Enterprise Integration Update

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Agenda


I. Introduction
II. History
III. Current Trends and Standards
IV. The Effects of New Trends on Integration
V. Java Standards and Tools
VI. Conclusions and Recommendations

History

- Proprietary EAI solutions popular in mid-90's
- Their value proposition: provide pre-built connectors to most common enterprise systems
- Custom connectors expensive to build
- Locked to specific programming language (often C or C++)
- Security, if any, seemed like an after-thought

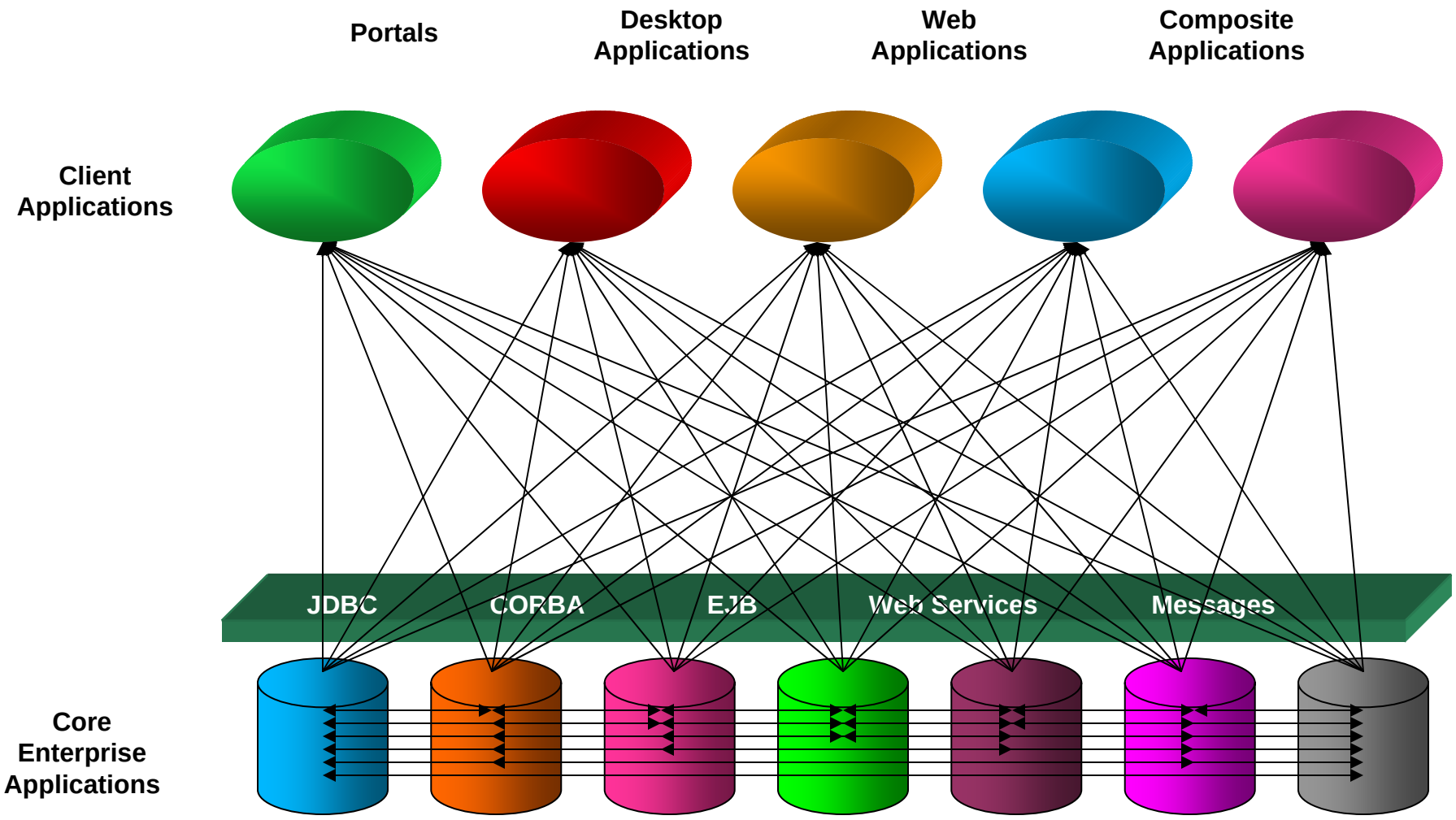
Enterprise Integration Challenges

- Communication
- Connectivity
- Transformation
- Service-Oriented Architecture
- Portability
- Security

Examples of Applicable Standards

- Communication: Messaging / JMS
- Connectivity: Web Services: XML, SOAP, WSDL, UDDI
- Transformation: XSLT, Xquery
- Service-Oriented Architecture (SOA): based of the above standards; loosely-coupled
- Portability: Java, HTTP, XML, SOAP on Windows, Unix, mainframes
- Security: SSL, certificates, signatures, SAML plus all of the WS-* security standards

Point-to-Point Integrations



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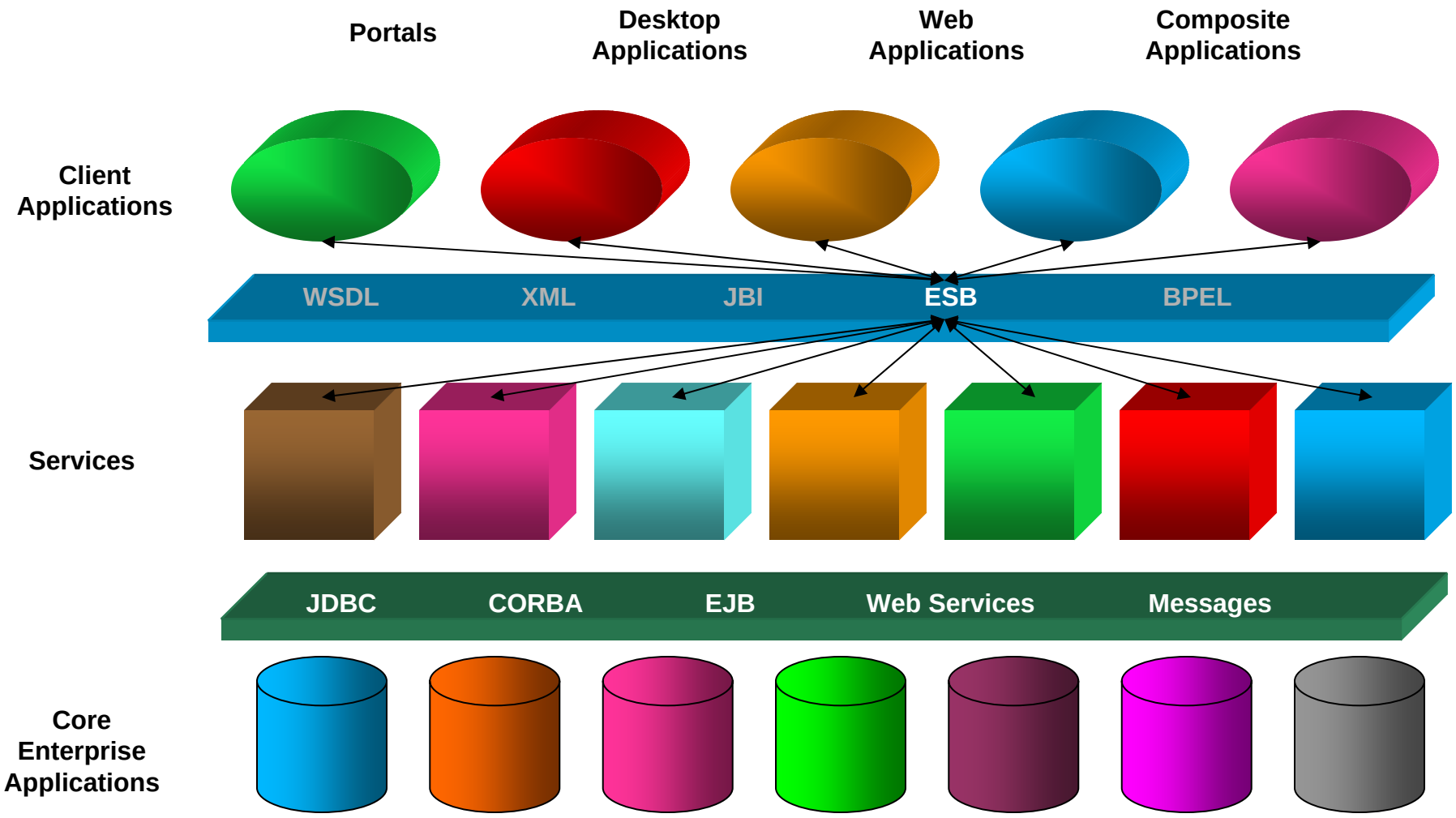
Service Oriented Architecture



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Enterprise Service Bus

- Not necessarily a message bus
- Evolved from MOM, Integration Brokers, Application Servers, XML, JMS, E-Commerce, and Web Services
- ESB provides the backbone for building an enterprise SOA-based integration environment
- ESB is not just an abstract pattern. It is a product category with a distinct definition and many vendor offerings.

New Java-Specific Standards

- EJB 3.0
- JBI (JSR 208)
- BPELJ
- JDBC 4.0

EJB 3.0

- Simplifies the EJB programming model
- Eliminates the requirements for Home, Remote interfaces and deployment descriptor
- Allow transaction demarkation with annotations
- Remove the requirement to implement boilerplate methods (ejbCreate(), ejbActicate(), ejbRemove(), ...)
- Continue support for 2.1 and older

JBI (JSR 208)

- Java Business Integration
- Standardizes the Enterprise Application Integration APIs
- Prevents vendor lock-in with EAI and B2B applications
- Helps with building SOAs
- Too new to know its potential for success, but it has gained traction

JDBC 4.0

- 4.0 is labeled as an “Ease of Development” release
- Can use Generics and Annotations
- SQL 2003-compliant XML data type
- Connection.isValid()
- Connection and Statement pooling now a part of the standard
- Specific SQL exceptions: transient and non-transient (transient might succeed if retried)
  - Non-transient: SQLSyntaxErrorException, SQLInvalidAuthorizationSpecException, SQLIntegrityConstraintViolationException, SQLDataException, SQLNonTransientConnectionException
  - Transient:SQLTimeoutException, SQLTransactionRollbackException, SQLTransientConnectionException

Java Tools

- Java 5 needed for all standards that require annotations
- EJBs are much simpler to write:

```
import javax.ejb.*;

/**
* A stateless session bean requesting that a remote business
* interface be generated for it.
*/
@Stateless
@Remote
public class HelloWorldBean {
   public String sayHello() {
      return "Hello World!!!";
   }
}
```

For more information, read this article: http://www.javaworld.com/javaworld/jw-08-2004/jw-0809-ejb_p.html

JBI

- Reference Implementation: JBI SDK 1.0
  - **SunSequencingEngine**
    SunSequencngEngine works by accepting an input message and sequentially invoking a series of services. The list of services is described in an XML syntax created by an external tool and deployed to the engine. When the engine receives a service request, it locates the service list corresponding to the service and executes each service in the service list.
  - **SunTransformationEngine**
    SunTransformationEngine allows transformation of an XML document input in one format to another format. The transformation is based on a specified style sheet.
  - **SunSOAPBinding**
    SunSOAPBinding allows external web services to invoke services in the JBI environment and vice versa. An external web service is likely to use a different message format and/or network protocol from an internal one. These service interactions are made possible via SOAP bindings and WSDL files.
  - **SunFileBinding**
    SunFileBinding allows services to communicate with the local file system in which JBI SDK 1.0 is installed.

JBI Implementations

- JBI implementations are ESBs
- Commercial ESB implementations have been slow to implement JBI
- Open source JBI implementations exist today:
  - Open-ESB is available from java.net: http://open-esb.dev.java.net/
  - Iona started Celtix: http://celtix.objectweb.org/
  - LogicBlaze started ServiceMix: http://servicemix.org/Home
  - Mule: http://mule.codehaus.org/

Java Tools

- Apache Axis provides a rudimentary WS toolkit
- Sun has JAX-RPC
- The University of Colorado has designed and is implementing an SOA
  - Based on WSDL standard
  - Using Glue from webMethods (now replaced with the next generation product called Fabric)
  - Glue simplifies WS programming greatly:
    - no SOAP, WSDL, or XML
    - POJO to WSDL and WSDL to POJO conversions
    - Includes a SOAP server

Java Tools

- University of Illinois developed OpenEAI.
- It is an ESB that facilitates implementing SOA.
- Focuses on documenting interfaces and information exchange among enterprise applications.
- Key differentiator: individual enterprise applications only integrate with the ESB, not with each other.
- Currently JMS-based, but adding WS interface for a future release.
- There is a commercial company offering support (not Unicon). ☺
- Messaging protocol and message format in XML. Examples:
  - Person
    - Query
    - Create
    - Generate
    - Delete
    - Update
  - Course
    - Query
    - Create
    - Generate
    - Delete
    - Update

Enterprise Integration Summary

- Enterprise integration is not synonymous with Web application integration
- Service-Oriented Architectures (SOA)
  - Usually Web Services
  - Easily Accessible
  - Interface Definitions
  - Discoverable
- SOA can be implemented ad-hoc (ala University of Colorado) or using an ESB product like OpenEAI (ala University of Illinois)
- Standards should make enterprise integration easier
- There are too many standards to choose from

Conclusions and Recommendations

- The first priority should be to access enterprise data from the authoritative data source rather than from a replica. This does not mean directly reading from that data source, but rather through an ESB.
- Integration platform should be independent of the ERP platform vendor.
- Only platform-independent, standards-based, and vendor-agnostic solutions should be considered.
- While an EJB-based SOA is still an SOA, it is too difficult to access from .NET or other non-Java applications.
- Web services based on SOAP and WSDL are proven while JBI, for example, is not.
- Message-based ESB may be OK, but there should be a WS interface to it, too.