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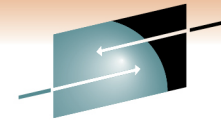
Getting the Most Out of the z/OS Workload Manager

Donald Zeunert
IBM Tivoli Software Group

Monday, February 28, 2011 3:00 PM-4:00 PM

Session Number 8940

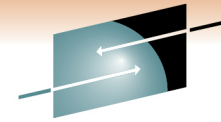




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Agenda

- WLM is handling it, why should I care ?
- Summary of White Paper “Workload Manager – Minding the Flock, but Who’s Watching the Sheep?”
- How does WLM manage workloads
- How to find workloads in trouble
- Managing WLM Service-Class Definitions
- Q&A Session



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Preface

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IBM's Integrated Service Management (ISM)

framework can optimize costs and streamline operations



This session is focused on:

Integrated Service Management



VISIBILITY



See your business services

Understand health and performance of services across your enterprise infrastructure

CONTROL



Manage service risk and compliance

Govern and secure complex infrastructure and ensure regulatory compliance

AUTOMATION



Optimize business service delivery

Drive down cost, minimize human error and increase productivity

Workload Manager is handling it ?



- WLM is much better than compatibility mode, even for casual tuners, and much easier to use.
 - However it still needs to be observed and corrected.
- Performance is not necessarily better in goal mode if you set bad or simple goals.
 - Though you may get lucky, you may also be lulled into a false sense of security.
- When results don't match expectations, you need to understand how WLM makes decisions.

Why do I care?



Critical
Application
Non-acceptable
Continuous
Erratic / poor
Response

Credit Card Co – Increased volume



Business Challenge:

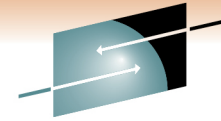
- Credit authorization application unable to keep up with volume of requests
- Business loss from potential customers using other issuers cards

Real Results

Credit card revenue increases

- 70% more transactions / hr on average
 - Increased from 850 to 1450 / hr
- 66% more trans/hr at peak load
 - Increased from 1200 to 2000 / hr
- 60% reduction in Average response time
 - Reduced from 3.5 seconds to 1.4 seconds
- 45% reduction in Worst response time
 - Reduced from 17 seconds to 10 seconds

Workload Manager – White Paper



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The screenshot shows the IBM website interface for the CCR2 publication. The top navigation bar includes the IBM logo, a search box, and links for Home, Solutions, Services, Products, Support & downloads, and My IBM. The main content area features a breadcrumb trail: Software > Tivoli > CCR2 >. The article title is "CCR2" with the subtitle "A publication for the IBM Tivoli and zSeries community". The featured article is "Workload Manager—minding the flock, but who's watching the sheep?" from CCR2, Issue 5 - 2004, written by Don Zeunert, a Consulting Systems Engineer at Candle Corp. The article text discusses Workload Manager (WLM) as a tool for performance tuning, noting that while it's easier to use than compatibility mode, it still requires observation and correction. It explains that WLM makes decisions based on average performance of service classes, which can lead to a false sense of security. The article concludes by stating that WLM looks at the big picture to identify and address performance issues for "loved ones" (service classes).

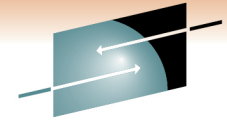
Related links:

- Warranty info
- Business Partners
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- Licensing
- Contact Tivoli

Right sidebar:

- Tivoli software**
- We're here to help**
- Easy ways to get the answers you need.
- [Request a quote](#)
- [E-mail IBM](#)
- Or call us at: **877-426-3774**
Priority code: **109HJ03W**
- Code**
-
- Continuous file backup without scheduling, tapes or worries!
- [Download your CDP](#)

<http://www-01.ibm.com/software/tivoli/features/ccr2/ccr2-2004-05/features-workload.html>



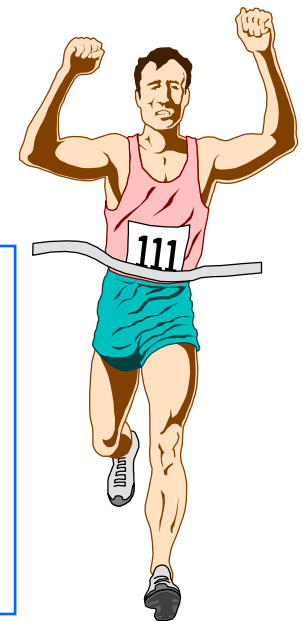
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Workload Manager

- Goal Types
 - Velocity (Using and delay samples)
 - Response time (directly measured)

What Is Velocity ?

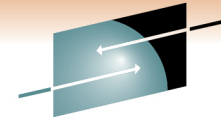
$$\text{Velocity} = \left[\frac{\text{Using samples CPU [+I/O*]}}{\text{Using samples CPU [+I/O] + Delay samples (CPU + Storage [+ I/O])}} \right] \times 100$$



Velocity does not equal dispatching priority.

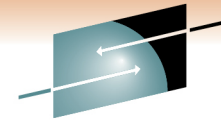
Using > resources = higher velocity, better P/I

Loops, real I/O vs Buffer hits



Minding the Flock - Summary

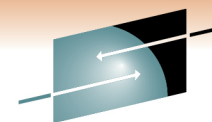
- Velocity goals
 - Less effective than response goals
 - CICS Storage Isolation
 - VTAM Generic Resources Routing
 - Used by most customers (easier to define)
 - Service classes goal attainment measured by using vs. delayed samples
 - **Velocity is calculated and managed for the service class, not address space**



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Minding the Flock -- Summary

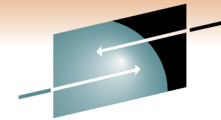
- Even with response-time goals WLM manages address spaces, not TCBs
- DB2 and WebSphere® enclaves are independently managed and are not discussed here. But are managed as a group based on their Service class
- **WLM manages to average performance of work units in service class**



Goal Types

	Goal Type	
	Velocity	CICS / IMS Response
Measurement	Service Class % Using	Service Class Response
Adjustments	Service Class	Address space ?
Displayed Service Class	Address space	Address space
Multiple Periods Allowed	Yes	No

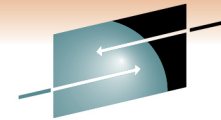
Velocity Goals (Two Periods)



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SDSF DA SP22 SP22									
JOBNAME	DP	Srv Class	SP	SR	JOBNAME	DP	Srv Class	SP	SR
CXECNDL	F7	STC	1		CXECNDL	FB	STC	1	
CXEGA26	FF	STC	1	DW	CXEGA26	FF	STC	1	DW
CXEGA27	F7	STC	1		CXEGA28	FB	STC	1	
CXEGA28	F7	STC	1		CXEGA27	FB	STC	1	
CXEGA22	F5	STC	2		CXEGA35	F3	STC	2	
CXEGA23	F5	STC	2		CXEGA22	F3	STC	2	
CXEGA24	F5	STC	2		CXEGA39	F3	STC	2	
CXEGA25	F5	STC	2		CXEGA25	F3	STC	2	
CXEGA35	F5	STC	2		CXEGA37	F3	STC	2	
Low volume trivial w/ high long running, later reverse workload									

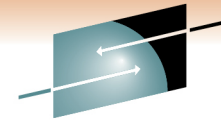
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Service-Class Management

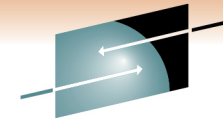
- WLM manages to average performance
- WLM management of velocity goals
 - All address spaces in same period, same priority
- WLM management of address space response
 - All address spaces in same period, same priority
- WLM management of transaction goals
 - Source of confusion
 - Internal **Server** classes created by WLM
 - All address spaces same priority



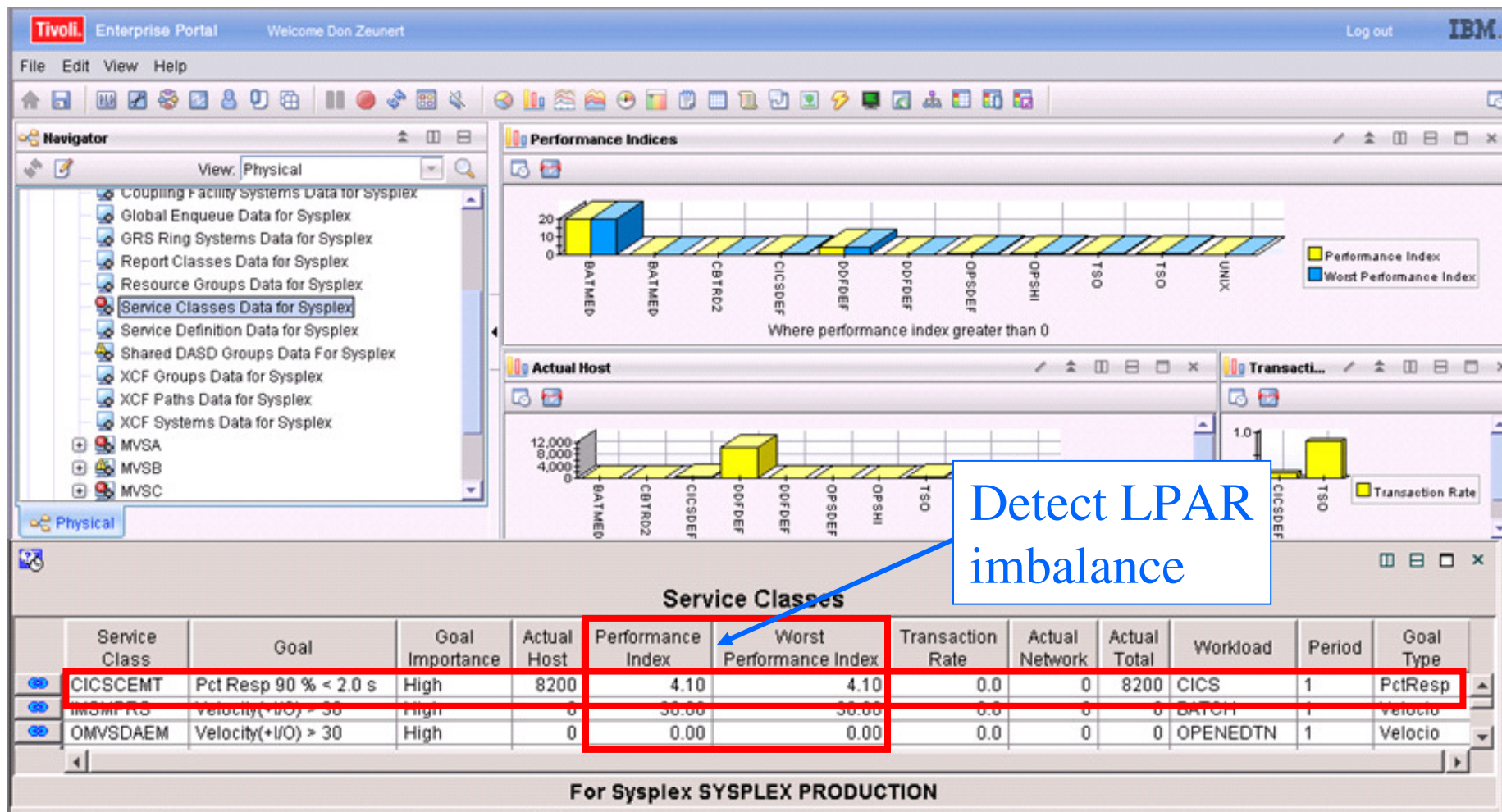
CICS Managed With Response Goal

JOBNAME	DP	Workload	SrvClass	SP	Server
CICSS20	F5	STC	STC	2	NO
CICSS18	FB	STC	STC	1	YES
CICSS19	F5	STC	STC	2	NO

CICS region CICSS18 has response goals and is being actively managed to a dynamically created Server service class. The other regions may have response time goals, but insufficient volume of work to be managed as a server.



Sysplex-Wide Service Classes



Address Spaces Managed by Service Class CICSCENT



```

    Actions  GoTo  Index  View  Options  Help
    _____ 05/28/04 12:05:48 PM
    KM2S10D      Service Class Period Address Spaces      System: SP12

    Workload Name . . . . : CICS          Desc: CICS transactions
    Service Class Name . . : CICSCENT +   Desc: CICS CEMT transactions
    Service Class Period . : 1           Service Class Type .: Transaction
    Importance . . . . . : High
    Goal . . . . . : %Rsp 90%< 2.00s   Transaction Rate . . : 46/h
    Actual . . . . . : 8.02s           Performance Index . . : 4
    Resource Group . . . . : n/a        Network Response . . : n/a

    View of All Address Spaces

    Address Space | Report Class | Wkg Set | Frames Held | I/O Rate | CPU %
    _____|_____
    CCCDS18 S | REPORTA | 473 | 5344 | n/a | 0.0 | 0.0

    (Serv Class Period Details) <Serv Class Prd Wkf Analysis>
    F1=Help F2=Keys F3=Exit F5=Refresh F6=Console F10=Action Bar
    F11=Print F15=System Status
  
```

CICS – Service-Class Displays as That of Address Space



```

Actions  GoTo  Index  Options  Help
-----
KM2W03D  Resource Details For Batch Job, STC or TSO User  System: SP12
05/28/04 12:06:39 PM

Resource Utilization          WLM Control Values

Jobname or userid . . . CCCDS18 +
ASID . . . . . 125 +
CPU % . . . . . 0.0
I/O rate per second : 0.0
Status . . . . . WAT*NSW

Working set . . . . . 21404K
Fixed frames in priv : 92
Total fixed frames . : 97
Expanded frames . . . : N/A
Page-ins/CPU sec . . . : 0.0
Page-ins/sec . . . . . : 0.0
Page-outs/sec . . . . . : 0.0
Shared page views . . : 0

Svc. Class : STC
Period . . . : 2
Dprty . . . : 243
Algorithm . . : Fixed
High UIC . . : 2540

Frames in UIC
0 to 1 . . . . . : 869
1 to 2 . . . . . : 0
2 to 30 . . . . . : 373
30 to 255 . . . . . : 4017

(Resource Details)  <Job Details>
F1=Help  F2=Keys  F3=Exit  F4=Prompt  F5=Refresh  F6=Console  F10=Action Bar
F11=Print  F15=System Status
4B  :02.0  01/02
    
```

Two CICS-Managed Velocity Goals of Service Class STC



Resource Utilization		WLM Control Values	
<pre> Jobname or userid . . . CCCDS19 + ASID 128 + CPU % 0.0 I/O rate per second . . . 0.0 Status WAT*NSW Working set 25204K Fixed frames in priv . . . 96 Total fixed frames . . . 101 Expanded frames N/A Page-ins/CPU sec 0.0 Page-ins/sec 0.0 Page-outs/sec 0.0 Shared page views 0 </pre>	<pre> Svc. Class : STC Period . . . : 1 Dprty . . . : 251 Algorithm . . : Fixed High UIC . . : 2540 Frames in UIC 0 to 1 : 277 1 to 2 : 0 2 to 30 : 142 30 to 255 : 5785 </pre>	<pre> Jobname or userid . . . CCCDS20 + ASID 129 + CPU % 0.0 I/O rate per second . . . 0.0 Status WAT*NSW Working set 35716K Fixed frames in priv . . . 113 Total fixed frames . . . 126 Expanded frames N/A Page-ins/CPU sec 0.0 Page-ins/sec 0.0 Page-outs/sec 0.0 Shared page views 0 </pre>	<pre> Svc. Class : STC Period . . . : 1 Dprty . . . : 251 Algorithm . . : Fixed High UIC . . : 2540 Frames in UIC 0 to 1 : 506 1 to 2 : 0 2 to 30 : 109 30 to 255 : 8199 </pre>

Different
DPRI for
address
space
managed
from
transaction
managed

SDSF
shows
SRVCLS
STC

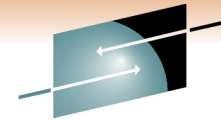


Where/How to Find lost Sheep

- Probable candidates
 - High resource consumption with low relative volume
- WLM sets address space, not TCB priority
 - Lower priority than the rest of the group
 - CICS attach facility DB2 HIGH/LOW

Heterogeneous Workloads

- Service classes with diverse address spaces
 - CICS regions (TORs, AORs, FORs)
- Address spaces with diverse units of work
 - IMS MPPs (Classes 1-5)
 - IMS dispatching priorities
 - CICS AORs
 - CICS transaction priority, long-running



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All Service Classes on LPAR

Tivoli Enterprise Portal Welcome Don Zeunert Log out IBM

File Edit View Help

Navigator View: Physical

- System CPU Utilization
- System Paging Activity
- Tape Drives
- User Response Time
- WLM Service Class Resources
- z/OS UNIX System Services Overview
- NetView Agent
- Storage Subsystem
- DB2plex
- IMSplex

Physical

CPU Percentage

I/Os Per Se...

Where I/O rate is greater than 0

Average Sto...

1201

WLM Service Class Resources

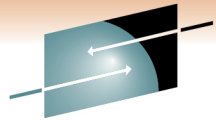
Service Class	Period	Goal Type	Goal Percentile	Goal Importance	Goal Value	Duration	Average Response Time	Performance Index	Actual Host	Percent CPU	Percent IFA	Percent IFA on CP	Percent zIIP	Percent zIIP on CP	Promoted Percent	I/O Rate	L Pri
OPSHI	1	Velocio	0	Highest	70	0	0	1.25	56	0.3	0.0	0.0	0.0	0.0	0.0000	76.4	Unave
OPSDEF	1	Velocio	0	High	60	0	0	0.75	79	2.1	0.0	0.0	0.0	0.0	0.0000	216.9	Unave
SYSOTHER	1	SysGoal	0	Unavailable	0	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
SPECIAL	1	Velocio	0	Highest	70	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
ORAMT3	1	Velocio	0	Medium	40	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
ORAMT2	1	Discret	0	Unavailable	0	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
ORAMT1	3	Velocio	0	Lowest	10	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
ORAMT1	2	AvgResp	0	Medium	5000	500	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
ORAMT1	1	AvgResp	0	Highest	15	50	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
ORACLES	1	Velocio	0	Lowest	10	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
OPSLO	1	Velocio	0	Medium	10	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
OMVS	1	Velocio	0	Lowest	10	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave
NETV/NWI	1	Velocio	0	Lowest	10	0	0	0.00	0	0.0	0.0	0.0	0.0	0.0	0.0000	0.0	Unave

Multiple Percentile Goal Service Classes for TP

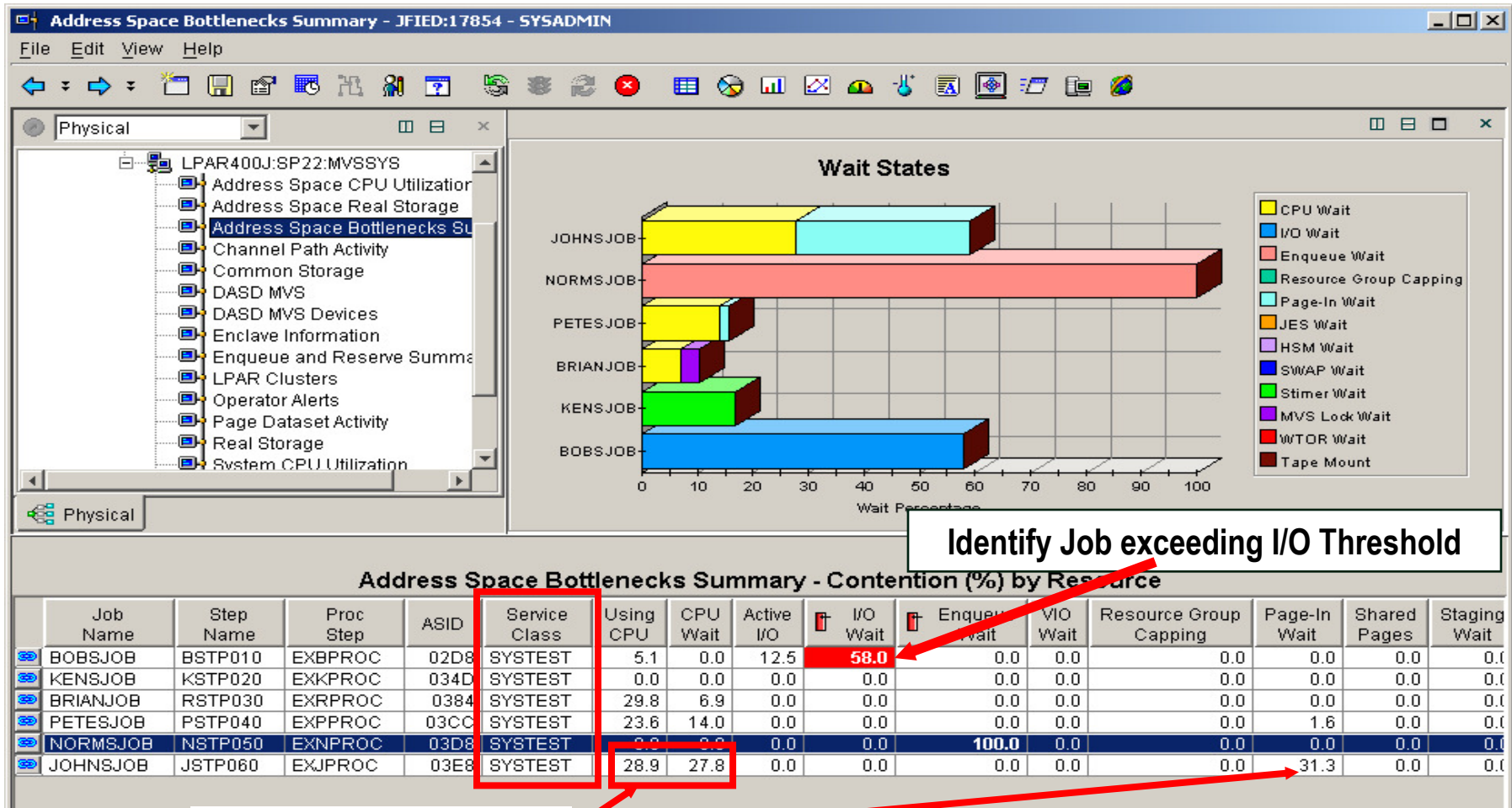
For System MVSC

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Heterogeneous Workloads in Service Class



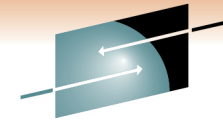
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Identify Job exceeding I/O Threshold

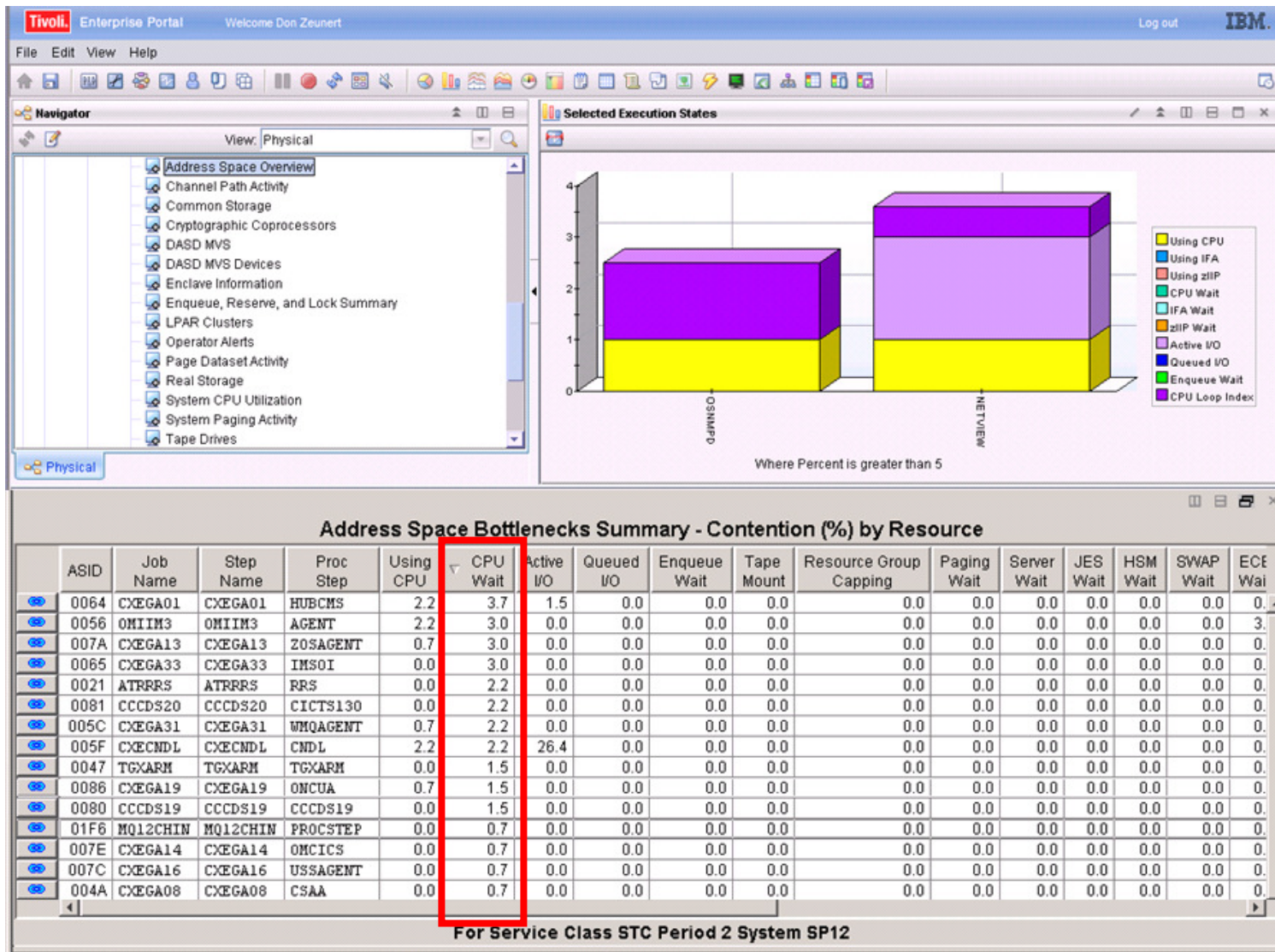
Different delays

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Single Service Class Sort by CPU Wait

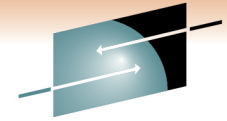


P/I < 1.0, but Some Regions Waiting on CPU



- Customers - Previous environment
 - Three CICS percentile goals for all regions classified by SUBSYSTEM (regions APPL ID)
 - Grp1 95% < 0.5 secs
 - Grp2 95% < 1.0 secs (troubled regions here)
 - Grp3 95% < 2.0 secs

Service Class ONLPRDG2



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Actions GoTo Index Options Help

06/02/04 1:45:49 PM

KM2S110

Service Class Period Workflow Analysis

System: SYSA

Status

Bottlenecks

<p>Workload Name : ONLINE Desc: Online transaction goals Service Class Name. . . ONLPRDG2 + Desc: Online Transactions Goal #2 Service Class Type. . . : Transaction Service Class Period. . . 1 Importance. . . . : Highest Goal. : %Rsp 95% < 1.00s Actual. : 800ms Network Response. . . : n/a Transaction Rate. . . : 36/s Performance Index . . : 0.8 Period CPU% : .0 _ Resource Group. . . :</p>	<table border="1"> <thead> <tr> <th>Resource</th> <th>%</th> <th>8.....96</th> </tr> </thead> <tbody> <tr> <td>_ Using CPU</td> <td>20.3</td> <td>--></td> </tr> <tr> <td>_ Active I/O</td> <td>.0</td> <td></td> </tr> <tr> <td>_ CPU wait</td> <td>16.6</td> <td>--></td> </tr> <tr> <td>_ I/O wait</td> <td>.0</td> <td></td> </tr> <tr> <td>_ Paging wait</td> <td>.0</td> <td></td> </tr> <tr> <td>_ Enqueue wait</td> <td>.0</td> <td></td> </tr> <tr> <td>_ Tape mount</td> <td>.0</td> <td></td> </tr> <tr> <td>_ Other waits</td> <td>.0</td> <td></td> </tr> <tr> <td>_ Idle</td> <td>62.9</td> <td>-----></td> </tr> </tbody> </table>	Resource	%	8.....96	_ Using CPU	20.3	-->	_ Active I/O	.0		_ CPU wait	16.6	-->	_ I/O wait	.0		_ Paging wait	.0		_ Enqueue wait	.0		_ Tape mount	.0		_ Other waits	.0		_ Idle	62.9	----->
Resource	%	8.....96																													
_ Using CPU	20.3	-->																													
_ Active I/O	.0																														
_ CPU wait	16.6	-->																													
_ I/O wait	.0																														
_ Paging wait	.0																														
_ Enqueue wait	.0																														
_ Tape mount	.0																														
_ Other waits	.0																														
_ Idle	62.9	----->																													

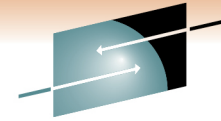
**CPU
Using
20.3%**

**CPU
Wait
16.6%**

Making Goal P/I < 1

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AddrSpcs Managed by Trans Goal



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ONPRDG2
transaction
service class
address
spaces

CICSPAM0
is one of the
heavy hitters
in

```

    _____ Actions GoTo Index View Options Help
    _____ 06/02/04 1:47:20 PM
    *M2S10J      Service Class Period Address Spaces      System:SYSA
    _____

    Workload Name . . . : ONLINE      Desc: Online transaction goals
    Service Class Name . . : ONLPRDG2 + Desc: Online Transactions Goal #2
    Service Class Period . 1         Service Class Type .: Transaction
    Importance . . . . : Highest
    Goal . . . . . : %Rsp 95% < 1.00s  Transaction Rate . . : 37/s
    Actual . . . . . : 600ms           Performance Index . . : .8
    _ Resource Group . . : n/r         Network Response . . : n/a
    _____

    View of All Address Spaces      Lines 1__ to 5 of 23

    _____
    Address  Report  Wkg  Frames Held  I/O  CPU % 2.....22
    Space   Class   Set  CSTOR  ESTOR  Rate
    _____
    - CICSP2M0 S  - CICSP2M0      21K  n/a  477.4  17.7 ----->
    - CICSPAM0 S  - CICSPAM0      24K  n/a   0.0  16.7 ----->
    - TRACKER S  - TRACKER       19K  n/a  80.6  13.3 ----->
    _____
    
```

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Region not like Service Class



Actions GoTo Index Options Help

06/02/04 1:12:50 PM

KM2W020

Details for a Job or Started Task

System:SYSA

Status

Elapsed Time Profile

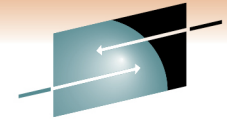
```

Job or task . . . . . CICSPAM0 +
ASID . . . . . : 456 +
Service class . . : SERVERS
Submitted by . . . : CICSPAM0
Procstep . . . . . : AUTOSAOR
Step . . . . . : CICSPAM0
Step CPU time left : NO LIMIT
Step CPU time . . : 37:53 MN
Step elapsed time . : 09:10 HR
Step CPU % . . . . : 7.41%
Job elapsed time . : 09:10 HR
Status . . . . . : WAT*NSW
Wait/swap reason . :
Wait/swap time . . : 2 S
    
```

Execution State	%	5.....75
_ Using CPU	8	->
Active I/O	0	
_ CPU wait	27	----->
_ I/O wait	0	
_ Paging wait	0	
_ Enqueue wait	0	
_ SRM delay	0	
_ Tape mount	0	
_ Other waits	0	
_ Idle	73	----->
_*SYSTEM* is main impactor		

**CICS region
CICSPAM0
wait of 27%
> Service
class
ONLPRDG2
wait of 16%**

CICS region not like Service class



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___ Actions GoTo Index Options Help

06/02/04 12:59:38 PM

KM2W020

Details for a Job or Started Task

System:SYSA

Status

Elapsed Time Profile

```

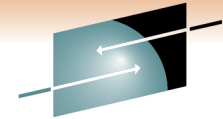
Job or task . . . . . CICSPAM1 +
ASID . . . . . : 433 +
Service class . . : SERVERS
Submitted by . . . : CICSPAM1
Procstep . . . . . : AUTO5AOR
Step . . . . . : CICSPAM1
Step CPU time left : NO LIMIT
Step CPU time . . : 28:37 MN
Step elapsed time. : 08:57 HR
Step CPU % . . . . : 5.88%
Job elapsed time . : 08:57 HR
Status . . . . . : WAT*NSW
Wait/swap reason . :
Wait/swap time . . : 1 S
    
```

Execution State	%	4.....60
_ Using CPU	21	----->
_ Active I/O	0	
_ CPU wait	56	----->
_ I/O wait	0	
_ Paging wait	0	
_ Enqueue wait	0	
_ SRM delay	0	
_ Tape mount	0	
_ Other waits	0	
_ Idle	33	----->
_ *SYSTEM* is main impactor		

**CICS region
CICSPAM1
wait of 56%
> Service
class
ONLPRDG2
wait of 16%**

SHARE
in Anaheim
2011

CICS w/ Response problem



CMD==> DIS RPC(CIC*) RIF(RES(>1S)) TODAY STIME(11:00)

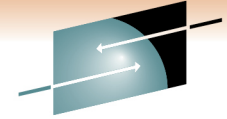
```

=====
| Report Class = CICSPAM0
| From      11:59 to 12:19 on 06/02/04           Elap =   19:54 M SYSA
|-----
|Wait_Reason_____Time_____%_|0___1___2___3___4___5___6___7___8___9___0|
|Using CPU                .30 S  12.0|---->  .   .   .   .   .   .   .   .   .|
|ECB Wait (w/ STIMER)     1.34 S  53.5|-----> .   .   .   .   .   .   .   .   .|
|Waiting for CPU          .85 S  34.0|-----=> .   .   .   .   .   .   .   .   .|
|Average Trans Time      2.50 S           804 MVS Transactions Ended
|-----
| Report Class = CICSPAM0
| From      12:39 to 12:59 on 06/02/04           Elap =   19:57 M SYSA
|-----
|Wait_Reason_____Time_____%_|0___1___2___3___4___5___6___7___8___9___0|
|Using CPU                .64 S  12.7|---->  .   .   .   .   .   .   .   .   .|
|ECB Wait (w/ STIMER)     3.42 S  67.1|----->>> .   .   .   .   .   .   .   .   .|
|Waiting for CPU          .99 S  19.4|----> .   .   .   .   .   .   .   .   .|
|Average Trans Time      5.09 S           320 MVS Transactions Ended
|-----

```

Goal 95% < 1 sec, Service class does 51K trans

History -- All Service Classes



!CANDLE CORP. 06/02/04 13:15 Mode: PAGE 1 of 7

CMD==> **DIS RSCL**

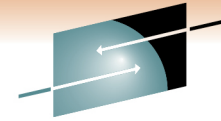
+===== WLM Service Classes=====+

| From: 10:19 to 10:39 on 06/02/04 Elap = 20:00 M SYSA |

+-----+

Service Class	Pd	Goal	Dur	Actual	Perf. Index	Goal Imp.	Num Tran	Tran Rate	I/O Rate	Avg Stor	CPU%
AMMO	1	95%< 500ms		25ms	0.50	HGHST	8682	7/s			
ARCHIVE	1	VEL+IO>50%		62.3	0.80	HGHST	1	2/h	102.5		.6
CICSLONG	1	1%< 24.0h		720.0m	0.50	LOWST	510	25/m			
DART	1	90%< 1.00s		90ms	0.90	HGHST	13K	10/s			
DDFDEBTM	1	95%< 1.00s		50ms	0.50	HGHST	78K	64/s			32.4
DDFDSNP	1	95%< 1.00s		50ms	0.50	HGHST	13K	10/s			18.9
DDFPROD	1	95%< 1.00s		50ms	0.50	HGHST	1542	1/s			2.1
IMSPRDG3	1	93%< 1.00s		60ms	0.60	HGHST	84K	70/s			
ONLPRDG1	1	95%< 500ms		2.00s	4.00	HGHST	15K	12/s			
ONLPRDG2	1	95%< 1.00s		50ms	0.50	HGHST	51K	42/s			
ONLPRDG3	1	95%< 2.00s		1.00s	0.50	HGHST	120K	1/s			

Service class making its goal (in red)



CICS Response goals Service Class

Tivoli Enterprise Portal Welcome SYSADMIN Log out IBM

File Edit View Help

Navigator View: Physical

- XCF Groups Data for Sysplex
- XCF Paths Data for Sysplex
- XCF Systems Data for Sysplex
- S01
 - CICS
 - DB2
 - Mainframe Networks
 - MVS Operating System
 - Services Management Agent
 - Storage Subsystem
 - WebSphere Agent - Primary
 - zOS Management Console
- S02
- zVM Systems

KFWITM025I 4 Navigator updates pending

Physical

CICS Performance Summary

Service Class Name	CICS Region Name	Transactions Total	Transaction Rate	Average Response Time	Response Time Goal	% Time Using CPU	% Wait on Redispatch	% Wait on MRO	System ID
CTRANS	CICSC141	118	23	00:00:00.027	00:00:00	11	6	0	S01_
DTRANS	CICSC141	44318	8863	00:00:00.097	00:00:01	0	24	0	S01_
RTRANS	CICSC141	77616	15523	00:00:00.079	00:00:01	0	1	0	S01_
STRANS	CICSC141	33957	6791	00:00:00.111	00:00:01	0	35	0	S01_
TTRANS	CICSC141	22176	4435	00:00:00.073	00:00:01	0	0	0	S01_
ATRANS	CICSC141	77616	15523	00:00:00.073	00:00:01	0	0	0	S01_
ITRANS	CICSC141	22176	4435	00:00:00.109	00:00:01	0	34	0	S01_

Compare 1 region to CICSplex
Using & waiting the same

Service Level Summary

Service Class Name	Transactions Total	Transaction Rate	Average Response Time	Response Time Goal	% Time Using CPU	% Wait on Redispatch	% Wait on MRO	% Wait on DB2	% Wait on MQ	% Wait on File Control	% Wait on DLI	50% of Goal	200% of Goal	Interval End Timestamp	W
CTRANS	118	23	00:00:00.027	00:00:01	11	6	0	18	0	0	0	118	0	02/03/11 15:22:32	DFLT
DTRANS	44318	8863	00:00:00.097	00:00:01	0	24	0	2	0	0	0	44297	0	02/03/11 15:22:32	DFLT
RTRANS	77616	15523	00:00:00.079	00:00:01	0	1	0	0	0	0	0	77284	86	02/03/11 15:22:32	DFLT
STRANS	33957	6791	00:00:00.111	00:00:01	0	35	0	0	0	0	0	33957	0	02/03/11 15:22:32	DFLT
TTRANS	22176	4435	00:00:00.073	00:00:01	0	0	0	0	0	0	0	22176	0	02/03/11 15:22:32	DFLT
ATRANS	77616	15523	00:00:00.073	00:00:01	0	0	0	0	0	0	0	77616	0	02/03/11 15:22:32	DFLT
ITRANS	22176	4435	00:00:00.109	00:00:01	0	34	0	0	0	0	0	22176	0	02/03/11 15:22:32	DFLT

Pub Time: Thu 02/03/2011 03:20 PM Server Available CICS Performance Summary 012.16.161 SYSADMIN

P/I < 1.0, but Some Regions Waiting on CPU



- Previous environment
 - Three CICS percentile goals for all regions classified by SUBSYSTEM (regions APPL ID)
 - Grp1 95% < 0.5 secs
 - Grp2 95% < 1.0 secs (troubled regions here)
 - Grp3 95% < 2.0 secs
- New environment
 - Additional service class for five suffering CICS regions, plus 10 hitchhikers (part-time)
 - Appl1 90% < 1.0 secs

Results of Change – One Transaction in One Region



Hr	TRN6 Mon Feb 3				TRN6 Mon Feb 10				Chg Avg Resp	% AVG Resp	Chg in Max Resp	% Max Resp	Chg % < 1s	Chg # tran	% Chg in # of trans
	Avg	Max	% < 1s	# tran	Avg Resp	Max Resp	% < 1s	# tran							
8	2.39	9.14	10.40	346	1.68	7.18	35.65	561	-0.70	-29.48%	-1.96	-21.47%	25.25	215.00	62.14%
9	3.54	14.33	4.22	663	1.58	7.59	33.92	1073	-1.97	-55.46%	-6.74	-47.05%	29.70	410.00	61.84%
10	3.20	16.97	6.28	955	1.58	12.98	33.31	1462	-1.62	-50.53%	-3.99	-23.50%	27.03	507.00	53.09%
11	6.50	35.00	1.29	1011	1.53	16.04	37.67	1728	-4.97	-76.49%	-18.96	-54.17%	36.38	717.00	70.92%
12	4.54	24.79	6.04	944	1.63	12.37	36.40	1684	-2.90	-64.02%	-12.41	-50.07%	30.36	740.00	78.39%
13	4.21	30.93	5.08	1279	1.51	8.56	35.66	1806	-2.70	-64.09%	-22.37	-72.33%	30.58	527.00	41.20%
14	4.43	33.44	4.54	1146	1.43	11.11	37.98	2014	-3.00	-67.63%	-22.33	-66.77%	33.44	868.00	75.74%
15	3.63	21.79	6.74	1232	1.61	15.91	37.80	2042	-2.02	-55.60%	-5.88	-26.98%	31.06	810.00	65.75%
16	2.56	17.34	11.46	838	1.32	12.37	48.57	1616	-1.24	-48.32%	-4.97	-28.67%	37.11	778.00	92.84%
17	3.03	20.05	7.98	539	1.22	14.40	50.85	1119	-1.81	-59.71%	-5.65	-28.17%	42.87	580.00	107.61%
18	2.22	18.45	10.88	386	1.02	15.58	56.50	800	-1.20	-54.01%	-2.87	-15.55%	45.62	414.00	107.25%
AVG	3.66	22.02	6.81	849	1.47	12.19	40.39	1446	-2.19	-59.93%	-9.83	-44.64%	33.58	596.91	70.31%

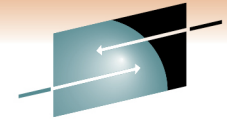
60% Avg resp

45% Worst resp

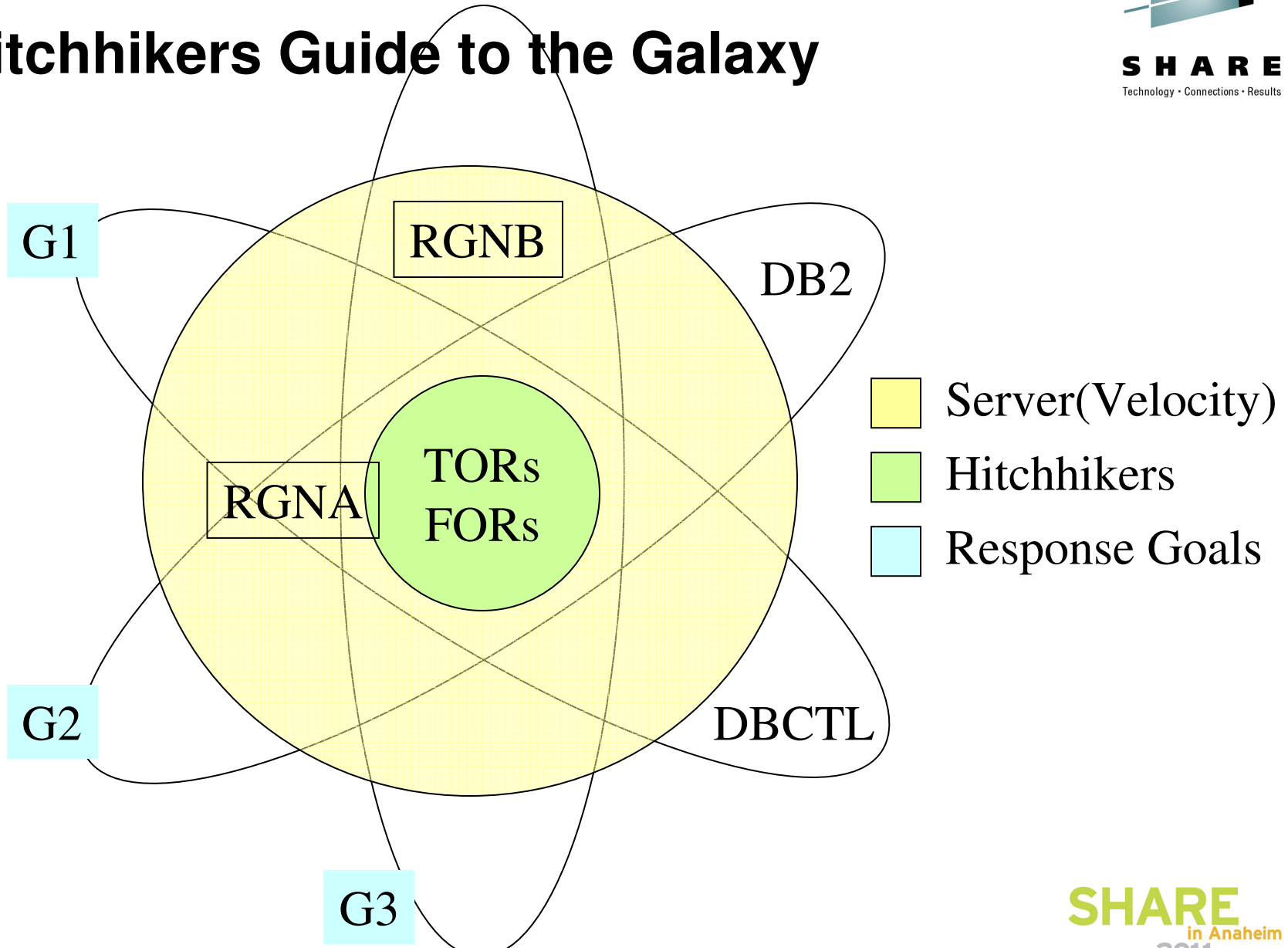
70% more trans

New service class – APPL ID 90% less than 1 sec





Hitchhikers Guide to the Galaxy



WLM Assigns DPRI by Goal

Service Class DPRI

SYSTEM	FF
SYSSTC	FE

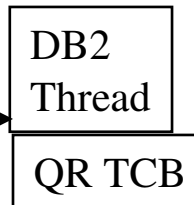
TSO 1st	FB
---------	----

PRODDDB2	DC
----------	----

CICSShrt	DB
----------	----

CICSNorm	D5
----------	----

CICSSrvr	BE
----------	----



- Internal dispatcher
 - CICS transaction priority
 - CICS favors trivial
 - IMS message classes
- All address spaces (20 CICS regions) in service class have same DPRI
 - **Maybe not with DB2 threads**
- TCB priority
 - DB2 (high, low, equal)

Other Ways to Find Delays

```

!CANDLE CORP.      05/23/04 20:22  Mode: PAGE
CMD==> DIS SCL(*) RIF(CPW(>1))
*****
+=====+
| Service Class = TSO                                     Period = (1) |
| From      22:45 to 23:00 on 05/02/04                   Elap =   14:55 M SP12 |
+-----+
|Wait_Reason_____Time_____%_|0___1___2___3___4___5___6___7___8___9___0|
|Using CPU          .00 S  11.3|---->  .   .   .   .   .   .   .   .   .   .|
|ECB Wait           .00 S  50.6|----->=====>  .   .   .   .   .   .|
|Waiting for CPU    .00 S  25.3|----->  .   .   .   .   .   .   .   .|
|Disk  CAN005 0210 Act .00 S  12.6|---->  .   .   .   .   .   .   .   .|
|Average Trans Time .00 S          4070  MVS Transactions Ended |
+=====+

```

Display any service class experiencing CPU delays

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