----------Webservices Class Notes----------
Date : 07-Aug-2018

Hello Friends,

Welcome to Webservices.....

Before starting Webservices course, first let me set the expectations like who should learn this course and who should not learn, what are the pre-requisites to learn Webservices
and how job opportunities will be there for Webservices and what is the course content etc..

Who Should Learn Webservices ?

For Freshers - > Webservices are optional

For Experienced/fake experience ppl - > Webservices & Restful Services are mandatory

If i learn Webservices, what is the use ?

Webservices and Restful services are trending technologies in the market.

All most all ppl will learn Spring and Hibernate but very few ppl are learing Webservices.

If you know Webservices along with Spring and Hibernate then getting job opportunities will be multiplied for you.

Even in the industry also, very few ppl knows how to work with Webservices.

Out of 10 members -> max 3-4 ppl only knows webservices.

If you know Spring and Hibernate then you can demand for 5 - 6 lakhs package for 3 years exp.

If we know Spring, Hibernate , Webservices and Restfull services also then we can demand upto 8 lakhs package (Companies also ready to pay good packages for Webservice developers because need is there). - Demand and Supply rule.

In Realtime all applications are tightly coupled with Webservices.

I might also heared, Restfull services are there in almost all applications development.

Feel proud that you are going become Webservices and Restful services developer in another 2 months.

If you mention Webservice and Restfull services in your resume then it will have special weightage (more demand will be there)

Pre-requisites

You should complete core java first to attend Webservices

If anybody doing core java now, please don't come to Webservices from tomorrow. Even if you come you will not understand (Time waste and money waste).

First learn Core java properly then come for Webservices.

Core Java

- OOPS
- Exception Handling
- Multi-Threading
- IO Streams
- Annotations
- Generics
- java.net (i will cover basics)
- Swings & AWT & Applets (Not required)
- Collections

Adv Java

- JDBC (Not required)
- Connection Pooling (not required)
- Servlets (Basic knowledge is required)
- WebServer
- ApplicationServer
- Application Deployment process

Frameworks

- Struts (Not required)
- Hibernate (Not required)
- Spring (optional)

Distributed Technologies - Not required

- CORBA
- RMI
- EJB

Course content
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1) Introduction (1 week)

2) Real-time use cases (How Webservices are using)

2) WebServices Architecture (2days)

3) Xml Technologies (XML, DTD, XSD, JAX-P and JAX-B)-(2-3 weeks)

XML - > It is used to represent the data
DTD - > To validate xml structure
XSD - > To validate structure and type of data as well

I am storing some data in xml

```
<?xml version="1.0" encoding="UTF-8"?>
<books>
  <book>
      <id>101</id>
      <name>Spring</name>
      <price>1000.00</price>
  <book>
</books>
```

Can i read the above xml file using Java ? - Yes we can read

IO streams we can use to read this file but io steams will read from starting to ending (it will data and meta data as well)

If I want to read only data we need to write customized logic for every xml (to differentiate meta-data and actual data).

To overcome this problem sun provided jax-p api to parse xml files in xml style. (It ignores meta-data and provides only usefull data to us).

-> jax-p --> java api for xml parsing

-> jax-b -> java architecture for xml binding

Why two apis are there to parse xml ?
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jdbc - textaul data
hibernate - objects data
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jax-p will parse xml data in text format

jax-b will parse xml data in object format

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Post XML Technologies Actual WebServices will start

In java we can develop webservices in 2 ways.

1) JAX-RPC API(Immutured API)
2) JAX-WS API

These are 2 apis provided by sun to develop soap based webservices (Big Webservices)

JAX-RPC = > JAVA API FOR XML - Remote Procedural Call

JAX-WS => JAVA API FOR XML - Web Services

-> We can a write a program for sum of 2 nums using C and using Java also.

-> If i do that program in C and Java -> Output will be same or Different ? - > Output will be same only.

-> But weather to use C or java it depends on programmer choice and it depends on programmer comfort level.

-> Similarly if i develop a Webservice using JAX-RPC OR JAX-WS the result will be Webservice only.

-> JAX-RPC is the first and foremost api given by Sun Micro System to develop Webservices.

-> JAX-WS api came into market later point of time with some additional features to develop Webservices.

-> Using JAX-RPC we need to huge amount of code, if we use JAX-WS code will be reduced (Developer life will be simple).

Now, Can i develop Webservices using these APIs ?

By using only these APIs we can't develop webservices because
APIs are partial they are not complete.

To work with API we need implementations

For Jdbc API we need Implementations like
- > oracle | mysql | db2 | mongodb etc..

What are the Implementations available for these APIs ?

Its not one Implementation there are several implementations available.

JAX-RPC API Implementations

- SI (Sun implementation)
- Apache AXIS
- Oracle Weblogic Webservices
- IBM Websphere Webservices

JAX-WS API Implementations

- RI (Reference implementation) - Sun
- Metro
- APACHE AXIS2 (j2ee)
- Apache CXF (Spring)
- Oracle Weblogic Webservices
- IBM Websphere Webservices
- JBoss webservices

-> In Web Application we will have CLient and Server

- > In Webservices we will have Provider and Consumer

-> We can execute a query in 2 ways
using Statement and Prepared Statemnt

-> Webservices server side we can develop in below 2 ways

- > Contract First Approach
- > Contract Last Approach

jax-rpc api - > SI - > Server side - > Contract First
jax-rpc api - > SI - > Server side - > Contract Last

jax-rpc api - > AXIS - > Server side - > Contract First
jax-rpc api - > AXIS - > Server side - > Contract Last

jax-WS api - > RI - > Provider side - > Contract First
jax-ws api - > RI - > Provider side - > Contract Last

jax-WS api - > AXIS 2 - > Provider side - > Contract First
jax-WS api - > AXIS 2 - > Provider side - > Contract Last

jax-WS api - > CXF - > Provider side - > Contract First
jax-WS api - > CXF - > Provider side - > Contract Last

Consumer side Programming
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jax-rpc consumer development

We can develop JAX-RPC consumer in below 3 ways

- STUB based consumer
- DP (Dynamic proxy)
- DII (Dynamic Invocation Interface)

JAX-WS API Consumer development

We can devlop jax-WS consumer in below 2 ways

- STUB BASED Consumer
- DP (Dynamic Proxy)

SOAP UI - Webservice Testing tool
WSDL - Contract
Security
Spring Integration with Soap webservices

What Webservices you are using in your project ?

JAX-RPC API
SI Implementation
Server Side (Provider)
Contract First Approach

JAX-RPC API
SI Implementation
Client Side (Consumer)
STUB Based client

----------RESTful services----------
Introduction
Diff soap and Rest
Rest Architecture
Rest Principles
JSON (Jakson & Gson)
Restfull services

JAX-RS (2.0) - api
- Jersy (Sun)
- RestEasy (JBoss)

Spring with Rest (2 days)
Rest Security
POSTMAN (restfull services testing) - chrome plugin
OAUTH (will not be covered)
Swagger(documentation)
WADL (Web application description language)

Before jumping into Webservices , first tell me what is your opinion on Webservices ? - Anyone can answere

Your Answeres

It is used to communicate with 2 applications which are devleoped in 2 diff technologies

To share business services from one app to another app

Both are correct.....

What is Web-service ?

Webservice is one of the forms of Distributed technologies which is used to develop distributed applications.

We can't implement all requirements using Distributed technologies.

What factors will motivate us to use distributed technologies?
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1) If we want to increase throughput of application

- > Doing more task in less time is called Throughput

2) If we want to reduce turn-around time of application

- > Completing more jobs with in less time is called reducing turn around time.

3) If we want to build scalable and high responsive systems

-> Should not break

4) If we want high utilization of resources

5) If we want hig availability of resources

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Distributed technologies are not available from day 1 onwards in the industry. As the demands and usecases are increasing for applications the notation got started for Distributed technologies.

Sun Micro System also provided support for developing Distributed Applications by providing below

technologies/apis.

1) CORBA
2) RMI
3) EJB

Corba : Common object request broker architecture

-> CORBA enables communication between software written in different languages and running on different computers. Implementation details from specific operating systems, programming languages, and hardware platforms are all removed from the responsibility of developers who use CORBA. CORBA normalizes the method-call semantics between application objects residing either in the same address-space (application) or in remote address-spaces (same host, or remote host on a network). Version 1.0 was released in October 1991.

-> CORBA uses an interface definition language (IDL) to specify the interfaces that objects present to the outer world. CORBA then specifies a mapping from IDL to a specific implementation language like C++ or Java. Standard mappings exist for Ada, C, C++, C++11, COBOL, Java, Lisp, PL/I, Object Pascal, Python, Ruby and Smalltalk. Non-standard mappings exist for C#, Erlang, Perl, Tcl and Visual Basic implemented by object request brokers (ORBs) written for those languages.

-> CORBA applications needs to be deployed in MOM (Message oriented Middleware servers) - They are costly

-> Here we need to start with IDL then we need to create language specific file and then we have to write business logic and we need to purchase MOM server. Due to all these factorys CORBA got outdated from industry.

-> To Overcome the drawbacks of CORBA, Sun provided RMI

RMI : Remote method invocation

-> RMI stands for Remote Method Invocation. After CORBA, SUN released RMI as an API to support distributed programming. It allows a Java Object to be
exposed over the network. SUN designed RMI keeping in view of all the complexities and drawbacks in CORBA and ensured those will not be reintroduced
in RMI. So, in RMI java developer instead of writing a different language script like IDL, he will start with Java Object development and once he
finish writing the business logic in the POJO, he will give it as input to RMI Compiler, which will generates abstractions (a layer on top of it) to expose over the network.

-> Here the programmer need to worry to code a different language file or need not write the code in some other generated object, rather the development starts with POJO and once finishes will generate network abstractions to expose it. To expose the generated object over network, it has to be deployed on a server called RMI server. The RMI server is open source and would be shipped as part of JDK and is very light weight server.

-> With this if you observe almost all the dis-advantages with CORBA have been fixed in RMI and it is light weight.

Out of its simplicity, it introduced certain dis-advantages as well. In RMI developer has to deploy the RMI

object on RMI server and it is absolutely light weight, it is just a registry holding the RMI object with a name to locate it. Apart from this the server would not provide any infrastructural services like security or connection pooling or transactions and these has to be coded by developer itself, which would be so costly and huge amount of effort is required.

-> To overcome these Problems Sun introduced EJB.

EJB : Enterprise Java Beans

EJB stands for Enterprise Java Bean, which is next to RMI. From the EJB's onwards the concept of managed object came into picture. You will write an Object which acts as an EJB and is deployed on a managed server called EJB container. While your EJB object is executing, it might need some external infrastructural resource support, instead of programmer coding for it, like security or transaction or auditing or connection pooling, these would be configured, maintained and provided to the EJB object by EJB Container itself.

So, programmer need not worry about implementing these infrastructural resources. Container will provide them. This makes programmer life easier rather than coding each and everything out of box. But the problem with EJB is when you expose an Object as EJB, it can be accessed over the network by other programs. The other programs which wants to access the EJB object should also be Java applications only and non-java programs cannot access EJB's.

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People are looking for Intereoperable applications development.

What is intereoperability ?

Language independent and platform independent.

java ---------- .Net

Java ---------- Python

C++ ---------- JAVA

c ---------- python etc...

windows ---------- linux

Linux ---------- Mac

To achieve Intereoperability every body started providing their own standards. If everybody provides their own standars we can't achieve.

Ex : If group ppl from different different states wants to talk.

One person speaks in hindi, another one in Tamil another one in Marathi and somebody in Telugu... then we can't achieve intereoperability.

We need to identify common language that eveybody can understand so that we can conversation in the group.

Similarly, all companies in the market decided to identify set of rules and guidelines that everybody should follow to develop Intereoperable applications.

That's where - > people from diff diff companies joined together and they formed a group and named it is WS-I.

WS-I (Webservices intereoperability) :- Non profitable organization

WS-I documented some rules and guidelines to achieve intereoperability and released into market as B.P 1.0 specification.

Sun adopted B.p 1.0 specification and released JAX-RPC api to develop Intereoperable applications.

As B.P 1.0 is succesfull WS-I provided B.P 1.1 specification with new features

Sun adopted B.P 1.1 specification by releasing JAX-WS API.

JAX-RPC ---- B.P 1.0 ---- WS-I
JAX-WS ------B.P 1.1 -----WS-I (successor of jax-rpc)

B.P 1.0 AND B.P 1.1 are specificaitons for developing soap based webservices (big webservices)

As these are API's we can't directly use to develop soap webservices.

We need implementations for these APIs to develop Webservices.

JAX-RPC IMPLEMENTAITONS

- SI
- Apache Axis
- IBM
- Oracle

JAX-WS IMPLEMENTAITONS

- RI (Sun)
- METRO
- APACHE AXIS 2
- APACHE CXF (Spring Based)
- oracle - weblogic
- IBM - Websphere
- jboss etc.

We can develop Soap based webservices using above 2 apis but there are some challenges involved in using jax-rpc and jax-ws api.

- > We will dicuss them after completion of these apis.

Roy fielding - > started analysing soap challenges and started identifing best pricicples to resolve them.

-> As part of his research he identified some principle and named them as Rest Architecture principles.

-> That's where (in 2000) Notation started for Restful services.

-> But There is no specificaiton for Restfull services only priciples provided by Roy Fielding.

-> Sun adopted rest architecture principles and supported those principles by releasing JAX-RS api.

-> As JAX-RS is an API we can't use it directly to start the development

-> We need implementation for JAX-RS api, below are the world famous implmentations available for JAX-RS api

- > jersy (sun)
- > Rest Easy (Jboss)

-> We can develop Restful services using Spring also (Spring with Rest)

As part of this course we are going to learn Soap Webservices and Restful services

To Devleop Soap webservices we have below 2 apis

-> JAX-RPC
-> JAX-WS

To develop Restful services we have one api
- > JAX-RS

As discussed earlier, each api having several implementations. We can use any one implementation to work with Webservices/Restful services.

Use cases for Web Services

IRCTC and MakeMyTrip
IRCTC and Yatra
IRCTC and GOIBIBO
Flipkart and Paypal
Amazon and Amex

State Govt application with Central govt Applications

OLA with Bank Applications
OYO with Hotel Applications etc...