

The Internet

In this section of notes you will learn about the history of the Internet, how it works and techniques that can be used to more efficiently search for information.

James Tam

Origins Of The Internet

- History: what was happening in the 1950's



Rock and
roll was in
it's infancy



The Cold War
was on

James Tam

Origins Of The Internet (2)

- The cold war spilled over into space.
- Both sides tried to be the first to send a satellite into space.
- Americans in 1957: A sophisticated three stage rocket was planned as the first man-made vehicle to be sent into space.
- The USSR in 1957: surprised the world by launching Sputnik I (first artificial satellite).



- The launch of Sputnik motivated the creation of ARPA (Advanced Research Projects Agency) in the US.

James Tam

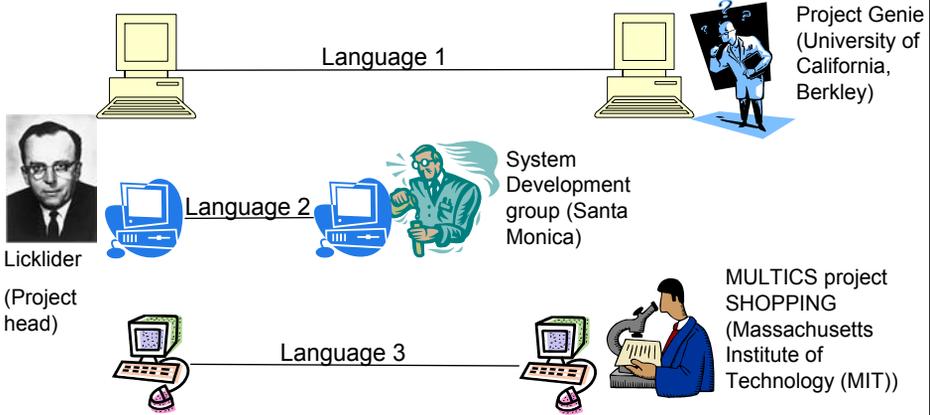
ARPA

- ARPA was a branch of the ministry of defense.
- The focus was on:
 - Getting different types of computers communicating
 - Creating a mechanism to allow networks to operate even in the event of disaster.

James Tam

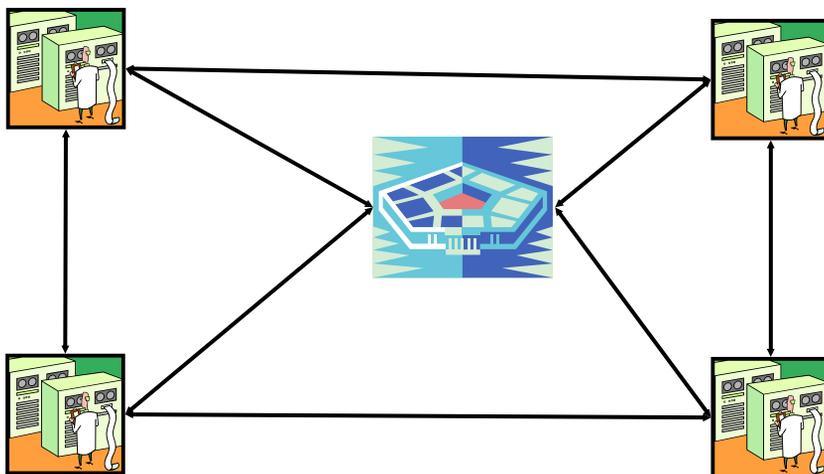
Getting Computers To Communicate

- Researchers working for ARPA needed computers to communicate and to share information
- Current approaches weren't satisfactory.



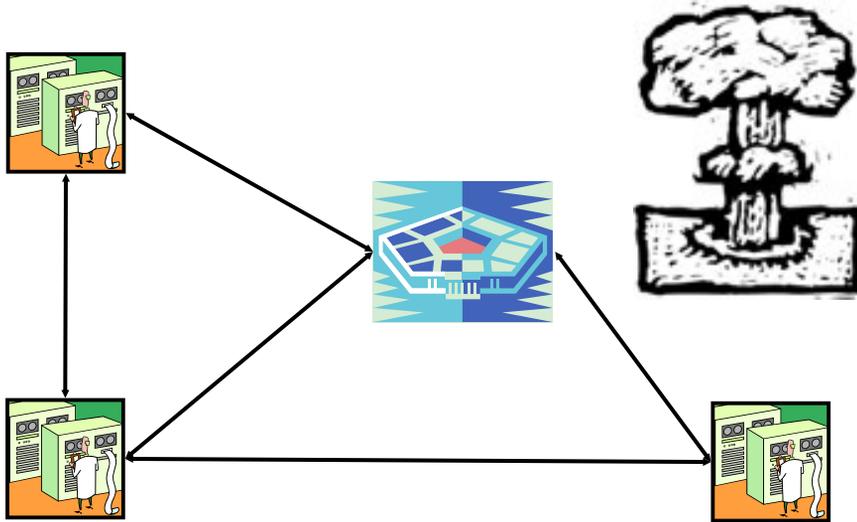
James Tam

Allowing Networks To Survive Disasters



James Tam

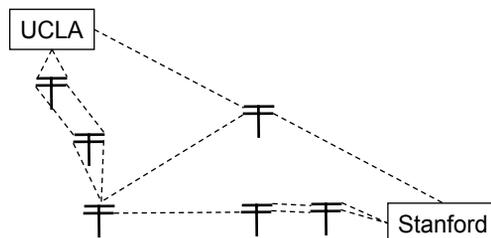
Allowing Networks To Survive Disasters (2)



James Tam

ARPANET

- The first computers were connected via ARPANET (Advanced Research Projects Agency Network).
- The initial ARPANET consisted of 2 host computers which were connected at the start of 1969 from the following locations:
 - UCLA
 - Stanford

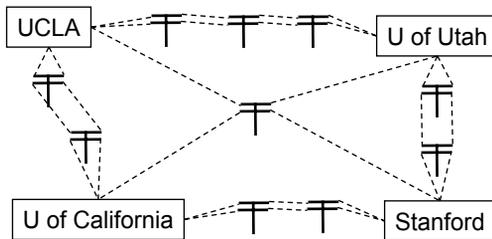


James Tam

ARPANET (2)

- Later additional hosts were added to the network (end of 1969) from:

- The University of California (Santa Barbara)
- The University of Utah



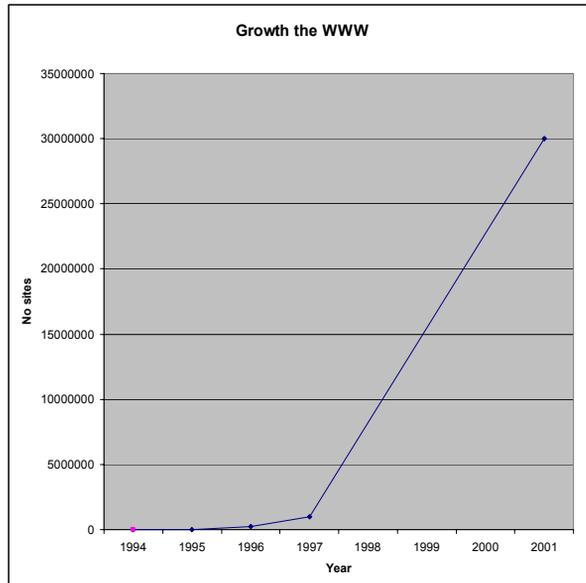
James Tam

Important Milestones Of The Internet

- In 1972
 - The first "hot application" (something that really caught on) was introduced by Ray Tomlinson.
- 1989:
 - The ideas behind the World Wide Web were first described in a paper.
- 1990:
 - The ARPANET was shut down.
 - The first Internet search program Archie was developed at McGill university.
- 1991:
 - The World Wide Web was released to the public.

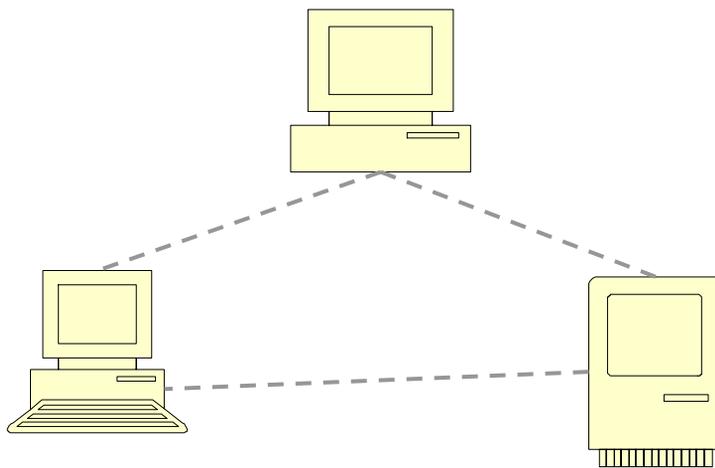
James Tam

The Growth Of The World Wide Web



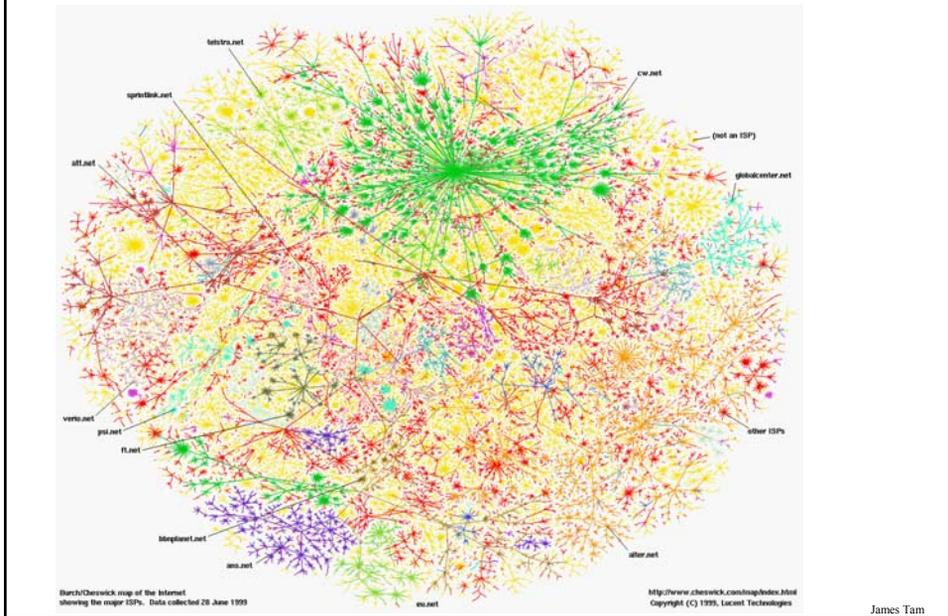
James Tam

A Network: Computers That Are Connected



James Tam

The Internet: A Gigantic Network Of Networks



What Makes This Connectivity Possible?

- Recall: the motivation for connecting computers came out of the ARPA project.
- The protocols (rules) of the Internet is what allows the connections (and therefore the Internet) to exist:
 - HTTP (**H**yper **T**ext **T**ransfer **P**rotocol): rules for linking documents on the WWW.
 - SMTP (**S**imple **M**ail **T**ransfer **P**rotocol): rules for sending simple English text messages.
 - MIME (**M**ultipurpose **I**nternet **M**ail **E**xtensions): allows messages in other languages to be sent, provides the ability to send non-text attachments in the mail.

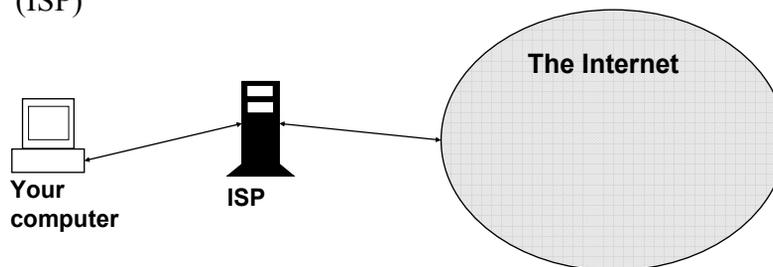
“Who” Of The Internet

- Who invented the Internet:
 - The US government team at ARPA first led by JCR Licklider and later by Larry Roberts. However no one person can take credit for ‘creating’ the Internet.
- Who owns the Internet:
 - Not the US government (although it still has some influence).
 - The networks that make up the Internet are owned by companies, non-profit organizations, governments and individuals.
- Who funds the Internet:
 - Originally it was the US government.
 - Now it’s the owners of the networks that make up the Internet.

James Tam

Connecting Your Computer To The Internet

- Requires that you sign up with an Internet Service Provider (ISP)

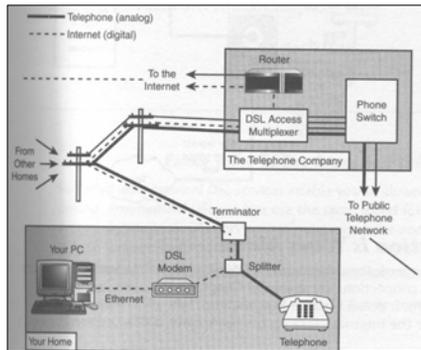


- Types of Internet connections
 1. Faster phone line connections
 2. Cable connections
 3. Satellite connections

James Tam

1. Phone Line Connections (DSL/ADSL)

- DSL (Digital Subscriber Line) / ADSL (Asymmetrical DSL)
- Uses a single wire for voice and data (computer)



From "The Complete Idiot's Guide to High Speed Internet Connections" by Soper

James Tam

1. Phone Line Connections (DSL/ADSL)

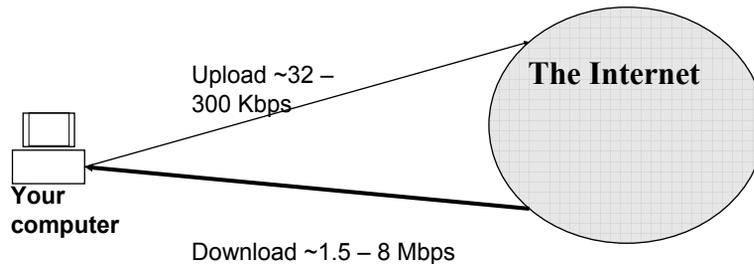
- Important characteristics:
 - Fast connection: ~ 100's Kbps – several Mbps.
 - Doesn't tie up a phone line.
 - Allows for an always on (continuous) connection.
 - 1 MB image would take at least a second to download
 - 4 GB movie would take at least 4,000 seconds (66.7 minutes, 1.1 hours) to download

James Tam

1. Phone Line Connections (DSL/ADSL): 2

ADSL (Asymmetrical DSL)

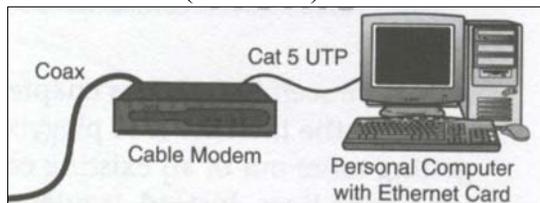
- You can download information (get information from the internet) faster than you can upload it (send information somewhere to the internet)



James Tam

2. Cable Connections

- Uses a coaxial (cable TV) connection.



From the The Complete Idiot's Guide to High Speed Internet Connections by Soper

- The Internet connection occurs on the same coaxial cable used for television.
- Important characteristics
 - Download: ~several Megabits (~1 – 6+ Mbps) per second.
 - Upload: approximately several hundred Kilobits (200 – 300 Kbps).
 - Allows for an always on (continuous) connection

James Tam

ADSL/DSL Vs. Cable

•ADSL/DSL

- Typical transfer rates are slower
- Internet connection is not shared

- ADSL/DSL Internet service is highly restricted
- (Calgary): The service is targeted more for 'experienced' computer users

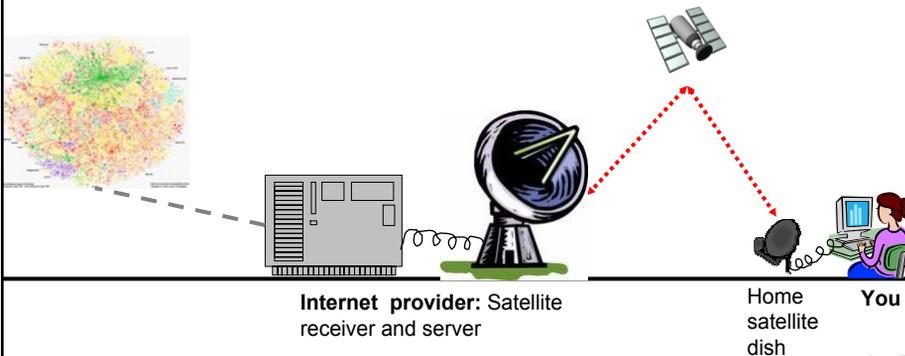
•Cable

- Typical transfer rates are faster
- Internet connection is among shared subscribers
- Cable Internet service is widely available
- (Calgary): The service is targeted to the general population.

James Tam

3. Satellite connections

- For most cases a standard wired ADSL/DSL or cable connection should be chosen.
- Some remote locations don't allow for either service (DSL/ADSL connections won't work).
 - In this case the only broadband connection available is via satellite:



James Tam

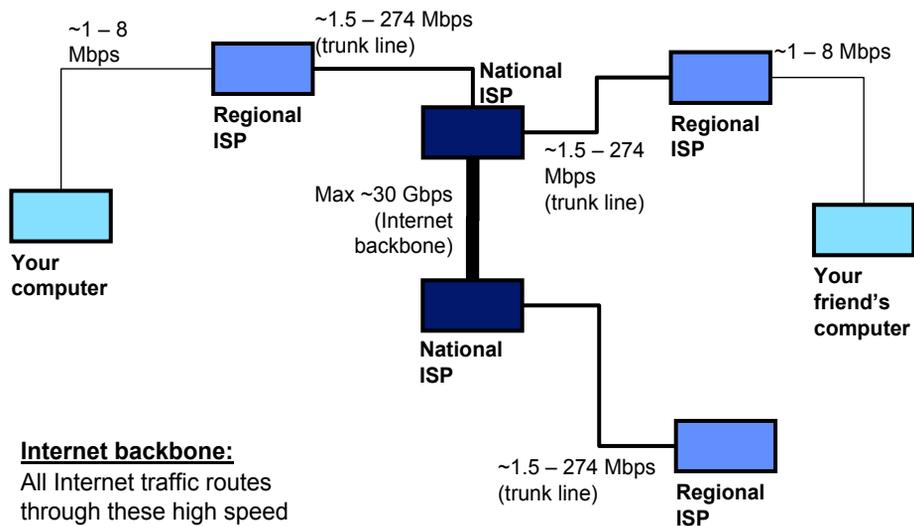
3. Satellite connections (2)

• Satellite connections are slower than most other types of connections:

- Upload ~ 100 Kbps
- Download ~ 500 Kbps
 - 1 MB picture would take to 16 seconds to download
 - 4 GB movie would take to 64000 seconds (1066.7 minutes, 17.8 hours) to download

James Tam

Transmission Speeds



Internet backbone:
All Internet traffic routes through these high speed connections

James Tam

Transmission Of Information

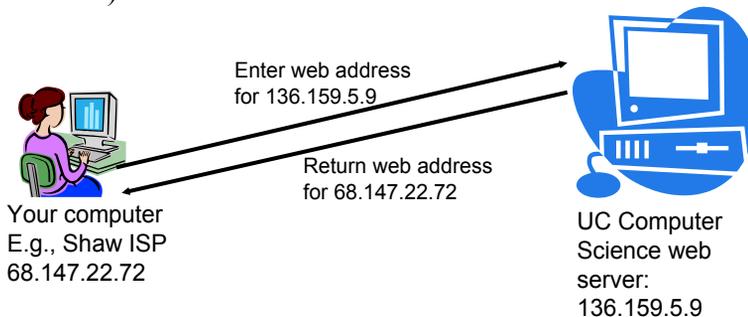
- Similar to transmitting information on a single network.
- Information that is transmitted on the Internet is broken down into parts (packet) at the source computer.
- The route taken may vary from packet-to-packet depending upon:
 - Network availability
 - Network congestion
- The packets are reassembled in their proper order at the destination computer.

PACKET			
Address of source computer	Data to be sent	Instructions for dissembling / reassembling the data	Address of destination computer

James Tam

IP (Internet Protocol) Addresses

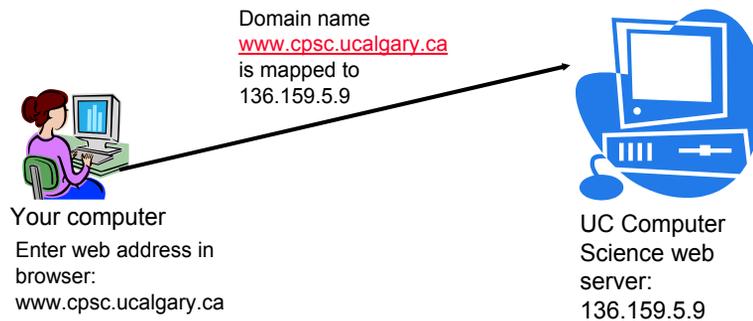
- Needed to properly route information on the Internet.
- Every computer connected to the Internet has an IP Address (IP for short):



James Tam

IP Addresses Are Mapped To Domain Names

- Because numeric addresses are hard to remember (and may change) domain names are typically used instead



James Tam

High Level Control Of Internet Addresses

- Different organizations (Registrars) provide Internet Addresses for Internet providers or websites:
 - VeriSign: dot-com (“.com”), dot-net (“.net”)
 - RegistryPro, NeuLevel and Public Interest Registry: dot-biz (“.biz”), dot-pro (“.pro”), dot-org (“.org”)

James Tam

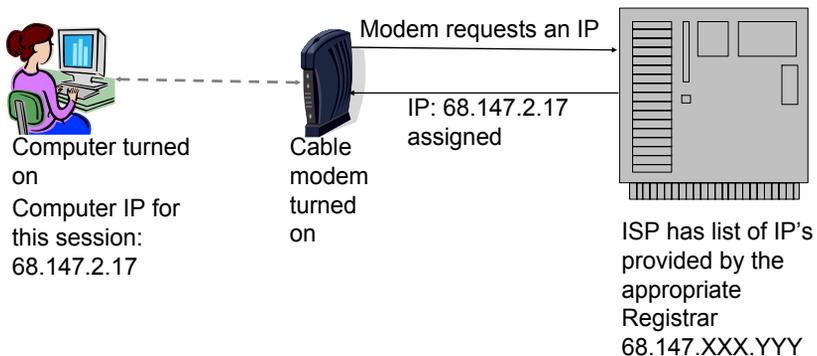
How IP Addresses Are Assigned

- Because of IP addresses the Internet is not an anonymous network!
- Internet service providers purchase a number of addresses for their computers and for the computers of their subscribers.
- When you turn on your computer and modem an IP address is assigned to your computer from your ISP.

James Tam

Details Of Getting An Internet Address

- Whenever a computer is connected to a network or the Internet it's assigned a IP address from the existing pool of free addresses:



- Consequently the address may or may not be the same as ones that have been previously assigned.

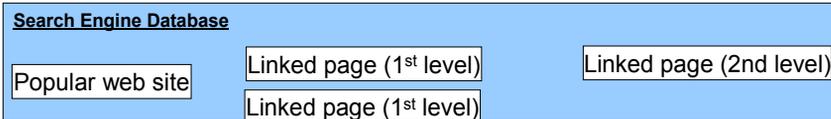
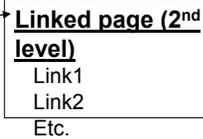
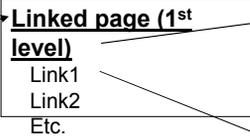
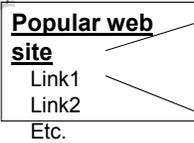
James Tam

How Do Search Engines Work

- Using a search engine involves searching the library of pages built up by that engine.



- The library is built up by the search engine's spiders (web)



James Tam

Some Search Engines Use People Instead Of Technology

- Rather than using search programs to build the database some search engines organize results based on human scrutiny.



Person submits page



Yahoo librarian



Yahoo database



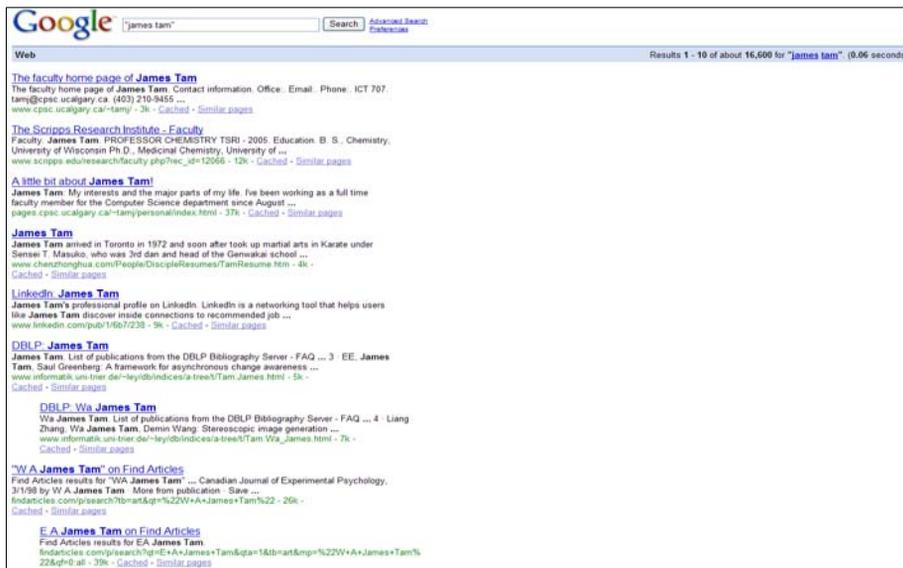
Person searching for info



Database is organized by Yahoo librarians (a person not automated)

James Tam

Search Results Are Ranked According To Relevance



The screenshot shows a Google search for "James Tam". The search bar contains "James Tam" and the search button is labeled "Search". Below the search bar, there are several search results. The first result is "The faculty home page of James Tam" with a link to "tam@cpsc.ucalgary.ca". The second result is "The Scripps Research Institute - Faculty" with a link to "www.scripps.edu/research/faculty.php?rec_id=12066". The third result is "A little bit about James Tam!" with a link to "pages.cpsc.ucalgary.ca/~tam/personal/index.html". The fourth result is "James Tam" with a link to "www.chenronghua.com/People/Discipline/Resumes/TamResume.htm". The fifth result is "LinkedIn James Tam" with a link to "www.linkedin.com/pub/11607238". The sixth result is "DBLP James Tam" with a link to "www.infomark.uni-trier.de/~ley/db/indices/a-tree/Tam/James.html". The seventh result is "DBLP: Wa James Tam" with a link to "www.infomark.uni-trier.de/~ley/db/indices/a-tree/Wa/Wa_James.html". The eighth result is "'W A James Tam' on Find Articles" with a link to "findarticles.com/psearch/tb=art&q=%22W+A+James+Tam%22". The ninth result is "E A James Tam on Find Articles" with a link to "findarticles.com/psearch/tb=art&q=%22E+A+James+Tam%22&qf=all".

James Tam

Making A Site More Noticeable

- Search database built via search spiders (e.g., Google):
 - Add relevant keywords to your page.
 - The frequency and location of keywords may play a role in determining relevance.
 - Engaging in spamdexing¹ may result in a page being put at the bottom of the list
- Search databases built via human researchers (e.g., Yahoo):
 - Make sure that your site is examined by the people who build the database.



The screenshot shows the Yahoo! Sign In page. The "Sign In" link is highlighted in red. Below the sign in links, there is a navigation menu with "Yahoo! Help", "Directory Help", and "Suggest a Site". The "Suggest a Site" link is highlighted in red. Below the navigation menu, there is a section titled "How do I add my web site to the Yahoo! Directory?" with instructions on how to add a site to the directory. The instructions are: "In order to add your web site to the Yahoo! Directory, you must first have every site added to the Directory. To suggest your site for evaluation, follow these steps: Step 1: Check to see if your site is already in the Yahoo! Directory. Step 2: Find the appropriate category in the Yahoo! Directory. We ask that you suggest your site from the most relevant category." The "Suggest a Site" link is highlighted in red.

¹ Spamdexing refers to the process of trying to artificially increase the ranking of a web page.

James Tam

Searching For Information On The Internet: Google

- Easy? Just type in what you're searching for...



- ...you may get the information that you were looking for plus much more!



James Tam

You Will Learn Strategies For Narrowing Your Search Results:

1. Reducing the number of unrelated results.
2. Explicitly avoiding pages with certain words.
3. Searching for information from select pages.

Employing These Search Strategies

- Many (but not all) of the features can be found through the “Advanced Search” link on the Google site.



- This leads you to a page with several options (to be covered shortly):

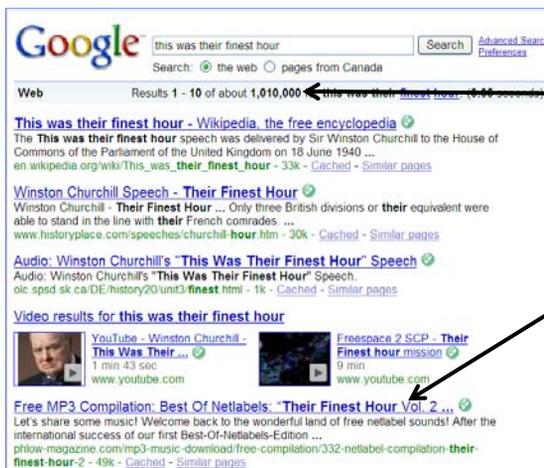


James Tam

Searching For Exact Phrases

- Sometimes you may be looking for information about a famous quote.

- “This was their finest hour?” – Winston Churchill



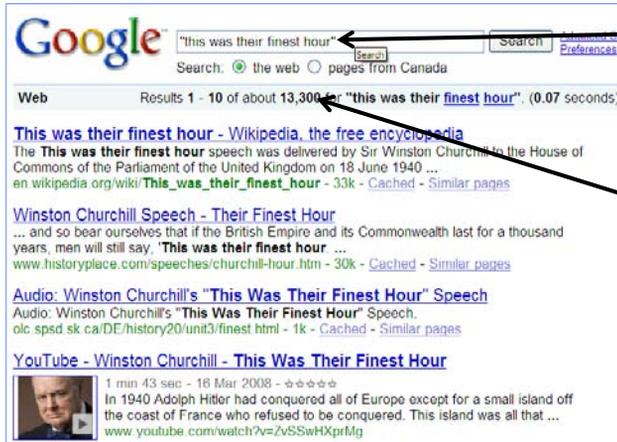
The number of results that must be reviewed is quite high.

Unrelated websites show up

James Tam

Searching For Exact Phrases (2)

- Enclosing the phrase that you are searching for in quotes will search for pages that contain that specific phrase.



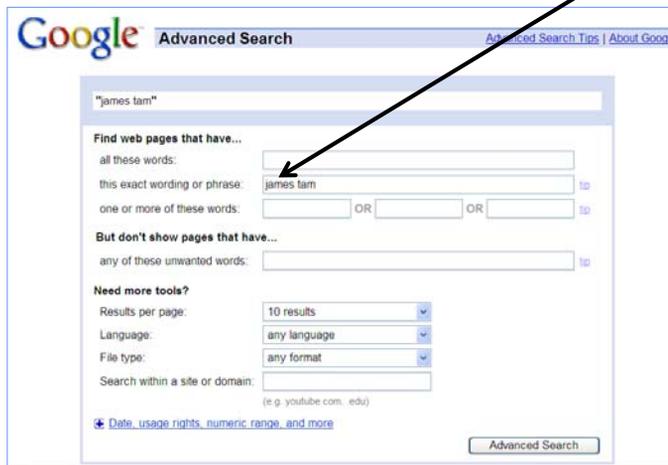
The desired phrased enclosed quotation marks.

Fewer, more relevant results show up

James Tam

Searching Exact Phrases: Advanced Search

No other combinations are possible



James Tam

Words That Are Commonly Ignored By Google

- Stop words are ignored by search engines such as Google:
 - Common words
 - Reserved words
- The search engine can be forced to include the stop words:
 - Use quotes
best places to eat in Calgary
Vs.
“best places to eat in Calgary”

 - Use the ‘plus’ operator.
Star Wars I
Vs.
Star Wars +I

James Tam

Words That Are Commonly Ignored By Google (2)

- Use the ‘plus’ operator.
how select phone service
Vs.
+how select phone service

James Tam

What If More Than One Word Can Be Used?

- Some concepts can be represented by using different words.
- The '~' operator includes synonyms in the search.
- Example:
 - ~cheap computers

James Tam

Searching If The Search Criteria Is Incomplete/Partially Unknown

- For example: “Arnold Schwarzenegger”
- How is it spelled?
 - Arnold Swartzengger?
 - Arnold Schwartzenger?
 - Arnald Swartzencker?

James Tam

Using The Wildcard In Searches



The screenshot shows a Google search interface. The search bar contains the text "arnold schw*" which is circled in red. Below the search bar, there are radio buttons for "the web" (selected) and "pages from Canada". The search results are displayed under the heading "Web".

[PDF] Page 1 2-19.pub
File Format: PDF/Adobe Acrobat - [View as HTML](#)
26 **Arnold Schwar-**. zenegger, R, governor of California Tue., Feb. 27, Janet Napolitano,
... **Arnold Schwar-**. zenegger, R, will speak at a Club ...
npc.press.org/about/record/2007/2-19-07Record.pdf - [Similar pages](#)

[PDF] BUSINESS
File Format: PDF/Adobe Acrobat - [View as HTML](#)
Arnold Schwar-. zenegger signed a "compact" providing for. modest increases in the
university budget. in exchange for commitments to make UC ...
www.universityofcalifornia.edu/news/dynesinterview0905.pdf - [Similar pages](#)

[PDF] 1 2 SUPERIOR COURT OF CALIFORNIA COUNTY OF SACRAMENTO 10 11 ...
File Format: PDF/Adobe Acrobat - [View as HTML](#)
ARNOLD SCHW ARZENEGGER,. Governor, in his individual capacity;. GOVERNOR SCHW
ARZENEGGER'S. CALIFORNIA RECOVERY TEAM, a ...
www.fppc.ca.gov/legal/lit/citizensruling.pdf - [Similar pages](#)

James Tam

Searching A Range

- Searching numerical values within a certain min – max range
- Range operator .. (multiple dots)
- Example:
 - United Arab Emirates history 1971..2009
 - ~Cheap Computers \$200..\$500

James Tam

Range Searching: Advanced Search

The screenshot shows the Google Advanced Search interface. It includes sections for finding web pages that have certain words, excluding unwanted words, and various filtering tools. Two arrows point to specific features: one to the search criteria input field and another to the numerical range filter.

Find web pages that have...

all these words: ← Search criteria

this exact wording or phrase: tip

one or more of these words: OR OR tip

But don't show pages that have...

any of these unwanted words: tip

Need more tools?

Results per page:

Language:

File type:

Search within a site or domain:

(e.g. youtube.com, .edu)

[Date, usage rights, numeric range, and more](#)

Date: (how recent the page is)

[Usage rights:](#)

Where your keywords show up:

Region:

Numeric range: .. ← Numerical range

James Tam

Searching Among Alternatives

- Normally when a word is included in the search box Google will try to find web pages that include all those words.

- Example:

cute wallpapers cats dogs

Vs.

cute wallpapers cat OR dogs

Example:

“Bruce Lee” OR “Little Dragon” OR “Lee Siu Lung”

James Tam

Searching Among Alternatives (2)

Note: Google is case sensitive in this situation! (OR must be upper case in order to search for alternatives).

To be or not to be

Vs.

To be OR not to be

James Tam

Searching Alternatives: Advanced Search

The screenshot shows the Google Advanced Search interface. It includes several sections: 'Find web pages that have...' with fields for 'all these words:', 'this exact wording or phrase:', and 'one or more of these words:'. The 'one or more of these words:' field contains 'cats', 'OR', 'dogs', and 'OR' followed by an empty field. Below this is 'But don't show pages that have...' with an 'any of these unwanted words:' field. The 'Need more tools?' section includes dropdowns for 'Results per page:' (10 results), 'Language:' (any language), and 'File type:' (any format), along with a 'Search within a site or domain:' field. A link for 'Date, usage rights, numeric range, and more' is at the bottom left, and an 'Advanced Search' button is at the bottom right. Two arrows point from the text on the right to the 'Cute wallpapers' field and the 'cats' field.

All words
that must
appear

One of
more of
these words
can appear

James Tam

Using 'OR': Exceptions¹

- Google was designed to approximate how people think and behave when searching for information.
- Consequently exceptions to the rules are sometimes made.
- Example:
For better OR for worse

¹ From <http://www.google.com/support/websearch>

Excluding Words

- There may be times when you want Google to exclude sites with certain words or phrases.
- This can be done with the subtraction operator (subtract the words that follow the operator from search results).
- Example:
"James Tam"
Vs.
"James Tam" -calgary

Excluding Words: Advanced Search

Find web pages that have...

all these words:

this exact wording or phrase:

 [tip](#)

one or more of these words:

 OR OR [tip](#)

Exact search
phrase

But don't show pages that have...

any of these unwanted words:

 [tip](#)

Exclusion
word

Need more tools?

Results per page:

Language:

File type:

Search within a site or domain:

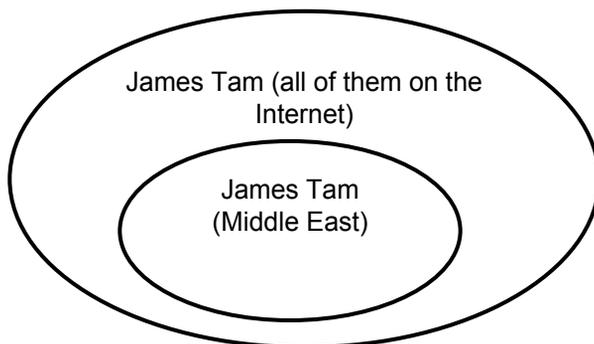
(e.g. youtube.com, .edu)

[Date](#), [usage rights](#), [numeric range](#), and [more](#)

James Tam

Searching Within Previous Results

- Sometimes you will perform a search and come up with too many results.
- You can search within the set of previous results in order to narrow down the list of results.



James Tam

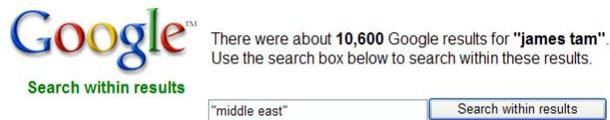
Searching Within Previous Results (2)

Perform the search



Select the option to narrow down the search results

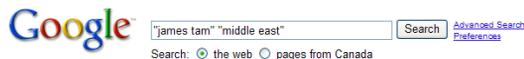
Enter the additional search criteria to narrow down the search



James Tam

Searching Within Previous Results (3)

- Of course these steps could have be consolidated into one step as well.



Web [Show options...](#)

[Hospitality News -- Events](#)

4 May 2009 ... The Senior Vice President Mr. **James Tam**, the Vice Presidents of Vietnam, Indonesia and The **Middle East**, Mr. G. Michael Bischof (Vietnam) Mr. ...
[www.hospitalitynewsmag.com/events.asp](#) - [Cached](#) - [Similar](#)

[PDF Page 1 PRESS RELEASE \(for immediate release\) SWISS-BELHOTEL ...](#)

File Format: PDF/Adobe Acrobat - [View as HTML](#)
Mr. **James Tam**, Senior Vice President ... The **Middle East** gears up for the Group's ... was attended by: Gavin Fauli, Chairman and President, **James Tam**, Senior Vice ...
[www.swiss-belhotel.com/doc/Jameth%20Borlagdan%20-%20SBEC%20and%20Branding%20Manager,%20SBI.pdf](#) - [Similar](#)

[PDF Memorandum](#)

File Format: PDF/Adobe Acrobat - [View as HTML](#)
Mr. **James Tam**, Senior Vice President ... The **Middle East** - SBI Regional Office ... Vice President - Operations and Development, The **Middle East** ...
[www.swiss-belhotel.com/doc/Jameth%20Borlagdan%20-%20SBEC%20and%20Branding%20Manager,%20SBI.pdf](#) - [Similar](#)
[More results from www.swiss-belhotel.com »](#)

[ICME 2006](#)

Co-Chairs: Liang Zhang, Communications Research Centre Canada, Wa **James Tam**, Communications ... Gozde Bozdagi Akar, **Middle East** Technical University ...
[www.icme2006.org/Papers/PublicSessionIndex3.asp?Sessionid=1136](#) - [Cached](#) - [Similar](#)

[speaking peace](#)

hey **james tam** here. i was deeply moved by this entry, really met my need for especially in conflict-ridden areas like the **Middle East**, Sierra Leone, ...
[community.livejournal.com/speakingpeace](#) - [Cached](#) - [Similar](#)

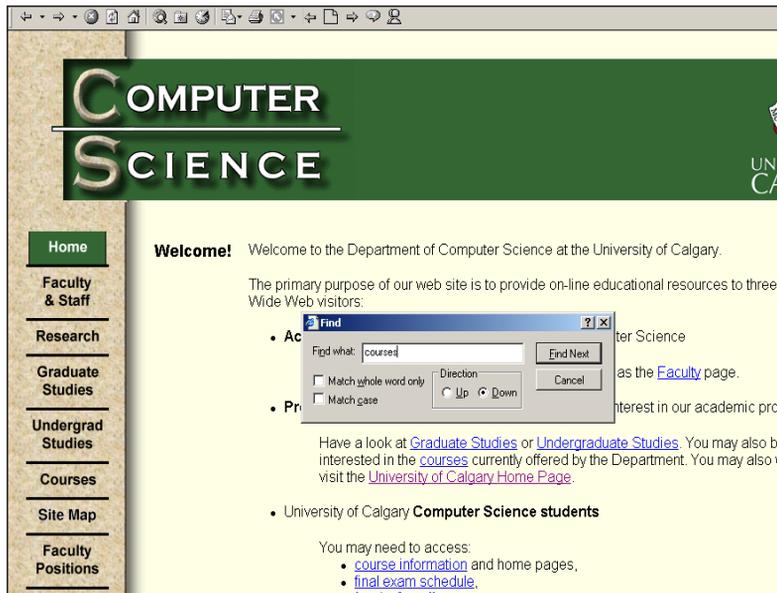
James Tam

Site Searches

- Useful when a webpage is large and/or not well organized:
 - Searching the viewed loaded page
 - Searching the entire site

James Tam

Searching The Currently Viewed Web Page



The screenshot shows a web browser window displaying the homepage of the Department of Computer Science at the University of Calgary. The page features a green header with the text "COMPUTER SCIENCE" and the University of Calgary logo. A navigation menu on the left includes links for Home, Faculty & Staff, Research, Graduate Studies, Undergrad Studies, Courses, Site Map, and Faculty Positions. The main content area contains a "Welcome!" message and a list of links. A "Find" dialog box is overlaid on the page, with the search term "course" entered. The dialog box includes options for "Match whole word only" and "Match case", and buttons for "Find Next", "Find Previous", "Cancel", and "Close".

COMPUTER SCIENCE UNIVERSITY OF CALGARY

Home
Faculty & Staff
Research
Graduate Studies
Undergrad Studies
Courses
Site Map
Faculty Positions

Welcome! Welcome to the Department of Computer Science at the University of Calgary.

The primary purpose of our web site is to provide on-line educational resources to three t
Wide Web visitors:

- Ac...ter Science
- Pr... as the [Faculty](#) page.

interest in our academic prog

Have a look at [Graduate Studies](#) or [Undergraduate Studies](#). You may also be interested in the [courses](#) currently offered by the Department. You may also visit the [University of Calgary Home Page](#).

- University of Calgary **Computer Science students**

You may need to access:

- [course information](#) and home pages,
- [final exam schedule](#).

Faculty & staff

James Tam

Searching An Entire Site

- Involves searching one entire site (and not just the one page from the site that is currently loaded into the web browser). Results from other sites will not be shown.
- Example:

Search only the Computer Science website for the desired text



Results are only from the Department of Computer Science

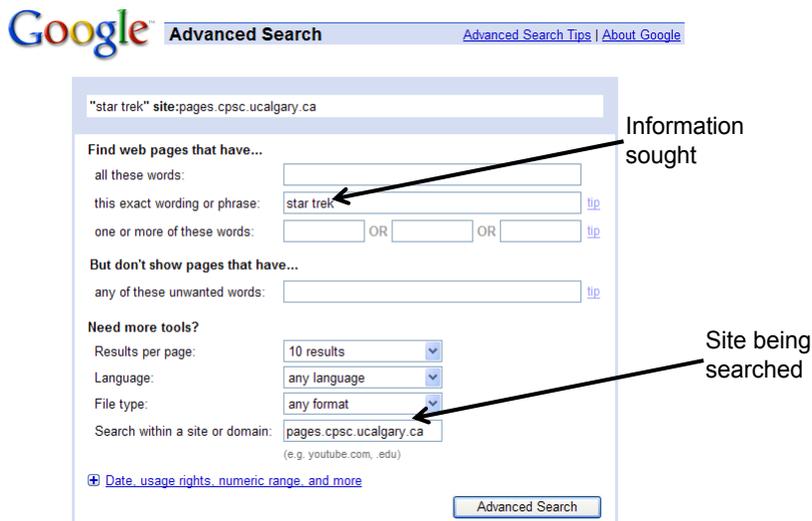
[Microsoft PowerPoint - logic](#)
File Format: PDF/Adobe Acrobat - [View as HTML](#)
(Fascinating). In this section you will learn some basic logical operations and how to evaluate expressions. Image from [Star Trek © Paramount](#). James Tam ...
[pages.cpsc.ucalgary.ca/~tamj203/notes/acrobat/logic.pdf](#) - [Similar](#)

[Microsoft PowerPoint - logic](#)
File Format: PDF/Adobe Acrobat - [View as HTML](#)
In this section you will learn what are the basic logical operations and how to evaluate different logical expressions. Image from [Star Trek © Paramount](#) ...
[pages.cpsc.ucalgary.ca/~tamj2008/217W/notes/acrobat/logic.pdf](#) - [Similar](#)

[QuickTime VR - An Image-Based Approach to Virtual Environment ...](#)
File Format: PDF/Adobe Acrobat - [View as HTML](#)
commercial CD-ROM title: [Star Trek/The Next Generation®](#). Interactive Technical Manual. ...
The making of the [Star Trek](#) title in a rather short time frame ...
[pages.cpsc.ucalgary.ca/~samavati/papers/othersthe-Artj09chen.pdf](#) - [Similar](#)
by SE Chen - 1995 - [Cited by 1184](#) - [Related articles](#)

James Tam

Searching An Entire Site: Advanced Search



James Tam

Other Advanced Search Features

Need more tools?

Results per page:

Language:

File type:

Search within a site or domain:

(e.g. youtube.com, edu)

[Data, usage rights, numeric range, and more](#)

Advanced Search

Click

[Data, usage rights, numeric range, and more](#)

Date: (how recent the page is)

[Usage rights:](#)

Where your keywords show up:

Region:

Numeric range:

(e.g. \$1600 \$3000)

[SafeSearch:](#)

Off On

Advanced Search

Additional search parameters

James Tam

Meta-Search Engines

- Searches the databases of multiple search engines automatically.
- Examples:
 - www.metacrawler.com
 - www.dogpile.com
 - www.search.com
 - www.mamma.com
- Drawbacks:
 - Searches occur in the simplest form
 - Timeouts
 - Number of results returned

James Tam

After This Section You Should Now Know

- What motivated the development of the Internet
- How long has the Internet existed
- What were the two things that was the main focus in the early development of the Internet
- What was the name of the first version of the Internet
- Some important milestones in the development of the Internet
- What is the Internet and how do protocols allow it to exist
- The important 'Who's' of the Internet
- Three different ways of connecting to the Internet and the characteristics of each
- Typical transmission speeds of the different Internet providers and the role of the Internet backbone

James Tam

After This Section You Should Now Know (2)

- How information is transmitted on the Internet using packets
- IP addresses: what is their purpose, how are they assigned
- How do search engines work
- Techniques for narrowing your search results and increasing the efficiency of your searches using Google
- Meta search engines: what are they, how do they work, what are some of their drawbacks/weaknesses

James Tam