Networks & Server Structures

Intro to Networking

Origin of Internet

Consumers & Internet

Using Search Tools Effectively

What is a Network

- A combination of hardware, software, and cabling, which together allow multiple computing devices to communicate with each other and share resources such as files, printers and email

Purpose of a Network

- Facilitating communications
- Sharing hardware
- Sharing files, data and information
- Sharing software
- Information preservation
- Security

Network Origins

- Telegraph - 1837 - 1st form of digital communication
- Telephone - 1876
- Teletypewriter - typed communication via telephone lines
- Telex - late 19th century - telecommunications network for TTY
- Fax - 1970s
- Modem

Networking Terms

- **Server**
  - a network computer that shares resources with and responds to requests from other network computers, including other servers
  - provide centralized access and storage for resources that can include applications, files, printers or other hardware, and specialized services such as email

Networking Terms

- **Client**
  - a network computer that utilizes the resources of other network computers, including other clients

Networking Terms

- **Peer**
  - a self sufficient computer that acts as both server and a client to other similar computers on the network

Networking Terms

- **Node**
  - any network device that can connect to the network and can generate processes or transfer network data. Every node has at least one unique network address.

Networking Terms

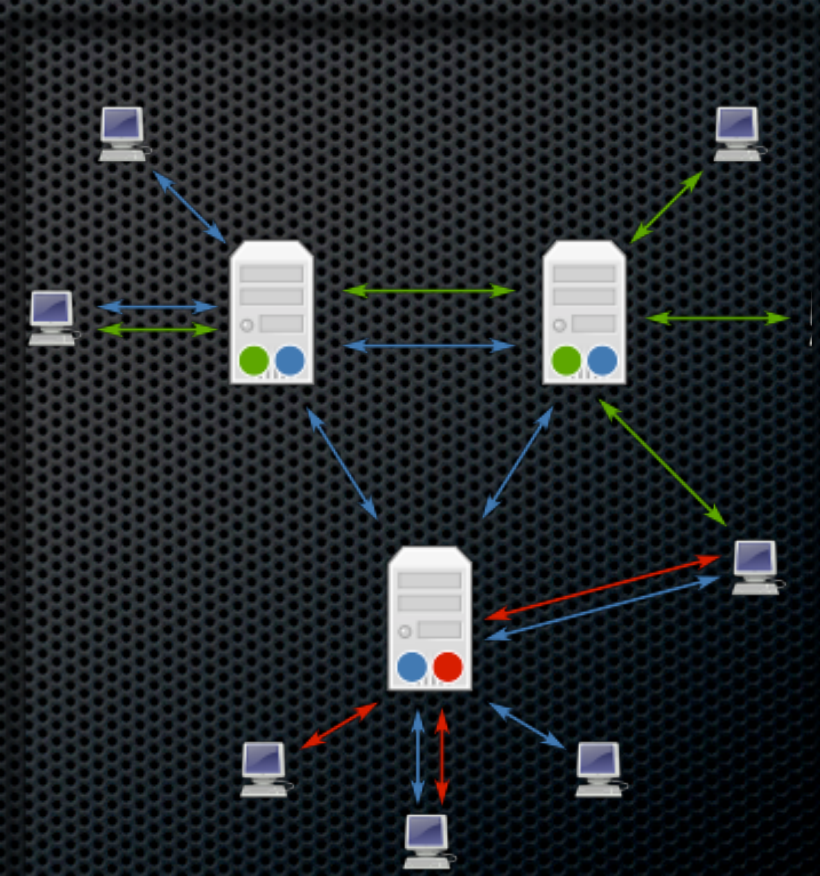
- **Backbone**
  - highest-speed transmission path that carries the majority of the network data

Networking Terms

- **Segment**
  - A specially-configured subset of a larger network
  - Bounded by physical inter-networking devices (switch or router)
  - All nodes attached to the same segment have common access to that portion of the network

Client / Server Network

- All available network resources—such as files, directories, applications, and shared devices—are centrally managed and hosted, and then are accessed by the client computers
- Somewhat decentralized



Peer to Peer Network

- Each computer is responsible for making its own resources available to other computers on the network
- Completely decentralized
- The technology itself is not illegal. It's not just about stealing music

Network Topology

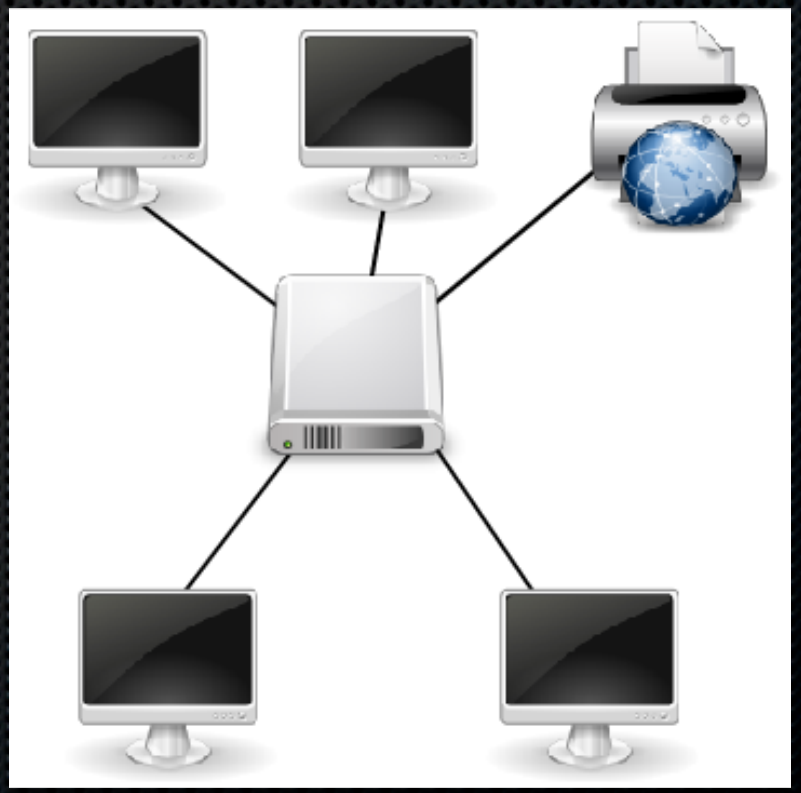
- The “shape” of the network
- Can refer to either the physical topology (how the hardware is arranged) or the logical topology (how the data flows regardless of how the hardware is laid out)

Bus Topology

- Nodes arranged in a linear format
- All connected to the same cable
- Inexpensive
- Difficult to troubleshoot
- One cable failure and the entire network fails

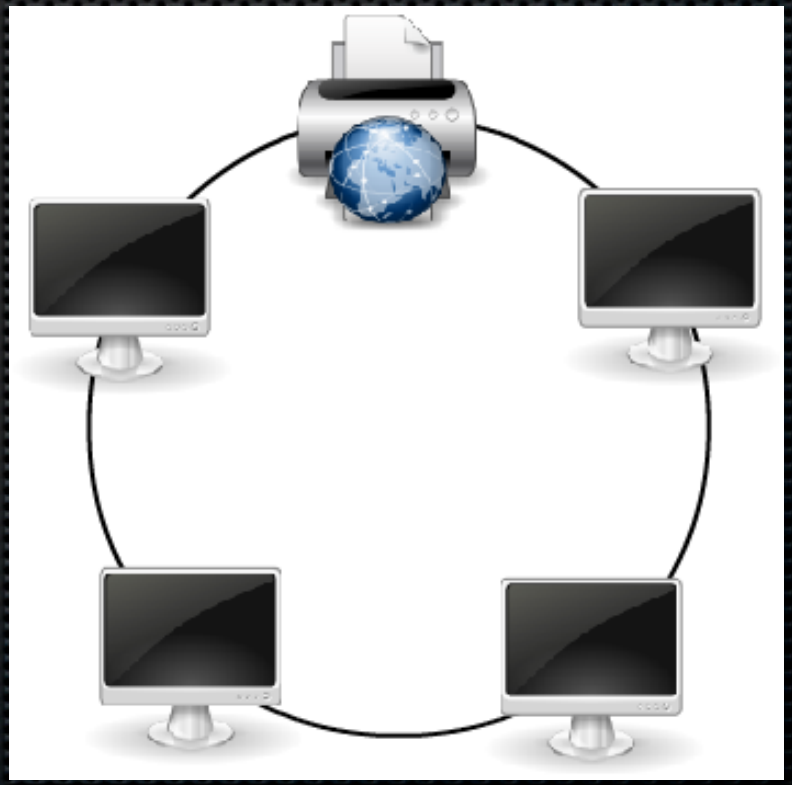
Star Topology

- Central connectivity device
- Easily expandable
- Easy to troubleshoot



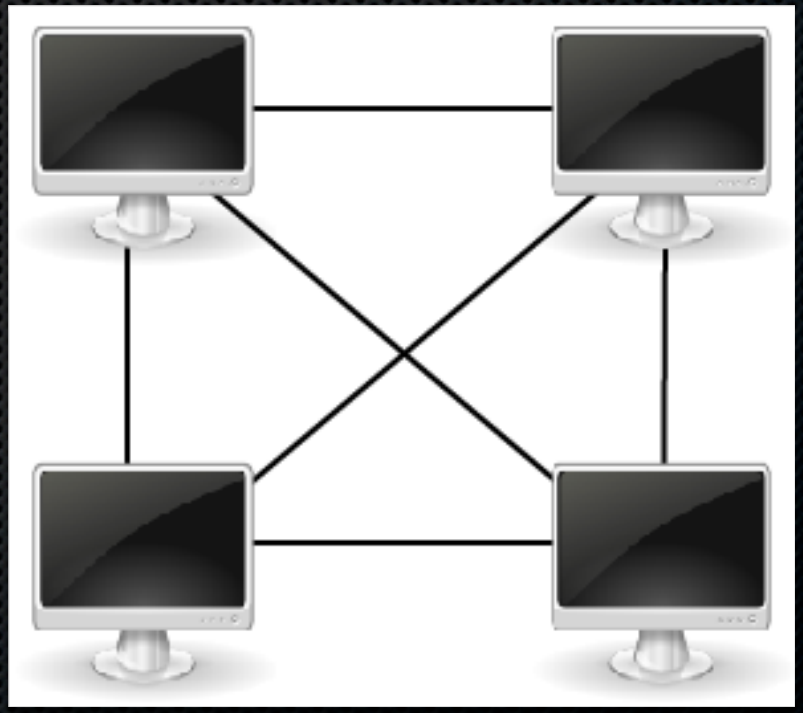
Ring Topology

- Data moves in one direction
- Easy to troubleshoot
- Failure of a single node can bring the entire network down



Mesh Topology

- Each node has a connection to every other node
- Extremely fault tolerant
- Expensive
- Difficult to implement



Hybrid Topology

- A combination of two or more other topologies

Network Categories

Local Area Network

- LAN
- Covers a limited geographic area
  - Building
  - Home
  - Office
  - Lab
- Developed at Xerox P.A.R.C.

Wide Area Network

- WAN
- A network that includes components that are relatively far apart, typically in different buildings and almost always requiring connectivity through a telecommunications company
- Covers multiple geographic locations
- The largest WAN in the world is _____

Wide Area Network

- WAN
- A network that includes components that are relatively far apart, typically in different buildings and almost always requiring connectivity through a telecommunications company
- Covers multiple geographic locations
- The largest WAN in the world is __Internet__

Network Categories

- Intranet - private company-specific network modeled after the Internet
- Extranet - Intranet that is available to select 3rd parties
- Enterprise Network - encompasses all the network components employed by a particular organization

Origins of the Internet

...wtf

Paul Otlet - 1868-1944

- Father of Information Architecture
- Foresaw the creation of the computer and the Web
- Envisioned a radiated library and televised book that could be seen over great distances using an electric telescope
- Coined the term “links”

Paul Otlet

A.R.P.A.

- Advanced Research Projects Agency
- James Licklider - 1st head of computer research dept
  - "A network of such [computers], connected to one another by wide-band communication lines [which provided] the functions of present-day libraries together with anticipated advances in information storage and retrieval and [other] symbiotic functions."
- Project was called ARPANET
- Larry Roberts - chief scientist of the project

ARPANET

- Made possible by a shift in thinking from circuit switching to packet switching
- Circuit Switching - before communication can take place between two devices, a circuit must be established between them
- Packet Switching - data travels through intermediate spots that are richly interconnected
  - One way or another the data gets to its destination
  - Leonard Kleinrock, MIT 1961

ARPANET

- Went live in October, 1969
- First public demonstration in 1972 at the International Computer Communication Conference (ICCC)

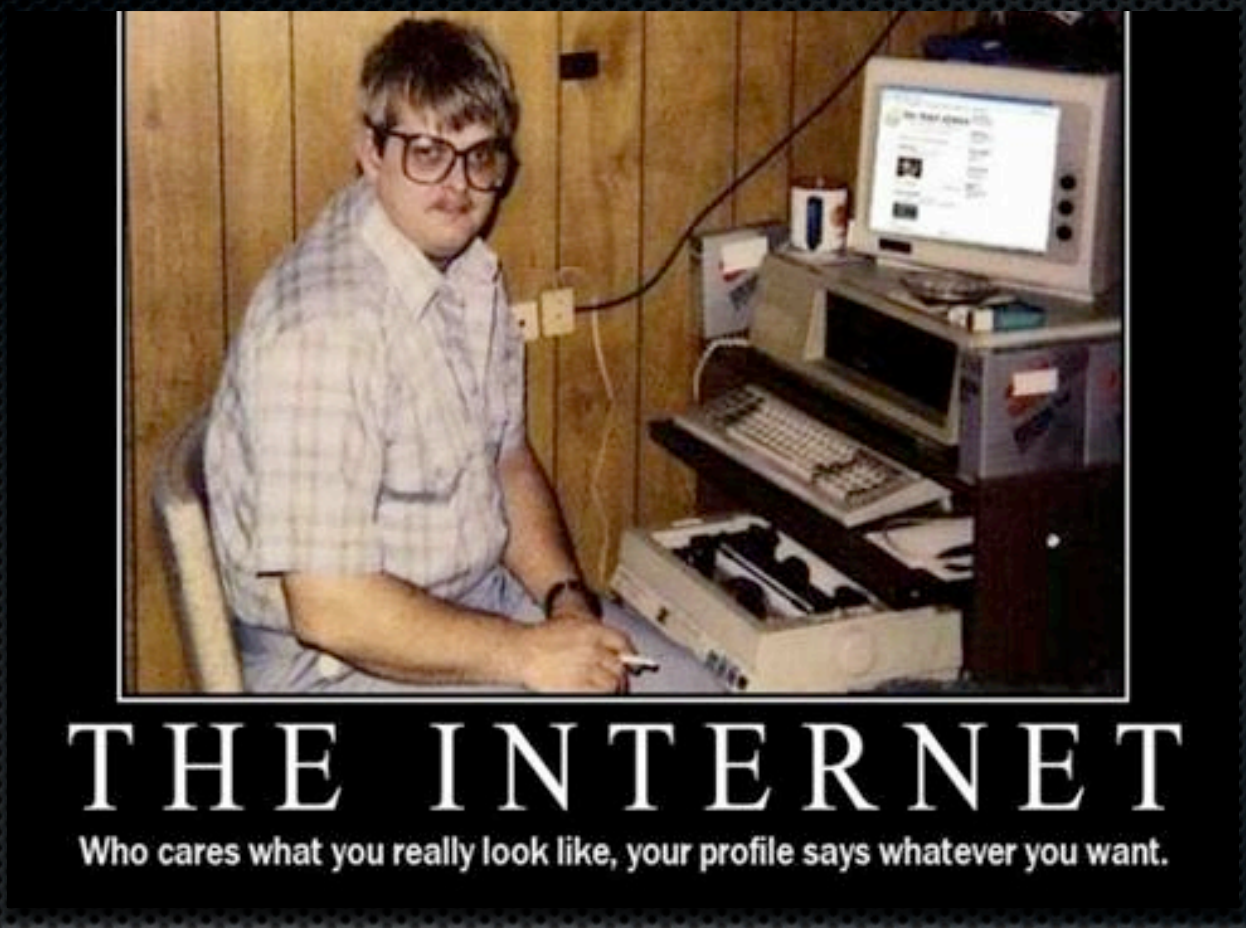
ARPANET

- Ray Tomlinson at BBN Technologies was tasked with finding something interesting to do with ARPANET
- Came up with a way to send messages between two computers. Now known as electronic mail (email)
- Inspired by colleagues who didn’t answer their phone

ARPANET => Internet

- Internet was based on the idea that there would be multiple independent networks of rather arbitrary design
- In 1983 ARPANET split into ARPANET and MILNET
- In 1990 ARPANET ceased to exist

History of Internet



Consumers & the Internet

Access for the masses

BBS - 1978

- Bulletin Board System
- System that allowed users to files, read news, exchanges messages with other users or view other content provided by the BBS

Usenet - 1979

- A worldwide distributed Internet discussion system
- Requires specific client software
- Articles are organized into topical categories called newsgroups, which are themselves logically organized into hierarchies of subjects

CompuServe

- First major commercial online service in the US
- CLI based

IRC - 1988

- Internet Relay Chat
- The first popular real-time chat program

Prodigy - 1984

- Online service providing news, weather, shopping, bulletin boards, games, polls, expert columns, banking, stocks, travel, and a variety of other features.
- First service with a GUI

AOL - 1989

- Formerly the AppleLink program
  - Apple's online service for dealers, third party developers and users
- Renamed America Online
- Eventually became a dial-up ISP

Gopher - 1991

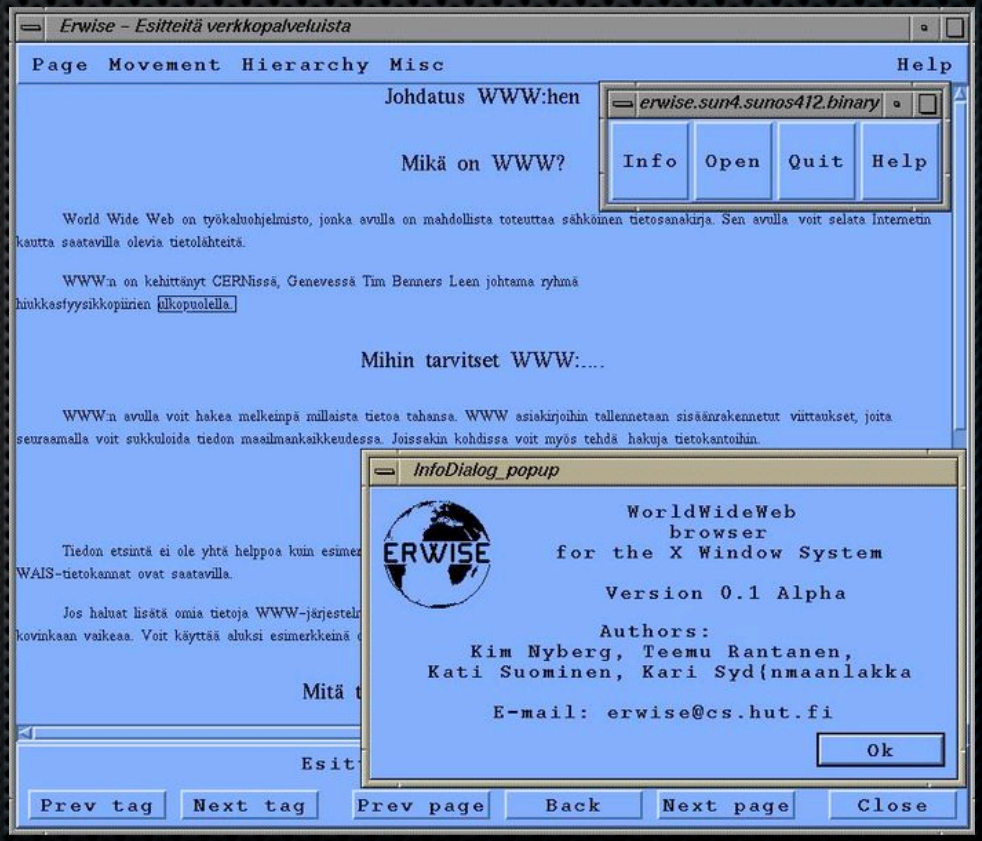
- Content-based search protocol
- Designed for distributing, searching, and retrieving documents over the Internet
- Examined content instead of just filenames
- Predecessor of and alternative to the Web

World Wide Web - 1989

- A system of interlinked hypertext documents accessed via the Internet.
- Accessed via a web browser
- Created by Tim Berners-Lee while working at CERN

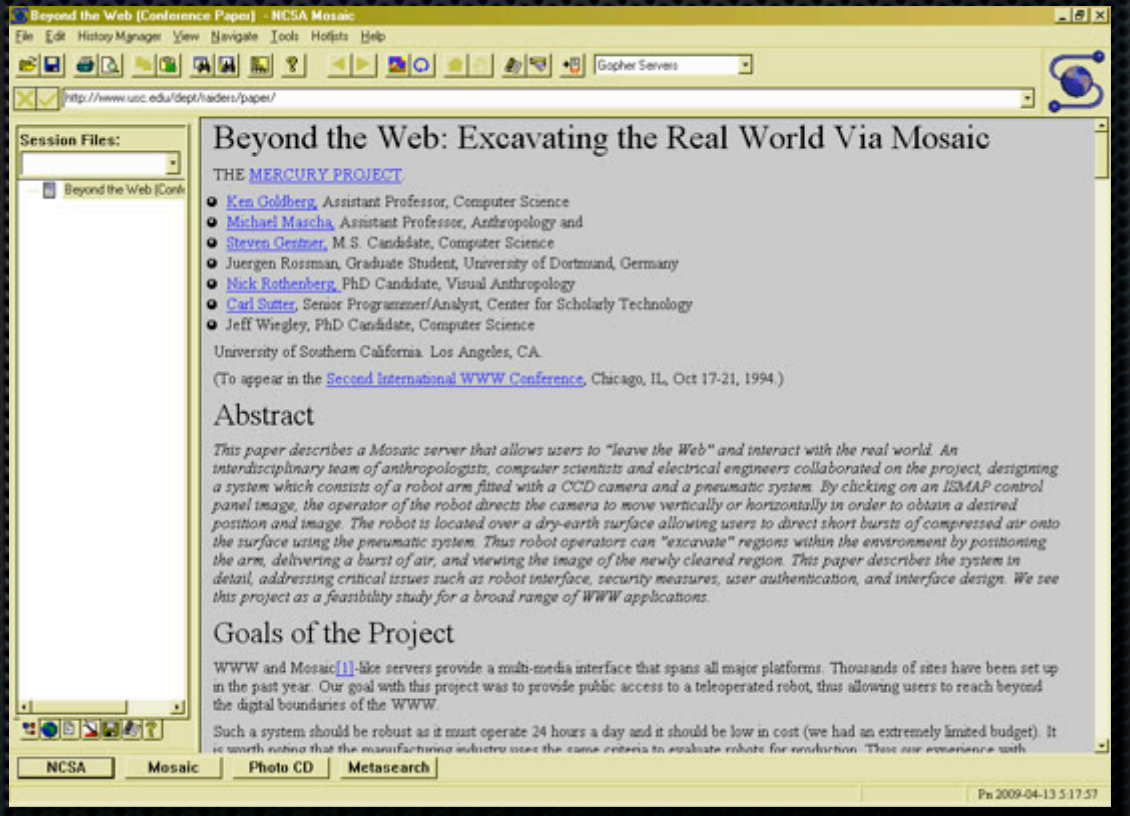
Erwise - 1992

- First web browser to feature a graphical interface
- Written for Unix computers running the X Window System



Mosaic - 1993

- First graphical web browser for the general public
- First browser to display images inline with text instead of displaying images in a separate window



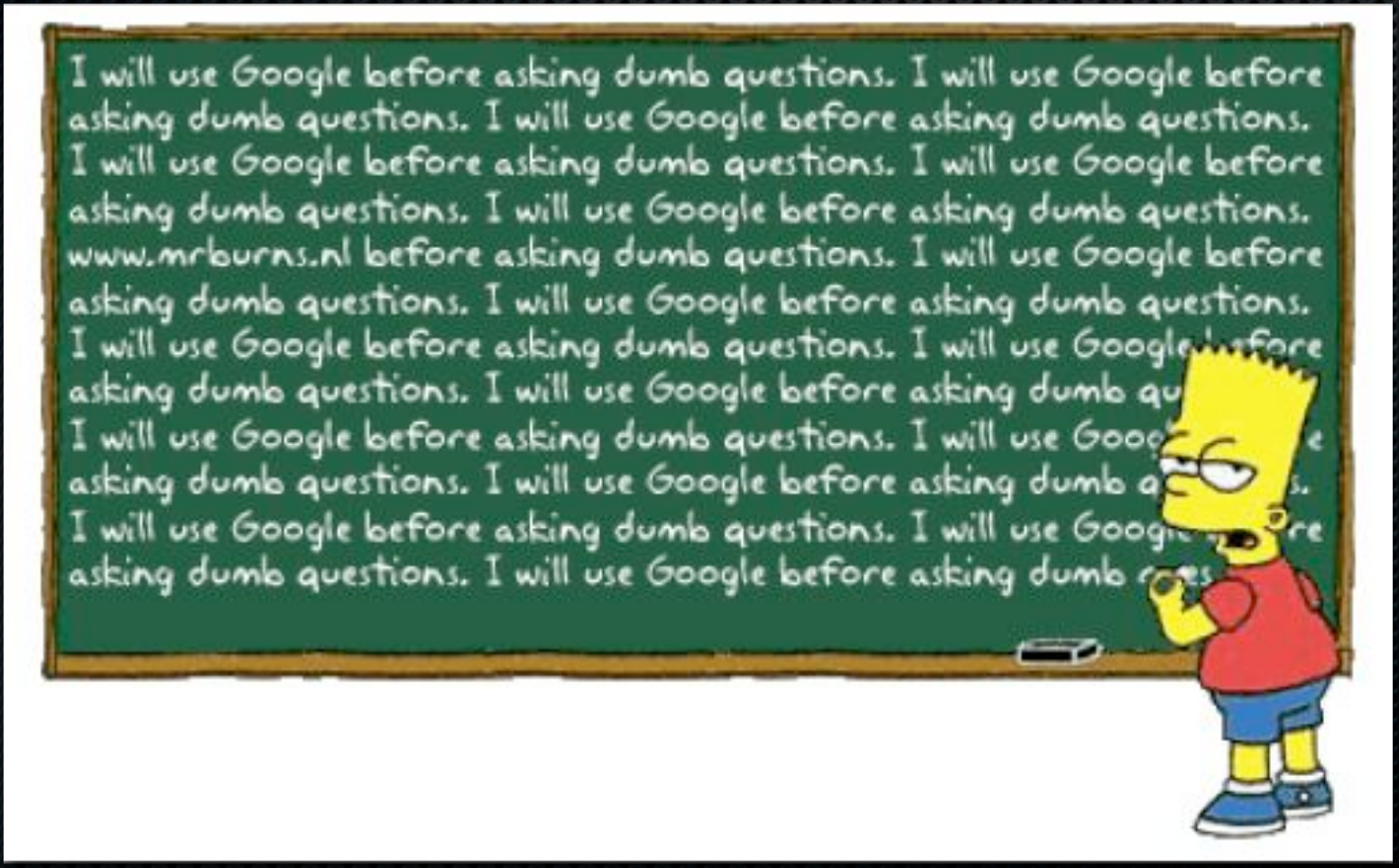
Netscape Navigator - 1994

- Based on Mosaic
- Was later unseated by Internet Explorer

Google - 1998


Google!
BETA
Search the web using Google!
Google Search
I'm feeling lucky
Special Searches
Stanford Search
Linux Search
Help!
About Google!
Company Info
Google! Logos
Get Google!
updates monthly:
your e-mail
Subscribe
Archive
Copyright ©1998 Google Inc.

Google ... Use it



Google

- Most people are not skilled searchers
- Most use the Google search interface as an address bar
- Most believe that they are above average consumers
- We have different ways of describing things and different ways of asking questions

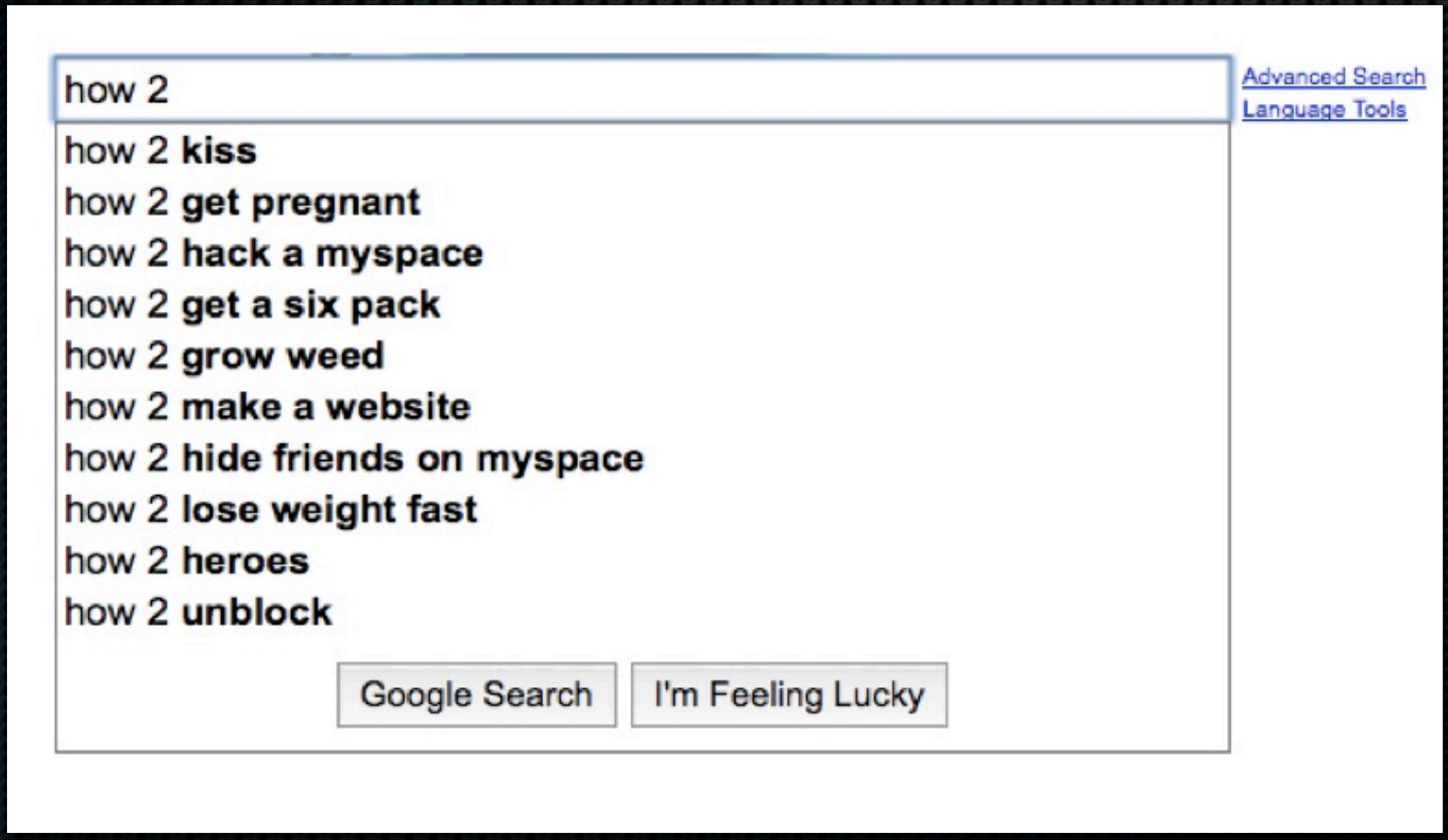
Google Searching

"How 2..."

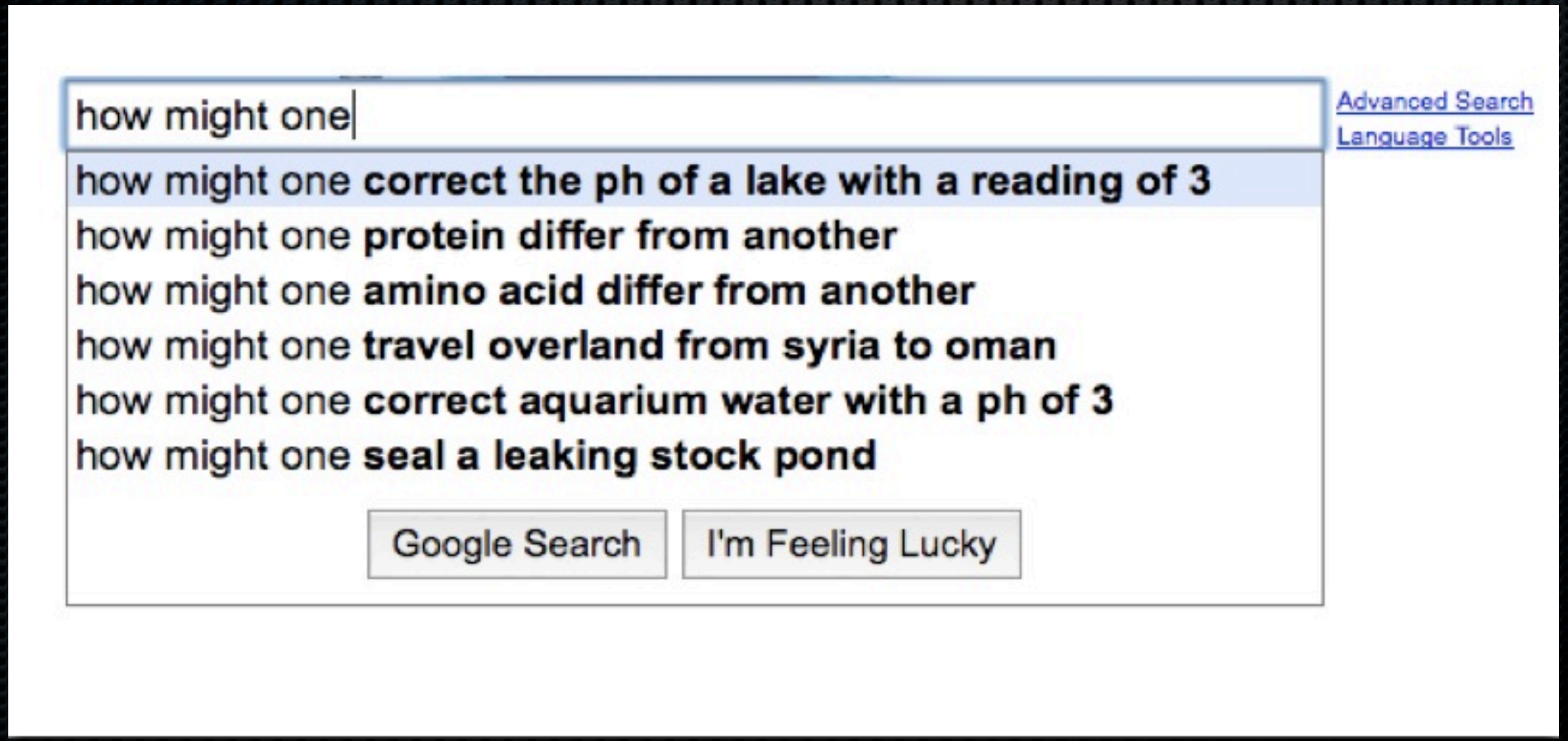
vs

"How might one..."

How 2...


how 2
Advanced Search
Language Tools
how 2 kiss
how 2 get pregnant
how 2 hack a myspace
how 2 get a six pack
how 2 grow weed
how 2 make a website
how 2 hide friends on myspace
how 2 lose weight fast
how 2 heroes
how 2 unblock
Google Search
I'm Feeling Lucky

How might one...



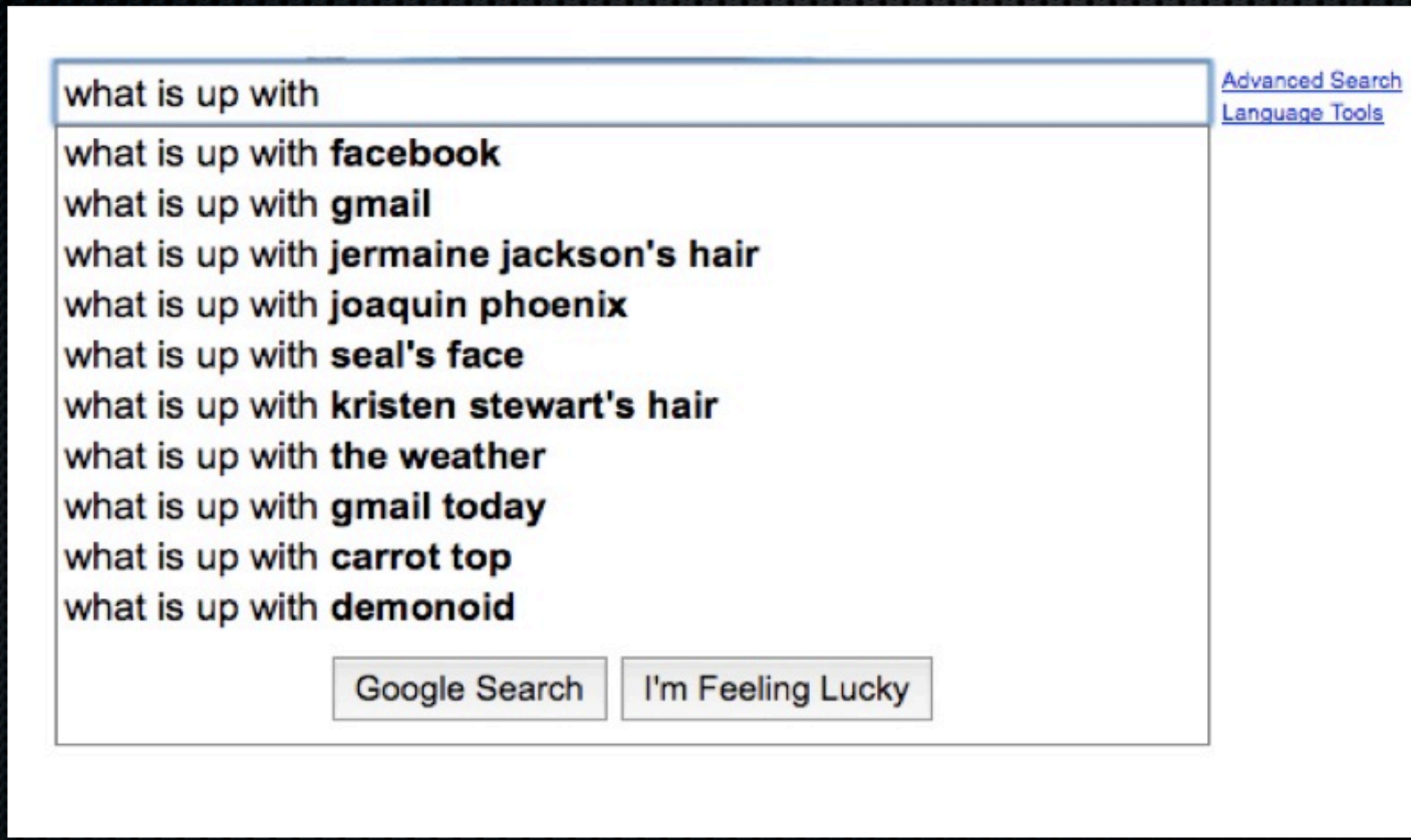
Google Searching

“What is up with...”

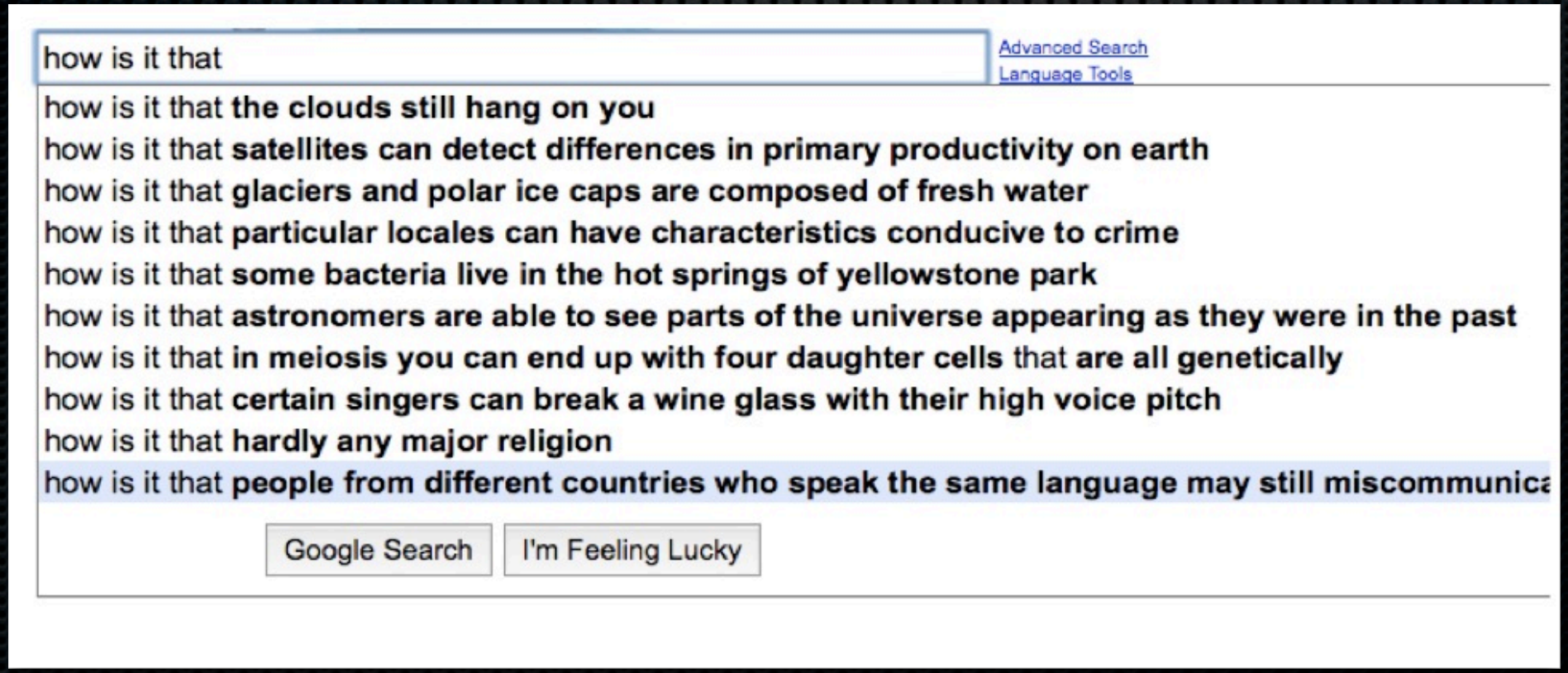
vs

“How is it that...”

What is up with....



How is it that....



Search Basics

- Every word in a query matters; be specific and use as few words as possible to find what you're looking for

- Case typically doesn't matter
- Google generally ignores punctuation like # $ % , ! &
- Also ignores common words like the, and, to, etc.

Search Basics: Boolean Operators

- **AND**
  - Search for both terms [Full AND Sail]
  - The default in Google, simply query [Full Sail]
  - To search specific phrases use quotes [“Full Sail University”]

Search Basics: Boolean Operators

- **OR**
  - Search for either term [“Full Sail” OR “Full Sail University”]
  - Capitalize and place between two words or use a pipe

Search Basics: Boolean Operators

- **NOT**
  - Exclude a term from the search query
  - In Google represented by [-]
  - [Full Sail -brewing] will ignore brewing

Search Basics

- Google removes common words from search phrases.To keep them use “+” in front of the term you want to include
- Search for synonyms of a word using the tilde “~”: [~amazing ~lecture] Tip: Add [+] to disable synonyms for a word (Searching for [~synonym] will crash the Internet)
- Search for either term using uppercase “OR” or [|] between terms
  - [posters “Star Wars” OR “Star Trek”]

Refine a Search

- Search for your keywords in the title of the web page
  - [intitle:web design] Note: This will search for the word “web” in the title and the word “design” anywhere else.
- Search for all of your keywords in the title
  - [allintitle: entertainment business]
- Search only within a particular website
  - [“how to string a guitar” site: youtube.com]

Refine a Search

- You can also limit search by top level domain
  - [site: edu] will only search within .edu websites
    Exclude a domain from your search using [-site:com]
- Search for your keywords in the web address/URL
  [inurl: web design]

Refine a Search

- Love a website? Find similar sites using the “related:” operator
  - related:hulu.com
- Define a word
  - [define:Google]
- Search for all of your keywords in the text of the page
  - allintext: web design & development

Refine a Search

- Searching using a wild card [*] to fill in the blanks
  - [web design *]
- Search for your keywords in a particular file type
  - filetype: xls
- Add “official” at end of query to find official version of site.
  - [“White House” official]

Searching by Numbers

- Search by numbers; flights, UPS | FedEx tracking,Vehicle ID, patent, telephone, et al.
  - [“123456789”]
- Convert currency and other units
  - [4.5 usd in yen]
  - [3 (us gallons per litres)]

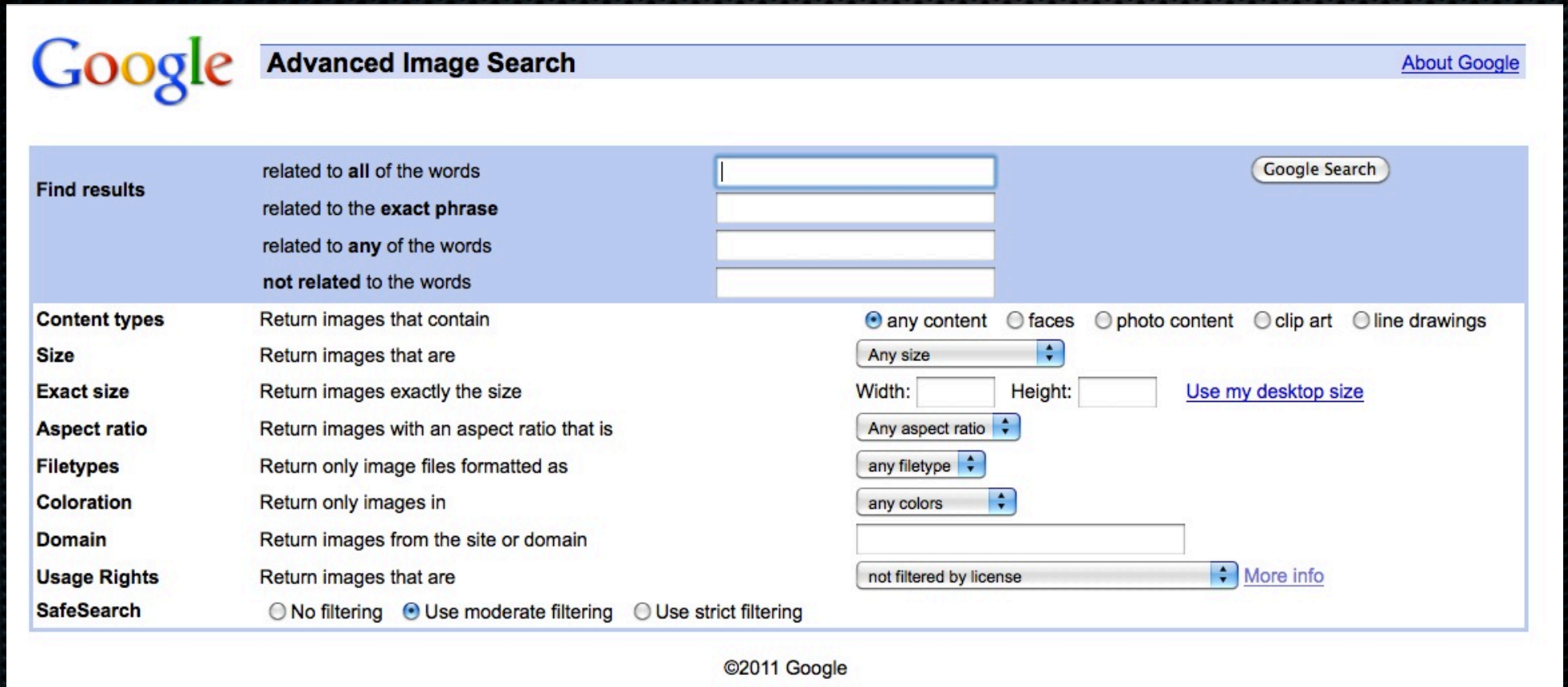
Searching by Numbers

- Search for results in a numbered range by separating two numbers with two periods
  - [“US Population” 1960..2000]
- Use Google as a Calculator. Functions similar to Excel: + ,- ,* ,/
  - [10*5]
  - [10 miles in kilometers]

Searching for Images

- Search for images sets by keyword in the title or url
  - intitle:clowns site:flickr.com
  - intitle:clowns
- Image search engines:
  - http://images.google.com
  - http://www.picsearch.com
  - http://www.everystockphoto.com
  - http://www.freefoto.com/index.jsp

Advanced Image Search



- http://google.com/advanced_image_search

Searching for Images

- Creative Commons and Fair Use
  - http://search.creativecommons.org/
  - http://www.flickr.com/creativecommons/
  - http://fairuse.stanford.edu/
- Cool Flickr search engines:
  - http://www.compfight.com/
  - http://www.zoo-m.com/flickr-storm/
- Library of Congress:
  - http://memory.loc.gov/ammem/index.html

Searching for Sounds

- Keep it simple and search for file format
  - [chirping wav]
  - [“birds chirping” filetype: wav]
  - [+the birds -chirping filetype:wav]
  - [intitle:"the birds" -bees -hitchcock filetype: mp3]
- Sound search:
  - http://findsounds.com
  - http://google.com/landing/music

Using Multiple Search Operators

- Search using multiple operators
  - [“marine biology” syllabus filetype:pdf site:edu]
  - [inurl:“entertainment business” site:edu]
  - [“star wars” | “star trek” (“gross revenue”| “box office”) site:edu]
- Search library sites at universities?
  - [inurl:lib site:edu]

Put It All Together

- Charles would like to buy a Cannon EOS 20D for under $500. He spends some time searching:
  - [canon]
  - [canon eos]
  - [canon eos $300..$500]
  - [canon eos $300..$500 site:ebay.com]
  - [canon eos $300..$500 site:ebay.com -450d -“eos 7”]
  - [canon eos 20d $300..$500 site:ebay.com OR site:amazon.com]

Critical Evaluation

- Why evaluate what you find on the web?
  - Anyone can put up a web page
  - Many pages are not updated
  - No quality control
    - Less trustworthy than scholarly publications

Before You Click to View a Page...

- Look at the URL
  - Personal page or site?
- Domain name appropriate for the content
  - Restricted: edu, gov, mil, etc
- Published by an entity that makes sense?
  - News from its source? - www.nytimes.com
  - Advice from valid agency? - www.nih.gov

Scan the Perimeter of the Page

- Can you tell who wrote it ?
  - name of page author
  - organization, institution, agency you recognize
- Credentials for the subject matter ?
  - Look for links to: “About us” “Philosophy” “Background” “Biography”
- Is it current enough ?
  - Look for “last updated” date

Examine the Content

- Text
  - possibly forged ?
  - why not a link to published version ?
- Sources
  - documented with links or notes ?
  - do the links work ?
- Evidence of bias
  - in text or sources ?

Do Some Detective Work

- Search the URL in alexa.com
  - Click on “Site info for … ”
  - Who owns the domain?
  - Who links to the site?

Does It All Add Up?

- Was the page put on the web to
  - inform ?
  - persuade ?
  - sell ?
  - as a parody or satire ?
- Is it appropriate for your purpose?

Google Scholar

- Provides a search of scholarly literature across many disciplines and sources, including theses, books, abstracts and articles.
- scholar.google.com

The Web That Wasn't

Alex Wright

October 23, 2007