Internet – History, Present and Future

The Internet

Internet = **inter**connected **net**works

Internet is a ***publicly available worldwide system*** of mutually ***interconnected computer networks*** which transfer data and use the standard **Internet Protocol Suite (TCP/IP)** to serve billions of users worldwide.

It is a network of networks that consists of millions of private and public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic and optical networking technologies.

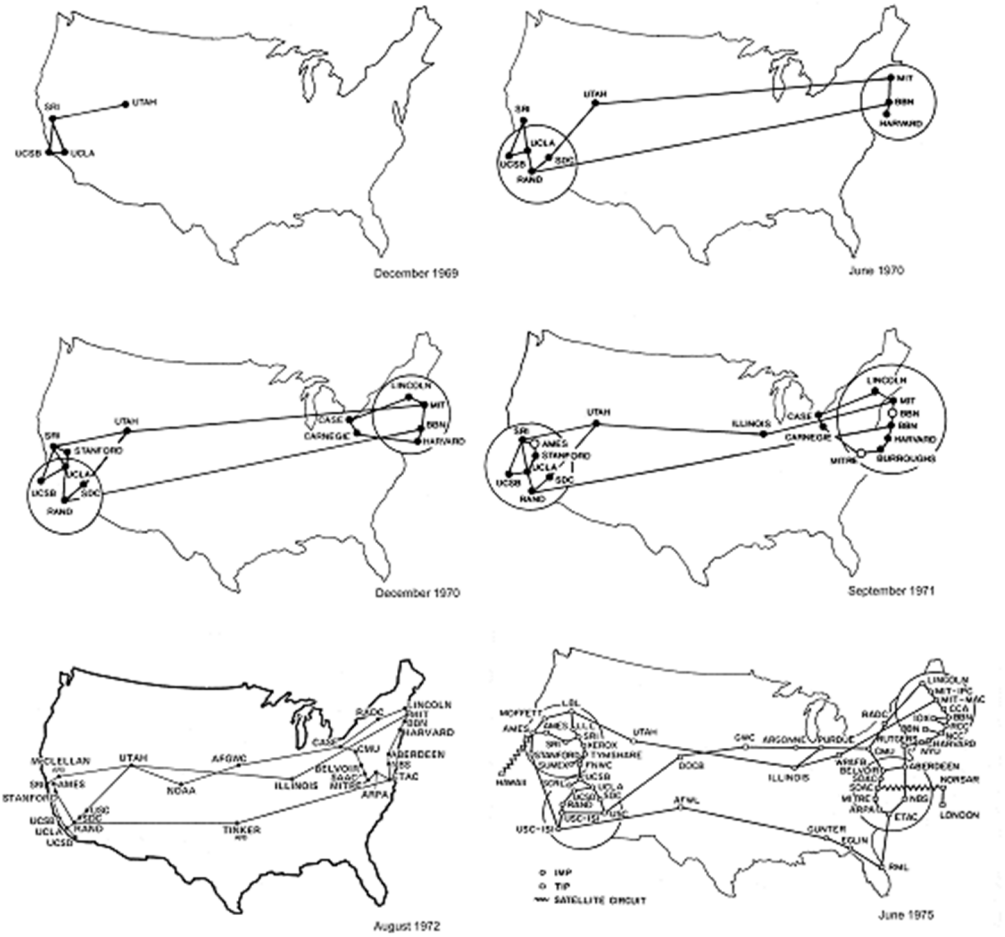
The Internet carries a vast array of information resources and services, most notably the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail.

Brief History

1960s

- A project of a communication network for the US Army (ARPANet) – goal: development of a decentralized network → it could work even if important US centers were destroyed by USSR nuclear attack. All previous versions of connections were centralized – one nuke would terminate all communication.
- 1969 – ARPANet was launched – 4 nodes at universities

- Later a network among universities, which cooperated on the ARPANet project, where it became very popular (fast and versatile communication and information exchange) – emails, BBS



1969 – Request for Comments (RFC): informal documents describing network standards, protocols etc. Later the RFCs became official documentation of how the Internet and related technologies work (e.g. RFC 791 defines the IP protocol).

1970s

- development of the key technologies
- 1971 – the 1st email (the creator sent it to himself and its text was –probably – "QWERTYUIOP" – guess why ☺
- FTP protocol was developed – transfer of files between computers
- Global network – ARPANet connections with UK and Norway
- USENET – discussion groups

1980s

- Explosive growth of the ARPANet, mostly due to commercial use
    - 1981 – ARPANet had 200 nodes
    - 1986 – 10 000 nodes
    - 1989 – 100 000 nodes
- Main service: email – cheap, instant communication
- DNS was developed
- The 1st worm crashed cca 6% of servers

1990s

- Tim Berners-Lee at CERN developed the WorldWideWeb (WWW) – transfer of HTML documents from web servers to web browsers using URLs and HTTP protocol
- The first website – still active: http://info.cern.ch/
- Explosive growth of WWW, which became substantial part of the Internet:
    - 1991 – 10 web sites
    - 1992 – 50 web sites
    - 1993 – 623 web sites
    - 1994 – 10 022 web sites
    - 1995 – 23500 web sites
    - 1996 – 100 000 web sites
- First web browsers: Mosaic, Netscape, Internet Explorer
- Netscape introduced
    - Plug-ins
    - Java applets
    - **Javascript**
- 1994 – Yahoo! launched – the largest **web directory** – not a search engine as we know it today, but a collection of categorized links maintained by human staff

- 1996 – Internet Archive (http://web.archive.org) started archiving the Web

- 1998 – **Google** was founded

- 1999 – HTML 4.01 was officially published; it was the official standard up to 2014, when HTML5 was released.
- 1990s – relatively cheap and simple access for home users over telephone lines

2000s

- DOTCOM bubble (*speculative investments into Internet companies without any serious business plan*) burst almost terminates any further development of the Internet
- Lots of popular services were founded:
    - 2001 – WIKIPEDIA – one of the first Web 2.0 services (Web 2.0 – content = made by cooperating users)
    - 2002 – Blogs were becoming popular
    - 2003 – iTunes was started
    - 2004 – MySpace – the first popular social network (there were some earlier attempts; however, none of them reached MySpace popularity at that time)
    - 2005 – YouTube
    - 2006 – Twitter; Facebook almost immediately took over the world of social networks
    - 2008 – Firefox 3 was the most downloaded app in 24 hours; Google released Chrome
- Commercial services thanks to encrypted protocols (HTTPS, SSL, TLS) – e-shops, internet banking, PayPal
- E-services emerged: e-government, e-health, e-management
- Apple iPhone

2010s

- Majority of connections to Internet and Web is made from smartphones
- Cloud services – storage and backup – Dropbox, OneDrive, Google Drive; cloud applications – Google Docs, Office365, Adobe Creative Cloud, Deezer, Spotify, …
- Internet of Things – connections of smart devices (cars, sensors, TVs, cameras, …) over the Internet

Internet Search

Search Engine

A service, which helps users to retrieve useful information

There are various search engines; however, none of them gained the popularity and versatility of the **Google** Search Engine. Its popularity is behind a relatively new verb = to google, i.e. to look for something using the Google search.

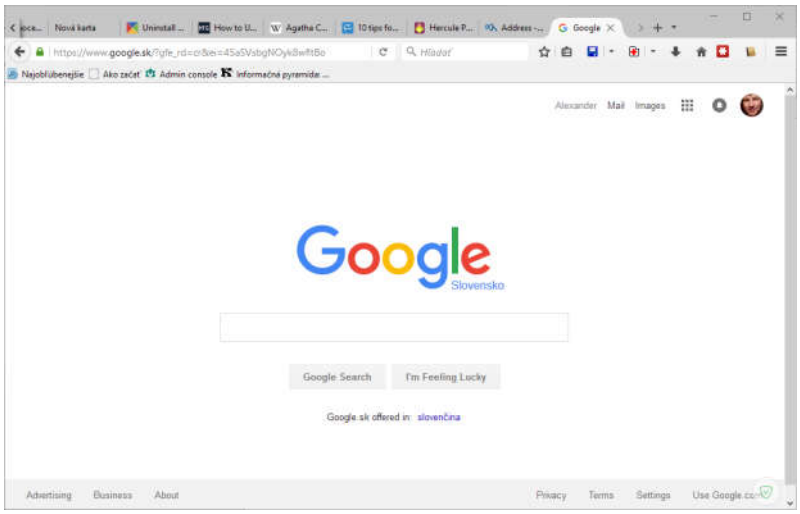
Other search engines:

- **General**
  - **Bing** (http://www.bing.com/) – it is more-over the only search engine we are familiar, which can be used in China.
  - **Answers** (http://www.answers.com/)
  - **Qwant** (https://www.qwant.com/)
  - **DuckDuckGo** (https://duckduckgo.com/) – this one does not keep information about its users
  - **Ask** (http://www.ask.com/)
- **Metasearch Engine** – simultaneous search at several search engines
  - **Sputtr** (http://www.sputtr.com/)
- **P2P**
  - **Faroo** (http://www.faroo.com/)
  - **YaCy** (http://www.yacy.net/en/)
- **Topic Specific**
  - **Google Scholar** (https://scholar.google.com) – books, articles, patents
  - **Profesia.sk** (http://www.profesia.sk/) – jobs
  - **Ahmia** (msydqstlz2kzerdg.onion) – darknet search engine –available over the Tor
  - **SoundHound, Shazam** – music search – over a smartphone application

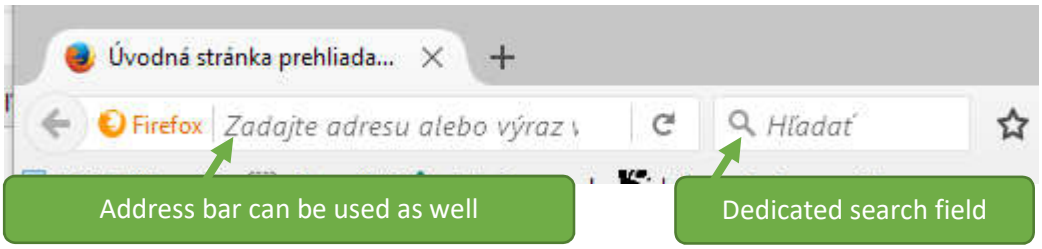
Search Engine Interface

- the place, where the **query** (*i.e. keywords, which identify the searched information*) is addressed to the search engine.

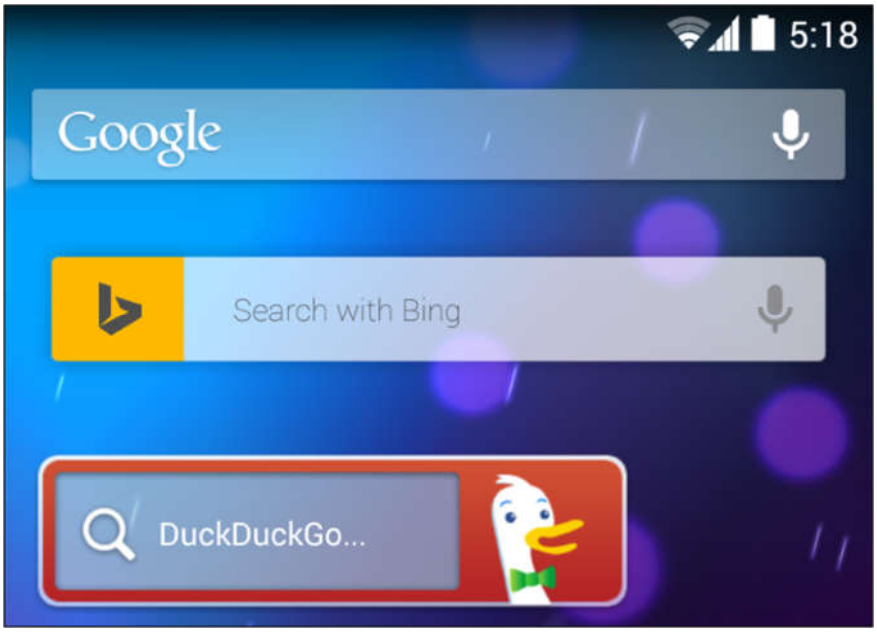
Website



Search Field in a Browser



Integrated in the operating system/Widget



How Search Engines Collect Information

First of all search engines will crawl the webpages using spider or robot. The spider or robot is software that finds web pages and stores the information (HTML text contents) into the database of search engines. Search engines will change their technology frequently to get most relevant search result for user. This is called **search engine algorithm**.[1]

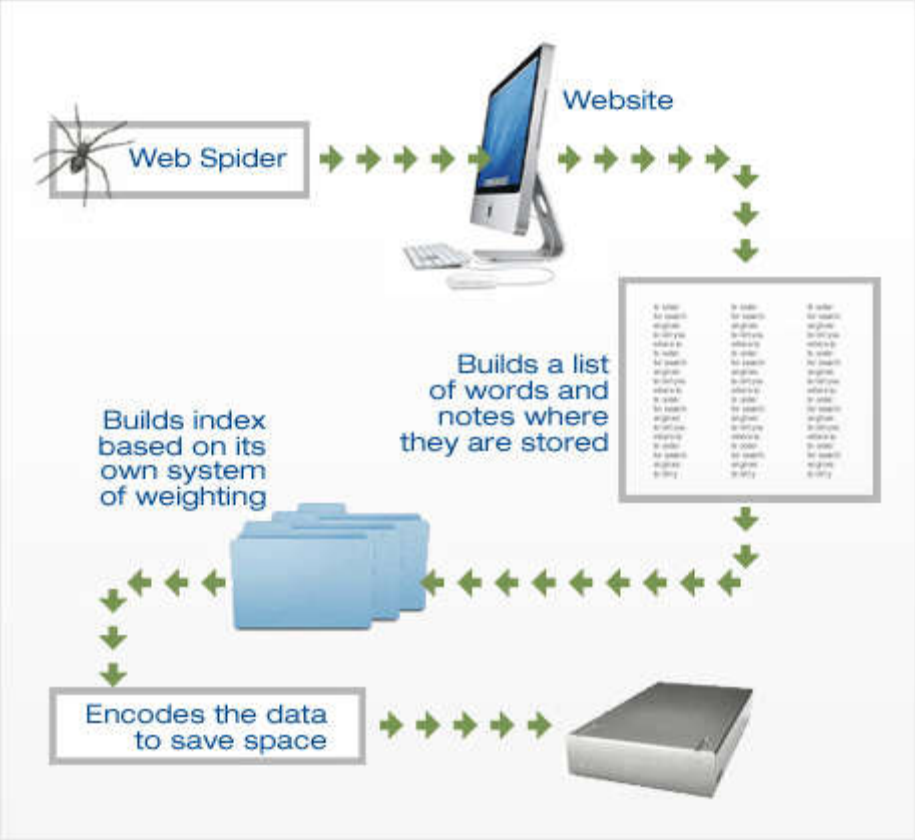


Figure 1: Search by Crawler (source: http://www.fastseotips.com/seo/basic-seo-tips-for-beginners/)

[1] http://www.fastseotips.com/seo/basic-seo-tips-for-beginners/

Answer Engine

- Ordinary search engine returns the result in the form of a list of websites
- The answer engine is a more sophisticated system, which tries to answer the query directly
- Examples: [WolframAlpha (http://wolframalpha.com)]
- It is quite difficult to mention all possibilities – there is an option to learn by random queries or premade examples

- Some examples you may try
  - x2-5x+2=0 (quadratic equation)
  - earthquakes in Slovakia from 1950 to 2010
  - atomic weight beryllium
  - population of New York
  - heart beat rate
  - benzene

Search Assistants

An answer engine combined with the speech recognition:

- **Siri** – iPhone, iPad
- **Cortana** - Windows
- **Google Now** – Android, ChromeOS, Chrome

Their availability and functionality can be limited depending on the country.

Various Search Tools

Google Goggles – recognition of real objects using their photos

SoundHound, **Shazam** – audio search

Useful Tips for Googling

Exact Phrase

- To find exact phrase (exact words in the given order) surround them by quotation marks

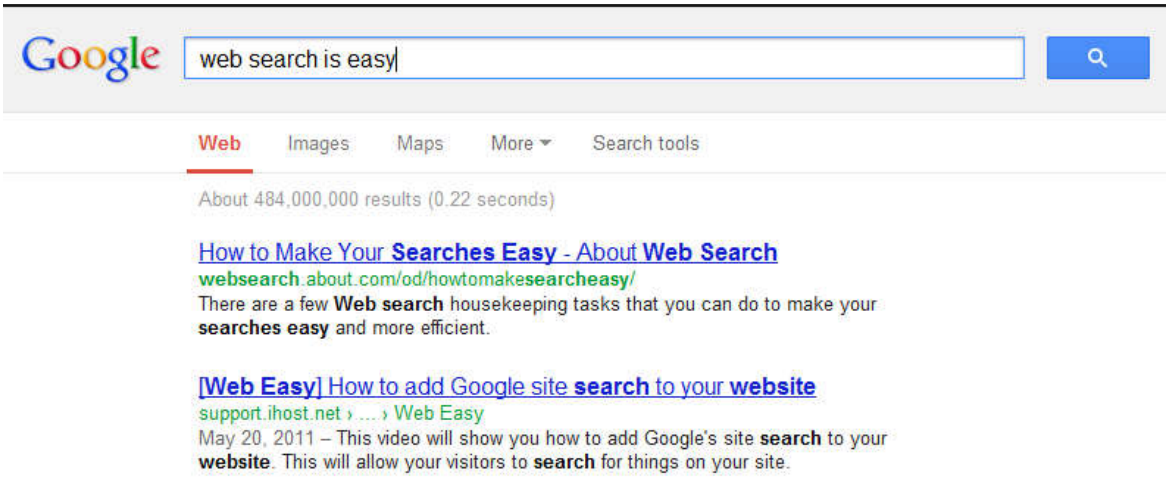


Figure 2: Standard Query

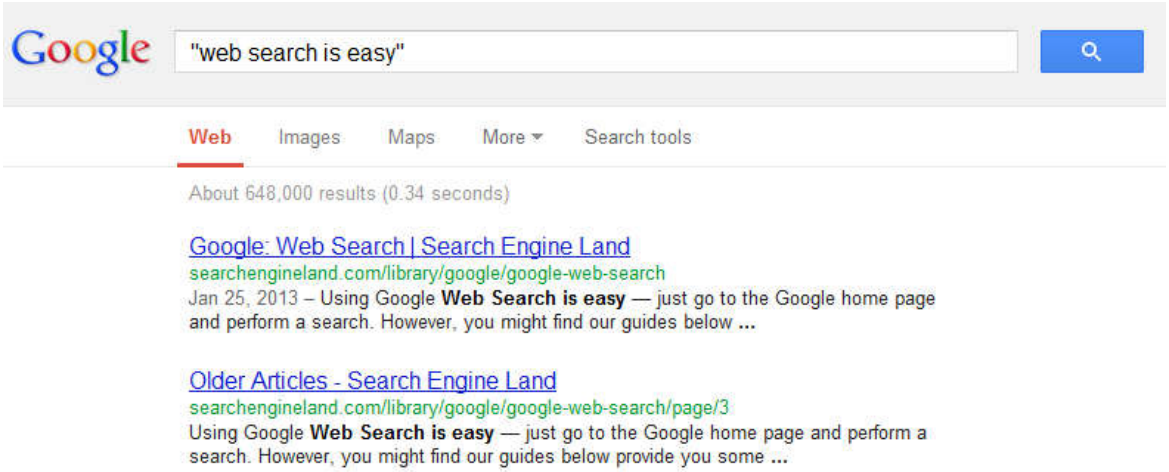
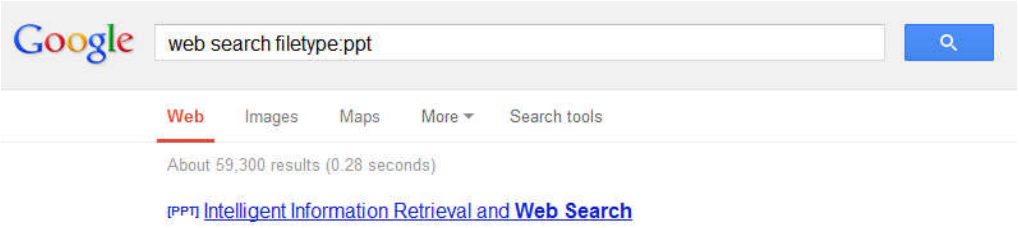


Figure 3: Exact Phrase Query

Only Specific File Type

- Type **filetype:*file_extension*** next to keywords – works for **ppt**(PowerPoint slideshows), **pdf** (PDF documents), **doc** or **docx** (Word documents), **xls** (Excel spreadsheets) etc.

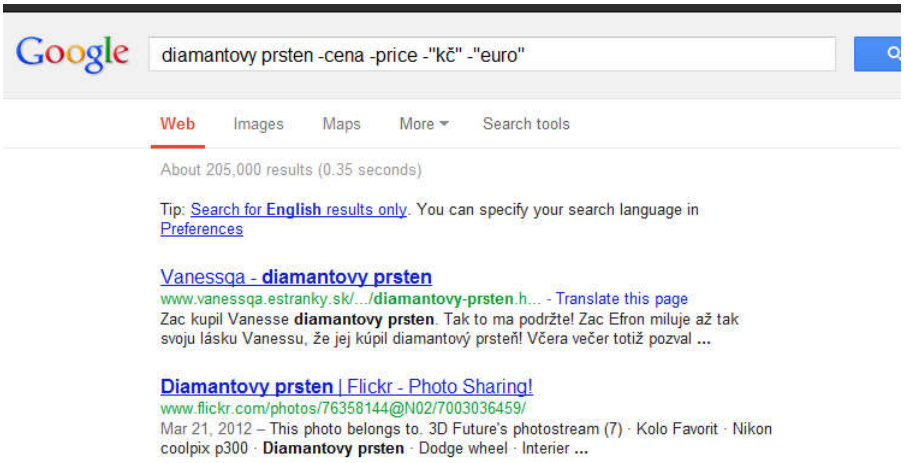


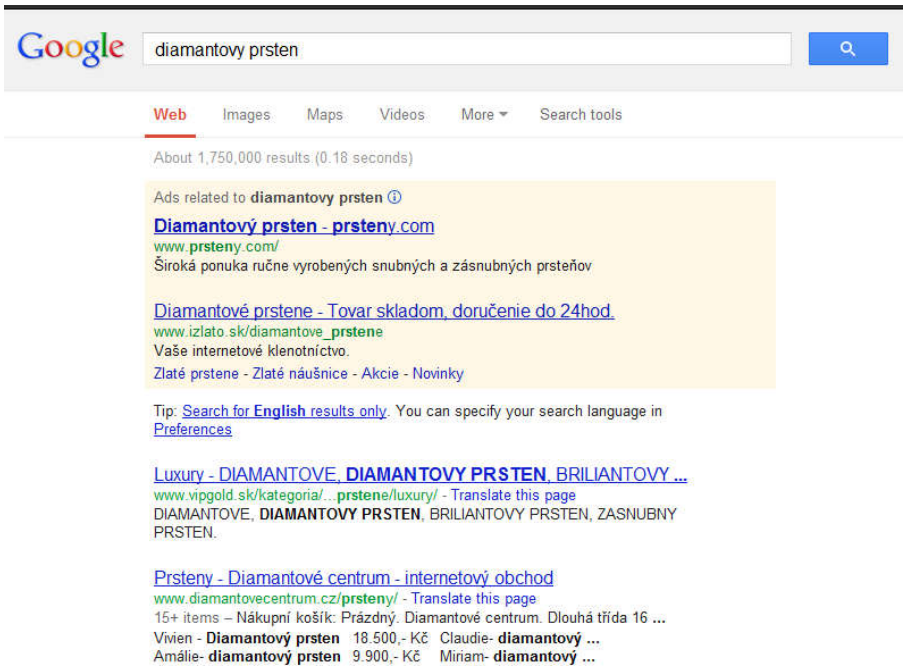
Only Specific Domain

- Type **site:*domain*** next to keywords
- Examples
  - *Hard disk site:sk* – look for web pages about hard disk, Slovak domains only
  - *Zmluvy site:bratislava.sk* – look for web pages about deals within the Bratislava website

Exclude Words from Search

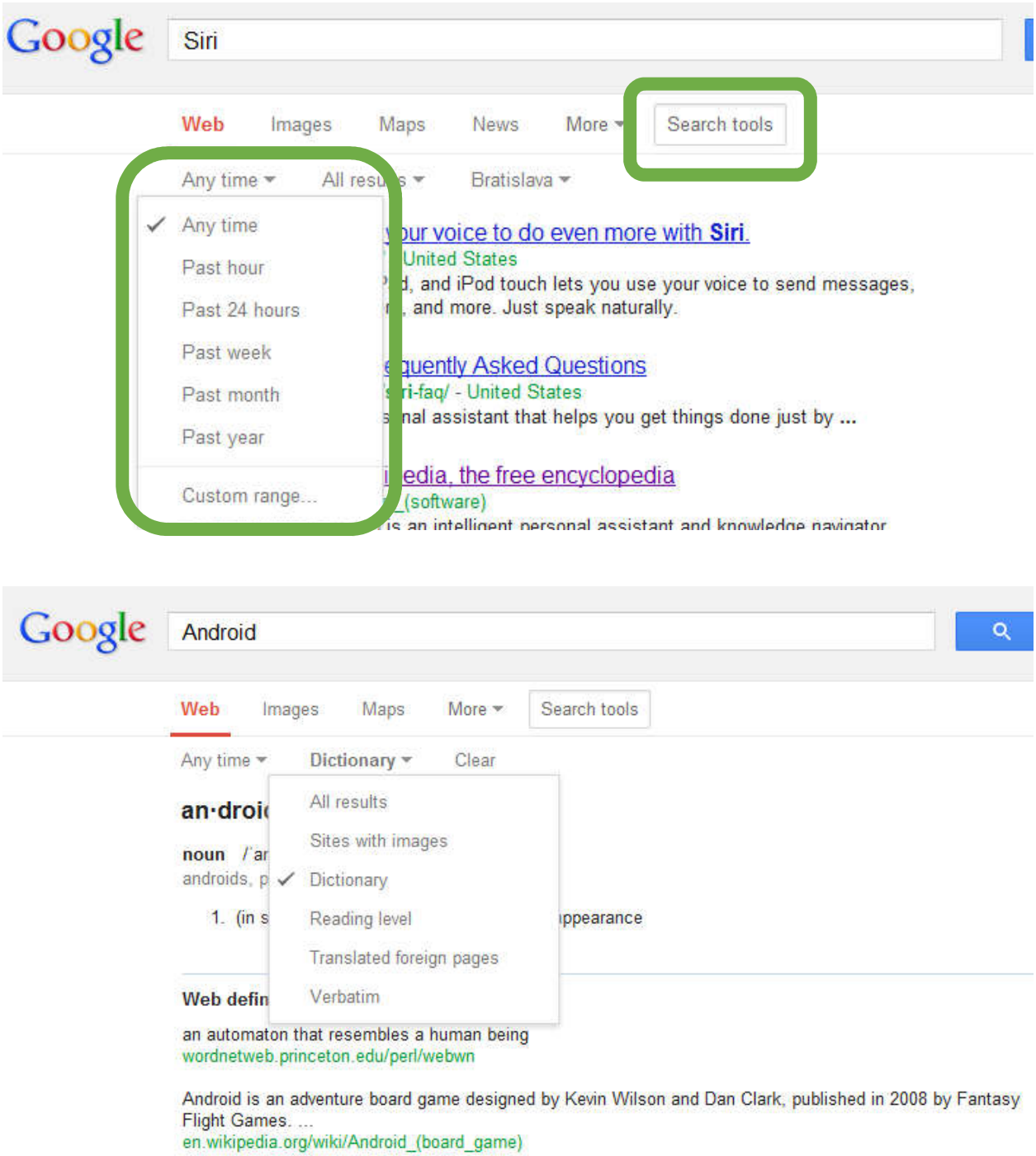
- If there is a word, which is undesirable in the search result, type it into query with minus sign (-) right in front of it
- Example
    - *Hard disk –price* – look for web pages about hard disks, where the word price is **not** mentioned





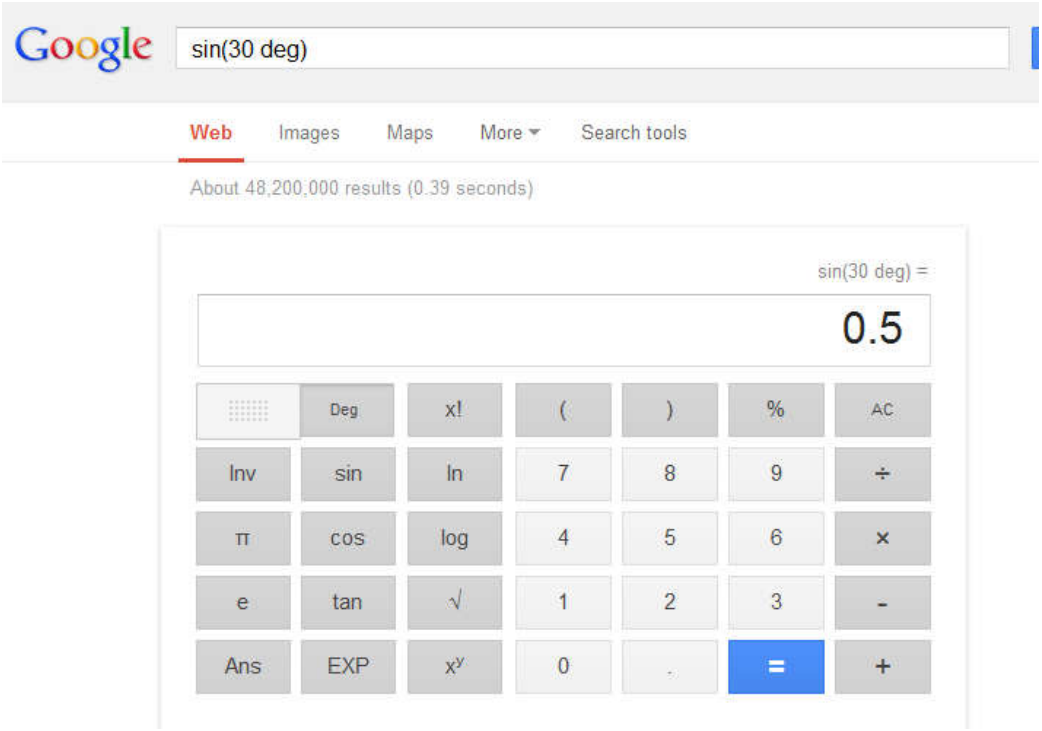
Search Tools

- It allows further specification of the query



Some More Tools @ Google

- **Calculator** – just type a mathematical expression, e.g. 210+154, 45^3 (it means 45 cubed) or sin(30 deg)



- **Units convertor** – type the number, input unit, and the output unit; e.g.
  - 200 pounds kg
  - 300 cm inches
  - 250 dollars in euro
  - 3000 czk in euro
- **Weather** – type **weather:location**, e.g. weather:zilina or weather:Singapore

- **Function Plots**
  - type the function definition, e.g. sin(x+2y) or x^4-cos(x)=0