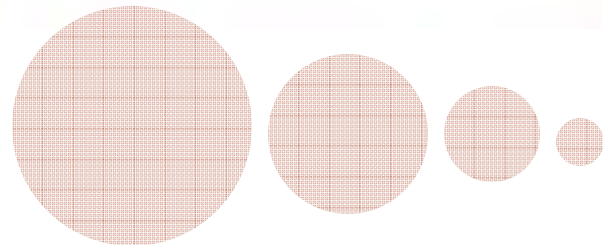


# Web Services for Human Beings

Apache Axis2



IndicThreads.com Conference On Java Technology  
26th & 27 Oct. 2007 Pune, India



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# About Me

- Member of Apache Software Foundation
  - Mainly work on Apache Axis2/C related projects
  - A user of Apache Axis2/Java



- Software Architect WSO2 Inc.
  - Manage Web Services Framework projects (C, C++, PHP, Ruby, Perl)



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<http://people.apache.org/~samisa>

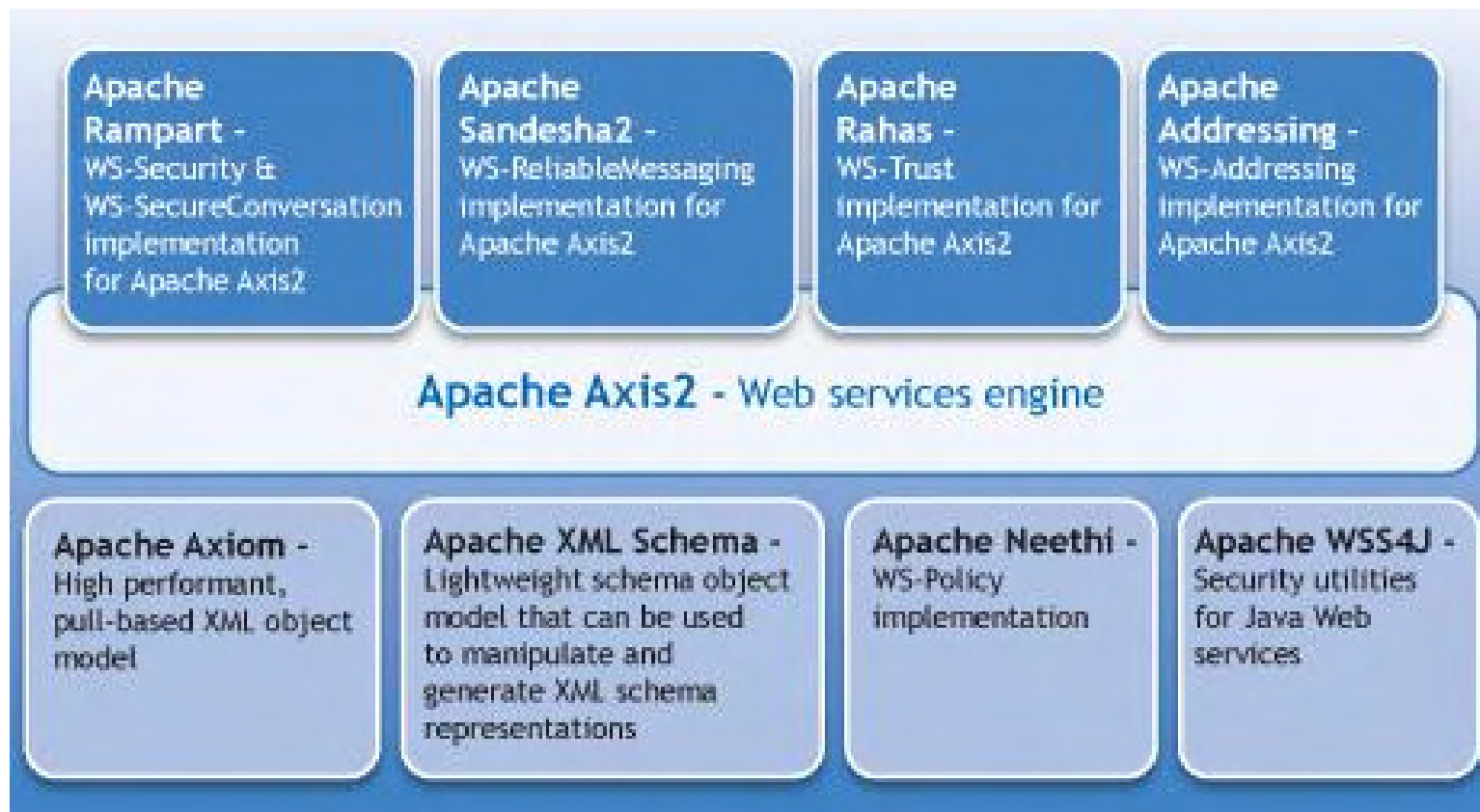
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# What is Axis2?

- An Apache project (<http://ws.apache.org/axis2/>)
  - Open source, freely available under the Apache License
- A Web Service toolkit
  - Handles SOAP, WSDL and XML/HTTP
  - Maps XML to Java
    - Either built-in or using a binding framework
  - Supports different message exchange patterns
  - Extensible
    - Plug-in projects support Security (Rampart) and Reliability (Sandesha)

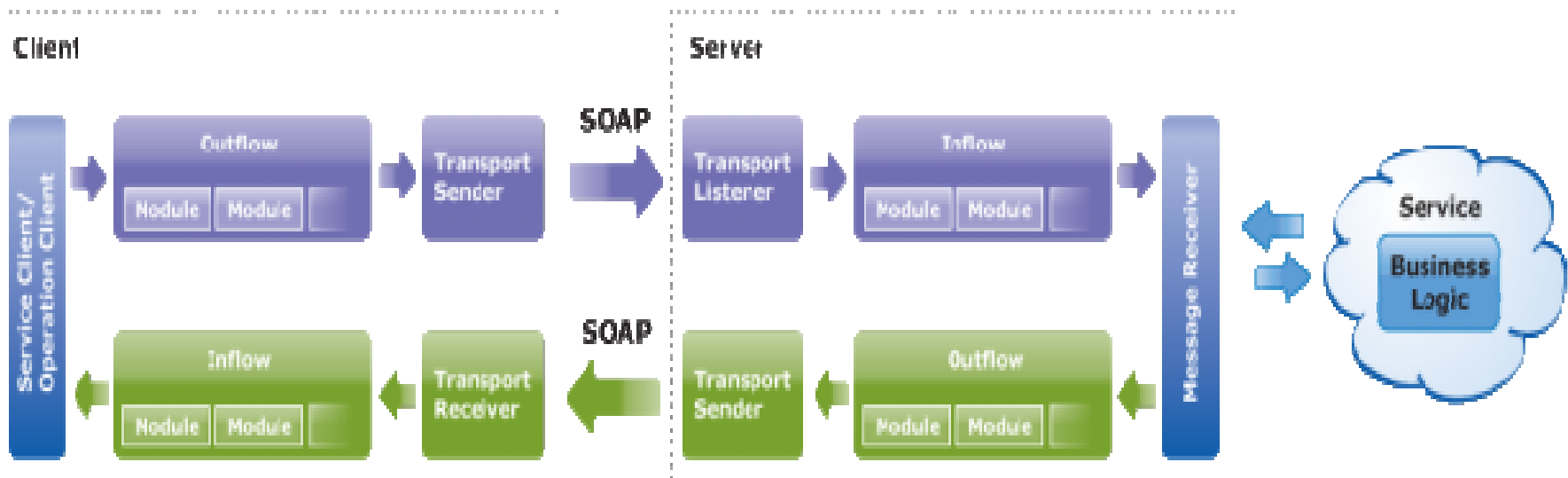


# Axis2 Family



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# Axis2 Architecture Overview



[http://ws.apache.org/axis2/1\\_3/Axis2ArchitectureGuide.html](http://ws.apache.org/axis2/1_3/Axis2ArchitectureGuide.html)

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# Client API

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.There are two main classes

- . ServiceClient
- . OperationClient

.In addition, there are two more supportivet classes

- . Stub
- . RPCServiceClient

[http://ws.apache.org/axis2/1\\_3/userguide.html#clients](http://ws.apache.org/axis2/1_3/userguide.html#clients)



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# ServiceClient

- Designed for convenient common use
- Supports XML in - XML out
  - Takes XML payload as input and returns XML as output
- Inbuilt support for invoking all eight MEPs defined in WSDL 2.0
- Support for both Synchronous and Asynchronous invocation
- Many options to fine tune behaviour
  - SOAP version, SOAP action etc.



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# Consuming Services

•ServiceClient has the following set of operations

- SendRobust
- FireAndForget
- SendReceive
- SendReceiveNonBlocking

•All of those take AXIOM (Axis2 XML Object Model) as input

- return AXIOM as output (where applicable)





# OperationClient

- .Designed for advanced users
- .Has more control over incoming and outgoing messages
- .Need to perform additional steps
  - . Create SOAPEnvelop
  - . Create a MessageContext



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# RPCServiceClient

- Convenient API for invoking a service
- An understanding of AXIOM is not required
- Extends from ServiceClient and has the following additional methods
  - OMElement invokeBlocking(QName opName, Object [] args)
  - Object[] invokeBlocking(QName opName, Object [] args, Class [] returnTypes)
  - invokeNonBlocking(QName opName Object [] args, AxisCallback callback)
  - invokeRobust(QName opName, Object [] args)

# Dynamic Client

- Creating a client on the fly
  - For a given WSDL

```
ServiceClient client = new ServiceClient(null,  
new URL("http://localhost:9090/axis2/services/MyService?wsdl"),  
null, null);
```

```
OMElement result = client.sendReceive(  
new QName("http://ws.apache.org/axis2", "add"), payload);
```



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# Stub

- Generate a client stub for a given WSDL
- Then use the generated stub to invoke the service

```
EchoServiceStub stub = new EchoServiceStub();  
EchoServiceStub.SayHelloResponse response = stub.sayHello();  
System.out.println(response.get_return());
```

Output : Hello World!!!

- How to re-target a stub to a new EPR

```
stub = new  
EchoServiceStub("http://myserver.com:8080/axis2/services/Echo");
```



# Client-Side Session Handling

- ServiceClient supports invoking a service in a session aware manner
  - In the case of a SOAP session, it will copy the required reference parameter
  - In the case of a transport session, it will copy the HTTP cookies
- Axis2, by default, copies the JSESSION cookie ID
- Want a custom cookie? Specify the cookie name  
`options.setProperty("customCookieID","SESSIONID");`

<http://www.developer.com/java/web/article.php/3620661>



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# Web Services with Axis2

- There are many methods of deploying a service
  - Using a service archive file
  - As a POJO
    - JSR 181 Annotated class or not
  - Programmatically

[http://ws.apache.org/axis2/1\\_3/userguide-buildingservices.html#buildservices](http://ws.apache.org/axis2/1_3/userguide-buildingservices.html#buildservices)



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# POJO Deployment

- .Write a Java class
- .Compile it
- .Deploy into repository
  
- .Has limited control
- .Issues when there are multiple classes

[http://ws.apache.org/axis2/1\\_3/pojoguide.html](http://ws.apache.org/axis2/1_3/pojoguide.html)



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# Very Simple Service with POJO

```
import java.io.IOException;
import org.apache.axis2.engine.AxisServer;

public class Main {
public static void main(String[] args) throws IOException {
    AxisServer axisServer = new AxisServer();
    axisServer.deployService(
        Math.class.getName());
    System.out.print("Hit Enter to stop");
    System.in.read();
    axisServer.stop();
}
```

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# Usual Service Deployment Model

- Normally, services are deployed in a Axis2 ARchive (AAR)
- Conceptually the same as a WAR file
- Deployment descriptor is called
  - META-INF/services.xml
- Place the AAR file into the Axis2 repository/services directory
- Can be hosted in Tomcat, other application servers, or standalone

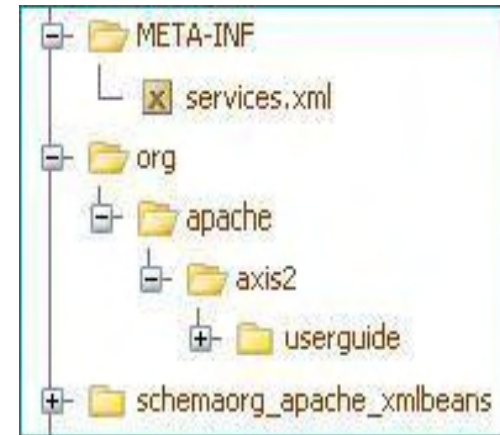


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# Service Archive

- Self contained package
  - Configuration files
  - Class files
  - Third party resources
  - WSDL and Schema files
  - Web resources
- Many configuration options
- Service isolation via one class loader per service



# Session Aware Services

.There are four types

- . Application
- . Transport
- . SOAP Session
- . Request

.Specifying a service scope

```
<service scope="application"> </service>
```

<http://www.developer.com/java/web/article.php/3620661>



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# Axis2 Modules

- Modules are the means of extending Axis2
  - Used to provide quality of services
- Implementation of WS-\* specification
  - Can add support for a new specification in a simple and clean manner
- Can be deployed as self contained packages

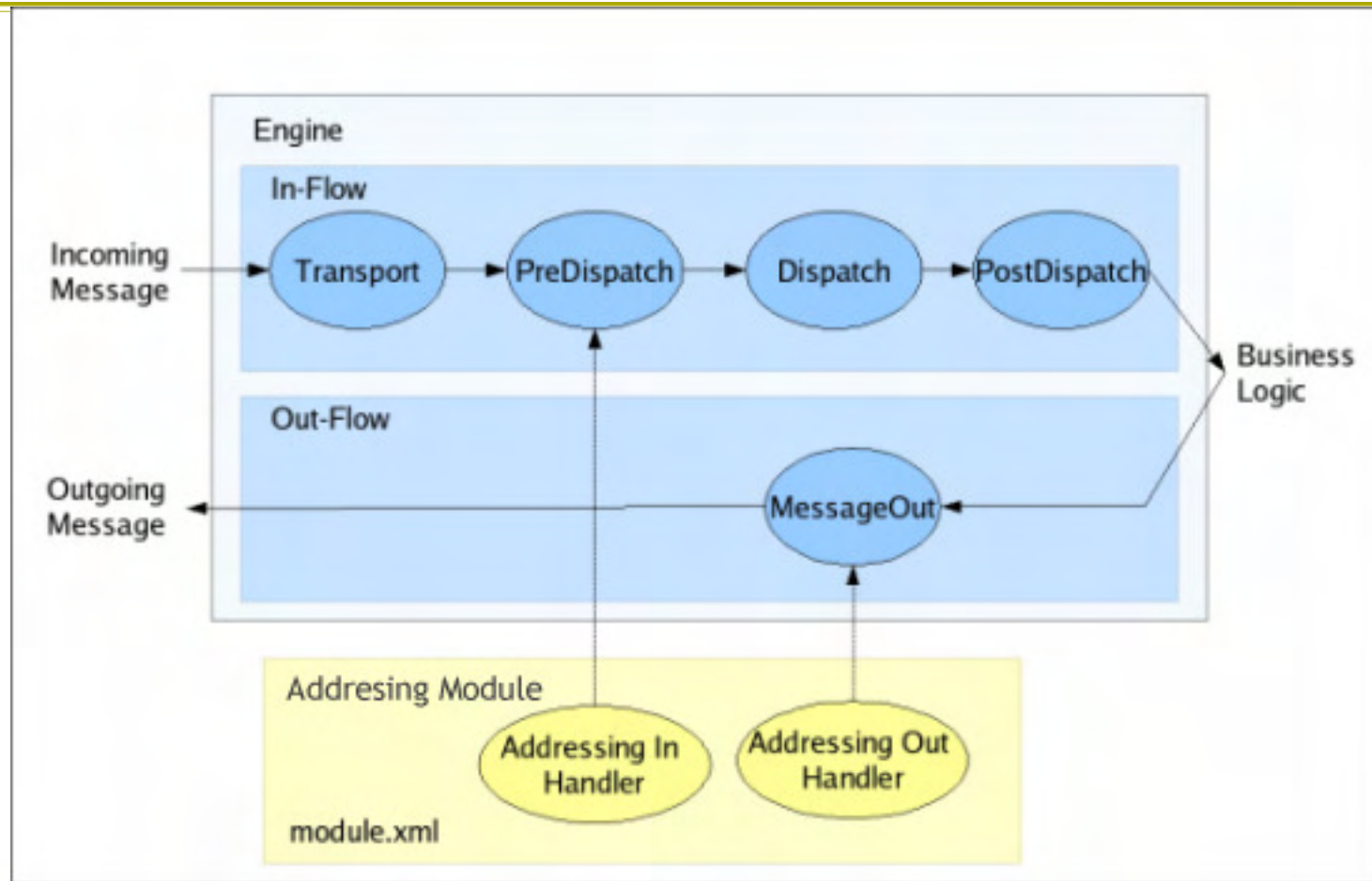
<http://wso2.org/library/777>



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# Flows, Phases and Modules



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# Current set of Axis2 Modules

- Addressing – WS-Addressing
- Rampart – WS-Security and WS-SecureConversation
- Rahas – WS-Trust
- Sandesha – WS-ReliableMessaging
- Savan - WS-Eventing
- Mex – WS-MetadataExchange
- Logging – logs messages
- SOAPMonitor – trace SOAP messages on the fly
- Ping – test if a service is alive without calling any business methods

**What you are looking  
is missing?**

**Could implement  
your own!!!**

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# WSDL2Java – Code Generation

- Support for both client side and server side code generation
- Support for both WSDL 1.1 and 2.0
  - Support for REST client generation
- Client side stubs can be configured using WS-Policy
- Client stub can be generated for both synchronous and asynchronous modes

[http://ws.apache.org/axis2/tools/1\\_3/CodegenToolReference.html](http://ws.apache.org/axis2/tools/1_3/CodegenToolReference.html)

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# Tooling Support for Code Generation

- Tools available for code generation
  - IDE plugins (Both Eclipse and IntelliJ idea)
- WSO2 WSAS has a convenient way of creating either client or server side code

[http://ws.apache.org/axis2/tools/1\\_3/idea/Idea\\_plug-in\\_userguide.html](http://ws.apache.org/axis2/tools/1_3/idea/Idea_plug-in_userguide.html)

[http://ws.apache.org/axis2/tools/1\\_3/eclipse/wsdl2java-plugin.html](http://ws.apache.org/axis2/tools/1_3/eclipse/wsdl2java-plugin.html)

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# Java2WSDL – WSDL Generation

- Generating a WSDL file from a Java class
- We can generate
  - WSDL 2.0
  - WSDL 1.1
    - doclit/wrapped
    - doclit/bare
- Can be used as a starting point of a complex system
- Available tools
  - IDE plugins
  - Command line tools

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# Adding a New Transport

- Adding a new transport framework is just a matter of
  - Creating a TransportSender
  - Creating a TransportReceiver
  - Registering them in axis2.xml
- TCP, SMTP, JMS, XMPP already available

[http://ws.apache.org/axis2/1\\_3/http-transport.html](http://ws.apache.org/axis2/1_3/http-transport.html)

[http://ws.apache.org/axis2/1\\_3/tcp-transport.html](http://ws.apache.org/axis2/1_3/tcp-transport.html)

[http://ws.apache.org/axis2/1\\_3/jms-transport.html](http://ws.apache.org/axis2/1_3/jms-transport.html)

[http://ws.apache.org/axis2/1\\_3/mail-transport.html](http://ws.apache.org/axis2/1_3/mail-transport.html)

[http://ws.apache.org/axis2/1\\_3/transport\\_howto.html](http://ws.apache.org/axis2/1_3/transport_howto.html)



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# REST (POX)

- Generating WSDL 1.1 and WSDL 2.0 REST binding
- Invoking a service the REST way
- Same service can be exposed as both SOAP and REST
  - No additional configuration required

[http://ws.apache.org/axis2/1\\_3/rest-ws.html](http://ws.apache.org/axis2/1_3/rest-ws.html)



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# Axis2 is Fast

- To be used in real world, it has to be fast
  - Axis2 is about 3 (XMLBeans) to 6 (ADB) times faster and Axis1
    - <http://wso2.org/library/91>
  - More than 3000 req/s for common cases, and faster than XFire
    - <http://wso2.org/library/588>



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# IDE Integration

- Eclipse plug-in
  - [http://ws.apache.org/axis2/tools/1\\_3/eclipse/servicearchiver-plugin.html](http://ws.apache.org/axis2/tools/1_3/eclipse/servicearchiver-plugin.html)
  - [http://ws.apache.org/axis2/tools/1\\_3/eclipse/wsdl2java-plugin.html](http://ws.apache.org/axis2/tools/1_3/eclipse/wsdl2java-plugin.html)
  - <http://wso2.org/library/1719>
  - <http://wso2.org/library/1986>
- IntelliJ Idea plug-in
  - [http://ws.apache.org/axis2/tools/1\\_3/idea/idea-plugin-userguide](http://ws.apache.org/axis2/tools/1_3/idea/idea-plugin-userguide)



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# Inter-operates

- Microsoft WCF (.NET)
- Other J2EE implementations
- Apache Axis2/C



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# Links

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- Apache Axis2 home page
  - <http://ws.apache.org/axis2>
- Articles, Tutorials, Howtos
  - <http://wso2.org>
- Web Services Application Server (WSAS)
  - <http://wso2.org/projects/wsas/java>



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