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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Unreliable Network

Hi There

Amanda

Hi There

Hi There

Amanda

TCP/IP
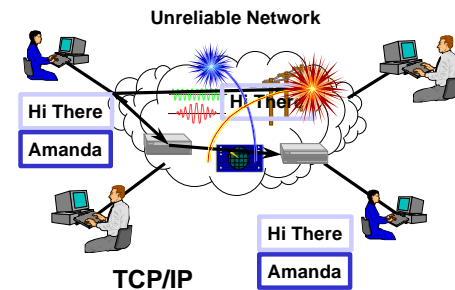
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Stone Age User Tools

- 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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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!utcsri!utnut!torn!
ux1.cso.uiuc.edu!news.cso.uiuc.edu!dan
From: mckay@alcor.concordia.ca (John McKay)
Subject: Fermat's Last Theorem has been proved
Approved: Daniel Grayson <dan@math.uiuc.edu>
Date: Wed, 23 Jun 1993 11:00:27 GMT
Message-ID: <C92MKs.8F2@newsflash.concordia.ca>
Sender: Daniel Grayson <dan@math.uiuc.edu>
Originator: dan@symcom.math.uiuc.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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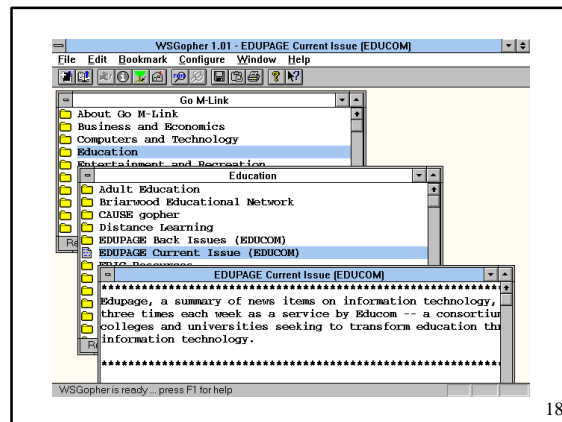
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The Age of Gopher

- 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 rewiting 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
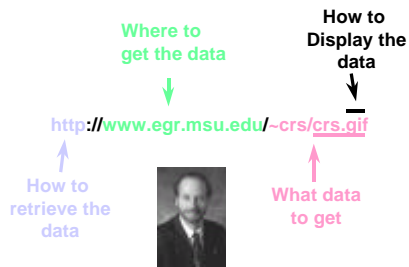- Microsoft Explorer developed by Microsoft to compete with Netscape

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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

Where to get the data

How to Display the data

http**://www.egr.msu.edu/**~crs/crs.gif

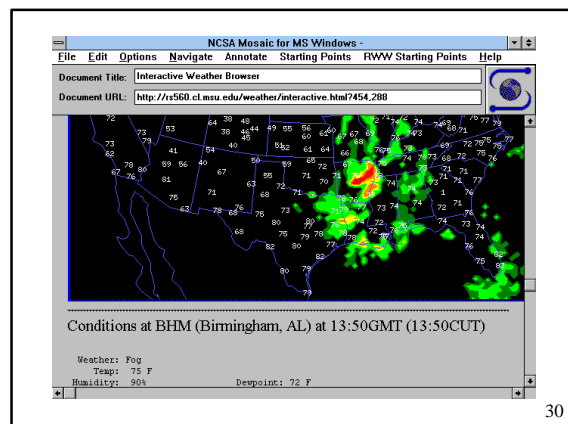**How to retrieve the data**

What data to get

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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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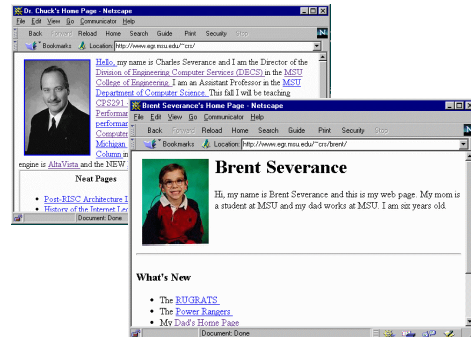
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Personal Publishing

- 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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