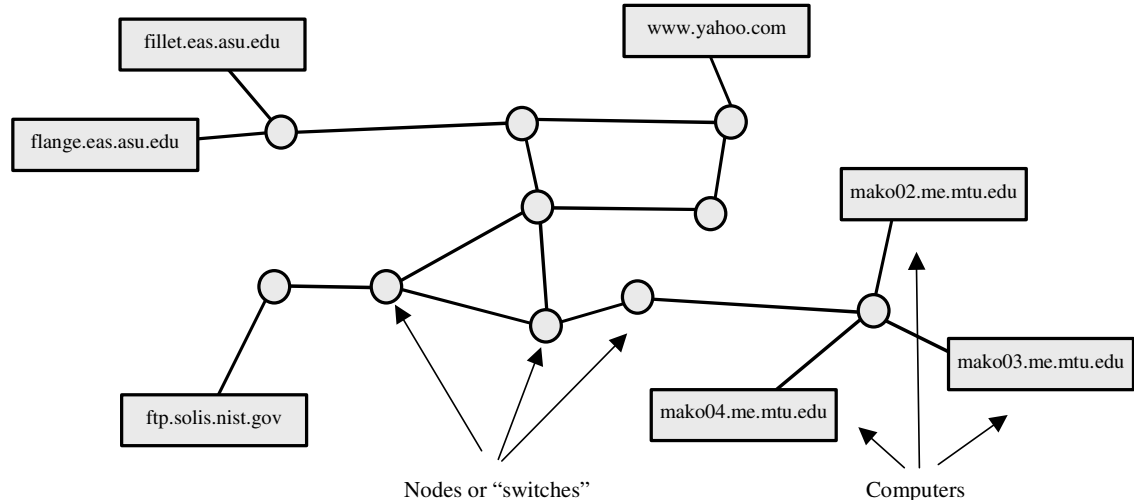


V. Communicating over the Internet

V.1. What the Internet is

The Internet is a connection of many computers to each other through a network of intermediate nodes. Each computer that is connected directly to this network is identified by an IP address and name. (E.g. 134.189.123.186, mako03.me.mtu.edu). Information can thus be passed between computers following a variety of routes.



V.2. How it's Used

A “server” program runs on one machine, which waits for a message to arrive. Another machine, running a “client” program, will send a message to the server machine to initiate communication. Communication then proceeds until one party terminates the session.

Both the client and server programs must follow the same communication protocols to transmit the information. These application protocols are known as a “services”. Common services include telnet, ftp, sendmail, and http.

As well, both the client and server programs must be able to interpret the data sent between each other.

E.g. A Netscape browser (a client) sends a request for a file to an http server. The server replies by sending a text file back. The contents of the file are in the html language, which the browser must interpret to draw the page on the screen.

In this course we will be using a service called CORBA (Common Object Request Broker Architecture) to access I-DEAS. This protocol allows us to pass objects over the Internet. The CORBA server is started by I-DEAS and we will write the client program.

Note that we will be using the “Orbix” product from Iona Technologies. These are libraries that implement the CORBA standard. The libraries are object-oriented and make transmitting and interpreting information easier by hiding the details in the classes provided.

V.3. Messages, Packets and Sessions

A “Message” is one unit of communication. If a recipient receives only part of a message, it is usually worthless. A message may be a document, an airline reservation, an email, a command, etc. Messages are ultimately sent as bits over the internet.

Because sending large messages over the internet has a detrimental effect on the efficient operation of the internet, messages are broken down into “packets” which are routed individually.

Usually communication involves sending a series of messages back and forth between two users. This is referred to as a “session”. If some procedure is required to initially establish the session, the session is also known as a “connection”.

V.4. How it works

The operation of the internet is divided into 7 layers, each with it’s own set of protocols.

7. Application	The client & server programs
6. Presentation	Message format conversion including compression & encryption
5. Session	Handles identifying the receiver and access rights for setting up a session
4. Transport	Disassembles messages into packets and reassembles them
3. Network	Handles routing the message
2. Data link control	Checks and corrects errors in packets
1. Physical Layer	Electronics standards for communication

Sending a message requires each layer of the sending computer to translate the message to the next lower layer. The physical (lowest) layer communicates the message to the receiving computer, which then translates back to the higher layers. Lower level layers act as black boxes to higher level layers.