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Java™ - The Platform

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Agenda

- **The e-Economy**
- **Java - The Platform**
  - Java 2 Platform Enterprise Edition (J2EE)
  - XML and Java
- **Example**
- **Status and Roadmap**
- **Resources, Conclusions and Q&A**

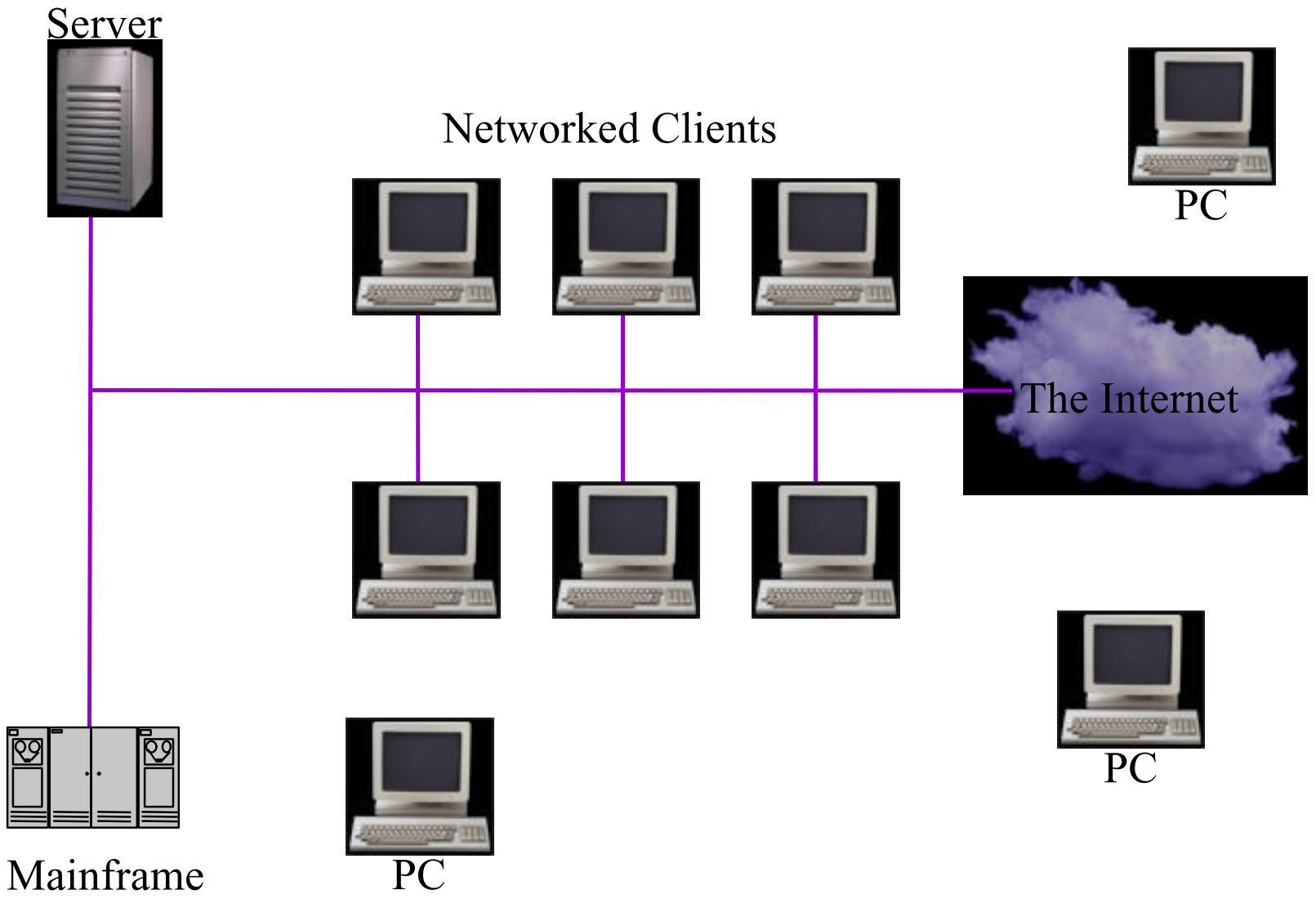
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The E-economy

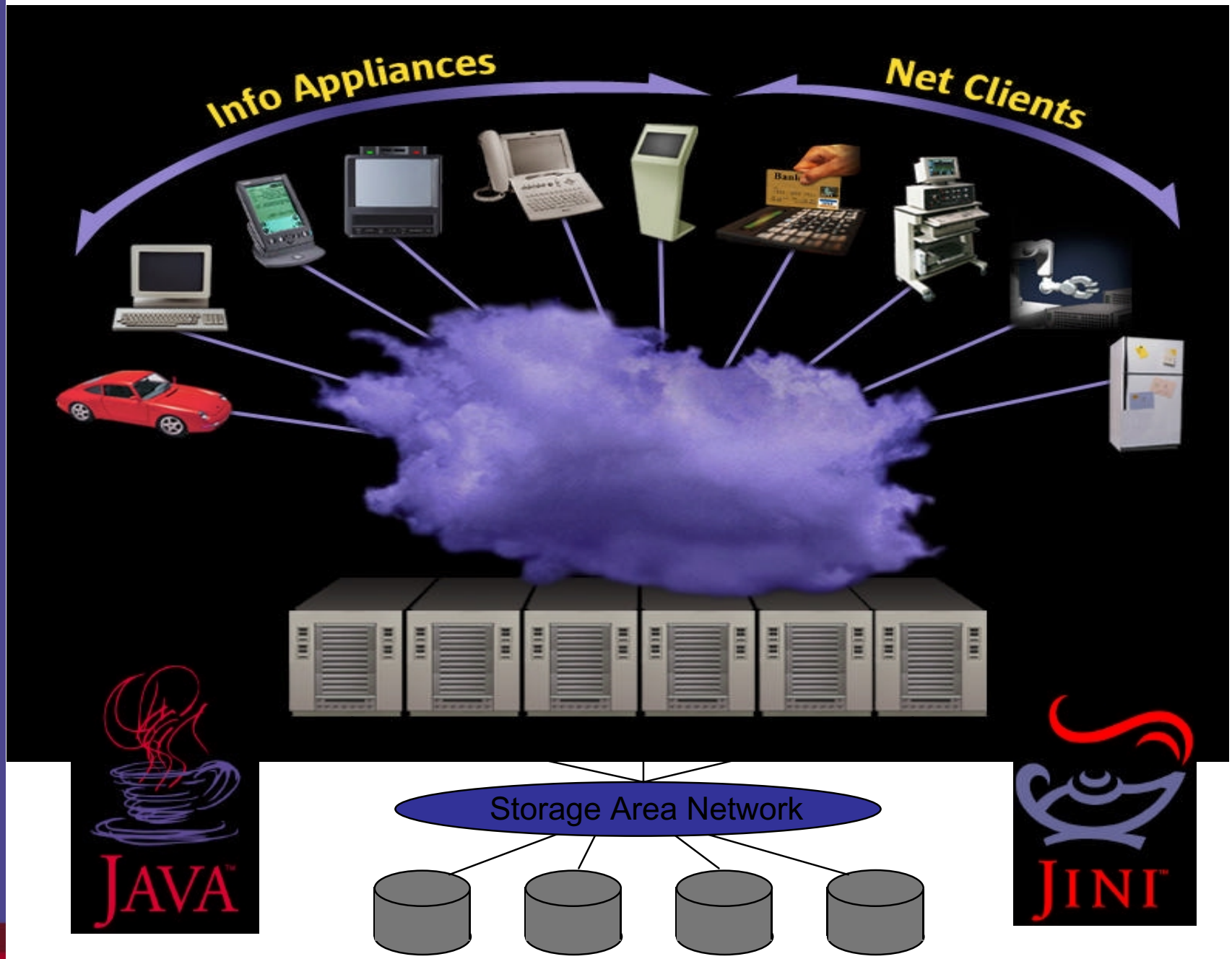
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1995 - It's the 'Net



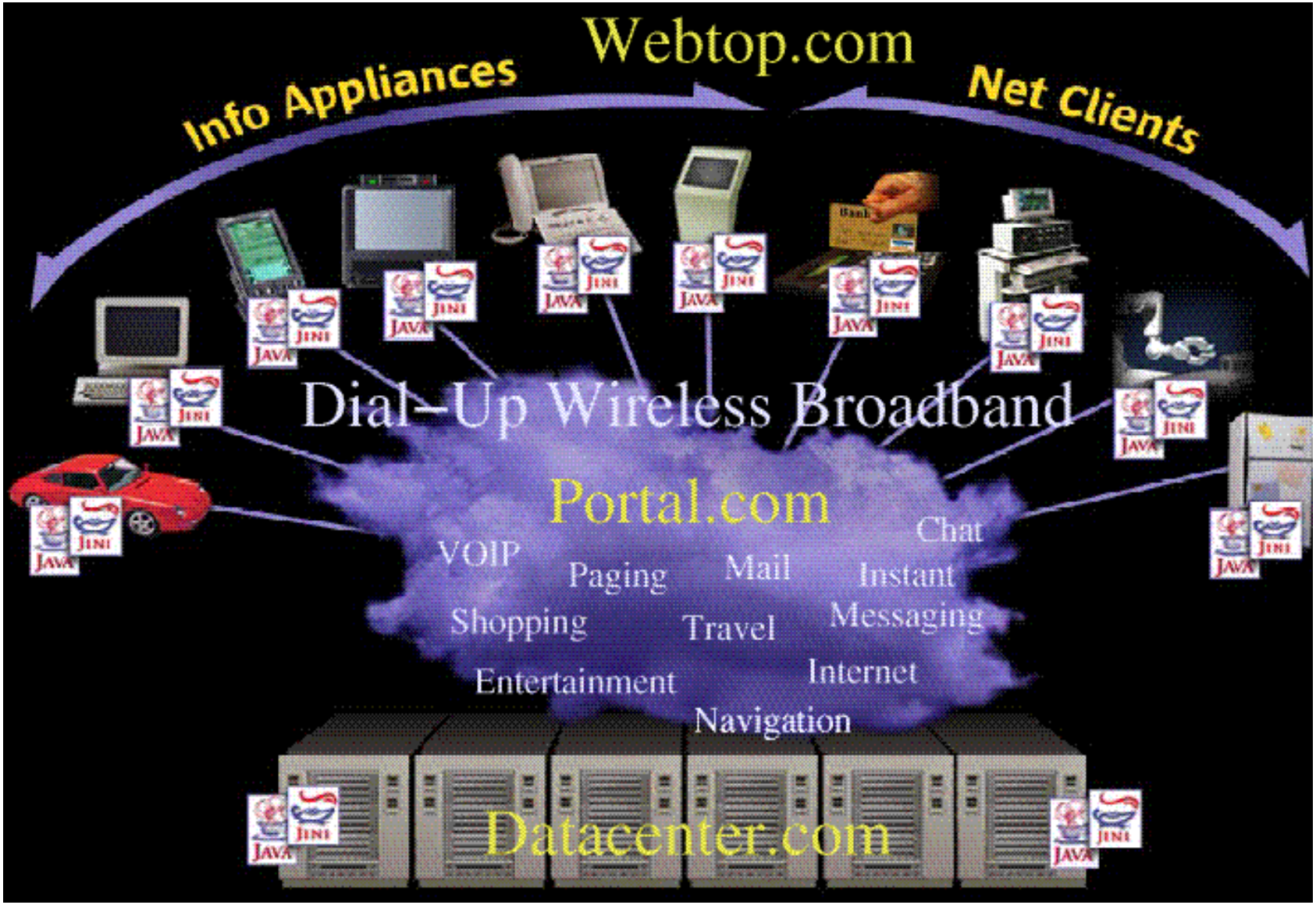
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Emerging Technologies



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2000 - It’s Services!



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Problems with Enterprise Applications Today

- Long implementation time scale
- Large up-front financial commitment
- Require high level of in-house technical expertise
- Lock-in to set business operations and workflow
- Lock-in to existing infrastructure, technologies, and applications

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Emerging Rules for E-economy(1)

- **Integration around services, not APIs**
  - Business processes can be defined as data exchanges (using XML)
  - Integration is driven by workflow (how services work together…)
  - Modeling will increase in importance

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Emerging Rules for E-economy(2)

- **Web applications are assembled…**
  - Assembled by teams of logic builders, page designers, domain experts, and deployment specialists
  - Business logic should be distributed and needs to be reusable (Enterprise JavaBeans™ technology)
  - Access to legacy/heterogeneous infrastructure is a requirement (MQ Series, CORBA, COM+)

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Emerging Rules for E-economy(3)

- **Services are delivered via the Web**
  - Presentation logic is through a flavor of markup languages/scripting languages (HTML/Java/JavaScript/XML)
  - Personalization becomes an attribute of service delivery
  - Managed caches cover latency and disconnection (need to allow for mobility)
  - Types of client devices continue to explode in both functionality and complexity

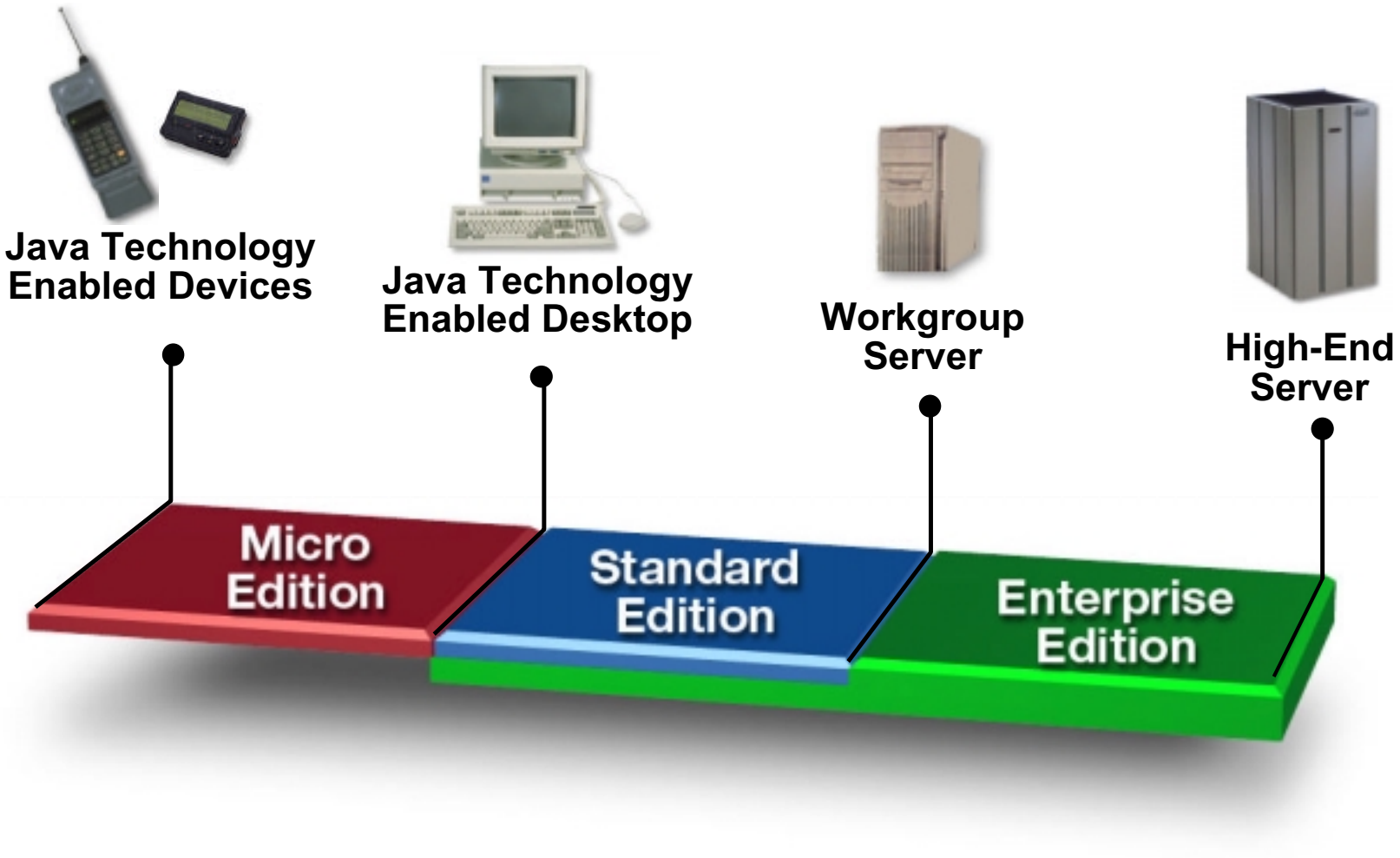
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Java - The Platform

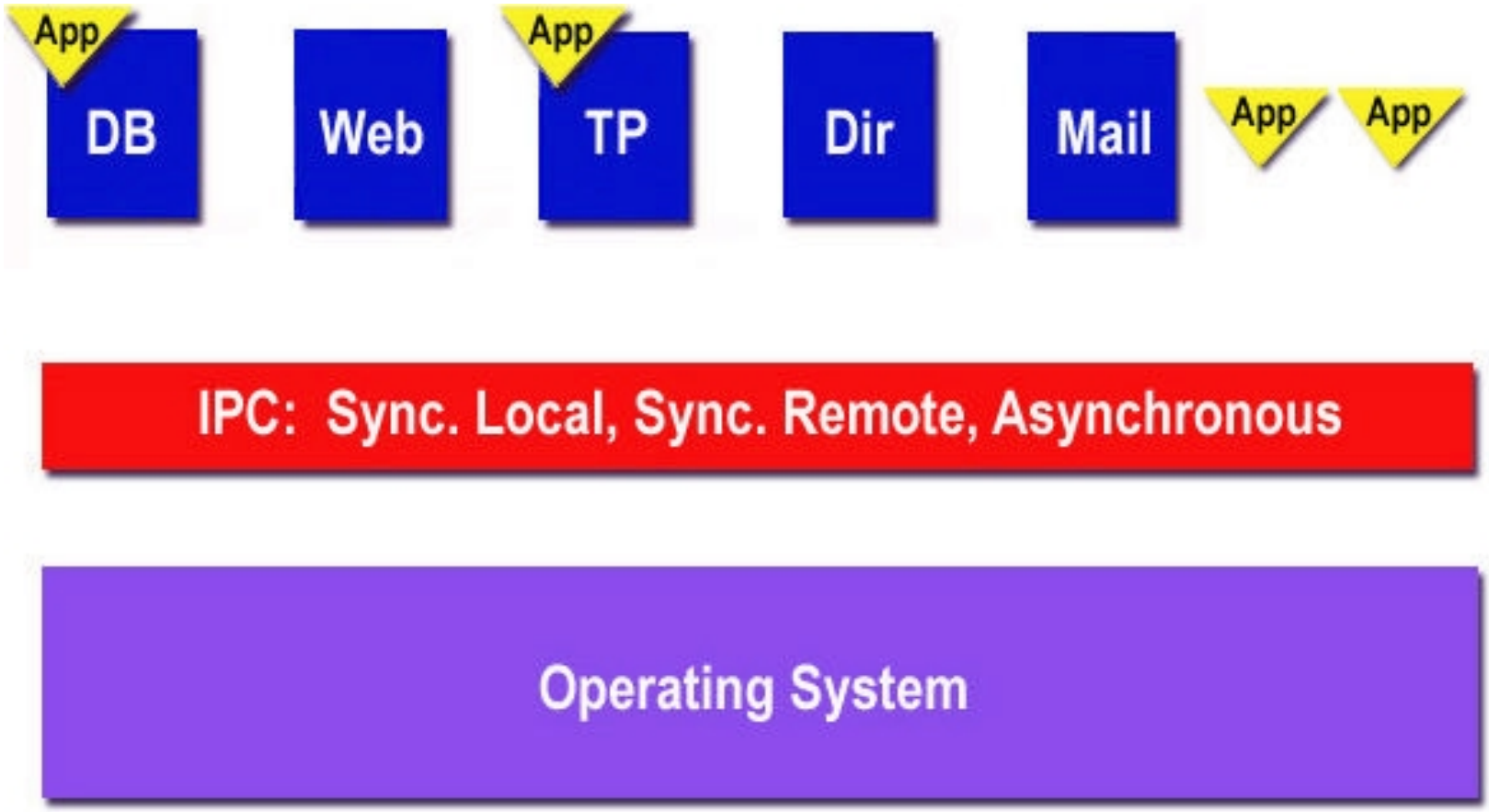


Java 2 Platform



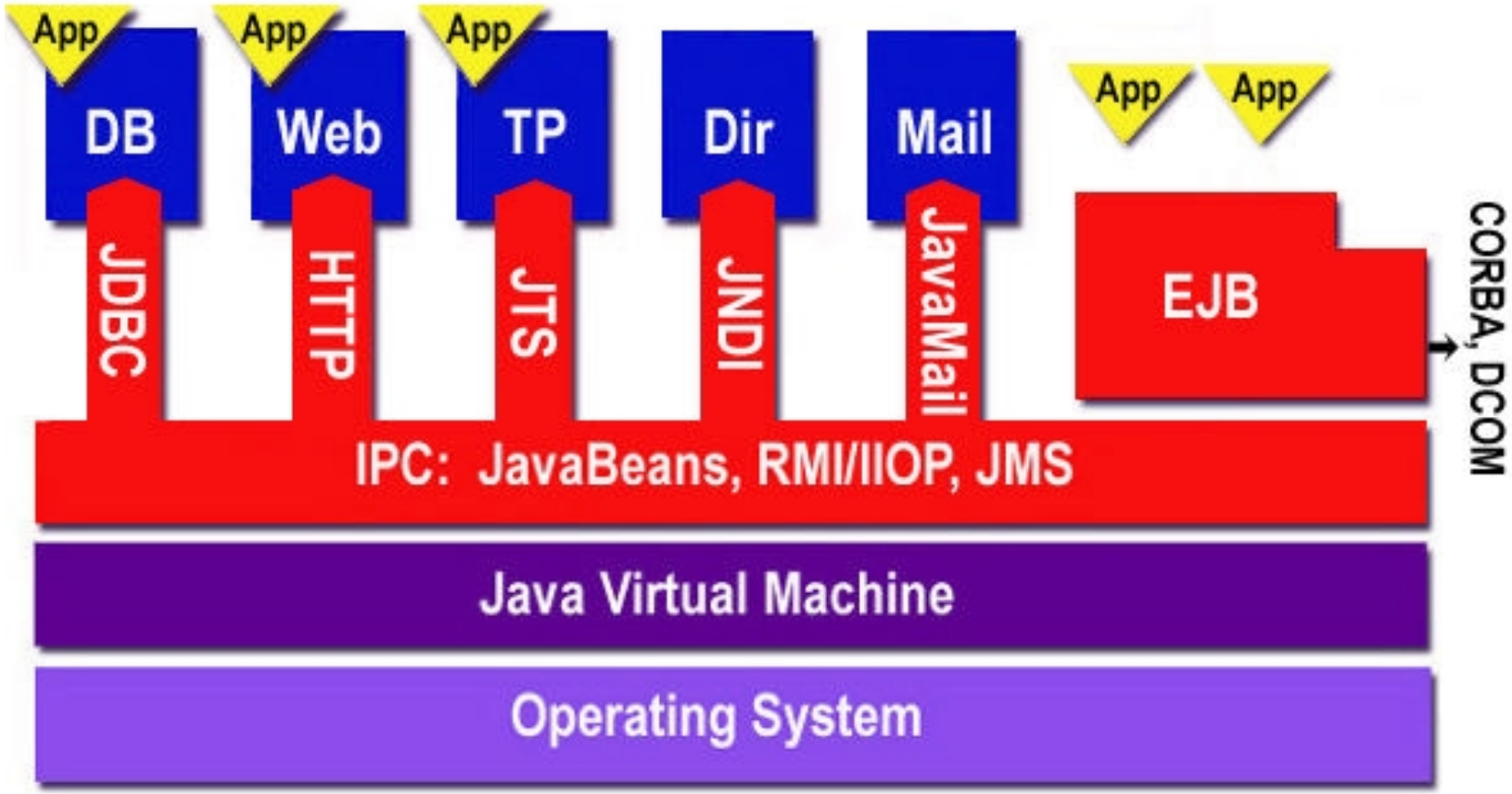
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Traditional Middleware



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Java In The Middle



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What Is the Java™ 2 Platform, Enterprise Edition?

- Java™ 2 Platform Enterprise Edition *enables* solutions for developing, deploying and managing n-tier *server-centric* enterprise applications

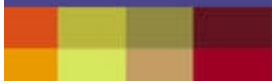
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What comprises J2EE?

- Specification
- Sun BluePrints for J2EE
- Reference Implementation
- Compatibility Test Suites

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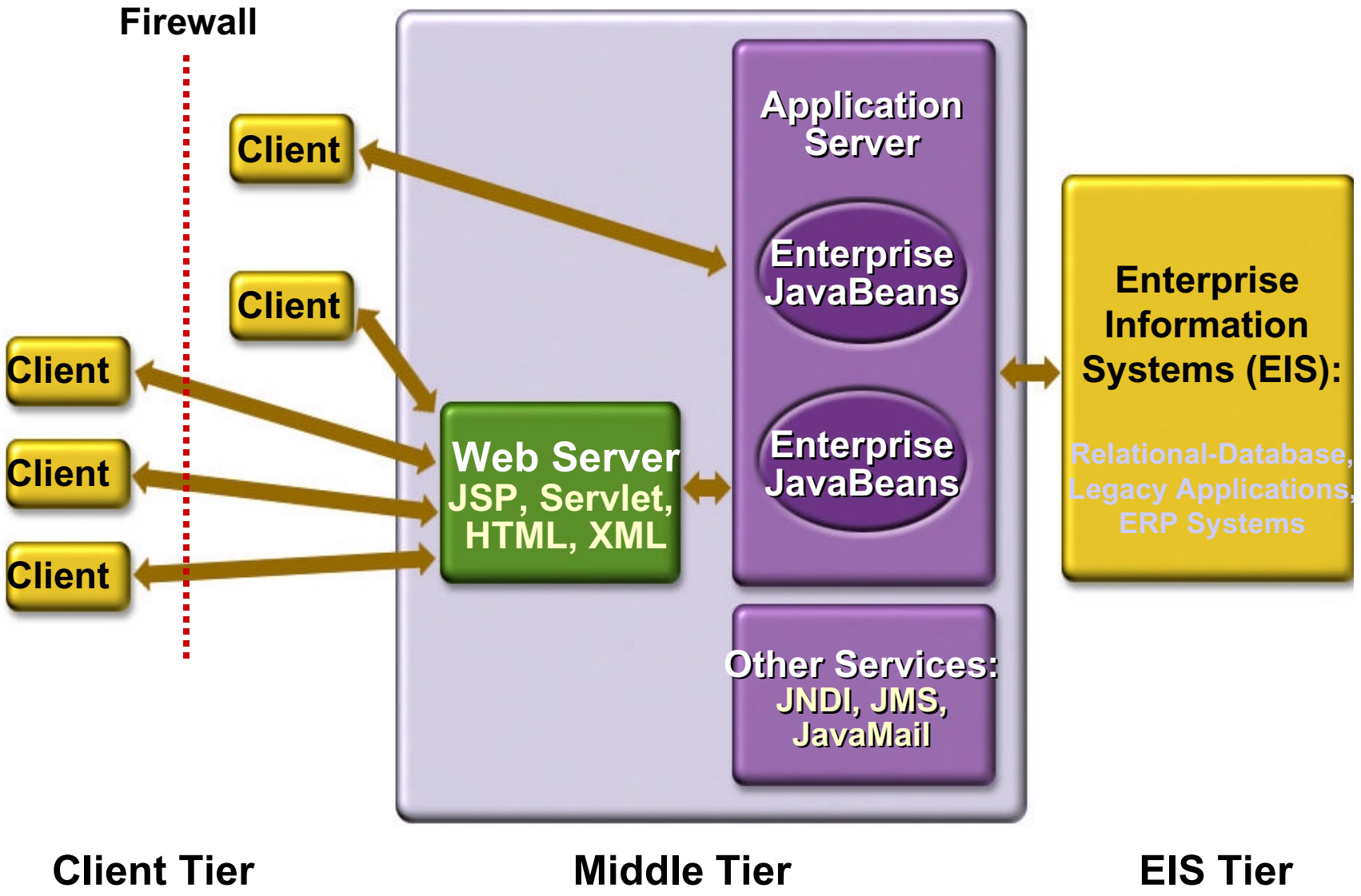


J2EE APIs

API	*Name*	*Version*
J2SE	Java 2 Standard Edition	1.2
JSP	JavaServer Pages™	1.1 (draft)
Servlets	Servlet API	2.2 (draft)
RMI/IIOP	RMI over IIOP	1.0
EJB	Enterprise JavaBeans	1.1 (draft)
JNDI	Java Naming and Directory Interface™	1.2
JTA	Java Transaction API	1.0
JDBC™	Java Database Connectivity	2.0
JMS	Java Messaging Services	1.0
JavaMail	JavaMail™ API	1.1
JAF	JavaBeans Activation Framework	1.0

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The J2EE Environment Enabling End-to-end Solutions



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J2EE Containers

- **Containers do their work invisibly**
  - No complicated APIs
  - They control by interposition
- **Containers implement J2EE**
  - Look the same to components
  - Have great freedom to innovate

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Containers and Components

Containers Handle

- Concurrency
- Consistency
- Security
- Availability
- Scalability
- Administration
- Integration
- Distribution

Components Handle

- Presentation
- Business Logic
- Data Access(optional)

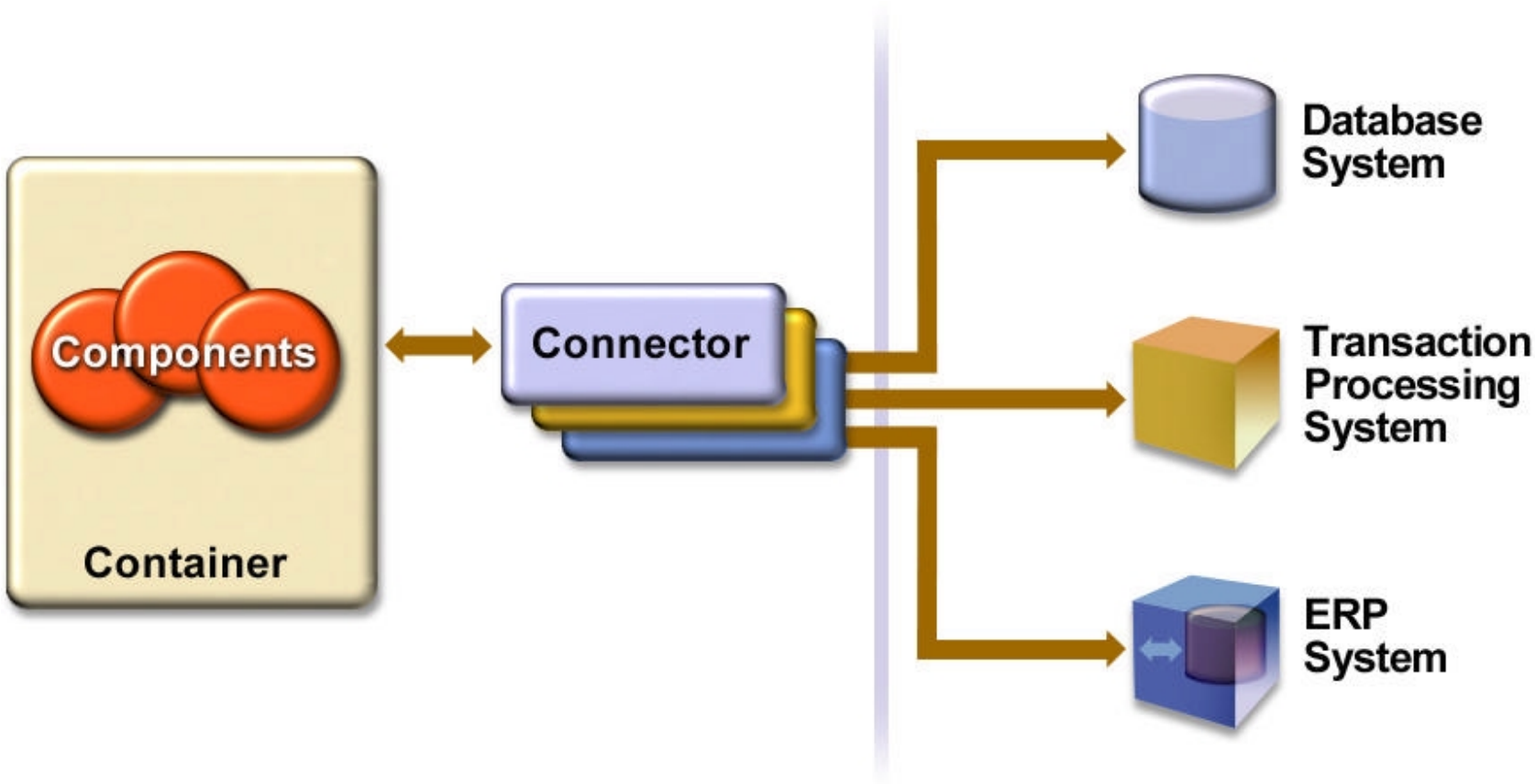
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What Are Connectors?

- **Standard architecture for integration with Enterprise Information Systems**
  - ERP systems
  - Mainframe transaction processing systems
  - Database systems
- **Replaces specialized containers in EJB 1.0**

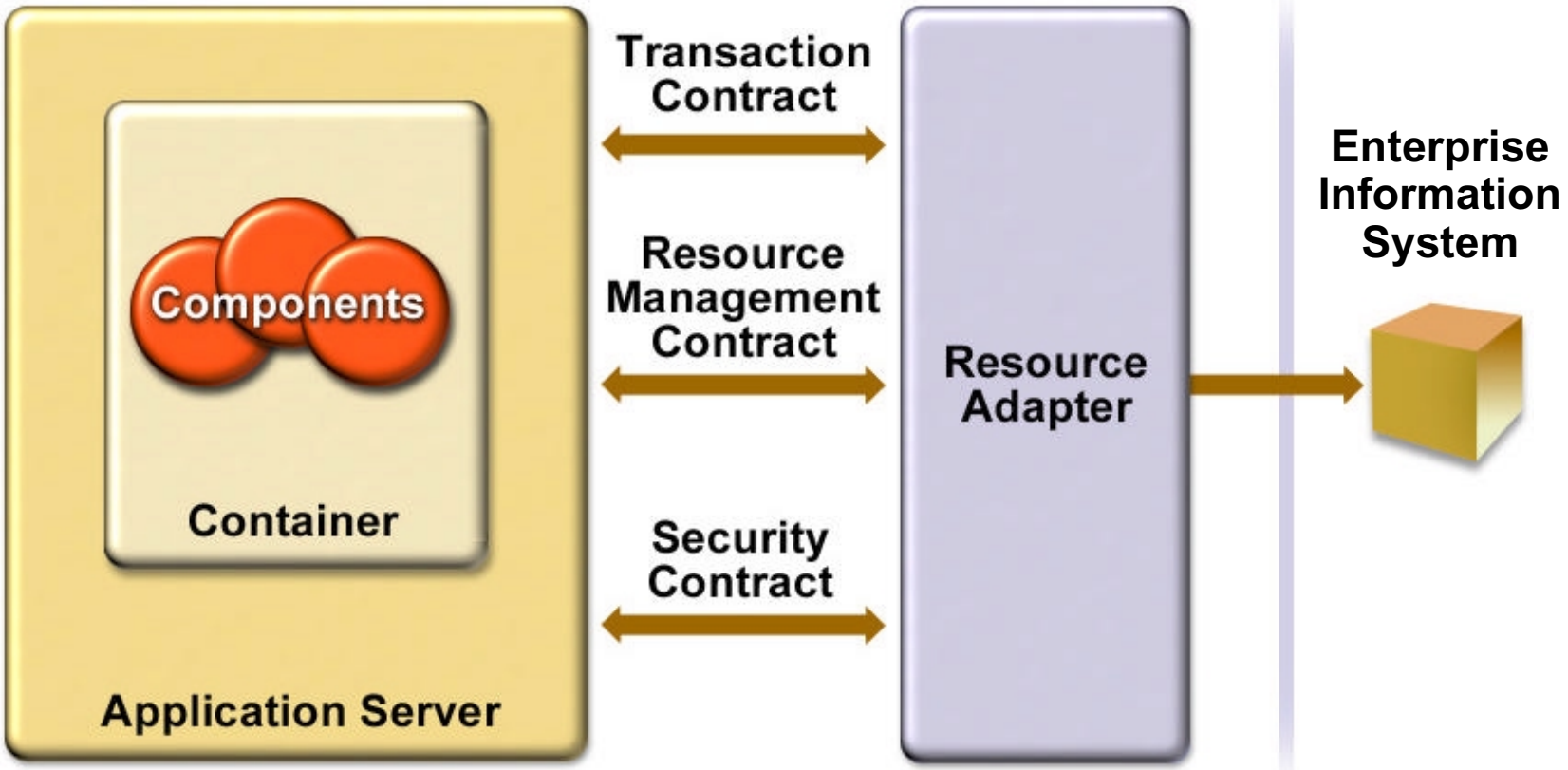
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Connector Overview



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Connector Architecture



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Broad Industry Adoption

- BEA/Weblogic
- Bluestone
- Bull
- Forte
- Fujitsu
- Gemstone
- Haht Software
- IBM
- Information Builders
- Informix
- Inline
- Inprise
- Iona
- Luna
- NetBeans
- NetDynamics
- Netscape
- Novasoft
- Novell
- Novera
- ObjectShare
- Oracle
- Persistence
- Progress
- SCT
- Secant
- Siemens
- SilverStream
- Sun Microsystems
- Sybase
- Symantec
- Tendril
- TradeeX
- Valto
- Versant
- Vision

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Enterprise Deployment

- Air Canada
- Celera Genomics
- Countrywide
- Covad Communications
- Electric Boat
- FAA
- FedEx
- GE Aircraft Engines
- GTE
- Impresse Corporation
- Instinet (Retuers)
- NationsBank
- Qwest Telecommunications
- Raytheon
- Rorke Data
- Scottish Equitable
- Sparks.com
- Trip.com
- University of Ottawa Heart Institute
- Visa International

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XML and Java



What Is XML?

- eXtensible Markup metaLanguage
- Universal Data description mechanism

Language	*Description*	*Pros*	*cons*
SGML	Language for describing documents	Complete and extensible	Complex
HTML	HyperText Markup Language	Simple	Focus on rendering; Not Extensible
XML	eXtensible Markup metaLanguage	Simple, extensible	Need other technologies in conjunction

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XML and the Java™ Platform

- **XML provides a universal syntax**
  - But what about behavior (semantics)?

```
<transmogrify>
This text has semantics associated with it,
but how do we discover the semantics in a
portable fashion?
</transmogrify>
```

- **Both are Web-friendly, open, vendor neutral, Unicode support**
- **Complementary technologies**
  - Portable reusable data; Portable behavior

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XML Applications

- **Message-Oriented Middleware (MOM)**
  - E-Commerce/EDI
  - Enterprise Application Integration
- **Presentation-Oriented Publishing(POP)**
  - Web “Compound” Documents
    - General and domain specific
  - Dynamic publishing
- **Structured Information Management and Retrieval**

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What is Needed?

- **XML Optional Packages:**
  - Phase 1 (basic plumbing)
    - Ability to parse XML:
      - Parser(s)
      - SAX (1 or 2)
      - DOM (level 1 or level 2)
    - Namespaces:
      - Support in parser(s)
  - Phase 2 (data binding)
    - Ability to easily manipulate XML data

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JAXP: Java API for XML Processing

- **Allows for Pluggable XML Parsers**
- **Thin & Lightweight**
- **Allows users to process XML in both of the predominant methods:**
  - Event Driven (SAX)
  - Tree Based (DOM)

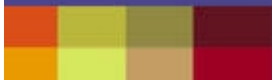
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XML Data Binding

- XML = Portable data
- XML … Data without meaning
- Schemas add meaning to XML
- Working with XML in programs
- XML Data Binding makes XML easy to use

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Working with XML in Programs

How to write `unmarshal`? Use SAX!

```
private static ShoeOrder newOrder = null;

static class DocHandler implements DocumentHandler {

  public void setDocumentLocator(Locator l) { }
  public void startDocument() { }
  public void endDocument() { }
  public void ignorableWhitespace(char[] cbuf, int offset, int len) { }
  public void processingInstruction(String target, String data) { }

  ShoeOrder so = null;
  String cur = null;

  public void startElement(String name, AttributeList al) {
    if (name.equals("ShoeOrder")) {
      so = new ShoeOrder();
      for (int i = 0, n = al.getLength(); i < n; i++) {
               String an = al.getName(i);
               if (an.equals("id")) {
                 so.setId(al.getValue(i));
               } else if (an.equals("style")) {
                 so.setStyle(al.getValue(i));
               } else {
                 throw new RuntimeException("Unknown attribute: "
                                            + an);
               }
      }
    } else {
      cur = name;
    }
  }

  public void characters(char[] cbuf, int offset, int len) {
    if (cur == null) return;
    String val = new String(cbuf, offset, len);
    if (cur.equals("color")) {
      so.setColor(val);
    } else if (cur.equals("size")) {
      so.setSize(Integer.parseInt(val));
    } else if (cur.equals("width")) {
      so.setWidth(val);
    } else {
      throw new RuntimeException("Unknown element: " + cur);
    }
  }

  public void endElement(String name) {
    if (name.equals("ShoeOrder")) {
      newOrder = so;
    } else {
      cur = null;
    }
  }

}

public static ShoeOrder unmarshal(InputStream in)
        throws SAXException
{
    InputSource is = new InputSource(in);
    Parser p = ParserFactory.makeParser();
    p.setDocumentHandler(new DocHandler());
    p.parse(is);
    return newOrder;
}
```

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Working with XML in Programs

How to write `unmarshal`? ~~Use SAX!~~ Use DOM!

```
public static ShoeOrder unmarshal(InputStream in)
    throws IOException, SAXException
{
    XmlDocument xd = XmlDocument.createXmlDocument(in, false);
    Element r = xd.getDocumentElement();
    ShoeOrder so = new ShoeOrder();
    so.setId(r.getAttribute("id"));
    so.setStyle(r.getAttribute("style"));
    for (Node n = r.getFirstChild(); n != null; n = n.getNextSibling()) {
        if (n instanceof Element) {
            Element e = (Element)n;
            String tn = e.getTagName();
            if (tn.equals("color")) {
                String val = ((CharacterData)e.getFirstChild()).getData();
                so.setColor(val);
            } else if (tn.equals("size")) {
                String val = ((CharacterData)e.getFirstChild()).getData();
                so.setSize(Integer.parseInt(val));
            } else if (tn.equals("width")) {
                String val = ((CharacterData)e.getFirstChild()).getData();
                so.setWidth(val);
            } else {
                throw new RuntimeException("Unknown element: " + tn);
            }
        }
    }
    return so;
}
```

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Working with XML in Programs

How to write `unmarshal`?

~~Use SAX!~~

~~Use DOM!~~

Problems with these approaches

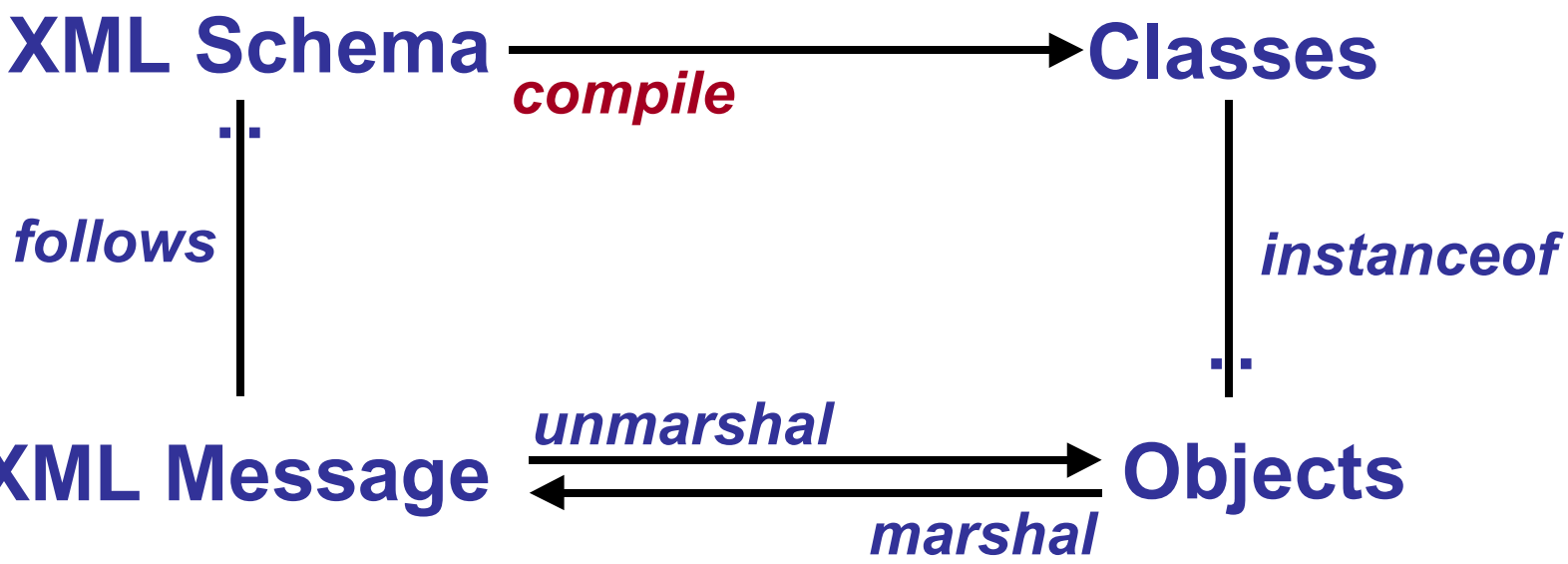
- **Need to write code**
- **maintain code as schemas evolve**

can do better…

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Binding XML to Programs

Binding compiles schemas into classes



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Binding XML to Programs

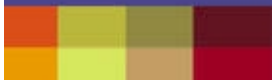
How to write **unmarshal**? ~~Use SAX!~~

~~Use DOM!~~

You don't!

```
public void acceptOrder(InputStream in) {
    ShoeOrder so = ShoeOrder.unmarshal(in);
    WarehouseDB.submit(so);
}
```

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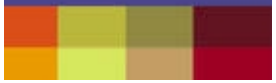




Project Adelard: XML Data Binding for the Java Platform

- **What**
  - Marshalling/unmarshalling framework
  - XML schema compiler
- **How**
  - Java℠ Community Process

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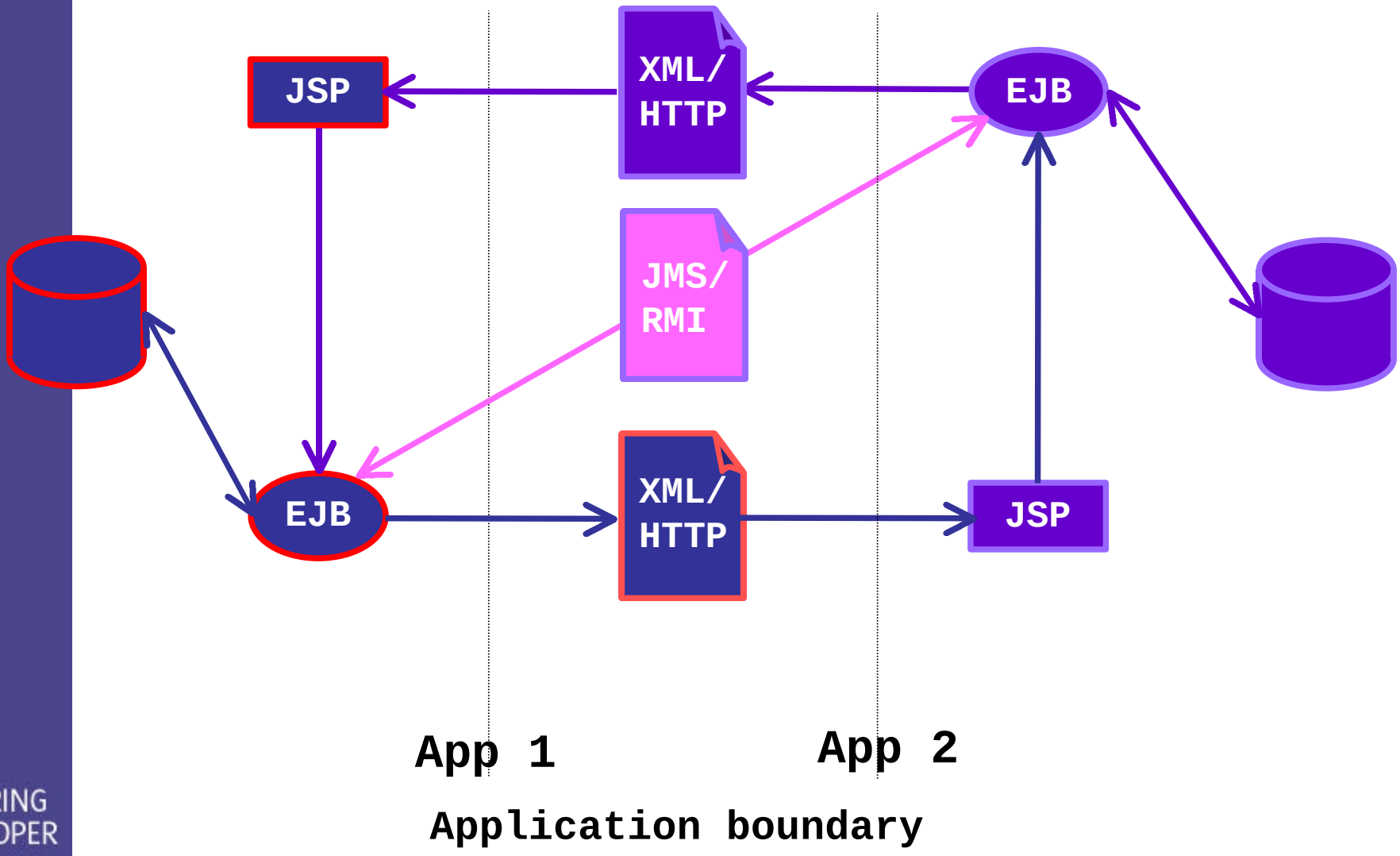


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Status, Roadmap, Resources and Conclusions



J2EE Web App Model



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J2EE Status and Roadmap

	Current Status	*Beta/ Draft*	*Final*
J2EE specification	Final	June 1999	Dec. 1999
Sun BluePrints – J2EE	Public Review	Aug. 1999	Dec. 1999
Compatibility Test Suites	Final	Sep. 1999	Dec. 1999
Reference Implementation	Final	Sep. 1999	Dec. 1999

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EJB Status and Roadmap

EJB Release	*Current Status*	*Final*	*Comments*
1.0	Released	Mar. 1998	
1.1	Final	Dec. 1999	Mandatory support for Entity Beans. Improvements, clarifications, etc.
2.0	Planning	2000	JMS Integration, Inheritance, Persistence, Interoperability Relationships Extensibility

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XML Data Binding: Project Adelard

- **Roadmap**
  - November 1999 — Expert group formed
  - January 2000 — First draft specification
  - June 2000 — First public review & early-access release

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J2EE Resources

- **For further information:**

  http://java.sun.com/j2ee
  http://java.sun.com/products/ejb
  http://java.sun.com/products/jdbc
  http://java.sun.com/products/jms
  http://java.sun.com/products/jsp
  http://java.sun.com/products/servlet
  http://java.sun.com/products/jndi
  http://java.sun.com/xml
  http://java.sun.com/products/xml
  http://java.sun.com/products/javamail

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XML Resources

- **Websites**
  `http://java.sun.com/xml`
  `http://www.xml.org`
  `http://www.w3c.org/xml`
  `http://www.oasis-open.org/cover`
- **Java Community Process**
  `http://java.sun.com/jcp`
- **XML feedback**
  `xml-feedback@java.sun.com`

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XML Resources (cont'd)

- **Mailing Lists**

```
xml-announce@java.sun.com
xml-interest@java.sun.com
xml-feedback@java.sun.com
```

- **Organizations**

```
http://www.xml.org
http://www.biztalk.org
http://www.rosettanet.org
http://www.aicpa.org
http://www.openapplications.org
```

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Java Futures Resources

- **Java Community Process**
  `http://java.sun.com/jcp`

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Conclusions

- Server-side portable standard for developing component-based N-tier applications
- Greatly enhances developer productivity
- XML enables loosely coupled web information interchange
- XML+java+http = Universal portability
- Wide industry support

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