

An Oracle White Paper
June 2014

A Brave New Integration World

*A Unified Framework for Cloud, Mobile, Internet of Things, Application Integration,
and B2B*

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Executive Overview

All businesses want modern information systems, but attempting to capitalize on every new wave of innovation can result in a hodge-podge of technologies that soon becomes a maintenance nightmare for IT. For example, with the advent of mobile computing, enterprise applications are no longer tied to the desktop. Users expect to be able to switch between desktop, tablet, and smartphone at will. While these mobile technologies promise improved business success, actualizing them within the context of a cohesive enterprise strategy can be challenging. It is complicated to support many different enterprise applications across several different platforms—plus build separate interfaces and support them across multiple channels.

Service Oriented Architecture (SOA) is a strategy for connecting business processes and exchanging information via loosely coupled software components. SOA is well entrenched in the IT landscape and SOA principles have become widely adopted as a foundation for enterprise applications. What began as a basic middleware technology for linking information systems has become a key enabler for many of today's hottest technologies including cloud integration, mobile enablement, fast data and the Internet of Things, application integration, and B2B. SOA has also revolutionized how modern businesses operate by simplifying internal application-integration projects and external business-to-business (B2B) integration tasks. Creating application interfaces with standard, reusable software components makes it easier to accommodate business changes and to share information with business partners.

This paper examines these middleware trends and explains how Oracle SOA Suite can enable a service-oriented foundation for creating, modifying, and combining information from all types of software applications and intelligent devices. Using real world examples, it demonstrates how Oracle customers have solved a wide variety of data management challenges using SOA and related technologies from the Oracle Fusion Middleware family.

Integration between Cloud and On-Premise Information Systems

As cloud computing becomes an essential aspect of business operations there is a pressing need to integrate cloud applications with on-premises applications. Organizations need to be able to quickly, easily, and efficiently integrate their on-premise business applications with new software as a service (SaaS) cloud applications. Cloud data and functions often must be shared with on-premise information systems. Similarly, private clouds that depend on local data often need to feed that data to cloud-based applications.

Unfortunately, application programming interfaces (APIs) differ greatly from one cloud app to another. Each vendor enforces its own mechanisms for security, message delivery, metadata definitions, query criteria, object semantics, and object schema. It is helpful to have a universal way to mask these technical details and enforce consistency at a logical level.

While many enterprises have committed some level of investment to the cloud, most of these organizations have to deal with on-premise systems as well—or fuse data among cloud applications. Oracle Fusion Middleware includes one set of integration tools to streamline all of these integration scenarios, with direct and interchangeable connections to cloud, on-premise, and legacy systems. For example, Oracle SOA Suite includes adapters to connect on-premise applications to Salesforce, along with a software development kit to create custom integrations with other cloud applications.

In conjunction with Oracle SOA Suite, Oracle Data Integration and other components of the Oracle Fusion Middleware family provide a cohesive set of integration capabilities to simplify the exchange of data and events within diverse IT environments. Oracle minimizes the distinction between cloud-based and on-premises applications by enabling a unified approach to service integration, process orchestration, application integration, and data integration—regardless of where individual applications are deployed.

Oracle SOA Suite accommodates all types of information systems, deployment models, SaaS vendors, and Platform as a Service (PaaS) infrastructure, anchored by a cohesive set of tools for development, management, security, and governance. Along with other components of the Oracle Fusion Middleware family, it is the hub to integrate on-premises and cloud-based services through one cohesive middleware layer. A unified integration approach between on-premises and cloud applications reduces the time, cost and complexity of application integration projects. It also lowers total cost of ownership by simplifying integration, consolidating toolkits, and reducing maintenance costs.

Case in Point: JDSU

JDSU relies on Oracle technologies and applications for its CRM and ERP portfolio. Until recently, however, IT pros lacked a well-defined integration strategy to tie these on-premise applications with their cloud-based Salesforce.com applications. To remedy this problem, the JDSU integration team used Oracle SOA Suite to unite on-premises and cloud-based application functions and data. According to Rajeev Sethi, senior director of IT applications at JDSU, this new integration architecture

has helped the JDSU sales team become more self-sufficient. Account managers can access both on-premises and cloud-based applications via mobile devices, with Oracle Identity Management securing these sessions and enabling single-sign-on. JDSU has also seen a reduction in Days Sales Outstanding by two percent and has improved operational forecasting by 20 percent as a result of these integrated systems. Sethi and his colleagues are now using Oracle SOA Suite to integrate their enterprise applications with corresponding information systems from JDSU's partners and contract manufacturers. As they roll out new applications and additional services, this centralized integration architecture becomes even more important. "Clearly Oracle SOA Suite is in line with the direction our business is taking," Sethi says. Watch the [webcast](#) to learn more.

Mobile Integration

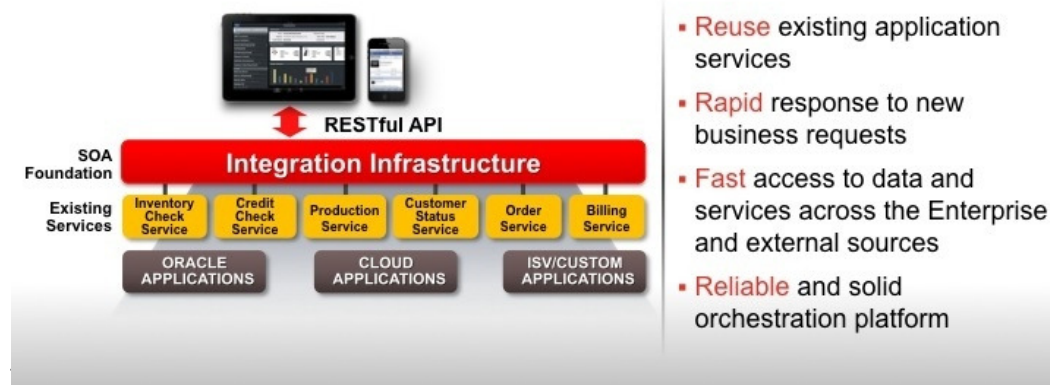
For many years web browsers and desktop computers were the primary way to access information from enterprise applications. As mobile devices have proliferated, applications are no longer tied to the desktop. Users want to use their smartphones and tablets to access corporate data and business apps, anytime, anywhere. Many IT departments are having a hard time accommodating these mobile interfaces while preserving hard-won enterprise standards. Rather than continuing to develop applications first for the desktop and then making tactical mobile development choices, IT leaders want a consistent architecture that considers all channels.

Many Oracle customers are addressing this challenge with Oracle Fusion Middleware. Rather than treating mobile as a new development and deployment channel, they see mobile integration as an extension of the SOA integration methods that they already have in place. The Oracle Mobile Suite utilizes standard technologies and tools to expose many data formats for exchange data and functions with any mobile application and includes Oracle Service Bus and Oracle Mobile Application Framework. Oracle supports all types of connections between applications on mobile devices and back end business systems including the popular REST/JSON. This means mobile applications don't have to be self-contained and data doesn't have to be stored on the device.

Mobile applications communicate with back-end applications through a standardized mediation and virtualization layer—Oracle Service Bus—which can connect to the backend web services and expose them as RESTful APIs. This allows developers to leverage their existing application and integration infrastructure as part of a highly reusable and scalable development and integration platform.

Integrate: Mobile Service Integration

Service Enablement, Management and Integration



Organizations can choose one of two ways to develop their mobile strategy. They can control the entire user experience, from the enterprise application all the way to the mobile front-end by building native front-end applications, or they can choose to expose RESTful APIs using Oracle Service Bus and leverage Mobile Application Framework to build front-end mobile applications that can be built-once but deployed to run on either iOS or Android. In addition, Mobile Application Framework allows existing Java developers to build on JDeveloper. This way, the same resources can be utilized for building front-end mobile applications without a need for new skills based on the type of mobile device.

Oracle's mobile integration capabilities include complete lifecycle management services such as definition, creation, security, monitoring, and management. Developers can create RESTful services and expose them to simplify the process of creating customizable applications from reusable components.

Representational State Transfer (REST) and JavaScript Object Notation (JSON) have emerged as the dominant standards for exposing services and APIs for mobile enablement. Oracle SOA Suite simplifies mobile enablement by providing native support for RESTful services that communicate using JSON (enhanced REST support with REST binding), with the ability to call out to such services. Developers can expose traditional SOAP services, Enterprise Java Beans (EJBs), or just about any other underlying implementation using JSON/REST by using Oracle Service Bus.

Case in Point: Agilent Technologies

As a leading electronic and bio-analytical measurement company, Agilent helps scientists, researchers, and engineers to accelerate innovation. Agilent's web presence offers an increasingly important and valuable way to interact with these users, provide them with personalized information, and gain insight into market trends. However, until recently, the company's disparate web presence and customer information silos did not support the integrated, seamless customer experience to which the company was aspiring—including mobile access via smartphones and tablets.

Agilent used Oracle Fusion Middleware technology to create a personalized portal that enables customers to check orders, obtain pertinent news, peruse products, and participate in discussion forums. Today, the company is creating a single view of customers, whether they come in for a discussion forum or to track an order. Agilent also has a single location to manage identities and can analyze how customers are using the company's web applications.

Agilent's most recent focus is on enabling users to access critical applications via their mobile devices. They use Oracle SOA Suite and Oracle Identity and Access Management Suite to integrate mobile apps with enterprise systems. Agilent relies on its Oracle middleware infrastructure to rapidly build mobile applications and mobile services, including field sales and purchase approvals.

“Mobile is an important part of our IT strategy moving forward,” said Rajesh Gathwala, an enterprise architect at Agilent Technologies. “With Oracle SOA Suite, we can efficiently reuse services and accelerate mobile enablement. For example, we can quickly build services for mobile applications. Oracle Fusion Middleware plays a critical role in our mobile initiatives and continues to deliver a valuable return on our investment.”¹

Oracle SOA Suite has reduced the time it takes Agilent to build new interfaces and reduced the IT budget devoted to interface maintenance by 60 percent. In addition, it accelerated business transaction processing by 20 percent and increased throughput by 30 percent. Over the long term, Agilent plans to use its SOA platform to streamline business-to-business and partner integrations. Here is a video of Rajesh Gathwala, Enterprise Architect at Agilent: [Agilent Transforms IT with Oracle SOA Suite](#).

The Internet of Things

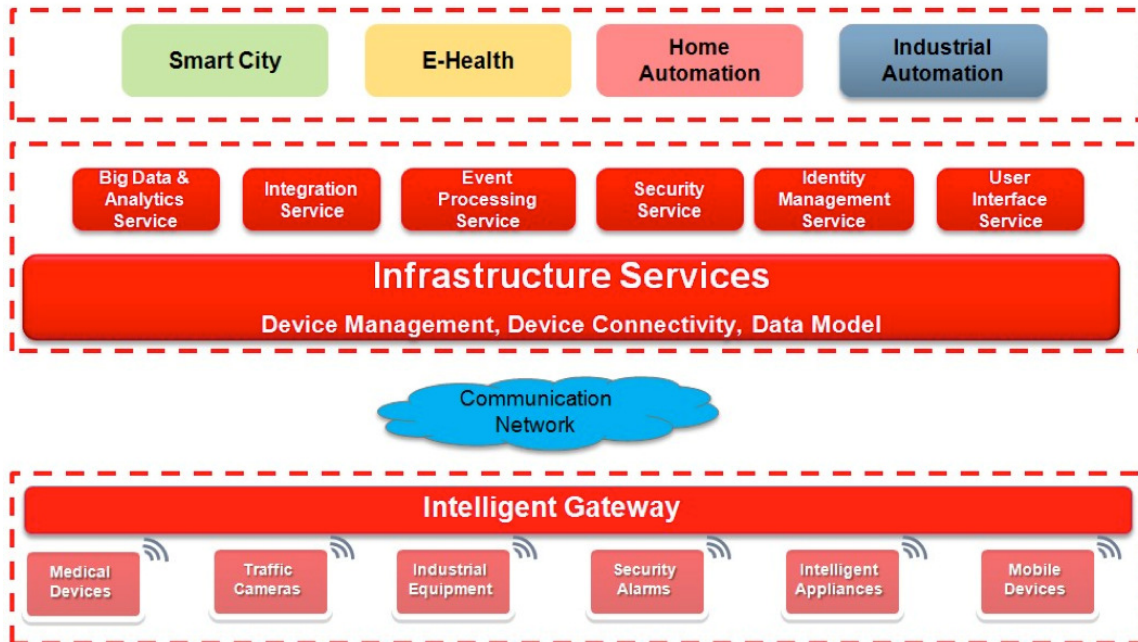
The proliferation of intelligent devices has created new markets for entirely new solutions based on Internet of Things (IoT) technology. As the volume, variety, and velocity of data increases—and the number of intelligent devices proliferates—the key to gaining real business value is effective communication among all elements of the architecture. Oracle SOA Suite forges links among devices, applications, and business processes. Oracle Event Processing, which is part of the SOA offering, is available in embedded form. This provides a very unique value proposition to provide intelligent filtering and correlation for event processing as close to the data source as possible, providing an opportunity for real-time, contextual reaction to events even before the data hits the data center. The fundamental component of Oracle’s Internet of Things platform is a data exchange and communication mechanism that enables real-time response capabilities for millions of device endpoints.

Service orientation provides a useful model for building IoT applications. A typical SOA composite application includes a collection of business processes, business services, and data services. Just as data services expose application interfaces as services that can be orchestrated to create useful business services, an IoT architecture could be modeled in a similar layered format. Each layer builds on the others to enable loosely coupled integration. For example, equipment sensors might interact with an intelligent gateway to enable seamless connectivity with various devices—just like the data services in a traditional SOA environment.

In addition, Oracle Data Integrator and Oracle GoldenGate can move information, when and where it is needed. These middleware technologies combine all the elements of data connectivity and integration into a unified platform that supports real-time and bulk data movement, data synchronization, big data transformation, and fast data processing.

¹ <http://www.oracle.com/us/corporate/customers/customersearch/agilent-7-fusion-middleware-cs-2034596.html>

Just as data services are independent of the associated applications, the IoT services layer is completed independent of the associated devices. Oracle SOA Suite enables standard communication protocols and connectivity semantics, along with a core set of services to build IoT applications for smart cities, home automation, industrial automation, e-health, and other domains. This type of layered IoT architecture is shown below.



Big Data and Fast Data

As diverse as these domains and applications are, they have one thing in common: the need to process very large volumes of dynamically changing data, both inside and outside of the firewall. Big data is a popular term used to describe the exponential growth and availability of data, both structured and unstructured. Clearly, big data presents a new set of IT challenges. However, it is also an opportunity to utilize unstructured information in a way that can provide fresh insight and value—especially for real time data sources.

Fast data refers to the continuous access and processing of events and data in real-time for the purposes of gaining instant awareness and instant action. Fast data can leverage big data sources, but it also adds a real-time component by providing the opportunity to take immediate action on events and information. High-velocity data brings high value, especially to volatile business processes. However, some of this data loses its operational value in a short time frame. To extract the maximum value from highly dynamic and perishable data, organizations need to process it faster and take action more quickly. The resulting real-time insights can:

- Enable new services that were not possible before
- Provide better customer experiences through more real-time personalized interaction

- Manage system resources more effectively
- Achieve higher quality in operations by increasing visibility and predictability

Case in Point: Turkcell

Turkcell is Turkey's largest GSM carrier, with more than 34 million subscribers. Since Turkcell started its operations in 1994, it has continuously increased the variety of its services based on mobile, audio, and data communication. Turkcell implemented an enterprise data warehouse solution that supports subscriber segmentation, credit scoring, and churn analysis. As the number of subscribers increased, data volumes reached 250 TB of uncompressed data. Turkcell had to add more servers, for a total of 11 server racks. However, even with this expansive infrastructure, query and ETL performances were not adequate to meet the needs of the business users, and growing complexity led to increased IT operations costs. Turkcell chose Oracle Exadata to consolidate this database infrastructure, along with Oracle Data Integrator (ODI) to provide bulk data loading and Oracle SOA Suite to create new business services. Today its Oracle-based integration architecture processes more than 800,000 subscriber related events per second (1.5 billion events each day).

In a related project, Turkcell developed an integration framework that leverages a centralized customer data hub to serve its back end systems for CRM, sales force automation, and partner interactions. To enforce consistency across these information systems, Turkcell created a Unified Customer Management Architecture based on Oracle SOA Suite. They used Oracle SOA Suite to expose platform capabilities as standard business functions that can be used by various service areas. They created 17 different workflows that impact more than 3,000 companies and 2 million subscribers, with approximately 19,000 transactions each day. According to Omur Koken, Senior Specialist at Turkcell, the architecture provides a standard integration infrastructure in which new business services can be developed, traced, monitored, and maintained easily. It eliminates disparate point-to-point connections between Turkcell's core information systems and ensures that customers experience the same service quality at each channel. Listen to this [podcast](#) with Turkcell to learn more.

Case in Point: Canon

As a leader in office equipment and document imaging solutions, Canon created a remote diagnostics system that processes millions of real-time transactions via a SOA infrastructure. The company's Information and Imaging Systems division created the imageWARE remote diagnostics system to collect information from more than one million multi function printers. Created with Oracle SOA Suite and hosted on Oracle Engineered Systems, the system gathers tens of millions of transactions from intelligent devices all over the world, with intelligent filtering through Oracle Event Processing. According to Greg Ryan, senior marketing director at Canon Information and Imaging Systems, Canon achieved breakthrough performance with Oracle Fusion Middleware, reducing event processing from a half second to fifty ms, improving throughput 4X to connect 50 million devices and deliver a strong foundation for the Internet of Things. You can listen to the customer testimonial here: [Canon Delivers on Internet of Things](#)

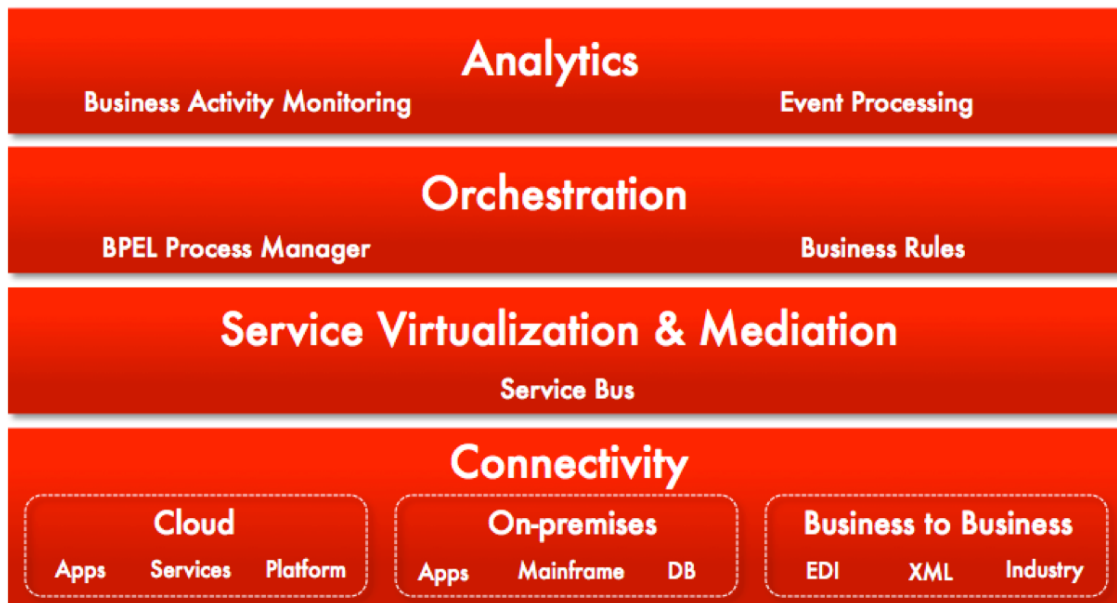
Application Integration

Application integration, sometimes called enterprise application integration (EAI), is the process of linking applications in order to simplify and automate business processes. At the most basic level it involves exchanging data and functions from one software application to another, including packaged applications, custom-developed applications, and many types of legacy information systems. Oracle SOA Suite streamlines application integration by enabling developers to create standard interfaces between services and applications. It facilitates the creation of an agile and reusable connectivity layer, speeding time to market and reducing costs.

As we have seen, Oracle SOA Suite can be used to unify applications of all type, both cloud-based and on-premises. In addition, out-of-the-box adapters make it easy to connect to virtually any data source, technology (messaging, database, etc.), application, or trading partner through a unified framework. Oracle SOA Suite also includes functionality for creating interfaces to mobile devices with REST support. Supporting products within the Oracle Fusion Middleware family simplify, streamline, and automate many aspects of these application integration scenarios. For example, customers can:

- Route, transform and virtualize services through the highly scalable Oracle Service Bus
- Orchestrate and automate business processes with Oracle BPEL Process Manager
- Externalize specific blocks of logic using Oracle Business Rules
- Detect specific patterns across multiple data streams and time windows through Oracle Event Processing
- Gain real-time visibility into business processes, along with the ability to respond to specific situations, through Oracle Business Activity Monitoring
- Secure all services through a policy-driven security framework and global policy manager in Oracle Enterprise Manager
- Execute SOA composite applications through a unified, optimized infrastructure built on top of Oracle WebLogic Server, Oracle JRockit, and Oracle Coherence
- Manage and monitor all of the above components through a single console, natively integrated with Oracle Enterprise Manager

These essential aspects of application integration are depicted in the figure below.



Oracle SOA Suite improves developer productivity by offering easy-to-use, drag-and-drop features for rapidly assembling metadata-driven business applications. It enables highly flexible and responsive applications through event-driven SOA. Additionally, Oracle SOA Suite is designed to work with Oracle Data Integrator (ODI), a comprehensive data integration platform that supports high-volume, high-performance batch integration scenarios. ODI's extract, load, and transform (E-LT) architecture leverages RDBMS engines to process and transform the data, optimizing performance and scalability and minimizing cost. Oracle GoldenGate, another key data integration product, provides real-time, log-based change data capture, routing, transformation, and delivery of transactional data across heterogeneous environments. These proven data integration and replication technologies provide the core foundation for combining data from various business-critical systems to gain a broad, unified view of business operations.

Case in Point: Ricoh

Ricoh Americas Corporation is a global technology company specializing in office imaging equipment, production print solutions, document management systems, and IT services. Ricoh uses Oracle SOA Suite to connect its on-premises Oracle E-Business Suite applications with cloud-based CRM systems from Salesforce.com. Oracle SOA Suite simplifies integration and policy management among these enterprise applications with a unified framework of middleware components that can be used interchangeably among many types of technology assets. This versatile architecture makes it easier to develop policies for signing messages, encrypting data, authenticating users, and managing access to IT resources, accommodating new types of interactions with customers and dealers, as well as among Ricoh employees.

Ricoh depends on Oracle SOA Suite to efficiently integrate applications of all types—hosted, on-premises, and in the cloud. Critical information related to customers, inventory, diagnostics, orders,

and other core functions that was previously only accessible via packaged applications is now available via mobile interfaces on smartphones and tablets.

Using Oracle SOA Suite as a framework for cloud and on-premises integration, Ricoh was able to merge, rationalize, and streamline its middleware infrastructure—and bring new efficiencies in sales productivity. Its shared integration service supports several major technology initiatives:

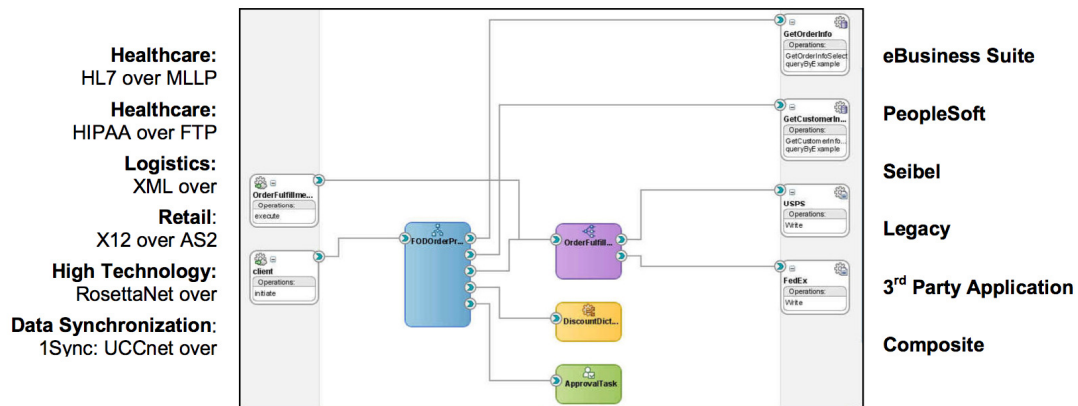
- An enterprise sales portal called RFORCE that delivers information about customers and prospects to the Ricoh sales team by integrating Salesforce.com with Oracle E-Business Suite for Quoting.
- An online self-service portal called MyRicoH that customers use to request service, report technology issues, and order supplies through computers and mobile devices. MyRicoH leverages Oracle E-Business Suite iSupport and iStore functionality and integrates with a global knowledgebase created using Oracle RightNow.
- A partner-facing portal that provides visibility into warehouse inventory for Ricoh's dealers
- A cloud based social collaboration environment that employees use to interact with colleagues, create work teams, share documents, form subject matter groups, and participate in discussions

Having a centralized integration platform minimizes the complexity associated with managing APIs from Salesforce and other cloud vendors. It also simplifies connections to mobile applications and social networks. Having a robust, centralized integration platform minimizes the complexity associated with managing APIs from various applications, on-premises and in the cloud. Here is a documentary webcast on Ricoh America: [RicoH Differentiates Business with Unified Cloud and On-Premise Integration](#). In addition, a detailed implementation whitepaper that is available at: [RicoH AppAdvantage](#).

B2B Integration with Trading Partners

B2B Integration involves combining, automating, and optimizing business processes that extend outside the four walls of an organization such as with third party suppliers, retailers, agents, dealers, and other trading partners. Integration software enables companies to manage these transactions via the Internet or a private network by allowing their information systems to communicate with each other in a common language and format. Common B2B exchange scenarios include sending and receiving purchase orders and exchanging supply chain data to enable a real time view of inventory and shipments.

B2B integration technology has evolved over many decades, from the widespread adoption of Electronic Data Interchange (EDI) methods to more modern interfaces based on XML, web services and SOA standards. Oracle B2B enables a secure and reliable exchange of documents based on these and other messaging services. Together with Oracle SOA Suite, Oracle B2B enables a unified business process platform with instance tracking, visibility, auditing, process intelligence, governance, and security. Common industries and communication standards are depicted in the figure below.



In addition, Oracle B2B Enables the seamless management of documents, tight collaboration with business partners based on industry standard protocols, and out-of-the-box connectivity to industry hubs like Wal-Mart, Cisco, and Intel.

Case in Point: Schneider National

Schneider National, Inc., a leading provider of truckload, logistics, and intermodal services, created a next-generation IT platform to manage the quote-to-cash process across the company's various business units. This SOA-based infrastructure gives drivers, customers, and business partners convenient access to the information and services they need while improving back-office processes to support greater operational efficiency and profitability.

Schneider linked Siebel CRM applications, Oracle Transportation Management, Oracle E-Business Suite, as well as custom and third party applications. Schneider also standardized integrations with its external trading partners. Prior to adopting Oracle SOA Suite, developers used a variety of tools for integration. Now Schneider relies on Oracle SOA Suite to provide a consistent programming model for developers, as well as to reduce development and maintenance costs. It automates enterprise processes that include human workflows and application-application interactions.

Schneider used well-defined integration patterns to design and implement its SOA interfaces, which support more than 200 integrations. To enable centralized access to data and facilitate re-use of data-access services, Schneider created enterprise Web services such as TransportationOrder, Claims, Shipment, Account, AccountProfile, Location, Driver, and Supplier. These enterprise services have enabled re-use and consistency in the development of integrations.

For integration with trading partners, Schneider uses Oracle B2B for EDI, which is part of Oracle SOA Suite. This centralized platform makes it easier to manage documents, align with trading partners, exchange documents, and execute transactions. One set of B2B servers processes 42,000 messages per day with 700 trading partners involving over 100 types of documents. Another B2B server processes 130,000 messages per day with 225 trading partners and handles over 30 different types of documents.

By standardizing on Oracle, Schneider has simplified its applications design, development, and maintenance, improved productivity, enabled component re-use, and put in place and open-systems based infrastructure that can provide Schneider with the scalability, performance, and reliability it needs to power its growth in the future.²

Conclusion

Today's organizations must contend with a growing volume of data, devices, and connections to connect the workforce with information. Oracle's industry-leading middleware solutions leverage a unified service integration framework for solving many types of information management challenges. They expose enterprise data and applications in a secure and standard way regardless of the interface that people use to surface those applications—or where those applications ultimately reside.

Oracle SOA Suite is a versatile platform for connecting business applications that complements and extends other products within the Oracle Fusion Middleware family. It simplifies connectivity by enabling developers to set up and manage universal services and orchestrate them into composite applications and business processes—on premises and in the cloud. It doesn't matter if the interfaces are from SaaS to SaaS, SaaS to on-premise, on-premise to SaaS, or on-premise to on-premise, SOA can connect any kind of SOAP or REST Web service using a robust family of Oracle data management solutions.

In addition to assisting with modern initiatives such as real-time analytics and cloud computing, Oracle Fusion Middleware technologies help customers with fundamental tasks related to building, deploying, and managing data warehouses, data marts, decision support systems, data hubs, and many other critical projects. They also support big data projects by supplying a growing number of operational users with access to up-to-date, trusted data.

² <http://www.oracle.com/us/products/middleware/schneider-cs-02222013-ofm-logo-1930040.pdf>



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June 2014

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