

# EPV Performance University 2021



- z/OS Performance Analysis
- WLM Update
- Db2 Performance Analysis

15th June 2021





# SYSTEM, SYSSTC and protection



# Agenda

- SYSTEM
- SYSSTC
- Protection





# SYSTEM



# SYSTEM

- Only started tasks (STC) created with the High Priority attribute, in the ASCRE macro, will be assigned to the SYSTEM service class by default
- Some of these address spaces are “protected” by WLM to be sure that the system runs smoothly
- No matter what you set in your WLM policy these address spaces will always run in SYSTEM
- SYSTEM workloads run at a fixed 255 DP



# SYSTEM

| Address space | Description                    | Forced to SYSTEM |
|---------------|--------------------------------|------------------|
| *MASTER*      | Master address space           | YES              |
| CATALOG       | Catalog functions              | YES              |
| CONSOLE       | Communications task            | YES              |
| GRS           | Global resource serialization  | YES              |
| IXGLOGR       | System logger                  | YES              |
| SMF           | System management facilities   | YES              |
| SMSPDSE       | PDSE management                | YES              |
| WLM           | Workload management            | YES              |
| XCFAS         | Cross system coupling facility | YES              |



# SYSTEM

- You could prevent these AS from running in SYSTEM
- My advice is: don't do it

| Address space | Description   | Forced to SYSTEM |
|---------------|---|------------------|
| ALLOCAS       | Allocation services and data areas  | NO               |
| ANTMAIN       | Concurrent copy support   | NO               |
| BPXOINIT      | z/OS UNIX System Services first parent                                    | NO               |
| DEVMAN        | Device manager  | NO               |
| DUMPSRV       | Dumping services  | NO               |
| IOSAS         | I/O supervisor, ESCON, I/O recovery                                       | NO               |
| MMS           | Message services  | NO               |
| OMVS          | z/OS UNIX System Services Kernel  | NO               |
| PCAUTH        | Cross-memory support  | NO               |
| RASP          | Real storage manager (includes advanced address space facilities support) | NO               |
| TRACE         | System trace  | NO               |



# SYSTEM

- The only action you should do is:
  - setting a classification rule in STC, using the SPM qualifier, to be sure that all the high priority address spaces will run in SYSTEM

```
Subsystem-Type  Xref  Notes  Options  Help
-----
                Modify Rules for the Subsystem Type          Row 1 to 8 of 60
Command ===> _____ Scroll ===> CSR

Subsystem Type . : STC      Fold qualifier names?  Y  (Y or N)
Description . . . STARTED TASK

Action codes:  A=After      C=Copy          M=Move          I=Insert rule
               B=Before      D=Delete row    R=Repeat        IS=Insert Sub-rule
                                   More ===>

          -----Qualifier-----          -----Class-----
Action   Type      Name      Start      Service      Report
-----  ---      ---      ---      ---          ---
          1  SPM      SYSTEM      _____  SYSTEM      RSYSTEM
          1  TN       DB2ADBM1  _____  STCHIGH     RDB2ADBM
          1  TN       DB2AMSTR  _____  STCHIGH     RDB2AMST
          1  TN       DB2AIRLM  _____  SYSSTC      RDB2AIRL

          DEFAULTS: STCLOW
```





# SYSTEM

- Other actions you could do are:
  - assigning specific report classes to the system address spaces you want to keep under control

```

Subsystem-Type  Xref  Notes  Options  Help
-----
                                Modify Rules for the Subsystem Type          Row 1 to 8 of 60
Command ==> _____ Scroll ==> CSR

Subsystem Type . : STC          Fold qualifier names?  Y (Y or N)
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Action codes:  A=After      C=Copy      M=Move      I=Insert rule
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                                   More ==>

Action      -----Qualifier-----          -----Class-----
Action     Type      Name      Start          Service      Report
                                DEFAULTS: STCLOW      RSTC
_____  1  TN      CONSOLE  _____  SYSTEM      RCONSOLE
_____  1  TN      GRS      _____  SYSTEM      RGRS
_____  1  SPM     SYSTEM  _____  SYSTEM      RSYSTEM
    
```



# SYSTEM

- The SPM rule at the beginning ensures that all the address spaces with the high priority attribute, run in the SYSTEM service class no matter whatever is written in any of the following rules
- To classify some system address spaces in specific report classes you have to add rules before the SPM rule but these rules must not specify a different service class
- This can be useful for specific analysis



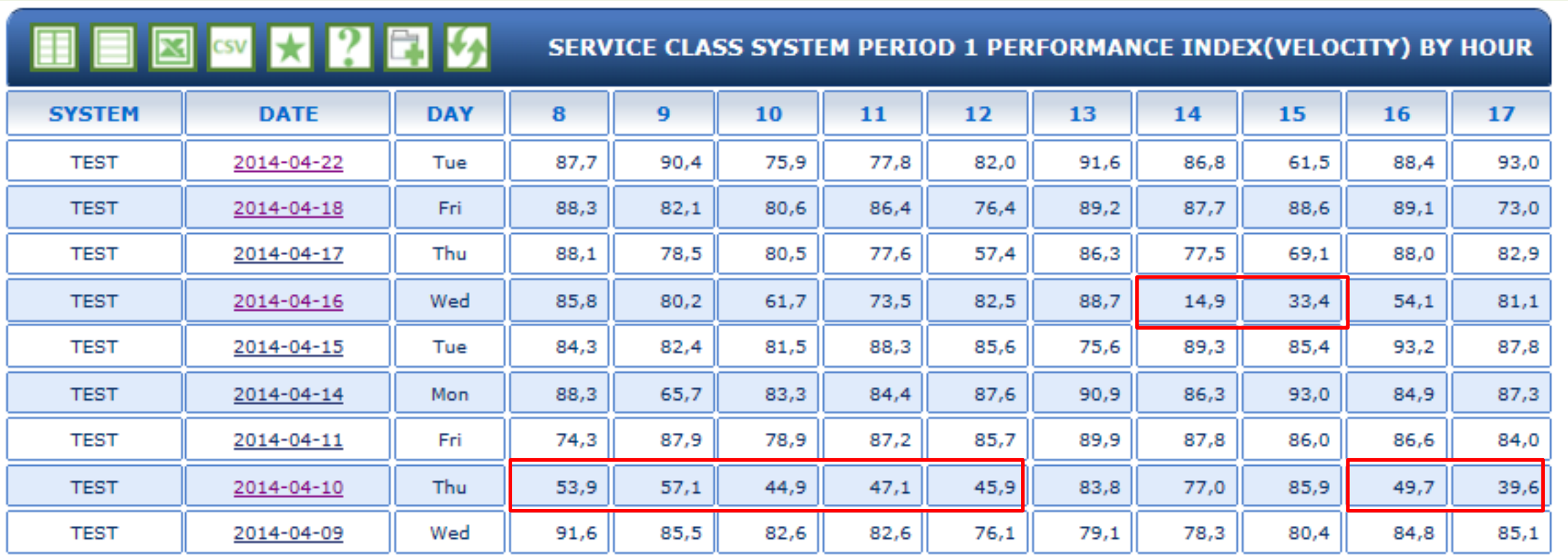
# SYSTEM

- In most situations SYSTEM velocity is calculated by using a small amount of samples so its values can be somewhat tricky and unstable
- However, as a general rule, you should want a system address space that needs resources to get them with a minimum delay
- You should expect to find high values for SYSTEM velocity
- It's more useful to look at daily trends



# SYSTEM

- In some hours SYSTEM velocity is reduced



Service Class System Period 1 Performance Index (Velocity) by Hour

| SYSTEM | DATE                       | DAY | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   |
|--------|----------------------------|-----|------|------|------|------|------|------|------|------|------|------|
| TEST   | <a href="#">2014-04-22</a> | Tue | 87,7 | 90,4 | 75,9 | 77,8 | 82,0 | 91,6 | 86,8 | 61,5 | 88,4 | 93,0 |
| TEST   | <a href="#">2014-04-18</a> | Fri | 88,3 | 82,1 | 80,6 | 86,4 | 76,4 | 89,2 | 87,7 | 88,6 | 89,1 | 73,0 |
| TEST   | <a href="#">2014-04-17</a> | Thu | 88,1 | 78,5 | 80,5 | 77,6 | 57,4 | 86,3 | 77,5 | 69,1 | 88,0 | 82,9 |
| TEST   | <a href="#">2014-04-16</a> | Wed | 85,8 | 80,2 | 61,7 | 73,5 | 82,5 | 88,7 | 14,9 | 33,4 | 54,1 | 81,1 |
| TEST   | <a href="#">2014-04-15</a> | Tue | 84,3 | 82,4 | 81,5 | 88,3 | 85,6 | 75,6 | 89,3 | 85,4 | 93,2 | 87,8 |
| TEST   | <a href="#">2014-04-14</a> | Mon | 88,3 | 65,7 | 83,3 | 84,4 | 87,6 | 90,9 | 86,3 | 93,0 | 84,9 | 87,3 |
| TEST   | <a href="#">2014-04-11</a> | Fri | 74,3 | 87,9 | 78,9 | 87,2 | 85,7 | 89,9 | 87,8 | 86,0 | 86,6 | 84,0 |
| TEST   | <a href="#">2014-04-10</a> | Thu | 53,9 | 57,1 | 44,9 | 47,1 | 45,9 | 83,8 | 77,0 | 85,9 | 49,7 | 39,6 |
| TEST   | <a href="#">2014-04-09</a> | Wed | 91,6 | 85,5 | 82,6 | 82,6 | 76,1 | 79,1 | 78,3 | 80,4 | 84,8 | 85,1 |



# SYSTEM

- In this case it is due to soft capping

↑ SYSTEM SOFT CAPPING Switch

SOFT CAPPING % BY HOUR TEST

| SYSTEM | DATE                       | DAY | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|--------|----------------------------|-----|----|----|----|----|----|----|----|----|----|----|
| TEST   | <a href="#">2014-04-22</a> | Tue | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TEST   | <a href="#">2014-04-18</a> | Fri | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TEST   | <a href="#">2014-04-17</a> | Thu | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TEST   | <a href="#">2014-04-16</a> | Wed | 0  | 0  | 0  | 0  | 0  | 0  | 66 | 18 | 0  | 0  |
| TEST   | <a href="#">2014-04-15</a> | Tue | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TEST   | <a href="#">2014-04-14</a> | Mon | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TEST   | <a href="#">2014-04-11</a> | Fri | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TEST   | <a href="#">2014-04-10</a> | Thu | 76 | 50 | 95 | 52 | 22 | 0  | 0  | 0  | 37 | 72 |
| TEST   | <a href="#">2014-04-09</a> | Wed | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |



# SYSTEM

- In normal situations most of the system address spaces use a small amount of CPU
- Some others may use much more CPU depending on the requests coming from applications
- This is the case, for example, of CATALOG for operations on datasets, XCFAS for cross system communication, CONSOLE when command intensive activities such as automation are in place



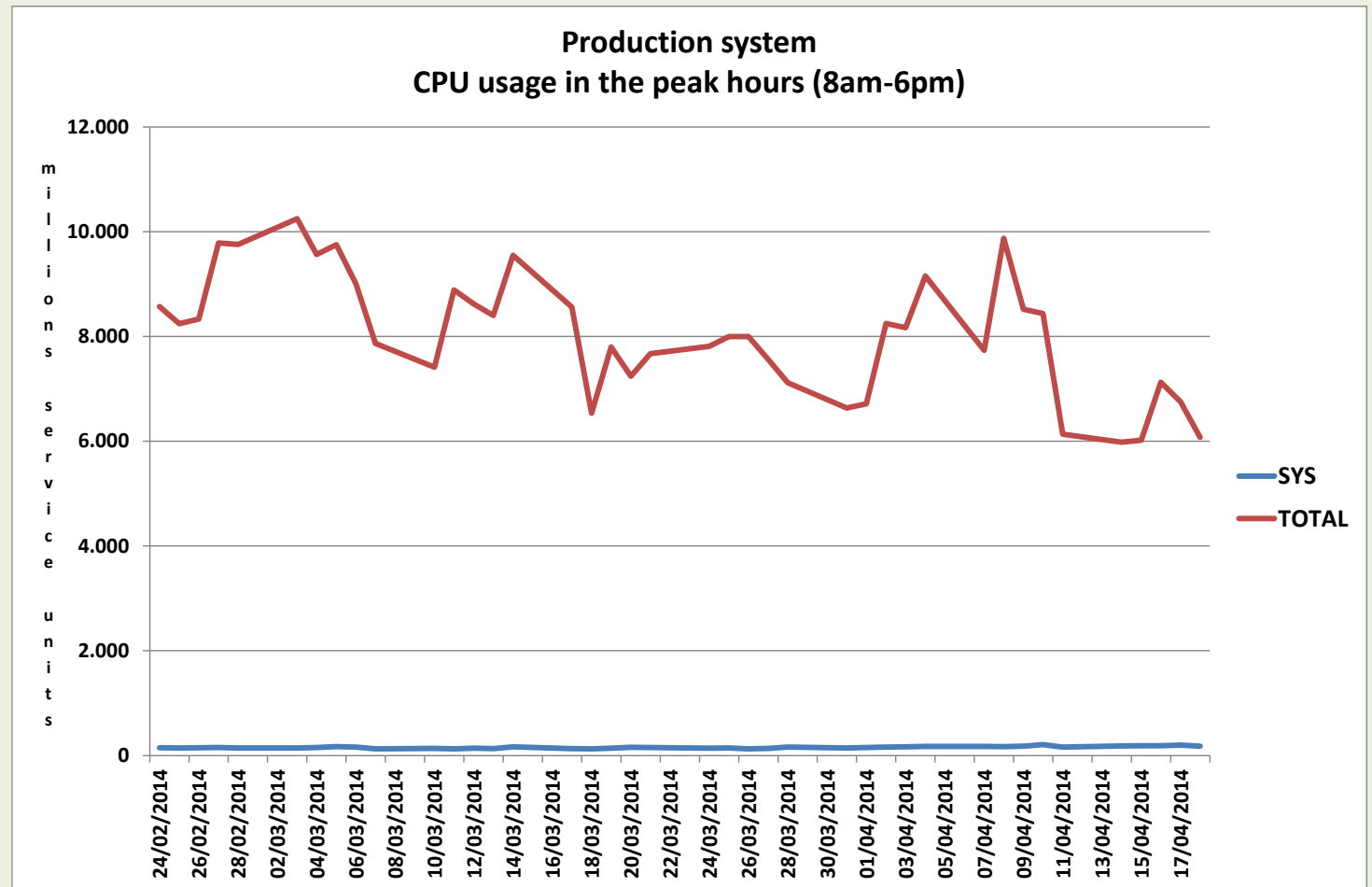
# SYSTEM

- In EPV for z/OS we create by default a workload called SYS which includes all the address spaces running in the SYSTEM service class
- This automatically provides information, taken from SMF 30 records , about the SYSTEM address spaces behaviour at daily and trend level
- By looking at this info you can assess what is the normal situation and easily identify anomalies



# SYSTEM

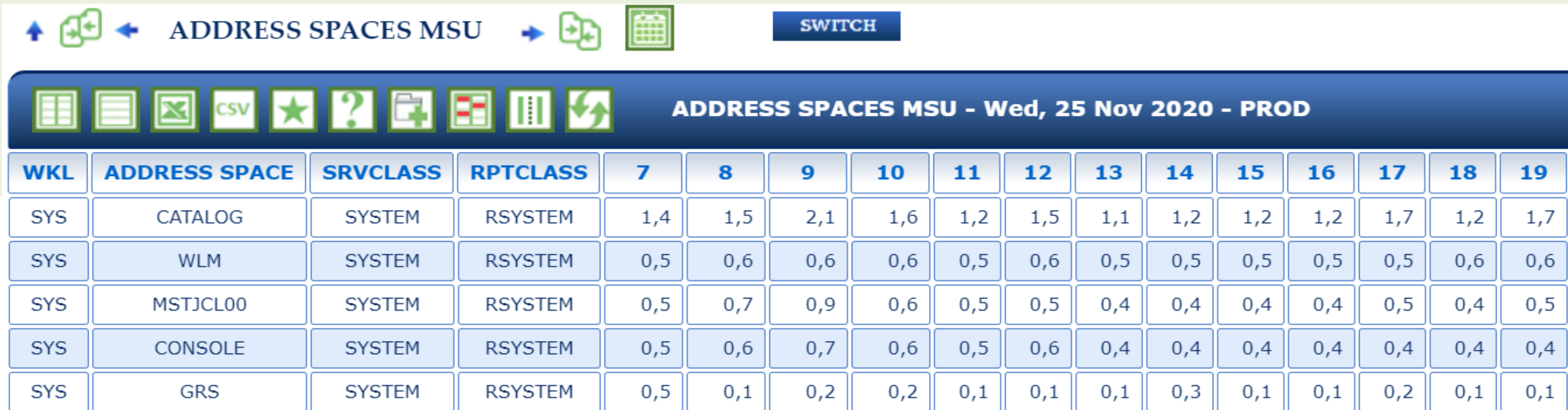
- System AS CPU usage compared to the total system usage should be less than 5% for production systems





# SYSTEM

- This is an example of system daily report (monoplex)
- MSU consumptions look normal



The screenshot displays a web-based interface for monitoring system resources. At the top, there are navigation icons and a title 'ADDRESS SPACES MSU'. Below this is a toolbar with various icons and a 'SWITCH' button. The main content area shows a table titled 'ADDRESS SPACES MSU - Wed, 25 Nov 2020 - PROD'. The table has columns for 'WKL', 'ADDRESS SPACE', 'SRVCLASS', 'RPTCLASS', and 19 days of MSU consumption data.

| WKL | ADDRESS SPACE | SRVCLASS | RPTCLASS | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  |
|-----|---------------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| SYS | CATALOG       | SYSTEM   | RSYSTEM  | 1,4 | 1,5 | 2,1 | 1,6 | 1,2 | 1,5 | 1,1 | 1,2 | 1,2 | 1,2 | 1,7 | 1,2 | 1,7 |
| SYS | WLM           | SYSTEM   | RSYSTEM  | 0,5 | 0,6 | 0,6 | 0,6 | 0,5 | 0,6 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 |
| SYS | MSTJCL00      | SYSTEM   | RSYSTEM  | 0,5 | 0,7 | 0,9 | 0,6 | 0,5 | 0,5 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,4 | 0,5 |
| SYS | CONSOLE       | SYSTEM   | RSYSTEM  | 0,5 | 0,6 | 0,7 | 0,6 | 0,5 | 0,6 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 |
| SYS | GRS           | SYSTEM   | RSYSTEM  | 0,5 | 0,1 | 0,2 | 0,2 | 0,1 | 0,1 | 0,1 | 0,3 | 0,1 | 0,1 | 0,2 | 0,1 | 0,1 |



# SYSTEM

- Abnormal situation highlighted in a daily report
- MSTJCL00 is using a lot of MSUs

ADDRESS SPACE MSU

SYSTEM : PROD - AS : MSTJCL00 MSU BY HOUR

| DATE       | DAY | TOTAL | MEAN | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   |
|------------|-----|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2016-01-27 | Wed | 18    | 0,8  | 0,7  | 0,5  | 0,4  | 0,5  | 0,5  | 0,6  | 0,7  | 0,8  | 1,1  | 1,2  | 1,2  | 0,6  | 0,8  | 0,9  | 1,2  | 1,3  | 1,4  | 1,0  | 0,7  | 0,4  | 0,5  | 0,3  | 0,3  | 0,3  |
| 2016-01-26 | Tue | 41    | 1,7  | 0,4  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,4  | 0,4  | 0,5  | 0,6  | 1,4  | 1,6  | 1,7  | 0,6  | 2,6  | 3,4  | 3,6  | 5,1  | 5,2  | 3,5  | 3,5  | 2,3  | 1,6  | 1,5  |
| 2016-01-25 | Mon | 55    | 2,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,5  | 0,6  | 1,1  | 1,0  | 1,4  | 1,6  | 2,2  | 2,8  | 3,3  | 4,3  | 5,3  | 5,4  | 4,8  | 5,1  | 5,0  | 3,3  | 3,2  | 3,0  |
| 2016-01-24 | Sun | 7     | 0,3  | 0,3  | 0,4  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,4  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  |
| 2016-01-23 | Sat | 21    | 0,9  | 3,8  | 3,4  | 3,2  | 2,9  | 2,1  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,4  | 0,4  | 0,3  | 0,3  | 0,3  | 0,3  | 0,4  | 0,4  | 0,3  |
| 2016-01-22 | Fri | 431   | 18,0 | 31,2 | 30,8 | 31,7 | 33,0 | 34,6 | 35,1 | 33,4 | 33,6 | 33,3 | 32,3 | 33,5 | 34,3 | 4,2  | 4,2  | 4,4  | 4,7  | 4,8  | 2,6  | 1,9  | 1,7  | 1,4  | 1,3  | 1,5  | 1,2  |
| 2016-01-21 | Thu | 775   | 32,3 | 32,8 | 31,0 | 33,5 | 34,0 | 35,5 | 35,0 | 34,3 | 32,7 | 33,0 | 33,3 | 32,1 | 31,8 | 31,5 | 30,7 | 31,2 | 33,2 | 32,7 | 31,3 | 31,8 | 30,6 | 31,6 | 32,2 | 28,6 | 30,9 |
| 2016-01-20 | Wed | 799   | 33,3 | 33,4 | 32,8 | 34,8 | 36,5 | 37,1 | 35,9 | 35,8 | 33,1 | 33,0 | 33,1 | 32,8 | 32,2 | 31,7 | 32,8 | 33,5 | 33,8 | 33,8 | 32,9 | 32,1 | 30,8 | 31,5 | 32,3 | 30,1 | 33,1 |
| 2016-01-19 | Tue | 112   | 4,6  | 3,7  | 1,4  | 1,3  | 1,3  | 0,3  | 0,4  | 0,5  | 0,4  | 0,5  | 0,8  | 1,3  | 1,4  | 1,5  | 0,7  | 1,0  | 1,2  | 1,5  | 2,6  | 3,9  | 4,3  | 4,9  | 12,0 | 30,6 | 33,9 |
| 2016-01-18 | Mon | 566   | 23,6 | 26,8 | 23,1 | 23,6 | 25,2 | 25,3 | 24,3 | 23,9 | 22,7 | 23,4 | 23,0 | 24,0 | 23,9 | 22,7 | 23,0 | 22,8 | 23,2 | 24,0 | 23,2 | 23,4 | 22,2 | 23,5 | 23,6 | 21,5 | 23,7 |
| 2016-01-17 | Sun | 649   | 27,0 | 26,4 | 21,5 | 23,5 | 25,4 | 26,0 | 27,8 | 27,6 | 27,6 | 28,1 | 27,8 | 28,2 | 28,2 | 28,1 | 28,3 | 28,2 | 26,1 | 28,0 | 28,2 | 28,1 | 27,9 | 28,2 | 25,0 | 28,0 | 26,3 |
| 2016-01-16 | Sat | 558   | 23,3 | 1,1  | 6,6  | 23,0 | 23,8 | 24,2 | 24,8 | 24,1 | 23,4 | 25,8 | 25,0 | 25,7 | 26,6 | 26,8 | 26,7 | 27,2 | 26,0 | 23,2 | 25,2 | 25,2 | 26,6 | 26,8 | 20,8 | 23,5 | 26,0 |
| 2016-01-15 | Fri | 36    | 1,5  | 1,5  | 1,6  | 1,5  | 1,4  | 1,3  | 1,3  | 1,2  | 0,5  | 0,6  | 1,4  | 1,6  | 1,7  | 2,1  | 3,0  | 3,2  | 2,2  | 1,2  | 1,1  | 0,9  | 0,9  | 0,9  | 0,9  | 2,0  | 1,9  |
| 2016-01-14 | Thu | 74    | 3,1  | 1,4  | 1,3  | 1,3  | 1,2  | 1,1  | 1,1  | 1,2  | 1,8  | 2,2  | 2,5  | 2,8  | 2,8  | 3,1  | 3,4  | 5,6  | 6,0  | 7,4  | 5,8  | 3,9  | 4,8  | 5,0  | 3,3  | 3,2  | 1,8  |
| 2016-01-13 | Wed | 51    | 2,1  | 0,7  | 0,7  | 0,8  | 0,8  | 0,8  | 0,9  | 1,0  | 1,2  | 1,4  | 2,3  | 0,9  | 1,7  | 3,6  | 4,3  | 5,8  | 5,0  | 4,8  | 3,3  | 2,0  | 2,0  | 2,0  | 1,7  | 1,6  | 1,5  |
| 2016-01-12 | Tue | 48    | 2,0  | 1,5  | 1,5  | 1,4  | 1,3  | 1,2  | 1,2  | 1,0  | 0,8  | 2,9  | 3,9  | 5,2  | 5,6  | 3,8  | 1,8  | 2,1  | 2,4  | 2,9  | 2,7  | 1,4  | 1,4  | 0,8  | 0,4  | 0,5  | 0,6  |
| 2016-01-11 | Mon | 30    | 1,2  | 0,2  | 0,3  | 0,3  | 0,3  | 0,3  | 0,3  | 0,5  | 0,5  | 0,6  | 0,6  | 1,1  | 2,3  | 3,6  | 4,3  | 3,3  | 2,1  | 2,2  | 1,6  | 1,0  | 1,0  | 1,0  | 0,7  | 0,8  | 0,8  |





# SYSSTC



# SYSSTC

- Only started tasks (STC) running a program with the PRIV (privileged) or SYST (system task) special attributes will be assigned to the SYSSTC service class by default
- By customizing the PPT (Program Property Table) parameter inside the SCHEDxx member of the SYS1.PARMLIB library the installation may specify special attributes for specific programs or override an IBM-supplied entry in the PPT



# SYSSTC

- Starting from z/OS 2.1 a Display PPT command is provided to list default and active PPT
- Partial output is shown here

```
IEF386I 11.20.01 DISPLAY PPT
No Parmlib Values
Default Values
PgmName  NC NS PR ST ND BP Key 2P 1P NP NH CP
AHLGTF   Y  Y  .  Y  .  .  0  .  .  Y  .  .
AKPCSIEP .  Y  .  Y  Y  .  1  .  .  Y  .  .
ANFFIEP  .  Y  .  Y  Y  .  1  .  .  .  .  .
APSHPOSE .  Y  .  Y  Y  .  1  .  .  Y  .  .
APSKAFPD .  Y  .  Y  Y  .  1  .  .  Y  .  .
APSPPIEP .  Y  .  Y  Y  .  1  .  .  Y  .  .
ASBSCHIN .  Y  .  Y  .  .  1  Y  Y  .  .  .
ASBSCHWL .  .  Y  .  .  .  1  .  .  .  .  .
ATBINITM .  Y  .  Y  .  .  1  Y  Y  .  .  .
ATBSDFMU .  .  Y  .  .  .  1  .  .  .  .  .
AVFMNBLD Y  Y  .  Y  .  .  3  .  .  Y  .  .
BBGCTL   .  Y  Y  .  .  .  2  .  .  .  .  .
BBGDAEMN .  Y  Y  Y  .  .  2  .  .  .  .  .
BBOCTL   .  Y  Y  .  .  .  2  .  .  .  .  .
BBODAEMN .  Y  Y  Y  .  .  2  .  .  .  .  .
BNJLINTX .  Y  .  .  .  .  8  .  .  .  .  .
```



# SYSSTC

- The SYSSTC service class is designed to be used for workloads that use a small amount of resources (mostly CPU) but need to run with the smallest possible delays
- SYSSTC workloads run at a fixed 254 DP
- Tasks in SYSSTC should not use a lot of CPU to avoid monopolizing the CPU resources with consequent delays for all the other workloads



# SYSSTC

- SRB activity from the SYSSTC class run on any available logical processor independently from HD affinity nodes
- This supports the highly interactive requirements for work typically classified to this service class, or more specifically, lots of short-running, local SRBs required for transaction workflow
- Examples of address spaces with this type of work are VTAM, TCP/IP and IRLM



# SYSSTC

- To minimize the risk of loops you should put in SYSSTC only workloads running “trusted code”; an example of “trusted code” is the IMS control region while an example of “non-trusted code” is an IMS message region running user applications
- The idea behind is that, while it’s always possible a bug, IBM and ISV code is normally more tested in many different environments than the specific user applications





# SYSSTC

- You should also put in SYSSTC workloads not using large amounts of memory, unless memory is really very abundant in the system
- The reason is that WLM doesn't protect the working set of address spaces running in SYSSTC (and SYSTEM)
- So if memory is constrained, a lot of memory frames belonging to SYSSTC address spaces may be paged-out and then paged-in when needed hurting the overall system performance



# SYSSTC

- Examples of address spaces normally running with a very large memory footprint are DB2 DBM1, MQ MSTR, WebSphere regions
- They should not be assigned to SYSSTC but to a high importance service class with an appropriate velocity goal



# SYSSTC

- There are some changes a customer should do to the default WLM classification:
  - setting STC classification rules to be sure that AS using a lot of resources (CPU and memory) don't run in SYSSTC
  - setting STC classification rules to be sure that the appropriate address spaces run in SYSSTC
  - assigning a specific report class to the system address spaces you want to keep under control
  - setting an SPM rule in STC classification rules to be sure that address spaces not classified before and running programs with the PRIV and SYST attributes run in SYSSTC



# SYSSTC

```
Subsystem-Type  Xref  Notes  Options  Help
-----
                Modify Rules for the Subsystem Type      Row 54 to 60 of 60
Command ===> _____ Scroll ===> CSR

Subsystem Type . : STC          Fold qualifier names?  Y  (Y or N)
Description . . . STARTED TASK

Action codes:   A=After      C=Copy          M=Move          I=Insert rule
                B=Before      D=Delete row    R=Repeat        IS=Insert Sub-rule
                More ===>

                -----Qualifier-----                -----Class-----
Action   Type      Name      Start      Service      Report
-----  -
_____  1    TN      DB2TMSTR  _____  IMSDB2LO    DB2TMSTR
_____  1    TN      DB2TDBM1  _____  IMSDB2LO    DB2TDBM1
_____  1    TN      DB2TIRLM  _____  SYSSTC      DB2TIRLM
_____  1    TN      DB2PMSTR  _____  IMSDB2HI    DB2PMSTR
_____  1    TN      DB2PDBM1  _____  IMSDB2HI    DB2PDBM1
_____  1    TN      DB2PIRLM  _____  SYSSTC      DB2PIRLM
_____  1    SPM     SYSSTC    _____  SYSSTC      RSYSSTC

***** BOTTOM OF DATA *****
```



# SYSSTC

- It's enough common assigning one or more TSO users to SYSSTC in order to be able to quickly execute commands when the system is slowing down
- Another common issue is about monitor address spaces; do you have to put them in SYSSTC ?
- The answer is: it depends

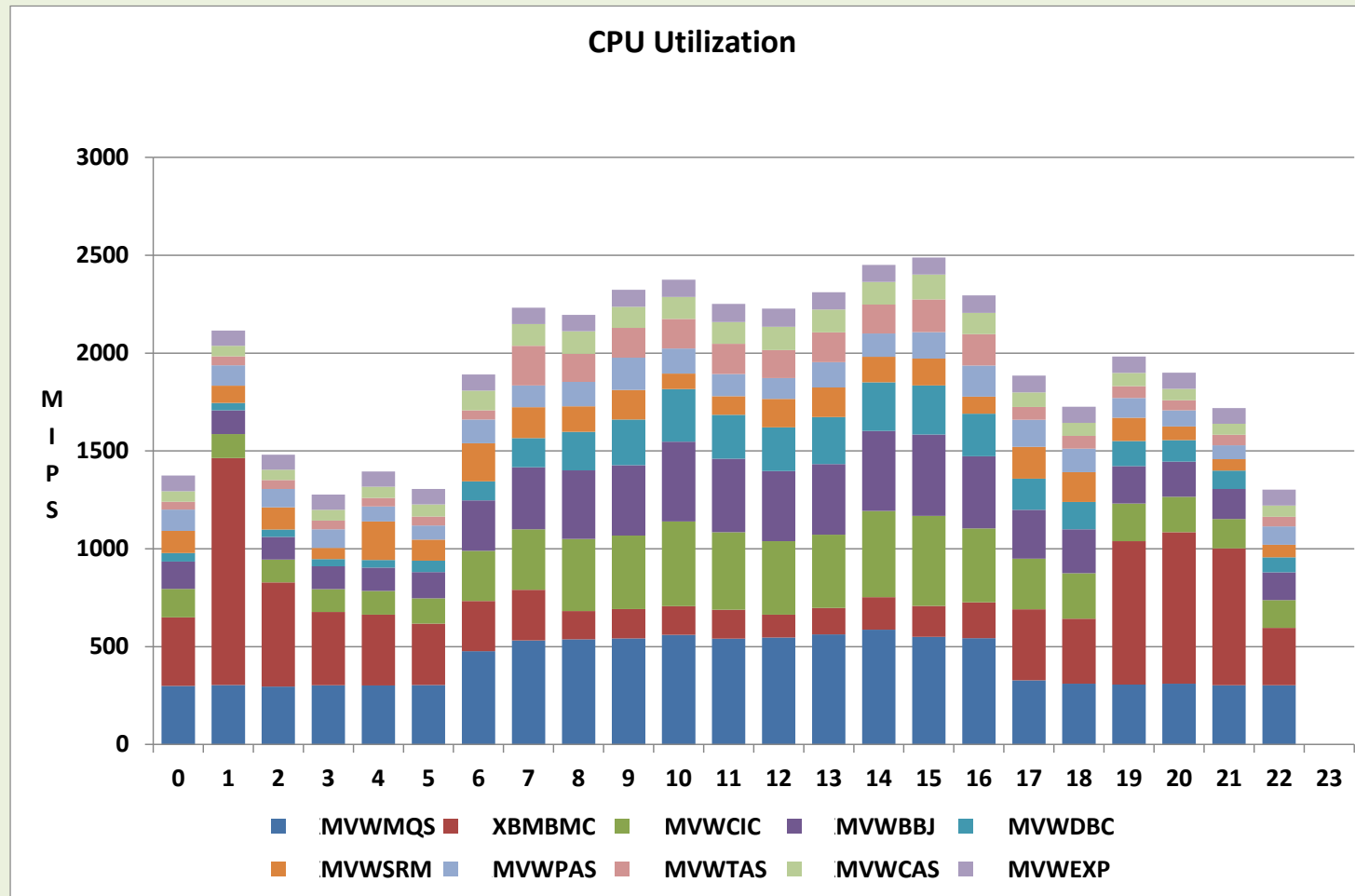


# SYSSTC

- RMF address spaces can normally be considered “trustable”
- Other monitors such as Mainview and Omegamon could be a bit more dangerous depending on how you exploit them
- If you put them in SYSSTC, keep them under strict control



# SYSSTC




# SYSSTC

- Since many years the service classes SYSSTC1, SYSSTC2, SYSSTC3, SYSSTC4, and SYSSTC5 are provided; IBM manuals say “for future use”
- Work assigned to any of these service classes is managed identically to work assigned to SYSSTC
- Currently, there is no technical reason to choose one of these service classes as an alternative to SYSSTC







# WLM protection



# WLM protection

- The following options are available to help WLM administrators protect critical work such as, but not only, CICS and IMS work:
  - Long-term storage protection
  - Long-term CPU protection



# WLM protection - Storage

- With long-term storage protection WLM restricts storage donations to other work
- Protected work will lose storage only if other work of equal or greater importance needs the storage to meet performance goals
- This option can be useful for work that needs to retain storage during long periods of inactivity because it cannot afford paging delays when it becomes active again
- Not for enclaves



# WLM protection - Storage

- Storage Critical = YES assigned in a classification rule to all A.S. matching it
- Service Class in ASCH, JES, OMVS, STC, TSO:
  - If only one period
  - If velocity goal or response goal > 20 seconds



# WLM protection - Storage

```
Subsystem-Type  Xref  Notes  Options  Help
-----
                Modify Rules for the Subsystem Type      Row 25 to 32 of 62
Command ==> _____ Scroll ==> CSR

Subsystem Type . : STC          Fold qualifier names?  Y (Y or N)
Description . . . STARTED TASK

Action codes:   A=After      C=Copy      M=Move      I=Insert rule
                B=Before     D=Delete row R=Repeat   IS=Insert Sub-rule
                <=== More

Action  -----Qualifier-----  Storage  Manage Region
        Type      Name      Start    Critical  Using Goals Of
-----
_____ 1  TNG      STCHIGH  _____ NO         TRANSACTION
_____ 1  TNG      DBRCHI   _____ NO         TRANSACTION
_____ 1  TNG      DBRCLO   _____ NO         TRANSACTION
_____ 1  TN       DB21DIST _____ NO         TRANSACTION
_____ 1  TN       DB21MSTR _____ NO         TRANSACTION
_____ 1  TN       DB21DBM1 _____ YES        TRANSACTION
```



# WLM protection - Storage

- For CICS and IMS work, you can assign long-term storage protection by specifying YES in the Storage Critical field in the rules for specific transactions
- Once you specify YES for one transaction in a CICS/IMS service class, all CICS/IMS transactions in that service class will be storage-protected
- In fact, if a CICS or IMS region is managed as a server and any of the transaction service classes it serves is assigned storage protection, then the CICS/IMS region itself is automatically storage-protected



# WLM protection - Storage

```
Subsystem-Type  Xref  Notes  Options  Help
-----
                Modify Rules for the Subsystem Type                Row 1 to 4 of 4
Command ==> _____ Scroll ==> PAGE

Subsystem Type . : IMS                Fold qualifier names?  Y  (Y or N)
Description . . . Critical transactions

Action codes:   A=After      C=Copy      M=Move      I=Insert rule
                B=Before    D=Delete row R=Repeat   IS=Insert Sub-rule
                <=== More

                -----Qualifier-----
Action  Type      Name      Start      Storage  Manage Region
                Type      Name      Start      Critical Using Goals Of

_____ 1  TN      TEPV815*  _____ YES      N/A
_____ 1  TN      TEPV830*  _____ YES      N/A
_____ 1  TN      TEPV7A7*  _____ NO       N/A
_____ 1  TN      TEPV6316  _____ NO       N/A

***** BOTTOM OF DATA *****
```



# WLM protection - CPU

- CPU Critical = YES assigned to the Service Class
- Applies to all kind of service classes (A.S., enclaves, CICS/IMS transactions)
- Only one period has to be defined
- Not discretionary goal
- If you set CPU protection for a Service Class running CICS/IMS transactions the regions where the transactions in the Service Class are served will be automatically CPU protected





# WLM protection - CPU

```
Service-Class Xref Notes Options Help
-----
                          Modify a Service Class
Command ==> _____

Service Class Name . . . . . : IMSDB2HI
Description . . . . . : Production IMS
Workload Name . . . . . : IMSDB2 (name or ?)
Base Resource Group . . . . . : _____ (name or ?)
Cpu Critical . . . . . : YES (YES or NO)

Specify BASE GOAL information. Action Codes: I=Insert new period
E=Edit period, D=Delete period.

-- Period -- ----- Goal -----
Action  £  Duration  Imp.  Description
-----  -  -
1      1  _____  1    Execution velocity of 60
***** Bottom of data *****
```



# WLM protection - CPU

- Long-term CPU protection ensures that less important work will have a lower dispatching priority
- The CPU protected Service Class will compete for the CPU with equal or higher importance Service Classes only
- Not subject to Discretionary Goal Management
- Still subject to less important work promotion when such work is holding an enqueue for which there is contention.
- Use this protection for extremely CPU-sensitive and critical workloads



# WLM protection - CPU

- A Service Class with low importance, depending on its resource usage, goal and PI can temporary get the highest available dispatch priority in the system and this is normally not a problem
- In which cases is CPU protection needed?



# WLM protection - CPU

## A CICS CASE

*Lunch time is normally a low activity period for online work so other workloads as batch can get higher DP*

*When people start logging on again WLM will take some policy adjustment cycles before giving CICS the proper dispatching priority*

*In the meantime people will experience response time elongation*





# Questions?

