CICS TS V5 Performance Improvements that You Definitely Don't Know About.

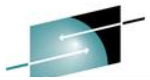
Martin Cocks – IBM – CICS TS Development

cocksmar@uk.ibm.com

#SHAREorg

SHARE is an independent volunteer-run information technology association that provides **education**, professional **networking** and industry **influence**.

Notices and Disclaimers



U.S. Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM.

Information in these presentations (including information relating to products that have not yet been announced by IBM) has been reviewed for accuracy as of the date of initial publication and could include unintentional technical or typographical errors. IBM shall have no responsibility to update this information. THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER EXPRESS OR IMPLIED. IN NO EVENT SHALL IBM BE LIABLE FOR ANY DAMAGE ARISING FROM THE USE OF THIS INFORMATION, INCLUDING BUT NOT LIMITED TO, LOSS OF DATA, BUSINESS INTERRUPTION, LOSS OF PROFIT OR LOSS OF OPPORTUNITY. IBM products and services are warranted according to the terms and conditions of the agreements under which they are provided.

Any statements regarding IBM's future direction, intent or product plans are subject to change or withdrawal without notice.

Performance data contained herein was generally obtained in a controlled, isolated environments. Customer examples are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual performance, cost, savings or other results in other operating environments may vary.

References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business.

Workshops, sessions and associated materials may have been prepared by independent session speakers, and do not necessarily reflect the views of IBM. All materials and discussions are provided for informational purposes only, and are neither intended to, nor shall constitute legal or other guidance or advice to any individual participant or their specific situation.

It is the customer's responsibility to insure its own compliance with legal requirements and to obtain advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulatory requirements that may affect the customer's business and any actions the customer may need to take to comply with such laws. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the customer is in compliance with any law.

Notices and Disclaimers (con't)

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. IBM does not warrant the quality of any third-party products, or the ability of any such third-party products to interoperate with IBM's products. IBM EXPRESSLY DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents, copyrights, trademarks or other intellectual property right.

IBM, the IBM logo, ibm.com, Bluemix, Blueworks Live, CICS, Clearcase, DOORS®, Enterprise Document Management System™, Global Business Services ®, Global Technology Services ®, Information on Demand, ILOG, Maximo®, MQIntegrator®, MQSeries®, Netcool®, OMEGAMON, OpenPower, PureAnalytics™, PureApplication®, pureCluster™, PureCoverage®, PureData®, PureExperience®, PureFlex®, pureQuery®, pureScale®, PureSystems®, QRadar®, Rational®, Rhapsody®, SoDA, SPSS, StoredIQ, Tivoli®, Trusteer®, urban{code}®, Watson, WebSphere®, Worklight®, X-Force® and System z® Z/OS, are trademarks of International Business Machines Corporation, registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at: www.ibm.com/legal/copytrade.shtml.

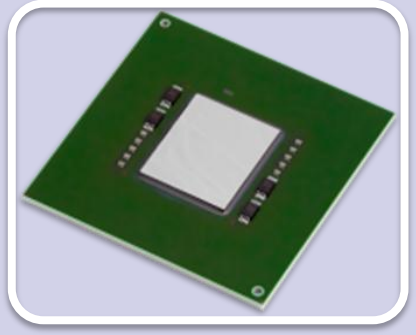
Agenda

- What do we mean by “Performance”?
- CICS TS V5.3 open beta – Performance improvements
- Improvements in CICS TS V5.2 and V5.1 you should know about
- What can you do to improve performance?

What do we mean by “Performance”?

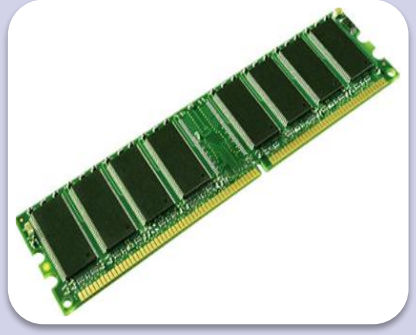
What do we mean by “Performance”?

Response Time



CPU Usage

Throughput



Memory Usage

CICS TS V5.3 open beta – Hills

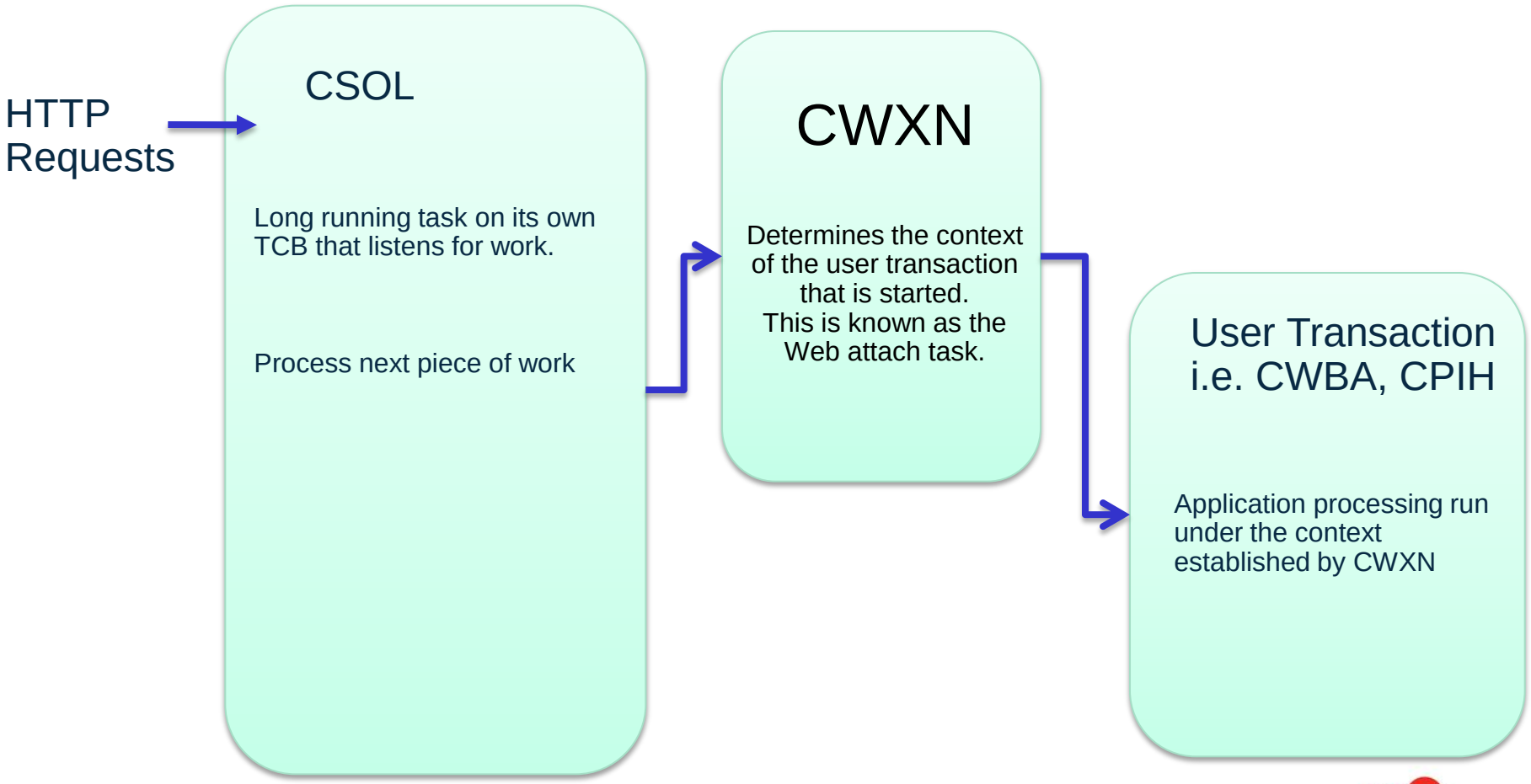
- Design Thinking and Performance
  - Hill 2 - A capacity planner can demonstrate, in routing and data owning regions, a CPU reduction of 10 to 20%.
- Reduce the overheads of connecting to your Systems of Record
- Customer and Sponsor User feedback used to determine areas to work on
  - Popular and growing communications
  - Understanding what is going on

CICS TS V5.3 open beta – Performance Improvements

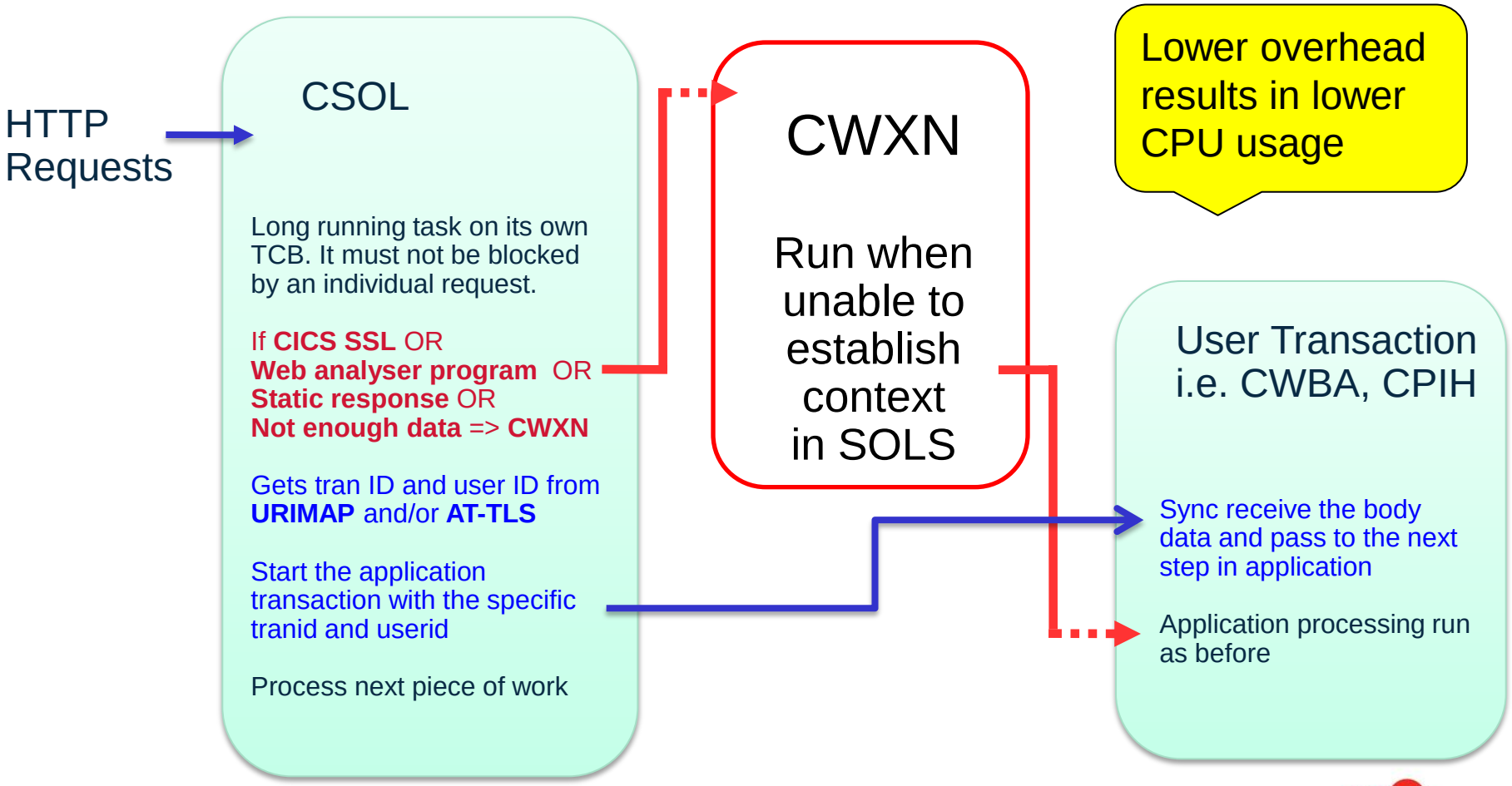
CICS TS V5.3 open beta – Performance Improvements

- HTTP efficiency, including for web services
- SSL/TLS improvements
- Other areas of improvement
- Some numbers from a CICS TS V5.3 open beta development level

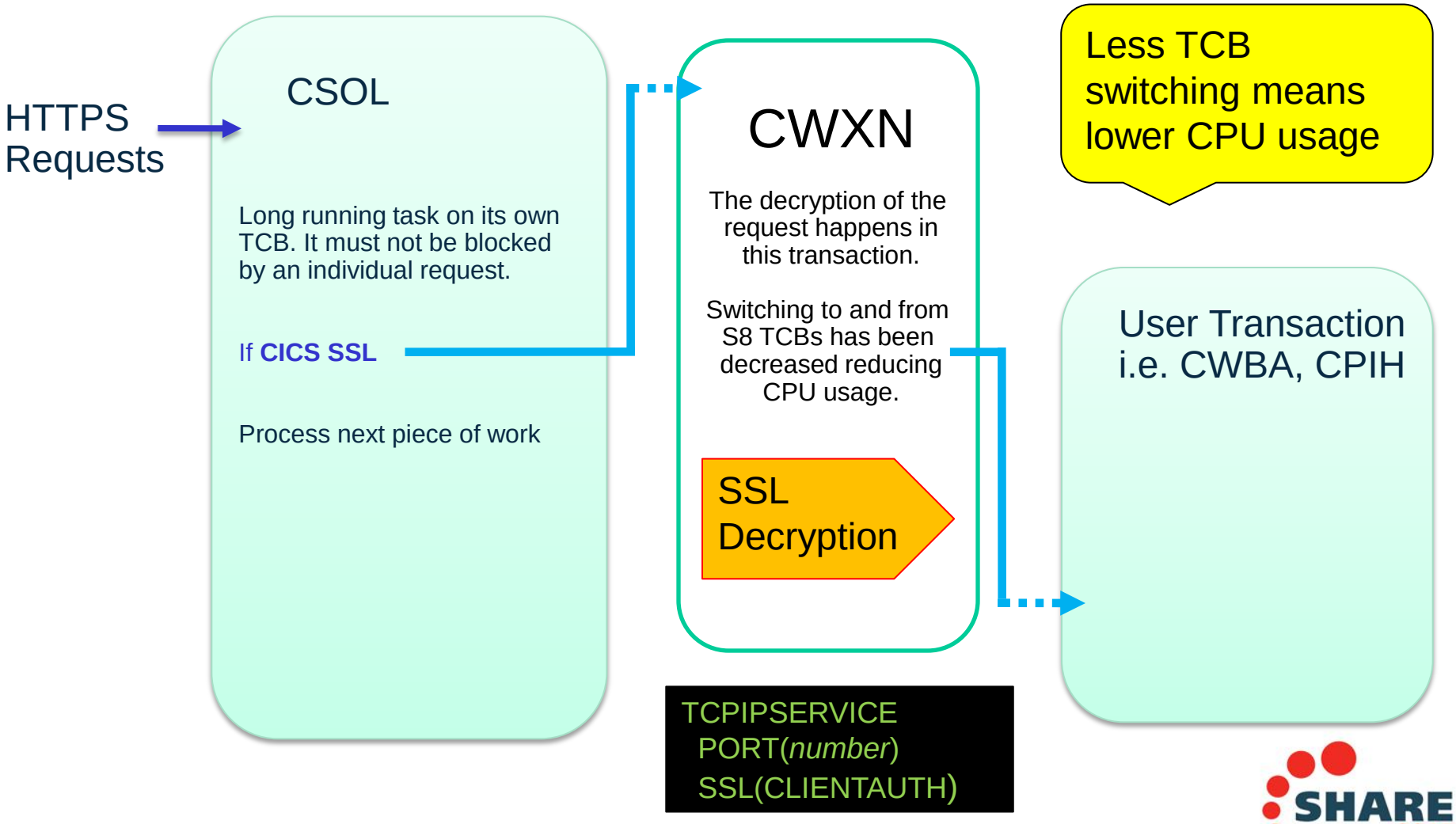
HTTP Pre open beta



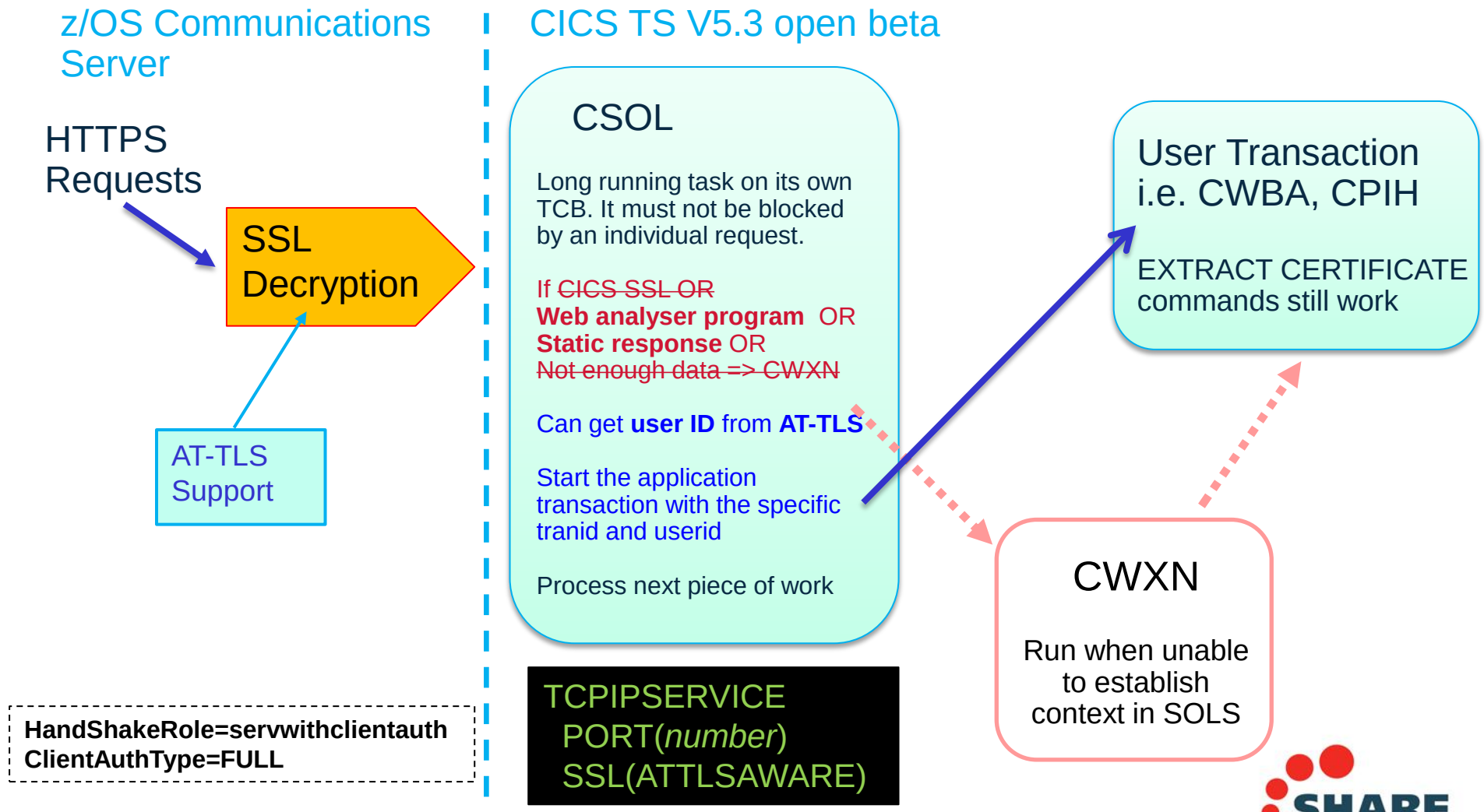
HTTP in CICS TS V5.3 open beta



SSL in CICS TS V5.3 open beta



AT-TLS Aware CICS TS V5.3 open beta



Liberty z/OS Connect feature in CICS

- z/OS Connect is the provides a way to have RESTful APIs with JSON payloads between CICS, mobile devices, and cloud environments
- The performance of this feature within the CICS TS V5.3 open beta has been improved.
  - Also for CICS TS V5.2 via APAR PI32451

Enhanced Metrics

- Metrics have been added to global CICS statistics, including transaction CPU time measurements captured without needing CICS monitoring to be active - allows greater insight into CPU resource usage of CICS TS V5.3 open beta regions without the overhead of collecting and processing SMF 110 monitoring records.
- *Transaction tracking identifies relationships between application tasks as they flow across CICS systems*, and has been extended to transactions started by the CICS-WebSphere MQ bridge. This expands the scope of transactions that can use transaction tracking, to help with problem determination, reporting and auditing.

Other Performance Enhancements

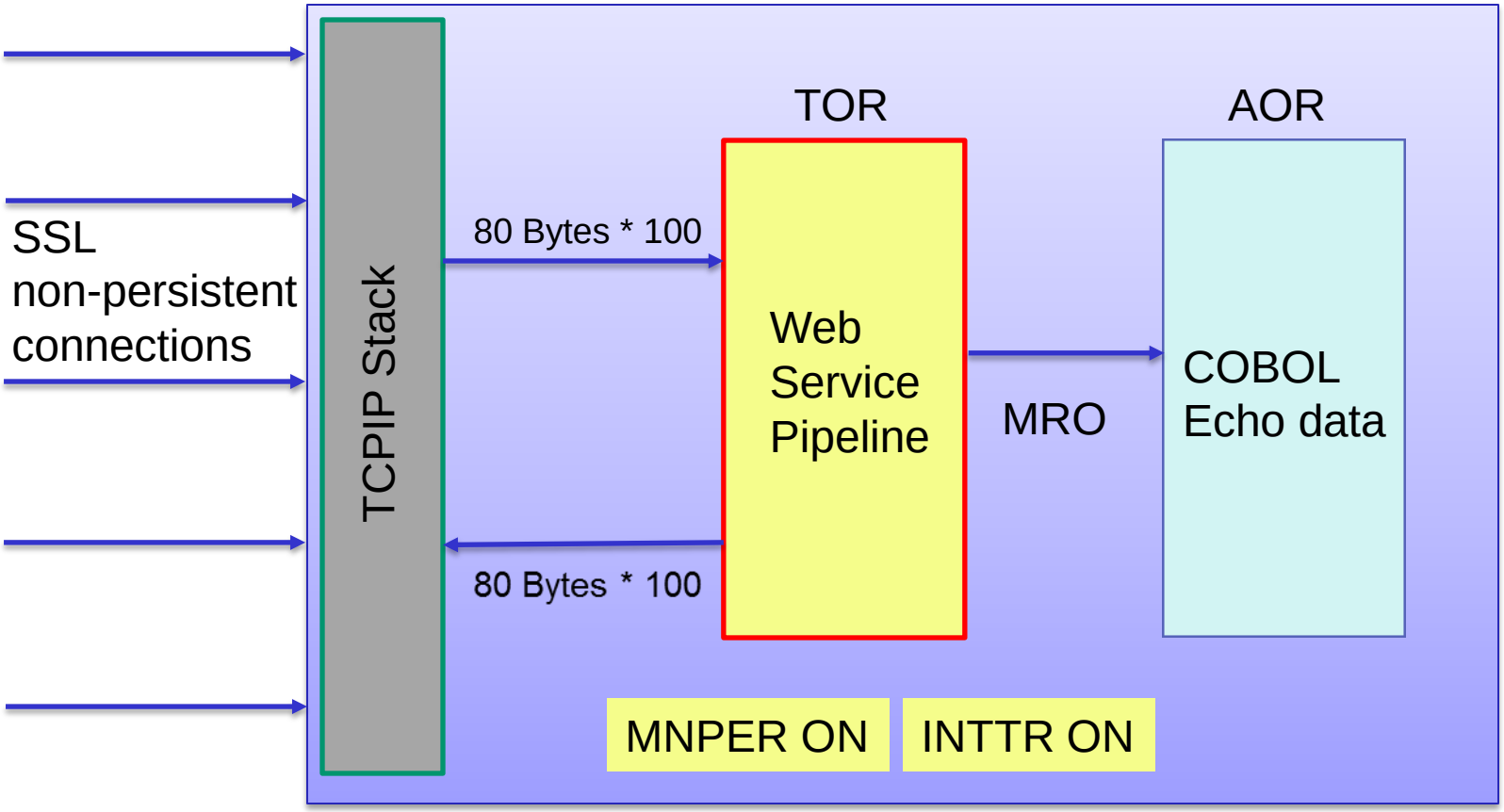
- Trace Facility
  - Use of z9 hardware instructions, including store clock fast
- Monitoring Facility
  - Excluding fields is now less efficient than collecting all of them
  - Use of z9 hardware instructions, including store clock fast
  - Some level 1 trace moved to level 2
  - Reduced internal lock contention
- MRO connections with high session counts
  - Improved the algorithm to make it more efficient
- Cache alignment of control blocks, the use of prefetch, and tuning of other internal algorithms also contribute to general CPU usage reductions.

Caution!
All numbers in this section have been created using developmental code. Your experiences using the CICS TS V5.3 open beta will vary.

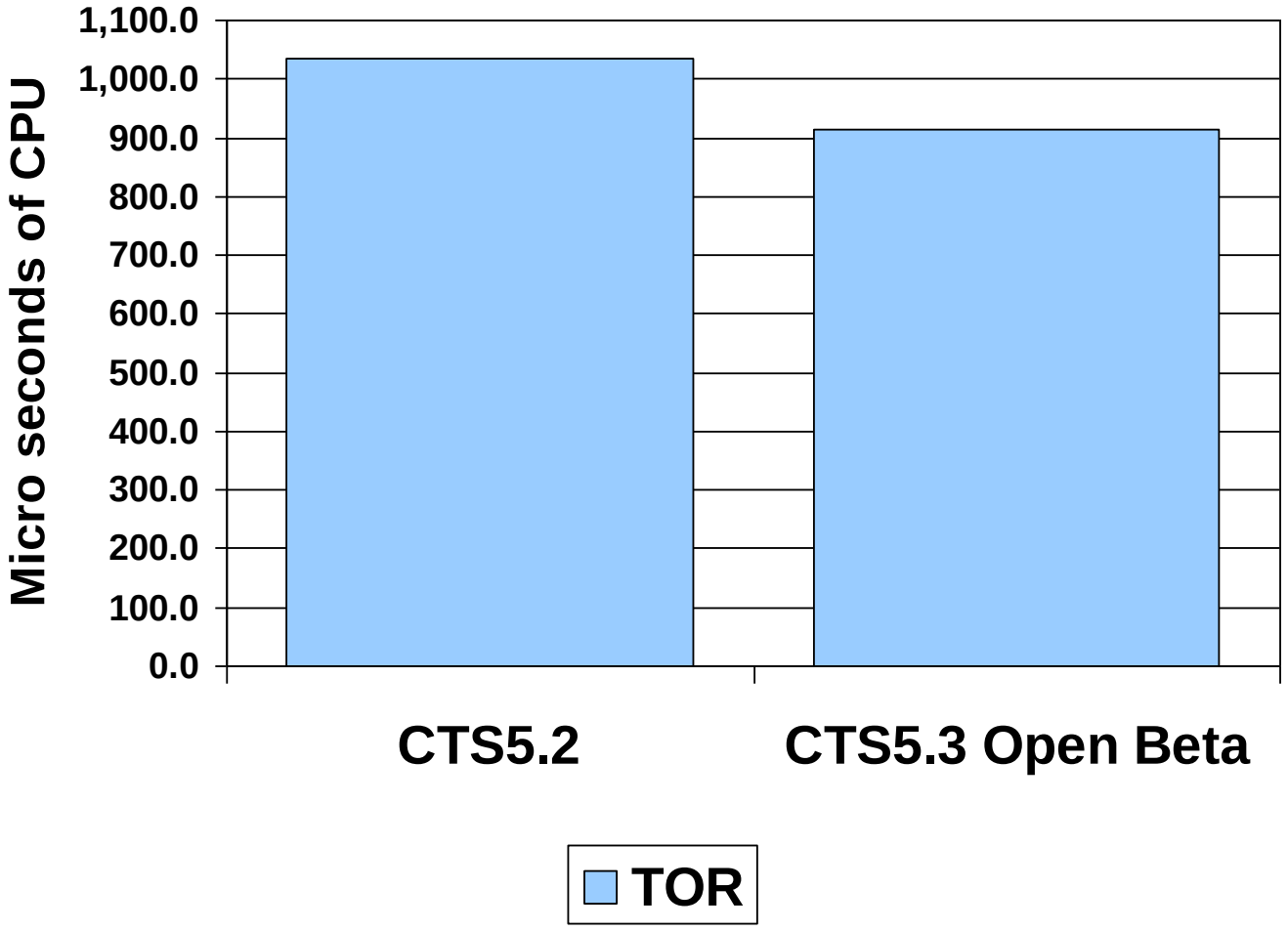
Some numbers from a CICS TS V5.3 open beta development level region

The Workload

Machine used was an EC12



CPU per Transaction comparison - 11.6% reduction in TOR



TCB and SRB CPU times – 5 minute interval

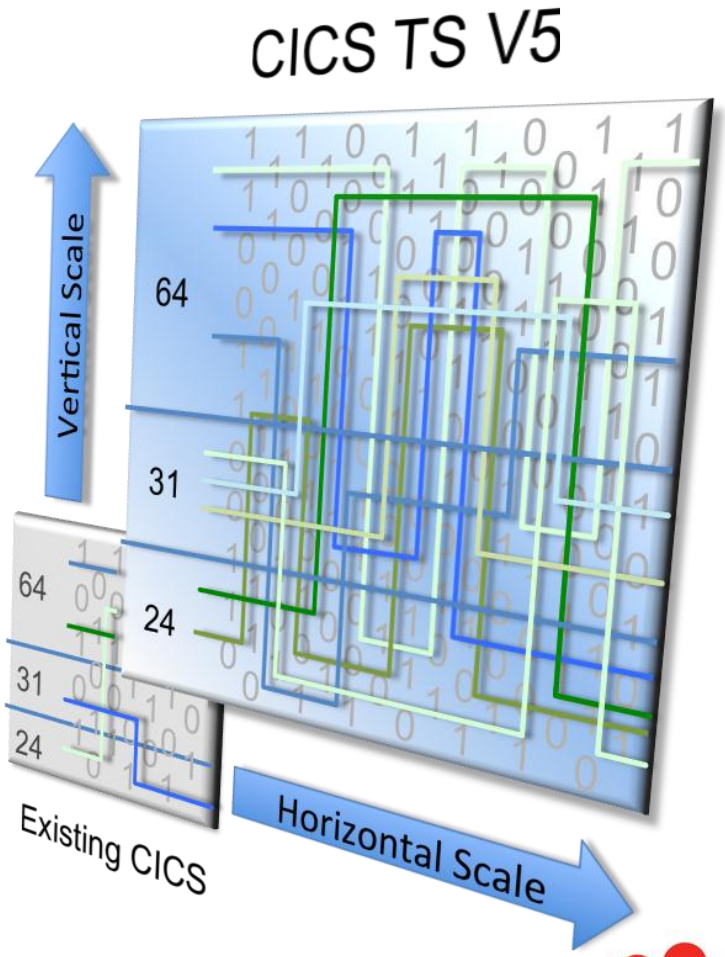
	CICS TS V5.2	CICS TS V5.3 open beta	
Transactions	600181	600243	
TCB	299.97	260.42	-13%
SRB	13.32	12.16	
QR TCB	58.99	47.55	-19%
SL TCB	21.28	20.25	
SO TCB	46.30	22.45	-51%
S8 TCB	118.85	120.32	+1%
L8 TCB	54.50	49.80	-8%

I/O now done on S8, used to be on SO, eliminates change modes

Performance Improvements in CICS TS V5.2 and V5.1 you should know about

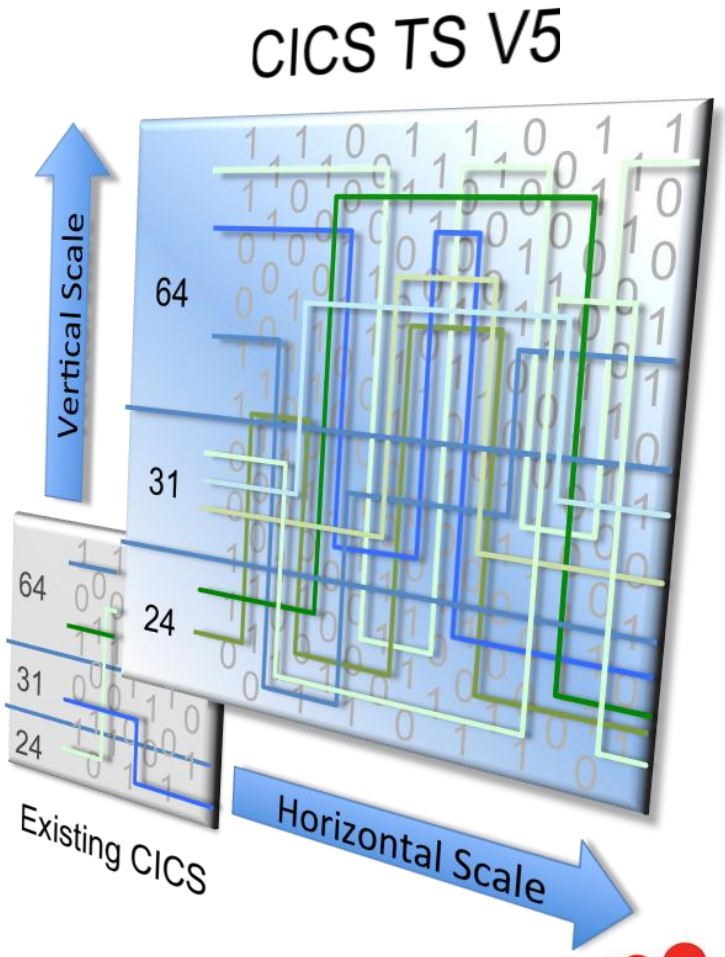
Throughput Enhancements – V5.2 and V5.1

- Threadsafe API and SPI
  - (V5.1) EXEC CICS SET TASK
  - (V5.1) INQUIRE and SET TRACEDEST / TRACEFLAG / TRACETYPE
  - (V5.2) INVOKE APPLICATION
  - (V5.2) VERIFY TOKEN
- Threadsafe TD (V5.1)
  - TD GLUEs must be threadsafe
- Max tasks increase (V5.1)
  - New default 500, min 10 and max 2000
  - NB: It is okay to hit max tasks!



Throughput Enhancements – V5.2 and V5.1

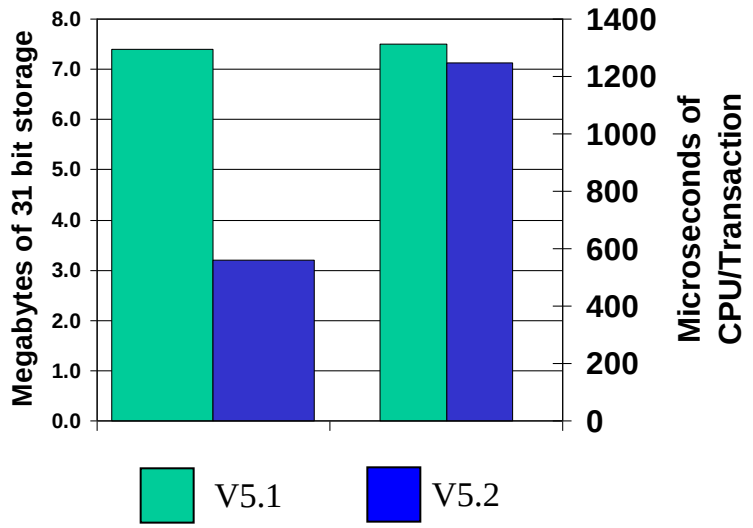
- Multi-cast event emission
  - Use an EP adapter set
  - Allows more efficient event handling
- Increase the potential of program load capacity (V5.1)
  - Reduced contention for the single CICS RO TCB
  - New statistics added



Virtual Storage Constraint Relief – V5.2 and V5.1

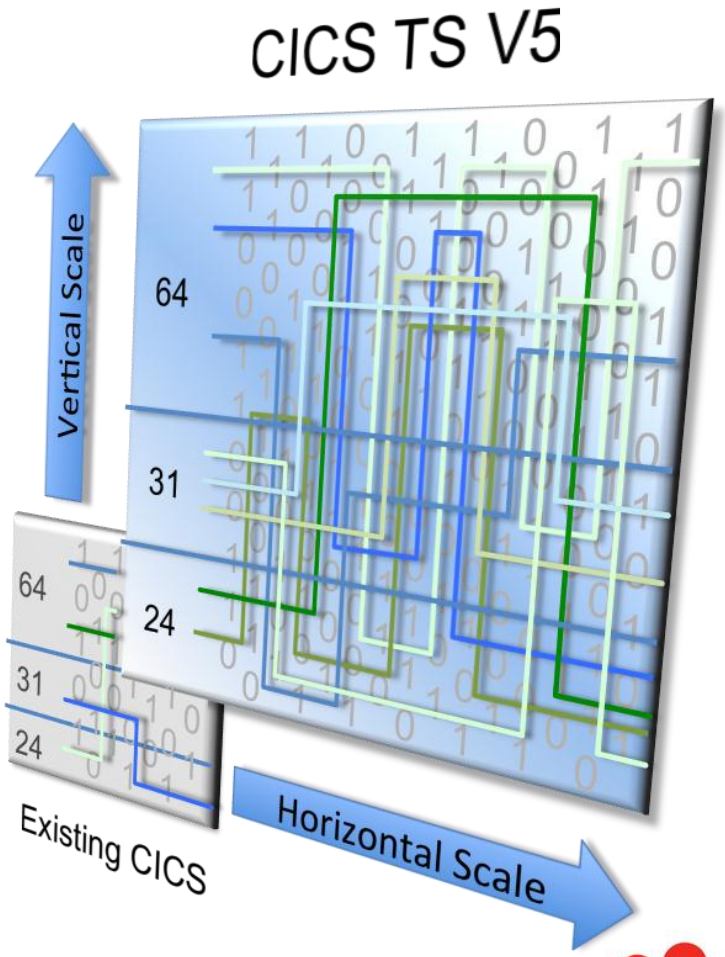
- Reduced 31bit memory usage for Web services (V5.2)
  - The SOAP node parsing is done entirely in 64 bit storage
- 64 bit application storage (via assembler) (V5.1)
  - Non-LE ONLY
  - EXEC CICS GETMAIN64 and FREEMAIN64
  - EXEC CICS PUT64 CONTAINER and GET64 CONTAINER

1 Megabyte Web service



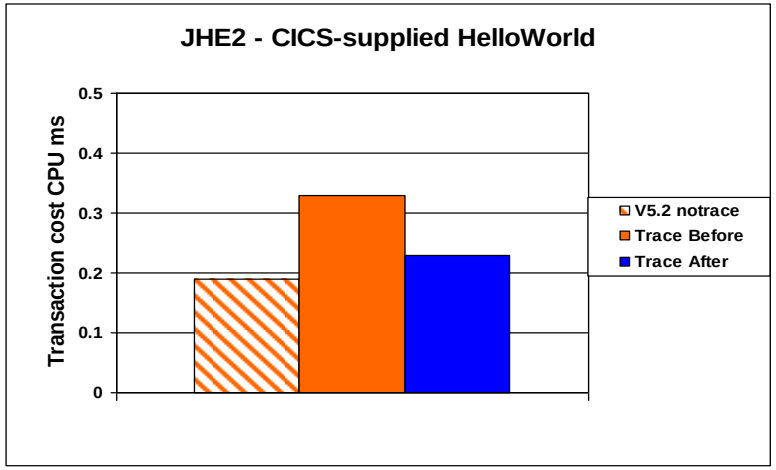
Virtual Storage Constraint Relief – V5.2 and V5.1

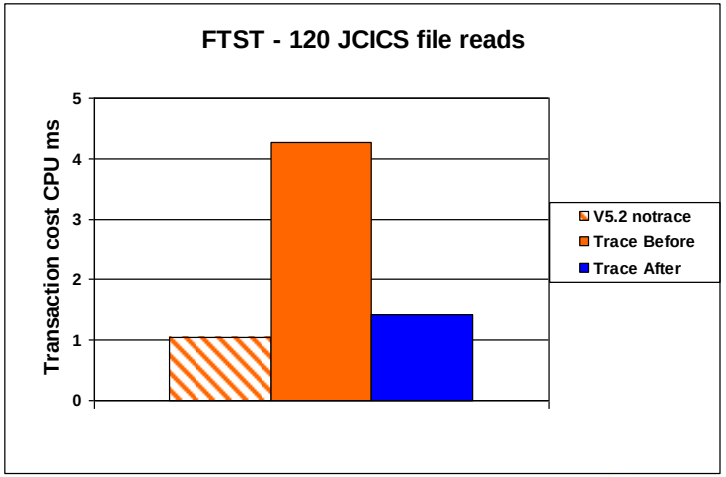
- Domains exploiting 64 bit
  - (V5.1) Storage Manager, Loader, Console Queue, new function
  - (V5.2) Pipeline, new function
- 24 bit storage use significantly reduced (V5.1)
  - Supplied transactions now TASKDATALOC(ANY)
  - Internal control blocks moved



CPU Usage – V5.2 and V5.1

- Java Trace (V5.2)
  - Content of default trace changed
  - Better performance for JCICS
  - Measurements in tables from pre-GA code
- Java calls to DB2 reduced TCB switching (V5.1)
  - Requests stay on T8 TCBs
- Improved defaults for some system configuration parameters

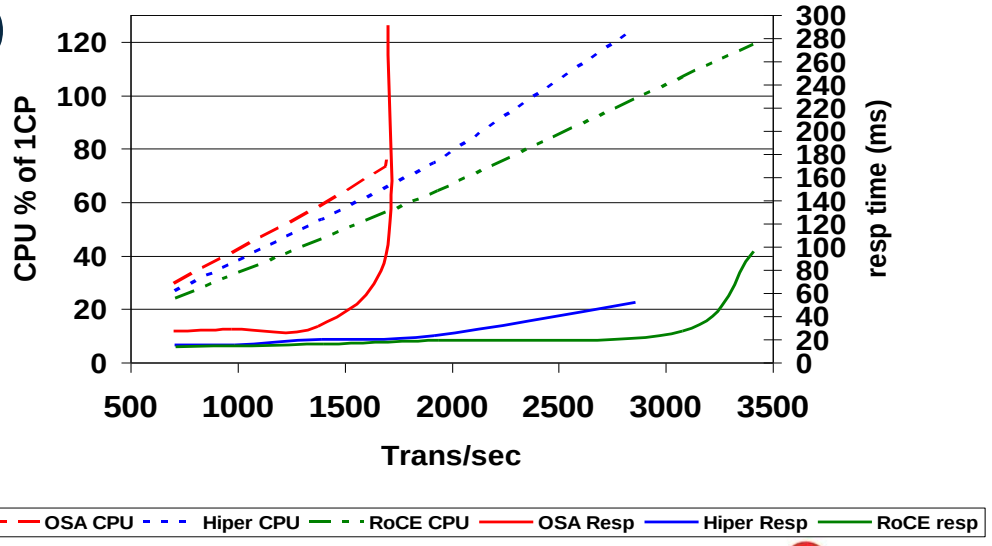




CPU Usage – V5.2 and V5.1

- TCB Switches (V5.2)
  - Remove 2 TCB switches per web service request when invoking transactions defined with DYNAMIC(NO), by optimizing when the routing program is called
- Also apply to other releases (All)
  - RoCE (SMC-R) gives reduced CPU and better scaling
  - Use of Flash with CICS V5.2, z/OS V2.1 and zEC12 gives benefits when paging & when taking system dumps

SMC-R vs other connectivity options



Other items in CICS TS V5.2

- Task association data parameter list improvements
  - Better performance when looking at these fields
- Reinstate ability to control MAXxxxTCBS (with option for system to set value)
  - For very heavily loaded systems having very large numbers of open TCBs can have detrimental impact on performance
- CICS PA improved visualization and expertise
  - Visualisation in the PA plugin allows easy comparison between areas, e.g. storage use and transactions
- Better understanding of QR dispatch queue
  - Additional dispatcher and transaction manager metrics are collected to aid understanding of threadsafe application usage

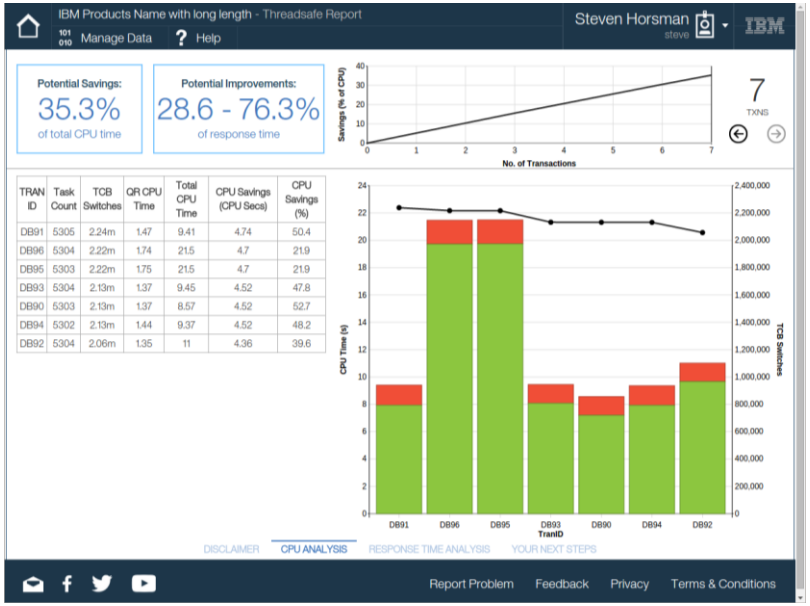
What can you do to improve performance?

What can you do to improve performance?

- Analyse your systems
- Make appropriate programs threadsafe
- Recompile with newer compiler versions
- Exploit zIIP offload
- Education – Red Paper series
- Upgrade machine
- Add accelerator cards
- Consolidate regions
- Change settings to be appropriate for workload
- Use policies to protect regions
- Get help from IBM

CICS Operational Insights open beta

- New Cloud based Service to identify opportunities to tune your CICS
- Understand your operational characteristics to target improvements
- Upload a snapshot of operational data and get a Threadsafe Assessment (more insights to follow)
- Threadsafe can help you get more efficient and save money



Try it out at
https://cicsoi.mybluemix.net/

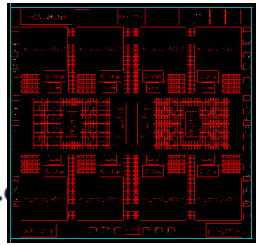
Have your say on new insights on
https://ibm.biz/cicsoi-forum

CICS and z13

IBM z13: built for the needs of digital business and designed for the mobile generation

z13 Feature	Potential CICS benefit
SMT on zIIP exploited by Java	CICS OSGi Java, CICS Liberty JVM server, CICS Mobile, CICS TG
CPACF and SIMD exploited by Java 8	CICS TS Statement of Direction for Java 8 support
Cryptographic improvements: Crypto Express5S & CPACF	SSL processing: CICS TS and CICS TG
Large Memory	Storage-constrained workloads e.g. using channels and containers, shared data tables, Java heap
SIMD exploitation and other improvements in COBOL V5.2, PL/I V4.5, C/C++ V2.1.1	CICS applications recompiled for z13

Transaction Processing
Data Serving
Mixed Workloads
Operational Efficiency
Trusted and Secure Computing
Reliable, Available, Resilient
Virtually Limitless



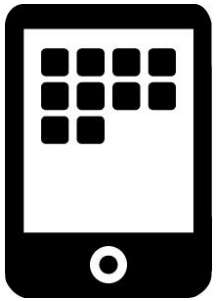
Need expert help?

CICS Development Services, for worldwide services assistance

Get a deep dive into your systems with a CICS health check	Move forward with mobile with our customized mobile workshop	Soar into the cloud with our tailored cloud workshop
Want to know more about CICS and Java? We offer tailored Java education	Need to optimize your systems? Then ask about a performance optimization engagement	Need to modernise your workload in CICS? Ask about a integration and connectivity engagement
Get the low down on performance with a CICS performance workshops	Need some help upgrading to the latest release? Then ask about our upgrade workshop	Need to reduce cost by optimizing your systems? Then a performance optimization engagement may be for you
Need something different? Then we can build a **customized** workshop, just for you!	Visit ibm.com/cics then click 'Services'	**Availability** a concern? Then try our High Availability workshop

Bringing CICS development expertise directly to your doorstep

Email us CICSDTS@UK.IBM.COM



The Mainframe Mobile App Throwdown is back for 2015!

Mobilize your mainframe in our fun app-building contest for z Systems clients & business partners!

Register now at

ibm.biz/mmathrowdown

and submit your app by April 12th

Questions

Thank You!

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