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FUSION MIDDLEWARE

ORACLE TUXEDO APPLICATION RUNTIME FOR BATCH

PREMIER MAINFRAME
REHOSTING PLATFORM

KEY FEATURES

- Runs IBM batch jobs with no change to business logic

- Supports standard JCL functions, COBOL programs, and common utilities

- Provides JES services for batch production control

- Distributes workload across a multi-node batch grid or cloud

- Supports migrated DB2 tables, VSAM and flat files, and remote access to DB2

- Supports Oracle and 3rd party schedulers using CLI or service based job control

- Supports CICS/IMS integration with Tuxedo Application Runtimes for CICS and IMS

- Provides integrated monitoring and operations for CICS and batch using OEM/TSAM

KEY BENEFITS

- Reduces IT costs by over 50 percent vs. the mainframe

- Enables rehosting batch applications to Linux/UNIX servers, engineered systems, and enterprise clouds

- Simplifies and accelerates migration by preserving COBOL logic, file/DB access, JCL structure, and batch operations

- Addresses risk of mainframe skills attrition through open, extensible job scripts, simplified architecture, and operations

- Improves batch availability and scalability through Tuxedo's application cloud and dynamic resource management

- Expedites extension and modernization using COBOL, C/C++, and Java programs, scripts, COTS modules, ODI, and BI options

Oracle Tuxedo Application Runtime for Batch supports rehosted IBM mainframe batch jobs with no change to job flow or business logic using standard JCL functions, COBOL programs, and common utilities with migrated VSAM, DB2, and flat file data at a fraction of the mainframe cost. Its support of the mainframe programming model combined with robust batch control services allows mainframe batch applications to run unchanged, preserving decades of investment in business logic and data. Using this runtime on top of the proven Oracle Tuxedo infrastructure enables workload distribution in a batch cloud comprised of multiple Tuxedo nodes and robust, mainframe-compatible file management and locking in local and shared file systems. The result – effective parallelization of batch workflows in an application cloud, and a reduced batch window. The batch runtime in conjunction with Tuxedo Application Rehosting Workbench helps to rehost mainframe applications to open systems faster and with low risk, and to run even large scale applications efficiently and reliably on the vertically and horizontally scalable Oracle Tuxedo – an industry-leading COBOL and C/C++ application server, leading to significant cost savings and greater flexibility.

Rehost Mainframe Batch to Reduce Costs and Shorten Batch Window

Oracle Tuxedo Application Runtime for Batch helps organizations to migrate mainframe batch applications to open systems without having to re-write them to Java or .Net. It is powered by the premier COBOL and C/C++ application server – Oracle Tuxedo.
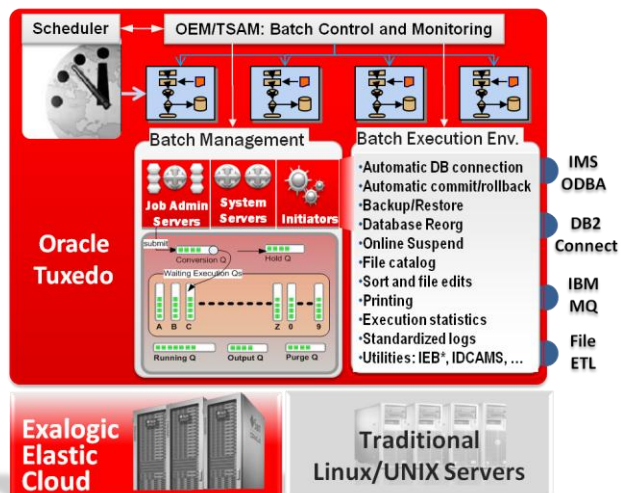

Figure 1. Oracle Tuxedo Application Runtime for Batch

Running mainframe applications in COBOL and other languages combined with support for IBM JCL functions, standard utilities, and data access provided by the batch runtime, allows application migration without a re-write – preserving decades of investment in business logic and data, protecting users from change, and avoiding the risk and cost of changing business-critical applications.

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Tuxedo delivers a robust platform to run high-volume applications across distributed, heterogeneous computing environments, enabling transactions that stretch from customer-facing, business-critical applications to back-office processes, across any system, anywhere in the world.

Tuxedo Application Runtime for Batch leverages this foundation to run rehosted IBM batch jobs unchanged. It helps IT to regain control by reducing complexity of rigid IT infrastructure, providing choice and flexibility, and addressing mainframe skill attrition with simplified architecture and operations.

Rehosted batch applications run under the control of Tuxedo's batch runtime and its distributed batch initiators. Tuxedo's queuing framework in conjunction with application runtime's batch control servers and flexible batch initiators provide robust job management capabilities similar to IBM JESPlex. Initiators run the distributed batch execution environment that delivers production features of JCL and standard batch utilities for creating, managing, copying, reformatting, sorting, and deleting datasets, launching programs, and a number of other system functions. Rehosted batch applications run in a native environment, not an emulation black box, and can benefit from the ability to run original COBOL programs, as well as any compiled executable, Java programs, third party programs, and scripts.

Rehosted batch jobs can preserve CICS and IMS integration when used together with rehosted CICS and IMS components running under Tuxedo Application Runtimes for CICS and IMS, including full use of IMS BMP. They can also leverage a rich set of integration options – from DB2 Connect and IMS ODBA for remote access to mainframe databases to Oracle Data Integration (ODI) services and Business Intelligence (BI) solutions for evolving and modernizing data extracts, transformations, and reporting in batch.

File access to migrated VSAM or flat files data on open systems remains unchanged, while embedded DB2 SQL is automatically adapted to Oracle SQL if desired. Tuxedo Application Rehosting Workbench facilitates this process and automates data migration of flat files, VSAM datasets, and DB2 tables. In addition to local data access, remote access to mainframe data is supported through DB2 Connect and other gateways. Tuxedo Mainframe Adapters also provide full connectivity to mainframe CICS and IMS TM programs and transactions.

Offload Batch Workloads Intact

IBM z/OS batch applications rely on JES services, JCL functions, and standard utilities. The batch Application Runtime helps to avoid changes to the application and preserve the job flow, job structure and programs, and execution characteristics by providing a similar environment of JES-compatible services, JCL functions, and utilities – built-in and provided by partners, such as Syncsort DMX. This robust production environment supports job scripts converted from JCL by Oracle Tuxedo Application Rehosting Workbench.

The Batch runtime provides JES-like management using job queues defined in Tuxedo QSPACE and control functions that support standard job parameters (e.g., job name, class, priority, etc.) and job stages. Standard JES functions to submit, hold/release, cancel, purge, and query jobs cluster-wide are available through a command-line interface (CLI), open services API, and Web UI. The CLI and services API enable integration with any batch scheduler, including Oracle Enterprise and Database schedulers as well as 3rd party enterprise schedulers, and mainframe schedulers. The services API can be used via Web Services, JCA adapter, and other gateways to enable real-time job control from other enterprise applications. In addition to scheduled jobs, the Web UI provided by TSAM and Enterprise Manager enable end user job control, job status views, and centralized access to job logs.

JES Application										
jessample:bjlinux99.cn.oracle ⌄	List Available Jobs									
View ⌄ Submit Refresh Detach										
Script File	Job Name	Priori	Class	Resta Optio	Type Run	Vertion	Start Label		EJR Option	Shell Option
/home/bluan/bea_linux64/art11gR1/Batch_RT/sample/simpjob/repository/JOBA	JOBA	5	A	abc	def	2.0	START			
/home/bluan/bea_linux64/art11gR1/Batch_RT/sample/simpjob/repository/JOBB	JOBB	5	A			2.0	START			
/home/bluan/bea_linux64/art11gR1/Batch_RT/sample/simpjob/repository/JOBC	JOBC	5	A			2.0	START			
/home/bluan/bea_linux64/art11gR1/Batch_RT/sample/simpjob/repository/sub/JOBA	JOBA	5	A			2.0	START			
/home/bluan/bea_linux64/art11gR1/Batch_RT/sample/simpjob/repository/sub/JOBB	JOBB	5	A			2.0	START			
/home/bluan/bea_linux64/art11gR1/Batch_RT/sample/simpjob/repository/sub/JOBE	JOBE	5	A			2.0	START			

Figure 2. Submitting Ad-hoc Jobs in to the Tuxedo Batch Application Cloud

The jobs are processed through submit/convert/waiting stages and queued by job class and priority until picked up by a Tuxedo Initiator service that monitors queues for its assigned job

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classes. Initiators control one or more job slots, and when a slot becomes available, the highest priority job from the Initiator's assigned classes is launched in the batch execution environment. The runtime can distribute the workload in a batch cloud by defining Initiators on multiple nodes. To support the cloud and parallelize batch execution, the runtime also provides mainframe-compatible file management and locking in a local filesystem and over NFS for shared file access from multiple batch nodes.

Once the job is launched, it leverages all the typical production functions provided by the batch execution environment, including:

- Automatic DB Connection/disconnection
- Automatic commit/rollback at the end of program execution
- File access with concurrency control based on DISP
- Support for GDG functions and file catalog for their metadata
- A library of built-in utility functions
- Return code management and conditional execution
- Execution statistics and standardized logs

The GDG metadata can be maintained in the filesystem or in a database-backed file catalog, which provides more robust management and reporting for batch operations with large number of files and Web UI for end user file management and operations.

The Batch runtime provides event-based, extensible monitoring using Tuxedo Event Server. This rich notification framework, which is programmatically extensible for custom job monitoring and management, can publish events which can be propagated as SNMP traps, or trigger system commands, queue messages, and run custom services. In addition to individual job events, TSAM provides a service level monitoring framework that can generate notifications and events based on data aggregated over specified monitoring intervals.

Figure 3. Job Status Search, Display, and Control in Tuxedo Batch Application Cloud

The Web UI also provides SDSF-like job query and display facility with cluster-wide access to all jobs, their logs and SYSOUT files, and standard Cancel/Purge/Hold/Release operations.

The batch runtime supports not only mainframe JCL jobs converted by the Tuxedo Application Rehosting Workbench, it also allows batch to be extended with steps to run new COBOL, C/C++, or Java programs, native OS scripts or executables, custom user exits before/after each step, and new jobs built from the provided templates. This enables customers to integrate COTS modules from packaged software, ODI tools, and leverage rich BI options to supplement or replace existing reports while maintaining required formats.

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Mainframe Robustness and Scalability in a Cloud

Oracle Tuxedo Application Runtime for Batch can be used to run large scale mainframe applications more efficiently on horizontally scalable Linux/UNIX servers. It can also leverage engineered systems and enterprise clouds with simplified provisioning, virtualization, dynamic scale-out, accounting/chargeback, and integrated monitoring and management – at a fraction of mainframe cost. Powered by the most scalable, ultra reliable and high-performance Tuxedo foundation, the batch runtime leverages its core capabilities:

- Fault-tolerant application cloud infrastructure on Linux/UNIX platforms with autonomous health monitoring, automatic recovery, fail-over, and fail-back

- Dynamic priority management and resource management with Exalogic performance optimizations and cloud-ready features

- Multi-language support for COBOL, C/C++, Java, Python, Ruby, PHP containers

This foundation supports rehosted batch applications across multiple nodes, similarly to mainframe JESPlex configurations that run jobs across multiple LPARs. Powered by this distributed infrastructure, the batch runtime supports centralized job submission and control with distributed execution across multiple nodes, which enables batch workloads to use more resources and helps to parallelize batch execution whenever possible. Elastic scale-out of batch environments is supported by the new Tuxedo Dynamic Resource Broker (DRB) in TSAM and Enterprise Manager as well as Tuxedo plug-in in Oracle Virtual Assembly Builder (OVAB) for introspection, packaging, and automated deployment of software appliances. DRB enables elastic scale-out of batch servers and initiators within a Tuxedo domain in physical and virtualized environments. OVAB software appliances are virtual machines that can be deployed with a single click on-demand or automatically based on defined policies and rules. Both of these can be used to dynamically manage resources in response to fluctuating workloads and longer than expected job wait times by providing additional capacity when needed or shifting capacity between batch and online workloads based on various conditions.

The key value of the batch runtime is to simplify and accelerate migration by avoiding or minimizing application change, while providing an open, extensible, and agile framework on a mainstream platform. Combining support for the applications' programming model and environmental dependencies with the robustness, performance, and scalability of Oracle Tuxedo enables migration of the largest mainframe applications safely and cost-effectively. By taking advantage of the modern distributed infrastructure, customers with large scale batch workloads can optimize the batch execution and shorten the batch window. When deployed on Exalogic Elastic Cloud, rehosted mainframe applications can benefit from cloud attributes – simplified provisioning, virtualization and application isolation, elastic scale-out, and integrated monitoring and management. Further optimization provided by connecting Exalogic with an Exadata Database Machine can increase data access throughput up to 5X and significantly speed up database-dependent jobs.

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