

Networking

A computer network allows computers to share resources.

Types of network:

- Local Network – Private networks that cover smaller areas such as a hospital
- Metropolitan Area Network – These cover areas the size of a town or city
- Wide Area Network – Cover great distances like a country. ie 4g, 5g.

Networks can be connected in different ways.

A Bus Connection connects computers to a single cable. If the cable breaks then all computers loose connection.

In a Star Connection all computers connect directly to a single point. Each computer maintains an individual connection. If one connection breaks the rest are unaffected.

Network Protocols

A protocol is an agreed upon set of rules that applied when applied at to side of an exchange allow machines to understand each other. Morse code is an example of a communication protocol. Networks make use of protocols for robust communication.

Here is a description of some early and still important protocols for network communication primarily in local networks.

CSMA Collision Detection

When multiple machines use the same carrier (A wire, or Wireless carrier), collisions of data transfer can cause problems. Multiple messages at the same time cause collisions which corrupt messages.

The CSMA Collision detection protocol ensure that machines will stop if another machine is communicating as a collision will occur. Both the machines will stop communicating and then each retry after a random amount of time, ensuring that one will go before the other.

CSMA Collision Avoidance

Collision avoidance is required if the individual machines cannot tell is the carrier is busy, for example if another WI-FI device is communicating but is out of range of another device that wants to communicate. In this protocol the sending machines can request to send data and will only send data if the hub gives it the all clear. It is the hub that is responsible for ordering the requests to ensure collisions do not occur.

Networking Devices

A number of devices are used to connect networks.

- Repeaters – These extend a network by increasing the Bus.
- Bridge – These connect multiple networks together
- Switch – These connect more networks that bridge does
- Router – These connect multiple incompatible networks

Communication over networks

Two common network communication types are peer to peer and client to server.

In peer to peer communications 2 processes communicate as equals, in client to server multiple clients communicate to a server not as equals.

The Internet

The internet is made up of many different networks of different types.

Devices on the internet have unique IP address that is used to allow communication with location addressing.

There are various transfer protocols for different data types. A few common transfer protocols are SSH, FTP and HTTPS.

Web pages are written in Hyper Text which are stored on web server. Browsers can be used with a URL to access a page; this page is transferred with the Hyper Text Transfer Protocol.

Data Mining

Data mining is the act of finding patterns in collections of data. Data mining can be useful in marketing, investment, and other fields. Whereas traditional data base techniques aim to retrieve data based on known relationships data mining aims to find unknown patterns.

Data mining is often done on static snapshots of a database because it is easier to operate on an offline copy rather than a live database. Operating on an offline database allows for repeatability of queries. Class descriptions are used to identify properties of a data group. Class discrimination is used to identify properties that divide groups. Cluster analysis can be used to identify classes. Cluster analysis does not generate class descriptions. Association analysis is used to find relationships between data groups. Outlier analysis is used to identify differences from norms, such as unusual credit card payments. Judgement must be used to determine which patterns are meaningful.

Social Impacts Of Database Technology

Database technologies make access to meaningful relationships easier to uncover than ever before. This insight can be accessed by political parties, law enforcement etc. Data collection is not always optional for users and it is not always clear that it is occurring. Data collected is valuable as the insight it can provide is powerful.

Emerging trends in computing

Big Data

Big Data is a process that allows the collection and processing of large volumes of data.

Big Data is used to aid organizations in making informed strategic decisions,

Cloud Computing

Fundamentally cloud computing entails abstracting away details of a computer and instead utilizing computers over network when required.

There are a number of ways in which cloud computing is being made accessible, each with different abstractions for the developer to utilize:

- Software as a service – Web apps and services that are powered by the cloud and run in a user's browsers that do not require the application to be installed in the traditional sense.
- Platform as a service – Allows developers to create customized applications that are hosted in the cloud.
- Infrastructure as a service – Cloud infrastructure is made available on demand offering services such as storage, authentication and compute resources. Users only pay for what they need and don't need to maintain any hardware that would require sizable upfront costs.

Social Media

Social media refers to platforms such that allows social networking online.

Social media platforms such as Facebook and twitter require vast storage capacities and large compute power to operate.

Social media platforms raise issues such as bullying and data privacy concerns.

Large amounts of personal data are shared without knowledge or meaningful consent on social media platforms.