WEB ENGINEERING & DEVELOPMENT

SWE 363

Spring Semester 2008-2009 (082)

Module 1-1-2:
Internet Basics for Web Development

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Objectives/Outline

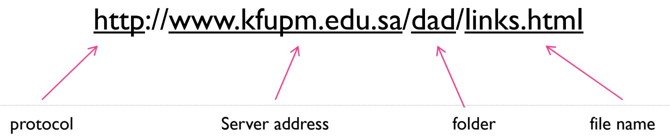
- Module Objectives
  - Learn the basics of the Internet and the Web
  - Identify and describe the key elements of the Internet and the Web

- Lecture Outline
  - URL Structure
  - Finding Information on the Web
    - Search Engines
    - Other means
  - Web 2.0
  - Questions & Answers

URL Structure

- Uniform Resource Locator (URL)
  - Represents the address of a resource on the Web
- URL defines:
  - Protocol used to access/transfer the document (such as HTTP or FTP; the default is HTTP)
  - Server that hosts the document and its domain name
  - Protocol port number of the server (optional; the default is 80)
  - Path and document name (the default is index.html)
- General form of URL

  protocol: / /server.domain_name:port/item_name
- Example



http://www.kfupm.edu.sa/dad/links.html

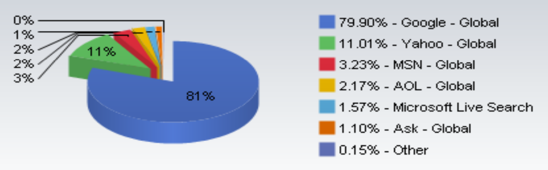
protocol Server address folder file name

Search Engines

- The Web provides a wealth of information on almost any topic – huge volume of online content
  - No central catalog is possible
- Search engines are the primary tools used to help find relevant information on a specific topic
  - search engine = an information retrieval system that helps find information stored on a computer system, such as the Web, that is relevant to a user query
- There are many search engines
  - Some of them are used for general search but others (called vertical search engines) focus on specific topics (e.g. bioinformatics, medical, Job, Business, real estate, travel, etc)
  - Examples of major search engines
    - Google, Yahoo, MSN, Infoseek, AltaVista, Ask.com, Excite, etc.
    - See a list of them at http://en.wikipedia.org/wiki/List_of_search_engines
  - Differ in their capabilities and the way they work

Search Engines …

- Total market share of major search engines



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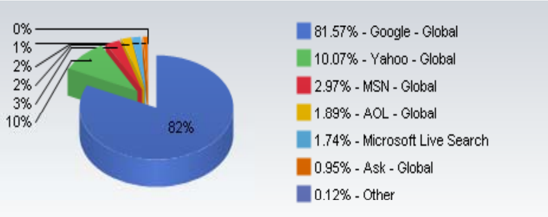
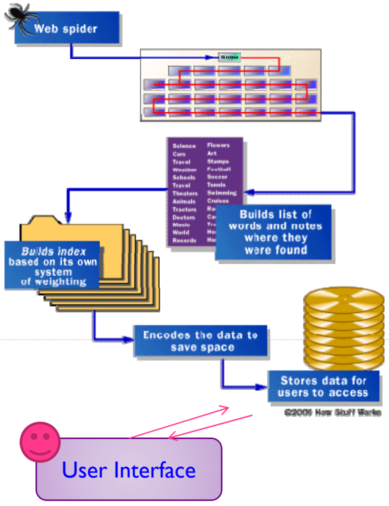


Feb 2009

[Source: Net Applications]

How Web Search Engines Work

- Web crawling (spider)
  - Navigates the web, retrieves web pages that satisfy certain criteria
  - Starts with a popular Web site containing lots of links, such as Yahoo then continues until it finds a logical stop, e.g. a dead end with no external links or reaching a number of levels inside the Web site's structure
- Indexing
  - Pages are analyzed and a list of words and notes (extracted from titles, headings and other special meta tags) are stored in indexes to facilitate quick information retrieval
- User interface
  - Web-Based GUI
  - Allows users to enter their search criteria (search query)
- Searching
  - A search engine stores information about web pages in a database
  - Records that best match the search criteria are returned to the user


Web spider
Builds list of words and notes where they were found
Builds index based on its own system of weighting
Encodes the data to save space
Stores data for users to access
©2005 How Stuff Works
User Interface

How Web Search Engines Work …

- Large search engines, such as Google, index tens to hundreds of millions of web pages involving a comparable number of distinct terms, and answer tens of millions of queries every day.
- Some search engines pre-process the user query to improve the retrieval performance (a process called *query expansion*), e.g.
  - Removing spelling errors
  - Searching for synonyms of the specified keyword
  - Stemming the given keywords to find all morphological forms
- Some search engines *rank* (sort according to relevance) pages that satisfy the criteria specified in the user query

Enhancing Site Visibility

- Search engine optimization (SEO)
  - Developing or tuning a website to improve its ranking in non-paid search engines; to maximize traffic to this site
- SEO can be done using
  - White hat SEO – refers to methods approved by search engines (i.e. do not attempt to deceive search engines), e.g.
    - Offering quality content
    - Using proper metadata and effective keywords
    - Having inbound links from relevant high-quality pages
  - Black hat SEO (spamdexing) – methods that are used to deceive search engines, these can result in temporal improvement, e.g.
    - Googlebomb (or link bomb) is a black hat SEO that attempts to trick the search engine to promote a certain page

Challenges Faced by Search Engines

- Size of the Web
  - Contains more than 3 billion documents, growing very fast and not indexed in any standard vocabulary
- Currency
  - Many Web pages are updated frequently, which forces the search engine to revisit them periodically.
- Relevancy
  - Because the queries one can make are currently limited to searching for key words, may result in many false positives
  - Better results might be achieved by using a proximity-search option or using organic search engines.

Challenges Faced by Search Engines …

- Problem with dynamically-generated Web sites
  - Because these sites may be slow or difficult to index, or may result in excessive results, perhaps generating 500 times more Web pages than average.
- Search engines can be tricked
  - To return pages, in favor of the trick makers, which contain little or no information about the matching phrases.
  - Making the more relevant Web pages pushed further down in the results list
- Indexing secured pages
  - Content hosted on HTTPS URLs pose a challenge for crawlers which either can't browse the content for technical reasons or won't index it for privacy reasons.

[Source: Wikipedia]

Other Ways to Find Info. on the Web

- Meta-search engines
  - have no databases or indexes but they use multiple other search engines and aggregate their results, e.g. WebCrawler
- Web directories
  - human- edited databases that store links in a categorized manner and information about these links (e.g. Yahoo! Directory, Business.com, etc); they can also be automatically created by mining the output of some search engines
- Web portals
  - large multi-service web sites that provides a single point of access to a variety of content and core services.
  - often includes customizable pages, calendars, discussion groups, announcements, reports, searches, email and address books, and access to news, weather, maps, and shopping, as well as bookmarks.
  - often organizes information into channels (customizable page containers) where specific information or an application appears to facilitate locating information of interest by content category.
  - Several universities uses it to create virtual campuses

Web 2.0

- Coined in 2003 by Dale Dougherty at O'Reilly Media to describe the noticeable shift in how people and businesses use the web and develop web-based applications
- In Web 1.0, companies and advertisers produce content for users to access – "brochure web"
- Web 2.0 provides collaborative community-based platforms that involve more user participation, interaction and community contributions
  - Users create content, help organize it, critique it, update it, etc
  - Users create open source software and make it available for anyone to use and modify
  - Users direct how media is delivered and which news and information outlets to trust
  - e.g. Wikis, YouTube, Flickr, MySpace, Facebook, LinkedIn, Google, etc
- Web 1.0 is as a lecture and Web 2.0 is as a conversation
- The growth of Web 2.0 can be attributed for some key factors
  - Improvements in hardware: cheaper and faster
  - Increasing memory capacities and speeds at a rapid rate
  - Broadband Internet access
  - Availability of abundant open source software has resulted in cheaper (and often free) customizable software options
  - Reduced cost of failure to start new Web 2.0 companies

Web 2.0

- User Generated Content
  - Allow users to edit existing content and add new information
  - Collaboration can result in smart ideas
  - But, users also might deliberately submit false or faulty information
    - Web 2.0 companies rely on collaborative filtering to help police their sites
    - Let users promote valuable material and flag offensive or inappropriate material
  - Wikis (What I Know Is) and social networks, e.g. Wikipedia, MySpace, YouTube, Facebook, LinkedIn, Second Life, etc
- Blogs ("Web logs")
  - Websites consisting of entries listed in reverse chronological order; exponential growth; bloggers = blog authors
  - Blogs can also now incorporate media, such as music or videos, e.g. Xanga or LiveJournal
- Social Media
  - Allows users to decide which news articles are most significant, e.g. Digg, Reddit
- Social Bookmarking
  - Allows users to recommend their favorite sites, e.g. del.icio.us, ma.gnolia
- Tagging
  - Labeling already existing web content by subject or keywords that allow anyone to locate information more effectively – pushing the content right to the user's desktop
- RSS feeds
  - RSS = Rich Site Summary
  - Allow users to receive new information as it is updated

Q & A

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Resources

- *Data Communications and Networking*, 4/e. B.A. Forouzan, McGraw-Hill Higher Education 2007. http://www.mhhe.com/forouzan
- The World Wide Web Consortium (W3C)
- The Anatomy of a Large-Scale Hypertextual Web Search Engine, by Sergey Brin & Lawrence Page at Stanford University
- Dive Into Web 2.0, http://www.deitel.com/freeWeb20ebook/