

The History of the Internet and World-Wide-Web

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Five Phases

- Long Distance Networking 1966-1973
- Network of Networks “internet” 1974-1985
- internet becomes Internet 1985-1990
- Internet becomes easier to use 1991-1993
- Internet becomes internet.com 1993-now

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Long Distance LAN

- 1956 - Universities Building Computers
- 1966 - Merit network formed
- 1968 - BBN Develops IMPs
- 1969 - ARPANET - UCLA, Stanford, UCSB, Univ. of Utah
- 1971 - ARPANET - 23 Hosts
- 1971 - Apple microcomputer

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“internet”

- 1973 - Internet - network of networks
- 1973 - ARPANET - University of London
- 1974 - Design of TCP/IP starts
- 1981 - 213 hosts
- 1981 - IBM PC (8088) introduced
- 1983 - TCP/IP is the standard protocol
- 1984 - Internet - 1000 hosts

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Internet

- 1985 - Many campuses expand their LANs
- 1986 - NSFNET - 5 supercomputer centers
- 1987 - 10000 hosts
- 1987 - Merit manages NSFNET

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Tool Building

- 1989 - World-Wide-Web at CERN
- 1991 - Gopher developed at Minnesota
- 1992 - 1 Million hosts
- 1992 - National Information Infrastructure
- 1993 - Multimedia PC < \$1000
- 1993 - Very-high-speed-backbone (VBNS)
- 1993 - Mosaic is written

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Commercialization

- 1995 - 10 Million hosts
- 1995 - NSFNET is turned over to MCI
- 1997 - People can view video lectures all over the world on demand
- 1997 - 100 Universities planning to connect to the VBNS at 155Mb/sec

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Computing History

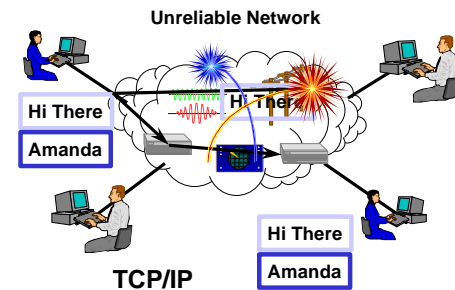
- Internet history is driven by the availability computer technology
- Networks are useless if network cards cost \$5000
- Virtual reality would never work on an Intel 8088
- Without sound cards - no RealAudio

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Designing an Internet

- Technical Challenges
 - Federated Network - No single authority
 - Many computer vendors
 - Worked over fast local links and slower long-distance links
 - Worked over unreliable links
- TCP/IP was the result of this effort

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Stone Age User Tools

- Stone Age 1966-1990
- People had "Terminals" - Usually text
 - telnet - remote log in
 - FTP - File Transfer
 - MAIL - Personal Communication
- Tools are primitive but very powerful in the hands of an experienced user

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telnet -cs04b
Connect to Terminal 040:

Mailbox is "/var/mail/cers" with 99 messages [ELM 2.8 PL24]

1 Jan 6 Mark Rosenblum (25) OPS 201
2 Jan 6 carls@cs.cmu.edu (10) Toner cartridges
3 Jan 6 carls@cs.cmu.edu (29) PC lab-like system
4 Jan 6 carls@cs.cmu.edu (28) pers
5 Jan 6 Rich Higgins (22) Post-Web talk
6 Jan 6 carls@cs.cmu.edu (20) [highlighted]
7 Jan 5 Ernie Kalpa (25) No knowledge CD's
8 Jan 5 [See] H. H. (115) Fun Query from Scientific American
9 Jan 5 Dr Richard Ertsey (26) Re: Annual Report
10 Jan 3 carls@cs.cmu.edu (24) belz

You can use any of the following commands by pressing the first character:
d) delete or undelete mail, n) next message, r) reply or forward mail, q) quit
to read a message, press return. ] = move down, k = move up, ? = help

Command:
    
```

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Nerds at Play

- Can send something non-work related
 - Network News - Worldwide discussion forums
 - Talk - On-line instant communication
 - Mailing lists
 - FTP Servers - Public Domain Software

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Newsgroups: sci.math.research
Path:newsflash.concordia.ca/tuicsr!lutttom!
ux1.cso.uuic.edu/news.cso.uuic.edu/dan
From: mckay@alcor.concordia.ca (John McKay)
Subject: Fermat's Last Theorem has been proved
Approved: Daniel Grayson <dan@math.uuic.edu>
Date: Wed, 23 Jun 1993 11:00:27 GMT
Message-ID: <C92MKs.8F2@newsflash.concordia.ca>
Sender: Daniel Grayson <dan@math.uuic.edu>
Originator: dan@symcom.math.uuic.edu
Organization: Concordia University, Montreal, Quebec
Lines: 8

I have heard that an announcement to this effect has been made in Cambridge by Andrew Wiles today, June 23rd. 1993.

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The State of the Net - 1988

- Very limited access - Universities
- Personal communication
- Personal data exchanged
- Some central repositories
 - ftp.uu.net
 - wuarchive.wustl.edu
- Public domain software evolves

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Anticipating Gopher

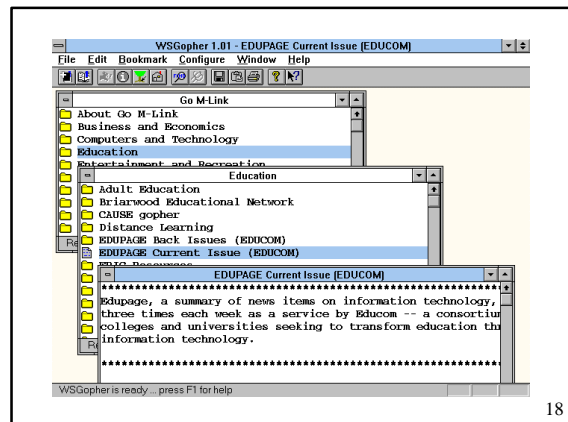
- The number of information repositories (ftp sites) started to grow
- There was a problem keeping track
- Simple cataloging tools were created to manage the problem
- Disk was becoming cheap and desktop systems were increasing in power

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The Age of Gopher

- Gopher was the first “net browser”
 - University of Minnesota - 1991
- Simple user interface
 - No cryptic commands - menu driven
 - Network details completely hidden
- Combines
 - Retrieval of information
 - Conversion of information
 - Viewing of information

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The Age of Gopher

- Gopher made the Internet usable by the masses.
- Using Gopher was an adventure - travel the world from an easy chair
- Gopher accessed existing information and encouraged the creation of new information

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The Age of Gopher

- Gopher server became a matter of pride
- Gopher showed that the Internet could be a valuable resource
- Gopher still had limitations
 - Strict menu interface
 - Not a very “Jazzy” interface

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Gopher Content

- Universities
 - <gopher://gopher.msu.edu/>
- Federal Government Agencies
 - <gopher://gopher.nsf.gov/>
- State Governments
 - <gopher://gopher.mde.state.mi.us/>
- No individuals

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Gopher’s Short Life

- University of Minnesota decided to make some money
- People spent time rewriting free versions of Gopher
- Mosaic and the web arrived
- Remember that gopher was what triggered the interest

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Government Internet

- Technology became political issue in 1992 elections
- Al Gore - “Information superhighway”
- National Information Infrastructure - Information Infrastructure Task Force
- 1993 NII = 500 two-way TV channels
- 1995 Internet = IITF

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The Age of Web

- Web - Was a “better mousetrap” (or perhaps a gophertrap)
- Mixed text and graphics
- Hypertext approach - hot links
- Focused on pleasing the end-user
- Available on MAC, Windows, and UNIX

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Web Heritage

- HTML - Hypertext Markup Language invented at CERN by Tim Berners-Lee
- Mosaic from NCSA - Mark Andreesen
- Netscape formed by Mark Andreesen and Jim Clark
- Microsoft Explorer developed by Microsoft to compete with Netscape

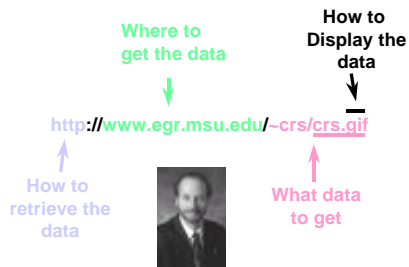
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Browser Power

- User interface was like a CD-ROM
- Extremely intuitive - Interactive forms
- Web introduced the concept of a URL or “Uniform Resource Locator”
- Like an E-Mail address for data
 - Completely specified world-wide
 - Could be typed into browser

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URL - All About Data



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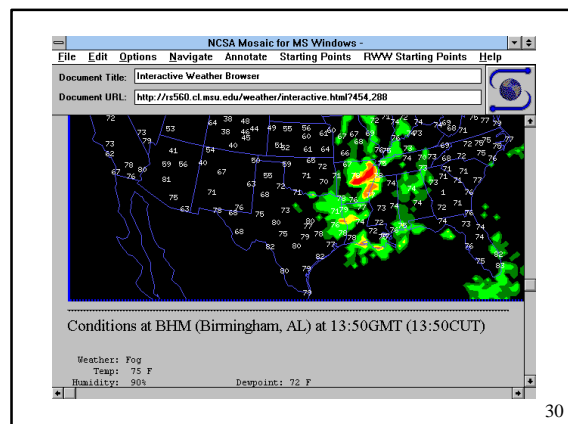
Early Web Content

- Mostly from organizations
- Nifty Collections
 - Software
 - Art Museums
- Proof of Concept - Look what I can do!
 - `http://wxweb.msu.edu/weather/`
 - `http://www.hcc.hawaii.edu/`
- Folks would say, “look what I found!”

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Personal Publishing

- First Web Servers supported “User Pages”
- As many styles of user pages as there are people
 - Serious publications
 - “My Favorite Stuff”
 - My views on whatever
 - Family pictures

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Internet Rush

- People want to get on to “consume”
- Some become producers
 - Governments - Federal/State/Local
 - Businesses
- More producers make Internet more desirable - more consumers ...
- URLs on TV fuels curiosity

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Internet As a Medium

- The Internet has quickly evolved
 - Experiment
 - Gee-Whiz - It works
 - CD-ROM Database
 - A Publishing Medium
- Many newspapers have E-Editions
 - www.nando.com
 - www.detnews.com

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Java Programming

- Most dramatic adoption of language in history - developed by SUN
- JAVA is an evolutionary language - Similar to C++ with multimedia and network extensions
- JAVA has the potential to be the most portable language in computing history - hardware vendors hate this

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Browser Battles

- Microsoft realized that the browser with JAVA could eventually make the operating system irrelevant
- Software could run on any computer - not just computers which ran Microsoft operating systems
- Microsoft Explorer - ActiveX

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Summary

- The current Internet trend is based on years of preparation
- The Internet has the potential to have a large impact on our technology
- The Internet would *never* have existed without Universities and research funding from Government

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