

Gathering Workload and Transaction Performance Data Using WLM Service and Report Classes

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Agenda

Plan for performance data collection

Frequency performance data reported

Systems Management Facility (SMF) parameters

Resource Measurement Facility (RMF) parameters

Identify workload information required

Workload categories

WLM service and report classes

RMF Workload Activity Reports

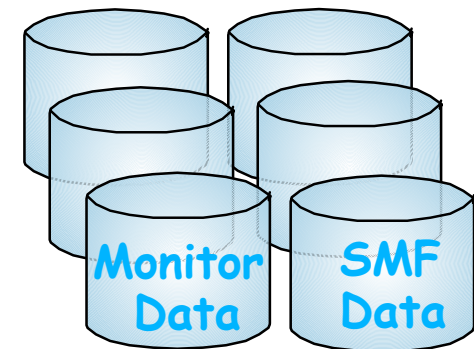
Workload Activity Reports



Why Plan?

From my experiences ...

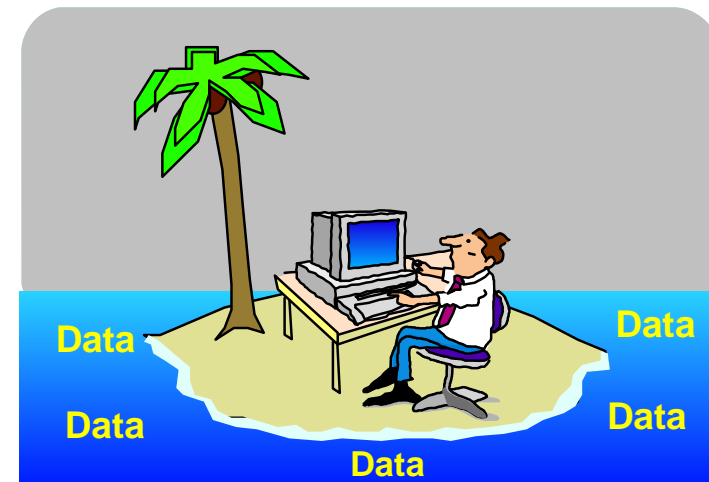
- ▶ **No planning often results in no data**
- ▶ **Collecting more performance data does not guarantee one will have all data required; it only guarantees the use of DASD space**
- ▶ **Data not collected will be the data most needed**



Planning

Performance data reports ...

- ▶ **Determine performance data needed for workloads**
CPU utilization, I/O activity, storage usage
- ▶ **Identify the source of the performance data**
SMF data from RMF, CICS, DB2, WebSphere
Performance monitor data
- ▶ **Establish the reporting interval**
Every 15, 30, or 60 minutes
Each shift, day, week, month



Workload Information



Our focus is RMF Workload Information ...

- ▶ **Workload information reported on the RMF Workload Activity report**
- ▶ **Source of information is RMF data
workload data is reported in SMF Type 72.3 record**
- ▶ **Information may be reported by Workload Manager (WLM) policy, workload group, service class, and report class**
- ▶ **Interval value is the minimum report time period**

More about intervals...

SMF Interval Recording

SMF writes records at a specific time interval

Interval records written each recording interval

SMF record types 30 (job), 32 (TSO)

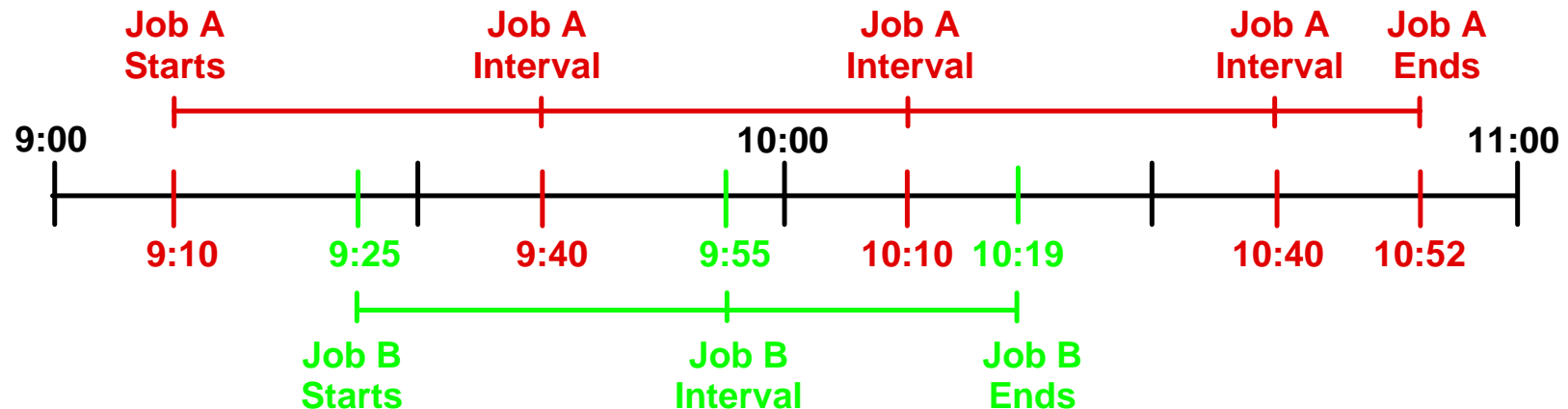
Interval starts when unit of work starts

Minimize loss of data for long running jobs

Interval parameter to enable and provide length

SYS(INTERVAL(hhmmss))

SUBSYS(INTERVAL(hhmmss))



Synchronizing Data

Synchronize the reporting interval within an hour
SYNC mm where mm is 0 to 59

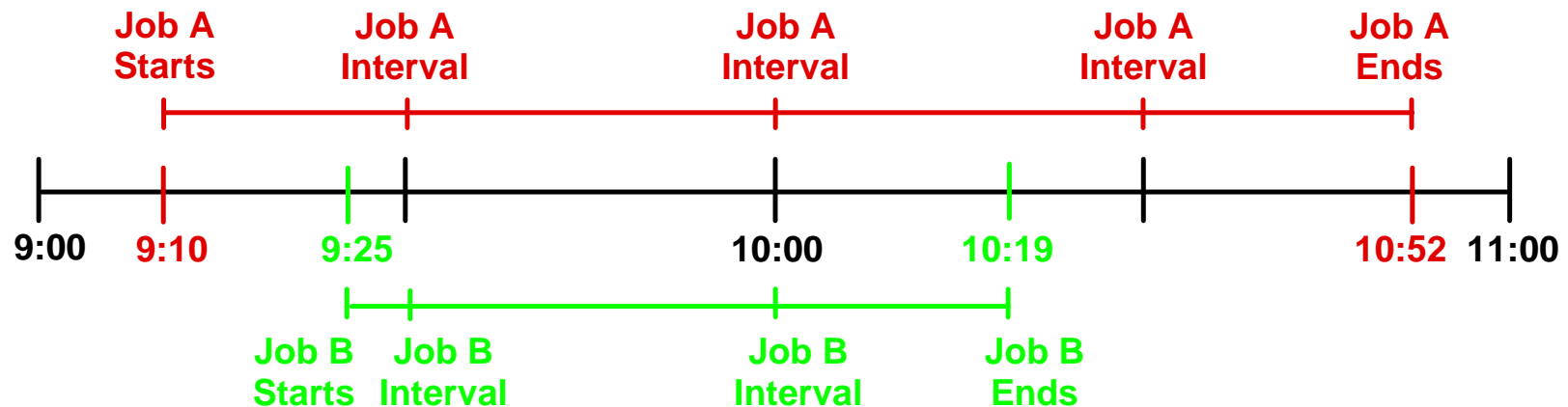
Reasons to synchronize measurement data

Report data by time interval, e.g. by hour

Combine measurement data from different sources

Compare data for same time window across systems

Need same SYNC value on all systems for sysplex data



Global Recording Interval

- ▶ **SMF recording interval available to programs**
- ▶ **Interval length is from 1 to 60 minutes**
 - Default is 30**
 - Specified with INTVAL(mm) SMF parameter**
- ▶ **Synchronized with TOD clock**
 - Value specified in minutes past the hour**
 - Default is 00**
 - Specified with SYNCVAL(mm) SMF parameter**
- ▶ **Tell SMF and RMF to use global recording interval**
 - SMF: SYS(INTERVAL(SMF,SYNC))**
 - SUBSYS(INTERVAL(SMF,SYNC))**
 - RMF: SYNC(SMF) in RMF monitor I parameters**

SMF & RMF Intervals

- ▶ **RMF writes SMF records at the end of each interval**
 - Interval is the minimum duration for a report
 - Shorter intervals provide more granular data
- ▶ **Interval selection**
 - Value to provide desired data granularity
 - Large value provides less granularity
 - Small value produces more data
- ▶ **Intervals can be combined for reports with longer duration**
- ▶ **Systems in a sysplex may have different interval values**
 - Sysplex reports have same time interval for all systems

Collecting SMF & RMF Data

RMF parameters to collect workload information

```
/* **** */
/*  ERBRMFxx                               */
/* **** */
WKLD           /* WORKLOAD MANAGER DATA - default */
NOSTOP        /* ACTIVE UNTIL OPERATOR ISSUES STOP */
RECORD        /* WRITE SMF RECORDS EVERY INTERVAL */
SYNC(SMF)     /* USE INTVAL/SYNCVAL FROM SMFPRMXX */
/* **** */
```

SMF parameters to write RMF 70-78 records

```
/* **** */
/*  SMFPRMxx                               */
/* **** */
INTVAL(05)     /* SMF GLOBAL RECORDING INTERVAL */
SYNCVAL(00)    /* GLOBAL SYNC VALUE */
SYS(TYPE(0,30,70:78,82,88:90,100:120),INTERVAL(SMF,SYNC))
/* Write records, interval recording use global interval */
/* **** */
```

Workloads

Work and Workloads ...

- ▶ **Work is a demand for service**
 - ▶ System, Started tasks
 - ▶ TSO
 - ▶ Batch
 - ▶ UNIX System Services work
 - ▶ CICS & IMS transactions
 - ▶ WebSphere AppServers
 - ▶ Data Base queries
- ▶ **A workload is a group of work**
 - ▶ Types of work are assigned to workloads
 - ▶ Workload categories determined by installation
- ▶ **Within a workload, work with similar performance characteristics and business importance is grouped into service classes**

Workload Data

Gathering performance data on workloads...

- ▶ **Determine what work is running on the system**
- ▶ **Determine performance data needed for each type of work, such as subsystem, application, transaction**
- ▶ **Identify work with additional reporting requirements**
 - ▶ **CICS, IMS transactions**
 - ▶ **DDF work**
 - ▶ **WebSphere Application Server enclave work**
- ▶ **Define the work to WLM to get desired granularity of performance data for each workload**
 - ▶ **Service classes**
 - ▶ **Report classes**

WLM Constructs

- ▶ **Policy**
 - Named set of performance goals
 - One WLM policy is active in a sysplex
- ▶ **Workloads**
- ▶ **Service Classes**
 - Group of work managed to a performance goal
 - Performance information collected by service class
- ▶ **Report Classes**
 - Group work for reporting purposes
 - Report performance data for specific address spaces
- ▶ **Classification Rules**
 - Assign incoming work to a service class
 - May optionally assign work to a report class
 - How work enters system determines classification rule used

Define Workloads in WLM Policy



Update WLM policy to gather workload data ...

- ▶ **Service Classes**
 - Add any new service classes
- ▶ **Classification Rules**
 - Use classification rules to assign work to desired Service class
 - Report class
- ▶ **Report Classes**
 - Define any new report classes

WLM Service Class



Functionality LEVEL008

Definition Menu

WLM Appl LEVEL023

Command ==> _____

Definition data set . . : none

Definition name WLM (Required)

Description WSC WPLEX Service Definition

Select one of the

following options. 4



1. Policies
2. Workloads
3. Resource Groups
4. Service Classes
5. Classification Groups
6. Classification Rules
7. Report Classes
8. Service Coefficients/Options
9. Application Environments
10. Scheduling Environments

Define WLM Service Class



Service Class Selection List

Row 1 to 14

Command ==>

Action Codes: 1=Create, 2=Copy, 3=Modify, 4=Browse, 5=Print, 6=Delete,

Action	Class	Description	Workload
___	CBDEF	WebSphere AppServer Tran Def.	WAS_WKL
___	CICSPROD	CICS Production Regions	CICS_WKL
___	CICSTEST	CICS Test Regions	CICS_WKL
___	CICSTRAN	CICS Transactions	CICS_WKL
___	DB2DIST	DB2 DDF Work	DB_WKL
___	DB2PROD	DB2 Production	DB_WKL
___	DDFDEF	DB2 DDF Default	DB_WKL
___	DDFPROD	DB2 DDF Production	DB_WKL
___	DDFTEST	DB2 DDF Test	DB_WKL
___	STCDEF	STC Default Class	STC_WKL
___	WASPROD	WebSphere AppServer Production	WAS_WKL
___	WASTRAN	WebSphere AppServer Enclave	WAS_WKL
___	WAS7CR	WebSphere AppServer CR	WAS_WKL
___	WAS7SR	WebSphere AppServer Servant	WAS_WKL

WLM Classification

How work enters the system ...

<u>Type</u>	<u>Description</u>
CB	WebSphere AppServer Enclave Work (Component Broker)
CICS	CICS Transactions
DB2	DB2 Distributed Query Requests
DDF	DB2 Distributed Data Facility Work
IMS	IMS Transactions
JES	JES - Batch Jobs
OMVS	UNIX System Services Work
STC	Started Tasks
TCP	TCP/IP Requests
TSO	TSO Session Work

WLM Workload Classification



Functionality LEVEL008

Definition Menu

WLM Appl LEVEL023


Command ==> _____

Definition data set . . : none

Definition name WLM (Required)

Description WSC WPLEX Service Definition

Select one of the
following options. 6

- 1. Policies
- 2. Workloads
- 3. Resource Groups
- 4. Service Classes
- 5. Classification Groups
-  6. Classification Rules
- 7. Report Classes
- 8. Service Coefficients/Options
- 9. Application Environments
- 10. Scheduling Environments

WLM Classification Rules



Subsystem Type Selection List for Rules

Row 1 to 13

Command ==>

Action Codes: 1=Create, 2=Copy, 3=Modify, 4=Browse, 5=Print, 6=Delete,

Action	Type	Description	----- Class ----- Service	Report
___	ASCH	APPC scheduled trans programs	_____	_____
___	CB	Component Broker requests	_____	_____
___	CICS	CICS Transactions	_____	_____
___	DB2	DB2 Parallel Query transactions	_____	_____
___	DDF	Distributed DDF work	_____	_____
___	IMS	IMS transaction level rules	_____	_____
___	IWEB	Scalable WebServer Transactions	_____	_____
___	JES	JES classification rules	_____	_____
___	OMVS	Unix System Services requests	_____	_____
___	SAP	SAP R/3 application	_____	_____
___	STC	Started Tasks classifications	_____	_____
___	TCP	TCP Work	_____	_____
___	TSO	TSO classification rules	_____	_____

Example - Default Service Class

Specify default service class - all UNIX work has service class

```
Subsystem Type . . : OMVS
Description . . . Unix System Services requests
```

Action	-----Qualifier-----			Start
	Type	Name		
_____	1	UI	OMVSKERN	_____
_____	1	UI	ASTLEY*	_____
_____	1	UI	IRWW*	_____
_____	1	UI	SYSADMN*	_____
_____	1	UI	FTP*	_____

-----Class-----	
Service	Report
DEFAULTS: UNIX	_____
OMVS	_____
UNIXADMN	_____
UNIXIRWW	_____
UNIXADMN	_____
OMVS	_____

Default Service Class of UNIX

Example - CICS Workloads



CICS regions as started tasks are classified using STC rules

```
Subsystem Type . : STC
-----Qualifier-----
Action      Type      Name      Start
-----
_____ 1   TN      CICS1    _____
_____ 1   TN      CICS2    _____
_____ 1   TN      CICST*   _____

                                DEFAULTS:
                                Service      Report
                                _____
                                CICSPROD   RCICS1
                                CICSPROD   RCICS2
                                CICSTEST   _____
```

CICS transactions may be classified as CICS work

```
Subsystem Type . : CICS
-----Qualifier-----
Action      Type      Name      Start
-----
_____ 1   TN      ACTR     _____
_____ 1   TN      ACTU     _____
_____ 1   TN      BBO*    _____
_____ 1   TN      CPIH     _____

                                DEFAULTS:
                                Service      Report
                                _____
                                CICSTRAN   RCICSDEF
                                CICSTRAN   RACTR
                                CICSTRAN   RACTU
                                CICSTRAN   RBBO
                                CICSTRAN   RCPIH
```

Example - DB2 Workloads

DB2 address spaces are classified using STC rules

Subsystem Type . : STC

Action	Type	Name	Start	Service	Report
_____	1	TN	DSN%DBM1	DB2PROD	RDB2DBM1
_____	1	TN	DSN%MSTR	DB2PROD	RDB2MSTR
_____	1	TN	DSN%DIST	DB2DIST	RDB2DIST
_____	1	TN	DSN%IRLM	SYSSTC	RDB2IRLM
_____	1	TN	DSN%SPAS	DB2PROD	RDB2SPAS

-----Qualifier-----

-----Class-----

DEFAULTS: STCDEF

Distributed data facility work is classified with the DDF rules

Subsystem Type . : DDF

Action	Type	Name	Start	Service	Report
_____	1	UI	DDFUSER	DDFPROD	RDDFUSR
_____	1	UI	WASADM*	DDFPROD	RWASDDF
_____	1	UI	ASTLEY*	DDFTEST	_____

-----Qualifier-----

-----Class-----

DEFAULTS: DDFDEF

Example-WebSphere AS



WebSphere AS started tasks are classified using STC rules

Subsystem Type . : STC

Action	-----Qualifier-----			-----Class-----	
	Type	Name	Start	Service	Report
				DEFAULTS: STCDEF	
_____ 1	TN	%%DEMN	_____	WASPROD	RWASDMN
_____ 1	TN	%%DMG*	_____	WASPROD	RWASDMGR
_____ 1	TN	%%AGNT*	_____	WASPROD	RWASNAGT
_____ 1	TN	%%SR%%%	_____	WAS7CR	_____
_____ 1	TN	%%SR%%%S	_____	WAS7SR	_____

WebSphere AS enclave work classified using CB rules

Subsystem Type . : CB

Action	-----Qualifier-----			-----Class-----	
	Type	Name	Start	Service	Report
				DEFAULTS: CBDEF	
_____ 1	CN	%%SR*	_____	WASTRAN	_____
_____ 1	CN	%%DM*	_____	WASPROD	RWASDMGR

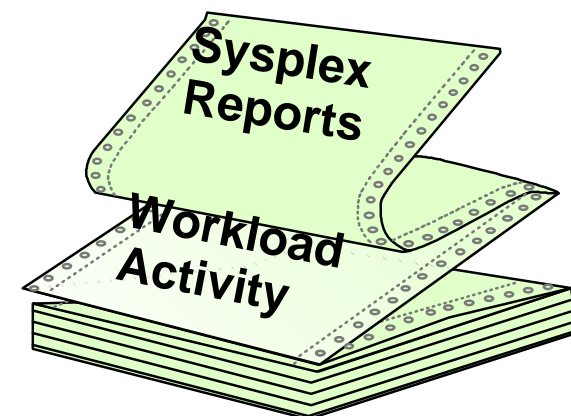
RMF Workload Activity Report

- ▶ Performance and resource usage information provided for workloads
- ▶ Sysplex report - one report for all systems in the sysplex
- ▶ Workload information may be reported by
 - ◆ WLM policy
 - ◆ WLM workload
 - ◆ WLM service class
 - ◆ WLM report class
- ▶ RMF post processor program will produce report

```
//RMFPP EXEC PGM=ERBRMFPP,REGION=0M
//MFPINPUT DD DISP=SHR,DSN=RMFDATA.SYSPLEX
//MFPMSGDS DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  SYSRPTS(WLMGL) /* Workload Activity */
/*
```

Getting a Workload Report

- ▶ Run the RMF post processor program
- ▶ Specify **SYSRPTS(WLMGL)** control statement
 - SYSRPTS** - sysplex report
 - WLMGL** - option for Workload Activity report
- ▶ Consider suboptions to tailor the report
 - POLICY** - Summary of all workloads in service policy
 - WGROU**P - Summary of all service classes in workload group
 - WGPER** - Service classes reported by workload group with one line for each service class period
 - SCLASS** - Summary of all service class periods in service class
 - SCPER** - Service class periods reported for service class
 - RCLASS** - Report classes are reported
 - RCPER** - Report class periods reported





Workload Report - CICSPROD



WORKLOAD ACTIVITY

PAGE 5

z/OS V1R10 SYSPLEX WPLEX START 07/13/2009-18.20.00 INTERVAL 000.29.59 MODE = GOAL
 RPT VERSION V1R10 RMF END 07/13/2009-18.50.00

REPORT BY: POLICY=WLMPOL WORKLOAD=STC_WKL SERVICE CLASS=CICSPROD RESOURCE GROUP=*NONE PERIOD=1 IMPORTANCE=1
 CRITICAL =NONE

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT	--DASD I/O--	---SERVICE---	SERVICE TIME	---APPL %---	--PROMOTED--	----STORAGE----	
AVG	1.00	ACTUAL	0	SSCHRT 16.5	IOC 2968	CPU 492.601	CP 29.21	BLK 0.000	AVG 24010.80
MPL	1.00	EXECUTION	0	RESP 0.5	CPU 20525K	SRB 33.144	AAPCP 0.00	ENQ 0.000	TOTAL 24010.79
ENDED	0	QUEUED	0	CONN 0.2	MSO 1083M	RCT 0.000	IIPCP 0.00	CRM 0.000	SHARED 0.00
END/S	0.00	R/S AFFIN	0	DISC 0.1	SRB 1381K	IIT 0.101			
#SWAPS	0	INELIGIBLE	0	Q+PEND 0.1	TOT 1104M	HST 0.000	AAP N/A		-PAGE-IN RATES-
EXCTD	0	CONVERSION	0	IOSQ 0.0	/SEC 613611	AAP N/A	IIP N/A		SINGLE 0.0
AVG ENC	0.00	STD DEV	0			IIP N/A			BLOCK 0.0
REM ENC	0.00				ABSRPTN 614K				SHARED 0.0
MS ENC	0.00				TRX SERV 614K				HSP 0.0

GOAL: EXECUTION VELOCITY 60.0% VELOCITY MIGRATION: I/O MGMT 58.1% INIT MGMT 57.2%

SYSTEM	RESPONSE TIME	EX	PERF	AVG	--EXEC USING%--	-----	EXEC DELAYS %	-----	-USING%-	--- DELAY % ---	%							
	VEL%	INDX	ADRSP	CPU	AAP	IIP	I/O	TOT CPU I/O	CRY CNT	UNK	IDL	CRY CNT	QUI					
SYSA	--N/A--	57.2	1.0	0.5	27	N/A	N/A	1.2	20	20	0.2	0.0	0.0	0.0	51	0.0	0.0	0.0

Workload - CICS Trans Reporting



WORKLOAD ACTIVITY

PAGE 18

z/OS V1R10 SYSPLEX WPLEX START 07/13/2009-18.20.00 INTERVAL 000.29.59 MODE = GOAL
 RPT VERSION V1R10 RMF END 07/13/2009-18.50.00

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RACTR
DESCRIPTION =CICS WS Read Trans

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 10
MPL	0.00	EXECUTION 0
ENDED	302399	QUEUED 0
END/S	168.00	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 16
REM ENC	0.00	
MS ENC	0.00	

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RACTU
DESCRIPTION =CICS WS Update Trans

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 12
MPL	0.00	EXECUTION 0
ENDED	37690	QUEUED 0
END/S	20.94	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 16
REM ENC	0.00	
MS ENC	0.00	

Workload Report - SYSSTC/DB2



WORKLOAD ACTIVITY

PAGE 8

z/OS V1R10 SYSPLEX WPLEX START 07/13/2009-18.20.00 INTERVAL 000.29.59 MODE = GOAL
 RPT VERSION V1R10 RMF END 07/13/2009-18.50.00

REPORT BY: POLICY=WLMPOL WORKLOAD=SYSTEM SERVICE CLASS=SYSSTC RESOURCE GROUP=*NONE PERIOD=1 IMPORTANCE=SYSTEM
 CRITICAL =NONE

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT	--DASD I/O--	---SERVICE---	SERVICE TIME	---APPL %---	--PROMOTED--	----STORAGE----							
AVG	42.02	ACTUAL	65	SSCHRT	162.0	IOC	35445	CPU	16.864	CP	5.79	BLK	0.000	AVG	23187.40
MPL	42.02	EXECUTION	65	RESP	0.3	CPU	720771	SRB	78.322	AAPCP	0.00	ENQ	0.000	TOTAL	974250.9
ENDED	61	QUEUED	0	CONN	0.1	MSO	62778K	RCT	0.022	IIPCP	0.00	CRM	0.000	SHARED	14080.33
END/S	0.03	R/S AFFIN	0	DISC	0.0	SRB	3265K	IIT	9.041						
#SWAPS	424	INELIGIBLE	0	Q+PEND	0.1	TOT	66799K	HST	0.000	AAP	N/A			-PAGE-IN RATES-	
EXCTD	0	CONVERSION	0	IOSQ	0.0	/SEC	37111	AAP	N/A	IIP	N/A			SINGLE	0.0
AVG ENC	0.00	STD DEV	169					IIP	N/A					BLOCK	0.0
REM ENC	0.00													SHARED	0.0
MS ENC	0.00													HSP	0.0

GOAL: SYSTEM

SYSTEM	RESPONSE TIME	EX	PERF	AVG	--EXEC USING%--				EXEC DELAYS %		-USING%-		--- DELAY % ---			
	VEL%	INDX	ADRSP	CPU	AAP	IIP	I/O	TOT	CPU	CRY	CNT	UNK	IDL	CRY	CNT	QUI
*ALL	--N/A--	38.3	88.7	0.1	N/A	N/A	0.2	0.1	0.1	0.0	0.0	18	82	0.0	0.0	0.0
SYSA		55.6	48.7	0.1	N/A	N/A	0.3	0.1	0.1	0.0	0.0	16	83	0.0	0.0	0.0
SYSB		7.3	40.0	0.0	N/A	N/A	0.0	0.1	0.1	0.0	0.0	20	80	0.0	0.0	0.0

Note:

Many system address spaces running in SYSSTC
 Report is sysplex in scope, includes SYSA and SYSB

Workload - DB2 Report Classes



W O R K L O A D A C T I V I T Y

PAGE 16

z/OS V1R10 SYSPLEX WPLEX START 07/13/2009-18.20.00 INTERVAL 000.29.59 MODE = GOAL
RPT VERSION V1R10 RMF END 07/13/2009-18.50.00

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RDB2DBM1
DESCRIPTION =DB2 DBM1 Address Spaces

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT	--DASD	I/O--	---SERVICE---	SERVICE TIME	---APPL %---	--PROMOTED--	----STORAGE----						
AVG	1.00	ACTUAL	0	SSCHRT	16.7	IOC	7706	CPU	0.005	CP	0.06	BLK	0.000	AVG	165713.5
MPL	1.00	EXECUTION	0	RESP	0.5	CPU	225	SRB	0.790	AAPCP	0.00	ENQ	0.000	TOTAL	165713.4
ENDED	0	QUEUED	0	CONN	0.4	MSO	91628	RCT	0.000	IIPCP	0.00	CRM	0.000	SHARED	0.00
END/S	0.00	R/S AFFIN	0	DISC	0.0	SRB	32896	IIT	0.313						
#SWAPS	0	INELIGIBLE	0	Q+PEND	0.1	TOT	132455	HST	0.000	AAP	N/A			-PAGE-IN RATES-	
EXCTD	0	CONVERSION	0	IOSQ	0.0	/SEC	74	AAP	N/A	IIP	N/A			SINGLE	0.0
AVG ENC	0.00	STD DEV	0					IIP	N/A					SHARED	0.0
REM ENC	0.00					ABSRPTN	74							HSP	0.0
MS ENC	0.00					TRX SERV	74								

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RDB2MSTR
DESCRIPTION =DB2 Master Address Spaces

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT	--DASD	I/O--	---SERVICE---	SERVICE TIME	---APPL %---	--PROMOTED--	----STORAGE----						
AVG	1.00	ACTUAL	0	SSCHRT	134.2	IOC	24149	CPU	0.081	CP	1.92	BLK	0.000	AVG	3990.60
MPL	1.00	EXECUTION	0	RESP	0.2	CPU	3393	SRB	33.350	AAPCP	0.00	ENQ	0.000	TOTAL	3990.60
ENDED	0	QUEUED	0	CONN	0.1	MSO	29897	RCT	0.000	IIPCP	0.00	CRM	0.000	SHARED	1.00
END/S	0.00	R/S AFFIN	0	DISC	0.0	SRB	1390K	IIT	1.138						
#SWAPS	0	INELIGIBLE	0	Q+PEND	0.1	TOT	1447K	HST	0.000	AAP	N/A			-PAGE-IN RATES-	
EXCTD	0	CONVERSION	0	IOSQ	0.0	/SEC	804	AAP	N/A	IIP	N/A			SINGLE	0.0
AVG ENC	0.00	STD DEV	0					IIP	N/A					BLOCK	0.0
REM ENC	0.00					ABSRPTN	804							SHARED	0.0
MS ENC	0.00					TRX SERV	804							HSP	0.0

Finding The Data - Example 1



Finding the information for a transaction ...

- ▶ **Transaction is a web service call from CICS to WebSphere AS on zLinux, which calls DB2**
- ▶ **CICS and DB2 are on same z/OS system and WebSphere AS is on zLinux**
- ▶ **CICS and DB2 information on the Workload report**
- ▶ **Service and report classes for CICS and DB2**
 - ▶ **CICS transaction service class is CICSTRAN**
 - ▶ **CICS transaction report classes**
 - ▶ **DB2 report classes for each address space**
 - ▶ **DDF work service class is DDFPROD**

Example 1 - CICSTRAN



CICS transaction service class information

Transaction rate - **TRANSACTIONS END/S**
Response time - **TRANS-TIME ACTUAL**

W O R K L O A D A C T I V I T Y

PAGE 5

z/OS V1R10 SYSPLEX WPLEX START 08/19/2009-15.30.00 INTERVAL 000.29.59 MODE = GOAL
 RPT VERSION V1R10 RMF END 08/19/2009-16.00.00

REPORT BY: POLICY=WLMPOL WORKLOAD=ONL_WKL SERVICE CLASS=CICSTRAN RESOURCE GROUP=*NONE PERIOD=1
IMPORTANCE=1

CRITICAL =NONE

-TRANSACTIONS-		TRANS-TIME HHH MM SS TTT	
AVG	0.00	ACTUAL	129
MPL	0.00	EXECUTION	0
ENDED	282882	QUEUED	0
END/S	212.71	R/S AFFIN	0
#SWAPS	0	INELIGIBLE	0
EXCTD	0	CONVERSION	0
AVG ENC	0.00	STD DEV	627
REM ENC	0.00		
MS ENC	0.00		

END/S = 212.71 trans/sec

TRANS-TIME ACTUAL = 129 ms

Example 1 - CICS Trans



CICS transaction report class information

W O R K L O A D A C T I V I T Y

PAGE 19

z/OS V1R10 SYSPLEX WPLEX START 08/19/2009-15.30.00 INTERVAL 000.29.59 MODE = GOAL
 RPT VERSION V1R10 RMF END 08/19/2009-16.00.00

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RACTR
DESCRIPTION =CICS WS Read Trans

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 1.150
MPL	0.00	EXECUTION 0
ENDED	32254	QUEUED 0
END/S	17.92	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 1.308
REM ENC	0.00	
MS ENC	0.00	

RACTR
END/S = 17.92 trans/sec
TRANS-TIME ACTUAL = 1150 ms

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RACTU
DESCRIPTION =CICS WS Update Trans

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 1.175
MPL	0.00	EXECUTION 0
ENDED	7919	QUEUED 0
END/S	4.40	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 1.416
REM ENC	0.00	
MS ENC	0.00	

RACTU
END/S = 4.40 trans/sec
TRANS-TIME ACTUAL = 1175 ms

Example 1 - CICS Trans



CICS transaction report class information

W O R K L O A D A C T I V I T Y

PAGE 20

z/OS V1R10 SYSPLEX WPLEX START 08/19/2009-15.30.00 INTERVAL 000.29.59 MODE = GOAL
 RPT VERSION V1R10 RMF END 08/19/2009-16.00.00

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RCICSDEF
DESCRIPTION = CICS Trans Not Classified

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 10
MPL	0.00	EXECUTION 0
ENDED	167803	QUEUED 0
END/S	93.22	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 388
REM ENC	0.00	
MS ENC	0.00	

RCICSDEF
END/S = 93.22 trans/sec
TRANS-TIME ACTUAL = 10 ms

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RCPIH
DESCRIPTION =CICS WS Trans Flow

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 8
MPL	0.00	EXECUTION 0
ENDED	174906	QUEUED 0
END/S	97.17	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 203
REM ENC	0.00	
MS ENC	0.00	

RCPIH
END/S = 97.17 trans/sec
TRANS-TIME ACTUAL = 8 ms

Example 1 - DB2 DDF



DB2 calls are remote from WebSphere AS on zLinux Classified using DDF rules with service class DDFPROD

WORKLOAD ACTIVITY

PAGE 2

z/OS V1R10

SYSPLEX WPLEX

START 08/19/2009-15.30.00 INTERVAL 000.29.59 MODE = GOAL

REPORT BY: POLICY=WMPOL WORKLOAD=DB_WKL SERVICE CLASS=DDFPROD RESOURCE GROUP=*NONE PERIOD=1 IMPORTANCE=1
CRITICAL =NONE

-TRANSACTIONS-	TRANS-TIME HHH.MM.SS.TTT	--DASD I/O--	---SERVICE---	SERVICE TIME	---APPL %---	--PROMOTED--	----STORAGE----
AVG 24.42	ACTUAL 1.093	SSCHRT 0.0	IOC 0	CPU 25.830	CP 1.44	BLK 0.000	AVG 0.00
MPL 24.42	EXECUTION 1.093	RESP 0.0	CPU 1076K	SRB 0.000	AAPCP 0.00	ENQ 0.000	TOTAL 0.00
ENDED 40170	QUEUED 0	CONN 0.0	MSO 0	RCT 0.000	IIPCP 0.67	CRM 0.000	SHARED 0.00
END/S 22.32	R/S AFFIN 0	DISC 0.0	SRB 0	IIT 0.000			
#SWAPS 0	INELIGIBLE 0	Q+PEND 0.0	TOT 1076K	HST 0.000	AAP N/A		-PAGE-IN RATES-
EXCTD 0	CONVERSION 0	IOSQ 0.0	/SEC 598	AAP N/A	IIP N/A		SINGLE 0.0
AVG ENC 24.42	STD DEV 1.126			IIP N/A			BLOCK 0.0
REM ENC 0.00			ABSRPTN 24				SHARED 0.0
MS ENC 0.00			TRX SERV 24				HSP 0.0

GOAL: EXECUTION VELOCITY 30.0% VELOCITY MIGRATION: I/O MGMT 13.6% INIT MGMT 13.6%

SYSTEM	RESPONSE TIME EX	PERF AVG	--EXEC USING%--	EXEC DELAYS %	-USING%-	--- DELAY % ---	%
	VEL% INDX	ADRSP	CPU AAP IIP I/O	TOT CPU	CRY CNT	UNK IDL CRY CNT	QUI
SYSA	--N/A--	13.6 2.2	12.2 0.0 N/A N/A 0.0	0.1 0.1	0.0 0.0	100 0.0 0.0 0.0	0.0

END/S = 22.32 trans/sec

TRANS-TIME ACTUAL = 1093 ms

Example 1 - Transaction Rates

- ▶ **Transactions running in CICSTRAN service class**
All CICS trans => 212.71 trans/sec & 126 ms/tran
- ▶ **CICS transaction report classes**
 - RCICSDEF => 93.22 tran/sec & 10 ms/tran
 - RCPIH => 97.17 tran/sec & 8 ms/tran
 - RACTR => 17.92 tran/sec & 1150 ms/tran
 - RACTU => 4.40 tran/sec & 1175 ms/tran
- ▶ **DB2 DDF transaction report class**
All DDF trans => 22.32 trans/sec & 1093 ms/tran
- ▶ **Comparisons**
 - Sum of CICS report class tran rates = 212.71 trans/sec
 - RACTR + RACTU average tran rates = 22.32 trans/sec

WebSphere AS - Example 2



Finding Data for WebSphere Server Work ...

- ▶ **Transaction is CICS call to z/OS WebSphere AS, which calls DB2**
- ▶ **Control and servant regions are started tasks**
- ▶ **Transactions run in an enclave**
 - ▶ **Classified as CB work**
 - ▶ **May have different service class than servant region**
- ▶ **Service and report classes**
 - ▶ **Control region started task service class is WAS7CR**
 - ▶ **Servant region started task service class is WAS7SR**
 - ▶ **Enclave work service class is WASTRAN**
 - ▶ **CICS transaction service class is CICSTRAN**
 - ▶ **CICS transaction report classes**

WebSphere Servers

Control Region

One control region per server

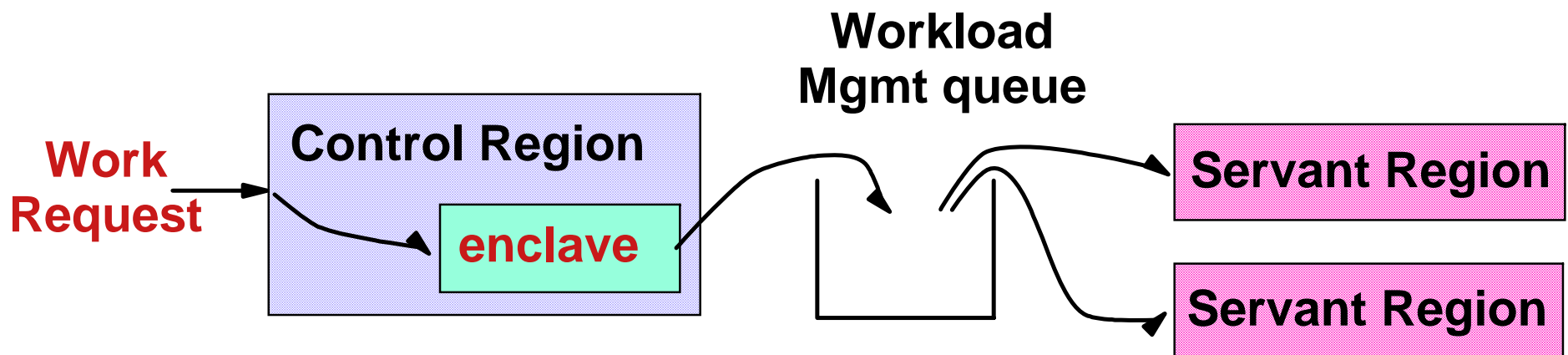
Started task

Servant Region

One or more per server

Started task, started by WLM

Work runs as enclave work



Example 2 - Enclave Work



WebSphere Server transactions

Classified using CB rules with service class WASTRAN

WORKLOAD ACTIVITY

PAGE 13

z/OS V1R10

SYSPLEX WPLEX

START 07/13/2009-18.20.00 INTERVAL 000.29.59 MODE = GOAL

RPT VERSION V1R10 RMF

END 07/13/2009-18.50.00

REPORT BY: POLICY=WLPOL

WORKLOAD=WAS_WKL

SERVICE CLASS=WASTRAN
CRITICAL =NONE

RESOURCE GROUP=*NONE

PERIOD=1 IMPORTANCE=1

-TRANSACTIONS-	TRANS-TIME HHH.MM.SS.TTT	--DASD I/O--	---SERVICE---	SERVICE TIME	---APPL %---	--PROMOTED--	----STORAGE----
AVG 4.26	ACTUAL 1	SSCHRT 3.2	IOC 0	CPU 1012.277	CP 56.24	BLK 0.000	AVG 0.00
MPL 4.26	EXECUTION 1	RESP 0.5	CPU 42178K	SRB 0.000	AAPCP 30.76	ENQ 0.000	TOTAL 0.00
ENDED 2265258	QUEUED 0	CONN 0.3	MSO 0	RCT 0.000	IIPCP 0.00	CRM 0.000	SHARED 0.00
END/S 1258.48	R/S AFFIN 0	DISC 0.1	SRB 0	IIT 0.000			
#SWAPS 0	INELIGIBLE 0	Q+PEND 0.1	TOT 42178K	HST 0.000	AAP N/A		-PAGE-IN RATES-
EXCTD 0	CONVERSION 0	IOSQ 0.0	/SEC 23432	AAP N/A	IIP N/A		SINGLE 0.0
AVG ENC 4.26	STD DEV 6			IIP N/A			BLOCK 0.0
REM ENC 0.00			ABSRPTN 5501				SHARED 0.0
MS ENC 0.00			TRX SERV 5501				HSP 0.0

TRANS-TIME ACTUAL = 1 ms

END/S = 1258.48 trans/sec

Example 2 - CICS Trans

CICS transaction report class information

W O R K L O A D A C T I V I T Y

PAGE 15

z/OS V1R10 SYSPLEX WPLEX START 07/13/2009-18.20.00 INTERVAL 000.29.59 MODE = GOAL
RPT VERSION V1R10 RMF END 07/13/2009-18.50.00

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RACTR
DESCRIPTION =CICS WS Read Trans

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 10
MPL	0.00	EXECUTION 0
ENDED	302399	QUEUED 0
END/S	168.00	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 16
REM ENC	0.00	
MS ENC	0.00	

RACTR
END/S = 168.00 trans/sec
TRANS-TIME ACTUAL = 10 ms

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RACTU
DESCRIPTION =CICS WS Update Trans

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT
AVG	0.00	ACTUAL 11
MPL	0.00	EXECUTION 0
ENDED	75140	QUEUED 0
END/S	41.74	R/S AFFIN 0
#SWAPS	0	INELIGIBLE 0
EXCTD	0	CONVERSION 0
AVG ENC	0.00	STD DEV 16
REM ENC	0.00	
MS ENC	0.00	

RACTU
END/S = 41.74 trans/sec
TRANS-TIME ACTUAL = 11 ms

Example 2 - CICS Trans

Other CICS transactions

W O R K L O A D A C T I V I T Y

PAGE 16

z/OS V1R10 SYSPLEX WPLEX START 07/13/2009-18.20.00 INTERVAL 000.29.59 MODE = GOAL
 RPT VERSION V1R10 RMF END 07/13/2009-18.50.00

REPORT BY: POLICY=WLMPOL

REPORT CLASS=RCICSDEF

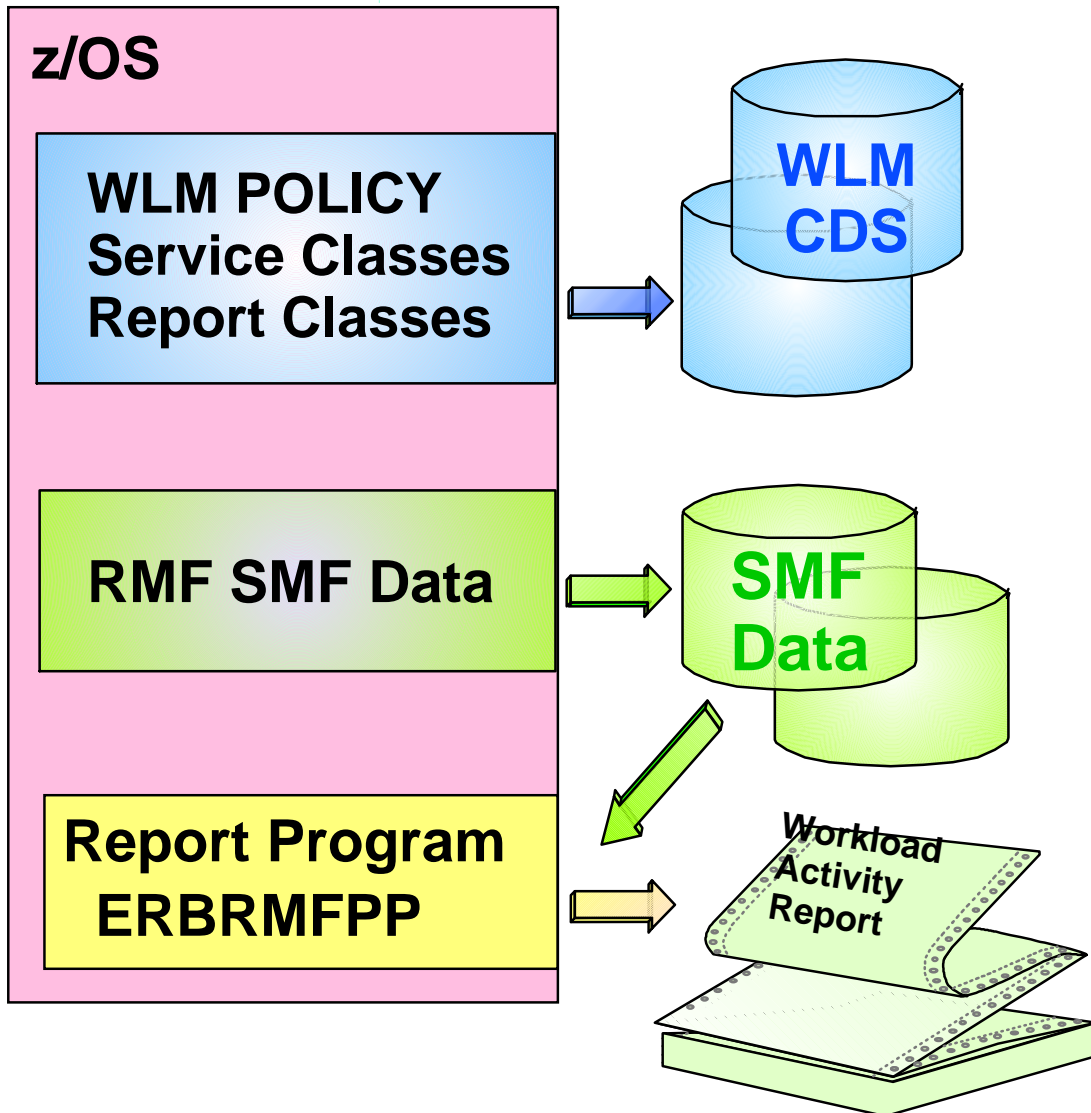
DESCRIPTION = CICS Trans Not Classified

-TRANSACTIONS-	TRANS-TIME	HHH.MM.SS.TTT	
AVG	0.00	ACTUAL	1
MPL	0.00	EXECUTION	0
ENDED	755088	QUEUED	0
END/S	419.50	R/S AFFIN	0
#SWAPS	0	INELIGIBLE	0
EXCTD	0	CONVERSION	0
AVG ENC	0.00	STD DEV	2
REM ENC	0.00		
MS ENC	0.00		

RCICSDEF

END/S = 419.50 trans/sec

Summary



- Determine reporting requirements of work
- Select an interval to get the needed granularity
- Define service and report classes in WLM to report on workloads
- Write RMF SMF records
- Run RMF post processor program to produce Workload Activity report

References

z/OS Publications:

- ▶ [z/OS MVS System Management Facilities \(SMF\), SA22-7630](#)
- ▶ [z/OS MVS Initialization and Tuning Reference, SA22-7592](#)
- ▶ [z/OS MVS Planning: Workload Management, SA22-7602](#)
- ▶ [z/OS RMF User's Guide, SC33-7990](#)
- ▶ [z/OS RMF Report Analysis, SC33-7991](#)
- ▶ [z/OS RMF Performance Management Guide, SC33-7992](#)

