Computer Networks (ICT2223)

Activity - Week 07

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WWW

WWW or World Wide Web is basically a collection of resources which are interconnected by URLs (Uniform Resource Locators). WWW invented by Sir Timothy Berners-Lee. Those resources are transferred via HTTP (HyperText Transfer Protocol). WWW uses the Internet as the network which transferred those resources. WWW is a service which is facilitated through the Internet network. An application software called Web Browser is used to access the resources that we discussed previously. Those resources are stored in computers which are called Web Servers. Web servers providing resources to the clients (browsers). Those resources mostly consist of HTML codes. They are being translated to human readable format by the browsers. A collection of HTML or any resource pages makes a Web Site which will share a common domain name.

DNS

DNS, or Domain Name System is a kind of a database (or you can call it a phonebook - like your mobile phone has) which stores domain names and the ip addresses which those domain names are redirected to.

Simply, DNS is for what your phonebook is for. Instead of remembering all phone numbers of your contacts, you can save them under a name. Same as that, instead of remembering IP addresses of web sites, there is a name (human readable words) assigned to it which can be remembered easily for humans.

When you insert a domain name to the browser's address bar, the browser is requesting the id address of that domain by sending the domain name to a DNS resolver which the OS is pointing to. Then, the special server which is called a DNS server (and resolver) finds the ip which browser is asked and gives the ip address the browser is requested. Also, the browser and OS itself maintain a DNS cache to speed up this process.

Multiplexing and Demultiplexing

Multiplexing is used to send multiple signals over a single channel. It increases the amount of data that can be transmitted in a given time and bandwidth. It divides the path into several logical paths and uses those paths to prasmit data of an individual node.

Two devices are used in this process. They are multiplexer and demultiplexer. Those two devices are used to accomplish those two processes which are multiplexing and demultiplexing. Multiplexer works in transmitting side and demultiplexer is working in receiving side. Multiplexer merges signals of all nodes and loads them on the path. When the signals are arrived at the demultiplexer, it separates all the signals and passes them to their respective nodes.
There are several types of multiplexing,

- Time Division Multiplexing (TDM)
- Statistical Multiplexing (SM)
- Frequency Division Multiplexing (FDM)
- Wavelength Division Multiplexing (WDM)

Segmentation

Segmentation is the term used to describe the process of chopping streams of data into smaller chunks. Segmentation usually occurs fairly early in the communication process and it is almost always software that performs the segmentation process. The segmentation process is performed prior to transfer of data across a network or before storage on a peripheral device. Segmentation is necessary because today's communication systems use what is called packetized communication.

Chopping the data into segments has several advantages. Once segmented, the segments are referred to individually as protocol data units. These PDUs are encapsulated into packets. Packets can be sent along more than one path to the destination. This increases both the reliability, and the speed at which data can travel across a network. Packets can travel across a packet switched network without tying up a communications circuit expressly for that purpose. Multiple conversations between different parties can therefore share a single communications link. If any single packet is lost, it can be retransmitted instead of having to start the entire conversation all over again.

Sequencing and Reassembling

To handle duplicate packets and out-of-order deliveries, transport protocols use sequencing. The sending side attaches a sequence number to each packet. The receiving side stores both the sequence number of the last packet received in order as well as a list of additional packets that arrived out of order. When a packet arrives, the receiver examines the sequence number to determine how the packet should be handled. If the packet is the next one expected (i.e., has arrived in order), the protocol software delivers the packet to the next highest layer, and checks its list to see whether additional packets can also be delivered. If the packet has arrived out of order, the protocol software adds the packet to the list. Sequencing also solves the problem of duplication — a receiver checks for duplicates when it examines the sequence number of an arriving packet. If the packet has already been delivered or the sequence number matches one of the packets waiting on the list, the software discards the new copy.

Error Correction

All data communications systems are susceptible to errors. There are three main categories of transmission errors:

1. Interference.
2. Distortion.
3. Attenuation.

Two Strategies For Handling Channel Errors
A variety of mathematical techniques have been developed that overcome data errors and increase reliability. Known collectively as channel coding, the techniques can be divided into two broad categories:

1. Forward Error Correction (FEC) mechanisms
2. Automatic Repeat reQuest (ARQ) mechanisms

The basic idea of forward error correction is straightforward: add additional information to data that allows a receiver to verify that data arrives correctly and to correct errors, if possible.

Basic error detection mechanisms allow a receiver to detect when an error has occurred; forward error correction mechanisms allow a receiver to determine exactly which bits have been changed and to compute correct values. The second approach to channel coding, known as an ARQ, requires the cooperation of a sender — a sender and receiver exchange messages to ensure that all data arrives correctly

Flow Control

Several techniques are available to prevent a fast computer from sending so much data that it overruns a slow receiver. We use the term flow control to refer to techniques that handle the problem. The simplest form of flow control is a stop-and-go system in which a sender waits after transmitting each packet. When the receiver is ready for another packet, the receiver sends a control message, usually a form of acknowledgement.

To obtain high throughput rates, transport protocols use a flow control technique known as sliding window. The sender and receiver are programmed to use a fixed window size, which is the maximum amount of data that can be sent before an acknowledgement arrives.

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