

WLM - Effective Setup and Usage of WLM Report Classes (Session 16579)

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Abstract

• WLM - Effective Setup and Usage of WLM Report Classes

Abstract

- Rarely are WLM report classes used to their full potential. Most customers set them up so that they are used, but then never use them. Or do not even set them up effectively to begin with. Then when it comes time to debug a performance problem, or when management asks a question about a specific workload, the report class setup falls short of its objective.
- During this session WLM expert Peter Enrico will walk you through an effective report class setup. Report examples will be provided so you can see first-hand the power of a great report class structure.

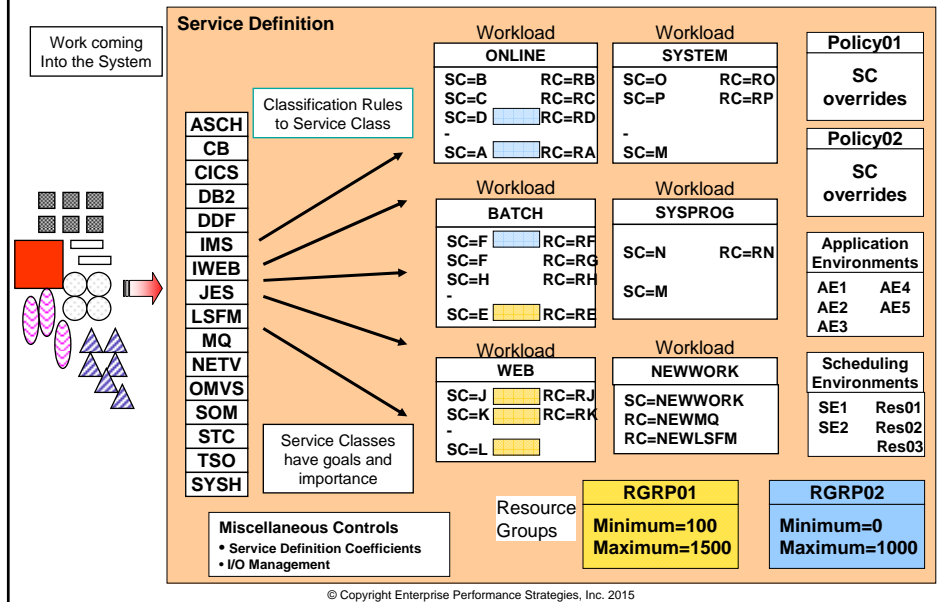
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Presentation Overview

- What are report classes?
 - Why use report classes
 - History of report classes
 - Overhead of report classes
- General Guidelines for report classes
 - General guidelines
 - Subsystem and workload guidelines
- Using report classes to evaluate resource usage
- Using report classes to evaluate goals

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Overview of WLM Service Definition



WLM Service Definition Review

- A WLM Service Definition consists of
 - Service Policies - named sets of overrides to defined goals in service policy
 - Workloads - aggregation of service classes for reporting purposes
 - Service Classes - subdivided into periods, groups of work with similar performance goals, business importance, and resource requirements for reporting and management purposes
 - Report Classes - group of work for 'more/less granular' reporting purposes
 - Resource Groups - define processor capacity boundaries across a sysplex
 - Classification Rules - determine how to assign incoming work to a service class and/or a report class
 - Application Environments – groups of application functions that execute in server address spaces and can be requested by a client
 - Scheduling Environments – lists of named resources along with their required state
 - Global Settings - miscellaneous settings for WLM controls

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What are WLM report classes?

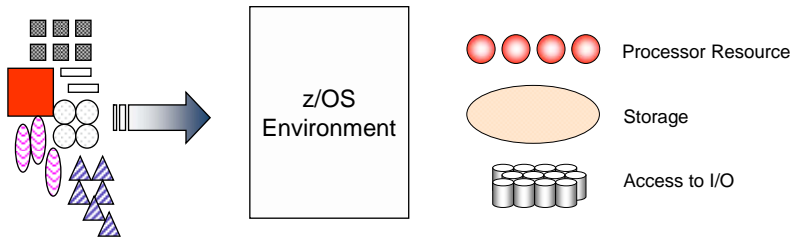
- In the world of WLM, all work is classified
 - To a service class for management and reporting purposes
 - and optionally assigned to a report class strictly for reporting
- A report classes are groupings of work used for installation monitoring
 - Division of work into separate WLM defined report has no effect WLM goal or resource management
 - Defined as an installation sees fit and is strictly for reporting purposes

STCHI Service Class	BATCHHI Service Class	TSO Service Class
RC Name = RC_DB2P • Production DB2P Regions	RC Name = PS_HR • People Soft HR Jobs	RC Name = TSOPROD • Production TSO
RC Name = RC_WMGP • Production MQ Regions	RC Name = CLASSY • Class Y Jobs	RC Name = TSOSYSP • TSO Sysprogs
RC Name = RC_DATAC • DATACOM regions	RC Name = CLASSP • Class P Jobs	RC Name = DEPTA • HR Department
RC Name = RC_CTGP • Production CICS CTG Regs	RC Name = BAT_ATM • Batch ATM Jobs	RC Name = D24PAE1 • User Peter Enrico

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Why use report classes?

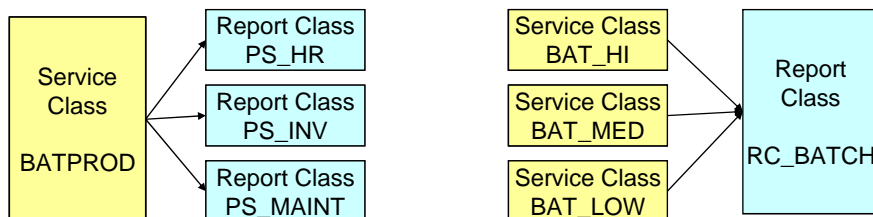
- As a reminder, the performance objectives of any installation are
 - Optimize the use of all system resources across all system in Sysplex
 - Make management happy
 - Enable all work in the system to achieve the installation's run time objectives
 - Make the customers happy
- Report classes provide more or less granular measurements to assist in
 - evaluation of workload resource usage
 - evaluation of goals, importance levels, multiple periods, etc



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Why use report classes?

- Report classes are used to allow:
 - Reporting of workloads on a *more granular* level than service class
 - Example: Breakdown of service class measurements into smaller groupings
 - Reporting of workloads at a *less granular* level than service classes
 - Example: Combine the measurements of work in several service classes to a larger set



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Overview of Report Classes

- Report class measurements are contained in the SMF 72 records
 - Very low overhead, but does result in SMF records
- SMF 72 report class measurements are mostly the same set of measurements available to service classes
 - Throughput data
 - Velocity achieved data
 - Response time and response time distribution data
 - Resource consumption data (CPU, Storage, I/O)
 - State samples
 - Work manager delay data
- A unit of work can
 - only be classified and managed into a single service class
 - optionally classified into a single report class
 - Thus, a unit of work can never be in more than service class and never be in more than on report class
 - So no double accounting

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Simple Example of Using Report Classes

- Report class definition is made up of a name and a description
- When work is classified it is optionally also classified to a report class
 - In the below example all work classified to service class TSO
 - But work is broken up into several report classes so measurements are more granule

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

Subsystem Type . : TSO          Fold qualifier names?  Y  (Y or N)
Description . . . TSO Workload Classification

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-----
Type   Name      Start      Service  Report
-----
_____ 1 UI      TSOS*    _____  TSO      RDEFTSO
_____ 1 UI      TSOP*    _____  TSO      RTSOSYS
_____ 1 UI      TSOD*    _____  TSO      RTSOPROD
_____ 1 UI      TSOD*    _____  TSO      RTSODEV

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

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Simple Example of Not Using Report Classes

- But report classes are totally optional
 - In the below example, none of the work assigned to service class TSO will be reported in any report class

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

Subsystem Type . : TSO          Fold qualifier names?  Y  (Y or N)
Description   . . . TSO Workload Classification

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      Service      Report
-----
      1  UI      TSOS*      _____  TSO
      1  UI      TSOP*      _____  TSO
      1  UI      TSOD*      _____  TSO
***** BOTTOM OF DATA *****
```

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History of Report Classes

- Just as a fun back ground story...
 - Today, a WLM service definition
 - Can have up to 100 service classes
 - Can have up to 2047 report classes
 - However, the first release of WLM had limits that were very different
 - Could have up to 999 service classes
 - Could have up to only 100 report classesThe thought was that units of work would be assigned their own service classes and WLM management was to be very granular
 - But with the introduction of fair share dispatching to improve WLM responsiveness, it was realized that fewer service class (periods) would result in better WLM management of workloads
 - So fewer service classes were expected, but more report classes was required
 - So the limits were switched
 - It was much later than the report class limit was raised from 999 to 2047

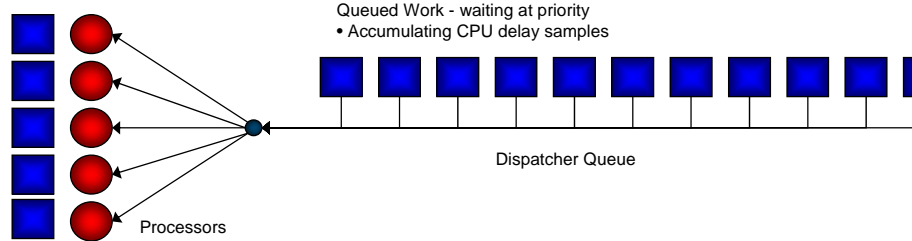
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Fair Share Dispatching

- Fair share dispatching
 - At a given CPU dispatching priority
 - Each unit of work gets fair share access to the processors
 - Eliminates the need for work to be secluded to a period for micromanagement of access to the CPU
 - Lesson:
 - It is OK that like work is grouped and managed in the same service class period

Dispatched Work

- Accumulating CPU Using Samples



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General Report Class Setup Guidelines

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General Guidelines

- A report class setup should be as sophisticated as the reporting intentions
 - **First... Report classes are not required**
 - From a technical point-of-view, if you have zero report classes defined, or 500 report classes defined, their existence or absence will have no affect on WLM management of the workloads or resources
 - However, at the very least it, is helpful to have report classes defined to assist in debugging and analysis of reporting issues
 - Examples given later in this presentation
 - **Second... It is never too late to change your report class structure**
 - The degree of difficulty to change an established report class structure is directly related to how much report classes are being used at your installation for reporting
 - Installations that make heavy use of report classes and have lots of daily / weekly / monthly / YTD reports will have a much more difficult time making report class changes
 - Installations that do not heavily depend on reports that use report classes will have a much easier time

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Determine why report classes are needed

- Remember, all measurements are available at the service class level
 - So most performance analysis and debug can be done with service class measurements
 - When designing a report class setup, it is important to ask what the reporting needs are
 - Will they be used for evaluation of **workload performance**?
 - When a group of work is managed together, but insights into workload components is desired at a more granular level to better understand workload performance
 - Granular reporting of
 - Transaction throughput such as ended transactions
 - Velocities
 - Response time and response time distribution
 - Discretionary work performance
 - SYSTEM / SYSSTC work
 - Workload constraints
 - Etc.

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Determine why report classes are needed

- Are the report classes to be used for evaluation of resource consumption?
 - For capacity planning purposes?
 - Example: Trending workload and resource growth for projection or verification purposes
 - For guidelines and insights for MSU usage and pricing purposes?
 - Example: Breaking down work the R4HA was composed of
 - General debug and insights into what workloads are using the resources at a more granular level than at the service class level
 - Example: When work is to be managed together but more granular measurements are needed to evaluate what makes up that service class

-----Qualifier-----				-----Class-----		
Action	Type	Name	Start	Service	Report	
				DEFAULTS: STCDEF	RDEFSTC	
:						
:						
_____	1	TN	DB2P*	_____	STCPROD	RDB2PROD
_____	1	TN	MQPD*	_____	STCPROD	RWMQPROD
_____	1	TN	DLIPROD	_____	STCPROD	RDLIPROD
***** BOTTOM OF DATA *****						

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Report class naming guidelines

- Report classes can be assigned nearly any 8 character name
 - Name (required) - Eight character identifier of the report class.
 - Description (optional) - An area of 32 characters to describe the report class
- Report class descriptions – optional, but highly recommended
- Report class names - Installations use different naming conventions
 - Most installation have no naming conventions
 - > Example: XCFAS, RTSO, JOE
 - Others use name of the transaction or address space
 - > Example: Report class XCFAS for address space XCFAS
 - Others start report class names with the letter R
 - > Example: RTSOPROD, RDB2P
 - Some use cryptic name but meaningful descriptions
 - > Example: Report class RSTCD22, Description: DB2PMSTR address space
- So long as report class measurements can be mapped and used, then all is OK

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Do not name report classes to names already being used by service classes

- please, Please, **PLEASE!**
 - Use report class names that are different than service class names
 - Confusing when report class names are the same as service class names

```

Subsystem-Type  Xref  Notes  Options  Help
-----
Modify Rules for the Subsystem Type      Row 1 to 8 of 47
Command ==> _____ SCROLL ==> PAGE

Subsystem Type . : STC      Fold qualifier names?  Y  (Y or N)
Description . . . Started Tasks

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      Service      Report
-----
(all other STC rules are here, and then last rule is as follows:

_____ 1 TNG      STCHI      _____ STCHI      STCHI
_____ 1 SPM      SYSTEM     _____ SYSTEM     SYSTEM
_____ 1 SPM      SYSSTC     _____ SYSSTC     SYSTC
    
```

Consider renaming to
RSTCHI
DEFSYSTM
DEFSYSSTC

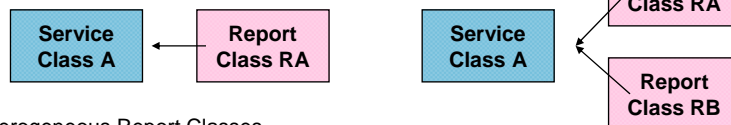
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Heterogeneous versus Homogeneous report classes

- Report classes are either heterogeneous or homogenous relative to the service class where the work in the report class is classified

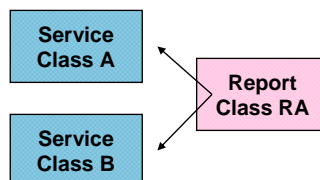
– Homogenous Report Classes

- Report class is made up of work from a single service class



– Heterogeneous Report Classes

- Report class is made up of work from multiple service classes
- Even if goal of the different service class is the same



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Make sure all report classes are homogenous

- Classification rules can assign work to report classes
 - Work can only be assigned to one report class



- Problems
 - Difficult to monitor goals using heterogeneous report classes
 - Since work in report class could be managed to different goals and different importance levels
 - Report classes can be multiple period like their associated service class
 - But heterogeneous report classes associated with different multiple period service classes can result in misleading evaluations and measurements
 - Response time distribution data in heterogeneous report classes inaccurate if the response time goals of the associated service classes are different

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Example Heterogeneous versus Homogeneous

- Ensure that all work classified to a report class comes from a single service class
 - In the below example
 - PRODBAT is a heterogeneous report class - it contains work from both BATCHHI and BATCH
 - TESTBAT is a homogeneous report class - it contains work from just BATCH

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

Subsystem Type . : JES Fold qualifier names? Y (Y or N)
Description . . . JES2 Batch

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 Service Report
-----Class-----
DEFAULTS: BATCH
1 TN BOBA* TPNS
1 TN BACK* BATCHHI PRODBAT
1 TN COMP* BATCH PRODBAT
1 TN TEST* BATCH TESTBAT
***** BOTTOM OF DATA *****
```

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SMF data indicates if report class is heterogeneous or homogeneous

Class Type	Class Name	Heterogeneous?	Class Type	Class Name	Heterogeneous?	Class Type	Class Name	Heterogeneous?
RC	ASYNCRPT	N	RC	PF1DDF	N	RC	PS1ADM	N
RC	BATRPT	N	RC	PF1DIA	N	RC	PS1BTC	N
RC	BATRPT	Y	RC	PF1SPO	N	RC	PS1DB2	Y
RC	CPSM	N	RC	PF1STPR	N	RC	PS1DDF	N
RC	DCSDB2	Y	RC	PF1UP2	N	RC	PS1DIA	N
RC	DDFRPT	N	RC	PF1UPD	N	RC	PS1DRDA	N
RC	DPAPP1	N	RC	PG1ADM	N	RC	PS1SPO	N
RC	DPAPP2	N	RC	PG1BTC	N	RC	PS1STPR	N
RC	DPAPP3	N	RC	PG1DB2	Y	RC	PS1UP2	N
RC	DPCOL1	N	RC	PG1DDF	N	RC	PS1UPD	N
RC	EDI	N	RC	PG1DIA	N	RC	QOR	N
RC	EXCI	N	RC	PG1DRDA	N	RC	SAPCICS	N
RC	FOR	N	RC	PG1SPO	N	RC	SAPRPT	Y
RC	MONITORS	N	RC	PG1STPR	N	RC	SRDS05M	N
RC	MONITORS	Y	RC	PG1UP2	N	RC	SRDS10S	N
RC	MQRPT	Y	RC	PG1UPD	N	RC	SRSD02M	N
RC	NEONRPTO	Y	RC	PH1ADM	N	RC	SRSD05M	N
RC	NEONRPTW	Y	RC	PH1BTC	N	RC	SRSERV	N
RC	NEONRPTX	Y	RC	PH1DB2	Y	RC	STCRPT	Y
RC	NEONRPTY	Y	RC	PH1DDF	N	RC	SYNC	N
RC	NEONRPTZ	N	RC	PH1DIA	N	RC	TOR	N
RC	NETWK	Y	RC	PH1SPO	N	RC	TSORPT	N
RC	OMVS	Y	RC	PH1STPR	N	RC	TSORPT	Y
RC	OMVSDFLT	N	RC	PH1UP2	N	RC	ZOSRPT	Y
RC	ONLRPT	Y	RC	PH1UPD	N	SC	BATCHHI	N
RC	P11ADM	N	RC	PM1ADM	N	SC	BATCHLO	N
RC	P11BTC	N	RC	PM1BTC	N	SC	DDF	N
RC	P11DB2	Y	RC	PM1DB2	Y	SC	HOTBATCH	N
RC	P11DIA	N	RC	PM1DDF	N	SC	KILLIT	N
RC	P11GEN	N	RC	PM1DIA	N	SC	NEON	N
RC	P11ICL	N	RC	PM1SPO	N	SC	NEWWORK	N
RC	P11SMQ	N	RC	PM1STPR	N	SC	ONLINEHI	N
RC	P11SPO	N	RC	PM1UP2	N	SC	ONLINELO	N
RC	P11STPR	N	RC	PM1UPD	N	SC	SAPBW	N
RC	P11UP2	N	RC	POR	N	SC	SAPHI	N

Use SMF 30 to figure out what is in a report class

Job Name	AS_Type	SC_Name	RC_Name	SYS1	SYS2
PQ0ACHIN	SYS	STCHI	MQRPT	380.19	
PQ0AMSTR	SYS	SYSSTC	MQRPT	404.52	
PQ1ACHIN	SYS	STCHI	MQRPT	448.57	
PQ1AMSTR	SYS	SYSSTC	MQRPT	1280.54	



Job Name	AS_Type	SC_Name	RC_Name	SYS1	SYS2
CICPWUI1	SYS	SYSSTC	MONITORS	26.16	
IMVCAS	SYS	SYSSTC	MONITORS	1.91	
SVOS	SYS	STCHI	MONITORS	29.13	
TMONDB2	SYS	SYSSTC	MONITORS		2.01
TMONDB2L	SYS	SYSSTC	MONITORS	170.15	73.96
TMONDLFL	SYS	SYSSTC	MONITORS	14.71	0.54
TMONDLFS	SYS	SYSSTC	MONITORS		0.55
TMONHUBP	SYS	SYSSTC	MONITORS	7.36	0.08
TMONHUBR	SYS	SYSSTC	MONITORS	0.28	0.32
TMONMLFS	SYS	SYSSTC	MONITORS	26.35	33.84
TMONMQS	SYS	SYSSTC	MONITORS	263.95	
TMONMSA	SYS	SYSSTC	MONITORS	2.28	
TMONMST	SYS	SYSSTC	MONITORS	313.31	342.1
TMONMVS	SYS	SYSSTC	MONITORS	24.82	280.43
TMONQLFS	SYS	SYSSTC	MONITORS	1.19	
TMONTCP	SYS	SYSSTC	MONITORS	11.75	4.88
TMONTLFS	SYS	SYSSTC	MONITORS	0.19	0.36
TMONULFS	SYS	SYSSTC	MONITORS	0.04	
TMONUSS	SYS	SYSSTC	MONITORS	0.01	
TMONVLF	SYS	SYSSTC	MONITORS	3.24	
TMONVTM	SYS	SYSSTC	MONITORS	9.12	
XMANAGER	SYS	SYSSTC	MONITORS	4.79	7.4



These report classes are examples of report classes used to evaluate resource consumption.

In both these cases you may decided to live with the heterogeneous report classes

Just be careful when using report class measurements to evaluate goal

Keep report classes homogeneous across subsystems as well cont...

- Rarely is it necessary to have a service class for OMVS interactive users
 - OMVS interactive users should be classified to the TSO service classes
 - However, make sure the report classes of these OMVS users are different so there is insight into what TSO work ran TSO environment and what ran OMVS environment
- Example Part B – Below we see that OMVS interactive user are classified to different report classes

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

Subsystem Type . : OMVS Fold qualifier names? Y (Y or N)
Description . . . USS Workload Classification

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 Service Report
-----Class-----
          TSOS* TSO RDEFOMVS
          TSOP* TSO ROMVSSYS
          TSOD* TSO ROMVSRDD
          TSOD* TSO ROMVSDEV
***** BOTTOM OF DATA *****
```

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Make all default report classes are unique

- Ensure every defined set of subsystem classification rules have a report class
 - And make sure each report class for each subsystem type is unique
 - This helps identify any work that is not explicitly classified via a rule
 - Helps to gain insight into work that may not be well understood
- Go one step further and make sure the measurements for these default report classes are always zero
 - If RDEF* measurements are zero then all work is explicitly classified

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

Subsystem Type . : CB Fold qualifier names? Y (Y or N)
Description . . . WAS EE and Component Broker

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 Service Report
-----Class-----
          WASAPPL1 DFLTWAS RDEFWAS
          WASAPPL1 WAS_HI RWASAPPL1
***** BOTTOM OF DATA *****
```

Example of a
subsystem type's
classification rules

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Make all default report classes are unique cont...

- It is recommended that only active subsystem types are defined
 - It makes for a simpler service definition
 - Work that exists for a subsystem type not used goes to SYSOTHER
 - So monitor SYSOTHER to make sure it is always void of activity
 - If not, then figure out the new type of work and add the necessary subsystem type and classification
 - But also use default report classes to determine what work is being classified by the default rules

Subsystem-Type View Notes Options Help					

Subsystem Type Selection List for Rules Row 1 to 11 of 11					
Command ==> _____					
Action Codes: 1=Create, 2=Copy, 3=Modify, 4=Browse, 5=Print, 6=Delete, / =Menu Bar					
-----Class-----					
Action	Type	Description	Service	Report	
---	CICS	CICS Transactions	CICSHI	RDEFCICS	
---	DDF	All data_server requests	DDFDEF	RDEFDDF	
---	JES	JES2 Batch	BATCHLO	RDEFBAT	
---	OMVS	Unix Services	OMVS	RDEFOMVS	
---	STC	started Tasks	STCLO	RDEFSTC	
---	TSO	Single service class	TSO	RDEFTSO	
***** Bottom of data *****					

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Make sure all work is classified to a report class

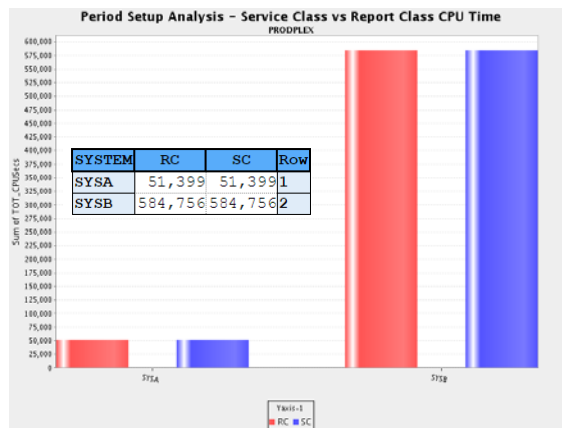
- Ensure that all work is classified to report classes
 - In theory, the total CPU time accumulated to service classes should equal the CPU time accumulated to report classes
- Benefits of all work classified to report classes
 - Service classes are setup for management purposes
 - But report classes allow a finer granularity of reporting
 - Helps with goal management of debugging
 - Work may be meeting its service class period goal, but finer granularity of reporting could show one part of the work doing well, but another part doing poorly

-----Qualifier-----				-----Class-----	
Action	Type	Name	Start	Service	Report
DEFAULTS: BATCH					
---	1	TN	BOBA*	TPNS	
---	1	TN	BACK*	BATCHHI	PRODBAT
---	1	TN	COMP*	BATCH	PRODBAT
---	1	TN	TEST*	BATCH	TESTBAT
***** BOTTOM OF DATA *****					

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Comparing RC CPU seconds to SC CPU seconds

- Exercise: For a period of 24 hours, compare the summed CPU time of all report classes against summed CPU time of all service classes
 - If both numbers equal that good indicator that all work is assigned to a report class
 - Should do same exercise for number of transactions



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Report Class Setup Guidelines

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The foundation of a good report class setup is a good service class setup

- A good report class setup is based on a good service class setup
 - Reminder: **Service classes** are used to manage and report like work together

- Work types
- Performance goals
- Resource requirements
- Business importance to installation

COMBAT Service Class

Period 1
Goal = Velocity 15
Importance 4
RGRP = FENCED

- Remember that not all work on the system is the same:
 - Interactive workloads versus background workloads
 - System workloads versus customer workloads
 - High importance workloads versus low importance workloads
 - High regular volume workloads versus low sporadic volume workloads
 - Short running work versus long running work
 - Distributed workloads versus single system workloads
 - e-business workload versus legacy workloads
 - And much more

PRODTSO Service Class

Period 1 – 500 Service
Goal = RT 0.5 sec, 95%
Importance 2
RGRP =

Period 2 – 1500 Service
Goal = RT 1.5 sec, 90%
Importance 3
RGRP =

Period 3
Goal = RT 3.0 sec, 80%
Importance 4
RGRP =

- If this separation is already achieved, and report classes are kept homogenous, then there is a good foundation to build a report class structure upon

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So, as a reminder... Keep service classes homogeneous

- If you keep service classes homogeneous
 - Keep work in each service class relatively homogeneous
 - WLM takes different actions for different types of work to meet goals
 - Reports may not always reflect reality
 - Example: Don't mix CICS transactions in same service class as TSO
- Separate unlike work
 - Don't mix enclave work with non-enclave work
 - Don't mix interactive work with non-interactive work
 - Don't mix participants with non-participants
 - Don't mix server with non-servers
 - Don't mix regions managed towards region goal with regions managed towards transaction goals
 - Don't mix Batch in WLM inits with batch in JES inits
 - Don't assign goals to spaces that should truly be in SYSTEM and SYSSTC
 - Don't put stuff into SYSTEM and SYSSTC that should not be there

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Make sure report classes do not contain a mixture of different work unit types

- Continuing on the theme of ensuring report classes are homogenous
 - Do not mix into the same report class (or service class):
 - Address spaces and Enclaves and CICS / IMS transactions
 - Examples:
 - Do not put WAS transactions into same report class as WAS regions
 - Do not put CICS transactions into same report class as CICS regions
 - Exceptions:
 - OK for TCP and NETV work to be with STC work

Subsystems that have address space oriented transactions:

- APPC
- JES2
- JES3
- UNIX System Services
- TSO/E
- Started Tasks

Subsystems that use enclaves:

- Component Broker
- DDF
- IBM HTTP Server
- MQSeries Workflow
- NetView
- LSFM
- TCP
- WebSphere

Note: CICS and IMS subsystems do not use enclaves, but use a different set of services to support transactions to WLM.

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STC report class setup

- Report class setup for STC work is especially important since the STC rules is where so many different workloads are classified
- Separate into different groups of homogeneous report classes
 - Monitors
 - Production versus test
 - Various products
 - Example: DB2 regions, away from WMQ regions, away from WAS regions, etc..
 - Various subsystem instances of a product
 - Example: DB2 regions (MSTR, DBM1, DIST) for DB2P, away from DB2D, etc.
 - Certain SYSTEM and SYSSTC address spaces
 - Consider setting up report classes for the following address spaces since each has performance sensitivities
 - IXGLOGR, ZFS, GRS, WLM, XCFAS, etc.

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STC report class setup...

- One or more report classes should be defined fore each of the possible groups of STC work
 - SYSTEM address spaces
 - SYSSTC address spaces
 - Monitors
 - DB2 regions
 - Separate by subsystem instance
 - Separate IRLM from other DB2 regions
 - Separate WLM stored procedure address spaces away from DB2 regions
 - Separate WLM stored procedure address space by application environment
 - CICS regions
 - Separate by subsystem instance
 - Separate TORs from AORs from FORs
 - Separate regions managed by velocity goals from those managed by transaction goals
 - IMS regions
 - Separate by subsystem instance
 - Separate DLISAS, DLI, DBRC, etc. from MPRs
 - Separate regions managed by velocity goals from those managed by transaction goals

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STC report class setup...

- One or more report classes should be defined fore each of the possible groups of STC work
 - WMQ
 - Separate by subsystem instance
 - WAS
 - Separate by subsystem instance
 - Separate controllers from servants
 - Separate into their own report classes: NODE agents, Deployment managers, DAEMONS
 - Non-Participants each into their on report classes
 - ADABAS, IDMS, CTG, XCOM, VSAM RLS, etc

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STC report class setup...

- Setup unique report classes for STC work being classified via SPM rules
 - Subsystem Parameter (SPM) rule for STC subsystem
 - Indicates that the system provided service class of SYSTEM or SYSSTC will be assigned if a started task with high dispatching priority, privileged, or system task attribute but is not assigned to a regular service class with goal

```

Subsystem-Type  Xref  Notes  Options  Help
-----
Command ==>      Modify Rules for the Subsystem Type      Row 1 to 8 of 47
SCROLL ==> PAGE

Subsystem Type . : STC      Fold qualifier names?  Y  (Y or N)
Description . . . Started Tasks

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      Service      Report
-----
(all other STC rules are here, and then last rule is as follows:

```

1	SPM	SYSTEM		SYSTEM	DEFSYSTEM
1	SPM	SYSSTC		SYSSTC	DEFSYSTC

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JES (Batch) report class setup

- There are so many different types of batch
 - Normal Production Jobs submitted by a Job Scheduler
 - Critical Path Jobs submitted through a Job Scheduler
 - Ad-hoc Jobs (possibly submitted by a Job Scheduler)
 - Development Jobs
 - Normal System Support Jobs
 - High-Priority System Support Jobs
 - Logs, Archival, Backup, and D/R Jobs (possibly submitted by a Job Scheduler or an appropriate Subsystem)
 - Quick Utility Jobs
 - Emergency or Hot Jobs
 - Those requiring setup
- Report class recommendation
 - Separate jobs running in WLM managed inits away from JES managed inits
 - Figure out what batch reporting you need
 - Try to put applications into their own report classes
 - Try to separate using the above for batch types

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TSO, OMVS report class setup

- TSO
 - If helpful, separate users into different report classes as needed
 - Most common division is system programmers and all other users
 - Very useful to classify 'problem' users into their own report class
 - Example:
 - RTSOSYS, RTSOPRD, PETER, etc..
- OMVS
 - We need to remember there are distinct types of UNIX System Service work
 - Long running daemons
 - Interactive users
 - Production users or just system programmers doing their thing?
 - Batch Workloads
 - Things like JDBC and FTP users
 - Example:
 - ROMVSSYS, ROMVSPRD, ROMVSSTC, etc...

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CICS and IMS Transactions

- Regardless if you are managing regions towards velocity goals or transaction goals, still classify all CICS and IMS transactions

```
Subsystem-Type Xref Notes Options Help
-----
Modify Rules for the Subsystem Type Row 1 to 3 of 3
Command ==> SCROLL ==> PAGE

Subsystem Type . : CICS Fold qualifier names? Y (Y or N)
Description . . . CICS 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 Service Report
-----Class-----
_____ 1 SI CICP* _____ RCCICSA
_____ 1 SI CICT* _____ RCCICSP
_____ 1 SI CICD* _____ RCCICST
_____ 1 SI CICSDEV _____ RCCICSD
***** BOTTOM OF DATA *****

Subsystem Type Name Start Service Report
-----Class-----
_____ 1 SI CICP* _____ CICSDEF RCCICSA
_____ 1 SI CICT* _____ CICSPROD RCCICSP
_____ 1 SI CICD* _____ CICSDEV RCCICST
_____ 1 SI CICSDEV _____ CICSDEV RCCICSD
***** BOTTOM OF DATA *****
```

When not managing towards transaction goals

When managing towards transaction goals

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Enclave transaction report class setup DDF, CB (WAS),

- The world is your oyster!
 - Have fun!
- DDF – Distributed Data Facility transactions
 - Report classes are extremely useful to gain insights into transaction response time and resource consumption
 - A good DDF report class structure may help to avoid the need for some SMF 101 processing
- CB – WebSphere Application Server transactions
 - Report classes are extremely useful to gain insights into transaction response time and resource consumption
 - A good CB report class structure may help to avoid the need for some SMF 120.9 processing

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Enclave transaction report class setup TCP, NETV, IWEB

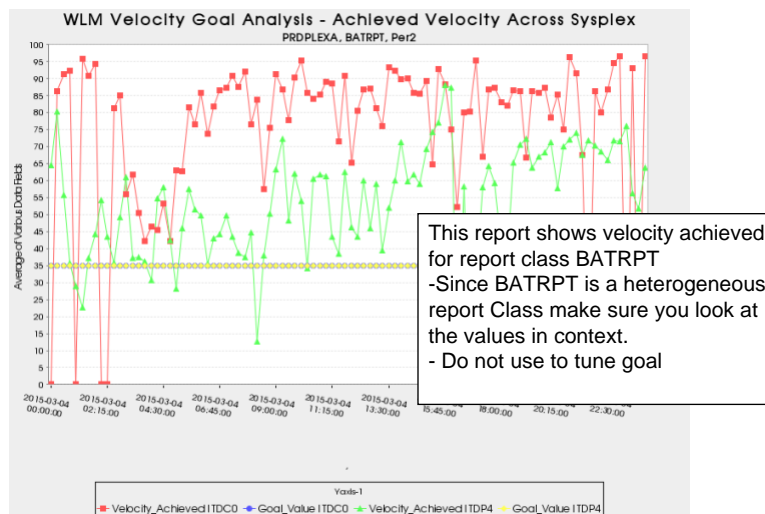
- TCP and NETV
 - NETV
 - Includes all NetView network management subtasks and system automation subtasks created by Tivoli NetView for z/OS
 - TCP
 - Enclave work requests processed by the z/OS Communication Server
 - Neither is worthy of their own service class, so classify this work to a service class such as STCHI
 - One of the few cases when it is OK to mix enclave and address spaces into the same service class
 - However, still put each into their own report class to gain insights into their resource consumption
- IWEB
 - Most installations do not enable IWEB classification rules
 - Instead they disable enclaves in the http.conf file
 - If enclave transactions are enabled, then put this work into its own service class and report classes

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Using Report Classes

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Example of Velocity Goals - BATRPT is a Heterogeneous report class



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SMF 30 Measurements to Correlate to SMF 72.3

- Can also use SMF 30 WLM information to correlate measurements to the SMF 72.3 records
 - Use Service Class name and Report Class name to correlate measurements to the SMF 72.3 records

Name	Description
SMF30TRS	Number of system resources manager (SRM) transactions.
SMF30WLM	Workload name.
SMF30SCN	Service class name.
SMF30GRN	Resource group name.
SMF30RCN	Report class name.
SMF30ETC	Independent enclave transaction count.

Name	Description
SMF30JBN	Job or session name.
SMF30PGM	Program name (taken from PGM= parameter on EXEC card).
SMF30STM	Step name (taken from name on EXEC card).
SMF30UIF	User-defined identification field
SMF30JNM	JES job identifier.
SMF30STN	Step number (first step = 1, etc.).
SMF30CLS	Job class (blank for TSO/E session or started tasks)
SMF30SSN	Substep number. This field is set to zero for non-z/OS UNIX System Services steps. When the z/OS UNIX System Services exec function is requested, a new substep is begun and this value is incremented.
SMF30EXN	Program name. For a z/OS UNIX program, this contains the UNIX program that was run or the 8 character name of an MVS program that was run.
SMF30ASI	Address Space identifier

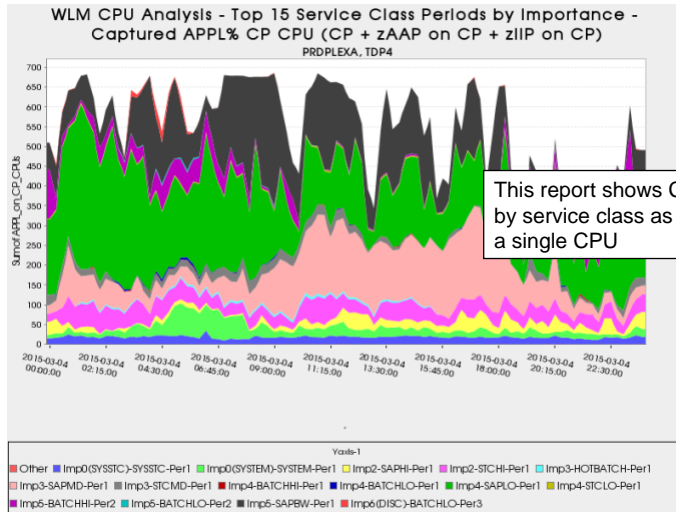
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Create a SMF30.2 to WLM Mapping

Row	Job Name	AS Type	SC Name	RC Name	SYS1	SYS2
1	1 ANCLARK	SYS	TSO	TSO	0.35	
2	2 ANTAS000	SYS	STCMD	(Top 10...)	0.01	0.02
3	3 ANTMALN	SYS	SYSTEM	ASYNC	0.46	2.67
4	4 APP1PDBA	SYS	STCLO	BATRPT	91.44	
5	5 APP2PDBA	SYS	STCLO	CPSM	88.09	
6	6 APP3PDBA	SYS	STCLO	DCSDB2	21.51	
7	7 APPC	SYS	STCHI	DPAPP1	1.58	2.42
8	8 ASCH	SYS	STCHI	DPAPP2	0.36	0.46
9	9 AXR	SYS	STCLO	DPAPP3	0.01	0
10	10 BKP0001D	SYS	BATCHLO	EDI	4.89	
11	11 BKP0002D	SYS	BATCHLO	FOR	4.58	
12	12 BKP0003D	SYS	BATCHLO	MONITORS	5.16	
13	13 BKP0004D	SYS	BATCHLO	MQRPT	4.66	
14	14 BKP0005D	SYS	BATCHLO	NEONRPTO	75.27	
15	15 BKP0007D	SYS	BATCHLO	NEONRPTW	6.04	
16	16 BMATHE1	SYS	TSOPRD	NEONRPTX	0.21	
17	17 BMATHEH	SYS	BATCHLO	NEONRPTY	0	
18	18 BMATHEW	SYS	TSOPRD	TSORPT	1.4	
19	19 BPXOINIT	SYS	SYSTEM	ZOSRPT	4.21	1.45
20	20 CANSCN	SYS	STCLO	ZOSRPT	0.01	0.02
21	21 CANSO2	SYS	STCLO	ZOSRPT		0.01
22	22 CANSO5	SYS	STCLO	ZOSRPT		9.36
23	23 CANSO2	SYS	STCLO	ZOSRPT		826.57
24	24 CATALOG	SYS	SYSTEM	ZOSRPT	161.19	1013.23
25	25 CEA	SYS	SYSTEM	ZOSRPT	0.01	0.02
26	26 CFZCIM	SYS	STCLO	ZOSRPT		1.01
27	27 CICKMA1	SYS	SYSSTC	CPSM	135.75	

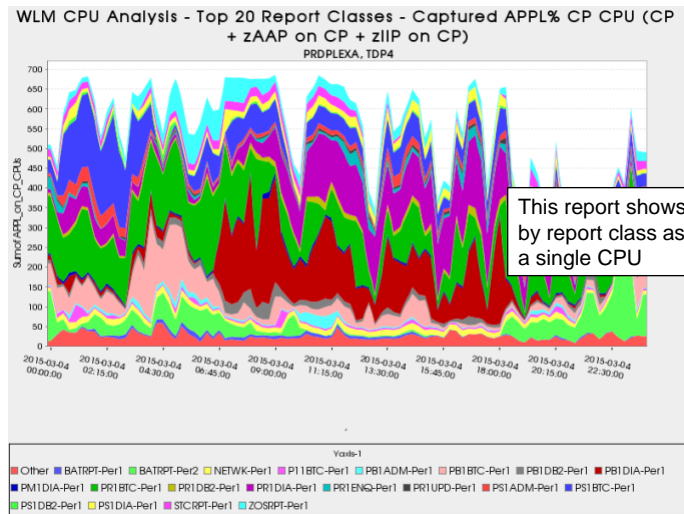
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Look at CPU consumption by service class



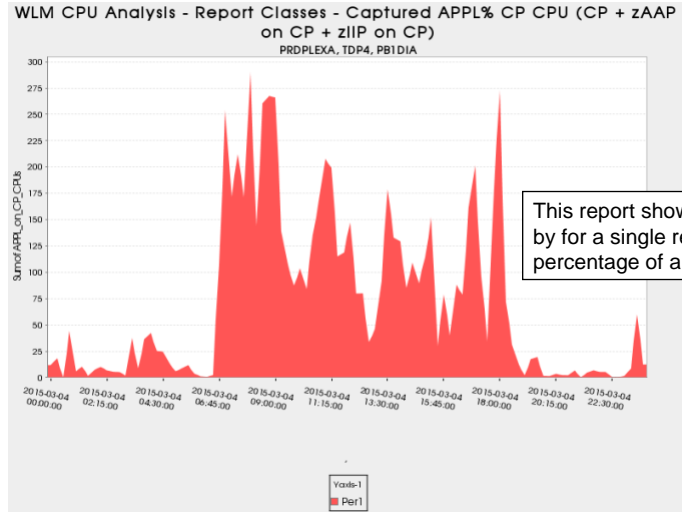
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CPU consumption by top report classes



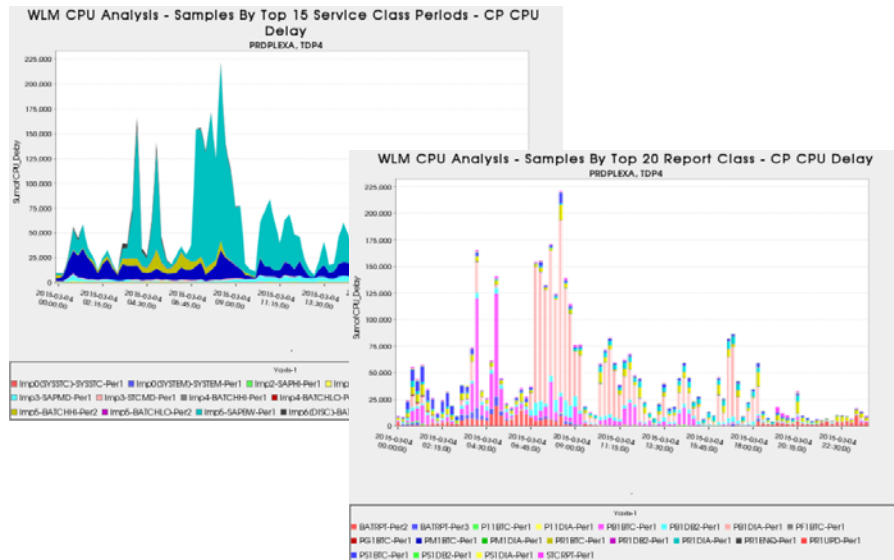
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CPU Consumption for selected report class



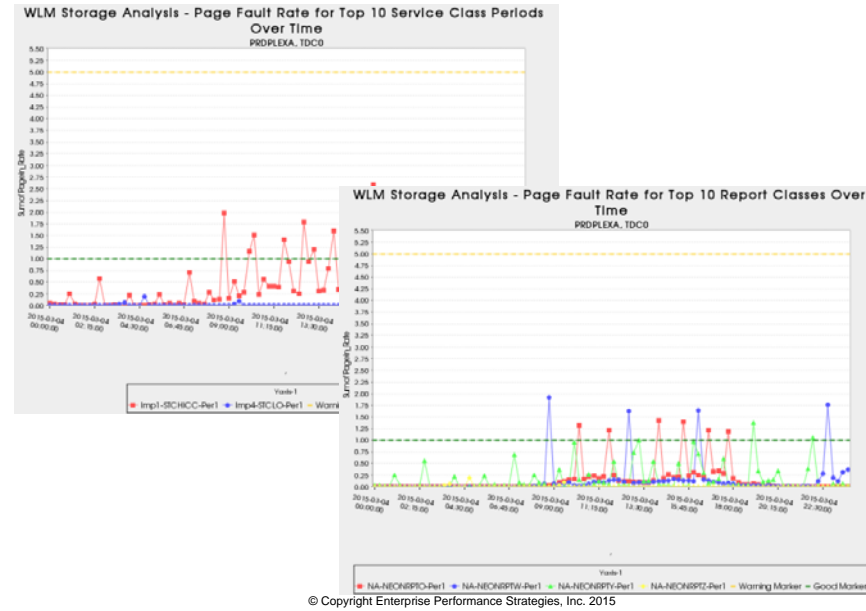
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Example of CPU Delay Samples - By Top Service Classes and Top Report Classes



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Example of Page Fault Rate - By Top Service Classes and Top Report Classes



Example of Storage Megabytes - By Top Service Classes and Top Report Classes

