Web services

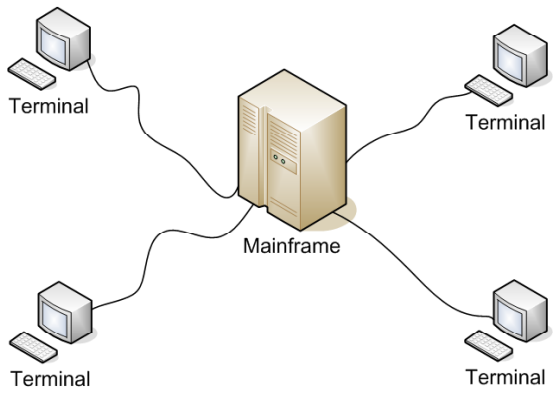
Outline

- Interprocess communication history
- Web services

History

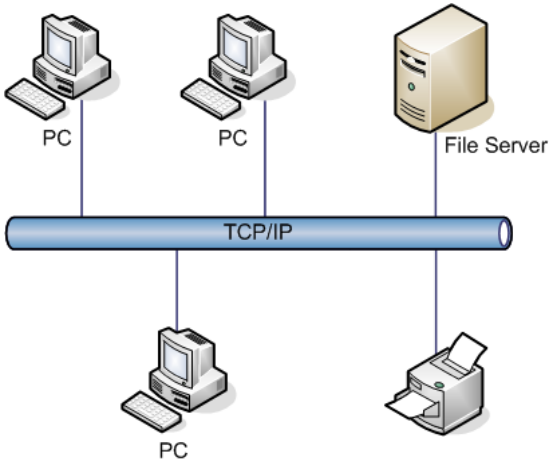
- Mainframe computers (1960s)
- Personal computers (1970s)
- Computer networks (1970s)

Mainframe computers

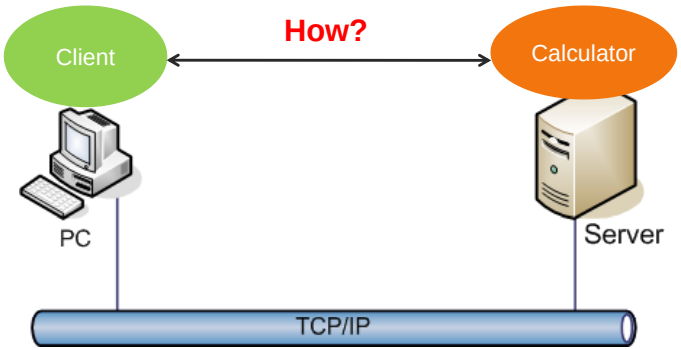


Personal computers

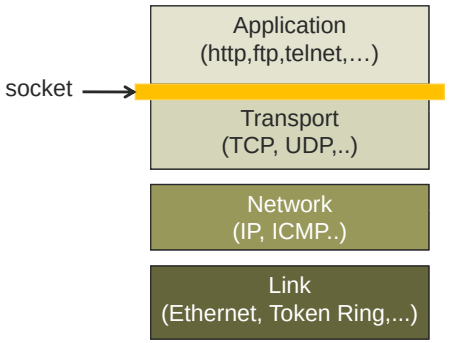
Computer networks



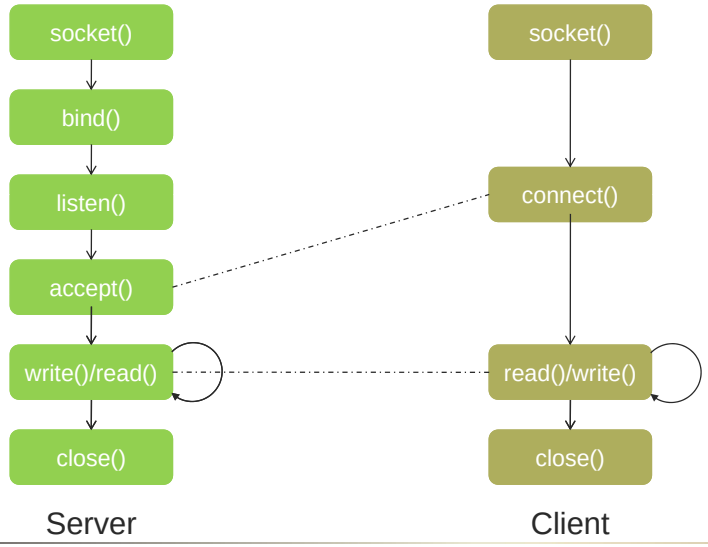
Interprocess communication



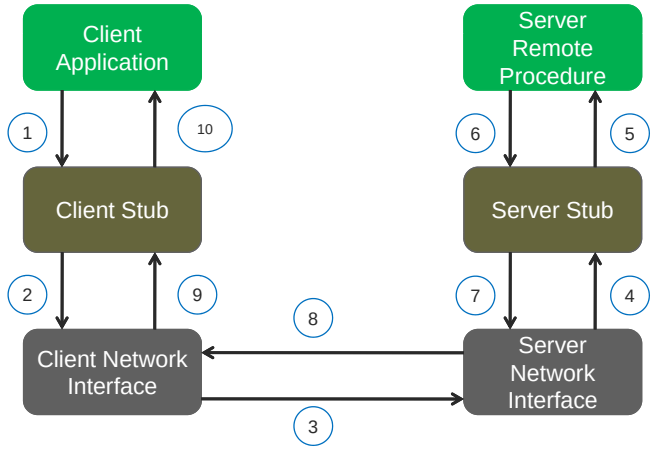
Socket



Socket



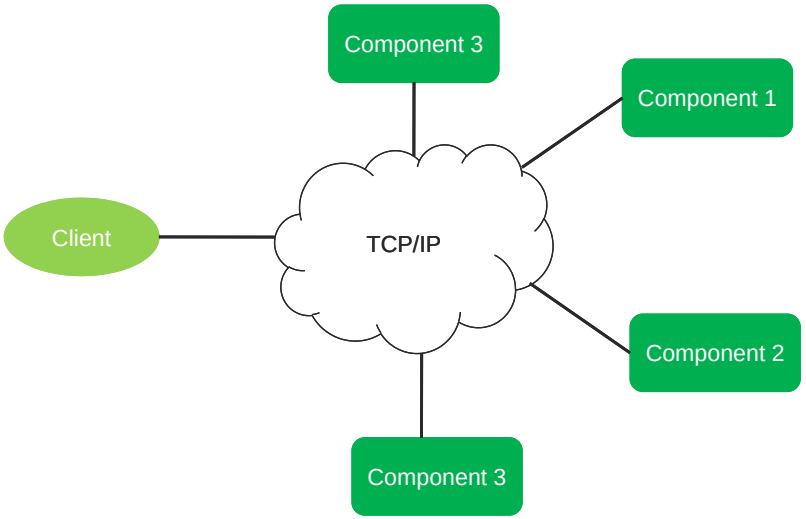
Remote Procedure Calls



Remote Procedure Calls

- Higher level of abstraction
- Drawbacks
  - Cross platforms/programming languages
  - Security, transaction, etc.

Distributed Component Technology



Distributed Component Technology

- Examples
  - DCOM (Distributed Component Object Model)
  - CORBA (Common Object Request Broker Architecture)
  - EJB (Enterprise JavaBeans)
- Good points
  - Mechanisms for security, transaction, etc.
- Drawbacks
  - Integration

Needs

- Systems integration
- Software as a service

WWW

- Document sharing
- Client-server model
- HTTP
- OS/language independent

XML

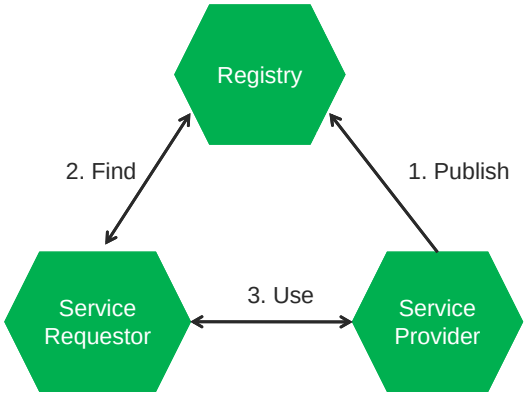
- eXtensible Markup Language
- <tag> value </tag>
- Provide a means for exchange data between systems

```
<?xml version="1.0"?>
<product barcode="2394287410">
        <manufacturer>Verbatim</manufacturer>
        <name>DataLife MF 2HD</name>
        <quantity>10</quantity>
        <size>3.5"</size>
        <color>black</color>
        <description>floppy disks</description>
</product>
```

Web services

- A Web service
  - A software component
  - Accessed through XML messages over HTTP (or SMTP, FTP)
  - Described using XML

Architecture



Building blocks

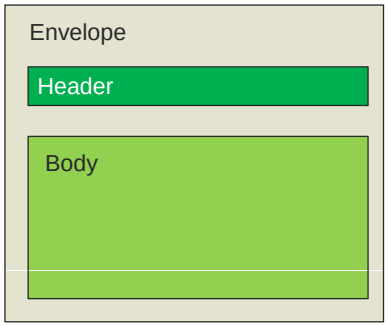
- SOAP (Simple Object Access Protocol)
- WSDL (Web Service Description Language)
- UDDI (Universal Description, Discovery, and Integration)

SOAP

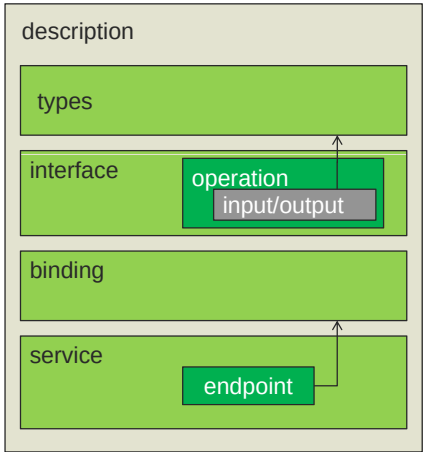
SOAP Envelope element is the root element of a SOAP message. This element defines the XML document as a SOAP message.

SOAP Header element contains application-specific information (like authentication, payment, etc) about the SOAP message. This element is optional

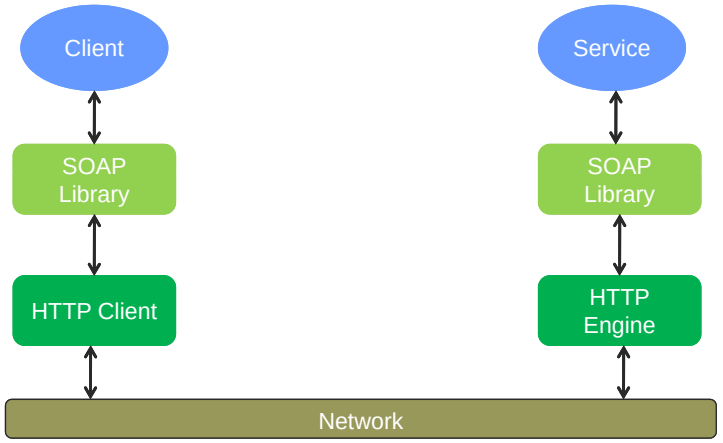
SOAP Body element contains the actual SOAP message intended for the ultimate endpoint of the message.



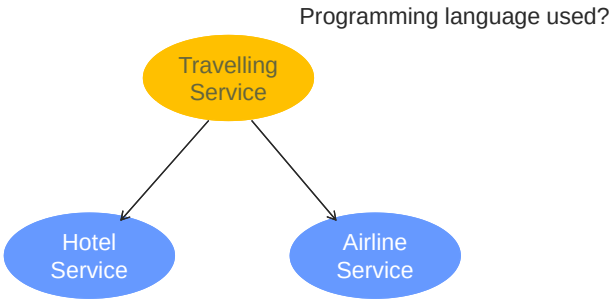
WSDL



Interaction



Service composition



BPEL

- Business Process Execution Language
- a.k.a WS-BPEL (BPEL4WS in the past)
- XML-based language

BPEL

```
<sequence>
   <invoke .../>
   <flow>
      <sequence>
         <invoke .../>
         <while ... >
            <assign> ... </assign>
         </while>
      </sequence>
      <sequence>
         <receive .../>
         <invoke ... >
      </sequence>
   </flow>
   <reply>
</sequence>
```


Summary

- Evolution of interprocess communication
- Web services
- Service composition