Announcement ...

Searching The WWW

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Looking In the Right Place

Google is not necessarily the first place to look!

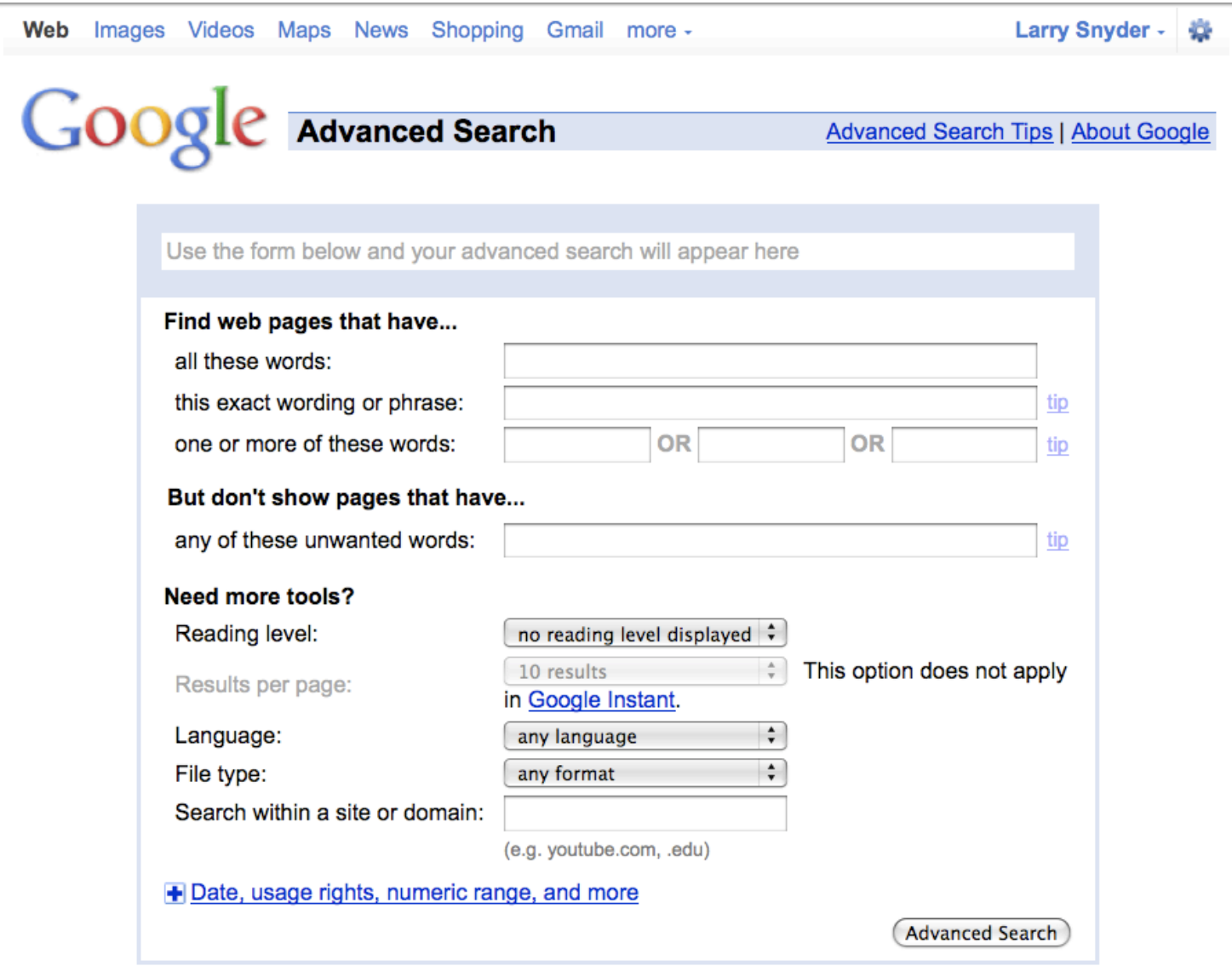
- Go directly to a Web site -- www.irs.gov

Guessing a site's URL is often very easy, making it a fast way to find information

- Go to your bookmarks -- dictionary.cambridge.org
- Go to the library -- www.lib.washington.edu
- Go to the place with the information you want -- www.npr.org

Ask, "What site provides this information?"

Google Advanced – Use It!

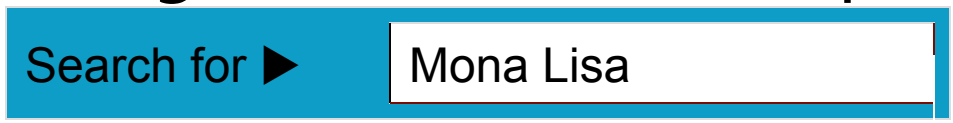


Caution!

- In the next few slides, the general principles of keyword search are discussed … Google and Bing "adjust" the results somewhat

Boolean Queries

Search Engine words are independent



- Words don't have to occur together

- Use Boolean queries and quotes
  - Logical Operators: AND, OR, NOT

    monet AND water AND lilies

    "van gogh" OR gauguin

    vermeer AND girl AND NOT pearl

Queries In Advanced Search

Searching strategies …

- Limit by top level domains or format … .edu
- Find terms most specific to topic … ibuprofen
- Look elsewhere for candidate words, e.g. bio
- Use exact phrase only if universal, … "Play it again"
- If too many hits, re-query … let the computer work
- "Search within results" using "-" … to get rid of junk

Queries, continued

- Once found, ask if site is best source
  - How authoritative is it?
  - Can you believe it?
  - How crucial is it that the information be true?
    - Cancer cure for Grandma
    - Hikes around Seattle
    - Party game

Search Engines

No one controls what's published on the WWW … it is totally decentralized

To find out, *search engines crawl* Web

- Two parts
  - *Crawler* visits Web pages building an *index* of the content (stored in a database)
  - *Query processor* checks user requests against the index, reports on known pages [You use this!]

Only a fraction of the Web's content is crawled

- We'll see how these work momentarily

HTML and the Web

- As you know, the Web uses http:// protocol
- It's asking for a Web page, which usually means a page expressed in hyper-text markup language, or HTML
  - *Hyper-text* refers to text containing links that allow you to leave the linear stream of text, see something else, and return to the place you left
  - *Markup language* is a notation to describe how a published document is supposed to look: fonts, text color, headings, images, etc. etc. etc.

Three Slides: Basics of HTML 1

- Rule 0: Content is given directly; anything that is not content is given inside of tags
- Rule 1: Tags made of < and > and used this way:

Attribute&Value

```
<p style="color:red">This is paragraph.</p>
```

Start Tag | Content | Tag | End

It produces: This is paragraph.

- Rule 2: Tags must be paired or "self terminated"

Example

Last Saved: 2/20/11 3:24:50 P
File Path : ~/Desktop/skiing.

skiing.html | Downhill Skiing!!!

```
<html>
  <head>
    <title>All Downhill From Here</title>
  </head>
  <body style="background-color:black;
               face:helvetica; color:white">
    <h1>Downhill Skiing!!! </h1>
      <img src="skier.jpg" alt="Skier In Snow"/>
  </body>
</html>
```

- Write HTML in text editor: notepad++ or TextWrangler
- The file extension is `.html`; show it in Firefox or your browser

Three Slides: Basics of HTML 2

- Rule 3: An HTML file has this structure:

```
<html>
    <head><title>Name of Page</title></head>
    <body>
                    Actual HTML page description goes here
    </body>
</html>
```

- Rule 4: Tags must be properly nested
- Rule 5: White space is mostly ignored
- Rule 6: Attributes (`style="color:red"`) preceded by space, name not quoted, value quoted

Three Sides: Basics of HTML 3

- To put in an image (.gif, .jpg, .png), use 1 tag

```
<img src="skier.jpg" alt="Skier in Snow"/>
```

Tag | Image Source | Alt Description | End

- To put in a link, use 2 tags

```
<a href="http://www.cs.uw.edu/cse120">Pilot </a>
```

Hyper-text reference – the link | Anchor

- More on HTML (including good tutorials) at http://www.w3schools.com/html/default.asp

Return To Search Engines

- How to crawl the Web:
  - Begin with some Web sites, entered "manually"
  - Select page not yet crawled; look at its HTML
    - For each keyword, associate it with this page's URL as in http://www.cs.uw.edu/cse120/example : downhill and http://www.cs.uw.edu/cse120/example : skiing
    - Harvest words from URL and inside <title> tags …
    - For every link tag on the page, associate the URL with the words inside of the anchor text, that is,

      http://www.cs.uw.edu/cse120/ : pilot
  - Save all links and add to list to be crawled

Net Result From Crawling A Page

- After crawling a page like

  `http://www.cs.washington.edu/education/courses/cse120/13wi/gallery.html`

  the crawler will associate many terms with the URL: Henry, Pong, Tron, … as well as `gallery`, [from anchor] and `cse120` [from URL]
- Terms from URL and anchor are more important in describing the page

Net Result of Crawling All Pages

- When the crawling is "done" (it's never done), the result is an *index*, a special data structure that a query processor can use to look up your queries:

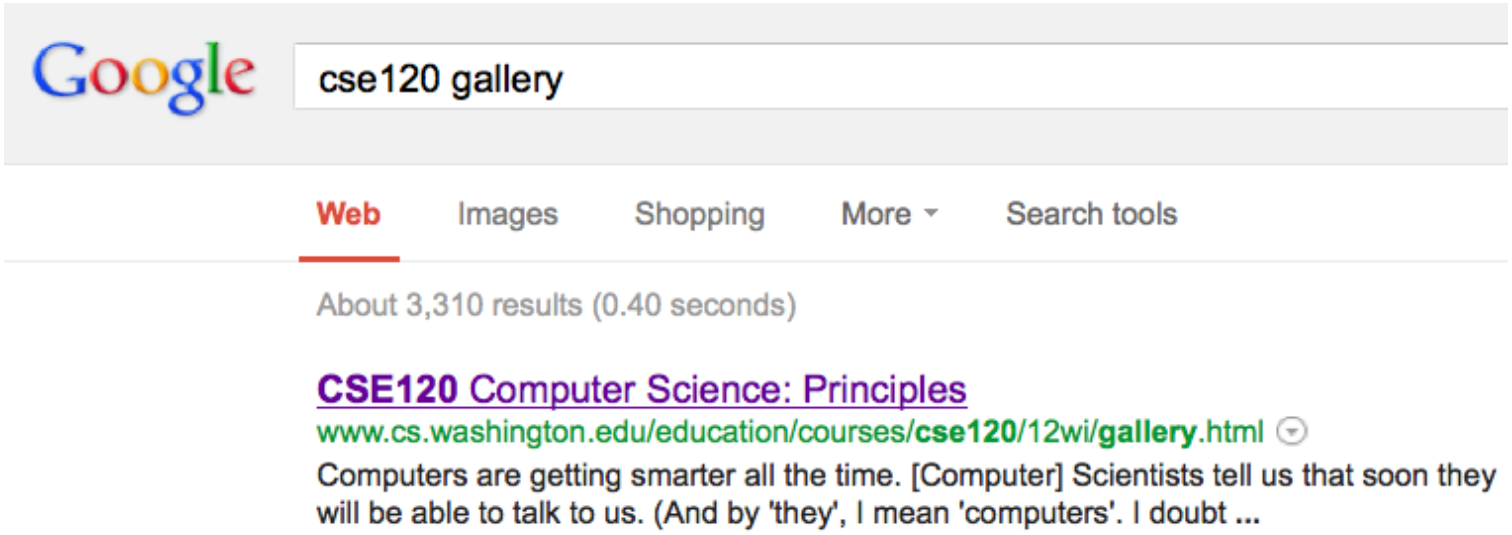
  Henry: …, `www.cs.washington.edu/cse120/gallery.html`, …

  Pong: …, `www.cs.washington.edu/cse120/gallery.html`, …

  Tron: …, `www.cs.washington.edu/cse120/gallery.html`, …

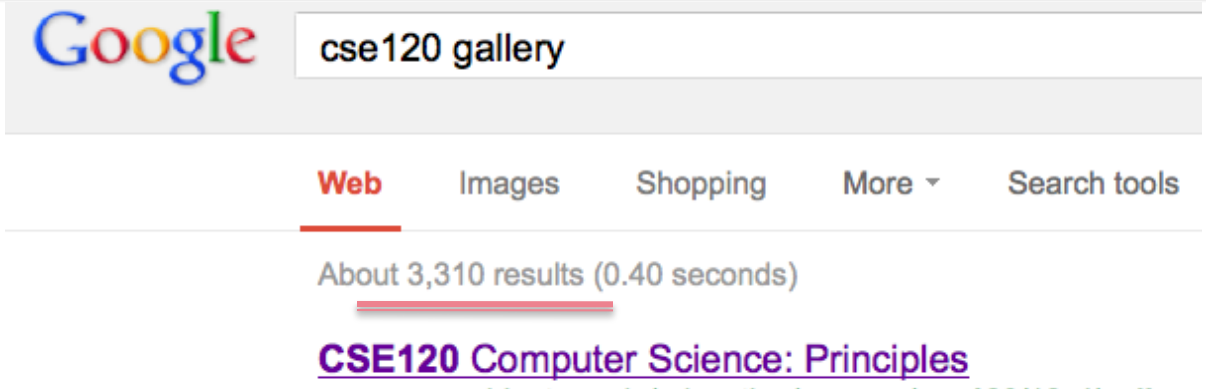
Make A Query

- When Google gets the query



- It "ands" the two lists together, finding URLs that are on both lists
- It counts them up, records time, shows 10 hits

Houston, We Have A Problem



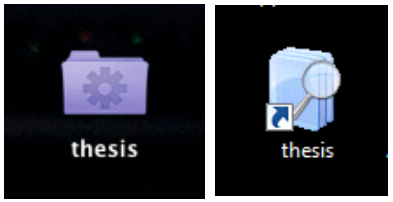
- You want the most likely hits … how does Google show you what you want?
- Page Rank – a mechanism to estimate the "importance" of a page; pages are listed by page rank, highest to lowest

Page Rank

- Google has never revealed all details of the ranking algorithm, but we know …
  - URL's are ranked higher for words that occur in the URL and in anchors
  - URL's get ranked higher if more pages point to them, it's like: A links to B is a vote by A for B
  - URL's get ranked higher if the pages that point to them are ranked higher

Crawling/Querying Personally

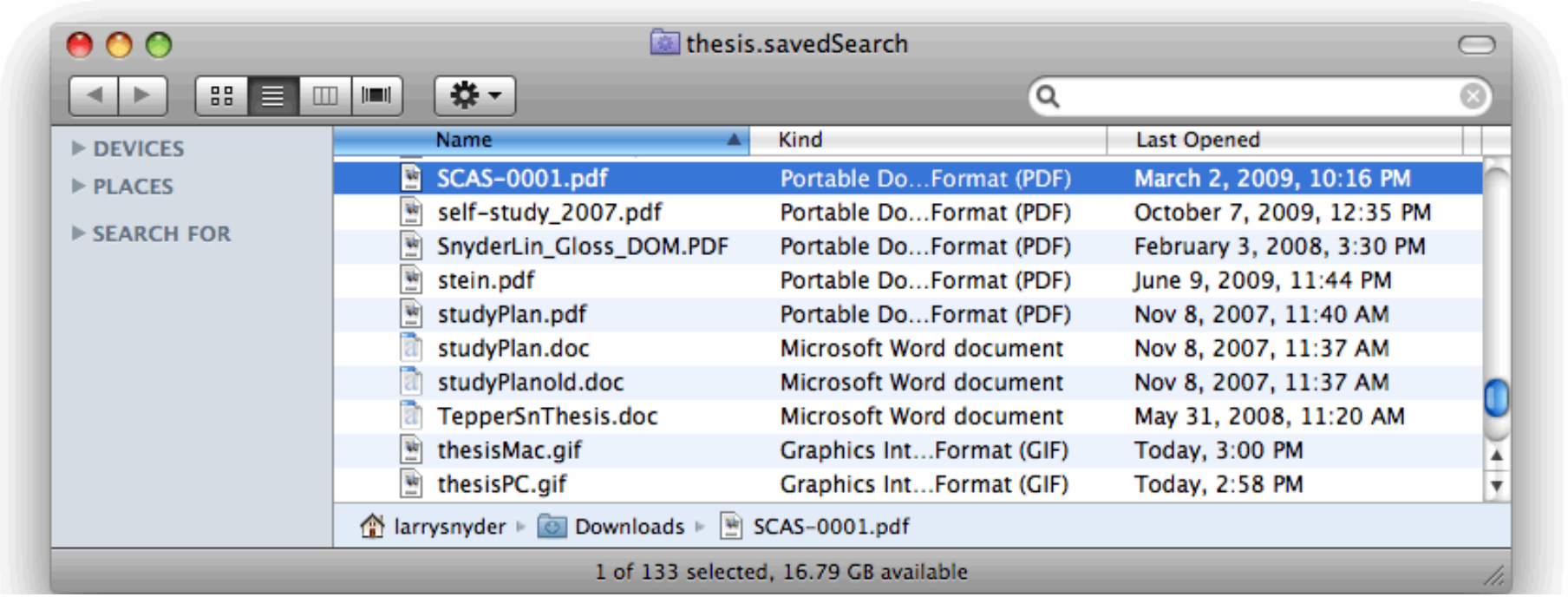
- Virtual Folders are a "crawling/querying" technology that helps you
  - Mac: Smart Folders
  - PC: Saved Folders



- In both cases your files are "indexed", that is, crawled, and the query you make results in a smart folder of the files that "hit"
- It's like Googling the stuff on your own computer

Query "thesis"

- The folder doesn't exist … it just contains links to the files shown



- Very convenient!

Search Engines … A Summary

- A search engine has two parts
  - Crawler, to index the data
  - Query Processor, to answer queries based on index
- In the case of many hits, a query processor must rank the results; page rank does that by
  - "using data differentially" … not all associations are equivalent; anchors and file names count more
  - "noting relationship of pages" … a page is more important if important pages link to it

Google, Bing, Yahoo and other Search Engines Use All of These Ideas