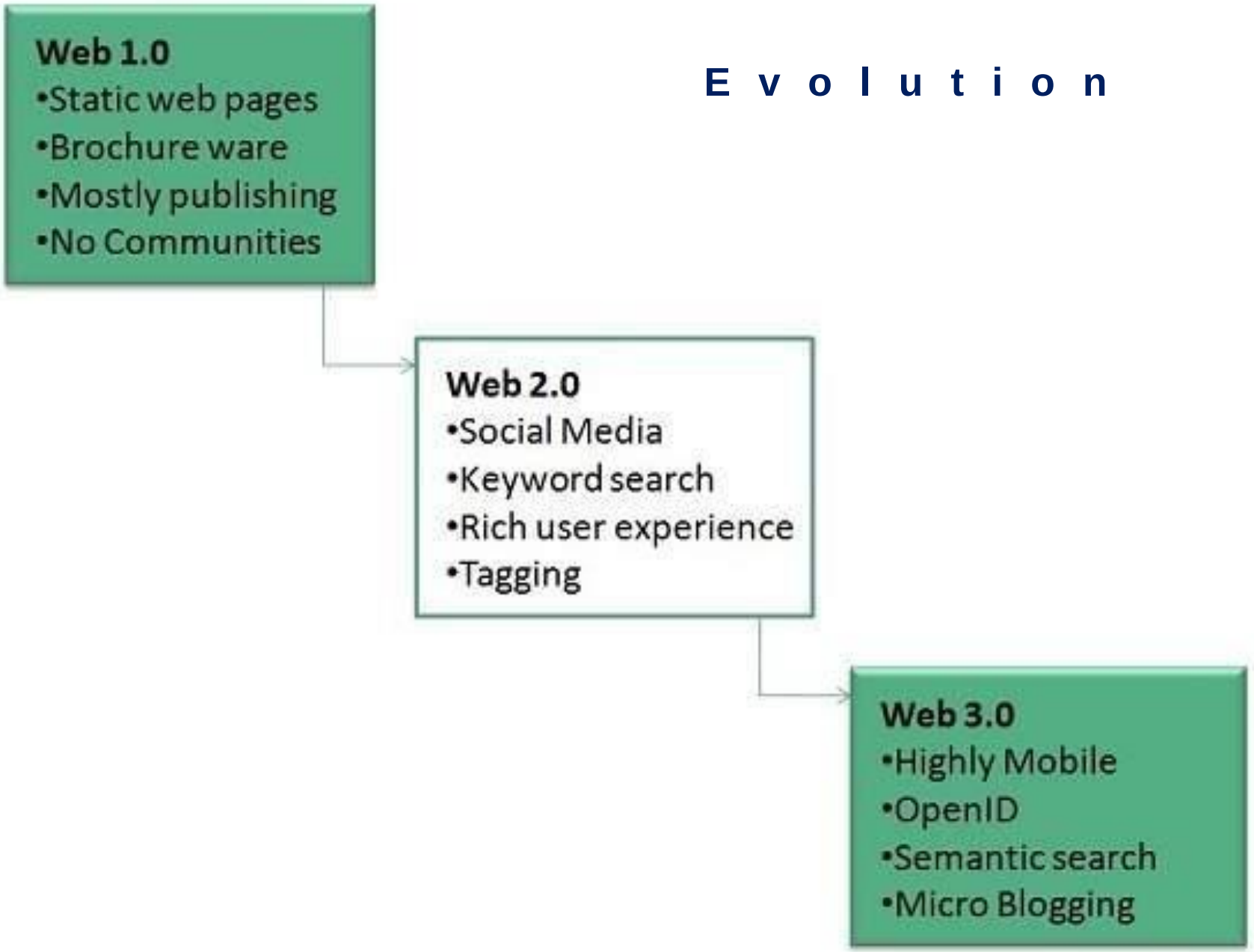
CSE 3002
INTERNET AND WEB PROGRAMMING

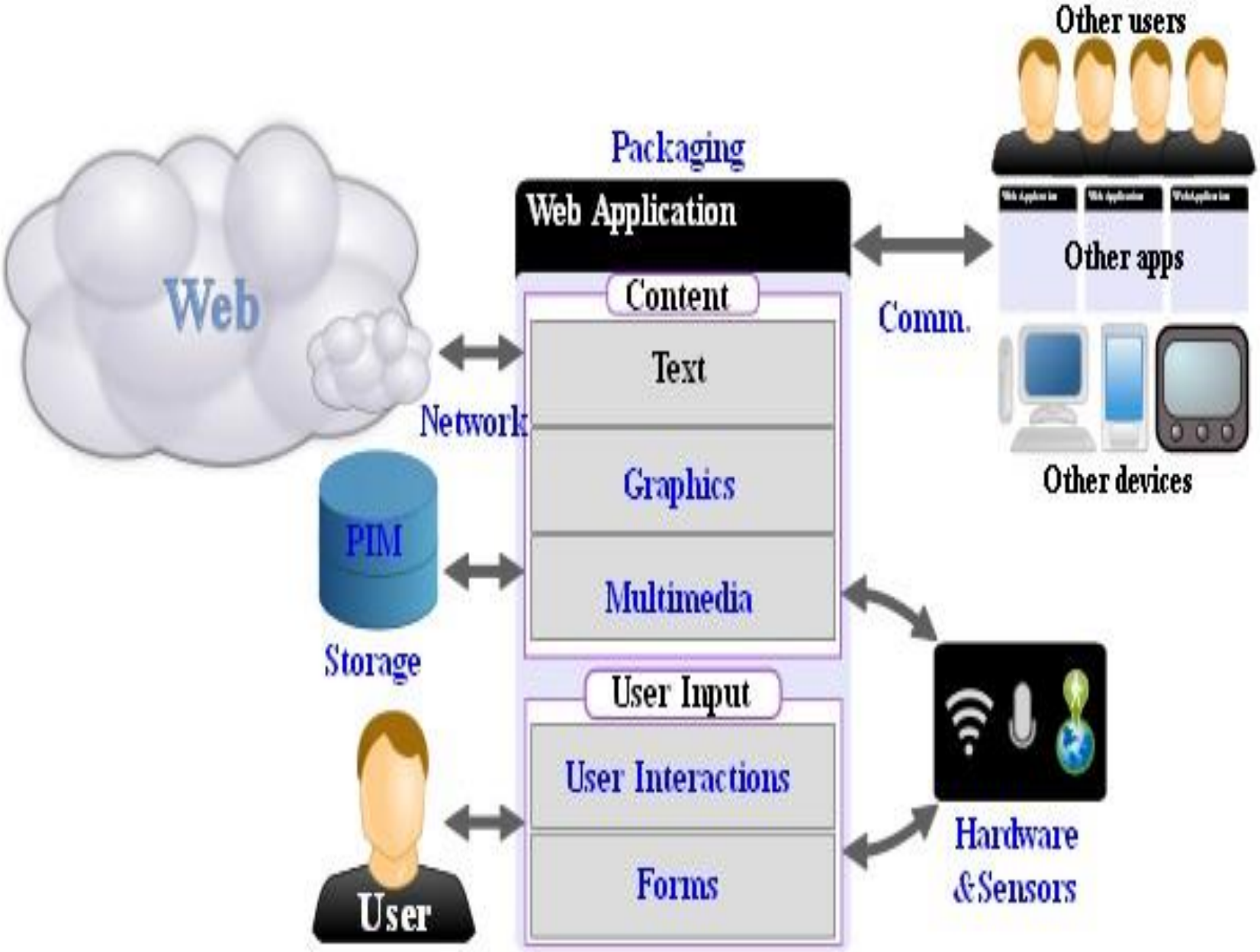
Module:1 Introduction to Internet

WEB CONCEPTS

- **WWW**
- **PROTOCOLS**
- **ISPs**
- **DNS**
- **INTERNET REOURCES**

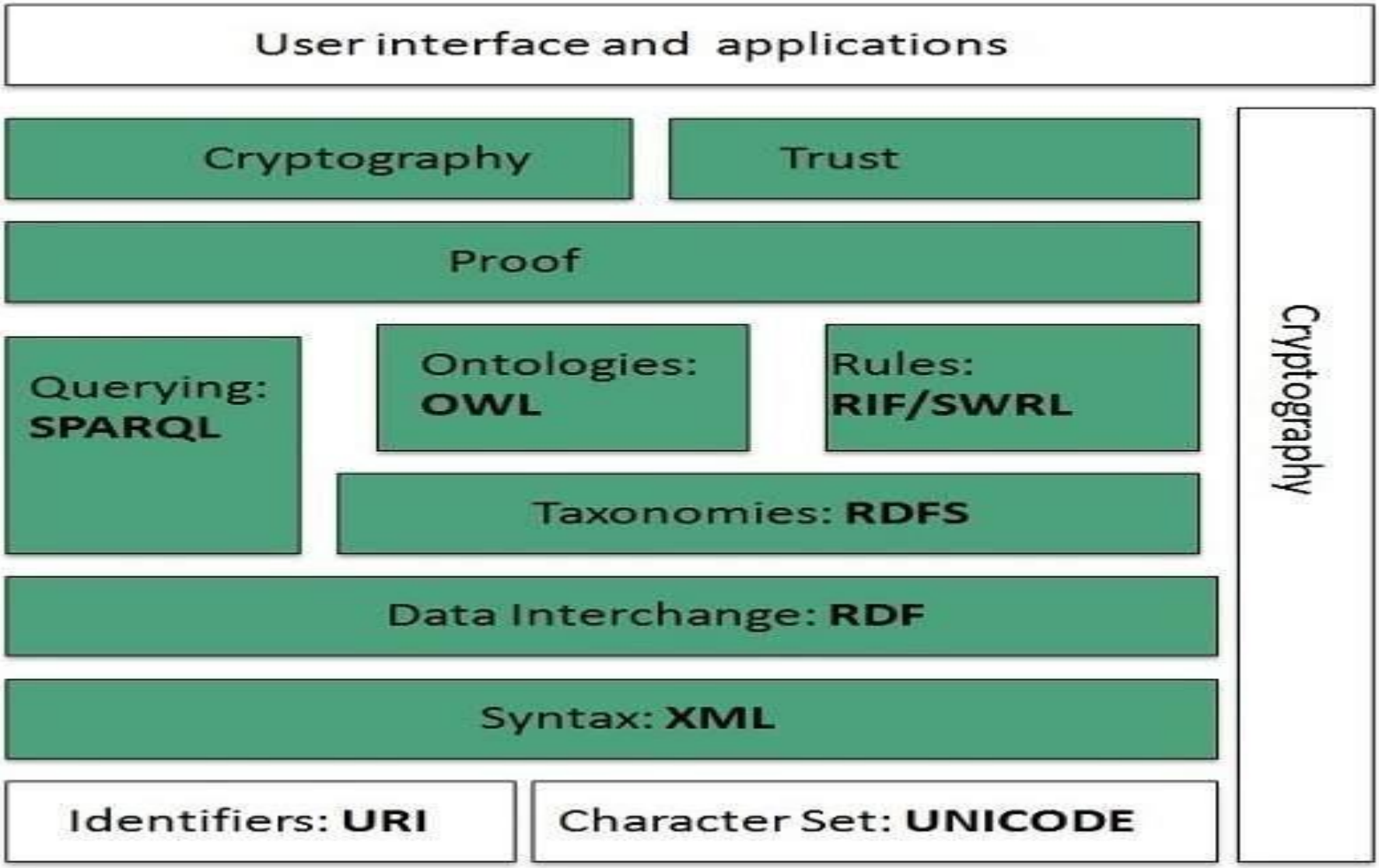
Evolution


Web 1.0
•Static web pages
•Brochure ware
•Mostly publishing
•No Communities
Web 2.0
•Social Media
•Keyword search
•Rich user experience
•Tagging
Web 3.0
•Highly Mobile
•OpenID
•Semantic search
•Micro Blogging



The Web as an application development platform

WWW Architecture



Functions

- Hypertext documents
  - Text
  - Links
- Web
  - billions of documents
  - authored by millions of diverse people
  - edited by no one in particular
  - distributed over millions of computers, connected by variety of media

Linking

- Most web pages contain hyperlinks to other related pages and perhaps to downloadable files, source documents, definitions and other web resources.
- A hyperlink points to a whole document or to a specific element within a document.
- Hypertext is text with hyperlinks

Dynamic updates of web pages

- Clearing old UI components and adding new ones in their proper places on a Web page
- Binding different event handlers to different dynamic elements of a Web page
- Registering a listener looking for changes on the server side
- Using Scripting techniques to refresh only the dynamic parts of the Web page instead of the whole page

WWW prefix

- Many domain names used for the World Wide Web begin with www because of the long-standing practice of naming Internet hosts (servers) according to the services they provide. .

- The hostname for a web server is often www, in the same way that it may be ftp for an FTP server, and news or nntp for a USENET news server.

Specifiers: http and https

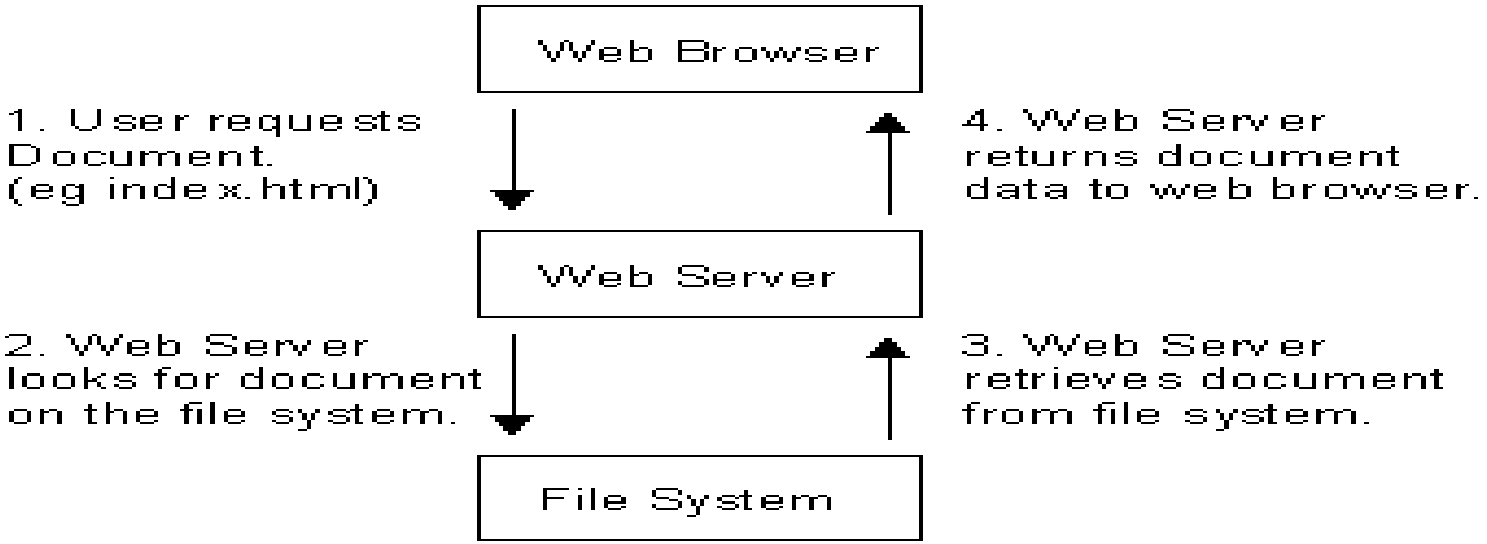
- The scheme specifiers (http:// or https://) in URIs refer to the the communication protocol to be used for the request and response.

- The **HTTP protocol** is fundamental to the operation of the World Wide Web;

- The added encryption layer in **HTTPS** is essential when confidential information such as passwords or banking information are to be exchanged over the public Internet.

Web Servers

- The primary function of a web server is to deliver web pages on the request to clients using the Hypertext Transfer Protocol (HTTP).
- Delivery of HTML documents and any additional content that may be included by a document, such as *images, style sheets and scripts*.
- A user agent, commonly a *web browser or web crawler*, initiates communication by making a request for a specific resource using HTTP



Security

- The Web has become criminals' preferred pathway for spreading malware.
- Cybercrime carried out on the Web can include identity theft, fraud and intelligence gathering.
- Through HTML and URIs the Web was vulnerable to attacks like cross-site scripting (XSS)
- Today by one estimate, 70% of all websites are open to XSS attacks on their users.

Standards

- Recommendations for markup languages, especially **HTML and XHTML, from the W3C.**
- These define the structure and interpretation of hypertext documents.
- Recommendations for stylesheets, especially **CSS**, from the W3C.
- Recommendations for the **Document Object Model**, from W3C.

W3C

Standards

Participate

Membership

About W3C

Member Home

STANDARDS

W3C standards define an **Open Web Platform** for application development that has the unprecedented potential to enable developers to build rich interactive experiences, powered by vast data stores, that are available on any device. Although the boundaries of the platform continue to evolve, industry leaders speak nearly in unison about how HTML5 will be the cornerstone for this platform. But the full strength of the platform relies on many more technologies that W3C and its partners are creating, including CSS, SVG, WOFF, the Semantic Web stack, XML, and a variety of APIs.

W3C develops these technical specifications and guidelines through a process designed to maximize consensus about the content of a technical report, to ensure high technical and editorial quality, and to earn endorsement by W3C and the broader community.

If you are learning about Web technology, you may wish to start with the introduction below, and follow links for greater detail.

Web Design and Applications

Web Design and Applications involve the standards for building and Rendering Web pages, including HTML, CSS, SVG, Ajax, and other technologies for Web Applications ("WebApps"). This section also includes information on how to make pages accessible to people with disabilities (WCAG), to internationalize them, and make them work on mobile devices.

SPECIFICATIONS

All Specifications

DEVELOPERS

W3C DEVELOPERS

W3C Developer Avenue is the one-stop place to find the information and tools Developers need to learn, build, and move the Web forward.

W3Cx

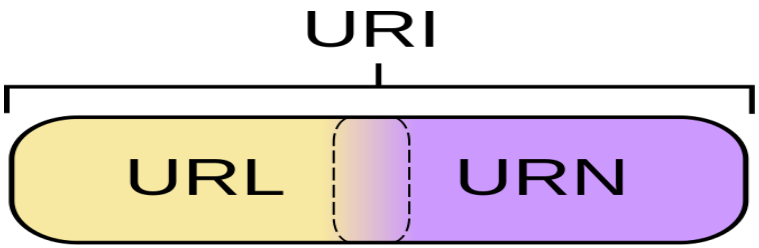
World Wide Web Success

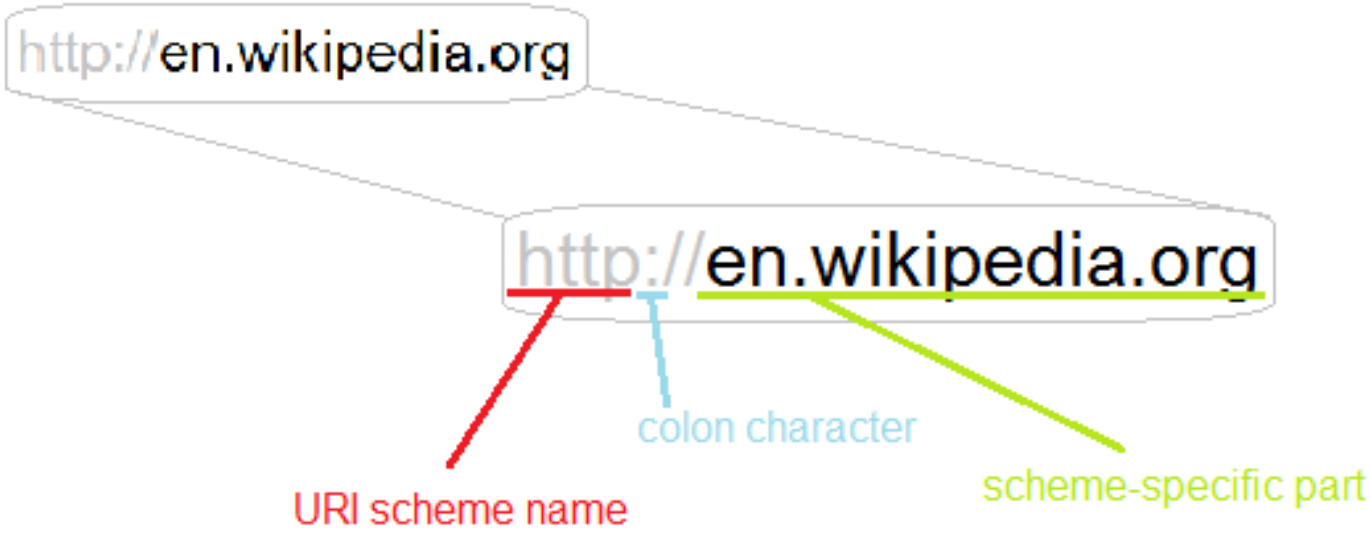
- World Wide Web succeeded because it was **simple**!
  - Didn't attempt to maintain links, just a common way to name things
  - Uniform Resource Locators (URL)

Service — Hostname — File Path

HyperText Transfer Protocol

URL,URI & URN

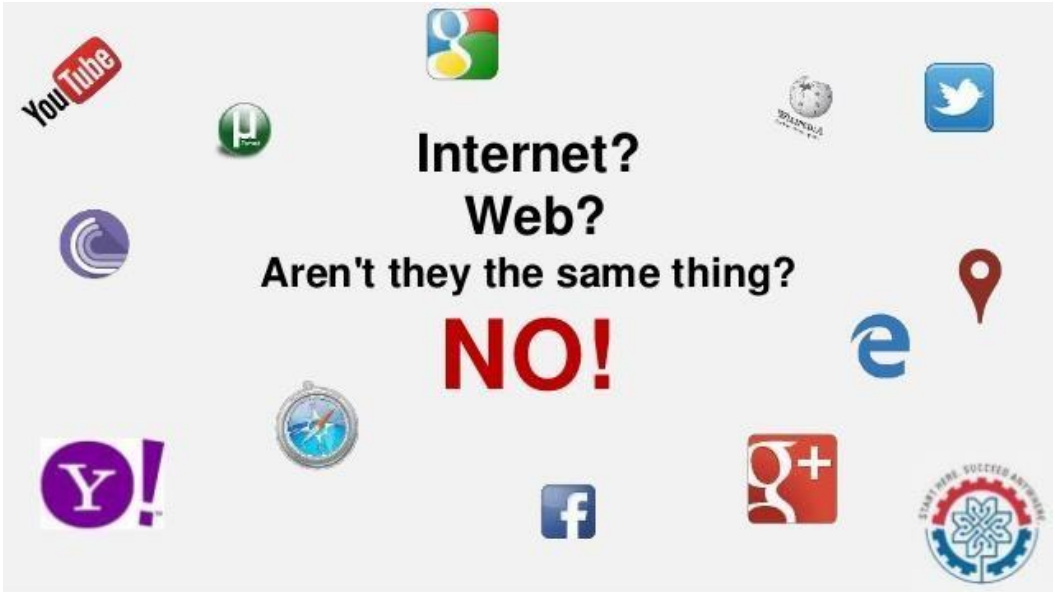




Internet Assigned Numbers Authority

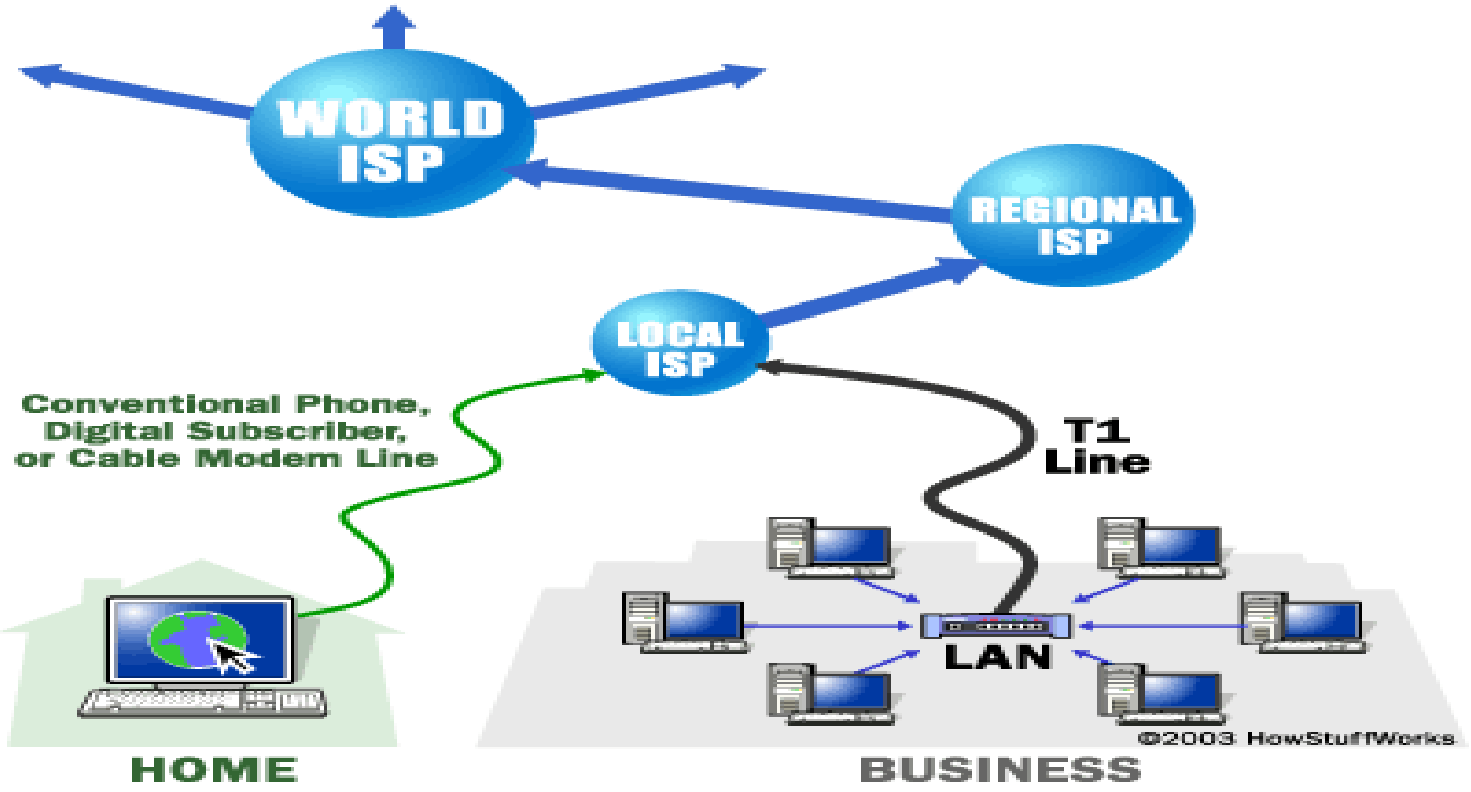
INTERNET

VS



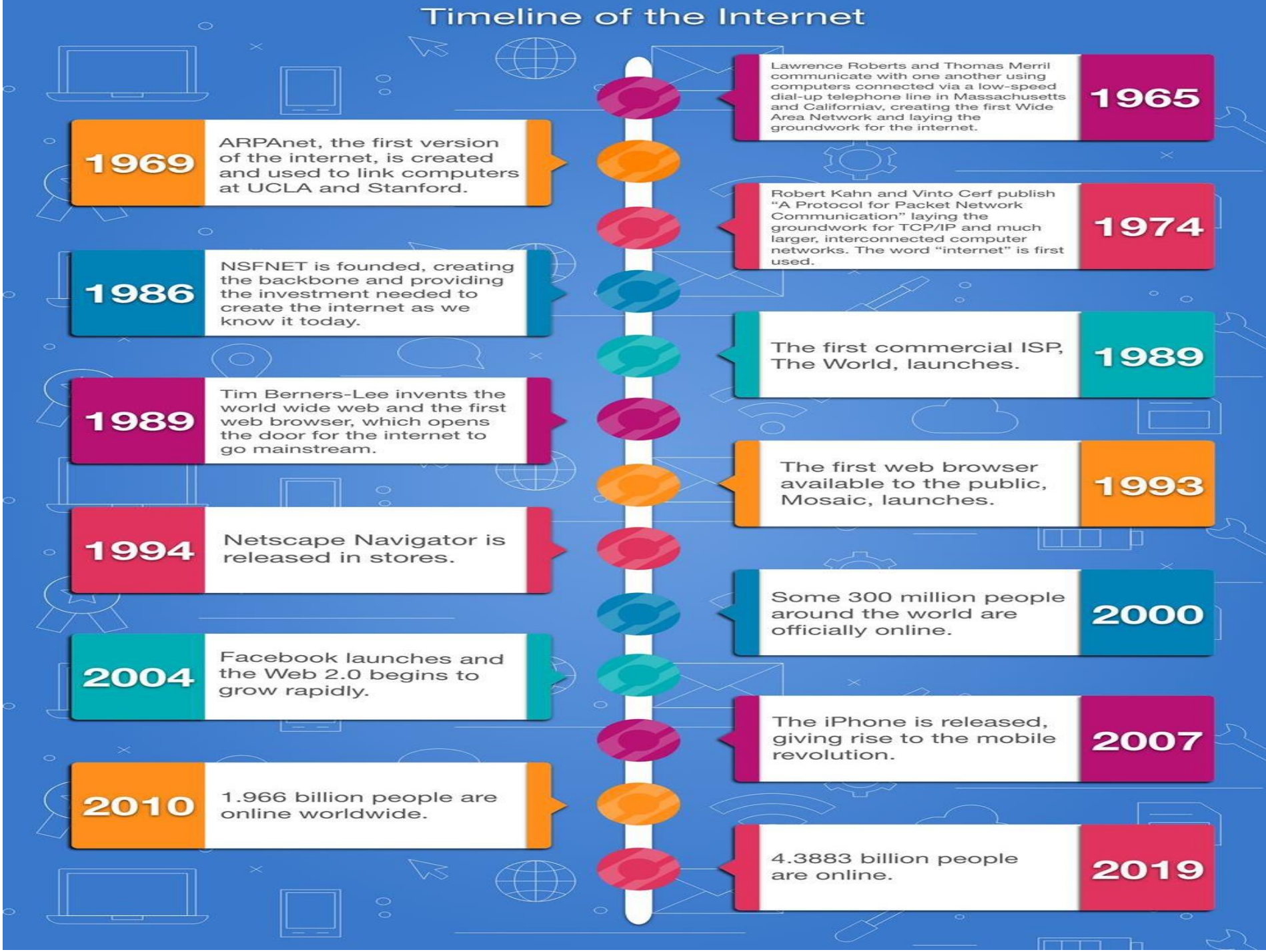
What Is the Internet?

- A network of networks, joining many government, university and private computers together and providing an infrastructure for the use of E-mail, bulletin boards, file archives, hypertext documents, databases and other computational resources.



		
Estimated year of Origin	1969, though opening of the network to commercial interests began only in 1988	1993
Name of the first version	ARPANET	NSFnet
Comprises	Network of Computers, copper wires, fibre-optic cables & wireless networks	Files, folders & documents stored in various computers
Governed by	Internet Protocol	Hyper Text Transfer Protocol
Dependency	This is the base, independent of the World Wide Web	It depends on Internet to work
Nature	Hardware	Software

Timeline of the Internet



The Creation of the Internet

The creation of the Internet solved the following challenges:

- Basically inventing digital networking as we know it
- Survivability of an infrastructure to send / receive high-speed electronic messages
- Reliability of computer messaging

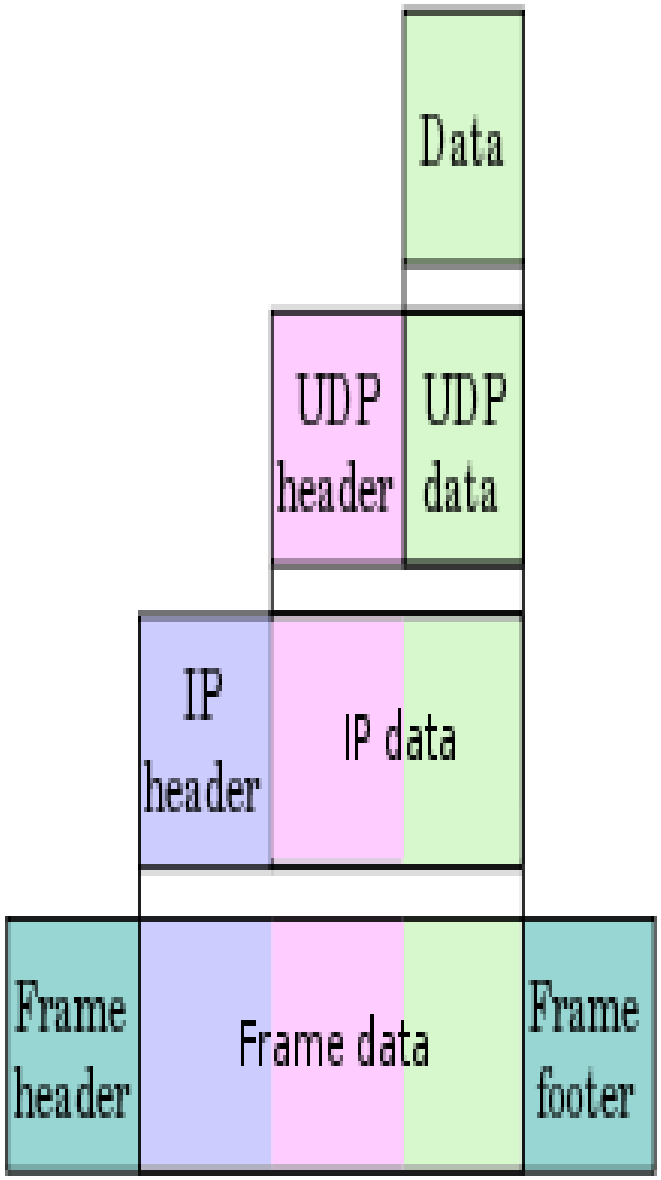
Who owns the internet today?

- ***Who owns the internet today?***
  - NSFNET was officially privatized in 1995.
  - Management of internet is managed by the internet Network information center
  - (InterNIC) which subcontracts various tasks to such companies as AT&T and Network Solutions
  - Today nobody owns the internet

INTERNET TECHNOLOGY

Protocols

- The Internet protocol suite is the set of communications protocols used for the Internet and similar networks, and generally the most popular protocol stack for wide area networks.
- It is commonly known as TCP/IP, because of its most important protocols: Transmission Control Protocol (TCP) and Internet Protocol (IP), which were the first networking protocols defined in this standard.
- The link layer (commonly Ethernet) contains communication technologies for a local network.
- The internet layer (IP) connects local networks, thus establishing internetworking.
- The transport layer (TCP) handles host-to-host communication.
- The application layer (for example HTTP) contains all protocols for specific data communications services on a process-to-process level.



Internet protocol suite

Application layer

DHCP · DHCPv6 · DNS · FTP · HTTP · IMAP · IRC · LDAP · MGCP · NNTP · BGP · NTP · POP · RPC · RTP · RTSP · RIP · SIP · SMTP · SNMP · SOCKS · SSH · Telnet · TLS/SSL · XMPP · (more)

Transport layer

TCP · UDP · DCCP · SCTP · RSVP · (more)

Internet layer

IP (IPv4 · IPv6) · ICMP · ICMPv6 · ECN · IGMP · IPsec · (more)

Link layer

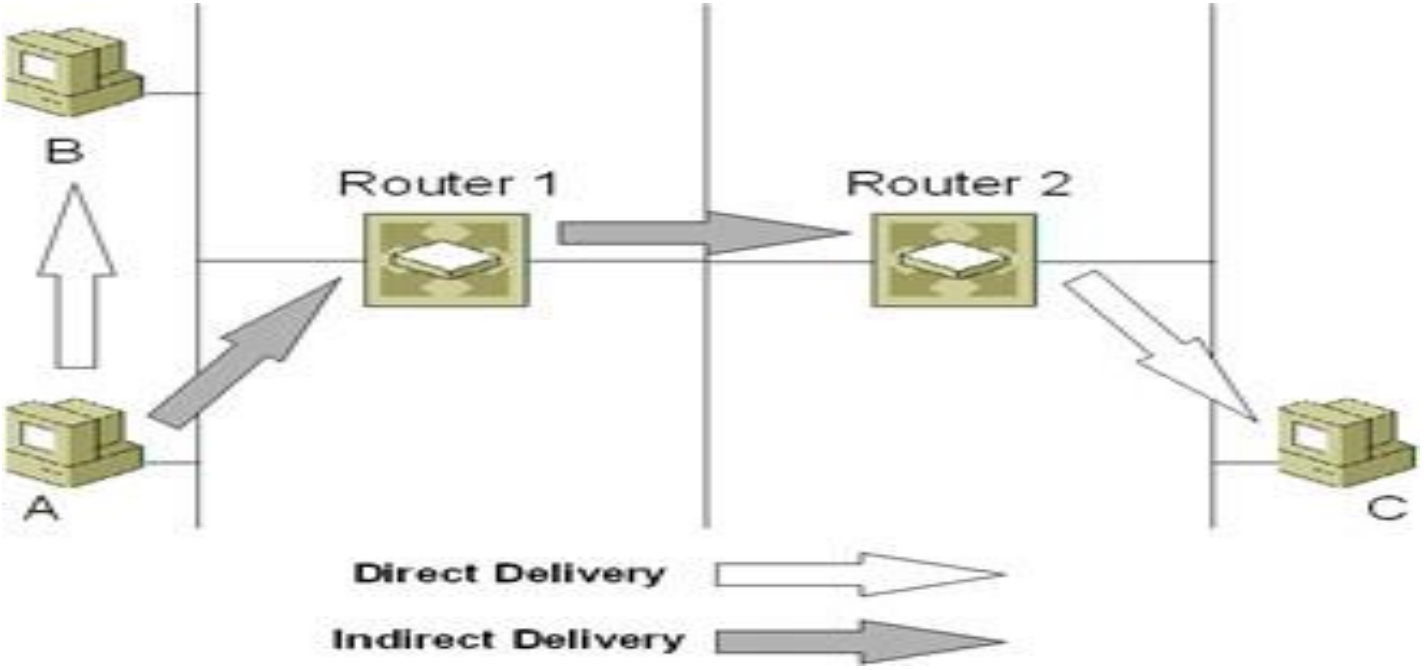
ARP/InARP · NDP · OSPF · Tunnels (L2TP) · PPP · Media access control (Ethernet · DSL · ISDN · FDDI) · (more)

V · T · E

Routing

- **Routing** is the process of selecting paths in a network along which to send network traffic.
- Routing is performed for many kinds of networks
- Computers and routers use ***routing tables*** to direct IP packets among locally connected machines.
- Tables can be constructed manually or automatically via DHCP for an individual computer or a routing protocol for routers themselves.
- In single-homed situations, a default route usually points "up" toward an ISP providing transit.

Routing



Direct delivery occurs when the IP node (either the sending host or an IP router) forwards a packet to the final destination on a directly attached subnet. The IP node encapsulates the IP datagram.

Indirect delivery occurs when the IP node (either the sending host or an IP router) forwards a packet to an intermediate node

APPLICATIONS OF INTERNET

INTERNET RESOURCES

Introduction

- **Structure of the Internet**

➢ **Hardware**

Servers
Communications Media
Storage Area Networks (SANs)
Connecting to the Internet
Digital Subscriber Lines (DSL)
Broadband
Integrated Services Digital Network (ISDN)

➢ **Software**

Application Service Providers (ASPs)
Databases

Structure of Internet

- *IP address* (Internet Protocol)
  - Computers use IP addresses to locate other computers on the Internet
- *Packet*
  - Source address, a destination address, sequencing information, error-control information and the data to be delivered to the destination address
- *Router*
  - Used to move packets across the Internet efficiently

Hardware

- ***Server***
  - A host on the Internet that manages network resources and fulfills requests from clients
  - Web servers, e-mail servers, database servers and file servers
  - A single server may provide multiple services

  A Web server stores Web pages and delivers the pages to clients upon request

  Protocols for delivering information over the Web
  - Hypertext transfer protocol (HTTP)
  - File transfer protocol (FTP)
  - Post office protocol (POP)
  - Simple mail transfer protocol (SMTP)

Communications Media

- *Communications medium*
  - The hardware that connects computers and other digital equipment
- *Bandwidth*
  - Indicates how much data can be transferred through the medium in a fixed amount of time
  - Usually measured in bits per second (bps)
- *Copper wire* / fiber-optic cable
  - The primary communications mediums

The strength of a signal transmitted over a communications medium is reduced as the signal travels farther and farther

- ***Repeater***
- Can be used to alleviate this problem by amplifying and retransmitting the signal across segments of copper wire or fiber-optic cable
- Transmission costs
- Fiber-optic cable is more expensive than copper wire
- Installation of fiber-optic cable is more complicated than installation of copper wire
- Fiber-optic cable requires fewer repeaters

Storage Area Network (SAN)

- Provides high-capacity, reliable data storage and delivery on a network
- Allows network administrators to collect data in logical groups on data servers distributed throughout the network
- SAN devices store large volumes of data and may also provide backup and recovery services

➢ ***Mirroring* technology**

- A SAN device stores redundant copies of data, so that if one copy is lost or damaged, a mirrored copy can be used

➢ ***Fiber-channel technology***

- A high-speed communications medium based on fiber-optic technology that provides transfer rates of 100 Mbps

Connecting to the Internet

Internet Service Provider (ISP)

- Most home users subscribe to an *Internet Service Provider (ISP)* to connect to the Internet

Modem

- User connects to an ISP using the modem, which then connects the user to the Internet
- Takes digital signals from the computer and turns them into analog signals

Digital Subscriber Lines

- *Digital Subscriber Lines (DSL)*
  - Offers high-bandwidth Internet access over existing copper telephone lines
  - Splits your phone line into three information-carrying channels
- *IAD* (integrated access device)
  - Provides network connections for high-speed Internet access, as well as connections for multiple voice telephone lines
- *ADSL* (asymmetric DSL)
  - The connection speed for sending data to the Internet (*upstream*) is slower than the connection speed for receiving data from the Internet (*downstream*)
- *SDSL* (symmetric DSL)
  - Transfers data at the same speed both upstream and downstream
- *VoDSL* (voice over DSL)
  - Provides voice telephone services and high-speed data access over a single standard telephone line

Broadband

- *Broadband*
  - A category of high-bandwidth Internet service provided mainly by cable television and telephone companies to home users
  - Can handle voice, data and video information
  - Enables videoconferencing, real-time voice and streaming-media applications
  - Always connected, eliminating the need to dial into an ISP
- *Cable modem*
  - Translates digital signals for transmission over the same cables that bring cable television to homes and businesses
  - Connections is shared among many users

Integrated Services Digital Network (ISDN)

- Communications standards for simultaneous digital transmission of voice, video, data, and other network services.
- Provides high-speed connections to the Internet over both digital and standard telephone lines
- Limited service
- Costly connection

Application Service Providers

- Provide customized business software applications over the Internet
- Maintains and updates the application as necessary
- Companies can eliminate the costs associated with developing and maintaining business applications
- *Virtual private networks* (VPNs)
  - Allow customers to connect to their applications securely over the Internet
  - VPNs use the *point-to-point tunneling protocol (PPTP)* to create a secure channel of communication between the customers.

Examples:

- Google Spreadsheets
- Google Docs
- Free Online Logo Makers

Databases

Relational database model

– A logical representation of the data that allows the relationships between the data to be considered independently of the physical implementation of the data structures

- Popular enterprise-level relational database systems:
  - **Microsoft Sql Server**
  - **Oracle**
  - **Sybase**
  - **DB2**
  - **Informix**

Summary

- **Internet resources** has been the domain of Internet technicians in managing the addressing structure of the Internet to enable the explosive growth of Internet use, and to have enough addressing space for that growth.
- **Structure of the Internet**
- **Hardware**
  - Servers
  - Communications Media
  - Storage Area Networks (SANs)
  - Connecting to the Internet
  - Digital Subscriber Lines (DSL)
  - Broadband
  - Integrated Services Digital Network (ISDN)
- **Software**
  - Application Service Providers (ASPs)
  - Databases