# Understanding
# J2EE

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# Introduction to J2EE

- The Java 2 Platform, Enterprise Edition (J2EE) defines the standard for developing multi-tier enterprise applications.

- J2EE simplifies enterprise applications by
  - basing them on standardized, modular components
  - by providing a complete set of services to those components
  - by handling many details of application behavior automatically, without complex programming

# To understand J2EE and its features, let us look at a scenario!

# MaxMoney Bank

- MaxMoney Bank is a large multinational bank with global presence.

- Over the years, its activities have increased in terms of the services offered and the volume of transaction.

- Broadly, the bank has three activities – regular deposits, loans, and credit. The bank also offers a credit card facility and ATM centers.

- The following slides describe how J2EE technologies were used to solve specified requirements and to automate various banking activities for MaxMoney Bank.

# Requirement 1

- MaxMoney Bank wants to find out the popularity of their newly created Web site before investing money on advertisements.

- The bank wants to keep track of the of users visiting the Web site.

- For this purpose, they want a Login/Registration page to be created for the visitors of the site.

# Solution: Servlets and JDBC

- Whenever a user visits the MaxMoney Bank Web site, he will need to Login with authentic username and password.

- This information will typically be kept in a database at the bank.

- In this scenario:

  - A server side (Web) technology is required to generate HTML output for the client browsers

  - Database connectivity is required to check/validate usernames and passwords

# Solution: Servlets and JDBC

Clients connect to the Servlet which accepts the login information and validates it in the database
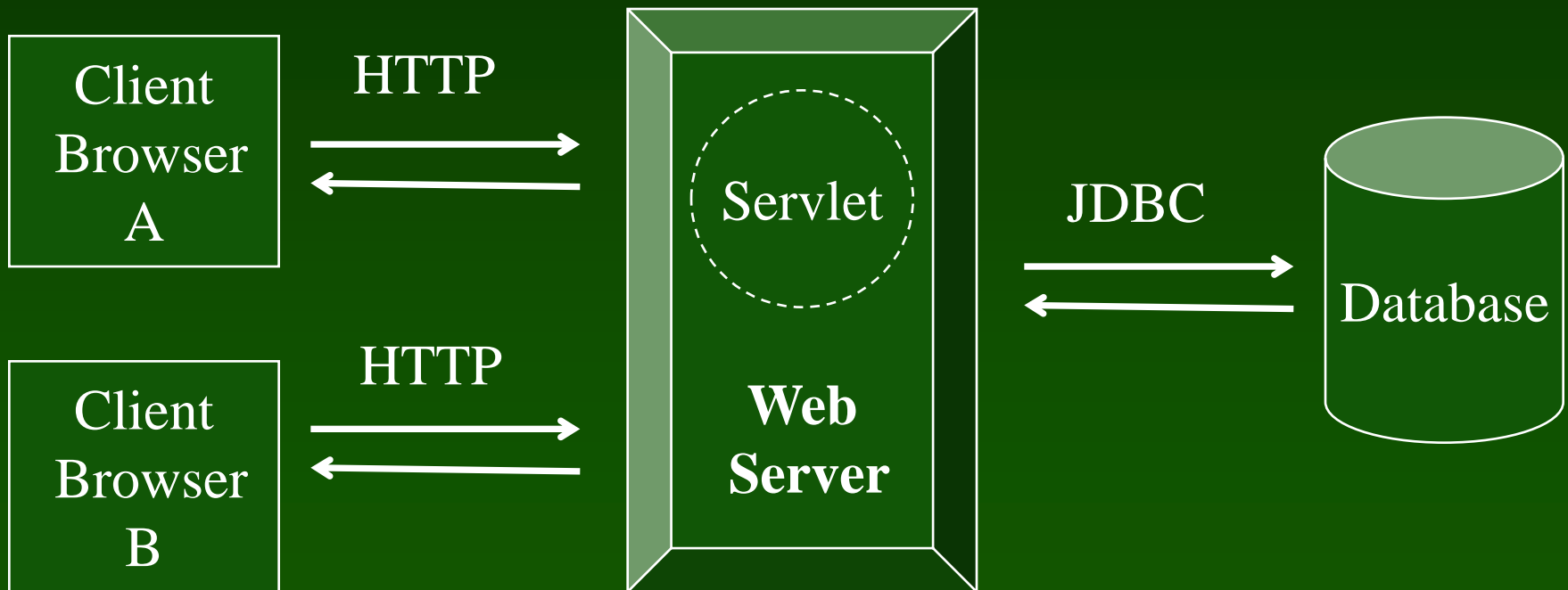
# Solution: (Contd…) Servlets

- Servlets are:
  - Java Components on the Web Server
  - Used for generation of dynamic content
  - Output can be HTML, XML, WML, or any other content type

- A servlet is loaded only once in the memory and is initialized.

- After the servlet is initialized, it starts accepting requests from the client and processes them till it is shutdown.

# Solution: (Contd…) JDBC

- Java Database Connectivity (JDBC) provides a database-programming API for Java programs.

- Contains a set of classes and interfaces that are used to:
  - connect to a database built using any DBMS/RDBMS
  - submit SQL queries to a database
  - retrieve and process the results of SQL queries

# Requirement: 2

- After receiving various inputs from their customers, MaxMoney Bank decided to modify the Web site and enhance its presentation.

- To speed up the development cycle, the project development  team is split into two.

  – The first team will create the static content of the application that involves designing the user interface

  – The second team, comprising the programmers, will be responsible for coding and creating the dynamic content of the application.

# Solution: JSP

- JSP technology segregates the work profiles of a Web designer and a Web developer.

- A Web designer can design and formulate the layout for the Web page by using HTML.

- A Web developer working independently can use Java code and other JSP specific tags to code for the business logic.

- The simultaneous construction of the static and dynamic content facilitates development of quality applications with increased productivity.

# Solution: (Contd…) JSP

A JSP page processes the request and returns the result to the Web Server, which in turn gives it to the client.
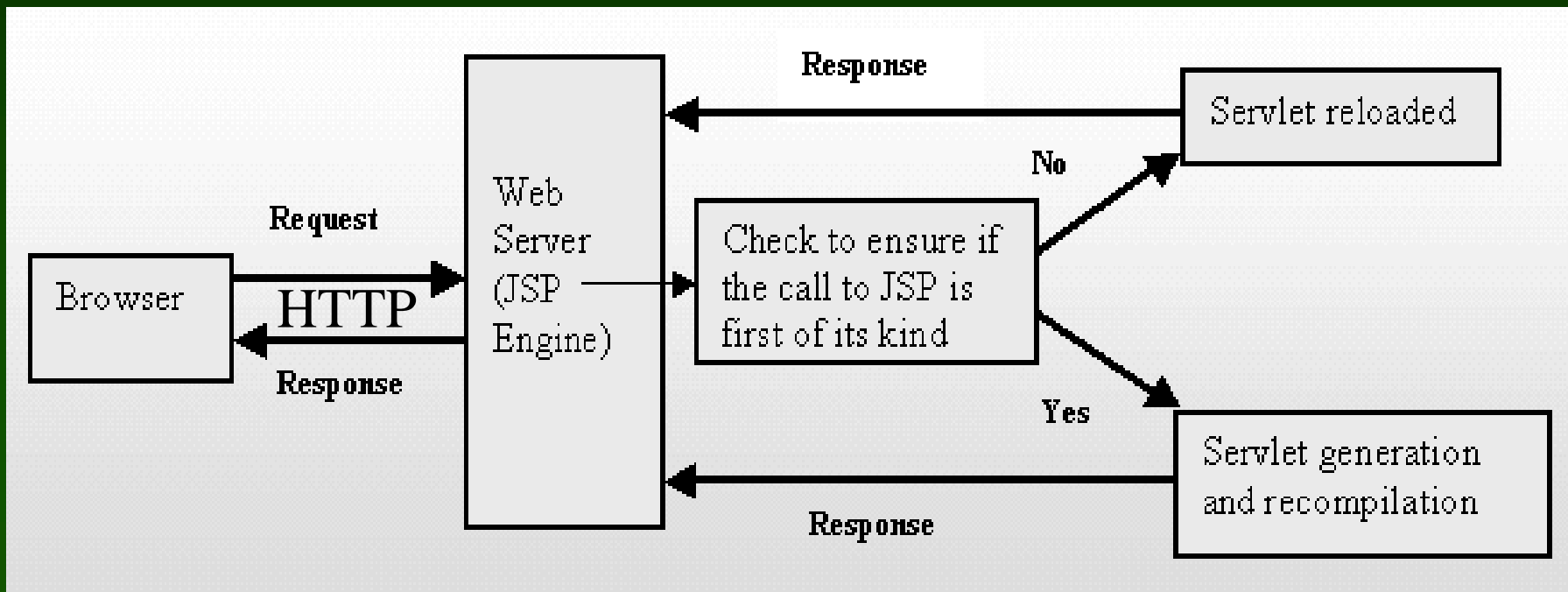
# Requirement: 3

- MaxMoney Bank has ATMs in all major cities across the globe.

- They have a central database in Chicago.

- The bank wants to create a distributed application (which is NOT Web based) that will allow its customers to access an account with the bank.

# Solution: RMI

- The ideal solution in this scenario would be to
  - have the clients access and submit information using the client application
  - information will be validated by components hosted on a server
  - Server, in turn (if the data submitted meets all the business rules), will create a connection with the database server and submit the data
  - To keep the load on the database server optimized, the application will need to be distributed across the network.

# Solution: (Contd…) RMI

RMI-Clients invoke the methods stored on the RMI-Server which accepts the request and retrieves information from the centralized database at Chicago
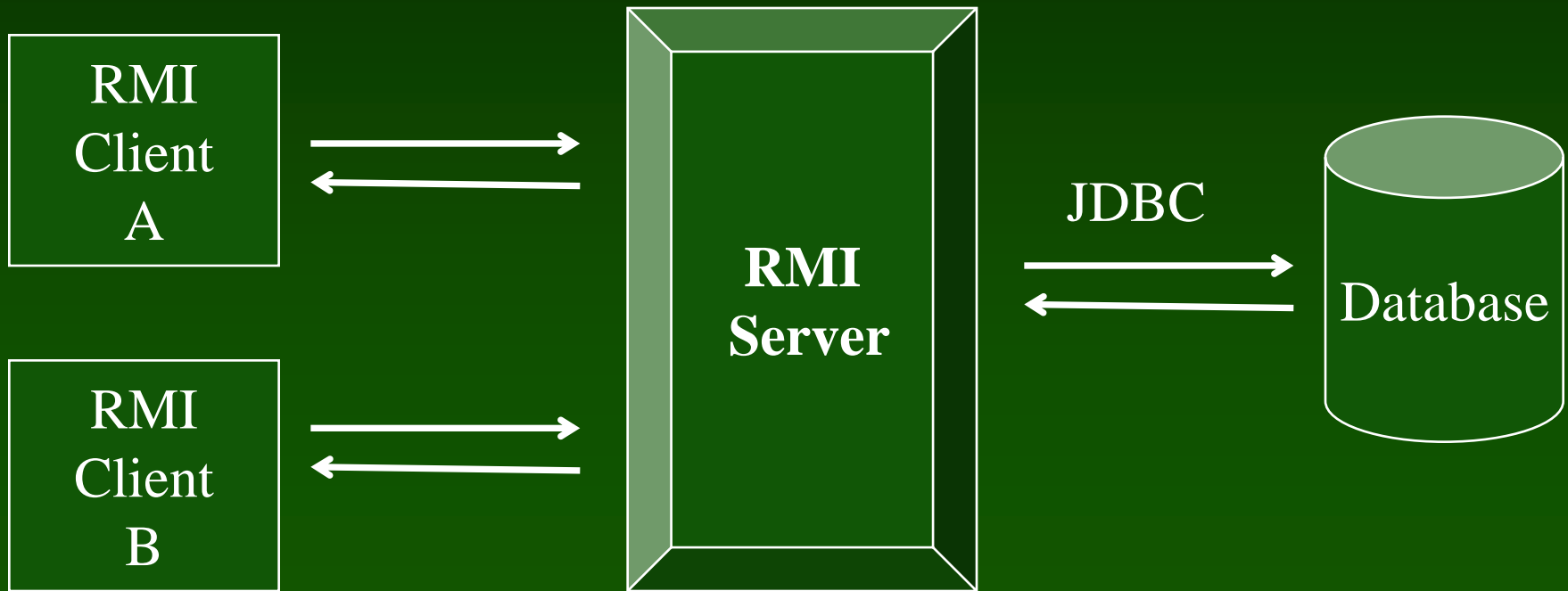
# Solution: (Contd…) RMI

- RMI is a specification that enables one Java Virtual Machine (JVM) to invoke methods in an object located in another Java Virtual Machine (JVM).

- These two JVMs could be running on different computers or running as separate processes on the same computer.

- RMI is implemented on the middle-tier of the three-tier architecture framework, thereby facilitating the programmers to invoke distributed components across a networked environment.
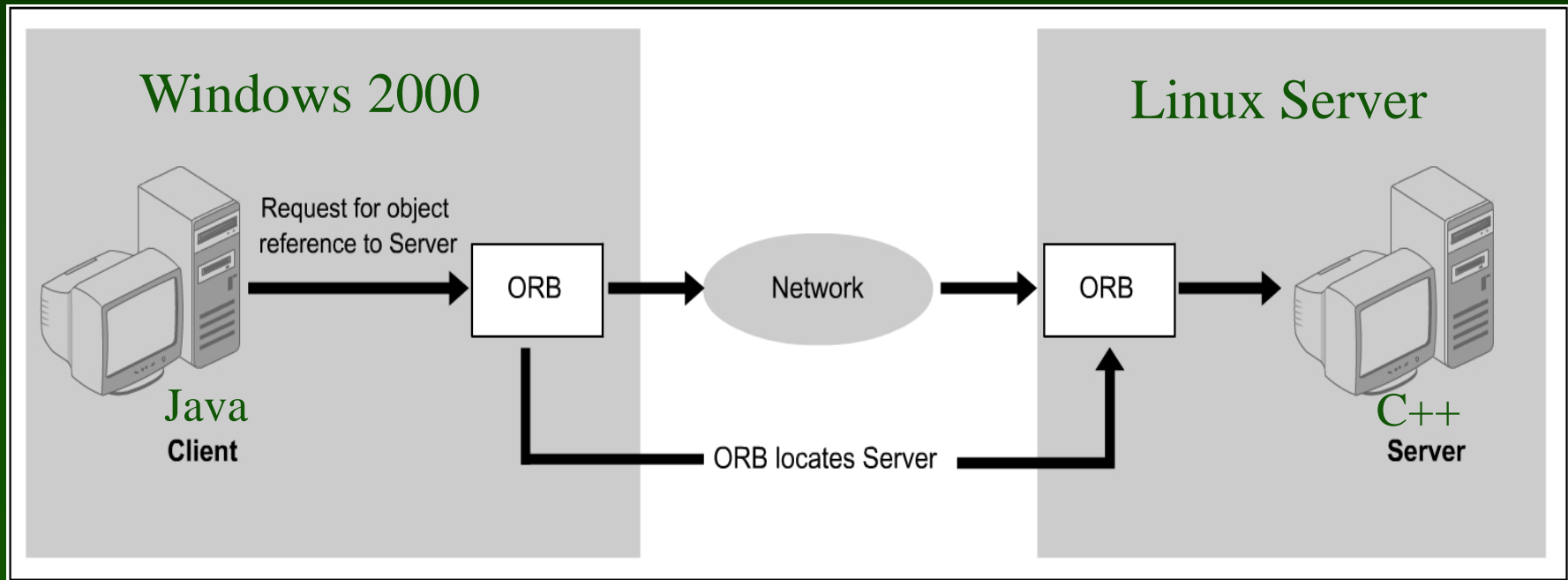
# Requirement: 4

- MaxMoney Bank has an existing application written in C++. Unlike the newly developed solution (which is hosted on Windows 2000 server), this C++ application is residing on Linux server.

- The bank wants to integrate this application to the newly developed Java applications.

# Solution: CORBA

- The ideal solution in this scenario would be to:

  - have the clients(Java) access an interface that will allow it to submit request to the server (C++) application

  - The interface will enable the C++ and Java applications (over dissimilar platforms) to communicate with each other

# Solution: (Contd…) CORBA

CORBA, or Common Object Request Broker Architecture, provides a standard architecture that enables distributed and heterogeneous objects to interoperate



Windows 2000                Linux Server

Request for object reference to Server

ORB → Network → ORB

ORB locates Server

Java
**Client**

C++
**Server**

# Solution: (Contd…) CORBA

- Using CORBA, a client can remotely communicate with the server irrespective of the:

  - hardware

  - operating systems

  - software development language

# Requirement: 5

- MaxMoney bank wants to enhance the ATM application.

- A customer should be able to do multiple transactions (cash withdrawal, request for account summary etc.) once he has logged into the ATM.

# Solution: EJB

- The application needs to be designed to validate the card information entered by the user, and this information, if valid, must be carried over until the user leaves ATM.

- Considering that the information must be retained while the user traverses across screens, it is best suited to create an EJB.

# Solution: (Contd…) EJB

EJB is a specification for creating server-side components that enables and simplifies the task of creating distributed objects
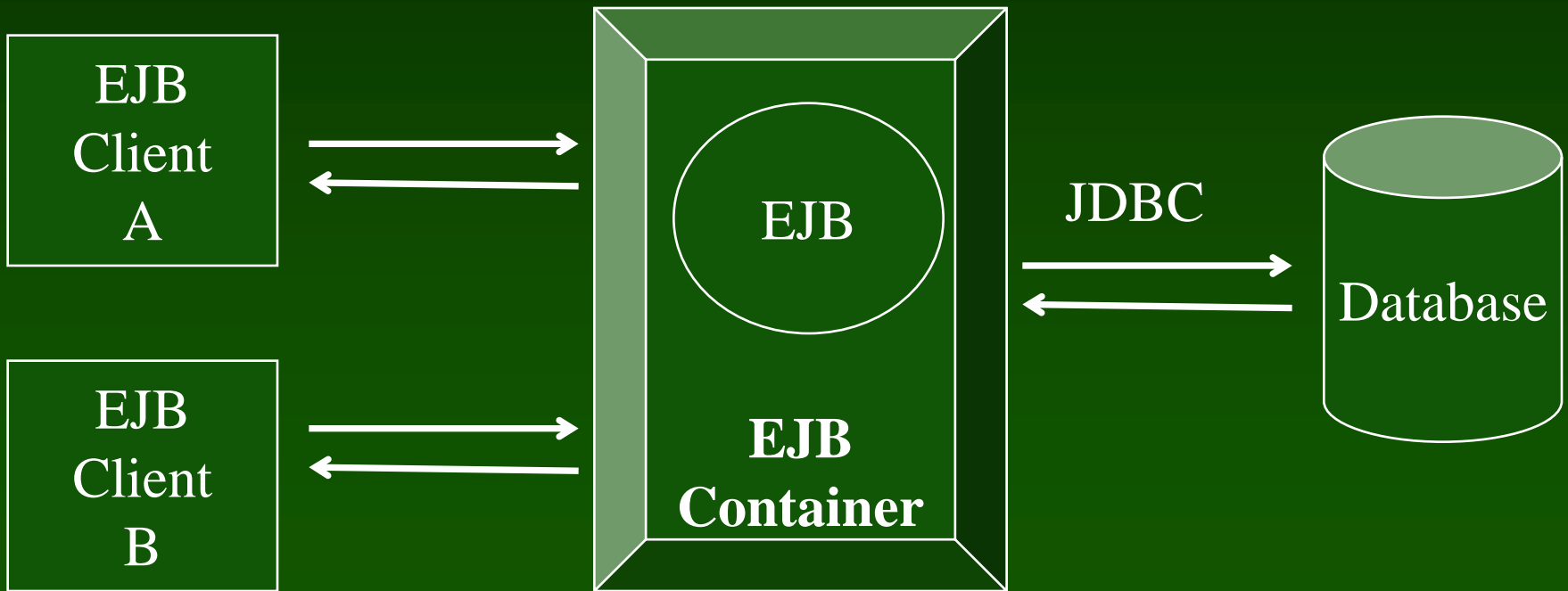
# Solution: (Contd…) EJB

- EJB components are server-side components written using Java

- EJB components implement the business logic only

- EJB components provide services, such as transaction and security management

- EJB can maintain state information across various method calls

# Requirement:  7

- Other integral requirements of any real-time enterprise solution are:
  - Messaging Service
  - Transaction management
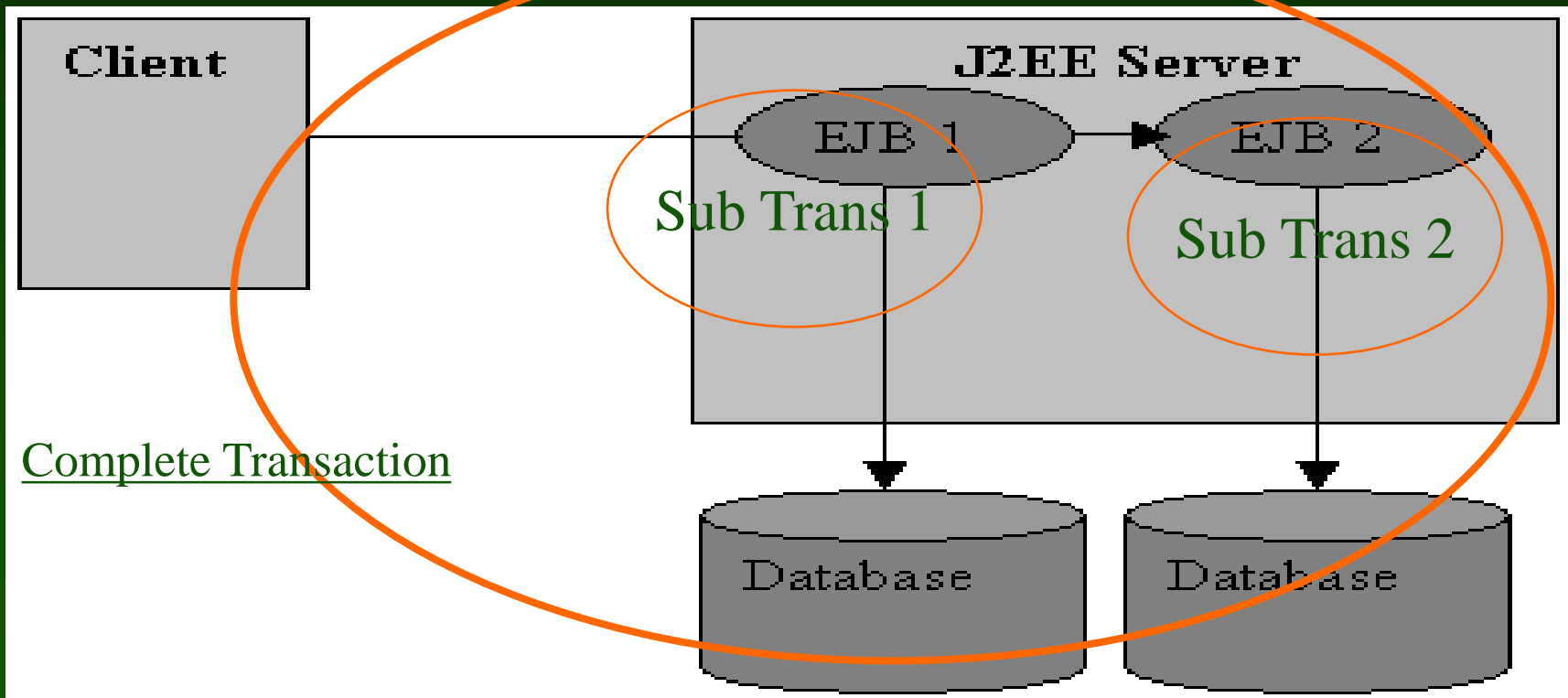  - Directory Service
  - Security service

# Solution: Messaging Service

- The components in a message-based application send messages to a message server.

- The message server, in turn, delivers the messages to the specified recipients.

- The message service model is much like the model behind the postal service

# Solution: (Contd…) Transaction Service

The transaction is completed when all the sub-transactions are also completed individually

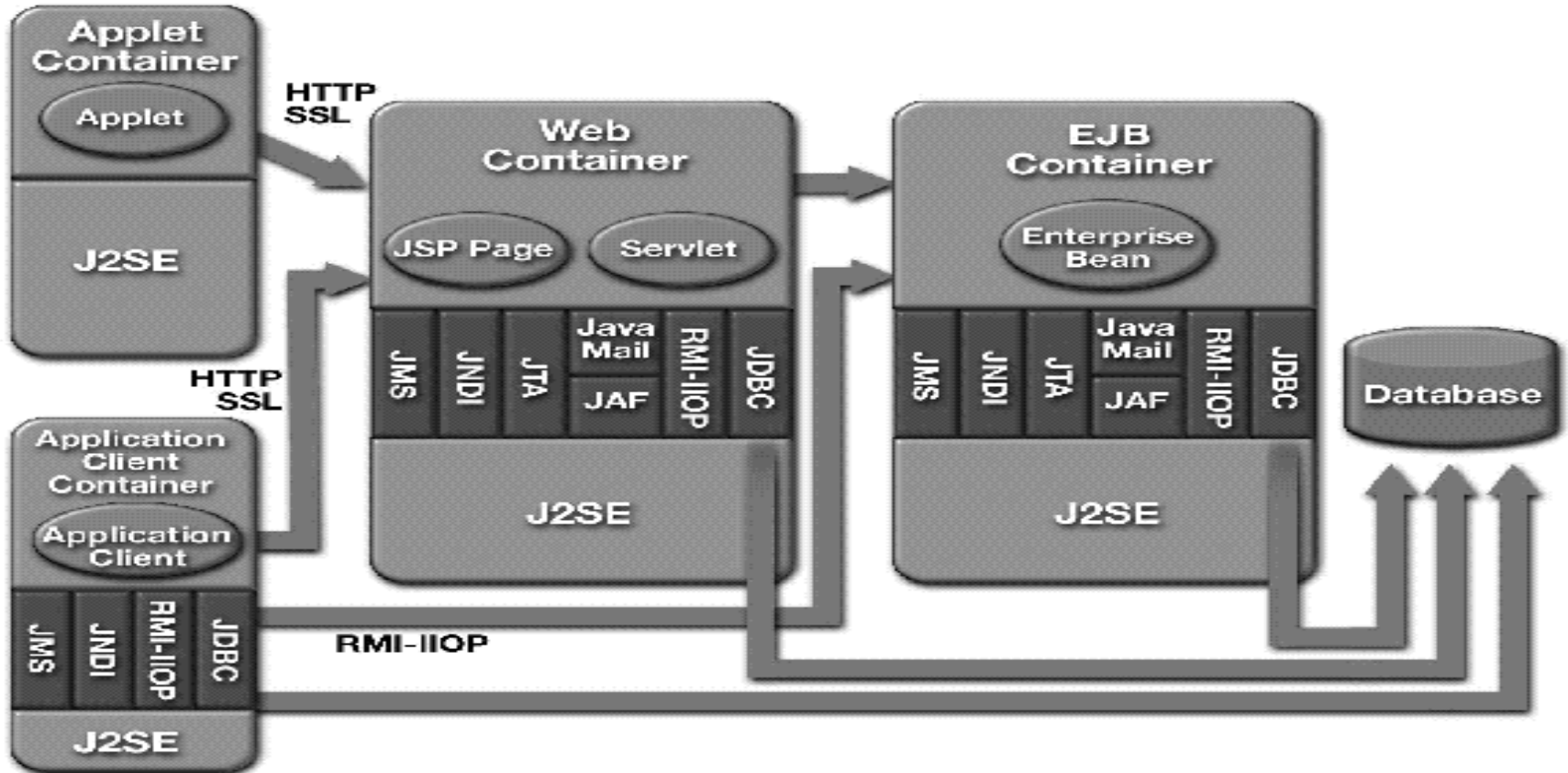# Solution: (Contd…)Directory Service

- JNDI is an API specified in Java that provides naming and directory functionality to applications written in Java

- Using JNDI, Java applications can store and retrieve Java objects across networks

# Solution: 7 (Contd…) Security

- J2EE platform supports the following types of security: Authentication, Authorization and Integrity mechanisms

- In the J2EE platform, a container establishes the authenticity of both inbound calls and outbound calls

- The Java Cryptography Architecture (JCA) API provides you the mechanism to encrypt/decrypt messages in Java applications

- Java Authentication and Authorization Service (JAAS) and Java Generic Security Services Application Programming Interface (GSS-API) are used to secure messages

# J2EE Components and Services

All the technologies/services of J2EE can be viewed together in the following diagram:

# THANK YOU

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