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

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Oracle
Agenda

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


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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

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Why Start with Rehosting Approach?

**SAFE 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
• 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

Common Premises

Automated Process

Scalable Application Server Cluster

Scalable Database Cluster

• 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

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Key Technology Requirements for Mainframe Migration & Modernization

Integration
- JCA
- WMQ
- SOAP/REST

Remote
- DB2 & IMS
- DB Access

CICS & IMS TM Adapters

Utilities, Productivity Tools
- Batch Environment
- CICS Runtime
- IMS TM Runtime

Foundational Services

Scalable Application Server Cluster

Distributed Cache
- Indexed File Store
- Database Cluster

Scalable Data Management

Virtualization
- Servers, Storage, Network

Resilient Infrastructure

Development/Test
- TSO/ISPF
- SCM
- FileAid

Business Applications
- COBOL
- C
- 4GL

Integration
- MQ
- NDM
- FTP

Batch
- JES
- Scheduler
- REXX
- JCL
- Utilities

Online TPHs
- CICS
- IMS DC/TM
- TPF

Data
- DB2
- QSAM
- PDS
- IMS
- VSAM
- GDG

Management
- Management Tools (IBM, CA, BMS, etc.)

Java
- C/C++
- COBOL

SDLC Tooling and IDE

Authentication, Fine-grained Authorization, Auditing

Batch Production
- CICS/IMS Regions
- App Server
- Database
- HW & OS

Operations and Monitoring

Servers, Storage, Network

HW & OS
Rehosting Mainframe to Extensible Architecture

Combines Mainframe-compatible Software Stack, Automated Tooling, Proven Methodology

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

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Sample of over 200 Mainframe Migrations to Tuxedo

Banking
- Caisse des Dépôts
- Crédit Mutuel
- Caixa Penedes
- RSI
- GCS
- Nordea

Insurance
- Debeka Versicher & Bausparen
- Delta Dental
- SwissLife
- AG2R La Mondiale
- Liverpool Victoria

Retail
- PG&E
- Mazda
- Market Basket
- Eurocopter

Manufacturing
- Carrefour
- Lis
- NTT Data

Utilities
- United States Department of Veterans Affairs
- Caisse Nationale d'Assurance Maladie
- MSA
- Försäkringskassan

Public Sector

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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

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Legend: 🌈 In Production 🌟 In Parallel Run
Much Lower TCO – 9:1 Cost Reduction
Mid-Size European Bank With 3600 Branches, 80K POS Systems

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”

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

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An 8500 MIPS European Sports Betting/Horse Racing Co.

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

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An 8500 MIPS European Sports Betting/Horse Racing Co.

**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

**Technology stack**

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

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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

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

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

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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

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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

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A Top Asian Bank – Core Banking Applications Migration

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

<table>
<thead>
<tr>
<th>Application Platform</th>
<th>Tuxedo/ART for CICS and Batch on ¼ Rack Exalogic X3-2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>128 cores at 60% utilization</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Database Platform</th>
<th>Oracle RAC on ½ Rack Exadata X3-2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>64 DB cores at 90% utilization</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sustained tps: 13,900</th>
<th>109 tps/core – App Server</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>217 tps/core – DB Server</td>
</tr>
</tbody>
</table>

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• Summary and Q&A

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Typical Project Approach

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

Assessment
- Evaluate possible options and define target solution and planning with budget
- Validate target solution and confirm budget and planning

Application POC and/or Pilot
- Evaluate possible options and define target solution
- Validate target solution and confirm budget and planning

Production Pilot or Full Migration
- Deliver modernization solution and support transition

Mainframe Migration Insight
- Requirements summary
- Potential applications
- Modernization approaches
- Target architecture options
- Modernization roadmap
- Risk evaluation
- Possible partners
- ROI model and investment evaluation
- Further assessment needs

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

Statement of Work
- 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

GO / NO-GO decision

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## Sample Mainframe to Open Systems Mapping

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

<table>
<thead>
<tr>
<th>Rehost intact core components via automated tooling</th>
<th>Reduce, re-engineer, or replace with open system equivalents</th>
<th>Exploit flexibility of Oracle Tuxedo/RAC deployment architecture</th>
<th>Integrate with the remaining ecosystem – mainframe and open</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Migrate COBOL, C in CICS, IMS, and Batch</td>
<td>• Reduce Assembler, convert what remains to COBOL or C</td>
<td>• Collapse multiple CICS and IMS regions into single Tuxedo domains to simplify management</td>
<td>• Remaining CICS or IMS TM components (TMA: DPL, APPC/LU6.2, OTMA)</td>
</tr>
<tr>
<td>• Convert PL/I to C/C++ or COBOL</td>
<td>• Replace REXX with OpenREXX or convert to native scripting</td>
<td>• Deploy in Active/Active configuration for HA/DR, adapt rolling upgrades, use built-in dynamic load-balancing</td>
<td>• Reconnect IBM MQ Messaging</td>
</tr>
<tr>
<td>• Convert JCL jobs with standard utilities</td>
<td>• Replace RACF/ACF2/Top Secret with LDAP for AuthN, and OES AuthZ, reducing complexity</td>
<td>• Use Oracle Partitioning for very large tables</td>
<td>• Re-establish remote DB connectivity using DB2Connect, OTG for DRDA, ODBA for IMS</td>
</tr>
<tr>
<td>• Migrate DB2, VSAM, Flat Files, GDGs</td>
<td>• Replace Syncsort with Syncsort DMX, LRS DRS with LRS VPSX, etc.</td>
<td>• Parallelize batch streams to reduce batch window</td>
<td>• Re-integrate open systems components using Tuxedo JCA, .Net libs, Oracle ESB</td>
</tr>
<tr>
<td>• Migrate pre-relational DBs (IMS, Datacom, IDSM, Adabas) and 4GLs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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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

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Key Success Factors - The Long Term View

Migration
- Automation
- Coverage
- Accuracy
- Testing

Go-Live
- Infrastructure
- Staff
- Operations
- Monitoring
- Supportability

Production
- Stability/Resilience
- Performance
- Dev Environment
- App Evolution
- Scalability
- TCO

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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

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Application Rehosting Workbench
Automated, Industrialized Rehosting Process

Uniformity, high accuracy reduce risk, cost of testing

$ Configurable, extensible with custom rules for special needs

Automation, high efficiency speed up migration projects

z/OS Source Environment

Programs, Copybooks, JCL, DDL

Create project, Import assets

Configure parameters

Component Cataloguer

Abstract Representation

Target COBOL Programs, Copybooks

Target Batch Components

Source unloading Target reloading Validation SQL Schema - DDL Logical Access DML

DB2 Migration

Build

Reload

Validate

ART Workbench

Deploy

Target Runtime Environment

Configure

Build

Files

Binary Transfer

Source unloading Transfer Programs, Copybooks, JCL, DDL

Build

Configure parameters

ART Workbench

Configure

Parameters

Create project, Import assets

Properties

Databases

Files

Transfer

Unload

Build

Validate

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Resilient, Compatible Infrastructure

Application Runtimes (ART) for CICS and IMS

SOA, JEE, ESB, .Net, Packaged Applications

CICS, IMS, and JES Framework for Distributed Operations

- SOA
- JEE
- ESB
- .Net
- Packaged Applications

Oracle Tuxedo

IBM z/OS

- DB2
- IMS
- IMS TM
- CICS

Web Server

- JSP/HTML
- JOLT

Custom

- Windows Client
- ECI

tn3270

3270 Term. Servers

- Rehosted CICS/IMS Programs, Batch Jobs

Web UI

- ART CICS Servers
- ART IMS TM Servers
- ART Batch Servers
- End-to-End Monitoring

3270 Term.

Databases

Art CICS

Web Services

WMQ/TMQ

JCA

End-to-End Monitoring

- 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

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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

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Centralized Management of ART CICS(Plex) Resources

CICS Resource Type Selection

CICS Transactions and their Attributes

Adding/Changing a Transaction

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CICS Trace
Transactions Summary and Detail Drilldown (CICS verbs, SQL)

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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

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

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TSAM Plus – Detailed IMS Application Trace

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

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Application Runtime for Batch

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

Oracle Batch Control and Monitoring

- Automatic DB connection
- Automatic commit/rollback
- Backup/Restore
- Database Reorg
- Online Suspend
- File catalog
- Sort and file edits
- Printing
- Execution statistics
- Standardized logs
- Utilities: IEB*, IDCAMS, ...

Oracle Tuxedo

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Resilient Batch Cluster Architecture

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

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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

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 profiles
  - 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/Seattle
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

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Tuxedo Mainframe Adapter – Connection Protocols

Application Runtimes (ART)
- CICS Runtime
- Batch Runtime
- IMS Runtime

Tuxedo Mainframe Gateway

Oracle Tuxedo
- Linux/Unix
- Linux/Unix
- Linux/Unix
- Linux/Unix

- 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)

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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
Flexible, Elastic, Scalable Runtime Deployment Configurations

CICS Region A

- Single application region scaled over multiple nodes
- High Availability
- Dedicated CPU/Memory for maximum performance
- Maximum security

Tuxedo MP Domain A

VM/Partition 1

Compute Node | Compute Node | Compute Node | Compute Node

- Multiple HA application regions or one composite HA application region
- Common Level of Service (shared CPU, Memory, failure unit, security)

VM/Partition 2

Compute Node | Compute Node

VM/Partition 3

Compute Node

- Multiple Regions
- Single availability
- Maximum density
- Shared Dev/Test Environments

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Deployment Options: On Premises and in the Cloud

Engineered Systems (Exalogic, SuperCluster)

Public, Private, 3rd Party Cloud

Conventional Systems

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Leveraging Post-Rehost Modernization Options

- **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

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SOA Enablement of Rehosted Components

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

Ready for Integration

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

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

Remote Authentication & Authorization using RACF via TDS/LDAP Connection
Remote Data Access
  - DB2: DB2Connect
  - IMS DB: ODBA Proxy

Tuxedo Mainframe Adaptor
  - CICS ISC: DPL, DTP/APPC
  - IMS: OTMA, APPC

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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
Join the Oracle Tuxedo Community

Oracle Tuxedo modernized our mission-critical applications to reduce risk, increase agility, and lower cost.

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