05. Client Server

Network Programming and Applications

Previously, we looked at some of the services that a network provides.

- A data network is a passive entity, it neither generates nor understands the data being sent.

Now, we look at computer networks from an application perspective:

- Applications that use computer networks operate in pairs: the client and the server.
- Typically, these applications run on hosts that are remote from each other.
- Between the host machines there is a network across which the data must travel.

Server applications run on server-class machines. Sometimes these are mistakenly referred to as servers. **Servers** are applications and the machines on which they run are server-class machines.

Server applications are continuously running waiting for contact from client applications.

Client applications can run on any machine.

Client-Server Interaction

Before any inter-application communications can take place, an application must interact with its local protocol software to notify it to expect messages of a specific type.

The application then waits passively for contact from remote applications.

The protocol software examines incoming messages and passes matching messages to the application.

The application that is continuously running, passively waiting for contact from other applications is called a **server**.

The application that actively initiates contact with a server is called a **client**.

This is known as the **client-server** paradigm.

Characteristics of Clients

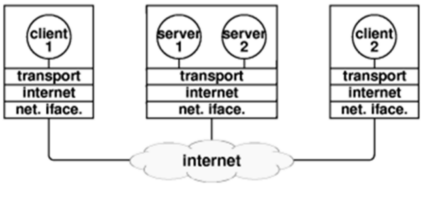
- Provides general purpose computational functionality to a user but on occasion it becomes a client application.
- Invoked directly by a user and executes for one session.
- Runs locally on a user's personal computer.
- Actively initiates contact with a server.
- Can access multiple services but can only contact one server at a time.
- Does not require specialised hardware or a sophisticated operating system.

Characteristics of Servers

- Special-purpose, privileged program dedicated to providing one service.
- Can handle multiple remote clients simultaneously.
- Invoked automatically upon boot-up, and executes through many sessions.
- Runs on a shared computer.
- Passively waits for and accepts contact from arbitrary remote clients.
- Requires powerful hardware and a sophisticated operating system.

Multiple Services on One Computer

Some server-class machines run multiple clients and servers simultaneously. These computers have an operating system that allows multiple application programs to execute concurrently (UNIX or Windows).



For each server offered there must be an associated server program executing (a single computer might run a file server and a World Wide Web server).

With multiple servers running, some form of addressing is required so a client can identify a particular server unambiguously.

- Each server is assigned a unique identified.
- Clients and servers use this identifier in all interactions.

The communications paradigm is as follows:

- The server application starts execution first. It registers its identifier with the local protocol software and waits for contact from clients.
- Clients contact servers by specifying the server’s location and unique identifier.
- The client and server exchange messages and terminate communication.