Network Programming
Concepts

Bi-Ru Dai

Perface

- What is network?
- What is Internet?
- What is World Wide Web?
- Where are the programs executed?
What is Network?

- A group of two or more computer systems linked together. There are many types of computer networks, including:
  - **local-area networks (LANs)**: The computers are geographically close together (that is, in the same building).
  - **wide-area networks (WANs)**: The computers are farther apart and are connected by telephone lines or radio waves.

Characteristics

- In addition to these types, the following characteristics are also used to categorize different types of networks:
  - **topology**: The geometric arrangement of a computer system. Common topologies include a bus, star, and ring.
Characteristics

- **protocol**: The protocol defines a common set of rules and signals that computers on the network use to communicate. One of the most popular protocols for LANs is called **Ethernet**. Another popular LAN protocol for **PCs** is the **IBM token-ring network**.

- **architecture**: Networks can be broadly classified as using either a **peer-to-peer** or **client/server architecture**.

Protocol

- An agreed-upon **format** for transmitting **data** between two **devices**. The protocol determines the following:
  - the type of error checking to be used
  - **data compression** method, if any
  - how the sending device will indicate that it has finished sending a message
  - how the receiving device will indicate that it has received a message
Protocol (cont.)

- There are a variety of standard protocols from which programmers can choose. Each has particular advantages and disadvantages; for example, some are simpler than others, some are more reliable, and some are faster.

Protocol (cont.)

- From a user's point of view, the only interesting aspect about protocols is that your computer or device must support the right ones if you want to communicate with other computers. The protocol can be implemented either in hardware or in software.
Examples

- HTTP
- FTP
- TELNET
- HTTPS
- PPPoE (Point-to-Point Protocol over Ethernet)
Clients and Servers

- Computers on a network are sometimes called nodes. Computers and devices that allocate resources for a network are called servers.

What is Internet?

- A global network connecting millions of computers. As of 1999, the Internet has more than 200 million users worldwide, and that number is growing rapidly. More than 100 countries are linked into exchanges of data, news and opinions.
Differences

Unlike online services, which are centrally controlled, the Internet is decentralized by design. Each Internet computer, called a host, is independent. Its operators can choose which Internet services to use and which local services to make available to the global Internet community. Remarkably, this anarchy by design works exceedingly well.

How to use Internet?

There are a variety of ways to access the Internet. Most online services, such as America Online, offer access to some Internet services. It is also possible to gain access through a commercial Internet Service Provider (ISP).
What is World Wide Web?

- A **system** of **Internet servers** that **support** specially **formatted documents**. The documents are formatted in a **script** called **HTML (HyperText Markup Language)** that supports links to other documents, as well as **graphics**, audio, and video **files**. This means you can jump from one document to another simply by **clicking** on **hot spots**. Not all Internet servers are part of the World Wide Web.

---

History of WWW

- **歐洲量子物理實驗室**
  (European Organization for Nuclear Research, CERN)
Where are the programs executed?

The client sends an HTTP message to a computer running a Web server program and asks for a document. The Web server sends the hypermedia HTML document to the client. You end up seeing the document on your screen.

Where are the programs executed?

Server Program
- Acquire Data and Process
- Wait for Request
- Return Temperature to Requester

Client Program
- Request Temperature
- Display Temperature
The Client Side

- In the browser
- DHTML: JavaScript & VBScript
- Java Applet
- ActiveX Control

The Server Side

- CGI (Common Gateway Interface)
- ISAPI, Servlet
- Active Server Page, Java Server Page, PHP, Perl
Jobs of the Client Side

- 檢查使用者輸入在網頁中，欲傳遞到伺服器的資料
- 回應使用者在網頁中執行之動作，所觸發的事件
- 控制瀏覽器

Jobs of the Server Side

- 操作資料庫
- 取得網站的相關資訊
- 控制網頁在不同狀態下的顯示內容
参考文献

- http://www.webopedia.com