Internet and its Application in Libraries

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Contents

- What is Internet?
- How does it work?
- Internet applications in libraries
  - Internet as an information source
  - Library management
  - Library website
  - Digital library collections
  - Professional development

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Acknowledgements

- Some of the content for first part of this presentation (What is Internet and How it Works) is derived from UNESCO's '**ICT for Library and Information Professionals**' training package.

What is the Internet?

A top level summary…

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What and How of Internet: A Summary

- Network of networks connected using a common communication protocol (TCP/IP)
  - Organizational LAN's, dial-up PCs connecting to ISP's
- Computers on Internet have unique addresses – IP addresses (dynamic/ static)
- Clients and Servers (hosts).
  - Servers host content and provide services. Clients access content/services on servers
- Information exchanged through 'packet switching' (TCP/IP) – traverses the network – origination and destination addresses - can take different 'best available' path

What and How of Internet: A Summary

- 'Routers' route information across networks
- Application protocols – E-mail, FTP, Telnet, HTTP, Chat
- Domain names – English language names for hosts – easy to remember – Domain name services
- URL – Uniform Resource Locator – unique addresses for documents and services on Internet
- Intranets – LANs that use TCP/IP protocol
- Internet protocols are non-proprietary – available in all operating systems today
- Connecting to Internet – Dial-up, Dedicated (leased line)

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What is the Internet?

Details…

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What is the Internet?

The Internet is a global network of computers and computer networks communicating under one set of guidelines, formally called Transmission Control Protocol/Internet Protocol (TCP/IP).

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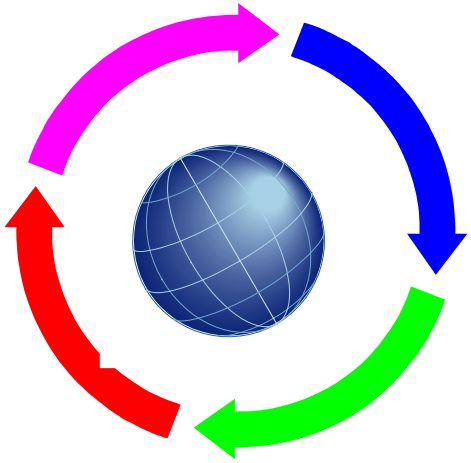

The Internet is not a specific place, company, or service, although places, companies and services are accessible via the Internet. Nobody owns the Internet.

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How does the Internet work?

- Protocols – standardized rules that define how computers communicate and exchange data
- IP address – unique number used to identify computers on the Internet
- Domain name – structured naming system to locate computers on the Internet
- URL – uniform naming scheme that specifies unique addresses of Internet resources
- Client and server – computing architecture used by most Internet services

How does the Internet work?

TCP/IP (Transmission Control Protocol / Internet Protocol)

- The Internet is a packet-switching network that uses TCP/IP as its core protocol
- TCP/IP is a suite of protocols that govern network addresses and the organization and packaging of the information to be sent over the Internet
  - TCP – flow control and recovery of packets
  - IP – addressing and forwarding of individual packets

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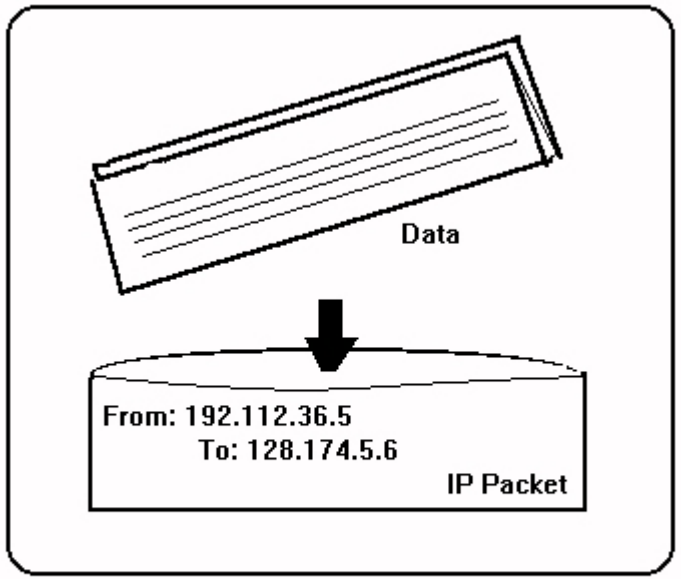
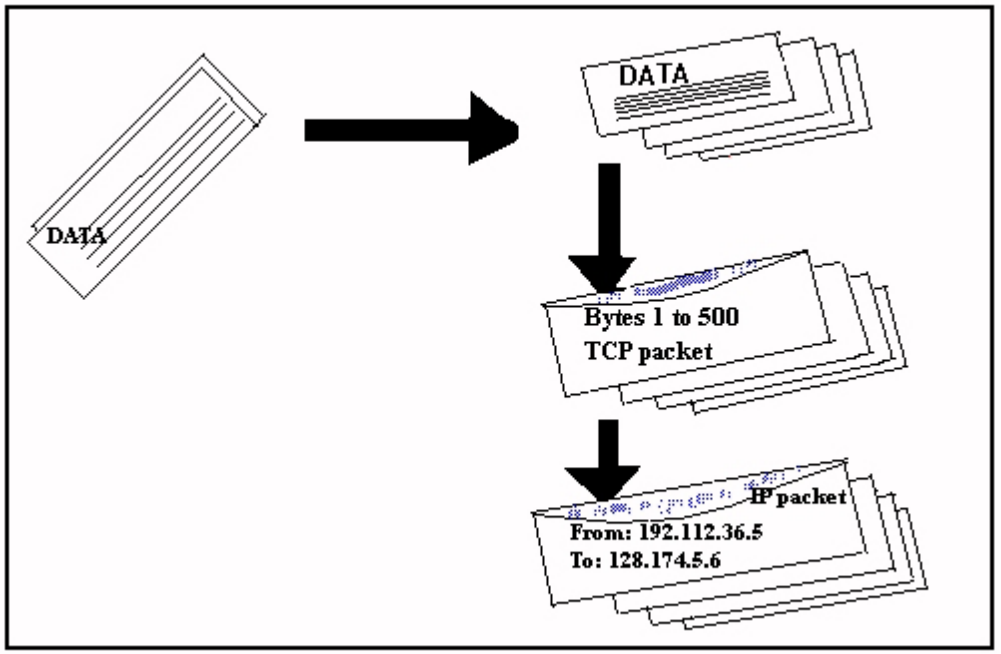


IP Envelopes

TCP Packet Encapsulation



How does the Internet work?

Internet Protocols

- HTTP (Hypertext Transfer Protocol Protocol) - for accessing and transmitting World Wide Web documents
- FTP (File Transfer Protocol Protocol) - for transferring files from one computer to another
- Gopher Protocol - for accessing documents via Gopher menus (no longer widely used)
- Telnet Protocol - allows users to logon to a remote computer
- SMTP (Simple Mail Transfer Protocol) for sending and managing electronic mails (e-mail)

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How does the Internet work?

IP address

- IP address is a unique address assigned to each computer connected to the Internet
- It is used by TCP/IP to route packets of information from a sender to a location on the Internet
- IP address consist of four sets of numbers ranging from 0 to 255 Ex. 249.7.13.53

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How does the Internet work?

IP address

- 249.7.13.53
- The first two number sets designate the network
- The third number set identifies the local network
- The fourth number set identifies the particular machine

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How does the Internet work?

Domain names

- Domain names are the alias or English language equivalent of a computer's IP addresses
- Domain Name System (DNS) allows the use of easier to remember domain names instead of IP addresses to locate computers on the Internet
- Domain Name Resolvers scattered across the Internet translate domain names into IP addresses

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How does the Internet work?

Domain names

- Domain names have two parts:
  - First part names the host computer
  - Second part identifies the top level domain
- Top level domains (TLD) – identifies the type of host
  - Generic Top Level Domains
  - Country Code Top Level Domains
- Domain names are used in URLs and e-mail addresses

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How does the Internet work?

Top Level Domains

- **.com** – commercial/company site
- **.edu/ac** - educational/academic
- **.gov** – government site
- **.org** – non-profit organization
- **.mil** – military sites
- **.int** – international organizations
- **.net** – network providers

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Additional Top Level Domains

- **.aero** - restricted use by the air transportation industry
- **.biz** - general use by businesses
- **.coop** - restricted use by cooperatives
- **.info** - general use by both commercial and non-commercial sites
- **.museum** - restricted use by museums
- **.name** - general use by individuals
- **.pro** - restricted use by certified professionals and professional entities

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How does the Internet work?

Country Code Top Level Domains

- **.au** – Australia **.ph –** Philippines
- **.cn –** China **.sg –** Singapore
- **.fj** – Fiji **.uk** – United Kingdom
- **.id** – Indonesia **.us –** United States
- **.jp** – Japan **.tw -** Taiwan
- **.mn** – Mongolia **.vn -** Vietnam
- The complete list can be accessed at http://www.iana.org/cctld/cctld-whois.htm

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How does the Internet work?

Uniform Resource Locator (URL)

- Each Internet document or file has a unique address called a URL
- The URL comprises of three parts:
  - Protocol – lets the computer know how to process the information it receives
  - Domain name – Internet address of the computer hosting the site and storing the documents
  - Path – lets the computer which directory and file to access

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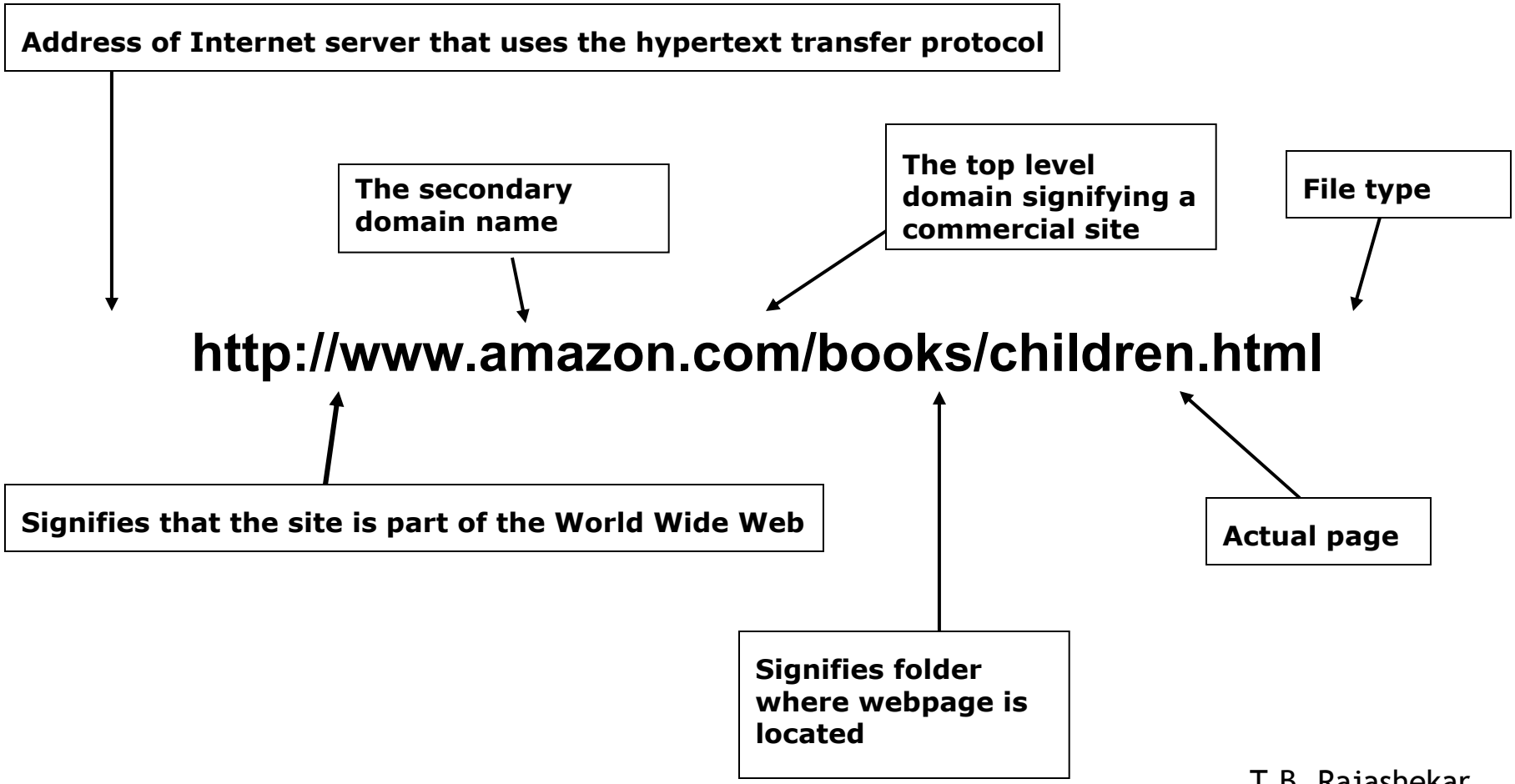
What is URL?

UNIFORM RESOURCE LOCATOR



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How does the Internet work?

http://www.amazon.com/books/children.html

- **"http“**
  - transfer protocol
- **"www"**
  - server name
- **“amazon"**
  - second-level domain name
- **“com"**
  - top-level domain name
- **"books"**
  - directory name
- **“children"**
  - file name
- **"html"**
  - file type

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How does the Internet work?

Client Server

- The client server model is the distributed computing architecture used by most Internet services, generally classifying hosts on the Internet as clients and servers
- Client programs are used to access Internet services provided by host computers running server programs that provide the information or service needed
- For example web browsers are client programs used to access information hosted by web servers

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How do you connect to Internet?

- Dial-up access
  - PC
  - Modem, telephone connection
  - Internet account on an ISP (VSNL, Satyam…)
  - Dynamic IP address
- Dedicated access
  - Leased line
  - Connect to organizational intranet
  - PC with network card
  - Static IP addresses

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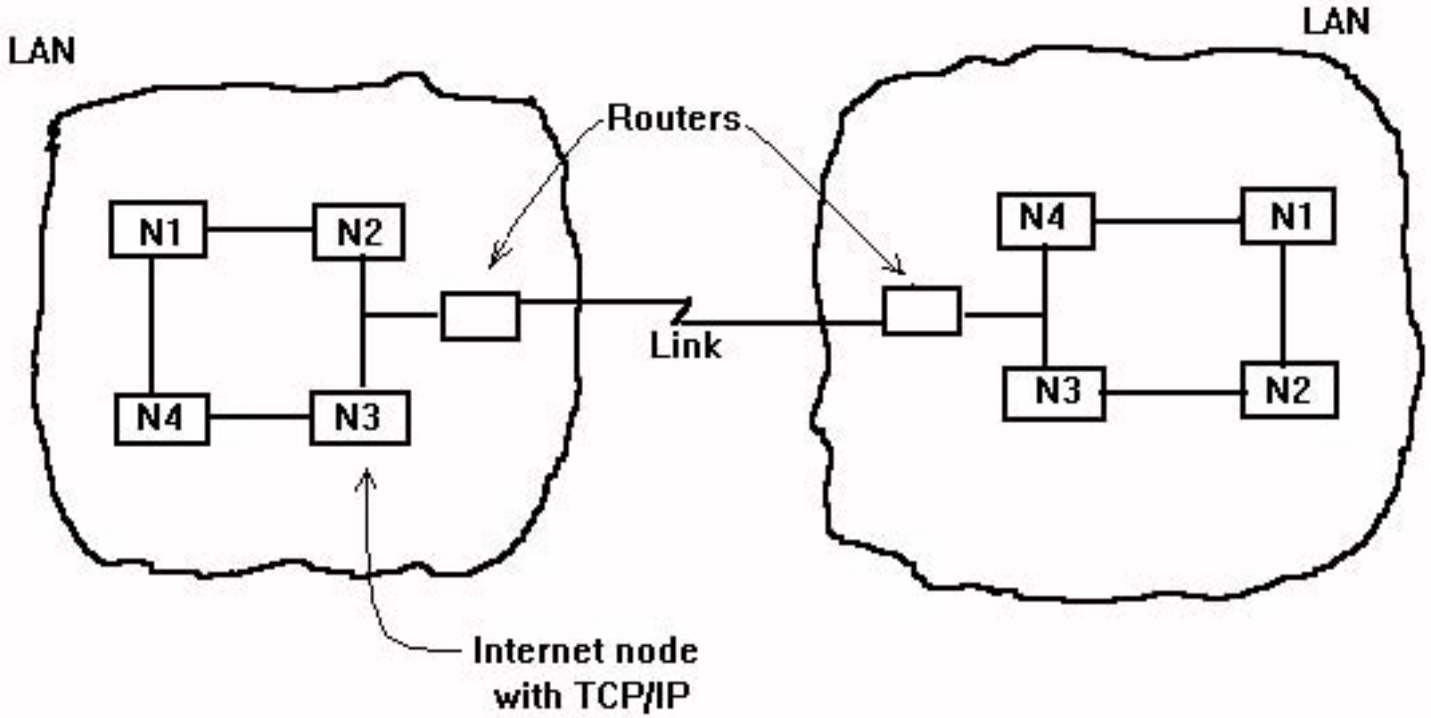
The Internet - Network of networks



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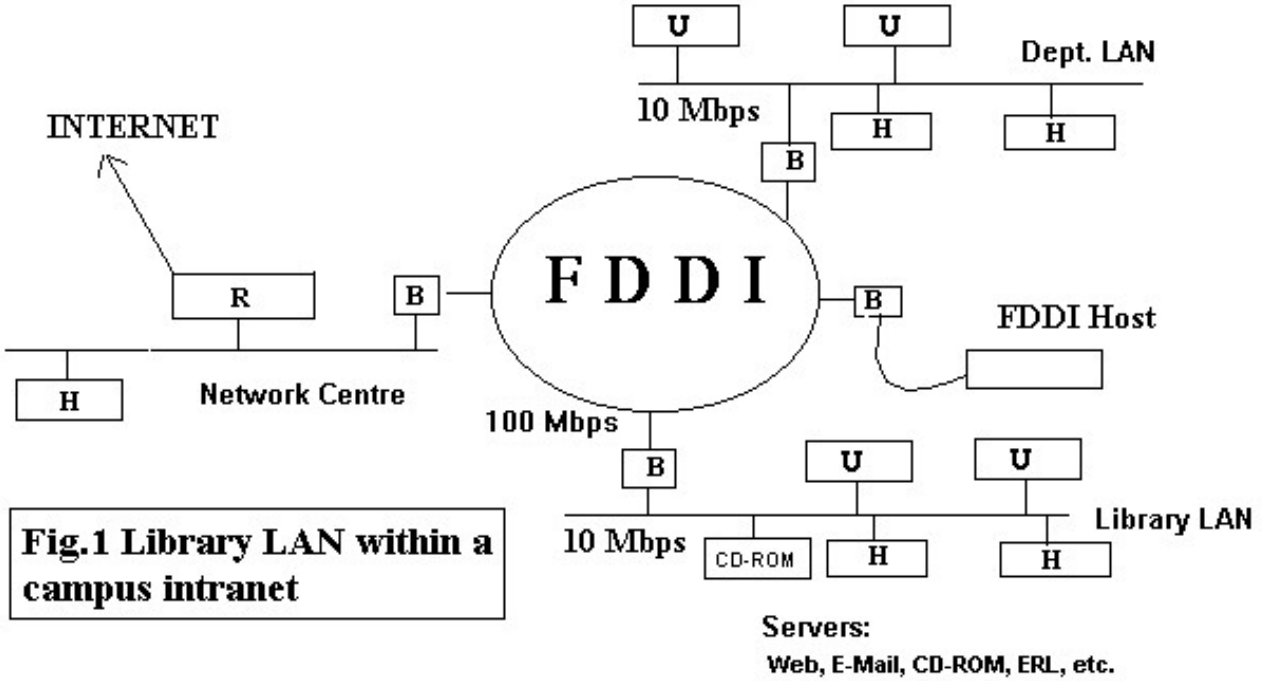


Fig.1 Library LAN within a campus intranet

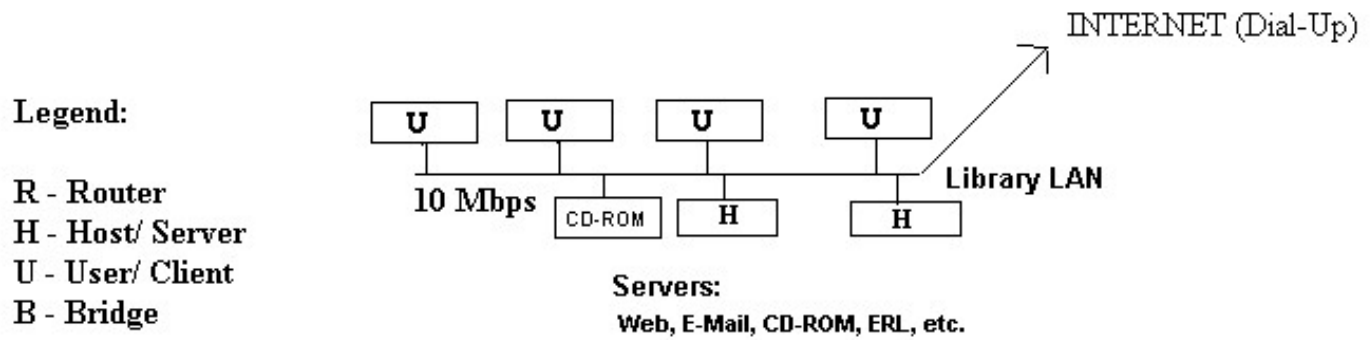
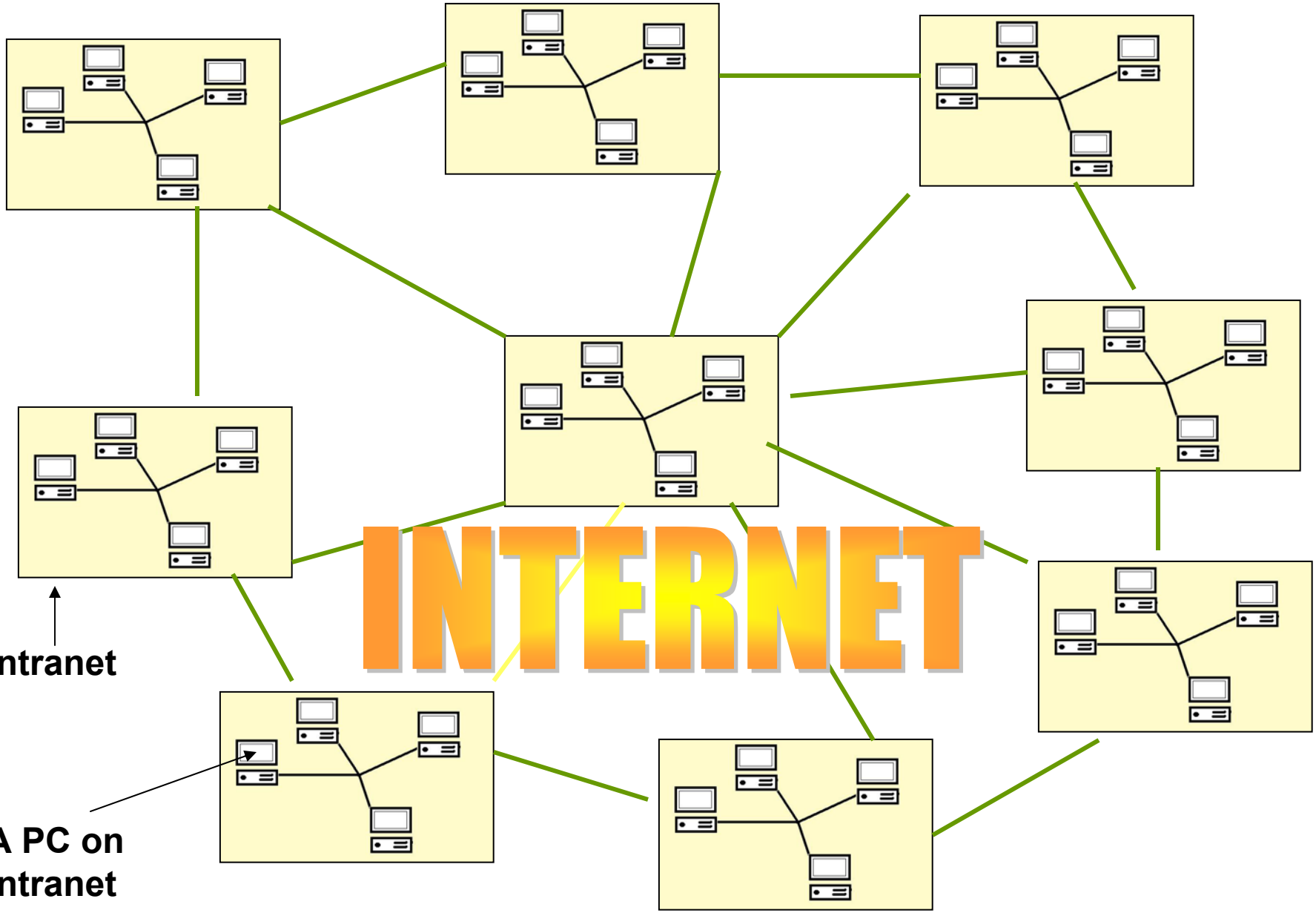


Fig. 2 Library LAN as a private intranet



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How Internet Evolved?

- The Internet grew from ARPANET the first computer network designed for the Advanced Research Projects Agency (ARPA) of the U.S Department of Defense
- ARPA sponsored research on interconnecting geographically remote computers to allow communication and sharing of data and resources
- The goal was to create a communications network that could exist even if parts of it was incapacitated

How Internet Evolved?

- One of the early developments that proved significant to the success of ARPANET (which later on becomes the Internet) were “packet switching” and “TCP/IP”
- Packet switching involves digital systems that transmit data in small packets that use the best current path to their destination
- TCP/IP is the core Internet protocol that allows computers to communicate with each other

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How Internet Evolved?

- Realizing the value of interconnected computers the academic community started with its own research network
- The NSFNet, created and named for the National Science Foundation, linked academic networks that connected universities and research organizations around North America.
- Networks from Europe and other countries were connected to NSFNet making it the backbone of the Internet.

How Internet Evolved?

- ARPANET was decommissioned and the management of the Internet was passed on to the NSFNET
- Restriction on commercial use was lifted
- The emergence of World Wide Web, and Mosaic brought an unprecedented growth to the Internet
- NSFNET reverts back to a research project, leaving the Internet in commercial hands and its management to independent organizations

How Internet Evolved?

- Summary
- The Internet started as a military network called ARPANET, which was involved in networking research
- The Internet later expanded to include universities, businesses and individuals
- Today, the Internet is also referred to as the Net, Information Superhighway, and Cyberspace

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What can you do on the Internet? (Internet Services)

- E-Mail: Messaging (SMTP)
- Remote computer access (Telnet)
- File Transfer (FTP)
- World Wide Web (HTTP)
- Chat (IRC)
- Internet telephony, mobile access, etc.

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Electronic Mail (e-mail)

- The most popular use of the Internet
- Available for free on the Web
  - Yahoo Mail, Hotmail
- Valid e-mail address consists of a username and a domain name separated by the @ sign
- Format: username@hostname.domain

  example: me@hotmail.com

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Telnet

- Service that allows one computer to access another computer
- Enables the user to exchange data and issue commands on the other computer, the Telnet host
- Mainly used by libraries to allow access to information stored in their computers

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Transferring files from one computer to another

- Allows the transfer or copying of files from one computer to another
- Ideal for procuring or sending files to a remote computer
- FTP Programs available freely
- Modern browsers have built in FTP capabilities
- The File Transfer Protocol (ftp) allows you to copy a file from a remote computer to your desktop and vice versa
- Syntax:
  - ftp <ftp.sunsite.edu>
- Logging in
  - username
  - password

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Real-time communication using the Internet

- Talk / ytalk
  - talk <user address>
- IRC - Internet Relay Chat
  - Allows real-time text based communication through the Internet
  - Organized by topic of interest into “channels”
  - Discussion occurs in “chatrooms”
  - irc <nickname> <irc server>
- Freetel, iPhone, etc.

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The World Wide Web

- Invented in 1991 by Tim Berners-Lee, the web is the fastest-growing Internet service ("Killer Application")
- Based on HTML (Hyper Text Markup Language) allowing users to access data in multimedia format
- Simplest unit is the Webpage, primarily a document encoded in HTML format that can be accessed by using a browser
- HTML links contents of a Webpage to each other as well as to other Web pages through a hyperlink
- Each page has an address, a Uniform Resource Locator (URL)

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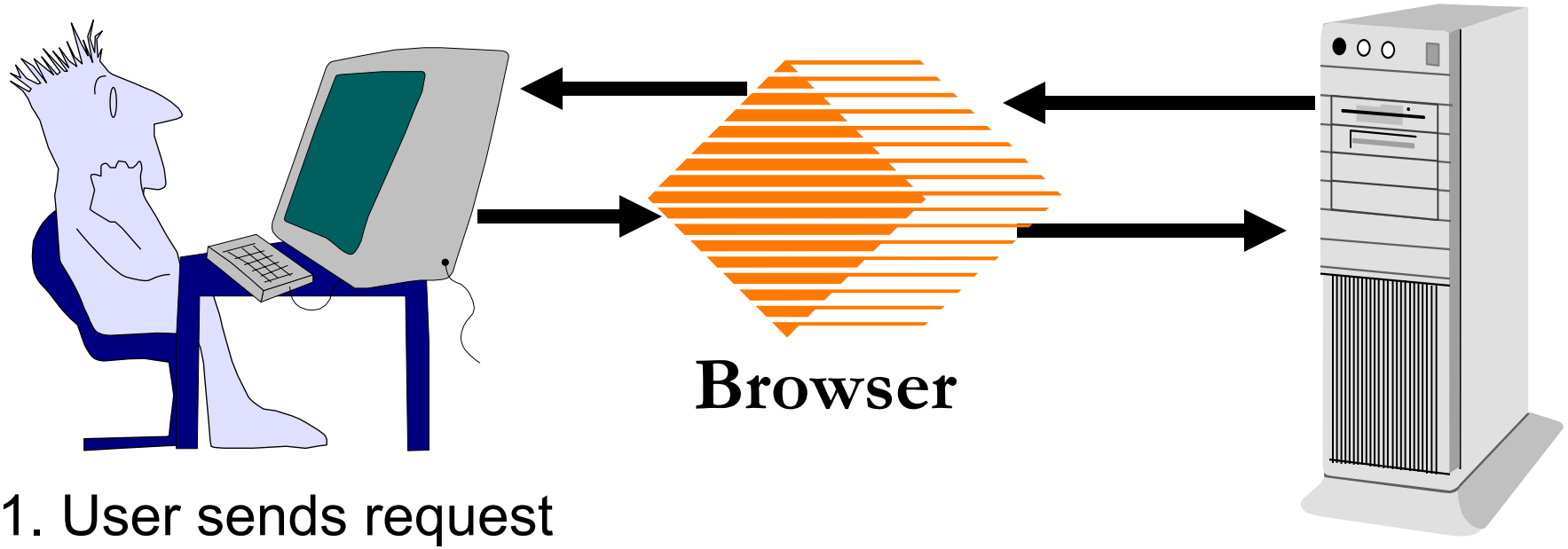
The Web Components

- Web browsers and servers - Web browsers are application software used to access files or applications which are located and run by Web servers (web sites).
- Web contents - files in several formats text, multimedia, video, audio, etc...that are available through the World Wide Web
- HTTP and HTML - HTTP is the protocol used in World Wide Web to transfer files from one computer to another while HTML is used to format and display Web pages

Web browsers and servers

5. User receives file

4. Server sends requested files to browser to be interpreted.



1. User sends request

2. Browser interprets user's selection and makes request from appropriate server.

3. Server accepts and processes request from browser.

Examples of browsers

- Netscape Navigator
- Microsoft Internet Explorer
- Opera
- Neoplanet
- Mozilla
- More…

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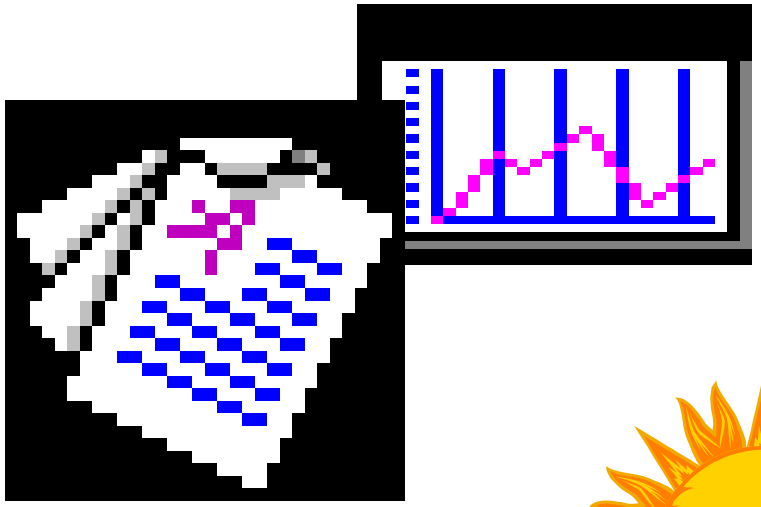
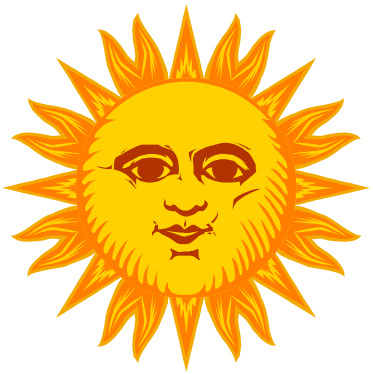
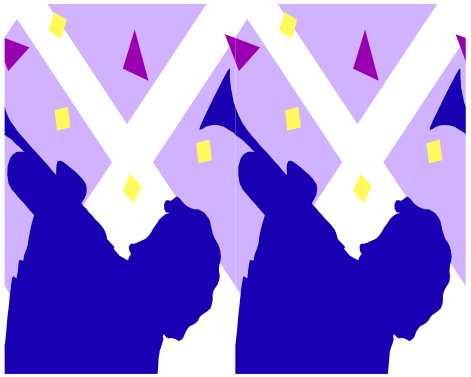
Web Content





- Text
- Sound
- Images
- Video
- Animation
- Full-text
- Statistical data
- Abstracts/Indexes
- Software
- Library catalogs
- News
- And more



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Uniform Resource Locator (URL)

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- The URL comprises of three parts:
  - Protocol – lets the computer know how to process the information it receives
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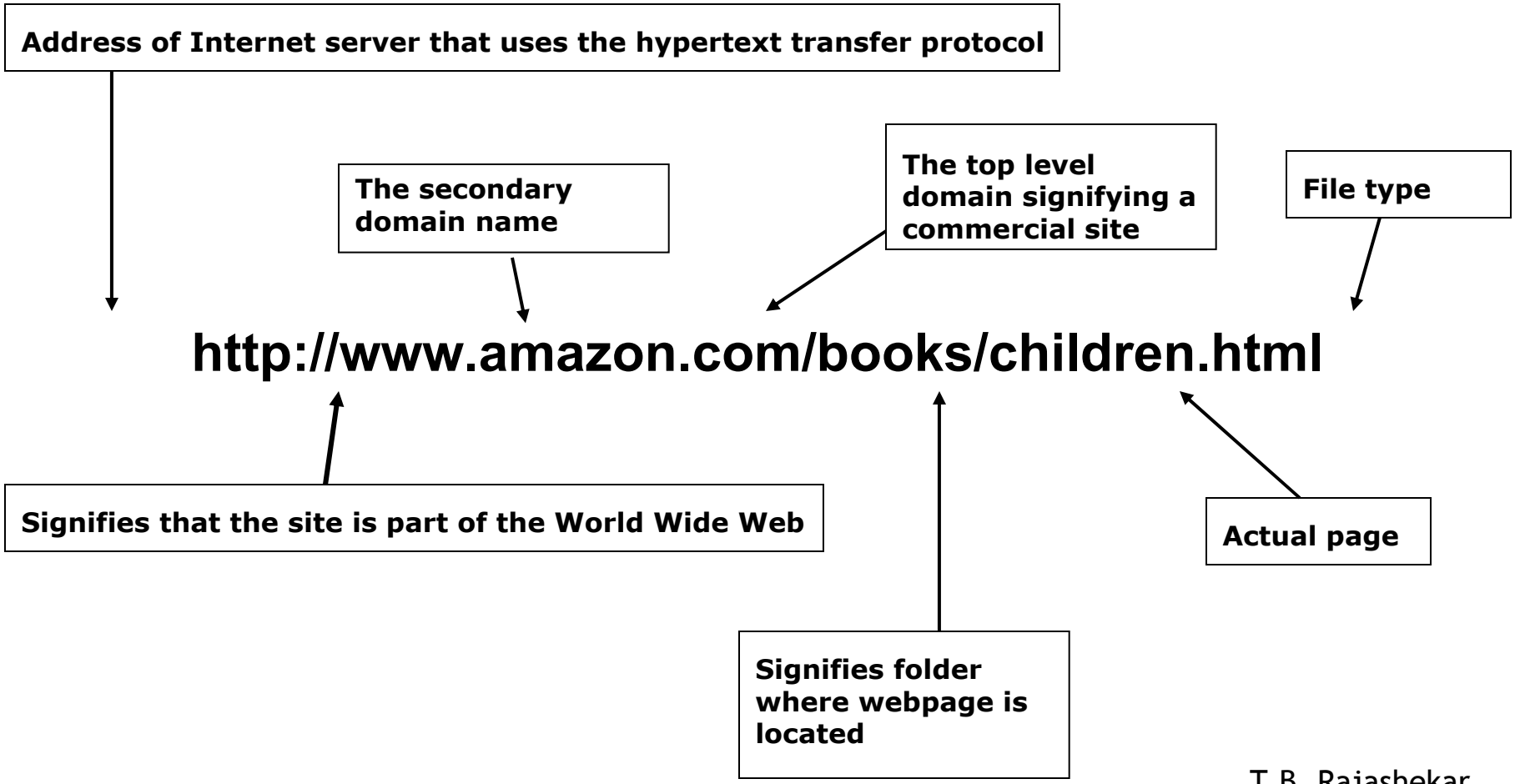
  - Path – tells the computer which directory and file to access

What is URL?

UNIFORM RESOURCE LOCATOR



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Sample URL's

- http://lcweb.loc.gov
- http://www.ifla.org
- http://www.ala.org
- http://library.albany.edu/internet/
- http://webopedia.internet.com/

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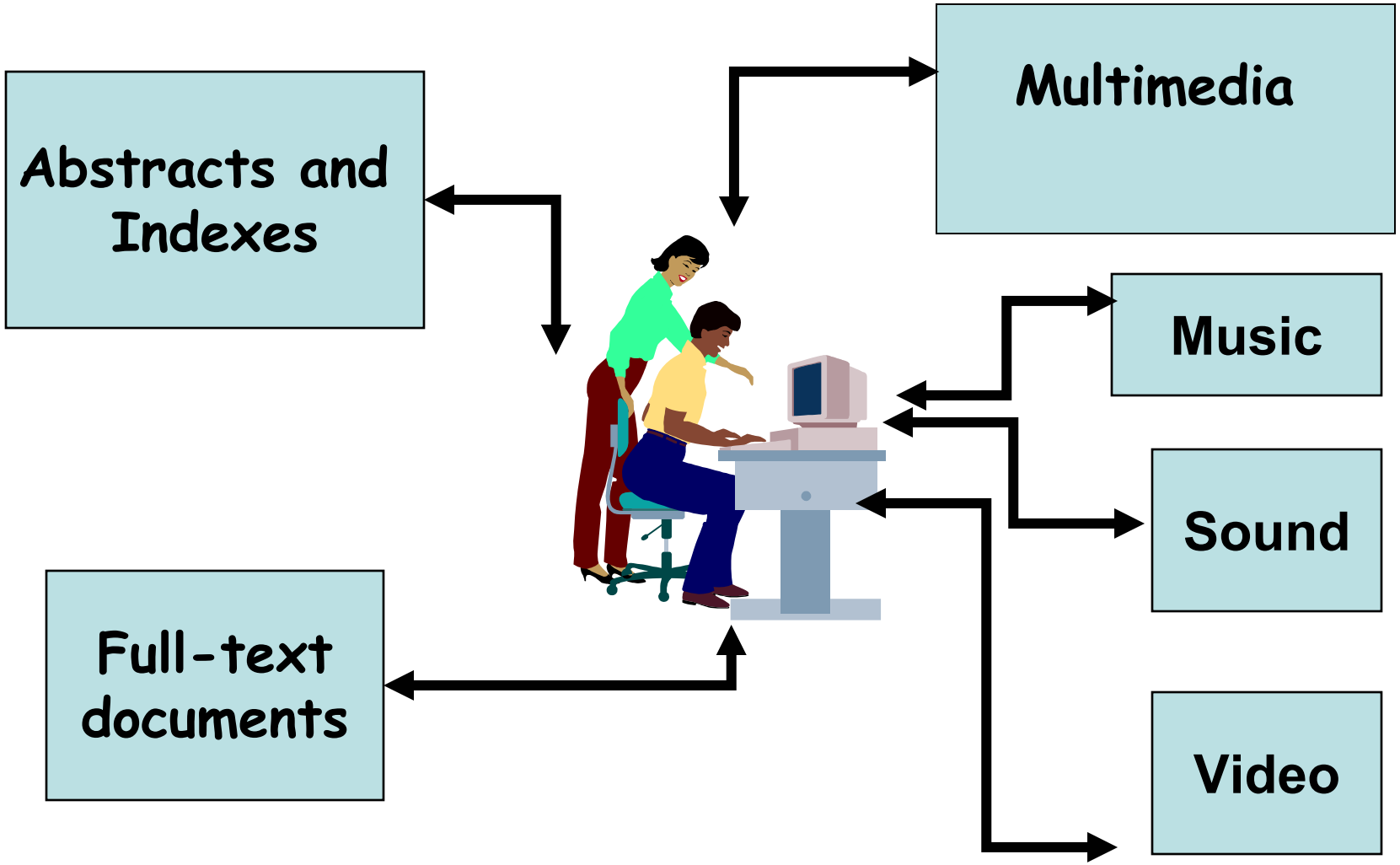
Online information resources



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Internet Applications

- Internet supports 3 key information related activities:
  - Communication medium – messaging: E-Mail
  - Information access medium - Internet as Information Source
  - Publishing, distribution and dissemination medium – information hosting and delivery

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Internet and Libraries

- Provide access to online information resources
- Library management
- Library website: Online L&I services
- Develop digital library collections
- Professional self-learning

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Access to Online Information Resources

- E-journals, bibliographic databases, patents, technical reports, e-books, etc.
- Licensed commercial online resources
  - Consortia subscription (INDEST, INFONET)
  - Library subscription
- Freely available online resources
  - High-quality education and research related resources are available today for free

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Access to Online Information Resources…

- Challenge:
  - How do we extend print library collection to include online resources?
  - How do we bring awareness of these to our users?
  - What IT infrastructure is required for providing online access?
- Possibilities:
  - HTML page with brief description and link to online resources – grouped by simple subject/ type categories
  - Integration with OPAC
  - Separate online resources gateway service

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Library Management

- Internet can be used to improve the productivity of operations in different library units, by virtue of being able to quickly reach people, publishers and vendors; carry out business transactions; and access related information sources.
  - Acquisitions
  - Technical processing
  - Serials management

Online L&I Services

- Library website
  - Information about the library, collections, staff, rules and regulations, services, etc.
- Web OPAC
- E-Mail/ web-based alerting services
- Requirements:
  - Campus intranet
  - Dedicated Internet connectivity with good bandwidth
  - Library LAN
  - Staff with appropriate skills

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Digital Library Collections

- Development of digital library collections
  - Capture, organization, preservation and provision of online access to digital material
  - Internally produced/ licensed
  - Example material: Theses and dissertations, lecture notes, technical reports, project reports, journal articles, conference papers, presentations, lectures, etc.
  - Open source free digital library/ repository software
    - Example: Greenstone, DSpace, EPrints
- ‘DL/ Repository’ managed by the library

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Professional Development

- Improve professional knowledge and competence
- Participation in discussion forums (e.g. LIS-Forum)
- Subscribe to current awareness services (e.g. CurrentSites)
- Exploit free, high-quality sources for keeping up-to-date
  - E-Journals, resources on websites of associations and societies (e.g. SLA, ASLIB, IFLA), conference publications, etc.
- Watch and learn from what others are doing

Example Applications at NCSI, IISc

- SciGate – IISc Science Information Portal (http://www.ncsi.iisc.ernet.in/)
- E-JIS – E-Journal Information Service (http://e-jis.ncsi.iisc.ernet.in/)
- ePrints@iisc - The IISc e-prints archive (http://eprints.iisc.ernet.in/)
- etd@iisc - The IISc ETD archive (to be released soon!)

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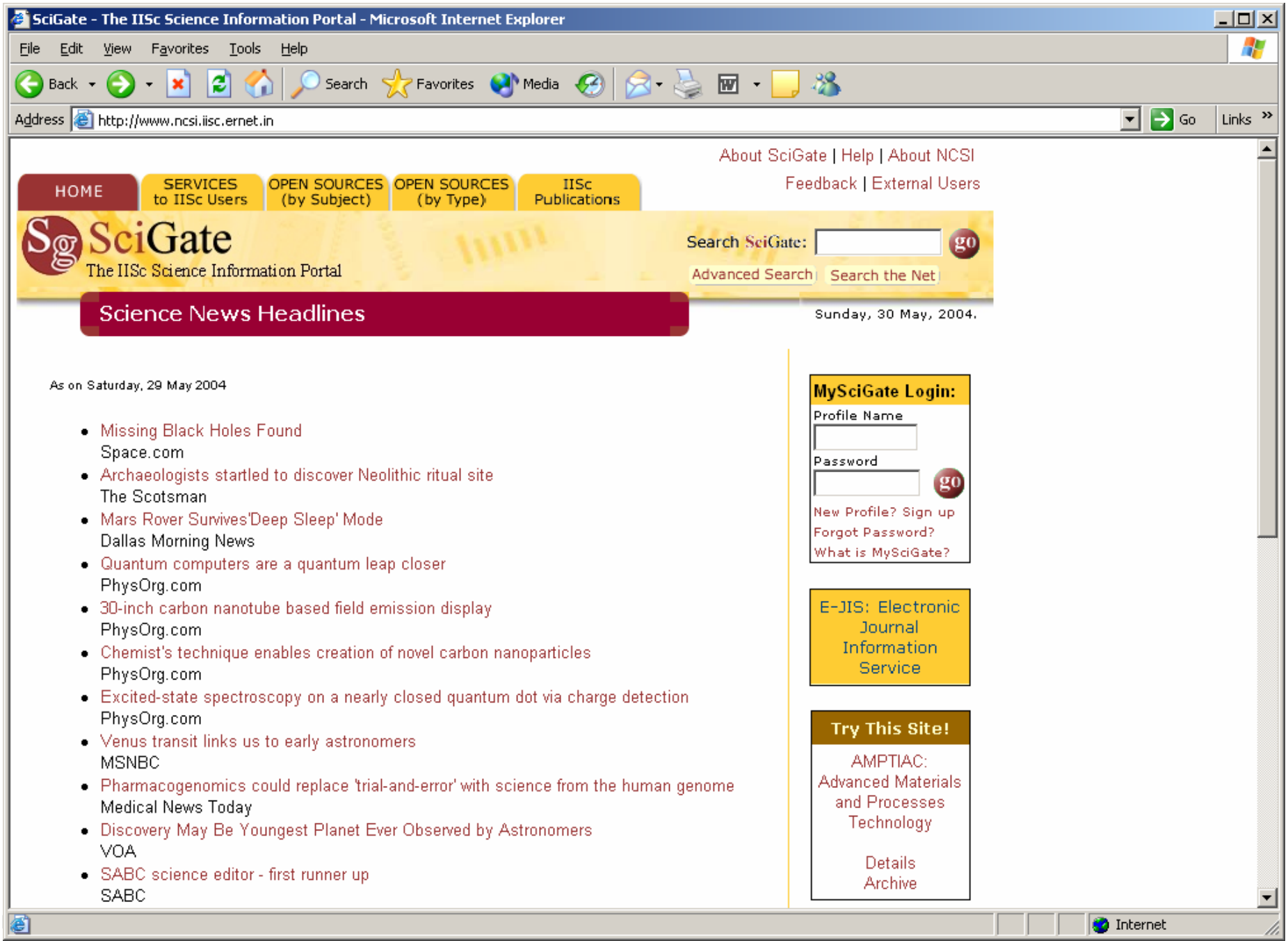
SciGate: IISc Science Information Portal



E-JIS: Electronic Journal Information Service (Gateway Service)

In

E-JOURNAL INFORMATION SERVICE

About E-JIS

Welcome to E-JIS, the electronic journal gateway service developed as a joint effort by NCSI and IISC library, for IISc researchers.Using E-JIS, you can select and access from over 10,000 online fulltext journals.

The goal of E-JIS is to provide desktop access to electronic version of all the journals covered under the following categories:

- INDEST Licensed journals
- Free-against-print journals subscribed by IISc Library
- Online subscription journals by IISc Library
- Completely free online journals.

Through the MHRD INDEST Consortium, IISc users now have online access to a very large number of journals through the Internet. These include: Elsevier's ScienceDirect, Springer's Link,IEEE/IEE journals, ACM digital library, ABI/Inform, Proquest Science, ASME and ASCE journals, EBSCO Journals, and Emerald Full-text journals. We have developed a web-accessible directory database of all these journals providing name of the Publisher or Aggregator, Acquisition type, as well as link to the journal website. Using these links, you can visit the journal site and access the full text of articles of all the journals included in the E-JIS database.Most of the journals covered provide online access to both current year as well archives. Please ascertain the exact years of coverage for each journal by visiting the respective journal site.

A search interface is provided to access the journals in E-JIS directory.

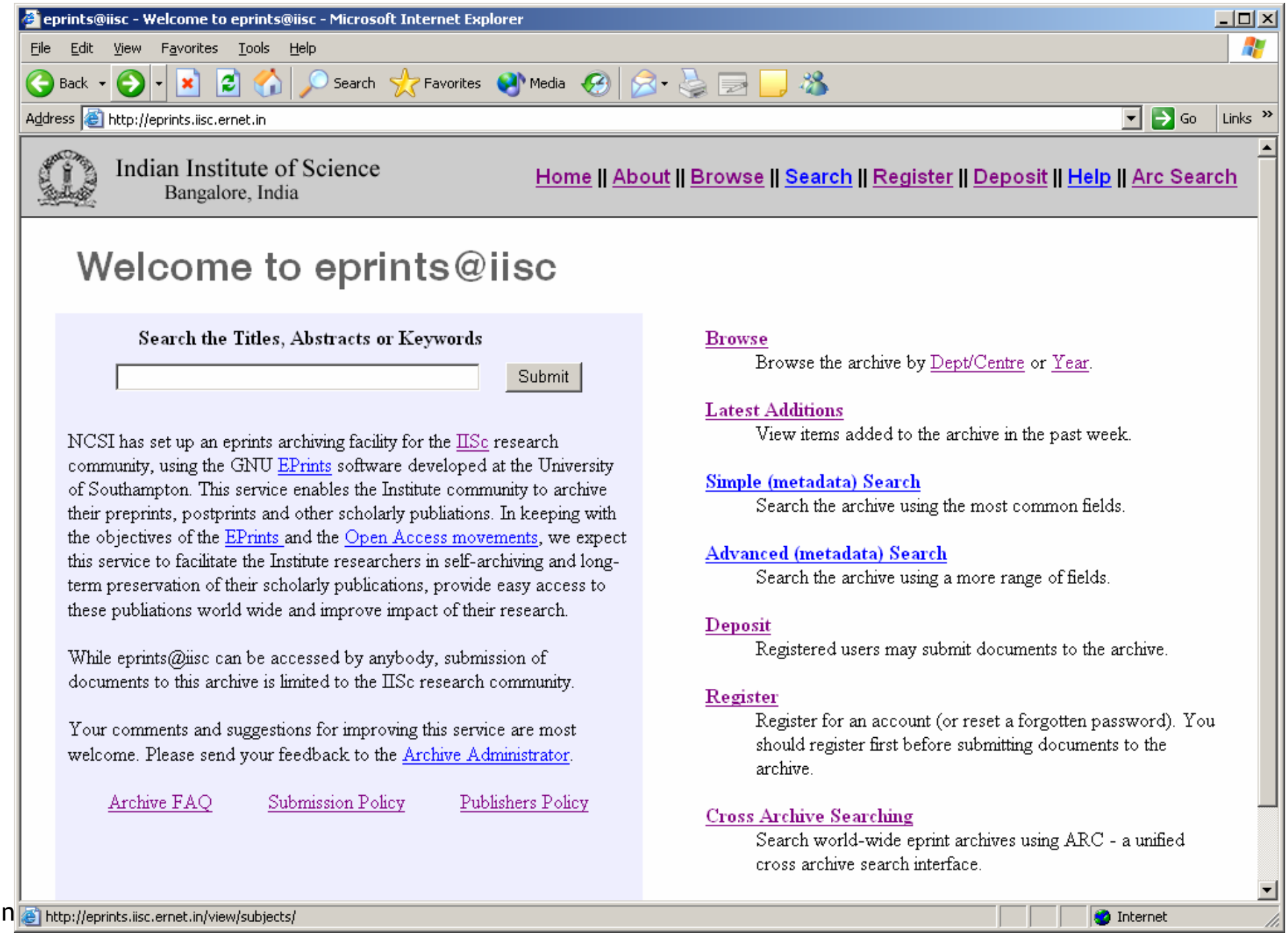
eatures

- Any-Time Access
- Regular Updates
- Search
- Journal Info.
- Full Text Access

Personalize your ccess to e-resources thru' MySciGate

Access TOC and article index of urnals subscribed by Ts and IISc through JCCC

IISc E-Print Archive (Digital Library)



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  - Administration
    - Associate Director's Office
    - Council Section
    - Deans' Offices
    - Director's Office
    - Other Offices
    - Registrar's Office
  - Division of Biological Sciences (22)
    - Biochemistry (5)
    - Centre for Ecological Sciences (5)
    - Microbiology & Cell Biology (4)
    - Molecular Biophysics Unit (5)
    - Molecular Reproduction, Development & Genetics (11)
  - Division of Chemical Sciences (49)
    - Inorganic & Physical Chemistry (12)
    - Materials Research Centre (9)
    - Organic Chemistry (2)
    - Solid State & Structural Chemistry Unit (19)
    - Sophisticated Instruments Facility (7)
  - Division of Electrical Sciences (46)
    - Centre for Electronic Design & Technology (3)
    - Computer Science & Automation (25)

Conclusion

- Internet - a challenge and an opportunity
- With growing user familiarity with Internet, users expect compatible services from Libraries
- Developing necessary network infrastructure, competence and skills are key requirements for success

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