Chapter 7 - SOAP

- Describe what SOAP is used for and the concept behind SOAP
- Identify what the SOAP specification is composed of and where it can be found
- Describe the SOAP Message Exchange Patterns
- Describe the structure of the SOAP message and explain all of its parts
- Describe how data is encoded in a SOAP message
- Provide a step-by-step example of how to program with SOAP in Java
SOAP Overview

• SOAP is a specification that describes a standard structure for encoding and packaging data and exchanging that data between distributed software applications
• SOAP provides interoperability between applications written in different programming languages and/or running on different platforms
• SOAP achieves interoperability through the use of the eXtensible Markup Language (XML) and by remaining independent of other protocols
• Since SOAP is based on XML therefore, SOAP is text-based. Past attempts at a standard protocol for cross-platform interoperability have used a binary format (e.g., DCE-RPC, CORBA-IIOP)
SOAP Overview, cont.

- SOAP is typically transported from one computer to another as the payload of some other network protocol, usually the HyperText Transfer Protocol (HTTP).
- Embedding SOAP in HTTP allows SOAP to freely pass through corporate firewalls (*HTTP tunneling*).
- The primary use of SOAP is application-to-application (A2A) communication, specifically business-to-business (B2B) and enterprise application integration (EAI).
- B2B is electronic commerce between businesses, as opposed to electronic commerce between a business and a consumer (B2C). EAI is the use of software called *middleware* to integrate the applications, databases, and legacy systems that support an organization’s critical business processes.
B2B using SOAP over HTTP
SOAP Overview, cont.

EAI using SOAP over HTTP
SOAP Overview, cont.

- The SOAP specification is maintained by the World Wide Web Consortium (W3C) – http://www.w3c.org
- The current versions of SOAP are 1.1 and 1.2
- SOAP has enjoyed widespread acceptance by the software community and is endorsed by most enterprise software vendors and standards organizations like W3C, the Organization for the Advancement of Structured Information Systems (OASIS), and the Web Services Interoperability Organization (WS-I)
- Due to its platform-independence and vendor backing, SOAP has become the de facto communication protocol standard for invoking applications over a network
SOAP Concepts

- SOAP is a decentralized, stateless, one-way message exchange paradigm where XML messages are passed from an initiator, through zero or more intermediate locations, to a final destination.
- A SOAP message is the SOAP XML document instance that is exchanged between SOAP applications over a network.
- The peers exchanging the SOAP message are called SOAP nodes (SOAP nodes are also called SOAP applications). Within SOAP messages a SOAP node is identified by a URI. SOAP nodes handle routing and processing of the SOAP message and are categorized into one of three concepts - SOAP sender, SOAP receiver, and SOAP intermediary.
SOAP Concepts, cont.

- **SOAP sender**: SOAP node that generates and transmits a SOAP message
- **SOAP receiver**: SOAP node that receives and processes the SOAP message that was generated by a SOAP sender
- **SOAP intermediary**: SOAP node that is considered a SOAP receiver as well as a SOAP sender. Zero or more intermediaries can lie between the initial SOAP sender and the ultimate SOAP receiver. These intermediaries can perform preprocessing of the message before it reaches its final destination. Common uses for intermediaries are security, logging, and transactions.
- The set of SOAP nodes through which the SOAP message passes, including the initial sender and the ultimate receiver, are called the SOAP message path
SOAP Concepts, cont.

- The **initial SOAP sender** (also commonly called the SOAP client) is the SOAP sender that generated the original SOAP message.

- The **ultimate SOAP receiver** (also commonly called the SOAP server or Web service) is a SOAP receiver that is the final destination of a SOAP message.

![SOAP Message Path Diagram]

**Initial Sender**

**Sender (Client)**

**SOAP Message**

**1st Intermediary**

**Intermediary**

**SOAP Message**

**nth Intermediary**

**Intermediary**

**SOAP Message**

**Ultimate Receiver (Web Service)**

**Receiver (Server)**

**Node**

**Node**

**Node**

**Node**

**SOAP Message Path**