Unit - III

SOA and Programming

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Web Service

- A web service is any piece of software that makes itself available over the internet and uses a standardized XML messaging system.
- web services are not tied to any one operating system or programming language--Java can talk with Perl; Windows applications can talk with Unix applications.
- Web services are XML-based information exchange systems that use the Internet for direct application-to-application interaction.

Use of service in cloud environment

- Service Models
  - Iaas (Infrastructure as a service)
  - Paas(Platform as a service)
  - Saas (Software as a Service)

IaaS

- Infrastructure as a Service (IaaS) involves outsourcing the equipment used to support operations, including storage, hardware, servers and networking components.

PaaS

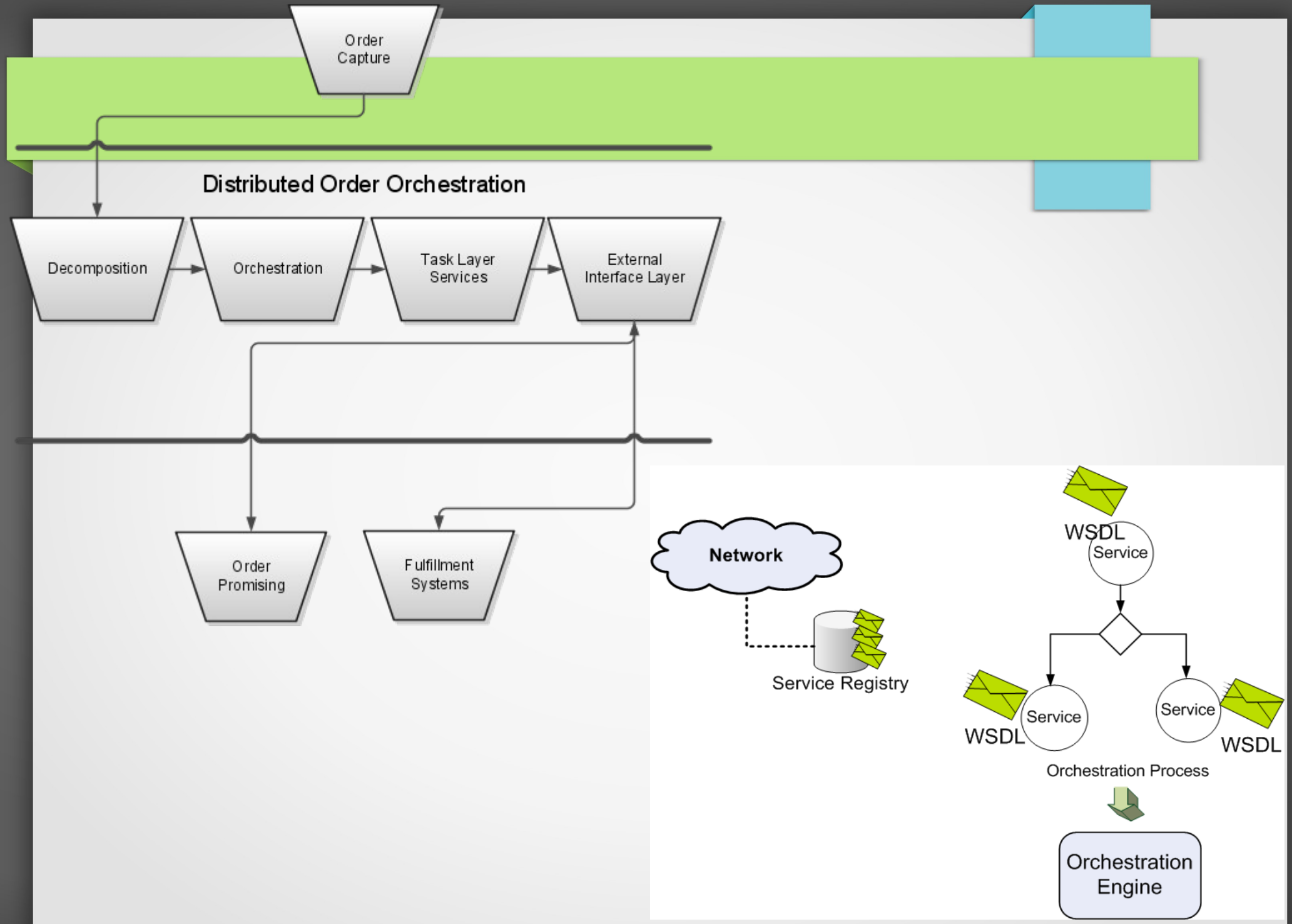
- Platform as a Service (PaaS) is a paradigm for delivering operating systems and associated services over the Internet without downloads or installation.

SaaS

- Software as a Service (SaaS) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet

Service Orchestration

- Orchestration
  - An arragement of event that attempts to achieve a maximum effect
  - Co-ordination of event between different web services
  - Orchestration directs and manages on demand services to create a composite application or buisness process
  - Message Passing Among Requester and Provider
  - Data Handling

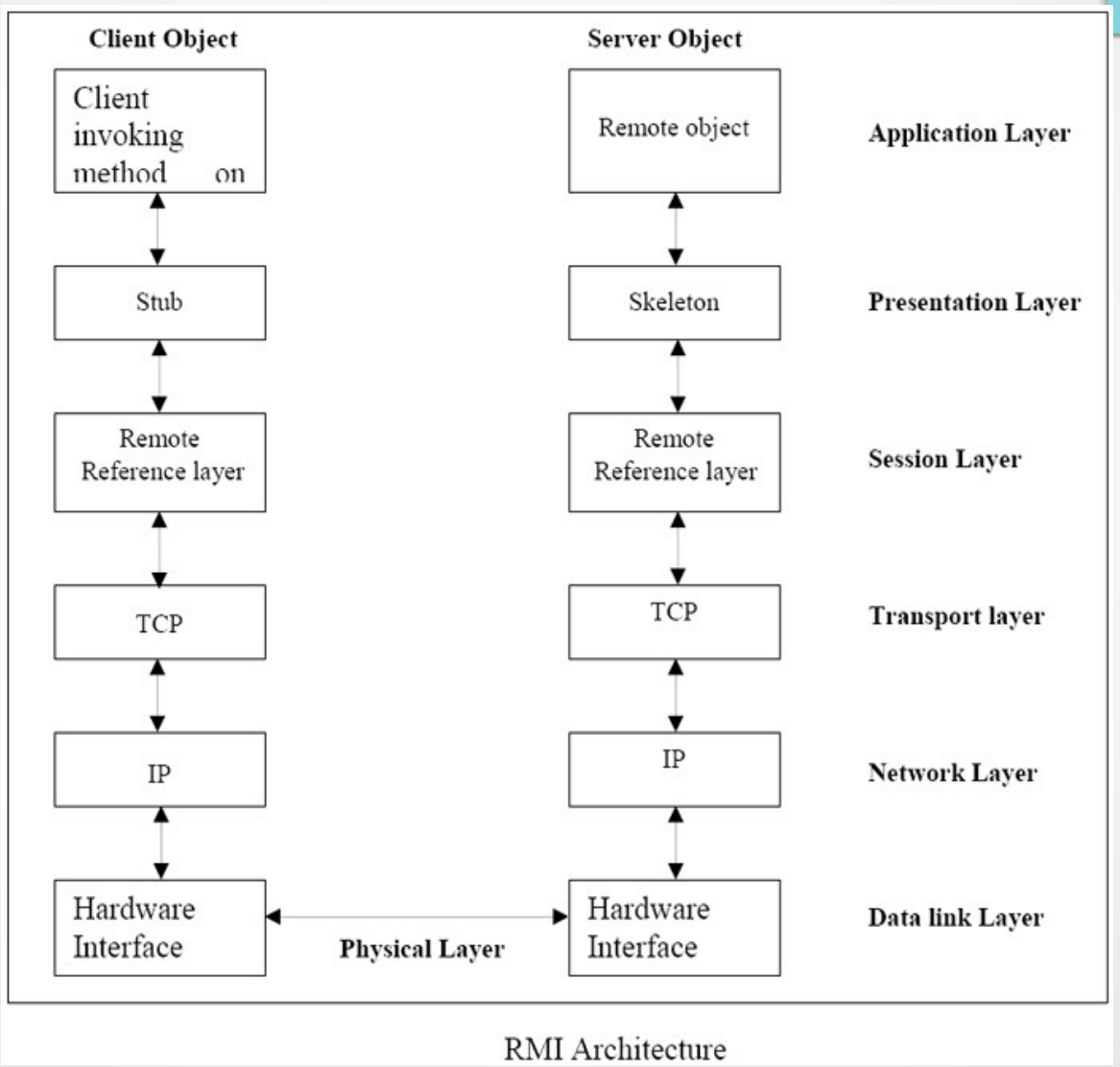

Order Capture
Distributed Order Orchestration
Decomposition
Orchestration
Task Layer Services
External Interface Layer
Order Promising
Fulfillment Systems
Network
Service Registry
WSDL
Service
WSDL
Service
Service
WSDL
Orchestration Process
Orchestration Engine

RMI

- It is a technology for distributed System
- RMI allows object to object communication between different JVM
- The RMI provides remote communication between the applications using two objects stub and skeleton.

RMI Architecture

- Three Layers
  - Stub.Skeleton Layer
  - Remote Reference Layer
  - Transport Layer



RMI Architecture

- Stub/Skelotn Layer
  - It is for Marshalling and Unmarshalling
  - Marshalling – Process of converting data/object being transfeered into a byte stream
  - Unmarshalling- reverse of Marshalling

- Stub –
  - It is a client side Object
  - Acts as a proxy for remote object
  - It has same interface,metho as remote object
  - But when client calls the stub method, the stub forwards the request via RMI interface to remote Object
- Skeleton
  - It take care of all the details of remoteness so that actual remote object doesn't need to worry about them
- Remote Reference Layer
  - This layer provides a JRMP(Java Remote Method Protocol)
  - Java.rmi.server.RemoteRef object that represents a handle to remote Object
- Transport Layer
  - It is stream based network connections over TCP/IP between the JVM
  - RMI uses wire level protocol called JRMP on top of TCP/IP

- Registry
  - java.rmi.registry.Registry
  - It runs in 1099 port number
  - Remote object is associated with a name in registry
  - Any time client wants to invoke the remote object,it obtain the reference by looking up into name into the registry
  - The lookup returns the remote reference, a stub,to the object.

Naming class in RMI

- RMI provides the class called naming for iteraction purpos
- Methods
  - Bind
    - Binds the remote object to string name
  - Rebind
    - Rebind the specified name if it is already in use to new remote object
  - Unbind
    - Removes the binding with sepcified name
  - List
    - Return the array of name bound to registry
  - Lookup
    - Return the reference, a stub for remote object associated with specific name
  -

How to run RMO Prog

- Compile all .java files
- Rmic – impelentation file
- Start rmi registry
- Start Server
- Start Client

Web Service

- A web service is way of establishing communication between two softwares which language interoperable
- A web service is a way of accling a function which is inside a software from other software
- Types of Web Services
  - SOAP
  - RESTful

SOAP

- Simple Object Access Protocol
- XML Based Protocol
- Platform Independent and Lang Independent
- Advantages
  - WS Security – SOAP Defines its own security
  - Lang and Platform Independent
- Disadvantages
  - Slow – Soap uses xml format that must be parsed to read
  - Defines many standards that must be followed while developing soap application
  - WSDL Dependent
    - It used WSDL and dosent have any other mechanism to discover the service

WSDL

- WSDL stands for Web Services Description Language
- WSDL is written in XML
- WSDL is an XML document
- WSDL is used to describe Web services
- WSDL is also used to locate Web services
- Contaning info about web such as name,method parameter and how to access it
- It act interface between web service application

UDDI

- Universal Description,Discovery Integration
- XML Based Framework
- It is described by WSDL
- UDDI is a specification for a distributed registry of web services.
- UDDI is a platform-independent, open framework.
- UDDI can communicate via SOAP, CORBA, Java RMI Protocol.
- UDDI uses Web Service Definition Language(WSDL) to describe interfaces to web services.
- UDDI is seen with SOAP and WSDL as one of the three foundation standards of web services.
- UDDI is an open industry initiative, enabling businesses to discover each other and define how they interact over the Internet.

Servlet

- A servelt is a small,pluggable extension to server that enhance the server functionality
- Java Servlets are programs that run on a Web or Application server and act as a middle layer between a request coming from a Web browser or other HTTP client and databases or applications on the HTTP server.

Competing Technologies

- **CGI**
  - Common Gateway Interface
  - Processing occurs on web server
- Disadvantages
  - Each time CGI scripts is executed a new process is started
  - When Server recieves a request that access a CGI progr
  - It must create a new Process to run the CGI Prog

- FAST CGI
  - Similar to CGI the only difference is that instead of creating a new process for every request it creates new process for every prog
  - So one process for each CGI Program
- ASP
  - Active Server Pages
  - Introduced by microsoft
  - Similar to JSP
  - Drawbacks
    - It is for only microsoft platform.

Servlet

- Compare with CGI and Fast CGI servlet creates seperate thread for every request.
- Servelet run inside java virtual machine so it is safe and portable
- Advantages
  - Portability
  - Powerfull
  - Efficiency
  - Saftey
  - Flexible
  - Extensible

Servlet Container

- It allow servlet class to read data which is coming from browser
- To run servelt class we required servlet container

Servlet Life Cycle

- It icludes three methods
  - Init (ServletConfig)
  - Service()
  - Destroy()

Init(ServletConfig)

- It is called by server immediately after the server constructs the servlet instance
- It is used to perform servelt initialization
- It takes serveltconfig as an argument

Service()

- It is for handling request of clients
- It takes two arguments a request object and response object

Destroy()

- This method is called when server shutdown ro servlet is reloaded

  Init() and destroy() methods are going to called only once in life cycle while service method get called for every request.

Web Services Using Java

- To develop web services using java some API are used
- JAX-RPC
- JAX-M
- JAX-WS
- JAX-RS
- Synchronous Web Services
  - Whenever client send a req to webservice and web service provides imidate response this is called synchronous web service
- Asynchronous Web Services
  - Whenever client makes a req to web service and if web service takes some time to provide response to client is called asynchronous web service

JAX-RPC

- Java API for XML-Remote Procedure Call
- It is a specification
- We can develop both SOAP based web services and SOAP based web services client
- Implementation classes
  - JAX-RPC-SI
  - Axis 1
  - Weblogic
  - WebSphere
  - JBoss

JAX-WS

- Java API for XML-Web Service
- Impleentation Classes
  - JAX-WS-RI
  - Metro
  - Axis2
  - Apache CXF
  - WebLogic
  - WebSpeher
  - Jboss
  - GlassFish

JAX-RS

- Java API for XML- RESTful
- Implementation classes
  - Jersy
  - RESTEASY
  - Apache CXF

EJB

- EJB stands for Enterprise Java Beans.
- EJB is an essential part of a J2EE platform.
- J2EE platform have component based architecture to provide multi-tiered, distributed and highly transactional features to enterprise level applications.
- EJB provides an architecture to develop and deploy component based enterprise applications considering robustness, high scalability and high performance.

Advantages

- Simplified development of large scale enterprise level application.
- Application Server/ EJB container provides most of the system level services like transaction handling, logging, load balancing, persistence mechanism, exception handling and so on. Developer has to focus only on business logic of the application.
- EJB container manages life cycle of ejb instances thus developer needs not to worry about when to create/delete ejb objects.

TYPES OF EJB

- Session Bean
- Entity Bean
- Message Driven Bean

Session Bean

- Session bean stores data of a particular user for a single session.
- It can be stateful or stateless.
- It is less resource intensive as compared to entity beans.
- Session bean gets destroyed as soon as user session terminates.

Entity Bean

- Entity beans represents persistent data storage.
- User data can be saved to database via entity beans and later on can be retrived from the database in the entity bean.

Message Driven Bean

- Message driven beans are used in context of JMS (Java Messaging Service). Message Driven Beans can consumes JMS messages from external entities and act accordingly.

Stateless Session Bean

- A stateless session bean is a type of enterprise bean which is normally used to do independent operations.
- A stateless session bean as per its name does not have any associated client state, but it may preserve its instance state.
- EJB Container normally creates a pool of few stateless bean's objects and use these objects to process client's request.
- Because of pool, instance variable values are not guaranteed to be same across lookups/method calls.

Statefull session Bean

- A stateful session bean is a type of enterprise bean which preserve the conversational state with client.
- A stateful session bean as per its name keeps associated client state in its instance variables.
- EJB Container creates a separate stateful session bean to process client's each request.
- As soon as request scope is over, statelful session bean is destroyed.

Persistence

- Entity - A persistent object representing the data-store record. It is good to be serializable.
- EntityManager - Persistence interface to do data operations like add/delete/update/find on persistent object(entity). It also helps to execute queries using Query interface.
- Persistence unit (persistence.xml) - Persistence unit describes the properties of persistence mechanism.
- Data Source (*ds.xml) - Data Source describes the data-store related properties like connection url. user-name,password etc.