Business Process Digitalization and Cloud Computing
5. Web Services and SOA

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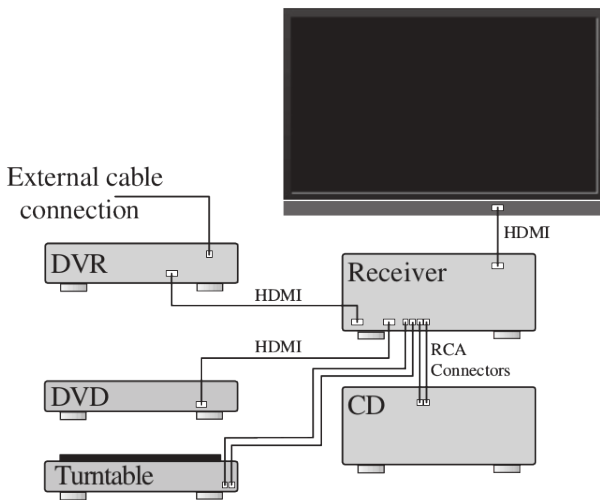
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Web Service Analogy

Web services are connections not unlike those we have with AV systems

SOA Overview

- The communication in SOA can involve either simple **data passing** or it could **involve two or more services** coordinating some activities.
- Service support of automate a business function.
    - **Atomic:** is a well-defined, self-contained function that does not depend on the context or state of other services
    - **Composite:** is an assembly of atomic or other composite services. May depend of the context of others services.
- Organizations will eventually evolve **standard** capabilities of CRM, enterprise resource planning (ERP), and other services. (fewer people writing software and more organizations buying software or renting access to software)
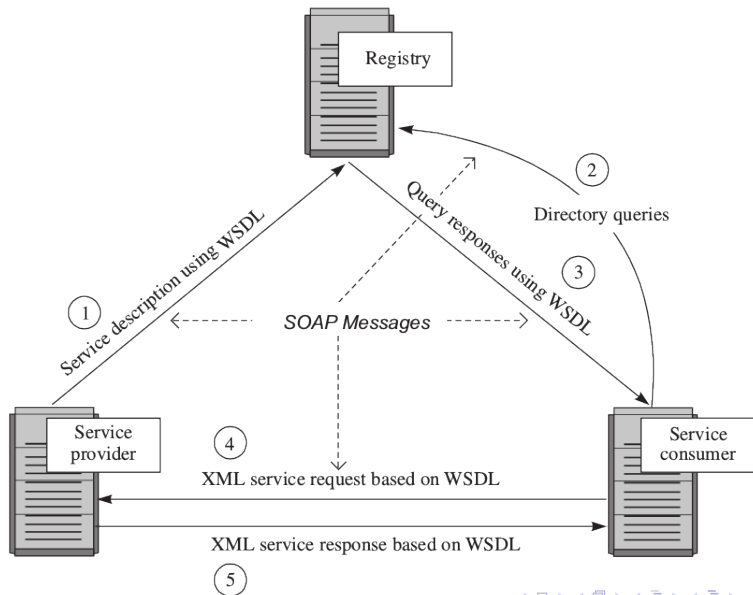
Connections

Web services **provide the means of connecting services**.
Connections such as Web services are part of the inevitable evolution of interconnectedness (e.g. mail).
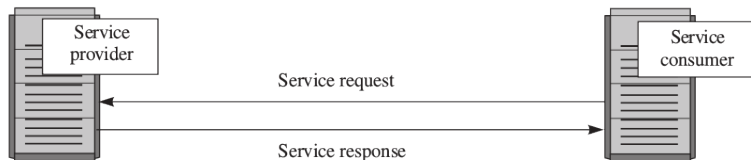
The request and subsequent response connections are defined in some way that is **understandable** to both the service consumer and the service provider.

Web Service Scenario

Universal Description, Discovery and Integration

The UDDI language was intended to **discovering** Web Services described using WSDL.

The UDDI registry could be **searched** in various ways to obtain **contact information** and the services available from various organizations.

The term **registry** is sometimes used interchangeably with the term service **repository**.
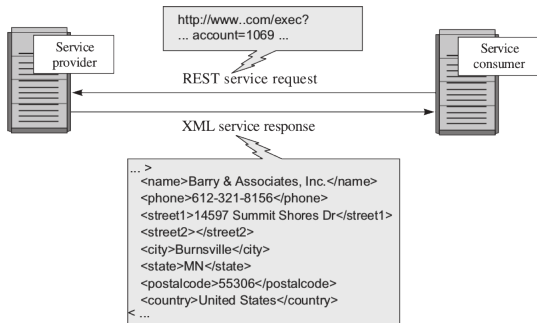
Simple Object Access Protocol (SOAP)

- SOAP provides the **envelope** for sending Web services messages.
- SOAP generally uses HTTP
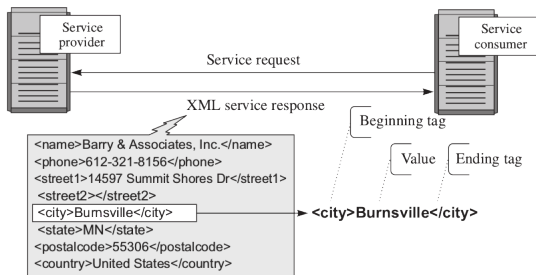- It is possible to use **SOAP without UDDI**. The connection is, "hard-coded" in the service.
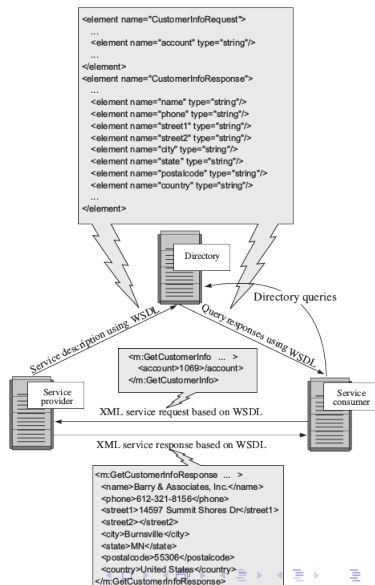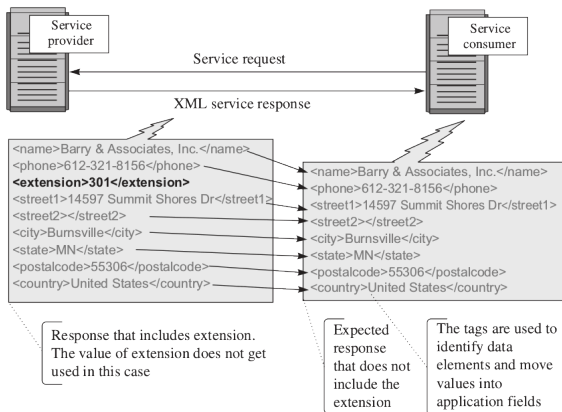
REST

- REST is **simpler** and a bit **less verbose** than SOAP.
- REST looks like any other HTTP request that uses parameters.

XML

- XML has a **tagged** message format.
- XML uses the tags and not the order of the data to get the data values so **information can be saved in any order**.

XML extension

Response that includes extension. The value of extension does not get used in this case

Expected response that does not include the extension

The tags are used to identify data elements and move values into application fields

Nothing bad happen when **extra data** is passed to a service that does not expect additional tags.

XML extension
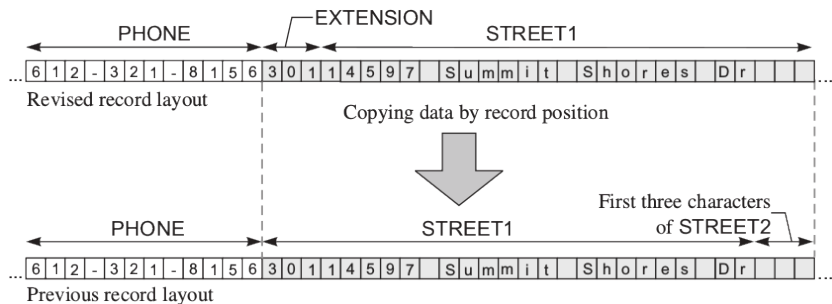
In fixed record messaging, everything is positional.

- XML create system more **resilient** but much **longer**

JavaScript Object Notation (JSON)

| XML	JSON

... >
<name>Barry & Associates, Inc.</name>
<phone>612-321-8156</phone>
<street1>14597 Summit Shores Dr</street1>
<street2></street2>
<city>Burnsville</city>
<state>MN</state>
<postalcode>55306</postalcode>
<country>United States</country>
< ...
	{
	  "name" : "Barry & Associates, Inc.",
	  "phone" : "612-321-8156",
	  "street1" : "14597 Summit Shores Dr",
	  "street2" : "",
	  "city" : "Burnsville",
	  "state" : "MN",
	  "postalcode" : "55306",
	  "country" : "United States"
	}

- JSON uses **name/value pairs** instead of the tags used by XML
- The name/value pairs do not have to be in **any particular order** to work
- XML and JSON can use the same vocabulary for the names of the data elements

When to Use SOAP, REST, JSON, or Other Options

- If you are using **external services**, you will need to use whatever they have chosen.
- If you are **developing** your own service, you can choose the Web service that is best for you

Standardized semantic vocabularies

- Exchanging data among many organizations can bring **inconsistency** in data element name and meaning, for example, the "account number" in one unit has the same meaning as the "customer ID" in another unit

- This can lead to added development **costs** or even **processing problems**.

- Industry groups and other organizations have establish **standard semantic vocabularies**.
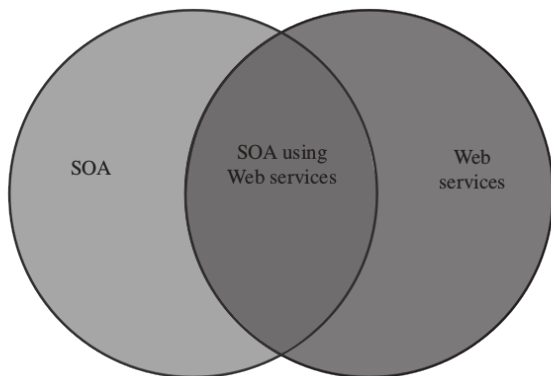
Web Services & SOA

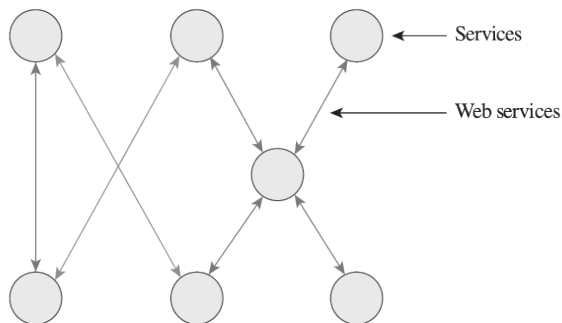- overlapping area represents SOA using Web services for connections.

Services in a service provider
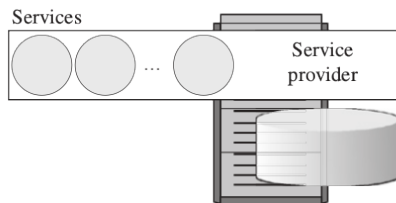
- Any service provider could provide **multiple services**.
- Services are **code running** on an underlying computer system that provide **computing** as well as access and **updates to stored data**.

Assembly of services into an SOA

- Services are assembled to support or automate business functions
- Web services are used to connect the services in an SOA.

Example sources of services in an SOA
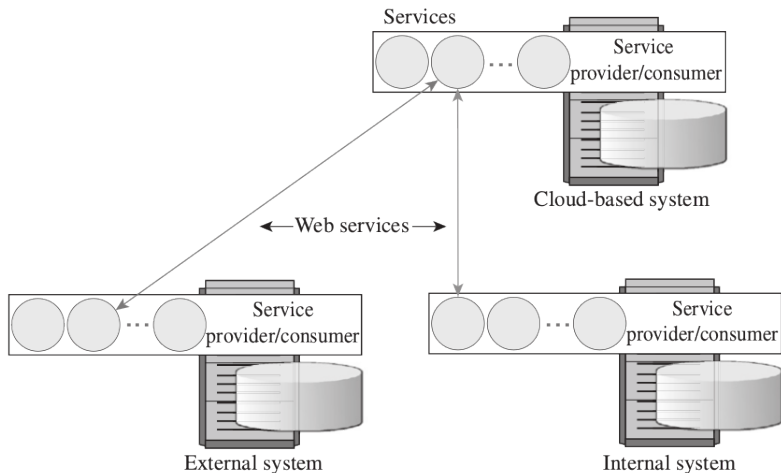
The services might be from internal systems along with any number of **external systems accessible anywhere on the Internet**

Questions?