Progress | Artix

Getting Started with Artix

Version 5.6, August 2011

Third Party Acknowledgments — See the Third Party Acknowledgements section on page 10.

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Preface

What is Covered in This Book

Getting Started with Artix introduces Progress Software Corporation's Artix ESB technology and Web Services Description Language (WSDL).

Who Should Read This Book

Getting Started with Artix is for anyone who needs to understand the concepts and terms used in the Artix product.

Organization of This Book

This book contains conceptual information about Artix and WSDL:

- Chapter 1, "About Artix ESB" introduces the Artix ESB product, discussing key concepts in depth and describing the types of problems it is designed to solve.
- Chapter 2, "Understanding WSDL" explains the basics of WSDL.

The Artix Documentation Library

For information on the entire Artix Documentation Library, including organization, contents, conventions, and reading paths, see Using the Artix Library.

See the entire documentation set, at the Artix Product Documentation Web Site.

Third Party Acknowledgements

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CHAPTER 1

About Artix ESB

This chapter introduces the main features of Artix ESB.

In this chapter

This chapter discusses the following topics:

What is Artix ESB?

Overview

Artix ESB is an extensible enterprise service bus. It provides the tools for rapid application integration that exploits the middleware technologies and products already present within your organization.

The approach taken by Artix ESB relies on existing Web service standards and extends these standards to provide rapid integration solutions that increase operational efficiencies, capitalize on existing infrastructure, and enable the adoption or extension of a service-oriented architecture (SOA).

Web services and SOAs

The information services community generally regards Web services as application-to-application interactions that use SOAP over HTTP.

Web services have the following advantages:

- The data encoding scheme and transport semantics are based on standardized specifications.
- The XML message content is human readable.
- The contract defining the service is XML-based and can be edited by any text editor.
- They promote loosely coupled architectures.

SOAs take the Web services concept and extend it to the entire enterprise. Using a SOA, your infastructure becomes a collection of loosely coupled services. Each service becomes an endpoint defined by a contract written in Web Services Description Language (WSDL). Clients, or service consumers, can then access the services by reading a service's contract.

Artix and services

Artix extends the Web service standards to include more than just SOAP over HTTP. Thus, Artix allows organizations to define their existing applications as services without worrying about the underlying middleware. It also provides the ability to expose those applications across a number of middleware technologies without writing any new code.

Artix also provides developers with the tools to write new applications in Java that can be exposed as middleware-neutral services. These tools aid in the definition of the new service in WSDL and in the generation of stub and skeleton code.

Just like the WSDL contracts used to define a service, the code that Artix generates adheres to industry standards.

Benefits of Artix

Artix ESB's extensible nature provides a number of benefits over other ESBs and older enterprise application integration (EAI) products. Chief among these is its speed and flexibility. In addition, Artix ESB provides enterprise levels of service such as session management, service discovery, security, and cross-middleware transaction propagation.

EAI products typically use a proprietary, canonical message format in a centralized EAI hub. When the hub receives a message, it transforms the message to this canonical format and then transforms the message to the format of the target application before sending it to its destination. Each application requires two adapters that are typically proprietary and that translate to and from the canonical format.

By contrast, Artix ESB does not require a hub architecture, nor does it use any intermediate message format. When a message is received by the bus, it is transformed directly into the target application's message format.

Artix ESB is highly configurable and easily extendable. You can configure it to load only the pieces you need for the functionality you require. If Artix ESB does not provide a transport or message format you need, you can easily develop your own service, extend the contract definitions, and configure Artix to load it.

Artix ESB features

Artix ESB includes the following features:

- Support for multiple transports and message data formats
- Java development
- Message routing
- Cross-middleware transaction support
- Asynchronous Web services
- Deployment of services as plug-ins via a number of different containers
- Look-up services
- Load-balancing
- High-availability service clustering
- Integration with EJBs
- Easy-to-use development tools
- No need to hard-code WSDL references into applications

Runtime and programming model

Artix ESB ships with a Java Runtime based on the Apache CXF, that provides a JAX-WS API and a JavaScript API.

Using Artix ESB

There are two ways to use Artix ESB in your enterprise:

- You can use Artix ESB to develop new applications using one of the supported APIs. In this situation, developers generate stub and skeleton code from WSDL, and Artix becomes a part of your development environment.
- You can use the Artix bus to integrate two existing applications, built on different middleware technologies, into a single application. In this situation, developers simply create an Artix contract defining the integration of the systems. In most cases, no new code is needed.

Becoming proficient with Artix ESB

To become an effective Artix ESB developer you need an understanding of the following:

1. The Java runtime and programming model available in Artix ESB.
2. The syntax for WSDL and the Artix ESB extensions to the WSDL specification.
3. The configuration mechanisms available in the Artix Java runtime.
4. The Artix APIs that you can use in your application.

This book introduces these concepts. The other books in the Artix documentation library covers the same technologies in greater detail.

Runtime Features

Java Runtime

Artix ESB Java Runtime provides the developer with both a JAX-WS API and a JavaScript API with which to implement services.

It is based on the Apache CXF services framework and provides a fast, modular, and extensible platform for implementing services that is built purely in Java.

Feature list

The following bindings, transports, and quality of service features are supported by the Java runtime:

- Supported APIs
  - → JAXB 2.1/2.2
  - → JAX-WS 2.1/2.2
  - → WSDL 1.1
  - → JCA Connector 1.5
- Development Languages
  - → Java
  - → JavaScript
- Bindings
  - → SOAP (1.1 and 1.2)
  - → MTOM/XOP
  - → RESTful
  - → CORBA
  - → Pure XML

- Transports
  - → HTTP
  - → JMS
  - → WebSphere MQ
- Quality of Service
  - → Message routing
  - → Security
  - → Reliable messaging
  - → High availability
  - → Load balancing
  - → Location resolution

Key Concepts in Depth

This section discusses key Artix ESB concepts in depth.

In this section

This section discusses the following topics:

Artix ESB Runtime Components

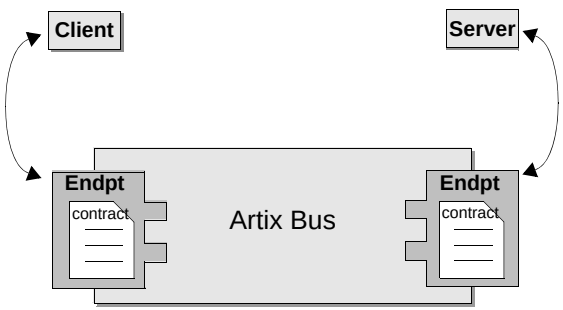
How it fits together

The Artix ESB runtime consists of the following components :

- Artix Bus is at the core of Artix, and provides the support for various transports and payload formats.
- Artix Contracts describe your applications in such a way that they become services that can be deployed as Artix Endpoints.
- Artix Services include a number of advanced services, such as the locator and session manager. Each Artix service is defined with an Artix contract and can be deployed as an Artix endpoint.

Figure 1 illustrates how the Artix ESB elements fit together.

Figure 1: *Artix ESB Runtime Components*



Artix Bus

Overview

The Artix bus is at the heart of the Artix ESB architecture. It is the component that hosts the services that you create and connects your applications to those services. The bus is also responsible for translating data from one format into another.

In this way, Artix ESB enables all of the services in your company to communicate, without needing to communicate in the same way. It also means that clients can contact services without understanding the native language of the server handling requests.

Benefits

While other products provide some ability to expose applications as services, they frequently require a good deal of coding. The Artix bus eliminates the need to modify your applications or write code by directly translating the application's native communication protocol into any of the other supported protocols.

For example, by deploying an Artix instance with a SOAP-over-WebSphere MQ endpoint and a SOAP-over-HTTP endpoint, you can expose a WebSphere MQ application directly as a Web service. The WebSphere MQ application does not need to be altered or made aware that it is being exposed using SOAP over HTTP.

The Artix bus translation facility also makes it a powerful integration tool. Unlike traditional EAI products, Artix translates directly between different middlewares without first translating into a canonical format. This saves processing overhead and increases the speed at which messages are transmitted.

Artix Endpoints

Overview

An Artix endpoint is the connection point at which a service or a service consumer connects to the Artix bus. Endpoints are described by a contract describing the services offered and the physical representation of the data on the network.

Reconfigurable connection

An Artix endpoint provides an abstract connection point between applications, as shown in Figure 1 on page 21. The benefit of this abstract connection is that it allows you to change the underlying communication mechanism without recoding any of your applications. You only need to modify the contract describing the endpoint.

For example, if one of your back-end service providers is a Tuxedo application and you want to swap it for a CORBA implementation, you simply change the endpoint's contract to contain a CORBA connection to the Artix bus. The clients accessing the back-end service provider do not need to be aware of the change.

Artix Contracts

Overview

Artix contracts are written in WSDL. In this way, a standard language is used to describe the characteristics of services and their associated Artix endpoints. By defining characteristics such as service operations and messages in an abstract way—independent of the transport or protocol used to implement the endpoint—these characteristics can be bound to a variety of protocols and formats.

Artix ESB allows an abstract definition to be bound to multiple specific protocols and formats. This means that the same definitions can be reused in multiple implementations of a service. Artix contracts define the services exposed by a set of systems, the payload formats and transports available to each system, and the rules governing how the systems interact with each other. The simplest Artix contract defines a single pair of systems with a shared interface, payload format, and transport. Artix contracts can also define very complex integration scenarios.

WSDL elements

Understanding Artix contracts requires some familiarity with WSDL. The key WSDL elements are as follows:

WSDL types provide data type definitions used to describe messages.

A WSDL message is an abstract definition of the data being communicated. Each part of a message is associated with a defined type.

A WSDL operation is an abstract definition of the capabilities supported by a service, and is defined in terms of input and output messages.

A WSDL portType is a set of abstract operation descriptions.

A WSDL binding associates a specific data format for operations defined in a `portType`.

A WSDL port specifies the transport details for a binding, and defines a single communication endpoint.

A WSDL service specifies a set of related ports.

The Artix Contract

An Artix contract is specified in WSDL and is conceptually divided into logical and physical components.

The logical contract

The logical contract specifies components that are independent of the underlying transport and wire format. It fully specifies the data structure and the possible operations or interactions with the interface. It enables Artix to generate skeletons and stubs without having to define the physical characteristics of the connection (transport and wire format).

The logical contract includes the `types`, `message`, `operation`, and `portType` elements of the WSDL file.

The physical contract

The physical component of an Artix contract defines the format and transport-specific details. For example:

- The wire format, middleware transport, and service groupings
- The connection between the `portType` operations and wire formats
- Buffer layout for fixed formats
- Artix extensions to WSDL

The physical contract includes the `binding`, `port`, and `service` elements of the WSDL file.

Artix Services

Overview

In addition to the core Artix components, Artix also provides the following services:

- Locator
- Accessing contracts and references

These services provide advanced functionality that Artix deployments can use to gain even more flexibility.

Locator

The Artix locator provides service look-up and load balancing functionality to an Artix deployment. It isolates service consumers from changes in a service's contact information.

The Artix WSDL contract defines how the client contacts the server, and contains the address of the Artix locator. The locator provides the client with a reference to the server.

Servers are automatically registered with the locator when they start, and service endpoints are automatically made available to clients without the need for additional coding.

Accessing contracts and references

Accessing contracts and references in Artix ESB refers to enabling client and server applications to find WSDL service contracts and references. Using the techniques and conventions of Artix avoids the need to hard code WSDL into your client and server applications.

For more information

For more information on Artix services, see Configuring and Deploying Artix.

Solving Problems with Artix ESB

Overview

Artix ESB allows you to solve problems arising from the integration of existing back-end systems using a service-oriented approach. It allows you to develop new services using Java, and to retain all of the enterprise levels of service that you require.

There are three phases to an Artix ESB project:

1. The design phase, where you define your services and define how they are integrated using Artix contracts.
2. The development phase, where you write the application code required to implement new services.
3. The deployment phase, where you configure and deploy your Artix solution.

Design phase

In the design phase, you define the logical layout of your system in an Artix contract. The logical or abstract definition of a system includes:

- the services that it contains
- the operations each service offers
- the data the services will use to exchange information

Once you have defined the logical aspects of your system, you then add the physical network details to the contracts.

The physical details of your system include the transports and payload formats used by your services, as well as any routing schemes needed to connect services that use different transports or payload formats.

The Artix command-line tools automate the mapping of your service descriptions into WSDL-based Artix contracts. These tools allow you to:

- Import existing WSDL documents
- Create Artix contracts from scratch
- Generate Artix contracts from:
  - CORBA IDL
  - A Java class
- Add the following bindings to an Artix contract:
  - CORBA
  - SOAP
  - XML

Development phase

You must write Artix application code if your solution involves creating new applications or a custom router. The first step in writing Artix code is to generate client stub code and server skeleton code from the Artix contracts that you created in the design phase. You can generate this code using the Artix command-line tools.

After you have generated the client stub code and server skeleton code, you can develop the code that implements the business logic you require. For most applications, Artix-generated code allows you to stick to using Java code for writing business logic.

Once the stub code is generated, you can use your favorite development environment to develop and debug the application code.

Artix ESB also provides advanced APIs for directly manipulating messages, for writing message handlers, and for other advanced features your application might require. These can be plugged into the Artix runtime for customized processing of messages.

Deployment phase

In the deployment phase, you configure the Artix runtime to fine-tune the Artix bus for your new Artix system. This involves modifying the Artix configuration files and editing the Artix contracts that describe your solution to fit the exact circumstances of your deployment environment.

CHAPTER 2

Understanding WSDL

Artix contracts use WSDL documents to describe services and the data they use.

In this chapter

This chapter discusses the following topics:

WSDL Basics

Overview

Web Services Description Language (WSDL) is an XML document format used to describe services offered over the Web. WSDL is standardized by the World Wide Web Consortium (W3C) and is currently at revision 1.1. You can find the standard on the W3C website at www.w3.org/TR/wsdl.

Elements of a WSDL document

A WSDL document is made up of the following elements:

- `import` allows you to import another WSDL or XSD file.
- Logical contract elements:
  - `types`
  - `message`
  - `operation`
  - `portType`
- Physical contract elements:
  - `binding`
  - `port`
  - `service`

These elements are described in "WSDL elements" on page 24.

Abstract operations

The abstract definition of *operations* and *messages* is separated from the concrete data formatting definitions and network protocol details. As a result, the abstract definitions can be reused and recombined to define several endpoints. For example, a service can expose identical operations with slightly different concrete data formats and two different network addresses. Alternatively, one WSDL document could be used to define several services that use the same abstract messages.

The portType

A *portType* is a collection of abstract operations that define the actions provided by an endpoint.

Concrete details

When a portType is mapped to a concrete data format, the result is a concrete representation of the abstract definition.A *port* is defined by associating a network address with a reusable *binding*, in the form of an endpoint. A collection of ports (or endpoints) define a service.

Because WSDL was intended to describe services offered over the Web, the concrete message format is typically SOAP and the network protocol is typically HTTP. However, WSDL documents can use any concrete message format and network protocol. In fact, Artix contracts bind operations to several data formats and describe the details for a number of network protocols.

Namespaces and imported descriptions

WSDL supports the use of XML namespaces defined in the `definition` element as a way of specifying predefined extensions and type systems in a WSDL document. WSDL also supports importing WSDL documents and fragments for building modular WSDL collections.

Example

Example 9 on page 88 shows a simple WSDL document.

Abstract Data Type Definitions

Overview

Applications typically use data types that are more complex than the primitive types, like `int`, defined by most programming languages. WSDL documents represent these complex data types using a combination of schema types defined in referenced external XML schema documents and complex types described in `types` elements.

Complex type definitions

Complex data types are described in a `types` element. The W3C specification states that XSD is the preferred canonical type system for a WSDL document. Therefore, XSD is treated as the intrinsic type system. Because these data types are abstract descriptions of the data passed over the wire, and are not concrete descriptions, there are a few guidelines on using XSD schemas to represent them:

- Use elements, not attributes.
- Do not use protocol-specific types as base types.
- Define arrays using the SOAP 1.1 array encoding format.

WSDL does allow for the specification and use of alternative type systems within a document.

Example

The structure, `personalInfo`, defined in Example 1, contains a `string`, an `int`, and an `enum`. The `string` and the `int` both have equivalent XSD types and do not require special type mapping. The enumerated type `hairColorType`, however, does need to be described in XSD.

Example 1: *personalInfo structure*

```
enum hairColorType {red, brunette, blonde};

struct personalInfo
{
 string name;
 int age;
 hairColorType hairColor;
}
```

Example 2 shows one mapping of `personalInfo` into XSD. This mapping is a direct representation of the data types defined in Example 1. `hairColorType` is described using a named `simpleType` because it does not have any child elements. `personalInfo` is defined as an `element` so that it can be used in messages later in the contract.

Example 2: *XSD type definition for personalInfo*

```
<types>
  <xsd:schema targetNamespace="http://iona.com/personal/schema"
    xmlns:xsd1="http://iona.com/personal/schema"
    xmlns="http://www.w3.org/2000/10/XMLSchema"/>
    <simpleType name="hairColorType">
      <restriction base="xsd:string">
        <enumeration value="red"/>
        <enumeration value="brunette"/>
        <enumeration value="blonde"/>
      </restriction>
    </simpleType>
    <element name="personalInfo">
      <complexType>
        <sequence>
            <element name="name" type="xsd:string"/>
            <element name="age" type="xsd:int"/>
           <element name="hairColor" type="xsd1:hairColorType"/>
        </sequence>
      </complexType>
    </element>
</types>
```

Another way to map personalInfo is to describe `hairColorType` in-line as shown in Example 3. WIth this mapping, however, you cannot reuse the description of `hairColorType`.

Example 3: *Alternate XSD Mapping for personalInfo*

```
<types>
  <xsd:schema targetNamespace="http://iona.com/personal/schema"
    xmlns:xsd1="http://iona.com/personal/schema"
    xmlns="http://www.w3.org/2000/10/XMLSchema"/>
    <element name="personalInfo">
      <complexType>
        <sequence>
          <element name="name" type="xsd:string"/>
          <element name="age" type="xsd:int"/>
          <element name="hairColor">
            <simpleType>
              <restriction base="xsd:string">
                <enumeration value="red"/>
                <enumeration value="brunette"/>
                <enumeration value="blonde"/>
              </restriction>
            </simpleType>
          </element>
        </sequence>
      </complexType>
    </element>
</types>
```

Abstract Message Definitions

Overview

WSDL is designed to describe how data is passed over a network. It describes data that is exchanged between two endpoints in terms of abstract messages described in `message` elements.

Each abstract message consists of one or more parts, defined in `part` elements.

These abstract messages represent the parameters passed by the operations defined by the WSDL document and are mapped to concrete data formats in the WSDL document's `binding` elements.

Messages and parameter lists

For simplicity in describing the data consumed and provided by an endpoint, WSDL documents allow abstract operations to have only one input message, the representation of the operation's incoming parameter list, and only one output message, the representation of the data returned by the operation.

In the abstract message definition, you cannot directly describe a message that represents an operation's return value. Therefore, any return value must be included in the output message.

Messages allow for concrete methods defined in programming languages like Java to be mapped to abstract WSDL operations. Each message contains a number of `part` elements that represent one element in a parameter list.

Therefore, all of the input parameters for a method call are defined in one message and all of the output parameters, including the operation's return value, are mapped to another message.

Example

For example, imagine a server that stores personal information as defined in Example 1 on page 34 and provides a method that returns an employee's data based on an employee ID number.

The method signature for looking up the data would look similar to Example 4.

Example 4: *Method for Returning an Employee's Data*

```
personalInfo lookup(long empId)
```

This method signature could be mapped to the WSDL fragment shown in Example 5.

Example 5: *WSDL Message Definitions*

```
<message name="personalLookupRequest">
  <part name="empId" type="xsd:int" />
</message>
<message name="personalLookupResponse">
  <part name="return" element="xsd1:personalInfo" />
</message>
```

Message naming

Each message in a WSDL document must have a unique name within its namespace. Choose message names that show whether they are input messages (requests) or output messages (responses).

Message parts

Message parts are the formal data elements of the abstract message. Each part is identified by a `name` attribute and by either a `type` or an `element` attribute that specifies its data type. The data type attributes are listed in Table 1.

Table 1: *Part Data Type Attributes*

Attribute	Description
`type="`*`type_name`*`"`	The data type of the part is defined by a `simpleType` or `complexType` called *`type_name`*
`element="`*`elem_name`*`"`	The data type of the part is defined by an `element` called *`elem_name`*.

Messages are allowed to reuse part names. For instance, if a method has a parameter, `foo`, which is passed by reference or is an in/out, it can be a part in both the request message and the response message. An example of parameter reuse is shown in Example 6.

Example 6: *Reused Part*

```
<message name="fooRequest">
  <part name="foo" type="xsd:int"/>
</message>
<message name="fooReply">
  <part name="foo" type="xsd:int"/>
</message>
```

Abstract Interface Definitions

Overview

WSDL `portType` elements define, in an abstract way, the operations offered by a service. The operations defined in a portType list the input, output, and any fault messages used by the service to complete the transaction the operation describes.

PortTypes

A `portType` can be thought of as an interface description. In many Web service implementations there is a direct mapping between portTypes and implementation objects. PortTypes are the abstract unit of a WSDL document that is mapped into a concrete binding to form the complete description of what is offered over a port.

PortTypes are described using the `portType` element in a WSDL document. Each portType in a WSDL document must have a unique name, specified using the `name` attribute, and is made up of a collection of operations, described in `operation` elements. A WSDL document can describe any number of portTypes.

Operations

Operations, described in `operation` elements in a WSDL document, are an abstract description of an interaction between two endpoints. For example, a request for a checking account balance and an order for a gross of widgets can both be defined as operations.

Each operation within a portType must have a unique name, specified using the required `name` attribute.

Elements of an operation

Each operation is made up of a set of elements. The elements represent the messages communicated between the endpoints to execute the operation.

The elements that can describe an operation are listed in Table 2.

Table 2: *Operation Message Elements*

Element	Description
`input`	Specifies a message that is received from another endpoint. This element can occur at most once for each operation.
`output`	Specifies a message that is sent to another endpoint. This element can occur at most once for each operation.
`fault`	Specifies a message used to communicate an error condition between the endpoints. This element is not required and can occur an unlimited number of times.

An operation is required to have at least one `input` or `output` element. The elements are defined by two attributes listed in Table 3.

Table 3: *Attributes of the Input and Output Elements*

Attribute	Description
`name`	Identifies the message so it can be referenced when mapping the operation to a concrete data format. The name must be unique within the enclosing port type.
`message`	Specifies the abstract message that describes the data being sent or received. The value of the `message` attribute must correspond to the `name` attribute of one of the abstract messages defined in the WSDL document.

It is not necessary to specify the `name` attribute for all input and output elements; WSDL provides a default naming scheme based on the enclosing operation's name.

If only one element is used in the operation, the element name defaults to the name of the operation. If both an `input` and an `output` element are used, the element name defaults to the name of the operation with `Request` or `Response`, respectively, appended to the name.

Return values

Because the portType is an abstract definition of the data passed during an operation, WSDL does not provide for return values to be specified for an operation. If a method returns a value, it is mapped into the output message as the last part of that message. The concrete details of how the message parts are mapped into a physical representation are described in "Bindings" on page 44.

Example

For example, in implementing a server that stores personal information in the structure defined in Example 1 on page 34, you might use an interface similar to the one shown in Example 7.

Example 7: *personalInfo Lookup Interface*

```
interface personalInfoLookup
{
  personalInfo lookup(in int empID)
  raises(idNotFound);
}
```

This interface could be mapped to the portType in Example 8.

Example 8: *personalInfo Lookup Port Type*

```
<types>
...
  <element name="idNotFound" type="idNotFoundType">
  <complexType name="idNotFoundType">
    <sequence>
      <element name="ErrorMsg" type="xsd:string"/>
      <element name="ErrorID" type="xsd:int"/>
    </sequence>
  </complexType>
</types>
<message name="personalLookupRequest">
  <part name="empId" type="xsd:int" />
</message>
<message name="personalLookupResponse">
  <part name="return" element="xsd1:personalInfo" />
</message>
<message name="idNotFoundException">
  <part name="exception" element="xsd1:idNotFound" />
</message>
<portType name="personalInfoLookup">
  <operation name="lookup">
    <input name="empID" message="personalLookupRequest" />
    <output name="return" message="personalLookupResponse" />
    <fault name="exception" message="idNotFoundException" />
  </operation>
</portType>
```

Mapping to the Concrete Details

Overview

The abstract definitions in a WSDL document are intended to be used in defining the interaction of real applications that have specific network addresses, use specific network protocols, and expect data in a particular format. To fully define these real applications, the abstract definitions discussed in the previous section must be mapped to concrete representations of the data passed between applications. The details describing the network protocols in use must also be added.

This is accomplished in the WSDL `bindings` and `ports` elements. WSDL binding and port syntax is not tightly specified by the W3C. A specification is provided that defines the mechanism for defining these syntaxes. However, the syntaxes for bindings other than SOAP and for network transports other than HTTP are not defined in a W3C specification.

Bindings

Bindings describe the mapping between the abstract messages defined for each portType and the data format used on the wire. Bindings are described in `binding` elements in the WSDL file. A binding can map to only one portType, but a portType can be mapped to any number of bindings.

It is within the bindings that you specify details such as parameter order, concrete data types, and return values. For example, a binding can reorder the parts of a message to reflect the order required by an RPC call. Depending on the binding type, you can also identify which of the message parts, if any, represent the return type of a method.

Services

To define an endpoint that corresponds to a running service, the `port` element in the WSDL file associates a binding with the concrete network information needed to connect to the remote service described in the file. Each port specifies the address and configuration information for connecting the application to a network.

Ports are grouped within `service` elements. A service can contain one or many ports. The convention is that the ports defined within a particular service are related in some way. For example, all of the ports might be bound to the same portType, but use different network protocols, like HTTP and WebSphere MQ.

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