

Frameworks Evaluations:

During the frameworks survey, we tried to find per programming language, at least one framework which allow the use of web services. We chose these frameworks according to their popularity and/or according to the different features they offer.

The list below is not exhaustive and can be improved.

The following tools will be evaluated:

- **AXIS 2:** It's a core engine for web services. It is one of the most popular framework of APACHE GROUP FOUNDATION, and allow to create (server) and consume web services. One of its advantages is the availability of services (implementation) as well as in C/C++ or in Java. So most of features evaluated are available for AXIS2/JAVA and AXI2 / C.
- **CXF:** is another APACHE GROUP FOUNDATION open source services framework that offers building and developing web services using frontend programming APIs, like JAX-WS. It's can be only used with java.
- **WSO2 Frameworks:** WSO2 is an innovative Open Source technology company devoted to building Web services middleware. It's focused on providing modular open middleware for SOA powered by APACHE. WSO2 contains components which include utilities, modules (that can be dropped in to Apache Axis2/Java) and add-ons to other Apache Web Services projects.
WSO2 WSF (Web Service Framework) is the fully open source base framework on which all of WSO2 products are built. WSF implementation is available in C, C++, PHP, PERL, RUBY, PYTHON, JAVA...
- **METRO :** is an integrated stack which offer development of Web Services by using Java Technology APIs and tools powered by SUN JAVA. Metro stack is part of Project Metro and as part of GlassFish project. The Metro stack consisting of JAX-WS, JAXB, and WSIT.
- **WCF:** The unified programming model for Microsoft to generate service-oriented applications. It's based on .NET framework.
WCF applications can be developed using the different languages of Microsoft. NET applications as Visual basic, C/C++, C#, java...
While Microsoft is a board member of WS-I, it is not clear how many WS-I profiles they are committing to support completely.

We briefly considered other frameworks such as:

- gSOAP(C++)
- NuSOAP,Pear SOAP (PHP)
- SOAP ::Lite (Perl)
- PySAOP (python)

Which allow generating web services using SOAP and WSDL specification according to W3C. But most of them do not offer functionality as broad as WSO2; so we don't report them.

What to evaluate?

We are defined here a list of features which will be evaluated in our different frameworks. The different features are:

- WS-Concepts
- Transport
- Encoding table
- Data binding
- General features

WS-Concepts

There are a lot of specifications which is linked to Web Services WS-*. Those specifications are in different levels of maturity, and are maintained by different standards organizations as (OASIS, W3C, DMTF...) Each specification can be complemented or overlapped by another one or even in competition with another specification.

The purpose of this part is not to study each concept but to provide the different concepts that can be supported by the various frameworks evaluated. And identify the important concepts to our project according to the shortlist found.

Transport

Encoding table

Data binding

General Features.

WS-Concepts	AXIS2	CXF	WSO2 Frameworks	METRO	WCF
Addressing	✓	✓	✓	✓	✓
Transfer	✓ [A1]	NO	✓	NO [±]	
Management	NO *	NO	✓	NO	✓
DistributeManag.	✓ [A2]	NO	✓	NO	
Notification	✓ [A2]	NO	✓	NO	
Atomic Transaction	✓ [A3]	NO	✓	✓	
Business Activity	✓ [A3]	NO	✓	NO	
Coordination	✓ [A3]	NO	✓	✓	
Eventing	✓ [A4]	NO	✓	NO	
Metadata Exchange	✓ [A5]	NO	✓	✓	
ReliableMessaging	✓ [A6]	✓	✓	✓	
Security	✓ [A7]	✓	✓	✓	

[A1] : It possible to use it via **xFer** (as an add-on module for Apache Axis2) which is a component of [WSO2 Commons](#)

[A2] : **MUSE** is an Apache project which is an implementation of the WS-ResourceFramework (WSRF), WS-BaseNotification (WSN), and WS-DistributedManagement (WSDM) specifications. It will be use as module.

[A3] : **Kandula** module implements WS-Coordination, WS-AtomicTransaction and WS-BusinessActivity protocols based on Apache Axis and Axis2.

[A4] : **Savan/C** is a C implementation of WS-Eventing specification. We don't find a module for java...

[A5] : Metadata Exchange is packaged as an Axis2 Module, named metadataExchange on top of Axis2. But Axis2 engine does not support metadataExchange module by default. To activate the metadataExchange module, it will have to be deployed and engaged globally to all web services. Once the metadataExchange is engaged in Axis2, client can have the option to discover WSDL, XML Schema, and Policy in cases where a specific reference is passed to a client.

[A6]: WS-RM is given by the module **Sandesha** (implementations for the Apache Web Services project).

[A7]: **Rampart** is a module based on Apache WSS4J to provide WS-Security features. Apache WSS4J is an implementation of the OASIS Web Services Security from OASIS Web Services Security TC (SecureConversation; SecurePolicy, Trust...).

* :We don't find a which is directly support by axis2 but it's possible to bypass this problem by declaring the parameters needed directly in the WS-addressing header. Unfortunately the client must be known informed to fix it. This comes down to diy.

± : N'est pas contenu dans la liste publiée par le site officiel. Pourtant ce même site officiel montre des tests mettant le paramètre en jeu avec d'autres frameworks (Must be look in deeper)

Transport	AXIS2	CXF	WSO2 Frameworks	METRO	WCF
HTTP/HTTPS	✓	✓	✓	✓	✓
SMTP	✓		✓	✓	✓
POP3	✓		✓	✓	
FTP	✓		✓		
TCP	✓		✓	✓	
JABBER	Exp.			NO	
JMS	✓	✓	✓	✓	
Proxy Support	✓		✓	✓	✓
In-VM	✓	✓	✓	✓	

Encoding Table	AXIS2	CXF	WSO2 Frameworks	METRO	WCF
XML Textual	✓	✓	✓	✓	
MTOM	✓	✓	✓	✓	
FastInfoset	✓	✓	✓	✓	
JSON	✓	✓	✓	✓	✓

Data Binding	AXIS2	CXF	WSO2 Frameworks	METRO	WCF
XMLBeans	✓	✓	✓		
Castor	✓		✓		
JiBX	✓		✓		
JAXB	✓	✓	✓	✓	

DATA Binding is the technology for accessing XML by binding it to programming language types.

General Features	AXIS2	CXF	WSO2 Frameworks	METRO	WCF
BP 1.1 [1]	✓		✓	✓	
AP 1.0 [2]				✓	
SSBP 1.0 [3]					
Soap 1.1	✓		✓	✓	
Soap 1.2	✓		✓	✓	
WSDL 1.1	✓		✓	✓	
WSDL 2.0	✓		✓	✓	
WSDL -> code Client	✓		✓	✓	
Eclipse Plugins	✓		✓	✓	
NetBeans Plugins	NO		NO	✓	
IDEA Plugins	✓		✓	✓	
Hot Deployment	Axis2			glassFish	Visual Studio

[1] : Basic profile Compliant

[2] : Attachement Profile Compliant

[3] : Simple SOAP Binding Profile Compliant

Important note : Lorsqu'un champ est « NO » cela veut dire que le paramètre évalué n'est pas supporté. Et quand le champ est vide cela veut dire que nous n'avons pas trouvé sur le site officiel ou ceux des projets associés des informations sur le paramètre évalué.

References :

AXIS2

- <http://ws.apache.org/>
- <http://www.oasis-open.org/>
- <http://wso2.org/>

CXF

- <http://cxf.apache.org/>
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WSO2 Frameworks

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- <http://wso2.org/projects/wsf>
- <http://wso2.org/interop>
- <http://wso2.org/projects/commons>

METRO

- <https://wsit.dev.java.net/>
- <https://jaxb.dev.java.net/>
- <https://jax-ws.dev.java.net/>
- <http://java.sun.com/webservices/index.jsp>

WCF

- <http://msdn.microsoft.com/fr-fr/default.aspx>
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Others

- <http://json.org/>

Definition:

CIM:

The **Common Information Model** is an open standard that defines how managed elements in an IT environment are represented as a common set of objects and relationships between them. This is intended to allow consistent management of these managed elements, independent of their manufacturer or provider.

The CIM standard is defined and published by the [Distributed Management Task Force](#) (DMTF).

For more information see DMTF specifications.

JAX-WS:

The **Java API for XML Web Services** is a Java programming language API for creating web services. It is part of the Java EE platform from Sun Microsystems. Like the other Java EE APIs, JAX-WS uses annotations, introduced in Java SE 5, to simplify the development and deployment of web service clients and endpoints.

JAXB:

Java Architecture for XML Binding (JAXB) allows Java developers to map Java classes to XML representations. JAXB provides two main features: the ability to serialize Java objects into XML and the inverse, i.e. to de-serialize XML back into Java objects. In other words, JAXB allows storing and retrieving data in memory in any XML format, without the need to implement a specific set of XML loading and saving routines for the program's class structure.

JSON:

short for **JavaScript Object Notation**, It is a lightweight data-interchange format very easy for reading and writing by humans, but also easy for machines to parse and generate.

The JSON format is often used for serialization, transmitting structured data over a network connection. Its main application is in Ajax web application programming, where it serves as an alternative to the use of the XML format.

OASIS:

(**Organization for the Advancement of Structured Information Standards**) is a not-for-profit consortium that drives the development, convergence and adoption of open standards for the global information society. The consortium produces more Web services standards than any other organization along with standards for security, e-business, and standardization efforts in the public sector and for application-specific markets.

WSIT:

Web Services Interoperability Technology is an open-source project started by Sun Microsystems to develop the next-generation of web service technologies. It consists of Java programming language APIs that allow developers to create **web service clients and services that interoperate between the Java platform and Microsoft's Windows Communication Foundation (WCF) and .NET.**

WSIT implements the following WS-Concepts:

Messaging	Metadata	Security	Transaction
<ul style="list-style-type: none">• WS-ReliableMessaging• WS-RMPolicy	<ul style="list-style-type: none">• WS-MetadataExchange• WS-Transfer• WS-Policy	<ul style="list-style-type: none">• WS-Security• WS-SecureConversation• WS-Trust• WS-SecurityPolicy	<ul style="list-style-type: none">• WS-Coordination• WS-AtomicTransaction

WCF: Short of **Windows Communication Foundation**.