Sessional 2

Step for creating

① Create web app.

New → Web service → Text Web Service.

Package : mypackage

& Select from scratch.

Add operation :→

Name - sin.

parameters I double.

@WebMethod (operationName = "sin")

Public string sin(@WebParam (name = parameter1)

double parameter1)

{

double result = Math.sin(parameter1);

return result + " ";

}

Deploy & run web service.

Components of WSDL.

What is WSDL ?

⇒ Web service Description lang.

→ It is a document written in xml

→ The doc. describes a web service

→ specifies the location of the service & the methods the services exposes

Why WSDL ?

⇒ without WSDL, calling syntax must be determined from documentation that must be provided, or from examining wire messages.

→ With WSDL, the generation of proxies for Web services is automated in a truly language and platform independent way.

Where does WSDL fit?

→ SOAP is the envelope containing the msg.
→ WSDL describes the services
→ UDDI

Document structure

- written in XML
- Two types of section
  - Abstract & concrete

→ Abstract sections defines SOAP msgs in a platform & language independent way.
- Site-specific matters such as serialization are delegated to concrete sections.

5 components in WSDL document.
binding, Type, Msgs, port Type → abstract
binding, service → concrete

(1) Types: Machine & lang independent type definitions → what datatype will be transmitted?
(2) Messages: contains n^n parameters (i/p are separate from o/p) or document descriptions
→ what msgs will be transmitted?

(3) Port Types : Refers to message definitions in messages section that describe function signature (operation name, ~~the~~ parameters, ~~or~~ parameterss).

→ It is like class with multiple methods.

→ Used messages. → what operations will be transmitted?

Concrete.

(4) Bindings : specifies binding(s) of each operation in the Port Types section.

→ Defines the protocol

(5) Service : specifies port addresses of web service.

→ Types can be omitted of only simple data types are used

→ messages consists one or more ~~elementtype~~

Types of <operation>.

→ 4 types

(1) synchronous

request-response
- The service receives a msg & sends a reply.

solicit response
- The service sends a msg & receives a reply msg.

(2) Asynchronous

one way
- The service receives a msg.

Notification
- The service sends a msg.

→ All of these can be defined in WSDL

Four operations patterns in WSDL 1.1 ←

(1) One way
(2) Request response
(3) Solicit response
(4) Notification

The <binding> element

→ used to define the mechanisms that client will use to interact with the Web services

There possibilities
1) HTTP
2) SOAP
3) MIME

→ In multiple binding, we can use SMTP protocol

→ One porttype can have multiple bindings

→ contains following parts:
(1) binding type
(2) soap operations

The <port> element

<port name = "____" binding = "____" >
<soap: address location = "____" />
</port>

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(2) WSDL 1.1 vs WSDL 2.0

Msg exchange patterns in WSDL 2.0

In bound
- in only
- Robust - in only
-
-

Out bound
- out - only
- Robust - out only
-
-

(3) Namespace

7/9/19

Contract first Approach for creating SOAP Web Services

- Two approaches for creating SOAP web service

(1) Code first approach
- Writing source code for web service & then WSDL file

(2) Contract first approach
- creating web service based on given WSDL file.

Steps for Contract first approach,

(1) create web app. → name - Arithmetic
New → WSDL document.
Name → STTPScientificWSDL.

→ Now for abstract configuration

Port Name : STTP scientific WSDLPortTyre
Operation Name : ~~Sin~~ Addition
Operation Type : Request - Response
I/P msg part : SinRequestPart
Element : xsd : double
O/P msg part : SinResponsePart
Element : xsd : double
Binding Name : _____ Type : SOAP.

|| → In WSDL view, right click Port Types → STTP.

→ On binding → Add → binding operations
→ Add SOAP body for operation. if it is not these.
do same for adding → soap operation

In source code, whatever operations are not these in cos then explicitly copy them from sin operation.

On project name right click
→ New → Web service from WSDL.

Select local WSDL file. : Either whatever above
Ex : MyWSDL.wsdl.

In TestWebServiceFromWsdl.java

In addition, method

```
int result = num1 + num2;
return result + " ";
```

→ Compile deploy.

→ Test web service → MySQLService

BPEL (Business Process Execution Language)

→ Used for integration of WS services.

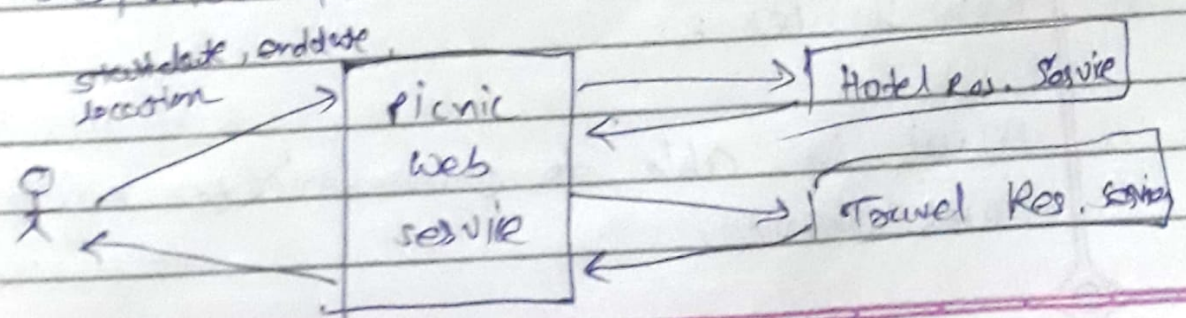
Business Process :-

→ It consists of both internal computations & invocations of operation exported by web service partners.

→ The operations it exports constitute its interface to its partners.

→ The sequence of invocations it executes is referred to as a protocol.

- Is data dependent
- responds to exceptional conditions.



overview

Enterprise Application integration

→ Businesses today requires to quickly adapt to customes needs and market conditions
- EAI & B2B interactions (through web services)

→ Needs to be flexible internally & externally.
→ Without a common set of standard, each organization is left to build their own set of proprietary business protocols.
- Leaving ~~little~~ little flexibility for true web services collaboration.

Web service composition

Def^n :

Provides an open, standards-based approach for connecting web services together to create higher-level business processes.

⇒ Standards are designed to reduce the complexity required to compose web services, hence reducing time & costs, & increase overall efficiency in business.

New Issues :

- Must be able to communicate with other web services.

⇒ Must be able to access & modify data received in messages.
- Use XPath to extract information form msgs.

⇒ Must have control constructs
- sequence, switch (if), flow (concurrency), while, link (synchronize concurrent processes), invoke etc.

⇒ must be able to handle faults.

Basic requirements.

⇒ Ability to invoke services in asynchronous manner.
- Achieve reliability, scalability & adaptability required by Today's IT environment.

⇒ Manage exception & transactional integrity.
- studies shown nearly 80% of the time spent in building business processes are spent in exception management

⇒ Provide dynamic, flexible & adaptable framework
- provide a clear separation bet^n process logic & web services used
- Able to compose highes level services from existing processes.

Standards.

① BPEL4WS (BPEL) - Business Process Execution lang. for web services
- IBM & Microsoft

② WSCI – Web service choreography Interface
- Sun, SAP, BEA & Intalio.

③ BPML – Business Process management lang.
- BPMI.org (chastered by Intalio, Sun, CS & others)

Composition of Web services & two approaches.

# Orchestration	vs	Choreography
A single director in control		Defines Interaction. WS-Choreography describes Publicly Visible Message Exchange.
- A central process takes control over the involved web services & coordinates the execution.		- Does not rely on a central coordinator. Each web service in choreography knows exactly when to execute its operation & whom to interact with.
- The involved web services don't know that they are involved into a composition & that they are a part of higher business process. Only central coordinator knows this.		- Choreography is a collaborative effort focused on exchange of messages in public business processes. All participants of choreography need to be aware of business process, operations to execute, msgs to exchange

BPEL Process Models

→ provides support for 2 business process models

(i) Executable
- Models the behavior of participants in a specific business interaction, a private workflow.

(ii) Abstract
- Business protocols in BPEL, specify the public message exchanges between parties.

Executable & Abstract processes

→

→ We can specify public msg exchange bet^n parties only. Such processes are called abstract business processes. They follow the choreography paradigm.

BPs

- Executable BP - complete description of BP (including all computations)

- Abstract BP - Contains only externally visible communication related) behaviour of BP
  - not executable
  - Internal decision making algorithm & data manipulation not described

- Languages for describing abstract & executable BPs share a common core, but differs primarily in data handling capabilities
- BPEL4WS is used to specify both abstract & executable BPs

BPEL Goals :

- Platform independence - XML based language (Java, .NET implementations available)
- services & messages are first order citizens
-
- Leverage runtime metadata based interface like WSDL.
- 'enterprise ready (security, transaction, reliable, etc)

BPEL Vs. WSDL

⇒ WSDL supports a stateless model which describes operations supported by web servers
- One or two messages needed for client/server communication
- No mechanism for describing state between operations

Example: Ordering stationery.

BPEL4WS

- XML based language.
- It describes the control logic for web services coordination in a business process.
- Interpreted & executed by BPEL engine

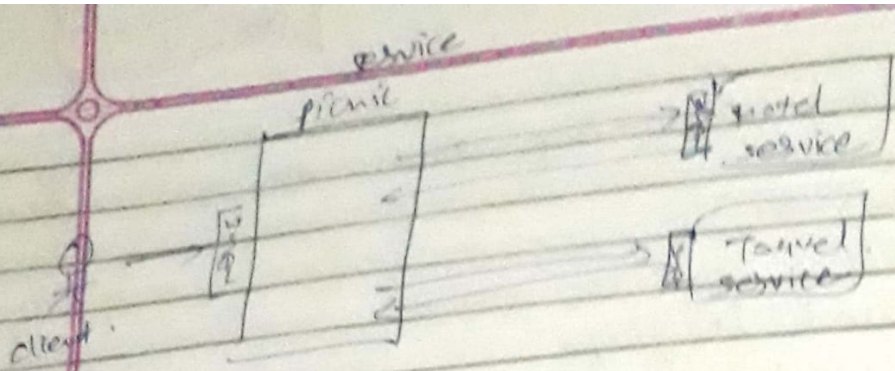
BPEL servers / Engines.

- They provide a runtime environment for executing BPEL business processes.
- BPEL servers exists for J2EE.

Ex: Oracle BPEL process manager
Microsoft BizTalk

BPEL - Overview

- Use web services standard as a base
  1) Every BPEL is exposed as a web service using WSDL. And WSDL describes the public entry & exit points of the process.
  2) Interacts through WSDL interfaces with external web services.
  2) WSDL data types are used to describe information flow within the BPEL process.



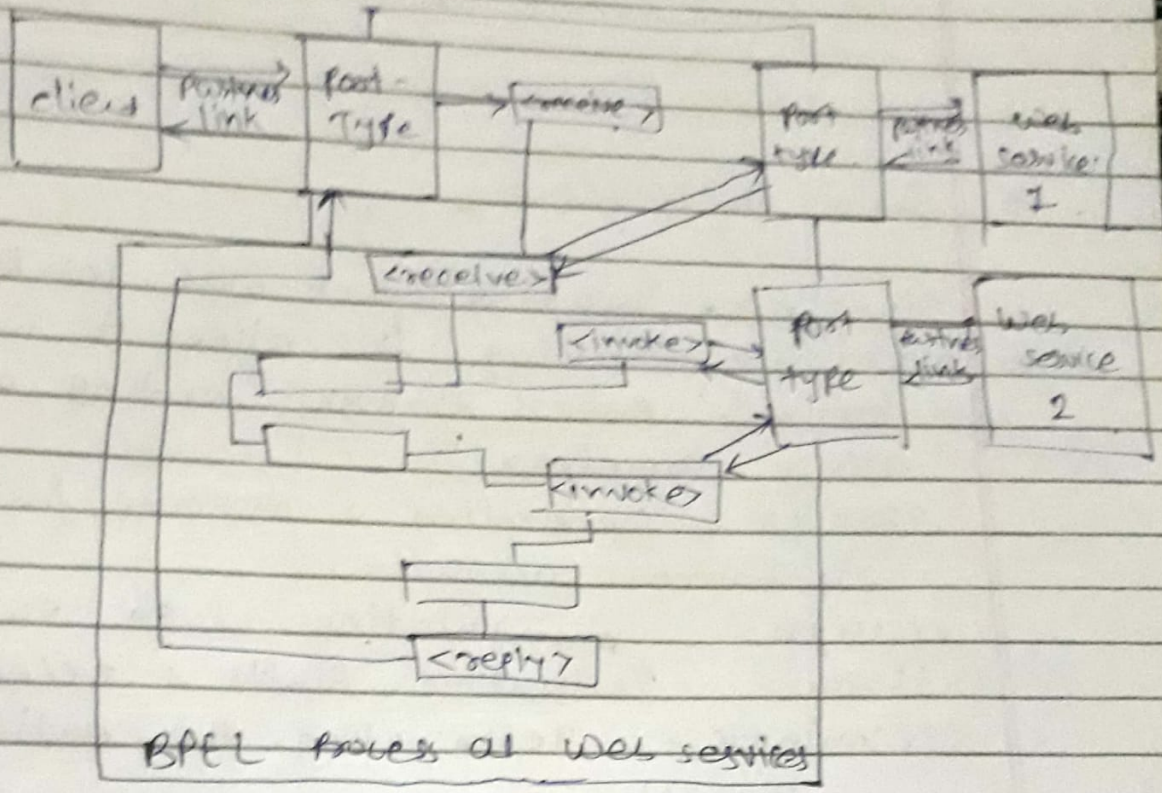
BPEL & Web services

- BPEL introduces WSDL extensions, which enables us to accurately specify relations bet^n several web services in business process. These relations are called partner links.

Communication - Client side

- Invoking an operation of an interface (specified in WSDL) exported by server
  - Client assigns message to operation's input variables.
  - Client executes invoke an operations:
    - (i) Asynchronous
    - (ii) synchronous.

BPEL - Example Process



Core components :-

- BPEL process consists of steps. Each step is called an activity.

Activities

1) Basic Activities.

2) Structured activities.

* Basic Activities :

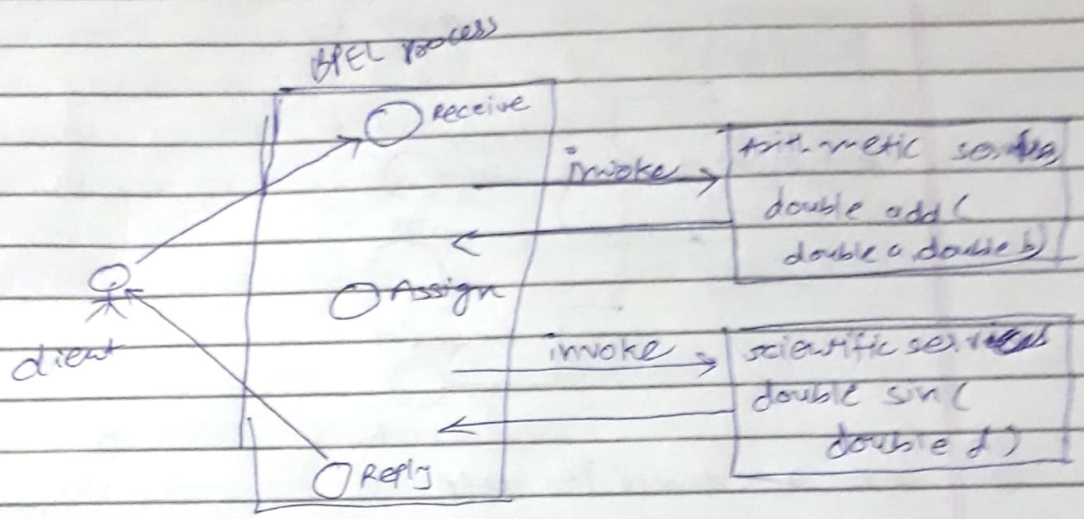
- <invoke> - Invoking other web services
- <receive> - Waiting for client to invoke business process through sending a message using <receive>
- <reply> - Generating a response for synchronous operations
- <assign> - manipulating data variables
- <throw> - Indicating faults & exceptions
- <terminate> - Terminating the entire process.

BPEL structured activities :

- <sequence> - for defining a set of activities that will be invoked in an order sequence.
- <flow> - for defining a set of activities that will be invoked in parallel.
- <switch> - Case-switch construct for implementing branches.
- <while> - for defining loops
- <pick> - to select one of a number of alternative paths.

BPEL activities

⇒ Each BPEL process will also define partnerlinks, using <partnerlink> & declare....



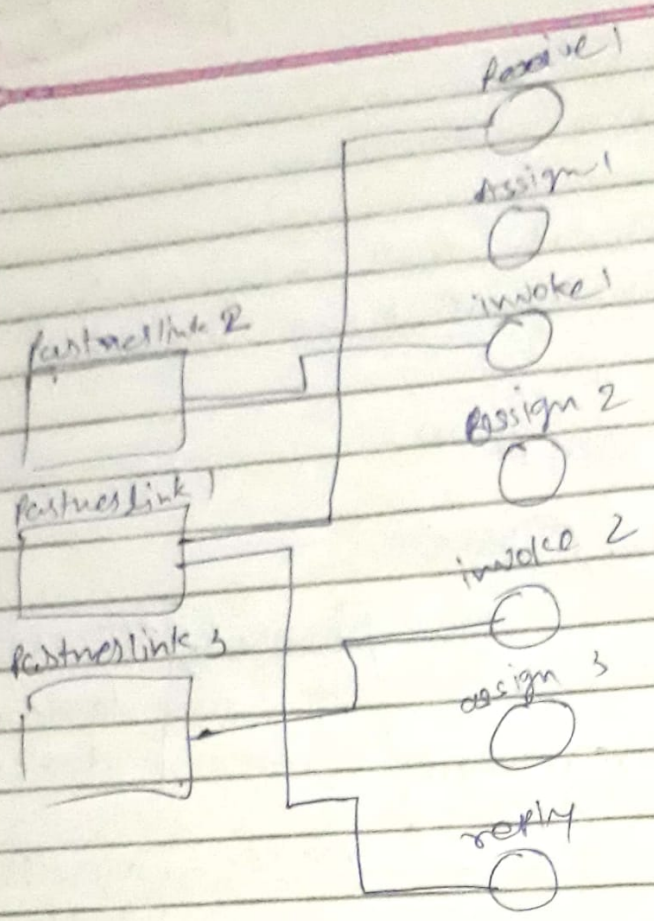
Steps

Create

① Arithmetic service } web services.
② Scientific service.

③ SOA ⇒ BPEL Module. ⇒ myBPEL Module
on that ⇒ New ⇒ WSDL Document ⇒ ArithmeticScientificBPEL
BPEL the WSDL file for client
SoapUI configure BPEL & invoke web service
Simple HTTP.

④ Create composite app.
ⓐ Add JBI module of BPEL.
ⓑ Prepare test cases based on WSDL file.



(4) SOA → Composite app.

(1)

Understanding Links to Partners.

partnerlinks :

→ A partner link type declares two parties interact & what each party offers.

→ BPEL process interact with external web services in two ways:
- BPEL process invokes operations on other web services.
- BPEL process receives invocations from clients.

→ Links to all parties BPEL interacts with are called partner links.

→ partner links can be links to web services that are invoked by BPEL process. These are called invoked partner links.

→ partner links can also be links to clients. These are called client partner links.

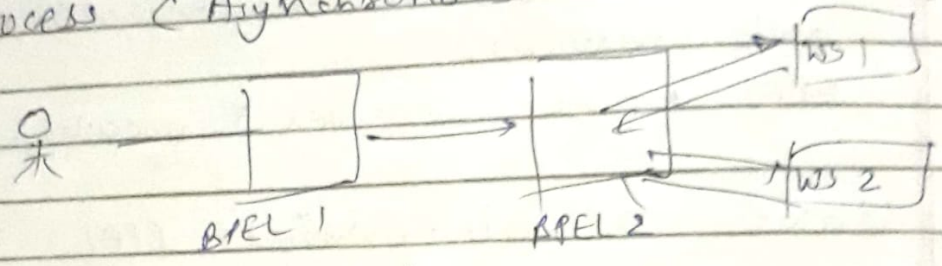
Client partner links :

→ BPEL treats client as partner links for 2 reasons:

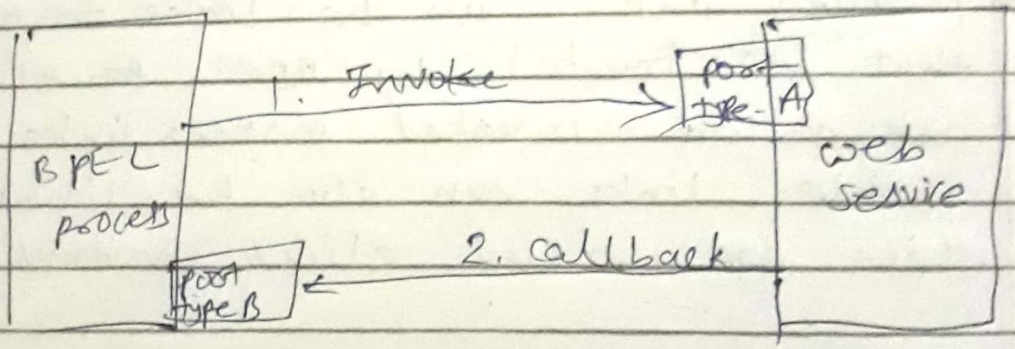
1. - Support for asynchronous interactions
2. -

Partner links :

→ partner links describe links to partners, where partners might be
- services invoked by process
- services that invoke the process
- services that have both roles -- they are invoked by process & they invoke the process (Asynchronous communication)



Asynchronous callback



Roles in Partner links :-

- A partner link type must have at least one role & can have at most two roles
- For each role we must specify a port type that is used for interaction.

Ex:-

<partner link name = " "
xmlns = />

Logic

PL Types in WSDL :

⇒ It is important to note that PL Types are not part of BPEL process specification documentation.

3 remaining ⇒ Partnerlink types use this WSDL extensibility mechanism.

partner links in BPEL process def^n.

⇒ for each PL, we have to specify

- Name: serves as a reference for interactions via that partner link.
- partnerLinkType: Defines the type of PL.
- myRole: Indicates the role of BPEL process itself.
- partnerRole: Indicates the role of partner.