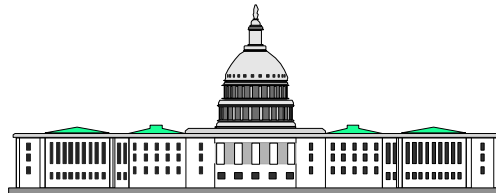


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# Understanding WLM RMF Reports

**WSC Performance Team  
IBM  
Washington Systems Center  
Advanced Technical Support**

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IBM Washington Systems Center

# Overview

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- RMF / SMF Data
- Generating RMF Reports
- Understanding RMF Data

# SMF Records

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- RMF generates SMF records 70:79
- Workload Activity Reports are contained in the SMF 72 records
  - New subtypes are created for Goal Mode
    - 72(3) - written for each service class and report class in the active policy
    - 72(4) - written by RMF Mon III for each service class period in the active policy
  - If you switch between goal and compat modes the 72 subtypes generated will change

# RMF Report Creation

- Can be created from either the in-storage RMF data, or from offloaded SMF data
- Reports are Sysplex in scope, though individual systems can be reviewed via SYSID parameter
- Syntax:
  - SYSRPTS(WLMGL(options))
    - ▶ POLICY - for each policy generate a **summary** report
    - ▶ WGROU - for each workload generate a **summary** report
    - ▶ WGP - for each workload, generate a **detail** report for service classes and periods
    - ▶ SC - for each service class, generate a **detail** report for each service class period
    - ▶ SCLASS - for each service class generate a **summary** report
    - ▶ RCLASS - for each report class generate a **detail** report

# Service Policy Page

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- Created automatically for each interval at end of the report
  - Installed date
  - Service Definition Coefficients
  - SYSID and SU/SEC of each system
  - Resource Group Definitions and Actuals
- Required to normalize the APPL% if a sysplex view is given

# WLMGL(POLICY)

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- Used to create a summary report for each **policy**
  - The report will have the same service classes, but will differ based on policy overrides, such as goal definitions and classification rules
- Can print specific policies via WLMGL(POLICY(PROD))

# WLMGL(WGROUP)

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- Shows workload activity by workload
  - All service classes defined to the workload are summarized
- Useful to get the total CPU used by workloads, needed for the capture ratio calculation
  - Remember to qualify by SYSID

## (SCPER) vs (SCLASS)

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- Reports most like the compat mode workload activity report
  - 70% of the information on the two reports are the same
- SCLASS:
  - Shows the server topology under a section called SERVICE CLASSES BEING SERVED when an address space is doing work or processing transactions which were classified to another service class
- SCPER:
  - Shows the response time distribution
  - Shows the goal vs actual information including:
    - ▶ PI
    - ▶ USING%
    - ▶ Execution Delay %
    - ▶ DLY %
    - ▶ Velocity Migration Information (I/O and WLM Inits)

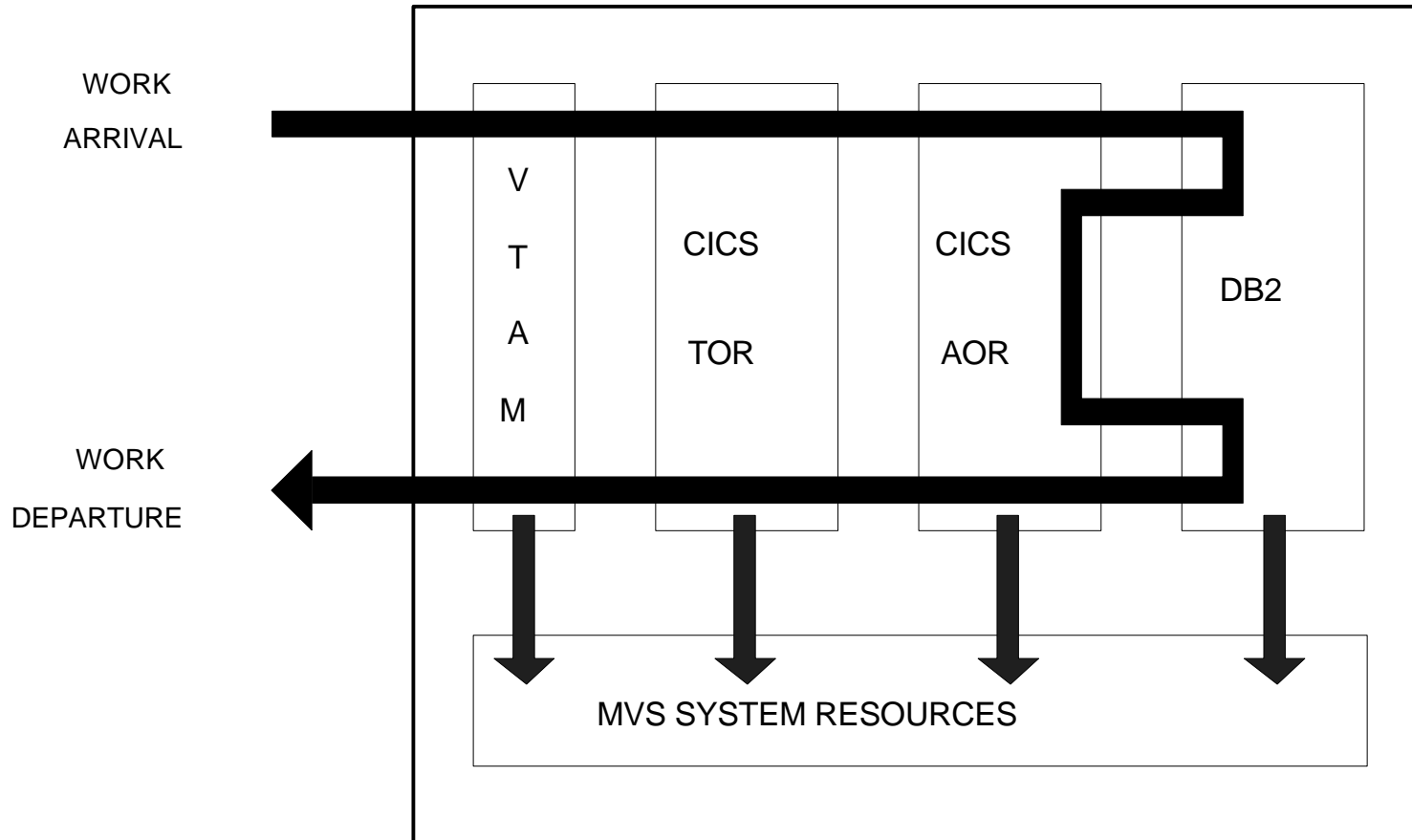


# WLMGL(RCLASS)

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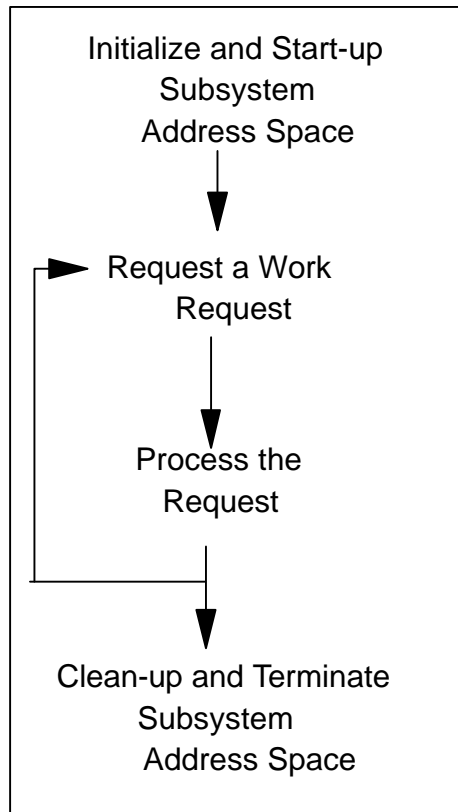
- Used to generate report classes
- Almost exactly like service class reports except does not report on workloads
  - Service classes from different workloads can be classified into a single report class so workload, and PI information would not be valid

# Cross-Subsystem Management



# Work Manager Services Example

## *Single Address Space Transaction Manager*



*CONNECT to WLM*  
*CREATE performance block*

*CLASSIFY arriving work request*  
*INITIALIZE performance block*

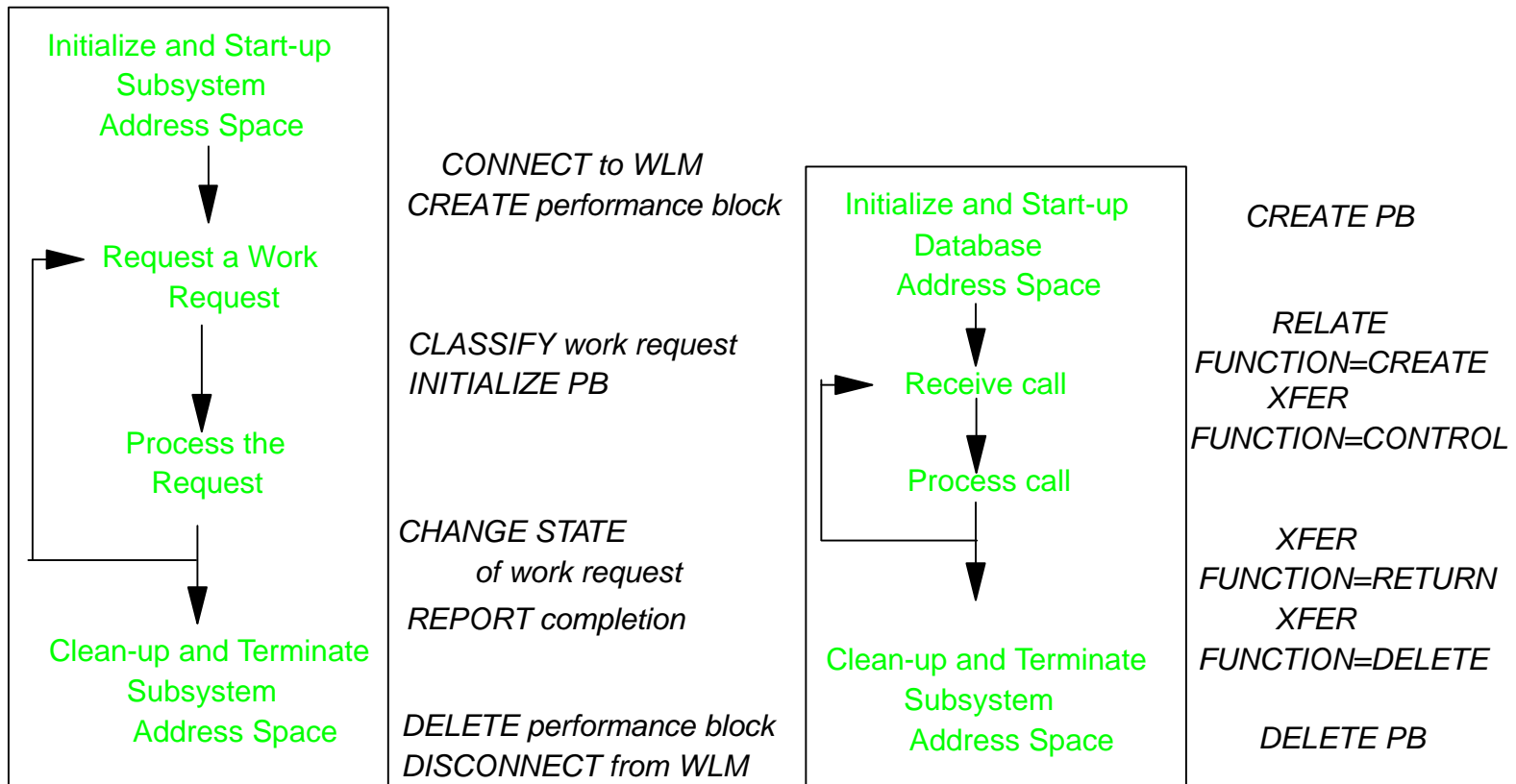
*CHANGE STATE of work request*

*REPORT completion*

*DELETE performance block*  
*DISCONNECT from WLM*

# Work Manager Services Example

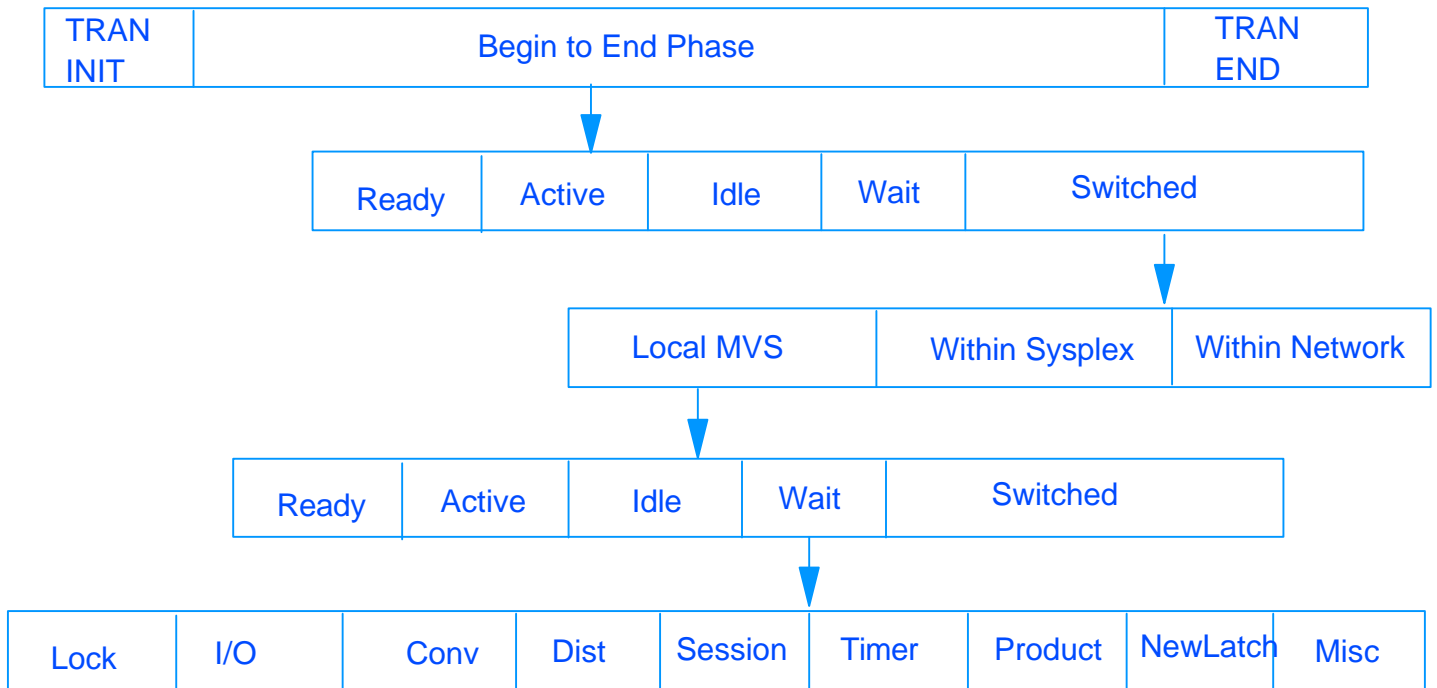
Single Address Space Transaction Manager  
 Transaction Manager TCB calls Database Manager



# Transaction Reporting

B  
T  
E

E  
X  
E



# Transactions

NAME	SOURCE	Address Space	TSO	Work Manager Transactions	Unix Services
AVG	<u>Tran Active Time</u> RMF Interval	Count of ended ASID	Trans completing	N/A	Trans completing
MPL	<u>Tran Resident Time</u> RMF Interval	Avg # of ASIDs in Proc Storage	Avg # of ASIDs in Proc Storage	N/A	Avg # of ASIDs in Proc Storage
ENDED	R723CRPC	# of completions	# of Tran completions	# of Tran completions	# of Tran completions
ENDED / SEC	<u>ENDED</u> RMF Interval	<u>ENDED</u> RMF Interval	<u>ENDED</u> RMF Interval	<u>ENDED</u> RMF Interval	<u>ENDED</u> RMF Interval
# SWAPS	R723CSWC	# of swaps	# of swaps	N/A	
EXECUTD	R723CNCP	N/A	N/A	Trans completing EXE phase in interval *	N/A

**Address Space - Generally Batch and STCs**

**Work managers - Generally CICS and IMS transactions**

**\* - A single transaction can have 0 or more EXE phases**

# Trans Time

NAME	SOURCE	Address Space	TSO	Work Manager Transactions	Unix Services
ACTUAL	<u>Tran Elapsed Time</u> RMF Interval	AVG Elapsed time of trans ended in the interval	AVG Elapsed time of trans ended in interval	AVG Elapsed time of trans ended in interval	AVG Elapsed time of trans ended in interval
EXECUTION	<u>Tran Execution Time</u> Tran End Count	AVG time spent in execution	AVG tran time spent in execution		AVG tran time spent in execution
	<u>EXE Phase Time</u> EXE Phase Count			AVG tran time spent in EXE phase	
QUEUED (Pre 2.4)	<u>Elap Time - Exec Time</u> Tran Ended Count	AVG time trans are queued Changes in V2.4	N/A	AVG time trans are queued *	
QUEUED V2.4	WLM Calculates	Avg time tran is queued waiting for an init	N/A	Always 0	Avg time tran is queued waiting for an init

**Address Space - Generally Batch and STCs**

**Work managers - Generally CICS and IMS transactions**

**\* - BTE only transactions are included in elapsed time but not in Execution time**

# Response Time Breakdown In Percentage

- Only Created for Transaction Service Classes

Name	Description
Subtype	CICS or IMS
P	Phase. BTE - Begin to End EXE - Execution
TOTAL	Total percent of samples represented by the line
ACTIVE	Percent of the transaction elapsed time a program is executing from the perspective of the work manager. This DOES NOT mean the program is active from an MVS perspective
READY	Percent of elapsed time a program was ready to execute on behalf of a transaction but the work manager gave priority to another transaction.
IDLE	Percent of the transaction elapsed time no work requests were ready to run.
WAITING FOR	The 10 highest non-zero values. The remaining, less important, values are accumulated and presented in OTHR.



# Subsystem Response Percentages

- Work Managers post states in performance blocks, (PB)
- WLM samples the PB and records states for all transactions in the BTE or EXE phases
  - Active, Ready, Idle
- RMF **calculates** the divisor necessary to produce the response percentages based on the elapsed times of **ended** transactions

**Total Number of Samples =**  
**Elapsed time (R723CTET) x # of samples per second**

ACTIVE = Active Sample Count / Total Number of Samples

READY = Ready Sample Count / Total Number of Samples

IDLE = Idle Sample Count / Total Number of Samples

# Response Time Reporting Issues

- Samples of transactions states are taken dynamically and count is recorded at the end of the interval
- Elapsed time is based only on ENDED transactions. Calculations are valid only when:
  - All trans begin and end in the interval (Samples and elapsed times are equal)
  - Sufficient transactions exist so the differences between samples and lost, corresponding ended transactions is a small percentage
- Concerns:
  - Long running trans which span the RMF interval will have samples included but not their elapsed time. May see percentages > 100%
  - In subsequent interval, few samples will be included, but all of the elapsed time. May see percentages <100%.
  - Never ending trans will have their samples included but never their elapsed time

# Waiting For Resources

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- Work Managers determines which states they report
- RMF reports the following:
  - LOCK, CONV, DIST, LOCL, SYSP, REMT, TIME, LTCH, PROD, MISC
  - CONV - For CICS, shows tran was sent from TOR to AOR, or to IMS
- CICS shows BTE and EXE phases depending upon topology
  - If tran executes only in TOR then only BTE is reported
  - If single region, then only BTE is reported
- IMS/MPR reports only EXE times, but their response times are more like BTE times. This is because IMS/CR does not have a PB and hence no BTE Phase.

# Address Space Reporting

## ■ Not Created for Transaction Service Classes

Name	Description
AVG ADRSP	Number of address spaces and enclaves, (DU), contributing to samples shown in the address space execution delay. Can be larger than AVG MPL due to IDLE spaces.
USING CPU%	Percent of samples taken when some DU was using the CPU. An address space can have more than 1 DU. State samples are accumulated for each DU.
USING I/O%	Percent of state samples taken when some DU was using the non-paging DASD. Only connect, and disconnect using time is included.
Execution Delays %	Each DU sampled can increase one of the CPU or paging delay samples. Only the 9 highest delays will be shown. The TOTAL value is total delay used by SRM in its velocity calculation.
DLY%	These states are not included in Total Execution Delays UNKN - State is unknown, not using or delayed for any sampled resource IDLE - Idle state, Work is in STIMER wait, TSO terminal wait, APPC wait, OMVS input or output wait, or an initiator is waiting for work.
%QUIE	Work in the service class period has been RESET with the QUIESCE keyword.