

General Informatics

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Network

- Transmits voice, video or data between users
- Includes network OS (UNIX, Windows), cables (twisted pair, coax, fiber optics), and h/w (bridges, routers and switches)
- Wireless systems – antenna and tower are used
- **Network adapter** (NIC) – ethernet, token ring, localtalk
- **Network administrator**: monitors daily activity, network security, installing new applications, distributing software upgrades, enforcing licensing agreements, developing storage management program, prepare backups
- **Network OS**: manages multiple request concurrently and provides security in a multi-user environment
- One piece of NOS resides in each client (workstation) and the other in each server
- Share files, applications, printer, fax, modem
- In a peer-to-peer network, each station is both client and server

Types of Networks

- **WAN**: covers a wide geographic area (state or country)
- **LAN**: covers a limited geographical area (within a building or campus)
- Message transfer is managed by a transport protocol such as TCP/IP and IPX
- **LAN topologies** - different patterns of interconnection b/w nodes
- **Bus topology**: a common cable, pathway or channel is used. ISA, EISA, PCI
- **Ring topology**: ring network is a communication network that connects terminals and computers in a continuous loop
- **Star network**: a communication network in which all terminals are connected to a central computer, controller or hub. E.g: PBX, telephone system
- **Token ring topology**: provides equal opportunity for each station to gain access to the network. All nodes connect to multi-station access unit

Satellite

- **Geostationary satellite** (22,282 miles): rotate with the earth. Downlink from GEO covers a third of the earth's surface
- **Low earth orbit satellite** (below 1000 miles): revolve around the globe every couple of hours
- **Medium earth orbit satellite**: takes 6 hours to orbit the earth
- **Earth station**: required for transmitting/receiving signals in satellite communication. It uses dish-shaped antenna for microwave (electromagnetic wave that vibrates at 1 GHz and above) transmission
- Digital data **transmission** to a satellite: data streams are combined in a *multiplexing* device whose o/p goes to a *modem* for modulation onto a carrier frequency of 50 to 180 MHz. An *upconverter* bumps the carrier up into GHz range, and o/p goes to *high power amplifier* and dish
- For **receiving**: *low noise amplifier* boost the signals to *down converter* which lowers the frequency and sends it to the *modem*. The modem demodulates the carrier and the digital o/p goes to the *demultiplexing* device and then to its destinations

Cont...

- **VSAT**: a small earth station that handles up to 56 KB/s of digital transmission
- **TSAT**: handles T1 data rate (1.544 MB/s)
- **GPS**: a system of 24 satellites for identifying earth locations

Advantages of a network

- File sharing
- Resource sharing
- s/w cost and management
- Security
- Communication
- Flexible access
- Workgroup computing: interactive teamwork

Internet

- Network of networks – linking using telephone lines to fiber optics lines

Internet Chronology	
1969	ARPANET of US defense department
1982	Development of hundred of WANs and creation of TCP/IP protocol
1983	All types of networks are linked together with the help of TCP/IP to form the Internet
1990	Menu based Internet browsing using GOPHER (Minnesota University)
1991	Development of WWW
1993	Mosaic, first graphical browser, by NCSA
1994	Netscape Navigator and Netscape Communicator from Netscape
1995	ISP came to the field
1996	Internet Explorer from Microsoft
1998	Windows with Internet Explorer
2006	450 million Internet hosts
2010	750 million Internet hosts

Internet Services

- E-mail
- Telnet: permits you to log onto another computer
- FTP: file handling
- GOPHER
- WWW (by Tim Berners Lee): Internet interface. Retrieve documents, view images, audio, video and animation
- Developed at CERN, Geneva
- View documents on WWW using web browser (IE, Google Chrome, Opera, Mozilla, Safari)
- HTML, hypertext, URL
- Hypertext and hypermedia demolished the concept space and time
- 450 million web sites

Cont...

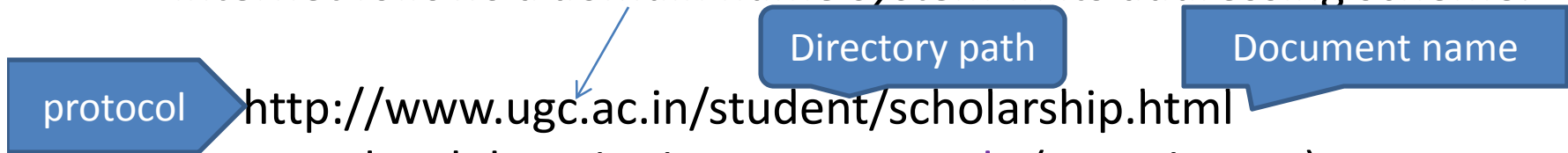
- **Newsgroup**: a setup to receive and send articles and messages on specific topics
- alt (alternative), biz (business), comp (computing), misc (miscellaneous), rec (recreational). E.g: alt.music, alt.music.jazz
- **dejaneews.com**: a search engine devoted to newsgroups
- **Internet relay chat**: real time interactive communication
- **Instant messenger**: s/w that provides instant messaging service
- **Avathar**: a picture is selected to represent yourself in a chat site

Teleconferencing

- **Audio conferencing**: audio communication using PBX
- **Video conferencing** standards defines the communications handshaking and compression algorithm for reducing digital video into a smaller bandwidth
- H.320 (for WAN), H.323 (for LAN), H.324 (for POTS)
- **Data conferencing** (a kind of video conferencing): allows data and documents to be shared by multiple participants.
- T.120: a standard for whiteboards, application sharing, application viewing
- **Multimedia tools**: Real Player, Media Player, Windows Media Player
- View cinema and live TV programs, video phone

Internet Address

- Internet follows a *domain name system* in its addressing scheme.



- *ac* – top level domain, *in* – **country code** (www.isc.org)
- Visit www.networksolutions.com or www.icann.org to know whether a domain name is already allocated
- **Top level domains**: com, firm (business firm), gov, info, int (international), mil (military), net, nom (individual users), org, rec (recreational activities), store (retailers), web (business related to web)
- **Plug-ins**: subprograms stored with s/w to support special types of files
- Wireless Fidelity (Wi-Fi) campuses
- Use proxy server for shared Internet connection
- ISDN, DSL, satellite, and cable are high bandwidth leased line connections
- **Firewall** for network security

Search Engines

- s/w to prepare indexes to the Internet content
- Searchable database of Internet files collected by programs like wanderer, crawler, robot, worm or spider
- Exponential growth of information
- No quality control on publishing the web contents
- Filter out the right information
- Relevance is the most important criteria for the success of information retrieval

Components

- **Spider**: program that traverses web from link to link, identifying and reading pages. Send back indexing information to search engine
- **Index**: database containing searchable information about web page gathered by spider
- **Search and retrieval mechanism**: technology that enables users to query the index and that returns results in a schematic order

Types of General Search Engines

Free text

- Alta Vista (www.altavista.com)
- 1995, Digital Research Lab, available in 25 languages
- First search engine to index every word in a page
- + (add weight), - (avoid terms)
- “20th century fox”
- ‘+ “Ayurvedic medicine” + domain: in’
- ‘+url: letter bomb + domain: lk’

Cont...

Search	Result
Anchor: nano	All links to nano
Applet: music	Applet on music
Domain: uk	Search within a domain
Host: britannica	Retrieve pages under a host
Image: delhi.jpg	Retrieve images of delhi
Link: adobe.com	Link pages to the URL
Text: hypermedia	Retrieve all pages with word hypermedia
Title: library	Retrieve all websites with the word library in title page
url: microsoft	Find web pages containing microsoft in its URL

Google

- Fastest search engine
- Search Within Results link
- **Search options:** web, image, video, news...
- Mathematical calculations
- Define <word> : to know the meaning
- Weather <place>

Directory Based Search Engine

Yahoo! (Yet Another Hierarchically Official Oracle)

- Search topic under a category. Search through directory and subdirectory (*Search this category*)
- E-mail, Yahoo! Messenger, text/voice chat, Internet commerce
- www.yahooligans.com for kids
- **Advanced Search**

Meta Search Engine

- Searches multiple search engines simultaneously – not a search engine by itself. E.g. www.metaplus.com
- It accepts queries and passes them to search engines
- **Expert search engine**: specialized form of meta search engine. Accept natural language queries. E.g. www.brainboost.com

Special purpose search sites

- **Resource specific search sites** to find information on a single subject or service. E.g www.amazon.com
- **Portal sites** contain links on various reference sources, educational aids, homework guidance, etc. e.g. www.encyclopedia.com
- **Subject gateways** are portals created by librarians on a subject. E.g www.sosig.ac.uk

Social Network Service

- Focuses on building online communities of people who share interests and activities
- Provide email and instant messaging service
- E.g. Facebook, Orkut, LinkedIn, Netlog
- Profile, friends, create groups
- **Drawback**: privacy threat, data theft, viruses
- **Invisible web (Deep web)**: paid services will not be gathered in search engine spiders

Knowledge Resources in the Internet

Abstracting and indexing databases and online searching started in 1960s. s/ws: ASSASSIN, POLYDOC

- 1969: created magnetic tapes containing bibliographic records. E.g. MEDLARS
- 1980s: OPAC (Online Public Access Catalogues)

E-publishing

- **Adv:** less cost
- Publishing time is less
- Publisher and author can interactively make changes in the manuscript
- One copy is enough
- Authors get higher percentage of royalties
- **Disadv:** sell fewer copies
- Many of the people are unaware of e-books
- Piracy
- Prices aren't always cheaper

Digital Documents

- Digital libraries: anytime/anywhere accessibility
- Open book stores
- Open access resources
- E-journals
- E-journal consortia
- Article citation services
- Information portals
- Directories and reference books
- Subject gateways
- Audio and video on demand
- s/w packages
- Online tutorials
- Games

Digital Library

- E-book website
- [Internet Library of Early \(17, 18, 19 century\) Journals](#) by Universities of Manchester, Leeds, Oxford and Birmingham
- www.bodley.ox.ac.uk
- Covers parliamentary and legal reports, book reviews, poetry, essays, fiction, articles on ancient monuments
- [World public library](#) (1996): PDF format
- www.worldpubliclibrary.org
- [Internet public library](#): www.ipl.org
- [National Science Digital Library](#) (www.nsdlib.org) by National Science Foundation
- Covers science, technology, engineering and mathematics
- [Digital library of India](#) (www.dli.iit.ac.in): science, arts, culture, music, movies, traditional medicine, palm leaves
- [Feedbooks](#) (www.feedbooks.com): private sector digital library and digital publishing service
- [E-book store](#): collect and distribute e-books. E.g. amazon.com, Google books

E-book Aggregators

- Connect with multiple publishers to supply e-books and audio books, and provide a platform for libraries and end users to search, order, access, and download the content on the web
- Ebook library (www.ebib.com) provides ebooks to academic and research, Govt., and corporate libraries
- Ebrary(.com) with searching capability, and enables Info-Tools (networks every word with other online resources)
- MyiLibrary(.com)
- IngentaConnect(.com), www.publishingtechnology.com
- Largest supplier of technology and related services to publishing and information industries
- Provides data conversion, secure online hosting, access control, distribution and marketing services, and information commerce systems
- CredoReference(.com): general reference solution for learners and librarians

Cont...

- [Fictionwise.com](#) (2000): collection of fiction and nonfiction
- [Dawsonera.com](#): e-books
- OCLC's [NetLibrary.com](#): e-content provider for libraries and publishers
- [Amazon.com](#) (1995): online selling of items
- [Google books](#): 35 languages, 100 countries, 28 partners
- [OverDrive.com](#) (1986): helps to securely manage, protect, and lend or sell e-audiobooks, e-books, music, and video
- [EC Media International.com](#) (2010): e-book aggregator from Kerala
- [E-Journals](#) (1990): IEEE, Elsevier, Springer, World Scientific

E-Journal Consortia

- Several institutions join together and subscribe e-journals at lesser cost
- **UGC-Infonet** (by INFLIBNET, Ahmedabad): 294 universities, 13150 colleges, 88.21 lakh students, 4.27 lakh teachers
- **CSIR E-journals consortia** (by NISCAIR): creation to monitoring of access facility of scientific periodicals
- **Open archive**: aims to develop and promote the use of OAMHP protocol designed for better sharing and retrieval of e-prints residing in distributed archives
- **Self archive**: individual authors submit their own papers to a server or archive
- **Institutional archive**: authors submit e-prints to a server administrated by an organization or scholarly society
- **Discipline based archive, Specialty archive** (e.g. ERA)

Cont...

- **Open access movement**: digital, online, free of charge, and free of copyright and licensing restrictions
- **Conf. Open Access to Knowledge in Science and Humanities (2003)**
- **SPARC Europe** is a voice for European research library community
- **Association of American University Presses**
- **eContentplus** program of ICT-PSP. Initiative of European parliament
- **Ithaka** services: **Ithaka S+R** works with initiatives and organizations to develop sustainable business models and conducts research and analysis on the impact of digital media on academic community
- **JSTOR** helps scholars, researchers, and students discover, use, and build a wide range of content in a trusted digital archive.
- **Portico** preserves scholarly literature published in electronic form

BioMed Central

- www.biomedcentral.com (2000): Open access publisher having 205 peer reviewed journals in science, technology and medicine
- **Public library of science**, 2000 (www.plos.org): open access publisher in medicine and life sciences
- **CiteSeer** (1997) www.citeseer.ist.psu.edu : scientific literature digital library and search engine
- **CiteSeerX** replaced CiteSeer
- **Citebase**(.org), 2005 by Tim Brody. Semi autonomous citation index for free, online research literature
- **SCOPUS**(.com): abstract and citation database of peer reviewed literature and quality web sources
- **Scirus**(.com): science specific search engine
- **REPEC**(.org) – research papers in economics
- **Google Scholar** (www.scholar.google.co.in): searches for peer reviewed papers, theses, books, preprints, abstracts and technical reports
- **Web of knowledge** (www.isiwebofknowledge.com): provides access to citation databases

Computer Localization

- The process of adapting s/w for a particular country or region is called localization
- Technology can be used to improve life with proper and effective localization

Problems

- More than 30 regional languages each with independent alphabet
- The script has undergone several revisions

Reason for lack of localization

- Insufficient support for Indian languages at OS level
- Lack of awareness about localization

Cont...

Localization and empowerment

- **Aim:** to achieve equal opportunity for all languages in all areas in the information age. Bridge the digital divide. Provide interactive and transparent service
- **E-governance (NeGP):** take Govt. to the doorsteps of the people. Aim at efficient delivery of services
- Avail services from the Govt. quickly, at convenient locations in a cost effective manner
- All Indian scripts are included in Unicode standards
- **C-DAC, IITs:** machine translation from one language to another

Font

- **Weight**: thickness of the character. Thin, normal, bold
- **Unicode** (1991): industry standard (UTF) for representation and handling of text. > 100000 characters of 90 scripts
- It is implemented by different character encodings such as UTF-8, UTF-16, UCS-2
- **TrueTypeFile** (.ttf) is an outline font standard
- **ASCII**: 128 characters

S/W Tools for Local Languages

- **C-DAC**: development of multilingual technologies by its groups GIST and AAI
- **GIST**: facilitates use of Indian languages in IT
- **AAI**: knowledge based understanding systems, machine translation system, information extraction and retrieval, language tutors, chat server

Products

- **LISM**: LINUX based Indian script font code. Multilingual office automation (word processing) solution
- Supports Devnagari, Gujarati, Kannada, Malayalam, Oriya, Tamil, Telugu
- **iLEAP**: Indian language word processor on Windows. Create web content and send e-mail
- Multilingual spellchecker, keyboard layouts

Cont...

- **Chitrakan**: OCR system for Indian languages. It enables the printed text to feed into a file and edit it using word processor. Spell check facility also
- **Applications**: Office automation, DTP, Data entry, archival of text
- **LEAP Office 2000**: Indian language s/w for office applications
- **ISM Office (1991)**: word processing, publishing, database and web applications
- Supports 19 Indian languages, unicode content creation made easy

Cont...

- **Apex Language Processor**: multilingual word processor under DOS/UNIX. Wordstar compatible commands
- **NTRANS**: s/w for translation of nouns from and to Indian languages
- It contains a dictionary and a heuristic suggestion mechanism (context based)
- **MANTRA**: translates English text into Hindi

GIST

- **GIST terminal** (C-DAC): compatible to ANSI terminals, and allows the use of any Indian script along with English
- Ideal for multilingual database applications on UNIX
- **GIST card**: allows the use Indian scripts in all existing text based application packages and compilers on DOS
- **GIST SDK**: s/w development tool for Indian languages on Windows
- Provides Indian language layer for data entry, storage, retrieval, and printing
- Enables Windows applications to process ISCII data directly
- Consists of a set of DLL, ActiveX controls, and ttf fonts
- **GIST Java Framework Architecture**: s/w development kit for designing s/w in Indian languages
- **Components**: JFATextArea, JFATextField, JFAButton, JFALabel, JFACheckBox, JFAList

C-DIT

- **Aim:** facilitates Malayalam computing to Govt. of Kerala and other agencies
- **Objective:** integrate Malayalam with ICT
- **Motto:** globalize Malayalam through language technology for the benefit of local users
- **Operations:** R & D, production, publication, training, consultancy, and service in Malayalam language computing
- Produce linguistically and culturally customized s/w

Major Projects

- **Aksharamala CD:** a font package containing 25 Malayalam fonts including 3 web fonts
- **Bharana Malayalam CD:** incorporates commonly used administrative jargon, telephone directory of Govt., administrative glossary, gazettes published for Malayalam language, GOs and circulars

Cont...

- **Nilā**: text editor supporting doc, rtf, html, and txt formats
- Supports E-mail, alphabetical sorting, conversion from ASCII to unicode
- **Kaveri**: Continuation of Nilā. Customized, localized and modified version of OpenOffice.org
- Spell check facility, User interface in Malayalam, English to Malayalam translation, supports Tamil, Telugu, Kannada and Hindi also
- **Arogyasree**: text editor for health department
- **Periyar Malayalam Community s/w**: components are grammar checker, thesaurus, universal font converter, Malayalam-English dictionary, South Indian language dictionary
- **Other services**: www.clickeralam.org for R & D, production, and dissemination of Malayalam language technology and s/w
- www.entemalayalam.org enables online learning, knowing, and using Malayalam through games and tests
- Provides general information about culture, history, literature and art forms of Kerala