Transaction Processing Systems (SOA Middleware) Vendor Landscape Report:

IBM TXSeries vs. Oracle Tuxedo

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Branham

Introduction

Service oriented architecture (SOA) is a business-centric IT architectural approach to building and integrating applications that supports integrating business as linked, repeatable business tasks, or services. Because much of the world's data is processed using many of the transaction servers that exist today, using standards-based interfaces is a vital and core step in the journey to SOA.

In this whitepaper we review two of the industry's original and leading SOA platforms focused on enabling organizations to connect critical data and applications in mixed, multi-language distributed enterprise environments. Essentially, portions of the critical middleware systems that help large, complex organizations operate daily. Here we will introduce two products and their capabilities, compare their functionality and examine key strengths and weaknesses, to provide readers with the ability to take practical steps forward as they evolve relevant aspects of their IT strategies.

Highly complex, mission critical SOA middleware platforms such as the ones examined herewith from IBM (TXSeries) and Oracle (Tuxedo) aim to deliver substantial key benefits to organizations. These include:

- » Optimized infrastructure capable of delivering maximum application performance
- » Optimized transactions and data integrity across resources regardless of access protocol

- » Balanced resource usage
- » Improved response times
- » Increased service availability
- » Maintenance without service interruption

To achieve this they must be capable of:

- » Linear scalability as well as high availability
- » Distributed transaction processing
- » Effective workload balancing and management
- » Clustering and failover capabilities including robust fault management
- » Robust enterprise-level messaging
- » State-of-the-art security infrastructure
- » Comprehensive IDE for application development
- » Broad manageability and monitoring capabilities
- » Intuitive diagnostic capabilities
- » RESTful and HTTP Web services
- » Processing multiple transactions concurrently in a distributed environment

The following sections provide a high level perspective on how each solution stack compares with regard to these and other defined areas of functionality.

Product Overviews

IBM TXSeries for Multiplatforms

IBM TXSeries for Multiplatforms is a distributed CICS (Customer Information Control System) online transaction processing (OLTP) environment for mixed language applications. The product started as CICS/6000 in early 1990s and was re-branded as TXSeries (at IBM's Transarc subsidiary) in 1997, bundling CICS version 2.1.2 with Encina, MQSeries middleware, Lotus Domino Go web server, and other software.

Available on Linux, AIX, Windows Server, Solaris and HP-UX, TXSeries shares similar design principles and some functionality with CICS on the mainframe. The end of 2006 saw a major release of TXSeries (V6.1) that removed the DCE and Encina components, significantly simplifying the product, and introduced a new graphical web-based administration console. TXSeries 7.1, announced in 2009, included a new protocol (i.e., IPIC) that enabled communication with mainframes using TCP/IP. TXSeries for Multiplatforms V8.1 extends the capabilities of TXSeries for Multiplatforms V7.1, offering new capabilities in the area of platform coverage, operational efficiency, enterprise integration, and serviceability.

CICS forms a layer of middleware between business applications and the operating system. Business end-users see only the application interfaces and need not know anything about the underlying architecture.

The CICS components include:

» *Transaction Processing Systems* - CICS is a family of products that provide online transaction processing and transaction management for applications on IBM and on non-IBM platforms. CICS builds on the services of the operating system and offers many services for application development, communications, recovery, presentation, data management, security, and intercommunication.

» *Client Systems and Communications Gateways* - Communications in a CICS environment can use TCP/IP and SNA. CICS can use PPC TCP/IP or CICS family TCP/IP to communicate with clients and other systems. A CICS region can use SNA directly to another system, or indirectly through a PPC Gateway to achieve stronger transactional semantics.

» *Resource Managers* - Servers that manage shared resources, such as application data in files, communication resources, and databases. TXSeries for Multiplatforms provides support for the following: CICS Structured File Server (SFS), a record-oriented transactional file system, Relational database support, and WebSphere MQ.

Oracle Tuxedo

Oracle Tuxedo is an application server for C, C++, COBOL, Java and dynamic language applications in private cloud or traditional data center environments. Oracle Tuxedo provides a reliable and linearly scalable platform to develop, deploy, and manage mission-critical applications. Oracle Tuxedo provides optimized communication among applications written in multiple programming languages (e.g., C, C++, COBOL, Java, PHP, Python and Ruby), which can co-exist in the same container, and includes various tools for application development, deployment, and management to lower total cost of ownership.

Oracle Tuxedo is a key component of Oracle's Fusion Middleware and Cloud Application Foundation, which is well known for its RASP (reliability, availability, scalability and performance) features. Tuxedo provides the framework or middleware, to build scalable multi-tier client/server applications in heterogeneous, distributed environments that extend from the Web to the Enterprise. Using

Oracle Tuxedo, users can develop, manage, and deploy distributed applications independently of the underlying hardware, operating system, network, and database environment.

The Oracle Tuxedo software consists of the following components:

» ATMI Programming Interface
» CORBA Programming Interface
» Transaction Processing Application Server
» Object Application Server
» Oracle SNMP Agent software

Oracle Tuxedo also provides an array of adapters to connect to other systems. Examples include Oracle Tuxedo Mainframe Adapter for SNA, Oracle Tuxedo Mainframe Adapter for TCP, Oracle MessageQ, Oracle SALT, Oracle Tuxedo JCA Adapter, Oracle Tuxedo Application Runtime for CICS and Batch, and Oracle Tuxedo Application Rehosting Workbench.

Overall Strengths and Weaknesses

IBM Strengths vs. Oracle	Oracle Strengths vs. IBM

Total Cost of Ownership: IBM provides customers with a simpler pricing model and an overall lower TCO as compared to Oracle in defined scenarios. Oracle charges by named user or CPU and requires customers to purchase additional add-ons where comparable capabilities are included in the core IBM product. Overall IBM can provide customers with a significant cost savings; upwards of 50% depending on hardware configurations.

External Integration Features: IBM offers a wider range of integration and communication abilities for third party solutions as well as support for more open and less proprietary standards. Oracle requires additional components for external solutions to communicate with Tuxedo (e.g., SALT to expose Tuxedo applications as Web Services), or requires third party vendors to develop plug-ins (requires special agreement).

Scale Up: Both vendors provide facilities for horizontal scalability to support increased application throughput. IBM however also supports vertical scalability supporting the mainframe, which is optimized for centralized data as well as performance and quality of service focused cloud capability.

Performance and Monitoring: IBM excels in the fields of performance and monitoring. Compared to Oracle, IBM provides an overwhelming number of counters and statistics, which provide customers with insight into the most granular of requirements. While both vendors offer excellent out of the box monitoring abilities, IBM further strengthens its advantage thanks to the TXSeries monitoring agent for Tivoli, which comes at no additional cost and also offers monitoring capabilities through the web based administration console. Oracle Tuxedo does not offer similar capabilities.

Post Failure Restoration: IBM provides customers with specific instructions to help expedite failure recovery. IBM's explanation of the requirements for a successful restore clearly indicates strong capabilities in this area, which go beyond those of Oracle.

Reporting & Analysis: Both vendors offer excellent out of the box monitoring, reporting and analysis capabilities. In addition to the granular metrics provided by IBM, the optional Tivoli Monitor provides customers with the ability to expand the breadth of monitoring control and coverage. Further, IBM allows customers to use a set of sophisticated APIs to integrate the monitoring data within 3rd party reporting tools. Oracle does not offer such capabilities.

Application Development: IBM provides customers with a more complete application development environment and debugging facilities. While Oracle does provide a plug-in for its Solaris Studio (IBM also supports Solaris Studio), this targets applications intended for Solaris and Linux. Oracle requires the Microsoft Visual C++ IDE for Windows specific applications.

Upgrade Process and Automation: Oracle's support for Hot Upgrades means that no downtime is required offering greater benefits to those customers upgrading their systems. IBM does not offer the same option but does support upgrading to a new machine to minimize down time.

API Integration Capabilities: While both vendor products deliver impressive API capabilities, it is Oracle's presentation of these capabilities as fundamental pieces of the system architecture that gives it a perceptual edge. This allows for a better understanding and a feeling of ease.

Industry Standards Support: Oracle uses blanket statements that it supports "any" relational database, "any" object oriented database management system, "any" file manager and "any" queue manager. This provides prospective customers with a perception they will not need to worry about supported integrations. It remains to be seen if these claims can be substantiated or the amount of effort that may be required. IBM provides support for the more common industry standards; customers should not be left wanting.

Dynamic Workload Balancing and Fault Management: Both solutions feature workload balancing and failover capabilities. Oracle's positioning however, may provide the company with a marketing advantage in this respect. Specifically, Oracle's explanation of these abilities and the emphasis on the importance of fault management along with the use of traditional concepts helps provide a feeling of familiarity and lower learning curve.

Auditing: While both systems offer strong access control mechanisms that augment the network encryption that is available, Oracle Tuxedo offers extensive auditing functionality that further enhances the array of controls provided by the system. IBM TXSeries does not offer auditing support.

SSO Support: Tuxedo offers a more complete/detailed solution for Single Sign-On authentication supporting SAML. IBM TXSeries trusts remote systems that use IDs are already verified.

Summary

In general, IBM (TXSeries) and Oracle (Tuxedo) each offer robust solutions that yield optimized infrastructure and maximum application performance for organizations. As reviewed in this whitepaper, to achieve this each must be capable of various core capabilities. Some key ones for final consideration include:

» **Total Cost of Ownership** – For up-front costs, IBM provides customers with a simpler pricing model compared to Oracle, which charges by named user or CPU. While Oracle may have an initial purchase price advantage when implementing on older (read slower) hardware, overall IBM can provide customers with a significant cost savings; upwards of 50% depending on hardware configurations (e.g., deployment using four (4) quad core IBM Power 7 processors). This does not include additional Oracle adapters that must be purchased individually while IBM includes similar functionality within the core IBM TXSeries product. While the initial purchase price includes the first year of Maintenance and Support in both cases, it should be noted that Oracle support typically comes at a cost of 22% while IBM averages 20%, further increasing the differential between Oracle and IBM over multi-year calculations. As already discussed, IBM customers are free to upgrade to new platforms re-using old licenses without a requirement to purchase new licenses unless required based on capacity requirements. Finally, these considerations do not take into account the boost in developer productivity provided by the integrated IBM Rational development environment.

» **OS Platform Support** – Both products offer solid platform support. Oracle Tuxedo provides support for Microsoft Windows Server (2008, 2008R2, and 2012), IBM AIX, HP-UX, Oracle Solaris, and Linux (Red Hat, Oracle, and SUSE) including Red Hat Enterprise Linux on the mainframe. IBM TXSeries for Multiplatforms, supports Microsoft Windows Server (2008, 2008R2, and 2012), Sun (Oracle) Solaris, HP-UX, IBM AIX, and Linux (RedHat and SUSE). What is important to note here, is that as a distributed product, IBM TXSeries customers can simply migrate between platforms. More specifically, customers are entitled to re-use old licenses when moving to the new platform, and can purchase additional licenses based on capacity requirements.

» **Scale Up and Scale Out** – IBM TXSeries provides intuitive workload management tools for scaling business applications at no extra cost. IBM TXSeries is also the only distributed transaction processor that can scale up to CICS Transaction Server for z/OS as the business grows, while maintaining application compatibility. When it comes scaling out, Oracle Tuxedo supports an almost linear increase in application throughput, corresponding to the increase in available resources. Oracle Tuxedo applications can also be dynamically provisioned and deployed to address scalability needs within a private cloud environment. While implemented differently, IBM TXSeries supports elastic distributed caching, in-memory databases, and XTP/Data Grid applications. We find that as distributed systems, scaling out is expected to be a fundamental part of the architecture and is well supported by both products. IBM's deep and seamless integration with the mainframe however, can provide it with a significant advantage where customers are looking to scale up (vs out).

» **Application Development / Tooling Environments (IDE)** – IBM Rational Tools provide seamless integration for the development and deployment of TXSeries based applications. For example, IBM Rational Developer provides unified environments specialized for the development of software solutions targeted to distributed platforms using C and C++ (on AIX and Linux), COBOL (on AIX), Java, Web 2.0, mobile Web, SOA, SCA, OSGi, and other technologies. The integration provided by IBM Rational Tools spans to other collaborative change and project management tools such as IBM Rational Team Concert to provide a single IDE solution that caters to the different scenarios or facets of application development. IBM uses Eclipse as the common environment that allows plug-ins to link to one another, providing organizations with the flexibility to pick and choose the combination of tools that address their unique needs.

In contrast, Oracle Tuxedo ATMI integrates into the Microsoft Visual C++.Net IDE (msdev) and emulates the functionality of msdev when integration is not possible. This integration makes it possible to develop Oracle Tuxedo ATMI applications for 16-bit and 32-bit Windows operating systems. The Oracle Tuxedo Plug-in for Oracle Solaris Studio allows developers to use the Oracle Solaris Studio IDE with Oracle Tuxedo to simplify the development of C and C++ applications for Oracle Tuxedo on Solaris and Linux. Overall however, IBM provides a more complete application development environment and debugging facilitates without a requirement for third party IDEs.

» **API Integration Capabilities** - Oracle offers API integration capabilities for ATMI (Application-to-Transaction Monitor Interface), .NET Framework environment, and Dynamic Languages (PHP, Python, and Ruby) that allow users to develop (or refine) web applications using one of the above scripting languages and to rapidly deploy within the Tuxedo scripting engine across environments without the need for compilation processes.

IBM TXSeries offers a common set of programming commands that are used to request CICS services from an API. Because the API is common to all CICS family members, CICS applications can be moved from one platform to another. COBOL, C, or C++ application programs that include CICS API commands

are processed by the command language translator (cicstran), which translates the CICS API commands into statements in the language used. Users can then compile and link-edit programs by using the COBOL, C, or C++ compilers. TXSeries also provides support for the JCICS library to aid Java applications access CICS resources. Similarly CFC (C++ Foundation Classes) provides a set of libraries/class objects for C++ programs to access CICS resources in OO fashion.

We find that while both vendor products deliver impressive API capabilities, it is Oracle's presentation of the capabilities as fundamental pieces of the system architecture that give it the edge. This allows for better understanding and a feeling of ease.

» **Monitoring Abilities** - Oracle Tuxedo System and Application Monitor (TSAM) provides comprehensive monitoring and reporting for the Oracle Tuxedo system and applications. Oracle TSAM Manager provides a graphical user interface to correlate and aggregate performance metrics collected from one or more Tuxedo domains and display it in real time. The major features of Oracle TSAM include: call path monitoring and analysis; service monitoring and statistics; system server monitoring and statistics; transaction monitoring and SLA Events.

IBM TXSeries offers a web based admin console for ease of administration, configuration and monitoring; extensive monitoring facilities for both online and offline monitoring of TXSeries; and CICS Monitoring Facility, Tivoli Monitoring, and Admin Console Monitoring. TXSeries provides a rich set of monitoring and statistics facilities to get granular information on the activities occurring within the CICS region.

While both vendors offer excellent out of the box monitoring abilities, IBM has an advantage of note thanks to: (a) Tivoli - TXSeries monitoring agent for Tivoli comes with no additional cost, and offers monitoring capabilities through the web based administration console. This would not entail customers to depend on third-party monitoring infrastructure if their basic monitoring requirements are minimal. (b) An extensive set of APIs and monitoring points for collecting statistics and performance metrics of the CICS region. Oracle Tuxedo does not offer similar capabilities.

» **Mobile Enablement** – The demand for mobile adoption has dictated the extension of enterprise applications onto a mobile platform, allowing organizations to capitalize on existing investments without the need to develop entirely new solutions. IBM Worklight Server provides customers with a middle-tier gateway that facilitates the integration of multiple back-end services (including IBM TXSeries) with mobile applications. While Oracle provides its Mobile Application Framework, it requires an Oracle Fusion Middleware infrastructure to expose enterprise applications and data as Web Services and restful APIs to support integration between

applications and back-end systems (i.e., more infrastructure requirements). IBM Worklight offers easier back-end services discovery, and performs the necessary server-side logic on data coming from back-end systems (e.g., automatically converting hierarchical data to JSON format).

» **Cloud and Virtualization Support** – Both vendors provide support for IBM AIX workload partitions (WPARs) and are considered supported (although not officially) on other hypervisor technologies (e.g., VMware). More specifically, IBM TXSeries could theoretically be deployed on any virtual environment that meets the supported software criteria; for example, deployment to a private cloud environment such as the IBM PureApplications Systems. Also of note, is that Oracle does officially support its own virtualization software environments (i.e., OVM, OBM for SPARC, and VirtualBox).

Through the Tuxedo plug-in for Oracle Virtual Assembly Builder, Oracle delivers application aware virtualization by packaging Tuxedo applications into virtual appliances. Additionally, integration with Oracle Enterprise Manager allows Oracle Tuxedo applications to be dynamically provisioned and deployed and automatically scaled up and out within a private cloud. Oracle also provides significant support for its own Exalogic technology providing self-tuning and reduced bottlenecks and latency. While IBM has introduced support for IBM SoftLayer public cloud for quick and easy deployment of TXSeries, this support is currently offered as a trial sandbox for quick evaluation of TXSeries-based applications.

» **Support and Services** – Both vendors are considered capable with respect to being able to provide enterprises with the required paid support and services. However, a number of interviews have shown time and again that the quality of support provided by IBM has been exemplary with respect to the speed and depth to which issues are addressed. That being said, if customers understand the processes by which Oracle support works, they can maximize their return on the time they invest using these services. IBM post sales services (L2/L3) is commendable in terms of response times and quick problem resolution with required work around, quick fixes and fix packs. This is in addition to frequent new releases to help keep IBM TXSeries in pace with market trends and technologies.

In closing, careful consideration must be placed by organizations on the assessment of these and all key functionality as they seek to introduce such capabilities into a new or expanding infrastructure. The sheer complexity of such systems requires a methodical process and the selection of a vendor and partner that can engage, support and grow over the course of years, as needs evolve, new applications are developed and deployed, and business priorities adapt. Examining these vendors and mapping the criteria methodically will be an important aid in completing this process successfully.

Appendix: Product Comparison

This section provides a high level visual comparison of the support provided by both IBM TXSeries and Oracle Tuxedo. The ratings shown in the below table are relative to where the vendors rank against each other on specific functionality.

Legend:

No Support	Poor Support	Satisfactory Support	Good Support	Extensive Support	--- Information Not Available

Feature	Oracle Tuxedo	IBM TXSeries
Pricing		
Standard Pricing	◴	●
Packaging		
Solution Packaging	◴	●
Support and Services Offering		
Support	●	●
Support Pricing	◔	●
Services	◔	●
Education & Support Resources	●	●
Required Skillsets to Administer and Control	◔	●
Migration & Upgrades		
Migration Assistance - Services & Support	◑	◔
Upgrade Process and Automation	◔	◑

Feature	Oracle Tuxedo	IBM TXSeries
Enterprise Application Support		
Supported Applications with Direct Integrations (no API requirements) – ERP, Data, ETL, other	●	●
API Integration Capabilities	●	◔
Platform and System Support		
Industry Standards Support (IP protocols, DBMS, CORBA, SSL, etc.)	●	◔
OS Platform Support	●	●
Programming Language Support	◔	◔
Cloud / Virtualization Deployments	◔	◑
Scalability & Performance		
Scale Out Abilities & Limitations	●	●
Scale Up	◔	●
Dynamic Workload Balancing	●	◔
Growth and Demand	●	●
Performance Metrics	◔	●
High Availability & Disaster Recovery		
Redundancy Configuration	◔	◔
Fault Management & Transparent Workload Failover	◔	◔
Post Failure Restoration	◔	●

Feature	Oracle Tuxedo	IBM TXSeries
Product Connectivity and Integration		
Internal Integration Features (e.g., Tuxedo to Tuxedo or TXSeries to TXSeries) - Inter System Communication Support	●	●
Clients and Resource Manager Support	◐	◐
External integration features - Other product integration such as BPM, Java EE servers, Enterprise systems, Web Services etc.	◐	◕
Monitoring & Alerts		
Monitoring Abilities	◔	●
Integration with Monitoring Products	●	●
Insight & Foresight		
Reporting	◔	●
Analysis	◕	●
Management & Administration		
Command Line Interface	◕	◔
Primary Interface / Web Based System Management	◐	●
Mobile Management & Administration	---	◔
Security & User Management		
Network Level Encryption	●	●
Application Level Encryption	●	●
Access Control	●	◕

Feature	Oracle Tuxedo	IBM TXSeries
LDAP/AD	●	●
SSO support	◔	●

Application Development and Deployment

Feature	Oracle Tuxedo	IBM TXSeries
Application Development / Tooling Environments (IDE) and Multi-user Debugging Facilities	◔	●
Java Support Capabilities (e.g. integration with other programming languages, transaction sharing, etc.)	●	●
Mobile Enablement	◑	●
Multilingual Support	◔	●

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