Music & the Internet
MUMT301

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Plan

- Review of the last class and assignment
- History of Internet
- The WWW and HTML
- Introduction to HTML
- Code editors
- In-class exercise
- Assignment #2

Review

- Music Technology Computer Lab (MTCL/E-215)
  - OSX accounts & password (creds: lastnamefirstinitial/changeit)
  - Backup (e.g., external drive, memory stick, Dropbox, iCloud, etc)
  - Emergency contact: Darryl Cameron (darryl@music.mcgill.ca)
- NIN Ghosts I-IV project as a case study of the New Music Economy
- Transformations in the music industry
  - Shift from physical to virtual in the 2000s
  - Music is in the cloud
- The “Cloud” and Web 2.0 in the music industry
- New music economy
  - Connectivity vs. control
  - Service vs. product
  - Amateur vs. professional

Review

- UNIX/Linux command shell crash course
  - `ssh`, `passwd`, `man`, `pwd`, `ls`, `cd`, `mkdir`, `rmdir`, `mv`, `cp`, `rm`, `cat`, `nano`

Assignment1 review

		Prog Lang	OS	Mobile Tech	Social Media	Acronyms	Instrument	Music reading	Music collection	Scrobble	MRS	Code	Github	Live music in Montreal
Julie David	http://132.206.14.130/jdavid/assignment1.txt	No	OS Sierra Version 10.12.5	iPhone 5	FaceBook, rarely	Good, but HTTP developed for safe internet transactions?	Guitar. I like electronic (ambient) music. Like what?	Very slowly	Over 700 artists on iTunes.	Never scrobbled	Friends and YouTube	Did not try	"version control repository and Internet hosting service"	Bodywash (PM), Doldrums (BSTB) Lookvibrant (BSTB)
Tommy Lupinacci	http://132.206.14.130/tlupinacci/assignment1.txt	No	Mac OS	iPhone 6s	Facebook, Instagram, Snapchat, and Twitter	Good	Drums (7 years)	No	Approximately 2,000 albums, 5,000 songs, and 2,000 artists.	No	Apple Music	Did not try	"development platform made for the building and development of coding projects"	None
Jacob Rosenberg	http://132.206.14.130/jrosenberg/assignment1.txt	Max/Msp, basic Dr Java	OS X	Nexus 5	Facebook and Snapchat	Good	13 years guitar, 8 years clarinet. Sings in a band	I can read basic music notation	50 Artists, 150 albums, 2000 songs	No	Google Play playlists and Youtube recommendations	Did not try	Did not explain	None
Volodymyr Trunov	http://132.206.14.130/vtrunov/assignment1.txt	Python, C++, JavaScript	Windows	Samsung Galaxy S5	Facebook,Vkontakte	Good	Piano, guitar, and singing	I can read music pretty well	Usually, I use streaming services to listen to music, therefore I don't have a collection of music.	No	Spotify	Yes	"web-based Git or version control repository hosting service"	I won't have time to visit any events in the next few weeks
Sam Coxon	http://132.206.14.130/scoxon/assignment1.txt	Java, Python, some C, MATLAB, some JS, LISP	Mac OS	Iphone 5	Soundcloud, Facebook, Instagram	Application Program Interface REpresentational State Transfer HyperText Transfer Protocol	Sing—highly proficient	Yes, 7/10	100 artists, < 1000 songs, 25 full albums	Nay	Spotify reccomendations, Soundcloud "wall" (reposts by artists I follow), friends/reccs	Yes	http://github.com/samcoxon	Nick Murphy, Nicolas Jaar, San Holo / Droeloe

Introduction to Internet

- What is Internet?
- History of Internet
- What is the web?
- The Internet network

What is Internet?

- [redacted]orks, and
- [redacted]orldwide
- [redacted]

What is Internet?

- It is a network of networks that put together intranets, extranets and networks interconnecting them.
- It is a global system of interconnected computer networks that use the standard TCP/IP protocol suite to link several billion devices worldwide
- Who invented the Internet?
    - March 9, 1999
- In defense of Al Gore: Robert Kahn and Vint Cerf (they coined the term Internet in 1974)
    - http://web.eecs.umich.edu/~fessler/misc/funny/gore,net.txt

Pre-history of the Internet

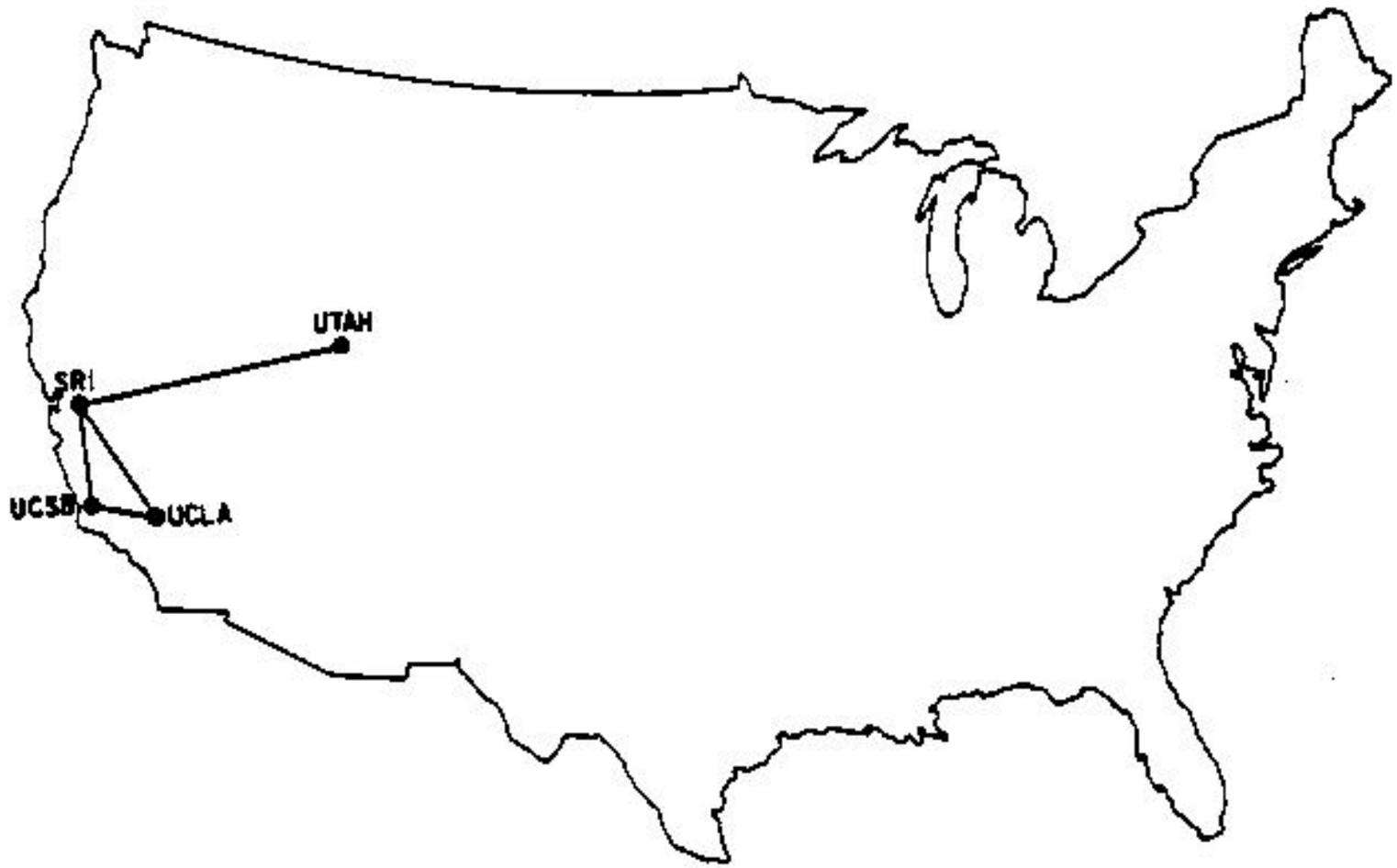
- 1961: Leonard Kleinrock @ MIT publishes the first paper on packet switching theory. First book later on 1965
- 1962: J.C.R. Licklider @ DARPA envisioned a “Intergalactic Computer Network”, a globally interconnected set of computers, through which everyone could quickly access data and programs from any site
- 1964: While working at RAND, Paul Baran devised a solution to communication in the aftermath of a nuclear attack and published a seminal paper on IEEE conceptualizing a distributed network.
- 1965: Lawrence Roberts and Thomas Merryl connected two computers using circuit switching (TX2 in Mass. and Q32 in California) They realized they needed packet switching
- 1966: Roberts went to DARPA and put together his plan for the computer network ARPANET
- 1967: First ACM symposium on Operating System Principles: publications on packet switching from MIT (Lawrence Roberts), NPL (Davies et al.)

Pre-history of the Internet

- 1968: Overall ARPANET architectural **design and network topology** developed by community of researchers led by Heart, Kahn, Roberts, and Frank
- 1969: UCLA selected to be the first node on the ARPANET, second node at Stanford. First host-to-host message! *lo…*
- 1969, Dec: four-node network established
- Computers were added quickly to the ARPANET after 1969 and there was a large amount of work in developing host-to-host protocols and network software. This allowed the network users to develop applications

Pre-history of the Internet

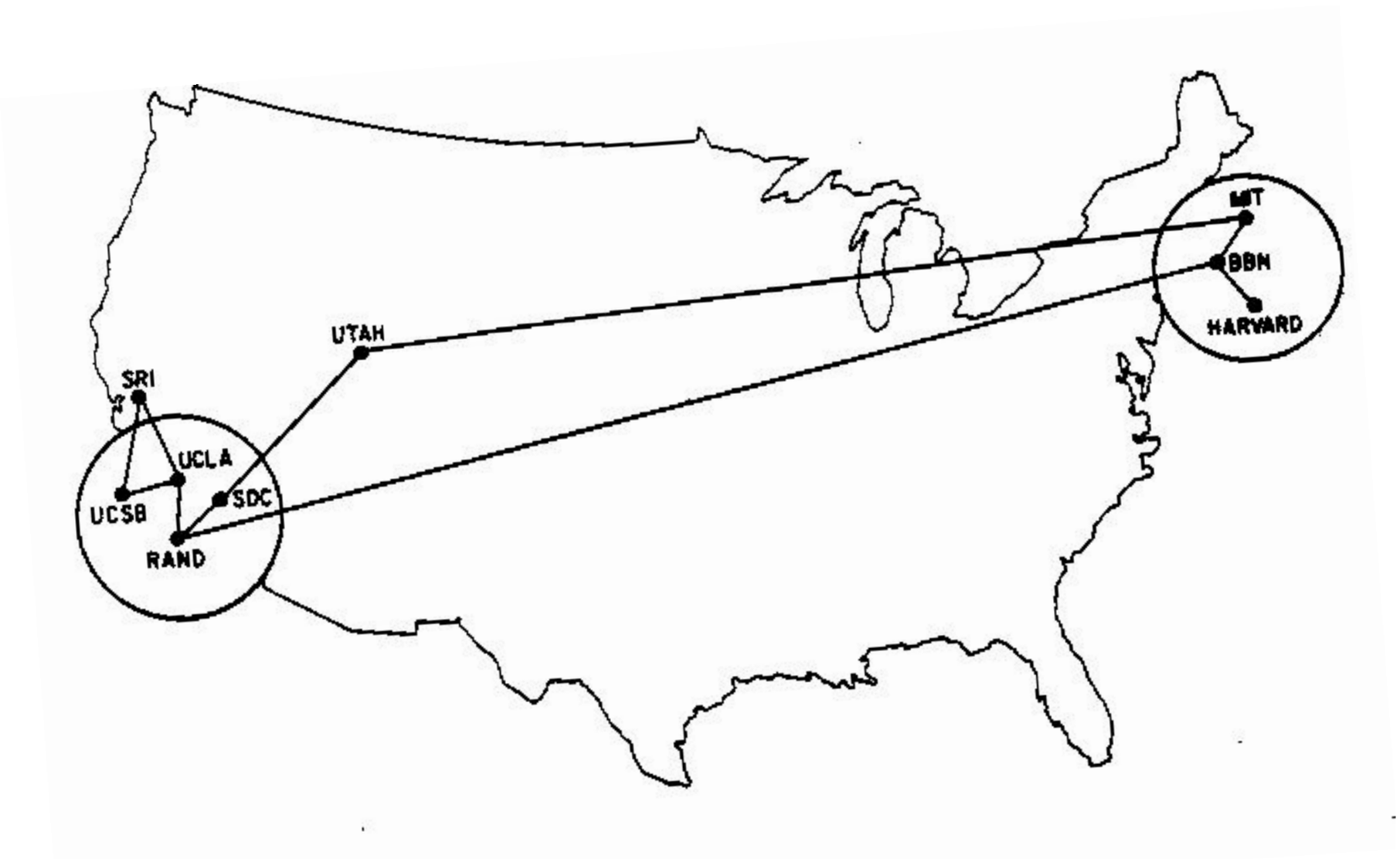
Dec.1969



Taken from Heart, F., et al.1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

Jun.1970



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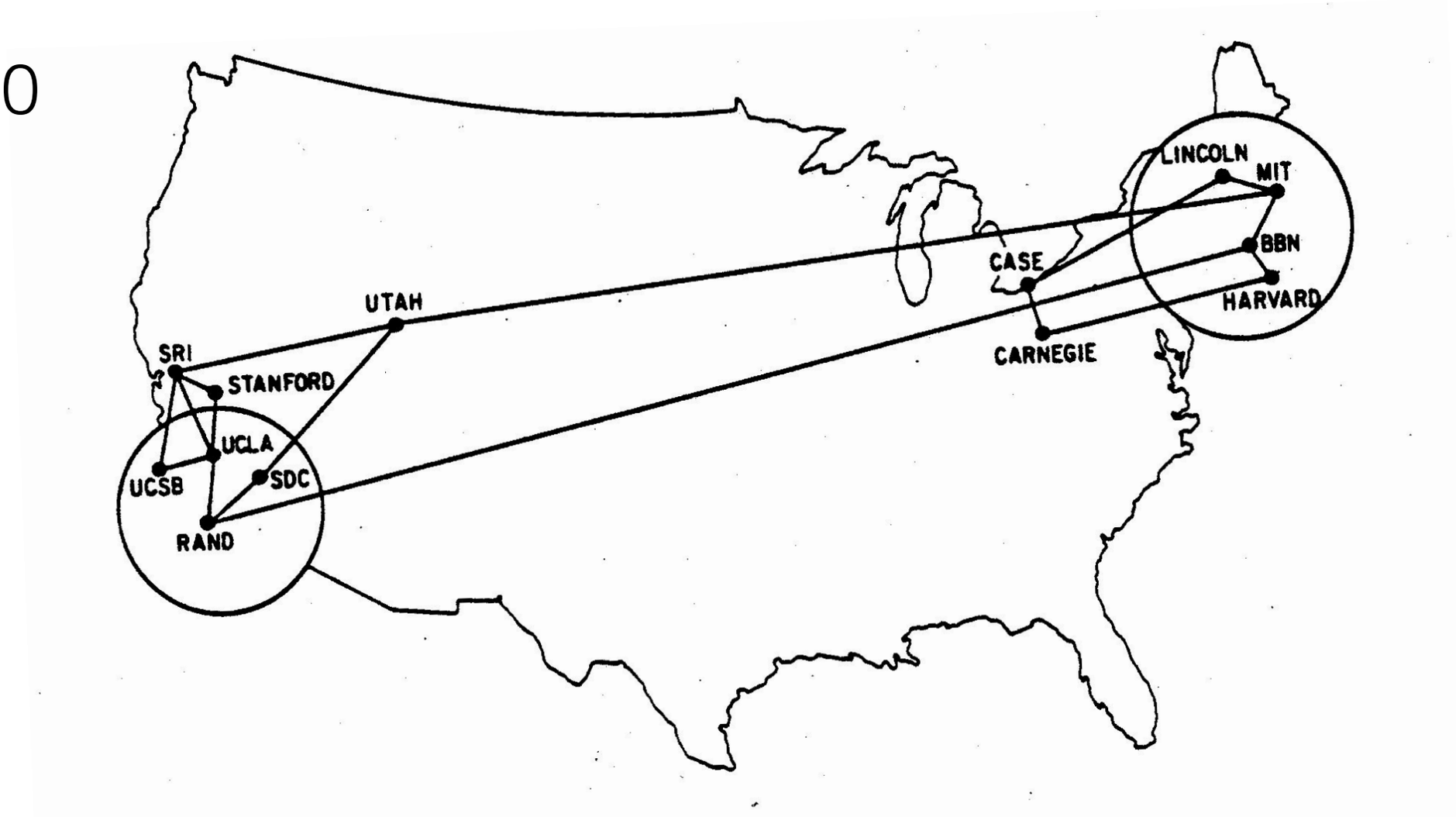
Pre-history of the Internet

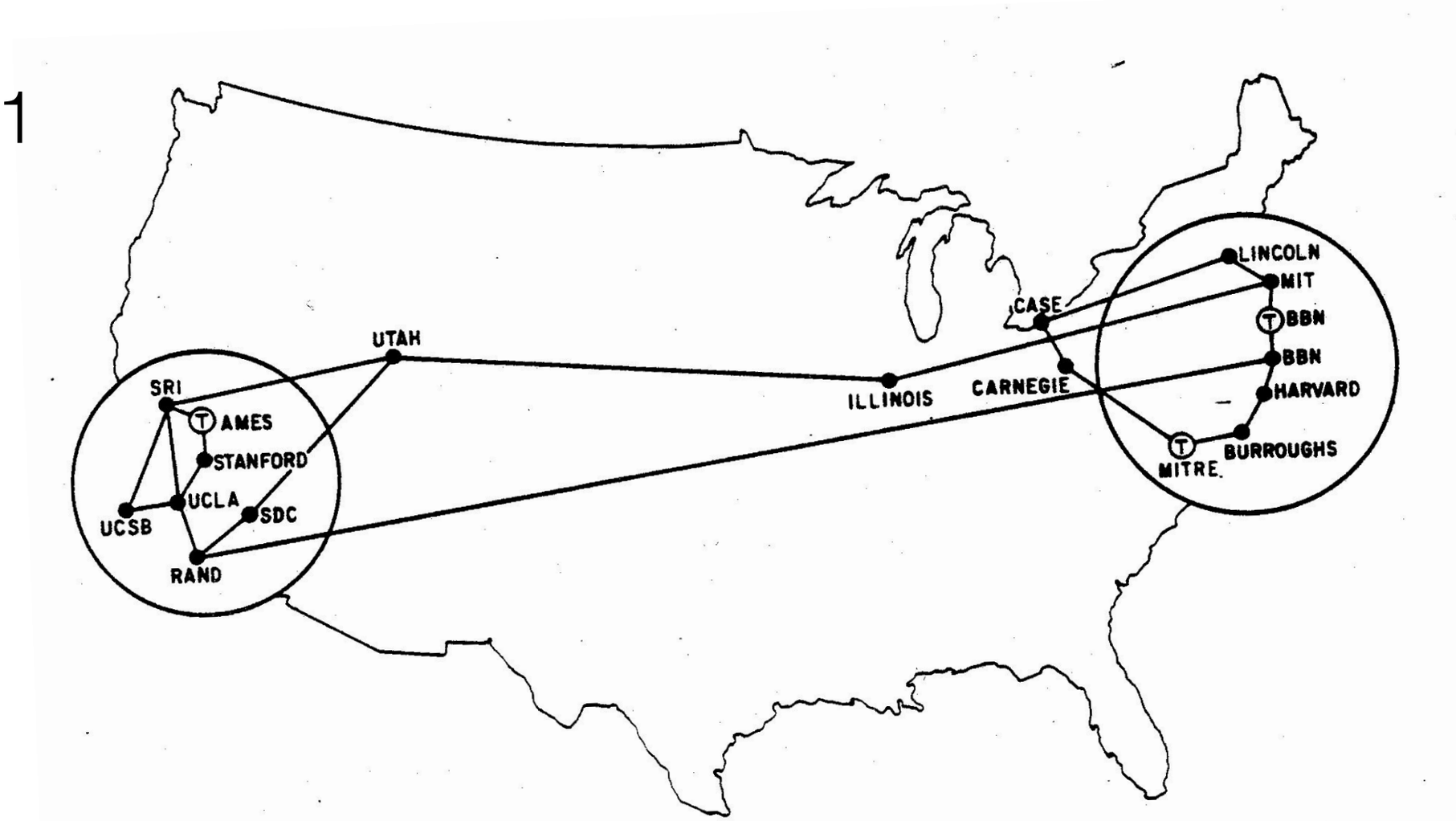
Dec.1970



Taken from Heart, F., et al.1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

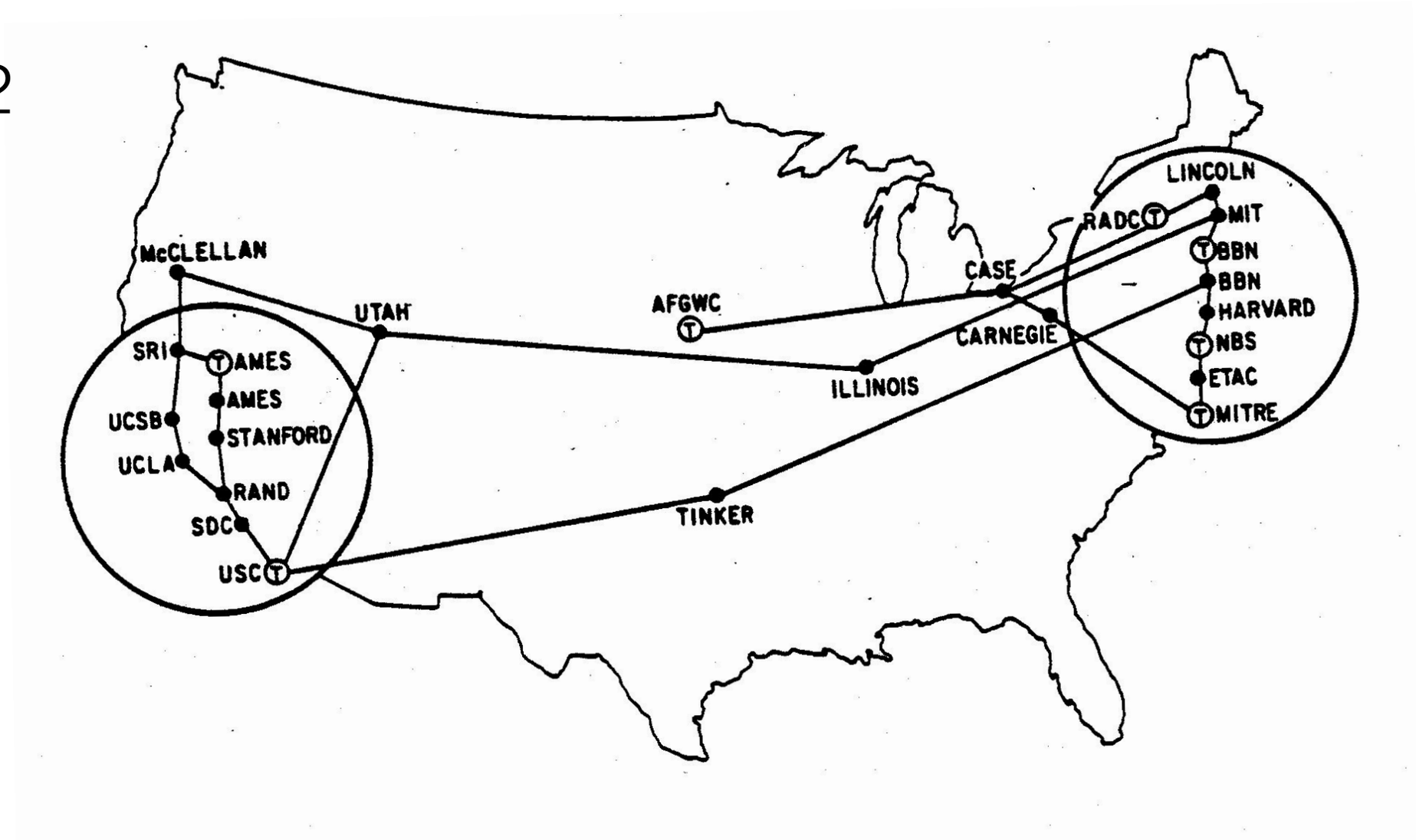
Sept.1971



Taken from Heart, F., et al.1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

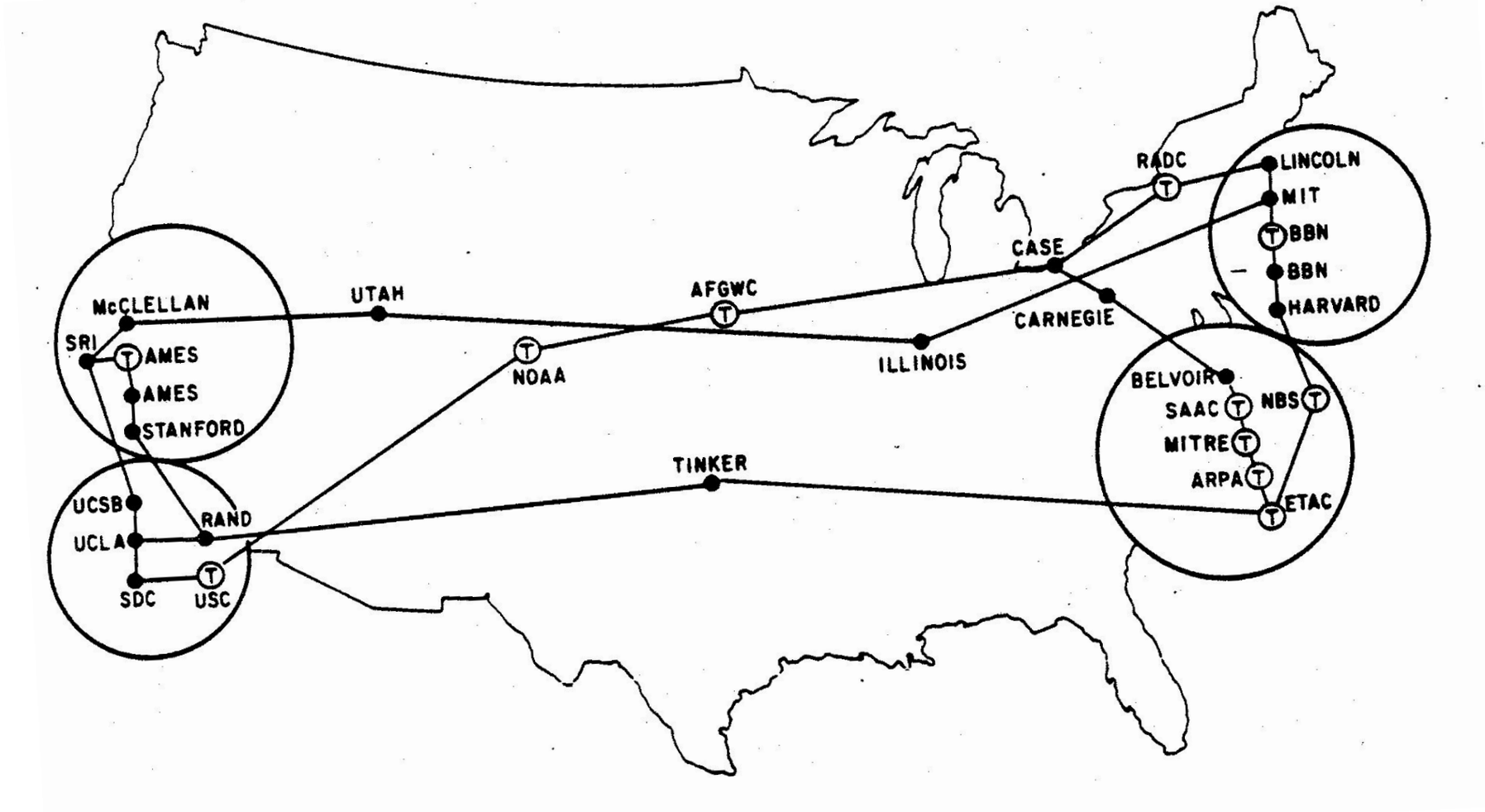
Mar.1972



Taken from Heart, F., et al.1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

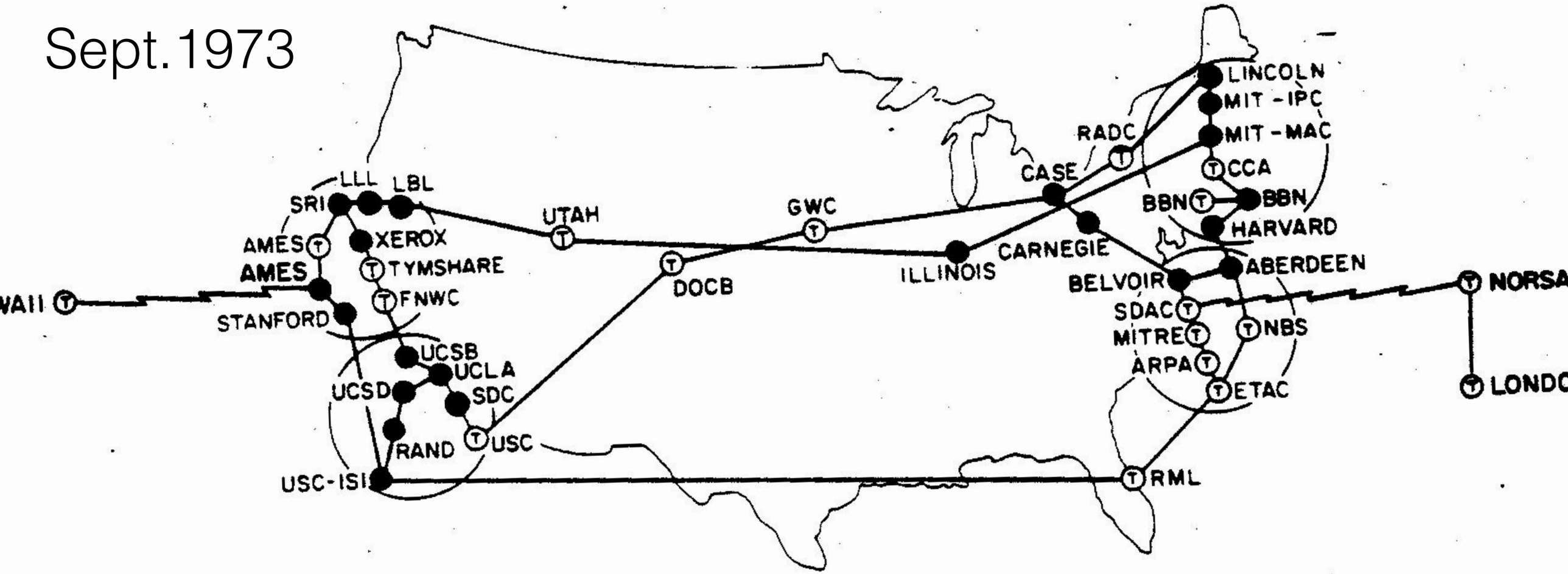
Aug.1972



Taken from Heart, F., et al.1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

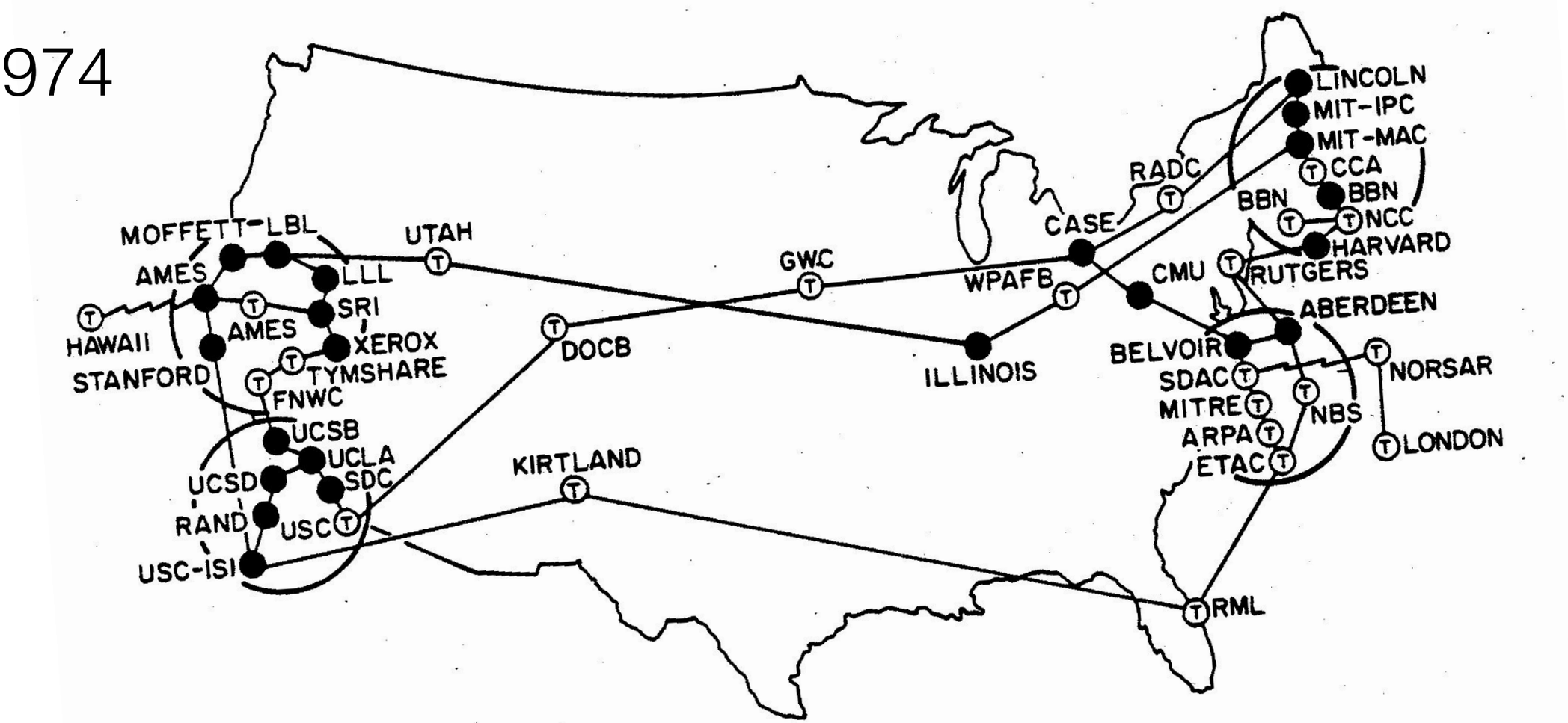
Sept. 1973



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

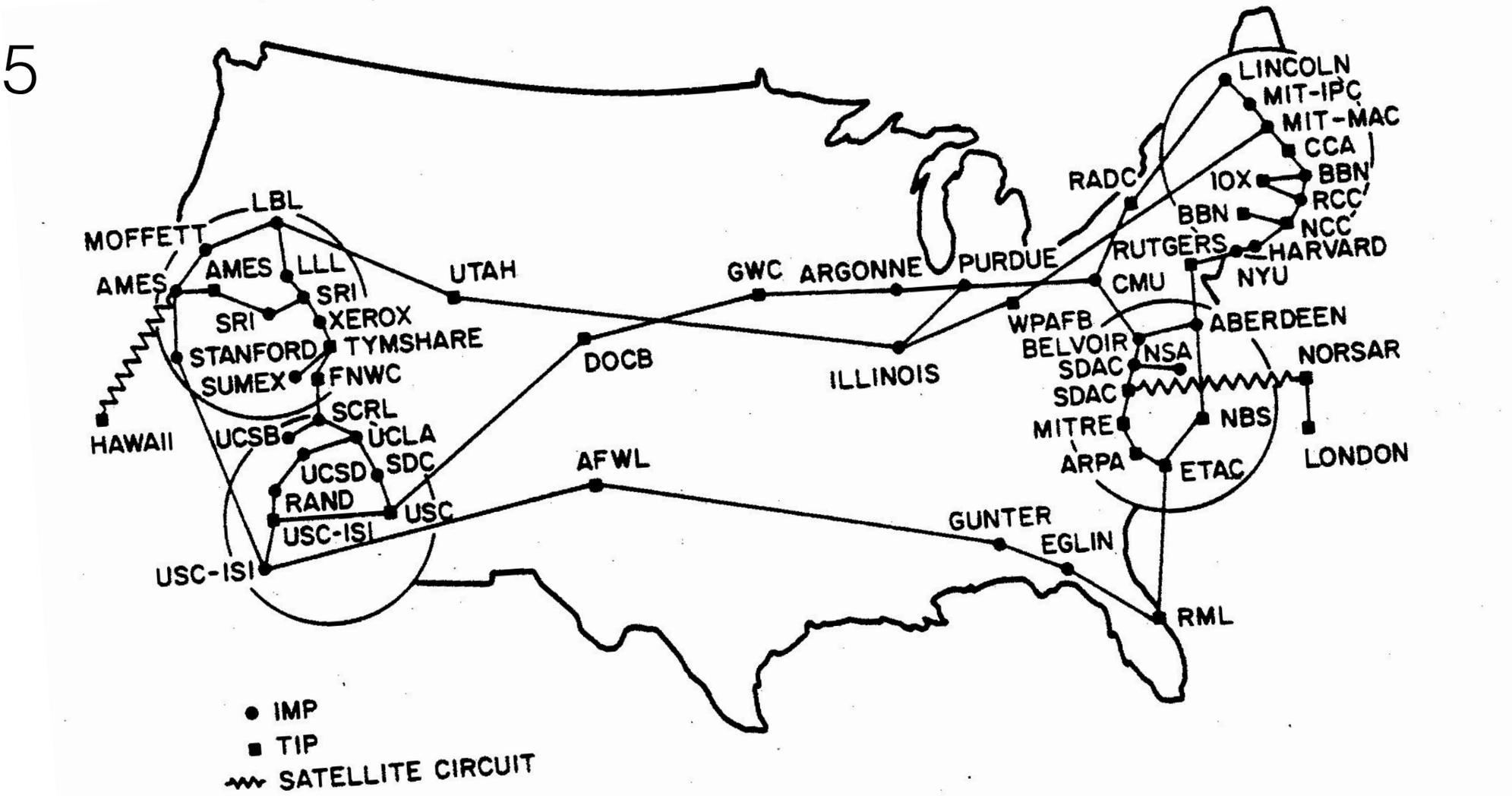
Jun.1974



Taken from Heart, F., et al.1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

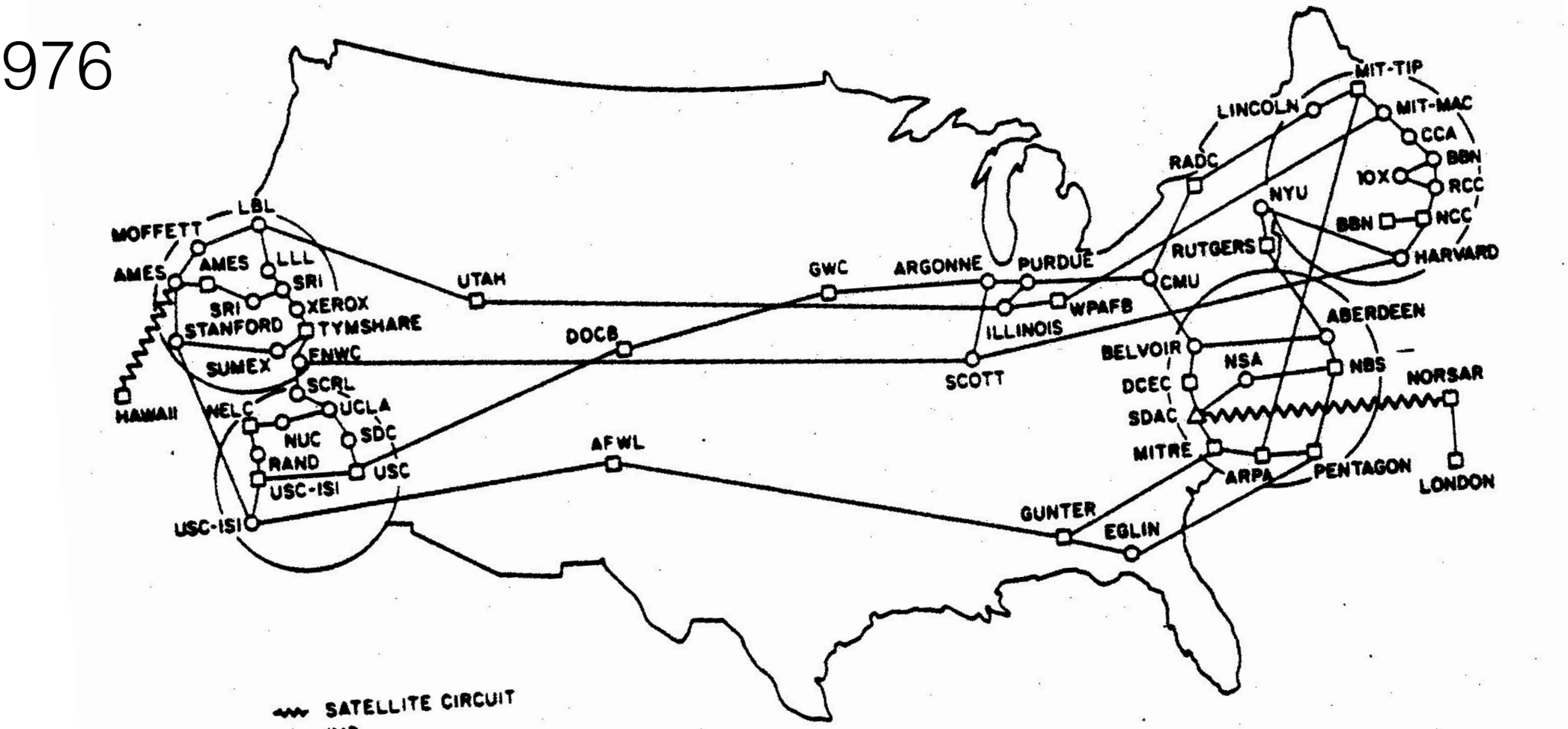
Jul.1975



Taken from Heart, F., et al.1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

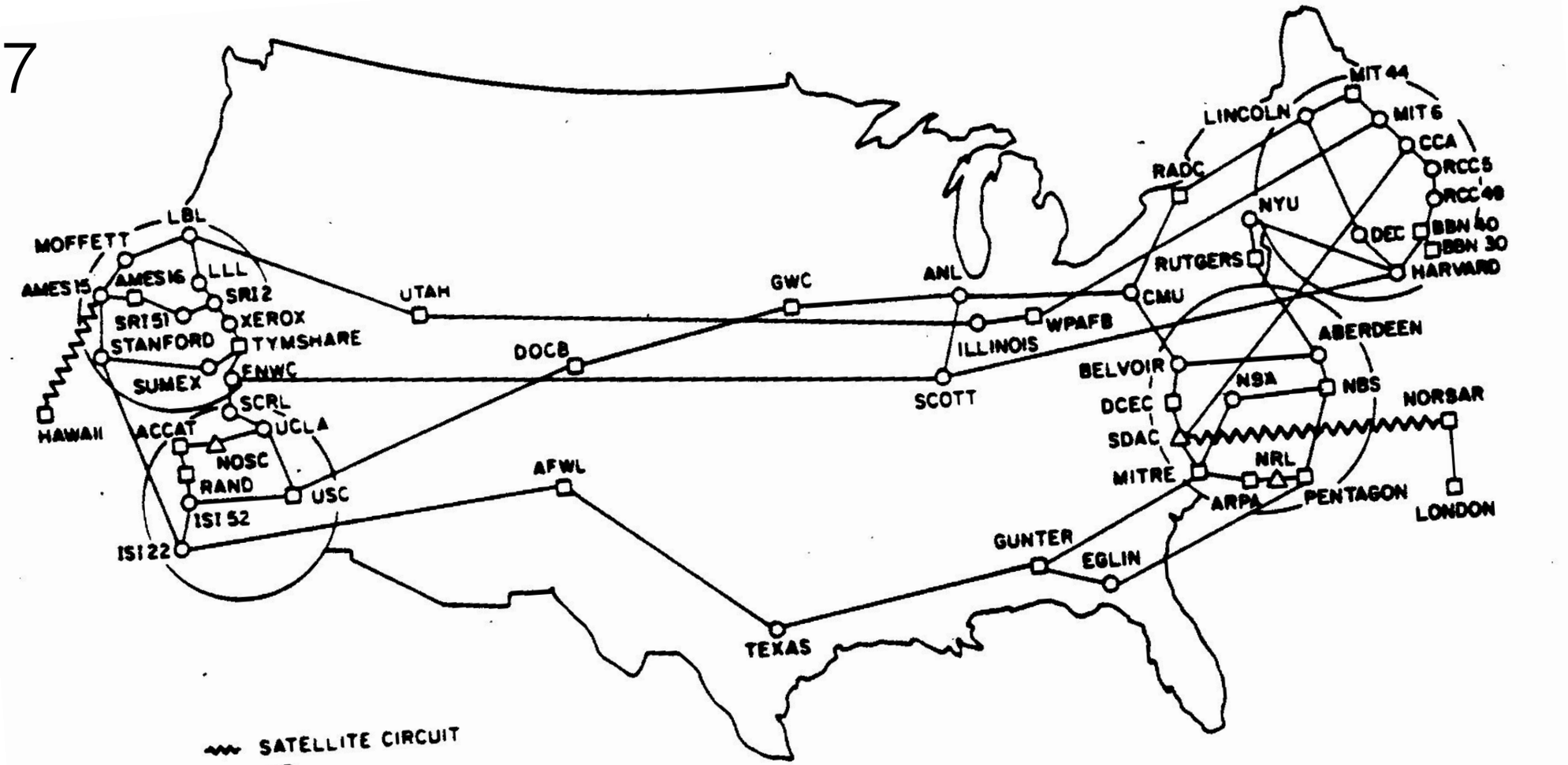
Pre-history of the Internet

Jul.1976



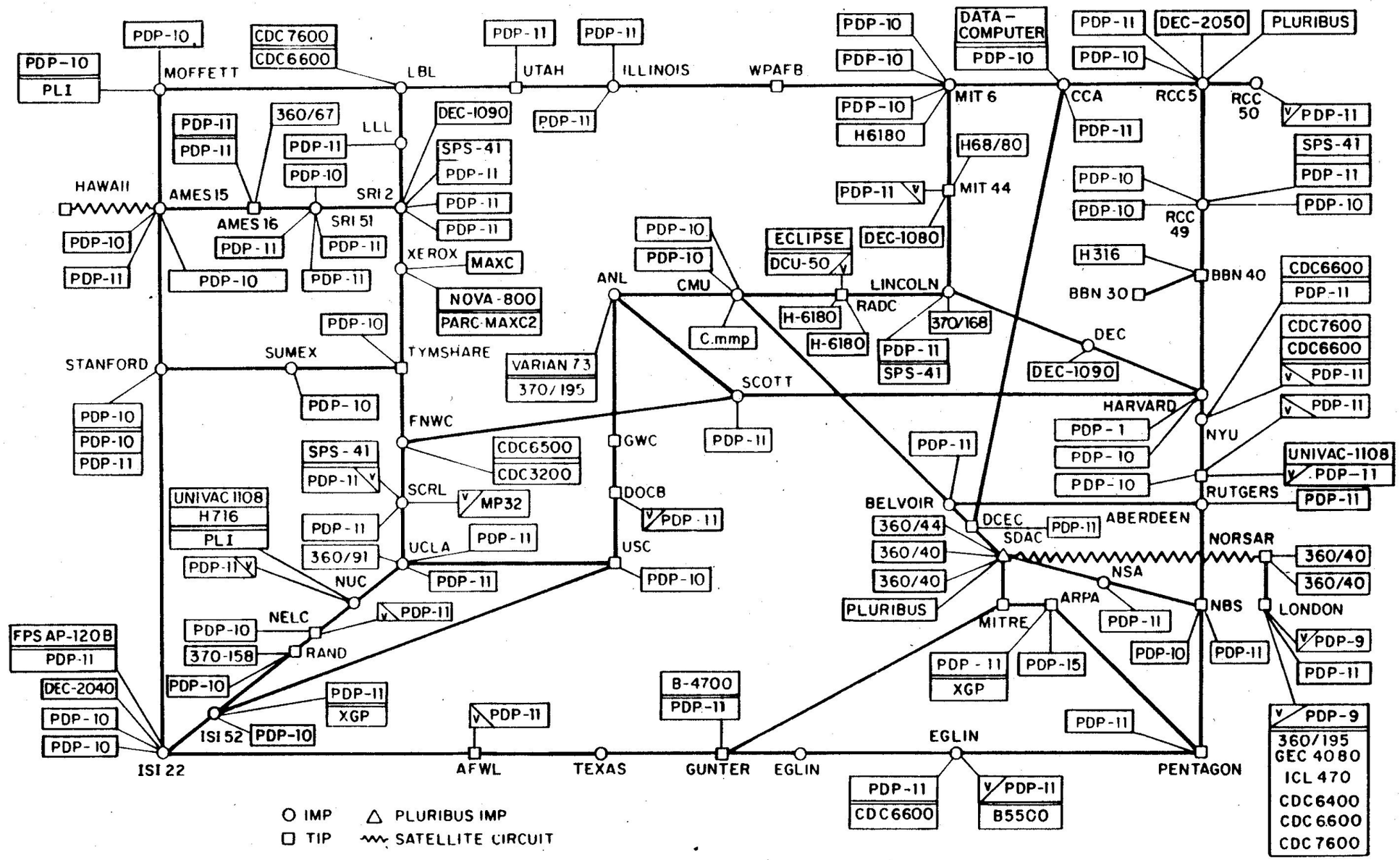
Pre-history of the Internet

Jul.1977



Pre-history of the Internet

ARPANET LOGICAL MAP, MARCH 1977



(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE HOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES

Initial Internetting Concepts

- The original ARPANET grew into the Internet
- 1972: Robert Kahn introduced the key technical idea of an **open-architecture network**, and developed with Vint Cerf a new protocol that eventually would be called **TCP/IP** (Cerf and Kahn, 1974)
- Key concept of the Internet: it **wasn't designed for a specific application**, but as a **general infrastructure for conceiving any application**.
- First applications:
  - email
  - resource sharing
  - file transfer
  - remote login
  - packet-based voice communication
  - file and disk sharing

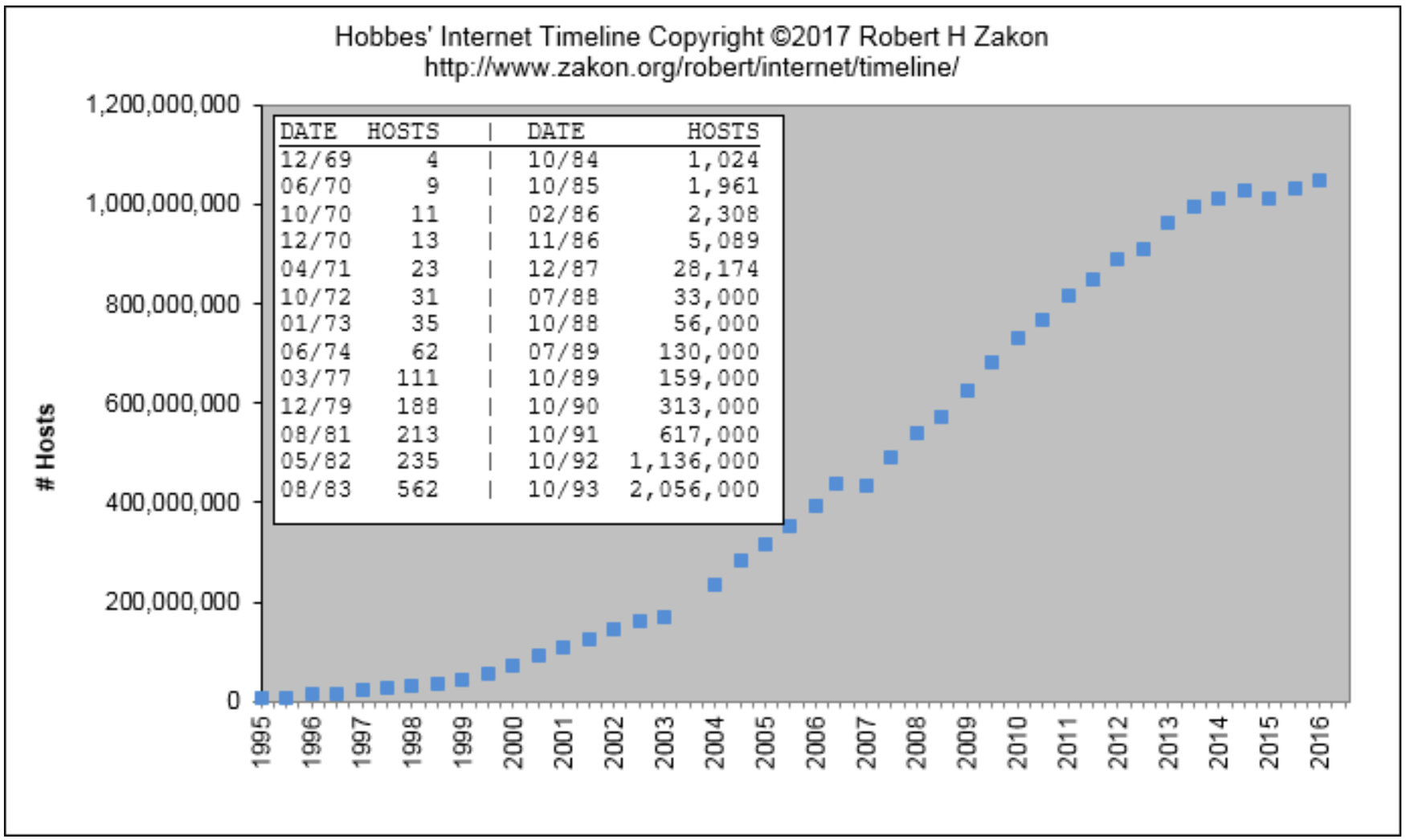
Protocols and expansion

- 1973: Bob Metcalfe@Xerox PARC developed the **Ethernet** technology
- 1976: compact and simple TCP implementation was designed for first **personal computers**
- 1980s: widespread creation of LANs and use of PCs lead to some management issues:
  - There were too many numeric addresses, and so **hosts were assigned names**
  - a **single table** of hosts and names was **no longer feasible**
- 1983 was an important year for the Internet:
  - Paul Mockapetris invented the **Domain Name System** (DNS), allowing to resolve (map) **hierarchical host names** into an Internet address
  - **Internet protocols** were incorporated natively into the **Unix OS** at UC Berkeley, which led to a widespread adoption of the Internet into the research community
  - ARPANET moved from its own host protocol to TCP/IP

Widespread infrastructure

- **US Federal agencies** made and implemented **policy decisions** that shaped Internet by the late 80s
  - Federal agencies **shared the cost of common infrastructure** (e.g., trans-oceanic circuits)
  - NSF encouraged regional networks to **look for non-academic customers** to lower costs
  - However, NSF **prohibited the use of its national network for non-academic or research purposes** with the intention of **stimulate the growth of private networks**
  - 1995: The NSF national network was defunded in 1995, but its policies led the Internet to grow to around 30,000 networks just in the US
- 1995: FNC passed a resolution defining the term Internet:
  - **"Internet" refers to the global information system that:**
    - is linked together by a globally **unique address space** based on the IP
    - is able to **support communications using TCP/IP**
    - provides **high level services** layered on the communications and infrastructure previously described

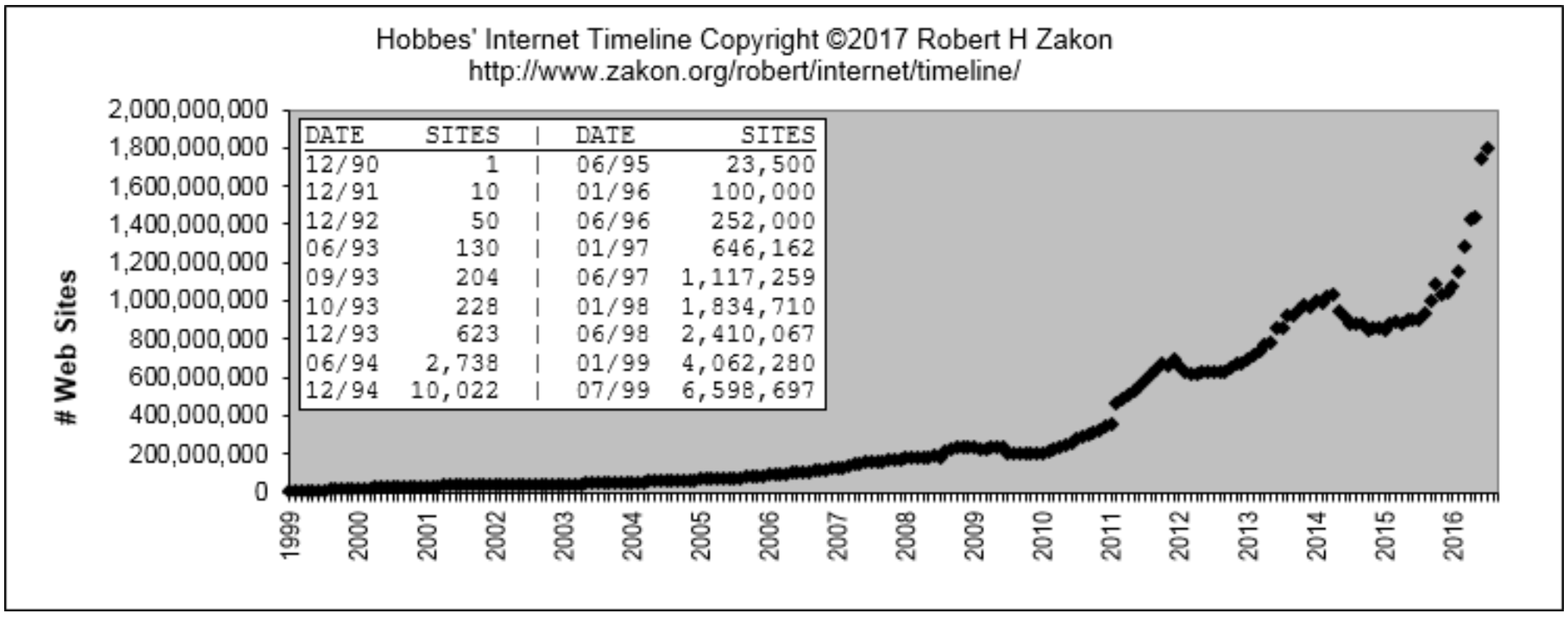
Growth of number of Internet Web servers



DATE	HOSTS	DATE	HOSTS
12/69	4	10/84	1,024
06/70	9	10/85	1,961
10/70	11	02/86	2,308
12/70	13	11/86	5,089
04/71	23	12/87	28,174
10/72	31	07/88	33,000
01/73	35	10/88	56,000
06/74	62	07/89	130,000
03/77	111	10/89	159,000
12/79	188	10/90	313,000
08/81	213	10/91	617,000
05/82	235	10/92	1,136,000
08/83	562	10/93	2,056,000

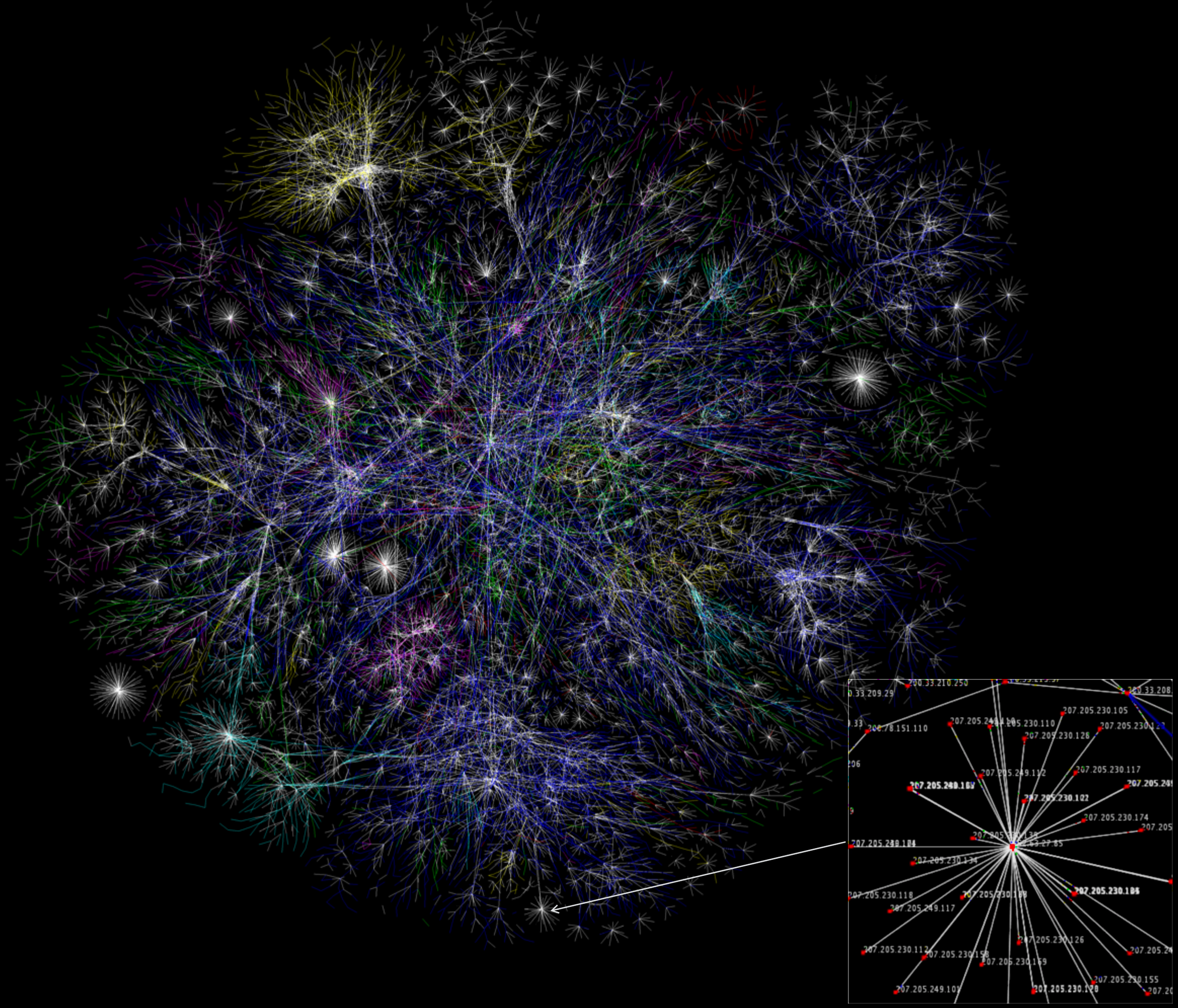
Taken from Hobbes' Internet Timeline

Growth of number of Internet Web sites



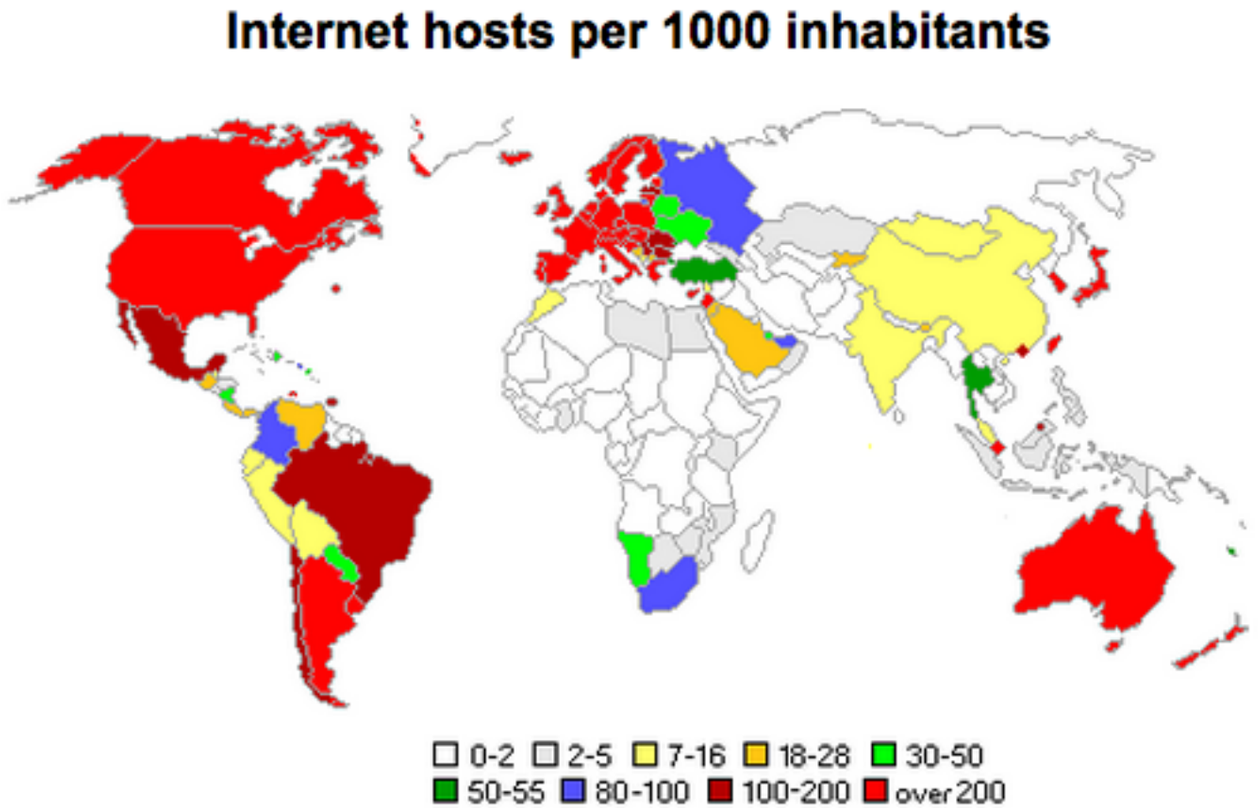
DATE	SITES	DATE	SITES
12/90	1	06/95	23,500
12/91	10	01/96	100,000
12/92	50	06/96	252,000
06/93	130	01/97	646,162
09/93	204	06/97	1,117,259
10/93	228	01/98	1,834,710
12/93	623	06/98	2,410,067
06/94	2,738	01/99	4,062,280
12/94	10,022	07/99	6,598,697

Taken from Hobbes' Internet Timeline


207.205.230.105
207.205.230.110
207.205.230.128
207.205.249.112
207.205.230.117
207.205.230.122
207.205.230.174
207.205.230.134
207.205.230.118
207.205.249.117
207.205.230.126
207.205.230.169
207.205.230.155

North America (ARIN)
Europe (RIPE)
Latin America (LACNIC)
Asia Pacific (APNIC)
Africa (AFRINIC)
"Backbone" (highly connected networks)

Internet penetration by country



Taken from http://www.gandalf.it/data/data1.htm,
data up to December 2012

Internet stats

- Internet usage and population in the world
  - http://www.internetworldstats.com/stats.htm
- Internet traffic
  - http://www.internetlivestats.com/

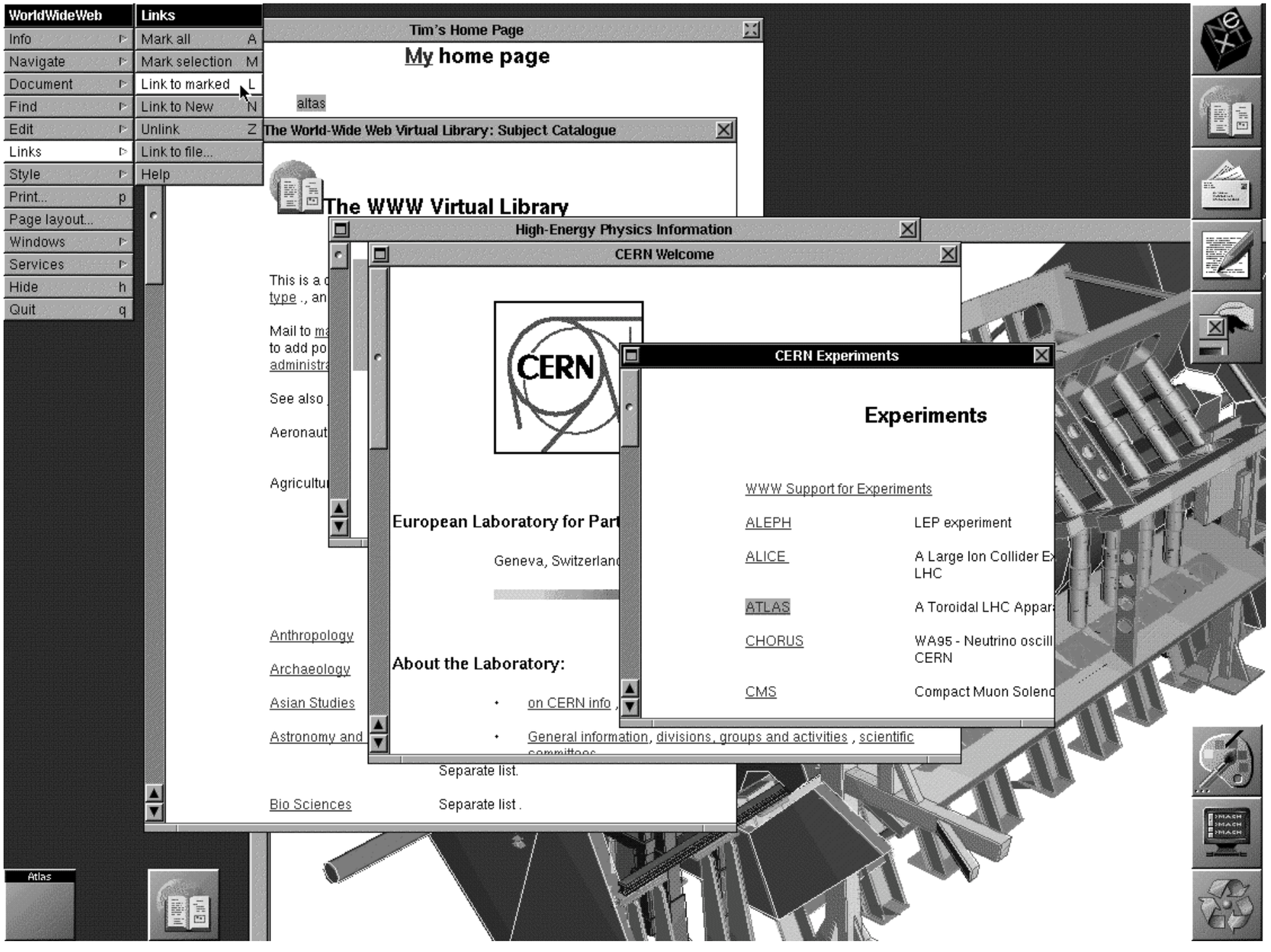
The Web (WWW)

- W3C (World Wide Web Consortium) appeared as the new **organization for the coordination and evolution of the various protocols**. Initially led by Tim Berners-Lee @ CERN
- He designed the Web as a **system of interlinked hypertext documents** that are accessed via the Internet
- With a web browser, people can view **web pages that may contain text and media**, and can be **navigated between them by hyperlinks**
- The **first website** in the world was **dedicated to the WWW** project itself and was hosted on Berners-Lee's computer
- The site was restored in its original address and **can be accessed** at http://info.cern.ch/hypertext/WWW/TheProject.html

HTML

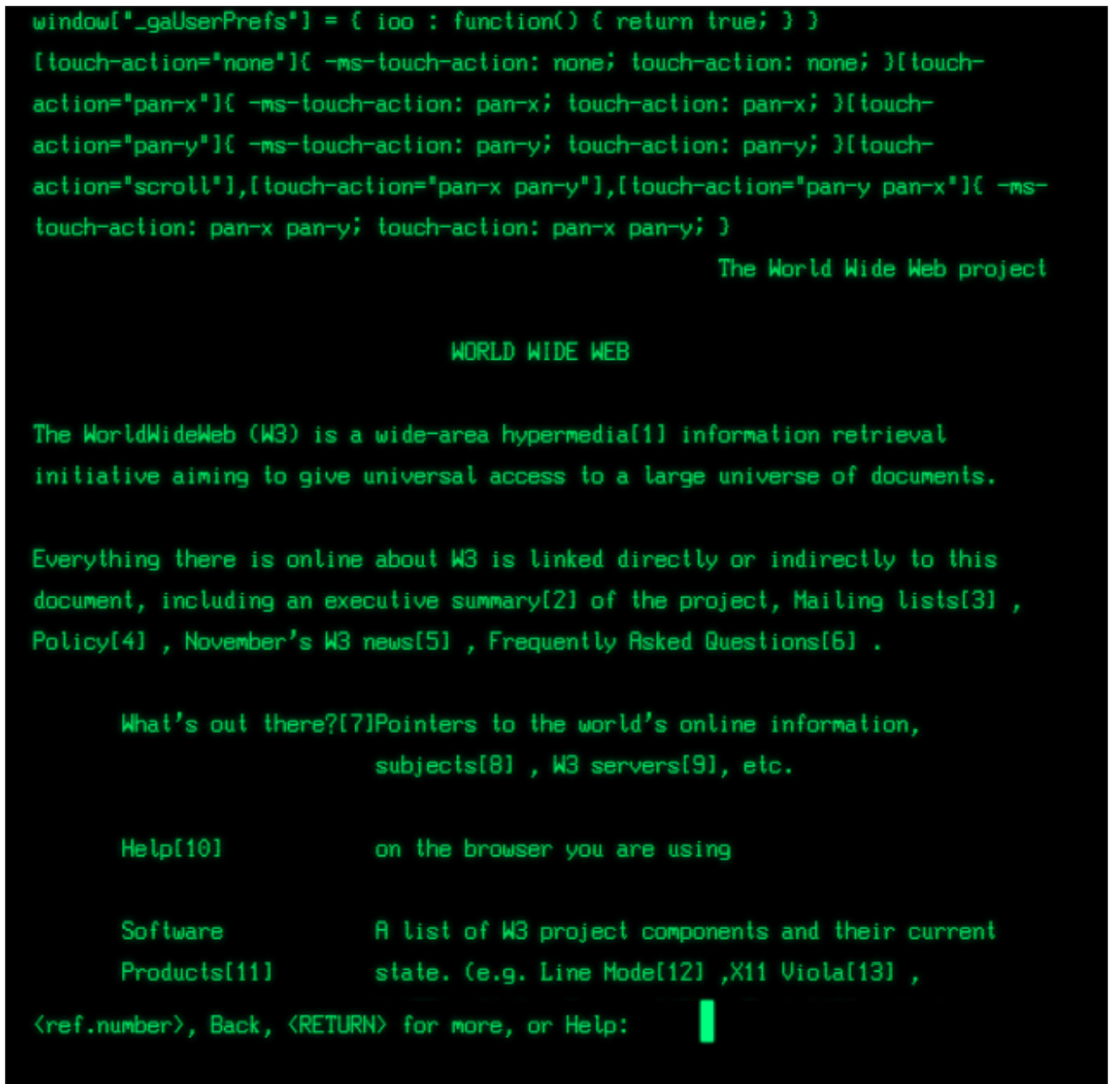
- The WWW system uses **marked-up text** to represent a **hypertext document** for transmission over the network
- WWW parsers **should ignore tags which they do not understand**, and **ignore attributes which they do not understand** of tags which they do understand
- **Backwards compatible** by design:
  - even the first webpage still work in a modern browser
  - modern webpages should be readable in old browsers

History of WWW: Browsers



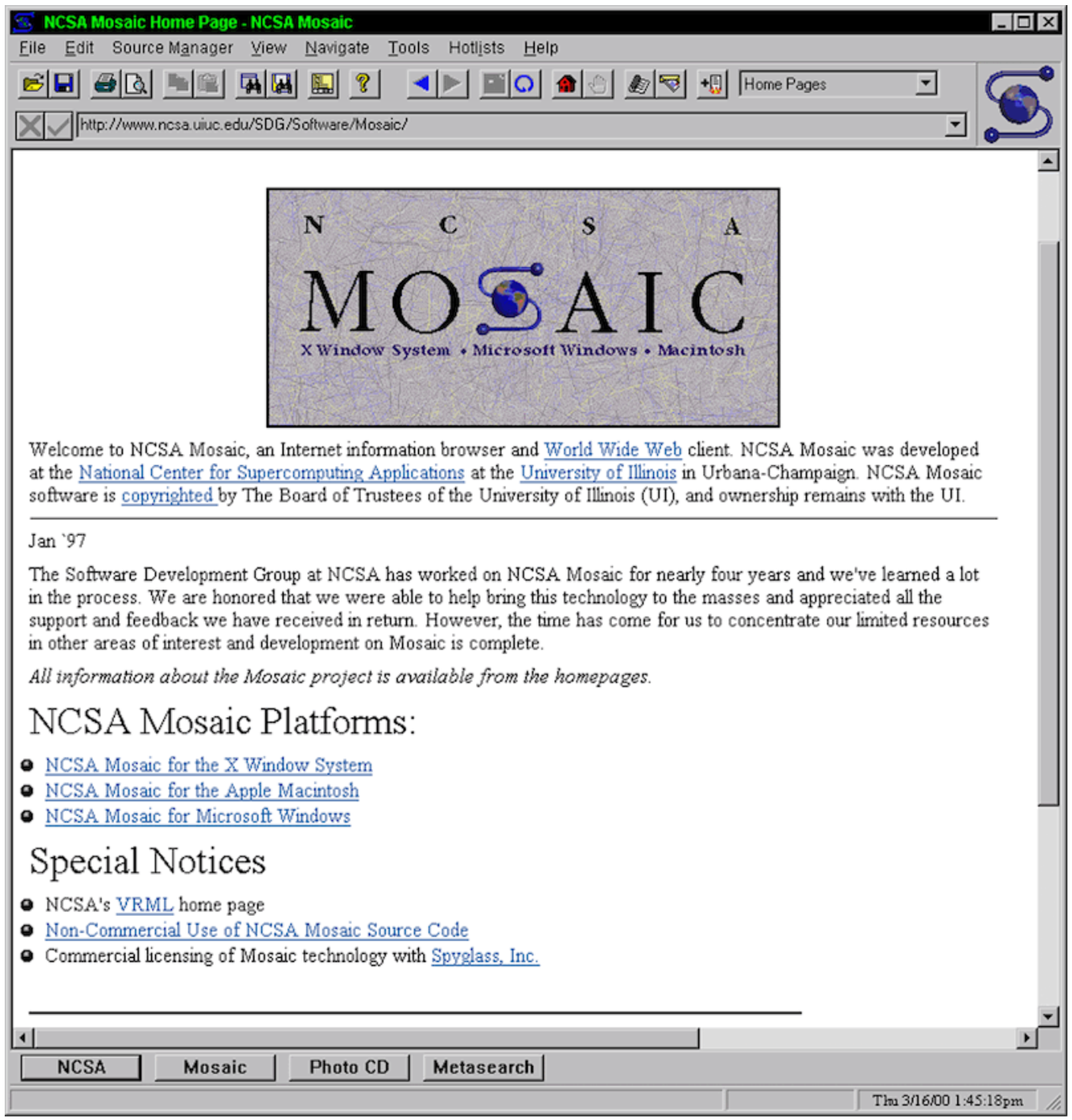
1990: WorldWideWeb by Tim Berners-Lee

History of WWW: Browsers



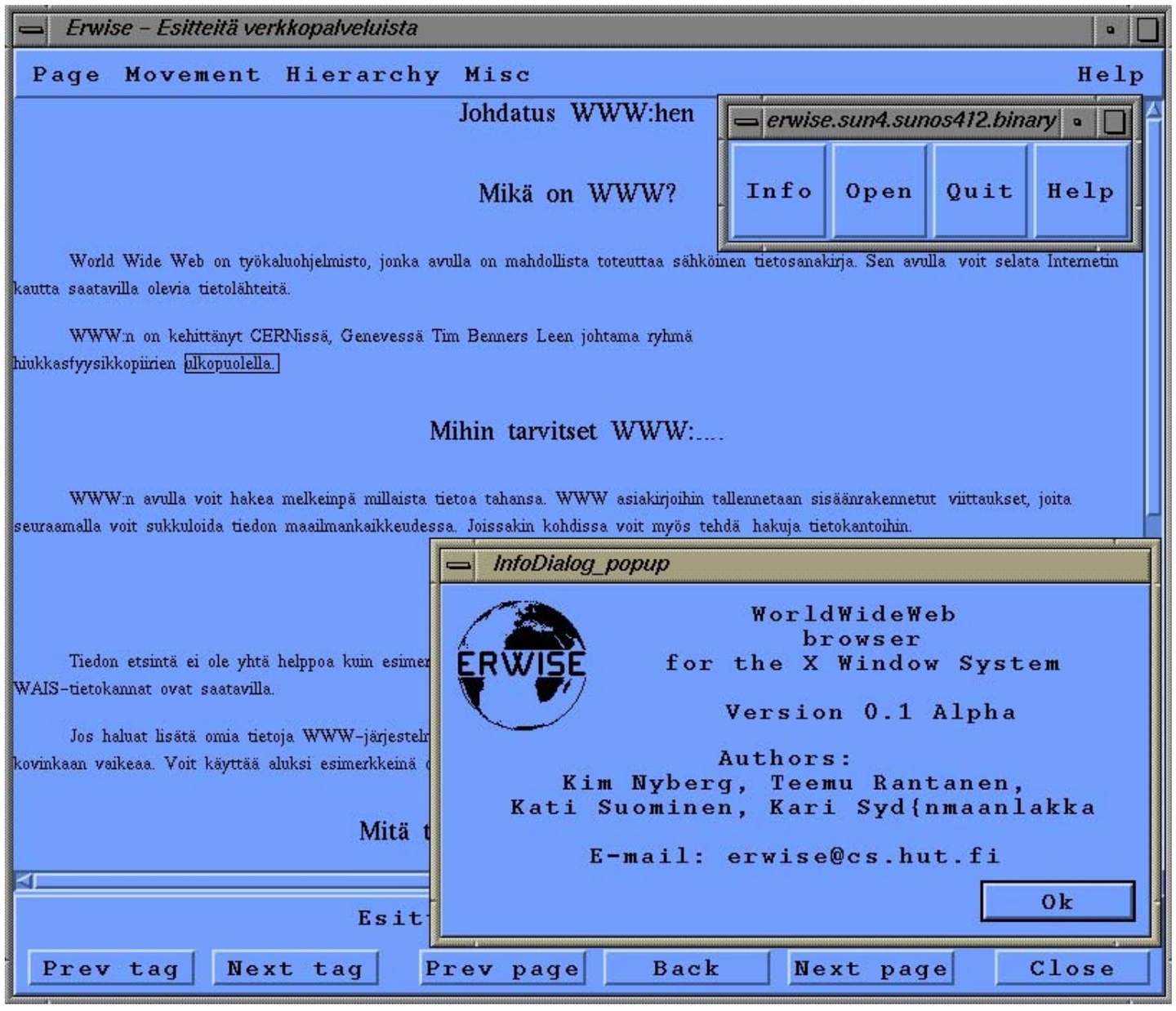
1992: WorldWideWeb Line Mode browser by Tim Berners-Lee

History of WWW: Browsers



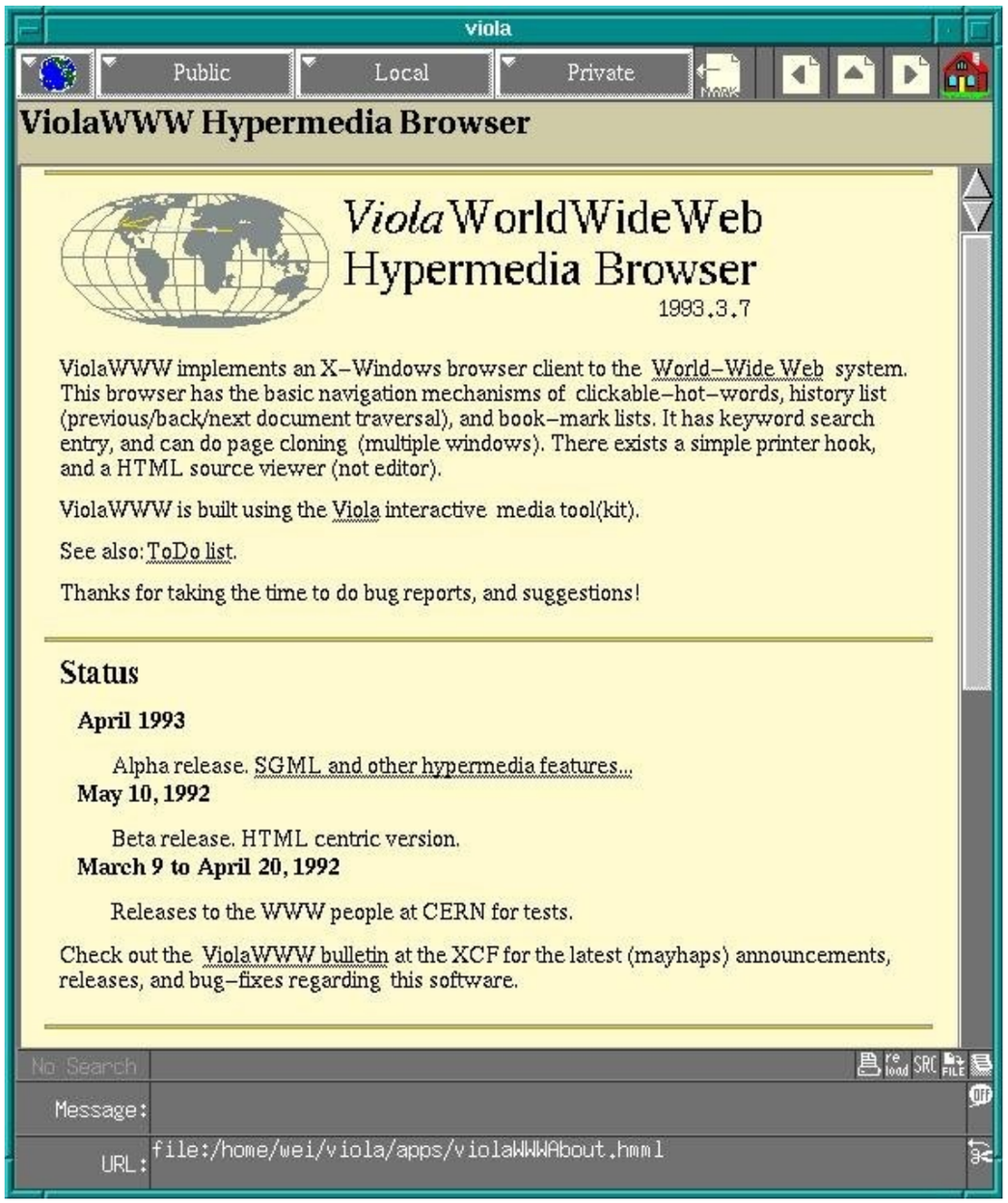
1992: Mosaic@NCSA

History of WWW: Browsers



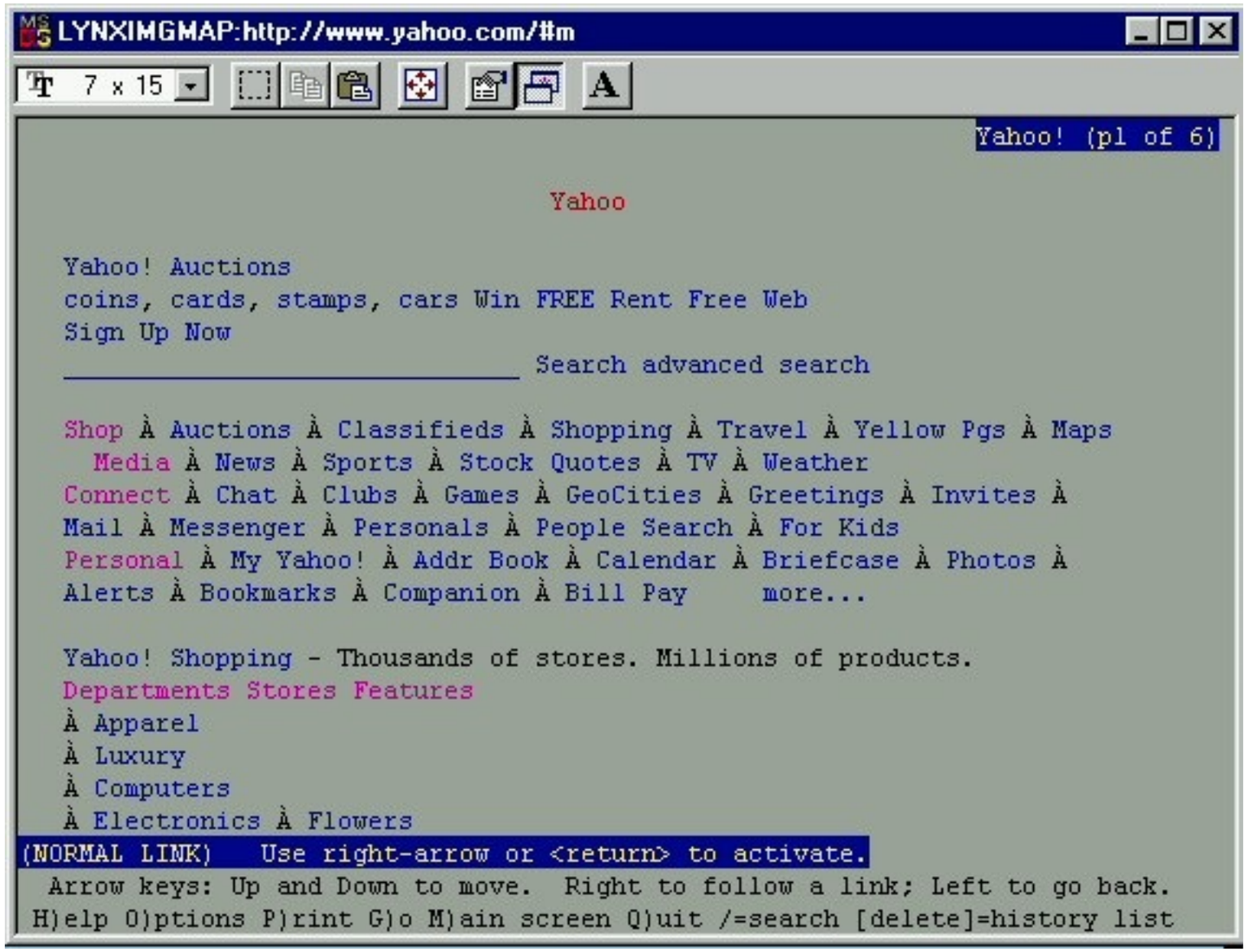
1992: Erwise @ Helsinky University of Technology

History of WWW: Browsers



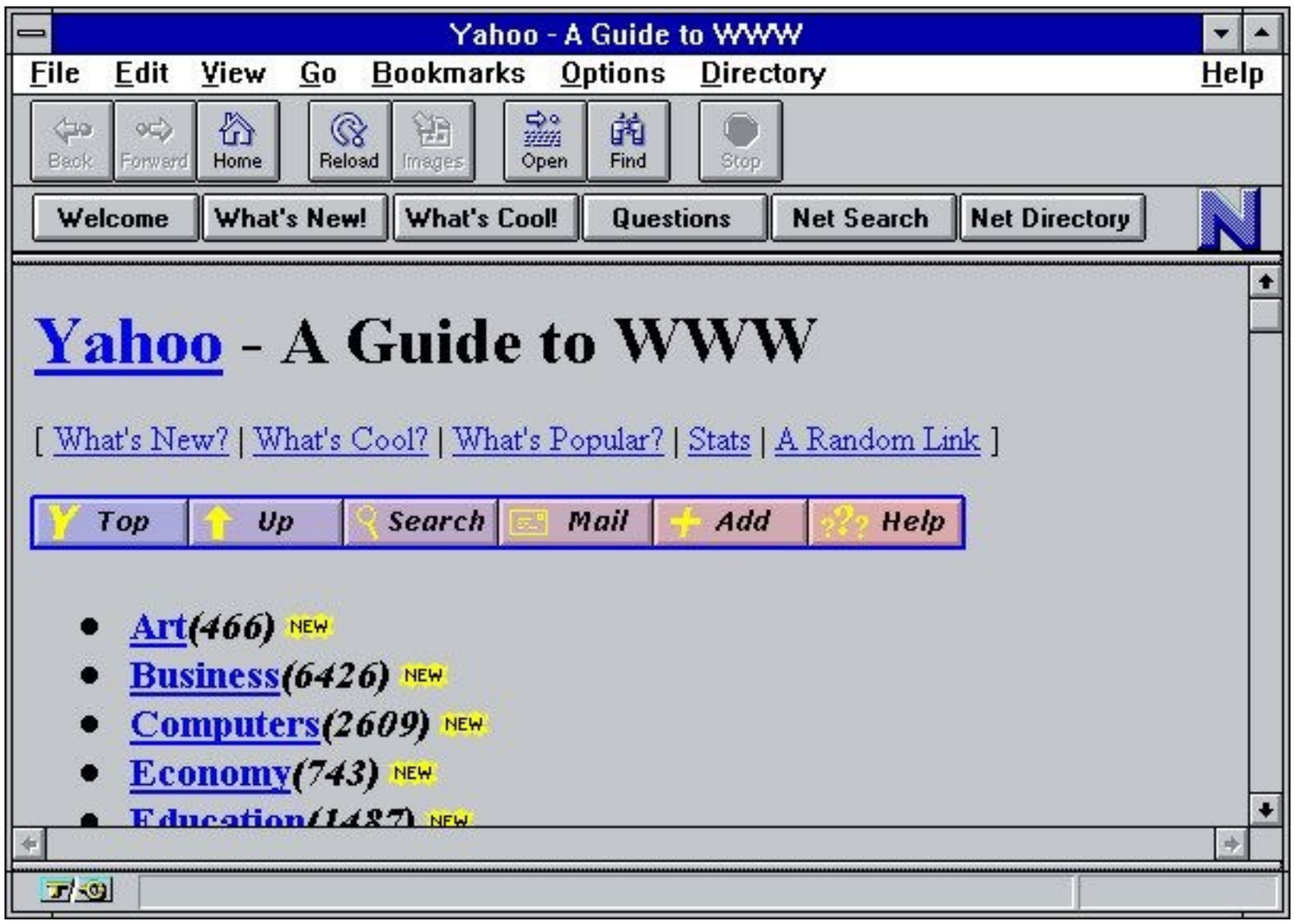
1992: ViolaWWW by Pei-Yuan Wei

History of WWW: Browsers



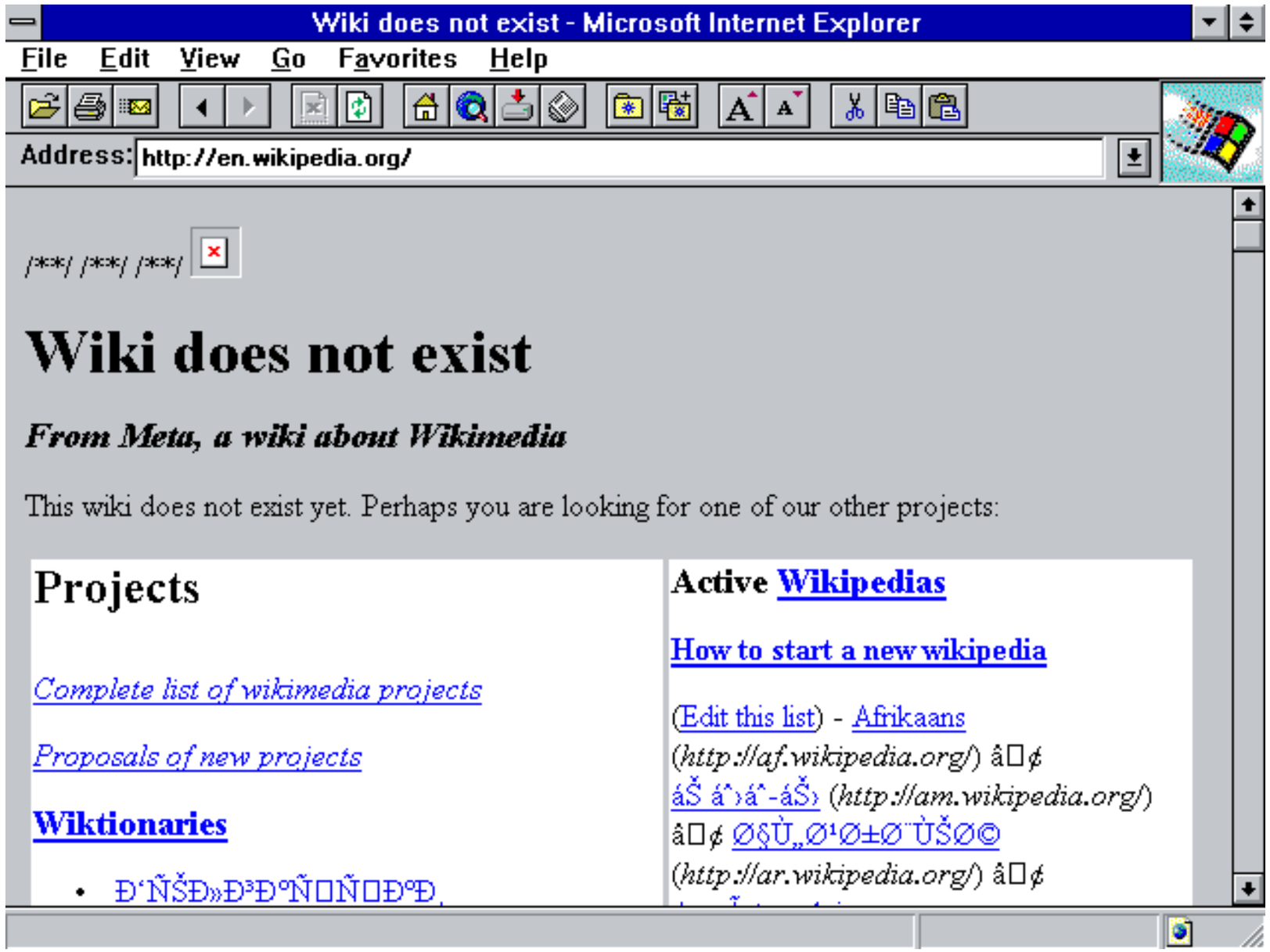
1992: Lynx@University of Kansas

History of WWW: Browsers



1994: Netscape (M. Anderseen from Mosaic@NCSA)

History of WWW: Browsers



1995: Internet Explorer (Microsoft)

History of WWW: Browsers

1996: MultiTorg Opera

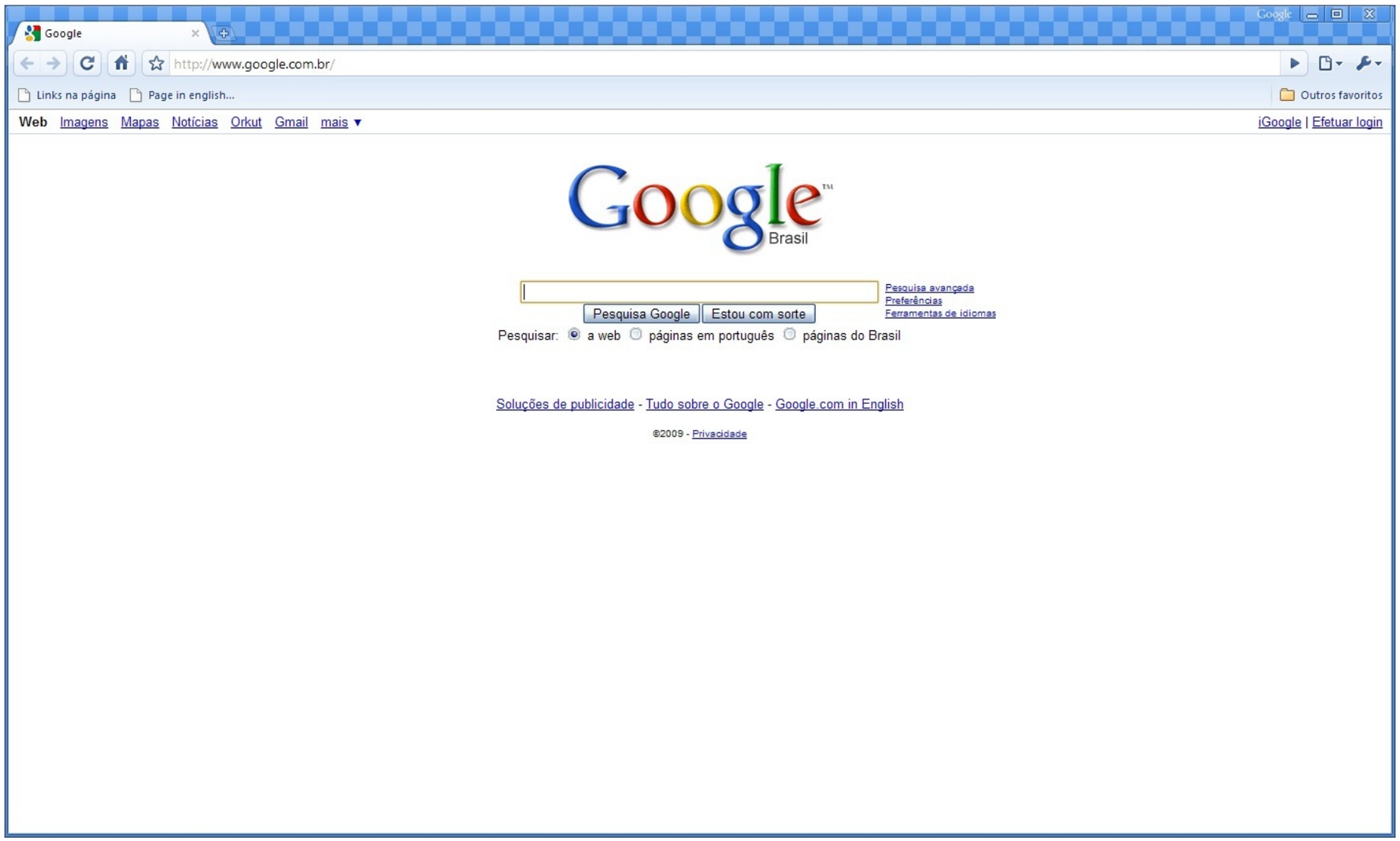
History of WWW: Browsers

2003: Safari (Apple)

History of WWW: Browsers

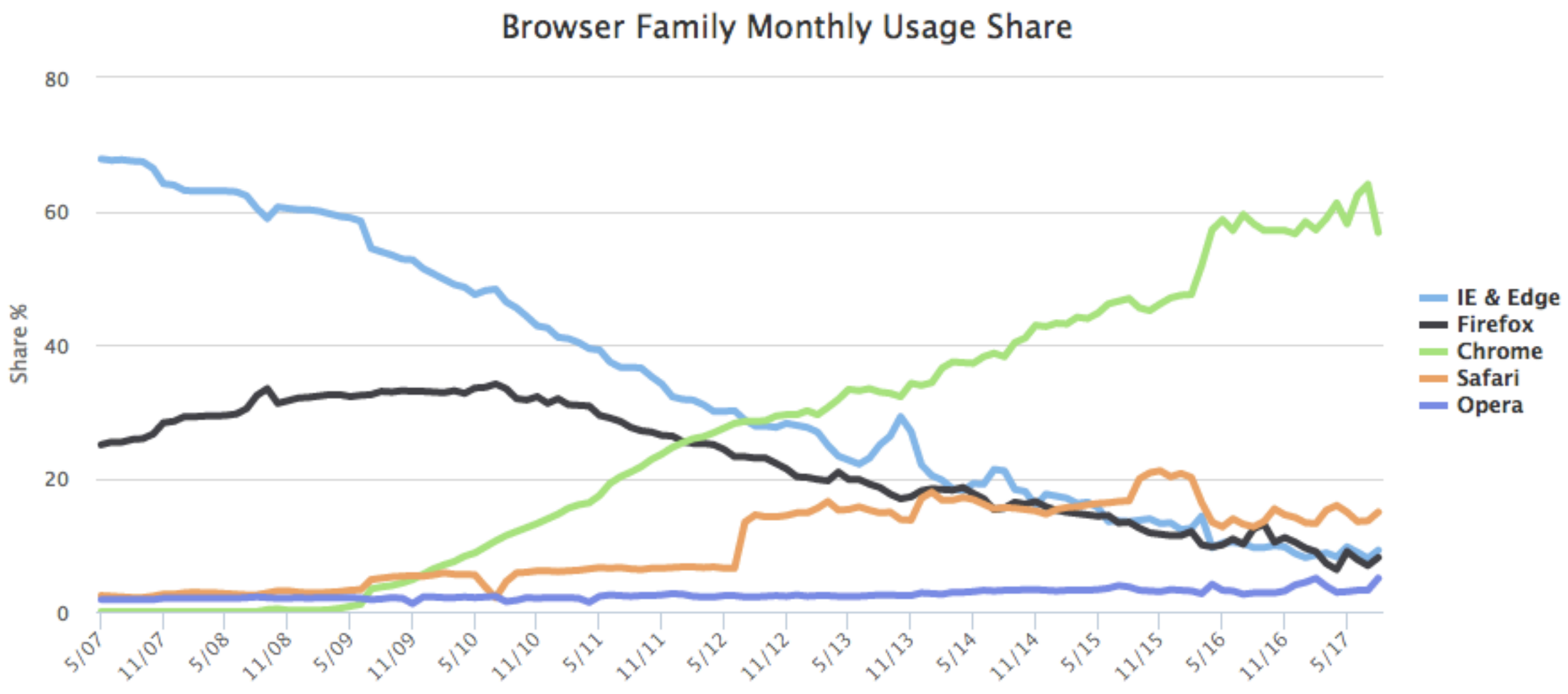
2004: Firefox (Mozilla project)

History of WWW: Browsers



2008: Chrome (Google)

History of WWW: Browsers



Taken from http://www.w3counter.com/trends

BREAK

Intro to HTML

(from w3chools.com)

- **What is HTML?**
  - Hyper Text Markup Language
  - **Language for describing web pages**.
  - A markup language is a computer language that **uses tags to define elements within a document**
  - The **tags describe document content**
  - HTML documents contain **HTML tags** and **plain text**
  - HTML documents are also called **web pages**

Intro to HTML

(from w3schools.com)

HTML Tags

- Are **keywords surrounded by angle brackets** (e.g., <html>, <title>)
- **Normally come in pairs** (e.g., and)
- The end tag is written like the start tag, with a slash before the tag name

```
<tagname>content</tagname>
```

HTML Elements

- An **individual component** of an HTML document
- Most elements are written with the **text content between tags**:

```
<title>This is the title</title>
<p>This is a paragraph</p>
```

- Some elements **can have attributes**

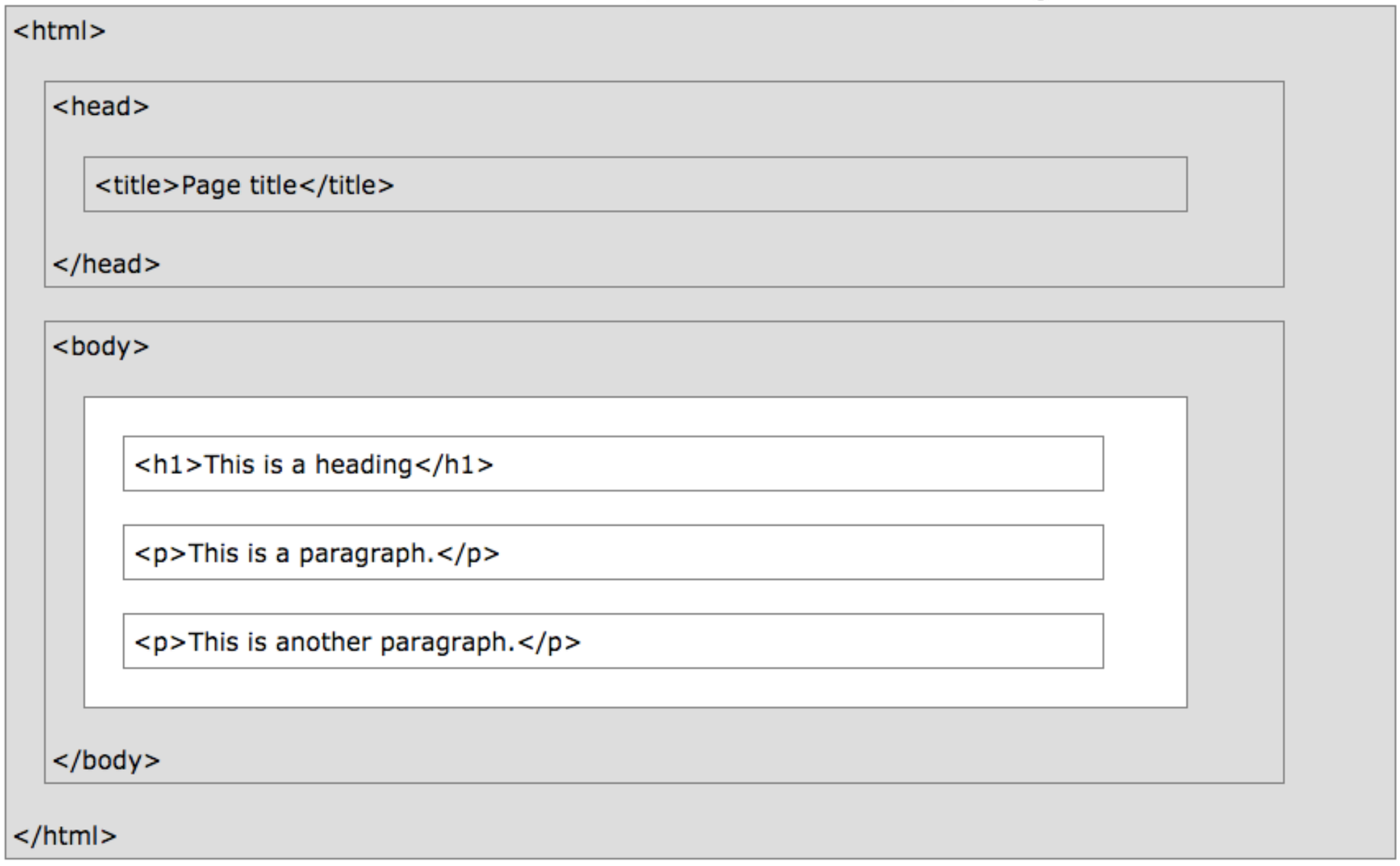
```
<a href="www.vigliensoni.com">Link to my webpage</a>
```

- HTML5 list of elements, HTML W3 schools

Intro to HTML

(from w3schools.com)

Visualization of an simple HTML page structure:



Code editors

- Text editor program designed specifically for editing source code
- Syntax highlighting, indentation, autocomplete features, and bracket matching, among other features
- May be Standalone, built into an IDE, or web-based
- Free options (fully functional with some restrictions)
    - Sublime Text
    - TextMate
    - Komodo Edit (with integrated SFTP)
    - codeanywhere.com (integrated SFTP)

Code editors

- NOW! Open Sublime Text

Intro to HTML

(w3schools.com/html)

Simple in-class assignment

- In your local machine
  - Create a folder for your website development
  - Open your code editor (e.g., Sublime Text)
  - Create new file, and save it as `index.html` within the folder you just created

- Within that file write HTML code for:
  - giving the page a title
  - giving a welcome message (e.g., “This is my homepage…”)
  - displaying a picture of you (check http://www.w3schools.com/html/html_images.asp)
  - creating hyperlinks to all your classmates’ homepages
  - creating a second HTML page (e.g., “bio.html”)
  - linking the two HTML pages together

Files in Web server

Now we have to upload the files to its final destination in the Web server

We can make use of any FTP software, but the MTCL has CyberDuck

Open CyberDuck and create a connection with SFTP
server: 132.206.14.130
username: yourusername
password: yourpassword

Drag your local folder to www, which is your publicly available folder on the server

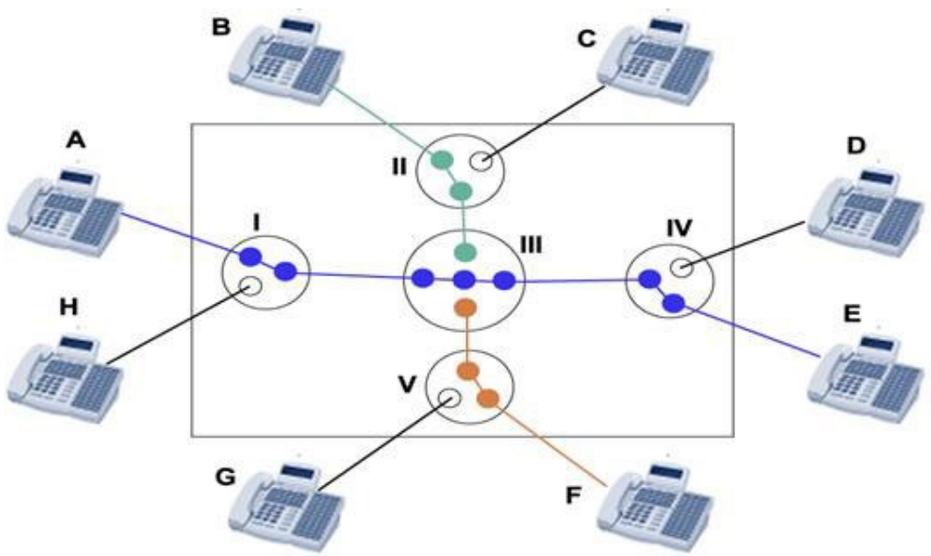
If everything went well, you should be able to see your site now online

Review

- Summary last class
- History of Internet
- The WWW and HTML
- Introduction to HTML
- Sublime Text editor
- Assignment 2

Switching

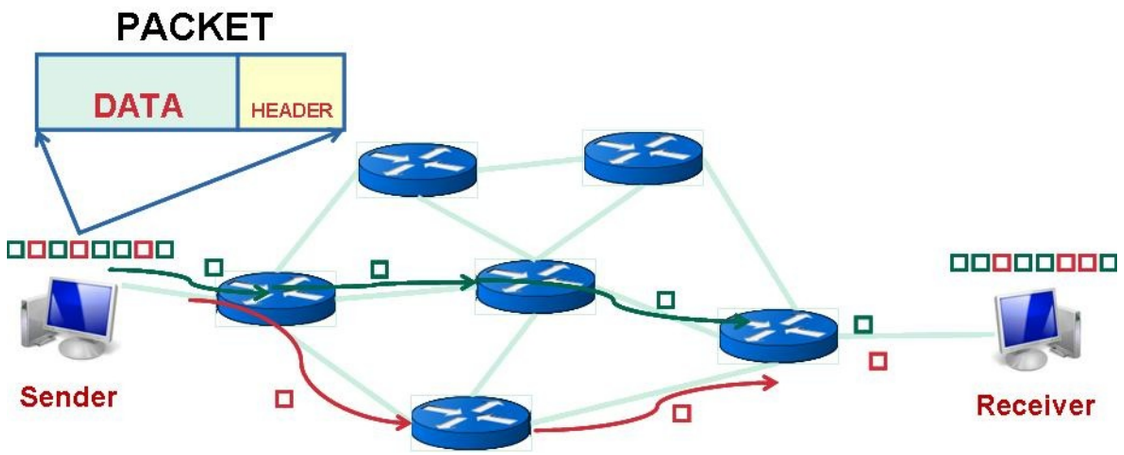
- Switching is the method by which data is transferred from an input port to an output port
- In **circuit switching**:
  - a path is first **reserved**
  - data is transferred after the **connection has been established**
  - all data passes through the **same circuit**
  - **no other user can use** the circuit until the session is completed
  - the **circuit is released after** the data is transferred



Taken from http://cyberlawsolutions.blogspot.ca/2011/12/packet-switching.html

Packet switching

- In **packet switching**
  - Divides the data to be transmitted into **small units** (packets) **transmitted independently** through the network
  - Each packet may be **routed via a different path**
  - The **original message is reassembled** in the correct order at the destination based on the packet number
- A **packet consists of**:
  - **Source**: the IP address of the computer sending the packet
  - **Destination**: the IP address of the destination computer
  - **Length**: the length of the packet in bytes
  - **Number**: the total number of packets in the complete message
  - **Sequence**: the number of this packet in the whole list of packets making up this communication



Taken from http://computernetworkingsimplified.com/physical-layer/overview-circuit-switching-packet-switching/