Java Vs .NET

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About Speaker

- Raj Laad (raj.laad@pristineinfotech.com)
- CTO of Pristine Infotech
  - Business solutions to mobile workforce - business intelligence at your fingertips
- Owner of GURU Technology
  - Consulting to medium-large organizations across industries
- Technologies
  - Products, Web Applications, SOA/Web Services
  - Enterprise Systems
  - Business Analysis , Data Warehousing
  - C#, ASP.NET, ADO.NET, C++, COM, XML
  - Java, J2EE/EJB, JSP, JMS
  - Mobile Computing

Agenda

- History
- Architecture and Technologies
- Security and Versioning
- Development and Deployment Environments
- Interoperability
- Conclusion
- Code Samples
- Q & A

Java History

- Sun Microsystems began development early 1990s
- Intended for smart devices - PDAs, Set Tops
- Response to C++ Issues/Limitations
  - Lack of garbage collection
  - Too big for embedded software
  - No portable services for security, distributed programming, threading, etc.
  - Wanted portable platform – easy to port to all types of devices
- James Gosling came up with Java
- Java and Java platform first released in 1995
- Popularity grew with the rise of internet

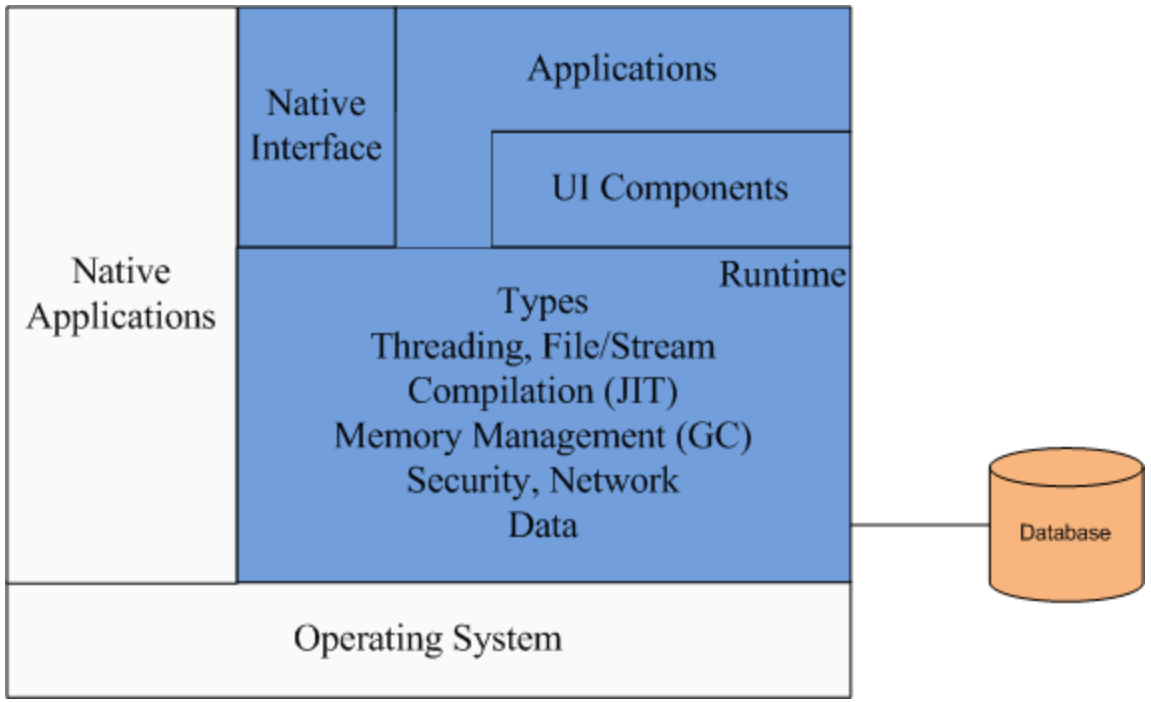
.NET History

- Developed by Microsoft in late 1990s
- Needed unified solution to common programming problems
  - Memory management
  - Security
  - User interface
  - Data access
  - Exception handling
  - Common type system (VB, C#, C++)
  - Solve DLL hell
- Move away from COM problems
- And answer to Java

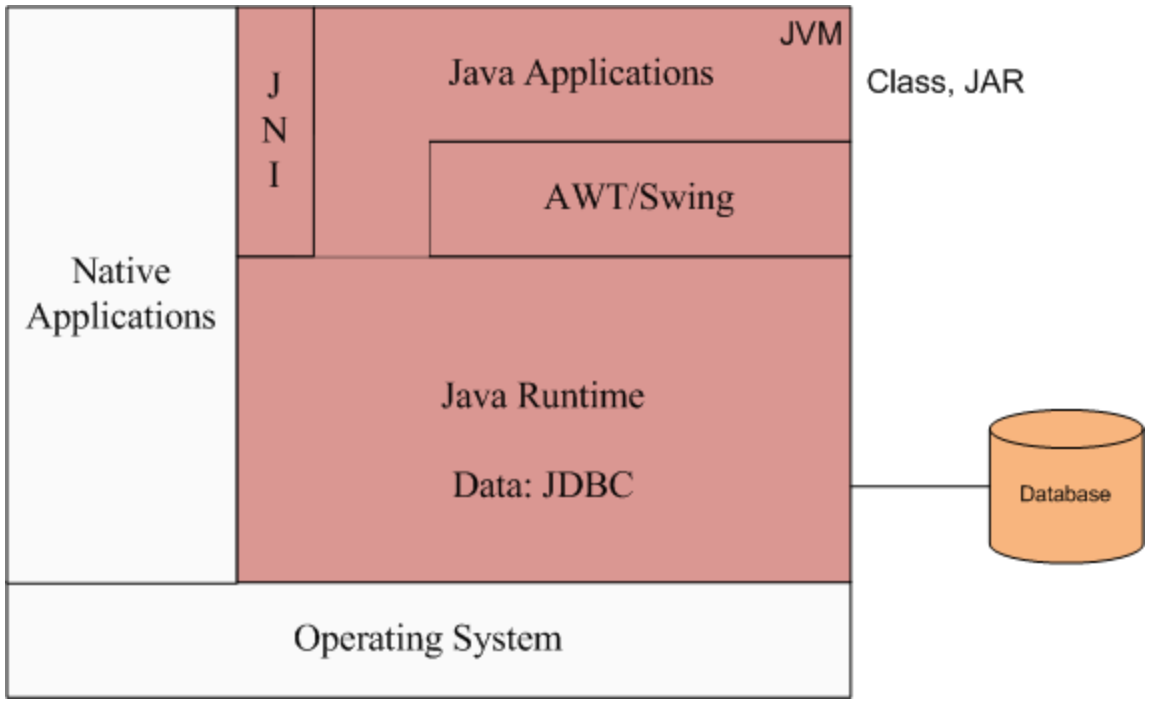
Language Feature Differences

- Indexer
- Operator overloading
- Namespaces
- Class & files different, partial classes

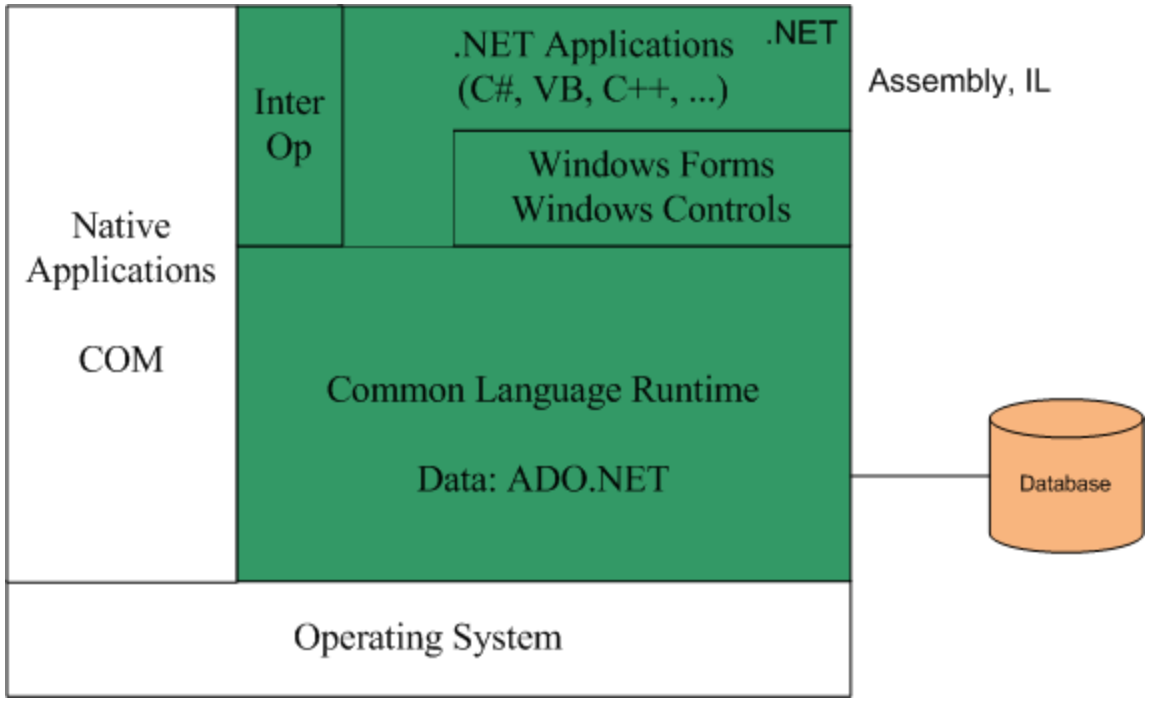
Standalone Applications



Standalone Applications



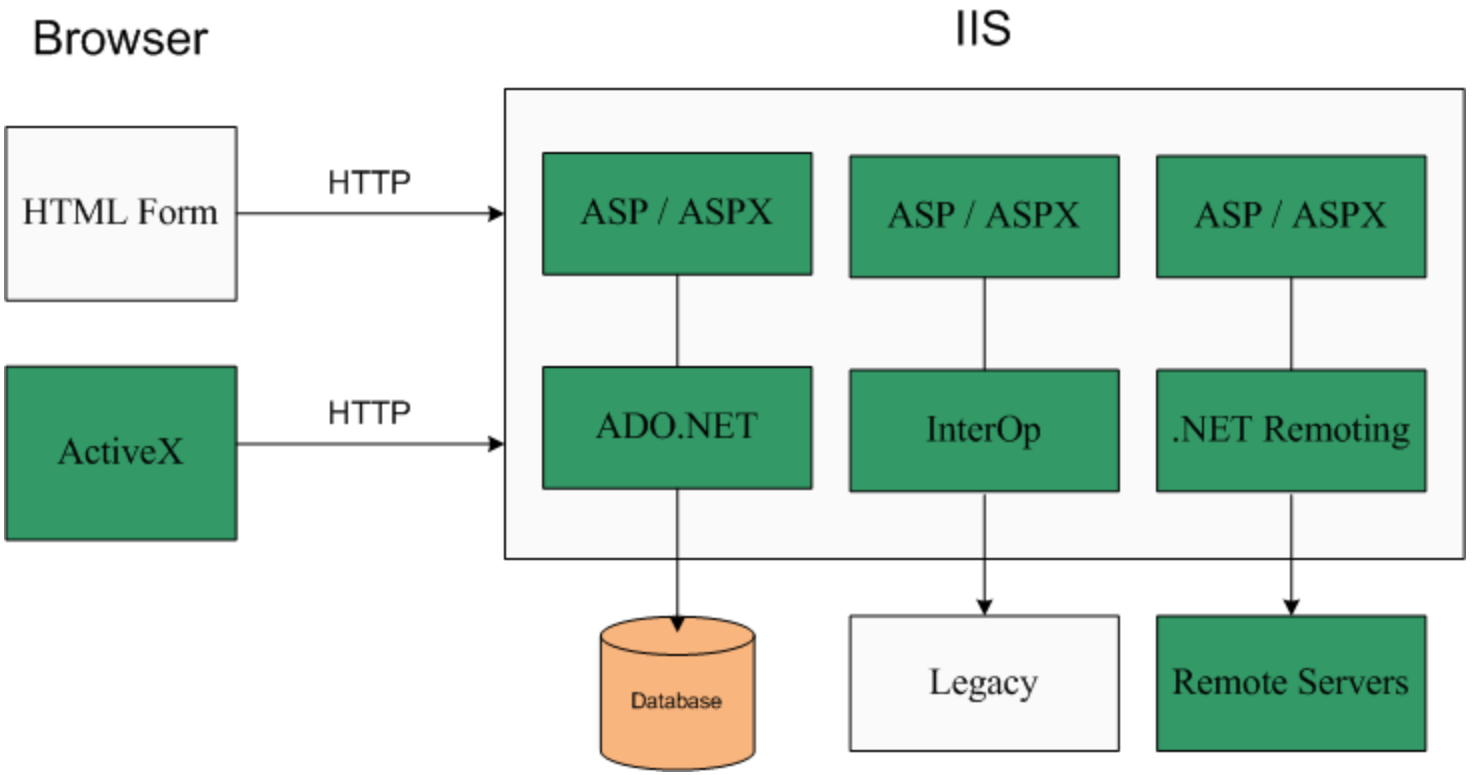
Standalone Applications



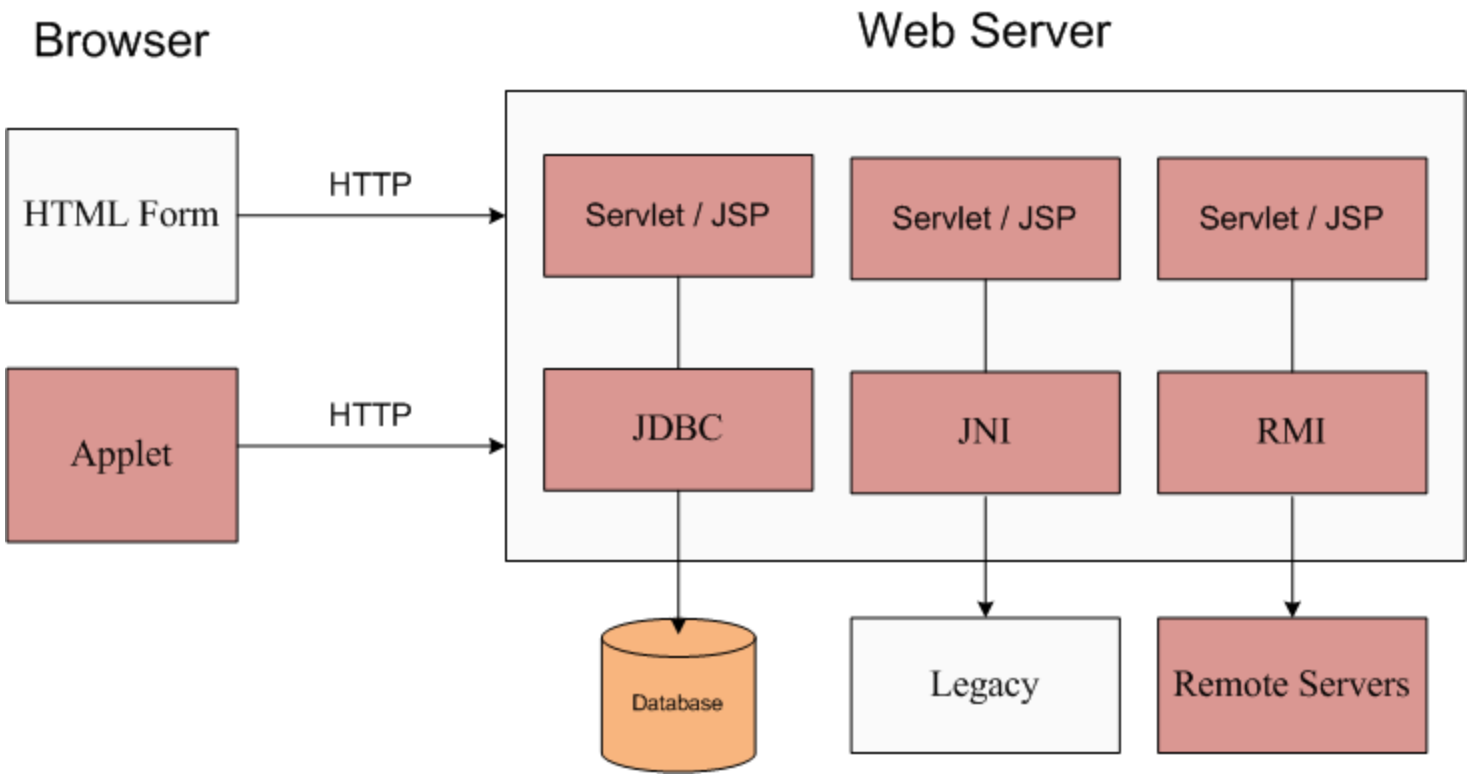
Client Server Applications

- Trend towards web browser web server
- Better than CGI scripts
  - Performance
  - Simplicity
  - Reusability
  - Functionality availability
  - Open standards within platform
  - Security

Client Server Applications



Client Server Applications



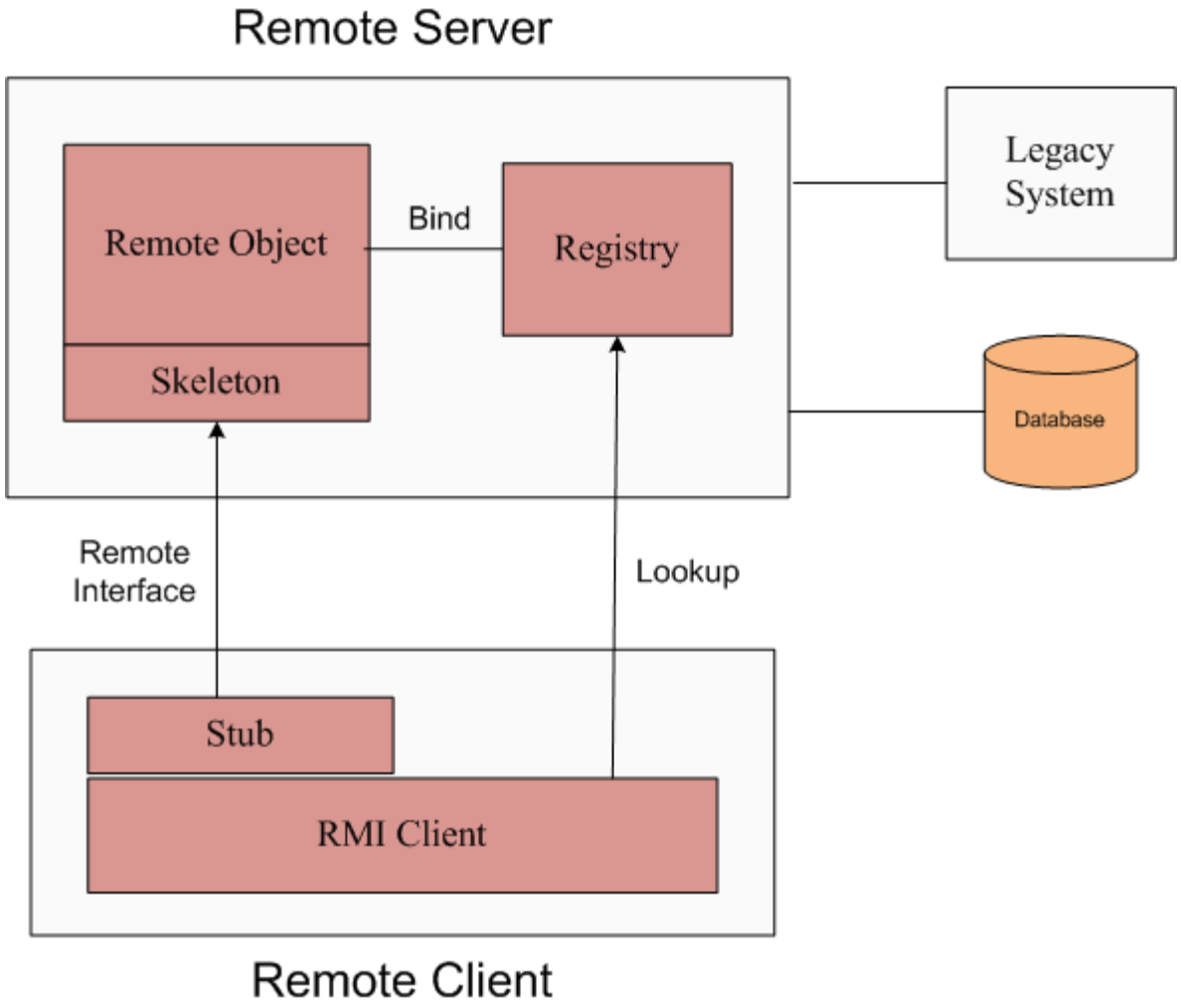
Client Server Applications

- HTML controls
  - Data entered lost
  - Hidden variables to store state
- Server controls
  - Data maintained
  - .NET - ASPX
  - Java - JSF, Tag libraries
- Java web servers
  - Apache, Tomcat
  - Weblogic, Websphere
  - SunOne, JBoss
- .NET web server
  - IIS

Distributed Computing

- Applications distributed
  - Developed by departments
  - Developed by subsidiaries
  - Developed by partners
- Remote object registry
- Remote object interface
- Remote client
- Object serialization
  - Pass objects
  - Marshaling / Un-marshaling
- Distributed garbage collection

Distributed Computing

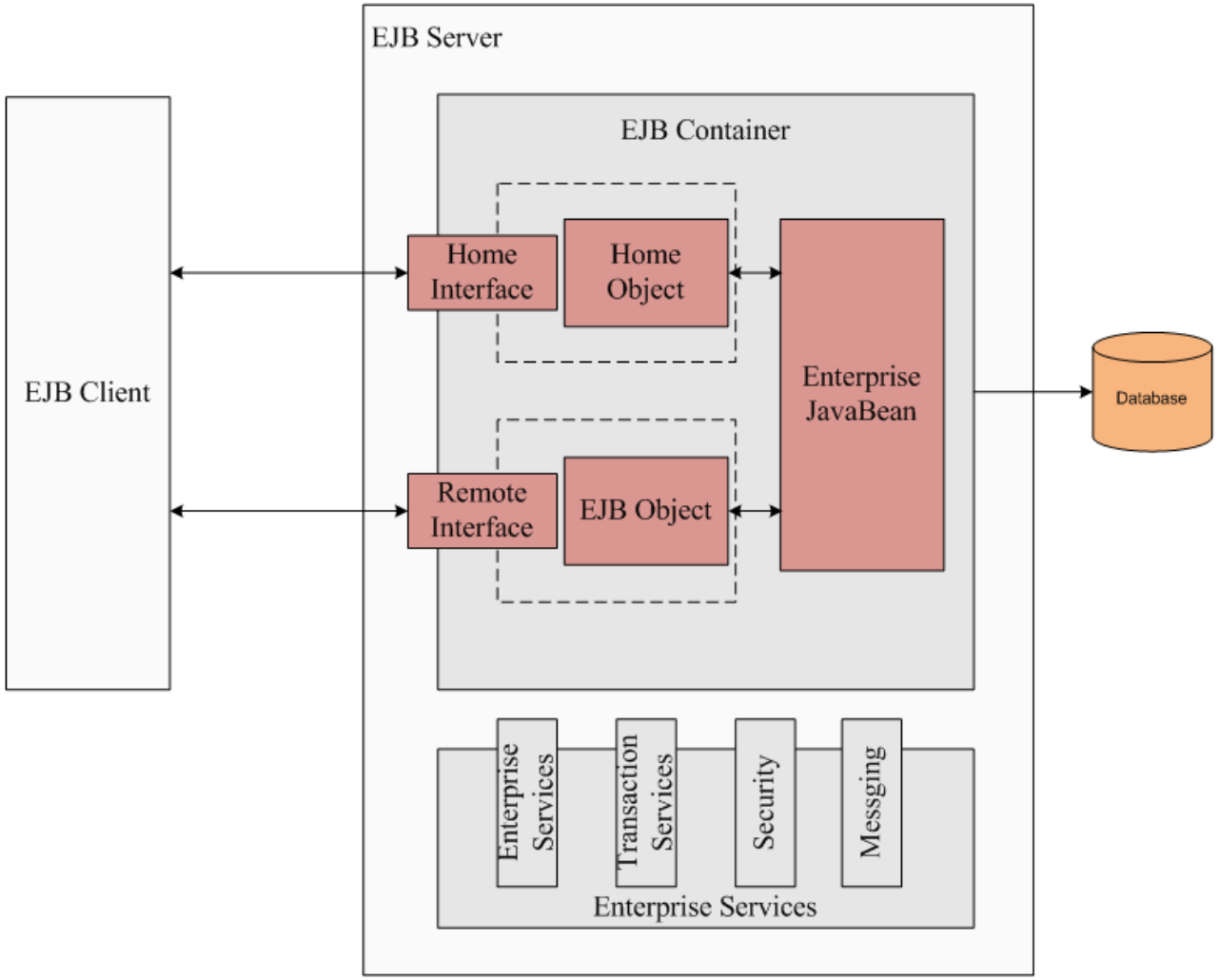


Distributed Computing

Enterprise JavaBeans (EJB)

- Server side components
- Based on RMI
- EJB Model
  - EJB server, EJB containers
  - Home interface & home object – factory pattern
  - Remote interface and EJBObject/Enterprise JavaBean
  - EJB client

EJB


EJB Server
EJB Container
EJB Client
Home Interface
Home Object
Enterprise JavaBean
Database
Remote Interface
EJB Object
Enterprise Services
Transaction Services
Security
Messging
Enterprise Services

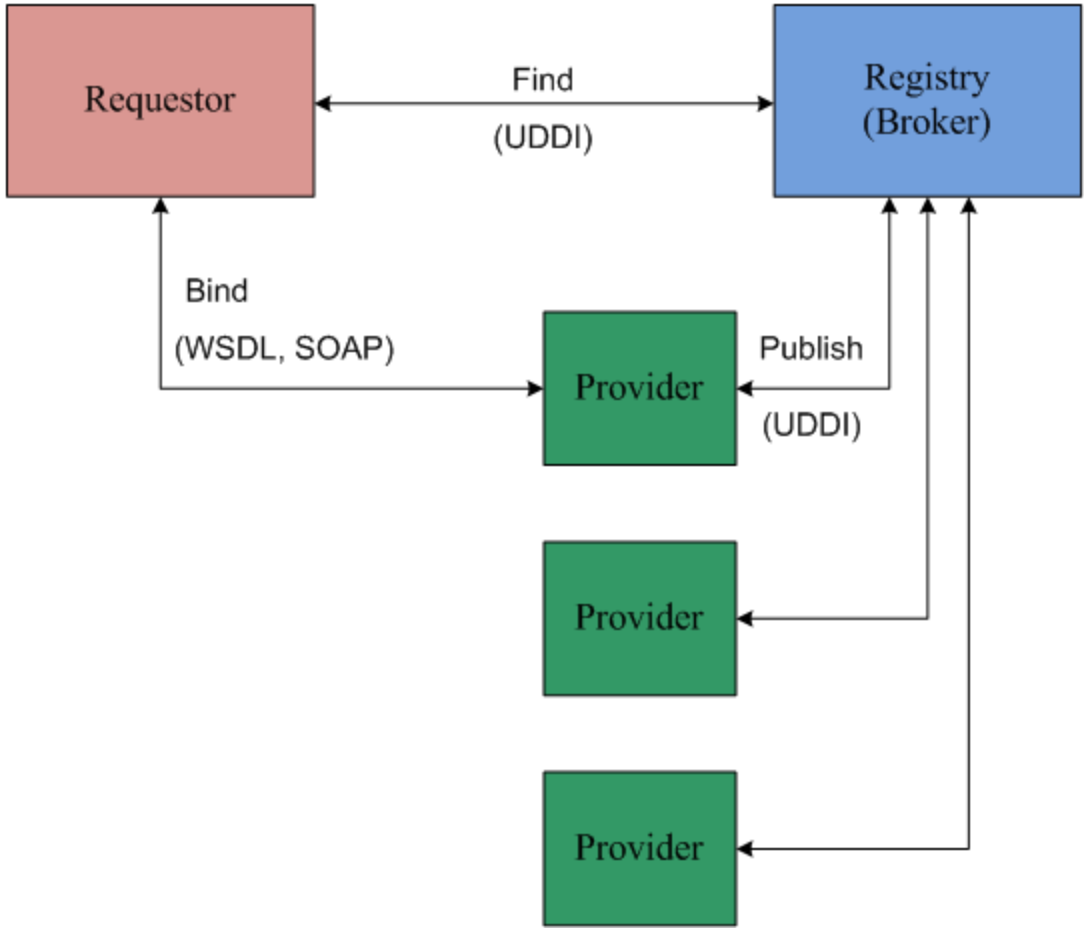
EJB

- Enable distributed development - roles
  - EJB server provider
  - EJB container provider
  - EJB developer
  - EJB deployer
  - Application developer
- Performance issues if objects fine grained

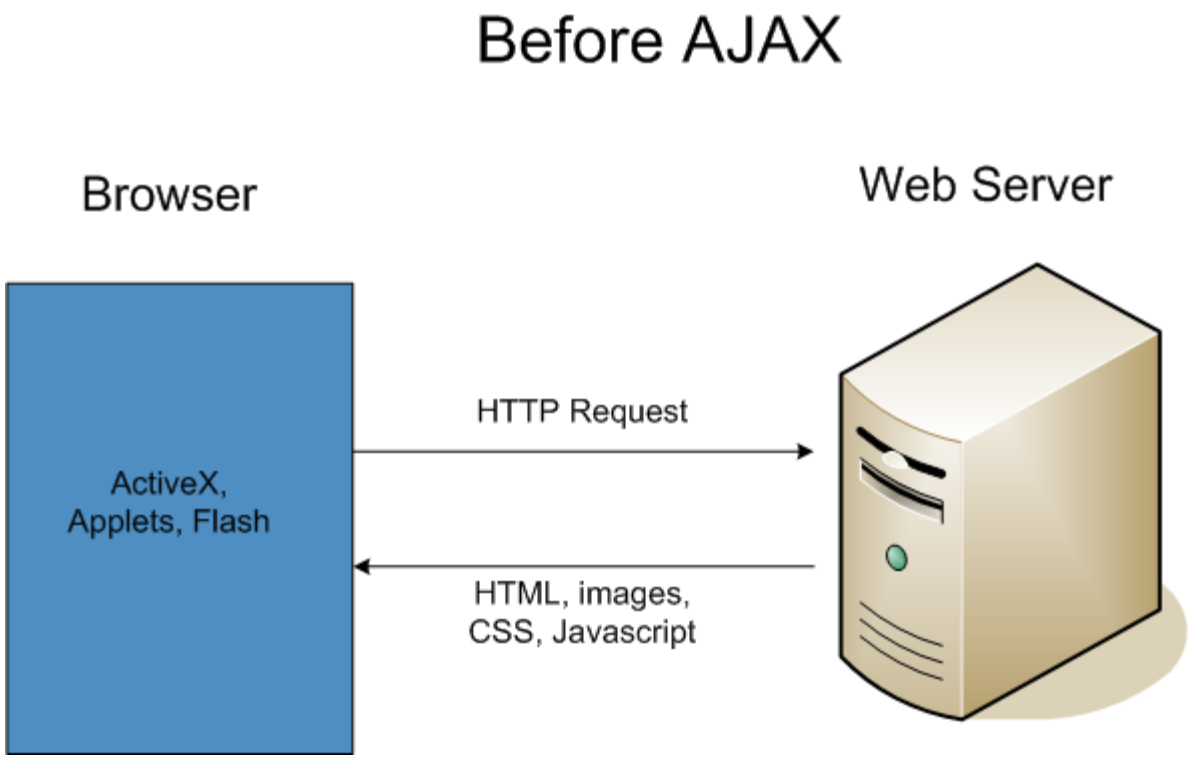
Service Oriented Architecture (SOA)

- Different paradigm for distributed computing
- Technologies
  - SOAP - Simple Object Access Protocol
  - WSDL – Web Services Description Language
  - UDDI – Universal Description, Discovery and Integration
  - XML – data representation
  - HTTP/SMTP - transport
- Platform independent
- Web Services

SOA


Requestor
Find
(UDDI)
Registry
(Broker)
Bind
(WSDL, SOAP)
Provider
Publish
(UDDI)
Provider
Provider

AJAX - Asynchronous JavaScript and XML



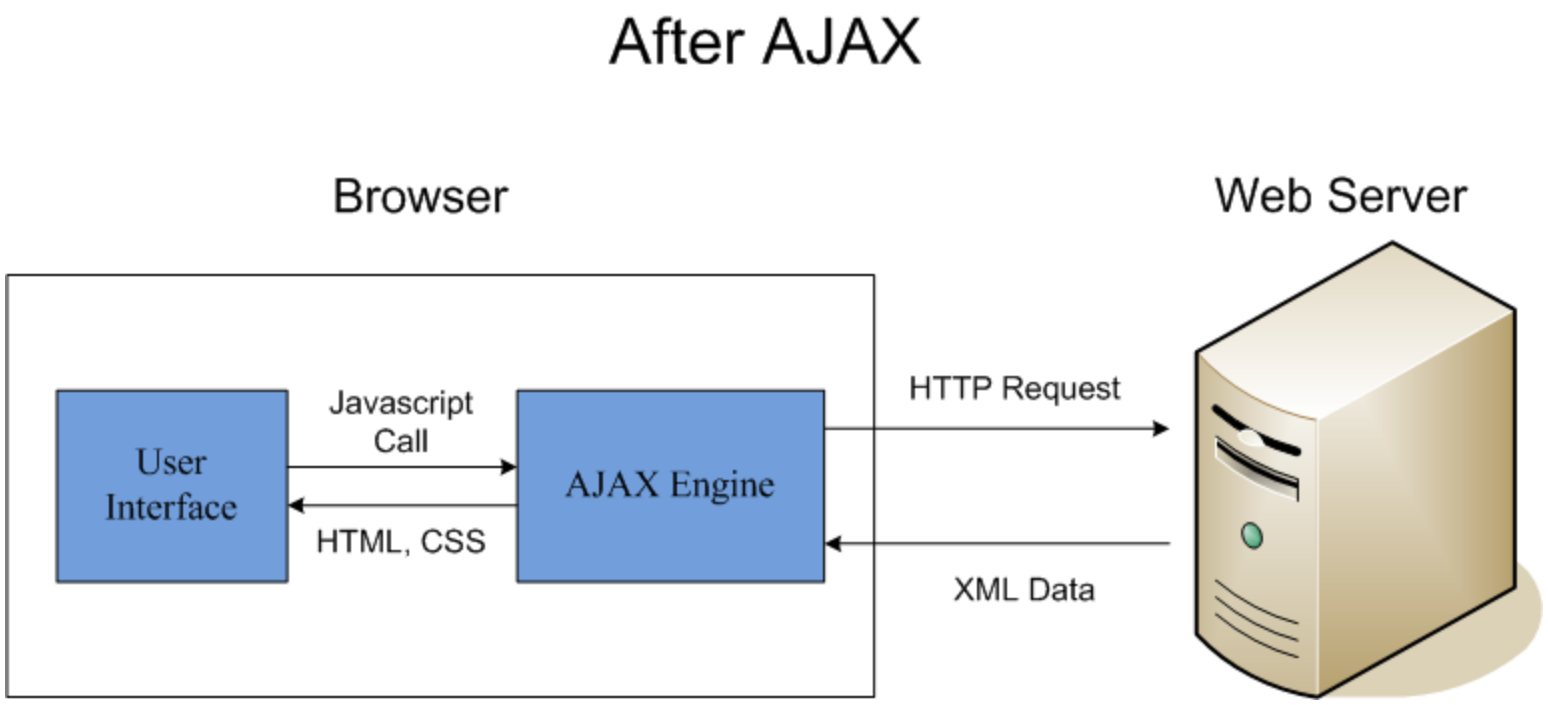
Hidden frame / iframe

XMLHTTPRequest

AJAX

- Increase in bandwidth
- Browser capabilities increase and become more compatible with one another
- Rediscovery of XMLHTTPRequest object
  - Allows asynchronous messages between browser and web server
  - No need to refresh entire web page for dynamic data

AJAX


After AJAX
Browser
Web Server
User Interface
Javascript Call
HTML, CSS
AJAX Engine
HTTP Request
XML Data

AJAX

- Technologies
  - JavaScript
  - CSS
  - Web page DOM/JSON
  - Asynchronous communication with web server
  - XML
- Applications
  - Rich user experience, real-time form data validation
  - Auto-completion, load on demand
  - Sophisticated user interface and effects, partial submit
  - Web 2.0 mashups
  - Page as an application
- Google Maps, Gmail, Yahoo! News

Mobile Computing

- Cell phones ubiquitous to age old phone
- Access information from anywhere
- Technologies
  - Windows Mobile, J2ME
  - Android, iPhone (Mac OS X), Symbian, Palm
  - Connectivity: cellular, WiFi, Bluetooth
  - GPS, A-GPS – location based services
  - Camera, video
  - Voice, music
  - SMS, MMS

Additional Technologies

- Java
  - JMS, JNDI, Jini/JavaSpaces
- .NET
  - WCF, WPF, WWF
  - LINQ, MSMQ

Security

- Very critical for consumer or enterprise applications
- Browser security
  - Sandbox model
  - Can access from codebase
- Threat modeling
  - Authentication
  - Authorization
  - Data input validation
  - Data protection
  - Configuration management
  - Auditing
  - Exception management
  - Source code protection

Security

- Cryptography
  - Sender authentication, non-repudiation, data integrity, confidentiality
  - Hashing, symmetric keys, asymmetric keys, signing
  - RSA, DSA, AES, Triple DES, SHA, PKCS#5, RC2, and RC4
- Permissions
- Role based security
  - Authorization - privileges
  - User identity and roles
- Secure Communications
  - SSL, TSL
  - HTTPS over SSL/TSL
- Platform security
  - Strong data typing, automatic memory management
  - Byte code verification, secure class loading

Security

- .NET Framework
  - Code access security
    - Permission sets – FullTrust, LocalIntranet, Internet, Nothing
    - Code groups: app directory, GAC, site, publisher, URL, zone, …
    - Security policy – enterprise, machine, user, AppDomain
  - Web configuration file example
- Java
  - Policy file example

Versioning - Java

- Stream Unique ID stored in serialized objects
- Package versioning – in manifest file
  - VM: java-vm.specification.version, java-vm.specification.vendor, …
  - Runtime: java.version, java.vendor, java.specification.version, …
  - Package: Package-Title, Package-Version, …
- Component versioning not solved
  - Component dependency
  - JAR versioning
  - Application using components that use different versions of a component
  - Components shared across different JRE versions
  - JSR 277 on hold

Versioning - .NET

- Assembly level versioning
- Assembly version
- Dependent assembly versions
- Proper version assembly is bound to calling assembly

Development and Deployment Environments

- Development Environment
  - Visual Studio
  - Eclipse, Java Studio, IntelliJ, JBuilder, JDeveloper
- Deployment Environment
  - IIS
  - Apache, Tomcat, Weblogic, Websphere, SunOne, JBoss

Interfacing Java and .NET

- Interoperability issues
  - Byte order, data format, hardware compatibility
  - Complex integration issues
    - Complexity of systems
    - TCP/IP connection is not enough
- Approaches
  - Shared resource
    - File, database, queue
  - In-process Interop
    - JNI, COM Interop
    - Cross compilation/tools: IKVM, Grasshopper, JuggerNET
  - Out-of-process Interop
    - Sockets, RPC
    - XML/HTTP, web service

Technology Comparison

Java	.NET
JDBC	ADO.NET
JSP/Servlet	Aspx
JMS	MSMQ
RMI	.NET Remoting/WCF
EJB	COM+
JAX-WS/Axis	Asmx/WCF
J2ME	Windows Mobile

Closing Thoughts

- .NET offers a unified vision of software development
- Java offers a wide array of third-party choices for dev. environment
- .NET is clear winner as a desktop application dev. environment
- Java has much higher penetration into back-end systems
- Java stronger in mobile computing
- Java and .NET compete in web application server space

- Future
  - Parallel computing
  - Event-driven web applications, server push
  - Grid computing
  - Robotics

AJAX

- Code Sample

Web Service

- Code Sample

RMI

- Code Sample

Q & A