ORACLE FUSION MIDDLEWARE – THE BACKBONE FOR *e*HEALTH

SUMMARY

- Oracle Fusion Middleware is the industry's most comprehensive and cohesive middleware platform. Healthcare organisations can leverage the integrated application platform to turn their IT infrastructure into a service-oriented architecture (SOA).
- A SOA will enable healthcare organizations to
  - Achieve a higher degree of interoperability
  - Reducing total cost of ownership over time
  - Reduce complexity of information systems

KEY ADVANTAGES OF ORACLE

Oracle Fusion Middleware is the fastest growing middleware. An integrated approach with loosely coupled components makes it a compelling proposition for healthcare.

With its robust deployment architecture with no single point of failure, Oracle Fusion Middleware provides the reliability that healthcare industry needs

Oracle Fusion Middleware is fully open standards compliant

Multi-level authentication from Oracle Identity Management provides the security and privacy levels needed to meet regulatory requirements

The healthcare industry worldwide is under pressure to make healthcare more accessible, affordable, safe and secure. While Healthcare is one of the most technologically advanced industries, ironically it has traditionally invested very little in using IT to support the delivery of healthcare services. There is therefore a huge opportunity to use IT to improve efficiency throughout the healthcare delivery chain. Increased patient mobility and home care plans, for example, require collaboration between many stakeholders over multiple channels. Effective use of IT will enable healthcare providers to meet current challenges and continuously evolve to align with increasing patient demand.

Oracle's comprehensive Oracle Fusion Middleware platform enables an integrated approach to e-health. The emerging market leader in middleware, Oracle provides a complete solution for the easy and cost effective development, integration and deployment of healthcare applications.

Infrastructure vs. Applications

Healthcare informatics is a complex business, which can be seen as a balancing act between specialised individual domain/department requirements and overall interoperability. Ad-hoc applications meet user requirements in the short term but create silos of information that cannot easily be shared across the organisation. These information islands increase the total cost of IT ownership and create an IT infrastructure that is difficult to adapt and costly to integrate.

Healthcare organisations are starting to realise the benefits of taking an infrastructural, rather than applications-driven approach to informatics. In this scenario, all applications are integrated into a single infrastructure based on a common data repository and set of services, allowing processes to be automated and data to be shared by all applications, enabling the creation of a single electronic healthcare record. This approach is already proven to deliver rapid returns on investment and a significantly lower total cost of IT ownership.

What makes an infrastructure?

In the context of this new approach to healthcare informatics, infrastructure is defined as a set of functional and technology services that are common across applications and can be used in one or more ways depending on the context. These services hide the underlying processing and complexities of infrastructure functions.

Key features of an infrastructure are:

- **Scalability –** the infrastructure functions are highly optimised and are scalable up and down.
- **Encapsulation –** the infrastructure provides a standard set of access points and hides the implementation complexities of business logic processing.
- **Reliability –** applications are highly available and performance is guaranteed

- **Standardisation** – the infrastructure has embedded standards that enable applications to interoperate and meet regulatory requirements

A service-oriented architecture (SOA) approach to developing this applications infrastructure will enable healthcare organisations to maximise their ROI for their IT investments in long term.

What are the benefits of SOA in healthcare?

Healthcare organisations can expect a host of benefits from adopting SOA for healthcare informatics, including:

Achieve interoperability through standards and standards governance - Integration is a complex and expensive initiative, but it is unavoidable. Multiple domain-specific applications delivered by multiple technology vendors create a heterogeneous technology environment that must then be integrated. The key to success is to simplify the integration problem by taking an enterprise view instead of an application view, thereby avoiding the creation of a multitude of individual interfaces.

Ad-hoc development tends to focus on immediate needs and may not align to a bigger picture of overall applications interoperability. Silos of information with different representations of entities and different processes tend to create duplication at all levels from data to services. Achieving interoperability between applications within the enterprise as well as with external enterprises is a difficult, time-consuming and expensive problem that has traditionally required a high degree of manual intervention.

By contrast, a SOA approach allows standardisation of data and processes across the enterprise and achieves a high degree of interoperability by design. Standards are not absolute and continuously evolve. The infrastructure approach provides an easy and seamless governance model for the adoption of new standards, maintaining interoperability over time.

Oracle Fusion Middleware goes beyond syntactic interoperability and provides a comprehensive solution for achieving semantic interoperability in the healthcare industry. Oracle Healthcare Transaction Base (HTB) leverages Oracle Fusion Middleware to provide a comprehensive healthcare-specific integration platform based on HL7 V3.0 standards. Leveraging HL7 V3.0 RIM HTB enables healthcare to achieve semantic interoperability of information. For more information, visit www.oracle.com/healthcare.

An enterprise view that supports individual needs – A typical disadvantage with many enterprise software solutions is that everybody is forced to use the same tools and work the same way. In healthcare, this approach is not feasible. Different clinical specialities have different needs and different areas of focus. Using the service-oriented architecture of Oracle Fusion Middleware, healthcare organisations can gain the benefits of enterprise-wide integration while supporting the specific needs of individual departments. The unique combination of standards-based integration (HL7 and DICOM) together with the flexibility of using BPEL creates a completely new vision for the electronic healthcare record.

Implement new processes and initiatives faster – New healthcare initiatives triggered by drivers like regulations or process optimisation efforts usually need to be introduced quickly. A SOA approach requires far less effort and enables new applications or initiatives to be put in place much more quickly. Changes are localised to a specific domain or application, reducing the effort and cost of changing multiple instances. Changes only need to be made once to the infrastructure, and are then automatically available to all service consumers.

The re-use of time tested, proven and scalable services significantly reduces the time to market for new initiatives/applications and lowers the overall risk factors.

Lower total cost of ownership – departmental IT initiatives tend to focus on initial build cost while ignoring the total cost of ownership from an enterprise perspective. Reusing what is already in place reduces the cost of building, managing and upgrading applications. The biggest contributing factor to the reduced total cost of ownership for an infrastructure approach is the ability to predict future hardware and software requirements by analysing current use patterns and the likely impact of planned IT initiatives on the overall infrastructure.

Simplify the unnecessary complexity - according to an independent study conducted by HINE (Health Information Network Europe), the biggest barrier to improved standards of healthcare is a lack of systems interoperability, both inside individual institutions and between different organisations. Non-interoperable syntactic and semantic structures will be the biggest obstacle to the provision of cross-border healthcare delivery in Europe, for example.
Aligning to a SOA will enable healthcare organisations to achieve a high degree of interoperability between applications running within a single organisation, but also between applications at different organisations. The reduction in individual interfaces and processes will reduce the overall complexity and provide significant savings.

A single view of operations – taking an infrastructure approach will provide a backbone for cross-domain processes that will help achieve higher process efficiency for healthcare enterprises. Cross-domain process management enables a higher degree of visibility into problem areas and removes bottlenecks.

Enabling Health IT infrastructure – the Oracle way

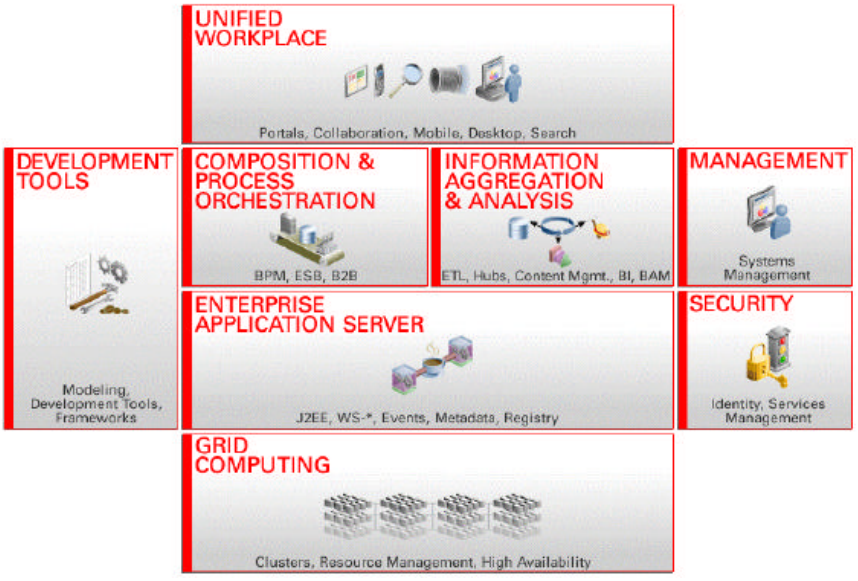
Oracle Fusion Middleware is a comprehensive platform that is ideally suited for the creation of an integrated healthcare informatics infrastructure, whether at an institutional, regional, national or international level. A fully integrated set of tools and technologies provides a single platform for service-oriented computing, including

"A complete technology platform that includes business applications, an application platform (containing robust integration capabilities), and integrated database technology will be one of the most efficient alternatives for organizations that want to acquire the ability to create composite applications."

Forrester

1) Industry standards-based J2EE container to develop, deploy, manage and operate healthcare applications

2) Enterprise integration enabling the integration and orchestration of cross-domain processes



based on Oracle or non-Oracle technologies

3) An enterprise portal providing multi-channel (including wireless) access to applications

4) Business intelligence for data analysis and reporting.

All these solutions share a common security infrastructure to unify security management across enterprise applications.

Oracle Fusion Middleware is based on industry standards, enabling healthcare organisations to build, operate and enhance eHealth services through a service-oriented architecture. Minimising development effort with support for healthcare standards like DICOM and HL7, Oracle Fusion Middleware is a compelling offering for the healthcare industry.

Benefits of an integrated middleware platform

There are many vendors that provide standards based components, and the option to pick and choose heterogeneous components always exists. However there are some key benefits to adopting an integrated platform, including:

- Heterogeneous components, although based on similar standards, do not integrate with each other out of the box. Some integration does exist in some cases but may not be suitable for all scenarios. Major effort is required to make heterogeneous components work and to test them for reliability, delaying time to market. Using Oracle Fusion Middleware will provide significant time gains and minimal development costs.
- Different platform vendors have different timelines for releases, resulting in part upgrades of your applications with multiple testing cycles. Oracle Fusion Middleware components will follow the same release cycles, facilitating a seamless upgrade and a more stable environment.
- A single hardware platform with a single database infrastructure will optimise resources and save costs. By contrast, multiple proprietary schemas and different runtime environment lead to underutilisation of resources and redundancies.
- A single interface to resolve issues related to platform with lower effort testing cycles

"Oracle has a broad functional vision for its E-APS that will also be the foundation for the next generation of Oracle applications. Notably, it is ahead of most in developing its event-driven angle (Gartner believes event-driven processing will be the industry-leading architecture by 2008, the way service oriented architecture is in 2005, and Oracle leads the way in its APS R&D). Several Oracle EAPS components are certified on non-Oracle platforms, and its architecture is being moved to an extensible Java Business Integration model."

Gartner: Magic quadrant for enterprise scope application platform suites, 3Q05

Develop robust applications on the industry-leading J2EE platform

Oracle Application Server provides a comprehensive set of technologies for the easier and faster development of applications and web services. It includes high productivity development frameworks like Application Development Framework (ADF) for faster application development with a smaller team. With support for healthcare technology standards including DICOM, Oracle Application Server offers a high availability, high performance platform that is critical for healthcare applications. Oracle Application Server deployment options with no single point of failure provides the reliability that healthcare applications require.

Oracle JDeveloper is a free and comprehensive development environment that enables model driven software development. A high productivity tool enables faster development of J2EE applications and web services and automated deployment options with UML modeling tools.

Increase information access with Oracle Fusion Middleware Portal and Wireless

Oracle Fusion Middleware enables access to healthcare applications via a variety of user interfaces. In addition to traditional Web-based or thick client access, Oracle Fusion Middleware Portal provides a wireless interface to applications that will enable healthcare providers to reach mobile patients. Wireless technologies and integration with RFID technologies open up a host of new applications like patient monitoring, sensor-based monitoring, telemedicine, remote care plans etc. Oracle Portal provides portlet-driven content aggregation with personalisation through predefined and partner portlets. Personalisation services provide a user-specific single access point to multiple information sources and applications.

Integrate and orchestrate across information silos with Oracle Fusion Integration

Oracle Fusion Integration is a standards-based applications and web services integration tool for enterprises. Most healthcare organisations run a diverse mixture of packaged, custom-built and legacy applications. Aligning these systems to a SOA requires an integrated set of technologies that provide data level integration and the ability to orchestrate services into a business process. Oracle Interconnect provides data integration services for applications that are intensive on data exchange. Oracle Business Process Execution Language (BPEL) Manager provides a strong web services orchestration tool to align applications into a SOA and to enable process management across those applications.

The standards based Oracle Enterprise Service Bus (ESB) provides the backbone for enterprise integration, and also interoperates with other non-Oracle JMS-based middleware. The suite contains a comprehensive set of adapters that facilitates easy and faster integration. The set of adapters include popular commercial off-the-shelf (COTS) applications, messaging standards like HL7, and data sources like database, files, etc.

Access to information and intelligence with Oracle Business Intelligence

Oracle Business Intelligence integrated with Oracle Application Server provides Web-based reporting and business intelligence. The resulting increased access to information will enable healthcare professionals, administration and authorities to make informed decisions.

Oracle Business Intelligence accessed through Oracle Fusion Middleware Portal supports standard and ad-hoc reporting. Healthcare institutions can increase productivity by providing end users with reporting tools that are interactive and user-configurable.

Centralised secure access with Oracle security and identity management

Healthcare is a highly regulated industry with a strong emphasis on security and privacy. Oracle Identity Management provides a comprehensive security and identity management solution that manages security across all components of Oracle Fusion Middleware. Oracle Identity Management can work with all leading directory services in a heteogeneous enterprise infrastructure. With multi-level and multi-factor authentication management, Oracle Identity Management provides a policy-based authorisation management solution enabling enterprises to meet regulatory requirements. Centralised administration with single sign on reduces management overheads, removes redundant processes (e.g. multiple user logins) and provides a better user experience.

Oracle Identity Management provides the necessary data security for web services environment..

Oracle's vision for Healthcare

Oracle's vision for healthcare is to reduce the complexity of healthcare informatics, lower total cost of ownership and improve the scalability, security and availability of healthcare applications.

Oracle is committed to enabling the healthcare sector to leverage information technology to deliver next-generation patient care with minimum costs.

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