Java EE Overview

Enterprise Application

- What is Enterprise?

  “a project or undertaking, typically one that is difficult or requires effort.”
- Big Business => Big Money
- The word enterprise can potentially double the price of your product and your salary.
- Your application may be beautifully designed by using all the latest techniques and tools, but is it enterprise-ready?

The Challenge of Enterprise Applications

- Enterprise Businesses live in a global competitive environment today. Business needs are getting more and more complex. Change is the only constant in business.

Challenges :

- Enterprise Businesses are stretched across different countries and continents doing business 24/7 dealing with different time zones, currencies, political systems and etc. => distributed system
- Reliable and safe data storage => Database and transaction management
- Offering different GUI to different customers/users=> Flexible information presentation. (xhtml)
- How to incorporate new system with existing Enterprise Information System (EIS). Data storage may be dispersed in different location using different DBMS

The Challenge of Enterprise Applications

- B2B application with different partners
- Legacy application may be written in different languages
- Different Protocols
- Enterprise system must be highly available, fast response time, scalable, and secure. Each time the system stalled or crashed, money is lose somewhere.
- All this adds up to what characterizes enterprise applications: robustness in the face of complexity
- Enterprise applications have to face change and complexity, and be robust.
- Java EE is designed and developed to solve problems faced by Enterprise applications
- Java EE API stack is used to solved these problems

What is Java EE

- Java Enterprise Edition (Java EE)
- Previously known as Java 2 Enterprise Edition (J2EE)
- An over simplified definition of Java EE:

  " Java Platform, Enterprise Edition defines the standard for developing component-based multitier enterprise applications."

  OR

  "Java EE is a suite of specifications for APIs, a distributed computing architecture, and definitions for packaging of distributable components for deployment. It's a collection of standardized components, containers, and services for creating and deploying distributed applications within a well-defined distributed computing architecture."

Why Java EE?

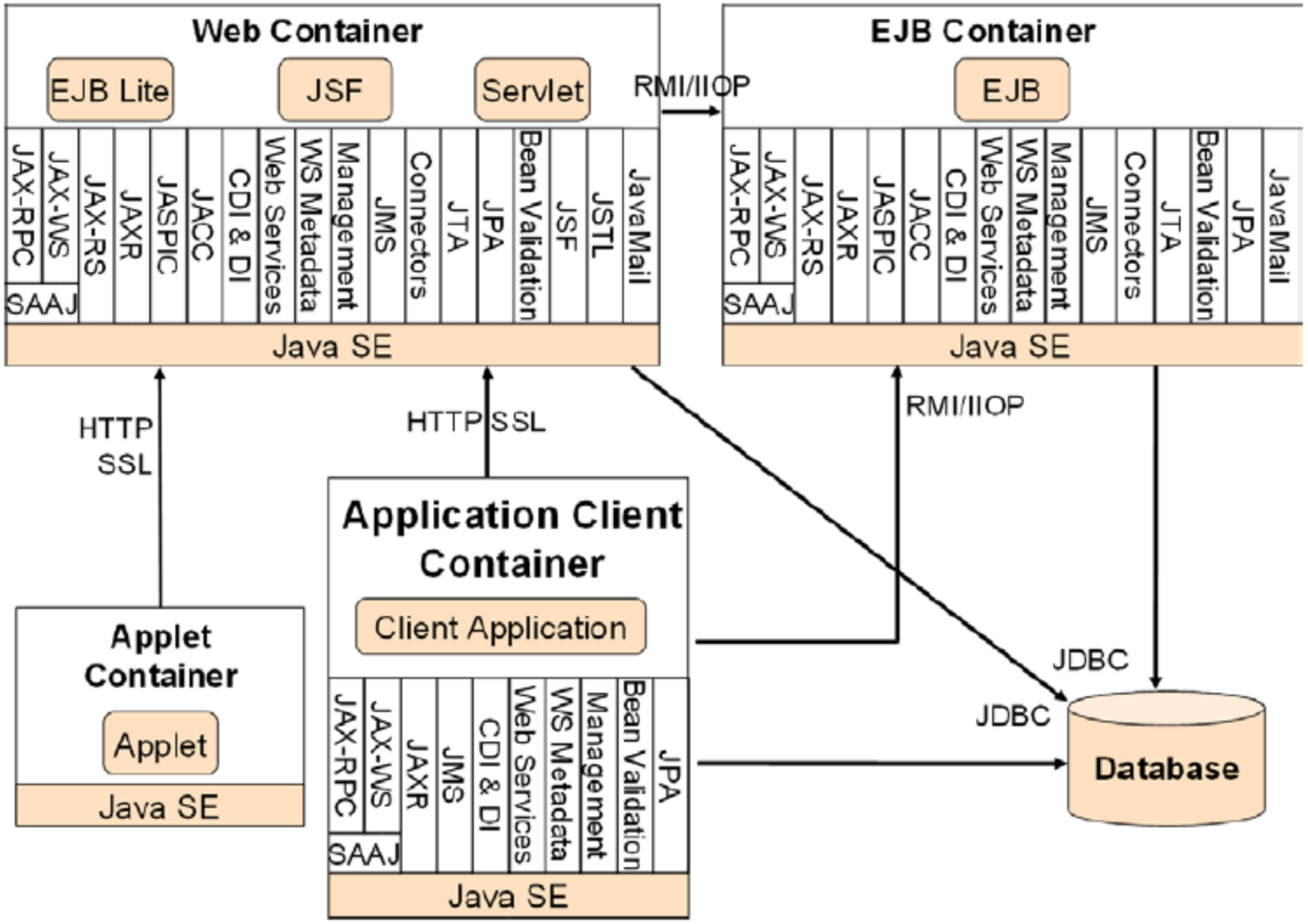
- Java EE lets developer to focus on business process logic development rather than solving technical problems faced in enterprise applications.
- The low level details are better left to the experts.
- There are many different system-level capabilities that are required before you can develop a distributed applications that are scalable, robust, secure, and maintainable.
- Some basic infrastructure capabilities include: security, database access, and transaction control.
- Building a distributed computing infrastructure(the plumbing and wiring of an architecture) that supports enterprise applications is monumental.
- This is exactly why Java EE architectures are so attractive because the hard system-level infrastructure is already in place.

Why Java EE?

- Java EE architecture is open => Benefit of Platform independence and Financial independence.
- Platform independence => no worry about being locked into a single vendor's implementation
- Weblogic, Oracle, Sun One, Jboss, WildFly, GlassFish and etc
- This also mean easy to do migration
- Financial independence => Open Source Servers are available for use. This is good news to small or medium size business startup.
- Multi-tier architecture => Separation of concerns
- Scalability => response time remains the same in the event of sudden increase of users at the same time
- Many vendors offer features of clustering, connection pooling and failover technologies
- Object-oriented design principles and patterns
- A time-tested: An evolution over 20 years

Hard system-level infrastructure

- Container provides services:



Web Application

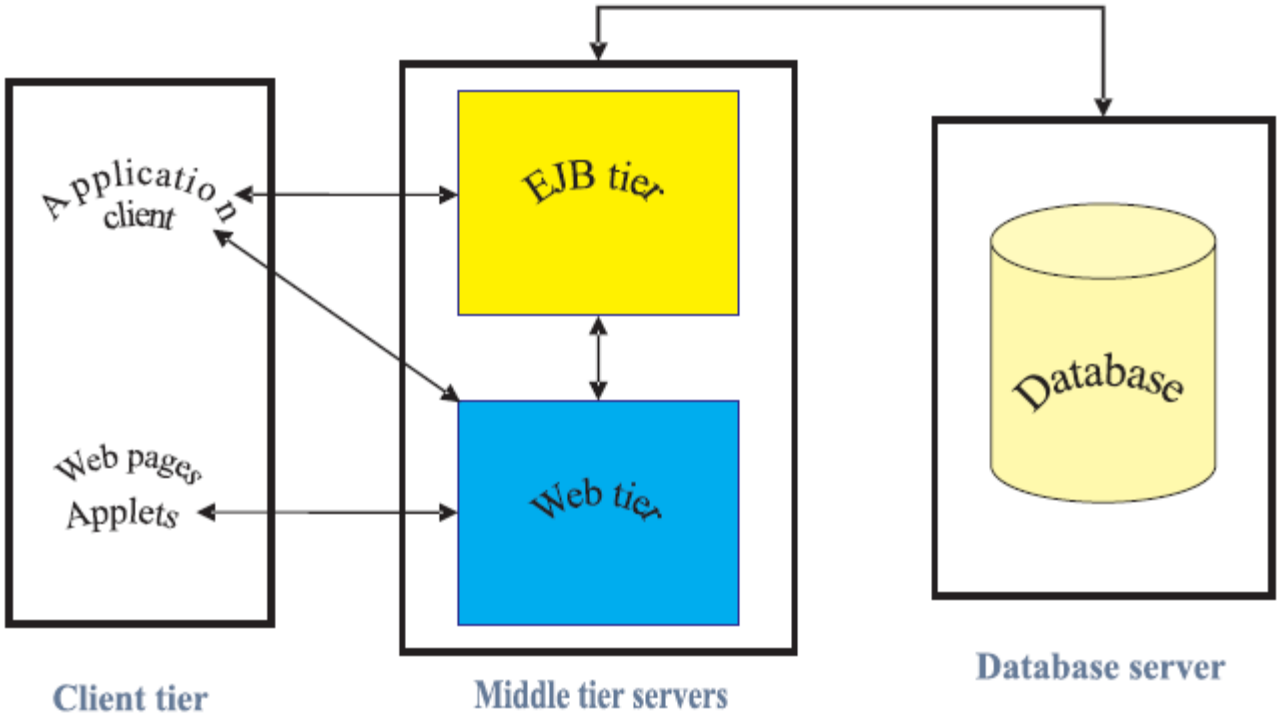
- What is a web application?
- A Web Application is a complete collection of resources for a Web site.
- Amazon, Airline reservation online, Internet Banking, Hotel.com, CheapTickets.com and etc.
- What happen behind the scene?

Why Servlet, JSP are important

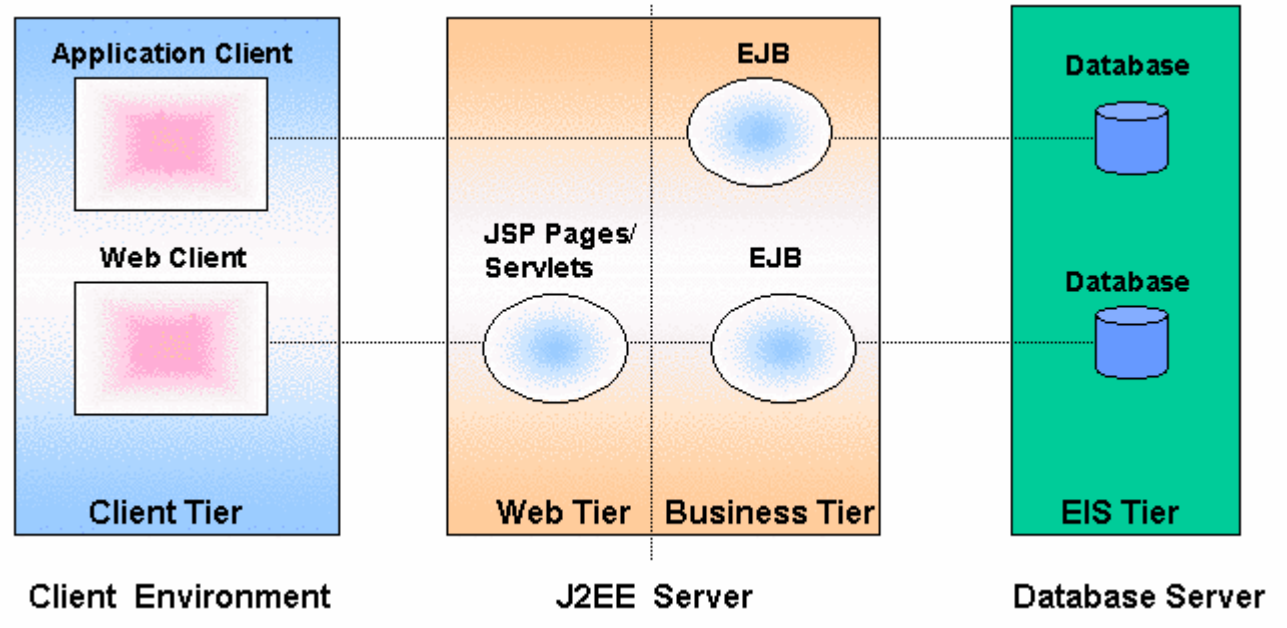
- Servlets, JSP are the building blocks of Java EE applications
- Many popular MVC frameworks are built on top of JSPs and Servlets.
- Popular frameworks: JSF, Struts and Spring.
- Behind the scene these frameworks are using JSP and Servlet
- Servlets and JSPs are always part of a larger project called a Web Application.
- A good understanding of JSP and Servlet will help you in future when you come across these frameworks in your IT career

MVC (Model View Controller)

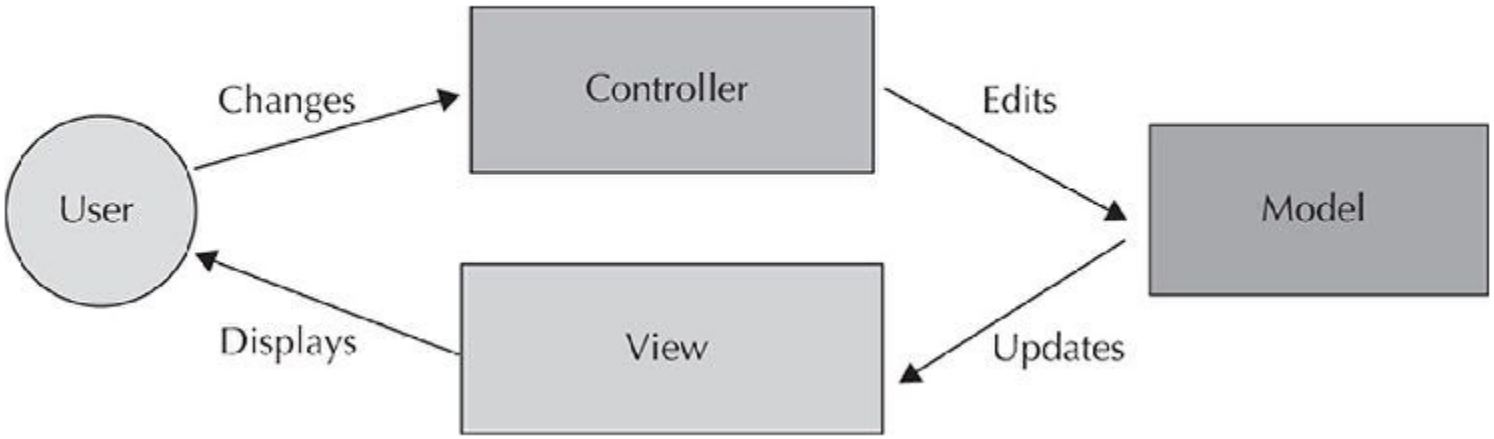
Separation of concerns



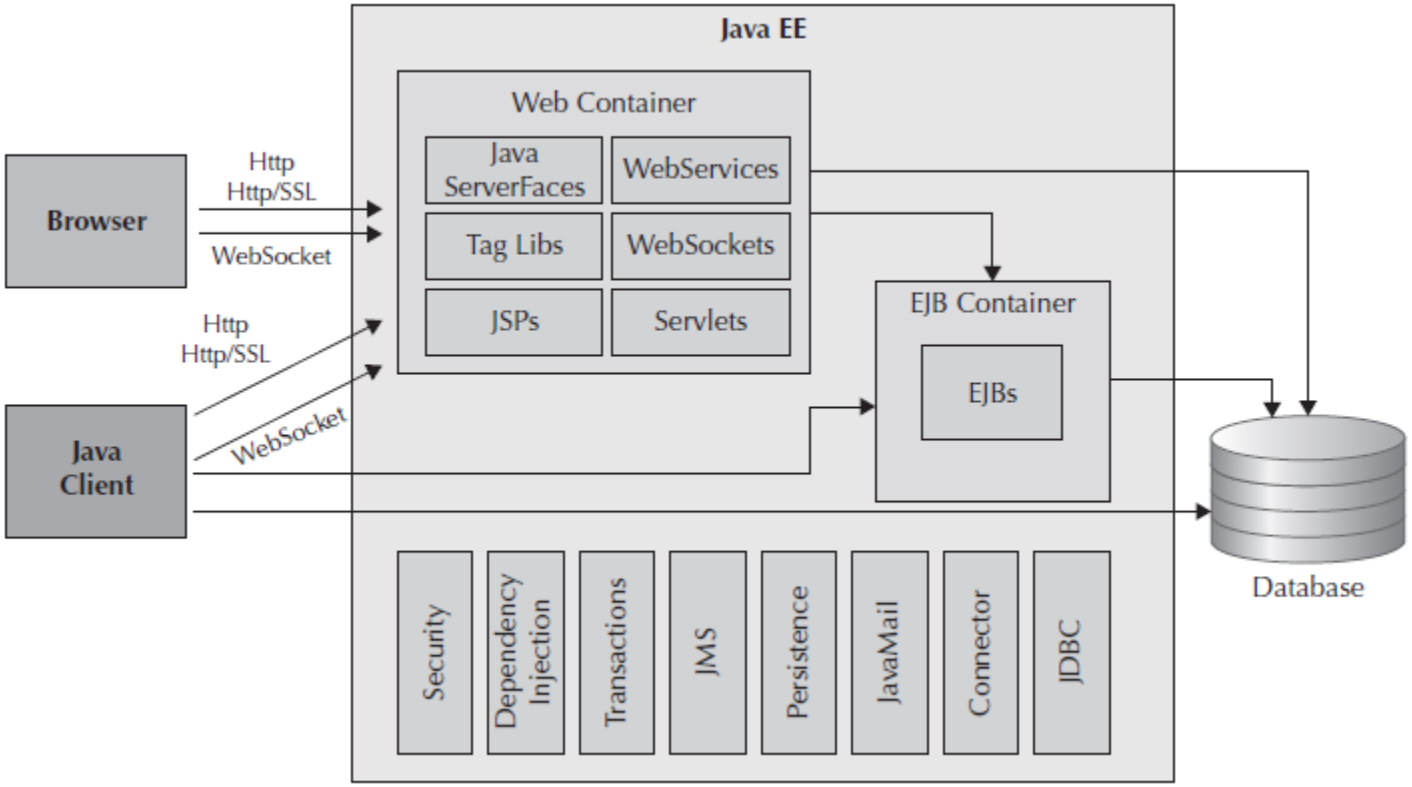
MVC (Model View Controller)



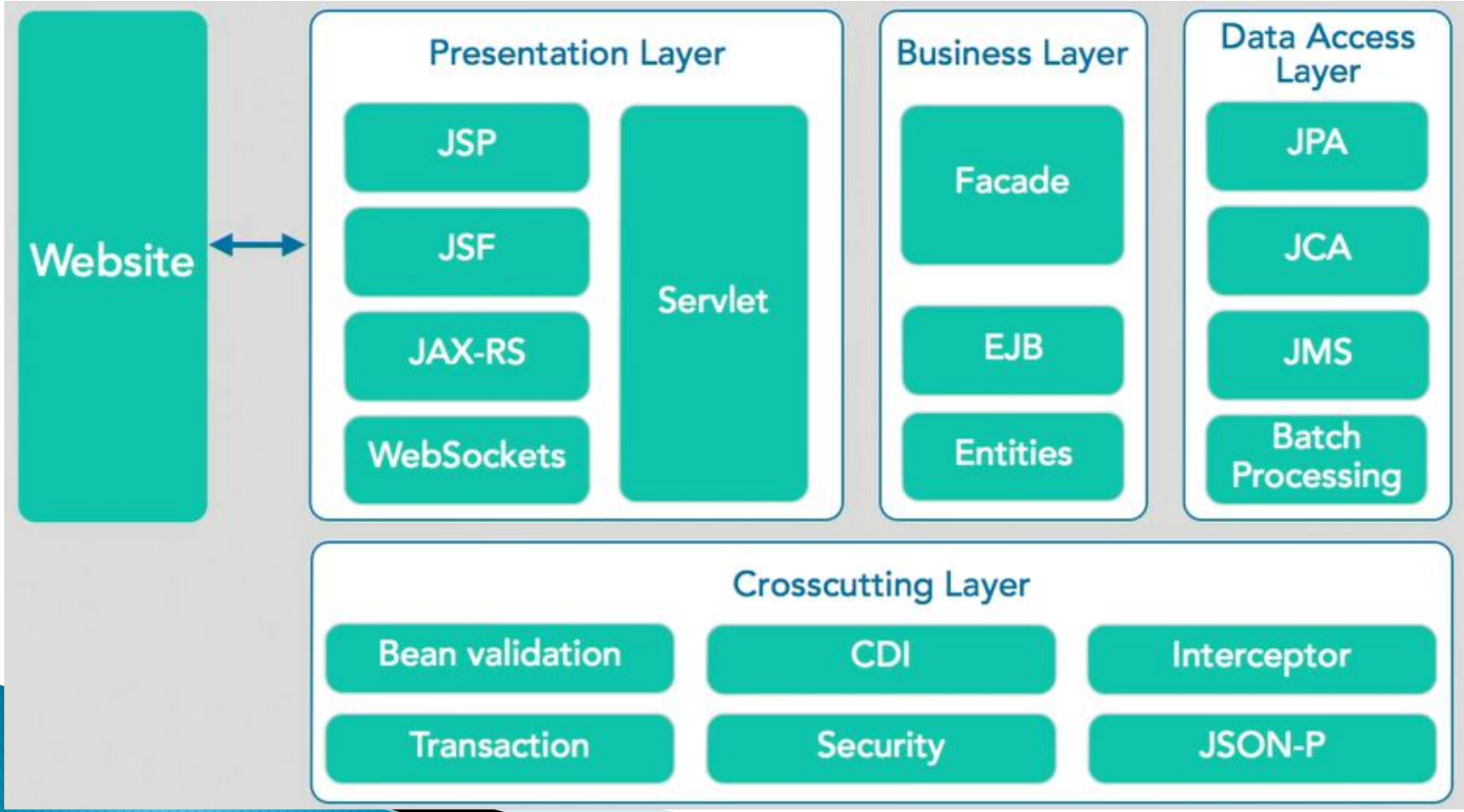
MVC (Model View Controller)



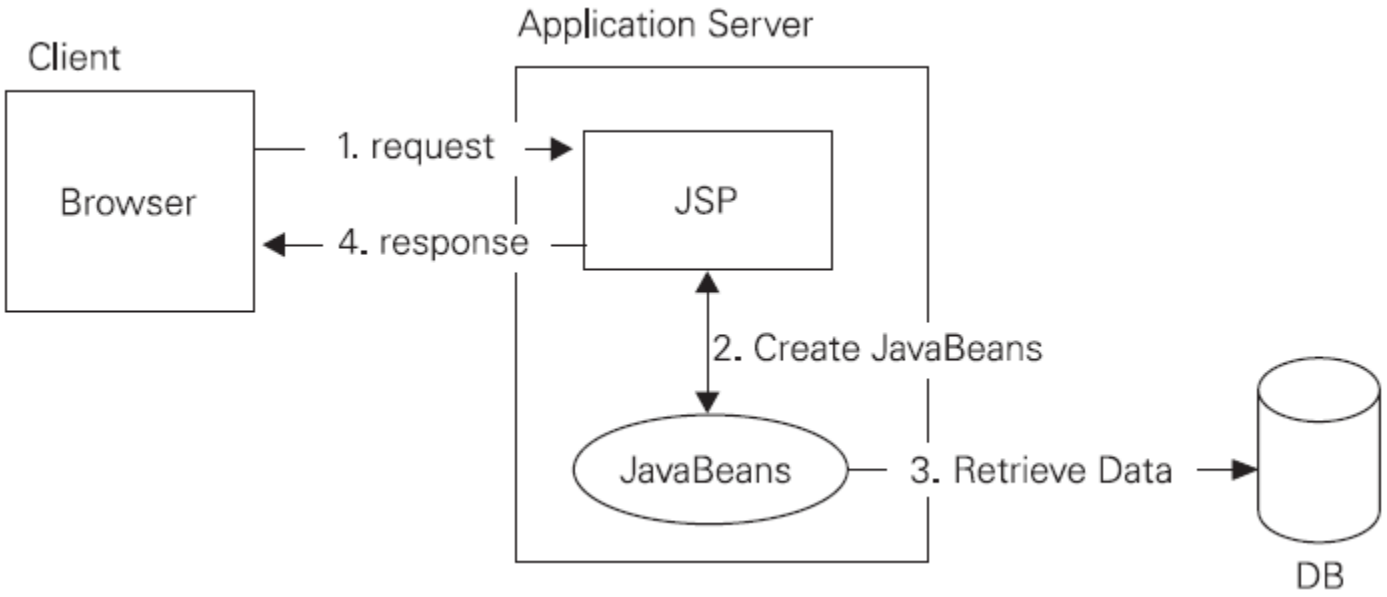
MVC (Multi-tier)



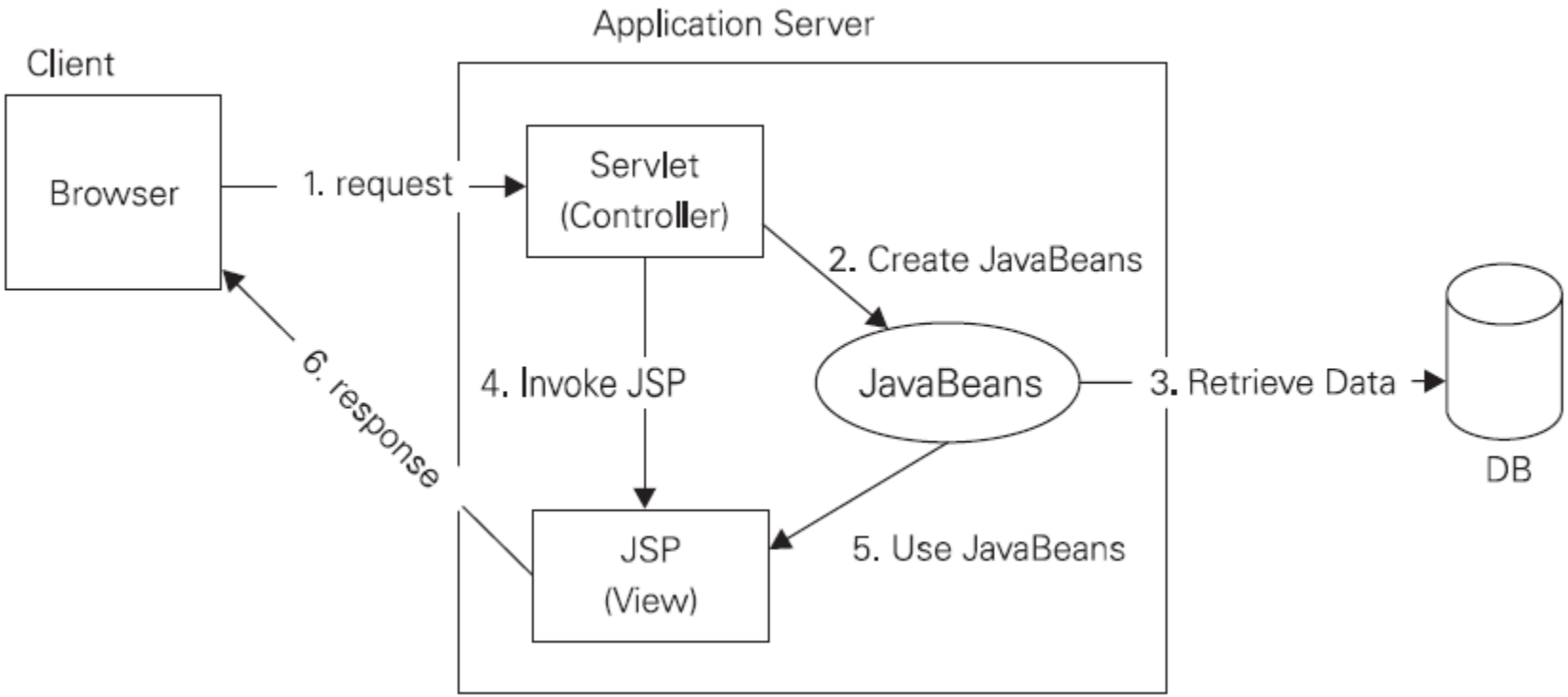
MVC(API)


Website
Presentation Layer
JSP
JSF
JAX-RS
WebSockets
Servlet
Business Layer
Facade
EJB
Entities
Data Access Layer
JPA
JCA
JMS
Batch Processing
Crosscutting Layer
Bean validation
CDI
Interceptor
Transaction
Security
JSON-P

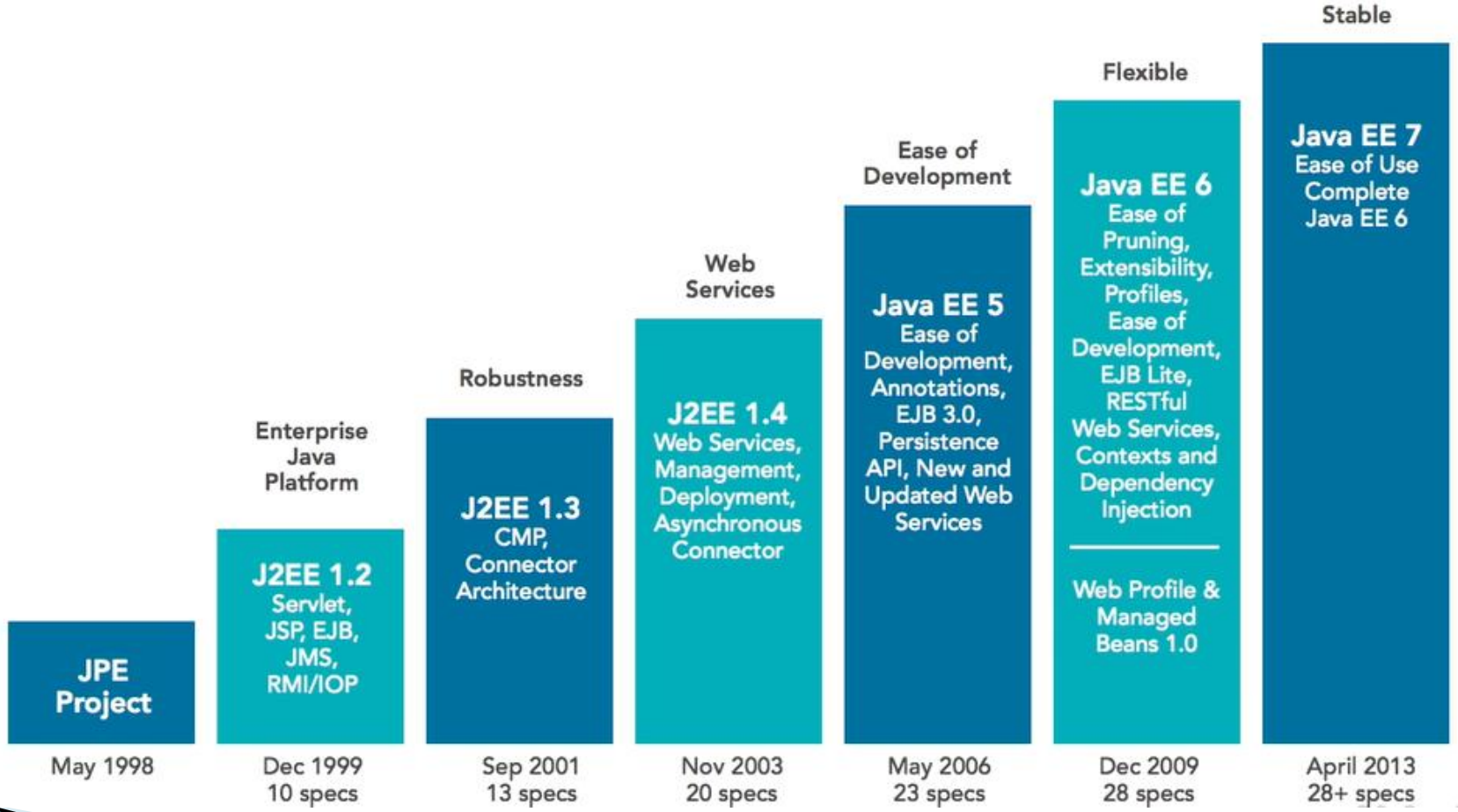
MVC Model 1


Application Server
Client
Browser
1. request
4. response
JSP
2. Create JavaBeans
JavaBeans
3. Retrieve Data
DB

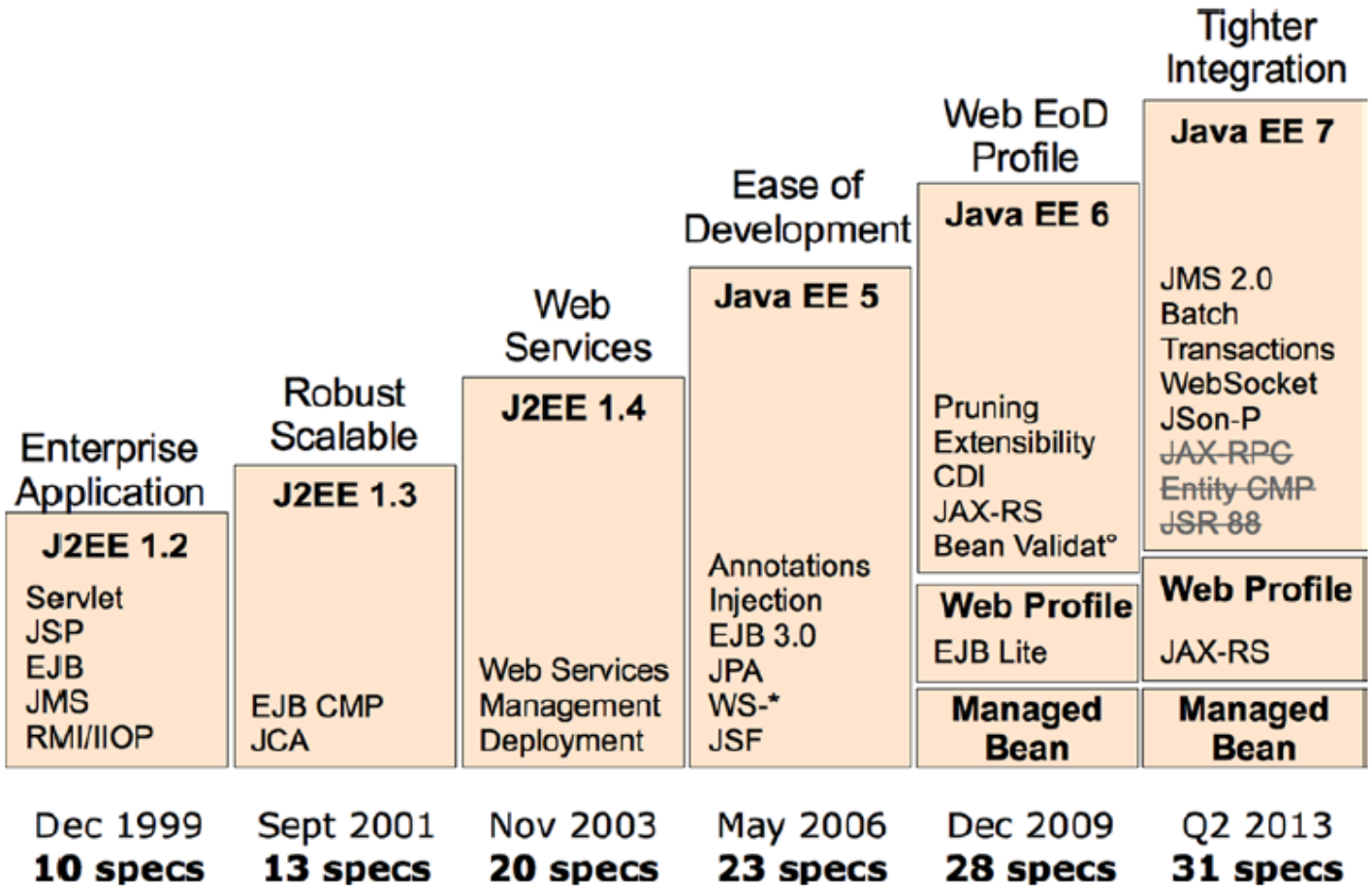
MVC Model 2


Application Server
Client
Browser
1. request
Servlet
(Controller)
2. Create JavaBeans
JavaBeans
3. Retrieve Data
DB
4. Invoke JSP
6. response
JSP
(View)
5. Use JavaBeans

Evolution of Java EE



Evolution of Java EE



JPE (May 1998)

- Announcement of the JPE (Java Platform for the Enterprise) project at Sun.

J2EE 1.2 (December 12, 1999)

Technology	Version
JDBC Standard Extension API	2.0
Java Naming and Directory Interface Specification (JNDI)	1.2
RMI-IIOP	1.1
Java Servlet	2.2
JavaServer Pages (JSP)	1.1
Enterprise JavaBeans (EJB)	1.1
Java Message Service API (JMS)	1.0
Java Transaction API (JTA)	1.0
JavaMail API	1.1
JavaBeans Activation Framework (JAF)	1.0

J2EE 1.3 (September 24, 2001)

Technology	Version
JDBC Extension	2.0
Java Naming and Directory Interface Specification (JNDI)	1.2
Java API for XML Processing (JAXP)	1.1
Java Servlet	2.3
JavaServer Pages (JSP)	1.2
JavaServer Pages Standard Tag Library (JSTL)	1.0
Enterprise JavaBeans (EJB)	2.0
J2EE Connector Architecture	1.0
Java Message Service API (JMS)	1.0
Java Transaction API (JTA)	1.0
JavaMail API	1.2
JavaBeans Activation Framework (JAF)	1.0
Java Authentication and Authorization Service (JAAS)	1.0

J2EE 1.4 (November 11, 2003)

Technology	Version	JSR
Web Services Technologies:		
Web Services for J2EE 1.1	1.0	
Java API for XML Processing (JAXP)	1.2	
Java API for XML-based RPC (JAX-RPC)	1.1	
Java API for XML Registries (JAXR)	1.0	
Web Application Technologies:		
Java Servlet	2.4	JSR154
JavaServer Pages (JSP)	2.0	JSR152
JavaServer Pages Standard Tag Library (JSTL)	1.1	JSR52
JavaServer Faces (JSF)	1.1	JSR127
Enterprise Application Technologies:		
Enterprise JavaBeans (EJB)	2.1	JSR153
J2EE Connector Architecture	1.5	JSR112
Java Message Service API (JMS)	1.1	
Java Transaction API (JTA)	1.0	
JavaMail API	1.3	
JavaBeans Activation Framework (JAF)	1.0	
Management and Security Technologies:		
Java Authorization Service Provider Contract for Containers (JACC)	1.0	
Java Management Extensions (JMX)	1.2	
Enterprise Edition Management API	1.0	
Enterprise Edition Deployment API	1.1	

Java EE 5 (May 11, 2006)

Technology	Version	JSR
Web Services Technologies:		
Web Services	1.2	JSR109
Java API for XML-Based Web Services (JAX-WS)	2.0	JSR224
Java Architecture for XML Binding (JAXB)	2.0	JSR222
Web Service Metadata for the Java Platform	2.0	JSR181
Java API for XML-Based RPC (JAX-RPC)	1.1	JSR101
Java API for XML Registries (JAXR)	1.0	JSR93
SOAP with Attachments API for Java (SAAJ)	1.3	JSR67
Streaming API for XML (StAX)	1.0	JSR173
Web Application Technologies:		
Java Servlet	2.5	JSR154
JavaServer Faces (JSF)	1.2	JSR252
JavaServer Pages (JSP)	2.1	JSR245
JavaServer Pages Standard Tag Library (JSTL)	1.2	JSR52
Debugging Support for Other Languages	1.0	JSR45

Enterprise Application Technologies:		
Enterprise JavaBeans (EJB)	3.0	JSR220
Java Persistence API (JPA)	1.0	JSR220
Java EE Connector Architecture	1.5	JSR112
Common Annotations for the Java Platform	1.0	JSR250
Java Message Service API (JMS)	1.1	JSR914
Java Transaction API (JTA)	1.1	JSR907
JavaMail API	1.4	JSR919
JavaBeans Activation Framework (JAF)	1.1	JSR925
Management and Security Technologies:		
Java Authorization Service Provider Contract for Containers (JACC)	1.1	JSR115
J2EE Application Deployment	1.2	JSR88
J2EE Management	1.1	JSR77

Java EE 6 (December 10, 2009)

Technology	Version	JSR	Included in Web Profile
Web Services Technologies:			
Java API for RESTful Web Services (JAX-RS)	1.1	JSR311	
Web Services	1.3	JSR109	
Java API for XML-Based Web Services (JAX-WS)	2.2	JSR224	
Java Architecture for XML Binding (JAXB)	2.2	JSR222	
Web Services Metadata for the Java Platform	2.1	JSR181	
Java API for XML-based RPC (JAX-RPC)	1.1	JSR101	
Java APIs for XML Messaging (JAXM)	1.3	JSR67	
Java API for XML Registries (JAXR)	1.0	JSR93	
Web Application Technologies:			
Java Servlet	3.0	JSR315	✓
JavaServer Faces (JSF)	2.0	JSR314	✓
JavaServer Pages (JSP)	2.2	JSR245	✓
Expression Language (EL)	2.2	JSR245	✓
JavaServer Pages Standard Tag Library (JSTL)	1.2	JSR52	✓
Debugging Support for Other Languages	1.0	JSR45	✓
Enterprise Application Technologies:			
Enterprise JavaBeans (EJB)	3.1	JSR318	✓ Lite
Java Persistence API (JPA)	2.0	JSR317	✓
Contexts and Dependency Injection for Java (CDI)	1.0	JSR299	✓
Dependency Injection for Java	1.0	JSR330	✓
Bean Validation	1.0	JSR303	✓
Managed Beans	1.0	JSR316	✓
Interceptors	1.1	JSR318	✓
Java EE Connector Architecture	1.6	JSR322	
Common Annotations for the Java Platform	1.1	JSR250	✓
Java Message Service API (JMS)	1.1	JSR914	
Java Transaction API (JTA)	1.1	JSR907	✓
JavaMail API	1.4	JSR919	
Management and Security Technologies:			
Java Authentication Service Provider Interface for Containers (JASPIC)	1.0	JSR196	
Java Authorization Service Provider Contract for Containers (JACC)	1.4	JSR115	
Java EE Application Deployment	1.2	JSR88	
J2EE Management	1.1	JSR77	

Java EE 7 (June 12, 2013)

Technology	Version	JSR	Included in Web Profile
Web Application Technologies:			
Java API for WebSocket	1.1	JSR356	✓
Java API for JSON Processing	1.0	JSR353	✓
Java Servlet	3.1	JSR340	✓
JavaServer Faces (JSF)	2.2	JSR344	✓
Expression Language (EL)	3.0	JSR341	✓
JavaServer Pages (JSP)	2.3	JSR245	✓
JavaServer Pages Standard Tag Library (JSTL)	1.2	JSR52	✓
Enterprise Application Technologies:			
Batch Applications for the Java Platform	1.0	JSR352	
Concurrency Utilities for Java EE	1.0	JSR236	
Contexts and Dependency Injection for Java (CDI)	1.1	JSR346	✓
Dependency Injection for Java	1.0	JSR330	✓
Bean Validation	1.1	JSR349	✓
Managed Beans	1.0	JSR316	✓
Enterprise JavaBeans (EJB)	3.2	JSR345	✓
Interceptors	1.2	JSR318	✓
Java EE Connector Architecture	1.7	JSR322	
Java Persistence API (JPA)	2.1	JSR338	✓
Common Annotations for the Java Platform	1.2	JSR250	✓
Java Message Service API (JMS)	2.0	JSR343	
Java Transaction API (JTA)	1.2	JSR907	✓
JavaMail API	1.5	JSR919	
Web Services Technologies:			
Java API for RESTful Web Services (JAX-RS)	2.0	JSR339	✓
Implementing Enterprise Web Services	1.3	JSR109	
Java API for XML-Based Web Services (JAX-WS)	2.2	JSR224	
Web Services Metadata for the Java Platform	2.1	JSR181	
Java API for XML-based RPC (JAX-RPC) (Optional)	1.1	JSR101	
Java Architecture for XML Binding (JAXB)	2.2	JSR222	
Java APIs for XML Messaging	1.3	JSR67	
Java API for XML Registries (JAXR)	1.0	JSR93	
Management and Security Technologies:			
Java Authentication Service Provider Interface for Containers	1.1	JSR196	
Java Authorization Service Provider Contract for Containers	1.5	JSR115	
Java EE Application Deployment (Optional)	1.2	JSR88	
Java EE Management	1.1	JSR77	
Debugging Support for Other Languages	1.0	JSR45	✓
Java EE-related Specs in Java SE:			
Java Architecture for XML Binding (JAXB)	2.2	JSR222	
Java API for XML Processing (JAXP)	1.3	JSR206	
Java Database Connectivity	4.0	JSR221	
Java Management Extensions (JMX)	2.0	JSR3	
JavaBeans Activation Framework (JAF)	1.1	JSR925	
Streaming API for XML (StAX)	1.0	JSR173	

Java EE 8 (September 21, 2017)

Technology	Version	JSR	Included in Web Profile
Web Application Technologies:			
Java API for WebSocket	1.1	JSR356	✓
Java API for JSON Binding	1.0	JSR367	✓
Java API for JSON Processing	1.1	JSR374	✓
Java Servlet	4.0	JSR369	✓
JavaServer Faces (JSF)	2.3	JSR372	✓
Expression Language (EL)	3.0	JSR341	✓
JavaServer Pages (JSP)	2.3	JSR245	✓
JavaServer Pages Standard Tag Library (JSTL)	1.2	JSR52	✓
Enterprise Application Technologies:			
Batch Applications for the Java Platform	1.0	JSR352	
Concurrency Utilities for Java EE	1.0	JSR236	
Contexts and Dependency Injection for Java (CDI)	2.0	JSR365	✓
Dependency Injection for Java	1.0	JSR330	✓
Bean Validation	2.0	JSR380	✓
Enterprise JavaBeans (EJB)	3.2	JSR345	✓
Interceptors	1.2	JSR318	✓
Java EE Connector Architecture	1.7	JSR322	
Java Persistence API (JPA)	2.2	JSR338	✓
Common Annotations for the Java Platform	1.3	JSR250	✓
Java Message Service API (JMS)	2.0	JSR343	
Java Transaction API (JTA)	1.2	JSR907	✓
JavaMail API	1.6	JSR919	
Web Services Technologies:			
Java API for RESTful Web Services (JAX-RS)	2.1	JSR370	✓
Implementing Enterprise Web Services	1.3	JSR109	
Web Services Metadata for the Java Platform	2.1	JSR181	
Java API for XML-based RPC (JAX-RPC) (Optional)	1.1	JSR101	
Java API for XML Registries (JAXR)	1.0	JSR93	
Management and Security Technologies:			
Java EE security API	1.0	JSR375	✓
Java Authentication Service Provider Interface for Containers	1.1	JSR196	✓
Java Authorization Service Provider Contract for Containers	1.5	JSR115	
Java EE Application Deployment (Optional)	1.2	JSR88	
J2EE Management	1.1	JSR77	
Debugging Support for Other Languages	1.0	JSR45	✓
Java EE-related Specs in Java SE:			
Java Management Extensions (JMX)	2.0	JSR3	
SOAP with Attachments API for Java (SAAJ) Specification	1.3	JSR67	
Streaming API for XML (StAX)	1.0	JSR173	
Java API for XML Processing (JAXP)	1.6	JSR206	
Java Database Connectivity	4.0	JSR221	
Java Architecture for XML Binding (JAXB)	2.2	JSR222	
Java API for XML-Based Web Services (JAX-WS)	2.2	JSR224	
JavaBeans Activation Framework (JAF)	1.1	JSR925	

Java Community Process(JCP)

- On December 8, 1998, Sun Microsystems, Inc., introduced the Java Community Process℠ Program for the development and revision of Java technology specifications. This formal process was designed to be fast, flexible, and adaptable to a wide variety of working styles present in the community today. A draft version of the process was circulated to licensees and others for their review and comment on October 8, 1998. Their feedback was gathered by PriceWaterHouseCooper and played an important role in shaping the form and content of the process.
- https://jcp.org/aboutJava/communityprocess/background.html

Java Community Process(JCP)

- Experience has shown that the best way to produce a technology specification is to gather a group of industry experts who have a deep understanding of the technology in question and then have a strong technical lead work with that group to create a first draft. Consensus around the form and content of the draft is then built using an iterative review process that allows an ever-widening audience to review and comment on the document.
- https://jcp.org/en/procedures/jcp2_9

Links to the useful tutorials

- J2EE 1.2 (December 12, 1999)
- https://docs.oracle.com/javaee/1.2.1/devguide/html/
- J2EE 1.3 (September 24, 2001)
- https://docs.oracle.com/javaee/1.3/tutorial/doc/
- J2EE 1.4 (November 11, 2003)
- https://docs.oracle.com/javaee/1.4/tutorial/doc/
- Java EE 5 (May 11, 2006)
- https://docs.oracle.com/javaee/5/tutorial/doc/
- Java EE 6 (December 10, 2009)
- https://docs.oracle.com/javaee/6/tutorial/doc/
- Java EE 7 (June 12, 2013)
- https://docs.oracle.com/javaee/7/tutorial/index.html
- Java EE 8 (September 21, 2017)
- https://javaee.github.io/tutorial/toc.html