

# CICS Workload Management:: A best practice approach

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Agenda



- CICSPlex SM: Start here
- CICSPlex SM and CICS Explorer: Enabling Single System
   Image
- CICSPlex SM: Workload Management
- CICSPlex SM: Foundation for CICS Platform and Application Deployment





#### Agenda

- CICSPlex SM: Start here
  - Foundation Concepts
    - Capabilities and Topologies
  - Getting Started
    - What you need to decide
    - Using CICS Deployment Assistant
    - Using CICS Configuration Manager
- CICSPlex SM and CICS Explorer: Enabling Single System Image
- CICSPlex SM: Workload Management
- CICSPlex SM: Foundation for CICS Platform and Application Deployment





#### CPSM-ite?





### From http://www.unilever.co.uk/brands-in-action/detail/Marmite/293688/

Marmite was conceived in 1902 and the Marmite Food Company opened a small factory in Burton-on-Trent where it still resides today. It took a couple of years to perfect the recipe and for the British public to warm to the spread's distinctive taste.

Before Louis Pasteur realised that the cells in yeast were in fact living plants, people simply discarded this by-product of the brewing process. German scientist Liebig then went on to make yeast into a concentrated food product - one that resembled meat extract but was in fact vegetarian.

Today Marmite is a nutritious, black, tasty, savoury spread enjoyable on toast or bread or even as a cooking ingredient. It is made from spent brewer's yeast and comes in a distinctive black jar with a yellow lid.

Following the discovery of vitamins in 1912, yeast was found to be a great source of five important 'B' vitamins. As a result Marmite was included in soldiers' ration packs during World War I. It became a dietary supplement in prisoner-of-war camps in World War II and was sent to British peacekeeping forces in Kosovo to boost morale in 1999.

Limited edition Guinness Marmite was launched in 2007, followed by Marmite champagne, especially for Valentine's Day in 2008 and 2009 saw a cricket-themed Marsden's Marmite. Extra strength Marmite XO was developed in 2010 and to celebrate the Queen's Diamond Jubilee in June 2012, Marmite decided to pay a fitting tribute by launching another limited edition, aptly named 'Ma'amite'.

Marmite has had a number of heart-warming advertising campaigns over the years from 'My Mate Marmite' to Paddington Bear. The most popular 'Love it or Hate it' campaign was born out of talking to people and discovering that most of them really either love or hate Marmite! A bold move for the brand which has coined a well-used phrase today.





**CICSPlex SM Features** 

- A real-time, single-system image (SSI)
- A single point of control
- Management of your business applications
- Operations for the entire CICSplex
- Management of your workloads
- Automated exception reporting for CICS resources
- Monitoring functions for the collection of statistical data for CICS resources
- An application programming interface (API)
- Management of the CICSPlex SM environment
- Management of time-dependent activity





# Read my lips...

## "CICSPlex SM is the foundation for enhancing the User Experience, Productivity, and Agility of running every type, size and complexity of CICS system, period."





CICSPlex SM – Getting Started

- Read the Concepts and Planning documentation
- Some basics...



### **CICSPlex SM – Provisioning Management Resources**



#### Logical Structure

Infrastructure Topology





#### CICSPlex SM – System Groups Logical Structure

Topology





#### Short-cut to CICSplex... CICS Deployment Assistant







#### CICS DA – Discover and Visualize

#### Graphical Visualisation: Sysplex view & Overview



### SHARE

#### Tree View





#### CICS DA – Discover and Visualize



Scoped connections view - in a physical layout





### **CICS DA - Plexify**

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In Prittsburgh 2014		Cancel

#### Agenda



- CICSPlex SM: Start here
- CICSPlex SM and CICS Explorer: Enabling Single System Image
  - CICS Explorer the modern face of CICS
  - Operations
  - Definitions
- CICSPlex SM: Workload Management
- CICSPlex SM: Foundation for CICS Platform and Application Deployment





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in Pittsburgh 2014

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#### Lifecycle







#### z/OS Perspective



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#### Agenda



- CICSPlex SM: Start here
- CICSPlex SM and CICS Explorer: Enabling Single System Image
- CICSPlex SM: Workload Management
  - Principles of WLM
  - Simplified WLM definition with CICS Explorer v5.2
- CICSPlex SM: Foundation for CICS Platform and Application
   Deployment





What's the problem?

... it all becomes more complicated to manage.

- -Definitions managed & maintained locally
- -Applications are statically routed
- -Which leads to...
  - Availability problems
  - Lower probability of meeting response time goals





#### What is the solution?

- Workload Management ... ٠
  - In the Network \_
    - **VTAM Generic Resource**
    - TCP/IP load balancing
  - In the Sysplex
    - z/OS Workload Manager
  - In CICS sub-system —
    - CICSPlex SM Workload Management





Plex



Workload management in the network

- TCP/IP balancing (balance web-services and CICS WEB clients)
  - Sysplex Distributor
    - Sysplex Distributor provides balancing of IP packets across multiple IP stacks.
  - Virtual IP Addressing (VIPA)
    - Dynamic VIPA provides non-disruptive rerouting around a failing network adapter.
  - DNS approach
    - DNS connection optimization, balances IP connections in a z/OS Sysplex IP domain. This is based on feedback from MVS<sup>™</sup> WLM about the health of the registered applications. It is still supported for CICS use.
  - Port Sharing
    - TCP/IP port sharing provides a simple way of spreading share

complete your session evaluations on line question of cics router regions

running in the same z/OS image.



#### Workload management in the network

VTAM Generic Resource





- Works with z/OS System Resource Manager (SRM)
- Dynamically allocates resources
  - Processor Storage, IO Priority
- Service Definition
  - Contains 1 or more Service Policies
- Policy defined in terms of "Goals", not resources
  - Service Policy
    - One per Sysplex
      - Can switch Policy when required
  - Service Class
    - Describes performance objectives for part of workload
- Report Class





- Goals
  - Response time How quick to run work
    - Average Response Time
      - E.g. Average transaction response should be 2 seconds
    - Percentile Response Time
      - E.g. 95% of transactions should complete in 3 seconds
  - Velocity
    - How fast work should run as a % of the time it's ready
      - High Value When work is ready, run it quickly
      - Low Value When work is ready, can wait to run
    - Used to get CICS active
  - Discretionary Work with no goals





- Report Class
- Classification Rules
  - How work get classified to Service Class
  - Some Classification Rules available for CICS:
    - SI SubSystem (Applid)
    - UI Userid
    - TN Transaction Name
    - LU LUName



- Goal Importance
  - Associated with Service Class
  - 1-5 : 1 = Very important, 5 = Not important
- Performance Index (PI)
  - Used to compare Goals
  - How well is work meeting it's Goal
    - PI = 1 : Meeting the Goal
    - PI < 1 : Over-achiever (beating the goal)
    - PI > 1 : Under-achiever (Not meeting the goal)





z/OS WLM and CICS : 1

- When CICS starts, as job or Started Task,
  - uses JES or STC classifications
- Once CICS is active,
  - CICS connects to z/WLM
  - CICS Sub-System related Service Classes are used
- At CICS startup, CICS will allocate a Pool of Performance blocks based on MAXTASKS
  - Sampled at regular intervals, e.g. every 250ms
  - Communicates transaction state to z/OS WLM





#### z/OS WLM and CICS : 2

- When a Task starts:
  - Performance block associated with Transaction
  - Transaction Classified (New, or passed via MRO)
  - Set-up Performance Block
- A Task executes
  - Dispatcher updates Performance Block
- Task ends:
  - Report transaction Complete or ...
  - Notify of partial transaction complete (e.g. in AOR via MRO)





z/OS WLM and CICS : 3

- Using z/OS WLM and CICS
  - Work distributed to the CICS System 'best' able to perform the work within the Sysplex
    - Based on z/OS WLM goals
  - z/OS WLM controls which Requesting/Routing (TOR) CICS Regions receive the work to be routed under CICSPlex SM criteria
    - Regions in bigger/more powerful LPARs may be favoured
    - CICSPlex SM will favour local routing





### z/OS WLM: Deciding how the work reaches CICS

- z/OS WLM controls which Requesting (TOR) CICS Regions receive the work
- z/OS WLM can also affect which AOR is chosen when using CICSPlex SM
- Once in CICS routed under CICSPlex SM criteria
  - Regions in bigger/more powerful LPARs may be favoured
  - CICSPlex SM will favour local routing
    - Can give the impression of an "Unbalanced" Workload
    - In reality more work goes to the System(s) best able to deal with the work
      - An uneven distribution may be an accurate reflection of the capabilities of the environment



Complete your session evaluations online at www.SHARE.org/Pittsburgh-Eval

Network



### zWLM & CICSPlex SM Workload Management

 Uses z/OS WLM 'Average Transaction Response Times' to influence the 'LOAD'





What can CICS do?: Dynamic

• Dynamic Routing

- Transactions associated with a terminal

- Physically 'entered' at a terminal
  Via an EXEC CICS START TERMID command
- Dynamic Program Link (DPL)
  - EXEC CICS LINK PROGRAM command





What can CICS do?: Distributed

• Distributed Routing

- Non-Terminal initiated STARTs (NTIS)

- i.e. EXEC CICS START with no TERMID

- CICS BTS

- Enterprise Java Beans (EJBs) & IIOP
- Inbound WebServices

- if modified to make them routable





How does CICS do this?

- CICS uses 'user replaceable' programs
  - One for Dynamic Routing
  - One for Distributed Routing
  - CICS ...
    - ... calls the appropriate program to decide where to route to
    - ... passes the program the DFHDYPDS commarea





### When is the Dynamic Routing Program called?

- Program
  - If defined:
    - DYNAMIC(YES)
  - If not defined:
    - Program not defined and the program is not autoinstalled
- Transaction
  - If defined:
    - DYNAMIC(YES)
  - If not defined:
    - SIT DTRTRAN={CRTX|name}





### When is Distributed Routing Program called?

- Transaction Starts (Non-Terminal Initiated)
  - TRANSACTION defined ROUTABLE(YES)
- CICS BTS
  - PROCESS or ACTIVITY started by RUN ASYNCHRONOUS
  - TRANSACTION associated with PROCESS or ACTIVITY has DYNAMIC(YES) and REMOTESYSTEM is blank
- Inbound WebServices
  - Target program defined DYNAMIC(YES)
  - A program in the PIPELINE changes contents of
    - Container DFHWS-USERID
    - Container DFHWS-TRANID & referenced TRANID defined DYNAMIC(YES)





So what part does CICSPlex SM play?

- It supplies a program to act as both...
  - ... the Dynamic Routing Program
    - SIT DTRPGM
    - SPI SET SYSTEM DTRPROGRAM
  - ... the Distributed Routing Program
    - In SIT DSRTPGM
    - SPI SET SYSTEM DSRTPROGRAM
  - EYU9XLOP





### What does CICSPlex SM do when it's called ?

- Once called...
  - CICSPlex SM Workload Management facilities create a list of suitable, candidate, target CICS Regions, based on:
    - the transaction
    - the terminal id, luname, user id, or process type.
      - Note:
        - CICSPlex SM does not do the routing,
        - CICS does
  - The list of candidate Target Regions is based upon the Workload to which the Requesting/Routing Region belongs.





What model does it use?

- The CICSPlex SM Workload Management model can be divided into 2 parts:
  - Workload Balancing
    - The process which decides which of the Target Regions is considered to be the most suitable, the 'best', candidate to route to, assuming:
      - Work 'could' be sent to any of the Target Regions
      - Work does not have an 'affinity' with a specific Region
  - Workload Separation
    - How CICSPlex SM Workload Management allocates specific work
      - to specific set(s) of Target Regions
      - for specific reasons





#### Workload Balancing 1

- What Workload Balancing is NOT!
  - It is NOT a means of EVENLY distributing work
  - It is NOT a way to CONSISTENTLY distribute work





Workload Balancing 2

- Workload Balancing is ...
  - Providing CICS with the 'best' Target Region, at the moment the request was made, from all of the possible candidates.
- How does it know which the 'best' is ?





#### Workload Separation





What is a CICSPlex SM Workload?

- At its most basic
  - One or more Requesting/Routing Regions
  - One or more Target Regions
  - One Workload Specification





#### Workload Balancing – Workload Specification 1



- Workload Specification resource (WLMSPEC)...
  - Defines a Workload
    - The Workload must be *"associated"* with ...
      - ... Requesting/Routing Region(s) (Dynamic & Distributed)
      - Target Region(s) (Distributed only)





in Pittsburgh

### Workload Balancing – Workload Specification 2



- There can be multiple Workloads within a CICSplex
- A Region can be a Target for multiple Workloads
- A Region can be BOTH a Requesting and a Target Region
- But... Requesting/Routing Region can ONLY be associated with 1 Workload
- While you might not be using distributed today, don't have your target regions as target scopes in more than one workload



#### Workload Balancing – Workload Specification 3



- Associated with your requesting/routing regions
  - systems (CSYSDEF) and system groups (CSYSGRP)
- Specifies default target scope
  - a CICS Region (CSYSDEF)
  - a Group of CICS Regions (CSYSGRP)
- Specifies the algorithm type
   QUEUE or GOAL





#### New Face of WLM

CS SM	<ul> <li>IBM CICS Explorer - /home/stewart/workspaces/runtime-</li> </ul>	com.ibm.cics.explorer.productolympia		Solution (2014)
Q	■ • □ · □ · ○ · ○ · ○ · ○ · ○ · ○ · ○ · ○ ·		Q Quick Access 🗈 🗈 CICS SM	Resource CICS Transaction Gateway CICS DA
	🔁 CICSplex Exp 👌 CICSplex Re 👌 Repository E 📮 🗖	📔 Program 🗈 File Defini 🝺 Terminal 😣 IPIC Conn 🏙 Workload	🛿 🖻 Regions 🗞 Tasks 📴 ISC/MRO 🖳 Termin	nals 🗎 Files ⇔ Transacti 😫 Transacti 🛛 🗖 🗖
$\mathbf{O}$	1. A.			🚸 🚆 Name: 🚺 🔘 🕱 🔻
	Server: EHCM	CNX0200I Not connected		
	▼ 🔁 CICSEXP3 (6/6)	Name Default Af Affinity Lif Target Sco Automatic Match	Event Nam Algorithm Description	Change Tir Change Us Abendcrit Abendthree
	🔻 进 Workload Management			
	▼ 🛄 DEMO EHCM (ACTIVE)			
	🔻 🖾 Routers			
	·왕 IYCWEHE1			
	Routing rules			
•	Default routing			
	Demo description (\$CE69817)			
. 1	Targets (1)			
	🐺 Transaction group 7 (\$CE71560)			
A	▼			
	▼ 🖾 Targets (1)			
	IYCWEHH1 (ACTIVE)			
2	EXAMPLE EHCM (ACTIVE)			
	BALA			
	BALAJI			
Same	BEN			
λ.	BLAH			
N. N. N.	BROKE			
<b>%</b>				
		Properties 🔮 Front Lon 🗱 👯 Host Connections 🖹 Console		
		WorkspaceLog		
		hune filter text		(III)
		cypenicer cext	RESULTED DEVICE	
	NICK77	Message	Plug-in Date	
1		i IZE0100I Connected to cicsexp3host.hursley.ibm.com:27055 - asd	com.ibm.cics.core.co 11/04/	/2014 15:02
	INICK88C	i CNX0621I: Create Workload Specification "ACCT" in "CICSEX52" suc	ceeded com.ibm.cics.core.ui. 11/04/	/2014 14:59
	MICK90	1 IZE0100I Connected to cicsex52host.hursley.ibm.com:28903 - asd	com.ibm.cics.core.co 11/04/	/2014 14:54
	1 NICK99	Unable to find feature.xml in directory: /home/stewart/workspace	s/olympia/com.ibm. org.eclipse.update.cc 11/04/	/2014 14:54
	In STEVE1	IZEUTUUI CONNECTED TO CICSEX52Nost.hursley.ibm.com:28903 - asd	com.ibm.cics.core.co 11/04/	/2014 14:33
	DI STEW	Unable to find reature.xml in directory: /nome/stewart/workspace i UZE0100LCopposited to size ox Eabort hursdow ibm	es/otympia/com.ibm_org.ectipse.update.cc 11/04/	/2014 14:31
	I TEST	IZEV TVUI CONNECTED TO CICSEX 52NOST. NUTSIEV. IDm. com: 28903 - asd	com.iDm.cics.core.co 11/04/	/2014 14:08
	WLMSPEC2	Onable to find reacure.xml in directory: /nome/stewart/workspace     (+(	syotympia/com.ibm; org.ectipse.update.cq 11/04/	2014 14.08
			1	





#### New Face of WI M

reate Workload S Create a workload sp	pecification pecification.		
CICSplex:*	CICSEX52		
Name:*	ACCT		
Description:	[		
larget Scope:*	ZEMAORS Browse		
Primary Criterion:*	LUNAME ‡		
Algorithm:*	QUEUE ‡		
open editor 🗹			
?		Cancel	Finish



ම් *Workload Specification (ACCT) 🛿			- 0
ACCT			
Description: ACCT			
Routers 👔 🕂 🕐 Rule	es 👍 🚵 💽 🕜 Targets		3
IYCWEIE1     2       IYCWEIF1     2       2     2	Default rule     DB2 Custom Routing     Rule 2     User ID:     BTS process type:	EXPAGRP1  * * * *	Browse
	Transactions		* 2
	Name: Description:	DB2 Transactions	
	Transactions:	Type name to add <b>s<sup>™</sup> &gt; DB2A (START)</b> <b>s<sup>™</sup> &gt; DB2B</b>	Add Browse
	Algorithm:	INHERIT	
	Primary criterion:		<b></b>
	Status:	ACTIVE	<b></b>
	Affinities		
	These transact	ions establish affinities	Ø
	Relationshin	IIINAME	





🖀 Routing Rule: Demo description (\$CE69817) 🛱		
Transactions		?
🔁 CICSEXP3 🕨 🎍 DEMO 🕨 🖀 \$CE69817 📼		
▼ Details		
Transaction group status: ACTIVE	Acceptable target region load level:	98
Default algorithm:	Acceptable abend level:	99
Active transaction count: 3	Default affinity relation:	LUNAME
Primary search criterion: LUNAME	Default affinity lifetime:	PCONV
A	Automatic affinity creation:	NO
Transactions		
ф <sup>с</sup>	→ 📲 🕴 Transaction ID:	<b>⊘ x</b> ⊽
CNX0211I Context: CICSEXP3. Resource: WLMA 15:02:40	TRAN. 3 records collected at 11-Ap	-2014
Transaction ID	Pseudoconversational Mode	
AN01	N_A	
BNE	N_A	
KYLE	N_A	
Targets Transactions Affinities Attributes		



#### Agenda



- CICSPlex SM: Start here
- CICSPlex SM and CICS Explorer: Enabling Single System Image
- CICSPlex SM: Workload Management
- CICSPlex SM: Foundation for CICS Platform and Application Deployment
  - Creating and deploying CICS Platforms
  - Deploying CICS Applications





## CICSPIEX SM - System Groups Platforms & Region Types



## Platforms & Region Type – CICS Explorer Cloud Perspective



A dedicated perspective for Platforms in the CICS Explorer shows both Applications and Region Types which comprise a Platform.





#### Summary



- CICSPlex SM: Start here
  What are you waiting for?
- CICSPlex SM and CICS Explorer: Enabling Single System Image
  - Quick and easy adminstration and operations
- CICSPlex SM: Workload Management
  - Efficient and resilient
- CICSPlex SM: Foundation for CICS Platform and Application Deployment
  - Confident, repeatable, agile

