UNIT II CLOUD ENABLING TECHNOLOGIES

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

2.1 Introduction

Web Service

- **Generic definition**

- Any application accessible to other applications over the Web.

- **Definition of the UDDI consortium**

- Web services are self-contained, modular business applications that have open, Internet-oriented, standards-based interfaces.

- **Definition of the World Wide Web Consortium (W3C)**

- A Web service is a software system designed to support interoperable machine-to-machine interaction over a network.
- It has an interface described in a machine-processable format (specifically WSDL).
- Other systems interact with the Web service using SOAP messages.

What is a Web Service?

- Web Services are Classes/Methods, NOT Servlets
- Loosely-coupled
- Encapsulate functionality to logical entities
- Reuse of code and functionality
- Distributed Architecture
- Standardized interface & established Internet protocols

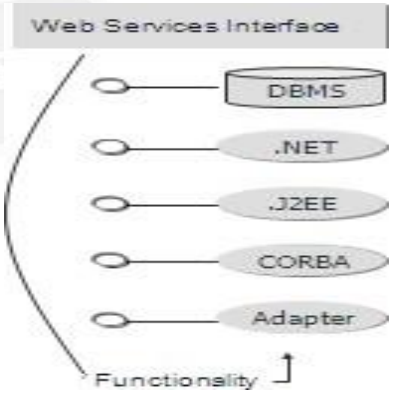


Figure 2.1 Service Interfaces

Characteristics of a Web Service

- A web service interface generally consists of a collection of operations that can be used by a client over the Internet.
- The operations in a web service may be provided by a variety of different resources, for example, programs, objects, or databases.
- The key characteristic of (most) web services is that they can process XML-formatted SOAP messages. An alternative is the REST approach.
- Each web service uses its own service description to deal with the service-specific characteristics of the messages it receives. Commercial examples include Amazon, Yahoo, Google and eBay.

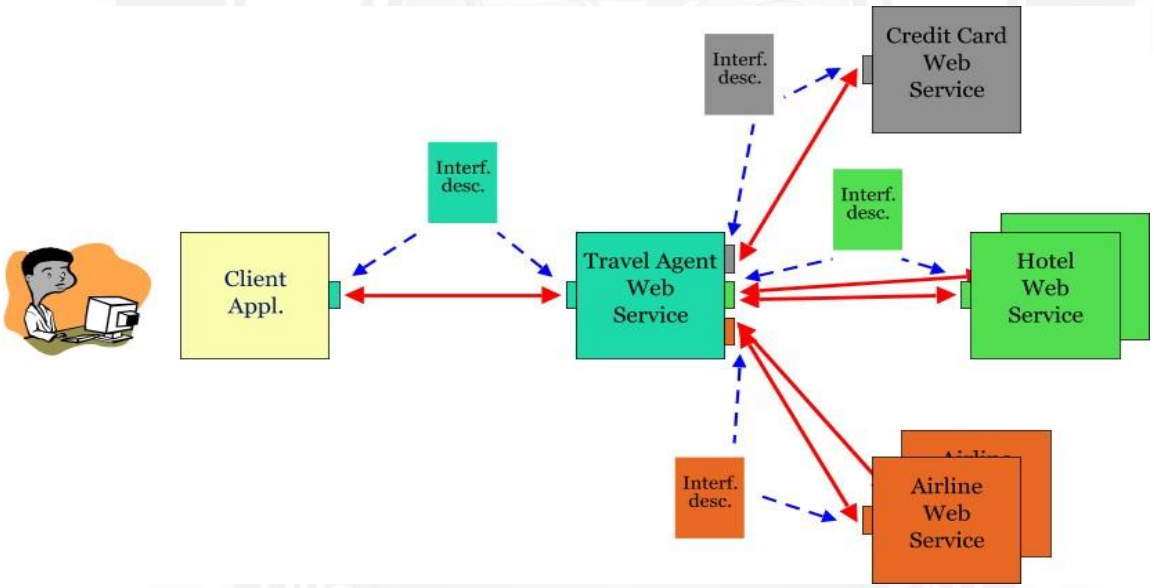


Figure 2.2 Example-Travel Agent Service

Remote Access

- IP Address - Locate a Computer
- URI - Uniform Resource Identifier
  - Locate a file in that Computer
- Socket and Port- Binding to a Method

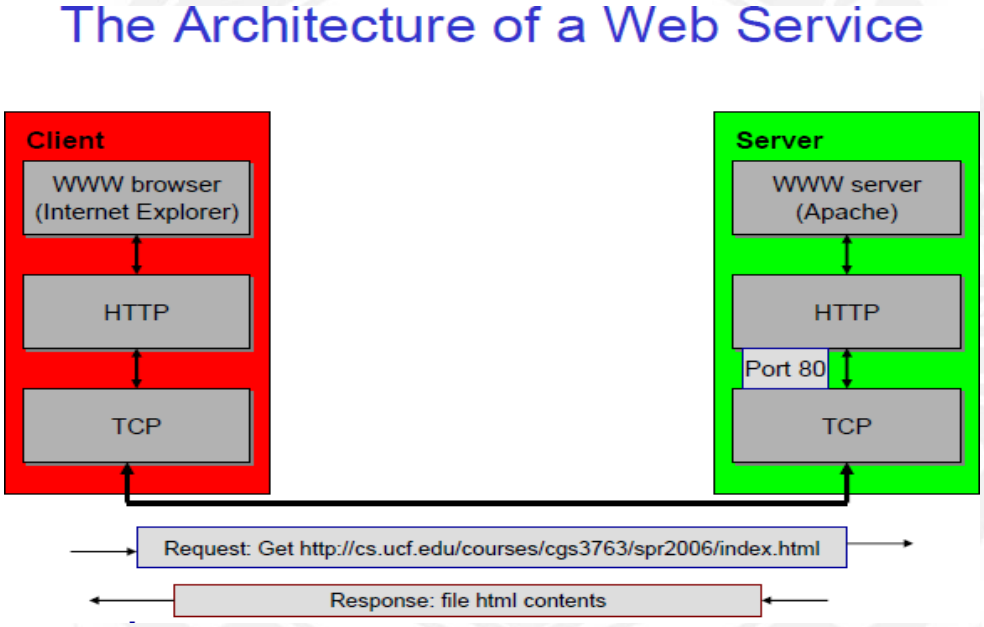
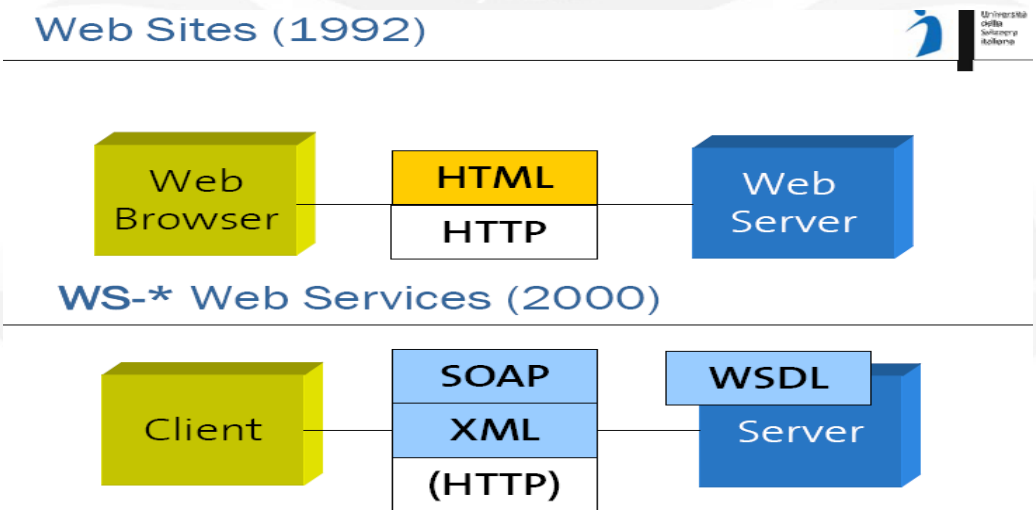


Figure 2.3 Web Service Architecture



2.1.1 SOA – Service Oriented Architecture

- Service provider publishes service description (WSDL), e.g. on a service broker
- Service Requester finds service (on service broker) and dynamically binds to service
- Enables ad-hoc collaboration and Enterprise Application Integration (EAI) within web-based information systems
- SOA is about how to design a software system that makes use of services of new or legacy applications through their published or discoverable interfaces.
- These applications are often distributed over the networks.
- SOA also aims to make service interoperability extensible and effective.
- It prompts architecture styles such as loose coupling, published interfaces and a standard communication model in order to support this goal.

Properties of SOA

- Logical view
- Message orientation
- Description orientation

Logical view

- The SOA is an abstracted, logical view of actual programs, databases, business processes.
- Defined in terms of what it does, typically carrying out a business-level operation.
- The service is formally defined in terms of the messages exchanged between provider agents and requester agents.

Message Orientation

- The internal structure of providers and requesters include the implementation language, process structure, and even database structure.
- These features are deliberately abstracted away in the SOA

- Using the SOA discipline one does not and should not need to know how an agent implementing a service is constructed.
- The key benefit of this concerns legacy systems.
- By avoiding any knowledge of the internal structure of an agent, one can incorporate any software component or application to adhere to the formal service definition.

Description orientation

- A service is described by machine-executable metadata.
- The description supports the public nature of the SOA.
- Only those details that are exposed to the public and are important for the use of the service should be included in the description.
- The semantics of a service should be documented, either directly or indirectly, by its description.

SOA Realization (Two ways)

- XML - SOAP Based Web Services
- Extensible Markup Language (XML) is a markup language designed as a standard way to encode documents and data
- SOAP is an acronym for Simple Object Access Protocol. It is an XML-based messaging protocol for exchanging information among computers
- RESTful Web services

Web service is the terminology used everywhere

Service Oriented Architecture model implemented by XML Web Services

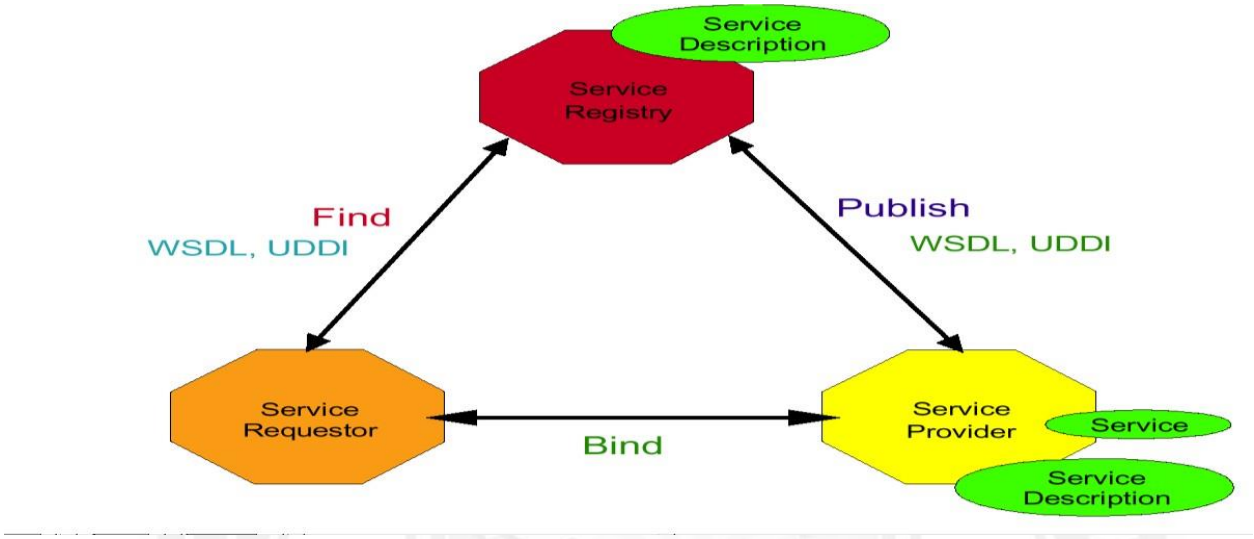


Figure 2.4 SOA Model

WSDL – Web Services Description Languages

- Provides a machine-readable description of how the service can be called, what parameters it expects, and what data structures it returns.
- Used in combination with SOAP and an XML Schema to provide Web services over the Internet.

UDDI – Universal Description, Discovery and Integration

- White Pages — address, contact, and known identifiers;
- Yellow Pages — industrial categorizations based on standard taxonomies;
- Green Pages — technical information about services exposed by the business.