zPCR User’s Guide

Processor Capacity Reference

for

IBM Z and LinuxONE

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- IMS™
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- PR/SM™
- Resource Measurement Facility™
- RMF™
- System z®
- System z9®
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# Table of Contents

## Introduction ................................................................................................................. 1

## Getting Started .............................................................................................................. 7
  Registration ................................................................................................................ 9
  Usage Tips .................................................................................................................... 9
  User Controls ............................................................................................................... 10

## Logo Window ............................................................................................................... 17

## Function Selection ....................................................................................................... 19
  Preferences .................................................................................................................. 30

## Reference-CPU ............................................................................................................. 32
  Provisional Reference-CPU ......................................................................................... 35
  How the Scaling-Factor Is Used .................................................................................... 37

## Workloads ..................................................................................................................... 39

## LSPR Processor Capacity Ratios .................................................................................. 44
  Capacity by Workload Type ......................................................................................... 44
  IBM Z Multi-Image Table ............................................................................................ 44
  IBM LinuxONE Multi-Image Table ............................................................................... 45
  IBM Z Single-Image Table ........................................................................................... 46
  LSPR Table Table Control ............................................................................................ 53

## LPAR Configuration Capacity Planning ..................................................................... 59
  LPAR Host and Partition Configuration ....................................................................... 59
  Creating LPAR Configuration from EDF ....................................................................... 62
  Creating LPAR Configuration from RMF ...................................................................... 63
  Copying Partitions from a Previous Study .................................................................... 63
  LPAR Host Processor ................................................................................................... 64
  Power-Save Mode .......................................................................................................... 67
  Absolute Capping .......................................................................................................... 67
  Nonstandard zAAP or zIIP Configurations .................................................................... 67
  zAAP on zIIP Capability ............................................................................................... 68
  LPAR Host Hardware Designations ............................................................................... 68
  Partition Definition ....................................................................................................... 80
  EDF Overview .............................................................................................................. 90
  EDF Interval Selection ................................................................................................. 94
  Get Partitions from EDF ............................................................................................... 97
  RMF Overview ............................................................................................................ 106
  RMF Interval Selection ............................................................................................... 108
  Get Partitions from RMF ............................................................................................. 110
  Copy Partitions from Study ......................................................................................... 118
  zAAP/zIIP Capacity Considerations ............................................................................ 121
  zAAP Specific Considerations ..................................................................................... 123
  zIIP Specific Considerations ....................................................................................... 125
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Summary Report</td>
<td>126</td>
</tr>
<tr>
<td>Partition Detail Report</td>
<td>130</td>
</tr>
<tr>
<td>Absolute Capping</td>
<td>140</td>
</tr>
<tr>
<td>SMT Benefit</td>
<td>143</td>
</tr>
<tr>
<td>LCP Alternatives</td>
<td>149</td>
</tr>
<tr>
<td>zAAP/zIIP Loading</td>
<td>152</td>
</tr>
<tr>
<td>Modify SCP/Workload</td>
<td>156</td>
</tr>
<tr>
<td>Calibrate Capacity to LPAR Host</td>
<td>159</td>
</tr>
<tr>
<td>Utilized Capacity Report</td>
<td>161</td>
</tr>
<tr>
<td><strong>Advanced-Mode</strong></td>
<td>165</td>
</tr>
<tr>
<td>Host Capacity Comparison Summary</td>
<td>177</td>
</tr>
<tr>
<td>Host Capacity Comparison</td>
<td>180</td>
</tr>
<tr>
<td>Partition Capacity Comparison</td>
<td>182</td>
</tr>
<tr>
<td>Optimizing LPAR Configuration Capacity</td>
<td>183</td>
</tr>
<tr>
<td>Host Margin-of-Error</td>
<td>186</td>
</tr>
<tr>
<td>Partition Margin-of-Error</td>
<td>187</td>
</tr>
<tr>
<td>Copy Partitions to an LPAR Configuration</td>
<td>189</td>
</tr>
<tr>
<td>Move Partitions between Configurations</td>
<td>193</td>
</tr>
<tr>
<td><strong>Accuracy of LPAR Capacity Projections</strong></td>
<td>201</td>
</tr>
<tr>
<td><strong>CP Calculator</strong></td>
<td>205</td>
</tr>
<tr>
<td>zAAP Capacity Estimator Input</td>
<td>206</td>
</tr>
<tr>
<td>zAAP Capacity Estimator Report</td>
<td>211</td>
</tr>
<tr>
<td><strong>Charts and Graphs</strong></td>
<td>215</td>
</tr>
<tr>
<td><strong>Support</strong></td>
<td>219</td>
</tr>
<tr>
<td><strong>External Study File</strong></td>
<td>220</td>
</tr>
<tr>
<td><strong>Definition of Terms</strong></td>
<td>221</td>
</tr>
</tbody>
</table>
**Introduction**

**zPCR**

Processor Capacity Reference for IBM Z and **LinuxONE**

*zPCR* is a PC-based productivity tool that runs under Windows 7, 8, or 10. It is designed to provide capacity planning insight for **Z** and LinuxONE platforms running various SCP/workload environments using various LPAR partition configurations. Capacity results are based primarily on IBM’s published LSPR data for IBM Z families. Generally, we have found the accuracy of using *zPCR* with an appropriate z/OS workload category to be well within the range of ±5% for reasonable LPAR configurations.

*zPCR* is based on a single version of LSPR data, normally published at the time of a new IBM mainframe processor announcement. The most recent LSPR data, identified as **z/OS-2.2**, adds the IBM **z14** to the entire set of recent IBM mainframe families. The specific families included are shown in the table below.

### IBM Z Processor Families

<table>
<thead>
<tr>
<th>High End (type)</th>
<th>Mid-Range (type)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>z14</strong> (3906)</td>
<td><strong>z14</strong> (3907)</td>
</tr>
<tr>
<td><strong>z13</strong> (2964)</td>
<td><strong>z13s</strong> (2965)</td>
</tr>
<tr>
<td><strong>zEC12</strong> (2827)</td>
<td><strong>zBC12</strong> (2828)</td>
</tr>
<tr>
<td><strong>z196</strong> (2817)</td>
<td><strong>z114</strong> (2818)</td>
</tr>
<tr>
<td><strong>z10 EC</strong> (2097)</td>
<td><strong>z10 BC</strong> (2098)</td>
</tr>
<tr>
<td><strong>z9 EC</strong> (2094)</td>
<td><strong>z9 BC</strong> (2096)</td>
</tr>
<tr>
<td><strong>z900</strong> (2084)</td>
<td><strong>z890</strong> (2086)</td>
</tr>
<tr>
<td><strong>z900</strong> (2064)</td>
<td><strong>z800</strong> (2066)</td>
</tr>
</tbody>
</table>

### IBM LinuxONE Processor Families

<table>
<thead>
<tr>
<th>High End (type)</th>
<th>Mid-Range (type)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emperor II</strong> (3906)</td>
<td><strong>Rockhopper II</strong> (3907)</td>
</tr>
<tr>
<td><strong>Emperor</strong> (2964)</td>
<td><strong>Rockhopper</strong> (2965)</td>
</tr>
<tr>
<td></td>
<td><strong>Rockhopper</strong> (2828)</td>
</tr>
</tbody>
</table>
LSPR capacity values used by **zPCR** are based on the most recent set of LSPR data, which includes various workload environments run under z/OS-2.2. Additional LSPR measurements are made for z/VM (a multiple Linux guest workload) and for native Linux (a single workload). For **zPCR** capacity planning purposes, the z/OS measurement data is considered to be representative for z/VM, z/VSE, KVM, and Linux.

For z/OS, LSPR capacity ratios representing three workload categories are published for each processor model. To increase granularity for capacity planning purposes, **zPCR** defines two additional workload categories. The assigned names are:

- **Low** represents light use of the processor’s memory hierarchy
- **Low-Avg** Defined midway between *Low* and *Average* (**zPCR** only)
- **Average** represents average use of the processor’s memory hierarchy
- **Avg-High** Defined midway between *Average* and *High* (**zPCR** only)
- **High** represents heavy use of the processor’s memory hierarchy

The capacity numbers representing these workload categories are based on LSPR workload primitives that are measured. An analysis of various production workload environments is then matched to specific mix combinations of these primitives to define the workload categories. These workload categories may also be assumed to be representative for z/VM and Linux production workloads.

z/OS and z/VM production workloads running on **z14**, **z13**, **z13s**, **zEC12**, **zBC12**, **z196**, **z114**, and **z10** processors can be characterized using **CPU-MF** (CPU Measurement Facility hardware counter data). The resulting data is then summarized into an EDF (*Enterprise Data File*) to be read by **zPCR**. EDFs that include **CPU-MF** data will be used by **zPCR** to automatically map the production workload of a partition to one of the workload categories mentioned above.

When CPU-MF is not available, a default workload category will be assigned.

The workload categories can be displayed in the **LSPR Processor Capacity Ratios** tables. These same workloads can be defined to individual partitions when using **zPCR**’s **LPAR Configuration Capacity Planning** function.

Two purposes are served by **zPCR**:

1. **LSPR Processor Capacity Ratios Tables**
   
   These tables provide capacity ratios for various SCP/workload environments displayed side-by-side. Specific workload categories and the order presented is user controlled. Capacity ratios are provided for General Purpose CPs (support any SCP type) and IFL CPs (support z/VM with Linux guests and native Linux only).

   Two forms of processor **LSPR Processor Capacity Ratios** tables are provided, **Multi-Image** and **Single-Image**. Capacity data is entirely based on a single version of z/OS.
The Multi-Image LSPR table provides capacity relationships for processors running with multiple partitions that are assumed to exploit all the available real CPs. While the table is based on z/OS LSPR data, it can also be assumed to be representative for z/VM and Linux environments. The table can be presented with either General Purpose CPs or IFL CPs. Capacity relationships portrayed assume configurations of multiple partitions deemed typical for the N-way of the model. Only General Purpose, IFL, and ICF partitions are represented (zAAP and zIIP specialty engines are not considered). The same workload is assumed to be running in every General Purpose or IFL partition. A 1-way processor is considered to be running with five partitions. Detail concerning the specific partition configurations represented for the other N-way models is not provided. However, as the number or real CPs increases, the number of partitions increases, the average number of partition logical CPs increases, and the logical CP to real CP ratio diminishes.

Note: The Multi-Image LSPR Processor Capacity Ratios table serves as a generalization of capacity expectation for processors with typical, multiple-partition configurations, all running the same SCP and workload. The LPAR Configuration Capacity Planning function (discussed below) should be considered as a more accurate way to assess the capacity expectation for a specific LPAR Host including its real CPs and types, each partition including SCP/workload environment, mode, logical CPs, weight, and capping assignment. Also considered is the association of zAAP or zIIP logical CPs with a General Purpose partition.

The Single-Image LSPR table relates capacity for a single copy of the SCP (1 partition) managing all the real CPs. The table can be presented with General Purpose CPs or IFLs. While (internally) the table contains values up to the maximum CPs that can be configured, capacity values are only displayed for reasonable single-image configurations (i.e., 30 CPs maximum).

The Single-Image values represent all the capacity data that is considered measured for LSPR purposes. These values are used as the capacity basis for both the Multi-Image LSPR table and the LPAR Configuration Capacity Planning function.

Note: The Single-Image LSPR Processor Capacity Ratios table serves only as a representation of capacity expectation for processors running a single partition with a particular SCP and workload. This table is intended primarily to support the LPAR Configuration Capacity Planning function, described below.

2. LPAR Configuration Capacity Planning

This function is designed to project the capacity expectation for a specific partition configuration on a specific LPAR host processor. Capacity results are provided for each individual partition and for the LPAR host as a whole.

The LPAR host processor is selected and configured with General Purpose CPs, zAAPS, zIIPs, IFLs, and/or ICFs, where supported. Then each partition is defined, specifying type (General Purpose, IFL, or ICF), SCP/workload, LP configuration (dedicated/shared with number of CPs), and weight/CAP assignments. zAAP and zIIP partitions are always associated with a General Purpose partition. IFL partitions may be associated with a General Purpose z/VM partition.
The LPAR host can be assigned as any Z or LinuxONE processor model. z/OS, z/VM, z/VSE, KVM, Linux, zAware, zACI, SSC, or CFCC may be defined as the operating system to any appropriate partition.

For z/OS, various versions may be specified, based on the limitations listed below. The version is used only to enforce version-specific partitioning rules such as logical CP limitations or zAAP/zIIP usage. Changing the version not affect capacity results. z/OS-2.2 is considered the current version by zPCR.

- **z14**  z/OS-1.13 or later must be specified
- **z13, and z13s**  z/OS-1.12 or later must be specified
- **zEC12 and zBC12**  z/OS-1.10 or later must be specified
- **z196 and z114**  z/OS-1.7 or later must be specified
- **z10**  z/OS-1.7 or later must be specified
- **z9 and prior**  z/OS-1.4 or later must be specified

For z/VM, 3 versions may be specified (z/VM-5.4, 6.3, and 6.4). The version is used only to enforce version-specific partitioning rules concerning SMT and number of logical CPs supported. Changing the version will not affect capacity results.

- **z/VM-5.4** implies it and any prior version. A maximum of 32 CPs are supported. z/VM-5.4 cannot be run on the z14.
- **z/VM 6.3 and 6.4** are considered identical, and imply any version 6.3 or later. On z13 and z14 processors, SMT is supported for IFLs. If SMT is enabled, a maximum of 32 CPs are supported; otherwise a maximum of 64 CPs are supported.

z/VSE, KVM and Linux are considered generically concerning versions (i.e., zPCR does not support any specific partitioning rules for versions of these SCPs).

For z/OS, any of the 5 LSPR workload categories may be specified. For z/VM, zVSE, KVM, and Linux, 5 workload categories with names similar to those for z/OS may be specified. z/OS, z/VM, z/VSE, KVM, and Linux capacity data is taken from the currently published LSPR tables, based on a single version of z/OS-2.2.

KVM runs on Z (z14, z13, z13s, zEC12, and zBC12 processors only) and all LinuxONE processors.

zAware runs on Z (z13, z13s, zEC12, and zBC12 processors only). A single workload (zAware) is available for assignment. zAware capacity data is derived from the z/OS Average workload category.

zACI (Appliance Container Infrastructure) runs on Z (z13, z13s processors only). A single workload (zACI) is available for assignment. zACI capacity data is derived from the Average workload category. zACI is intended to replace zAware on z13 and z13s processors.

SSC (Secure Service Container) runs on Z (z14, z13, and z13s processors only). A single workload (SSC) is available for assignment. SSC capacity data is derived from the Average workload category. SSC is intended to replace zAware and zACI; on the z14, SSC must be specified.

CFCC runs on all Z processors. A single workload (CFCC) is available for assignment. Capacity is based on measurements for the unique CFCC level available for each processor family.
Two modes of operation are provided for the **LPAR Configuration Capacity Planning** function:

- **Basic-mode** allows a single LPAR configuration to be defined. Comparisons between LPAR configurations must be made manually, using output from separate invocations of the tool.

- **Advanced-Mode** allows multiple LPAR configurations to be defined. Existing LPAR configurations can be cloned and subsequently modified. Windows are available with which to make direct comparisons of their capacity.

Partition configurations can be created in **zPCR** several ways:

- Automatically from a z/OS or z/VM generated EDF
- Automatically from a z/OS generated RMF report
- Manual entry
- Cloning a previously created LPAR host and its partition configuration

**zPCR** uses the concept of a **Reference-CPU** for the purpose of scaling capacity results to a common base. A General Purpose 1-way processor model and a scaling-factor are required (default and typical settings are provided). The scaling-factor is always interpreted to be the productive capacity of a shared single-partition configuration. A scaling-metric may also be supplied.

The assignment of a commonly accepted processor model and scaling-factor/metric can help in understanding capacity results and associating them with various hardware configurations and capacity tables. A **Reference-CPU** setting that is currently popular is the 2094-701 rated at **593 MIPS**.

The scaling-factor assigned to the **Reference-CPU** is adjusted internally, based on the function being accessed.

- For **LSPR Single-Image Capacity Ratios** table purposes, the scaling-factor is used directly, representing the capacity of a shared single-partition configuration on that particular 1-way **Reference-CPU** model.

- For **LSPR Multi-Image Capacity Ratios** table purposes, the scaling-factor is adjusted to represent the capacity of a typical shared 5-partition configuration on the 1-way **Reference-CPU** model. For information concerning this adjustment, see the **LSPR FAQ** paper, included with **zPCR**.

- For the **LPAR configuration Capacity Planning** purposes, the scaling-factor is adjusted to represent the capacity of the entire 1-way **Reference-CPU** model, without regard to any partitioning costs. This is the necessary starting point for the algorithms as implemented.

When comparing capacity between configurations, it does not matter what **Reference-CPU** settings are used. Capacity ratios are unaffected as long as the same **Reference-CPU** settings are used for each configuration being compared.

**zPCR** results shown on windows can be captured as tables and graphs for notes, presentations, or handouts. Complete studies can be captured for future reference.
The zPCR tool’s original design was in support of the z990 processor announcement. Features unique to the z990 include the ability to configure more than 16 real CPs on a CPC, and the ability to define up to 30 logical partitions. In addition, zPCR supports workload offload to a zAAP partition that is associated with a z/OS-1.6 (or later) partition, and workloads on IFL and ICF partitions on processors where such partitions are supported. On the z990 and z890 processors, zAAP, IFL, and ICF exist in a single common real CP pool. For capacity planning purposes, zAAP logical CPs associated with a z/OS partition are considered as separate partitions, though they do not count against the maximum number of partitions supported.

zPCR has subsequently been extended to support all newer Z and LinuxONE processor announcements. Features unique to the newer models include zIIP engines, and separate real CP pools for each CP type (i.e., General Purpose, zAAP, zIIP, IFL, and ICF). Also, weight and CAP assignments for zAAP and zIIP partitions are no longer tied to the associated General Purpose partition.

The number of partitions that may be defined depends on the processor family:
- z14, z13: up to 85 partitions
- z13s: up to 40 partitions
- zEC12, z196, z10 EC, and z9 EC: up to 60 partitions
- zBC12, z114, z10 BC, z9 BC, z990, z890: up to 30 partitions
- z900: up to 30 partitions
- z800: up to 15 partitions

For capacity planning purposes, zAAP and zIIP logical CPs associated with a z/OS partition or IFL logical CPs associated with a z/VM partition are considered as separate partitions. However, such associated partitions do not count against the maximum number of partitions supported.

The multi-image and single-image LSPR data is generally updated only when a new processor announcement is made. However, the algorithms supporting the LPAR Configuration Capacity Planning function may change more frequently, as additional experience is gained. To obtain legitimate capacity comparisons, all LPAR configurations being compared should be run using the same zPCR version, since the supporting algorithms are subject to change.

Users should always assure that the most recently available version of zPCR is being used. Your download site can be checked by clicking Check for updates under Help on the Function Selection window menu-bar.
Getting Started

**zPCR** is a PC-based productivity tool that runs under Microsoft’s Windows. It is one of a family of tools produced and maintained by your Capacity Planning Support (CPS) team, part of IBM’s Advanced Technical Sales (ATS) in Gaithersburg, Maryland.

**PC System** (minimum requirement)

<table>
<thead>
<tr>
<th>Processor:</th>
<th>Intel Core Duo or better (64-bit required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory:</td>
<td>1GB is required to install the tool; more is recommended</td>
</tr>
<tr>
<td>Graphics:</td>
<td>1280×1024; higher recommended</td>
</tr>
<tr>
<td>OS:</td>
<td>Microsoft Windows 7, 8, 10</td>
</tr>
</tbody>
</table>

The currently supported environment for **zPCR** is 64-bit Windows 7. **zPCR** should function under Windows 8 and 10. However, reported problems will be addressed only if they can be recreated under Windows 7.

**Note:** The **zPCR** tool and its supporting Java are intended to be installed to their own program folders. The default assignments are subfolders under `C:\CPStools`, which may be changed at install time. **Do not install to “C:\Program Files”,** since various user files are written to several install subfolders.

**Obtaining zPCR**

**IBM Customers** can obtain **zPCR** via the Internet at:


**Questions and Feedback**

Contact Capacity Planning Support via …

- E-mail [zpcr@us.ibm.com](mailto:zpcr@us.ibm.com)

**Installation**

**zPCR** is packaged with **Installshield**. To install the tool, execute the package file that you downloaded to your PC from your web site named above. It can be installed to a Administrator ID or a Standard ID. It must be run from the user ID to which it was installed.

Prompts are provided during installation to specify the target directory for the application code and the program folder for the application icons. **zPCR** should be installed to its own folder; `C:\CPSTOOLS\zPCR` is the default. Note that it should **not** be installed to **C:\Program Files** or to **C:\Program Files (x86)**, since it includes a number of sub-folders. An application icon can optionally be placed on your desktop.

When performing a **zPCR** upgrade as a Standard user, you may be prompted for an Administrator password. **This requirement can be eliminated by first uninstalling **zPCR**, and then doing a fresh **zPCR** install.**
In the directory where zPCR was installed, the following subdirectories have been created and are available for your use:

- **Documentation**
  Contains all of the documentation files that are provided with zPCR. The zPCR User's Guide (this document) is not included with the installation package; rather, it is available as a separate download. If the zPCR User's Guide PDF is copied into this directory, it will be directly available from zPCR under Documentation on the menu-bar.

- **Study Files**
  Default folder for Study files. Includes a sample basic-mode study file and a sample advanced-mode study file (same study that was used for examples in this document).

- **RMF Files**
  Default folder for RMF files. Includes sample RMF files.

- **EDF Files**
  Default folder for EDFs. Includes sample EDFs.

- **Outputs**
  Default folder for HTMP and CSV output files.

**Java Requirement**

zPCR requires the IBM 64-bit Java runtime environment. Special versions of the install material for zPCR are available to IBM Customers and to IBM Business-Partners that include the necessary Java. You can find instructions for obtaining/installing an appropriate version of the IBM Java runtime environment at the web site from which you obtained zPCR. As time progresses, newer versions of Java will be made available.

The IBM Java runtime environment for zPCR is installed without replacing or removing any other Java that may already be installed, and does not change your “System” Java.

**Note:** When other Java runtime packages are installed and configured with Java security enabled, a fresh install of zPCR may fail to execute properly. This has been observed in a very small number of zPCR installations (less than 0.05%). Should this situation occur, one possible solution is to 1) de-install the other Java, 2) install zPCR and its associated Java, and 3) reinstall the other Java.

**User’s Guide**

This zPCR User's Guide is distributed in Adobe PDF format. It has been created to be compatible with Acrobat Reader 5.0 and later. The current version of Acrobat Reader for Windows is available for free from:


The related online help consists of the user’s guide text, implemented as Java Help. This help is context sensitive to the window currently being viewed.

**Notes:**

The zPCR User’s Guide PDF can be made directly accessible from zPCR (under Documentation on the menu-bar of the primary windows) if copied to the zPCR Documentation sub-directory using the PDF filename as downloaded.

The LSPR Document PDF can be made directly accessible from zPCR (under Documentation on the menu-bar of the primary windows) if copied to the zPCR Documentation sub-directory using the PDF filename as downloaded.
Registration

A user registration process has been implemented to assist in monitoring the distribution and use of zPCR. Registration is required for continued usage. **You should be connected to the internet in order to register.**

Until your registration process is completed, a registration form will appear each time zPCR is started. zPCR may be used up to 3 times without submission of the registration information. After that, the registration process must be completed before the function of the tool can be accessed.

Fill in the requested fields (e.g., name, company name, geographical location, and e-mail address) and click the **Register (Internet)** button. **The primary value of providing a valid e-mail address lies in our ability to notify you of any critical news relating to zPCR usage and/or updates.** Use of your e-mail address will be limited to this purpose only.

There may be cases where a company’s firewall will prevent direct internet registration. In this situation you should click the **Register (e-mail)** button. This will 1) attempt to initiate a properly addressed e-mail for you, and 2) invoke a dialog box with instructions to copy the encoded registration information into the e-mail note. Send the e-mail as addressed with the encoded registration information and wait for an e-mail response (generally within a few hours). **Note: Do not modify the Subject line, as its text is used to trigger an automated registration response.** Once the registration response is received, start zPCR again, click the **Register (e-mail)** button, and continue with the dialog box instructions, indicating that you are to copy the contents of the returned note into the registration window and click the **Complete Registration** button.

Registration is only required once, the first time that zPCR is installed and attempted to be used. Once registered, you have unlimited access to the tool. Occasionally, as major versions of zPCR become available, your registration will be renewed. The renewal is done automatically, if direct internet registration is allowed. Otherwise, the e-mail registration process is necessary.

Capability to modify or remove your registration is provided under **Registration** on the **Function Selection** window menu-bar.

Execution

Start execution of zPCR by clicking on its program icon, located on your desktop or in the program folder that was designated when it was installed. Multiple copies of zPCR can be run at the same time. When loaded, tabs, pushbuttons, and radio buttons are provided on the **Function Selection** window to select between the various LSPR tables and the **LPAR Configuration Capacity Planning** function.

Usage Tips

**Drive\directory path\filename.ext** references are currently limited to 255 bytes. This is a Java limitation.

**Distorted Windows:** If the windows displayed by zPCR appear to be distorted or have text displays that tend to get cut off, it is probably due to your Windows display settings. zPCR will not tolerate a setting of “Larger Fonts”. In Windows 7, go to **Control Panel → Display** and make sure the setting is not “**Larger**”.
Low Resolution Displays: zPCR is designed for a display resolution of 1280 × 1024 pels or higher. While a display resolution of 1024 × 768 pels may function, some windows may be less appealing to the eye. At lower resolutions, several of zPCR’s windows may require the entire vertical or horizontal dimension. If your Windows task bar is always on top, portions of some windows may not be visible without moving the zPCR window. This situation can be corrected by going to Windows task bar properties and un-checking “Keep the taskbar on top of other windows”.

Erratic Behavior and Abend Situations: Most of the reported zPCR execution problems have been traced to outdated graphics drivers and Java activities that invoke “Hardware acceleration”. To identify this as the problem, you should turn “Hardware acceleration” off (go to Desktop properties, click on the Settings tab, click the Advanced button, click the Troubleshoot tab, and move the slider to “None”). If this solves the problem, you should try to find a more current graphics adapter driver version, or continue to run with the accelerator slider at a reduced setting.

User Controls

A variety of user interfaces are used to control the function of zPCR.

Menu-bar: Provides various controls, including the ability to capture output, save a study, and view related documentation and help. These menu-bar items are discussed with the description for each window.

Toolbar Icons: Most of zPCR’s windows include smart icons on the toolbar, providing a fast path to various common functions. These icons should be familiar to windows users. If you allow the mouse to dwell over a toolbar icon, a description of the icon’s function will appear.

Push button: Click the button.

Entry field: Click on the field to gain focus, key in desired data, and press Enter.

Dropdown list ▼: Click the icon at the right end of the entry field, and then click on the desired selection. Selection is limited to the items contained in the list.

Spin buttons : Shown as a pair of buttons at the right end of the entry field. Click the upper or lower button to cycle forward or backward through the predefined entries. Selection is limited to the items contained in the list.

Checkbox : Allows the activation of a feature or function. Click on the box to activate or de-activate.

Radio button ⊙: Provides the ability to select one of a number of mutually exclusive choices. Left click on the desired selection.

J-table: Many of zPCR’s windows present data in a J-table format. J-tables contain rows and columns of data. Each row/column intersection (cell) may be a presentation field P, or one of a number of input field types. In zPCR, all J-table user input fields have a white background, while all fixed fields have a shaded or colored background.

To select a row in a J-table, click on any fixed field. You must select a row in order to Clone or Delete it.
To gain access to a J-table input field, click on the input field. If the field is a

**Dropdown list ▼**: The selection list will appear. Click on the desired selection.

**Entry field E**: Double click on the cell, key in the desired data, and press **Enter**.

**Checkbox ✓**: Click the box to set on or off.

### Output Capability

- **HTML**: Information from most **zPCR** tables and windows may be output in **HTML** format using the **Output to HTML** toolbar icon. **HTML** can be used as input to various tools, preserving the column and row format, fonts, and coloring. With spreadsheets, **HTML** provides the ability to do further analysis. With most document processing applications, the formatting aspects of **HTML** are preserved, providing a more polished product over that of simple text.

  Many PC applications are able to render **HTML** output. It may be more convenient, however, to 1) double click the **HTML** file to open it in its default application, 2) stripe the desired area and copy it to the Windows clipboard, and 3) paste it into the open application where it is desired (i.e., a note, spreadsheet, presentation, etc.).

  Note that the precision of numbers in HTML output will be the same as shown on the originating window.

- **CSV**: Comma separated variable format is available with the **LPAR Configuration Capacity Planning** function, for the **Partition Detail Report** and the **Utilized Capacity Report** windows using the **Output to CSV** toolbar icon. The CSV file can be loaded into a spreadsheet for further analysis. While the numeric fields in HTML output carry the same precision that is displayed on the originating window, CSV data carries the full precision used by the internal algorithms.

  **Note**: CSV output does not normally respect the various national languages. All output fields are truly separated by commas. **zPCR** has been modified to determine what character is being used as a decimal place indicator. If it is found to be a comma, then **zPCR**’s CSV output will use a semicolon as the separator character.

  Alternatively, the national language can be temporarily set to English (United States) before generating standard CSV output.

- **JPG** and **PNG**: Graphs from **zPCR** can be captured as files in **JPG** format or **PNG** format, or they may be copied to the Windows clipboard.

- **Bitmap**: A picture bitmap of any **zPCR** window can be easily captured (you may want to resize the window so as to include all the information desired before capture). With focus on the desired window, press **Alt-PrintScreen**. The entire window will be copied to the windows clipboard. The clipboard contents can then be pasted into a note or an application such as Microsoft’s **Paint**.
Saved Studies
Most zPCR inputs can be captured as a saved study. Items saved include the Reference-CPU setting and all LPAR Configuration Capacity Planning function inputs, including the LPAR host and the individual partition definitions. (Note: A maximum of 130 unique General Purpose, IFL, and ICF partition definitions is allowed, regardless of the limitation on how many can be simultaneously active. zAAP, zIIP, and IFL partitions associated with a GP partition do not count against the maximum.

When in Advanced-Mode, a study being saved will be flagged as an Advanced-Mode study, meaning that it includes 1 or more defined LPAR configurations. If not running in Advanced-Mode, the study will be flagged as a Basic-Mode study which can have only a single LPAR configuration defined.

Basic-Mode studies can be saved from the Function Selection window, by using the Save toolbar icons or clicking on File on the menu-bar. Advanced-Mode studies can also be saved from the Advanced-Mode Control Panel window. Basic-mode studies can also be saved from the various windows in the LPAR Configuration Capacity Planning function. The file extension zPCR will be assigned.

Saved study files can be loaded into zPCR in any of the following ways:
- From the Function Selection window, click File, Load on the menu-bar
- Drag and drop a study file icon onto the Function Selection window
- Drag and drop a study file onto the zPCR desktop icon
- Double click on a zPCR study file icon.

When an Advanced-Mode study file is loaded, Advanced-Mode will be checked, and it cannot be changed. When loading a basic-mode study file, Advanced-Mode will be unchecked. In this case, Advanced-Mode may be changed before entering the LPAR Configuration Capacity Planning function if desired.

When in Advanced-Mode, a study file created in Basic-Mode may be used to populate any Advanced-Mode LPAR configuration icon using drag-and-drop. However, a study file created in Advanced-Mode study file can only be used to reinitialize zPCR in Advanced-Mode with that specific study.

Saved study files can also be referenced for the purpose of copying one or more partitions into an existing LPAR configuration.

Study files are intended to be supported for “N minus 1” zPCR versions. That means, when using zPCR version 9.x, a study file from zPCR version 8.x should load successfully. When loading older studies, it is possible that adjustments will be made, due to changes in tables or processing methods.

Termination
zPCR is terminated from the Function Selection window or the Advanced-Mode Control Panel window by clicking on the Exit toolbar icon, or by clicking File ➔ Exit from the menu-bar (Ctrl+E from the keyboard). If an LPAR configuration has been started or modified, a prompt will appear to allow the study to be saved. Clicking on File ➔ Fast Exit from the menu-bar (Ctrl+Q from the keyboard) will bypass the prompt to save a study.
Customization (Preferences)

*zPCR* can be customized to initialize with your own preset settings: From the menu-bar on the *Function Selection* window, click on Edit ➔ Preferences or Click the Preferences toolbar icon. Customization settings include

1. **Operating Mode**, Advanced-Mode or Basic-Mode
2. **Reference-CPU Settings**, processor model, scaling-factor and scaling-metric
3. **LSPR Table Control** settings
   - **Workload Categories** displayed in LSPR tables
   - **Selected Families** default list
4. **Directory Path for**
   - **Saved Studies**, default folder for loading or saving study files
   - **RMF Input Files**, default folder for loading RMF reports
   - **EDF Input Files**, default folder for loading EDFs
   - **HTML and CSV Output Files**, default folder for generated outputs

Multiple zPCR Invocations

If running multiple *zPCR* invocations, each can be differentiated by referring to the title bar. All primary *zPCR* windows will display the filename of the current study file on the window's title bar. Where subdirectories are involved, only the drive letter, a separator, and the actual filename are displayed. This helps to assure that the filename is visible.

Note that **Advanced-Mode** allows multiple LPAR configurations to be defined within a single *zPCR* invocation, thus eliminating the usual **Basic-Mode** requirement to use multiple *zPCR* invocations.

Multiple Monitor Support

If using a PC with multiple monitors set to “Extend these displays”, you can control where *zPCR* windows will display. *zPCR* will initially open on the primary monitor. Subsequent windows will open on the same monitor where the controlling window was displayed. Window positioning on the 2nd monitor remains the same as for a single monitor. This support can be useful to visually isolate two *zPCR* invocations from each other.

In cases where PDF documentation is displayed, the PDF will generally open on the same monitor where it was previously displayed.
Maintaining and Using Multiple zPCR Versions

It is recommended that you always use the latest version of zPCR. However, it is possible to have multiple versions installed and usable at the same time.

Preserve access to the former version

1. Make a copy of the zPCR installation folder: Before installing the new version, make a copy of the entire folder containing the version to be retained. The best way to do this is to right click on the folder and drag it to the same location or a new location. Then select Copy from the popup.

2. Rename the copied folder to represent the former version.

3. Create a desktop shortcut: Open the copied folder, right click on zPCR.exe, drag it to the desktop, and select Create shortcuts here.

4. Rename the desktop shortcut to better represent the former version.

5. Associate the zPCR icon with the desktop shortcut.
   - Right click the desktop icon, and select Properties.
   - On the General tab, click Change Icon.
   - In the Change Icon window, click Browse
   - Navigate to the zPCR install folder and click on the zPCR.ico file.
   - Click OK.
   - Click Apply.
   - Click OK.

Install the new version

The former install directory will be the target for the new version. Proceed with a normal install of the new version.

If you want to install the new version to a new folder, you must first uninstall the former version. Uninstall will not affect the steps taken above to retain a former version.

Note that, if the new version of zPCR depends on a Java upgrade, it will not be possible to retain working access to the former zPCR version. Java upgrades will likely occur every 2-3 years.

Documentation

Many documentation sources are included available with zPCR, including:

- **zPCR User’s Guide** - an Adobe PDF document, which may be printed or viewed directly on your PC. Figures showing examples of the various zPCR windows are included. Bookmarks provide quick access to the various sections.

  If the zPCR User’s Guide PDF is downloaded and copied to the zPCR Documentation folder (do not rename), it can be accessed from the Function Selection window or the Advanced-Mode Control Panel window by clicking zPCR User Guide under Documentation on the menu-bar.

- **zPCR Online Help** - text from the zPCR User’s Guide, implemented as Java Help to be context sensitive to the window currently being viewed. Help can be accessed by pressing PF1, or by clicking on Help ➔ Context Help on the menu-bar.
• **zPCR QuickStart Guide** - an Adobe PDF document available via a button on the *Function Selection* window or the *Advanced-Mode Control Panel* window. Use this as a guide for defining a current and an alternate LPAR configuration, and make capacity comparisons between them.

• **LSPR Document** - current version of *IBM's LSPI Document* (SC28-1187) in PDF format. If downloaded and copied to the *zPCR Documentation* folder, this document can be accessed from the *Function Selection* window or the *Advanced-Mode Control Panel* window by clicking LSPI Document under *Documentation* on the menu-bar. This document may be obtained via the link below.


• **LSPI FAQ** - an overview (shown as Frequently Asked Questions) of recent changes to LSPI tables, particularly concerning the capacity basis for the *Multi-Image LSPI Processor Capacity Ratios* table. This information can be accessed by clicking on the *LSPI FAQ* button found on the *Function Selection* window.

• **LSPI Workloads and Capacity Planning Considerations** - information and considerations concerning the LSPI workloads and their use with zPCR. This information can be accessed from the *Function Selection* window or the *Advanced-Mode Control Panel* window; click LSPI Workloads under *Documentation* on the menu-bar. This document has several sections, including:

  1. **LSPI Data and zPCR Usage Considerations** - discusses the current LSPI data and the workload category names for which data is provided. This section includes a discussion concerning the assignment of the various workload categories to workload primitive and workload mix names used previously in zPCR.

  2. **LSPI Workload Categories** - provides rationale concerning capacity planning workloads. This section can be accessed by clicking the *LSPI Workload Categories* button on the *Workloads* window.

  3. **LSPI Workload Primitive Descriptions** - a short description of each of the historic LSPI workload primitives. Some of these are used to define the workload categories that are currently published.

• **zAAP/zIIP Capacity Considerations** - a special section of the *zPCR User’s Guide* offering insight on zAAP and zIIP capacity. A web site pointer to a white paper concerning zAAPs is also provided. Click the *zAAP/zIIP Capacity Considerations* button on the *LPAR Host and Partition Configuration* window.
When zPCR execution is initiated, the Logo window is displayed. This window identifies the application, provides version information (also available under Help ➔ About zPCR on the menu-bar of the primary windows).

Registration is required to use zPCR. Upon initial use after install, you will be presented with a registration window requesting a few simple entries. The primary purpose of registration is to assure that you can be notified should there be a problem of serious concern. Complete the form and click the Register button. Once registration has successfully been completed, the registered user’s name appears at the bottom of the Logo window. For more detail concerning registration, see Registration under “Getting Started”.

To access the function of zPCR, wait for the Function Selection window to appear. The “Please wait” message indicates a short delay while the Java code is dynamically compiled for execution.
The **Function Selection** window is displayed immediately following the **Logo** window (once the Java code is compiled). This is the primary window to access all the basic-mode function of the tool. In basic-mode, when you finish a **zPCR** function, control is returned to this window. From the **Function Selection** window a basic-mode study can be saved, retaining the **Reference-CPU** and the LPAR configuration information that has been entered. You will also terminate **zPCR** from this window.
From the **Multi-Image Capacity** tab, you can:

- View the **LSPR Multi-Image Capacity Ratios** table, based on current z/OS LSPR data. All recent Z and **LinuxONE** processor models are included. General Purpose CPs with columns for up to 5 z/OS workloads can be viewed. Capacity ratios can also be considered to be representative of z/VM, z/VSE, Linux, and KVM. IFL CPs can also be displayed, where capacity ratios are representative of z/VM (running Linux guests), KVM, and native Linux. All contemporary IBM mainframe processor models up through the z14 with 170 CPs are available for viewing.

- Perform **LPAR Configuration Capacity Planning** for a specific LPAR host processor running with a specific partition configuration. Any SCP (**z/OS, z/VM, z/VSE, KVM, Linux, zAware, zACI, SSC, and CFCC**) may be assigned to a General Purpose partition if supported. When the SCP is **z/OS** or **z/VM**, a specific version must be chosen (the version is used only to enforce partitioning rules). Each of the other SCPs supported by **zPCR** are considered generically (i.e., there are no references to specific versions).

**z/OS** and **z/VSE** may only be assigned to General Purpose partitions. zAAP, zIIP, and IFL partitions associated with a GP partition will be assigned the same SCP and workload. 

**z/VM, KVM, Linux, zAware, zACI, and SSC** may be assigned to IFL or GP partitions. 

**CFCC** may be assigned to ICF or GP partitions.

Note that **KVM** can only be assigned to partitions on z14, z13, z13s, zEC12 and zBC12 processors. **zAware** can only be assigned to partitions on z13, z13s, zEC12 and zBC12 processors. **zACI** can only be assigned to partitions on z13 and z13s processors. **SSC** can only be assigned to partitions on z14, z13, and z13s processors.

**zPCR** function directed at generalizing on capacity or obtaining capacity results specific to a precise LPAR configuration can be obtained either using the **Basic-Mode Function Selection** window (Multi-Image tab) or using the **Advanced-Mode Control Panel** window.

User activities related to all **zPCR** function:

1. Set the **Reference-CPU**, and its **scaling-factor** and **metric**

User activities related to the **LSPR Processor Capacity Ratios** tables (multi-image is preferred) include:

2. Select SCP/workloads to be displayed in LSPR tables
3. View **General Purpose CP** capacity (assumes z/OS, z/VM, z/VSE, KVM, or Linux)
4. View **IFL CP** capacity (assumes z/VM, KVM or Linux only)
5. Select specific processors for review, capture, and graphing
User activities related to the **LPAR Configuration Capacity Planning** function in **Basic-Mode**, include:

2. From the *Function Selection* window, click the **[Define LPAR Host, Configure Partitions, Assess Capacity]** button.

3. Define the current LPAR host processor with General Purpose CPs, zAAPs, zIIPs, IFLs, and ICFs.

4. Define each General Purpose, IFL, and ICF partition. zAAP and zIIP logical CPs are always associated with z/OS General Purpose partitions. IFL logical CPs can be associated with a z/VM General Purpose partition.

5. View the **Host Summary Report** for an overview of the LPAR configuration and its capacity results.

6. View the **Partition Detail Report** to review individual partition capacity. Partition definition changes can also be made from this window.

7. Capture table and graph output.

8. Save basic-mode study inputs for future use.

9. Model a 2nd LPAR configuration to project its capacity. Then manually compare those results to the 1st (current configuration).

User activities related to the **LPAR Configuration Capacity Planning** function in **Advanced-Mode**, include:

1. From the *Function Selection* window, check **Advanced-Mode** and click the **[Enter Advanced-Mode]** button.

2. On the **Advanced-Mode Control Panel** window, double-click the **Configuration #1** icon.

3. Define the current LPAR host processor with General Purpose CPs, zAAPs, zIIPs, IFLs, and ICFs.

4. Define each General Purpose, IFL, and ICF partition. zAAP and zIIP logical CPs are always associated with General Purpose partitions. IFL logical CPs can be associated with a z/VM General Purpose partition.

5. View the **Host Summary Report**; for an overview of the LPAR configuration and the capacity results.

6. View the **Partition Detail Report** to review individual partition capacity. Partition definition changes can also be made from this window.

7. On the **Advanced-Mode Control Panel** window, select the **Configuration #1** LPAR Configuration icon and click the **Clone** toolbar icon. Then double-click the **Configuration #2** LPAR configuration icon.

8. Modify the LPAR host processor to a different model or a new processor family.

9. Update each defined partition as needed.

10. From the **Advanced-Mode Control Panel** window, compare the **Configuration #2** LPAR configuration capacity to that of the **Configuration #1** LPAR configuration.

11. Save advanced-mode study inputs for future reference.
In zPCR, most IBM mainframe processor capacity planning requirements can be satisfied by using:

1. The **LSPR Multi-Image Capacity Ratios** table, which generalizes on capacity for processors assumed to be running typical partition configurations. Use this table to identify models of a desired approximate capacity.

2. The **LPAR Configuration Capacity Planning** function provides a more precise capacity projection for any specific LPAR host processor running with any specific partition configuration, each partition running a specific SCP and /workload.

To help to generalize capacity relationships representing processors running in basic-mode (where supported) or LPAR-mode, with a single partition exploiting the hardware, the **Single-Image Capacity** tab is provided. Single-Image capacity is a reasonable way to compare processors when the maximum number of CPUs that could be configured is exactly what is to be supported by the SCP. Single-Image tables ignore any effect on capacity due to configurations that involve more than one partition.

Note that the **Single-Image LSPR** table is limited to showing reasonable single-image partition configurations (the limit is currently 30 CPUs).

LPAR-mode is required on all contemporary IBM mainframe platforms. To more fairly show capacity relationships for Z platforms, the **Multi-Image Capacity** tab is provided. Both the **LSPR Multi-Image Capacity Ratios** table and the **LPAR Configuration Capacity Planning** function can be used for comparing capacity projections of various configurations where multiple partitions are defined.

Note: The **LPAR Configuration Capacity Planning** function should be viewed as providing the most reliable capacity information, since its results are based on the specific LPAR host processor and its precise partition configuration, including SCP/workload assignments that are representative of the actual workload.

The **LSPR Multi-Image Capacity Ratios** table is not referenced by the **LPAR Configuration Capacity Planning** function of zPCR. Its use is limited to the generalization of capacity relationships between processors, assuming average LPAR configurations that are considered typical for each processor model. The table is actually built using zPCR’s **LPAR Configuration Capacity Planning** function.

The **LSPR Single-Image Capacity Ratios** table is used exclusively by the **LPAR Configuration Capacity Planning** function as the initial source for computing partition capacity.
Function Selection

Single-Image Capacity Tab

(Note that this window can only be displayed when running zPCR in Basic-Mode)

Click the **LSPR Single-Image Capacity** tab to reveal the 2nd page, providing access to the **LSPR Single-Image Capacity Ratios** tables.

The single-image table provides capacity relationships between processors running a single copy of the SCP, supporting all the available CPs. The single-image table can only be displayed from the **Single-Image Capacity** tab. To reveal Single-Image LSPR capacity ratios, click the [General Purpose CPs] button or the [IFL CPs] button. Note that single-image capacity ratios are only provided for reasonable single-image configurations (maximum of 30 CPs) in these tables.
z/OS: General Purpose CP capacity ratios can be considered representative for z/OS. Ratios are provided for all/any of the 5 z/OS workload categories shown on the LSPR Workload Categories window).

z/VM, KVM, and Linux: Either the IFL CP or the General Purpose CP capacity ratios may be considered for z/VM or Linux. The z/OS capacity relationships used can be assumed to be representative for z/VM (support generally limited to 32 CPs) and Linux. IFL CPs are always full speed engines.

z/VSE: z/OS General Purpose CP capacity ratios may also be considered representative for z/VSE, for up to a maximum of 4 CPs.

Considerations for both the Multi-Image and Single-Image tabs

When viewing General Purpose CPs or IFL CPs, all capacity values are generated to be relative to the current Reference-CPU settings.

Click the Workload Categories button to review the z/OS workload category names that are used for the LSPR Tables.

When initially loading zPCR, a new study is assumed; hence, the title bar will indicate an [untitled] study. When a study is saved, or a saved study is loaded, the name of the study will be indicated on the title bar.

Study Identification (E entry field)

The Study Identification entry field provides a means for identifying each unique study. Typically, this would be the name of a client or a site for which the study is being done. Character entry is accepted up to a count of 50. The name entered will appear on various tables and graphs that are produced. This name will be retained with a saved study.

Multi-Image Capacity (1st tab of 2)

This tab provides access to the LSPR Multi-Image Capacity Ratios tables. It also makes available the LPAR Configuration Capacity Planning function, providing the ability to configure partitions on IBM mainframe platforms. z/OS, z/VM, z/VSE, KVM, Linux, zAware, and CFCC workload environments are available to be defined to partitions.

1. LSPR Multi-Image Capacity Ratios tables

Click the General Purpose CPs button to reveal LSPR capacity relationships for processors configured with General Purpose CPs. Each processor has an LPAR configuration considered representative for the N-way of the model. Every partition is assumed to be running z/OS with the same LSPR workload category. Up to 5 workload categories can be viewed in the table.

Click the IFL CPs button to reveal LSPR capacity relationships for processors configured with IFL CPs. Each processor has an LPAR configuration considered representative for the N-way of the model. Every partition is assumed to be running z/VM or Linux with the same LSPR workload category. Up to 5 workload categories can be viewed in the table.

Capacity values are relative to the current Reference-CPU settings (Click the Reference-CPU button for access to the settings). While default values are
supplied, any 1-way General Purpose processor model contained in the table can be defined as the **Reference-CPU**. A scaling-factor and scaling-metric may also be set (see **Reference-CPU**).

To select the specific workload categories for which capacity ratios are to be produced in the **LSPR Processor Capacity Ratios** table, click **Settings** on the **LSPR Table Control** window.

2. **LPAR Configuration Capacity Planning**

This function provides capacity results for a specific LPAR host processor defined with a specific partition configuration. Any IBM mainframe processor model is supported as an LPAR host. Partitions can be defined as running z/OS, z/VM, z/VSE, KVM, Linux, zAware, and CFCC workloads. Specific (recent) versions of z/OS can be specified for partitions where supported. When in **Basic-Mode**, click the [Define LPAR Host, Configure Partitions, Assess Capacity] button to start defining the partitioned environment in basic-mode. In basic-mode, the **LPAR Host and Partition Configuration** window will appear.

☑ **Advanced-Mode**: This checkbox provides the capability to define multiple LPAR configurations and make direct comparisons between them. When checked, the push button below becomes the [Enter Advanced-Mode] button. Click this button to open the **Advanced-Mode Control Panel** window, used to manage one or more LPAR configurations. Once in **Advanced-Mode**, the study cannot be reverted back to basic-mode. A discussion of **Advanced-Mode** features is provided towards the end of this document (see **Advanced-Mode**).

The basis for **zPCR** capacity projections is controlled by the **Reference-CPU** setting (Click the [Reference-CPU] button). Only 1-way General Purpose processors may be set as the **Reference-CPU**. A scaling-factor and scaling-metric for it may also be set (see **Reference-CPU**).

Partitions may be defined as running any one of the supported SCPs. For z/OS, z/VM, z/VSE, KVM and Linux, any of the 5 workload categories may be used. For zAware and CFCC, the workload choices are limited.

**Single-Image Capacity** (2nd tab of 2)

This tab provides access to the **LSPR Single-Image Capacity Ratios** tables. Single-image capacity ratios are only provided for reasonable single-image configurations (maximum of 30 CPs) in these tables.

**Reference-CPU**

Capacity values in **zPCR** are always displayed relative to a **Reference-CPU**. The **Reference-CPU** may be set to any General Purpose processor 1-way model. In addition, the capacity rating for the **Reference-CPU** can be set to any desired scaling-factor and scaling-metric.

Click the [Reference-CPU] button to set the processor model and its metrics (see **Reference-CPU**).
Workloads

**LSPR Capacity Ratios** tables are displayed showing ITR ratios for multiple workload categories. Workloads that can be displayed include any of those included in the current LSPR tables. Click the [Workload Categories] button to review the available workload categories. Specify those to be included in the capacity tables (see Workloads).

Note that the Workloads window is common to the LSPR Multi-Image Table, the LSPR Single-Image Table, and the LPAR Configuration Capacity Planning function. While any of the SCP/workload categories shown can be used in the LPAR Configuration Capacity Planning function, only the published LSPR z/OS workload categories can be viewed in the LSPR tables.

Saved Studies

*zPCR* inputs that can be captured in a *.zPCR* study file, includes the Reference-CPU settings, including the scaling-factor and metric, and all LPAR Configuration Capacity Planning function definitions. Study files can be reloaded at a later time for review or further analysis. Using the menu-bar, save a study by clicking on File, and then on Save as (or Save, if this is already a named study). Save as will prompt for a file name. The default file extension assigned is zPCR.

When [Advanced-Mode] is checked, save study capability is disabled on the Function Selection window. Advanced-Mode studies must be saved from the Advanced-Mode Control Panel window.

When not in Advanced-Mode, a basic-mode study will be saved, containing only the single LPAR configuration that was defined. In addition to the Function Selection window, basic-mode studies can also be saved from several of the LPAR Configuration Capacity Planning windows. When a basic-mode study is subsequently loaded, *zPCR* is placed in basic-mode and only the single LPAR configuration is loaded.

When a saved study is loaded, the study filename appears on the title bar of all the primary windows.

New Study

A new study can be initiated by clicking New under File on the menu-bar. This is equivalent to terminating and restarting zPCR. All inputs and controls (including the Reference-CPU settings) will be returned to their Preferences state, or, if preferences have not been set, to their default state.

Customizing zPCR Initialization

*zPCR* can be customized via the Preferences window to always open with your own preset settings for the following items:

1. **Operating Mode**, Advanced-Mode or Basic-Mode
2. **Reference-CPU Settings**, processor model, scaling-factor and scaling-metric
3. **LSPR Table Control** settings
   - **Workload Categories** displayed in LSPR tables
   - **Selected Families** default list
4. **Directory Path for**
- **Saved Studies**, default folder for loading or saving study files
- **RMF Input Files**, default folder for loading RMF reports
- **EDF Input Files**, default folder for loading EDFs
- **HTML and CSV Output Files**, default folder for generated outputs

To activate customization, click on **Edit ➔ Preferences** on the menu-bar; the **Preferences** window will open (see Preferences). Customization can only be invoked prior to defining partitions.

The **Function Selection** window can be repositioned anywhere on the desktop (dual displays included). The new position will be used each time this window is returned to. When using multiple **zPCR** invocations at the same time, this feature makes it convenient to keep track of them.

**Updating your Registration**

You can update your registration (for example, you have a new email address), or delete your registration, by clicking **Registration** on the menu-bar. If you delete registration, **zPCR** (and any other CPS tools installed) will cease to run until you complete a new registration.

**Documentation Sources**

Some of the information sources found under **Documentation** on the menu-bar, include:

- **zPCR News file** carries information concerning changes in this **zPCR** version.
- **LSPR FAQ** provides access to a paper with information concerning the use and interpretation of the Multi-Image and Single-Image LSPR capacity ratio tables. Also discussed is the impact of HiperDispatch and capacity considerations for z/VM on z14, z13, z13s, zEC12, zBC12, z196, z114, and z10 processors.
- **LSPR Document** displays the **Large Systems Performance Reference** document (PDF format), published by IBM development and available via the internet at: [http://www.ibm.com/servers/eserver/zseries/lspr/lsprintr.html](http://www.ibm.com/servers/eserver/zseries/lspr/lsprintr.html)

The version included in **zPCR** is complete from a discussion standpoint, but the tables in the appendix could possibly exclude some of the latest capacity data. In lieu of using the tables in this document, one should reference **zPCR**’s **Multi-Image Ratios** table, which always includes the latest data. In addition, **zPCR** gives you the flexibility of setting the basis of the capacity values by setting the **Reference-CPU** and its scaling-factor and scaling-metric.

- **LSPR Workloads** displays pertinent information concerning the LSPR workload categories included in the LSPR tables. Also offered are considerations related to their usage for capacity planning purposes.

The **QuickStart Guide** button provides access to a short paper describing the process using **zPCR** to define a current and an alternate LPAR configuration and make capacity comparisons between them.
Checking for zPCR Updates
You can access your CPS tools download web site directly by clicking on Check for updates under Help on the menu-bar. This function can help you to assure that you are using the latest version of zPCR.

Toolbar Icons
Click the Return toolbar icon to go to the Multi-Image tab.
Click the Forward toolbar icon to go to the Single-Image tab.
Click the Backward toolbar icon to go to the Multi-Image tab.
Click the Preferences toolbar icon to go to the Preferences window.
Click the New toolbar icon to start a new study.
Click the Save toolbar icon to save the current study.
Click the Save as toolbar icon to save the current study with a new name.
Click the Exit toolbar icon to exit zPCR.
Click the Help toolbar icon to access context sensitive help for this window.
Menu-bar

File
- **New**
  Start a new (untitled) study.
- **Load**
  Open a previously saved study.
- **Save**
  Save this study (must already be a titled study).
- **Save as…**
  Save this study with a new name.
- **Up to 10 filenames**
  Recent study files are listed for possible loading.
- **Exit (Ctrl+E)**
  Terminate zPCR execution.
- **Fast Exit (Ctrl+Q)**
  Terminate zPCR execution immediately.

Edit
- **Preferences**
  Personalize zPCR startup settings (see Preferences).
- **CPcalculator**
  Capacity planning calculator function (see CP Calculator).
- **zAAP Capacity**
  Capacity estimator for migration to a zAAP or zAAP on zIIP configuration (see zAAP Capacity Estimator Input).

Registration
- **Remove**
  Delete your CPS tool registration (disables zPCR and any other CPS tools installed).

Documentation
  Various supporting documentation, including:
  - **zPCR NEWS file**
  - **zPCR User’s Guide** (if PDF is copied into zPCR’s Documentation folder)
  - LSPR FAQ
  - LSPR Workloads
  - LSPR Document (if PDF is copied into zPCR’s Documentation folder)
  - HiperDispatch Consideration
  - zAAP/zIIP Considerations
  - zAAP White Paper
  - Concerning Accuracy
  - Obtain CP3KEXTR
  - Obtain CP3KVMXT

Help
- **Context Help (F1)**
  A tool bar icon is also available.
- **QuickStart Guide**
  Provides guidance on using zPCR.
- **Check for updates**
  Access your zPCR download site.
- **About zPCR**
  Displays information from the Logo window including the version of zPCR.

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1 **Load** for an Advanced-Mode study will proceed in Advanced-Mode.
2 In Basic-Mode, **Save** and **Save as** will create a Basic-Mode study.
The *Preferences* window provides the capability to establish your own initialization conditions at *zPCR* startup. These settings will be used whenever a new study is started. The following items can be set:

1. **Operating Mode** group box:
   - *Advanced-Mode* can be set as the startup default by clicking the *Advanced-Mode* checkbox, which allows definition of multiple LPAR configurations (for details, see *Advanced-Mode*). The default setting is *Basic-Mode* where only a single LPAR configuration may be defined.
2. **Reference-CPU Settings** group box:
   To set the Reference-CPU, click the [Change] button. The Reference-CPU window will be presented, from which to make your selection, setting the processor model, a scaling-factor and a scaling-metric. This preferences setting can alternatively be made using the normal Reference-CPU window via the Update zPCR Startup Preferences on Return checkbox (see Reference-CPU).

3. **LSPR Table Control Settings** group box:
   Check the LSPR workload categories that are to be displayed in the LSPR Table windows. Also, check the specific processor families that will be displayed when Selected Families is used to view the LSPR Table windows.

4. **Directory Path Settings** group box:
   The default location for Saved Studies, RMF, EDF, and general output such as HTML and CSV can be defined. Click [Browse] for the desired file type to open a standard windows dialog from which to make the drive:\directory\selection.

   The Preference settings for the Reference-CPU are used each time a new zPCR study is started. Once a study has been started, the Preferences window can no longer be accessed. However, the preferences setting for the Reference CPU can be changed at any time from the Reference-CPU window by checking the box Update zPCR Startup Preferences on Return.

   Whenever the Reference-CPU window is open, the current preferences setting can be restored by clicking [Startup]. Whenever the LSPR Table Control window is open, its current preferences setting can be restored by clicking Restore Startup Settings under Settings on the menu-bar.

   When loading a previously saved study, all settings revert to those that were in use at the time the study was saved.

   Check [Automatically Check for Updates] for have zPCR determine (at startup) if a newer version is available. If so, you are provided the opportunity to obtain it.

   Click the Return toolbar icon to accept your preference changes and return to the Function Selection window. Your preference setting will take effect immediately.

   Click the Cancel toolbar icon to return to the Function Selection window without accepting any preference setting changes that were made.

   Click the [Restore Defaults] button to return all preference settings to their original default values. The Preferences window will close with the defaults set. To modify the default settings, open the Preferences window again.
The Reference-CPU window is accessed primarily from the Function Selection window by clicking the Reference-CPU button. This button is available on both the Multi-Image Capacity and Single-Image Capacity tabs. The both buttons control the same object. The example below represents the Typical setting (2094-701 @ 593 MIPS), which will be used through the remainder of this document.

The Reference-CPU can be set to any Z processor 1-way model. Only models representing General Purpose CPs (as known to z/OS) can be selected. If intending to represent IFL capacity (Z or LinuxONE), the Reference-CPU should be set to an equivalent full-speed GP 1-way model. Specific controls on the window are discussed below.

The Reference-CPU model and its scaling-factor/metric can be changed at any time. When changed, capacity values in all of the LSPR Capacity Ratios tables and the LPAR Configuration Capacity Planning will be updated to reflect the change. It is critical that all capacity results that are to be compared, be obtained using consistent Reference-CPU metrics.

While default and typical Reference-CPU metrics are provided in zPCR, the processor model chosen and its scaling-metric remain a purely arbitrary decision to be made by the user. When changing the processor model, no attempt is made to adjust the scaling-factor; rather it is initially set to 1.00 and the scaling-metric is set to ITRR (Internal Throughput Rate Ratio). These may then be user modified.
Processor Model and Capacity Assumption group box

- **Family**: Select the processor family from the dropdown list.
- **Speed Class**: Select the processor speed from the dropdown list.
- **Model**: The *Reference-CPU* processor can only be set to 1-way Models. Since there is only a single 1-way model for each Speed Class, no selection is necessary.
- **Scaling-Factor**: Enter the capacity value assumed for this processor. The value entered will be assumed as the capacity of a shared 1-partition configuration (default scaling-factor is 1.00). Regardless of the scaling-factor value entered, excessive decimal places will be dropped so as to preserve a maximum of six significant digits. Note that, while some processor families can be run in Power-Save mode, the scaling-factor always represents the *Reference-CPU* at full power.
- **Scaling-Metric**: Set the metric assumed for the capacity value, using the dropdown list or by keying in up to 12 characters. The default scaling-metric is ITRR (Internal Throughput Rate Ratio).

The *LSPR Multi-Image Capacity Ratios* table and the *LPAR Configuration Capacity Planning* function support all IBM mainframe families and models. Therefore, any General Purpose processor 1-way model can be assigned as the *Reference-CPU*.

Some Alternative Settings group box

- **Default**: assigns 2094-701 at 1.00 ITRR
- **Typical**: assigns 2094-701 at 593 MIPS
- **Startup**: assigns startup preferences *Reference-CPU* values

A message box at the bottom of the *Reference-CPU* window will display the status of any exception condition.

Click the **Return** toolbar icon to accept your changes and return to the calling window. Click the **Cancel** toolbar icon to return to the calling window without accepting any changes.

The new *Reference-CPU* settings can be saved as the *Preferences* setting by checking the **Update zPCR Startup Preferences on Return** checkbox. The *Preferences* setting will be updated when **Return** is clicked.

The normal *Reference-CPU* is always limited to 1-way processor models. However, when viewing *LSPR Capacity Ratios* tables, any processor model in the table can be set as a *Provisional Reference-CPU* (temporary setting). For details, see *Provisional Reference-CPU*.

For detail on how the *Reference-CPU* scaling-factor is interpreted for the various *zPCR* functions, see *How the Scaling-Factor Is Used*.
LPAR Configuration Capacity Planning Considerations

A 1-way processor model is always required for the Reference-CPU. For LPAR Configuration Capacity Planning purposes, a 1-way processor model provides a more consistent and understandable capacity perspective, particularly when small partitions are defined on large N-way processors, running workloads with lesser N-way efficiency. If the Reference-CPU were allowed to be set as an N-way processor, the MP effects of various workloads would affect the capacity perspective for partitions, such that, though correct, would be difficult to understand.

Most data processing installations exploit processor models with multiple engines (N-way is greater than 1). And most installations configure multiple active partitions. An installation often associates some capacity value and metric (i.e., MIPS) with the processor running their production work. In such cases, one would like to assign the current LPAR host model as the Reference-CPU, setting the scaling-factor to the associated capacity value. Since the Reference-CPU is limited to 1-way processor models, this is not possible. To accommodate such situations, a Calibrate function has been provided (see Calibrate Capacity to LPAR Host). You will need to start with a 1-way model as the Reference-CPU. Once the LPAR host’s partition configuration has been defined, you can then calibrate the current Reference-CPU model’s scaling-factor such that the LPAR host capacity result is the desired value. Use any capacity scaling-factor/metric that will help to make capacity values that are presented relevant for the study. Once calibrated, the Reference-CPU settings must not be changed when comparing new LPAR configurations to the current one.
Provisional Reference-CPU

When viewing either the LSPR Multi-Image Capacity Ratios or LSPR Single-Image Capacity Ratios windows for General Purpose CPs, a Provisional Reference-CPU may be set, serving as a temporary Reference-CPU setting only for that window while it is open. Upon closing, the normal Reference-CPU settings are restored. Click the Provisional Reference-CPU button at the bottom of the Processor Capacity Ratios window to open the Provisional Reference-CPU window.

The Provisional Reference-CPU window is aware of which LSPR Processor Capacity Ratios table window is calling it; a title line will so indicate. Entry fields, similar to those on the Reference-CPU window, are described below.

Each LSPR Table window invocation will default to using the Normal Reference-CPU settings. Once a Provisional Reference-CPU has been established, it will remain in effect until either the LSPR Table window is closed or it is manually changed via the Provisional Reference-CPU window.

Unlike the Reference-CPU, the Provisional Reference-CPU can be set to any processor in the LSPR table, including N-way models, thus allowing any specific model to any model comparisons.

Fast Path for setting the Provisional Reference-CPU

From the LSPR Processor Capacity Ratios window, double-click any processor model displayed in the window. The Provisional Reference-CPU window will open with appropriate values already populated in the CPU family and Processor Model fields. Only the scaling-factor and scaling-metric need be entered (if desired).
The *Provisional Reference-CPU* can only be set to General Purpose models. To get an equivalent capacity perspective for IFL CPs, one should choose an equivalent full-speed model from General Purpose CP table.

**Processor Model and Capacity Assumption** group box

- **Family**
  Select the processor family from the dropdown list.

- **Speed Class**
  Select the processor speed from the dropdown list.

- **Model**
  Select the specific processor model from the dropdown list. The list includes all N-way models.

- **Scaling-Factor**
  Enter the assumed capacity value (default is 1.00). The value entered will be assumed as the capacity of a shared 1-partition configuration. Regardless of the scaling-factor value entered, excessive decimal places will be dropped so as to preserve a maximum of six significant digits.

  Note that, while some processor families can be run in *Power-Save* mode, the scaling-factor always represents the *Reference-CPU* at full power.

- **Scaling-Metric**
  Set the metric assumed for the capacity value, using the dropdown list or by keying it in. The default is *ITRR* (Internal Throughput Rate Ratio).

Click the [*Restore Normal Reference-CPU* button to restore the normal *Reference-CPU* values. Note that normal *Reference-CPU* values are always restored when exiting the *LSPR Table* window.

Click the [*Return* toolbar icon to accept the settings and return to the LSPR table window.

Click the [*Cancel* toolbar icon to reject any changed settings and return to the LSPR table window.
How the Scaling-Factor Is Used

The Reference-CPU window establishes the processor model and scaling-factor/metric used for all capacity values displayed in zPCR. It is always set in terms of the LSPR Single-Image table. The chart below is provided to help in understanding how the Reference-CPU settings are interpreted by the various zPCR functions.

<table>
<thead>
<tr>
<th>Reference-CPU window (button for auto-defining the setting)</th>
<th>Default</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference-CPU model (1-way General Purpose models only)</td>
<td>2094-701</td>
<td>2094-701</td>
</tr>
<tr>
<td>Scaling-factor (capacity of a shared 1-partition configuration)</td>
<td>1.00</td>
<td>593</td>
</tr>
<tr>
<td>Scaling-metric</td>
<td>ITRR</td>
<td>MIPS</td>
</tr>
<tr>
<td>Value used for LSPR Multi-Image table</td>
<td>0.944</td>
<td>559.792</td>
</tr>
<tr>
<td>Value used for LSPR Single-Image table</td>
<td>1.000</td>
<td>593.000</td>
</tr>
<tr>
<td>Value used for LPAR Configuration Capacity Planning function assumed to represent capacity of the entire CPC</td>
<td>1.0197</td>
<td>604.682</td>
</tr>
</tbody>
</table>

Regardless of the scaling-factor value entered, excessive decimal places will be dropped so as to preserve a maximum of six significant digits.

The above relationships apply to 1-way processors only. For 1-way processors, partition configurations are always predicable (1 logical CP only) while not for N-way models. This is one reason why the Reference-CPU setting is limited to 1-way processor models.

Buttons are provided on the Reference-CPU window to automatically populate the input fields with the settings shown below:

- **Default** Assigns the 2094-701 at 1.00 ITRR
- **Typical** Assigns the 2094-701 at 593 MIPS
- **Startup** Assigns the startup setting, if defined in user preferences

Note: IBM’s LSPR Document (SC28-1187) publishes only Multi-Image ITR Ratios, all based on the 2094-701 rated at 1.00 (rather than the 0.944 shown above). To reproduce these ITR ratios in zPCR, you must defined the Reference-CPU in such a way that the 2094-701 comes up as 1.00 in the Multi-Image table. This can be done by setting the scaling value to 1.000 / 0.944, or 1.059322. To reproduce the PCI values, the Reference-CPU must be set as 2094-701 at 593 MIPS.

Capacity results for any specific LPAR configuration can vary considerably from those provided in the LSPR Multi-Image table. The difference lies in the degree to which the specific LPAR configuration deviates from the typical LPAR configuration assumed for that same processor model in the table. The use of zAAP or zIIP specialty engines will also contribute to deviation, since these CP types are not included in the typical configurations.
The **Workloads** window is accessed from the **Function Selection** window by clicking the **Workload Categories** button from either the **Multi-Image Capacity** tab or the **Single-Image Capacity** tab. It can also be accessed directly from either of the **LSPR Processor Capacity Ratios** tables via the **Workload Categories** button. Its purpose is to show the workload category names used in **zPCR** for each of the major SCPs.

Each of the z/OS workload categories is represented on every Z processor model. These z/OS workload categories are always displayed in the **LSPR ITR Ratio Tables**. These z/OS workload categories are also considered to be representative for z/VM, Linux, and z/VSE. When General Purposed CPs are being displayed, the capacity values are considered applicable for z/VM, z/OS, Linux, and z/VSE. When IFL CPs are being displayed, the capacity values are considered applicable for z/VM or Linux (z/OS and z/VSE can only be run in a GP partition).

General information about actual z/OS LSPR workload primitives used to generate the workload category data is included in the **LSPR Workloads** document. However, no specific information is provided about which workload primitives contribute to any specific workload category.
For zPCR’s LPAR Configuration Capacity Planning function, the table provides names for all of the workloads available for assignment to z/OS, z/VM, Linux, and z/VSE partitions.

- **z/OS** can only be defined to GP partitions; **Average** is the default assignment.
- **z/VM** can be defined to IFL or GP partitions; **Average/LV** is the default assignment.
- **z/VSE** can only be defined to GP partitions; **Average/VS** is the default assignment.
- **KVM** can be defined to IFL or GP partitions; **Average/K** is the default assignment.
- **Linux** can be defined to IFL or GP partitions; **Average/L** is the default assignment.
- **zAware** can be assigned to IFL or GP partitions (z13, z13s, zEC12, and zBC12 processors only); **zAware** is also the workload assignment.
- **SSC** can be assigned to IFL or GP partitions (z14, z13, and z13s processors only); **SSC** is also the workload assignment.
- **CFCC** can be defined to ICF or GP partitions; **CFCC** is also the workload assignment.

**LSPR Workloads**

Various LSPR workload primitives are measured in order to fully understand the total capacity envelope (or bounds) that can be expected for each processor model. Combinations of primitives are then used to develop capacity values for the 5 LSPR workload categories carried in zPCR. The association a production workload to one of these workload categories provides a reliable way to evaluate capacity expectation when planning for a processor replacement.
Relative Nest Intensity (RNI) is used to understand the memory use of a workload. The term Nest refers to a processor’s memory sub-system, beyond the 1st level High Speed Buffer all the way out to Central Storage. Intensity refers to the amount of impact the Nest has on capacity for each workload category. Relative is used because each different processor hardware design will affect the absolute Nest Intensity of any given workload.

The five z/OS LSPR workload categories available in zPCR are listed in the table below. The calculated RNI in combination with L1MP (level 1 cache miss percent) is used select either the Low, Average, or High workload category. Note that CPU-MF data must be captured in order to compute a production workload’s RNI and L1MP.

<table>
<thead>
<tr>
<th>Name</th>
<th>Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Light use of the processor’s memory hierarchy</td>
</tr>
<tr>
<td>Low-Avg</td>
<td>Mid-way between Low and Average</td>
</tr>
<tr>
<td>Average</td>
<td>Average use of the processor’s memory hierarchy</td>
</tr>
<tr>
<td>Avg-High</td>
<td>Mid-way between Average and High</td>
</tr>
<tr>
<td>High</td>
<td>Heavy use of the processor’s memory hierarchy</td>
</tr>
</tbody>
</table>

These 5 workload categories are expected to satisfy most IBM mainframe capacity planning requirements. All of these categories are available in zPCR, in the LSPR Multi-Image tables, the LSPR Single-Image tables, and for the LPAR Configuration Capacity Planning function.

While the 5 workload categories are derived primarily from z/OS measurement data, they are also representative for z/VM, Linux, z/VSE, KVM, Linux production workloads. Similarly named workload categories are also available for each of these SCPs when assigned to a partition. For zAware, and zACI, and SSC, a single workload is available for each.

Controls

Click the Return toolbar icon to return to the calling window (usually the Function Selection window).

Click the LSPR Workload Categories button for discussion concerning how to select between the workload categories available in zPCR.
Choosing a workload category to represent production work

The selection of an appropriate workload category to best represent a given production workload running in a partition is very important when projecting capacity requirements for a potential replacement processor.

- **z/OS** can be defined to General Purpose partitions (and any associated zAAP or zIIP partitions). When **CPU-MF** data is not available, **Average** will default for the assigned workload category. The workload used to represent a z/OS partition can be manually designated as any of the 5 workload categories.

  CPU Measurement Facility (**CPU-MF**) data provides a reliable method for assigning an LSPR workload category to a partition. **CPU-MF** data can be obtained from z/OS systems running on z14, z13, z13s, zEC12, zBC12, z196, z114, and z10 processors. **CPU-MF**, which is captured as SMF-113 records, must be turned on for each partition where the information is desired. SMF is post-processed into an EDF format that **zPCR** can read. For each partition where **CPU-MF** data was captured, the most representative LSPR workload category will be assigned and **CPU-MF** will be shown as the **Method Used**. zAAP and zIIP partitions will be assigned the same workload category as its associated General Purpose partition.

- **z/VM** can be defined to General Purpose or IFL partitions. When **CPU-MF** data is not available, **Average/LV** will default for the assigned workload category. The workload used to represent a z/VM partition can be manually designated as any of the 5 workload categories.

  CPU Measurement Facility (**CPU-MF**) data provides a reliable method for assigning a workload category to a z/VM partition. **CPU-MF** data can be obtained from z/VM systems running on z14, z13, z13s, zEC12, zBC12, z196, z114, and z10 processors. **CPU-MF**, captured in VM Monitor records, must be turned on for each partition where the information is desired. The VM Monitor data is post-processed into an EDF format that **zPCR** can read. For each partition where **CPU-MF** data was captured, the most representative LSPR workload category will be assigned and **CPU-MF** will be shown as the **Method Used** for the assignment.

  When z/VM is running in a General Purpose partition, while also supporting IFLs in an associated partition, **CPU-MF** data is captured separately for each. The workload category assignment could be different for these two partitions.

- **z/VSE** can be defined to General Purpose partitions. The default workload category assignment for z/VSE is **Average/VS**. The workload used to represent a z/VSE partition can be manually designated as any of the 5 workload categories.

- **KVM** can be defined to General Purpose or IFL partitions. The default workload category assignment for Linux is **Average/K**. The workload used to represent a KVM partition can be manually designated as any of the 5 workload categories.

- **Linux** can be defined to General Purpose or IFL partitions. The default workload category assignment for Linux is **Average/L**. The workload used to represent a Linux partition can be manually designated as any of the 5 workload categories.

- **zAware** can be defined to General Purpose or IFL partitions on z13, z13s, zEC12 and zBC12 processors only. The only workload category assignment is zAware.

- **zACI** can be defined to General Purpose or IFL partitions on z13, z13s, zEC12 and zBC12 processors only. The only workload category assignment is zACI.
- **SSC** can be defined to General Purpose or IFL partitions on z14, z13, and z13s processors only. The only workload category assignment is SSC. SSC is intended to be the new support structure for zAware and zACI on these models.

- **CFCC** can be defined to General Purpose or ICF partitions. The only workload category assignment is CFCC. Note that CFCC capacity is not based on the z/OS LSPR data, but rather determined by another measurement and analysis process. Each hardware family is supported by its own unique CFCC level.

  **Concerning z14 only:** CFCC level 22 running in a dedicated partition has considerably improved N-way ratios over those of previous CFCC levels. The improvement is less significant when running in a shared partition. As a result, separate CFCC ITRs are carried for dedicated and shared in **zPCR**. The mode of the partition determines which CFCC ITR will be used.
The **LSPR Multi-Image Processor Capacity Ratios** window is displayed from the **Function Selection** window (**Multi-Image Capacity** tab) by clicking on the **General Purpose CPs** button or the **IFL CPs** button in the **LSPR Multi-Image Capacity Ratios** group box.
LSPR Processor Capacity Ratios
Capacity by Workload Type

IBM LinuxONE Multi-Image Table

The LinuxONE Multi-Image Processor Capacity Ratios window is displayed from the Function Selection window (Multi-Image Capacity tab) by clicking on the LinuxONE CPs button in the LSPR Multi-Image Capacity Ratios group box. The LinuxONE model names in this table are intentionally unique to the Z model names.
LSPR Processor Capacity Ratios
Capacity by Workload Type

IBM Z Single-Image Table

The LSPR Single-Image Capacity Ratios window is displayed from the Function Selection window (Single-Image Capacity tab) by clicking on the General Purpose CPs button or the IFL CPs button in the LSPR Single-Image LSPR Processor Capacity Ratios group box.
The Single-Image table is intended to show reasonable Single-Image partition configurations, and is therefore limited to displaying a maximum of 30 CPs.

The Multi-Image table and the Single-Image table both provide **LSPR Processor Capacity Ratios** representing the capacity relationship of each processor, relative to the current **Reference-CPU** for each workload category displayed. The workload categories that are displayed are user controlled from the **LSPR Table Control** window under **Settings** on the menu-bar.

The window’s title area specifies **General Purpose CPs** or **IFLs**, and includes the **Reference-CPU** basis for the capacity values.

The LSPR table of processors columns are displayed as follows:

- **Processor** Specific processor model identification
- **Features** N-way and other notable information
- **Flag** Exception or additional information indicator
- **MSU** Rating used for software pricing

Note: MSU ratings are applicable for General Purpose CPs only.

**LSPR Workload Category**

- **Low** Relative capacity for Low RNI workload
- **Low-Avg** Relative capacity for Low-Avg RNI workload
- **Average** Relative capacity for Average RNI workload
- **Avg-High** Relative capacity for Avg-High RNI workload
- **High** Relative capacity for High RNI workload

Several exception settings are provided for the purpose of changing the perspective of the capacity values displayed in the table. For detailed discussion, see **LSPR Table Control** below.

Note: For **z14, z13, z13s, zEC12, zBC12, z196, z114**, and **z10** processor models, **z/OS capacity is represented with HiperDispatch turned ON**. A white paper concerning **HiperDispatch** is available at:

http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101229

**LSPR Multi-Image Capacity Ratios Table**

Three separate tables are available:

- IBM Z General Purpose CPs
- IBM Z IFL CPs
- IBM LinuxONE CPs (includes IFL CPs and one GP CP)

Capacity projections in the **LSPR Multi-Image Capacity Ratios** table assume a multiple-partition configuration deemed typical for each processor N-way model. As the N-way of the LPAR host increases, the number of partitions increases, and the number of logical CPs defined to the primary partitions increases, while the LCP:RCP ratio diminishes.
For a 1-way processor model, a shared 5-partition configuration is assumed. Therefore, the Reference-CPU single-image scaling-factor is adjusted down to consider the cost of managing 5 partitions over that of managing 1 partition. The adjustment is simply the multiplication of 0.944 times the scaling-factor assumed for a single partition. The Reference-CPU processor model will appear in the Multi-Image Table with this adjusted capacity value.

Any of the 5 LSPR workload categories can be displayed in the LSPR Multi-Image Capacity Ratios table. While these capacity values can be considered to accurately represent z/OS partitioned environments, they may also be viewed as being reasonable for z/VM, Linux, and z/VSE partitioned environments. Capacity values in each workload category column assume that the same workload is running in every partition.

Capacity values in the LSPR Multi-Image Capacity Ratios table represent typical (or average) partition configurations, and are therefore a generalization of processor capacity.

The capacity values for any specific LPAR configuration can deviate significantly (higher or lower) from those shown in the LSPR Multi-Image Capacity Ratios table due to the degree it differs from the typical configuration represented in the table.

Capacity differences can be due to any of the items listed below.

1. The following may vary from that of the “Typical” LPAR configuration:
   - Number of partitions defined
   - Number of logical CPs defined to each partition
   - Relative weights assigned to each partition
   - Capping of partitions
   - The workload category assigned to each partition may vary
   - SCPs other than z/OS (z/VM, z/VSE, Linux, CFCC) may be assigned to a partition.

2. When zAAP CPs are configured to support a portion of the z/OS workload content, z/OS capacity will be impacted. Capacity results for other partitions will also be impacted slightly. Capacity projections for the zAAP CPs are provided.

3. When zIIP CPs are configured to support a portion of the z/OS workload content, z/OS capacity will be impacted. Capacity results for other partitions will also be impacted slightly. Capacity projections for the zIIP CPs are provided.

4. When IFLs are configured to run z/VM, KVM, Linux, zAware, zACI, or SSC, capacity results for other partitions will be impacted slightly. Capacity projections for the IFLs are provided.

5. When ICFs are configured to run CFCC, the capacity results for other partitions will be impacted slightly. Capacity projections for the ICFs are provided.

6. When drawers on z14, z13, and z13s processors or books on zEC12, zBC12, z196, z114, z10 EC, z9 EC, and z990 processors are configured in excess of that needed for the real CPs required, capacity results for all partitions will be impacted slightly.

7. For z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, and z10 BC processor models, the HiperDispatch effect of keeping workload content on the same real CPs is inherent in the LSPR capacity data. However, any potential parking of logical CPs is ignored. If parked logical CPs were removed from the configuration, the reduced LCP:RCP ratio will result in slightly improved capacity.
The impact of any of these items (or some combination thereof) on capacity can be significant, thus providing capacity results that are quite different from those observed in the LSPR Multi-Image Capacity Ratios table.

To get a more reliable capacity assessment for any specific LPAR configuration, zPCR’s LPAR Configuration Capacity Planning function should be used. Any legitimate LPAR configuration can be modeled, with capacity results provided for each partition, for each real CP type (i.e., CP pool), and for the LPAR host as a whole.

The LSPR Multi-Image Capacity Ratios table plays no role in zPCR’s LPAR Configuration Capacity Planning function. Rather, the LPAR Configuration Capacity Planning function is based on the LSPR Single-Image Capacity Ratios table. This function is then used to compute the capacity values shown in the LSPR Multi-Image Capacity Ratios table.

**LSPR Single-Image Capacity Ratios Table**

Two separate tables are available:

- IBM Z General Purpose CPs
- IBM Z IFL CPs

Capacity projections in the LSPR Single-Image Capacity Ratios table assume a single shared partition configuration, running the indicated SCP/workload. Capacity projections in this table should be considered as having minimal LPAR overhead and no contention between partitions for sharing real CP resource. This table is a reflection of the z/OS workload environments that are considered measured for LSPR purposes.

This table is intended to show reasonable Single-Image partition configurations, and is therefore limited to displaying a maximum of 30 CPs.

The Single-Image LSPR table is not intended to imply what is supported by any given SCP. Rather, it is an indication of the capacity available if it could be supported.

LSPR data is currently based on z/OS-2.2, which supports a maximum of 141 CPs. If considering capacity for previous z/OS versions, one must ignore capacity ratios for N-way processors that are not supported. Versions prior to z/OS-1.6 can support a maximum of 16 CPs. z/OS-1.6 through z/OS-1.8 can support a maximum of 32 CPs. z/OS-1.9 can support a maximum of 64 CPs. z/OS-1.10 and later can support up to 100 CPs. z/OS-2.1 can support up to 128 CPs.

While the single-image capacity ratios are based on z/OS measurement data, they can also be considered reasonable for z/VM, Linux, and z/VSE. z/VM supports a maximum of 32 CPs. Linux can support any number of CPs. For zPCR purposes, z/VSE is limited to 4 CPs.

For z900 and z800 processors only, one may assume that the capacity relationships represent either basic-mode or LPAR-mode. When a z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, z9 BC, z990, or z890 processor is included in the analysis, you must assume that the capacity relationships represent LPAR-mode, since that is the only way that these processors can operate.

The values contained in the LSPR Single-Image Capacity Ratios tables are used as the capacity basis for the algorithms in zPCR’s LPAR Configuration Capacity Planning function.
Concerning both the Multi-Image and the Single-Image tables

Beneath the table is listed a quantification of the processors included in the current view, in the entire list box, and those that have been selected.

LSPR capacity ratios are available for General Purpose CPs and IFLs. To determine capacity for zAAPs, zIIPs, and ICFs, you must use the LPAR Configuration Capacity Planning function. LPAR configurations with any valid mix of General Purpose CPs and specialty engines can be characterized with this planning function.

One should not try to compare capacity values between the LSPR Multi-Image Table and the LSPR Single-Image Table. For the Multi-Image Table, the LPAR configuration grows increasingly complex as the N-way of the host increases, while the LPAR configuration represented by the Single-Image Table remains constant (a single partition) regardless or the N-way of the host. Therefore, direct comparison of results from the multi-image table to those from the single-image table is a worthless exercise. Since all contemporary processors run with multiple images, the LSPR Multi-Image Capacity Ratios table should be the preferred reference to generalize on capacity. The LPAR Configuration Capacity Planning function should be used to refine the capacity expectation for any specific LPAR host and its partition configuration.

LSPR Table Control Window

Whenever an LSPR Table window is displayed, an associated LSPR Table Control window also appears beside it, providing quick specification of the processor models, workload categories, and capacity exceptions to be displayed in the table. See LSPR Table Control for detailed information.

LSPR Table (continued)

Selecting Processors

Individual processor models can be selected from the table for the purpose of reducing the number being viewed to only those of interest. In addition, processors which are selected can be used to generate a variety of graphs.

No processor are selected when the table is initially displayed. To select processors, you must hold the Ctrl key while clicking anywhere on that processor row. To unselect an already selected processor row, hold the Ctrl key and click again on that processor row. If you click without holding the Ctrl key that row becomes the sole selection, To select a contiguous range of processors, click on the first processor model, and then, holding the Shift key, click on the last processor model.

Controlling the Processor Table Sequence

When viewing All Families or Selected Families, the processor table may be sorted on the Processor Name column, the MSU column, or on any Workload column by clicking the underlined column title. The first click will show ascending sequence, the second click will show descending sequence, and the third click will restore the default table sequence. An indicator is displayed next to the column title to indicate when processors are sorted and the sort order.

Whenever a processor table is in a sorted sequence, the processor family headers no longer serve a purpose, and therefore, are not displayed.
When viewing **Favorites**, the LSPR table cannot be sorted. However, the order of the processor models in the **Favorites** list can be changed using controls at the bottom of the *LSPR Table Control* window; the LSPR table will immediately be presented in that order.

Selected processors are always displayed on graphs in the same order as they are displayed in the table.

**Controls on the LSPR Table Window**

Click the **Provisional Reference-CPU** button on either the *Multi-Image* or the *Single-Image Capacity Ratios* table window to temporarily change the *Reference-CPU* model, scaling, and/or metrics while viewing that *LSPR Table* window. Unlike the *Reference-CPU*, the *Provisional Reference-CPU* can be set to any N-way processor model in the table. When the *LSPR Table* window is changed or closed, the normal *Reference-CPU* settings are restored.

Alternatively, when viewing **General Purpose CP** capacity, you can double click on any specific processor in the table to open the *Provisional Reference-CPU* window with that processor already selected. This technique does not work when viewing the IFL Engine capacity table, since the models displayed there cannot be named as a *Reference-CPU* processor model.

**Note:** Setting the *Provisional Reference-CPU* will cause z14, z13, zEC12 and z196 processor models, if being displayed in *Power-Save* mode, to revert to *Full Power*. If *Power-Save* mode is desired, it can be restored from the *LSPR Table Control* window by clicking *Settings ➔ Capacity Exceptions* on the menu-bar.

Click the **Workload Categories** button to view the *Workloads* window, which will display a table of the 5 LSPR workload categories and their naming convention when defined to partitions running SCPs other than z/OS.

Click the **Copy Selected to Favorites** button to copy selected processor models to the **Favorites** list. Processor models selected that are already in the **Favorites** list will be ignored. If the selected processors will cause the **Favorites** list to exceed its maximum of 20, a dialog will appear and only the ones that add up to the maximum will be added.

Click the **Return** toolbar icon to return to the *Function Selection* window. Both the LSPR Capacity Ratio Table and the Table Control windows will be closed.

Click the **HTM** toolbar icon to create an HTML file with the report tables.

When displaying the Single-Image LSPR Table with General-Purpose CPs, the table can be output as a flat file (this capability is in support of the *zTPM* tool). From the menu-bar, click **File ➔ Save as PRN** to create the PRN file output.
Menu-bar

**File**

A special case only for the Single-Image table when displaying General-Purpose CPs. The LSPR table can be output in a flat file format (this capability is in support of the zTPM tool). Click **Save as PRN** to create the PRN file output.

**Workload**

**Describe**

Display a short description for the 5 LSPR workload categories.

**Graph**

Create charts for processors that have been selected.

**Workload**

Generate capacity bars showing capacity for a specific LSPR workload category.

**All Workloads**

Generate capacity bars showing capacity for all of the published LSPR workload categories side-by-side.

**Response Time**

Generate line graph showing relative internal processor response time based on transaction rate or on utilization. A specific workload category must be selected. See discussion below.

**Help**

Information Concerning the Response Time Graphs

Two graphs are available:

- Processor response time based on utilization
- Processor response time based on transaction rate

For these charts, the currently defined Reference-CPU is assumed to have a transaction service time (or response time) of 10 milliseconds at a low transaction rate or a low utilization. Then, for each of the processors selected, the relative (theoretical) response time is plotted, showing the change as the transaction rate or utilization increases. The response time plotted is based solely on CPU time (no other potential delays assumed).

If the Reference-CPU is changed, that processor is then assumed to have a transaction service time (or response time) of 10 milliseconds. The Provisional Reference-CPU may be used to temporarily change the Reference-CPU setting. The original setting will be restored when the LSPR Capacity Ratio Table window is closed.
LSPR Table Control

Whenever an *LSPR Capacity Ratio Table* window is displayed, the *LSPR Table Control* window appears on the right. Its purpose is to quickly select what is to be displayed in the LSPR table. The settings are common to the *Multi-Image* table and the *Single-Image* table, for both *GP CPs* and *IFL CPs*. The primary settings (with a few exceptions) remain persistent throughout the zPCR invocation. Settings that are active at the time will be saved with a zPCR study. Settings to be used by default for a new study can be defined as *zPCR* preferences.

Controlling the LSPR Table window

**Processors Displayed** group box

- **All Families** – All Z families included in the current LSPR table will be displayed. This is the only setting that will allow viewing of the older z800, z900, z890, and z990 families.
- **Selected Families** – Only the Z families that are checked under **Selected Families** will be displayed. Checkboxes are provided for only the more current Z families. Checkboxes may only be altered when viewing **Selected Families**.
- **Similar CPCs** – Find processors with similar capacity or MSU rating (available for Multi-Image General Purpose LSPR table only). See **Similar CPCs** for a detailed discussion.
- **Favorites** - Only the Z processor models that have been copied to the **Favorites** list will be displayed. To be selected, there must be at least one processor in the **Favorites** list. The **Favorites** list may contain both GP and IFL models.

**Selected Families** group box provides checkboxes to control which Z families will be visible when **Processors Displayed** is set to **Selected Families**. Check the box for each of the processor family you wish to be displayed in the LSPR table. The LSPR Table window is updated dynamically as boxes are checked or unchecked. At least one processor family must be checked.

**Favorites** group box displays a user-specified set of processor models in the LSPR table when **Processors Displayed** is set to **Favorites**. When displaying **Favorites**, all the processors presented in the LSPR table are considered to be selected (i.e., graphs will include all of them). See **Favorites List** for details.
Similar CPCs

The *Find Similar CPCs* function provides the capability to search for processors of similar capacity or similar MSU rating. The function is available only when viewing the *Multi-Image General Purpose LSPR Table* window (it is not available for IFLs, for the *LinuxONE LSPR Table*, or for any of the *Single-Image LSPR Tables*).

The search is limited to the set of processors currently being displayed. Select either *All Families* or *Selected Families* under *Processors Displayed*. For *Selected Families*, check the processor families that are to be included. The *Similar CPCs* radio button is always disabled when viewing the *Favorites List*. It is also disabled when displaying the *Single-CP* capacity exception case.

To access *Similar CPCs* capability, a single processor model must be selected. Right click on a processor row and select *Show Similar CPCs* from the pop up menu. Once selected, the *Similar CPCs* radio button is enabled and selected and the *Find Similar CPCs* window will appear.

A search may be made for a specific LSPR workload category (based on the current *Reference-CPU* settings) or on a MSU rating. This selection is made with the radio buttons under *Type* at the top of the window.

The selected processor becomes a reference point for the search, identified under *Processor and rating*. The rating shown and scaling-metric will be based on the *Type* selection above.
The row beneath the selected processor affords the capability to specify an **Absolute** value for the search. The field is automatically set to the value for the selected processor. Click on the field to manually enter an **Absolute** value. Once a value has been entered, that value will persist.

Under **Within range of**, percent values are used to control the scope of the search. Click on a field to replace the default values. Values may be between -50% and 100%; the minimum must be at least 1% less than the maximum.

Click the **Return** tool bar icon to initiate the search. The **Multi-Image LSPR Table** window will now display the search results, sorted based on the search **Type** requested. Click **Cancel** to skip the search and restore the previous **Processors Displayed** view.

The window title is updated to reflect the **Similar CPCs** view and to show the search range that was applied and to show the number of hits. Columns remain available for sort. Graphs are available. Processor models may be selected and copied to the **Favorites List** (you may want to change the sort order before copying). The **Settings** menu-bar item on the **LSPR Table Control** window is disabled while this window is displayed.
If the search finds no matching CPCs, a dialog is presented.

Note: The Provisional Reference-CPU setting is not directly available from this window. To apply a Provisional Reference-CPU setting, copy the search results to the Favorites List, display Favorites, and then apply the Provisional Reference-CPU setting.

To exit the Similar CPCs view without leaving the LSPR Table window, select any of the other Processors Displayed radio buttons. To exit the LSPR Table window entirely, click the Return toolbar icon on that window (all Similar CPCs settings will be restored to the default values).

To restart Similar CPCs while remaining in the LSPR Table window, first choose either Selected Families or All Families, and then choose Similar CPCs. In this case, previous user settings will persist.

When selecting the Similar CPCs radio button, if the previously selected processor is no longer found in the displayed LSPR table, a dialog will suggest the selection of a different processor that is included in the table, or to start from the All Families view, which includes every one of the IBM mainframe processor models.

Settings defined for Find Similar CPCs are not saved when the LSPR Multi-Image Table window is closed.

Favorites List

The Favorites list is user-controlled, with a maximum of 20 processor model entries. The following function is available:

- **Copy** a processor to the Favorites list – From the LSPR Table window, select one or more processor rows and click the [Copy Selected to Favorites] button. Multiple processor models can be selected using Ctrl-Click (or Shift-Click). Once processor models have been selected, you may also right click and select Copy to Favorites from the pop-up menu.

- **Remove** a processor from the Favorites list – From the Favorites list, right click on a processor model and select Remove from the pop-up menu. Multiple processor models can be selected using Ctrl-Click (or Shift-Click). If currently displaying Favorites, the LSPR table will be dynamically updated.

- **Reorder** the Favorites list by selecting a single processor model, and, using the control buttons below, move the entry to the desired location in the list. If currently displaying Favorites, the LSPR table will be dynamically updated.

Note that when displaying Favorites from the Single-Image table, any processor models with more than 30 CPs will be excluded. This is because the Single-Image table is intended to represent reasonable single partition configurations only.

Menu-bar

- **Settings**
  - See discussion below

- **Help**

Settings (on the menu-bar) provides some less frequently needed controls for the LSPR Table window, including:
• **Workloads Displayed** – By default, all 5 LSPR workload categories are displayed in the *LSPR Table* window. The workload categories to be displayed when starting a new *zPCR* study can be set from the *Preferences* window. These can be refined to any specific workload categories by unchecking/checking the appropriate box. Note that the order in which the workloads are displayed cannot be changed.

• **Capacity Exceptions**: There are 5 capacity exception conditions (listed below). Capacity exceptions are retained only while an *LSPR Table* window is open. For each capacity exception requested, relevant information will appear in the title area of the *LSPR Table* window. All 5 settings will be restored to unchecked when the *LSPR Table* window is closed. If the LSPR table is in a sorted order when any of these items are checked, it is set to unsorted order before returning control to the table (this is because capacity values will change, making the sorted order no longer applicable). Capacity Exception settings cannot be defined as *zPCR* preferences.

  1. **Single-CP Capacity**: Checking this box will change the capacity values of all processors displayed in the *LSPR Table* window to represent the capacity of a single CP (by dividing processor total capacity by the number of CPs). When displaying single-CP capacity, capacity values are displayed in *brown* rather than *red*. Note that this setting applies to both the *Multi-Image* and the *Single-Image LSPR* table.

  2. **z196 Power-Save Mode**: Checking this box will change the MSU and capacity values for all z196 processor models to represent *Power-Save* mode (*a green background will be displayed for all the values that were changed*).

  3. **zEC12 Power-Save Mode**: Checking this box will change the MSU and capacity values for all zEC12 processor models to represent *Power-Save* mode (*a green background will be displayed for all the values that were changed*).

  4. **z14 Power-Save Mode**: Checking this box will change the MSU and capacity values for all z14 processor models to represent *Power-Save* mode (*a green background will be displayed for all the values that were changed*).

  5. **z13 Power-Save Mode**: Checking this box will change the MSU and capacity values for all z13 processor models to represent *Power-Save* mode (*a green background will be displayed for all the values that were changed*).

  6. **z14/z13/z13s SMT Benefit** (when viewing IFL models): Checking this box will increase capacity values for z14, z13, and z13s IFL processor models based on a percent improvement expected when exploiting Symmetrical Multi-Threading (SMT). The percent improvement is selected in 1% increments between 0% and 60% using the spin button on the right. The spin button is initially set to the *zPCR* default *SMT Benefit* value for IFLs. Whenever an *SMT Benefit* has been applied, the title line “IFL CPs” will indicate the *SMT Benefit* percent (*a yellow background will be displayed for all the values that were changed*).
While Capacity Exception settings are immediately applied, the LSPR Table window cannot be manipulated until the Capacity Exceptions dialog has been closed.

Notes

1. The Reference-CPU scaling-factor is always considered to be full power. Only the affected processor families in the LSPR table will be displayed in Power-Save mode.

2. The z14, z13, zEC12, and z196 processor families will default to displaying Full Power whenever:
   - An LSPR Table window is opened
   - The Provisional Reference-CPU is set or changed

3. The z14, z13, and z13s IFL processor families will default to displaying capacity without SMT Benefit applied. Use the Capacity Exceptions setting to factor in expected improvement due to the exploitation of SMT.

- **Restore Default Settings**: Clicking this menu item will perform the following:
  - Restore the Workloads Displayed to the 5 LSPR workload categories
  - Check all the processor families boxes under Selected Families.

Processor models copied to the Favorites list will be unaffected.

- **Restore Startup Settings**: Clicking this menu item will set all items as defined on the zPCR Preferences window. Processor models copied to the Favorites list will be unaffected.

- **Clear Favorites List**: Clicking this menu item provides the ability to erase the current Favorites List. A dialog will ask to confirm this action.

The LSPR Table Control window can be closed by clicking [X] on the title bar. If closed, it can be redisplayed by clicking the Table Controls button at the bottom of the LSPR Table window.

Both the LSPR Table window and the LSPR Table Control window can be repositioned anywhere on the desktop (dual displays included). The new position will be used each time these windows are opened. When using multiple zPCR invocations at the same time, this makes it convenient to keep track of them.
LPAR Configuration Capacity Planning

Note: The *Sample Basic Mode Study*, included with the *zPCR* package, is the source used for most of the examples shown prior to the *Advanced-Mode* section.

**LPAR Host and Partition Configuration**

**LPAR Configuration Capacity Planning**

Note: The *Sample Basic Mode Study*, included with the *zPCR* package, will be the primary source of the examples shown for Basic-Mode.

The **LPAR Configuration Capacity Planning** function provides capacity projections for any IBM mainframe LPAR host processor with any specific partition configuration running specific SCP/workload environments in each individual partition. Capacity projections are generated for each partition as well as for the LPAR host as a whole. All capacity results for this function are based on the currently defined *Reference-CPU*. 
The LPAR Host and Partition Configuration window is the control point for one fully defined LPAR configuration. An entry field is available at the top with which to provide a verbal description for the configuration. Note that when the LPAR configuration is obtained from EDF or RMF, this field is filled in with the CEC ID, interval #, date, and time.

zPCR may be run in Basic-Mode or Advanced-Mode. How the LPAR Host and Partition Configuration window is accessed depends on the mode used.

- **Basic-Mode**: From the Function Selection window, click the Define LPAR Host, Configure Partitions, Assess Capacity button.
- **Advanced-Mode**: Double-click on any defined LPAR icon under the LPAR configuration tree. Each icon represents a single LPAR configuration.

An LPAR configuration is created manually using the following steps:

1. **Define the LPAR host**: The LPAR host processor must be specified before any partitions can be defined. In the Define LPAR Host Processor group box, click the Specify Host button to display the LPAR Host Processor window (see LPAR Host Processor). Upon return, the LPAR host configuration is summarized on the left side of the LPAR Host and Partition Configuration window.

2. **Define one or more partitions**: Once the LPAR host has been specified, individual partitions can be defined using the GP, IFL, and ICF buttons in the Define Partitions group box. zAAP and zIIP partitions are always associated with a General Purpose partition running z/OS. IFL partitions may associated with a General Purpose partition running z/VM (hardware definition for the partition must be Mode=z/VM).

The LSPR Single-Image Capacity Ratios table is used exclusively to support this function (the multi-image table plays no role). Since all zPCR function is based on the same Reference-CPU setting, one can jump between LPAR configurations and the LSPR tables and continue to observe capacity values that are all on the same scale.

Several generations of IBM mainframe families are supported by zPCR as LPAR hosts. The SCP assigned to a partition will dictate the workload categories that can be assigned:

- **z/OS** 5 z/OS workload categories
- **z/VM** 5 z/VM workload categories
- **z/VSE** 5 z/VSE workload categories
- **KVM** 5 KVM workload categories
- **Linux** 5 Linux workload categories
- **zAware** 1 zAware workload (not shown in LSPR tables)
- **zACI** 1 zACI workload (not shown in LSPR tables)
- **SSC** 1 SSC workload (not shown in LSPR tables)
- **CFCC** 1 CFCC workload (not shown in LSPR tables)

Note: For z/OS partitions on z14, z13 and z13s processors, z/OS-1.13 or later must be specified. For z/OS partitions on zEC12 and zBC12 processors, z/OS-1.10 or later must be specified; and on z196, z114, and z10 processors, z/OS-1.7 or later must be specified. For all other processor families, z/OS can be defined as any version from 1.4 to 2.1. The SCP version information is used only to enforce configuration rules (i.e., the number of logical CPs that can be defined, or whether
zAAP or zIIP logical CPs are supported). Capacity results will not be affected by changing the version.

Any SCP/workload category shown on the **Workloads** window, including CFCC, can be assigned to a general purpose partition. Only z/VM and Linux can be assigned to an IFL partition. And only CFCC can be assigned to an ICF partition. zAAP and zIIP logical CPs must be defined in conjunction with the associated z/OS partition, and are assumed to be running the same z/OS version and workload category. IFL logical CPs may be defined in conjunction with a z/VM General Purpose partition (hardware definition for the partition must be **Mode=z/VM**), and are assumed to be running the same z/VM workload category.

For z/VSE, a maximum of four logical CPs is supported in **zPCR**.

The currently defined **Reference-CPU** (processor model, scaling-factor and scaling-metric), is used as the basis for all capacity projections. **Capacity projections for various partition configurations on the same LPAR host, or on different LPAR hosts are comparable as long as the Reference-CPU and its scaling-factor remain unchanged.**

Click the **Return** toolbar icon to close the **LPAR Host and Partition Configuration** window and return to (in **Basic-Mode**) the **Function Selection** window or (in **Advanced-Mode**) the **Advanced-Mode Control Panel** window.

**Define Partitions Group Box**

Once the LPAR host has been selected and configured, buttons are enabled for the purpose of defining partitions. Only the buttons that are valid for the LPAR host’s defined CP types are enabled.

- Click the **GP** button to define partitions with workloads to be run on General Purpose CPs. zAAP and/or zIIP partitions are defined in conjunction with its associated General Purpose partition. When such specialty CPs are configured on the host, the **GP** button name will be expanded to include the specialty CPs (i.e., **GP / zAAP / zIIP**). Additionally, an IFL partition may be defined in conjunction with a general purpose partition running z/VM.

- Click the **IFL** button to define partitions with workloads to be run on IFLs.

- Click the **ICF** button to define partitions with workloads to be run on ICFs.

Clicking any of these buttons will open the **LPAR Partition Definition window**, where individual partition definitions are created (see **Partition Definition**). Upon return, the logical partition configuration is summarized on the right side of the **LPAR Host and Partition Configuration** window.
Reports Group Box
With an LPAR host processor specified, and a legitimate partition configuration defined, three reports are available via buttons in the Capacity Reports group box:

1. Click the Host Summary button to display the Host Summary Report window, which includes a description of the LPAR host, a summary of the partition configuration, and the projected capacity available (see Host Summary Report).

2. Click the Partition Detail button to display the Partition Detail Report window, which shows each partition as entered, with its capacity expectation (see Partition Detail Capacity Report).

3. Click the Partition Utilized Capacity button to display the Utilized Capacity Report window (see Utilized Capacity Report). This button is enabled only if the entire LPAR host and its entire partition configuration was created from EDF or RMF.

Note that there is no output capability for the LPAR Host and Partition Configuration window. A complete review of the LPAR host and its partition configuration, including capacity results, can be obtained as output from the Host Summary Report window and the Partition Detail Report window.

Creating LPAR Configuration from EDF
An EDF (Enterprise Data File) can be used to create the entire LPAR host and partition configuration or to copy individual partition definitions into a currently active LPAR configuration. A single EDF interval must be chosen, from which the requested information will be drawn. For detailed information on EDFs, see EDF Overview.

From zPCR’s Host and Partition Configuration window, there are two ways that configuration information can be obtained from an EDF. The EDF file extension must be “.edf” or “.txt”.

1. In the Define LPAR Host Processor group box, under Create Host and Partitions From, click the EDF button to create the entire LPAR configuration (LPAR host processor and some or all of its partitions). This button is enabled only when the LPAR host has yet to be defined (i.e., a new LPAR configuration). This capability allows you to quickly build the LPAR host and its entire partition configuration, representing the current operating environment.

2. In the Define Partitions group box, under Copy Partitions From, click the EDF button to copy some or all partition definitions into a current LPAR configuration. This button is enabled only when the LPAR host processor has already been defined. This capability allows the addition of existing partitions to an LPAR configuration.

As an alternative to clicking these buttons, an EDF file can be dragged and dropped onto either of these EDF buttons when it is active.

Use of either button will display the EDF Interval Selection window (see EDF Interval Selection) from which an EDF report can be loaded. Once an EDF interval is selected, click the Show Partitions button to display the Create LPAR Configuration from EDF or Get Partitions from EDF window (see Get Partitions from EDF).
Creating LPAR Configuration from RMF

A z/OS RMF Report can be used to create the entire LPAR host and partition configuration or to copy individual partition definitions into a currently active LPAR configuration. A single RMF interval must be chosen, from which the requested information will be drawn. For detailed information on RMFs, see RMF Overview.

From zPCR’s Host and Partition Configuration window, there are two ways that configuration information can be obtained from RMF. The RMF file extension must be “.rmf” or “.txt”.

1. In the Define LPAR Host Processor group box, under Create Host and Partitions From, click the RMF button to create the entire LPAR configuration (LPAR host processor and some or all of its partitions) This button is enabled only when the LPAR host has yet to be defined (i.e., a new LPAR configuration). This capability allows you to quickly build the entire LPAR host and partition configuration model that represents a current operating environment.

2. In the Define Partitions group box, under Copy Partitions From, click the RMF button to copy some or all partition definitions into a current LPAR configuration. This button is enabled only when the LPAR host processor has already been defined. This capability allows the addition of existing partitions to a current study.

As an alternative to clicking the buttons, an RMF file can be dragged and dropped onto either of the RMF buttons when the button is active.

Use of either button will display the RMF Interval Selection window (see RMF Interval Selection) from which an RMF report can be loaded. Once an RMF interval is selected, click the Show Partitions button to display the Create LPAR Configuration from RMF or Get Partitions from RMF window (see Get Partitions from RMF).

Creating LPAR Configuration from a zPCR Study

From zPCR’s Host and Partition Configuration window, there are two ways that configuration information can be obtained from a previous zPCR study. The study file extension must be “.zpcr”.

1. In the Define LPAR Host Processor group box, under Create Host and Partitions From, click the zPCR Study button to create the entire LPAR configuration (LPAR host processor and all of its partitions) This button is enabled only when the LPAR host has yet to be defined (i.e., a new LPAR configuration). This capability allows you to quickly build the LPAR host and its entire partition configuration, using information previously defined.

2. In the Define Partitions group box, under Copy Partitions From, click the zPCR Study button to copy some or all partition definitions into a current LPAR configuration. This button is enabled only when the LPAR host processor has already been defined. This capability allows the addition of existing partitions to an LPAR configuration.

As an alternative to clicking the buttons, a zPCR study file can be dragged and dropped onto either of the zPCR Study buttons when it is active. For details concerning these transfers, see Create Host and Partitions from Study.
LPAR Host Processor

LPAR Configuration Capacity Planning

The LPAR Host window is accessed from the LPAR Host and Partition Configuration window by clicking the Specify Host button. From this window, any IBM mainframe processor model may be defined as the LPAR host for the configuration.

Make selections as follows:

1. Choose the IBM brand as Z or LinuxONE.
2. Choose a processor family using the Family dropdown list.
3. Choose the processor speed using the Speed Class dropdown list.
4. Choose the processor model using the Model dropdown list.
5. Set the number of CPs for each of the engine types that are to be configured using the dropdown lists provided.

Every processor family and model has a limit on the total number of CPs that can be configured. As the various types of CPs are added to the host configuration, the count of potential CPs remaining is reduced. Text below the Configure Real CP Types group box indicates the configured CP status.

For EC processor families with a Speed Class setting less than the highest, the number of General Purpose CPs that can be configured is limited, and may be less that the total CPs available. For these cases, the GP count is limited to that maximum.
For BC processor families, the number of General Purpose CPs that can be configured is limited, and may be less than the total CPs available. For these cases, the GP count is limited to that maximum.

For several older processor families (prior to z9), the *Speed Class* dictates the actual number of General Purpose CPs configured. In these cases the GP count will be set and the dropdown selection will be blocked.

Certain specialty CP types are not supported on specific processor families. In these cases, the CP type dropdown will not appear.

Notes:

1. z14, z13, and z13s processors do not support zAAP CPs. The zAAP CP type will be omitted from the *Configure Real CP Types* group box.
   If converting a LPAR host with zAAP CP configured, the zAAP associated partitions will need to be converted to zIIP associated partitions manually.

2. LinuxONE processors can only be configured with IFL CPs, and, optionally, 1 GP CP. zAAP, zIIP, and ICF CP types will be omitted from the *Configure Real CP Types* group box.

3. The LinuxONE Rockhopper 2828 models are actually known as 2828-H06 and 2828-H13. However, in zPCR they are identified as 2828-L06 and 2828-L13. This change was necessary in order to differentiate the LinuxONE models from the equally named zBC12 models.

The specific partition configuration that can be defined will be dependent on the processor family, model, and CP configuration selected, based on the following items:

- Maximum number of partitions that may be configured
- Number of General Purpose real CPs configured
- Number of zAAP real CPs configured (there are rules about how many CPs relative to General Purpose CPs can be defined while remaining a standard zAAP configuration).
- Number of zIIP real CPs configured (there are rules about how many CPs relative to General Purpose CPs can be defined while remaining a standard zAAP configuration).
- Number of IFL real CPs configured
- Number of ICF real CPs configured

**Switching the LPAR host from LinuxONE to Z**

The LPAR host can be changed from LinuxONE to Z since all LinuxONE CP types are supported. All defined real CPs and defined partitions will be transferred.

The LPAR host cannot be changed from Z to LinuxONE. This is because most Z CP types are not supported on LinuxONE. In addition, there are limitations concerning the number of GP CPs allowed on LinuxONE.

**SCPs that can be defined to Partitions**

Note: The z14 can only be IPL’d in z/Architecture mode. Therefore, some older versions of SCPs cannot be run. zPCR supports SCP versions for both z/OS and z/VM. When migrating to a z14 host, old versions of these SCPs will be converted to a default version that will IPL. For all other SCPs, zPCR assumes that a supported version will be used.
z/OS can be defined to General Purpose partitions on any Z processor model. **LinuxONE** allows a single GP CP, which must be assigned with z/OS.

- On z14, z13, and z13s processors, z/OS-1.13 or later must be specified.
- On zEC12 and zBC12 processors, z/OS-1.10 or later must be specified.
- On z196, z114, and z10 processors, z/OS-1.7 or later must be specified.
- On z9 processors and prior, z/OS version or later may be specified.

If changing an older LPAR host to a z13, z13s, zEC12, zBC12, z196, z114, z10 EC, or z10 BC processor model, partitions defined with older versions of z/OS must be converted to a newer version in order for partition definitions to be valid. Note that, changing the z/OS version will have no effect on capacity results, since all capacity data is drawn from the same z/OS LSPR table.

When supported by the specified z/OS version, zAAP LCPs and zIIP LCPs can also be associated with the z/OS partition.

If changing an older LPAR host to a z14, z13, or z13s, zAAP CPs are no longer supported. GP partitions with associated zAAP logical CPs must be converted to use zIIP logical CPs. Any zAAP workload must run on zIIP LCPs using “zAAP on zIIP capability.”

z/VM can be defined to General Purpose or IFL partitions on Z or to IFL partitions on **LinuxONE**. A z/VM image is generally limited to 32 CPs (on z13 and z14 the limit can be 64 when SMT is not enabled). When z/VM is run in an IFL partition, Linux guests must be assumed.

**z/VSE** can only be assigned to Z General Purpose partitions. A maximum of four logical CPs is supported by **zPCR**.

**KVM** can be defined to General Purpose or IFL partitions on Z (z14, z13, z13s, zEC12, and zBC12 processor models) and **LinuxONE**. A KVM image can support any number of CPs.

**Linux** can be defined to General Purpose or IFL partitions on any Z or **LinuxONE** processor model. A Linux image can support any number of CPs.

**zAware** can be defined to General Purpose or IFL partitions on Z (z13, z13s, zEC12, and zBC12 processors only). For a single zAware image, a limit of 16 CPs is currently enforced by **zPCR**. Starting with the z14, zAware should be defined as **SSC**.

**zACI** can be defined to General Purpose or IFL partitions on Z (z13, z13s, zEC12, and zBC12 processors only). For a single zACI image, a limit of 16 CPs is currently enforced by **zPCR**. Starting with the z14, zAware should be defined as **SSC**.

**SSC** (Secure Service Container) can be defined to General Purpose or IFL partitions on Z (z14, z13, and z13s processors only). For a single SSC image, a limit of 16 CPs is currently enforced by **zPCR**. SSC is intended to replace zACI. zAware, as well as other applications can be run in an SSC.

**CFCC** can be defined to General Purpose or ICF partitions on any Z processor model. A CFCC image is limited to supporting 16 CPs on all processor models.

**Note:** If the LPAR host is changed to a processor model that does not support one of the z/OS or z/VM versions currently defined to a partition, a dialog will offer the chance to convert to a supported version or to cancel the change.
Controls
Click the Return toolbar icon to accept your host specification. At least 1 General Purpose, IFL, or ICF must be configured. If a nonstandard zAAP or zIIP CP configuration is detected, a dialog will be posted providing a checkbox to justify the reason for being nonstandard. If not justified, zAAP and zIIP CPs will be restored to be the maximum allowed for a standard configuration.

Click the Cancel toolbar icon to discard your changes.
In either case you will return to the LPAR Host and Partition Configuration window, where the LPAR host specification is summarized.

Power-Save Mode
Applies to Z (z14, z13, zEC12 and z196) and LinuxONE Emperor only.
While normally run at full power, these families can also be run in Power-Save mode. Power-Save mode reduces the processor capacity (all CP types are affected equally) and the MSU rating, while also reducing power requirements. All processor models default to full-power. When defined as a model in one of these families, the LPAR Host window provides a means to set it so that capacity results will represent its operation in Power-Save mode.

To change to Power-Save mode, click the Saving radio button in the Power Mode group box. If the LPAR host is configured for Power-Save mode, all capacity reporting windows will indicate so in the title area.

Absolute Capping
Applies to Z (z14, z13, z13s, zEC12, and zBC12 only) and LinuxONE.
In addition to specifying Simple Capping for a partition, a value, expressed as a fractional number of logical CPs may also be provided. Doing so will establish an increased Maximum Capacity result for the partition. For cases where the LPAR host supports Absolute Capping, the related metrics can be entered on the Partition Detail Report window.

Nonstandard zAAP or zIIP Configurations
Standard configurations for zAAPs and for zIIPs limit the number of CPs of either type in relation to the number of General Purpose CPs configured.
- z14, z13, and z13s processors, zIIP CPs cannot exceed 2 for each GP CP.
- zEC12 and zBC12 processors, zAAP or zIIP CPs cannot exceed 2 for each GP CP.
- All other Z platforms, zAAP or zIIP CPs cannot exceed 1 for each GP CP.

With certain processor upgrade scenarios, the number of zAAP and zIIP CPs allowed is based on the number previously installed, and therefore the new LPAR host could become a nonstandard zAAP/zIIP configuration.

When defining the LPAR host, if a nonstandard zAAP or zIIP configuration is detected, a Notice dialog is offered with a checkbox to suggest the reason for being nonstandard. If checked, the nonstandard configuration will be allowed. If not checked, the zAAP and zIIP CPs will revert to those of a standard configuration.
Whenever a nonstandard zAAP/zIIP configuration has been defined, all subsequent windows will indicate such. Should the nonstandard configuration be changed to become standard, the nonstandard status is removed.

**zAAP on zIIP Capability**

On zEC12, zBC12, z196, z114, z10, and z9 processors, GP partitions can be configured to run zAAP eligible work on zIIP engines (*zAAP on zIIP*). On z13 and later processor families, zAAP eligible work must be run on zIIP engines.

When *zAAP on zIIP* is enabled for a GP partition, the following rules apply:

- zAAP logical CPs cannot be used by the GP partition, and, therefore, should not be associated with the GP partition.
- z/OS-1.11 is enhanced to allow use of this capability. z/OS-1.10 and z/OS-1.9 require a PTF to make use of this capability. The SCP for GP partitions with zAAP eligible work should be specified as z/OS-1.9 or later.

In **zPCR**, if *zAAP on zIIP* is to be assumed for a GP partition, then only zIIP logical CPs should be associated with it.

**LPAR Host Hardware Designations**

*zPCR* enforces the configuration rules applicable for each processor family.

For older and for lesser capacity families, the processor model designation indicates the specific number of General Purpose CPs configured. The number of specialty engines (zAAPs, zIIPs, IFLs, and ICFs) that can be configured is unique to each model, depending on whether supported by the family, and depending on the number of CPs available to be configured as such. zAAP CPs are not supported on z900 and z800 processors. zIIP CPs are not supported on z900, z800, z990 and z890 processors. IFL and ICF CPs are supported on all Z families.

Note: z900, z800, z990 and z890 processors are no longer supported by **zPCR** as an LPAR host.

The z14 and z13 processor families (drawer-based) and zEC12, z196, z10 EC, z9 EC, and z990 processor families (book-based), have a designation method where the model number indicates the number of books/drawers and the maximum number of CPs that can be configured. The actual number of General Purpose CPs (limitations apply for some models) and each of the other CP types are configured independently.

The z13s, zBC12, z114, and z10 BC processor families have a designation method where the model number indicates the maximum number of CPs that can be configured. The number of General Purpose CPs is limited to a subset of the total, and are based on the specific z/OS model designated. Each of the other CP types are configured independently.

The z14 3907-ZR1 has an additional metric specifying the maximum number of real CPs that can be configured. These are **Max4**, **Max12**, **Max24**, and **Max30**. This information is part of the **Model** specification (e.g., 3907-ZR1(Max30)/Z00).
IBM Z Processor Models

IBM z14 (3906)
When configuring, there is a choice of 5 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3906-M01</td>
<td>1 drawer; up to 33 CPs may be configured</td>
</tr>
<tr>
<td>3906-M02</td>
<td>2 drawers; up to 69 CPs may be configured</td>
</tr>
<tr>
<td>3906-M03</td>
<td>3 drawers; up to 105 CPs may be configured</td>
</tr>
<tr>
<td>3906-M04</td>
<td>4 drawers; up to 141 CPs may be configured</td>
</tr>
<tr>
<td>3906-M05</td>
<td>4 drawers; up to 170 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 4 General Purpose CP Speed Classes, the 400, 500, 600, and 700 (the 700 is the full speed model). No more than 33 General Purpose CPs can be configured for the 400, 500, and 600, while up to 170 can be configured for the 700. All General Purpose CPs must be the same speed class. The z14/400 is the only speed class that can be configured with no General Purpose CPs.

Any available CP can be configured as a General Purpose CP (within the limits described above for the 400, 500, and 600), as a zIIP (standard zIIP configurations are limited to 2X the number of General Purpose CPs), as an IFL, or as an ICF. Note that zAAP CPs are not available on the z14. Former zAAP workload must be run on zIIP CPs using “zAAP on zIIP” capability.

zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

IBM z14 (3907-ZR1)
When configuring, there is a single model

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3907-ZR1</td>
<td>1 drawer; up to 30 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 26 General Purpose CP Speed Classes, A, B, C, D…Z (Z is the full speed model). A maximum of 6 General Purpose CPs can be designated (for example 2965-Z01, Z02, Z03, Z04, Z05, or Z06). All General Purpose CPs must be the same speed class. The z14/A00 is the only speed class that can be configured with no General Purpose CPs.

After the General Purpose CPs are designated, any available CP can be configured as a zIIP (standard zIIP configurations are limited to 2X the number of General Purpose CPs), as an IFL, or as an ICF.

zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

A configuration specification limits number of real CPs that can be configured:
- Max4 – maximum number of CPs is 4 (slight performance penalty)
- Max12 – maximum number of CPs is 12
- Max24 – maximum number of CPs is 24
- Max30 – maximum number of CPs is 30

Note: When not specified, Max30 is assumed.
IBM z13 (2964)
When configuring, there is a choice of 5 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>2964-N30</td>
<td>1 drawer; up to 30 CPs may be configured</td>
</tr>
<tr>
<td>2964-N63</td>
<td>2 drawers; up to 63 CPs may be configured</td>
</tr>
<tr>
<td>2964-N96</td>
<td>3 drawers; up to 96 CPs may be configured</td>
</tr>
<tr>
<td>2964-NC9</td>
<td>4 drawers; up to 129 CPs may be configured</td>
</tr>
<tr>
<td>2964-NE1</td>
<td>4 drawers; up to 141 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 4 General Purpose CP *Speed Classes*, the 400, 500, 600, and 700 (the 700 is the full speed model). No more than 30 General Purpose CPs can be configured for the 400, 500, and 600, while up to 141 can be configured for the 700. All General Purpose CPs must be the same speed class. The z13/400 is the only speed class that can be configured with no General Purpose CPs.

Any available CP can be configured as a General Purpose CP (within the limits described above for the 400, 500, and 600), as a zIIP (standard zIIP configurations are limited to 2X the number of General Purpose CPs), as an IFL, or as an ICF.

Note that zAAP CPs are not available on the z13. Former zAAP workload must be run on zIIP CPs using “zAAP on zIIP” capability.

zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

IBM z13s (2965)
When configuring, there is a choice of 2 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>2965-N10</td>
<td>1 drawer; up to 10 CPs may be configured</td>
</tr>
<tr>
<td>2965-N20</td>
<td>2 drawers; up to 20 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 26 General Purpose CP *Speed Classes, A, B, C, D…Z* (Z is the full speed model). A maximum of 6 General Purpose CPs can be designated (for example 2965-Z01, Z02, Z03, Z04, Z05, or Z06). All General Purpose CPs must be the same speed class. The z13s/A00 is the only speed class that can be configured with no General Purpose CPs.

After the General Purpose CPs are designated, any available CP can be configured as a zIIP (standard zIIP configurations are limited to 2X the number of General Purpose CPs), as an IFL, or as an ICF.

zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.
### IBM zEnterprise EC12 (zEC12)

**When configuring, there is a choice of 5 models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2827-H20</td>
<td>1 book; up to 20 CPs may be configured</td>
</tr>
<tr>
<td>2827-H43</td>
<td>2 books; up to 43 CPs may be configured</td>
</tr>
<tr>
<td>2827-H66</td>
<td>3 books; up to 66 CPs may be configured</td>
</tr>
<tr>
<td>2827-H89</td>
<td>4 books; up to 89 CPs may be configured</td>
</tr>
<tr>
<td>2827-HA1</td>
<td>4 books; up to 101 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 4 General Purpose CP **Speed Classes**, the 400, 500, 600, and 700 (the 700 is the full speed model). No more than 20 General Purpose CPs can be configured for the 400, 500, and 600, while up to 101 can be configured for the 700. All General Purpose CPs must be the same speed class. The zEC12/400 is the only speed class that can be configured with no General Purpose CPs.

Any available CP can be configured as a General Purpose CP (within the limits described above for the 400, 500, and 600), as a zAAP (standard zAAP configurations are limited to 2X the number of General Purpose CPs), as a zIIP (standard zIIP configurations are limited to 2X the number of General Purpose CPs), as an IFL, or as an ICF.

zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

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### IBM zEnterprise BC12 (zBC12)

**When configuring, there is a choice of 2 models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2828-H06</td>
<td>1 drawer; up to 6 CPs may be configured</td>
</tr>
<tr>
<td>2828-H13</td>
<td>2 drawers; up to 13 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 26 General Purpose CP **Speed Classes, A, B, C, D...Z** (Z is the full speed model). A maximum of 6 General Purpose CPs can be designated (for example 2828-Z01, Z02, Z03, Z04, Z05, or Z06). All General Purpose CPs must be the same speed class. The z12BC/A00 is the only speed class that can be configured with no General Purpose CPs.

After the General Purpose CPs are designated, any available CP can be configured as a zAAP (standard zAAP configurations are limited to 2X the number of General Purpose CPs), as a zIIP (standard zIIP configurations are limited to 2X the number of General Purpose CPs), as an IFL, or as an ICF.

zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.
IBM zEnterprise 196 (z196)

When configuring, there is a choice of 5 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2817-M15</td>
<td>1 book; up to 15 CPs may be configured</td>
</tr>
<tr>
<td>2817-M32</td>
<td>2 books; up to 32 CPs may be configured</td>
</tr>
<tr>
<td>2817-M49</td>
<td>3 books; up to 49 CPs may be configured</td>
</tr>
<tr>
<td>2817-M66</td>
<td>4 books, up to 66 CPs may be configured</td>
</tr>
<tr>
<td>2817-M80</td>
<td>4 books; up to 80 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 4 General Purpose CP Speed Classes, the 400, 500, 600, and 700 (the 700 is the full speed model). No more than 15 General Purpose CPs can be configured for the 400, 500, and 600, while up to 80 can be configured for the 700. All General Purpose CPs must be the same speed class. The z196/700 speed class is the only z196 host that can be configured with no General Purpose CPs.

Any available CP can be configured as a General Purpose CP (within the limits described above for the 400, 500, and 600), as a zAAP (standard zAAP configurations are limited to the number of General Purpose CPs), as a zIIP (standard zIIP configurations are limited to the number of General Purpose CPs), as an IFL, or as an ICF (limited to 16).

zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

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IBM zEnterprise 114 (z114)

When configuring, there is a choice of 2 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2818-M05</td>
<td>1 drawer; up to 5 CPs may be configured</td>
</tr>
<tr>
<td>2818-M10</td>
<td>2 drawers; up to 10 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 26 General Purpose CP Speed Classes, A, B, C, D…Z (Z is the full speed model). A maximum of 5 General Purpose CPs can be designated (for example 2818-Z01, Z02, Z03, Z04, or Z05). All General Purpose CPs must be the same speed class. The z114/A00 is the only speed class that can be configured with no General Purpose CPs.

After the General Purpose CPs are designated, any available CP can be configured as a zAAP (standard zAAP configurations are limited to the number of General Purpose CPs), as a zIIP (standard zIIP configurations are limited to the number of General Purpose CPs), as an IFL, or as an ICF.

zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.
IBM System z10 EC
When configuring, there is a choice of 5 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2097-E12</td>
<td>1 book; up to 12 CPs may be configured</td>
</tr>
<tr>
<td>2097-E26</td>
<td>2 books; up to 26 CPs may be configured</td>
</tr>
<tr>
<td>2097-E40</td>
<td>3 books; up to 40 CPs may be configured</td>
</tr>
<tr>
<td>2097-E56</td>
<td>4 books; up to 56 CPs may be configured</td>
</tr>
<tr>
<td>2097-E64</td>
<td>4 books; up to 64 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 4 General Purpose CP Speed Classes, the 400, 500, 600, and 700 (the 700 is the full speed model). No more than 12 General Purpose CPs can be configured for the 400, 500, and 600, while up to 64 can be configured for the 700. All General Purpose CPs configured must be the same speed class. The z10 EC/700 is the only speed class that can be configured with no General Purpose CPs.

Any available CP can be configured as a General Purpose CP (within the limits described above for the 400, 500, and 600), as a zAAP (standard zAAP configurations are limited to the number of General Purpose CPs), as a zIIP (standard zAAP configurations are limited to the number of General Purpose CPs), as an IFL, or as an ICF (limited to 16).

zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

IBM System z10 BC
When configuring, there is a single model

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2098-E10</td>
<td>1 drawer; up to 10 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 26 General Purpose CP Speed Classes, A, B, C, D…Z (Z is the full speed model). A maximum of 5 General Purpose CPs can be designated (for example 2098-Z01, Z02, Z03, Z04, or Z05). All General Purpose CPs must be the same speed class. The z10 BC/A00 is the only speed class that can be configured with no General Purpose CPs.

After the General Purpose CPs are designated, any available CP can be configured as a zAAP (standard zAAP configurations are limited to the number of General Purpose CPs), as a zIIP (standard zIIP configurations are limited to the number of General Purpose CPs), as an IFL, or as an ICF.

zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.
IBM System z9 EC

When configuring, there is a choice of 5 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2094-S08</td>
<td>1 book; up to 8 CPs may be configured</td>
</tr>
<tr>
<td>2094-S18</td>
<td>2 books; up to 18 CPs may be configured</td>
</tr>
<tr>
<td>2094-S28</td>
<td>3 books; up to 28 CPs may be configured</td>
</tr>
<tr>
<td>2094-S38</td>
<td>4 books; up to 38 CPs may be configured</td>
</tr>
<tr>
<td>2094-S54</td>
<td>4 books; up to 54 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 4 General Purpose CP Speed Classes, the 400, 500, 600, and 700 (the 700 is the full speed model). No more than 8 General Purpose CPs can be configured for the 400, 500, and 600, while up to 54 can be configured for the 700. All General Purpose CPs configured must be the same speed class. The z9 EC/700 is the only speed class that can be configured with no General Purpose CPs.

Any available CP can be configured as a General Purpose CP (within the limits described above for the 400, 500, and 600), as a zAAP (standard zAAP configurations are limited to the number of General Purpose CPs), as a zIIP (standard zIIP configurations are limited to the number of General Purpose CPs), as an IFL, or as an ICF (limited to 16). zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

IBM System z9 BC

When configuring, there is a choice of 2 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2096-R07</td>
<td>1 drawer; up to 6 CPs may be configured</td>
</tr>
<tr>
<td>2096-S07</td>
<td>1 drawer; up to 7 CPs may be configured</td>
</tr>
</tbody>
</table>

There are 26 General Purpose CP Speed Classes, A, B, C, D…Z (Z is the full speed model). Speeds A through J can be configured on the 2096-R07. Speeds K through Z may be configured on the 2096-S07. Depending on the speed, a maximum of 4 General Purpose CPs can be designated (for example 2096-Z01, Z02, Z03, or Z04). All General Purpose CPs must be the same speed class. The z9 BC/Z00 is the only speed class that can be configured with no General Purpose CPs.

After the General Purpose CPs are designated, any available CP can be configured as a zAAP (standard zAAP configurations are limited to the number of General Purpose CPs), as a zIIP (standard zIIP configurations are limited to the number of General Purpose CPs), as an IFL, or as an ICF.

zAAPs, zIIPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.
**Note**: Processors on this page may no longer be defined in **zPCR** as an LPAR host. They do remain visible in the **LSPR ITRR Table** windows when “**All Families**” is selected.

<table>
<thead>
<tr>
<th><strong>IBM zSeries 990</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>When configuring, there is a choice of 4 models</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2084-A08</strong></td>
<td>1 book; up to 8 CPs may be configured</td>
</tr>
<tr>
<td><strong>2084-B16</strong></td>
<td>2 books; up to 16 CPs may be configured</td>
</tr>
<tr>
<td><strong>2084-C24</strong></td>
<td>3 books; up to 24 CPs may be configured</td>
</tr>
<tr>
<td><strong>2084-D32</strong></td>
<td>4 books, up to 32 CPs may be configured</td>
</tr>
</tbody>
</table>

Any available CP can be configured as a General Purpose CP, a zAAP (limited to the number of General Purpose CPs), an IFL, or an ICF (limited to 16). There is only 1 **Speed Class** for the z990.

All z990 CPs are the same speed regardless of the type assigned.

The z990 operates with 2 CP pools:
- 1st pool is for General Purpose CPs
- 2nd pool is for zAAP/IFL/ICF CPs

<table>
<thead>
<tr>
<th><strong>IBM zSeries 890</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>When configuring, there is a choice of 4 models</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2086-070</strong></td>
<td>No General Purpose CPs, IFL and ICF only</td>
</tr>
<tr>
<td><strong>2086-1x0</strong></td>
<td>1 General Purpose CP</td>
</tr>
<tr>
<td><strong>2086-2x0</strong></td>
<td>2 General Purpose CPs</td>
</tr>
<tr>
<td><strong>2086-3x0</strong></td>
<td>3 General Purpose CPs</td>
</tr>
<tr>
<td><strong>2086-4x0</strong></td>
<td>4 General Purpose CPs</td>
</tr>
</tbody>
</table>

Up to 4 CPs can be configured on any model above. The number of General Purpose CPs is based on the model selection above. The remaining CPs can be assigned as zAAP (limited to the number of General Purpose CPs), as IFL, or as ICF. There are 7 General Purpose **Speed Classes**, designated as 1 (slowest) through 7 (full-speed). For the General Purpose models above, substitute the “**X**” with the desired speed.

zAAPs, IFLs, and ICFs are always full speed CPs regardless of the General Purpose CP speed class installed.

The z890 operates with 2 CP pools:
- 1st pool is for General Purpose CPs
- 2nd pool is for zAAP/IFL/ICF CPs
# LinuxONE Processor Models

**IBM LinuxONE Emperor II (3906)**
When configuring, there is a choice of 5 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>3906-LM1</td>
<td>1 drawer; up to 33 CPs may be configured</td>
</tr>
<tr>
<td>3906-LM2</td>
<td>2 drawers; up to 69 CPs may be configured</td>
</tr>
<tr>
<td>3906-LM3</td>
<td>3 drawers; up to 105 CPs may be configured</td>
</tr>
<tr>
<td>3906-LM4</td>
<td>4 drawers; up to 141 CPs may be configured</td>
</tr>
<tr>
<td>3906-LM5</td>
<td>4 drawers; up to 170 CPs may be configured</td>
</tr>
</tbody>
</table>

The **Speed Class** must be designated as /400.
A maximum of one General Purpose CP may be configured (seen by z/OS as 3906-401). Remaining CPs may be only be configured as IFLs.

**IBM LinuxONE Emperor (2964)**
When configuring, there is a choice of 5 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2964-L30</td>
<td>1 drawer; up to 30 CPs may be configured</td>
</tr>
<tr>
<td>2964-L63</td>
<td>2 drawers; up to 63 CPs may be configured</td>
</tr>
<tr>
<td>2964-L96</td>
<td>3 drawers; up to 96 CPs may be configured</td>
</tr>
<tr>
<td>2964-LC9</td>
<td>4 drawers; up to 129 CPs may be configured</td>
</tr>
<tr>
<td>2964-LE1</td>
<td>4 drawers; up to 141 CPs may be configured</td>
</tr>
</tbody>
</table>

The **Speed Class** must be designated as /400.
A maximum of one General Purpose CP may be configured (seen by z/OS as 2964-401). Remaining CPs may be only be configured as IFLs.
## LinuxONE Rockhopper Models

### IBM LinuxONE Rockhopper II (3907)

When configuring, there is 1 model

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3907-LR1</td>
<td>1 drawer; up to 30 CPs may be configured</td>
</tr>
</tbody>
</table>

The *Speed Class* may be designated as /A00 (no GP CPs) or /C00 (1 GP CP seen by z/OS as 3907-C01).

A maximum of one General Purpose CP may be configured. Remaining CPs may be only be configured as IFLs.

A configuration specification limits number of real CPs that can be configured:
- **Max4** – maximum number of CPs is 4 (slight performance penalty)
- **Max12** – maximum number of CPs is 12
- **Max24** – maximum number of CPs is 24
- **Max30** – maximum number of CPs is 30

Note: When not specified, **Max30** is assumed.

### IBM LinuxONE Rockhopper (2965)

When configuring, there is a choice of 2 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2965-L10</td>
<td>1 drawer; up to 10 CPs may be configured</td>
</tr>
<tr>
<td>2965-L20</td>
<td>2 drawers; up to 20 CPs may be configured</td>
</tr>
</tbody>
</table>

The *Speed Class* may be designated as /A00 (no GP CPs) or /C00 (1 GP CP seen by z/OS as 2965-C01).

A maximum of one General Purpose CP may be configured. Remaining CPs may be only be configured as IFLs.

### IBM LinuxONE Rockhopper (2828)

When configuring, there is a choice of 2 models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2828-H06</td>
<td>1 drawer; up to 6 CPs may be configured</td>
</tr>
<tr>
<td>2828-H13</td>
<td>2 drawers; up to 13 CPs may be configured</td>
</tr>
</tbody>
</table>

The *Speed Class* must be designated as /A00 (no GP CPs) or /F00 (1 GP CP seen by z/OS as 2828-F01).

A maximum of one General Purpose CP may be configured. Remaining CPs may be only be configured as IFLs.

Notice: In zPCR, the references to these models is as follows:
- **2828-H06** will appear as **2828-L06**
- **2828-H13** will appear as **2828-L13**

This change was necessary in order to differentiate the LinuxONE models from the equally named zBC12 models.
Specify the LPAR host’s real CP configuration using the dropdown list provided for each of the following categories:

- **General Purpose**
  On Z14, Z13, zEC12, Z196, Z10 EC, and Z9 EC processors, the range allowed is implied by the model specification, and you must provide a number. On Z14-ZR1, Z13s, ZBC12, Z114, Z10 BC, and Z9 BC processors, this number is limited, based on the model specification.

  On **LinuxONE** processors, a single special purpose GP may optionally be defined.

- **zAAP**
  May only be configured on Z14, Z13, Z114, Z10 EC, Z10 BC, Z9 EC, and Z9 BC processors. The maximum number of standard zAAPs is generally restricted, based on the total number of General Purpose CPs configured.

- **zIIP**
  May only be configured on Z14, Z14-ZR1, Z13, Z13s, ZEC12, ZBC12, Z114, Z10 EC, Z10 BC, Z9 EC, and Z9 BC processors. The maximum number of zIIPs is generally restricted, based on the total number of General Purpose CPs configured.

- **IFL**
  May be configured on any Z or LinuxONE processor.

- **ICF**
  May be configured on any Z processor. For Z14, Z14-ZR1, Z13, Z13s, and ZEC12 processors any number of the CPs configured may be ICF. For all other processor families, the maximum number of ICF CPs is limited to 16.

Notes:

1. Engine assignment is validated by CP type as you make your choices. Therefore, you cannot specify more of any type than are available to be configured on the host processor model you have chosen.

2. zAAP and zIIP logical CPs assigned to a z/OS partition are considered by **zPCR** as separate partitions in order to report capacity. However, these zAAP and zIIP partitions do not count towards the partition limit of the family being configured.

3. zAAPs (ZEC12, ZBC12, Z196, Z114, Z10 EC, Z10 BC, Z9 EC, Z9 BC, Z990, and Z890 processors), zIIPs (Z14, Z14-ZR1, Z13, Z13s, ZEC12, ZBC12, Z196, Z114, Z10 EC, Z10 BC, Z9 EC, and Z9 BC processors), IFLs, and ICFs are configured separately. On Z14, Z13, Z13s, ZEC12, ZBC12, Z196, Z114, Z10 EC, Z10 BC, Z9 EC, and Z9 BC processors, each of these CP types operates as a separate CP pool. On Z990 and Z890 families, these 4 specialty engine types operate as a single pool, and any zAAP, IFL, or ICF partition may be configured to use any/all of the CPs in the pool, after DED/SHR rules are applied. This reflects the way the hardware actually works, but does not reflect any usage restrictions implied by the specific processor features that have been ordered and are installed.

4. Any SCP may be assigned to a General Purpose partition.
   - z/OS, z/VM, and z/VSE can only be assigned to General Purpose partitions.
o z/VM (running Linux guests), KVM, Linux, zAware, zACI, and SSC can be assigned to an IFL partition.
o CFCC can be assigned to an ICF partition.

5. The workload category assigned to a zAAP or zIIP partition will be identical to that assigned to the associated General Purpose partition, which must be designated with z/OS-1.6 or later.

6. If you reconfigure the LPAR host for which a partition configuration has already been defined, and the reconfiguration causes one or more partitions to become invalid, a dialog box appears, giving you a chance to cancel the change. If you accept the change, any partitions that become invalid will have their \textit{Include} box unchecked; you will need to correct each excluded partition before it can be restored to the LPAR configuration. Any time that a partition has been automatically excluded, must be manually re-included.

On multi-book configurations for zEC12, z196, z10 EC, z9 EC, and z990, \textit{zPCR} recognizes that General Purpose, zAAP, and zIIP CPs are allocated upward, starting in the first book and IFL and ICF CPs are allocated downward, starting in the last book. An intersection of GP/zAAP/zIIP CPs with IFL/ICF CPs can occur in only one book. When such an intersection exists, algorithms apply a partitioning cost that reflects contention between the two CP groups in that book only. The partitioning cost for the CPs in the remaining books will be less. A bar graph is available from the \textit{Partition Detail Report} window showing how these CPs would be allocated and where any contention between them might occur.

On multi-drawer configurations for z14, z13, and z13s, HiperDispatch will attempt to contain all of a partition’s logical CPs within a single drawer. However, the logical CPs of any given partition are not aligned as above, and are likely to land on any drawer.
Partition Definition

LPAR Configuration Capacity Planning

The **Partition Definition** window is accessed from the **LPAR Host and Partition Configuration** window by clicking the **GP** button to define General Purpose partitions, the **IFL** button to define IFL partitions, or the **ICF** button to define ICF partitions.

The **Partition Definition** table (at the top) provides an area where individual partitions are defined to the LPAR host, whose configuration is stated above. The **Partition Summary by Pool** table is presented below, summarizing the current partition definitions for each CP pool. This table is updated dynamically as partitions are added or modified.

When each of the 3 possible **Partition Definition** windows is initially opened, a single default partition of the requested type is automatically defined. This partition definition entry should be modified to match your requirements. Click the **Add** button to create additional partitions of the same type.

When defining additional General Purpose partitions, click the **Add GP** button. When defining partitions for z/OS, associated zAAP/zIIP partitions may also be defined. When defining partitions for z/VM, associated IFL partitions may also be defined.
The **Partition Definition** window serves to enter data defining each logical partition. The following fields comprise each partition’s definition:

- **Include** ✓ Include/exclude this partition in the capacity assessment

### Partition Identification

- **No.** ✓ P The relative partition number (determined by zPCR)
- **Type** ✓ P The real CP pool to which the partition is assigned
- **Name** ✓ E Partition name; assigned default can be modified
- **SCP** ✓ z/OS, z/VM, z/VSE, KVM, Linux, zAware, zACI, SSC, or CFCC may be assigned to a General Purpose partition. z/VM (running Linux guests), KVM, Linux, zAware, zACI, and SSC can be assigned to an IFL partition. CFCC can be assigned to an ICF partition.
- **Workload** ✓ For z/OS, z/VM, z/VSE, KVM, and Linux, 5 workload categories are available. For zAware, the workload must be zAware. For zACI, the workload must be zACI. For SSC, the workload must be SSC. For CFCC, the workload must be CFCC. Note: On z14, use SSC in lieu of zACI and zAware.

### Partition Configuration

- **Mode** ✓ DED (dedicated) or SHR (shared)
- **LCPs** ✓ Number of active logical CPs
- **Weight** ✓ E SHR partitions only; relative weight assigned

### Capping metrics

- ✓ (checkbox) Partition is capped (SHR only)
- **ABS** An Absolute Capping value may be set for Z (z14, z13, z13s, zEC12, zBC12 only) and all LinuxONE. Absolute Capping values cannot be entered on this window; use the **Partition Detail Report** window. For details, see [Absolute Capping](#).
### General Purpose Partitions with Associated Specialty Logical CPs

- **z/OS zAAPs**  
  Number of zAAP logical CPs to be associated with a z/OS-1.6 (or later) partition. This column will appear only if real zAAP CPs have been configured.

- **z/OS zIIPs**  
  Number of zIIP logical CPs to be associated with a z/OS-1.6 (or later) partition. This column will appear only if real zIIP CPs have been configured.

- **z/VM IFLs**  
  Number of IFL logical CPs to be associated with a z/VM partition. The partition must be on a z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, or z10 BC processor and must be designated as **Mode=zVM**. This column will appear only when real IFLs have been configured on the host.

### Specifying Partitions

Upon initial access to this window, a single partition is automatically defined with default values supplied for the input fields. Input fields always have a white background; click on the field to obtain a dropdown list; for fields where manual entry is required, double click to open the field. Fixed and computed fields have a background color other than white. Modify the partition setting entries as desired. The codes below identify the status for each of the partition defining fields above:

- **P**  
  Predefined field displaying generated information

- **E**  
  Entry field; Double click field to open, key in text, and press **Enter**.

- **▼**  
  Dropdown list; Click field to access dropdown list and make selection.

- **✔**  
  Checkbox; Click field to check or un-check.

As partition data is entered, it is validated against the currently specified LPAR host, and the RCP resources remaining. Should an entry make the partition configuration invalid, you will be required to correct it before continuing.

Up to 130 partitions (sum of General Purpose, IFL, and ICF partitions) may be defined in **zPCR**. The maximum number of partitions (General Purpose, IFL, and ICF) that can be active depends on the host processor model selected (GP associated zAAP, zIIP, and IFL partitions do not count against these limits). Once that limit has been exceeded, a subsequently defined partition will have its **Include** un-checked. The partition **✔ Include** checkboxes can be used to test various combinations of partitions on a given host when planning scenarios include many potential partitions and more than one CPC.
Partition Defining Controls

Click the [Add] button to add a new partition defined with default values; then modify the entries as desired.

Click the [Clone] button to make a copy of any single partition definition. In order to clone a partition, a previously defined partition entry must be selected. Click any non-entry field of the desired partition (e.g., the partition number) to select it. The original partition remains selected to accommodate multiple clone actions.

When defining General Purpose partitions, only the GP partitions can be cloned. Any zAAP/zIIP/IFL associated with the GP partition will also be cloned.

Click the [Delete] button to erase an existing partition definition. In order to delete a partition, it must be selected. Click any non-entry field of the desired partition (e.g., the partition number) to select it.

When defining General Purpose partitions, any individual GP, zAAP, zIIP, and IFL partition can be deleted. If deleting a GP partition that has an associated zAAP, zIIP, or IFL partition, the associated partition will also be deleted.

Partition Specification Fields

A number of input fields are provided to configure a partition and define its workload activity. Default values are assumed when new partitions are defined, which should be modified as needed. These input fields are:

☑ Include: Individual partitions that have been defined may be excluded from the capacity analysis by un-checking the partition’s ☑ Include checkbox. When there are specialty logical CPs associated with a General Purpose partition, this setting also applies to them. This action can also be done from the Partition Detail Report window for each individually identified partition.

Partition Identification

 Partition Name: A default name is generated for each new partition as it is added. This name will be a short prefix (default = LP) followed by a dash and a sequential 3 digit number, indicating the order in which the partition was defined. This method assures unique names for each partition. The prefix to be assigned can be specified in the Name prefix entry field. Click on the input field, and enter a new prefix string. A partition name can be changed to any character string by double clicking the field, keying in the name, and pressing Enter.
**SCP**: Must be specified for each partition. When defining General Purpose partitions, z/OS, z/VM, z/VSE, KVM, Linux, zAware, zACI, SSC, or CFCC can be selected. When the partition is not General Purpose, the SCP selection is limited. For IFL partitions, z/VM (running Linux guests), KVM, Linux, zAware, zACI, SSC can be selected. For an ICF partition, CFCC (Coupling Facility Control Code) must be selected. If the SCP for a partition is changed, the workload field is changed to a default value for that SCP. Make your workload selection from the dropdown list provided.

For **z/OS**, a specific version must be selected as the SCP. The z/OS version serves to enforce support rules shown in the table below. If in doubt about the actual version, specify the most recent LSPR measured version (z/OS-2.2).

<table>
<thead>
<tr>
<th>z/OS Version</th>
<th>GP + zAAP/zIIP Maximum LCPs</th>
<th>GP Associated zAAP / zIIP LCPs</th>
<th>z13 and z14 SMT on zIIPs</th>
<th>z10 and Later HiperDispatch</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS-2.3</td>
<td>170 **</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-2.2</td>
<td>141</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-2.1</td>
<td>128</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-1.13</td>
<td>100</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-1.12</td>
<td>100</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-1.11</td>
<td>80</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-1.10</td>
<td>64</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-1.9</td>
<td>64</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-1.8</td>
<td>32</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>z/OS-1.7</td>
<td>32</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>z/OS-1.6</td>
<td>32</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**170 LCPs are supported only on z14, and only if zIIP SMT is not enabled; Otherwise 141 LCPs is the maximum.**
For **z/VM**, a specific version must be selected as the SCP. The version serves to enforce support rules described below.

1. **z/VM-7.1** can only be run on zEC12/zBC12 and later processors.

2. **z/VM-7.1, z/VM-6.4,** and **z/VM-6.3** support a maximum of 64 logical CPs (GP, IFL, or GP+IFL) on z14 and z13. However, if SMT is enabled, the logical CP limit is reduced to 32. On all other processor models, the logical CP limit is 32.
   
   **z/VM-7.1, z/VM-6.4,** or **z/VM-6.3** is required for **LinuxONE** processors. For **LinuxONE Emperor**, the same logical CP configuration rules specified below apply.

3. **z/VM-5.4** is intended to represent all z/VM versions prior to z/VM-6.3. A maximum of 32 logical CPs (GP, IFL, or GP+IFL) is supported. SMT on **Z** z14, z13, and z13s IFLs is not supported.

   If the actual z/VM version being run is prior to z/VM-5.3, a maximum of 16 logical CPs are supported; in this case, you must ensure that no more than 16 logical CPs are defined to such a partition.

   Note: When reading previous study files, any occurrences of SCP = z/VM will automatically be translated to z/VM-6.3.

The table below differentiates the features supported by the various z/VM versions.

<table>
<thead>
<tr>
<th>z/VM Feature Support by Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/VM Version</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>z/VM-7.1</td>
</tr>
<tr>
<td>z/VM-6.4</td>
</tr>
<tr>
<td>z/VM-6.3</td>
</tr>
<tr>
<td>z/VM-6.2</td>
</tr>
<tr>
<td>z/VM-6.1</td>
</tr>
<tr>
<td>z/VM-5.4</td>
</tr>
<tr>
<td>z/VM-5.3</td>
</tr>
<tr>
<td>Prior to 5.3</td>
</tr>
</tbody>
</table>

** 64 LCPs are supported only on z14 and z13, and only if IFL SMT is not enabled; Otherwise 32 LCPs is the maximum

Note that for **Z** (z14, z13, zEC12, z196) and **LinuxONE Emperor**, **Power-Save** mode can be turned on regardless of the SCPs that are running. However, the ability to report on its status is only available from a partition running z/OS-1.10 or later.
When the LPAR host is defined as a **z14** processor, z/OS-1.13 or later must be specified; When the LPAR host is defined as a **z13**, **z13s**, **zEC12**, or **zBC12** processor, z/OS-1.10 or later must be specified; and when the LPAR host processor is defined as a **z196**, **z114**, or **z10** processor, z/OS-1.7 or later must be specified, since prior versions are not supported. The z/OS version selected will not affect capacity results since they are driven off a single LSPR table derived from z/OS-2.2 measurements. While actual capacity relationships may vary somewhat for different z/OS versions, the difference is considered insignificant enough to allow the use of a single LSPR table.

For z/VM-5.4 and later, logical CPs can be General Purpose or IFL CPs. On z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, and z10 BC processors, IFLs can be associated with a General Purpose z/VM if the partition is defined as **Mode=zVM**.

- **Workload**: Must be specified for each partition. Selection is limited to those workloads that are valid for the SCP specified. For **z/OS**, **z/VM**, **z/VSE**, **KVM**, and **Linux**, the workload can be any of the 5 supported workload categories. Make your selection from the dropdown list provided. For **zAware**, **zACI**, **SSC**, and **CFCC**, there is only a single workload selection available.

### Partition Configuration

- **Mode**: Must be specified for each partition as DED (for a dedicated partition) or SHR (for a shared partition). Make your selection from the dropdown list provided.

- **LCPs**: Set the number of active logical CPs to be assigned to the partition. The selection list only includes counts that are valid for the currently defined LPAR host configuration. Adequate real CPs must be available in the pool to which the partition is assigned. Dedicated partitions will remove real CPs from the shared pool.

  Note: There are limitations on the number of logical CPs that can be specified for some SCP/workload environments. For example, z/VM is limited to 32 logical CPs, since that is all it supports. Linux is limited to 32 logical CPs due to the absence of LSPR measurement data.

- **Weight**: Specified for each shared partition. Double click the field, keying in a whole number and press Enter. A default value of 100 is used if no value is provided. The individual weights for partitions in each pool are summed to determine each partition’s weight percentage.

### Capping

- **Capping**: A checkbox used to indicate that a shared partition is to be considered as being capped. Checking the box without entering an ABS value indicates hard capping. This specification can be changed from the **Partition Detail Report** window, discussed later.

  **ABS**: zEC12/zBC12 and later processors only. When the **Capping** box is checked, an **Absolute Capping** value may be provided (note that the value can only be entered from the **Partition Definition** window). The **ABS** value is entered as a fractional N.nn, and must be between zero and the number of logical CPs defined. The minimum value allowed will be dependent on the overall CP pool configuration.

Partitions must initially be defined from the **Partition Definition** window. Once defined, any partition’s definition metrics (of those shown above) can be modified from the **Partition Detail Report** window, discussed later.
**HiperDispatch**

HiperDispatch is supported on z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, and z10 BC processors. Both z/OS and z/VM support HiperDispatch.

z/OS LSPR data for z14, z13, z13s zEC12, zBC12, z196, z114, z10 EC, and z10 BC processors assumes that HiperDispatch is active for defined partitions. HiperDispatch achieves improved performance by attempting to keep workload elements on the same logical (and physical) CP. This aspect of HiperDispatch is inherent in the LSPR data used by zPCR.

HiperDispatch can also improve z/OS performance by dynamically parking partition logical CPs that it considers to be excessive for the workloads competing for the shared CP resource. This aspect of HiperDispatch is not included in the LSPR data or algorithms used by zPCR. To fairly represent capacity for these configurations, **parked logical CPs should not be included when defining the number of shared LCPs for a partition.** When Total LCPs is reduced by Parked LCPs, the result is termed Active LCPs. Parked LCPs are determined from EDF (z/OS or z/VM) or RMF data (z/OS only). Note that a separate input file is required for each partition to obtain parked LCPs.

With EDF input, parked LCPs (GP, zAAP, zIIP, and IFL) can be estimated for z/OS and z/VM partitions that are not represented by an EDF. This capability is available when the EDF interval has been selected and before the configuration is to be transferred into zPCR.

**Special consideration when defining a current operating environment**

For shared partition configurations, zPCR uses the weight percent to allocate processor resource, which is quantified as the **Minimum Capacity** available to each partition. This assumes that every partition is competing for CPU resource, and the partition’s weight percent determines the capacity realized. The sum of the partition **Minimum Capacity** values is taken to be the effective capacity of the LPAR host.

For production workloads, actual partition weights often may not align with the actual distribution of the processor resource. When a shared partition with a significant weight assignment, tends to idle, its presumed processor resource is available to be used by other active partitions. In such cases, it may be better to use the actual partition utilization (from RMF’s **Partition Data Report**) as the weight value in zPCR. In this way, the actual distribution of the processor resource to each partition is represented, resulting in a more accurate capacity projection. When modeling the planned LPAR host replacement, a decision will be necessary concerning the weights to be assigned.

**Associating Specialty Engines with a General Purpose Partition**

zAAP and zIIP engines may be defined as logical CPs associated with a General Purpose partition running a z/OS version that supports them. IFL engines may be defined as logical CPs associated with a General Purpose partition running z/VM (hardware definition for the partition must be **Mode=z/VM**).

Use the buttons in the **Associate with Selected GP** group box to associate a zAAP, zIIP, or IFL partition with a General Purpose partition. To associate a zAAP or zIIP partition with a z/OS partition, select the GP partition and click the [zAAP] or the [zIIP] button. To associate an IFL partition with a z/VM partition, select the GP partition and click the [IFL] button. In each case a default definition for the associated
logical CPs will appear below the General Purpose partition. Modify the default values to the intended settings.

**Entry Fields**

The Default Prefix entry field provides a way to customize partition names as they are defined. When the prefix is changed, it will affect partitions that are subsequently added. The prefix will have a sequential number appended, indicating the order in which the partition was defined (assuring a unique default name for each partition). The default name can be changed to any desired character string.

To change the Default Prefix, click on the entry field to set focus, key in your change, and press Enter.

**Repositioning Partitions**

The sequence of defined partitions can be modified using the Move buttons provided. There are move controls for Top, Bottom, Up, and Down.

Partitions can only be repositioned within their LP pool boundaries. All reports showing multiple LP pools will have the General Purpose pool first, followed by the zAAP, zIIP, IFL, and ICF pools.

Any repositioning done with these controls is retained with a saved study.

**zAAP and zIIP Logical CP Considerations**

zPCR considers zAAP logical CPs that are associated with a z/OS General Purpose partition as a separate zAAP partition, for capacity projection purposes. Likewise, zIIP logical CPs that are associated with a z/OS General Purpose partition are considered as a separate zIIP partition. zAAP partition logical CPs and zIIP partition logical CPs are managed by z/OS. A single central storage is shared by zAAP partitions, zIIP partitions, and each of their associated General Purpose partitions.

When initially created, a zAAP or zIIP partition inherits the associated General Purpose partition’s Number (preceded by an asterisk), Name, SCP, and Workload assignment, which can only be changed by changing that of the General Purpose partition.

A zAAP or zIIP partition’s Mode, Weight and Capping assignment is initialized to default settings, and may be changed to any legitimate value.

On z14, z13, zEC12, zBC12, z196, z114, z10, and z9 processors, the Mode, Weight and Capping assignments are totally independent of the associated z/OS partition.

On z990 and z890 processors, a zAAP partition’s Mode, Weight, and CAP assignment must be set identical to that of the associated General Purpose partition. The user must ensure that the settings are properly set. If the LPAR host is changed from a z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, or z9 BC processor to a z990 or z890 processor, the current Mode, Weight, and CAP settings are retained; the user must adjust them to match those of the associated z/OS partition. It is critical that these settings be accurate, since the zAAP partition weights compete with those of the IFL and ICF partitions which run out of the same CP pool.
IFL Logical CPs Associated with a z/VM General Purpose Partition

zPCR considers IFL logical CPs that are associated with a z/VM General Purpose partition as a separate IFL partition, for capacity projection purposes. The IFL partition is managed by z/VM. A single central storage is shared by the IFL partition and the associated General Purpose logical CPs.

Associated IFL partitions are only allowed on z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, and z10 BC processors.

When initially created, an associated IFL partition inherits the General Purpose partition’s Number (preceded by an asterisk), Name, and SCP assignment, which can only be changed by changing that of the General Purpose partition. The IFL partition’s Workload, Mode, Weight and CAP assignment may be any legitimate value.

Any change to the LPAR host or a partition’s definition that causes it to become invalid will trigger a dialog box explaining the problem, and the partition’s Include box will be unchecked; you will need to correct the excluded partition before it can be restored to the LPAR configuration. Any time that partition has been automatically excluded, it must be manually re-included.

Should the SCP assigned to a partition be changed, and the workload becomes an invalid name for that SCP, “unknown” will appear as the partition’s workload, and the partition will be excluded from the study until a proper workload is selected.

Partition Summary by Pool

A table beneath the partition definitions labeled Partition Summary by Pool provides a summary of the partition resources for each pool. The table is dynamically updated as partitions are added or modified.

Controls

Click the Return toolbar icon to return to the LPAR Host and Partition Configuration window. All partition definitions, as entered, will participate in the capacity assessment.

Click the Add (+) toolbar icon to add another partition, initialized with default settings.

Click the Clone (=) toolbar icon to clone a selected partition.

Click the Delete (x) toolbar icon to delete the selected partition.

Click the Help (?) toolbar icon for help concerning this window.

Menu-bar

Documentation Provides access to the various Notice windows associated with this window
EDF Overview

LPAR Configuration Capacity Planning

An **EDF** (Enterprise Data File) can be used to create the entire LPAR host and partition configuration or to copy individual partition definitions into a currently active LPAR configuration. EDFs can be created from partitions running z/OS or z/VM. Each EDF represents a single partition. EDFs generally represent multiple time intervals. EDFs from multiple partitions can be read into **zPCR** at the same time. All EDFs should include the same intervals, and all must include the exact interval selected as input to **zPCR**.

The first EDF, considered the master, contains all the necessary information to define the LPAR host processor and its entire partition configuration. It also includes information specific to the partition represented. The remaining EDFs will be used to obtain partition specific information.

The following EDF information is used by **zPCR**.

<table>
<thead>
<tr>
<th>LPAR Configuration Metrics Determined from EDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>An EDF created from any single partition reveals the following information for the entire CPC. This information is always obtained from the 1st EDF read.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LPAR host</th>
<th>CPC ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected Interval (Date, Time, and Duration)</td>
<td></td>
</tr>
<tr>
<td>Specific processor family and model</td>
<td></td>
</tr>
<tr>
<td>z14-ZR1 MaxNN configuration</td>
<td></td>
</tr>
<tr>
<td>Real CP counts: GP, zAAP, zIIP, IFL, ICF</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Partition detail</th>
<th>Logical CP count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: GP, zAAP, zIIP, IFL, ICF</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Mode: Dedicated or Shared</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td>Capping, including Absolute Capping</td>
<td></td>
</tr>
<tr>
<td>Utilization</td>
<td></td>
</tr>
</tbody>
</table>

Individual EDFs can reveal additional information concerning that specific partition:

**SCP**: Specific z/OS or z/VM version running

**Workload**: RNI (CPU-MF required) for appropriate LSPR workload assignment

**HiperDispatch**: Active and number of parked LCPs

**Measured SMT Benefit** (z14, z13, z13s processors only; zIIP/IFL partitions only)

Where indeterminate, the following assumptions apply. If an actual assignment differs, it can be changed after the configuration is loaded into **zPCR**.

<table>
<thead>
<tr>
<th>SCP</th>
<th>Workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP/zAAP/zIIP: z/OS</td>
<td></td>
</tr>
<tr>
<td>IFL: z/VM</td>
<td></td>
</tr>
<tr>
<td>ICF: CFCC</td>
<td></td>
</tr>
<tr>
<td>Average category</td>
<td></td>
</tr>
</tbody>
</table>
zPCR can read EDFs generated by reasonably current versions of z/OS or z/VM, using the applicable extract program (*CP3KEXTR* for z/OS; *CP3KVMXT* for z/VM). If the EDF was generated from an unsupported z/OS or z/VM version, or an unsupported version of the extract program that creates the EDF, a dialog will be presented concerning the supported versions.

EDFs must be downloaded to your PC (preferred file extension = *.edf*). Only one EDF is necessary to obtain the LPAR host, partition definition, and partition utilization information (referred to as the primary EDF).

Additional information specific to a partition (listed below) may also be captured (note that a separate EDF must be generated for each partition).

1. If **CPU-MF** is enabled (z10 and later) for the partition, counters will be captured. This information is used to compute an RNI value, and subsequently the appropriate LSPR workload category to be assigned for that partition.

2. If **HiperDispatch** is enabled for the partition (z10 and later running z/OS or z/VM), the EDF will provide information concerning the number of parked logical CPs for that partition. General Purpose LCPs (and any associated zAAP, zIIP, or IFL LCPs) may be parked. For these EDFs, zPCR will identify both the number of assigned LCPs and the number of parked LCPs for the interval selected for transfer. When partitions are transferred into zPCR, all parked LCPs that were identified will be removed from the total partition LCP count by default (a checkbox is provided to override this default). Any parked LCPs not removed when the partition is transferred, can subsequently be removed in zPCR itself.

3. If **SMT** is enabled (z13 and later; zIIP and IFL logical CPs only), the EDF will provide information concerning the actual benefit over running without SMT enabled.

In order for multiple EDFs to be processed, the following conditions must exist or the EDF processing will be skipped.

- Each EDF must represent the same CPC ID as the master. In cases where multiple CPC IDs exist, each must be defined independently as a separate LPAR host.
- Each EDF must represent the same period of time, within a defined tolerance.

  Note: For any EDF describing a partition with its time offset different than the master EDF partition, its interval times will be adjusted to be represented based on the master EDF time zone. Doing so assures that the interval picked will represent the same physical time for all partitions.

- The start time for each EDF interval is adjusted to the nearest 5 minutes. This allows the intervals across multiple EDFs to be aligned more consistently.

On z/OS partitions where IRD is actively managing resources, partition logical CPs are reported by EDF as fractional values. For zPCR purposes, fractional LCP numbers are rounded up to the nearest whole number. Since weights can also be dynamically modified by IRD, it is important that the interval selected for analysis be one that is representative for a load period of particular interest.

EDFs are read in via the EDF Interval Selection window (see EDF Interval Selection). Once processed, each measurement interval found is listed. A single measurement interval must be selected from which to obtain the LPAR configuration information. Using the master EDF, the LPAR configuration is determined. Partition specific information (i.e., **CPU-MF**, **HiperDispatch** and **SMT Benefit**) is obtained from each individual EDF.
EDFs created from z/OS

When running z/OS in a partition, SMF data is normally captured for the purpose of monitoring performance and capacity. SMF can capture a wide variety of record types, resulting in data which is voluminous and binary. This data can be reduced to an EDF (Enterprise Data File) that can be used by zPCR to automatically generate the LPAR configuration (same as can be done from an RMF report). With EDFs, zPCR usability can be further enhanced when certain SMF record types are captured for partitions. The record types used are listed below.

SMF Record Types used by zPCR

- SMF Type 70 – CPU Activity Record (required)
- SMF Type 113 – CPU Measurement Facility (CPU-MF) counters (optional but highly desired; only available on z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, and z10 BC processors). This information is used by zPCR to choose the LSPR workload category that will best represent characteristics of the partition’s production workload.

Information on capturing CPU Measurement Facility data can be found at:
www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TC000066

Creating z/OS EDFs

The z/OS extract program, CP3KEXTR, is available from your zPCR download website along with instructions for its use. It is distributed as a z/OS “Load and Go” job, to be run on any Z processor. CP3KEXTR reads SMF data, creating an EDF. Each EDF represents a single z/OS partition, while also including the information necessary to determine the LPAR host processor and its entire partition configuration. When there are multiple partitions for which SMF type 113 (CPU-MF hardware counters) are to be used, a separate EDF must be created for each. To be useful, all the EDFs for a single study must represent the same time period and should normally include the same number of intervals.

In order for EDF data to be valid for zPCR use, a recent version of CP3KEXTR is necessary. If the version used to generate the EDF is not currently supported, zPCR will present a dialog with information concerning the version(s) required.

EDFs created from z/VM

When running z/VM in a partition, VM Monitor data is normally captured for the purpose of understanding performance and capacity. VM Monitor can capture a wide variety of data. This data can be reduced to an EDF (Enterprise Data File) that can be used by zPCR to automatically generate LPAR configuration information.

When the LPAR host is a z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, or z10 BC, z/VM-5.4 and later can capture CPU-MF data in an EDF. This information is used by zPCR to choose the LSPR workload category that will best represent characteristics of the partition’s production workload. When z/VM is running in a General Purpose partition while also supporting an IFL partition, separate CPU-MF data is captured for each. Hence, the workload category chosen for each type could be different.
Creating z/VM EDFs

The z/VM extract program, **CP3KVMXT**, is available on your **zPCR** download website along with instructions for its use. It must be run under z/VM in a CMS guest. **CP3KVMXT** reads VM Monitor data to generate an EDF. The EDF represents the overall workload of a single z/VM partition, while also including the information necessary to determine the LPAR host processor and its entire partition configuration. To be useful, all the EDFs for a single study must represent the same time period and should normally include the same number of intervals.

In order for EDF data to be valid for **zPCR** use, a recent version of **CP3KVMXT** is necessary. If the version used to generate the EDF is not current enough, **zPCR** will present a dialog with information concerning the version(s) required.
EDF Interval Selection

LPAR Configuration Capacity Planning

From the LPAR Host and Partition Configuration window, click the EDF button in either the Define LPAR Host Processor group box or the Define Partitions group box to open the EDF Interval Selection window.

The EDF Interval Selection window provides the means to load one or more EDFs. For general information concerning EDFs, see EDF Overview.

Click the Load EDF button. A file dialog box will appear from which you can specify the drive: directory\filename of the desired EDF (multiple files can be selected). While the default EDF extension is "edf", "txt" may also be used.

When read, the EDFs are searched for all report intervals. If the file does not appear to be a standard EDF or appears to be invalid, a message is issued and no EDF intervals are shown.

Loading Multiple EDFs

zPCR can process multiple EDFs in a single pass, each representing an individual partition. The 1st file in the selection list is considered the master, serving as the basis for the LPAR host processor and its entire partition configuration. Each individual EDF is used to gather partition specific information.

To load multiple EDFs, hold down the Ctrl (or Shift) key while selecting files. When in Advanced-Mode, the selected files can be dragged to any undefined LPAR icon on the Advanced-Mode window, and they will all be processed. On the EDF Interval Selection window, when multiple EDFs are selected, they are placed in the selection list in the same order as displayed in the Load EDF dialog. With this order, the 1st entry may not be desired as the master EDF. The order of the selection list can be controlled somewhat by going to the Details view and sorting (ascending or descending) on Name, Size, or Date, and then selecting the multiple files. Alternatively, before clicking the Open button, cut (Ctrl-X) the desired master EDF from the list, and then paste (Ctrl-V) it back at the beginning of the list.

zPCR assumes that the report intervals of multiple EDFs, when loaded, will be equal in number. If they are not, a dialog will appear showing the total number of intervals, and
the number of intervals that do not match. Two choices are provided: 1) Proceed using only the intervals that do match; or 2) Cancel. In addition, zPCR assumes that the interval time stamps between the EDFs will be closely aligned. If they are not, no EDF intervals will be shown.

Once validated, the EDF is loaded and a title line reveals the EDF filename and location. The EDF will remain available until a different EDF is loaded.

Each EDF interval found is displayed in a sequentially numbered row. Interval descriptions include CPC ID, GP Processor Model, Date, Time, Interval Length, Number of Active Partitions, Includes CPU-MF, and GP Pool Utilization (generally the CP pool of most interest). Utilization for all CP pools can be displayed by checking the ✔ Show All Pools checkbox.

In the Includes CPU-MF column, a checkmark will appear if CPU-MF is included for at least one partition for the report interval.

To facilitate identification of report intervals where the greatest amount of CPU resource is consumed, the columns with underlined headings are enabled for sorting. Click on the heading once to sort in descending sequence, again to sort in ascending sequence, and once again to restore the original order.

From the table, select the report interval for which LPAR configuration information is to be obtained by clicking on the desired interval. The selected row will be highlighted. Then Click the [Show Partitions] button to open the Create LPAR Configuration from EDF or Get Partitions from EDF window where the partition definitions can be reviewed.
**Controls**

Click the **Load EDF File** button to select the specific EDF to be loaded.

Click the **Show Partitions** button to review the partitions that were active during the selected interval. The *Create LPAR Configuration* or *Get Partitions from EDF* window will appear.

Click the **Cancel** toolbar icon to close the window and return to the *LPAR Host and Partition Configuration* window.
Get Partitions from EDF

LPAR Configuration Capacity Planning

From the **EDF Interval Selection** window, click on an interval row to enable the **Show Partitions** button. Clicking the **Show Partitions** button will:

- When entered via **Create Host and Partitions From EDF**, the **Create LPAR Configuration from EDF** window appears.
- When entered via **Copy Partitions From EDF**, the **Copy Partitions from EDF** window appears.

Except for the window titles and some button names, these two windows are identical.

In addition to the primary window, a small **LPMT** window appears showing the LPAR management time for each CP pool as reported by EDF (informational purposes only).

At the top of the window, title lines reveal the location and filename of the currently loaded EDF report, and the interval selected. Just below is listed the LPAR host system ID and its General Purpose processor model as noted by EDF. The next line identifies the overall LPAR host configuration as would be shown in **zPCR**.

When the window title reads **Create LPAR Configuration from EDF**, the lines below reveal, what will become the host processor for the LPAR configuration. When the window title bar reads **Copy Partitions from EDF**, the currently defined LPAR host processor is simply identified. In either case, all the partitions that are selected in the table below will be transferred into the LPAR configuration.
Partition Utilization Considerations
Partition utilizations, while known, are not displayed on the LPAR Configuration from EDF window. However, they will be transferred into zPCR and will be included in a saved study. When the study for the original configuration is reloaded, the partition utilization values can be viewed in the Utilized Capacity Report window. In addition, the actual zAAP and zIIP partition utilizations will be available for assignment on the zAAP/zIIP Loading window.

SMT Benefit
For z14, z13, and z13s processors, measured SMT Benefit values can be obtained from each EDF for zIIP and IFL partitions with SMT enabled. An additional column, SMT Benefit, is displayed immediately following the Capping column with this information. When SMT information is found, it will be transferred to zPCR as a Measured SMT Benefit.

Partition Identification and Partition Configuration
The primary table contains a list of all the partitions found in the selected EDF interval with their then defined metrics. From this table you select the specific partitions to be copied.

All active partitions found in the selected EDF interval are listed in the table in the following order:

1. General Purpose
2. zAAP (listed below the associated General Purpose partition)
3. zIIP (listed below the associated General Purpose partition)
4. IFL
5. ICF

The format of each row is similar to that used in zPCR, with background colors differentiating each of the partition pools. Partition weights are summed by pool to determine each partition’s weight percent.

A checkmark in the column identified as From EDF indicates that an EDF was produced for that partition.

Partitions that are defined, but inactive (i.e., no SCP is IPL’d) are unchecked in the Active column. Normally, such partitions should not be included, since no LPAR overhead is generated on behalf of them.

SCP Assignment
The SCP field is populated with the SCP version found in the partition’s EDF or z/VM EDF, when available. Otherwise, the field is populated with a default SCP for the partition type as follows:
- **EDF from z/OS**: GP partitions that are represented by an z/OS EDF are assigned z/OS. All remaining GP partitions will default to z/OS. When another SCP is actually in control, the SCP will need to be changed.
- **EDF from z/VM**: z/VM partitions that are represented by a z/VM EDF are assigned z/VM. Any remaining GP partitions are defaulted to the radio button setting in the Change SCP for GP Partitions group box (z/OS or z/VM). Any remaining IFL partitions are defaulted z/VM. When another SCP is actually in control, the SCP will need to be changed.
- For **zAAP** or **zIIP** partitions that are associated with a GP partition, z/OS is assigned for each.
- For **IFL** partitions that are associated with a GP partition, z/VM is assigned as the SCP for each.
- For **ICF** partitions, **CFCC** is assigned.
- If the SCP setting for a GP or IFL partition is corrected before the configuration is transferred into zPCR, **Parked LCPs** will automatically be corrected to only represent those shared partitions running z/OS or z/VM. If the SCP is to be changed in zPCR, GP **Parked LCPs** should not be estimated.

**Workload**
The **Method Used** column (on the right side of the window) reveals the method applied for **Assigned Workload**. When the partition is represented by and EDF which includes CPU-MF information, the workload will be determined by the RNI.

If an **Assigned Workload** is subsequently altered, the **Method Used** will change accordingly.

**Mode** (Dedicated or Shared)

**Total LCPs**
Shows the total number of logical CPs assigned to the partition. A fractional LCP count indicates that the partition had LCP(s) varied off or on during the measurement interval. When the configuration is transferred into zPCR, fractional values are rounded up to the next integer.

**Weight and Weight %**
Shows the partition weight and calculated weight percentage relative to the other partitions in the CP pool.

**Capping**
If a partition was capped, a checkmark will appear in the ✔ column.

**Absolute Capping** (z14, z13, z13s, zEC12 and zBC12 processors only)
If **Absolute Capping** is defined to a partition, a value will appear in the **ABS** column.
SMT Benefit for zIIP and IFL Partitions

On z14, z13, and z13s processors, measured SMT Benefit is obtained from EDF for SMT enabled zIIP partitions running z/OS and for IFL partitions running z/VM. An additional column, SMT Benefit, is displayed with this information immediately following the Capping column.

The SMT benefit is considered reliable when the partition’s utilization is between 20% and 70%. When such a SMT benefit is found, it will be transferred to zPCR as a Measured SMT Benefit.

- When the partition utilization is 20% or less, the default SMT Benefit for the partition type will be assigned and flagged as an estimate.

- When the partition utilization is greater than 70%, the measured SMT Benefit value will be capped at 60% and flagged as an estimate.

  In either case, a dialog will offer the chance to accept the change or to disable SMT for the partition.

Any SMT benefit less than 90% will be transferred to zPCR. If the SMT benefit is greater, but less than 95%, a dialog will be offered allowing the SMT benefit to be accepted as measured or to disable SMT. An SMT benefit greater than 95% is unrealistic, and will not be accepted; in this case a dialog offers the choice of assigning the default SMT benefit for the partition type or disabling SMT.

If the SMT benefit is negative, it will not be ported to the zPCR configuration. Rather, a dialog will be offered allowing SMT to be enabled with a 0% benefit or be disabled.

HiperDispatch (z10 and later; running z/OS or z/VM)

- HiperDispatch Is Active: A checkmark indicates whether or not HiperDispatch was active for the partition.

- Parked LCPs: Indicates the actual number of the partitions logical CPs that were parked during the measurement interval. The Parked LCP count will display with 1 decimal place, since parking activity is dynamic across the selected interval.
Estimating Parked LCPs

If the LPAR host supports Hiperdispatch (z10 and later), parked LCPs can be estimated for GP shared partitions not represented by an EDF and running z/OS or z/VM. This also applies to associated zAAP or zIIP partitions. Parked LCPs can be estimated for IFL shared partitions not represented by an EDF and running z/VM. The Parked LCP estimate will display with zero decimal places.

When the Create/Copy from EDF window is opened, a dialog is displayed to help emphasize the ability to estimate parked LCPs. The dialog can remain open while making changes to the window.

Parked LCP estimates are controlled using the check boxes displayed below the J-table. When GP or IFL is checked, a parked LCP estimate of will be made (1 decimal precision) for the non-EDF shared partitions in that pool. Estimated values are prefixed with “Est.” so as to differentiate them from actual parked values. Unchecking the box will remove the parked LCP estimates.

Notes:

- Each partition’s Copy LP checkbox defaults to its LP is Active checkbox. If Copy LP is changed, all Parked LCP estimates for the CP pool will be recomputed.
- Changes to the any partition’s SCP other than z/OS or z/VM will cause Parked LCPs estimates for the CP pool will be recomputed. If such changes are to be made after transfer to zPCR, Parked LCPs should not be estimated, since the estimates would no longer be relevant.

To most accurately reflect partitioned capacity, Parked LCPs should be removed from each partition’s Total LCP count. Use the line at the bottom of the window for this purpose (disabled if there are no parked LCPs).
When partitions are transferred into zPCR, parked LCP values are rounded down to the next integer before being subtracted from Total LCPs.

When partitions are transferred into zPCR, parked LCP values are rounded down to the next integer before being subtracted from Total LCPs.

Once loaded into zPCR, the values will be identified as Active LCPs. Active LCP values can always be changed on the Partition Detail Report window. Unparked LCP information is carried forward into zPCR during the invocation (this information is not retained in a study file). Parked LCPs can subsequently be removed by clicking the LCP Alternatives button. For more information, see LCP Alternatives.

Note that the original Total LCPs partition information is not retained in a study file. To obtain that information, the EDF would have to be input again.

CPU-MF and Workload Category Determination

When CPU-MF data is available for a partition, information for the following items are displayed in the CPU-MF columns.

- **RNI** “Relative Nest Intensity” is computed for each z/OS partition where CPU-MF data is included in the EDF.
- **Workload Assignment**: Displays the z/OS or z/VM workload category that would be selected based on CPU-MF data.

The Assigned Workload for each partition (under Partition Identification) is initialized to one of the Workload Choices, in the priority listed below:

1. **CPU-MF** workload choice (z/OS and z/VM partitions only). When available, this workload category should be considered as the most reliable choice for the partition. For the CPU-MF method, the RNI and internal algorithms specific to each processor family are used to determine the Workload Choice.

2. **Default** workload choice (by SCP)
   - **z/OS** (General Purpose, zAAP, & zIIP) Average
   - **z/VM** (General Purpose and/or IFL) Average/LV
   - **z/VSE** (General Purpose only) Average/VS
   - **KVM** (General Purpose or IFL) Average/K
   - **Linux** (General Purpose or IFL) Average/L
   - **CFCC** (General Purpose or ICF) CFCC (cannot be changed)

When CPU-MF data is not available, the default workload assignment for the SCP should generally be used.

3. **User Modified** from one of the above assignment.

The SCP for IFL partitions may be altered to either z/VM, KVM, Linux, zAware, zACI, or SSC. If the SCP for a General Purpose partition needs to be changed, it must be done after the configuration has been transferred into zPCR.

The SCP and Assigned Workload for zAAP and zIIP partitions are always derived from the associated General Purpose partition.

The Assigned Workload field for a z/OS, z/VM, z/VSE, KVM, or Linux partition may be altered as desired. The Assigned Workload categories available will depend on the SCP specified.
**CPU-MF workload assignment considerations**

A single EDF interval is used to define partitioning metrics to zPCR. The workload selected is also based on that same interval (only Low, Average, or High will ever be selected). Since the actual workload characteristics may vary between intervals, it might be useful to load the configuration from several intervals before and after the desired one to see if the selected workload does vary. If so, a judgement could be made about the actual workload that should be used (the Low-Avg or Avg-High workloads could also be considered).

**Workload Category Determination**

The Method Used column (on the right side of the window) reveals the method applied for **Assigned Workload** (CPU-MF, Default, or Other). If the workload is manually changed, this indicator will change accordingly.

**Some exceptions to consider**

- For z990 processors, the actual hardware model (i.e., 2084-A08, B16, C24, or D32) may not be precisely determined by EDF. In these cases the model assumed is the smallest that could accommodate all of the CPs defined. The actual processor model should be determined, and, if different, the LPAR host definition in zPCR should be changed accordingly. The model designation will have some minor effect on capacity results.

- For z990, z890, z900, and z800 processors, partitions that are not General Purpose are always identified in EDF as Type=ICF. If any such partitions are actually IFLs, they will need to be modified to Type=IFL. All ICF partitions will have the Type field enabled for input. Click on the Type field entry to reveal a dropdown list which provides a selection for IFL. When this change is made, the SCP/workload is changed to the default for an IFL (z/VM with Average/LV workload), which can be subsequently modified from within zPCR.

- For z990 and z890 processors, zAAP CPs are identified as ICFs. However, since a zAAP partition always has the same name as its associated General Purpose partition, type=zAAP is automatically assigned and the SCP/workload of the associated General Purpose partition is used.

Other than the items noted above, partition definition changes such as changing the SCP for a General Purpose partition, and adding or removing zAAP or zIIP logical CPs for a General Purpose partition must be made after the configuration has been transferred into zPCR.
Transferring Configuration Information into zPCR

To enable partitions for transfer to zPCR, click each of the desired partition’s ✓ Copy LP checkbox. Note that zAAP and zIIP partitions are always transferred with their associated General Purpose partition. Use the [Select All] button to check all partitions and the [Remove All] button to uncheck all partitions. Use the [Select Active] button to check only those partitions that were active in the interval.

Once all the desired partitions are checked, when this function was entered via:

- **Create Host and Partitions From EDF**, click the [Create zPCR Configuration] button to create the entire LPAR configuration, including the LPAR host and the selected partitions. Partition utilization values will also be transferred, thus making the Utilized Capacity Report available in zPCR. The description field on the LPAR Host and Partition Configuration window will be initialized to indicate the source.

- **Copy Partitions From EDF**, click the [Copy Partitions] button to add the selected partition definitions to the currently active LPAR configuration.

If ✓ Remove Parked LCPs from Partition LCP Count is checked, any partition parked LCPs are subtracted from the total LCP count (fractional parked LCPs are always rounded up). Otherwise, the defined LCP count is transferred to the LPAR configuration.

In zPCR, transferred partitions can be viewed in the Partition Detail Report window. If a partition definition conflicts with the overall configuration, its ✓ Include checkbox will be unchecked. When you attempt to check Include, the partition’s definition is validated; if invalid, □ Include will remain unchecked. In this case you must make corrections to the partition definition or to the LPAR host definition before the partition can be included. Most partition definition metrics can be modified from either of these windows.

**Controls**

Click the [Select All] button to include all of the partitions.

Click the [Select Active] button to include only the active partitions.

Click the [Remove All] button to exclude all of the partitions.

Click the [Choose Another EDF Interval] button to select another EDF interval or to load another EDF report.

To estimate parked LCPs for GP (including any associated zAAP or zIIP) partitions or IFL partitions use the checkboxes in the line: Estimate parked LCPs where unknown for: ✓ GP partitions ✓ IFL partitions. Estimated parked values will appear in red to differentiate from actual parked.
Use the **When copying partitions into zPCR, remove Parked LCPs from the LCP Count** checkbox to have all active and estimated parked LCPs when the LPAR configuration is transferred to zPCR.

Depending on how this window was entered:

- Click the [Create LPAR Configuration] button to transfer the LPAR host and all the selected partitions to zPCR.
- Click the [Copy Partitions], to transfer all the selected partitions to the currently defined LPAR host in zPCR.

Click the **Cancel** toolbar icon to return to the **EDF Interval Selection** window. A 2nd **Cancel** will return to zPCR.

**Partition Utilization Values**

When an LPAR configuration is obtained from EDF, utilization values of each partition for the selected interval are also transferred into zPCR. These can be used to determine "utilized" capacity, which can then be compared to the capacity that would be allocated based on the partition weights.

To make this comparison, the **Utilized Capacity Report** window can be accessed from the **LPAR Host and Partition Configuration** window, using the [Partition Utilized Capacity] button. Note that this button is enabled only when the LPAR host and its entire partition configuration were transferred and only if no LPAR host or partition configuration changes have been made. For more information, see Utilized Capacity Report.

The EDF data represents a close approximation of utilized partition capacity. Some minor deviation from the capacity actually consumed may exist because:

1. What EDF views as **LPAR Management Time** (i.e., Physical) is not exactly equivalent to what zPCR views as **LPAR Management Time**.
2. zPCR algorithms assume the **Capacity Perspective** (i.e., LPAR costs are based on full utilization of the CPC’s CP resources). Since actual utilization for the CP pools may be less than full utilization, actual LPAR costs may be less than that reported by zPCR.

**Note:** CFCC in a dedicated partition always runs at 100% utilization. For such partitions, the actual capacity being consumed cannot be determined as done for the other partition types. The correct utilization values can be determined if EDF input is used.
RMF Overview

LPAR Configuration Capacity Planning

An RMF Report can be used as input to zPCR for the purpose of creating the entire LPAR host and partition configuration or copying individual partition definitions into a currently active LPAR configuration. An RMF report is created from a partition running z/OS. It must include the following:

1. **Partition Data Report (PDR)**
2. At least one **CPU Activity Report**, where the LPAR host processor model is identified. When a **CPU Activity Report** is included for more than one partition, each will be processed, providing additional detail for those partitions.

All other RMF reports are ignored.

RMF data generally represents multiple time intervals. One specific interval must be selected as input to zPCR.

The following RMF Report information is used by zPCR.

<table>
<thead>
<tr>
<th>LPAR Configuration Metrics Determined from RMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>The <strong>CPU Activity Report</strong> provides the following information</td>
</tr>
<tr>
<td><strong>LPAR Host</strong></td>
</tr>
<tr>
<td>System ID</td>
</tr>
<tr>
<td>Specific processor family and model</td>
</tr>
<tr>
<td><strong>The Partition Data Report</strong> provides the following information</td>
</tr>
<tr>
<td><strong>LPAR Host</strong></td>
</tr>
<tr>
<td><strong>Partition Detail</strong></td>
</tr>
<tr>
<td>Type: GP, zAAP, zIIP, IFL, ICF</td>
</tr>
<tr>
<td>Mode: Dedicated or Shared</td>
</tr>
<tr>
<td>Logical CP count</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Capping (Absolute Capping information is not provided)</td>
</tr>
<tr>
<td>Utilization</td>
</tr>
<tr>
<td><strong>Individual partition CPU Activity Reports</strong> provide the following information</td>
</tr>
<tr>
<td><strong>Partition Detail</strong></td>
</tr>
<tr>
<td>HiperDispatch: Active and number of parked LCPs</td>
</tr>
<tr>
<td>Measured SMT Benefit</td>
</tr>
<tr>
<td>(z14, z13, z13s processors only; zIIP/IFL partitions only)</td>
</tr>
</tbody>
</table>

Where indeterminate, the following assumptions apply. If an actual assignment differs, it can be changed after the configuration is loaded into zPCR.

| SCP | GP/zAAP/zIIP: z/OS |
| IFL: z/VM |
| ICF: CFCC |
| **Workload** | Average category |
RMF is transferred via a traditional RMF report in text format. The RMF report must be available as a flat file, downloaded to your PC (preferred file extension = .rmf or .txt). The file may either contain or exclude carriage-control characters in the 1st byte position of each record.

Note that the RMF report in the newer XML format is not supported.

RMF reports are read in via the RMF Interval Selection window (see RMF Interval Selection). Once processed, each measurement interval found is listed. A single measurement interval must be selected from which to obtain the LPAR configuration information. Partition specific information (i.e., HiperDispatch and SMT Benefit) is obtained from each individual partition CPU Activity Report that was made available.

For z/OS partitions where HiperDispatch is active (z10 and later), some General Purpose LCPs (and any associated zAAP or zIIP LCPs) may be parked. The number of parked LCPs is computed and thus noted before the partition is transferred into zPCR. Parked LCPs should be removed from the partition definition to more accurately relate capacity. Parked LCPs can automatically be removed from partitions when the configuration is transferred into zPCR.

On systems where IRD is actively managing the partition resources, partition logical CPs are reported by RMF as fractional values. For zPCR purposes, fractional LCP numbers are rounded up to the nearest whole number. Since weights can also be dynamically modified by IRD, it is important that the interval selected for analysis be one that is representative for a load period of particular interest.

Capping information from RMF

In 2016, a PTF for RMF became available which identifies 3 types of capping, any one of which may be assigned to a partition:

1. Hard Capping  
   Supported by zPCR
2. Absolute Capping  
   Supported by zPCR; requires manual input
3. Group Absolute Capping  
   Not supported by zPCR

In zPCR, partition capping will be set for only the 1st two types.

When RMF is generated with the PTF applied, zPCR will identify a partition’s capping type as one of the above. At the time the RMF is transferred into zPCR, a dialog will list each capped partition and it’s capping type. Use this dialog to identify the “Absolute Capped” partitions. Absolute capping values are not available from RMF; they must be obtained externally and the capping value must be manually entered into zPCR on the Partition Detail Report window.

When RMF is generated without the PTF, zPCR can only identify partitions as being “Hard capped”. At the time the RMF is transferred into zPCR, a dialog will list each capped partition. Any information concerning “Absolute Capped” partitions must be obtained externally and the capping value must be manually entered into zPCR on the Partition Detail Report window.
RMF Interval Selection
LPAR Configuration Capacity Planning

From the **LPAR Host and Partition Configuration** window, click the **RMF** button in either the **Define LPAR Host Processor** group box or the **Define Partitions** group box to open the **RMF Interval Selection** window.

The **RMF Interval Selection** window provides the means to load an RMF report file (for general information concerning RMFs, see **RMF Overview**).

Click the **Load RMF Report** button. A file dialog box will appear from which you can specify the drive:directory\filename of the desired RMF report. The input must be a traditional RMF report (text format, file extension assumed is "rmf" or "txt"). Traditional RMF reports must have a record length of 133 bytes, or if Carriage Control information is included, 134 bytes.

When read, the RMF file is searched for all report intervals. No RMF intervals are shown and a message is issued if the RMF report file:

- Does not appear to be a standard RMF report
- Was generated on a z/OS version not supported by zPCR
- Does not include a **Partition Data Report (PDR)** and a **CPU Activity Report**
- Appears to be invalid

Once validated, the RMF report is loaded. It will remain available until a different RMF report is loaded.
Once an RMF report is successfully loaded, a title line reveals the location and filename of that report.

Each RMF interval found in the report is displayed in a sequentially numbered row. Interval descriptions include **System ID**, **GP Processor Model**, **Date**, **Time**, **Interval Length**, **Number of Active Partitions**, and **Utilization** within each CP pool. By default, only the utilization column for the General Purpose pool appears (normally the pool of greatest interest). The **Show All Pools** checkbox can be used to reveal utilization values for the remaining CP Pools.

To facilitate identification of report intervals where the greatest amount of CPU resource is consumed, several columns (with underlined headings) are enabled for sorting. Click on the heading once to sort in descending sequence, again to sort in ascending sequence, and once again to restore the original order.

From this table, select the report interval for which LPAR information is to be captured by clicking on the desired interval. The selected row will be highlighted. Click the **Show Partitions** button to go to the *Create LPAR Configuration from RMF* or *Copy Partitions from RMF* window where the individual partition definitions can be reviewed and selected for transfer to the zPCR LPAR configuration.

RMF cannot identify the SCP/workload assigned to a partition in terms that zPCR uses. Therefore, SCP/workload assignments are made using default settings. These SCP/workload assignments can be subsequently changed in zPCR, on the *Define Partitions* window or the *Partition Detail Report* window.

**Controls**

Click the **Load RMF Report** button to select the specific RMF file to be loaded.

Click the **Show Partitions** button to reveal the partitions that were active during the selected interval. The window discussed in *Get Partitions from RMF* will appear.

Click the **Cancel** toolbar icon to close the window, return to the *LPAR Host and Partition Configuration* window with no changes applied.
Get Partitions from RMF

LPAR Configuration Capacity Planning

From the RMF Interval Selection window, click on an interval row to enable the Show Partitions button. Clicking the Show Partitions button will:

- When entered via Create Host and Partitions From RMF, the Create LPAR Configuration from RMF window appears.
- When entered via Copy Partitions From RMF, the Copy Partitions from RMF window appears.

Except for the window titles and some button names, these two windows are identical.

In addition to the primary window, a small LPMT window appears showing the LPAR management time for each CP pool as reported by RMF (informational purposes only).

At the top of the window, title lines reveal the location and filename of the currently loaded RMF report, and the interval selected. Just below is listed the LPAR host system ID and its General Purpose processor model as noted by RMF. The next line identifies the overall LPAR host configuration as would be shown in zPCR.

When the window title reads Create LPAR Configuration from RMF, the lines below reveal, what will become the host processor for the LPAR configuration. When the window title bar reads Copy Partitions from RMF, the currently defined LPAR host is simply identified. In either case, all the partitions that are selected in the table below will be transferred into the LPAR configuration.
Partition Utilization Considerations
Partition utilizations, while known, are not displayed on the LPAR Configuration from RMF window. However, they will be transferred into zPCR and will be included in a saved study. When the study for the original configuration is reloaded, the partition utilization values can be viewed in the Utilized Capacity Report window. In addition, the actual zAAP and zIIP partition utilizations will be available for assignment on the zAAP/zIIP Loading window.

SMT Benefit
For z14, z13, and z13s processors, measured SMT Benefit values can be obtained from RMF for SMT enabled zIIP and IFL partitions. An additional column, SMT Benefit, is displayed immediately following the Capping column with this information. When SMT information is found, it will be transferred to zPCR as a Measured SMT Benefit.

Partition Identification and Partition Configuration
The primary table contains a list of all the partitions found in the selected RMF interval with their definition metrics. From this table you select the specific partitions to be copied.

All active partitions found in the selected RMF interval are listed in the table, by pool, in the following order:

1. GP (General Purpose)
2. zAAP (listed below the associated General Purpose partition))
3. zIIP (listed below the associated General Purpose partition)
4. IFL
5. ICF

The format of each row is similar to that used in zPCR, with background colors differentiating each of the partition pools. Partition weights are summed by pool to determine the weight percent.

Partitions that are defined, but inactive (i.e., no SCP is IPL’d) are unchecked in the Active column. Normally, such partitions should not be included, since no LPAR overhead is generated on behalf of them.

SCP Assignment
The SCP field is populated with the z/OS SCP version found in the partition’s RMF CPU Activity Report, when available. Otherwise, the field is populated with a default SCP for the partition type as follows:

- All remaining GP partitions will default to z/OS. When another SCP is actually in control, the SCP will need to be changed.
- Any remaining IFL partitions are defaulted z/VM. When another SCP is actually in control, the SCP will need to be changed.
- For zAAP or zIIP partitions that are associated with a GP partition, z/OS is assigned for each.
- For IFL partitions that are associated with a GP partition, z/VM is assigned as the SCP for each.
- For ICF partitions, CFCC is assigned.
If the SCP settings for GP and IFL partitions are corrected before the configuration is transferred into zPCR, Parked LCPs will automatically be corrected to only represent those partitions running z/OS or z/VM. If these changes are to be made in zPCR, GP Parked LCPs should not be estimated.

**Workload**

For RMF input a partition’s workload assignment will always default to the Average category for the SCP. The workload may be changed to any of the SCP’s available categories.

**Mode (Dedicated or Shared)**

**Total LCPs**

Shows the total number of logical CPs assigned to the partition.

**Weight and Weight %**

Shows the partition weight and calculated weight percentage relative to the other partitions in the CP pool.

**Capping**

If a partition was capped, a checkmark will appear in the ✓ column.

**Absolute Capping** (z14, z13, z13s, zEC12, and zBC12 processors only)

If Absolute Capping is defined to a partition, in addition to the checkmark, a value will appear in the ABS column. Note that RMF does not support Absolute Capping. Therefore values will not appear in this column.

**SMT Benefit for zIIP and IFL Partitions**

On z14, z13, and z13s processors, measured SMT Benefit is obtained from RMF for SMT enabled zIIP partitions running z/OS. An additional column, SMT Benefit, is displayed with this information immediately following the Capping column.

The SMT benefit is considered reliable when the partition’s utilization is between 20% and 70%. When such a SMT benefit is found, it will be transferred to zPCR as a Measured SMT Benefit.

- When the partition utilization is 20% or less, the default SMT Benefit for the partition type will be assigned and flagged as an estimate.
- When the partition utilization is greater than 70%, the measured SMT Benefit value will be capped at 60% and flagged as an estimate.

In either case, a dialog will offer the chance to accept the change or to disable SMT for the partition.

Any SMT benefit less than 90% will be transferred to zPCR. If the SMT benefit is greater, but less than 95%, a dialog will be offered allowing the SMT benefit to be accepted as measured or to disable SMT. An SMT benefit greater than 95% is unrealistic, and will not be accepted; in this case a dialog offers the choice of assigning the default SMT benefit for the partition type or disabling SMT.
If the SMT benefit is negative, it will not be ported to the zPCR configuration. Rather, a dialog will be offered allowing SMT to be enabled with a 0% benefit or be disabled.

HiperDispatch  (z/OS and z/VM partitions only)

The following are reported only for partitions where a CPU Activity Report is included.

- **HD Active**: A checkmark indicates whether or not HiperDispatch was active for the partition.
- **Parked LCPs**: Indicates the number of the GP partitions total logical CPs that were parked during the measurement interval. Parked LCPs should be removed from the partition LCP count to more accurately reflect capacity. Use the **Remove Parked LCPs from Partition LCP Count** checkbox to have all parked LCPs remove from partitions when the LPAR configuration is transferred to zPCR.

Note that parked LCP information is carried forward into zPCR (this information is not retained in a study file). Parked LCPs can subsequently be removed from these partitions from the Partition Detail Report window, by clicking the **LCP Alternatives** button. For more information, see **LCP Alternatives**.

HiperDispatch  (z10 and later; running z/OS)

The following are reported only for partitions where a CPU Activity Report is included.

- **HiperDispatch Active**: A checkmark indicates whether or not HiperDispatch was active for the GP partition.
- **Parked LCPs**: Indicates the actual number of the GP partition’s logical CPs that were parked during the measurement interval. The Parked LCP count will display with 1 decimal place, since parking activity is dynamic across the selected interval.

Parked LCPs may be estimated for the remaining z/OS and z/VM partitions.
Estimating Parked LCPs

If the LPAR host supports Hiperdispatch (z10 and later), parked LCPs can be estimated for GP shared partitions not represented by an RMF and running z/OS or z/VM. This also applies to associated zAAP or zIIP partitions. Parked LCPs can be estimated for IFL shared partitions not represented by an RMF and running z/VM. The Parked LCP estimate will display with zero decimal places.

When the Create/Copy from RMF window is opened, a dialog is displayed to help emphasize the ability to estimate parked LCPs. The dialog can remain open while making changes to the window.

Parked LCP estimates are controlled using the check boxes displayed below the J-table. When GP or IFL is checked, a parked LCP estimate of will be made (1 decimal precision) for the non-RMF shared partitions in that pool. Estimated values are prefixed with “Est.” so as to differentiate them from actual parked values. Unchecking the box will remove the parked LCP estimates.

Notes:
- Each partition’s Copy LP checkbox defaults to its LP is Active checkbox. If Copy LP is changed, all Parked LCP estimates for the CP pool will be recomputed.
- Changes to the any partition’s SCP other than z/OS or z/VM will cause Parked LCPs estimates for the CP pool will be recomputed. If such changes are to be made after transfer to zPCR, Parked LCPs should not be estimated, since the estimates would no longer be relevant.
To most accurately reflect partitioned capacity, **Parked LCPs** should be removed from each partition’s **Total LCP** count. Use the line at the bottom of the window for this purpose (disabled if there are no parked LCPs).

When partitions are transferred into **zPCR**, parked LCP values are rounded down to the next integer before being subtracted from **Total LCPs**.

When partitions are transferred into **zPCR**, parked LCP values are rounded down to the next integer before being subtracted from **Total LCPs**.

Once loaded into **zPCR**, the values will be identified as **Active LCPs**. **Active LCP values** can always be changed on the **Partition Detail Report** window. Unparked LCP information is carried forward into **zPCR** during the invocation (this information is not retained in a study file). Parked LCPs can subsequently be removed by clicking the **LCP Alternatives** button. For more information, see **LCP Alternatives**.

Note that the original **Total LCPs** partition information is not retained in a study file. To obtain that information, the RMF would have to be input again.

**Workload Category Determination**

The **Method Used** column (on the right side of the window) reveals the method applied for **Assigned Workload** (**Default** or **Other**). If the workload is manually changed, this indicator will change accordingly.

**zAAP** and **zIIP** partitions will always be assigned the same workload as the associated GP partition. IFL partitions associated with a GP partition may have independent workload assignments.

**Some exceptions to consider**

- For z990 processors, the actual hardware model (i.e., 2084-A08, B16, C24, or D32) cannot be precisely determined by RMF versions prior to v1.7. In these cases the model assumed is the smallest that could accommodate all of the CPs defined. The actual processor model should be determined, and, if different, the LPAR host definition in **zPCR** should be changed accordingly. The model designated will have some effect on capacity results.

- For z990, z890, z900, and z800 processors, partitions that are not General Purpose are always identified in RMF as Type=ICF. If any such partitions are actually IFLs, they will need to be modified to Type=IFL. All ICF partitions will have the **Type** field enabled for input. Click on the **Type** field entry to reveal a dropdown list which provides a selection for IFL. When this change is made, the **SCP/workload** is changed to the default for an IFL (z/VM with Average/LV workload), which can be subsequently modified from within **zPCR**.

- For z990 and z890 processors, **zAAP CPs** are identified as ICFs. However, since a **zAAP** partition always has the same name as its associated General Purpose partition, type=zAAP is automatically assigned and the SCP/workload of the associated General Purpose partition is used.

Other than the items noted above, partition definition changes such as changing the SCP for a General Purpose partition, and adding or removing **zAAP** or **zIIP** logical CPs for a General Purpose partition must be made after the configuration has been transferred into **zPCR**.
Transferring Configuration Information into zPCR

To enable partitions for transfer to zPCR, click each of the desired partition’s Copy LP checkbox. Note that zAAP and zIIP partitions are always transferred with their associated General Purpose partition. Use the Select All button to check all partitions and the Remove All button to uncheck all partitions. Use the Select Active button to check only those partitions that were active in the interval.

Once all the desired partitions are checked, when this function was entered via:

- **Create Host and Partitions From RMF**, click the Create zPCR Configuration button to create the entire LPAR configuration, including the LPAR host and the selected partitions. Partition utilization values will also be transferred, thus making the Utilized Capacity Report available in zPCR. The description field on the LPAR Host and Partition Configuration window will be initialized to indicate the source.

- **Copy Partitions From RMF**, click the Copy Partitions button to add the selected partition definitions to the currently active LPAR configuration.

In zPCR, partitions can be viewed in the Partition Detail Report window. If a partition definition conflicts with the overall configuration, its Include checkbox will be unchecked. When you attempt to check Include, the partition’s definition is validated; if invalid, Include will remain unchecked. In this case you must make corrections to the partition definition or to the LPAR host definition before the partition can be included. Most partition definition metrics can be modified from either of these windows.

**Controls**

Click the Select All button to include all of the partitions.

Click the Select Active button to include only the active partitions.

Click the Remove All button to exclude all of the partitions.

Click the Choose a Different RMF Interval button to select another RMF interval or to load another RMF report.

Use the When copying partitions into zPCR, remove Parked LCPs from the LCP Count checkbox to have all parked LCPs that have been identified removed from partitions when the LPAR configuration is transferred to zPCR.

Depending on how this window was entered:

- Click the Create LPAR Configuration button to transfer the LPAR host and all the selected partitions to zPCR.

- Click the Copy Partitions button to transfer all the selected partitions to the currently defined LPAR host in zPCR.

Click the Cancel toolbar icon to return to the RMF Interval Selection window. A 2nd Cancel will return to zPCR.
**Partition Utilization Values**

When both the LPAR host and its entire partition configuration are obtained from RMF, utilization values of each partition for the selected interval are also transferred to zPCR. These can be used to determine "utilized" capacity, which can then be compared to the capacity that would be allocated based on the partition weights.

To make this comparison, the *Utilized Capacity Report* window can be accessed from the *LPAR Host and Partition Configuration* window, using the *Partition Utilized Capacity* button. Note that this button is enabled only when the LPAR host and its entire partition configuration were transferred and only if no LPAR host or partition configuration changes have been made. For more information, see *Utilized Capacity Report*.

The RMF data represents a close approximation of utilized partition capacity. Some minor deviation from the capacity actually consumed may exist because:

1. What RMF views as *LPAR Management Time* (i.e., Physical) is not exactly equivalent to what zPCR views as *LPAR Management Time*.

2. zPCR algorithms assume the *Capacity Perspective* (i.e., LPAR costs are based on full utilization of the CPC’s CP resources). Since actual utilization for the CP pools may be less than full utilization, actual LPAR costs may be less than that reported by zPCR.

**Note:** CFCC in a dedicated partition always runs at 100% utilization. For such partitions, the actual capacity being consumed cannot be determined as done for the other partition types. The correct utilization values can be determined if RMF input is used.
Create Host and Partitions from Study

Copy Partitions from Study

LPAR Configuration Capacity Planning

This capability is provided via the **LPAR Host and Partition Configuration** window.

1. To define an entire LPAR configuration from a study: In the **Define LPAR Host Processor** group box, click on the **zPCR Study** button. This button is disabled if the LPAR host has already been defined.

   The **Create Host and Partitions from Study** window will open.

2. To copy Partitions from a study: In the **Define Partitions** group box, click on the **zPCR Study** button.

   The **Copy Partitions from Study** window will open.

The **Load Study** dialog will appear from which you can select the appropriate drive: \directory\filename. Note that only studies made with recent **zPCR** versions are able to be loaded (a dialog will appear if the version is no longer supported). Once a valid study has been loaded, the **Copy Partitions from Study** window will appear.

The **Create Host and Partitions from Study** window can only be used to transfer an entire LPAR configuration into **zPCR**.

When the target study file is Advanced-Mode, multiple LPAR configurations may exist. In this case, one of those configurations must be selected from a drop down list. That configuration will become the object from which information is transferred.
The **Copy Partitions from Study** window provides the capability to select the specific partitions to be copied using the check boxes provided.

The file ID of the previous study is displayed followed its hardware configuration. For the active study, the hardware configuration and **Reference-CPU** capacity basis are provided.

**Transferring Partitions into zPCR**

Partitions are presented in a table format similar to the **Partition Detail Report** window. Partition definitions cannot be modified from this window.

A [Copy LP] checkbox is presented for each partition in the first column, defaulting to unchecked status. To copy one or more partitions to the active study, check each of those desired. A [Select All] button and a [Remove All] button are available to assist in controlling partition selection.

Once a partition has been checked, the [Copy Partitions] button is enabled. Clicking this button will copy each selected partitions into zPCR’s current LPAR configuration, and the **Copy Partitions from Study** window is closed. A dialog box will appear with information about the number of partitions copied and their status. Since some of the imported partition’s definition metrics may be invalid for the currently defined LPAR host (i.e., number of logical CPs defined or references to hardware features that are not configured such as zAAPs, zIIPs, IFLs or ICFs), all partition [Include] checkboxes will initially be unchecked.
For General Purpose partitions with associated zAAP, zIIP, or IFL partitions, the associated partitions will be included in the copy. However, in zPCR, if either the required hardware or the required software is not specified, neither the General Purpose nor the associated partition’s Include checkbox will be able to be checked.

Partitions copied from a previous study will appear in the Partition Definition window (GP, IFL, and ICF) and the Partition Detail Report window with the Include checkbox unchecked. When you attempt to check Include, the partition’s definition is validated; if invalid, Include will remain unchecked. In this case you must make corrections to the partition definition or to the LPAR host definition before the partition can be included. Most partition definition metrics can be modified from either of these windows. However, changes to the number of zAAP or zIIP logical CPs, and IFLs associated with z/VM, must be made from the Define Partitions window.

Capping
If a partition was capped, a checkmark will appear in the ✓ column.

If Absolute Capping is defined to a partition, a value will appear in the ABS column (z14, z13, z13s, zEC12 and zBC12 processors only). If copying a partition with Absolute Capping specified to an LPAR host that does not support the feature, the values will be discarded.

SMT Benefit
If a z14, z13 or z13s study was saved with zIIP or IFL SMT Benefit values applied, an SMT Benefit column will appear with all measured and estimated values that have been applied. If copying a partition that has SMT Benefit values specified to an LPAR host that does not support SMT, these values will be discarded.

Click the Cancel toolbar icon to close the Copy Partitions from Study window without transferring any partitions to the active study.
**zAAP/zIIP Capacity Considerations**

**LPAR Configuration Capacity Planning**

**zAAP CPs (Application Assist Processor)**

zAAPs may be configured on zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, z9 BC, z990, and z890 processor models. When running Java applications under z/OS-1.6 or later, zAAP processors may be used in lieu of General Purpose CPs to run certain Java code. This has the effect of relieving the General Purpose CPs assigned to that z/OS partition of some of the load and, hence, potentially reducing software licensing costs.

**zIIP CPs (Integrated Information Processor)**

zIIPs may be configured on z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, and z9 BC processor models. When running certain workloads under z/OS-1.6 or later (DB2 is a prime example), zIIP processors may be used in lieu of General Purpose CPs to run portions of the work. This has the effect of relieving the General Purpose CPs assigned to that z/OS partition of some of the load and, hence, potentially reducing software licensing costs.

**zAAP on zIIP Capability**

**zAAP on zIIP** capability may be enabled for a partition on z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, and z9 BC processor models running z/OS-1.9 or later. This capability allows zAAP eligible work to run on zIIP logical CPs (this is the only way that zAAP work can be run on z14, z13, and z13s since zAAP CPs cannot be defined). When enabled, zAAP and zIIP eligible work can only be directed to zIIP logical CPs. Therefore, zAAP logical CPs cannot be used by that partition (note that zPCR does not know that the partition is using this capability; therefore you need to ensure that the partition is defined with no zAAP logical CPs).

zAAPs and zIIPs, purchased as a feature code, are configured to the LPAR host similar to IFLs and ICFs. They are used in the form of zAAP or zIIP partitions, associated with a z/OS-1.6 (or later) partition. zAAP/zIIP associations are considered as unique partitions in zPCR for the purposes of projecting capacity. Each of these partitions will be defined identically with its associated z/OS partition for the following items:

- Name
- SCP and Workload
- Mode (may be modified on z9 and later processors)
- Weight (may be modified on z9 and later processors)
- CAP (may be modified on z9 and later processors)

Several questions concerning potential zAAP or zIIP capacity can be answered using zPCR:

1. What is the capacity expectation for the General Purpose partition's logical CPs when also managing associated zAAP or zIIP partitions?
2. What capacity expectation for the partition's zAAP or zIIP partitions?
3. With one or more zAAP partitions configured on a Z processor (z990 or z890 only), how might the weights for IFL and ICF partitions be rebalanced to best assure that each partition gets its intended capacity? Note that this is not an issue for z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC,
and z9 BC processors, since zAAPs, zIIPs, IFLs, and ICFs run in separate real CP pools.

4. If the capacity requirement for a z/OS General Purpose partition is reduced due to the addition of an associated zAAP or zIIP partition, what number of logical CPs might still be required?

5. How would the use of zAAP or zIIPs, and any associated partition configuration changes affect the overall capacity perspective of the LPAR host processor?

*zPCR* supports zAAPs used as zAAP logical CPs, and zIIPs used as zIIP logical CPs. Whenever a General Purpose partition is defined with its SCP as running z/OS-1.6 or later, and zAAP or zIIP real CPs exist in the hardware, additional input fields will appear, used to designate the number of zAAP/zIIP logical CPs (if any) to be associated with the General Purpose partition. For *zPCR* capacity reporting purposes, each partition’s zAAP logical CPs and each partition’s zIIP logical CPs are considered as a separated partition.

zAAP/zIIP partitions will appear in *zPCR* reports as a separate RCP pools on z14, z13 and z13s (zIIPs only), zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, and z9 BC processors. zAAP partitions will appear as part of the combined zAAP/IFL/ICF pool on the 2-pool z990 and z890 processors. zAAP/zIIP partition logical CPs are defined on the *Partition Definition* window for GP partitions. Each associated zAAP/zIIP partition may have its Mode, LCPs, Weight, Capping metrics set as desired.

On z990 and z890 processors, once the zAAP partitions are configured, the IFL and ICF weights can be rebalanced to get the desired capacity effect for each within the shared pool of zAAP/IFL/ICF real CPs.

*zPCR* capacity projections take into account the costs relating to a single z/OS managing the General Purpose logical CPs and its associated zAAP/zIIP logical CPs. Algorithms consider the processor family (i.e., z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, z9 BC, z990, z890), the total number of logical CPs seen by z/OS, and the number of books installed. The same SCP/workload defined to the General Purpose partition is also assumed for its associated zAAP/zIIP partition.

**Notice Concerning Specialty Engines**

Neither *zPCR* nor this document provides descriptions of the types and portions of workloads that are eligible for execution on Specialty Engines (e.g., zAAP, zIIP, and IFL). IBM authorizes customers to use IBM Specialty Engines only to process Eligible Workloads of specific Programs expressly authorized by IBM. These programs are specified in the “Authorized Use Table for IBM Machines”, found at:


No other workload processing is authorized for execution on an SE.

IBM offers Specialty Engines at a lower price than General Processors/Central Processors because customers are authorized to use Specialty Engines only to process certain types and/or amounts of workloads as specified by IBM in the Authorized Use Table.
zAAP Specific Considerations

To derive capacity projections for a zAAP partition associated with a z/OS partition, the number of logical CPs available is considered as the sum of the General Purpose logical CPs and the zAAP logical CPs. A small switching cost is factored in, based on the processor family and the number of books. These items apply to both the General Purpose partition and the associated zAAP partition. Once these items are factored in, the partitions are considered identically to other partition types to determine the final capacity projections.

When adding zAAP CPs to a configuration, zAAP eligible work that formerly ran on General Purpose logical CPs can now run on the zAAP logical CPs. As a result, it may be possible to reduce the number of General Purpose logical CPs, and therefore reduce the number of real General Purpose RCPs required.

If the amount of zAAP eligible workload exceeds the zAAP logical CP capacity available, some of that work can be run on the General Purpose logical CPs.

zPCR can only project the capacity that is available on zAAP logical CPs. Whether or not that capacity can be exploited can only be determined from sources outside of zPCR.

For zAAP capacity planning purposes, the workload of a z/OS image can be considered as having three components.

- **Normal content** is the percent of workload that has no Java content (i.e., no zAAP eligible work). When there are no zAAP logical CPs defined, the entire workload is considered normal content.
- **Java Content** is the percent of workload that contains zAAP eligible work (e.g., WebSphere).
- **zAAP Eligible Work** is the portion of Java Content that can actually run on zAAP logical CPs. This is the portion of the workload to consider when determining how much zAAP capacity could actually be consumed.

For Java content workloads such as WebSphere, on the order of 50% or more is generally seen as being zAAP eligible.

Capacity projections are shown for the General Purpose partition and its associated zAAP partition as separate entries on the Partition Detail Report window. You can relate the capacity of the zAAP partition to its associated General Purpose partition capacity by finding the matching partition name and/or number. zPCR projects the capacity available to accommodate work. The consumable capacity needs to be considered separately for the General Purpose logical CPs and zAAP logical CPs, based on the characteristics of the application. How the combined capacity of General Purpose logical CPs and the associated zAAP logical CPs actually get used will depend on the ability of the workload to exploit zAAP processors.

Additional partitions defined will have an effect on the overall capacity expectation for the LPAR host, and for each individual partition.

A CP calculator function, zAAAP Capacity Estimator, is available in zPCR to assess scenarios with specific Java content on various zAAP configurations (see zAAP Capacity Estimator).
White Paper documentation available

A white paper entitled “z/OS Performance: Capacity Planning Considerations for zAAP Processors” is available on the ATS Techdocs web site:

www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100417
zIIP Specific Considerations

To derive capacity projections for a zIIP partition associated with a z/OS partition, the number of logical CPs available is considered as the sum of the General Purpose logical CPs and the zIIP logical CPs. A small switching cost is factored in, based on the processor family and the number of books. These items apply to both the General Purpose partition and the associated zAAP partition. Once these items are factored in, the partitions are considered identically to other partition types to determine the final capacity projections.

When adding zIIP CPs to a configuration, zIIP eligible work that formerly ran on General Purpose logical CPs can now run on the zIIP logical CPs. As a result, it may be possible to reduce the number of General Purpose logical CPs, and therefore reduce the number of real General Purpose RCPs required.

If the amount of zIIP eligible workload exceeds the zIIP logical CP capacity available, some of that work can be run on the General Purpose logical CPs.

zPCR can only project the capacity that is available on zIIP logical CPs. Whether or not that capacity can be exploited can only be determined from sources outside of zPCR.

For zIIP capacity planning purposes, the workload of a z/OS image can be considered as having three components.

- **Normal content** is the percent of workload that has no Java content (i.e., no zAAP eligible work). When there are no zAAP logical CPs defined, the entire workload is considered normal content.

- **DB2 Content** is the total combination of those applications that contain zIIP eligible work.

- **zIIP Eligible Work** is the portion of DB2 Content that can actually run on zIIP logical CPs. This is the portion of the workload to consider when determining how much zIIP capacity could actually be consumed.

zIIP logical CP capacity is always associated with that of DB2 content workload.

Capacity projections are shown for the General Purpose partition and its associated zIIP partition, as separate entries on the *Partition Detail Report* window. You can relate the capacity of a zIIP partition to its associated General Purpose partition capacity by finding the matching partition name and/or number. zPCR projects the capacity available to accommodate work. The consumable capacity needs to be considered separately for the General Purpose logical CPs and zIIP logical CPs, based on the characteristics of the application. How the combined capacity of General Purpose logical CPs and the associated zIIP logical CPs actually get used will depend on the ability of the workload to exploit zIIP processors.

Additional partitions defined will have an effect on the overall capacity expectation for the LPAR host, and for each individual partition.
The **Host Summary Report** window is accessed from the **LPAR Host and Partition Configuration** window by clicking the [Host Summary] button in the **Capacity Reports** group box. This report is intended to provide an overview of the LPAR host configuration and characterize its partition configuration and capacity for each of the CP pools. Also included is a totals line for the overall LPAR host. Estimates for LPAR management time by pool (as would be reported by RMF) are also provided.

For information concerning capacity projections, see [Accuracy of LPAR Capacity Projections].
The fields describing the LPAR host processor (shown on the left side of the **Host Summary Report** window) are as follows:

**LPAR Host Processor**
- Processor Family
- Speed Class
- Processor Model
- Books Configured
- Books Unused
- Maximum CPs
- Maximum Partitions

**Real CP Configuration**
- GP: Number Assigned
  Number Unused
- zAAP: Number Assigned
  Number Unused
- zIIP: Number Assigned
  Number Unused
- IFL: Number Assigned
  Number Unused
- ICF: Number Assigned
  Number Unused

The fields summarizing the partition configuration (shown on the right side of the **Host Summary Report** window) are as follows:

**Rows displayed for each CP pool as follows**

<table>
<thead>
<tr>
<th>Pool Name</th>
<th>RCPs</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated</td>
<td>RCPs</td>
<td>Partitions LCPs</td>
</tr>
<tr>
<td>Shared</td>
<td>RCPs</td>
<td>Partitions LCPs</td>
</tr>
</tbody>
</table>

Regardless of the processor family, General Purpose CPs are always managed as a single pool. The first set of rows will reveal the General Purpose pool metrics.

On **z9 and later processor families**, zAAPs, zIIPs, IFLs, and ICFs are each managed as a separate pool. In these cases, four additional sets of rows will be displayed, one set for each of the CP pools.

On the **z990 and z890 processor families**, zAAPs, IFLs, and ICFs are all managed from a single pool. In these cases, one additional set of rows will be displayed as the zAAP/IFL/ICF pool.

On the **z900 and z800 processor families**, IFLs and ICFs are managed from a single pool. In these cases, one additional set of rows will be displayed as the IFL/ICF pool.

A **Totals** line summarizes the allocations and capacity for the entire CPC.

**Key to acronyms used**
- **RCP** Real CPs
- **Partitions** Logical Partitions
- **LCP** Logical CPs
- **LCP/RCP** Ratio of Shared Logical CPs to Shared Real CPs
- **Capacity** Effective capacity of the CP pool or CPC

In general, shared partitions should be configured such that the LCP:RCP ratio for the pool remains relatively low, especially when there are many CPs in the pool. Doing so will minimize capacity lost due to LPAR overhead related to excessive sharing of CP resource.
When a CP pool has only one shared RCP, the LCP:RCP ratio will be dictated by the number of logical partitions (i.e., 10 partitions = LCP:RCP of 10.00). As the number of shared RCPs in the CP pool increases, the tolerance for a large LCP:RCP ratio diminishes. As a general rule, when the number of shared RCPs in the CP pool is six, the LCP:RCP ratio should be kept below 3.00. And when the number of shared RCPs in the CP pool is 12 or greater, the LCP:RCP ratio should be kept below 2.00. Of course, if the various partition workloads have complimentary peak utilizations, or tend to remain idle, this rule-of-thumb becomes less important. zPCR computes two LCP:RCP limits for each CP pool, based on the number of shared RCPs in the pool:

- **Point at which the LCP:RCP ratio is considered unreasonable.** If the LCP:RCP for a CP pool exceeds this value, capacity results continue to be generated and a note is issued in the message box.

- **Point at which the LCP:RCP ratio is considered excessive.** If the LCP:RCP for a CP pool exceeds this value, capacity results are not generated and an error message is issued in the message box.

Effective capacity values for the LPAR host are expressed as the sum of the *Minimum Capacity* projection that each partition could see. Results represent the “Capacity Perspective”, i.e., maximum sharing contention, where every partition is seeking all the capacity it can get and the partition weights are deciding who gets it. For multiple partitions that tend to have complimentary peak utilizations, or tend to remain idle, the effective capacity could vary somewhat from the projection, and the capacity available to any individual partition could vary significantly, up to its *Maximum Capacity* projection.

**Messages Displayed**

The following messages may be issued in the message area at the bottom of the *Host Summary Report* window:

Displayed when the LCP:RCP ratio is considered excessive for the number of CPs in the pool. Capacity results continue to be provided. See note below.

*Note: GP shared LCP:RCP ratio appears excessive, exceeding threshold value of NN.NN for X shared RCPs.*

Displayed when the LCP:RCP ratio is unreasonable for the number of CPs in the pool. In this case, capacity results are not provided. See note below.

*Error: GP shared LCP:RCP ratio exceeds cutoff value of NN.NN for X shared RCPs; No results will be generated.*

**Note:** Often the number of logical CPs defined to a partition is in excess of what is normally needed, and HiperDispatch (z10 or later processors only) or IRD is used to manage them down to a reasonable level.

Whenever HiperDispatch is active, parked logical CPs should be removed from all partitions in the study that are being run that way.

Whenever IRD is active, logical CPs that are varied offline should be removed from all partitions in the study that are being run that way.
Displayed when the number of defined/active partitions exceeds 30:

*Note: Capacity results for LPAR configurations with a large number of partitions have not been validated by benchmarks or customer experience.*

Displayed when some of the CP pool capacity cannot be consumed due to capping assignments:

*Note: xx.xx% of XX (pool) capacity cannot be used by partitions due to capping assignments.*

Displayed when the number of logical CPs assigned to a partition is inadequate to support the assigned weight percent:

*Note: One or more partitions weights indicate more capacity than can be provided with the LCPs defined.*

Displayed when the [Include] checkbox for one or more partitions is unchecked:

*Note: N defined partitions are excluded from the capacity assessments.*

**LPAR Management Time**

The *Estimate of LPAR Management Time* group box is presented below the main table. Estimates of the LPAR management time are shown for each CP pool. These estimates are intended to reflect what would be observed in an RMF *Partition Data Report*.

The results represent the percent of the CP resource used by LPAR to manage the dispatching of LCPs on RCPs. Both a low percent and high percent are reported, representing the expected range for LPAR management time.

- Utilization level High – represents the condition when overall utilization tends to be high and/or small partitions are less likely to interrupt the execution of large ones on a frequent basis.
- Utilization level Low – represents the condition when overall utilization tends to be low and/or small partitions are likely to interrupt large ones on a frequent basis.

LPAR management time is generally a small percent of total capacity. The LPAR management time results from zPCR are merely estimates, which should not be expected to carry a high degree of accuracy.

**Controls**

Click the [Calibrate Reference-CPU] button to calibrate the current LPAR host and partition configuration such that the LPAR host capacity result comes out at a desired value. See *Calibrate Capacity to LPAR host* for a discussion of this capability.

Click the Return toolbar icon to return to the *LPAR Host and Partition Configuration* window.

Click the HTM toolbar icon to create a filename.HTML with the information from this report.

Click the Help toolbar icon to access context sensitive help for this window.
The Partition Detail Report window is accessed from the LPAR Host and Partition Configuration window by clicking the Partition Detail button in the Capacity Reports group box. This section discusses all the standard items on this widow.

Note: For z14, z13, and z13s hosts, this window also includes SMT benefit values (see SMT Benefit).

This window includes the necessary metrics concerning each partition participating in the analysis and the range of capacity expectation for each. For information concerning capacity projection accuracy, see Accuracy of LPAR Capacity Projections.

The title area includes the description field set on the LPAR Host and Partition Configuration window, followed by the number of active partitions with their distribution across real CP pools. The basis for all capacity results is also provided (i.e., the current Reference-CPU and its scaling-factor/metric).
Detail for the partition configuration is displayed below in a J-table. Fields with a white background are alternate input; changing them will modify results accordingly. See User Controls under “Getting Started” on how to enter data into J-table input fields.

**Partition Control**
- **Include** Checkbox to control partition participation in study

**Partition Identification metrics**
- **No.** Automatically assigned sequential partition number
- **Type** CP pool to which the partition is assigned
- **Name** Partition name
- **SCP** Operating system
- **Workload** Workload category

**Partition Configuration metrics**
- **Mode** Partition is dedicated or shared
- **LCPs** Number of active logical CPs
- **Weight** Weight value assigned (SHR only)
- **Weight %** Relative weight within the partition’s CP pool (SHR only)

**Capping metrics**
- ✓ (checkbox) Partition is capped (SHR only)
- **ABS** Absolute Capping value (zEC12/zBC12 and z13 only). For details, see Absolute Capping.

**Partition Capacity metrics**
- **SMT Benefit** [z14, z13, and z13s processors only] Displays the current percent SMT benefit settings (measured or estimated) for zIIP and for IFL partitions. For details, see SMT Benefit.
- **Minimum** Minimum capacity realizable when sharing contention is 100%
- **Maximum** Maximum capacity realizable when there is no sharing contention

**Note-1:** The partition number assigned for zAAP and zIIP partitions is the number of its associated General Purpose partition. These partitions do not count towards the maximum number of partitions allowed.

**Note-2:** If the assigned weight for a partition results in a weight percent that cannot be accommodated due to the limited number of logical CPs assigned, the field displays a red background. A note in the message box at the bottom of the window indicates the nature of the problem. Correction consists of increasing the number of logical CPs assigned to the partition or lowering its weight assignment. This condition is not necessarily problem for zPCR, as any capacity that cannot be used by such a partition (i.e., Unusable Capacity) is redistributed to the other partitions within the same CP pool.

**Note-3:** If Absolute Capping is specified for a partition such that the partition’s Minimum Capacity must be reduced, the field displays a red background. A note in the message box at the bottom of the window indicating that the setting is outside the suggested range. This condition is not necessarily problem for zPCR, as any capacity that cannot be used by such a partition (i.e., Unusable Capacity) is redistributed to the other non-capped partitions within the same CP pool. Correction consists of increasing the Absolute Capping value so that the Maximum Capacity exceeds the Minimum Capacity.
Note-4: Contention between two classes of CPs will have an effect on capacity results. On multi-drawer CECs, the GP/zAAP/zIIP class CPs and the IFL/ICF class CPs are each isolated to drawers to the extent possible. There can be only one drawer where the two CP classes might intersect. The drawer where they intersect will have some additional contention cost over that of the other drawers. Maximum contention will always exist on single drawer CECs. A bar chart is available to show how these 2 CP classes are distributed across drawers and reveals where contention would exist.

### Explain Minimum and Maximum Capacity

#### Dedicated Partitions

**Minimum Capacity** will be equal to its **Maximum Capacity**. Capacity is based solely on the number of logical CPs assigned.

#### Shared Partitions - Minimum Capacity

**Minimum Capacity** is that which can be realized when all shared partitions within a CP pool are actively competing for the available real CP resource. The determinants for **Minimum Capacity** are the partition’s logical CP count and its relative weight (or weight percent).

In cases where a partition’s weight percent is greater than its logical CP count would warrant (LCP ÷ RCPs), the **Minimum Capacity** will be determined by the number of LCPs, and the excess capacity, which cannot be consumed, is redistributed to the other shared partitions within the same CP pool.

In cases where **Absolute Capping** is defined such that the partition’s **Minimum Capacity** must be reduced, the excess capacity, which cannot be consumed, is redistributed to the other non-capped shared partitions within the same CP pool.

#### Shared Partitions - Maximum Capacity

A shared partition’s **Maximum Capacity** can only be realized when no other partitions are competing for the same real CP resource within the CP pool. The primary determinant for **Maximum Capacity** is the number of logical CPs assigned, since a partition can consume no more real CP resource than it has logical CPs.

LPAR cost is assumed to be the same when computing both the **Minimum Capacity** and **Maximum Capacity** values, even though a case could be made that LPAR cost might be less when only 1 partition is competing.

A partition that is **Normal Capped** will have its **Maximum Capacity** set equal to its **Minimum Capacity** (which is controlled by weight %). In actual production, a capped partition capacity may see ±3.6% of its **Minimum Capacity**. Capping a partition has no effect on the capacity of other partitions.

A partition that is **Absolute Capped** will normally have its **Maximum Capacity** set to a value somewhere between its **Minimum Capacity** value and its uncapped **Maximum Capacity** value. The value is established based on the **Absolute Capping** value provided, expressed as the fractional number up to its total logical CPs. Should the partition’s **Absolute Capping** value result with **Maximum Capacity** less than **Minimum Capacity**, its **Minimum Capacity** is reduced to equal **Maximum Capacity**.
The Capacity Summary by Pool group box below the table reports effective capacity values for the LPAR host’s processor pools as follows:

All processor families (General Purpose CPs are always managed as a single pool)
- **GP** Sum of General Purpose partition minimum capacity values

**z9 and later** (separate CP pools exist for specialty engines)
- **zAAP** Sum of zAAP partitions’ Minimum Capacity values
  
  Note: z14, z13, and z13s processors do not support zAAPs
- **zIIP** Sum of zIIP partitions’ Minimum Capacity values
- **IFL** Sum of IFL partitions’ Minimum Capacity values
- **ICF** Sum of ICF partitions’ Minimum Capacity values

**z990 and z990** (common pool of CPs exists for specialty engines)
- **zAAP/IFL/ICF** Sum of zAAP/IFL/ICF partitions’ Minimum Capacity values

**z900 and z800** (common pool of CPs exists for specialty engines)
- **IFL/ICF** Sum of IFL/ICF partitions’ Minimum Capacity values

Overall LPAR Host
- **Totals** Sum of all partitions’ Minimum Capacity values

Capacity results are determined based on the number of real CPs in each pool that can actually be exploited. If the total number of logical CPs assigned to a pool is less than the number of real CPs defined, a note appears in the message box, and only the usable real CP capacity is considered.

**Partition Pools**

A unique background color is assigned to distinguish each of the partition types.

- General Purpose partitions
- zAAP partitions
- zIIP partitions
- IFL partitions
- ICF partitions

This color key is applied consistently throughout zPCR windows.

By default, General Purpose partitions will be positioned first, followed immediately by any (z/OS) associated zAAP or zIIP partitions (also applies to IFL partitions that are associated with a General Purpose partition running z/VM with Linux guests).

An alternate order can be chosen, such that all partitions in a single pool are grouped together, General Purpose first, followed by zAAP, zIIP, IFL, and ICF.

When opening the Partition Detail Report window, partitions are initially displayed in the order most recently chosen from this window.
Report Controls

From the **Partition Detail Report** window, the following columns can be changed for any partition (various restrictions apply):

- **Include** a partition from being considered in the capacity assessment by un-checking its **Include** checkbox. zAAP, zIIP, and IFL partitions can be excluded without excluding their associated General Purpose partition. However, if a General Purpose partition is excluded, any associated zAAP, zIIP, or IFL partition will also be excluded.

- **Name**. Any name up to 8 characters may be specified. If the name of a General Purpose partition is changed, any associated zAAP, zIIP, or IFL partition’s name will also be changed.

- **SCP**. A zAAP or zIIP partition SCP or an IFL partition SCP that is associated with a General Purpose partition cannot be changed; it will always reflect the SCP of the associated General Purpose partition. If a General Purpose partition has an associated zAAP, zIIP, or IFL partition, its SCP cannot be changed to a different SCP (such as changing z/OS to z/VM). Such changes must be made via the **Partition Definition** window for General Purpose CPs.

- **Assigned Workload**. A zAAP or zIIP partition workload cannot be changed; it will always reflect the workload of the associated General Purpose partition. The workload for an associated IFL partition may be set differently than its parent General Purpose partition.

- **Mode**. Partitions may be switch between dedicated and shared. However, changing a partition to dedicated will remove real CPs from the shared pool, which may cause some partitions to become invalid (**Include** will become unchecked).

- **LCPs**. The LCP count allowed will be limited to the number of LCPs in its shared real CP pool.

- **Weight**. Changing a partition’s weight values will rebalance the **Minimum Capacity** results between partitions within the CP pool.

- **Capping**. Limit the **Maximum Capacity** available to a partition.
  - **Normal Capping** (any SHR partition) - Simply click the checkbox for the partition. This will limit its **Maximum Capacity** to its **Minimum Capacity**.
  - **Absolute Capping** (z14, z13, z13s, zEC12 and zBC12 processors only) - Specify a value for **ABS** to increase its **Maximum Capacity** over that of **Normal Capping**. For a detailed discussion, see **Absolute Capping**.

Neither capping case will affect the capacity value results of other partitions.

Any changes to partition metrics made on the **Partition Detail Report** window are reflected throughout **zPCR** for this LPAR configuration.

Changes to a partition’s definition that causes it or other partitions to become invalid will cause their **Include** to become unchecked. In many cases, a dialog box will explain the problem. Any such excluded partition will need to be corrected if it is to be restored to the LPAR configuration. Whenever a partition has been automatically excluded, must be manually re-included.
**zAAP or zIIP LCPs associated with a z/OS General Purpose Partition**

These partitions must be initially defined from the *Partition Definition* window. They can only be associated with a General Purpose partition running z/OS-1.6 or later. Except for the number of logical CPs, the zAAP/zIIP partition is initialized with partition definition metrics identical to its associated General Purpose partition. Once defined, the number of LCPs specified for the zAAP/zIIP partition can be modified from this window. In addition, on z9 and later processors, the *Mode*, *Weight*, and *CAP* assignment can also be changed from this window (not needing to be tied to the settings of the associated General Purpose partition). The *Name*, *SCP*, and *Workload* can only be changed via the associated General Purpose partition.

To delete a zAAP or zIIP partition, set the LCP count to zero on the *Partition Definition* window that includes the General Purpose partition.

**IFL LCPs associated with a z/VM General Purpose partition**

These partition configurations are only supported on z10 and later processors. They must be initially defined from the *Partition Definition* window, and can only be associated with a General Purpose partition running z/VM. Except for the number of logical CPs, the IFL partition is initialized with partition definition metrics identical to its associated General Purpose partition. Once defined, the number of logical CPs specified for the IFL partition can be modified from this window. The *Mode*, *Weight*, and *CAP* assignment can also be changed from this window. The *Name*, *SCP*, and *Workload* can only be changed via the associated General Purpose partition.

To delete an IFL partition associated with a General Purpose partition, set the LCP count to zero on the *Partition Definition* window that includes the General Purpose partition.

Any currently defined partition can be excluded by un-checking its *Include* checkbox. When a partition is excluded, it no longer participates in the capacity scenario, and all capacity values are adjusted accordingly. Even though a partition is excluded, it remains in the study’s partition list.

**Table View Controls**

- Under *Display zAAP/zIIP/IFL Partitions*
  - *With Associated GP* is the default order. This means that zAAP, zIIP, and IFL partitions that are owned by a General Purpose partition will be displayed immediately beneath the owning General Purpose partition. Partitions in the IFL and ICF pools will follow.
  - *Separate by Pool* is an alternative order. All partitions of the same type will be grouped together, General Purpose first, followed by zAAP, zIIP, IFL. and ICF.

Note: The most recent *Display zAAP/zIIP/IFL Partitions* setting made from any open *Partition Detail Report* window will serve as the default order for every window that displays the individual partitions of an LPAR configuration. The default order can only be changed from a *Partition Detail Report* window.

If a table sort is requested, the table is temporarily placed in *Separate by Pool* order. The default order is not affected.

- To limit the partitions shown in the window to those that are active (for documentation purposes), click the *Includes Only* radio button under *Show* in the *Table View Controls* group box. Click the *All Partitions* radio button to restore
excluded partitions to the view. To re-activate an excluded partition, the All Partitions radio button must be set so that the partition’s Include checkbox can be reset.

You can limit the report to show only partitions residing in specific pools by using checkboxes associated with each. All partitions continue to participate in the capacity scenario; capacity results are not affected. The un-checked pool(s) simply are not revealed in the table, while their capacity values continue to be reflected in the Capacity Summary by Pool group box.

To add partitions, to delete a partition, or to change the sequence of partitions within a pool, the Partition Definition window must be used.

When generating output, the partitions included in the report will always reflect what is currently being presented in this window.

Making Global Changes to the SCP/Workload of Partitions

zPCR provides the ability to make global changes for a defined LPAR configuration to the SCPs and/or workloads assigned to partitions. Requested changes are applied temporarily, such that updated capacity results can be viewed in the Partition Detail Report window. At any point in the change process, the temporary LPAR configuration can then be committed, becoming permanent for the active study. Use the Modify SCP/Workload button to display the Modify Partitions window, providing access to this capability (see Modify Partitions).

Controlling the Order of Displayed Partitions

By default, General Purpose partitions are always displayed first, followed by zAAP, zIIP, IFL, and ICF partitions. zAAP and zIIP partitions (and General Purpose associated IFL partitions) are either displayed immediately following their owning General Purpose partition or displayed grouped by pool (the order is determined by the setting in the Table View Controls group box). IFL partitions followed by ICF partitions are displayed last.

Within each pool (General Purpose, IFL when not associated with a General Purpose, and ICF), partitions are displayed in the order in which the partitions were defined. zAAP and zIIP partitions (and IFL partitions when associated with a General Purpose partition) will appear in the same order as their owning General Purpose partition. General Purpose partition ownership of zAAP, zIIP, and IFL partitions can be determined by the matching partition number and name.

the current table view can be temporarily sorted across all the partitions within a pool, based on LP Name, LP Weight Percent, LP Min Capacity, or LP Max Capacity (click on the related underlined title). The first sort request will sort ascending, the second will sort descending, and the third will restore the original order. While a sort is active, the table is temporarily placed in Separate by Pool order (the default order is not affected). Whenever output is requested, the current view will be used.

With the exception of zAAP, zIIP, and associated IFL partitions, permanent changes to the sequence of partitions within a pool can be made on the Partition Definition window.

Summary by Pool

The Capacity Summary by Pool group box shows the Minimum Capacity totals for each CP pool. A totals line shows the Minimum Capacity total for the entire CPC.
Messages Concerning Generated Results

The following messages may be issued in the message area at the bottom of the **Partition Detail Report** window:

**Error: GP shared LCP:RCP ratio exceeds cutoff value of NN.NN for X shared RCPs; No results will be generated.**
Displayed when the LCP:RCP ratio is unreasonable for the number of CPs in the pool. In this case, capacity results are not provided. See note below.

**Note: GP shared LCP:RCP ratio appears excessive, exceeding threshold value of NN.NN for X shared RCPs.**
Displayed when the LCP:RCP ratio is considered excessive for the number of CPs in the pool. Capacity results continue to be provided. See note below.

```
Note: Often the number of logical CPs defined to a partition is in excess of what is normally needed, and HiperDispatch (z10 or later processors only) or IRD is used to manage them down to a reasonable level.

Whenever HiperDispatch is active, parked logical CPs should be removed from all partitions in the study that are being run that way.
Whenever IRD is active, logical CPs that are varied offline should be removed from all partitions in the study that are being run that way.
```

**Note: Capacity results for LPAR configurations with a large number of partitions have not been validated by benchmarks or customer experience.**
Displayed when the number of defined/active partitions exceeds 30:

**Note: xx.xx% of XX (pool) capacity cannot be used by partitions due to capping assignments.**
Displayed when some of the CP pool capacity cannot be consumed due to capping assignments:

**Note: One or more partitions weights indicate more capacity than can be provided with the LCPs defined.**
Displayed when the number of logical CPs assigned to a partition is inadequate to support the assigned weight percent:

**Note: N defined partitions are excluded from the capacity assessments.**
Displayed when the checkbox for one or more partitions is unchecked:
Controls

Click the **Host Summary** button to display the *Host Summary Report* window, which includes a description of the LPAR host, a summary of the partition configuration, and the projected capacity available (see *Host Summary Report*).

Click the **SMT Benefit** button (only available for z13 and later) to add or change SMT benefit percentages for zIIP and IFL partitions running an eligible SCP. See *SMT Benefit* for a description of this capability.

Click the **LCP Alternatives** button to test the effect on capacity when changing the SCP and or workloads assigned to partitions. See *LCP Alternatives* for a description of this capability.

Click the **zAAP/zIIP Loading** button to assess the effect on General Purpose capacity when the load on associated zAAP or zIIP LCPs is changed from the default. See *zAAP/zIIP Loading* for a description of this capability.

Click the **Calibrate Reference-CPU** button to calibrate the current LPAR host and partition configuration such that the LPAR host capacity result comes out at a desired value. See *Calibrate Capacity to LPAR host* for a description of this capability.

Click the **Return** toolbar icon to return to the *LPAR Host and Partition Configuration* window. Any alterations to a partition’s ✓ **Include** checkbox, **Weight** or **CAP** assignment will be retained.

Click the **HTM** toolbar icon to create an HTML file with the report tables.

Click the **CSV** toolbar icon to create a CSV file with the report tables. (Note that CSV output was enabled for a particular project, and is not being considered for universal implementation in *zPCR*.

Click the **Help** toolbar icon to access context sensitive help for this window.
Menu-bar

Edit

Modify SCP/Workload \- Opens window with editing capability for globally modifying the SCP and/or Workload of z/OS partitions. See Modify SCP/Workload for a description of this capability.

Graph

Distribution of RCPs \- On multi-drawer (book) processors, the GP/zAAP/zIIP class CPs and the IFL/ICF class CPs are isolated to drawers to the extent possible. A bar chart shows how these 2 CP classes are likely distributed across the drawers and reveals the one where contention may exist. For z14, z13, and z13s processors, the location of the 2 CP classes is managed dynamically by PR/SM; therefore the precise drawer allocation layout cannot be portrayed. However, the maximum number or of RCPs in each drawer and an estimate of the number of GP/zIIP and IFL/ICF CPs in contention are revealed.

Distribution of capacity \- Pie chart showing all partitions or partitions by pool

Capacity available \- Bar chart showing all partitions or partitions by pool

Documentation \- Links to various informational dialogs
Absolute Capping

LPAR Configuration Capacity Planning

Absolute Capping is a feature available on z14, z13, z13s, zEC12, and zBC12 processor models. An Absolute Capping column will always appear on the Partition Detail Report window. Absolute Capping can be specified for any shared-mode partition in any CP pool. Absolute Capping is normally used to cap a partition’s Maximum Capacity at something above that of normal capping.

In order to specify an Absolute Capping value for a partition, Capping must be checked. If checked, and the LPAR host is a z14, z13, z13s, zEC12, or zBC12 processor model, the ABS field for that partition is enabled, and a value may be entered. Should Capping subsequently become unchecked, the ABS field is set to null and disabled for input.

Absolute Capping values are expressed as a fractional value (N.nn) greater than zero and less or equal to than the number of logical CPs defined to the partition. Normally, only the partition’s Maximum Capacity value is affected by this setting.
Capping Conditions

1. Without Capping, a partition’s Maximum Capacity represents the capacity it could get if no other partitions are competing for the shared CP resource.

2. With Normal Capping, a partition’s Maximum Capacity is limited to its Minimum Capacity.

3. Absolute Capping will generally result in a partition’s Maximum Capacity greater than Normal Capping and less than that if no capping were specified. However, if the value is set too low (outside the suggested range), the partition’s Minimum Capacity value will be driven down to match its Maximum Capacity.

Note: In order for an Absolute Capped partition to realize its elevated Maximum Capacity, other partitions in the same CP pool may not be able to realize their full Minimum Capacity.

Absolute Capping values are entered manually. If the value entered is greater than the partition’s logical CPs, a note appears and the value is assumed to equal the number of logical CPs defined to the partition. If the value entered generates a Maximum Capacity value greater than its Minimum Capacity, its Minimum Capacity is reduced to match, and a note appears indicating such. This results in unusable capacity for the partition, which is then redistributed to the other non-capped partitions within the same CP pool.

Exception Considerations

Absolute Capping values may become note-worthy or invalid if a partition’s logical CPs or relative weight is changed. In these cases, the partition’s Absolute Capping field will be highlighted with a red background. The conditions are:

1. Note: A partition’s Absolute Capping value exceeds its LCP count; The number of LCPs defined to the partition is assumed.

2. Note: Absolute Capping values specified are such that the partition’s Maximum Capacity would be less than its Minimum Capacity (hardware will actually allow this, but it is not recommended). In this case, the partition’s Minimum Capacity is lowered to equal its Maximum Capacity.

RMF and EDF Input

Absolute Capping information is not currently available in RMF. Values must be entered manually once the LPAR configuration has been defined to zPCR.

Absolute Capping values can be obtained from EDF for z14, z13, z13s, zEC12, or zBC12 partition. Such values will become part of the LPAR configuration study.

When copying z14, z13, z13s, zEC12, or zBC12 partitions from an EDF, Absolute Capping values will remain only if the currently specified LPAR host supports it.
**zPCR Study File**

*Absolute Capping* values will be saved as part of the LPAR configuration in a study file.

When copying partitions from a study file where the LPAR host was a z14, z13, z13s, zEC12, or zBC12 model, *Absolute Capping* values will be included only if the LPAR host is a model that supports it.

Study files that include *Absolute Capping* values cannot be loaded into zPCR versions previous to v8.7.

**Changing the LPAR Host**

If the LPAR host is changed to a model that does not support *Absolute Capping*, any *Absolute Capping* values will be purged. If the model is subsequently changed to one that does support Absolute Capping, the values must be reentered.
SMT Benefit

LPAR Configuration Capacity Planning

Note: For the SMT examples in this section, the LPAR host has been changed from the zEC12 model to an equivalently configured z14 model.

z14, z13, and z13s processor models can be run with Symmetrical Multi-Threading (SMT) enabled for zIIP and IFL partitions. SMT can provide a capacity benefit for these CP types when the partition is managed by an SCP that supports it.

Whenever a z14, z13, or z13s is defined as the LPAR host, two SMT Benefit columns are displayed on the Partition Detail Report window immediately after the Capping columns. An SMT Benefit column is also displayed in the Capacity Summary by Pool group box. An SMT Benefit button will also appear at the bottom of the window.

When SMT is checked for a partition, SMT is assumed to be enabled for that partition. The initial SMT benefit of 0% will be refined later via the SMT Benefit window.

The SMT benefit checkboxes may also be activated (or deactivated) by group at the time the SMT Benefit window is displayed. See below.
SMT benefit values for zIIP and/or IFL partitions are established via the **SMT Benefit** window. Click the **SMT Benefit** button to present the window; it will be displayed adjacent to the **Partition Detail Report** window.

Initially a dialog overlays the **SMT Benefit** window, providing the ability to activate SMT for groups of zIIP and IFL partitions. When requested, SMT activation occurs for all partitions within a group, based on having an SCP assignment that supports SMT.

Set the **Activate SMT** radio button to activate or the **Deactivate SMT** radio button to deactivate. The buttons below are available for the requested action:

- **z/OS-2.1 and Later – zIIP Partitions**  
  (SCP version enforced by zPCR)
- **z/VM-6.3 and Later – IFL Partitions**  
  (SCP version enforced by zPCR)
- **KVM-1.1.1 and Later – IFL Partitions**  
  (SCP version not enforced by zPCR)
- **Native Linux – IFL Partitions**  
  (SCP version not enforced by zPCR)

The overlay dialog may be skipped for subsequent accesses to the **SMT Benefit** window by checking the **Show this dialog only when no partitions are SMT enabled** checkbox.
Click [Continue] to proceed to the SMT Benefit window.

SMT benefit values to be applied are entered on the SMT Benefit window.

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Name</th>
<th>SCP</th>
<th>Assigned Workload</th>
<th>Mode</th>
<th>Active LCPs</th>
<th>Weight%</th>
<th>Measured EDF/RMF</th>
<th>Estimated by User</th>
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<td>GP</td>
<td>LP-01</td>
<td>z/OS-2.2</td>
<td>Average</td>
<td>SHR</td>
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<td>z/OS-2.2</td>
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<td>SHR</td>
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<td></td>
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<tr>
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<td>zIIP</td>
<td>LP-02</td>
<td>z/OS-2.2</td>
<td>Average</td>
<td>SHR</td>
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<td></td>
<td>31.5%</td>
</tr>
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<td>LP-03</td>
<td>z/OS-2.2</td>
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<td>SHR</td>
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</tr>
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<td>IFL</td>
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<td></td>
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</tr>
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<td>DED</td>
<td>1</td>
<td>4.00%</td>
<td></td>
<td>25%</td>
</tr>
</tbody>
</table>

SMT Benefit Values

There are two types of SMT benefit values. Only 1 type can be defined for each zIIP or IFL partition where SMT has been enabled.

- **Measured**: Measured values are typically obtained from performance data produced by z/OS or z/VM. When obtaining partition information via EDF or RMF, these measured values are loaded into the LPAR configuration. Measured values may also be entered manually (double click on the entry field, enter a value between ±90.0%, and press Enter). Negative values indicate that there is no benefit for enabling SMT; such values will be displayed with brown text. A measured value precludes the assignment of an estimated value for that partition.
- **Estimated**: Estimated values are intended to approximate an expected benefit due to SMT. Estimated entry fields appear as spin buttons. Values may be set between 0% and 60% in 1% increments. For the estimated setting to take effect, simply move the mouse off of the estimated entry field.

Note that a **Measured SMT Benefit** may be converted to an **Estimated SMT Benefit**; right click the entry field, then click **[Make this an Estimated Value]**. If an estimated value is not desired, set it to zero.

**Global Estimated SMT Benefit**

Estimated values may be set globally for all zIIP partitions and for all z/VM IFL partitions that have SMT enabled, using the controls in the **Global Estimated SMT Benefit** group box. The default values are provided as follows: zIIP is 25%; z14 IFL is 25% and z13 IFL is 20%. These may be modified using the spin buttons. Click the **[zIIP CPs]** or the **[z/VM & KVM IFL CPs]** button to apply the estimated values. For IFL partitions, estimated SMT benefit values can only be set for z/VM and KVM partitions. Linux partitions running on IFLs may be set manually (recognize that there is currently no SMT support available for Linux).

Radio buttons are provided on the right to control how the estimated values for either zIIP or IFL partitions are to be applied.

- 0% Estimated Only update estimated values that are currently 0%
- All Estimated Update all estimated values

The **[Restore SMT Benefit Default Values]** button can be used to reset the values to the supplied defaults, in case they have been modified.

Changes made on the **SMT Benefit** window are considered temporary. To commit pending changes, click the **[Commit Changes]** button. To remove pending changes, click the **[Undo Pending Changes]** button.

Click the **[Show SMT Restrictions]** button to display considerations for applying **SMT Benefit** values.

Click the **Return** tool bar icon to close the **SMT Benefit** window. If changes are pending, a dialog will ask whether the changes are to be committed or discarded. The full function of the **Partition Detail Report** window will be restored, reflecting the SMT benefit values that have been set.

Clicking the **Return** tool bar icon on the **Partition Detail Report** window will close both windows, returning to the **LPAR Host and Partition Configuration** window.
As **SMT Benefit** values are set, the **SMT Benefit**, **Minimum Capacity**, and **Maximum Capacity** columns on the (simultaneously displayed) **Partition Detail Report** window are updated to reflect the changes.

In the **SMT Benefit** column, **Estimated** values are prefixed with "**est**", while **Measured** values are not.

Measured SMT benefit values captured via EDF or RMF that are negative indicate that there is no benefit realized by enabling SMT for the partition; such negative values will be displayed with **brown text**.

The **Capacity Summary by Pool** group box values are also updated. The **SMT Benefit** column shows the combined benefit applied for the zIIP partitions and for the IFL partitions. If any of the contributing partitions have estimated SMT benefit values, "**est**" will prefix the value.

Whenever SMT is deactivated for a partition, its SMT benefit is retained behind the scene, but not applied. When SMT is subsequently activated for the partition, its SMT benefit reappears and is applied. Use of the SMT checkbox facilitates the comparison of a partition’s capacity without and with SMT enabled.

Clicking the **Return** tool bar icon on the **Partition Detail Report** window will close both windows, returning to the **LPAR Host and Partition Configuration** window.
SCP Considerations

With the current \texttt{zPCR} implementation be certain that each zIIP and IFL partition will be controlled by an appropriate SCP version before applying \textit{SMT Benefit} values to it. SMT is currently supported only by the SCPs listed below.

- To represent \texttt{z/OS} using SMT on zIIP logical CPs, \texttt{zPCR} requires that the SCP version be \texttt{z/OS-2.1} or later.
- To represent \texttt{z/VM} using SMT on IFL logical CPs, \texttt{zPCR} requires that the SCP version be \texttt{z/VM-6.3} or later.
- To represent \texttt{KVM} using SMT on IFL logical CPs, \texttt{KVM for IBM Z v1.1.1} or later is required. The KVM SCP is not qualified by a version number in \texttt{zPCR}. Be certain that the appropriate KVM version will actually be run before applying SMT benefit estimates.
- To represent \texttt{Linux} using SMT on IFL logical CPs, a version supporting SMT is required. The Linux SCP is not qualified by a version number in \texttt{zPCR}.

Where \textit{Estimated SMT Benefit} values have been set for zIIP and IFL partitions, the expected margin-of-error for capacity results must be considered greater than that normally assumed due to uncertainty of the estimate. An additional line of text will appear at the bottom of each capacity result window to indicate such. If the default \textit{Estimated SMT Benefit} settings are used, consider the margin-of-error to be $\pm 10\%$.

For any partition where an SMT value has been set, its SMT checkbox on the \textit{Partition Detail Report} window may be used to disable or enable SMT, adjusting capacity results accordingly.

\section*{Changing the LPAR Host}

If the LPAR host is changed to a processor model that does not support SMT, the SMT benefit column will be excluded from the \textit{Partition Detail Report} window and all \textit{SMT Benefit} values will be purged (purged values cannot be recovered).

\section*{zPCR Study File}

\textit{SMT Benefit} values will be saved as part of the LPAR configuration in a study file.

When copying partitions from a study file where the LPAR host is a z14, z13, or z13s model, \textit{SMT Benefit} values will be included only if the currently specified LPAR host is a model that supports SMT.

Study files that include \textit{SMT Benefit} values cannot be loaded into previous \texttt{zPCR} versions.

\section*{LSPR Table: Displaying IFL CPs}

When displaying IFL CPs in the \textit{LSPR Table} window, a \textit{SMT Benefit} value may be specified, uplifting the z14, z13, and z13s processor model capacity values to represent that benefit (see \textit{Capacity Exceptions} under \textit{Settings} on the \textit{LSPR Table Control} window menu-bar.)
The **LCP Alternatives** window is accessed from the **Partition Detail Report** window by clicking the **LCP Alternatives** button. This window provides the ability to test the effect of various sets of LCP counts on the overall capacity of the configuration. Only shared partition LCP counts can be changed.

While the **LCP Alternatives** window is active, the **Partition Detail Report** window remains visible, with its capacity results reflecting the effects of the alternative LCP setting applied. While most of the function on the **Partition Detail Report** window is disabled, **HTML** output and **Graph** creation are allowed.

Four variations of LCP settings may be applied, temporarily replacing the current LPAR host configuration’s LCP settings:
1. **EDF/RMF Unparked**: If any of the original partitions were generated from EDF or RMF data, and include Parked LCPs for 1 or more partitions, this column is enabled, and the LCPs for those partitions are set to the unparked LCP count (Total LCPs minus Parked LCPs) when the configuration was transferred into zPCR. The LCP count for all the other partitions remains at the Total LCPs value. If partition LCPs have been modified, these values can be restored by clicking the [Unparked] button in the **LCP Setting Alternatives** group box. Note that the LCP counts in this column are only available during the zPCR invocation when the EDF or RMF was read. They are not retained in a saved study.

Note: To allow zPCR to represent capacity more accurately, parked LCPs should always be removed from partitions running under the control of HiperDispatch. This includes z/OS partitions and any associated zAAP or zIIP LCPs. It also includes z/VM and any associated IFL LCPs. The **EDF/RMF Unparked** count will only reflect information for the single measurement interval that was chosen. The number of parked LCPs could vary considerably across intervals. Therefore, additional analysis outside of zPCR may be necessary to more accurately assess the average number of unparked LCPs. In this case, the **User Assigned** column should be used to enter and test results for these LCP counts.

2. **Weight Based Moderate**: LCP counts are computed to reflect the relative weight assigned to the partition. When the weight percent indicates that the number of logical CPs should be less than 2.6, the exact number of logical CPs (rounded up to the nearest whole number) will be assigned. When the weight percent indicates that the number of logical CPs is greater than or equal to 2.6, the exact number of logical CPs plus 1 (rounded up to the nearest whole number) will be assigned.

   GP and IFL N-way partitions will optimize to no less than 2 logical CPs. This is true regardless of the SCP defined to the partition. Partitions that were defined with 1 logical CP are unaffected unless the relative weight would indicate more.

   To update the **Partition Detail Report** window to reflect capacity for these values, click the [Moderate] button in the **LCP Setting Alternatives** group box.

3. **Weight Based Minimum**: LCP counts are computed to reflect the relative weight assigned to the partition. Fractional LCPs are then rounded up.

   GP and IFL N-way partitions will optimize to no less than 2 logical CPs. This is true regardless of the SCP defined to the partition. Partitions that were defined with 1 logical CP are unaffected unless the relative weight would indicate more.

   To update the **Partition Detail Report** window to reflect capacity for these values, click the [Minimum] button in the **LCP Setting Alternatives** group box.

4. **User Assigned**: When the **Alternative LCPs** window is opened, partition LCPs are set to the values on the **Partition Detail Report** window. The values can be user modified to any legitimate count. To update the **Partition Detail Report** window to reflect capacity for these values, click the [User] button in the **LCP Setting Alternatives** group box. The [User] button will remain disabled until at least one of the individual user LCP counts has been changed, or one of the other buttons has been used.
Partitions that have been excluded (✓ Include is unchecked) will not have their logical CPs adjusted. In this case, their relative weight no longer contributes to the weight percent total used to distribute LCP counts for the other partitions.

Suggested LCP counts are capped at the maximum LCPs supported by the partition's assigned SCP. When zAAP or zIIP LCPs are associated with a General Purpose partition, the total LCPs for the combination cannot exceed the maximum supported by the SCP. For such associations, the LCPs determined for the specialty partition will be limited if necessary. If the General Purpose partition is determined to have the maximum LCPs assigned, that number will be reduced by 1 so that a single specialty LCP can be assigned. This same logic applies for IFL LCPs associated with a z/VM partition.

As LCP counts are changed, the LCPs, Minimum Capacity, and Maximum Capacity columns on the Partition Detail Report window are dynamically updated to reflect the changes. The Capacity Summary by Pool group box values are also updated.

Changes made to logical CP settings are considered temporary. To commit pending changes to the LPAR configuration, click the [Commit Changes] button. Click the [Undo Pending Changes] button to restore settings back to the previous commit.

Use the [Explain Moderate/Minimal] button for a quick review of the rules used to apply Moderate and Minimal LCPs.

Click the Return tool bar icon to close the LCP Alternatives window. If any changes are pending, a dialog will ask whether the changes are to be committed or discarded. The full function of the Partition Detail Report window will be restored, reflecting the last LCP assignment setting made. Note that, once the study has been saved and subsequently reloaded, the original EDF/RMF Unparked counts are lost.

Clicking the Return tool bar icon on the Partition Detail Report window will close both windows, returning to the LPAR Host and Partition Configuration window.
**zAAP/zIIP Loading**

**LPAR Configuration Capacity Planning**

The **zAAP/zIIP Loading** window is accessed from the **Partition Detail Report** window by clicking the **zAAP/zIIP Loading** button. This window provides the ability to assess the effect on General Purpose capacity when an associated zAAP or zIIP partition is running at less than full utilization. The window can only be accessed if zAAP and/or zIIP partitions are defined in the configuration.

Only General Purpose partitions, and their associated zAAP and zIIP partitions are presented on this window. zAAP and zIIP partitions displayed are immediately following the associated General Purpose partition.
With the following two exceptions, columns displayed are the same as those shown on the *Partition Detail Report* window.

- **The zAAP/zIIP Utilization** column provides a spin button input field (white background) for each zAAP and zIIP partition. These fields are used to set the zAAP or zIIP utilization to any value less than the default 100%. Move the mouse onto the field to access the spin button. Select any value from 0 to 100 representing the percent utilization. Specifying a utilization of less than 100% will result in increasing the associated General Purpose partition’s capacity, reflecting a reduced amount of management, and switching cost.

- zAAP and zIIP partition capacity available is not affected by the utilization specified; however, the capacity considered as being consumed will be reduced to the value shown in the **Capacity Consumed** column.

When an LPAR configuration is generated using EDF or RMF input, actual zAAP/zIIP utilizations are known. In this case the [Apply Actual zAAP/zIIP Utilizations] button will be enabled. To apply those utilizations, click the button. Keep in mind that the utilizations will be those from the selected EDF or RMF interval.

For cases where the actual zAAP/zIIP utilizations are unknown, either estimate it or leave it at 100%. Some guidelines for estimating **zAAP/zIIP Utilization** follow:

**Explain zAAP/zIIP Loading**

*zPCR* capacity results default to full utilization regardless of CP type. Therefore, results can be interpreted as capacity available.

In cases where zAAP or zIIP utilization is actually less than 100%, a smaller **zAAP/zIIP Utilization** value can be specified. This has the effect of reducing management and switching cost, thus increasing the productive capacity of the associated GP partition.

The N-way of a GP+zAAP or GP+zIIP association is considered to be the sum of all the logical CPs involved plus some switching cost. Capacity values are derived for:

1. The GP partition assuming no **zAAP/zIIP Utilization**; i.e., no switching cost).
2. The GP partition assuming 100% **zAAP/zIIP Utilization**; i.e., full switching cost).

GP partition capacity is determined by interpolating between these 2 capacity values based on the **zAAP/zIIP Utilization** specified (value between 1% and 100%).

Note that, for z14, z13 and z13s LPAR host processors, the use of SMT is not considered when determining the influence on capacity for the associated General Purpose partition. The above interpolation is based on the capacity values determined before any SMT benefit is applied. Any negative impact on capacity results due to applying SMT benefit is expected to be minor.
zPCR algorithms assume 50% offload from GP to zAAP or zIIP as the basis for overhead to manage the CP combination. This means that the zAAP/zIIP capacity requirement would be equal to that of the associated GP partition.

- When GP capacity is equal to or greater than the associated zAAP or zIIP capacity, one can assume the zAAP or zIIP logical CPs would be fully utilized and zAAP/zIIP Utilization should remain at 100%.
- When GP capacity is less than zAAP or zIIP capacity, it is likely that the zAAP or zIIP logical CPs would be less than fully utilized and zAAP/zIIP Utilization should be reduced. This case becomes more likely when GP CPs are less than full-speed engines (zAAP and zIIP CPs are always full speed).
- If the expected offload from GP to zAAP or zIIP is known, compute the zAAP/zIIP capacity requirement by multiplying GP partition capacity by the expected offload percent times 2.0. Then adjust the zAAP/zIIP Utilization so that amount of zAAP or zIIP capacity is perceived as being used (Capacity Consumed column).

In the Capacity Summary by Pool group box, the total capacity for the General Purpose pool reflects the sum of General Purpose partition’s Minimum Capacity values using the currently specified zAAP/zIIP Utilization values. Capacity Consumed is computed for both the zAAP and zIIP CP pools, also based on the currently specified zAAP/zIIP Utilization values. This information can be useful for the purpose of increasing or decreasing zAAP and zIIP capacity by altering the number of real CPs available (such modifications must be made on the LPAR Host window).

Changes made to zAAP/zIIP Loading values are considered temporary. To commit pending changes to the LPAR configuration, click the Commit Changes button. To remove pending changes, click the Undo Pending Changes button.

Click the Restore zPCR Defaults button to set all of the zAAP/zIIP Utilization percentages to the default 100%. If such a study is saved, any actual zAAP/zIIP utilization values previously set will be lost.

If enabled, click the Apply Actual zAAP/zIIP Utilizations button to reset the zAAP/zIIP Utilization percentages to the measured values. Note that this can only be done during the zPCR invocation where EDF for RMF was processed. This button will not be enabled when loading saved study, since CP utilization values are not included.

Click the Explain zAAP/zIIP Loading button for a short dialog discussing the benefit of providing zAAP/zIIP Utilization percentages less than 100%.

Click the Return toolbar icon to close the zAAP/zIIP Loading window and return to the Partition Detail Report window with the Minimum Capacity of the affected general purpose partitions adjusted. If changes are pending, a dialog will ask whether the changes are to be committed or discarded.

To create an HTML file reflecting the window, click the HTM toolbar icon.

To access context sensitive help for this window, click the Help toolbar icon.

If any user specified zAAP/zIIP Utilization percentages (other than the default 100%) are committed to the configuration, they will be carried forward in a saved study file.
In **Advanced-Mode**, cloned configurations will include the **zAAP/zIIP Utilization** percentages of the original configuration. When comparing LPAR configurations, matching partitions (Name, SCP, Workload, and DED/SHR), should have matching **zAAP/zIIP Utilization** percentages for the comparisons to be fair. When making such comparisons, if **zAAP/zIIP Utilization** percentages for any partition in either configuration is less than 100%, a note will appear in the message area at the bottom of each comparison window.
**Modify SCP/Workload**  
LPAR Configuration Capacity Planning

The *Modify Partitions* window is accessed via the *Partition Detail Report* window by clicking *Modify SCP/Workload* under *Edit* on the menu-bar. The intent of this window is to provide an easy means to test the effect on capacity for the currently defined LPAR configuration by changing the SCP and/or workload in one or more partitions. Changes are limited to General Purpose z/OS partitions and any associated zAAP or zIIP partitions. The target SCP can be any z/OS version supported by *zPCR* for the LPAR host processor. The target workload is limited to one of the z/OS workload categories.

While the *Modify Partitions* window is active, the *Partition Detail Report* window will remain visible, with the capacity results reflecting the effects of any changes that have been applied. While most of the function on the *Partition Detail Report* window is disabled, *HTML* output and *Graph* creation are allowed.

At any time the changes being tested can be committed to the current study using the [Commit Changes] button. If the changes being tested are not intended to be committed, [Cancel] can be used to restore the original LPAR configuration.

<table>
<thead>
<tr>
<th>SCP</th>
<th>Workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>Keep Same</td>
</tr>
<tr>
<td>z/OS-2.1</td>
<td>Average</td>
</tr>
</tbody>
</table>

**Modify z/OS Partitions' SCP/Workload**

<table>
<thead>
<tr>
<th>Change Occurrences of</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCP</td>
</tr>
<tr>
<td>Workload</td>
</tr>
</tbody>
</table>

GP Partitions Affected

- All
- Included
- Selected

Test Changes

Commit Changes

Cancel
Defining Changes
Changes to the SCP and/or workload can be applied to all qualifying General Purpose partitions in the current LPAR configuration using the dropdown lists as follows:

- **From SCP** change can be set to:
  1. **Keep Same** – no change is to be made
  2. * {Any z/OS} (default)
  3. A specific z/OS version that is supported on the current LPAR host processor.

- **From Workload** change can be set to:
  1. **Keep Same** (default) – no change is to be made
  2. * {Any} workload
  3. Any specific z/OS workload category

- **To SCP** change can be set to Any specific z/OS version supported by zPCR for the current LPAR host processor.

- **To Workload** change can be set to Any of the z/OS workload categories.

Only General Purpose partitions with z/OS assigned are affected by the Modify Partitions function (IFL and ICF partitions will not be affected). When a General Purpose partition has an associated zAAP or zIIP partition, a change will only be applied if the To SCP is a z/OS version that supports zAAPs and zIIPs (i.e., z/OS-1.6 or later). Otherwise, these partitions will not be modified.

In the GP Partitions Affected group box changes can be directed to the following, using the associated radio buttons:

1. All General Purpose partitions
2. Only General Purpose partitions that are currently included in the study
3. General Purpose partitions that have been user selected before opening the Modify Partitions window.

Why the “Modify SCP/Workload” function can be helpful

1. When capacity planning for z14, z13, and z13s processors, z/OS partitions must be specified with z/OS-1.13 or later. When capacity planning for zEC12 and zBC12 processors, z/OS partitions must be specified with z/OS-1.10 or later. When capacity planning for z196, z114, or z10 processors, z/OS partitions must be specified with z/OS-1.7 or later (older releases are not supported). When the current processor LPAR configuration includes older z/OS releases, this function provides the ability to easily change all the z/OS partitions to one of the newer releases, thus allowing newer processor models to be assigned as the new LPAR host without incurring errors.

2. Regardless of the workload(s) used for capacity planning, it is often useful to test the effect of alternate workloads to determine their effect on capacity. This function provides the ability to change all the z/OS partitions to another workload. The capacity result can be reviewed without committing the changes to the study.

Such changes should be made to both the current LPAR configuration and the planned new LPAR configuration. The effect on absolute capacity results due to these changes should be ignored. Rather, the It is the effect on the capacity relationship between the two configurations that is important to note.
Controls

Click the **Test Changes** button to temporarily apply the intended SCP/workload changes to the current LPAR configuration and update the capacity results accordingly in the **Partition Detail Report** window.

Click the **Commit Changes** button to make the current (test) LPAR configuration the current study. A dialog will be offered allowing the current study to be saved under a new name. The **Modify Partitions** window will be closed and the **Partition Detail Report** window’s full function will be restored, reflecting the last modified state for the LPAR configuration.

Click the **Cancel** button to restore the original LPAR configuration. The **Modify Partitions** window will be closed and the **Partition Detail Report** window’s full function will be restored, reflecting the original LPAR configuration.
Calibrate Capacity to LPAR Host

LPAR Configuration Capacity Planning

For capacity planning purposes, it is often desirable to define the LPAR host and partition configuration for a currently installed system such that its capacity result comes out to be some specific value. While one would like to assign the LPAR host as the Reference-CPU, doing so is not always possible since a 1-way processor is required. A technique adjusting the 1-way Reference-CPU scaling-factor can be used to resolve this dilemma.

Using the LPAR Configuration Capacity Planning function, once the LPAR host has been defined with a valid partition configuration, calibration is available. Calibration simply adjusts the Reference-CPU’s current scaling factor such that the LPAR host capacity projection is the desired value. The scaling-metric may also be changed. From either the Host Summary Report window or the Partition Detail Report widow, click the [Calibrate Capacity] button to open the Calibrate window.

The Calibrate window reflects the current Reference-CPU settings, and a summary of the currently defined LPAR host’s CP configuration. Also displayed is the current capacity result for the LPAR host. Below, a single entry field (white background) provides the means to enter the desired capacity value for this LPAR host. Click on the field, key in a value, and press Enter. If a capacity value is entered, the scaling-metric may also be changed. The message box below will reflect what the new Reference-CPU metrics will be.
The desired capacity value can represent either that of the General Purpose CP pool only, or that of the entire CPC (i.e., combination of all CP pools). Radio buttons are available for this selection (default is General Purpose pool only). Upon Return, the new Reference-CPU metrics will be applied and the current LPAR host configuration capacity result will be recomputed to reflect this setting.

Calibrate does not require the Reference-CPU to be preset with any particular scaling-factor or scaling-metric. Even if default values are currently assigned (i.e., 1.00 ITRR), the LPAR host capacity can be designated with a much larger MIPS value. The only limit applied is the maximum value that is allowed for the Reference-CPU scaling-factor.

Once a valid capacity number has been entered, the Return toolbar icon is enabled. By clicking Return, the ratio between the projected LPAR capacity and the desired LPAR capacity is applied to the Reference-CPU scaling-factor, and control is returned to the calling window. Now the adjusted Reference-CPU scaling-factor appears at the top of the calling window, and the LPAR host configuration capacity result will reflect the desired value.

The new Reference-CPU metrics can be saved as the Preferences setting by checking the Update zPCR Startup Preferences on Return checkbox. The Preferences setting will be updated when Return is clicked.

Click the Cancel toolbar icon to exit without making any Reference-CPU scaling-factor adjustment.

Once the new Reference-CPU setting have been established, you should continue to use it unmodified, to model potential upgrades or new processors with the same or modified partition definitions. By retaining the same Reference-CPU settings, capacity results between each modeled configuration can be directly compared, since they will all be based on the same capacity assumption. In addition, since a 1-way must be used as the Reference-CPU, capacity results will be presented with a perspective that can be more easily understood.
Utilized Capacity Report
LPAR Configuration Capacity Planning

The *Utilized Capacity Report* window is accessed from the *LPAR Host and Partition Configuration* window by clicking the **Partition Utilized Capacity** button in the *Capacity Reports* group box.

This report is enabled only for cases where the entire LPAR configuration was obtained from EDF or RMF (these are the only input cases where utilization values are provided). Partition utilizations, when known, are included in a zPCR saved study, and subsequently be displayed when the original study is reloaded.

The intent of this report is to provide a comparison of the actual capacity used (for the EDF or RMF interval loaded) to the minimum capacity that is available to the partition based on each partition’s relative weight assignment. In addition, comparisons are available for each CP pool, as well as for the overall LPAR host.

The title area includes the description set on the *LPAR Host and Partition Configuration* window, followed by the number of active partitions with their distribution across real CP pools. The basis for all capacity results is also provided (i.e., the current *Reference-CPU* and its scaling-factor/metric).
Partition Reporting Section

By default, the General Purpose partitions are listed first, followed by zAAP, zIIP, IFL, and ICF partitions. A unique background color is assigned to distinguish each of the partition types. This color key is applied consistently throughout zPCR.

General Purpose partition logical CPs always operate from a single pool of real CPs. On z9 and later processor models, zAAP partitions, zIIP partitions, IFL partitions, and ICF partitions each operate from a separate pool of real CPs. On z990 and z890 models, logical CPs defined for these specialty engines operate from a single pool of real CPs.

The partition table columns include:

LPAR Configuration metrics
- **No.** Automatically assigned sequential partition number
- **Type** CP pool to which the partition is assigned
- **Name** Partition name
- **SCP** Operating system
- **Workload** Workload category
- **Mode** Partition is dedicated or shared
- **LCPs** Number of active logical CPs

Weight Based capacity metrics
- **Weight %** Relative weight within the partition’s CP pool (SHR only)
- **Minimum Capacity** Capacity realizable at 100% sharing contention (*Minimum Capacity* value from the Partition Detail Report window)
- **Pool Capacity** Capacity determined for the entire pool, based on the LPAR configuration defined. This is the capacity to which EDF or RMF utilization values will be applied.

Utilization Based capacity metrics
- **Busy** The partition utilization determined from EDF or RMF for the measurement interval that was captured.
- **Capacity** The capacity actually utilized by the partition (busy times the pool capacity).

Ratio
The computed ratio between the actual capacity used and the *Minimum Capacity* that should always be available to the partition, based on its weight percent.

Summary by Pool
The *Summary by Pool* group box reports by CP pool the actual capacity used and the *Minimum Capacity* based on the partition weight percentages. The ratio between these is also provided. A totals line draws a similar comparison for the entire LPAR host as a whole.

Controls
No change capability is provided on the *Utilized Capacity Report* window itself. Changes can only be made via prior windows.

The only change allowed without disabling this report is the modification of the *Reference-CPU* setting, in which case all capacity results will be adjusted accordingly.
If any modifications are made to the LPAR host or to any individual partition, the report is no longer accurate and the **Utilized Capacity Report** is disabled. Utilization values can only be representative for the original partition definitions. Any changes to the LPAR host or to partition definitions would affect the **Weight Based** metrics thus affecting the comparison to the **Utilization Based** metrics. Partitions that have been excluded on the **Partition Detail Report** window would also compromise the accuracy of the comparison.

Click the **Return** toolbar icon to return to the **LPAR Host and Partition Configuration** window.

Click the **HTM** toolbar icon to create an HTML file with the report tables.

Click the **CSV** toolbar icon to create a CSV file with the report tables. (Note that CSV output was enabled for a particular project, and is not being considered for universal implementation in **zPCR**.)

Click the **Help** toolbar icon to access context sensitive help for this window.
Advanced-Mode

On the **Function Selection** window (**Multi-Image Capacity** tab), when **Advanced-Mode** is checked, clicking the **Enter Advanced-Mode** button initiates the **LPAR Configuration Capacity Planning** function in advanced-mode. In advanced-mode, the **Advanced-Mode Control Panel** window provides access to all **zPCR** function, adding the capability to define and compare multiple LPAR configurations.

Define an LPAR configuration ...
- Drag & drop a zPCR study file, EDF, or RPM file onto the LPAR configuration icon
- Double-click the LPAR configuration icon for manual definition windows
- Create additional LPAR configurations ...
- Click the "Add(+)" toolbar icon and define the LPAR configuration as described above
- Select a defined LPAR configuration icon and click the "Clone(=)" toolbar icon
- Rename LPAR configurations ...
- Left-click to select the LPAR configuration icon
- Right-click LPAR configuration icon for pop-up menu and click "Rename Configuration"
- Enter new name and press ENTER
- Delete LPAR configurations ...
- Select LPAR configuration icon and click the "Delete(\))" toolbar icon
The primary advantage of zPCR's Advanced-Mode lies in the ability to make direct comparisons of capacity results between LPAR configurations. For capacity comparisons to be useful, the partition configurations being compared should both contain some or all of the same partitions (i.e., in terms of partition type, name, SCP, and workload). Generally, the capacity differences for a new LPAR configuration, over that of the current LPAR configuration will be a result of one or more of the following configuration changes:

1. Changing the LPAR host processor family and/or model
2. Changing the LPAR host processor's CP configuration
3. Changing the way that one or more partitions are defined
4. Adding one or more new partitions
5. Deleting one or more current partitions.

Note that, once a study is initiated in Advanced-Mode, it cannot revert to a basic-mode study. All control affecting the LPAR configuration(s) must be accessed via the Advanced-Mode Control Panel window. Saved study files will be in the Advanced-Mode format.

The QuickStart Guide button reveals a short paper describing the process using zPCR in Advanced-Mode to define a current and an alternate LPAR configuration and make capacity comparisons between them.

Summary of Advanced-Mode function

☑️ Advanced-Mode provides the following zPCR function:

1. The Reference-CPU metrics can be set.

2. Of the LSPR tables, the Multi-Image LSPR Capacity Ratios table is available for General Purpose CPs or for IFL CPs. The Multi-Image table is the preferred table with which to generalize capacity. (Note: To view the Single-Image LSPR Capacity Ratios tables, invoke a 2^nd^ copy of zPCR and access the table from the Function Selection window.)

3. Multiple LPAR configurations (currently limited to ten) with names such as Configuration #1 and Configuration #2 can be defined (these can be renamed, if desired). Several report windows are available with which to compare capacity results between various configurations.

4. The Reference-CPU scaling-factor can be calibrated for the 1^st^ LPAR configuration only, for the purpose of producing a desired capacity result for that LPAR configuration. Once calibration has been done, the resulting Reference-CPU scaling-factor will be use for all the LPAR configurations that are defined.

5. The Workloads window must be accessed from the LSPR Processor Table, since the Function Selection window is no longer accessible in Advanced-Mode.
When in **Advanced-Mode**, the following **zPCR** function is not available:

1. The **LSPR Single-Image Processor Capacity Ratios** tables cannot be viewed (the **LSPR Multi-Image Processor Capacity Ratios** table is preferred for generalizing on partitioned capacity). To subsequently access the **LSPR Single-Image Processor Capacity Ratios** tables, start a second **zPCR** invocation in basic-mode (be sure the **Reference-CPU** settings are as desired).

2. Basic-mode study files cannot be created (studies will be saved in **Advanced-Mode** format), and will include all of the LPAR configurations that are defined.

The **Advanced-Mode Control Panel** window provides the capability to define multiple LPAR configurations and to make direct comparisons between those configurations. The control panel is intended to remain visible while setting the **Reference-CPU**, viewing LSPR tables and defining LPAR configurations. Windows for any of these functions can be displayed simultaneously.

The only **Reference-CPU** modification allowed from windows other than the **Advanced-Mode Control Panel** is by using the [Calibrate Reference-CPU] button from either the **Host Summary Report** window or the **Partition Detail Report** window. This button is available for the first LPAR configuration only (i.e., the LPAR configuration named by default **Configuration #1**).

In **Advanced-Mode**, several additional windows are available, with which to compare capacity results between LPAR configurations (for details, see **Host Capacity Comparison** and **Partition Capacity Comparison**). Also, reports are available showing the effect on capacity when ±5% margin-of-error is applied (see **Host Margin-of-Error** and **Partition Margin-of-Error**). The **Advanced-Mode Control Panel** window will be locked while comparison windows are open.

The **Study Identification** text can be entered from either the **Advanced-Mode Control Panel** window or the **Function Selection** window. In addition, to further describe scenarios, an **LPAR configuration description** entry field is available on the **LPAR Host and Partition Configuration** window for each LPAR configuration defined.

The **Advanced-Mode Control Panel** window is composed of two sections:

1. The top panel is presented in the form of tree structures, with branches representing the controls that are available. Each branch provides access to function previously described in this document.

   - **Reference-CPU** tree: This branch provides access to the **Reference-CPU** settings which control how capacity will be represented throughout. The setting status is shown in the text attached to the branch. The scaling-factor used for the **LSPR Multi-Image Capacity Ratios** table is adjusted down from the **Reference-CPU**. The adjusted value is revealed on the **LSPR Multi-Image Capacity Ratios** table. Double-click the branch icon to open the **Reference-CPU** window.

   - **LSPR Processor Table** tree: Double-click the branch icon to open an **LSPR Multi-Image Processor Capacity Ratios** table.
      - IBM Z General Purpose CPs
      - IBM Z IFL CPs
      - IBM LinuxONE CPs.
- **LPAR Configurations** tree: Branches are displayed for each LPAR configuration; the first will be named **Configuration #1**, the second, when created, will be named **Configuration #2**, and the third, **Configuration #3**, etc. Each of these branches provide access to separate invocations of the **LPAR Configuration Capacity Planning** function, including the **LPAR host**, the **Partition Definition**, the **Host Summary Report**, and **Partition Detail Report** windows. The discussion below pertains to these branches.

  Whenever the mouse is passed over an LPAR configuration branch, its description (if one has been provided) will appear as flyover text.

2. The bottom panel alternates between presenting user instructions and presenting a summary of the currently selected LPAR configuration.

<table>
<thead>
<tr>
<th>#1</th>
<th>Current zEC12 2827-707</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>XYZ Production</td>
</tr>
<tr>
<td></td>
<td>zEC12/700 LPAR Host: 2827-H20/700</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pool CP Type</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>CPC Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCPs</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Partitions</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>LCPs</td>
<td>14</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>Capacity</td>
<td>9,188</td>
<td>n/a</td>
<td>1,364</td>
<td>5,511</td>
<td>1,349</td>
<td>17,411</td>
</tr>
</tbody>
</table>

### Example of LPAR Configuration Summary

When the **Advanced-Mode Control Panel** is initially presented, a single icon representing the branch for LPAR Configuration #1 is shown under the **LPAR Configurations** tree. This icon has a name of **Configuration #1**, and its configuration is initialized as “undefined”. There are several ways that an undefined configuration may be initialized:

1. To manually define a configuration, double click the branch icon. The normal **LPAR Configuration Capacity Planning** function windows will appear with which to define the LPAR host and its partition configuration.

2. The LPAR configuration may be defined by dragging a previous **zPCR** study file on top of the LPAR configuration branch icon.
   a. If a **Basic-Mode** study is used, its LPAR configuration is loaded.
   b. If an **Advanced-Mode** study is used, all of the defined LPAR configurations will be loaded (i.e., **Configuration #1, Configuration #2, Configuration #3**, etc).

In lieu of dragging a study file, it can be loaded by using **File → Load** from the menu-bar. Using this method to load a **Basic-Mode** study will result in a single LPAR configuration. To load multiple **Basic-Mode** studies, use drag and drop to each defined LPAR configuration.

3. The LPAR configuration may be defined by dragging an EDF on top of the **LPAR configuration** branch icon. The LPAR host and the partition configuration will be taken from the EDF interval selected.
4. The LPAR configuration may be defined by dragging an RMF report (text file) on top of the **LPAR configuration** branch icon. The LPAR host and the partition configuration will be taken from the RMF interval selected.

Notes:

Dragging an EDF, RMF, or a **zPCR** study file to an undefined LPAR configuration icon will cause that configuration to become defined.

If the 1st LPAR icon (“Configuration #1”) is undefined, it can be defined by dragging an EDF, RMF, or study file to that icon or to the area beneath it.

If more than one LPAR icon exists (defined or undefined), an additional LPAR configuration will be created when dragging an EDF, RMF, or study file to the area immediately below; the existing LPAR icons will be unaffected.

If an EDF, RMF, or study file is dragged to an LPAR configuration that is already defined, it is then considered to be a source for copying partitions into the existing configuration.

When dragging an Advanced-Mode study file to the area below existing LPAR icons, new icons will be created for each LPAR configuration in the study up to the maximum LPAR configurations allowed. Should the number of LPAR configurations in the study cause the maximum of LPAR configurations that can be defined, loading any of the LPAR configurations is prevented.

Once an LPAR configuration icon has become defined, it may be refined by double clicking its icon to access to the normal **LPAR Configuration Capacity Planning** windows. The associated icon and configuration name will appear on each of these windows to help differentiate which LPAR configuration the window belongs to.
Managing LPAR configurations

The LPAR Configuration branches are managed using the toolbar icons in the Manage group box:

- **Add** toolbar icon: Creates an icon representing the next LPAR configuration, starting with the name Configuration #1, Configuration #2, etc. Each added icon is initialized as “undefined”. It can be defined in any of the ways that were described for the first LPAR configuration.

- **Clone** toolbar icon: If a single defined LPAR configuration is selected, and room remains for additional LPAR configurations, the Clone icon is enabled. An icon representing the next available LPAR configuration is created with the name Configuration #x. Cloning allows you to use one LPAR configuration as a starting basis for another LPAR configuration. Changes can then be made to the LPAR host and/or the partition configuration as needed.

- **Delete** toolbar icon: An LPAR configuration can be deleted by selecting its icon and then clicking the delete button. When the icon contains a defined configuration, a dialog will be presented for confirmation of the delete action. When only two LPAR configuration icons exist, and the first (Configuration #1) is deleted, the second will become the first, and be renamed to Configuration #1. Note that when the last LPAR configuration icon is deleted, the first icon (Configuration #1) will reappear, but with no LPAR configuration defined. This state is equivalent to a new Advanced-Mode study.

Renaming LPAR Configurations

A default name is assigned to each LPAR configuration icon when it is created. Each icon can be renamed with up to 20 characters. To rename:

1. Left-click the LPAR configuration icon to select it
2. Right-click the LPAR configuration to generate a pop-up menu
3. Click Rename Configuration on the pop-up menu.
Comparing Capacity between LPAR Configurations

Direct comparisons between LPAR Configuration branches can be made using the following Compare toolbar icons:

- **Summary** toolbar icon: Generates the Host Capacity Comparison Summary window, showing the hardware configuration and the capacity results for each defined LPAR configuration. Capacity projections are provided for each CP pool, with a total for the overall CPC, which can be viewed as Full capacity (default) or Single-CP capacity. For details concerning this summary report, see Host Capacity Comparison Summary.

- **Compare** toolbar icons: Generates various reports comparing capacity between any two LPAR configurations. Two LPAR configuration icons must be present, and both must have LPAR configurations defined. The arrow on the toolbar icon indicates the order in which the LPAR configuration branches will be compared. Select either one or two LPAR configuration icons and click one of the compare icons to view the Host Capacity Comparison window and subsequently, the various Partition Capacity Comparison windows. If only one LPAR configuration was selected, the one adjacent to it will become the focus of the comparison. For details concerning these capacity comparison reports, see Host Capacity Comparison and Partition Capacity Comparison.

Migrating Partitions between LPAR Configurations

Partitions can be copied from one LPAR configuration to another using the toolbar icons in the Migrate & Analyze group box.

- **Copy** and **Move** toolbar icons: Provide the ability to modify an LPAR configuration with partitions from another LPAR configuration, and assess the overall effect on capacity. Select a single defined LPAR configuration that is to be the target of the migration and click Copy or Move. Partitions can be migrated to the target from any other defined LPAR configuration. In addition, partitions existing on the target can be modified. As each change is made, capacity values are recomputed and compared back to the original partition capacity values. Changes to the target configuration can either be retained (Commit) or discarded (Undo). For details concerning this capability, see Copy Partitions to an LPAR Configuration or Move Partitions between Configurations.

Saving Studies in Advanced-Mode

When in Advanced-Mode, saving a study from the Advanced-Mode Control Panel window will result in an Advanced-Mode study file format. When subsequently loaded, zPCR is automatically placed in Advanced-Mode, with the LPAR configuration(s) loaded.

In Advanced-Mode, Save is no longer available from the LPAR Host and Partition Configuration window.

Note: The Sample Advanced Mode Study, included with the zPCR package, is the source used for most of the examples shown in the Advanced-Mode section.
Menu-bar

File
- **New**
  - Start a new (untitled) study.

- **Load**
  - Open a previously saved study.

- **Save**
  - Save this study.

- **Save as…**
  - Save this study with a new name.

- **Up to 10 filenames**
  - Recent study files are listed for possible loading.

- **Exit (Ctrl+E)**
  - Terminate zPCR execution.

- **Fast Exit (Ctrl+Q)**
  - Terminate zPCR execution immediately

Edit
- **Preferences**
  - Personalize zPCR startup settings (see Preferences).

- **CPcalculator**
  - Capacity planning calculator function (see CP Calculator)

- **zAAP Capacity**
  - Capacity estimator for migration to a zAAP or zAAP on zIIP configuration (see zAAP Capacity Estimator Input)

Registration
- **Remove**
  - Delete your CPS tool registration (disables zPCR and any other CPS tools installed).

Documentation
- Various supporting documentation, including:
  - zPCR NEWS file
  - zPCR User’s Guide (if copied to the zPCR Documentation directory as zPCRUG.PDF)
  - LSPR FAQ
  - LSPR Workloads
  - LSPR Document
  - HiperDispatch Consideration
  - zAAP/zIIP Considerations
  - zAAP White Paper
  - Concerning Accuracy
  - Obtain CP3KEXTR
  - Obtain CP3KVMXT

Help
- **Context Help (F1)**
- **QuickStart Guide**
  - Provides guidance on using zPCR.

- **Check for updates**
  - Access your zPCR download site.

- **About zPCR**
  - Displays information from the Logo window including the version of zPCR.

---

1 **LOAD** for a Basic-Mode study will proceed in Advanced-Mode.

2 In Advanced-Mode, **Save** and **Save as …** will create an Advanced-Mode study.
Defining and Managing LPAR Configurations in Advanced-Mode

On the **Advanced-Mode Control Panel** window, for each LPAR configuration defined, a unique icon and name is displayed. The first icon default name will be *Configuration #1* and the subsequent icons will be named *Configuration #2, Configuration #3*, etc. (the icons may be renamed). Double clicking any of these icons will provide access to the various **LPAR Configuration Capacity Planning** windows represented by that icon.
While defining or altering any single LPAR configuration, each window will display that LPAR configuration’s icon and name in the title area to assist in associating the various windows presented.

An LPAR configuration description input field is available on the **LPAR Host and Partition Configuration** window, serving as additional documentation detail. When a configuration is loaded from a basic-mode study, the study’s file identification will be placed in the description field as a reminder of its origin. When a configuration is loaded from EDF or RMF, its file name and information concerning the CEC ID and the chosen interval will be placed in the description filed. Each LPAR configuration’s description field may be altered at any time to the text desired.

In **Advanced-Mode**, the **Utilized Capacity Report** window can be displayed for any LPAR configuration when the entire configuration was obtained from EDF or RMF (click the [Partition Utilized Capacity] button on the **LPAR Host and Partition Configuration** window). Once any LPAR host or partition configuration changes have been made, this report is no longer valid, a therefore, will no longer be available.
The **LPAR Configuration Capacity Planning** windows of separate LPAR configurations can be open at the same time, allowing changes to be made that are appropriate to the specific window. Use the LPAR configuration icon and description for guidance to assure that changes are being made to the LPAR configuration that was intended.
Whenever the *Host Capacity Comparison Summary* window or any of the *Capacity Comparison* windows are open, any open *LPAR Configuration Capacity Planning* windows are hidden. Once these capacity windows are closed, any open *LPAR Configuration Capacity Planning* windows are restored.

Clicking the *Double Return* toolbar icon will return directly to the *Advanced-Mode Control Panel* window, closing all windows relative to this particular LPAR configuration.

When the *Exit* toolbar icon on the *Advance-Mode Control Panel* window is clicked, all open windows, including the *LPAR Configuration Capacity Planning* windows, will automatically be closed.
**Host Capacity Comparison Summary**

**Advanced-Mode: Capacity Comparison Reports**

Once any LPAR configurations have been defined, the Summary toolbar icon on the **Advanced-Mode Control Panel** window is activated. The **Host Capacity Comparison Summary** window is displayed by clicking this icon. While the **Host Capacity Comparison Summary** window is being displayed, the **Advanced-Mode Control Panel** window remains locked. Any open **LPAR Configuration Capacity Planning** windows are hidden to prevent LPAR configuration changes being made while the window is open.

This report presents the capacity projections for each LPAR configuration that has been defined. The LPAR configurations displayed can be controlled; whenever two or more LPAR configurations are selected, only those selected will appear (select multiple LPAR configurations using the Ctrl key). Otherwise, all the LPAR configurations appear. LPAR configurations always appear in the order defined.

For each LPAR configuration, its icon and name are provided, along with the processor model information and the number of real CPs configured in each pool. To display the description set on the **LPAR Host and Partition Configuration** window, place the mouse pointer anywhere on that row. The description will appear in the message line at the bottom of the window.

Capacity values are provided for each CP pool. A total capacity value is also provided on the right as the sum of the individual CP pool capacity values.

Whenever a z14, z13, or z13s processor has been defined as the LPAR configuration’s host, a checkmark appearing in the SMT column indicates that an SMT benefit has been established, resulting in increased capacity for zIIP and/or IFL CPs. Refer to the LPAR configuration’s **Partition Detail Report** window to determine what SMT benefits have been defined.
LPAR configurations where zAAP/zIIP loading values less than the default 100% have been specified will be flagged (for details, see zAAP/zIIP Loading). The GP row heading will appear as “GP” and the General Purpose capacity number will be presented in brown rather than the normal red. The reason is that General Purpose capacity for the configuration is improved somewhat over that which would be shown using the default zAAP/zIIP loading values. The concern is that, when comparing General Purpose capacity between such configurations, user specified zAAP/zIIP loading values should be identical for matching partitions in both configurations. An explanation will be provided in the message box at the bottom of the window.

Capacity Deltas

Additional rows showing percent deltas for capacity values between LPAR configurations can be added to this window by checking in Show Capacity Deltas in the Content Control group box. The percent deltas can be displayed in either of two ways.

- Each percent delta is relative to the 1st LPAR configuration.
- Each percent delta is relative to the immediately previous LPAR configuration in the list.
Full CPC / Single-CP Capacity

Capacity projections on this window can be cycled between Full CPC capacity and Single-CP capacity, using the radio buttons in the Show Capacity as group box. By default, projections are presented as Full CPC, representing the total capacity for all CPs involved. Single-CP capacity represents the average capacity of each CP (determined by dividing the full capacity by the number of CPs involved). Single-CP capacity can be useful for revealing relative engine speed when comparing LPAR configurations where the host processor family is changed.

Formatted Output

Click the HTM toolbar icon to create an HTML file with the report table data.

Click the CSV toolbar icon to create a CSV file with the report tables data.

Closing the Window

When the Return toolbar icon is clicked, the Host Capacity Comparison Summary window will be closed, and control will be restored to the Advanced-Mode Control Panel window. Any open LPAR Configuration Capacity Planning windows will be unhidden.
Host Capacity Comparison

Advanced-Mode: Capacity Comparison Reports

The Host Capacity Comparison window is accessed by clicking either the Compare Down or the Compare Up toolbar icon on the Advanced-Mode Control Panel window. Exactly two LPAR configurations must be selected to activate these icons (use the Ctrl key to select the 2nd LPAR configuration). The arrow on the Compare toolbar icon indicates the order in which the 2 LPAR configuration branches will be compared. The base of the arrow indicates which LPAR configuration branch to be used as the basis for the comparison, and the head of the arrow indicates which LPAR configuration branch will be used as the focus of the comparison.

While the Host Capacity Comparison window is being displayed, the Advanced-Mode Control Panel window remains locked. Also, any open LPAR Configuration Capacity Planning windows are hidden to prevent LPAR configuration changes from being made while the window is open.

A processor oriented summary of the two LPAR host configurations is presented in this window. The first LPAR configuration is shown on the left, and the second is shown to the right. Each partition type is listed in a separate row, with a total line at the bottom. The metrics represent the combined values for each partition type, showing the number of partitions defined, the number of RCPs, the number of partition LCPs, the shared LCP:RCP ratio, and the capacity result. Note that, for partition types with only dedicated LCPs, the shared LCP:RCP ratio is omitted.

In the rightmost columns, the capacity Net Change (increase or decrease) and the % Delta for each is shown. The total row provides the capacity perspective between each of the LPAR configurations as a whole.
LPAR configurations where zAAP/zIIP loading values less than the default 100% have been specified will be flagged (for details, see zAAP/zIIP Loading). The GP column heading will appear as “GP*” and the GP capacity number will be presented in brown rather than the normal red. The reason is that GP capacity for the configuration is improved somewhat over that which would be shown using the default zAAP/zIIP loading values. The concern is that, when comparing General Purpose capacity between such configurations, user specified zAAP/zIIP loading values should be identical for matching partitions in both configurations. An explanation will be provided in the message box at the bottom of the window.

**Full / Single-CP Capacity**

Capacity projections on this window can be cycled between Full capacity and Single-CP capacity, using the radio buttons in the Show Capacity as group box. By default, projections are presented as Full, representing the total capacity for all CPs involved. Single-CP capacity represents the average capacity of each CP (determined by dividing the full capacity by the number of CPs involved). Single-CP capacity can be useful for revealing relative engine speed when comparing LPAR configurations where the host processor family is changed.

**Partition Capacity Comparisons**

The Partition Capacity Comparison window is displayed by clicking either the [Minimum Capacity] or the [Maximum Capacity] button, found in the Comparison Report by Partition group box. The Host Capacity Comparison window remains open while the new window appears, and will reveal any capacity changes due to adjustments made from it. Note that the Partition Capacity Comparison window is not available when viewing Single-CP capacity. For details, see Partition Capacity Comparison.

**Margin-of-Error Consideration**

Click the [Consider Margin-of-Error] button to display the Host Margin-of-Error window. This window will reveal the capacity results with the full 5% margin-of-error applied. For details, see Host Margin-of-Error.

**Output**

Output for this window can be obtained in HTML format by clicking the Output to HTML file toolbar icon.

**Closing the Comparison Windows**

When the Return toolbar icon is clicked, the Host Capacity Comparison window and any additional windows chained off it will automatically be closed, and control will be restored to the Advanced-Mode Control Panel window. Any open LPAR Configuration Capacity Planning windows will be unhidden.
Partition Capacity Comparison

Advanced-Mode: Capacity Comparison Reports

The **Partition Capacity Comparison** window is presented by clicking either the [Minimum Capacity] or the [Maximum Capacity] button on the **Host Capacity Comparison** window. The button used determines whether the **Minimum Capacity** values or the **Maximum Capacity** values will be the subject of the comparison. The **Host Capacity Comparison** window remains open, and will reflect capacity results of configuration changes made via the **Partition Capacity Comparison** window.

The **Partition Capacity Comparison** window compares the capacity results between similarly defined partitions of the two LPAR configurations. Partitions are considered similar when they have the same partition type, name, SCP, and workload. The partitions’ definition metrics and capacity result are shown for both configurations. The capacity **Net Change** (increase or decrease) and % **Delta** for each matched partition is shown on the right.

zAAP and zIIP partitions will be displayed in the order most recently chosen on the **Partition Detail Report** window (any defined LPAR configuration). The default order is to display zAAP and zIIP partitions immediately following their associated General Purpose partition.

While displayed, the **Partition Capacity Comparison** window provides the capability to modify several of the partition defining metrics for the 2nd LPAR configuration. These input fields, shown with a white background, include number of LCPs, weight, and capping. Changes to these metrics can be made to quickly assess the effect on the capacity of the second LPAR configuration, and, hence, on the capacity **Net Change** (increase or decrease) and the % **Delta** for each partition. Each time a change is made, the LPAR configuration is recalculated and the capacity results are updated. Changes are cumulative, and are considered to be temporary. Modifications to these metrics can be restored to their initial setting in the **Change Controls** group box, by clicking [Undo], or by simply closing the window. To change the LPAR configuration to permanently include the modified metrics, click [Commit] button before returning from the window.
LPAR configurations where zAAP/zIIP loading values less than the default 100% have been specified will be flagged (for details, see zAAP/zIIP Loading). The **GP** row heading for affected partitions will appear as “**GP**” and the General Purpose capacity number will be presented in **brown** rather than the normal **red**. The reason is that General Purpose capacity for the configuration is improved somewhat over that which would be shown using the default zAAP/zIIP loading values. The concern is that, when comparing General Purpose capacity between such configurations, user specified zAAP/zIIP loading values should be identical for matching partitions in both configurations. An explanation will be provided in the message box at the bottom of the window. In cases where actual zAAP/zIIP loading values differ between matching partitions, a **Notice** dialog window will appear.

**Optimizing LPAR Configuration Capacity**

Often, the number of LCPs assigned to a shared partition is more than adequate to satisfy the capacity requirement indicated by its relative weight. Such overstatements can easily happen when planning for a newer processor family, with faster but fewer RCPs. The number of LCPs will be reduced only to satisfy the partitioning rules without consideration of the relative weight assigned.

On the **Partition Capacity Comparison** window (**Minimum Capacity** or **Maximum Capacity** version), an **Optimize SHR LCPs** button is provided in the **Change Controls** group box. Click this button to open the **Optimize LCPs** window, which provides assistance in streamlining the LCP counts for the LPAR configuration to achieve more efficient use of the available RCPs.

![Optimize LCPs Window](image)

Any or all of the partition types may be selected for optimization, using the checkboxes provided in the **Select Partition Types** group box. By default, only the General Purpose partition type is checked.

The level of optimization for **LCP Count Assignment** can be chosen as:

1. **Moderate**: When the weight percent indicates that the number of logical CPUs should be less than 2.6, the exact number of logical CPUs (rounded up to the nearest whole number) will be assigned. When the weight percent indicates that the number of logical CPUs is greater than or equal to 2.6, the exact number of logical CPUs plus 1 (rounded up to the nearest whole number) will be assigned.
2. **Minimum**: The weight percent is used to determine the exact number of logical CPs (rounded up to the nearest whole number) to be assigned.

GP and IFL N-way partitions will optimize to no less than 2 logical CPs. This is true regardless of the SCP defined to the partition. Partitions that were defined with 1 logical CP are unaffected unless the relative weight would indicate more.

The resulting logical CP assignments are based strictly on the relative weight of the partition. The number of logical CPs assigned will determine the **Maximum Capacity** that could ever be seen by a partition. In cases where partition workload peaks might require more capacity than is indicated by **Maximum Capacity**, the optimized LCP assignment may need to be increased.

Use the **Explain Moderate/Minimal** button for a quick review of the rules used to apply Moderate and Minimal LCPs.

Click **Optimize** to apply the new LCP assignments. This action will return to the **Partition Capacity Comparison** window, with the new LCP assignments temporarily applied and capacity values updated to reflect the change. Note that you must click the **Commit** button for the new LCP counts to be assigned permanently to the LPAR configuration. Clicking the **Undo** button will restore the LCP counts to what they were before optimizing them.

Click **Cancel** to return to the **Partition Capacity Comparison** window without changing any LCP assignments.

<table>
<thead>
<tr>
<th>Special Considerations Concerning Partition Logical CP Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HiperDispatch</strong>: On z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, and z10 BC processors running z/OS or z/VM with HiperDispatch enabled, excessively configured logical CPs will tend to be parked, based on the overall demand for capacity. Parked logical CPs of partitions should not be included in an LPAR configuration, since only active logical CPs contribute to cost of partitioning.</td>
</tr>
<tr>
<td><strong>IRD</strong>: On Z platforms running z/OS with the <strong>Intelligent Resource Director (IRD)</strong>, shared partition logical CPs that are varied offline should not be included in an LPAR configuration, since only the active logical CPs contribute to cost of partitioning.</td>
</tr>
</tbody>
</table>

**Margin-of-Error Reports**

Click the **Consider Margin-of-Error** button to display the **Partition Margin-of-Error** window. This window will reveal the capacity results with the full 5% margin-of-error applied. For details, see **Partition Margin-of-Error**.

**Note**: This capability is provided only on the **Minimum Capacity** version of the **Partition Capacity Comparison** window.

**Output**

Output for this window can be obtained in HTML format by clicking the **Output to HTML file** toolbar icon.
**Closing the Partition Comparison Window**

When the **Return** toolbar icon is clicked, the **Partition Capacity Comparison** window and any additional windows chained off it will automatically be closed, and control will be restored to the **Advanced-Mode Control Panel** window. Any open **LPAR Configuration Capacity Planning** windows will be unhidden.
Host Margin-of-Error
Advanced-Mode: Capacity Comparison Reports

The capacity expectation derived from zPCR for a new processor should normally be considered as having a margin-of-error of up to 5% margin-of-error. The full ±5% margin of error should be considered whenever the LPAR host processor family is changed, or when very significant changes are made to either the LPAR host CP configuration or to the partition configuration itself. When changes are minor, the margin-of-error should be less.

The Host Margin-of-Error window is available from the Host Capacity Comparison window by clicking the Consider Margin-of-Error button.

The Projected Capacity, summed by partition type, is shown for both LPAR configurations and the capacity % Delta is computed for the 2nd LPAR configuration. The Projected Capacity and % Delta columns for each partition type of the 2nd LPAR configuration are then repeated on the right, with the -5% margin-of-error applied.

Note that the capacity projection for the 2nd LPAR configuration, the margin-of-error consideration is shown for all partition types regardless of whether the partition type was defined on the 1st LPAR configuration.

LPAR configurations where zAAP/zIIP loading values less than the default 100% have been specified will be flagged (for details, see zAAP/zIIP Loading). The GP row heading will appear as “GP” and the General Purpose capacity number will be presented in brown rather than the normal red. The reason is that General Purpose capacity for the configuration is improved somewhat over that which would be shown using the default zAAP/zIIP loading values. The concern is that, when comparing General Purpose capacity between such configurations, user specified zAAP/zIIP loading values should be identical for matching partitions in both configurations. An explanation will be provided in the message box at the bottom of the window.
Partition Margin-of-Error
Advanced-Mode: Capacity Comparison Reports

The capacity expectation derived from zPCR for a new processor should normally be considered as having a margin-of-error of up to 5% margin-of-error. The full ±5% margin of error should be considered whenever the LPAR host processor family is changed, or when very significant changes are made to either the LPAR host CP configuration or to the partition configuration itself. When changes are minor, the margin-of-error should be less.

The Partition Margin-of-Error window is available from the Partition Capacity Comparison window by clicking the Consider Margin-of-Error button. Not that the Partition Margin-of-Error window is available only when Minimum Capacity values are displayed.

The Projected Capacity for similarly defined partitions is shown for both LPAR configurations and the capacity % Delta is computed for each partition of the 2nd LPAR configuration. The Projected Capacity and % Delta columns for each partition of the second LPAR configuration are repeated on the right, with the 5% margin-of-error applied.

zAAP and zIIP partitions will be displayed in the order most recently chosen on the Partition Detail Report window (any defined LPAR configuration). The default order is to display zAAP and zIIP partitions immediately following their associated General Purpose partition.

Note that the capacity projection for the 2nd LPAR configuration that includes the margin-of-error consideration is shown for all defined partitions regardless of whether the partition was defined on the 1st LPAR configuration.
LPAR configurations where zAAP/zIIP loading values less than the default 100% have been specified will be flagged (for details, see zAAP/zIIP Loading). The GP row heading will appear as “GP” and the General Purpose capacity number will be presented in brown rather than the normal red. The reason is that General Purpose capacity for the configuration is improved somewhat over that which would be shown using the default zAAP/zIIP loading values. The concern is that, when comparing General Purpose capacity between such configurations, user specified zAAP/zIIP loading values should be identical for matching partitions in both configurations. An explanation will be provided in the message box at the bottom of the window.
Copy Partitions to an LPAR Configuration

Advanced-Mode: Copy & Move Partitions

When multiple LPAR configurations are defined, one of them can be selected to be the target for partitions to be copied from any of the other LPAR configurations. Select the LPAR configuration that is to be the target for migrated partitions and click in the Migrate & Analyze group box to open the Copy Partitions: Receiving LPAR Configuration window. The target configuration can be an existing LPAR configuration or may be an LPAR host definition with no partitions defined.

This window is similar to the Partition Detail Report window, except for the Partition Capacity columns which here, always relate to the partition Minimum Capacity values.

The Original Minimum column reveals partition capacity when the window was initially opened (before any partitions are copied or modified). For partitions that have been copied into the LPAR configuration, the Original Capacity value will be that from the contributing LPAR configuration.

The Modified Minimum column shows capacity that includes the effect of any partition changes as they are made. Possible changes include additional partitions that are 1) copied from another LPAR configuration, 2) changing partition LCPs, Weight, or CAP setting, or 3) unchecking a partition’s Include checkbox.
All capacity values are recomputed with each change to the LPAR configuration. **Net Change** and **% Delta** metrics are computed expressing the difference between the **Modified Minimum** capacity column and the **Original Minimum** capacity column.

The **Capacity Summary by Pool** table reveals CP pool metrics for the Original Configuration (state when the window was opened) and for the Modified Configuration (state after partitions have been copied or modified). In addition, **% Delta** values are provided for each of the metrics except **SHR LCP:RCP**.

Icons representing each of the remaining LPAR configurations appear enabled at the top of the window. Click one of them to select the LPAR configuration from which partitions will be copied. The **Copy Partitions: Contributing LPAR Configuration** window will open to the left of the **Copy Partitions: Receiving LPAR Configuration** window.

This window is similar to the **Partition Detail Report** window, except for the **Capacity** column which, here, reveals only partition **Minimum Capacity**.

To copy a partition into the **Receiving LPAR Configuration**, click its **Copy LP** checkbox. Once all desired partitions are selected, click the **Copy Partitions to Receiving Configuration** button and the partition definition for each will copied into the **Receiving LPAR Configuration**. Partitions that have already
been copied to the **Receiving LPAR Configuration** will display a dark background for its [Copy LP] checkbox and cannot be re-selected.

Partitions that would be invalid on the **Receiving LPAR Configuration** will not have their [Copy LP] checkbox enabled. This would normally be due to insufficient real CPs needed to support the partition. In cases where this problem condition is undetected, the partition will be copied, but its [Include] on the **Receiving LPAR Configuration** will be unchecked.

General Purpose partitions with associated zAAP or zIIP LCPs will always be copied together (if the zAAP or zIIP partition is not desired in the **Receiving Configuration**, its [Include] can be unchecked). Note that zAAP, zIIP, and IFL (when associated with a General Purpose partition) partitions cannot be copied without the associated General Purpose partition.

Click the [Unselect All] button to clear all [Copy LP] checkboxes.

Close the **Contributing LPAR Configuration** window by clicking [Cancel] in the upper right corner. Another LPAR configuration can then be selected from the **Receiving LPAR Configuration** to become the **Contributing LPAR Configuration** window.

Partitions that have been copied into the **Receiving LPAR Configuration** have their **Contributing LPAR Configuration** number and icon indicated in the **Original LPAR Config** column. The Modified Capacity values are computed for the new partition configuration and compared back to the Original Capacity values as revealed in the **Net Change** and **% Delta** columns.
Whenever a copied partition’s name matches one already in the configuration, a plus will be appended to make the name unique.

On this window, partition LCPs and Weights may be adjusted to rebalance CPU resource between partitions in each CP pool. Any change to a partition will likely have some effect on the capacity values of other partitions. All partitions are eligible to be excluded or modified to help understand the overall effect on capacity values.

Once the partition migration plan is complete, click **Commit Changes** to make the copied partitions permanent to the Receiving LPAR Configuration.

The Original Capacity values will remain fixed as long as the Receiving LPAR Configuration window is open. Additional partition migrations can still be applied, but another **Commit Changes** will be required to make those changes permanent.

Click the **Undo Changes** button to remove all copied partitions and partition changes since the last **Commit Changes**.

Note that there is no output capability for this function. A bitmap can be captured by pressing Alt-PrintScreen while it is the in-focus window.
Move Partitions between Configurations

Advanced-Mode: Copy & Move Partitions

When multiple LPAR configurations are defined, one of them can be selected to be the target for partitions to be moved from any of the other LPAR configurations. Select the LPAR configuration that is to be the target for migrated partitions and click in the Migrate & Analyze group box to open the Move Partitions: Receiving LPAR Configuration window. The target configuration can be an existing LPAR configuration or may be an LPAR host definition with no partitions defined.

This window is similar to the Partition Detail Report window, except for the Partition Capacity columns which, here, always relate to the partition Minimum Capacity values.

The Original Minimum column reveals partition capacity when the window was initially opened (before any partitions are moved or modified). For partitions that have been moved to the Receiving LPAR Configuration, the Original Capacity value will be that from the Contributing LPAR Configuration.

The Modified Minimum column shows capacity that includes the effect of any partition changes as they are made. Possible changes include additional partitions that are 1) moved from another LPAR configuration, 2) changing partition LCPs, Weight, or CAP setting, or 3) unchecking a partition’s Include checkbox.
All capacity values are recomputed with each change to the LPAR configuration. **Net Change** and **% Delta** metrics are computed expressing the difference between the **Modified Minimum** capacity column and the **Original Minimum** capacity column.

The **Capacity Summary by Pool** table reveals CP pool metrics for the Original Configuration (state when the window was opened) and for the Modified Configuration (state after partitions have been moved or modified). In addition, **% Delta** values are provided for each of the metrics except **SHR LCP:RCP**.

Icons representing each of the remaining LPAR configurations appear enabled at the top of the window. Click one of them to select the LPAR configuration from which partitions will be moved. The **Move Partitions: Contributing LPAR Configuration** window will open to the left of the **Move Partitions: Receiving Configuration** window.

This window is similar to the **Partition Detail Report** window, except for the **Capacity** column which, here, reveals partition **Minimum Capacity**.
To move a partition into the **Receiving LPAR Configuration**, click its **Move LP** checkbox. Once all desired partitions are selected, click the **Move Partitions to Receiving Configuration** button and the partition definition for each will be moved into the **Receiving LPAR Configuration**. Partitions that are moved to the **Receiving LPAR Configuration** are removed from the **Contributing LPAR Configuration**. In addition, all capacity values for the **Contributing LPAR Configuration** are recomputed. **Net Change** and **% Delta** metrics are computed expressing the difference between the **Modified Minimum** capacity column and the **Original Minimum** capacity column.

General Purpose partitions with associated zAAP or zIIP LCPs will always be moved together (if the zAAP or zIIP partition is not desired in the **Receiving Configuration**, its **Include** can be unchecked). Note that zAAP, zIIP, and IFL (when associated with a General Purpose partition) partitions cannot be moved without the associated General Purpose partition.

On the **Contributing LPAR Configuration** window, click the **Unselect All** button to clear the **Move LP** checkboxes.

Close the **Contributing LPAR Configuration** window by clicking **Cancel** in the upper right corner. Another LPAR configuration can then be selected from the **Receiving LPAR Configuration** to become the **Contributing LPAR Configuration** window.
Partitions that have been moved into the **Receiving LPAR Configuration** have their **Contributing LPAR Configuration** indicated in the **Original LPAR Config** column. The **Modified Capacity** values are computed for the new partition configuration and compared back to the **Original Capacity** values as revealed in the **Net Change** and **% Delta** columns.

Whenever a moved partition’s name matches one already in the configuration, a plus will be appended to make the name unique.

Note that a change to any partition will likely have some effect on the capacity values of every partition. This means that, in addition to partitions moved, partitions can also be excluded or modified to understand the overall effect on capacity values.

Once the partition migration plan is complete, click [Commit Changes] to make the copied partitions permanent to the **Receiving LPAR Configuration**.

The **Original Capacity** values will remain fixed as long as the **Receiving LPAR Configuration** window is open. Additional partition migrations can still be applied, but another [Commit Changes] will be required to make those changes permanent.
On the **Contributing LPAR Configuration** window, partitions that were moved will be flagged with a dark background in the **Move LP** column, indicating that this partition is no longer participating in this configuration.
Original partitions can also be moved from the **Receiving LPAR Configuration** to the **Contributing LPAR Configuration**. Such partitions are moved by checking the selections on the **Receiving LPAR Configuration** window, and clicking the **Move Partitions to Contributing Configuration** button.

---

**Move Partitions: Receiving LPAR Configuration**

Planned z/OS 906-707
Description 372 Production
z14 Host = 3906-M01/700 with 13 CPUs GP~7 ZIP~1 IFL~4 ICF~1
11 Active Partitions: GP~4 ZIP~3 IFL~3 ICF~3
Capacity based: 256MB RAM @ 32MB/60 MIPS for a shared single-partition configuration
Capacity for z/OS on z10 and later processors is represented with HyperDispatch turned ON

<table>
<thead>
<tr>
<th>Move LP</th>
<th>Orign LPAR Config</th>
<th>Include</th>
<th>No.</th>
<th>Type</th>
<th>Name</th>
<th>SCP</th>
<th>Workload</th>
<th>Mode</th>
<th>Active</th>
<th>LOPs</th>
<th>Weight</th>
<th>Weight %</th>
<th>Original</th>
<th>Minimum</th>
<th>Modified</th>
<th>Minimum</th>
<th>Net Change</th>
<th>% Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GP</td>
<td>E-01</td>
<td>z/OS-2.2</td>
<td>Average</td>
<td>SHR</td>
<td>4</td>
<td>2,603</td>
<td>46.6%</td>
<td>6,091</td>
<td>5,344</td>
<td>-827</td>
<td>-14.4%</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GP</td>
<td>E-02</td>
<td>z/OS-2.2</td>
<td>Average</td>
<td>SHR</td>
<td>4</td>
<td>460</td>
<td>26.6%</td>
<td>3,501</td>
<td>2,907</td>
<td>-594</td>
<td>-16.4%</td>
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<td></td>
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</tr>
<tr>
<td>3</td>
<td>ZIP</td>
<td>E-03</td>
<td>z/OS-2.2</td>
<td>Average</td>
<td>SHR</td>
<td>1</td>
<td>263</td>
<td>13.3%</td>
<td>882</td>
<td>554</td>
<td>-328</td>
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<td>4</td>
<td>ZIP</td>
<td>E-04</td>
<td>z/OS-2.2</td>
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<td>5</td>
<td>ZIP</td>
<td>E-05</td>
<td>z/OS-2.2</td>
<td>Average</td>
<td>SHR</td>
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<tr>
<td>6</td>
<td>IFL</td>
<td>E-06</td>
<td>z/OS-4</td>
<td>Average</td>
<td>SHR</td>
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<td>2,396</td>
<td>2,491</td>
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</tr>
<tr>
<td>7</td>
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<td>E-07</td>
<td>Linux</td>
<td>Average</td>
<td>SHR</td>
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<td>32.6%</td>
<td>2,148</td>
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</tr>
<tr>
<td>8</td>
<td>IFL</td>
<td>E-08</td>
<td>Linux</td>
<td>Average</td>
<td>SHR</td>
<td>1</td>
<td>25</td>
<td>8.0%</td>
<td>279</td>
<td>279</td>
<td>0</td>
<td>0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Capacity Summary by Pool**

- **Original Configuration**
- **Modified Configuration**
- **% Delta**

---

**Input fields with white background; Single click a "selection field" for drop-down list; Double click a "toggle field" to open.**

Using the LPAR configuration icons at the top of this window, select the configuration from which the partitions are to be migrated.
The moved partitions now appear on the **Contributing LPAR Configuration** window flagged with the original LPAR configuration icon.

The **Modified Capacity** values are computed for both of the partition configurations and compared back to the **Original Capacity** values as revealed in the **Net Change** and **% Delta** columns.
On the **Receiving LPAR Configuration** window, partitions that were moved will be flagged with a dark background in the **Move LP** column, indicating that the partition is no longer participating in this configuration.

On the **Receiving LPAR Configuration** window, click the **Undo Changes** button to remove all moved partitions and partition definition changes since the last **Commit Changes**.

Note that there is no output capability for this function. A bitmap can be captured by pressing **Alt-PrintScreen** while it is the in-focus window.
Accuracy of LPAR Capacity Projections

*zPCR* projections represent the *Capacity Perspective*, i.e., all partitions are competing for CPU resource, and partition weights (shared partitions) decide how the CPU resource will be distributed between them. Taken into account is the potential capacity available to each image, less the capacity costs due to partitioning. Results represent capacity that is available for the operating system (i.e., z/OS, Linux, etc.) and its workload.

With normal production workloads, some partitions will tend to dominate, while others will idle to various degrees. When this is the case, actual partitioning costs will be less than those projected by *zPCR*. The same is true when processor utilization averages less than 100%. In addition, partitions that tend to idle release capacity to those who dominate, thereby allowing the dominate partitions to achieve more than their projected minimum capacity.

Since every LPAR configuration defined to *zPCR* provides the *Capacity Perspective*, making capacity comparisons between them is reasonable, assuming that the current and new production systems are run in essentially the same manner.

*zPCR* accuracy lies partly in the selection of appropriate workload categories to represent the production environment. For both z/OS and z/VM, when CPU-MF data is available for a partition (via EDF), an algorithm automatically chooses the appropriate LSPR workload category. Otherwise, the default workload category *Average* will be assigned. Some judgment will be required to change from the default. If the workload selections are appropriate, when comparing the capacity of one processor’s LPAR configuration to another, *zPCR* results should be considered with up to ±5% margin-of-error. This is particularly true when the LPAR host processor’s family is being changed, or when the host CP or LPAR configuration is significantly changed. When configuration changes are minor, the margin-of-error will likely be less than ±5%.

Because there is a potential ±5% margin-of-error when sizing the capacity of a replacement processor, one should always consider how the new processor’s utilization might look if its actual capacity happened to be 5% less than that projected. The safe approach to plan for a new processor would be to always consider at least 5% growth. This concept is particularly important when the current processor is running at high utilization levels and all of the work is considered as high to medium priority.

**SCP (System Control Program) considerations**

- **z/OS on General Purpose CPs**: Capacity results in *zPCR* should be considered as reliable, given the number of LSPR workload categories that are defined (based on measured LSPR workload primitives) and number of processor models that are measured (see accuracy statement above). The degree to which capacity results will be accurate lies primarily in the decision concerning which LSPR workload category to use for representing a given production workload. Even when uncertain of the z/OS production environment, one can look at the LSPR-based worst case capacity relationship across all the z/OS workloads and assume that his capacity relationship will likely be no worse.
• **zAAP and zIIP CPs associated with a z/OS partition**: Only a few representative workloads have been tested for such configurations (such measurements are beyond the scope of IBM’s LSPR). Considerable variation can exist on how zAAP/zIIP CPs might actually be exploited over those benchmarked. Therefore, zPCR capacity results for these specialty engines should only be considered as reasonable approximations of realizable capacity. zPCR must assume the same workload is running on specialty engines as on the associated z/OS partition. Since zPCR results represent the Capacity Perspective, consider, that, when a single zAAP logical CP is associated with a single z/OS General Purpose logical CP, both are considered to be 100% busy, and maximum switching costs apply. If, in reality, the zAAP were only 1% busy, General Purpose capacity would be more in line with that when no zAAP is configured, because the switching cost would be very low. To consider General Purpose capacity for zAAP/zIIP configurations that will be less than fully utilized, one might interpolate General Purpose capacity based on expected zAAP/zIIP utilization between the two extremes projected by zPCR. For z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, and z9 EC processors, when large z/OS partitions (many logical CPs) are defined with associated zAAPs or zIIPs, capacity results for the zAAPs or zIIPs should be considered as rough approximations. This is because the only benchmarks available, with which to validate zPCR algorithms, involve much smaller configurations. If anything, capacity projections for such zAAP/zIIP configurations are likely conservative (low). zPCR does provide the ability to define the amount of work that might run on zAAP or zIIP partitions. This definition is made in terms of the minimum capacity of the associated General Purpose partition. By default, zPCR assumes the zAAP or zIIP capacity requirement to be equal to that of the associated General Purpose partition (i.e., 100% zAAP/zIIP loading). By specifying zAAP/zIIP loading less than 100%, General Purpose capacity will increase slightly due to reduced switching cost. zAAP and zIIP capacity is not affected.

• **z/VM, KVM, and Linux on IFL or General Purpose CPs**: Only one LSPR workload is run for each of these environments. z/VM has been measured on models up to the 32-way, which is the maximum that is supported. Linux has been measured on CPU models up to 16-way only, while more than 16 CPs can actually be supported. In actuality, production workloads on z/VM, KVM, or Linux are likely to have capacity relationships that vary as much (or more) as those for the z/OS workloads. With z/VM, there is an extremely wide variety of ways the SCP might be exploited. Therefore, zPCR capacity results for z/VM, KVM, and Linux, while reasonably represented by the z/OS LSPR workloads measured, must be considered with a wider margin of error than those for z/OS when used to represent a production workload. This accuracy consideration is true regardless of whether General Purpose CPs or IFLs are used. For both z/VM, KVM, and Linux, workload categories with names similar to those of z/OS are available for assignment to a partition. The capacity values displayed will be identical to those if z/OS (with the same workload category) was defined as the partition’s SCP. These workload categories provide additional flexibility when considering z/VM and Linux, particularly when defined on an IFL.
A z/VM General Purpose partition can have associated zAAP, zIIP, IFL, and ICF CPs. **zPCR** supports only the GP/IFL combination. The partition number and name of the associated IFLs will be the same as the General Purpose partition. The workload assignment for the associated IFLs may be different than that for the General Purpose partition. No attempt is made to factor in a cost for z/VM to manage the IFLs. Therefore, the capacity result generated for the IFLs will be identical to that if the IFLs were a partition independent of the z/VM General Purpose partition.

- **z/VSE on General Purpose CPs**: z/VSE environments are not measured for LSPR purposes. As a convenience, 5 z/VSE environments have been defined in **zPCR**, based on the z/OS LSPR measurements. Capacity results for z/VSE should be considered as **reasonable approximations of realizable capacity**.

- **CFCC on ICF of General Purpose CPs**: CFCC capacity data, carried internally, is used when configuring partitions as coupling facilities. This CFCC data is representative of the CFCC level that became available at the time of the processor family announce, and, therefore may not be 100% consistent across all processor families. In addition, CFCC numbers are based on only a single operating environment. Therefore, CFCC capacity results in **zPCR** should only be considered as **reasonable approximations of realizable capacity**.

  Note: Starting with the z14 (CFCC level 22), ITRs differ depending on whether it is running in a dedicated or shared partition. The mode of the partition determines which ITR is applied.

The potential accuracy of **zPCR** capacity results varies considerably across the various SCPs supported, as shown above, with z/OS results being the most reliable. When various partition types are configured on the same LPAR host, **zPCR** also considers their impact on each of the other partitions. Such impacts are generally small; there should be little concern that potential accuracy is reduced for any given partition running on such configurations.
CP Calculator

A side function provided in zPCR, identified as Capacity Planning Calculator, can be accessed from the CPcalculator menu-bar item on the Function Selection window.

The only function currently implemented is the zAAP Capacity Estimator, used to estimate the capacity available to and needed by a z/OS partition when migrating from a purely General Purpose CP environment to one with associated zAAP (or zIIP) CPs.

While CPcalculator function is started from the Function Selection window, it can be used in parallel with the normal zPCR function.

Inputs to CPcalculator functions are not retained as part of a zPCR saved study. Rather, you can save your inputs as a special file type, unique to the function. In this way, any previously saved CPcalculator function input can be loaded in conjunction with any zPCR study.

Note that Reference-CPU settings, when needed to provide capacity results, are derived from zPCR's current Reference-CPU. Any change to the Reference-CPU will immediately be reflected in capacity values revealed on CPcalculator windows. The Reference-CPU settings are not retained as part of a saved CPcalculator function.
The zAAP Capacity Estimator is accessed from the Function Selection window by clicking on the CPcalculator ➔ zAAP Capacity menu item. The zAAP Capacity Estimator Input window appears.

This function is intended to preview the effects on capacity when moving a z/OS image from a purely General Purpose CP environment to one that includes and can exploit zAAP CPs or zIIP CPs using zAAP on zIIP capability. Capacity comparisons should be considered as being appropriate for the current LSPR measurement data (z/OS-2.2).
Capacity values presented are based on zPCR’s currently defined Reference-CPU and its scaling metrics. If you change the Reference-CPU or its scaling-factor while the zAAP Capacity Estimator is active, capacity results will immediately reflect the change.

Capacity values presented with this function assume a single z/OS partition and its associated zAAP (or zIIP) partition, without regard to any other partitions that may be active. To evaluate the effects on capacity when defining multiple partitions sharing the same real CP resources, you must use the LPAR Configuration Capacity Planning function of zPCR.

All inputs are defined on the zAAP Capacity Estimator Input window. You may enter an Application ID by clicking on the entry area and keying in the name. If entered, the application name will appear on the Report window and the associated graphs and table output.

The codes below identify the type of entry for the input fields detailed below:

- **Entry field**: Double click field to open, key in text, and press Enter.
- **Dropdown list**: Click field to access dropdown list and make selection.
- **Checkbox**: Click field to check or un-check.
- **Spin button**: Click top to increase value and bottom to lower value.
- **Radio Button**: Make selection by clicking on desired button.

The controlling input fields are detailed below.

**Current Configuration: General Purpose CP Only**

Describe the z/OS image (a single partition) which is being considered for exploiting zAAP CPs or zIIP CPs using “zAAP on zIIP” capability. The capacity requirement must be characterized in terms of the current General Purpose CP Only configuration. You must provide a processor family, speed class, and model. In addition, supply the overall utilization represented by the workload, an estimate of the percent of the workload that has Java content, and an estimate of the percent of the Java content workload that will be eligible for zAAP processing.

- **(Processor) Family** - This field is initially displayed as a preset value. Click on the dropdown icon for a list of processor families, and make a selection. All Z families, z9 and later are available for selection.
- **(Processor) Speed Class** - This field is initially displayed as the full speed setting for the processor family chosen. Click on the dropdown icon for a list of processor speed settings for the family, and make a selection.
- **(Processor) Model** - This field is initially displayed as the default value for the processor family chosen. Click on the dropdown icon for a list of processor models in the family, and make a selection. The model determines the maximum number of CPs that can be defined.
- **GP CPs** - This field is initially set to 1. Click on the dropdown icon to change the number of General Purpose logical CPs active for the z/OS image. The value can be in the range of 1 to 141 (what z/OS-2.2 and later can support); only numbers valid for the selected processor model are shown in the list.
The **Processor** (as identified by z/OS), **Feature** (N-way), and **MSU** rating are redisplayed in the table below.

- **Overall workload utilization** - Click on the spin button to select a utilization value (or click on the field and key in the value desired). Click the **Set Default** checkbox to restore the default setting of 100%.

- **Percent of Middleware that includes Java Content** - Click on the spin button to select a percent (or click on the field and key in the value desired). Click the **Set Default** checkbox to restore the default setting of 50%. This value represents the percent of processor’s utilization represented by all the applications that have Java content (e.g., WebSphere).

- **Percent of Java content that is eligible for zAAP processing** - Click on the spin button to select a percent (or click on the field and key in the value desired). Click the **Set Default** checkbox to restore the default setting of 50%. This value represents the percent of the Java content activity expected to run under the Java Virtual Machine (JVM).

The workload’s total capacity requirement is computed as the capacity rating of the selected processor times the **Overall Workload Utilization**. The percent of Java content determines the amount of the total workload that will incur zAAP processing costs. The **Percent of Java content that is eligible for zAAP processing** defines the amount of workload that can actually be run on zAAP logical CPs.

### Planned Configuration: General Purpose CP + zAAP (or zIIP)

The intended new General Purpose plus zAAP processing environment is described, using the following fields:

- **zAAP or zAAP on zIIP** - Set the appropriate radio button for the intended environment. For an LPAR host that does not support zAAP (z14, z13, and z13s), **zAAP on zIIP** will be preset.

  When **zAAP on zIIP** is selected, **zIIP** will be used as the hardware designation, while the workload remains zAAP content.

- The **Processor Family** is assumed to be the same as the **Current Configuration**. Click on the dropdown icon for a list of processor families. Only processors within the currently designated family may be selected.

- **(Processor) Speed Class** - This field is initially displayed as the full speed setting for the processor family chosen. Click on the dropdown icon for a list of processor speed settings for the family, and make a selection.

- **(Processor) Model** - This field is initially displayed as the default value for the processor family chosen. Click on the dropdown icon for a list of processor models in the family, and make a selection. The model determines the maximum number of CPs that can be defined.

The **Processor Family** cannot be changed as it must be the same as that of the **Current Configuration**. The **Speed Class** and/or **Model** may be changed.
- **GP** (logical CPs) - This field is initially set to 1. Click on the dropdown icon to change the number of GP logical CPs active for this z/OS image. Only numbers valid for the selected processor model are shown in the list. At least 1 zAAP (or zIIP) logical CP must be assumed; the number of GP+zAAP logical CPs cannot exceed the CPs available with the designated processor model.

The **Processor** (as identified by z/OS), **Feature** (N-way), and **MSU** rating are redisplayed in the table below.

For the GP+zAAP environment, the speed class and number of GP logical CPs may both be changed; the goal is to lower the MSU rating (by reducing the GP CP count, meaning software cost are lower) while providing adequate zAAP CPs capacity to support the zAAP eligible work as defined.

- **zAAP** or **zIIP** (logical CPs) - This field is initially set to 1. Click on the dropdown icon to change the number of zAAP (or zIIP) logical CPs active for this z/OS image.

The values allowed are in the range of 1 to \( n \), where \( n \) cannot exceed the total CPs available minus number of GP CPs defined. Note that capacity results for configurations with a large number of zAAP (or zIIP) logical CPs may be less reliable, due to the absence of supporting measurement data.

- **Honor Priority** (Yes = Java may spill onto GP CPs) - Click on the Yes or No radio button for the desired setting. Click the **Set Default** checkbox to restore the default setting of Yes.

- **SDP: GP CPs** - Click on the spin button to set the upper limit for utilization on the General Purpose CPs. Click the **Set Default** checkbox to restore the default setting of 90%.

- **SDP: zAAPs (default varies with CP count)** - Click on the spin button to set the upper limit for utilization on the zAAPs. Click the **Set Default** checkbox to restore the default setting. Note that the default setting varies with the number of zAAP (or zIIP) logical CPs assigned.

- **Workload used for capacity relationships** - Click on the dropdown to set the z/OS workload category to be used for capacity relationships between models and for zAAP (or zIIP) logical CPs. Click the **Set Default** checkbox to restore the default setting of Low-Avg.

- **Apply SMT Benefit for zIIP** (z14, z13, and z13s only) - Check the box to activate SMT. A default value of 25% will be initially applied to the zIIP capacity values. Use the spin button to set the SMT Benefit to any value between 0% and 60%. Click the **Set Default** checkbox to restore the default setting of 25%.

Capacity available to z/OS is determined by the General Purpose processor family, its speed class, and the number of zAAP (or zIIP) logical CPs defined. The combination of GP and zAAP (or zIIP) logical CPs is viewed as a single z/OS N-way image for capacity purposes. That capacity is then apportioned to the actual number of CPs of each type configured. Nominal overheads associated with zAAP dispatching decisions are also taken into account.
For capacity planning purposes, the workload of a z/OS image is considered to have two separate components.

- **Normal content** is the total combination of those applications that have no zAAP eligible work. When there are no zAAP (or zIIP) logical CPs defined, the entire workload is considered normal content.

- **Java Content** is the total combination of those applications that contain zAAP eligible work (e.g., WebSphere).

Capacity for the zAAP (or zIIP) logical CPs and for the associated General Purpose partition is determined as follows:

- **Java content** work sees capacity relating to the sum of General Purpose CPs and zAAPs (i.e., N-way of the combination) plus overhead related to switching work between the two.

- **Normal content** work sees capacity relating to the General Purpose CPs (N-way of the General Purpose CPs), as if no zAAP (or zIIP) logical CPs were defined.

zAAP (or zIIP) capacity is always associated with that of Java content workload.

Within a single invocation of zPCR, all **zAAP Capacity Estimator** inputs are retained as the most recent value entered. To save all of the inputs for future use, click on **Save** or **Save as** under **File** on the menu-bar (inputs are not captured as part of a zPCR study file, but rather as a unique file extension of **zPCRZAP**). To restore a previously saved set of inputs, click on **Load** under **File** on the menu-bar. To restore all of the inputs to their initialization state, click on **New** under **File** on the menu-bar.

Click the **Report** to open the **zAAP Capacity Estimator Report** window. For details concerning the report, see **zAAP Capacity Estimator Report**.

Click the **Exit** toolbar icon or the **Exit** button to terminate this **CPcalculator** function.

**Menu-bar**

**File**

- **New** Refresh inputs to initialization state
- **Load** Open a previously saved set of **zAAP Capacity Estimator** inputs
- **Save** Save this set of inputs (must already be a titled study)
- **Save as...** Save this set of inputs with a new name
- **Exit function (Ctrl+E)** Terminate **zAAP Capacity Estimator**. Exit can also be invoked using the icon on the tool bar.
- **Exit tool (Ctrl+Q)** Terminate zPCR execution. If a zPCR study has been started, you will be asked for confirmation concerning the saving of those inputs.

**Help**
The zAAP Capacity Estimator Report window will normally appear alongside the input window. When not in view, Click the Report button on the input window. Changes made on the input window will be immediately reflected in the results on the report window. For details concerning inputs, see zAAP Capacity Estimator Input.

All capacity values presented on the zAAP Capacity Estimator Report window and the related graphs are based on the currently defined Reference-CPU. If you change the Reference-CPU or its scaling-factor while the zAAP Capacity Estimator is active, capacity results will immediately reflect the change.
Current Configuration Group Box
A summary of the workload as defined to the GP only configuration is presented in the upper group box. The precise configuration defined is summarized in the group box title.

The Overall workload utilization is applied to the selected processor’s capacity rating to reveal the capacity being consumed by the entire workload. The Portion of workload with Java content is applied to the capacity being consumed to reveal the capacity consumed by work containing Java content. And the Java content eligible for zAAP processing is applied to the Java content capacity to reveal the capacity that is eligible to run on zAAPs.

Planned Configuration Group Box
An analysis of capacity for the GP+zAAP (or zIIP) configuration is presented in the lower group box. The precise configuration defined is summarized in the group box title.

Since only a portion of the total workload can be eligible to be executed on zAAP (or zIIP) logical CPs, capacity for such a configuration must be viewed as two distinct entities, one for the zAAPs (or zIIPs) and one of the General Purpose CPs.

For zAAPs, the zAAP capacity needed is compared to the zAAP capacity available. If Honor Priority is set to No, then the zAAP capacity is deemed either adequate or inadequate. If Honor Priority is set to Yes, then any zAAP capacity needed that would exceed the zAAP SDP is assumed to spill over to the General Purpose CPs.

For General Purpose CPs, the General Purpose capacity needed is compared to the General Purpose capacity available, and General Purpose capacity is deemed either adequate or inadequate. If Honor Priority is set to Yes, then any unfulfilled zAAP capacity (at zAAP SDP) is added to the General Purpose capacity needed, and that result is compared to the General Purpose capacity available.

For both the zAAPs and the General Purpose CPs, the comments will indicate that their respective SDP settings are exceeded.

When the host processor is defined as a z14, z13, or z13s, an indication of zIIP SMT benefit is displayed at the bottom of the Planned Configuration group box.

Compare Solutions Group Box
Below the configuration results is a comparison of the solutions, based on total CPs, Capacity, and MSU Rating. A percent delta is computed for each.

Summary
Capacity results are generated directly from zPCR’s LPAR Capacity Planning Function. The Current and Planned Configurations are each modeled as a single partition configuration. Capacity results are then extracted and presented in the zAAP Capacity Estimator Report window. zAAP (or zIIP) utilization is used to determine zAAP/zIIP loading value used in the model. As zAAP (or zIIP) utilization decreases, the switching cost diminishes, resulting in somewhat increased GP capacity.

Keep in mind that this function considers the logical CPs for only a single GP+zAAP (or GP+zIIP) pairing. If in reality, multiple partitions would compete for the same real CP resources, capacity results will be different. In such cases, zPCR’s LPAR Capacity Planning Function should be used to model the entire LPAR configuration.
The report can be captured as an HTML file by clicking the **Output to HTML** toolbar icon. As an alternative form of output, you can capture either of the two windows as a bitmap by keying **Alt+PrintScreen** when the desired window is the active window. A copy of the window is written to the windows clipboard, which may subsequently be pasted into a document.

**Graphs**

Two graphs are available with this function.

1. Click the **[Capacity vs MSU Rating]** button for a bar graph showing the previous General Purpose capacity and the new GP+ZAAP environment capacity. The zAAP environment capacity is shown as a stacked bar, with separate values for the General Purpose CPs and for the zAAPs.

   ![Graph](image1)

2. Click on **[Utilization]** for a line graph depicting utilization of the GP CPs as utilization of the zAAP CPs declines. Dotted lines showing the currently set SDP values will appear if they fall within the utilization range plotted.

   ![Graph](image2)
Important Considerations

1. Capacity values presented here assume a single z/OS partition and its associated zAAP (or zAAP on zIIP) partition, without regard to other partitions that may be active. To evaluate the effects on capacity when defining multiple partitions sharing the same real CP resources, you must use the LPAR Configuration Capacity Planning function of zPCR.

2. The Capacity Available result for GP CPs of the Planned Configuration is based on the computed zAAP utilization. As zAAP utilization diminishes below 100%, the GP CP cost associated with managing them also diminishes, resulting in slightly higher GP capacity. If the zAAP utilization were 0%, the GP CP available capacity would align with that of the GP CPs when no zAAPs are configured. For configurations where the GP CPs are less than full speed, the difference in zAAP speed is considered when determining the GP CP capacity results.

Controls

Click the Return tool bar icon to close the report window.

Click the Exit button on the zAAP Capacity Estimator Input window to terminate this CPcalculator function.
Charts and Graphs

Throughout the various zPCR functions, a variety of pie charts and bar/line graphs are available. Each of these is presented in a common Graph window.
Graphs are available in the following functions as follows:

- **LSPR Capacity Ratios** tables for General Purpose or IFL CPs
  - Bar graphs showing processor capacity for workload categories
  - Bar graph showing processor capacity for all workload categories
  - Line graphs showing CPU response time for workload categories

- **LPAR Configuration Capacity Planning** function
  - Pie charts showing distribution of capacity by CP pool
  - Bar chart showing distribution of CPs across books or drawers
  - Bar graphs showing processor capacity by CP pool

- **zAAP Capacity estimator**
  - Bar graph showing General Purpose and zAAP capacity
  - Line graph showing General Purpose utilization as zAAP utilization diminishes

Titles on each graph will relate the intended purpose. Either the version of LSPR data or the **zPCR** version used to generate the graph, and the date generated, is provided at the bottom of the graph. All graphs relating capacity results will also include the Reference-CPU assumption that was used.

If a **Study Identification** is provided on the **Function Selection** window, that information will be included in the X-axis title.

Most bar graphs will reveal a capacity value at the top of each bar. However, for some bar graphs capacity values are not shown, due to the number of bars involved. In these cases, capacity values can be momentarily displayed by letting the mouse hover on the desired bar (known as fly-over display of text).
Charts and graphs can be captured for documentation purposes in three different formats:

- **Bitmap** Write the chart to the Windows clipboard as a bitmap, which can subsequently be pasted into a document.
- **JPEG** Save the chart as a named JPG file; this file can be viewed with a number of PC applications.
- **PNG** Save the chart as a named PNG file; this file can be viewed with a number of PC applications.

Captured file JPG or PNG files can be saved in a common directory as a collection of documentation relating to a study.

An alternative method to capture any zPCR window, including graphs can also be used. With focus on the desired window, press Alt-PrintScreen. The entire active window is copied as a bitmap to the windows clipboard. The contents of the windows clipboard can subsequently be pasted into a document.

A currently captured bitmap must be pulled from the Windows clipboard before another bitmap is captured, or it will be lost. The Windows clipboard can be pasted into the Windows Paint utility, and the picture subsequently saved in any of several graphic formats.

Click the **Copy to Clipboard** toolbar icon to create a copy of the chart in the Windows clipboard.

Click the **Create JPG** toolbar icon to save a JPG file of the chart.

Click the **Create PNG** toolbar icon to save a PNG file of the chart.

Click the **Return** toolbar icon to close the Graph window.
Support

Problems and Suggestions
Every effort has been made to make zPCR a useful and intuitive capacity planning application. Should you detect problems or desire to make suggestions for future enhancements, please send a note to the following Capacity Planning Support (CPS) address:

E-mail: zpcr@us.ibm.com

Specify “Subject: zPCR (Processor Capacity Reference).” Describe the problem or suggestion as thoroughly as possible, and suggest any possible solutions. Please include your name, your location, and phone number should additional information be required. If appropriate, send the saved study file (*.zPCR) representing the particular zPCR inputs with which you are working so that your scenario can be easily recreated.

All comments and suggestions will be considered.

Maintaining Currency
As new or additional LSPR data becomes available, zPCR will be updated. In addition, as further experience is gained, algorithms related to the LPAR Configuration Capacity Planning function may be revised.

It is your responsibility to ascertain that you are always working with the most current LSPR data and zPCR algorithms. You can check the Web site from which you obtained zPCR to determine if the version of the tool has changed. From the menu-bar on the Function Selection window or the Advanced-Mode Control Panel window, click Help ➔ Check for updates.
**External Study File**

*zPCR* provides the ability to input LPAR configurations as follows:

1. Manual input
2. A saved *zPCR* study
3. EDF input created with the CP3KEXTR program from z/OS SMF data, or created with the CP3KVMXT program from z/VM Monitor data.
4. RMF report (from z/OS SMF) using the *Partition Data Report* and *CPU Activity Report*.

There is one additional method to define LPAR configurations to *zPCR*, using a source referred to as an *External Study File* (ESF). This source would typically be created by a vendor’s software product, designed to read hardware/software performance data such as z/OS SMF. Information extracted by that software would then create a file containing the specific XML tags required by *zPCR*. The resulting file can then be loaded directly into *zPCR* similar to a study file, resulting with the LPAR host and its partition configuration entirely defined.

If you are interested in obtaining documentation concerning the format of a *zPCR External Study File*, send an E-mail request to:

`zpcr@us.ibm.com`
Definition of Terms

Processor Vintage Terminology

Mainframe
Includes the following processor models:
- IBM z14 (3906 and 3907)
- IBM z13 (2964) and z13s (2965)
- IBM zEnterprise EC12 (2827) and BC12 (2828)
- IBM zEnterprise 196 (2817) and 114 (2818)
- IBM System z10 EC (2097) and z10 BC (2098)
- IBM System z9 EC (2094) and z9 BC (2096)
- IBM zSeries 990 (2084) and 890 (2086)
- IBM zSeries 900 (2064) and 800 (2066)

IBM LinuxONE
Emperor and Rockhopper families

IBM Z
IBM z14, z13 and z13s models

zEnterprise EC12
IBM zEC12 models

zEnterprise BC12
IBM zBC12 models

zEnterprise 196
IBM z196 models

zEnterprise 114
IBM z114 models

System z10
IBM System z10 EC and z10 BC models

System z10 EC
IBM System z10 Enterprise Class models

System z10 BC
IBM System z10 Business Class models

System z9
IBM System z9 EC and z9 BC models

System z9 EC
IBM System z9 Enterprise Class models

System z9 BC
IBM System z9 Business Class models

zSeries
IBM eServer z990, x900, z890, or z800 processor models

S/390
IBM System/390 processor models (G6, G5, G4, G3.G2, MP3000, MP2000, 9021, and 9121). G6 and G5 processors are also considered to be zSeries processors. S/390 processors are no longer supported in zPCR.
**Hardware Terminology**

**CEC**  
Central Electronic Complex (the computer)

**CP**  
A PU that has been configured as a General Purpose CP, a zAAP, a zIIP, an IFL, or an ICF.

**CPC**  
Central Processing Complex (the computer; same as CEC)

**CPU-MF**  
CPU Measurement Facility (hardware counter data captured in z/OS SMF type 113 records or z/VM Monitor records). This information is used by zPCR to choose the LSPR workload category that most reliably represents the production workload of a partition.

**General Purpose CP**  
Real CPs (also referred to as GP CPs) that are eligible to run z/OS workloads (software pricing is based on MSU rating). A General Purpose CP can run any SCP that supports z/Architecture, including z/OS, z/VM, z/VSE, KVM, Linux, zAware, SSC, or CFCC.

**GP**  
An abbreviation used for “General Purpose”, used in conjunction with the acronyms zAAP, zIIP, IFL, and ICF when referring to real CPs, logical CPs, or partitions.

**GP CP Pool**  
All of the active General Purpose CPs on a CPC. They are managed by LPAR as a single pool of real CPs, in support of all defined General Purpose partitions. General Purpose partitions can only be dispatched on the CPs in this pool.

**ICF**  
Integrated Coupling Facility (a special purpose CP). Each ICF is a real CP on the CPC. An ICF can only run the CFCC control program, at the CFCC level appropriate for the hardware family.

**ICF Pool**  
All of the CPs in the ICF pool. For processor models subsequent to the z990 and z890, zAAP, IFL, and ICF CPs each operate as a separate pool.

**IFL**  
Integrated Facility for Linux (a special purpose CP). Each IFL is a real CP on the CPC. An IFL can only run z/VM (running Linux guests), KVM, Linux, zAware, zACI, or SSC.

**IFL Pool**  
All of the CPs in the IFL pool. For processor models subsequent to the z990 and z890, zAAP, IFL, and ICF CPs each operate as a separate pool.

**LCP**  
Logical CP (engines defined to a logical partition)

**LCP:RCP Ratio**  
Ratio of all the partitions’ Logical CPs to all of the processor’s Real CPs within a single CP pool. Dedicated CPs are generally removed from the real CP count of the pool before computing the ratio.

**LP**  
Logical partition

**RCP**  
Real CP (an engine on the real hardware)
Multi-Image Capacity represents the combination of multiple partitions, each running a copy of the same SCP and workload. Partition configurations assumed are intended to be typical for the processor model represented. The value of multi-image tables lies in the ability to represent capacity on models that cannot be supported with a single copy of an SCP.

PU Processor Unit which can be customer configured as General Purpose CPs, zAAP CPs, IFL CPs, ICF CPs, and/or ICF CPs.

SCP System Control Program (i.e., z/OS, z/VM, z/VSE, KVM, Linux, zAware, zACI, SSC, and CFCC)

Single-Image Capacity represents a single shared partition running the SCP and workload, with all the processor CPs assigned. SCPs are limited in the number of CPs supported; therefore, capacity can be represented only on models with CPs in the supported range.

zAAP z Application Assist Processor (a special purpose CP). Each zAAP is a real CP on the CPC (zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, z9 BC, z990, and z890 only). zAAP LCPs, using zAAP real CPs, can only run certain Java code on behalf of its associated z/OS-1.6 (or higher) partition.

zAAP/IFL/ICF Pool For z990 and z890 processors, all of the zAAP, IFL, and ICF CPs are managed by LPAR as a single pool of real CPs, in support of all defined zAAP, IFL, and ICF partitions. zAAP, IFL, and ICF LCPs can only be dispatched on the real CPs in this pool. On processors prior to the z990 and z890, zAAPs are not available and the IFL and ICF CPs operate as a single pool.

zAAP Pool All of the CPs in the zAAP pool. zAAPs can be configured only on zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, z9 BC, z990, and z890 processor models, and always operate as a separate CP pool.

zIIP z Information Integration Processor (a special purpose CP). Each zIIP is a real CP on the CPC (z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, and z9 BC only). zIIP LCPs, using zIIP real CPs, can only run certain redirected DB2 code on behalf of its associated z/OS-1.6 (or higher) partition.

zIIP Pool All of the CPs in the zIIP pool. zIIPs can be configured only on z14, z13, z13s, zEC12, zBC12, z196, z114, z10 EC, z10 BC, z9 EC, and z9 BC processor models, and always operate as a separate CP pool.
Hardware Features Terminology

Absolute Capping (A feature on zEC12/zBC12 and later processor only). For normal capping (hard capping), a partition’s Maximum Capacity value is set equal to its Minimum Capacity value. An Absolute Capping value is specified as a fractional value between zero and the number of logical CPs defined to the partition (format N.nn). This value has the effect of increasing the partition’s Maximum Capacity value proportionally between its hard capping value and the value had no capping been specified.

SMT Benefit Symmetrical Multi-Threading (a feature on z14, z13, and z13s processors applicable for zIIP and IFL CPs only). LSPr data is published based on single-threaded workload. To evaluate expected zIIP and IFL capacity, an SMT Benefit value can be applied manually for each zIIP or IFL partition. Suggested default SMT Benefit value for zIIP CPs is 25%; for IFL CPs on z14 is 25% and on z13 is 20%.

For workloads actually measured on z14, z13, and z13s processors, the actual SMT Benefit obtained can be determined from SMF data. Such measured SMT Benefit values can be transferred into zPCR via EDF or RMF.

Capacity Rating Terminology (Scaling-Metric)

ITRR Internal Throughput Rate Ratio The capacity of a processor expressed relative to the capacity the processor assigned as the Reference-CPU for a specific workload. The scaling-factor of the Reference-CPU may be set to any reasonable value, but is typically set to 1.00.

MIPS Millions of Instructions per Second (this literal translation is no longer applicable but the acronym remains commonly used). The capacity of a processor expressed relative to the capacity the processor assigned as the Reference-CPU for a specific workload. The scaling-factor of the Reference-CPU may be set to any reasonable value, but is normally set to a commonly accepted value for that processor.

PCI Processor Capacity Index The capacity of a processor expressed relative to the capacity the processor assigned as the Reference-CPU for a specific workload. The scaling-factor of the Reference-CPU may be set to any reasonable value, but is normally set to a commonly accepted value for that processor. This term is useful for those who oppose the MIPS terminology.

Capacity Index A wordy version of PCI.

Note that the scaling-metric assigned to the Reference-CPU is not limited to these 4 items. Any text up to 12 characters can be assigned as the scaling-metric.
**System Control Program (SCP) Terminology**

- **z/OS**: Any version of z/OS. zPCR always uses the most current z/OS LSPR data to generate capacity tables. However, algorithms related to partitioning are sensitive to the version of z/OS specified.
- **OS/390**: Any version of OS/390. zPCR no longer includes OS/390 LSPR data, which was the sole source for making comparisons that included S/390 processors.
- **MVS**: Includes any version of z/OS or OS/390.
- **z/VM**: Any version of z/VM. zPCR always uses the most current z/OS LSPR data to generate capacity tables. However, algorithms related to partitioning are sensitive to the version of z/VM specified.
- **z/VSE**: Any version of VSE. zPCR considers VSE generically, i.e., not specific to any particular release.
- **KVM**: Any version of KVM. zPCR considers KVM generically, i.e., not specific to any particular release.
- **Linux**: Any version of Linux. zPCR considers Linux generically, i.e., not specific to any particular release.
- **SSC**: Secure Service Container.
- **CFCC**: Coupling Facility Control Program, which normally runs in an ICF partition, but may also be run in a General Purpose partition.

**Workload Terminology Related to z/OS and zAAP/zIIP CPs**

- **Normal content**: The total combination of those applications that include no zAAP eligible work. When there are no zAAP LCPs defined, the entire workload is considered normal content.
- **Java content**: The percent of the overall workload that represents Java exploiting applications (e.g., WebSphere), and therefore have code that can exploit zAAP CPs.
- **zAAP eligible**: The percent of Java work that can execute on zAAP CPs.
- **DB2 content**: The percent of the overall workload that represents applications (in this case, DB2) that can exploit zIIP CPs.
- **zIIP eligible**: The percent of DB2 work that can execute on zIIP CPs.
- **zAAP/zIIP Loading**: A percentage representing the amount of zAAP or zIIP capacity that is being used. zPCR capacity algorithms assume full loading (i.e., 100% utilization) for all CP types. Specifying zAAP or zIIP utilization values less than 100%, will produce a slight increase for the associated General Purpose partition’s capacity, due to a reduction in switching cost.
Files Recognized by zPCR

EDF

An EDF (Enterprise Data File) is generated by running the CP3KEXTR program against z/OS SMF data on a Z processor. The SMF data (binary and voluminous) is reduced to a size that can be downloaded to a PC (preferred file extension = edf), while remaining useful for capacity planning purposes.

For z/VM, create an EDF by running the CP3KVMXT program against CP Monitor Data on a Z processor.

An EDF can be used by zPCR to define the LPAR host and its entire partition configuration or to copy specific partition definitions into a currently active LPAR configuration. An advantage of the EDF is that CPU-MF hardware counter data, if captured, can be used by zPCR to choose the LSPR workload category that best represents a z/OS partition’s production workload. In addition, for each partition represented by an EDF, information about the use of HiperDispatch, the number of parked LCPs, and SMT benefit (z14, z13, and z13s only) is available.

RMF

A Resource Measurement Facility report is generated using standard z/OS software against z/OS SMF data on a Z processor. The report generally consists of several selectable sections. For zPCR purposes, the CPU Activity Report and the Partition Data Report are necessary. When downloaded to a PC (preferred file extension = rmf), these reports can be used by zPCR to define the LPAR host and its entire partition configuration or to copy specific partition definitions into a currently defined LPAR configuration. In addition, for each partition represented by a CPU Activity Report, information about the use of HiperDispatch, the number of parked LCPs, and SMT benefit (z14, z13, and z13s only) is available.

Study File

A Basic-Mode Study file includes LPAR host and partition configuration definitions saved by zPCR. An Advanced-Mode Study file includes multiple LPAR host and partition configuration definitions. The file extension is zPCR. Study files can be reloaded into zPCR for future reference or used for the purpose of copying previously defined partitions into a currently active zPCR study.

External Study File

A file created by an OEM software product that reads hardware/software performance data such as z/OS SMF. Information extracted is used to generate specific XML tags required by zPCR. The resulting file can then be loaded directly into zPCR similar to a study file, to define the LPAR host and its partition configuration. For more information, see External Study File.