

The ART and Practice of Mainframe Rehosting for CICS, IMS, and Batch Applications Leveraging Oracle Tuxedo ART

Mark Rakhmievich (mark.rakhmievich@oracle.com)

Sr. Director, Product Management

Oracle



#SHAREorg



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



Agenda

- **Mainframe Migration Overview**
- Customer Examples
- Industrialized Methodology
- Key Technology Requirements
- Summary and Q&A

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

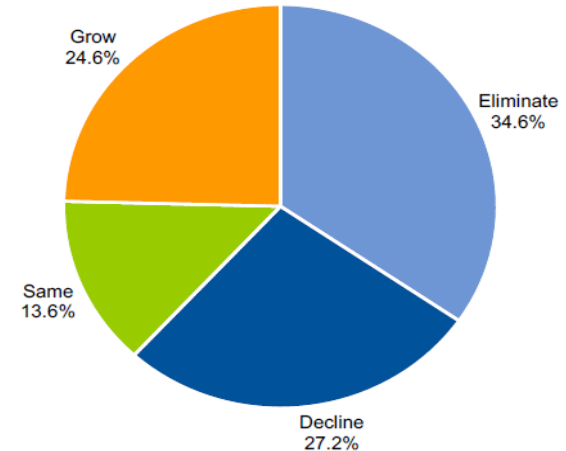


Mainframe Migration and Modernization Market



“Fully 75.4% of respondents indicated their mainframe footprint will remain the same, decline or be eliminated completely.. About half of the respondents that indicated no growth identified complete mainframe elimination as their option (34.6%).”

- **“Gartner cannot ignore the concerns expressed by our clients over this platform. These include their perception of the total cost of ownership of this platform, concern over an aging workforce that is the most knowledgeable about this platform, and dissatisfaction with their existing application portfolio and their ability to modernize it while remaining on this platform.”**
- **“The reported interest of large mainframe shops (greater than 10,000 MIPS) in mainframe elimination is surprising, even though we have seen growing interest in this option in increasingly larger mainframe shops over the last several years.”**



Source – Gartner: The Changing IBM Mainframe Market, October 4, 2013

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



Customer Drivers



1. COST REDUCTION

- 50%-80% Annual savings after mainframe rehosting
- Simpler, affordable HA/DR architecture
- Scalability at significantly lower cost vs. a mainframe
- Simpler operations
- Broader choices, more “bang for the buck”, greater budget flexibility

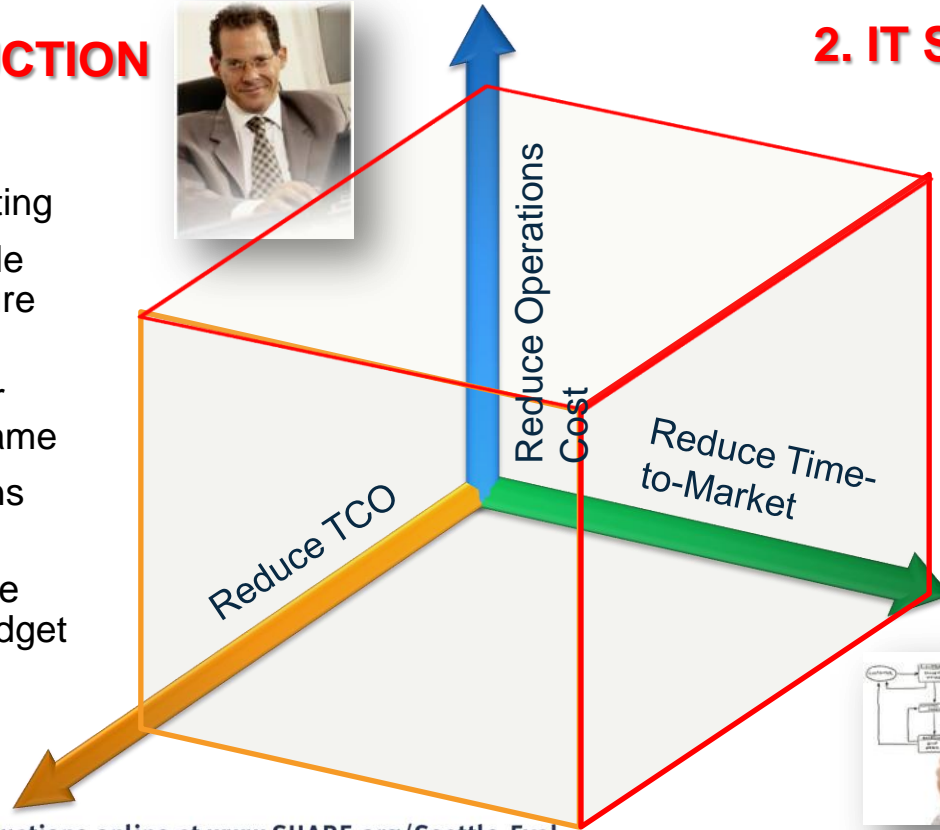


2. IT SIMPLIFICATION

- Horizontal Scale-out
- Dynamic Load-balancing
- Automated Operations
- PaaS/Private Cloud Deployment

3. SPEED UP BUSINESS

- Service-enabled/SOA-ready
- Easily extend COBOL/C with Java
- Built-in integration options: Web Svcs, JCA, SCA, ESB
- Plug-n-play BPM, ODI, BI, packaged components



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

Why Start with Rehosting Approach?



SAFEST FOR STRATEGIC APPLICATIONS



- Differentiated services and business logic
- Alignment with corporate standards
- Future-proof for further modernization, growth

THE MOST COST-EFFECTIVE MODERNIZATION OPTION



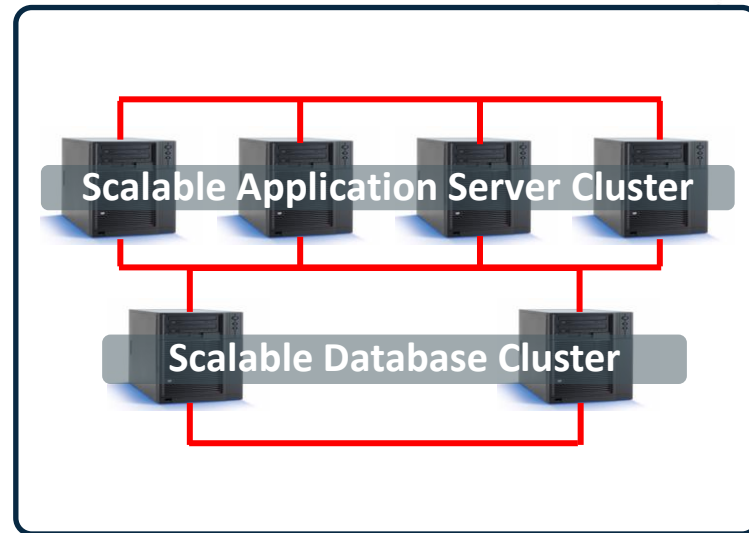
- Proven, predictable, quickest path to savings
- No impact on users, no retraining
- Open, flexible, doesn't constrain any future choices

ELIMINATE RISKS



- Retiring mainframe staff
- Technology obsolescence
- Vendor lock-in

Common Premises

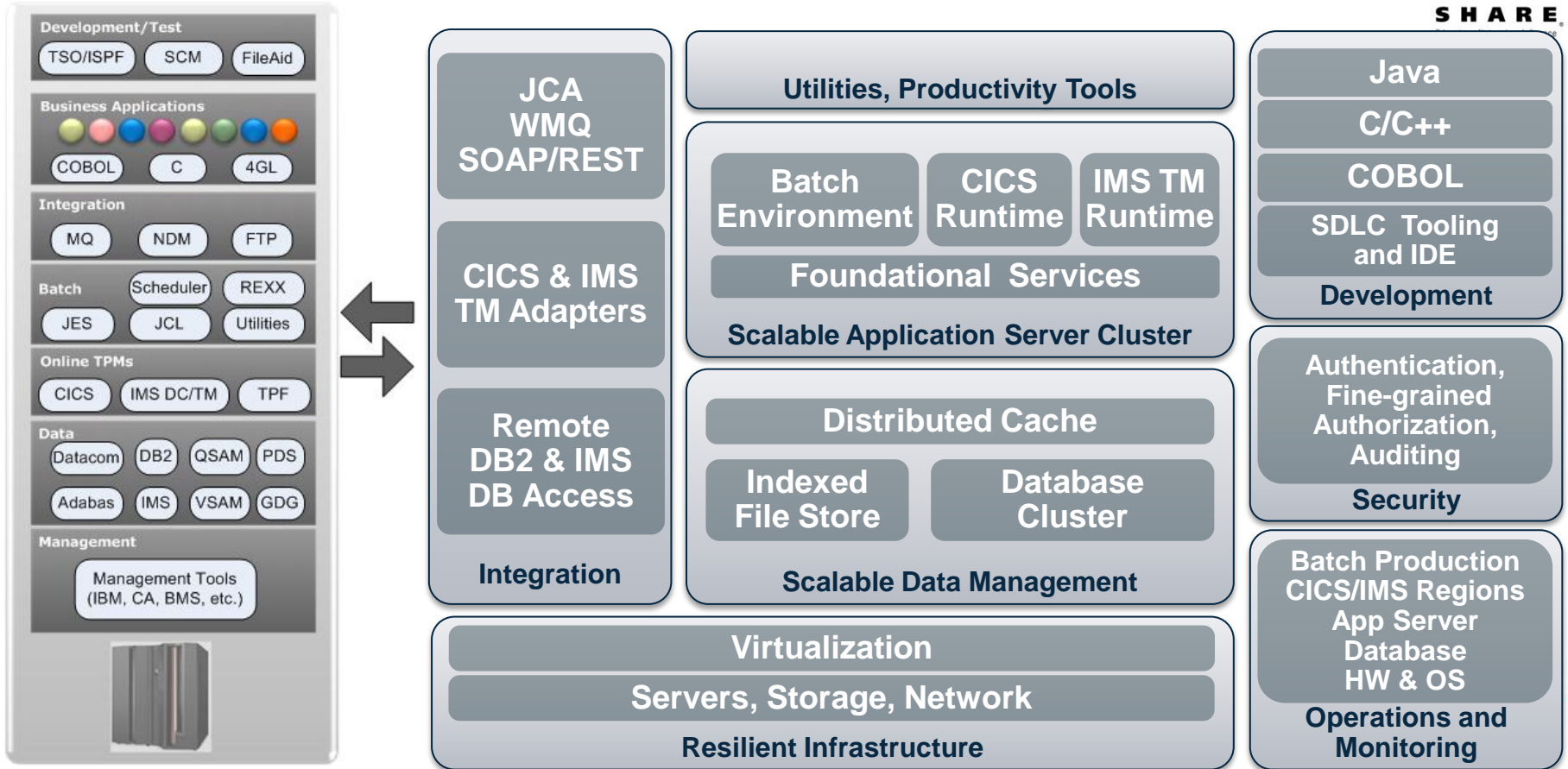


- Migrate MF Applications to Open Systems
 - Without Cost, Risk of a Re-Write
 - Ensure compatibility for CICS, IMS, & Batch apps
- Reduce Costs up to 50%-80% vs. Mainframe
 - Eliminate or reduce MIPS, defer an upgrade
 - Increase choice, budget flexibility

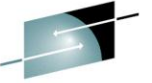
- Maintain and Extend Mainframe QoS
 - Improve scalability with elastic, horizontal scale-out at lower cost
 - Improve availability with rolling upgrades, active/active HA/DR
- Improve IT Responsiveness, Agility
 - Easily integrate in SOA, extend with Java
 - Unlock non-relational data to the enterprise

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

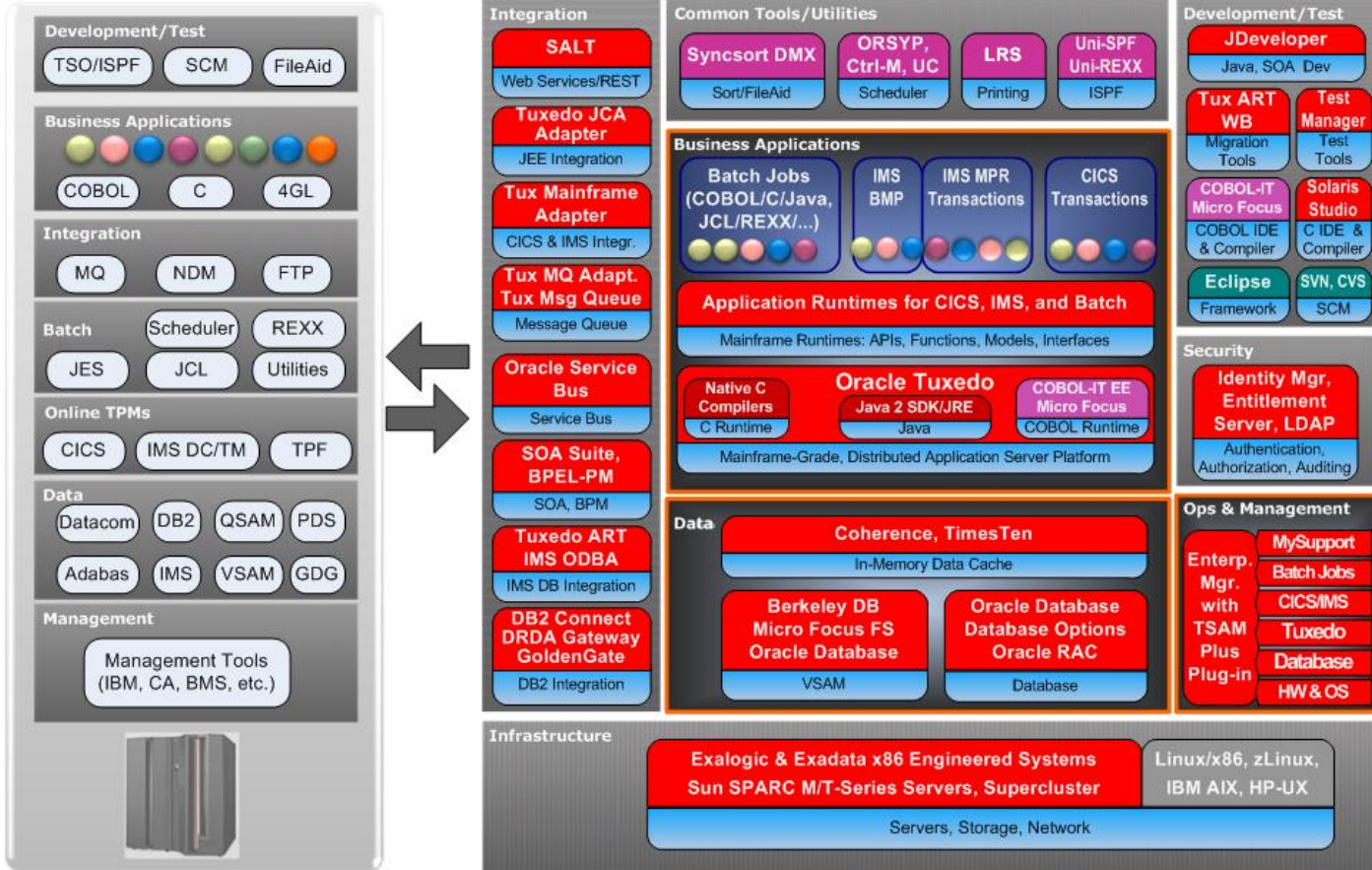
Key Technology Requirements for Mainframe Migration & Modernization



Oracle Reference Architecture for Mainframe Migration & Modernization



SHARE
Educate · Network · Influence



Rehosting Mainframe to **Extensible Architecture**



SHARE
Educate · Network · Influence

UI Services
3270 BMS/MFS Custom

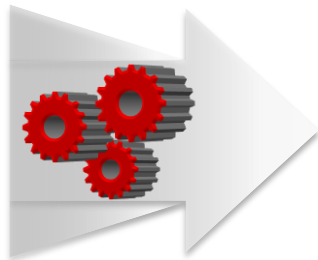
Batch Services
Job Schedulers 3rd Party: Syncsort, Printing
JCL, PROCs IBM Utilities
IBM JES

Data Sources (Files/Databases)
VSAM IMS/DB DB2 IDMS

4GL Environments
CA Gen CA-IDEAL Natural

Application and Transaction Services
CICS, IMS TM
Business Logic in COBOL, C, PL/I, ...

IBM Mainframe running z/OS



Combines

Mainframe-compatible
Software Stack,
Automated Tooling,
Proven Methodology

UI Services
tn3270 Web UI Custom

Batch Services ART ISPF Extensions
Job Schedulers 3rd Party: Syncsort, LRS, etc.
Migrated JCL Jobs JCL Functions and Utilities
Tuxedo ART for Batch

Data Sources
VSAM BDB Oracle DB Grid/Exadata

Application and Transaction Services
Rehosted Business Logic Migrated 4GLs
ORACLE TUXEDO
Tuxedo ART for CICS, IMS TM

Linux, Solaris, AIX, HP-UX

Users retain access via tn3270 emulators, custom clients, or switch to Web UI

Batch jobs run on Tuxedo ART with converted JCL and standard utilities

Databases migrate to Oracle, VSAM to VSAM fs, BDB, or Oracle DB

Online applications run on Tuxedo ART under CICS, IMS programming models

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



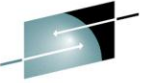
Agenda

- Mainframe Migration Overview
- **Customer Examples**
- Industrialized Methodology
- Key Technology Requirements
- Summary and Q&A

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



Sample of over 200 Mainframe Migrations to Tuxedo



SHARE
Educate • Network • Influence

Banking



Insurance



Retail Manufacturing Utilities



Public Sector



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



Sample Mainframe Customer Wins and Active Migrations to Oracle Tuxedo



Top 20 European Bank
Migrating ISV trading application
5000 MIPS – CICS, DB2, MQ



European Horse Racing/Betting
Rehost as 1st phase of modernization
8500 MIPS – IMS TM & DB, CICS, DB2, MQ



European Airline
Plane repair & maint., revenue mgmt.
1000 MIPS – IBM CICS, Batch, DB2



US HHS Department
Debt Mgmt Collection System
300 MIPS – CICS, Batch, VSAM



Banking ISV for Top Nordics Bank
Trade finance solution for major banks
IBM CICS to Tuxedo ART CICS on Linux



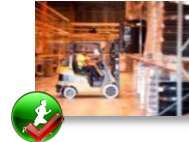
Top 5 European Bank
SWIFT messaging/payments ISV solution
Looking to increase throughput 10X



Top 10 Global Bank present in >70 countries
Rehost in France – 48 MF apps/20M LoC
2000 MIPS - CICS, Batch, DB2



Top Multi-line Mutual Insurer in Europe
Quote System/Pricing Engine
4000 MIPS - CICS, Batch, DB2, MF Integr.



US-based Global Distributor
Order mgmt. & fulfillment, inventory
800 MIPS - CICS, Batch, DB2, MQ



Major North American Telco
7 Initial Apps out of ~6000 MIPS portfolio
CICS, IMS TM, IMS DB, DB2, VSAM, SAS

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

Legend: In Production In Parallel Run

Much Lower TCO – 9:1 Cost Reduction

Mid-Size European Bank With 3600 Branches, 80K POS Systems

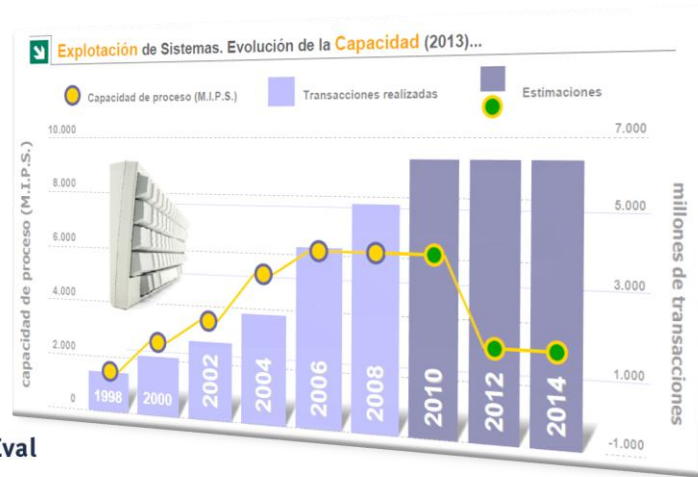


Results:

- 68% of all transactions run through migrated system
- Architecture open to SOA
- Cost reduction 9:1
- 50% transaction growth since 2007 while MIPS stayed flat
- 75% MIPS reduction by 2012

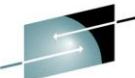
Objective: Migrating mission-critical applications to open systems to reduce operating costs, while

- Migrating rapidly
- Ensuring the same functionality
- Ensuring the same level of performance
- Ensuring the “day after”



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

An 8500 MIPS European Sports Betting/Horse Racing Co.

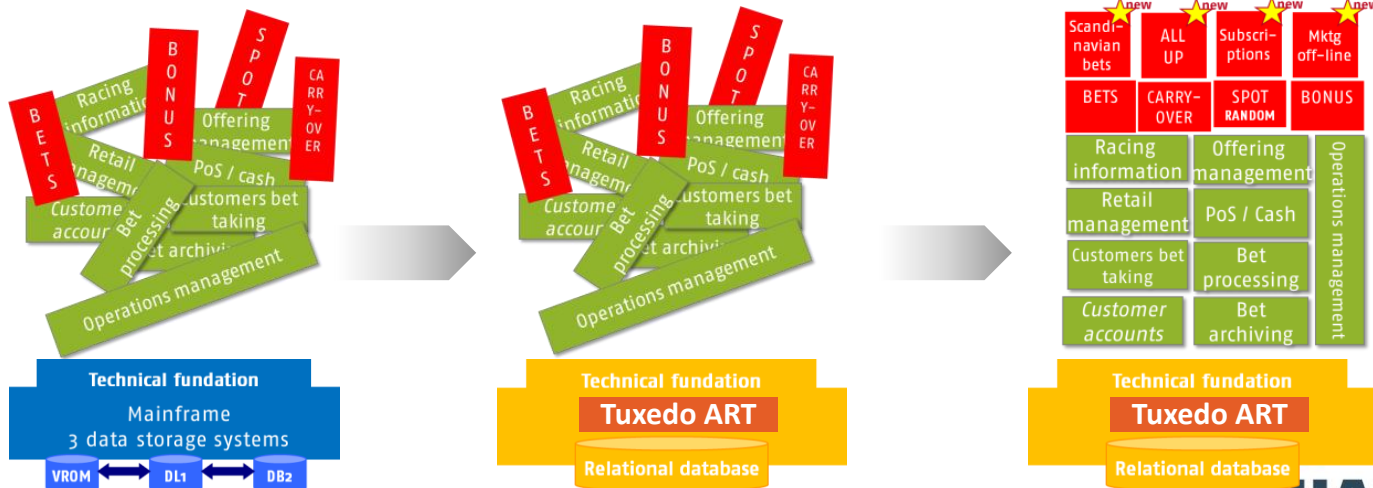


SHARE
Educate · Network · Influence

Customer Situation

- CICS/IMS FP/Batch-based application portfolio
- 10X transactions peak 5 min before main race
- 2-Stage Migration and Modernization Plan

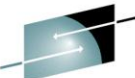
COBOL & C
CICS TS/CTG
IMS FP EMH
VROOM Cache
IMS DEDB/VSO
DB2



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



An 8500 MIPS European Sports Betting/Horse Racing Co.

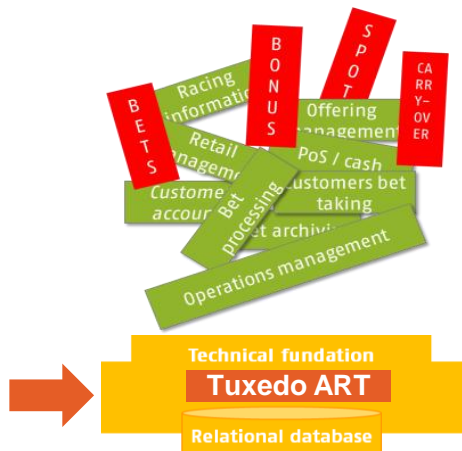


SHARE
Educate • Network • Influence

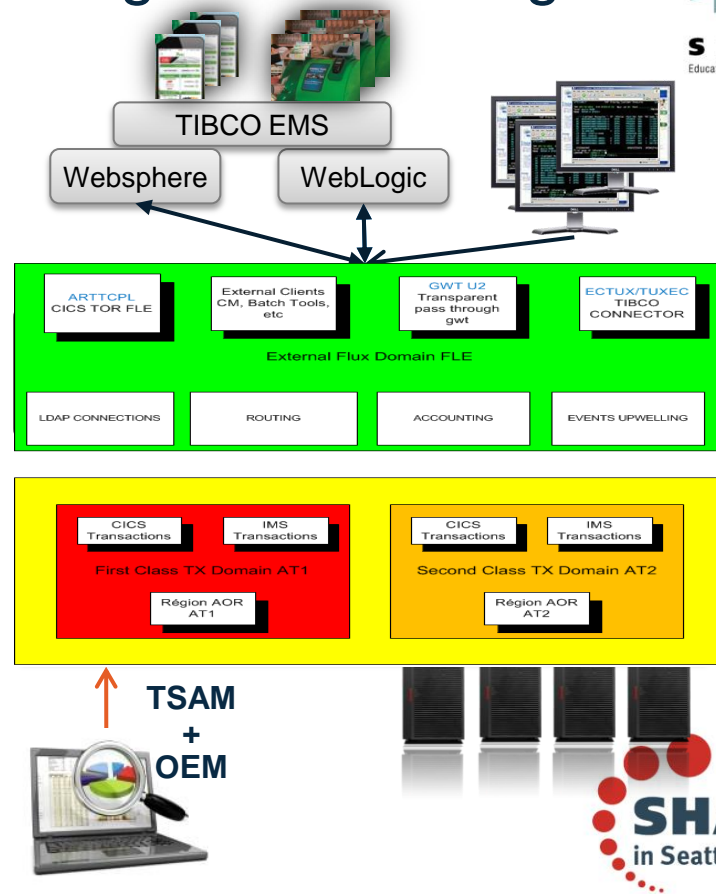
Interim Results

- 1st phase – live since April 2014
- Performance benchmarks on z/OS vs. Tuxedo ART show better response time, more linear scalability, and faster batch
- 2nd phase – parallel runs start in March 2015

COBOL & C
CICS TS/CTG
IMS FP EMH
VROOM Cache
IMS DEDB/VSO
DB2



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



Recent IMS/CICS Migration Benchmark

Sports Betting/Payment Processing



Workload scenarios

- Peak Transaction Loads - massively real time transactional with peak loads (36 000 points of sale)
- Stressful Batch – heavy data processing: GAPR, RDG, & VALO
- Management workload – Batch & standard OLTP CICS

z/OS SYSPLEX: 8500 MIPS **Benchmark Configuration:** 3 VMs with Tuxedo ART on 16 cores P7+ @4.4 GHz

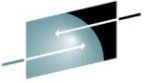
RESULTS

Noticeable improvements:

- Response Time: 7% to 50% faster
- Critical Batches: faster
- Transactional output : x2
- Scalability: n*100%
- Availability: Redundant Tuxedo ART Servers

Workload	Mainframe IMS FP & CICS	Unix Tuxedo ART
OLTP		
Online - 450 TPS	7 ms	4,1 ms
Online - 720 TPS	22 ms	4,6 ms
Online - 3 000 TPS	N/A	12,4 ms
Batch		
18 TPS // GAPR	13mn 05s	7mn 42s
1 600 TPS // RDG	34 s	21 s
3 000 TPS // VALO	133 s	95 s

A US-Based Global Books/Media Distributor – Full Migration



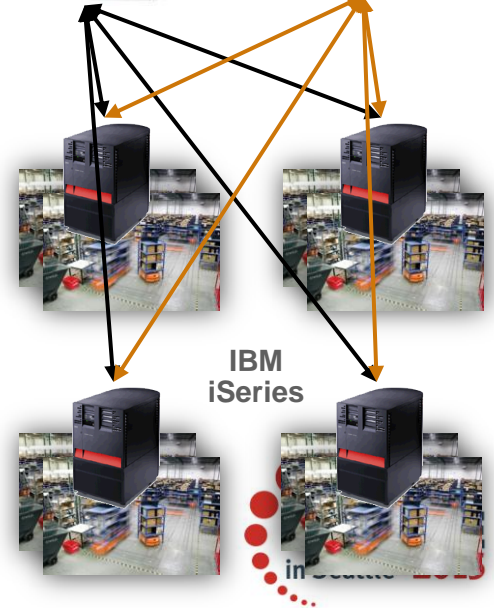
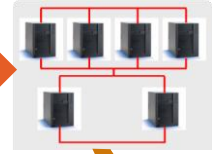
Customer Situation

- Drivers: Expansion-driven business needs lower cost platform to scale and grow the business
- 800 MIPS CICS & Batch-based Order-to-Cash application set
 - Manages inventory, order processing and fulfillment for 38K customers
 - 300K JCL jobs/Daily runs of 15K jobs
 - MQ & DB2 DRDA for integration of z/OS and iSeries at 8 warehouses
- Chose Tuxedo ART for
 - Robust, automated migration capabilities
 - High availability and txn management in multi-DB environment
 - Resilient IBM MQ integration for order processing
 - Mainframe-class operations/monitoring
- Currently live with first two migrated applications, one batch and one CICS.
- Preparing for 2nd phase deployment and go-live

IBM System z



Linux Servers
powered by
Tuxedo ART &
Oracle RAC DB

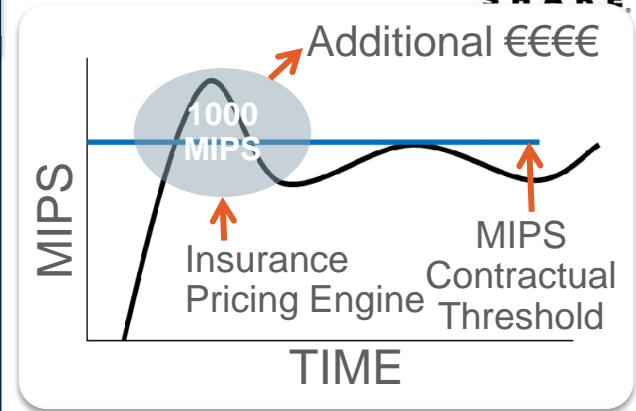


A Top Tier Mutual Insurer in Italy – Phased Migration



Customer Situation

- Drivers: Rapid cost reduction and streamlining due to market pressures
- 4000 MIPS CICS & Batch application portfolio
 - Policy issuance, underwriting, customer servicing at over 1000 agencies
 - ~1000 MIPS consumed by Pricing/Quote engine – often pushing total consumption above contracted threshold, leading to excessive costs
- Selected Tuxedo ART after POC due to:
 - Rapid, automated migration capabilities
 - Robust integration with remaining CICS transactions on the mainframe
 - High performance and mainframe-class operations/monitoring
- 5 months initial migration phase from start to go-live:
 - CICS pricing transactions re-hosted to Tuxedo/ART – 1200 MIPS
 - ART CICS – z/OS CICS integration using TMA benchmarked at 100 tps
 - Gradual rollout underway across 1000+ insurance agencies
 - Re-negotiated IBM agreement at lower cost



Next Steps:

- Migrating DB2 data to Oracle/Exadata
- Migrating the rest of CICS and Batch to Tuxedo/ART on Exalogic

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



A Top Asian Bank – Core Banking Applications Migration

SHARE
Educate • Network • Influence

Customer Situation

- Drivers: Cost reduction and reduced dependence on IBM
- 8000 MIPS CICS & Batch Enterprise (Centralized) Customer Information Facility (E-CIF)
 - 600M customer accounts
 - Concurrent users: 150...750
 - ¼ Rack Exalogic + ½ Rack Exadata
 - Also planning to migration Advanced Loan System (ALS) from FIS
- Completed Tuxedo ART POC and Benchmark to evaluate
 - Automated migration capabilities from z/OS to Linux/Exastack
 - **High volume tps scenarios: 13,900 transactions/sec**
 - Stability in long duration testing
 - Mainframe-class resilience and performance despite HW failures
 - Scalability, making effective use of HW resources
 - Recoverability after issues, outages
 - Mainframe and Open Systems interconnect (TMA)

Benchmark Environment and Results

Application Platform

Tuxedo/ART for CICS and Batch on ¼ Rack Exalogic X3-2

128 cores at 60% utilization

Database Platform

Oracle RAC on ½ Rack Exadata X3-2

64 DB cores at 90% utilization

Sustained tps: 13,900

109 tps/core – App Server

217 tps/core – DB Server

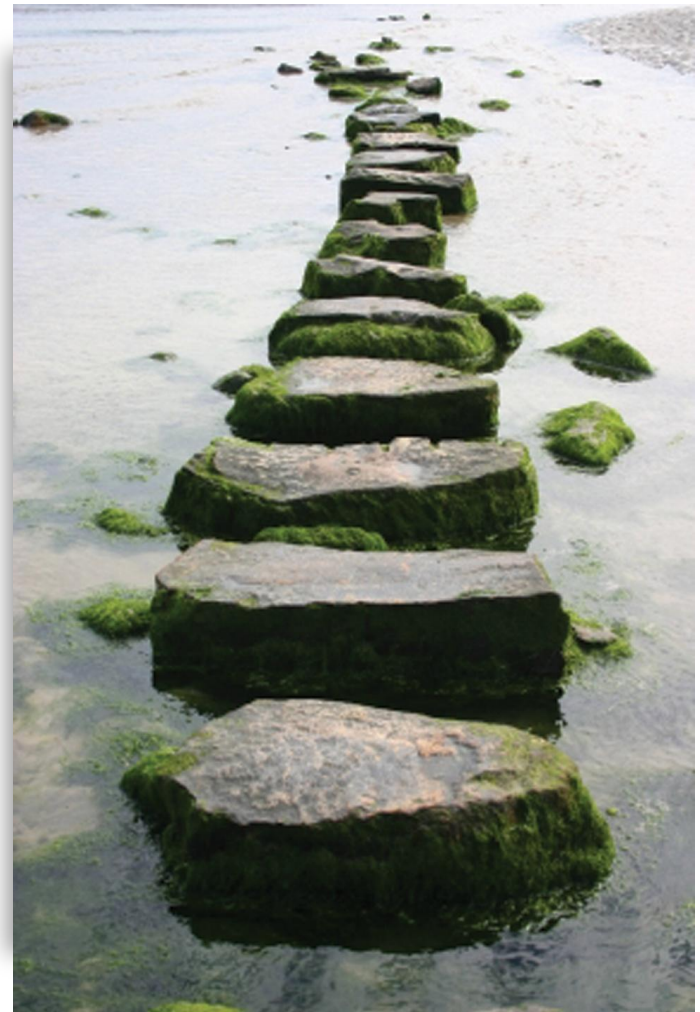
Complete your session evaluations online at www.SHARE.org/Seattle-Eval

SHARE
in Seattle 2015

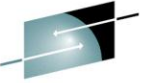
Agenda

- Mainframe Migration Overview
- Customer Examples
- **Industrialized Methodology**
- Key Technology Requirements
- Summary and Q&A

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



Typical Project Approach



SHARE
Educate · Network · Influence

investment

reward

ACTIVITIES/OBJECTIVE

Outline general requirements and constraints, modernization approaches and target architecture options

Evaluate possible options and define target solution and planning with budget

Validate target solution and confirm budget and planning

Deliver modernization solution and support transition

Discovery

Assesment

Application POC and/or Pilot

Production Pilot or Full Migration

DELIVERABLES

Mainframe Migration Insight Statement of Work

- ▶ Requirements summary
- ▶ Potential applications
- ▶ Modernization approaches
- ▶ Target architecture options
- ▶ Modernization roadmap
- ▶ Risk evaluation
- ▶ Possible partners
- ▶ ROI model and investment evaluation
- ▶ Further assessment needs
- ▶ Refined architecture
- ▶ Refined ROI evaluation
- ▶ Risk mitigation action plan
- ▶ Refined project plan
- ▶ Project budget, conditions
- ▶ Pilot project detailed plan
- ▶ Modernization options and strategies

PoC or Pilot Project

- ▶ Converted POC/Pilot programs and data
- ▶ Regression test report
- ▶ HW and SW platform benchmark results
- ▶ Final recommendations and refinements to the SoW for the full project
- ▶ Modernization architecture and plans

Project Deliverables

- ▶ Operational target environment
- ▶ Operational migrated programs and data
- ▶ Renovated operations environment
- ▶ SOA-ready components
- ▶ Trained developers and operations staff

GO / NO-GO decision

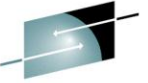


Complete your session evaluations online at www.SHARE.org/Seattle-Eval

Sample Mainframe to Open Systems Mapping

Environment Characteristics	Source	Target
Hardware	IBM z-Series	Exalogic, Sun M- or T-series, or customer preferred HW
Operating System	IBM z/OS	64 -bit Linux or Unix (Solaris, AIX)
TP Monitor/Screens/UI	CICS/IMS, BMS/MFS, tn3270	Oracle Tuxedo ART for CICS or IMS, BMS/MFS, tn3270/Web UI
Programming Languages	COBOL, Assembler, PL/1, C	COBOL, COBOL or C/C++ for Assembler, PL/1, C
DB2 Stored Procs	COBOL, PL/I	COBOL or C sub-pgms wrapped in Tuxedo services
Job Management	JES, JCL	Oracle Tuxedo ART for Batch, migrated JCL job scripts
Batch Languages	REXX, CLIST	KSH or OpenREXX for REXX
Compiler/Dev Environment	IBM Enterprise COBOL	Micro Focus or COBOL-IT Compiler, Eclipse-based IDE
Database	DB2, IMS DB	Oracle Database/RAC
Files	VSAM, GSAM, Flat files, GDGs	Oracle DB, BDB, or COBOL fs, Tuxedo ART GDG support
Reporting	Focus	Focus for UNIX or SQLPlus, BI Publisher
Sorting Utilities	DFSORT, Syncsort	Syncsort DMX
Job Scheduler	BMC Control-M, ESP, OPC	Same or an alternate scheduler
Security	RACF, ACF2	Oracle IdM (LDAP, Identity Mgr., Entitlement Server)
Management/Monitoring	Netview, TMON, Omegamon XE	Oracle Enterprise Manager Grid Control (OEM GC) w/Tuxedo System & App. Monitor, Business Transaction Monitor (BTM)

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



Rehost++ – Preserve and Improve

Rehost intact core components via automated tooling

- Migrate COBOL, C in CICS, IMS, and Batch
- Convert PL/I to C/C++ or COBOL
- Convert JCL jobs with standard utilities
- Migrate DB2, VSAM, Flat Files, GDGs
- Migrate pre-relational DBs (IMS, Datacom, IDSM, Adabas) and 4GLs

Reduce, re-engineer, or replace with open system equivalents

- Reduce Assembler, convert what remains to COBOL or C
- Replace REXX with OpenREXX or convert to native scripting
- Replace RACF/ACF2/Top Secret with LDAP for AuthN, and OES AuthZ, reducing complexity
- Replace Syncsort with Syncsort DMX, LRS DRS with LRS VPSX, etc.

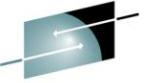
Exploit flexibility of Oracle Tuxedo/RAC deployment architecture

- Collapse multiple CICS and IMS regions into single Tuxedo domains to simplify management
- Deploy in Active/Active configuration for HA/DR, adapt rolling upgrades, use built-in dynamic load-balancing
- Use Oracle Partitioning for very large tables
- Parallelize batch streams to reduce batch window

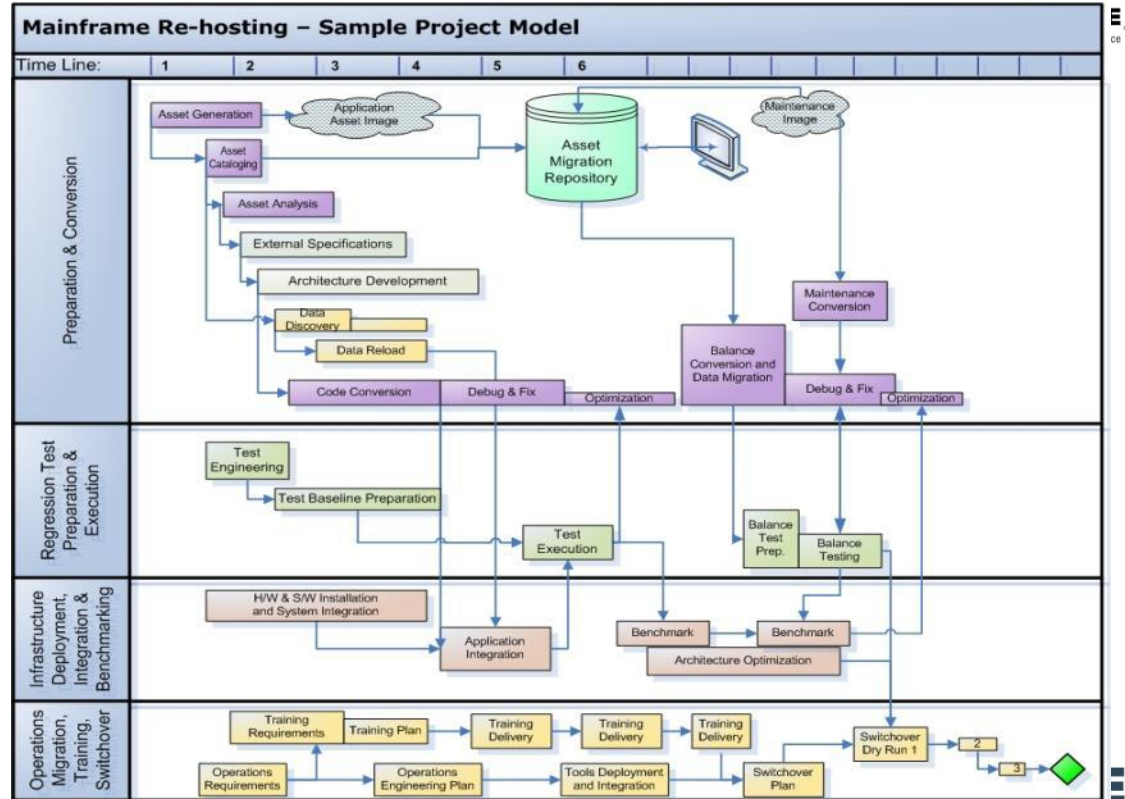
Integrate with the remaining ecosystem – mainframe and open

- Remaining CICS or IMS TM components (TMA: DPL, APPC/LU6.2, OTMA)
- Reconnect IBM MQ Messaging
- Re-establish remote DB connectivity using DB2Connect, OTG for DRDA, ODBA for IMS
- Re-integrate open systems components using Tuxedo JCA, .Net libs, Oracle ESB

Multi-swim Lane Sample Project Model

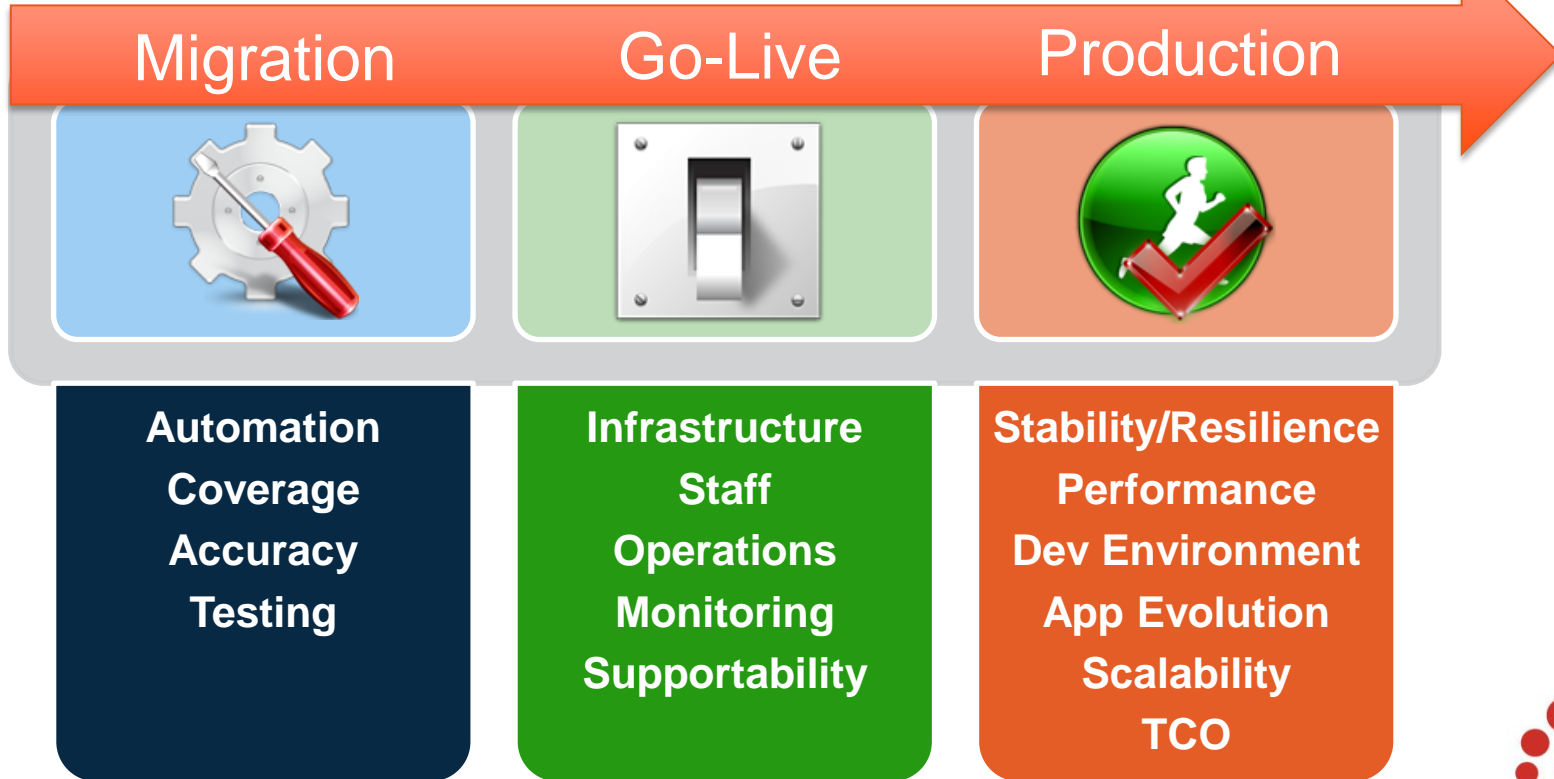


- Discovery Workshop
- Application Assessment
- Application and Data Conversion (pilot application or entire portfolio)
- Test Planning and Engineering
- System and Application Integration
- Regression Testing
- Performance/Scalability Testing
- Resilience Testing
- Operations Migration
- Education and Training
- Switch-Over



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

Key Success Factors - The Long Term View



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



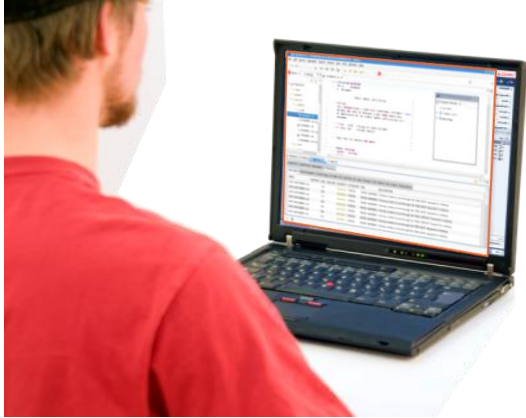
Agenda

- Mainframe Migration Overview
- Customer Examples
- Industrialized Methodology
- **Key Technology Requirements**
- Summary and Q&A

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



Automated, Uniform Transformation



- End-to-end Migration Life-Cycle
- Application repository & cataloger
- Language migration/adaptation: COBOL, JCL, SQL
- Data migration: VSAM, Flat Files, GDGs, DB2, IMS
- Configuration
- Build and Deploy
- Testing with automated results capture and compare

Economics of
Automation

**Faster Migration
Project**



**Lower Cost
and Risk**



Faster ROI

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

in Seattle 2015

Application Rehosting Workbench

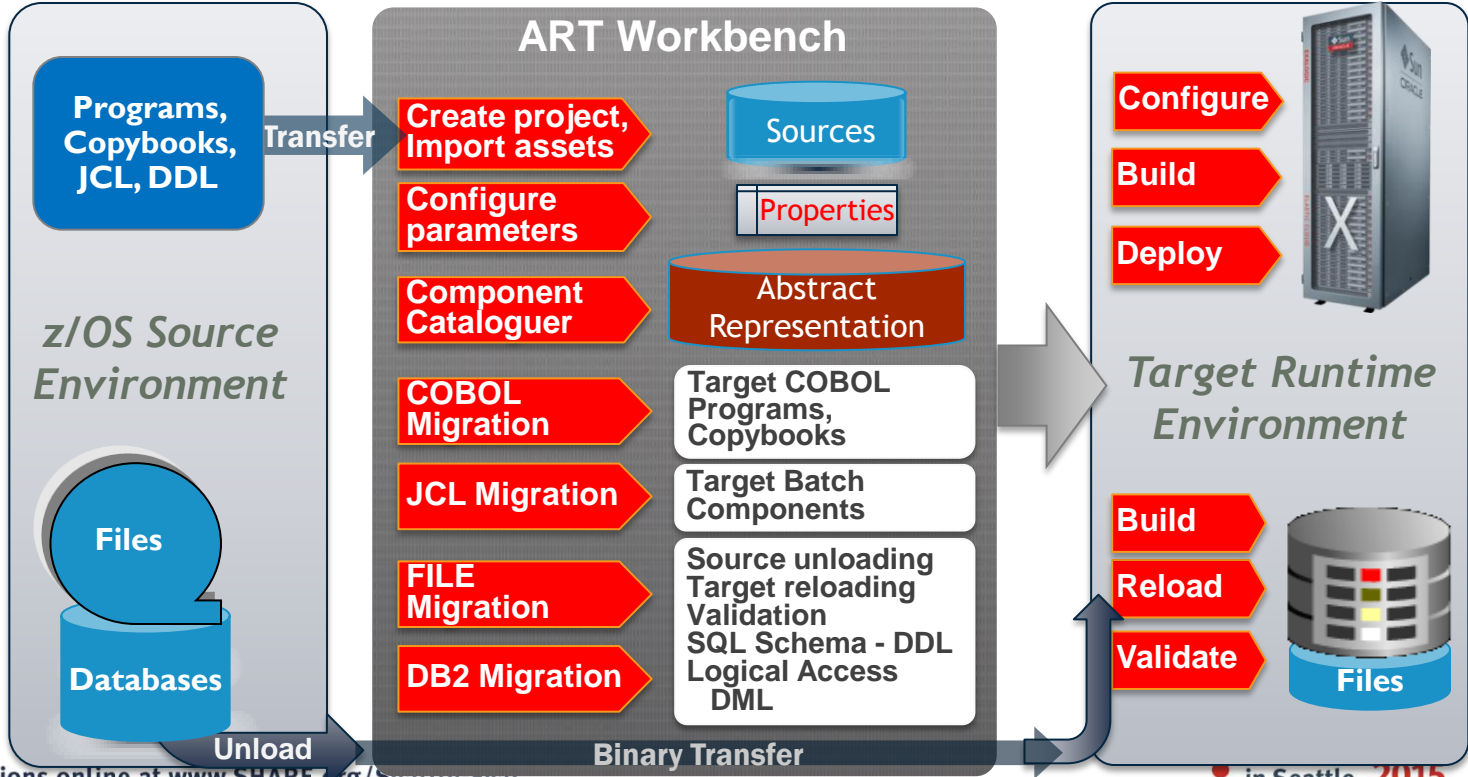
Automated, Industrialized Rehosting Process



\$ Uniformity, high accuracy reduce risk, cost of testing

🕒 Automation, high efficiency speed up migration projects

🔧 Configurable, extensible with custom rules for special needs

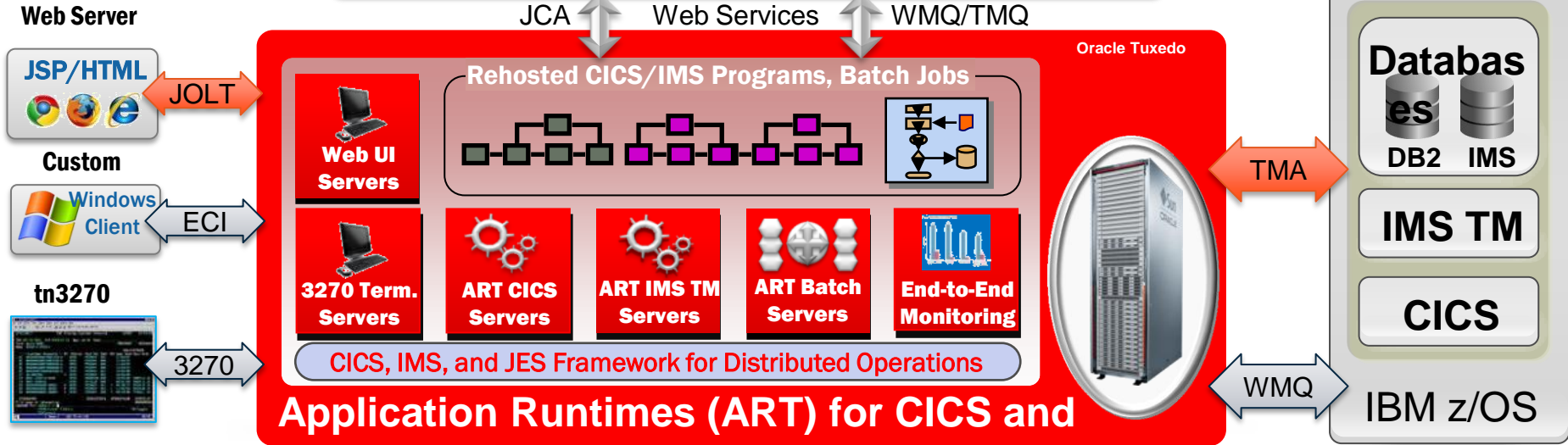


Complete your session evaluations online at www.SHARE.org/Seattle-Eval

in Seattle 2015

Resilient, Compatible Infrastructure

SOA, JEE, ESB, .Net, Packaged Applications



Reduced risk, lower cost, faster migration and accelerated ROI



Faster, simpler integration via SOA, extensibility in Java

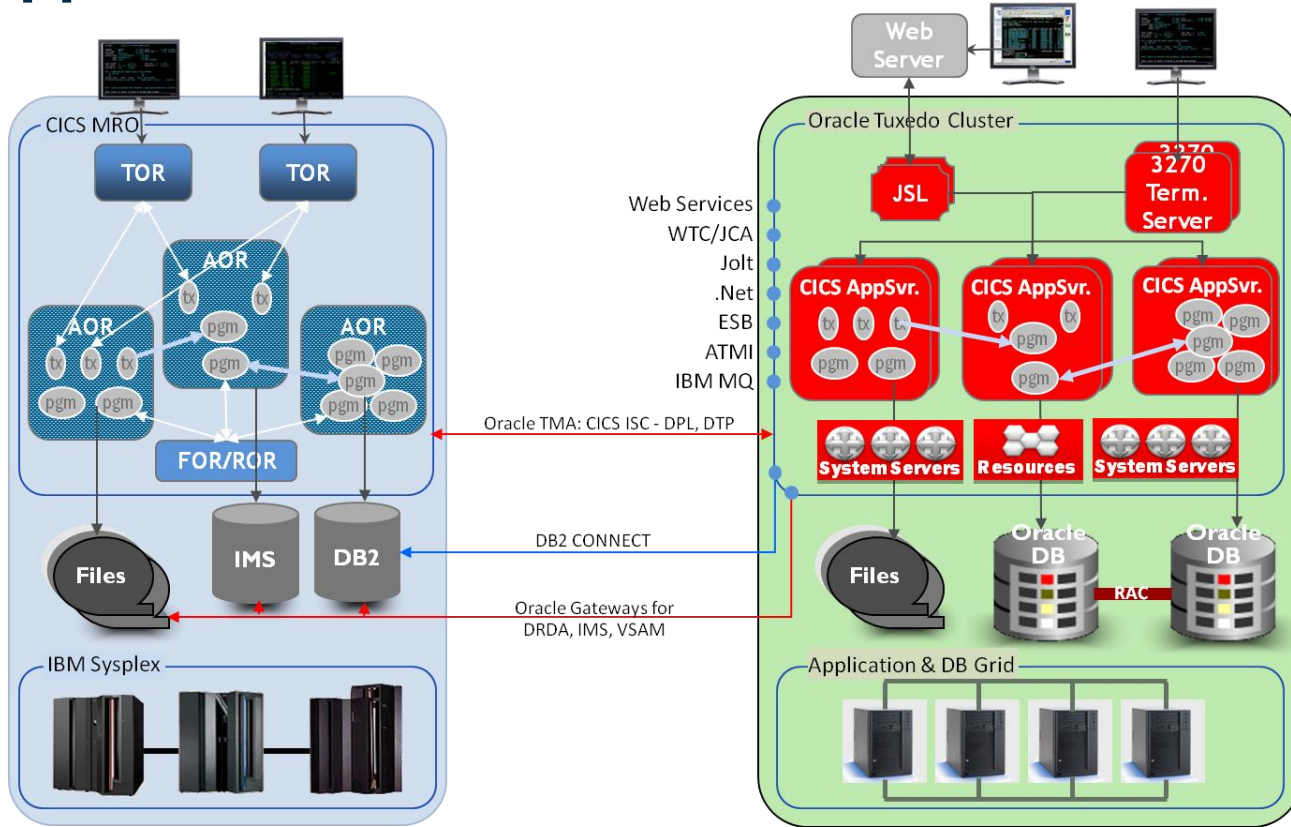


Scale-out CICS, IMS, and batch workloads, run with HA for non-stop operations

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



Application Runtime for CICS



- ✓ Synch & Asynch transactions
- ✓ DPL programs
- ✓ TSQs/TDQs, TSPools
- ✓ 3270/BMS
- ✓ EXEC CICS API
- ✓ SPOOL, INTRDR
- ✓ ECI Client
- ✓ JCA/CTG
- ✓ EXCI from Batch
- ✓ MQ-Initiated
- ✓ APPC Support
- ✓ CICSplex like clustering
- ✓ Tracing and monitoring

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

Centralized Management of ART CICS(Plex) Resources



CICS Resource Type Selection

CICS Transactions and their Attributes

Adding/Changing a Transaction

Region

REG1

Query

View Edit Refresh

Select Type

- ENQ Model Resources
- Mapsets Resources
- Transaction Resources
- TS Queue Model Resources
- Tranclasses Resources
- Program Resources
- TDQIntra Resources
- Typeterm Resources
- File Resources
- TDQExtra Resources

Transaction Resources

View Add Delete Refresh Detach

Select	Name	Alias	Group	Description	First Program Name	Call ESM	As In Confidential Data	Priority	Resource Security Checking	Use Transaction Restart Facility	Status	Task Data Key	TPNAME	Trace
<input type="checkbox"/>	ADDR		SIMPAPP	pg for simpapp	ADDRS	false	false	1	false	false	ENABI	USER		true
<input type="checkbox"/>	HANL		SIMPAPP	pg for simpapp	HANL						ENABI	USER		true
<input type="checkbox"/>	HANP		SIMPAPP	pg for simpapp	HANP						ENABI	USER		true
<input type="checkbox"/>	HELO		SIMPAPP	pg for simpapp	HELO						ENABI	USER		true
<input checked="" type="checkbox"/>	HEL		SIMPAPP	pg for simpapp	HELOSTR						ENABI	USER		true
<input type="checkbox"/>	HEL1		SIMPAPP	pg for simpapp	HELO1						ENABI	USER		true
<input type="checkbox"/>	INQC		SIMPAPP	pg for simpapp	INQC						ENABI	USER		true
<input type="checkbox"/>	INQX		SIMPAPP	pg for simpapp	INQX						ENABI	USER		true
<input type="checkbox"/>	T1PL		SIMPAPP	pg for simpapp	TOUPCLT						ENABI	USER		true
<input type="checkbox"/>	T2PL		SIMPAPP	pg for simpapp	TOUPCLT						ENABI	USER		true
<input type="checkbox"/>	T0PL		SIMPAPP	pg for simpapp	TOUPCLT						ENABI	USER		true
<input type="checkbox"/>	TTMP		SIMPAPP	pg for simpapp	TSTMAP						ENABI	USER		true
<input type="checkbox"/>	RESU		SIMPAPP	pg for simpapp	RESUME						ENABI	USER		true
<input type="checkbox"/>	SUSP		SIMPAPP	pg for simpapp	SUSPEND						ENABI	USER		true

Adding/Changing a Transaction

Name: HELS

Alias:

Group: SIMPAPP

Description: pg for simpapp

Priority: 1

Status: Enabled

Transaction Class Name:

First Program Name: HELOSTR

Call ESM:

As In Confidential Data:

Resource Security Checking:

Use Transaction Restart Facility:

Task Data Key: USER

TPNAME:

Trace:

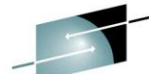
Size of The Transaction Work Area: 0 byte

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



CICS Trace

Transactions Summary and Detail Drilldown (CICS verbs, SQL)



SHARE
Educate · Network · Influence

ORACLE TSAM Plus 12c

Welcome: admin Logout Accessibility Oracle Corporation Home Page

Policy Tuxedo Metrics Tuxedo Application Runtime Metrics Management Alert Help

Current Location: CICS Regions/REG1

Tuxedo Application

Tuxedo Metrics > Call Path

Query by Filter

Initiator Type: All

Domain: Any

Machine: Any

Server: Any

Client Process Name: User Name: Initial Called Service: Any

Status: Any

Time: Any

Min Elapsed: 0 microsec

Max Record: 100

Total: 1

Search

Unread Alerts

Fatal (0)

Critical (0)

Warning (0)

Query

View Call Path Result List Refresh Detach

No.	Correlation ID	Initial Called Service	Call Depth	Start Time	Status	Return Code
7	KIXDOMAIN:OEL5U664DB11GR2P56.oracle.com:122222 KIXR GRP02 ARTSTRN 21 30892 1	SB00	0	2014-02-23 00:20:04.11374	🔍	
8	KIXDOMAIN:OEL5U664DB11GR2P56.oracle.com:122222 KIXR GRP02 ARTSTRN 21 30892 1	SB00	2	2014-02-23 00:20:04.104334	✓	0
8	KIXDOMAIN:OEL5U664DB11GR2P56.oracle.com:122222 KIXR GRP02 ARTSTRN 21 30892 1	SB00	2	2014-02-23 00:20:04.104334	✓	0

Export to Excel Total: 79 Success: 18 Running: 61 Application Failure: 0 System Failure: 0

View Call Path Details Refresh No. 11 Initial Called Service: SB00 Correlation ID: KIXDOMAIN:OEL5U664DB11GR2P56.oracle.com:122222 KIXR GRP02 ARTSTRN 20 30885 2967664368 18 2938368908952828

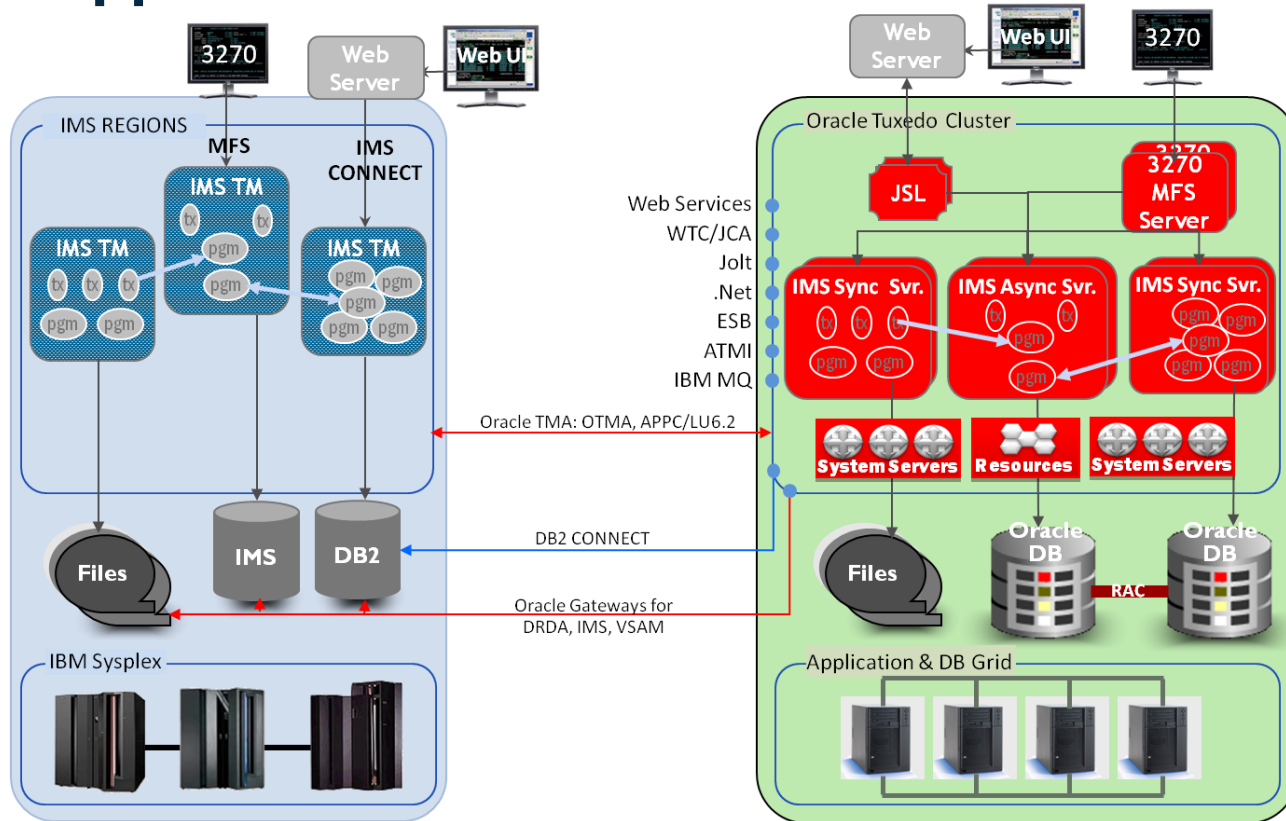
No.	Message Flow	Call Depth	Domain	Machine	Group	Server	Timestamp	Duration(microsecond)	Time
2	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:03.047764	562	
3	ARTATRN(EXEC SQL /SELECT)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:03.048794	1,030	
4	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:03.049268	474	
5	ARTATRN(EXEC CICS /DELAY)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:03.049294	26	
6	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:10.051321	7,002,027	
7	ARTATRN(EXEC SQL /SELECT)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:10.051546	225	
8	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:10.052397	851	
9	ARTATRN(EXEC CICS /DELAY)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:10.052543	146	
10	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:17.055589	7,003,046	
11	ARTATRN(EXEC SQL /SELECT)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:17.055661	72	
12	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:17.056695	1,034	
13	ARTATRN(EXEC CICS /DELAY)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:17.056756	61	
14	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:24.059005	7,002,249	
15	ARTATRN(EXEC SQL /SELECT)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:24.059049	44	
16	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:24.059896	847	
17	ARTATRN(EXEC CICS /DELAY)	2	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:24.059949	53	
18	ARTATRN	1	KIXDOMAIN:OEL5U664DB11GR2P56...	KIXR	GRP02	ARTATRN 30 30906	2014-02-23 00:20:31.062078	7,002,129	

Export to Excel Total: 28 Call Depth: 2 Status: ✓ Return Code: 0 Elapse Time(microsecond): 42021761

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



Application Runtime for IMS



Transaction types:

- ✓ Response / non-response mode
- ✓ Conversational / non-conv. mode

3270 support:

- ✓ tn3270 Interface
- ✓ Basic edit mode
- ✓ MFS mode/MFS bypass

MQ-IMS Bridge

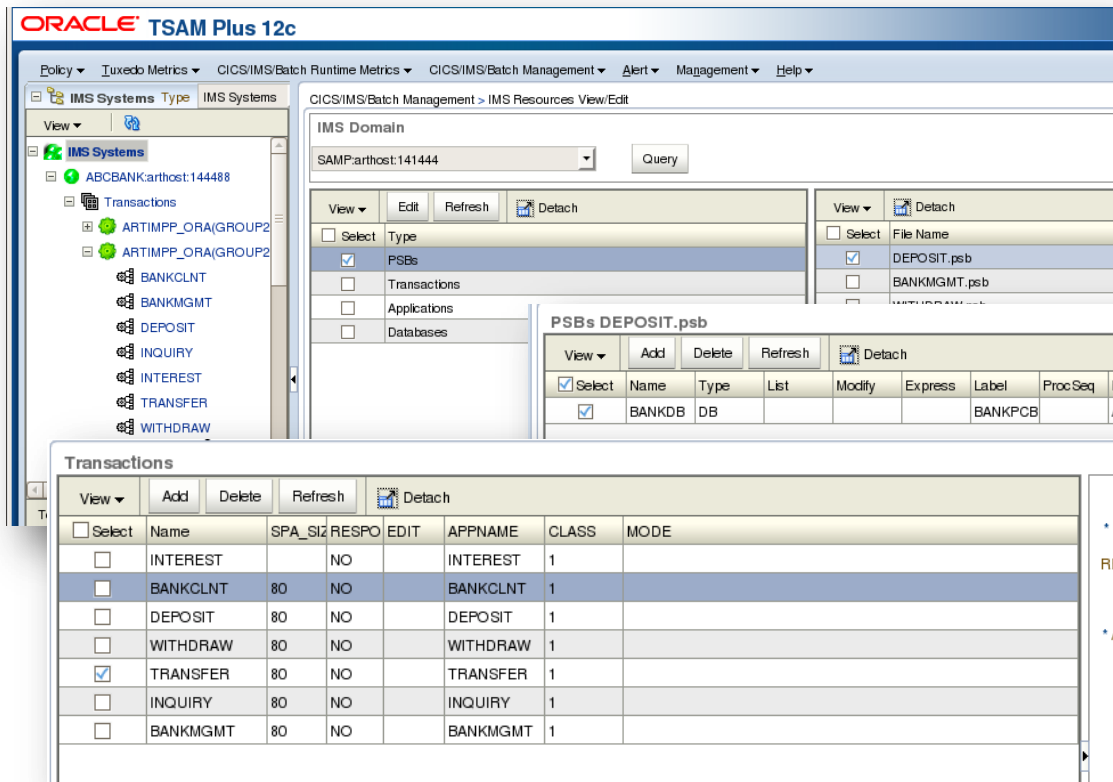
IMS Batch:

- ✓ Start/stop region
- ✓ DFSRRC00 utility to schedule BMP region
- ✓ Transactional Batch

IMS DB Options

- ✓ Remote access via ODBA Gateway
- ✓ Migrate to Oracle with DLI-2-SQL Access

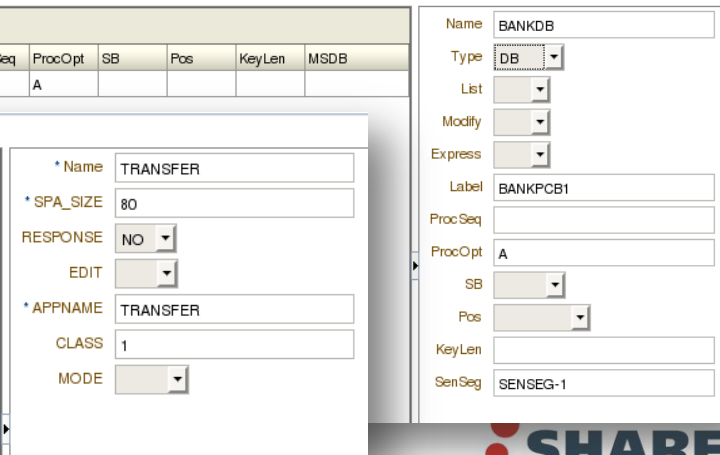
TSAM Plus – IMS Configuration Management



The screenshot displays the Oracle TSAM Plus 12c interface. On the left, a tree view shows the hierarchy: IMS Systems > ABCBANK:arhost:14448 > Transactions > ARTIMPP_ORA(GROUP2) > ARTIMPP_ORA(GROUP2) > BANKCLNT. The main window shows the 'IMS Domain' configuration for 'SAMP:arhost:141444'. Under 'Type', 'PSBs' is selected. The 'PSBs DEPOSIT.psb' table is visible, showing a row for 'BANKDB' of type 'DB'. Below this, the 'Transactions' table is shown with the following data:

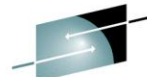
Select	Name	SPA_SIZE	RESPO	EDIT	APPNAME	CLASS	MODE
<input type="checkbox"/>	INTEREST		NO		INTEREST	1	
<input type="checkbox"/>	BANKCLNT	80	NO		BANKCLNT	1	
<input type="checkbox"/>	DEPOSIT	80	NO		DEPOSIT	1	
<input type="checkbox"/>	WITHDRAW	80	NO		WITHDRAW	1	
<input checked="" type="checkbox"/>	TRANSFER	80	NO		TRANSFER	1	
<input type="checkbox"/>	INQUIRY	80	NO		INQUIRY	1	
<input type="checkbox"/>	BANKMGMT	80	NO		BANKMGMT	1	

- Resource types:
PSBs, Transactions,
Applications, Databases
- Type-specific Editors



The screenshot shows the configuration editor for the 'TRANSFER' transaction. The 'Name' field is set to 'TRANSFER'. The 'SPA_SIZE' is 80. The 'RESPONSE' is set to 'NO'. The 'EDIT' field is set to 'EDIT'. The 'APPNAME' is 'TRANSFER'. The 'CLASS' is 1. The 'MODE' is set to 'MODE'. On the right, the 'Name' field is set to 'BANKDB', the 'Type' is 'DB', and the 'Label' is 'BANKPCB1'. The 'ProcSeq' is 'A', the 'SB' is 'A', and the 'Pos' is 'A'. The 'KeyLen' is 'SENSEG-1'.

TSAM Plus – Detailed IMS Application Trace



SHARE
Educate • Network • Influence

- IMS Transactions
- Transaction Details
- DL/I Stats by Type



Tuxedo Application Runtime Metrics > IMS Detailed Monitoring

Search by Filter

Domain

Machine

Group

Server

Transaction Class

Transaction

Program Name

Region Type

Query Result List

View Refresh Detach

Domain	Machine	Group	Server	PID	Transaction Class	Transaction Name	Program
TUXDOM:bjaix2:66831	bjaix2	APPGRP1	ARTIBMP	15597878	0		TESTP
TUXDOM:bjaix2:66831	bjaix2	APPGRP1	ARTIBMPT	18087950	0		TESTP
TUXDOM:bjaix2:66831	bjaix2	APPGRP1	ARTIBMP	15597878	0		DFSBA
TUXDOM:bjaix2:66831	bjaix2	APPGRP1	ARTIMPP	8847860	1	TESTPT01	TESTP
TUXDOM:bjaix2:66831	bjaix2	APPGRP1	ARTIMPP	8847860	1	TESTPT01	TESTP
TUXDOM:bjaix2:66831	bjaix2	APPGRP1	ARTIMPP	2883620	1	TESTCK02	TESTC
TUXDOM:bjaix2:66831	bjaix2	APPGRP1	ARTIMPP	8847860	1	TESTCK01	TESTC

Export to Excel Total: 7

Detailed Information

User CPU Time 2690 (microsecond(s))

PSB Name TESTCK01

Program Elapsed Time 2004 (microsecond(s))

Current SPA Size 0

Abend Code 0

Elapsed Time in DL/I 21518 (microsecond(s))

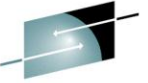
Enqueue Number 1

Dequeue Number 0

DL/I Event Name	DL/I Type	DL/I Invoked Count	DL/I Total Duration (microsecond)
SYS	CHKP	1	20127
TM	GU	1	372
TM	ISRT	2	702
TM	CHNG	1	317

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

Application Runtime for Batch



SHARE
Educate · Network · Influence



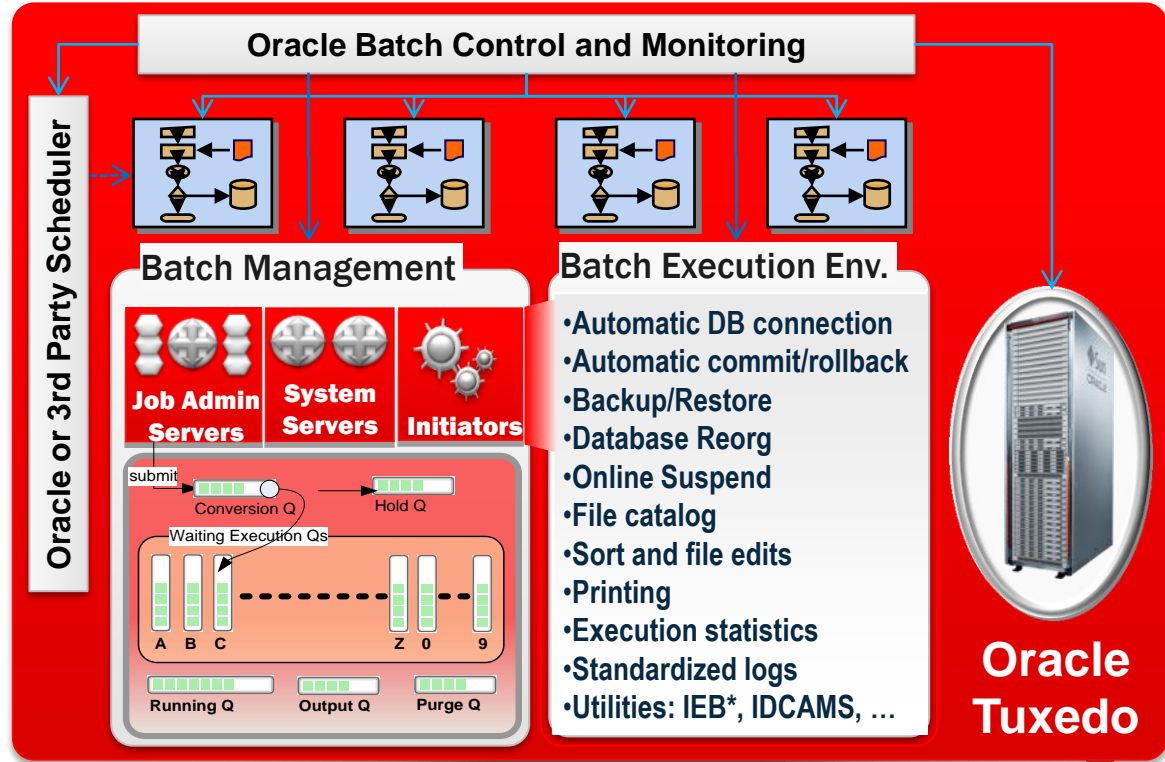
Preserves job flow and control, reduces migration cost and time



Reduces batch window through parallel execution, elastic resource utilization



Open, extensible - easily extend via scripts, Java programs, ODI, BI reports

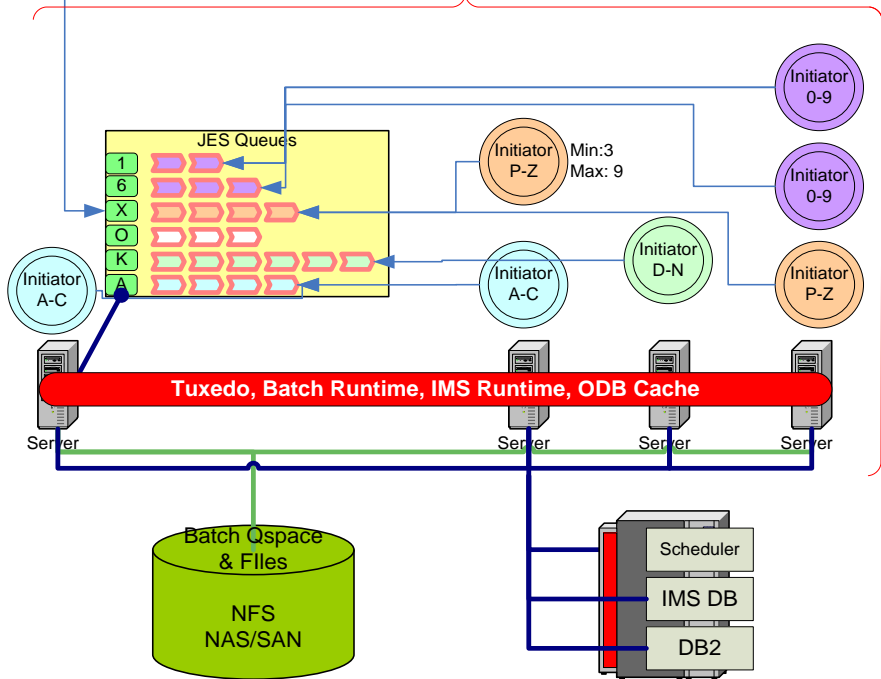


- IMS
- ODBA
- DB2 Connect
- WMQ
- File ETL

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

Resilient Batch Cluster Architecture

Oracle Enterprise Manager
Tuxedo System and Application Monitor
SLM, Alerts, and Dynamic Resource Broker



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

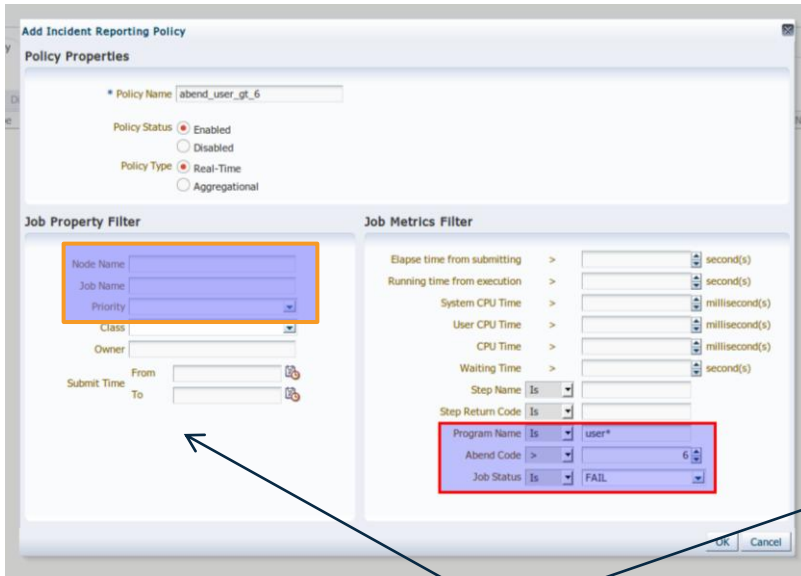
Key Requirements

- Centralized JES Queues for Cluster-Wide Job Management
- Distributed Initiators for Scalable Job Execution
- Concurrency Control over NFS-backed Qspace and Shared Data
- Integrated Monitoring & Management
 - Infrastructure components
 - Batch jobs
- Broad Job Control Interfaces
 - Command line client – for interactive or script use, scheduler integration
 - Service invocation using Web services, JCA
 - ISPF-based operations
 - Web UI for Batch operations

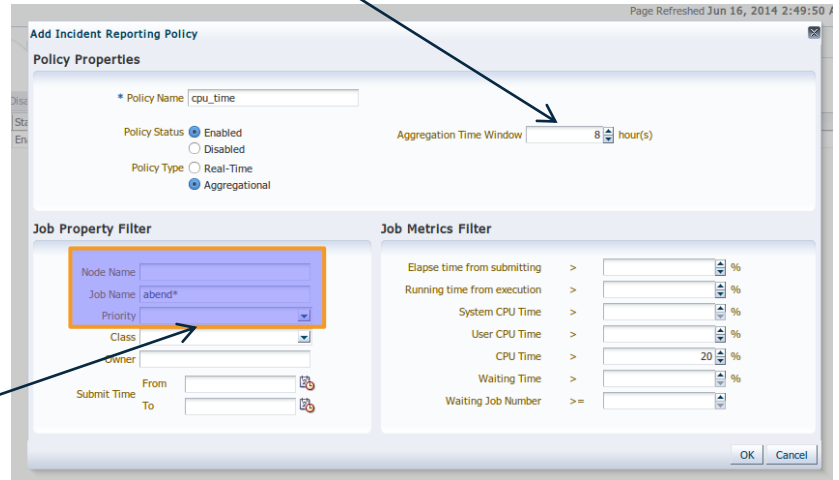
SLA and Exception Monitoring for Batch

Real-time: Absolute wait, exec, or CPU time; exceptions – step or job return codes, and abends

Aggregational: Relative (expressed in percent) value of wait, exec, or CPU time compared to past history over the specified aggregation time



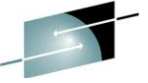
The screenshot shows the 'Add Incident Reporting Policy' dialog box. The 'Policy Properties' section has 'Policy Name' set to 'abend_user_gt_6', 'Policy Status' set to 'Enabled', and 'Policy Type' set to 'Real-Time'. The 'Job Property Filter' section has 'Node Name', 'Job Name', and 'Priority' highlighted with a blue box. The 'Job Metrics Filter' section has 'Program Name' set to 'user*', 'Abend Code' set to '6', and 'Job Status' set to 'FAIL' highlighted with a red box. The 'Submit Time' section has 'From' and 'To' fields.



The screenshot shows the 'Add Incident Reporting Policy' dialog box. The 'Policy Properties' section has 'Policy Name' set to 'cpu_time', 'Policy Status' set to 'Enabled', and 'Policy Type' set to 'Aggregational'. The 'Aggregation Time Window' is set to '8' hour(s). The 'Job Property Filter' section has 'Node Name', 'Job Name' set to 'abend*', and 'Priority' highlighted with a blue box. The 'Job Metrics Filter' section has 'Elapse time from submitting' set to '0.5' %, 'Running time from execution' set to '0.5' %, 'System CPU Time' set to '0.5' %, 'User CPU Time' set to '0.5' %, 'CPU Time' set to '20' %, 'Waiting Time' set to '0.5' %, and 'Waiting Job Number' set to '0.5' %.

Each policy has a defined scope in terms of nodes, job names, job class, owners and time range

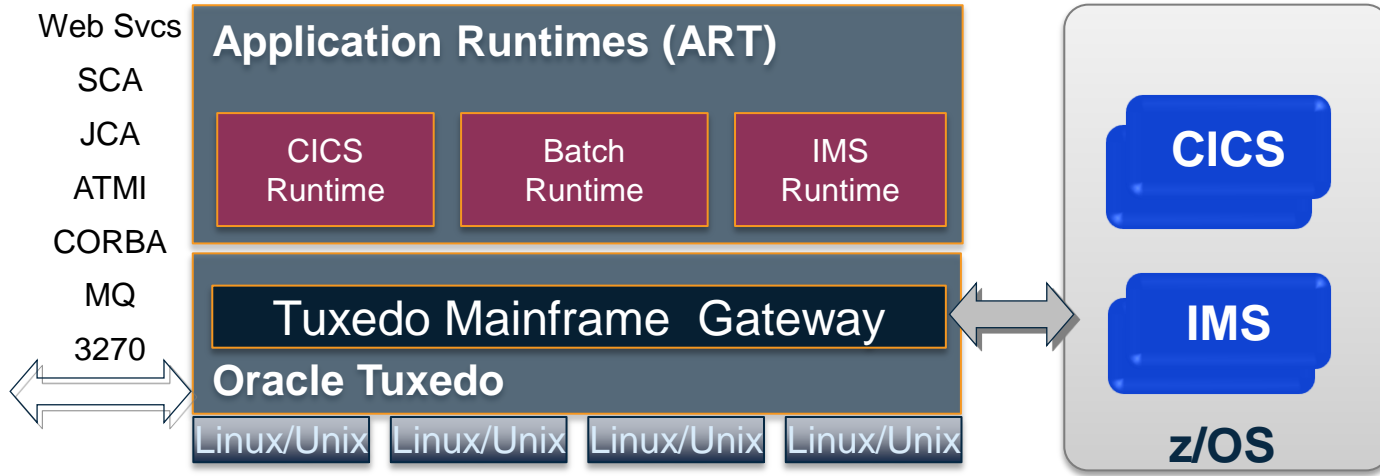
Tuxedo JES Framework for Mainframe-Grade Batch Support



- Cluster-aware job management
 - Centralized JES queues and spool for submitting and executing across a cluster
 - Distributed, fault-tolerant Initiators
 - Resilience through automated fail-over
 - Job control (submit/hold/release/cancel/print/purge) as a Service Call (ATMI, JCA, WS)
- Batch Event Management
 - Publishes state changes to Tuxedo Event Broker and OEM, enables autonomous management and SLA monitoring
- Security
 - User & DB connect info in encrypted profile
 - Built-in job authorization system
 - OOTB ESM (OES, LDAP) integration for role based authorization of job control function
- File catalog and GDG support
- CLI for scripting, scheduler integration
 - artjesadmin – sync./async. job submit
 - Native JCL and converted ksh scripts
 - Operations: submit, hold, release, cancel, purge, print
 - JES SYSLOG
 - Consolidated batch log (jobs/steps + system events)
- ISPF using uni-SPF/uni-REXX
 - Native ISPF features: editors, file mgmt, REXX scripts
 - ART Batch operations & administration extensions
- Batch Operations Web UI
 - Job submit/Job View with SDSF-like search
 - Operations: Cancel, Hold, Release, Purge, Re-submit
 - Views: Logs, SYSOUTs, GDG management
 - Job archival and search (Metadata, Logs, SYSOUTs)
 - Abend notifications – incident management
 - Batch SLA alerting policies and automated actions
 - System utilization reports

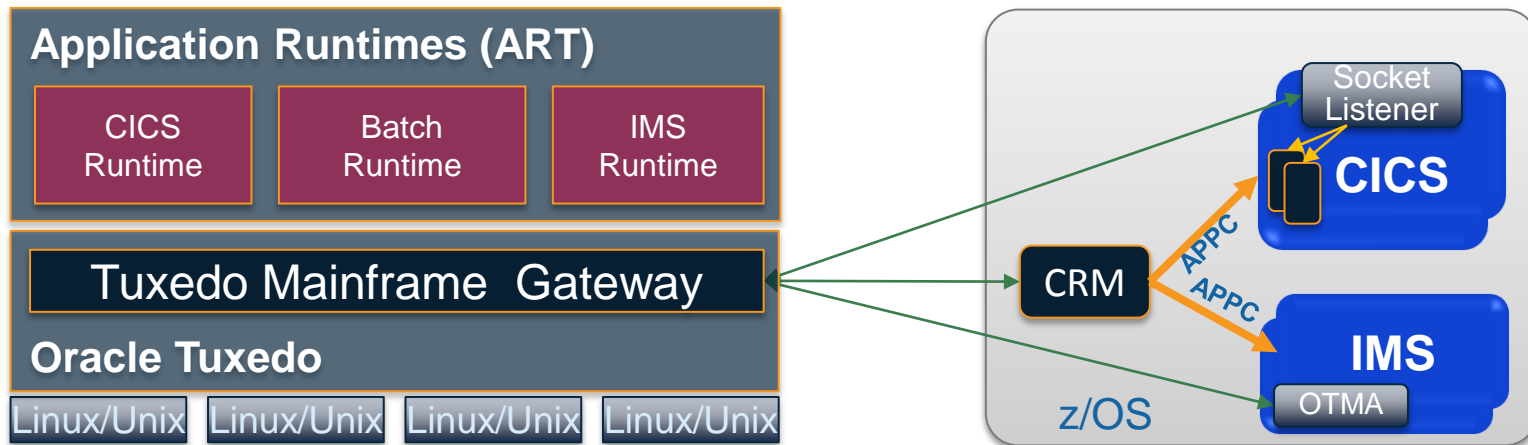
Complete your session evaluations online at www.SHARE.org/Seattl

Hybrid Deployments Require Mainframe Adapters



- Bi-directional transaction integration with CICS and IMS
- Configuration-based integration for CICS DPL, DTP/APPC, IMS OTMA
- Global transaction integrity (XA) w/2-Phase Commit (Sync level 2)
- Data translation - full EBCDIC/ASCII conversion
- Link authentication and encryption
- Security propagation – User credentials passed to CICS
- Performance and scalability for 1000s of transactions/sec
- Mesh configuration and automatic reconnection for HA

Tuxedo Mainframe Adapter – Connection Protocols



- CICS-CICS ISC Options
 - DPL (EXEC CICS LINK)
 - DTP/APPC (Send/Receive)
 - Transaction Routing
 - Channels/Containers
- OLTP/Batch Interactions
 - ART Batch jobs start z/OS CICS/IMS transactions
 - ART Batch jobs make EXCI calls to CICS
 - z/OS CICS submit batch jobs via TDQ to Tuxedo ART
 - z/OS Batch jobs start CICS/IMS transactions on Tuxedo ART
- IMS Options
 - OTMA
 - APPC (CPI-C)

Data Integration Options for Hybrid Deployments

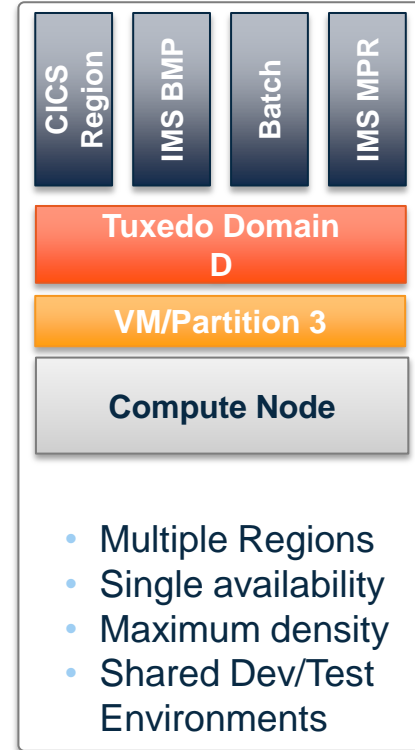
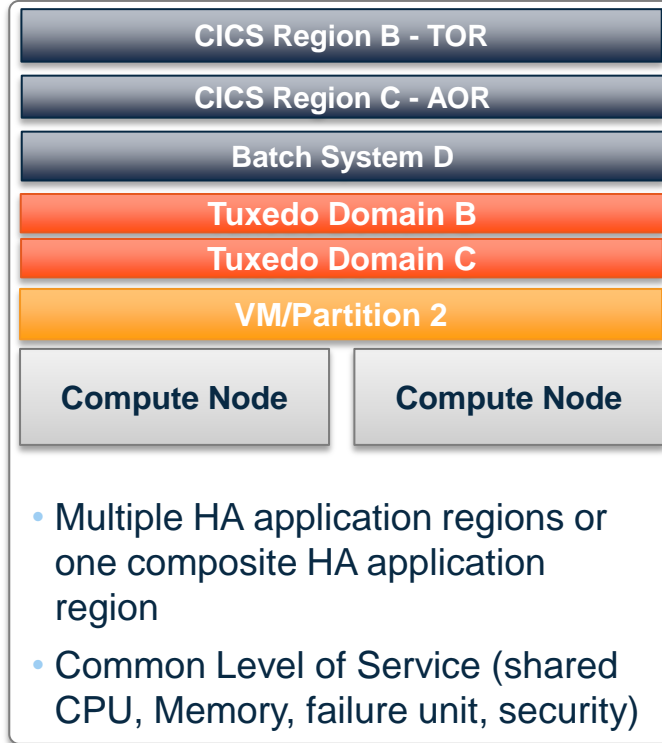
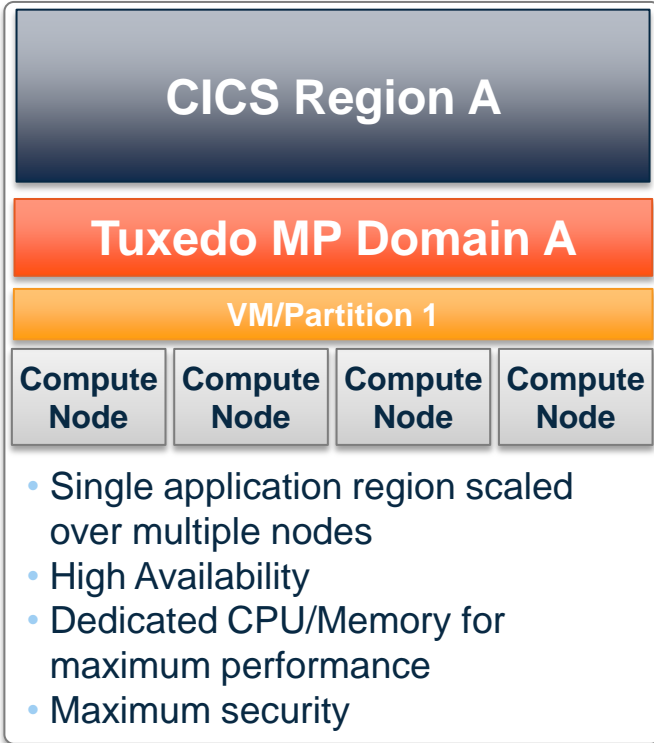
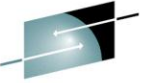


- IMS ODBA remote access from Tuxedo ART
- DB2 DRDA via DB2Connect or Oracle DRDA gateway
- Mainframe applications to Oracle via DRDA server
- GoldenGate based DB2-Oracle replication (one direction or bi-directional)
- File download/upload in batch jobs
- DB2 Stored Proc-based access to mainframe data

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



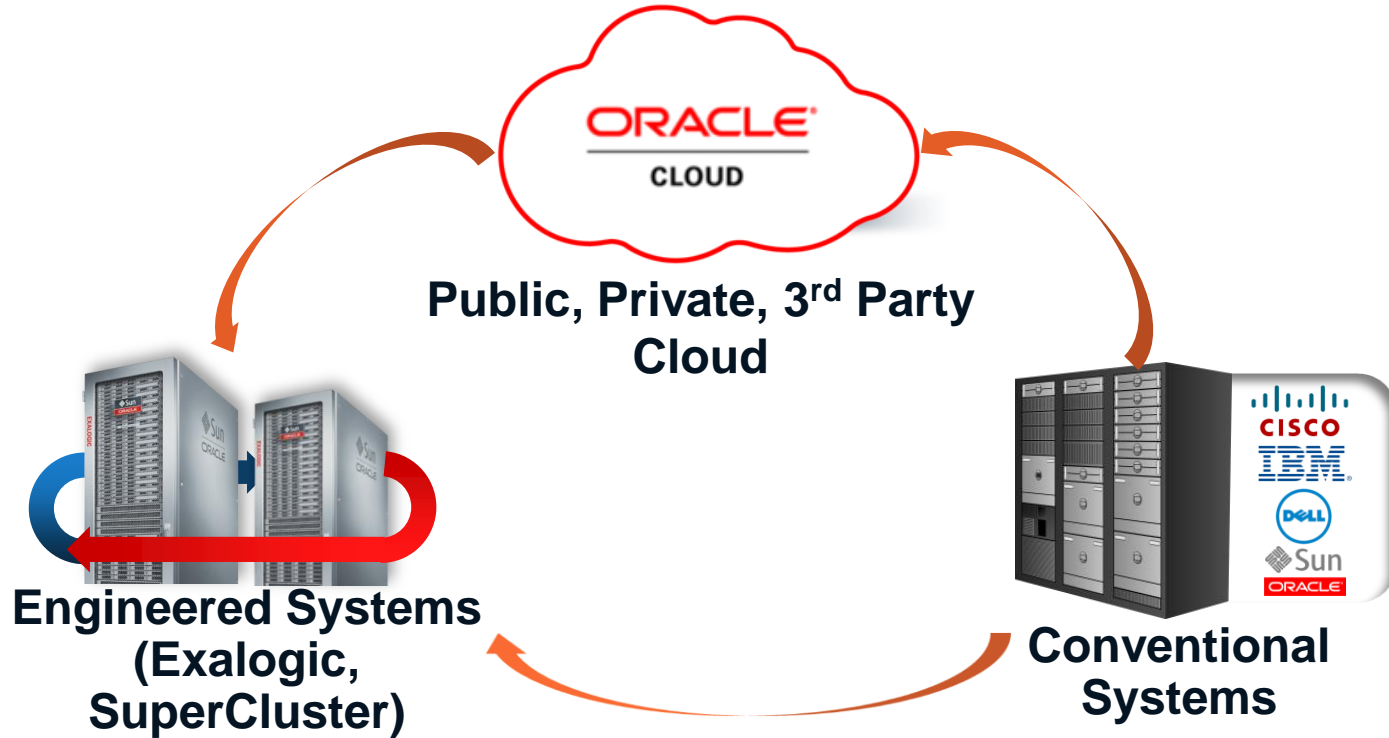
Flexible, Elastic, Scalable Runtime Deployment Configurations



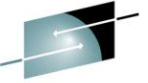
Complete your session evaluations online at www.SHARE.org/Seattle-Eval



Deployment Options: On Premises and in the Cloud



Leveraging Post-Rehost Modernization Options



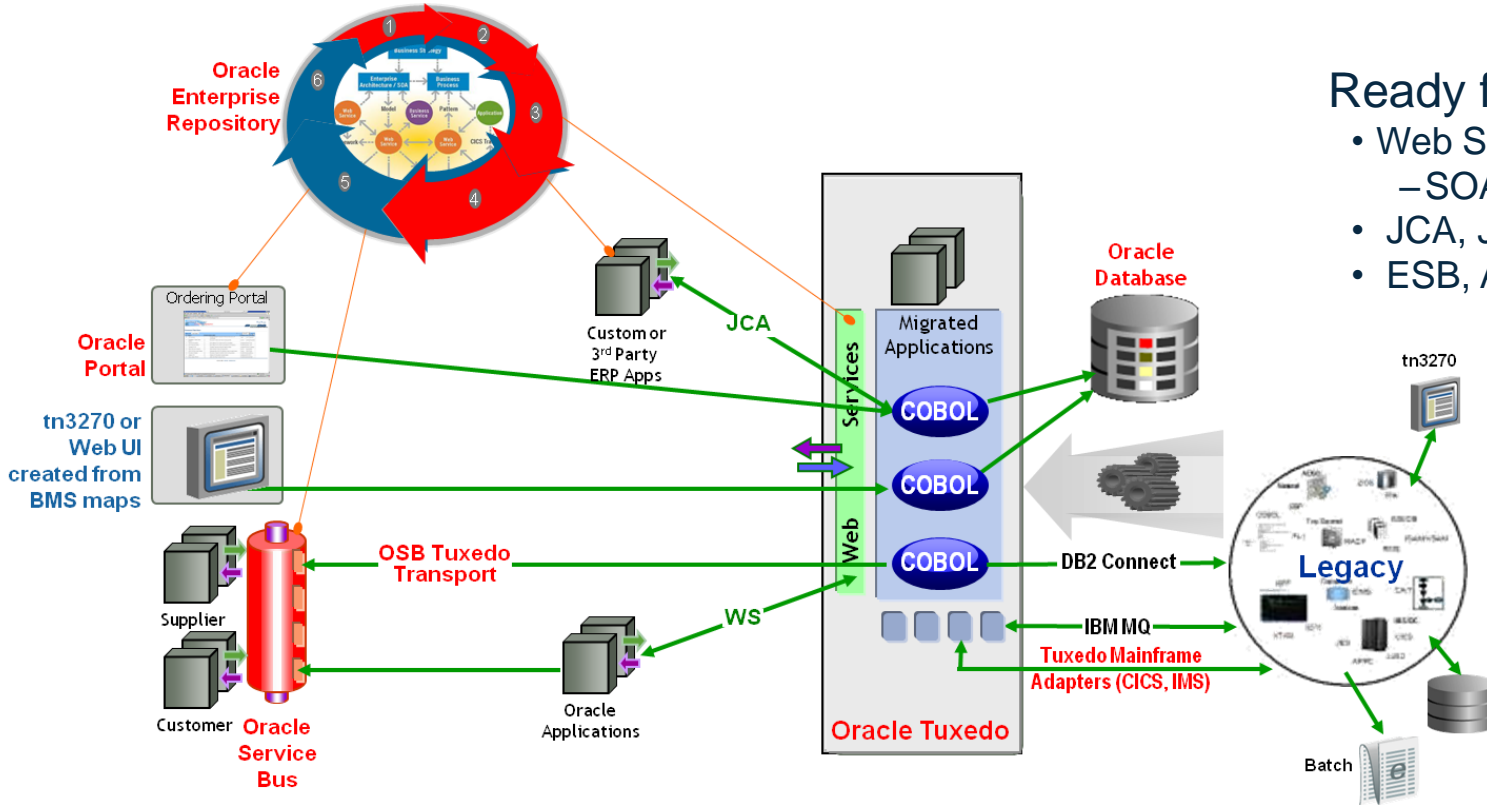
SHARE
Educate · Network · Influence

- **SOA enable and integrate online services (CICS/IMS txns, DPL pgms)**
 - Expose existing CICS transactions as online services through Web Services, ESB, or JCA
 - Integrate rehosted CICS transactions/online services in a BPM-driven process
- **Migrate selected COBOL programs to Java**
 - Leverage Tuxedo Java server and built-in integration to re-engineer some business logic
 - Benefit from common platform services
- **Extend the application for new needs**
 - Heterogeneous components (Java, C/C++, PHP, Ruby, Python), optionally leveraging SCA for composite applications
 - Outbound calls to Web Services provided by other custom or packaged solutions
- **Convert 3270/BMS UI to JSP/HTML**
 - Enable Web browser access, further UI renovation, and/or portal integration
- **Unlock access to migrated legacy data**
 - Migrate VSAM files to Oracle DB and open up access to this data for BI, enterprise apps, etc.
- **Increase batch flexibility and agility**
 - Replace hardcoded process flows or rules in COBOL using BPM or Rules Engine
 - Replace batch utilities or programs with Oracle Data Integration or ETL tools
 - Replace hard coded reporting with Oracle BI tools
- **Integrate with Big Data/Hadoop**
 - Launch Hadoop jobs
 - Integrate results in Batch processing

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



SOA Enablement of Rehosted Components

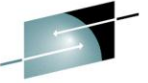


Ready for Integration

- Web Services:
 - SOAP, REST, JSON
- JCA, JMS
- ESB, ATMI, WMQ, etc.

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

Migrating COBOL/C to Java and Interfacing to Legacy Re-hosted Code



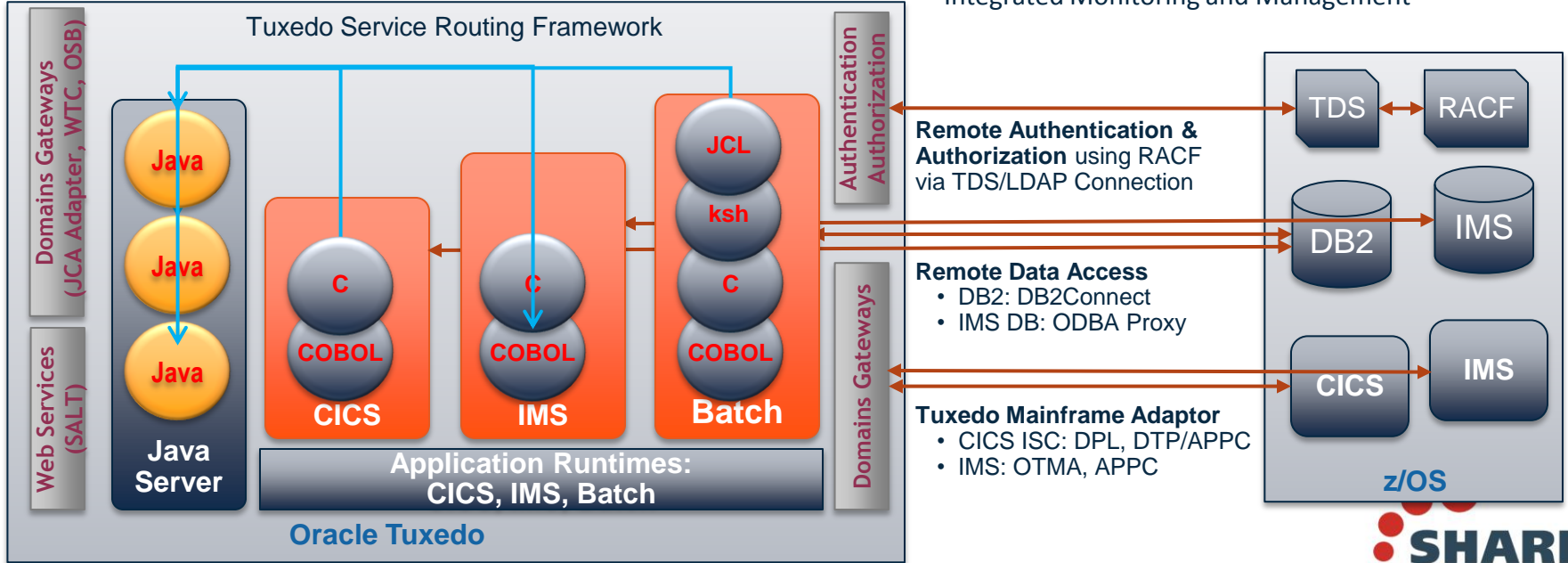
SHARE
Educate · Network · Influence

Replace individual COBOL/C programs in phased manner with no impact

- From batch: Invoked via EXEC PGM= in batch jobs
- From CICS: Invoked via EXEC CICS Link <program> in CICS programs
- From IMS: Invoked via DL/I ISRT with ALT PCB

Benefits of Integrated Tuxedo Platform

- Common Transaction Mgmt & XA Optimization
- Common External Integration Channels
- Integrated Clustering, Scale-out, Failover
- Integrated Monitoring and Management



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

Foundation of Customer Success

FAST AND AUTOMATED MIGRATION



- Automated Code and Data Migration Tools
- Application Runtimes for CICS, IMS, Batch
- Industrialized Methodology

ROBUST AND SCALABLE INFRASTRUCTURE



- Mission-Critical Enterprise Cloud-Ready Platforms
- Best-in-class QoS attributes
- Dynamic scalability
- Automated operations

EASIER EVOLUTION AND MODERNIZATION

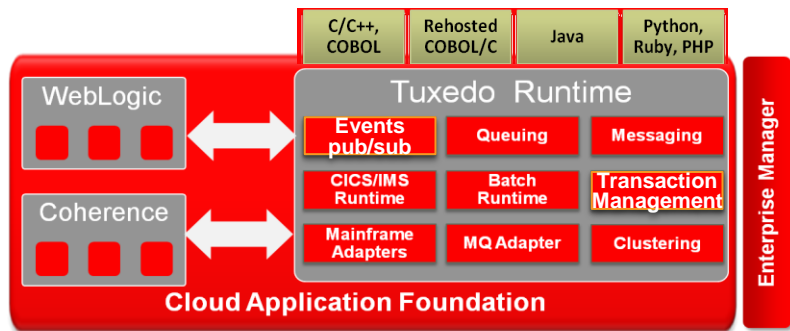


- Extensions in Java
- ODI/BI Integration
- Web Services
- JCA/JEE

Oracle Tuxedo – Mission-Critical Application Platform

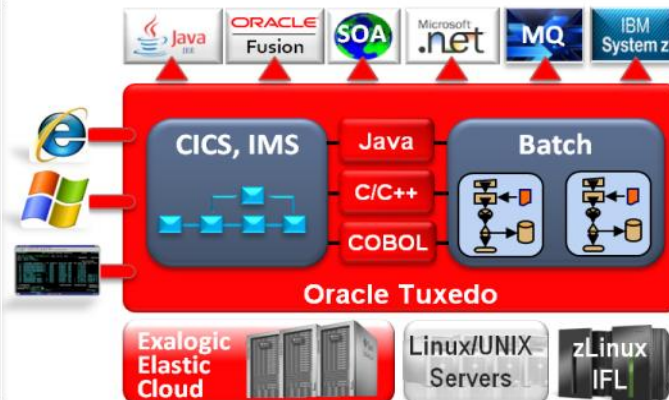
Application Server for Composite Applications (COBOL, Java, C/C++)

- Multi-language containers
- Very high throughput, low latency
- Linear scalability and high availability
- Integrated management and monitoring
- Out-of-the-box integration options



Platform for Mainframe Application Migration and Modernization

- 50-80% cost savings vs. the mainframe
- Flexible, scalable, cloud infrastructure
- Faster, simpler application evolution and modernization after migration



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

Join the Oracle Tuxedo Community



Oracle Tuxedo modernized our
mission-critical applications

to reduce risk,
increase agility,
and lower cost.



blogs.oracle.com/tuxedo



Oracle.com/tuxedo



linkd.in/oracle_tuxedo



Oracle.com/technetwork/tuxedo

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

