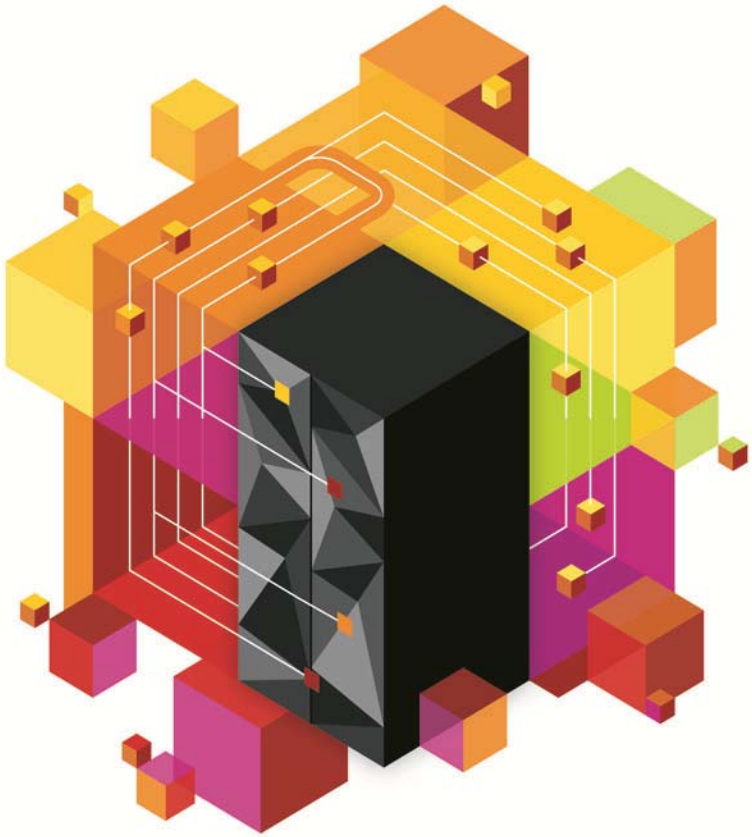
CICS V5
Scalability and Performance



Presenter –

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Agenda

- **Scalability**
- **Performance**
- **Policies**
- **Scalability Tooling**
- **Connectivity**
- **Summary**

Core Foundations and Scalability items addressing:

– Greater Capacity

– Increased availability

– Deeper Insight

– Foundation enhancements

Driving operational efficiencies - Greater capacity

VERTICAL SCALING

- **Vertical Scaling**
  - Relieve region storage constraints
  - Further virtual storage constraint relief
  - Maximum task limit has been doubled
  - Further threadsafe support to reduce TCB switching and increase workload capacity

*Run more, **more easily***

- **Horizontal Scaling**
  - Instrumentation enhancements – understand how the platform is scaling
  - Standardization and simplification

'right-size' and simplify CICS topologies

HORIZONTAL SCALING

DSW Workload – CPSM Dynamic routing

- **8 CPs - 34 CICS regions**
- **COBOL/VSAM**
- **All transactions routed from 4 TORs to 30 AORs via CPSM**
- **50% of transactions issue FC requests**
- **All TS requests are TS Shared**
- **All FC requests are VSAM RLS**
  - Average of 6 requests per transaction (all transactions)
  - 69% Read, 10% Read for Update, 9% Update,11% Add , 1% Delete

CICS DSW 4 TORs 30 AORs – RLS - 8 CPs

ETR	CICS %	Ms/Tran	LPAR%
2071.61	141.20	0.681	21.05
2842.02	189.11	0.665	27.85
4128.25	270.70	0.655	39.41
5047.36	326.08	0.646	47.24
6493.98	417.16	0.642	60.21

CICS TS 4.2

ETR	CICS %	MS/Tran	LPAR%
2074.87	139.91	0.674	20.87
2846.00	188.55	0.662	27.78
4133.39	269.54	0.652	39.32
5053.15	326.22	0.645	47.33
6501.18	416.92	0.641	60.25

CICS TS 5.1

4.2 Ave CPU/Tran = 0.657ms 5.1 Ave CPU/Tran = 0.654ms

DSW Workload – Static routing

- **16 CPs - 5 CICS regions**
- **COBOL/VSAM**
- **All transactions routed from 2 TORs to 2 AORs**
- **All File requests are Function Shipped to 1 FOR**
- **50% of transactions issue FC requests**
- **All FC requests are VSAM LSR**
  - Average of 6 requests per transaction (all transactions)
  - 69% Read, 10% Read for Update, 9% Update,11% Add , 1% Delete

CICS DSW 2 TORs 2 AORs 1FOR 16 CPs

ETR	CICS %	Ms/Tran	LPAR%
2498.52	75.86	0.304	6.78
2928.69	88.35	0.302	7.79
3543.47	104.08	0.294	9.09
4428.34	129.16	0.292	11.13
5944.91	168.58	0.284	14.34

CICS TS 4.2

ETR	CICS %	MS/Tran	LPAR%
2496.35	77.55	0.311	6.89
2939.62	87.18	0.297	7.65
3532.10	102.29	0.290	8.86
4425.48	126.17	0.285	10.80
5948.50	166.52	0.280	14.07

CICS TS 5.1

4.2 Ave CPU/Tran = 0.295ms 5.1 Ave CPU/Tran = 0.292ms

RTW Workload – Single region

- COBOL/DB2
- 7 transaction types
- 20 Database tables
- Average 200 DB2 calls per transaction
- 54% Select, 1% inset, 1% update, 1%delete,
- 8% open cursor, 27% fetch cursor 8 close cursor

CICS RTW single region

ETR	CICS %	MS/Tran	LPAR%
249.69	53.59	2.146	21.33
361.55	77.65	2.147	30.93
474.66	101.46	2.137	39.85
592.37	125.40	2.116	48.89
730.20	153.82	2.106	59.51

CTS 4.2

ETR	CICS %	MS/Tran	LPAR%
249.98	54.19	2.167	21.63
361.88	78.35	2.165	31.26
474.86	101.42	2.135	39.74
592.74	126.14	2.128	49.20
729.98	155.06	2.124	59.98

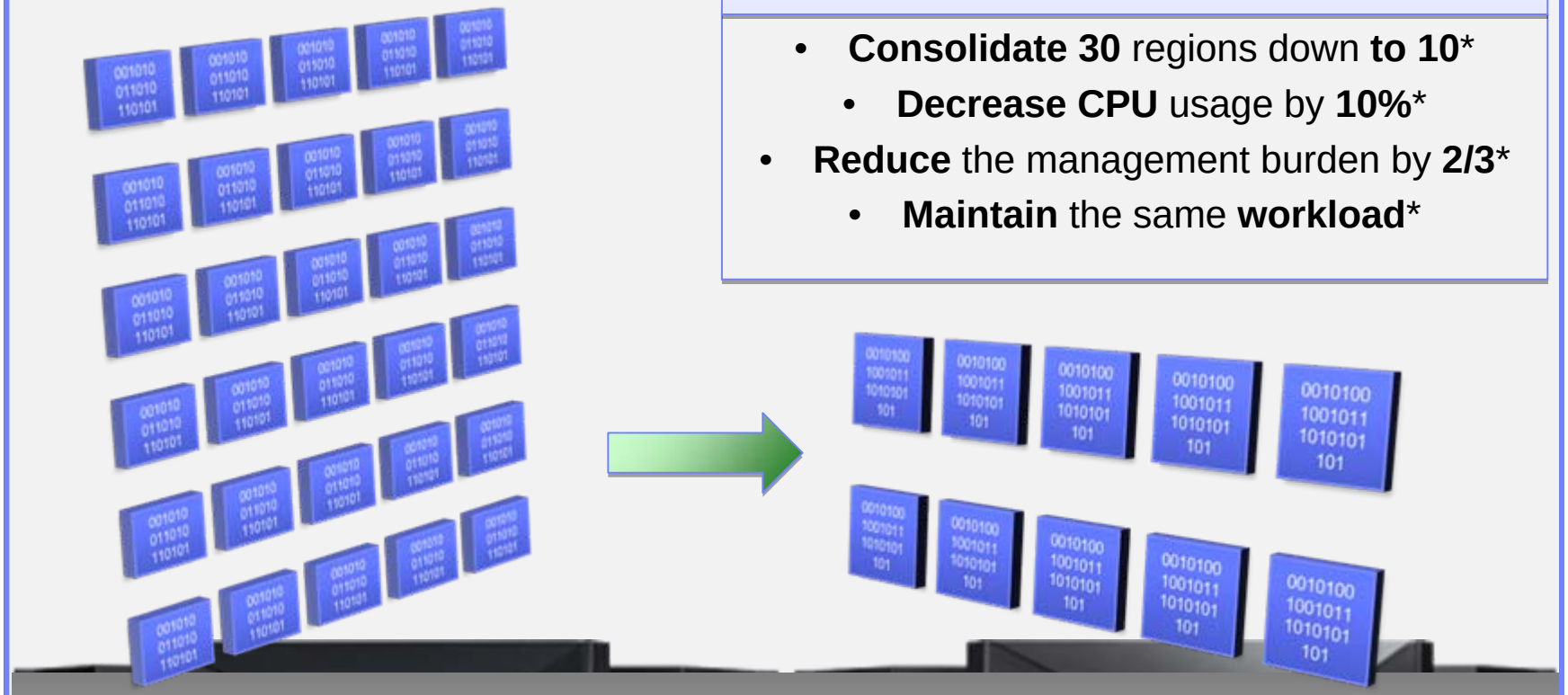
CTS 5.1

4.2 Ave CPU/Tran = 2.130ms 5.1 Ave CPU/Tran = 2.143ms

Greater Capacity – Achieve cost savings through consolidation

IBM Lab benchmark demonstrated…

- **Consolidate 30** regions down **to 10***
- **Decrease CPU** usage by **10%***
- **Reduce** the management burden by **2/3***
- **Maintain** the same **workload***



*Test conducted under lab conditions – For further information contact IBM

CICS Consolidation DSW/RLS workload

ETR	CICS %	LPAR%	MS/Tran	Real frames
4983.60	253.74	19.95	0.640	736961
6385.12	325.48	25.35	0.635	737319
10135.28	510.46	39.24	0.619	738387
13969.74	704.09	53.80	0.616	739682
15898.14	821.69	62.53	0.629	740917

30 AORs

ETR	CICS %	LPAR%	MS/Tran	Real frames
4969.95	232.11	18.09	0.582	342299
6390.11	293.22	22.69	0.568	342460
10137.49	456.27	34.93	0.551	342893
13969.68	620.51	47.22	0.540	343470
15867.72	725.80	55.26	0.557	343775

10 AORs

HIS data collected for the last measurement interval

DSW Hardware Instrumentation data extracts for last interval

	30 AORs	10 AORs	Delta
Execution Samples	2487298	2201099	-11%
Instruction First Cycle (IFC)	379000	371470	-2%
Micro Seconds per transaction	628.34	556.43	-11%
Cycles per instruction	6.53	5.90	-10%
MIPS per CP	797	882	+10%
Data cache misses (samples)	744894	608550	-18%
Instruction cache miss includes TLB miss	90483	66626	-26%
% Cycles used by TLB misses	6.82	5.94	-13%
Relative Nest Intensity (RNI)	0.48	0.34	

CICS Consolidation Webservices (GENAPP)

ETR	CICS %	LPAR%	MS/Tran	Real frames
828.31	94.85	37.47	1.145	862739
992.14	114.24	44.94	1.151	873593
1237.67	139.43	54.45	1.126	880690
1633.98	185.24	71.92	1.133	897041
1883.25	233.38	89.69	1.239	959291

30 AORs

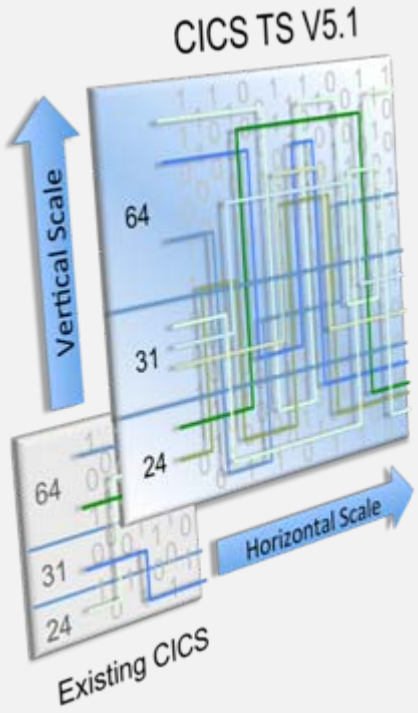
ETR	CICS %	LPAR%	MS/Tran	Real frames
827.72	86.42	34.26	1.044	381422
986.51	104.35	41.20	1.057	389384
1231.89	129.67	50.90	1.052	394495
1629.05	166.94	65.07	1.024	399247
1916.36	209.88	81.54	1.095	464827

10 AORs

Web Services Hardware Instrumentation data extracts for last interval

	30 AORs	10 AORS	Delta
Execution Samples	3517830	3188565	-9%
Instruction First Cycle (IFC)	589236	590667	+2%
Micro Seconds per transaction	1240	1095	-11%
Cycles per instruction	5.97	5.39	-10%
MIPS per CP	898	1003	+11.6%
Data cache misses (samples)	1145876	932896	
Instruction cache miss includes TLB miss	149468	115015	
% Cycles used by TLB misses	9.95	9.23	
Relative Nest Intensity (RNI)	0.75	0.51	

Greater capacity - Achieve cost savings through consolidation

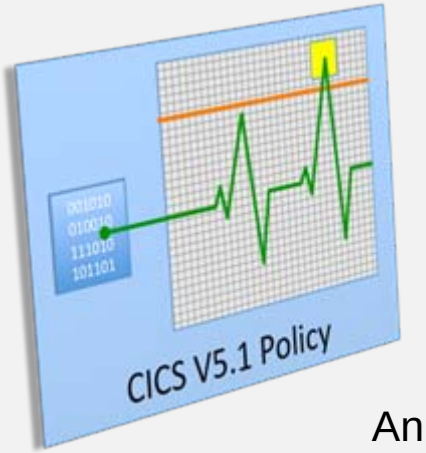


Feature	Benefit
Doubled MAXTASK limit to 2000 and optimized storage area usage	Greater vertical scalability
Optimized TCB usage and greater threadsafe capability	Greater horizontal scalability
Support for the latest Java 7 standard	Greater throughput
Access to 64-bit storage from assembler programs	Application level access to big data

Managed operations - Control critical resource thresholds with policies

Protect critical systems

- "*Abend* any *task* running on the Retail Banking region that tries to request any 24-bit storage"
  - "I want to see a *message* if a *task* allocates more than 1MB of storage in this region"
- "Trigger an *event* if a shopping-cart browse *task* generates more than 500 SQL requests"



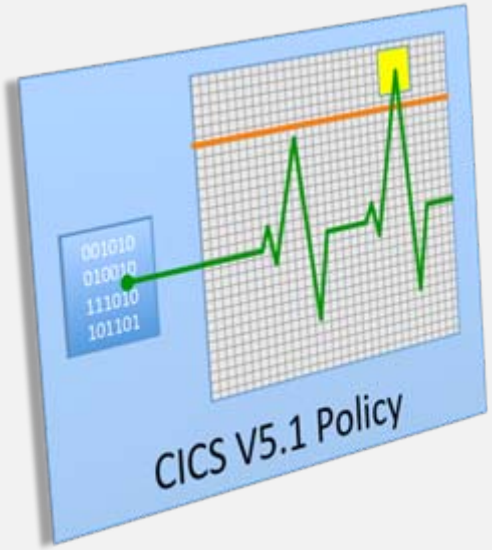
Threshold breach

CICS Triggers an action

Abend *Message* *Event*

An XML Policy document defines the threshold and action

Managed Operations - Reduce cost and risk through automation



Feature	Benefit
New declarative policy	Define and manage SLAs
Set policy thresholds on • CPU usage • Storage used and GETMAIN • SQL or file access • EXEC LINK	Critical resource protection
Issue message, abend a task, or emit an event on policy breaches	Automatic response to undesired behavior

Increased availability - Reduce the need for planned downtime

Feature	Benefit
SVC dynamic update utility	Upgrade without z/OS IPL
SSL refresh	Update SSL without region restart
IPIC Heartbeat	Maintain IPIC connections during periods of inactivity
EXCI XCF group selection from URM	Full region availability from EXCI across XCF groups
Replication logging support	IBM GDPS/AA readiness
Improved default values	Best practices configurations

Deeper insight - Improve decision making and audit readiness

Feature	Benefit
Logging of system configuration changes via SPI	Auditable system configuration changes
Specify that a full ID verification occurs	Accurate data stored for audit
Extended identity propagation to include started tasks	Improved end-to-end security and auditability
SMF now stores SSL cypher suite and specialty engine usage data	Better understanding of system performance
Notification during lost lock recovery	Understand progress of lock recovery
Logging of system configuration changes via SPI	Auditable system configuration changes

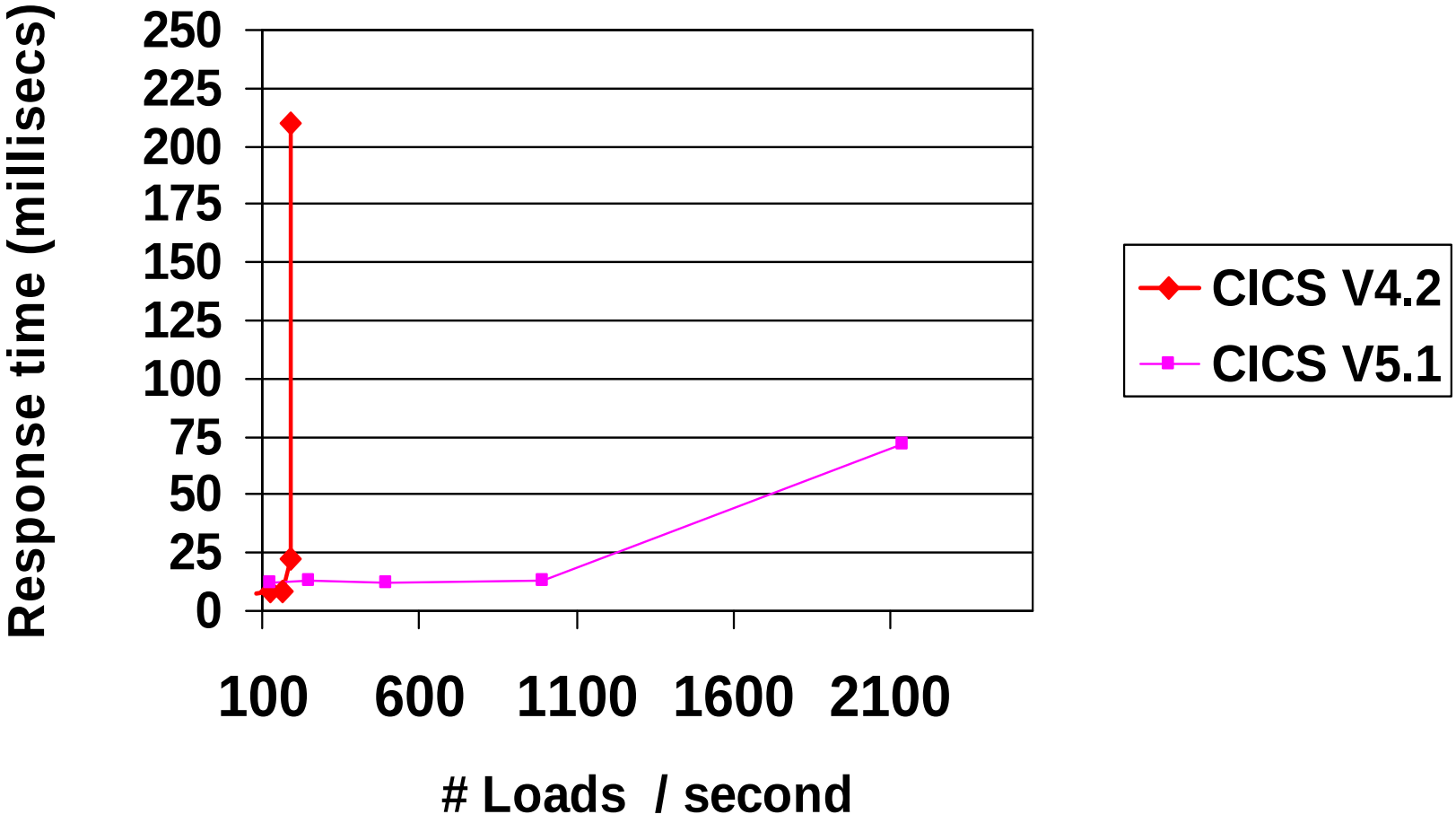
Foundational enhancements - Extending core CICS capabilities

Feature	Benefit
Enhanced CICS event support	One-to-many event emissions
WebSphere MQ Dynamic Program Link (DPL) bridge support message >32KB	No restrictions on MQ DPL message size
IPIC support for IMS	Improved integration and error recovery
GET and PUT container enhancements	Reduce application storage needs
Backup and restore capability for entire CICSPlex System Manager (CICSPlex SM) systems without manual overrides	Improved automation
Automatic daylight saving adjustments	No need to restart CICS regions

PROGRAM LOAD

- When running on an open TCB and a CICS program load is requested there is no longer a TCB switch to the RO TCB
  - EXEC CICS LINK, LOAD, XCTL, …
- CICS RO TCB will still be used for …
  - CICS program LOADs when NOT running on an Open TCB
  - DFHRPL and LIBRARY Dataset Management
- Updated Loader global statistics
  - New statistics on RO TCB program load requests
  - load time recorded by module
- Benefits …
  - Reduced contention for the single CICS RO TCB
  - Reduced pathlength – RO TCB switch eliminated
  - Significantly increased potential CICS program LOAD capacity

Physical Program Loads V4.2 vs V5.1



The power of Policy applied to Applications and Platforms

Application

Faster & easier deployment of CICS applications & resources

- "*Abend* any *application* running on the Retail Banking region that tries to request any 24-bit storage"

Platform

Faster & easier management of CICS application environment

- "I want to see a *message* if an *application* allocates more than 1MB of storage on this *platform*"

Policy

Respond faster to unwanted behaviour

- Dynamically update policies at runtime to manage changing workload characteristics

CICS Performance Analyzer for z/OS

What is CICS PA?

- A Comprehensive Performance Reporting and Analysis tool for CICS
- Provides ongoing system management and measurement reports on all aspects of CICS application performance

How does it work?

- Uses SMF data as input
- Easy to use interface for report generation (over 240 supplied report forms)
- Performance and Statistical analysis
- Graphical performance analysis via the explorer

What's its value?

- Analyze CICS Application performance
- Improve CICS resource usage
- Evaluate the effects of CICS system tuning efforts
- Improve transaction response time
- Provide ongoing system management and measurement reports
- Increase availability of resources
- Increase the productivity of system and application programmers
- Provide awareness of usage trends

Why this tool is important to CICS customers

- Reduce both time/resource required to analyze off-line performance data (usually massive) for tuning and capacity planning purposes.
- Enables deep-dive CICS performance analysis and understanding of usage trends
- Aids capacity planning and tuning
- Helps quickly identify and eliminate trends leading to online performance problems

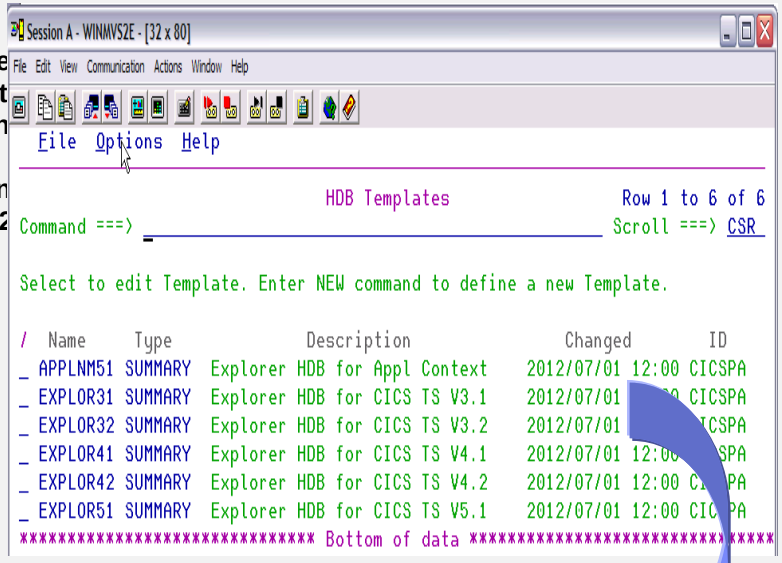
PERFORMANCE

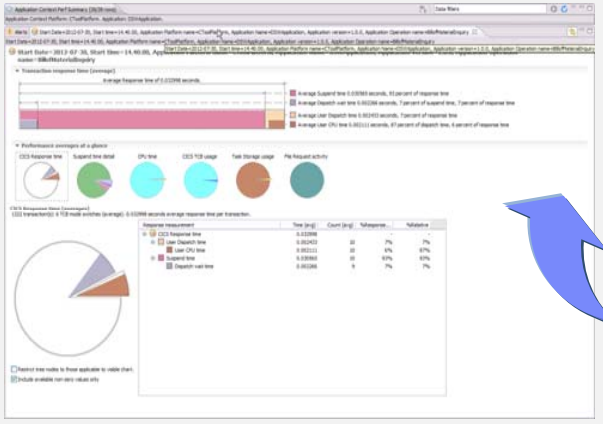
Platform and Application Performance insight

Scenario

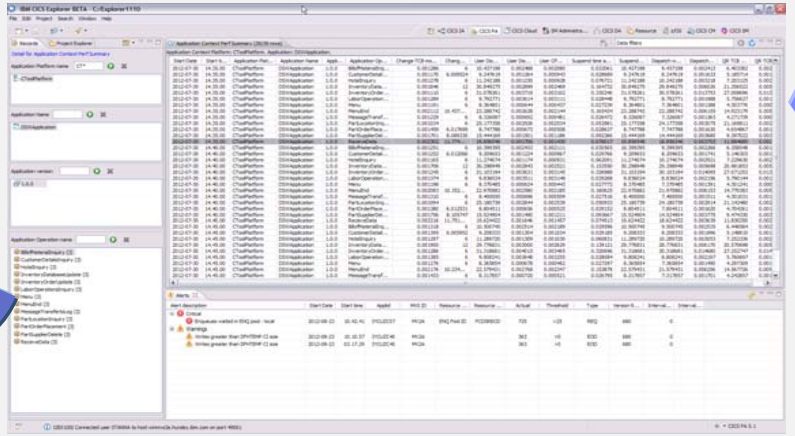
- Summarize CICS performance data at application and transaction level
- Drill down into details such as CPU, Response time, Storage and TCB usage
- Data filtering to analyze specific transactions and operations
- Statistics alerts
- Simplify analysis of large volumes of data
- Identify performance bottlenecks promptly

Summarize and export application and transaction data to DB2





Drilldown to transaction or operation

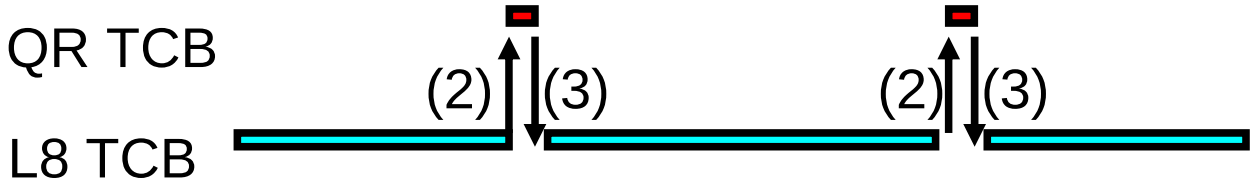


Detailed performance and statistics analysis with data filtering

CICS TS V5.1 Threadsafe enhancements

CICS TS V4.1 Threadsafe CICSAPI

CICS TS V4.2 Threadsafe Required



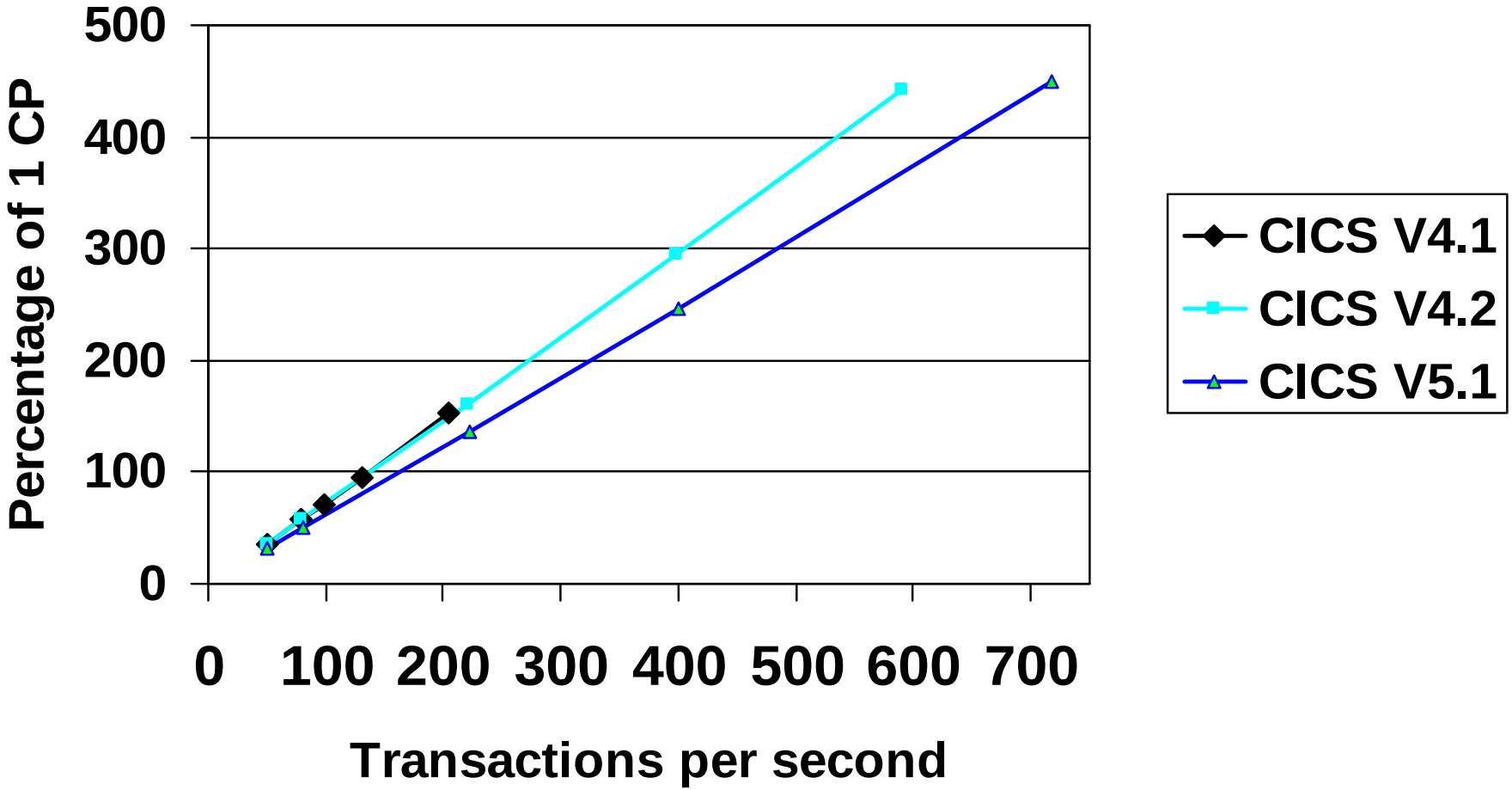
CICS TS V5.1 Threadsafe Required

(1) Changemode due to DB2 call

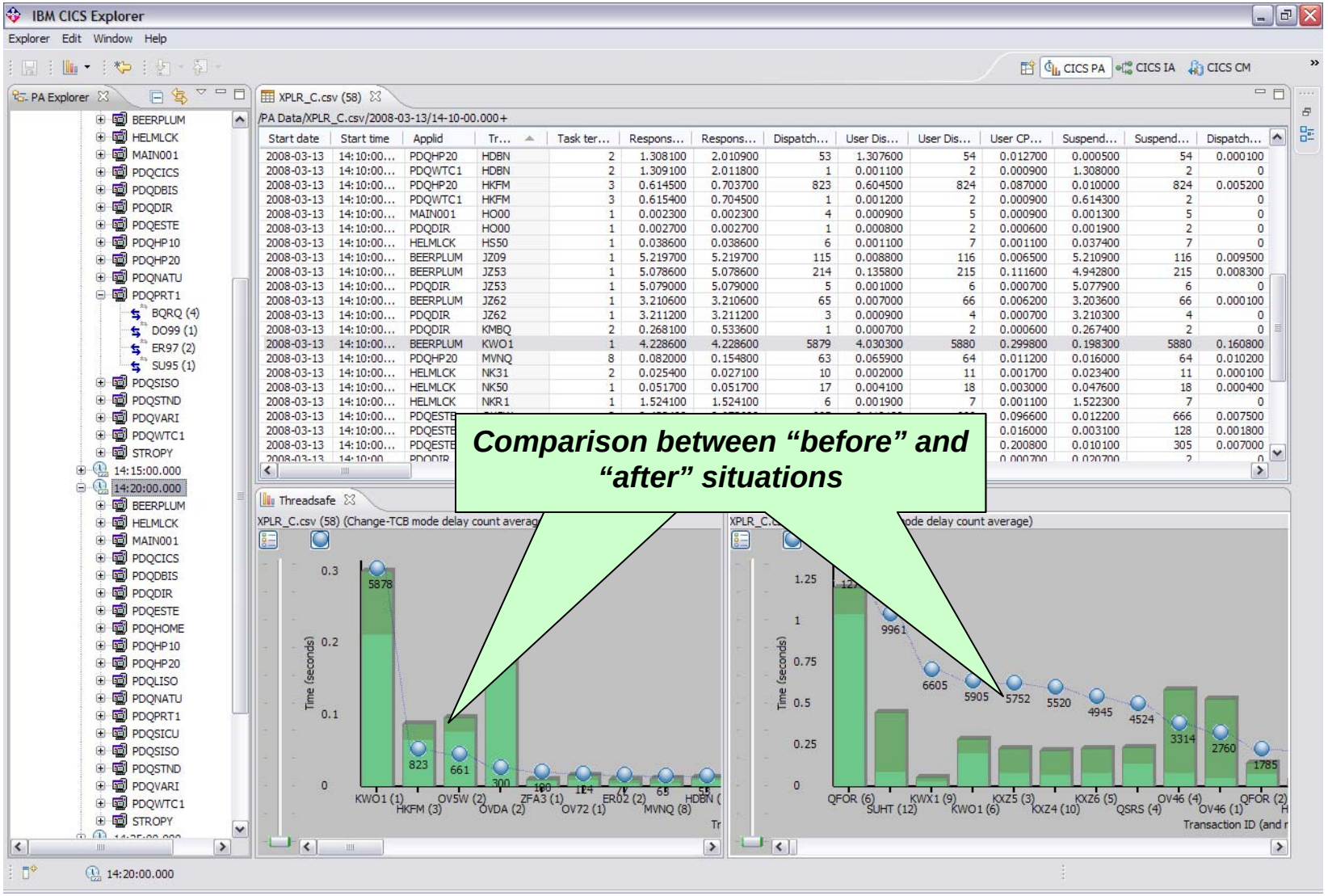
(2) Changemode due to TD Write

(3) Changemode back to L8 due to Required option

Transient data mixed with DB2



CICS PA - Threadsafe views



CICS PA - Alerts

Statistics Alert Reporting is a capability enabling the definition of conditions, in terms of CICS TS or CICS TG statistics field values, which will generate alerts.

Alerts can be used to assist users in highlighting potential tuning opportunities or identify trends that may lead to poor CICS performance or even unnecessary CICS system outages

Alerts enable users to more easily identify the specific CICS regions, the time of day and the type of CICS resources that may require further specific in-depth performance analysis thereby allowing preventative tuning action to be taken

Sheet view | Transaction Classes (1/1 rows)

Maximum active transactions in class reached Applid=IYDZEJ07, Version Release Modification=670, Interval Number=761, Type=INT, MVS ID=MV2F, Transaction class=DFHTCL09 Specific

Start D...	Start ti...	Applid	MVS ID	Version...	Type	Interval...	Interval...	Transaction class	Attaches	Times at Max active	Purged...	No long...	Accept
2011-11...	12.41.00	IYDZEJ07	MV2F	670	INT	00.01.00	761	DFHTCL09	14	15	0	1	

Alerts

Connected: DemoMVS - GENAPP. Alert table: Alert.

Alert description	Start ...	Start t...	Applid	MVS ID	Resourc...	Resourc...	Actual	Threshold	Type	Version .
Critical										
Maximum active transactions in class reached	2011-1...	12.41.00	IYDZEJ07	MV2F	Tclass Na...	DFHTCL09	15	>10	INT	670
Maximum active transactions in class reached	2011-1...	12.42.00	IYDZEJ07	MV2F	Tclass Na...	DFHTCL09	21	>10	INT	670
DB2 pool thread waits	2011-1...	13.16.00	IYDZEJ07	MV2F	DB2CONN...	DB2CONN1	148	>5	INT	670
Enqueues waited in ENQ pool - local	2011-1...	13.16.00	IYDZEJ07	MV2F	ENQ Pool...	EXECADDR	37	>25	INT	670

CICS Performance Analyzer for z/OS V5.1

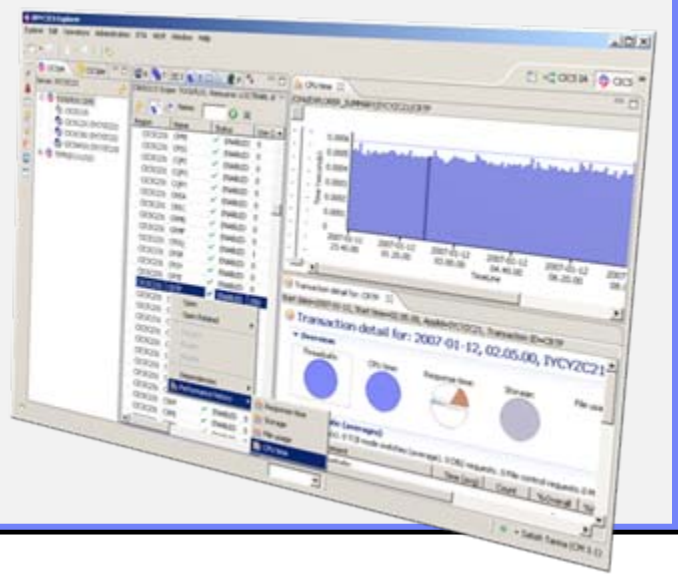
Performance insight

What's new in CICS PA V5.1…

- CICS TS V5.1 – support for new metrics
- Application, Platform, and Policy
- Plug-in enhancements:
  - Application centric view
  - Customizable sheet views
  - Suspend time reporting
- Easy navigation to key reports and alerts
- SMF logstream support
- Batch statistics reporting for CICS TG
- Improved management of PA data loaded to DB2
- CPU totals on MQ reports
- SMF data processing performance improvements

CICS PA enables you to…

- Comprehensive Performance Reporting and Analysis for CICS including DB2, WebSphere MQ, and MVS System Logger
- Understand trends and develop capacity plans
- View statistics and create statistical alerts

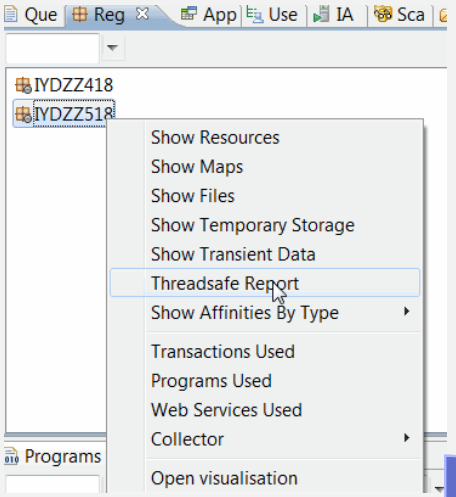


Drive a threadsafe report from the CICS Interdependency Analyzer plug-in

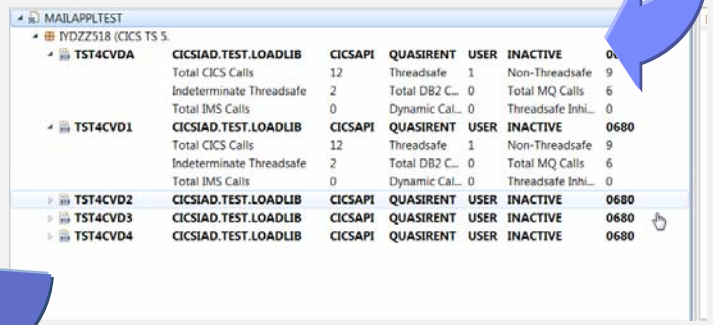
Benefits

- Understand threadsafe issues by program
- Run the report against the latest level of CICS

Run threadsafe report by region



View Summary



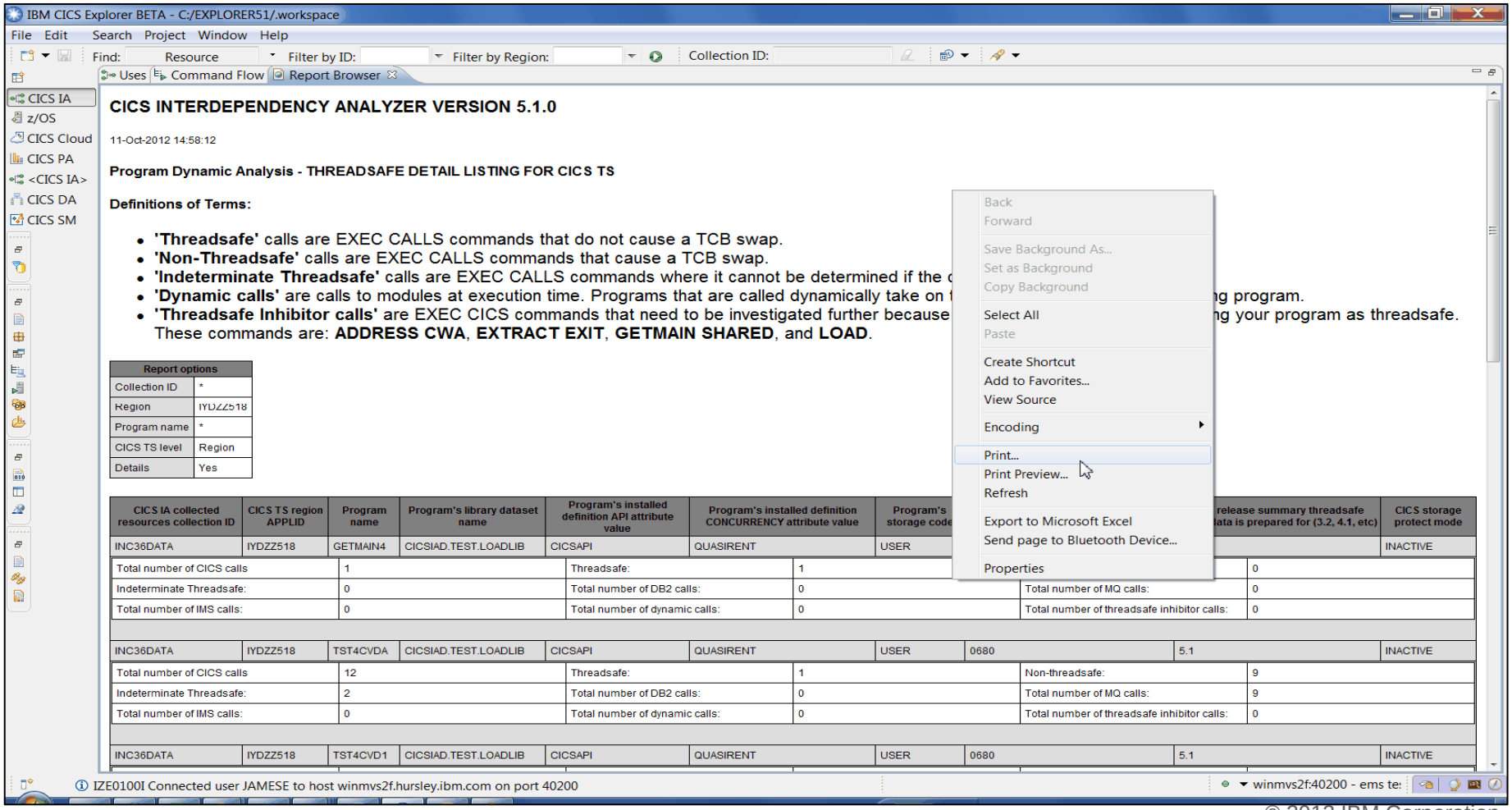
Save as HTML report

Comma...	Function	Type	Object	Offset	Use cou...	Threadsafe	Inhibitor
MQ	CLOSE	QUEUE	CSQ4SAMP.MAILMGR.JAM...	000063...	2	Y	
CICS	IGNORE	CONDITION		000049...	2	Y	N
MQ	INQUIRE	QUEUE	CSQ4SAMP.MAILMGR.JAM...	000065...	7	Y	
CICS	LINK	PROGRAM	TST4CVD2	00005A...	2	I	N
CICS	LINK	PROGRAM	TST4CVD4	00005B...	1	I	N
MQ	OPEN	QUEUE	CSQ4SAMP.MAILMGR.JAM...	000062...	2	Y	
CICS	RECEIVE	MAP	CSQ4VD0	00004E...	2	N	N
CICS	RECEIVE	MAP	CSQ4VD1	00005C...	5	N	N
CICS	RECEIVE	MAPSET	CSQ4VDM	00004E...	2	N	N
CICS	RECEIVE	MAPSET	CSQ4VDM	00005C...	5	N	N
CICS	SEND	MAP	CSQ4VD0	00004E...	2	N	N
CICS	SEND	MAP	CSQ4VD1	00005B...	5	N	N
CICS	SEND	MAPSET	CSQ4VDM	00004E...	2	N	N
CICS	SEND	MAPSET	CSQ4VDM	00005B...	5	N	N
CICS	SEND	TEXT	SEND TEXT	00004D...	2	N	N

View detail by program

CICS IA: Threadsafe report in the plug-in.

Open Report and print



CICS VSAM Transparency for z/OS V2.1

Modernize your CICS and batch VSAM data

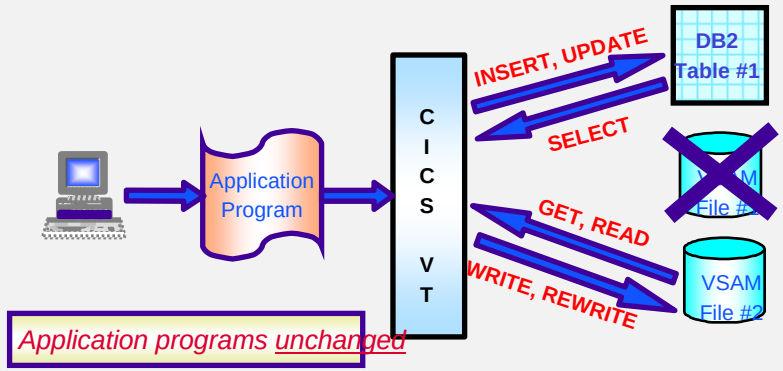
What's new in CICS VT V2.1…

- Auto-generate customized data migration JCL
- Enhanced IDCAMS REPRO support
- New migration tracking report
- Improved diagnostic facilities
- Support for CICS® Transaction Server V5.1 and DB2® 10
- Other functional enhancements
- Long column name support
- HLL support for user exits
- RRS support in batch
- Read-only DDM
- Dynamic DST update
- New plug-in for CICS Explorer

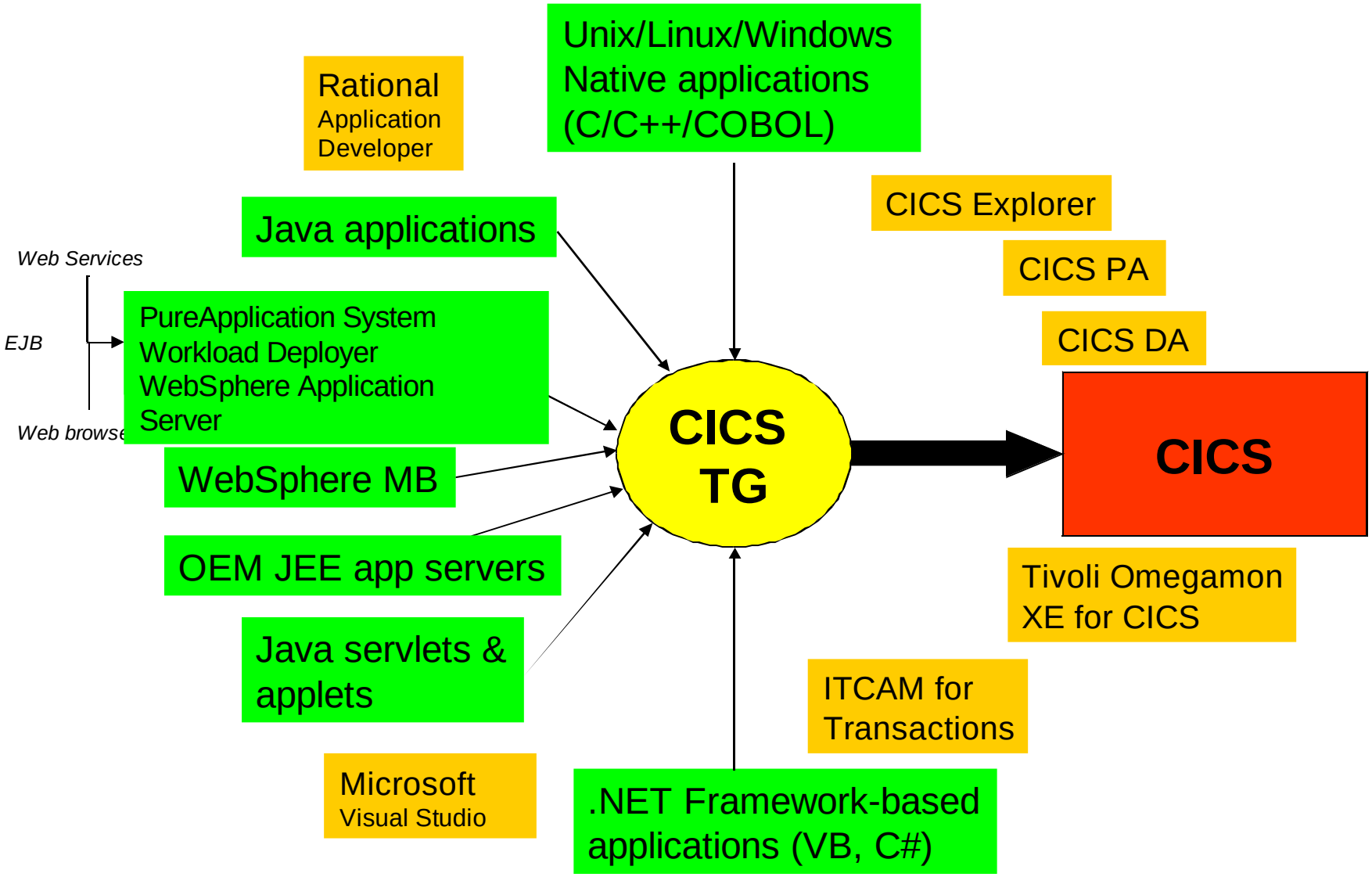
CICS VT enables you to…

- Migrate VSAM files to DB2 without changing application programs
- Maintain single copy of the data
- CICS and batch programs access data in DB2 under the control of CICS VT
- Access migrated DB2 data natively using SQL

After CICS VT



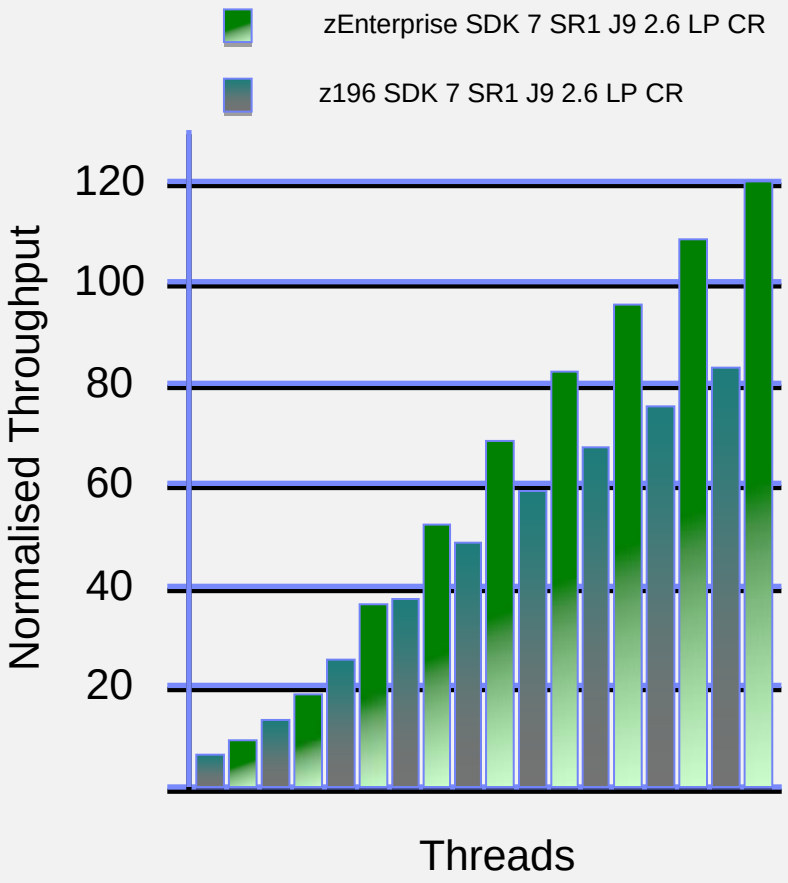
What is the CICS Transaction Gateway?



Performance improvements from Java 7 support

The latest JVM delivers a performance boost…

- zEnterprise EC12 offers a ~45% improvement over z196 running the Java Multi-Threaded Benchmark
- EC12 has additional instructions specifically for Java



Product positioning

CICS TS for VSE
TxSeries
CICS TS for i

CICS TS
for z/OS

DE+MP support
AIX
Windows
Linux (z/p/x)
Oracle Solaris
HP-UX

**CICS TG
for z/OS**

*Licensed
by VU*

Enterprise
1000s

.NET | C/C++
Java | JEE

**CICS TG for
Multiplatforms**

100s

*Licensed
by PVU*

.NET | C/C++
Java | JEE

**CICS TG
Desktop Edition**

DE DE DE

*Licensed
by AU*

.NET | Java | C/C++

CICS Transaction Gateway V9.0

Extended scalability, application interoperability, and flexible secure topologies

Increased capacity
Reduced complexity

- 64-bit z/OS Gateway
- Richer dynamic routing & filtering
- IPIC connection level timeout
- IPIC capacity for 2-tier

Flexible deployment

- Asynchronous ECI V2
- 64-bit C/C++ applications
- PureApplication System
- Java 7 JEE 6 WAS V8.5
- RHEL (Intel) compatible
- .NET 4

CICS TS V5.1

CICS PA V5.1
CICS DA V5.1
CICS Explorer

More security options

- 3-tier secure connectivity
- Improved identity assertion
- Security standards compliance
- Secure IPIC with DSS

Deeper insight

- Enhanced request monitoring
- WAS-CICS Transaction tracking
- Historical statistics on all platforms

Find out more

Register for Impact 2013 today
-30 CICS related sessions
- 2 Labs
-Meet CICS Technical specialists
-Hear about the latest CICS V5.1 Portfolio release
-http://www-01.ibm.com/software/websphere/events/impact/registration.html

CICS Smart Seminars

Arrange a customized CICS agenda at your location and hear about the CICS topics you want to hear about. Contact your local IBM representative or send an Email to cicssem@uk.ibm.com or Fred Marschner marschne@us.ibm.com

CICS Developer Trial

- Available from Jan 11th 2013
- No charge trial, fixed expiry date
- Does not start SVC period
- For non-production environments
- Available through IBM ShopzSeries
- PID 5655-CIC

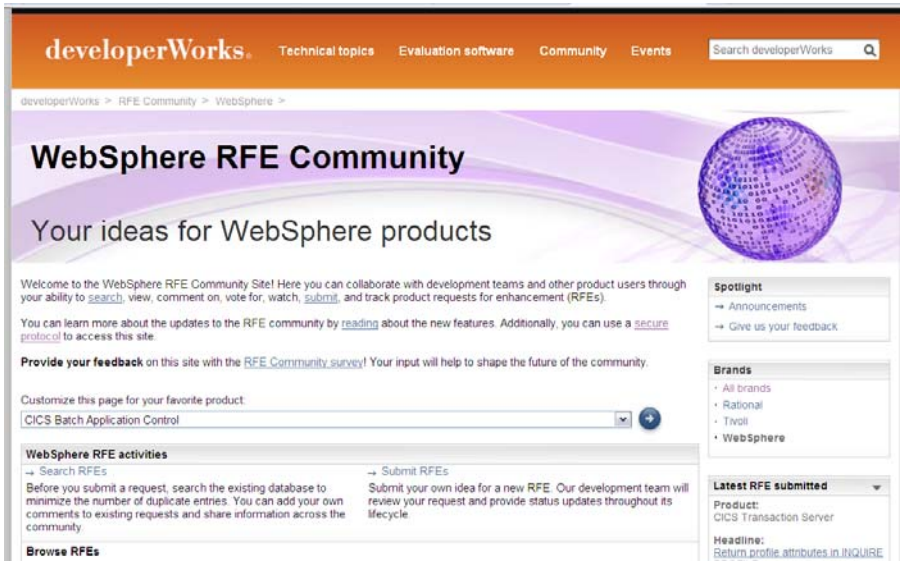
Based on CICS TS V5.1

- (with restrictions)
  - Performance
  - Capacity
  - License

https://www.ibm.com/developerworks/connect/cicsdev

Raising new requirements with RFE

- **You can now raise and track requirements using the new IBM RFE system for**
  - CICS Transaction Server
  - CICS Explorer
  - TXSeries
  - WXTR
  - IBM CICS Tools
  - CICS Transaction Gateway
  - PD Tools - coming soon (target end Jan 2012)



- **All previous FITS requirements have been processed, and either be transferred to RFE or closed and returned**
- **All brands https://www.ibm.com/developerworks/rfe/ - select Brand: WebSphere**
- **WebSphere only https://www.ibm.com/developerworks/rfe/?BRAND_ID=181**
- **Select Product Family: Transaction Processing - for CICS Transaction Server, TXSeries, and WXTR**
- **Select Product Family: Enterprise Tooling - for the CICS Tools, CICS Transaction Gateway, and PD Tools**
- **Raise CICS Explorer base requirements against the Explorer component of CICS TS.**
- **Raise plug-in requirements against the Explorer component of related product.**

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CICS Explorer Forum
ibm.com/developerworks/forums/forum.jspa?forumID=1475&start=0

CICS-L list Forum
listserv.uga.edu/archives/cics-l.html

Key documents

- **Analyst papers**
  - Lustratus Research - New project platform section for CICS Users ftp://public.dhe.ibm.com/software/htp/cics/pdf/Lustratus_Research_Paper_New_project_platform_selection_for_CICS_users.pdf
  - Branham Group: IBM CICS Tools: Unrealized Productivity Gains and True Cost Savings ftp://public.dhe.ibm.com/software/htp/cics/tools/IBM_CICS_Tools_Whitepaper_2009.pdf
  - Software Strategies: IBM z/OS Problem Determination Tool Suite Leads Again https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?lang=en_US&source=swg-rszswg
- **IBM Redbooks**
  - **CICS Transaction Server from Start to Finish**, SG24-7952-00
  - **Smarter Banking with CICS Transaction Server**, SG24-7815-00
  - **Implementing Event Processing with CICS**, SG24-7792
  - **CICS and SOA: Architecture and Integration**, SG24-5466-06
  - **Implementation of Popular Business Solutions with CICS Tools**, REDP-4824-00
  - **Threadsafe considerations for CICS**, SG24-6351-04
  - **Architects guide to CICS on System z**, SG24-8067-00
  - **CICS Transaction Server Application Architecture**, Redbooks solution guide

Summary

Operational efficiency

and service agility –

Doing more for less

- delivering results more quickly

- for a sound long-term investment