Business Process Digitalization and Cloud Computing

5. Web Services and SOA

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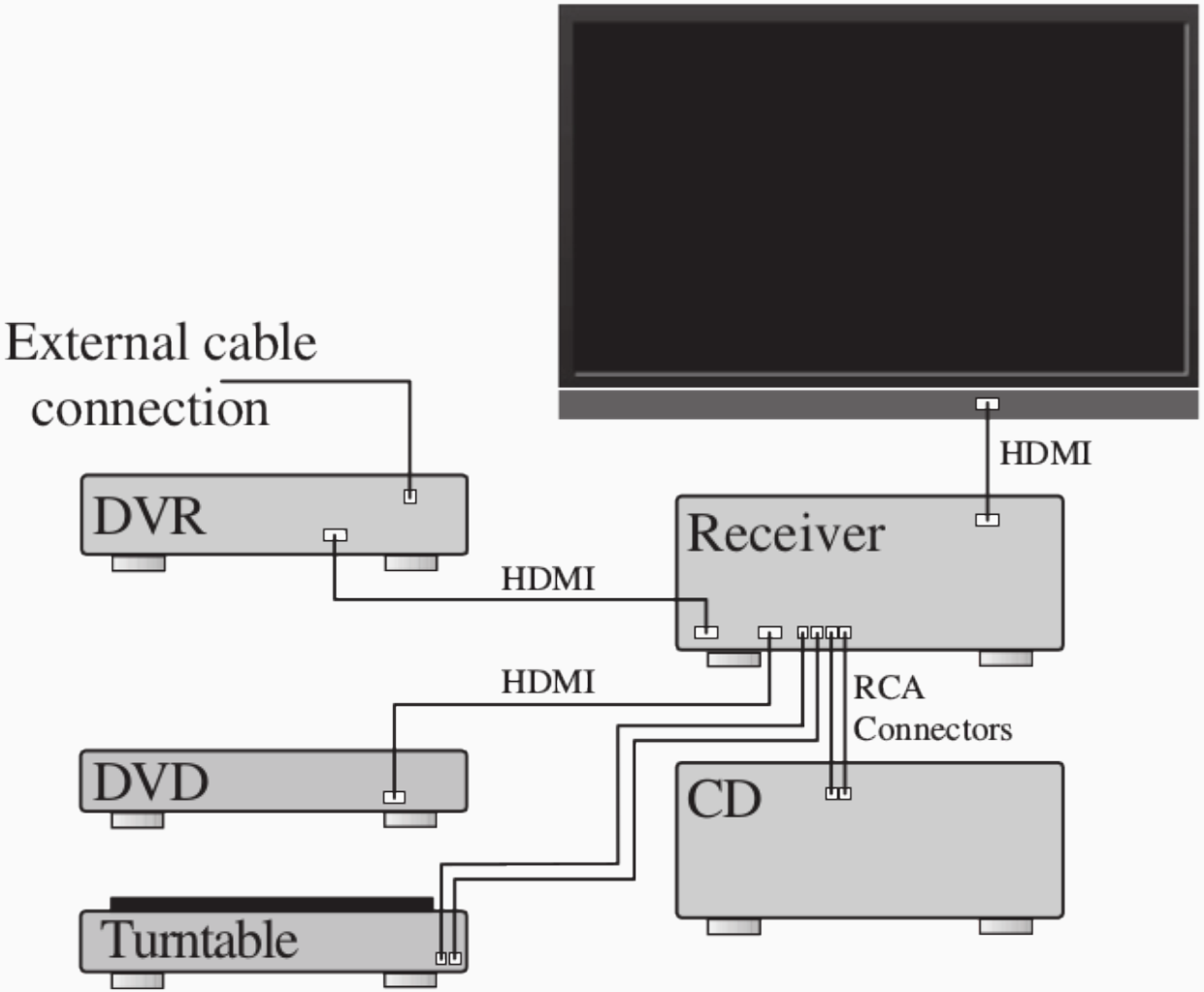
SOA Overview

Web Service Analogy

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



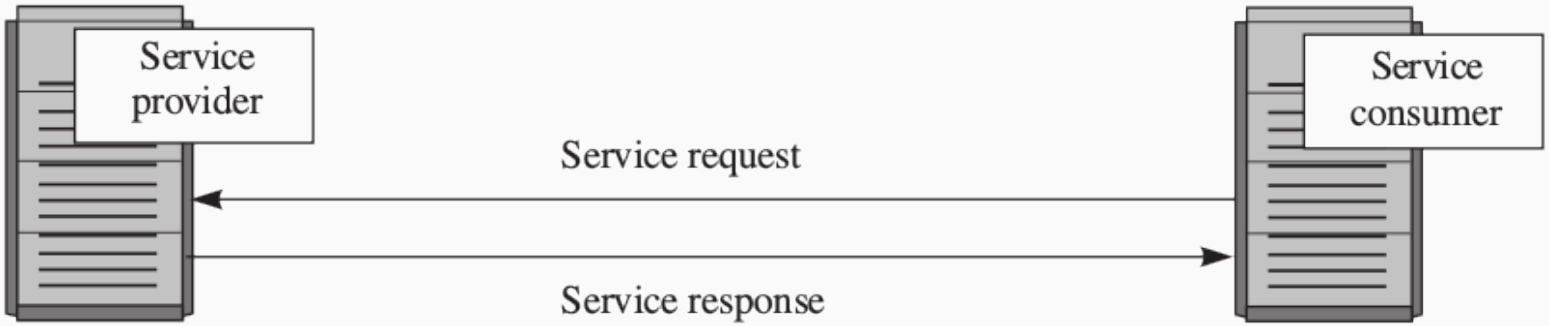
SOA Overview

- 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**.

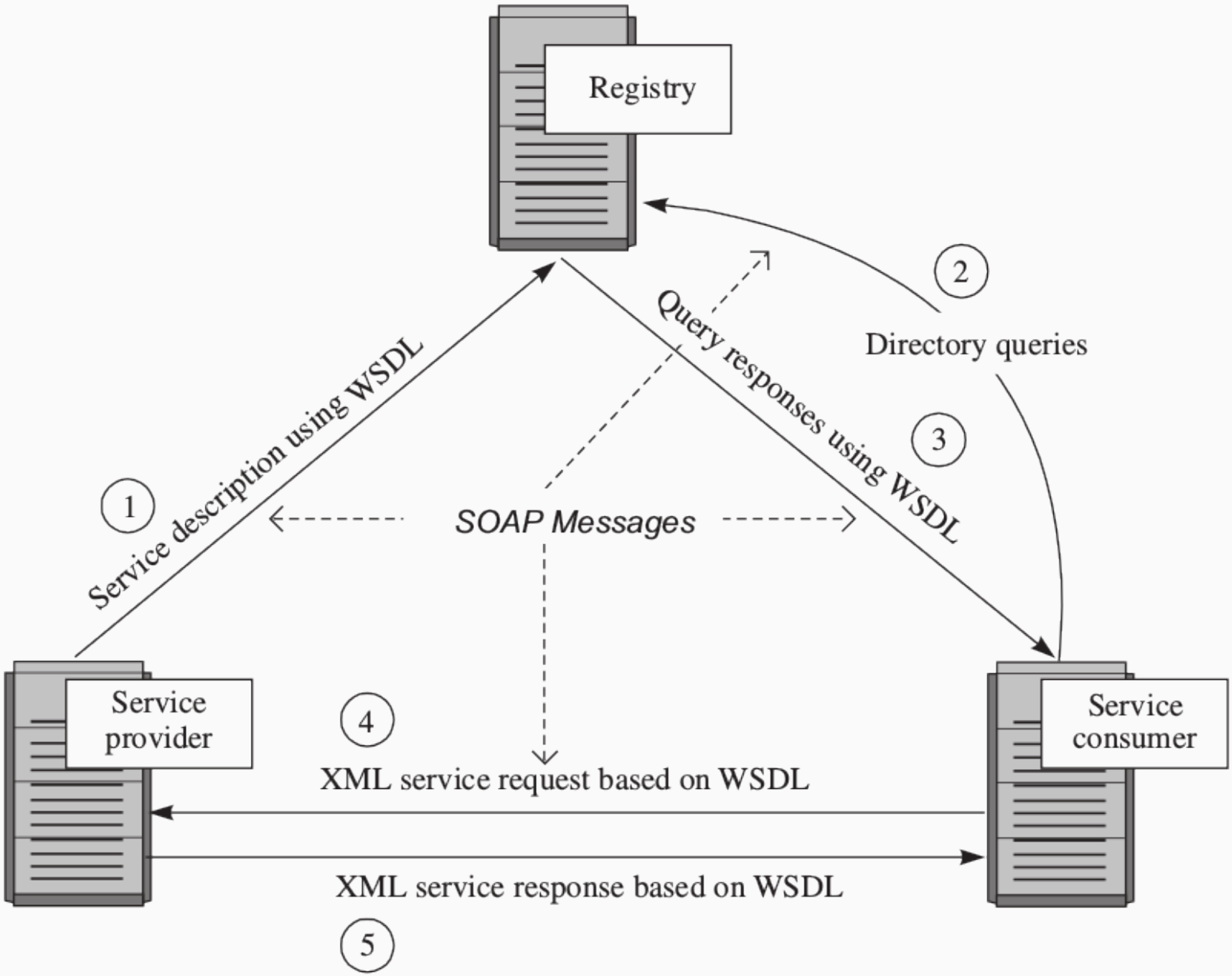
Connections such as Web services are part of the inevitable evolution of interconnectedness (e.g. mail).



The request and subsequent response connections are defined in some way that is **understandable** to both the service consumer and the service provider.

Web Services Explained

Web Service Scenario



Universal Description, Discovery and Integration

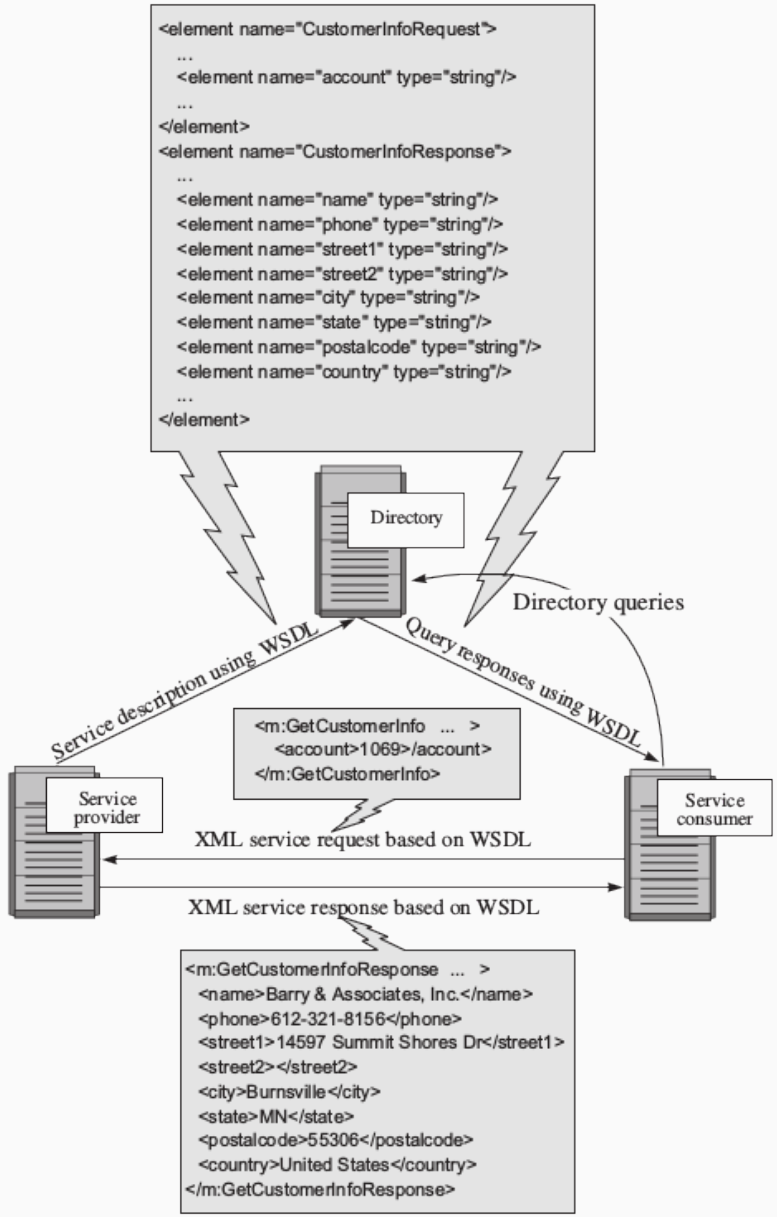
The UDDI language was intended to **discovering** Web Services described using WSDL.

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**.

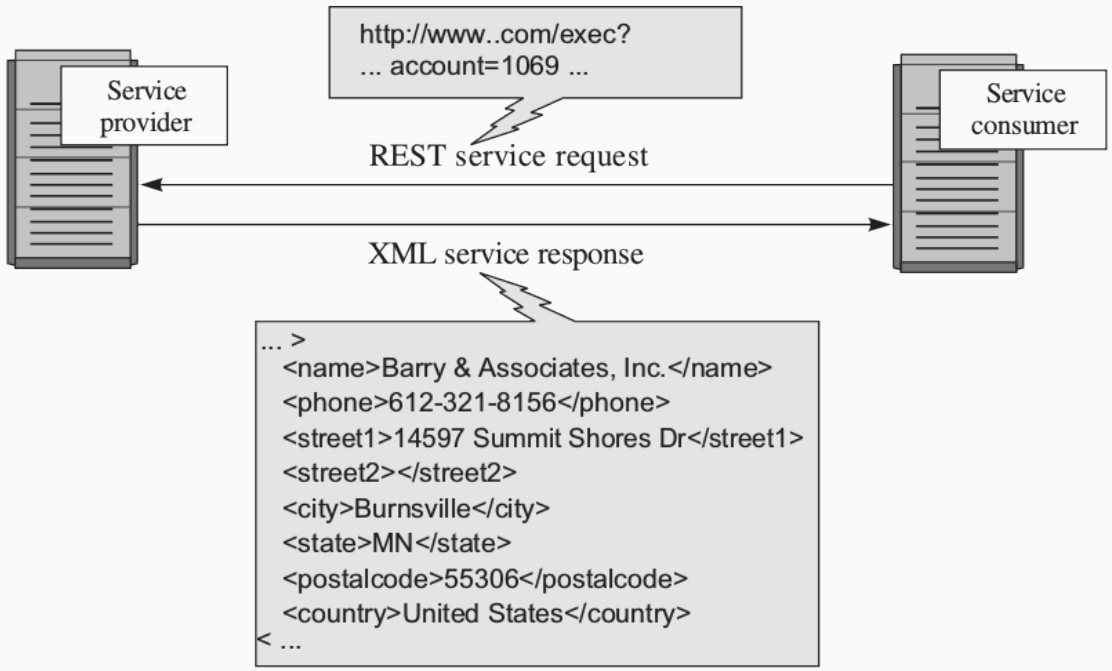
Simple Object Access Protocol (SOAP)

- 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.

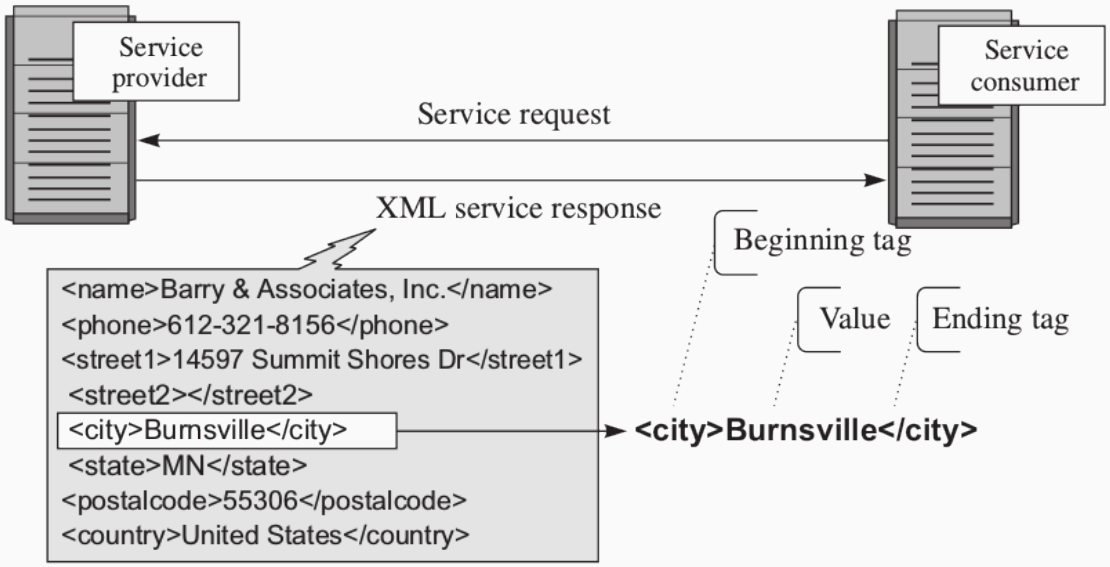


REST

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

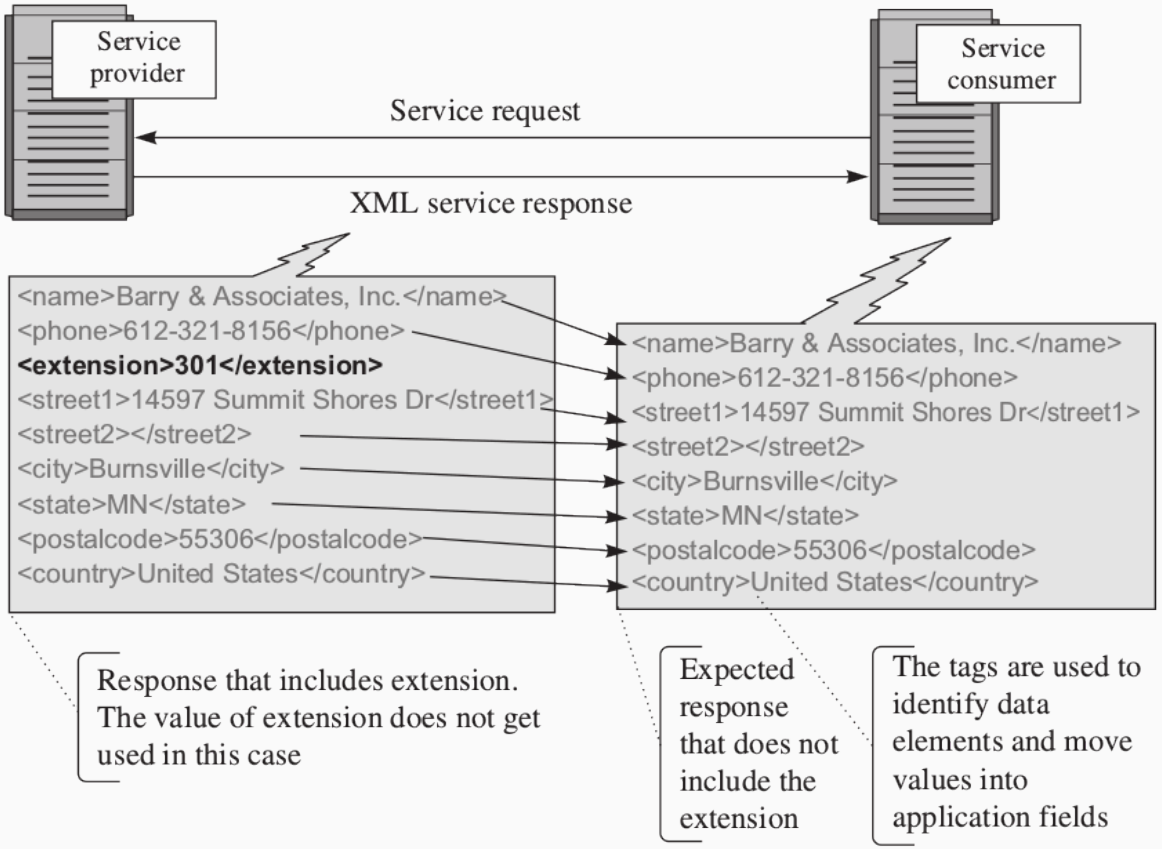


XML



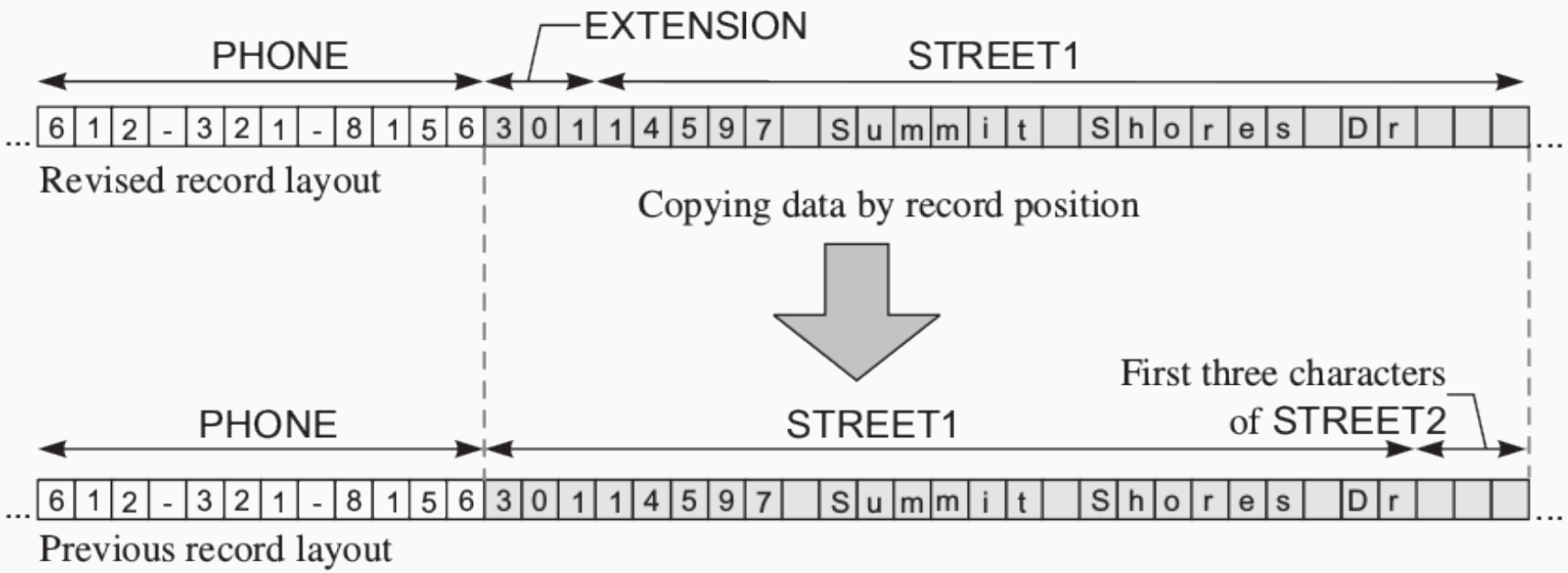
- XML has a **tagged** message format.
- XML uses the tags and not the order of the data to get the data values so **information can be saved in any order**.

XML extension



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

```
... >
  <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>
< ...
```

JSON

```
{
  "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

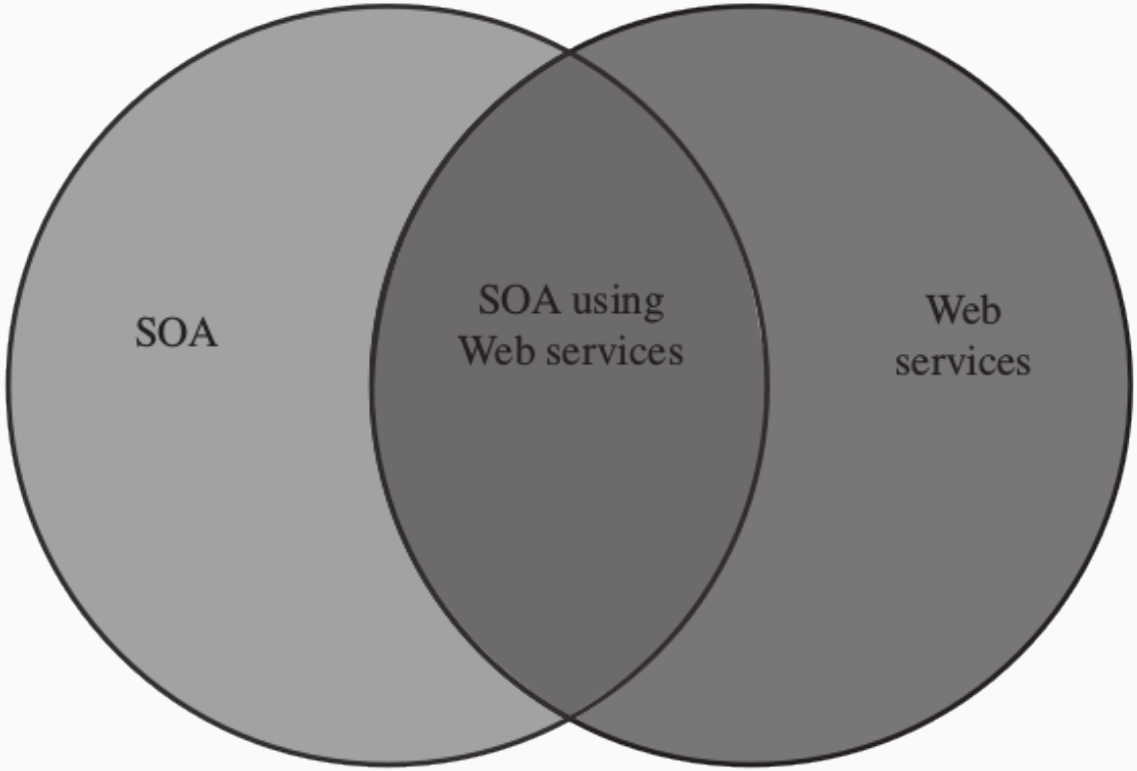
- If you are using **external services**, you will need to use whatever they have chosen.
- If you are **developing** your own service, you can choose the Web service that is best for you

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**.

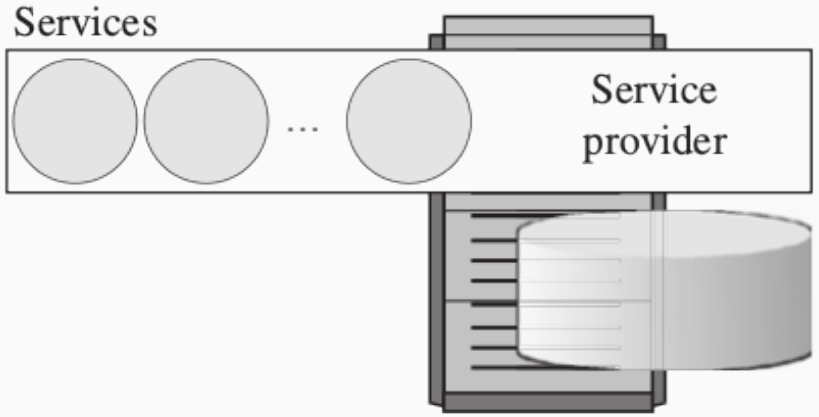
Service-Oriented Architecture Explained

Web Services & SOA



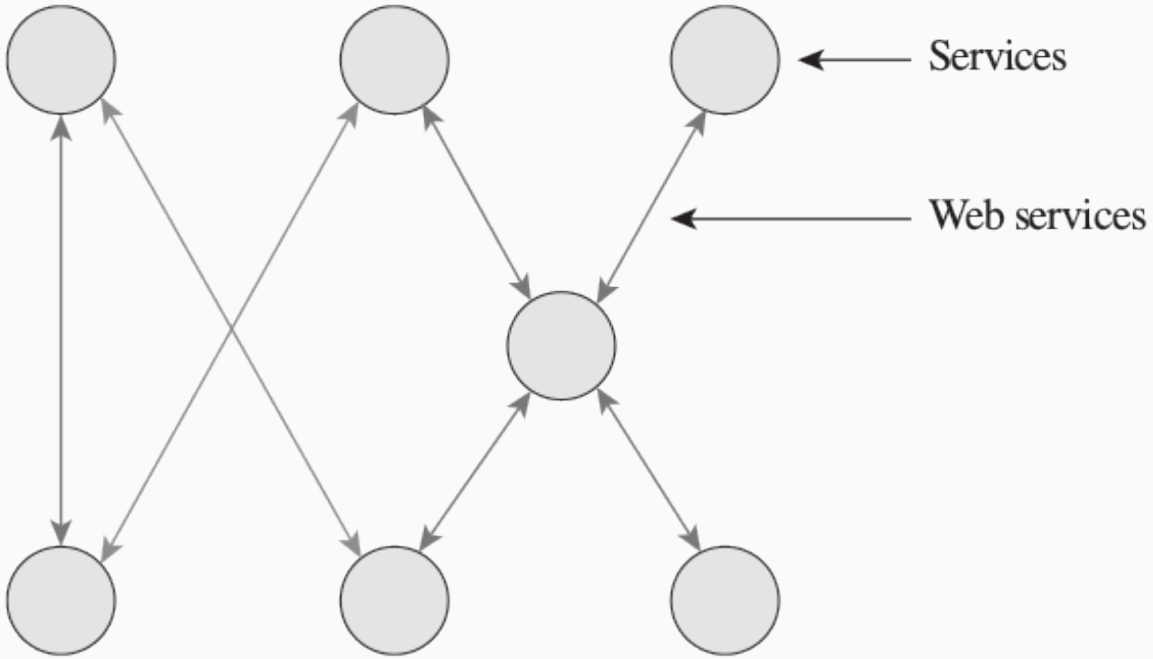
- overlapping area represents SOA using Web services for connections.

Services in a service provider



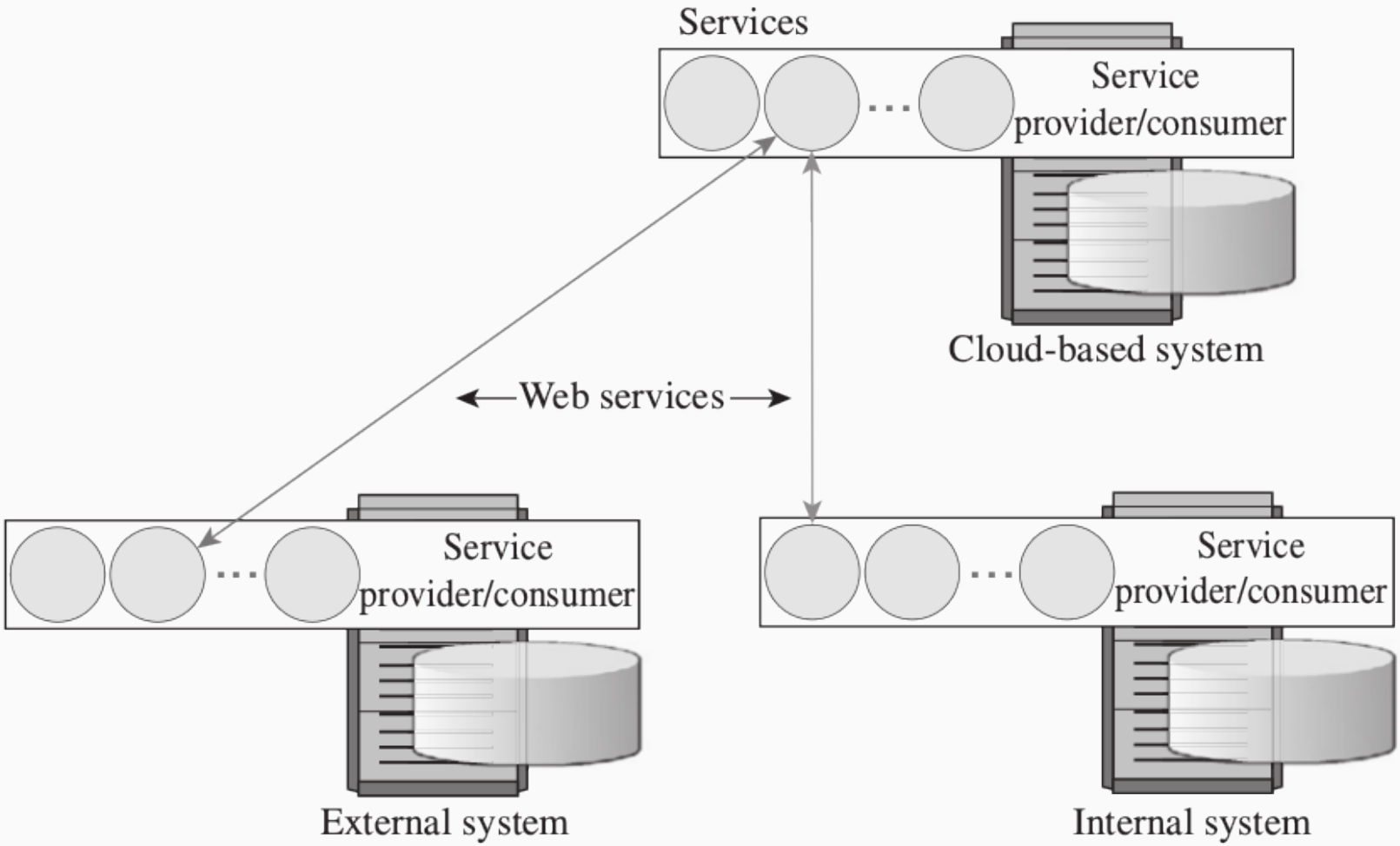
- Any service provider could provide **multiple services**.
- Services are **code running** on an underlying computer system that provide **computing** as well as access and **updates to stored data**.

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**

Questions?