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z/VM 6.3 edition

This edition applies to z/VM Version 6 Release 3.

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Abstract

This document is a step by step guide to configuring the Performance Toolkit for z/VM feature of z/VM. The configuration procedure is, of course, in the product documentation, but the steps listed here are the most straightforward method to get the product configured and working. If you are configuring an SSI cluster of z/VM systems, the configuration requirements are also described in this document. After you get PerfKit running, a brief walk though of the product is also included.
Enabling and Configuring Performance Toolkit for z/VM

The Performance Toolkit for z/VM® is the performance data collection/analysis tool installed on your system as an optional priced pre-installed feature of z/VM. Since it is optional and licensed separately, it must be enabled and configured before it can be used. If you have not licensed this feature, then do not enable it on your system!

Enabling the Performance Toolkit for z/VM

The SERVICE command is used both to receive maintenance and to enable pre-installed program products in the SYSTEM CONFIG file. You should be logged on to the MAINT630 userid to perform this task.

Enter: **SERVICE PERFTK ENABLE**
You will see several pages of messages ending with:

Response: VMFSRV1233I The following products have been serviced.
VMFSRV1233I PERFTK
VMFSRV2760I SERVICE processing completed successfully
Ready; T=0.01/0.01 hh:mm:ss

Do not continue until you receive the VMFSRV2760I message indicating success and the CMS ready prompt. If it did not complete successfully, use the VMFVIEW command to view the log from the service command. Once you have fixed the problem, run the SERVICE command again and ensure it is successful.

Remember that the SERVICE command only needs to be run one time from any member of an SSI cluster. Therefore, you will **not** need to run the SERVICE command on another SSI member, if your system is an SSI cluster.

Putting the Performance Toolkit for z/VM into Production

The PUT2PROD command is used to update production disks by moving files updated by the SERVICE command to the production disks. Enter the following command:

Enter: **PUT2PROD PERFTK**
You will see several messages ending with:

Response: VMFP2P1233I The following products have been put into production.
Recycle the appropriate servers.
VMFP2P1233I PERFTK
VMFP2P2760I PUT2PROD processing completed successfully
Ready; T=0.01/0.01 hh:mm:ss

Do not continue until you receive the VMFSRV2760I message indicating success and the CMS ready prompt. If it did not complete successfully, use the VMFVIEW command to view the log from the PUT2PROD command. Once you have fixed the problem, run the PUT2PROD command again and ensure it is successful.
The PUT2PROD command only updates the production disks of the SSI member where the command is run. It must also be run on any other members to update the production disks on those members.

**Configuring Performance Toolkit for z/VM**

**Modify the PROFILE EXEC of PERFSVM**

The Performance Toolkit for z/VM uses the CP Monitor as its main source of performance and configuration data. The function of the PROFILE EXEC for the PERFSVM user id is to issue the CP MONITOR commands required to select the appropriate data to be collected, starts the monitor, and starts the PERFKIT program. IBM supplies a sample PROFILE EXEC for PERFSVM that you will modify to enable the collection of specific Monitor data domains. From the MAINT630 userid enter the following commands:

Enter: `LINK PERFSVM 191 999 M`
Enter: `ACCESS 999 Z`Enter: `XEDIT PROFILE EXEC Z`Enter: `/CP MONITOR`

This command searches for this string in the exec

You will see several CP MONITOR commands that are inactive because they are inside comment delimiters. You will leave these lines alone (or delete them if you wish) and add the following lines:

'CP MONITOR SAMPLE ENABLE ALL'
'CP MONITOR EVENT ENABLE ALL'
'CP MONITOR EVENT DISABLE SCHEDULER ALL'
'CP MONITOR EVENT DISABLE SEEKS ALL'

This part of the file should look like this:

```verbatim
/* 'CP MONITOR EVENT ENABLE NETWORK' */ /*0F1153MP*/
/* 'CP MONITOR EVENT ENABLE ISFC' */ /*0F1153MP*/
/* 'CP MONITOR EVENT ENABLE SSI' */ /*0F1153MP*/
'CP MONITOR SAMPLE ENABLE ALL'
'CP MONITOR EVENT ENABLE ALL'
'CP MONITOR EVENT DISABLE SCHEDULER ALL'
'CP MONITOR EVENT DISABLE SEEKS ALL'

'PERFKIT' /* Invoke the PERFKIT module 0FC012BD*/

Exit
```

You could have just removed the comment indicators from lines 40 to 52 and enabled the commands shown. However, this does not enable all of the monitor settings. It is better to just enable all the domains, then disable ones that should be left disabled. This way, if any new domains are added, they are automatically enabled. You may use whichever method you choose. When you are finished, save your changes and exit from Xedit:

Enter: `FILE`
Create the configuration files

Before you can start the Performance Toolkit for z/VM, you will need to customize a few configuration files. Samples of these files are located on the 1CC minidisk of the user id PERFSVM. The 191 minidisk is where you should store your own customized copies of these files. You should copy the sample files from PERFSVM’s 1CC disk to its 191 disk. Continuing on the userid MAINT630 user id:

Enter: LINK PERFSVM 1CC 1CC RR
Enter: ACCESS 1CC M
Enter: COPYFILE * * M = = Z (OLDDATE

Modify the FCONX $PROFILE

Now you will make a few changes to the primary configuration file of Performance Toolkit for z/VM called FCONX $PROFILE. You will activate three different interfaces to PerfKit: The VMCF interface, the APPC/VM interface, and the HTTP interface.

Enter: XEDIT FCONX $PROFILE Z
Enter: /VMCF

In order to enable the VMCF, APPC, or HTTP interfaces you must change the line that reads:

*C MONCOLL VMCF ON

to

FC MONCOLL VMCF ON

In order to activate the HTTP interface, you must change the line (about 6 lines farther down) that reads:

*C MONCOLL WEBSERV ON TCPIP TCPIP 81

to

FC MONCOLL WEBSERV ON TCPIP TCPIP 81

This example uses port 81, but you may choose any other port that is not already in use. Save your changes and exit from Xedit:

Enter: FILE

Create FCONRMT AUTHORIZ

In order for users to view performance data through any of the three interfaces (VMCF, APPC/VM, or HTTP), they must be authorized. Also for the web interface to work properly, the PERFSVM service virtual machine must be authorized to function as a store and forward (S&F) server. You must configure the FCONRMT AUTHORIZ file to provide that authorization and to authorize the user MAINT630 to be able to request data from the Performance Toolkit for z/VM. You may authorize any other users that you wish to have access at this time.

Enter: XEDIT FCONRMT AUTHORIZ Z
Enter: INPUT
Response: DMSXMD573I Input mode:

Enter the following lines into the file. The “VM01” and “VM02” are example names for 2 members of an SSI cluster. If your system is not an SSI cluster, only enter the lines with the system id VM01, but substitute your own system identifier. If your system is part of an SSI cluster, add lines for each cluster member.
Press Enter twice to leave Input mode and accept the input. Then enter FILE on the XEDIT command line to save the file.

Create FCONRMT SYSTEMS

In order for users to view performance data using the HTTP interface you need to create the FCONRMT SYSTEMS file. This file is necessary to identify each system, even if there is only one local system or cluster member.

Enter:

XEDIT FCONRMT SYSTEMS Z
Enter: INPUT
Response: DMSXM573I Input mode:

Enter the following lines into the file. Just like before, the “VM01” and “VM02” are example names for 2 members of an SSI cluster. Put in your correct system identifier. If you have more than 2 SSI members, the nicknames for them are FCXC1R03 and FCXC1R04.

Press Enter twice to leave Input mode and accept the input. Then enter FILE on the XEDIT command line to save the file.

Create UCOMDIR NAMES

You must also create a UCOMDIR NAMES file on the PERFSVM 191 disk. The default PerfKit resource names must be translated to a unique resource names in the cluster. The UCOMDIR NAMES file specifies that translation. Each member in the SSI cluster will have a unique UCOMDIR NAMES file that identifies the resource names residing in that member.

Enter:

XEDIT UCOMDIR NAMES Z
Enter: INPUT
Response: DMSXM573I Input mode:

Enter the following lines into the file. The “n” on the :tpn. tag below must match the nickname you entered in the FCONRMT SYSTEMS file earlier for this system.
Press Enter twice to leave Input mode and accept the input. Then enter FILE on the XEDIT command line to save the file.

Now, release and detach the disks you linked.

Enter:  RELEASE M (DET
Enter:  RELEASE Z (DET

Start up PERFSVM

In order to use the HTTP interface of Performance Toolkit for z/VM, you must also have a PORT statement enabled in your PROFILE TCPIP that specifies the port to be used by PERFSVM. In this example, port 81 is used but it could be any port that is not already in use. If you have not reserved a port, log on to the user id TCPMAINT and edit the PROFILE TCPIP file to add this PORT statement. It will look something like this:

```
PORT
  81 TCP PERFSVM NOAUTOLOG ; Performance Toolkit for VM
```

TCP/IP must be restarted for this change to take effect.

After you have completed the changes to the configuration files above and released PERFSVM's mini-disks, you can start up the Performance Toolkit for z/VM using the XAUTOLOG command.

Enter:  XAUTOLOG PERFSVM

Automate the start-up of PERFSVM

You want PERFSVM to start up automatically each time z/VM starts up. To do this, you edit the PROFILE EXEC on the AUTOLOG1 191 disk (or, if RACFVM is also enabled, the AUTOLOG2 191 disk.)

This example uses the VMLINK command to link and access the disk in one step. If we also add the FILELIST option, it will link and access the disk, allow us to edit the file, and then release and detach the disk when we're finished.

Enter:  VMLINK AUTOLOG1 191 (WRITE FILELIST

You are now in a FILELIST of the AUTOLOG1 191 disk. Since there should only be 1 file on the disk (the PROFILE EXEC), the cursor is already positioned on that file. Use the "XEDIT" function key to edit it.

Press:  F11
Find the area where you should add statements, and add the start up of PERFSVM user. Add this line exactly as shown:

Enter: "CP XAUTOLOG PERFSVM"

File your changes and log off of MAINT630:

Enter: FILE
Response: DMSVML2061I AUTOLOG1 191 detached
Enter: LOGOFF

**Configure PERFSVM on other SSI members**

If you are configuring an SSI cluster, remember that each member is a unique z/VM host system with its own set of local resources. The PERFSVM service virtual machine you just configured on one member is not able to monitor any other members. You have to also set up PERFSVM on all other members so that this member is also monitored. You will be able to access PerfKit on any SSI member and see the performance data for all members once all members are set up.

You must repeat the steps from “Putting the Performance Toolkit for z/VM into Production” on page 5 to “Start up PERFSVM” on page 9 on all other SSI members before continuing.

1. “Putting the Performance Toolkit for z/VM into Production” on page 5
2. “Configuring Performance Toolkit for z/VM” on page 6
3. “Modify the PROFILE EXEC of PERFSVM” on page 6
4. “Create the configuration files” on page 7
5. “Modify the FCONX $PROFILE” on page 7
6. “Create FCONRMT AUTHORIZ” on page 7
7. “Create FCONRMT SYSTEMS” on page 8
8. “Create UCOMDIR NAMES” on page 8
9. “Start up PERFSVM” on page 9
10. “Automate the start-up of PERFSVM” on page 9

**Viewing Performance Data on PERFSVM**

Open 3270 emulator session and logon to the userid PERFSVM. After you press Enter, the PROFILE EXEC runs and you will be placed in PerfKit BASIC mode. You should see a fullscreen display that looks similar to this:
If all you see is a blank screen, pressing the Enter key should place you in PerfKit BASIC mode and then you should see the screen above. Your screen may not show all the messages listed above because some have already been hidden. The Redisplay function (F2) allows you to review the console log for the PERFSVM virtual machine and see any hidden messages. Examine the PERFSVM console log to see what messages were produced when it started:

Press: F2

Use F7 to scroll backwards and F8 to scroll forward. When you are finished looking through the log, pressing F12 returns you to the initial BASIC mode screen. To begin looking at performance data from your z/VM SSI cluster, enter the FCONAPPC subcommand:

Press: F12 This will return you to the BASIC mode screen
On the command line:
Enter: FCONAPPC FCXSYSTM

You should see the System Selection menu that looks like this (where VM01 and VM02 represent 2 SSI cluster members):
Move your cursor to under the cluster member name you are interested in, or type the cluster member name you are interested in on the command line, and press Enter. You will then see the Performance Screen Selection menu from that cluster member, such as the screen from VM01 shown in Figure 1.

The number of lines shown in the examples in this paper and the number of lines you see on your screen may be different because you have a larger emulated 3270 screen. The screens in this paper assume a default 24 line screen. In the screen shown above, notice that F7 and F8 are displayed as active function keys. This indicates that the number of lines of information that PerfKit needs to display is more than the current screen size. You must use these keys to scroll forward and back to see all the reports available. If you have your 3270 screen emulating a larger model of 3270, then F7 and F8 may not be shown because all of the information fits on the current screen.
You may also notice on this screen that some of the reports are highlighted (white numbers on your screen, black numbers in the figure) and others are not (green numbers.) Highlighted reports contain data and can be selected for viewing. If a report is not highlighted, then data for that report is not being collected. This is due to CP MONITOR settings, virtual machine settings, or the configuration of PerfKit.

You can select a particular performance report in one of three ways:

1. Move the cursor so that it is positioned under the name of the report you wish to display and press Enter.
2. Enter the number of the report you wish to display in the command line and press Enter.
3. Enter the appropriate Performance Toolkit for z/VM subcommand for the report you wish to display in the command line and press Enter. You can find the list of report names in the “Display Examples” section of the Performance Toolkit for z/VM manual or by using the HELP facility (F1) and selecting help on “Performance monitor commands” in the “Sub-commands” section of the screen.

When investigating a performance problem, a good place to start is the first report, “1. CPU load and trans.” On this screen you can get a good overall summary of the performance characteristics of the system and perhaps an idea of where to dig deeper to get to the root cause of a problem.

To select report number 1 and view the CPU Load and Transaction screen, enter the following on the command line and press Enter:

   Enter: CPU

You will see a screen that looks similar to Figure 2.

![Figure 2. PerfKit CPU display](image)

Again notice that if F7 and F8 are displayed as active keys, use F7 and F8 to scroll forward and backward to view the entire report.
It is possible to get HELP on any of the fields in the screen by moving the cursor under any of the field data labels and pressing F1.

To see the definition of the data field named %CPU:

Cursor: Position under %CPU
Press: F1

You will see a window that describes the %CPU and adjacent fields similar to this:

```
FCX100   CPU 2817  SER B7675  Interval hh:mm:ss - hh:mm:ss  VM01
CPU Load
PROC TYPE %CPU %CP %EMU %WT %SYS %SP %SIC %LOGLD %PR %ENT ded. User
P00   CP   0   0  100   0   0  98   0   0   0 Master

Help Text
Processor load fields
PROC The processor number in the format 'Pnn'. The first processor shown is the IPL processor.
TYPE The processor type. The values are:
CP - Central Processor
ICF - Internal Coupling Facility Processor
IFL - Integrated Facility for Linux Processor
ZIIP - IBM System z Integrated Information

F8=Forward  F12=Return

See also DSVBKACT for the Dispatch Vector activity
Command ===>
F1=Help  F4=Top  F5=Bot  F7=Bkwd  F8=Fwd  F12=Return
```

Scroll through the help text with the F8 key. Return to the Performance Screen Selection menu and select report 21, User Resource Usage by doing the following:

Press: F12 (to exit the Help screen)
Press: F12 (to return to the main menu)
Enter: 21

You will see the User Resource Usage screen as shown below. Note that F7 and F8 are active. Also that F10 and F11 are active, indicating that the data to display is wider than the current 80 column screen width.
To see the additional data available for each user displayed on this screen:

Press: F11

You will now see the remaining columns of data for these users:

<table>
<thead>
<tr>
<th>Userid</th>
<th>%CPU</th>
<th>TCPU</th>
<th>VCPU</th>
<th>Ratio</th>
<th>Total</th>
<th>DASD</th>
<th>Avoid</th>
<th>98</th>
<th>UR</th>
<th>Pg/s</th>
<th>User Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLONEDDR</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.002</td>
<td>1.03</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>CLONER</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.002</td>
<td>1.03</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>DATAMOVE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.002</td>
<td>1.03</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>DIRMAINT</td>
<td>0.01</td>
<td>0.005</td>
<td>0.005</td>
<td>1.00</td>
<td>3.2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>DISKAKNT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.002</td>
<td>1.03</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>DTCVSW1</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>1.00</td>
<td>3.2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>DTCVSW2</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>1.00</td>
<td>3.2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>EREP</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>FTPSERVER</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>1.00</td>
<td>3.2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>LINUX03</td>
<td>0.02</td>
<td>0.012</td>
<td>0.012</td>
<td>1.00</td>
<td>3.2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>OPERATOR</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>OPERSYM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>PERFSYM</td>
<td>0.00</td>
<td>0.002</td>
<td>0.001</td>
<td>2.00</td>
<td>3.1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
<tr>
<td>SECOPER</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>ESA,---,DORM</td>
</tr>
</tbody>
</table>

Select a user for user details or IDLEUSER for a list of idle users
Command ===>
F1=Help  F4=Top  F5=Bot  F7=Bkwd  F8=Fwd  F10=Left  F11=Right  F12=Return
More detail for an individual user can be seen by placing the cursor under a userid on the display and pressing Enter.

**Cursor:** Position under the user **TCPIP**  
**Press:** Enter

You will now see the User Detail display that looks something like this:

```
FCX115  CPU 2817  SER B7675  Interval hh:mm:ss - hh:mm:ss  Perf. Monitor

Detailed data for user TCPIP
Total CPU : .0%  Storage def. : 128MB  Page fault rate: .0/s
Superv. CPU : .0%  Resident <2GB : 3419  Page read rate : .0/s
Emulat. CPU : .0%  Resident >2GB :  0  Page write rate: .0/s
I/O rate : .0/s  Proj. WSET : 3108  Pgs moved >2GB>: .0/s
DASD 10 rate : .0/s  Reserved pgs : 0  Main > XSTORE : .0/s
UR I/O rate : .0/s  Locked pages : 290  XSTORE > main : .0/s
Diag. X'90' : .0/s  XSTORE dedic. : 0MB  XSTORE > DASD : .0/s
+BLOCK10 : .0/s  XSTORE pages : 0  SPOOL pg reads : .0/s
Last IPL : CMS  DASD slots : 3  SPOOL pg writes: .0/s
Config mode : ESA390  IUCV X-fer/s : .0/s  MDC insert rate: .0/s
Base CPU type : CP  Share : 3000  MDC I/O avoided: .0/s
Base CPU affin.: ON  Max. share : ...

#I/O active : 0  Active : 50%  PSW wait : 100%  I/O act. : 0%
Stacked blk : ...  Page wait: 0%  CF wait : 0%  Eligible : 0%
Stat.: ESA,QDS,PSWT  I/O wait : 0%  Sim. wait: 0%  Runnable : 0%

Data Space Name  Size Mode  PgRd/s  PgWr/s  XRd/s  XWr/s  Migr/s  Steal/s
Command ===>
F1=Help  F4=Top  F5=Bot  F7=Bkwd  F8=Fwd  F10=Left  F11=Right  F12=Return
```

Return to the Performance Screen Selection menu by pressing F12 twice.

**Press:** F12
**Press:** F12

Performance data about your network interfaces and TCPIP can also be viewed by the Performance Toolkit for z/VM. When you create a VSWITCH on your z/VM system, data about its operation and performance is included in the monitor data. The z/VM TCP/IP stack is also able to include performance data in the CP monitor records that can be viewed in PerfKit. You get this TCPIP data by adding the MONITORRECORDS statement to PROFILE TCPIP. This allows you to view basic z/VM TCIP/IP stack performance data. To view the z/VM TCP/IP data that is available on your system:

**Cursor:** Position under the line for screen **3K**  
(you may have to scroll down first using the F8 key)  
**Press:** Enter

You will see the following TCP/IP Report Selection menu. The QDIO and VSWITCH displays are created automatically; the remaining performance reports are only shown if the MONITORRECORDS statement is included in PROFILE TCPIP.
Take a look at some of these reports to see what networking performance data is provided. For instance, move the cursor to the period in front of the line System VNIC Virtual Network Device activity to see the virtual NICs defined on your system. When you are finished, return to the PerfKit main menu.

Press: **F12**

When you are finished viewing reports, you should Disconnect the PERFSVM user to keep PerfKit up and running. Return to the BASIC screen and disconnect.

Press: **F12**

Enter: **CP DISC**

You should now be disconnected from the PERFSVM user ID.

Congratulations, you now have a working Performance Toolkit for z/VM!
References

The following web pages and documents will give you more information about configuring and using Performance Toolkit for z/VM, as well as more information about performance on z/VM systems.

- The z/VM Home Page
  http://www.vm.ibm.com

- z/VM Performance Resources
  http://www.vm.ibm.com/perf/
  The 2 most important links on this page are:
  - z/VM Performance Reports
    http://www.vm.ibm.com/perf/reports/
  - z/VM Performance Tips or FAQs
    http://www.vm.ibm.com/perf/tips/

- Performance Toolkit for z/VM Feature
  http://www.vm.ibm.com/related/perfkit/

- z/VM Documentation
  Look for these documents:
  - SC24-6208 z/VM Performance
  - SC24-6209 z/VM Performance Toolkit Guide
  - SC24-6210 z/VM Performance Toolkit Reference