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CICS High Availability

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SunTrust Banks, Inc.

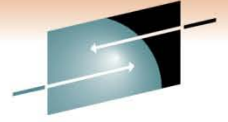
March 2, 2011
Session 8276



CICS High Availability Agenda



- Who we are & Environment Overview
- How WLM works
- Opportunities for WLM
- CICS and HA
 - Dynamic WLM
 - Deployment Scenarios
- Urban Myths and Legends regarding CICS WLM
- Tips and Hints
 - Challenges
 - Capabilities
 - Strategies



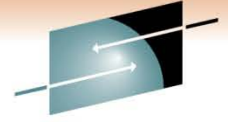
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Who we are and Environment Overview

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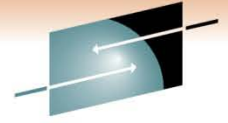


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Who we are

- Headquartered in Atlanta, Ga.
- Large US Bank and Financial Services Holding Company
- Regional Presence in Southeast and Mid-Atlantic
- \$174+ Billion in assets

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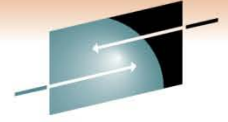
Environment Overview

- 34 LPARS
 - 6 NET390
 - 8 ICF
 - 6 DataMover
 - 1 NET390
 - 2 Control
 - 3 System Data Mover
 - 14 Application
 - 2 Tech 'Sandbox'
 - 4 Development and Integrated Testing
 - 2 QA
 - 6 Production
- z/OS 1.11
- Program Products for CICS
 - Omegamon for CICS
 - IBM Suite of PD Tools
 - GT Ivory

Environment Overview (cont)

- DB2 V9.0
 - 60 Subsystems
 - Multiple Data-Sharing Groups
 - New Function Mode
- WebSphere/MQ for z/OS V7.0
 - Shared Queues between High Availability LPARs (In process)
 - Clustering enabled
 - Extensive use of MQ-CICS Bridge

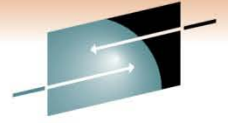
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Environment Overview (cont)

- CICS TS 4.1
 - 266 Total Regions
 - 112 Development/Maintenance
 - 14 Training
 - 16 Integrated Testing – Release Planning Path 1
 - 16 Integrated Testing – Release Planning Path 2
 - 12 Integrated Testing – Break Fix Path
 - 32 QAPlex – Release Path 1
 - 32 QAPlex – Release Path 2
 - 32 Production
 - 26 High Availability
 - 2 WUI
 - 4 Legacy
 - VSAM/RLS
 - Temporary Storage Shared Queues
 - Extensive use of BAS
 - DVIPA, Shared IP Ports, & SYSPLEX Distributor

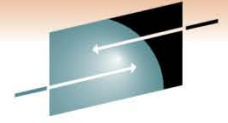


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How WLM Works – z/OS and CPSM

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How CPSM/WLM Works

- z/OS WLM
 - Velocity Goal
 - Response Time Goal
 - Discretionary
- CPSM WLM
 - Queue Mode
 - Goal Mode

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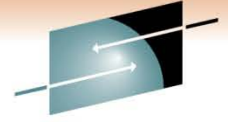


How WLM Works – z/OS

- Velocity Goal
 - Define service class for CICS regions
 - Applications with primarily long running transactions are ideal candidates
 - Set goal to service class
 - Uses real time data from CICS region
 - Performance Control Block (Allocated in the CICS region)
 - *Communicate transaction state data to z/OS*
 - *Sampled every 250MS*
 - Performance Control Block Extension
 - Target percentile of average response time
 - Not representative of transaction response time goals
 - Only control ‘utility-type’ functions such as region start-up/shutdown/statistics/logging/etc.

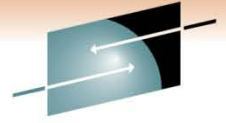
How WLM Works – z/OS

- Transaction Response Time Goal
 - Percentile
 - Percentage of completed transactions that meet the goal
 - Average
 - Average response time of all completed transactions
 - Defined and classified by:
 - *Single CICS APPLID*
 - *Transaction groups*
 - *Individual transaction*
 - *USERID*



How WLM Works – z/OS

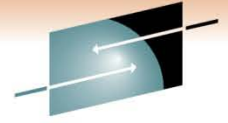
- Discretionary
 - Used for work that can run whenever the system has extra resources
 - Work not associated with an importance level
 - Work will be run behind all other workloads that have an importance level which can be satisfied



How WLM Works – CPSM SETUP

- Router regions (TOR)
- Target regions (AOR)
- DTRPGM/DTRTRAN
- WLMSPEC
- WLMGROUP
- WLMDEF
- TRANGRP

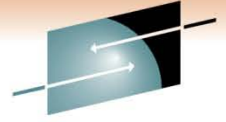
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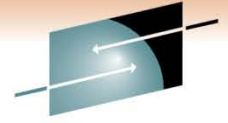
How WLM Works – CPSM DTRPGM

- DTRPGM = xxxxxxxx
 - Router program definition in SIT or 'router' region
 - EYU9XLOP – default
 - User replaceable
- DTRTRAN=CRTX
 - Default routing transaction



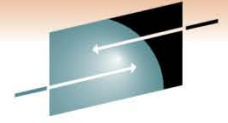
How WLM Works – CPSM WLMSPEC

- Define routers
 - Single TOR
 - Group of TORs
- Identify 'default target' regions
- Queue or Goal mode
- Created via CPSM WLM WUI view or Batch



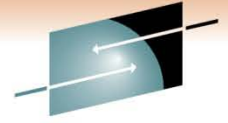
How WLM Works – CPSM WLMGROUP

- Association anchor for a set of WLMDEF
 - WLMSPEC ← WLMGROUP ← WLMDEF
- WLMGROUP name is specific
 - Associated with environment specific TORs
 - Add one or more WLMDEFS via ADD command
- Created via CPSM WLM WUI view or Batch



How WLM Works – CPSM WLMDEF

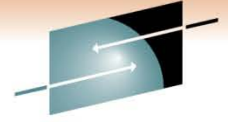
- Identify ‘non-default target’ regions
 - Affinity
 - Special TRANGRP processing
- Created via CPSM WLM WUI view or Batch



How WLM Works – CPSM TRANGRP

- Define common transactions
- Identify transactions for ‘special’ processing
 - Affinity
 - Isolated AORs
- Created via CPSM WLM WUI view or Batch

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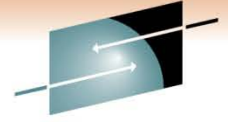


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Opportunities for CPSM WLM

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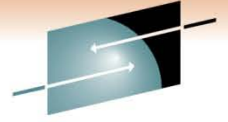


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Opportunities for CPSM/WLM

- Applications that require 24 x 7 access
- Implementation of maintenance/version upgrades
 - Roll changes into a region at a time
- Isolation of poorly performing transactions
 - Trangrp
- Workload separation
 - Duplicate TRANID
 - Duplicate DDNAME
 - Duplicate TSQs
 - Politics
 - Known 'storage hogs'
- Region recovery
 - In conjunction with Automation

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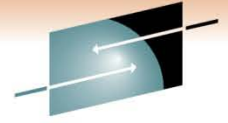
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CICS and HA

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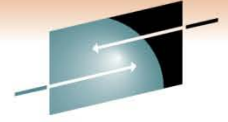
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Dynamic WLM

- More than 1 ‘router’ region
- More than 1 ‘target’ region
- Routing program
 - Default
 - User replaceable
- CPSM definitions
 - WLMSPEC
 - WLMGROUP (optional)
 - WLMDEF (optional)
 - TRANGRP (optional)

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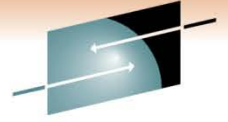
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Deployment Scenarios

- Single LPAR
 - Pseudo HA
- Multiple LPARs same CEC
 - Closer but not full HA
- Multiple LPARS different CEC
 - Full HA



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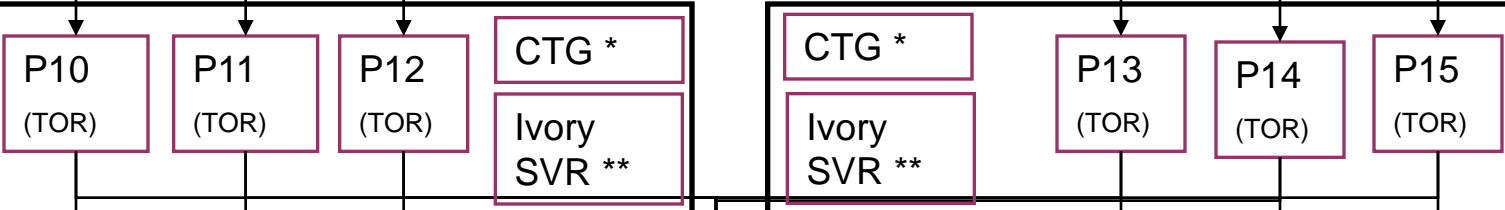
CICS and HA SunTrust Deployment Scenario

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VTAM Generic Resources PRODAPPL

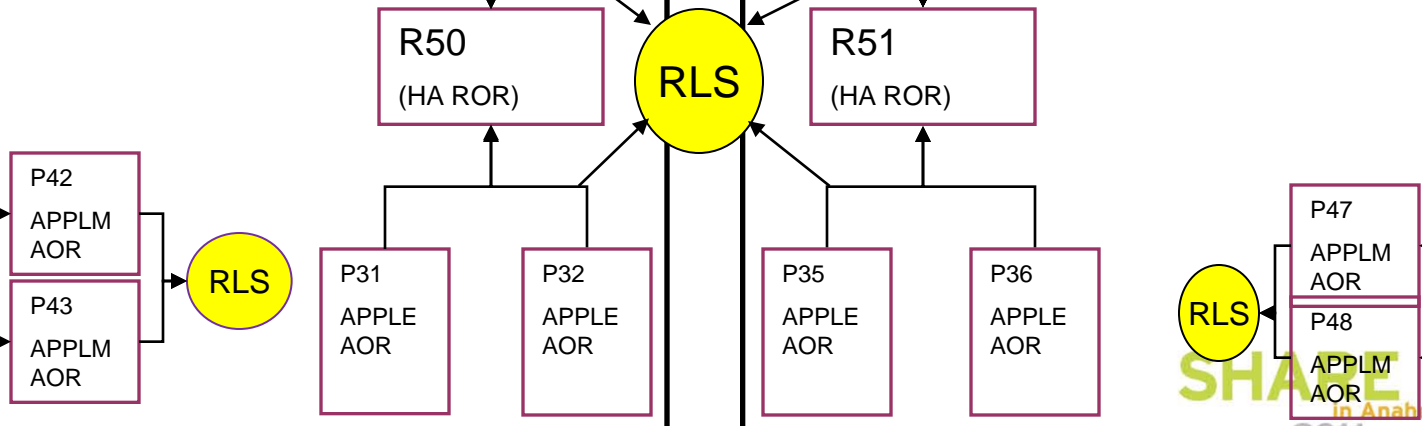
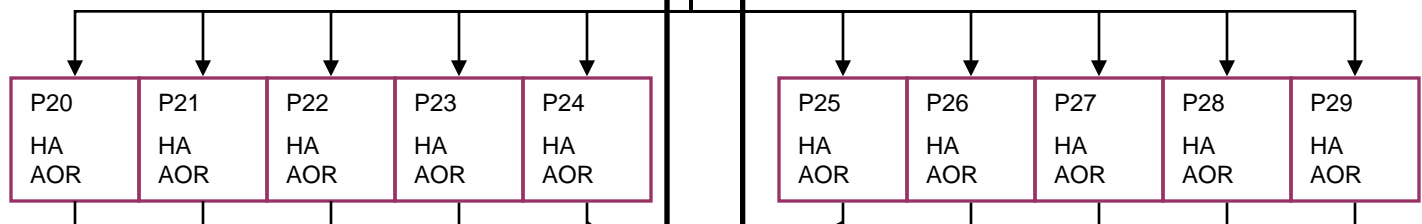


CTG *
Ivory SVR **



LEGACY AORS

CICSplex – Routes to all AORs. HA and Legacy



Note: APPLM regions WLM from TOR's and do NOT connect to ROR

Note: APPPLE regions do NOT connect to TOR's but DO connect to ROR

•CTG – EXCI connection to TORs and IPIC connection to AORs

** Ivory Server connects via EXCI to TORS while Ivory for CICS connects directly to AORs

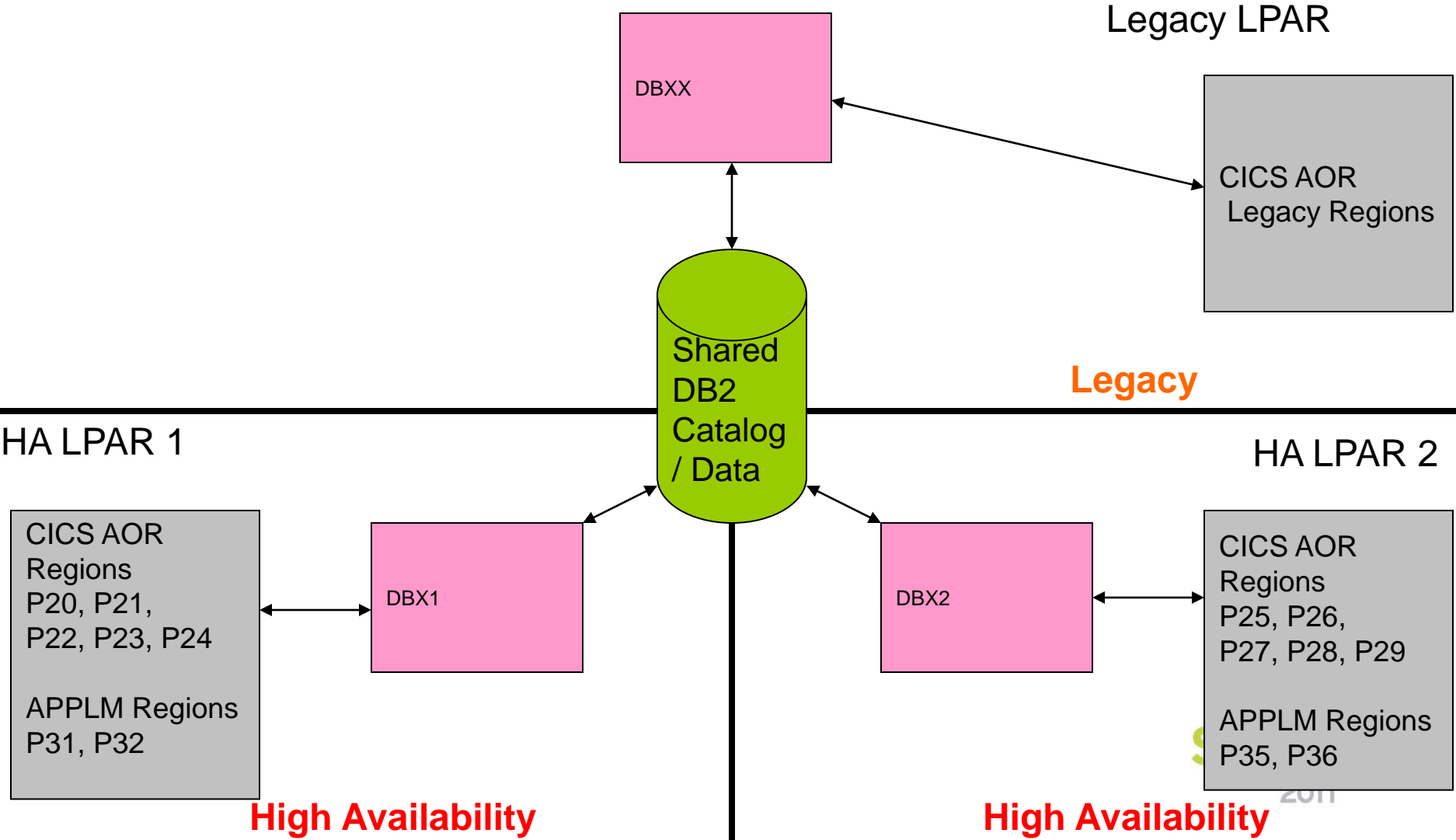
Legacy

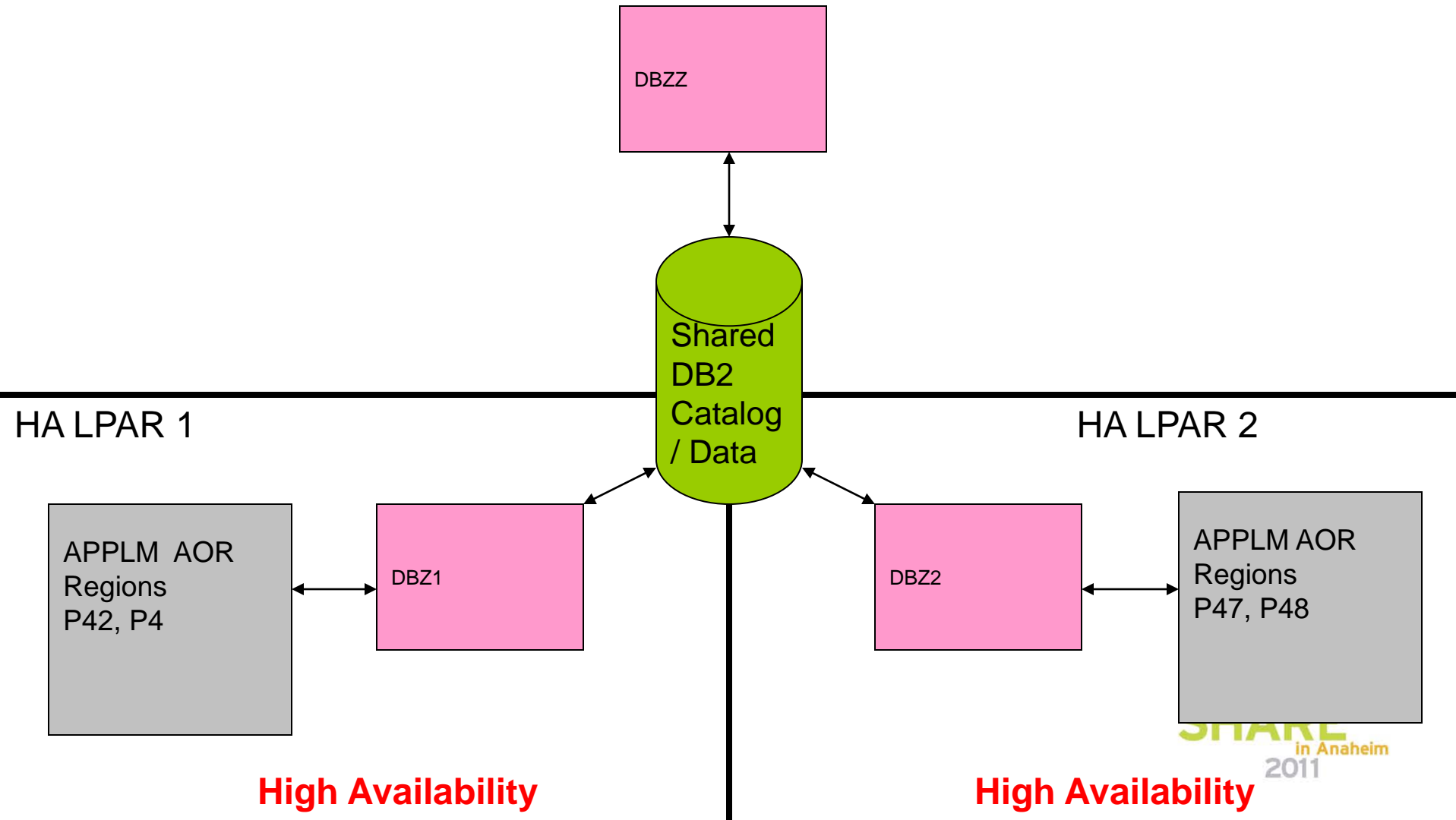
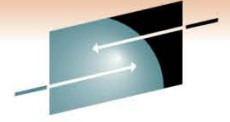
High Availability-LPAR 1

High Availability-LPAR 2

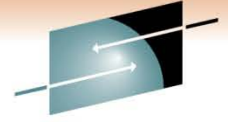


PROD
DB2 Datasharing Group Y
Group Attach = DPY





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Other Requirements

- DVIPA
- VTAM Generic Resources
- WebSphere MQ for Z/OS Shared Queues
- Understanding your applications
 - Affinities vs. affinity-free

Other Requirements - Cont

Types of affinity

Inter-transaction affinity

- One transaction terminates, leaving "state data" in a place that a second transaction can access only by running in the same CICS region as the first transaction.
- One transaction creates data that a second transaction accesses while the first transaction is still running. For this to work safely, the first transaction usually waits on some event, which the second transaction posts when it has read the data created by the first transaction. This synchronization technique requires that both transactions are routed to the same CICS region.

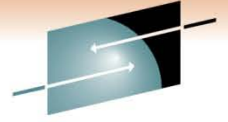
Other Requirements - Cont

Types of affinity

Transaction System Affinity

- An affinity between a transaction and a particular CICS region (that is, it is not an affinity between transactions themselves). It is caused by the transaction interrogating or changing the properties of that CICS region.
- Transactions with affinity to a particular system, rather than another transaction, are not eligible for dynamic transaction routing. In general, they are transactions that use INQUIRE and SET commands or have some dependency on global user exit programs.

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CPSM and Automation

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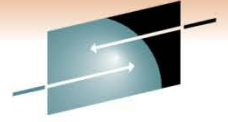
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CPSM and Automation

- WLM
 - Additional region startup/shutdown
 - Move ‘bad’ transactions to special TRANGRP
 - Isolates errors to a particular region
- RTA
 - Identify issues and have automation act
 - Loss of connections

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Urban Myths and Truths

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Urban Myths and Truths

- Myth:
 - Using z/OS WLM with CICS will cause excessive overhead
- Truth:
 - WLM adjusts system resources every 10 seconds
 - According to address space delays, CPU, Storage, etc.
 - Resources allocated at the address space level

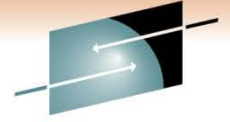
Urban Myths and Truths - Cont

- Myth:
 - Every CICS Transaction must be defined individually in z/OS WLM
- Truth:
 - Only required for the transactions you are using response time goal

Urban Myths and Truths - Cont

- Myth:
 - CPSM WLM is difficult to setup and maintain
- Truth:
 - Easy setup if you are using the defaults
 - Is as complex as you want to make it

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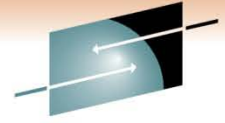


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Real Life Stats

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Real Life Stats

- HARDCOPY RMF V1R11 Work Manager Delays - PRODplex

- Command ===> Scroll ===> CSR

- WLM Samples: 400 Systems: 8 Date: 01/24/11 Time: 10.41.40 Range: 100 Sec

- Class: APPLPL Period: 1 Avg. Resp. time: 0.062 sec for 22487 TRX.

- Goal: 0.300 sec for 90% Avg. Exec. time: 0.000 sec for 0 TRX.

- Actual: 0.300 sec for 98% Abnormally ended: 0 TRX.

- Sub P -----Response time breakdown (in %)------ -Switched--

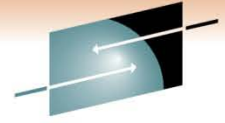
- Type Tot Act Rdy Idle -----Delayed by----- Time (%)

					MISC	CONV	I/O	PROD	LOCK	TIME	DIST	SESS	LOC	SYS	REM
CICS B	70.0	22.5	4.50	0	37.5	4.50	.100	.800	.100	0	0	0	4.5	0	0
CICS X	.200	.200	0	0	0	0	0	0	0	0	0	0	.00	0	4.5
DB2 B	4.00	.800	0	0	.000	0	3.10	0	0	0	0	0	0	0	0

- ----- Address Spaces Serving this Service Class APPLPL -----

- Jobname M ASID System Serv-Class Service Proc-Usg I/O-Usg Veloc Capp Quies

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Real Life Stats - Cont

HARDCOPY RMF V1R11 Sysplex Summary - PRODPLEX Line 1 of 14

Command ==> Scroll ==> CSR

WLM Samples: 400 Systems: 8 Date: 01/24/11 Time: 10.41.40 Range: 100 Sec

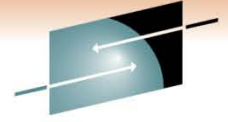
>>>>>>-----<<<<<<<<

Service Definition: PRODPLEX Installed at: 01/24/11, 09.21.57

Active Policy: PRIME Activated at: 01/24/11, 09.22.01

Name	T I	----- Goals versus Actuals -----			Trans Ended Rate	--Avg. Resp. Time--		
		Exec Vel	--- Response Time ---	Perf Indx		WAIT Time	EXECUT Time	ACTUAL Time
AEC	R	N/A			20.20	0.000	0.032	0.065
API	R	N/A			55.59	0.000	0.012	0.014
ALN	R	N/A			80	0.000	0.014	0.017
ACR	R	N/A			40.76	0.000	0.015	0.018
AAE	R	N/A			15.80	0.000	0.043	0.043
AMA	R	N/A			5.190	0.000	0.040	0.044
AMX	R	N/A			0.030	0.000	0.005	0.006
AML	R	N/A			13.30	0.000	0.055	0.059
AIQ	R	N/A			3.920	0.000	0.010	0.016
AOC	R	N/A			13.91	0.000	0.015	0.015
APL	R	N/A			224.9	0.000	0.062	0.062
ASF	R	N/A			1.000	0.000	0.337	0.090
ASE	R	N/A			32.79	0.000	0.012	0.014
ARU	R	N/A			32.14	0.000	0.006	0.008

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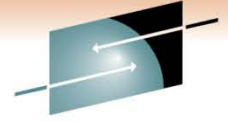


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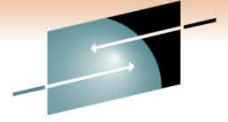
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Acknowledgements

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- Tony Deeb – SunTrust Capacity and Performance Expert
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- Gene Hudders – C-Trek
- Lisa Fellows – Bank of America

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Questions?

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