

Lecture

CS571 - Course Introduction

CS571: Web Technologies

- Instructor: Prof. Ellis Horowitz
- office: SAL 320
- email: horowitz@usc.edu
- office hours: Tuesday/Thursday 8:30-9:30 AM and 11:00-noon or by appointment

- Instructor: Prof. Marco Papa
- office: PHE 514
- email: papa@usc.edu
- office hours: Thursday 4:30-5:15 PM, or by appointment

General Rule

NO D-CLEARANCE

Course Objectives

- This course focuses on the phenomenon known as the World Wide Web
- Core technologies are:
 - HyperText Markup Language (HTML) and Cascading Style Sheets (CSS) for laying out (formatting) pages that contain text, graphics, audio and video components
 - HyperText Transfer Protocol (HTTP), the communication standard whereby Web browsers and Web servers communicate
 - Web servers, their configuration and performance properties
 - Extensible Markup Languages (XML), a mechanism for defining new tag sets and interchanging data
 - Server-Side programming using PHP
 - Client-side programming using JavaScript
 - Ajax Development Style
- Other Technologies of Interest
 - Responsive website design
 - Web services (REST)
 - Web security
 - Web technologies for mobile phones
 - Cloud computing

General Information

- Lectures:
 - Section 1: Tuesday - Thursday 12:30AM - 1:50PM
 - Section 2: Tuesday - Thursday 5:30PM - 6:50PM
 - Section 3: Tuesday - Thursday 7:00PM - 8:20PM
- Producers: see course website for office hours
- The course website is located at
<http://cs-server.usc.edu:45678/>
- Assignments - yes
- Two **Exams**, one in the middle and one towards the end
- Mobile Application final assignment
- Attendance - up to you

Relatively New

- **Student Disk space:**
 - Upgraded from 150MB to 0.5GB
- **CGI software: PHP**
- **Latest software for projects:**
 - Apache 2: version 2.2.22
 - PHP: version 5.4.5
- **Website in the cloud**
 - Using Amazon's Elastic Compute Cloud

Reading Materials

- No required textbook
- Class Slides are available online on the class website
Click on the  or  icon
- Recommended reading
 - the W3C site contains the formal specifications for (almost) all of the technologies; www.w3c.org
- O'Reilly & Associates publishes many relevant books:
 - *HTML & XHTML: The Definitive Guide*, 5th Edition by Chuck Musciano and Bill Kennedy, O'Reilly and Associates;
 - *JavaScript: The Definitive Guide*, 5th Edition by David Flanagan, O'Reilly and Associates;
 - *HTTP: The Definitive Guide*, Gourley, et. al. O'Reilly & Associates
 - Access O'Reilly books online at <http://safari.oreilly.com>
- For PHP:
 - *Learning PHP, MySQL, JavaScript, CSS & HTML5* by Robin Nixon, O'Reilly & Associates
- For Mobile SDKs:
 - Several books on iOS, Android and Windows Phone SDKs

Other Issues

- Class Sign up list
 - On the Home page click on the green "Sign Up" button at the right; fill in the form; Remember to record your number: it will be used to look up your scores.
- Class news group
 - We use Piazza; you will receive an invitation to join Piazza at the email address you provided during class signup process on CSCI571 web site. Activate your membership using the invitation link in the email, and create a login password. Or join at:
piazza.com/usc/spring2015/csci571/home
- Academic integrity policy
 - Do NOT submit the same program; you can discuss the project with fellow students, but do not develop code with other students; we have tools to check for similar code
- Downloading course software
 - all software can be downloaded from the class website; and all installation instructions correspond to this version of the software

Take a Look at Piazza

general advice
retrieved from
last semester

The screenshot shows a web browser window with the title bar "File Edit View History Bookmarks Tools Help" and the address bar "https://piazza.com/class/hxnr3xbzvl56m". The main content area displays the Piazza interface for the "CSCI 571" class. At the top, there are tabs for "Q & A", "Course Page", and "Manage Class". On the right, a profile picture of "Ellis Horowitz" is visible.

The left sidebar lists several posts:

- Tip 1: Add link to a question**: When a question has already been answered, it is nice to add a link to the original Q&A exchange, when the same ques
- Homework # 3: Practice Writ...**: The full description of the assignment can be found here: <http://cs-server.usc.edu:45678/hw/hw3/HW3>Description.pdf>
- Homework # 2: Creating Your...**: Students need to establish a directory in which they can store web pages that will be delivered by USC's student web
- Homework # 1: Join the Clas...**: Well, if you reading this message, you have successfully joined the class newsgroup. Sorry, but there will be no points
- Welcome to CSCI 571!**: Welcome to our class discussion on Piazza dedicated to questions related to all homework exercises and labs of CSCI 571.

Below these, under "WEEK 7/13 - 7/19", are three private posts:

- Introduce Piazza to your stud...**
- Get familiar with Piazza**
- Tips & Tricks for a success...**

At the bottom, a post titled "Welcome to Piazza!" is shown, describing Piazza as a Q&A platform designed to get great answers from classmates and instructors fast. It includes a link: https://piazza.com/demo_login?nid=hxnr3xbzvl56m&auth=ff4abc4.

The right side of the screen shows the "Class at a Glance" summary:

	20 unread posts	21 total posts
no unanswered questions	172 total contributions	
no unresolved followups	0 instructors' responses	
	0 students' responses	
	n/a avg. response time	

It also shows "Student Enrollment" with 13 enrolled students out of 350 (estimated).

Share Your Class: Professors appreciate Piazza best when they see how it is being used. Allow colleagues to view your class through a demo link - a restricted, read only version of your class where all students' names are anonymized and all student information hidden.

https://piazza.com/demo_login?nid=hxnr3xbzvl56m&auth=ff4abc4

Opening this link in the same browser will log you out as horowitz@usc.edu

Web Technology Videos Available

(see Additional Resources | Videos)

The screenshot shows a web browser window with the following details:

- Page Title:** CSCI 571 - Web Technologies
- Page Subtitle:** Fall 2014
- Navigation Bar:** Home, Lectures, Homeworks, Grades, Software, More
- Selected Tab:** Videos
- Content Area:**
 - CSCI 571 Lynda Web Videos**

lynda.com is a website that develops online software training, or as they advertise it "videos that really work". USC has paid for the entire campus to have free access to these videos. Many of the videos have to do with various aspects of Web Development. Many of the videos are quite good.

To access these videos, go to <http://www.usc.edu/its/lynda/> and login. It may be possible to do so from outside the campus networks as well, since the USC Shibboleth prompts you for the USC login

Their entire list of videos can be found [here](#). Below is a selection of videos that apply directly to this course.

 - CSS**
 - CSS Web Site Design
 - CSS Fundamentals
 - CSS Page Layout
 - CSS: Core Concepts
 - CSS Styling Forms
 - CSS for Developers
 - CSS Positioning Best Practices
 - HTML 5**
 - HTML5: Document Editing in Depth
 - HTML5: Messaging and Communications in Depth
 - HTML5: File API in Depth
 - HTML5: Geolocation in Depth
 - HTML5: Managing Browser History
 - HTML5: Drag and Drop in Depth
 - HTML5: Graphics and Animation with Canvas
 - HTML5: Video and Audio in Depth

The screenshot shows a web browser window with the following details:

- Page Title:** ITS - Lynda
- Page URL:** www.usc.edu/its/lynda/
- Page Content:**
 - ITS Information Technology Services**

A division of the Office of the Chief Information Officer

 - Getting Help
 - Your USC Account
 - Network Connectivity
 - Email & Google Apps
 - Security
 - Lynda.com Overview**

Lynda.com is an online training provider offering more than 1,200 video-based courses on a broad range of computing and technology topics.

Topics covered include Google Apps, Adobe products, Microsoft Office, web design and development, audio/video production, computer programming, and mobile devices, among others.

These courses are broken into 5-15 minute tutorials that are taught by subject-matter experts. These courses can be accessed around-the-clock for convenient, self-paced learning.

Free access to lynda.com is available to all current USC faculty, students, and staff.

Lynda.com Support Resources
 - [Lynda.com home page](#)
 - [Lynda.com FAQ](#)

Logging in to Lynda.com

Click the button below to log in to lynda.com.

Log in to Lynda.com

Characterizing the Web

- How many web sites are there?
- How many web pages are there?
- Invisible Web – what is missing
 - Searchable Databases – Most of the invisible web is made up of the contents of thousands of specialized searchable databases that you can search via the Web.
 - Excluded Pages – There are some types of pages that search engine companies exclude by policy.
- For more information on the invisible web see,

<http://www.robertlackie.com/invisible/index.html>

[http://www.lib.berkeley.edu/TeachingLib/Guides/
Internet/InvisibleWeb.html](http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/InvisibleWeb.html)

Characterizing Web Content

There are very few studies that examine the types of content on the web, however . . .

(From IEEE Spectrum, Jan. 2004, pp. 75) :

- Claim: 30% of the web is porn
- Claim: 30% of the web is duplicate information
 - There are lots of mirrored sites
- 50,000,000 pages are either new or changed *each day*
- 65% of the web pages are in English
 - There is a trend towards content in many languages

(From Personal Computer World, Optenet, Sept. 2008) :

- Claim: 35% of the web is porn, 11% is e-commerce
- <http://www.optenet.com/en-us/new.asp?id=162>

(From Forbes, Sept. 2011) :

- Claim: 4% is porn, 13% are porn Web Searches
- <http://www.forbes.com/sites/julieruvolo/2011/09/07/how-much-of-the-internet-is-actually-for-porn/>

Sample Web Sites (Modest Size)

- Running a web site can get complicated; here is one example.
- The facts:
 - www.fogdog.com, online sale of sporting goods
 - Revenues: \$5 million per year
 - 2.2 million page views per month
 - average of 20,000 unique visitors per day
- The solution (in-house):
 - commodity hardware
 - Linux server running Apache 2.0 web servers
 - Using MySQL data base
 - This is a low cost solution
 - They just moved to Ebay!

Sample Web Sites (Medium size)

- Here is a popular, alternate strategy for maintaining a web site
- The facts:
 - www.autobytel.com, new and used cars
 - Market Cap: \$98.31M (Jan. 2015)
 - Yearly Revenues: \$100.93M (Jan. 2015)
 - 500,000 purchased vehicles in 2013
 - 11,635 unique visitors (Q108)
 - Mobile version launched in 2012
 - Stock symbol: ABTL (Nasdaq)
- The Microsoft solution:
 - Microsoft Windows Server
 - Microsoft IIS 7.5 web server on Windows, plus proprietary software facilitating car purchase
 - Microsoft SQL server database
 - Akamai CDN
- The above solution is costly, but support is good and there are many people with the requisite skills that can be employed

Sample Web Sites (large size)

- The facts:
 - www.etrade.com, online investing services and resources
 - Market Cap: \$6.53B (Jan. 2015)
 - Yearly Revenues: \$1.76B (Jan. 2015)
 - 60 million page views per month
 - average of 53,000 unique visitors per day
 - 4.5 million accounts (Nov. 2009)
 - 3.1 million accounts (July 2014)
 - 72,000 new retail accounts opened (Q2 2014)
 - 1,952,000 customer transactions per month
 - Stock Symbol: ETFC (Nasdaq)
- The solution:
 - IBM 90 xSeries running Linux/Citrix, Apache and Tomcat web servers
 - Hardware facility for load balancing and redundancy
 - Oracle database system
 - Proprietary programming systems

Web Server Farms

- Until recently all serious web sites were maintained using web server farms;
 - A group of computers acting as servers and housed in a single location;
 - Internet Service Providers (ISP's) provide web hosting services using a web server farm
- Hardware and software is used to load balance requests across the machines
- Other issues addressed by web server farms include:
 - **Redundancy** eliminates single point of failure; backup and failover strategy is required
 - **Security**, secure areas are placed behind firewalls which monitor web traffic, network address translation, port translation, SSL

Popular Web Hosting Services

- **For individuals and small business:**

- **1&1**

[http://www.1and1.com/linux-web-hosting?
lf=Static&linkOrigin=&linkId=ct.tab.hosting&stage=hosting](http://www.1and1.com/linux-web-hosting?lf=Static&linkOrigin=&linkId=ct.tab.hosting&stage=hosting)

- **GoDaddy.com**

[http://www.godaddy.com/products/secure-hosting.aspx?
ci=72738](http://www.godaddy.com/products/secure-hosting.aspx?ci=72738)

- **Yahoo**

[http://www.iwebhostingplans.com/yahoo/
yahoowebhosting.asp](http://www.iwebhostingplans.com/yahoo/yahoowebhosting.asp)

- **For companies willing to pay MUCH higher costs:**

- **Rackspace**

http://www.rackspace.com/index.php?CMP=Google_hosting

- **Network Solutions**

<http://www.networksolutions.com/web-hosting/index.jsp>

- **Reviews and price comparisons:**

- <http://www.hosting-review.com>

- See next slide

- <http://www.pcmag.com/category2/0,2806,2269,00.asp>

Web Hosting Services

Top 10 Web Hosting Providers - Updated January 2015

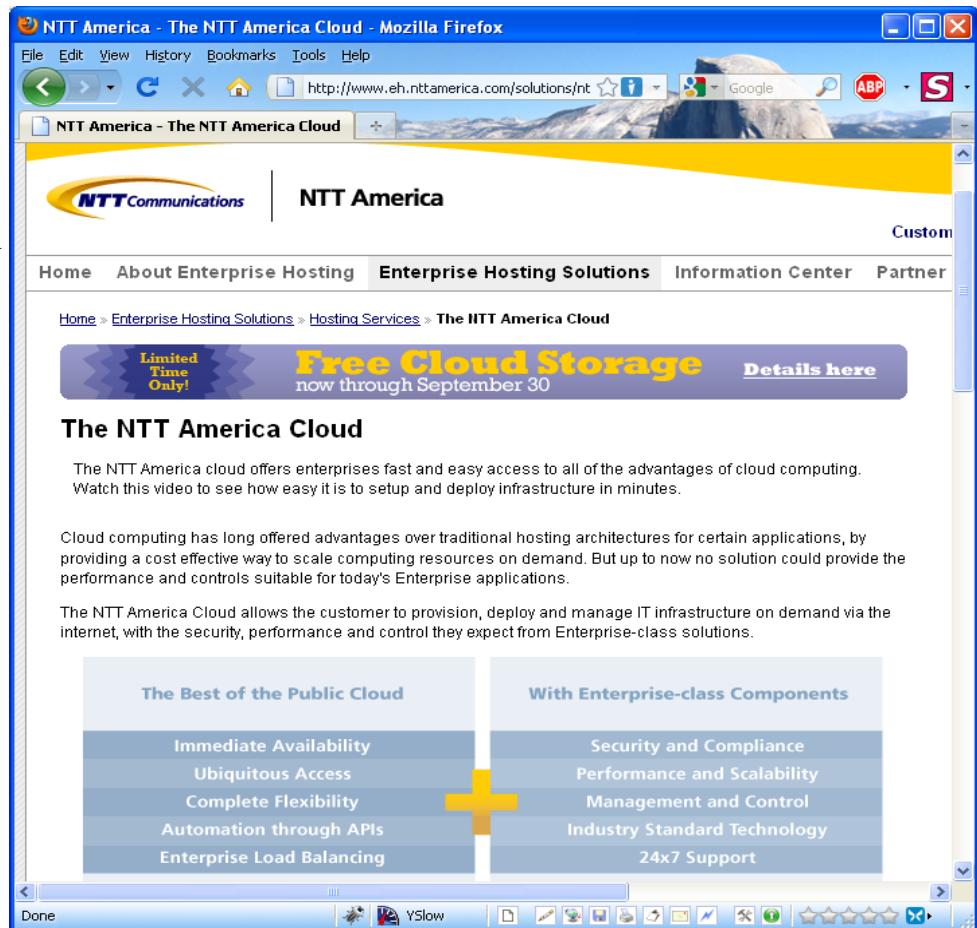
SHARED WEB HOST	PRICE	SALES INDEX	TREND	UPTIME SPEED	CUSTOMER REVIEWS	EDITORS REVIEW	SCORE INDEX	VISIT
 HOSTPAPA	\$2.95				拇指 83+ 手掌 20-	  Watch Read	94%	Visit Site
 iPage	\$2.25				拇指 133+ 手掌 52-	  Watch Read	92%	Visit Site
 justhost.com	\$2.25				拇指 87+ 手掌 36-	  Watch Read	89%	Visit Site
 HOSTGATOR	\$3.22				拇指 45+ 手掌 24-	  Watch Read	88%	Visit Site
 iXWEBHOSTING	\$1.95				拇指 73+ 手掌 39-	  Watch Read	87%	Visit Site
 GoDaddy.com	\$6.29				拇指 60+ 手掌 30-	  Watch Read	86%	Visit Site
 YAHOO!	\$3.00				拇指 40+ 手掌 21-	  Watch Read	85%	Visit Site
 bluehost	\$4.95				拇指 53+ 手掌 28-	  Watch Read	85%	Visit Site
 arvixe web hosting	\$4.00				拇指 48+ 手掌 18-	  Watch Read	84%	Visit Site
 FatCow	\$3.15				拇指 86+ 手掌 38-	  Watch Read	83%	Visit Site

Cloud Computing

- **Cloud computing** is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices **on demand**, like the electricity grid.
- Users no longer have need for expertise in, or control over, the technology infrastructure "in the cloud" that supports them.
- It typically includes web-based tools or applications that users can access and use through a web browser as if it were a program installed locally on their own computer. [\[1\]](#)
- Typical cloud computing providers deliver common business applications online that are accessed from another Web service or software like a Web browser, while the software and data are stored on servers.
- The major cloud service providers include Microsoft, Salesforce, Skytap, HP, IBM, Amazon, Google and Apple (iCloud).

An Example – NTT America

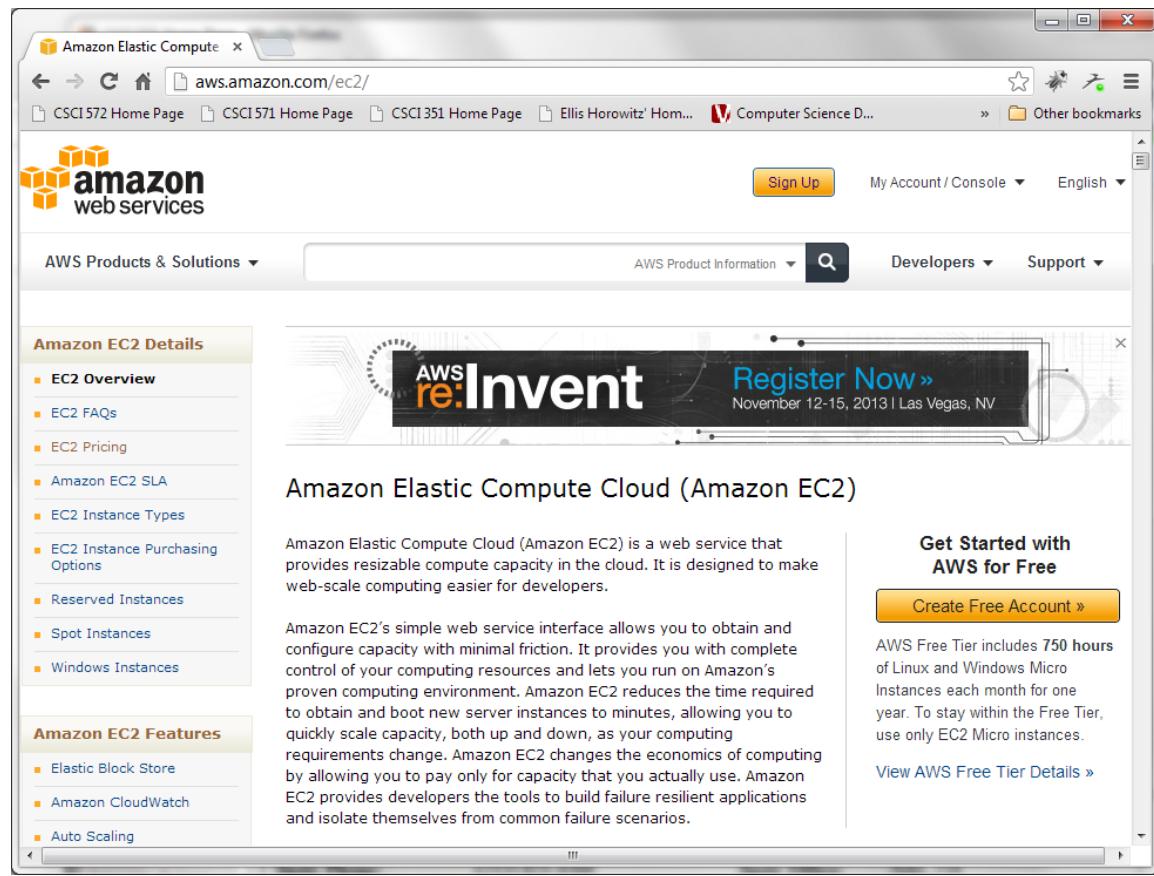
- For example, NTT America Cloud offers two types of service plans — by the hour with no commitments or minimum fees, or a monthly pre-paid plan. Under both plans the customer is only charged for the CPU and RAM usage when the server is actually running.
- See the link below for details
- Data Center locations are in:
 - San Jose, CA
 - Santa Clara, CA
 - Sterling, VA
 - Ashburn, VA
 - New York, NY
 - Frankfurt, Germany
 - London, England
 - Madrid, Spain
 - Paris, France
 - Singapore



http://www.eh.nttamerica.com/solutions/ntt_americ...

An Example – Amazon’s Elastic Compute Cloud

- A web service providing resizable compute capacity
- The “elastic” nature means the service instantly scales to meet demand with no up-front investment
- Users create an Amazon Machine Image (AMI), a virtual computer running your selected operating system (Linux, Windows, etc)
- Users use Amazon’s Simple Storage Service (S3) for large-scale, persistent storage
- You only pay for running AMI
- All accounts are limited to 5 Elastic IPv4 addresses per region
- See: aws.amazon.com/ec2



Amazon currently runs in 8 regions: US East, US West (Oregon), US West (Northern CA), Ireland, Asia Pacific (Singapore), Asia Pacific (Tokyo), Asia Pacific (Sydney), South America (Sao Paulo)

A Familiar Sample Web Site - USC

The screenshot shows a web browser window with the title "USC Web Server Statistics for [my organisation]". The main content area is titled "Monthly Directory Report". A note at the top states: "Note: This Monthly DIRECTORY report contains all USCweb pages with more than 10 hits during last month. For other Server statistics, (various summaries, reports, and only the most-visited top-level pages) check out the [Monthly Server Report](#)". Below this, it says "Program started at Wed-02-Jul-2014 15:02." and "Analysed requests from Sun-01-Jun-2014 00:00 to Mon-30-Jun-2014 23:59 (30.00 days)". A "General Summary" section follows, with a link to "Top | General Summary | Directory Report". It includes a note: "This report contains overall statistics." and a note about figures referring to a 7-day period ending on Jun 30, 2014. The summary lists various statistics:

- Successful requests:** 91,365,908 (21,398,777)
- Average successful requests per day:** 3,045,600 (3,056,968)
- Successful requests for pages:** 7,296,423 (1,702,977)
- Average successful requests for pages per day:** 243,219 (243,282)
- Failed requests:** 1,198,965 (266,680)
- Redirected requests:** 3,739,405 (826,309)
- Distinct files requested:** 1,446,392 (563,303)
- Distinct hosts served:** 1,201,612 (334,337)
- Corrupt logfile lines:** 382,944
- Unwanted logfile entries:** 1,548,841,179
- Data transferred:** 2.55 terabytes (636.37 gigabytes)
- Average data transferred per day:** 87.01 gigabytes (90.91 gigabytes)

91 million page requests and approx 3.0 million requests per day for the month of June, 2014

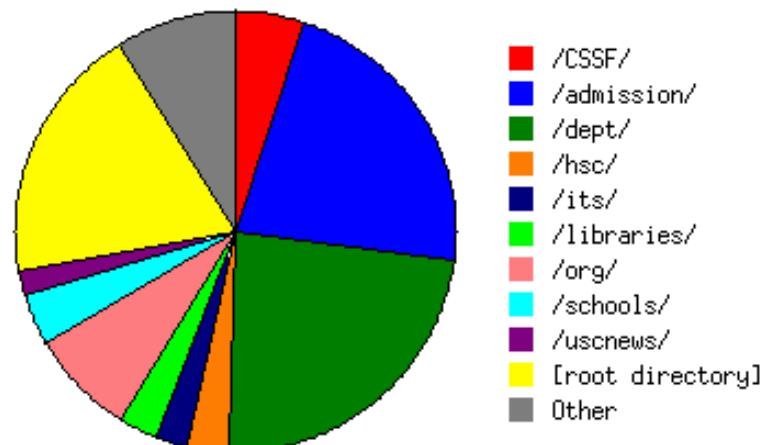
<http://www.usc.edu/stats/prev-uscweb-monthly-server-stats.html>

www.usc.edu server - Directory Report

Directory Report

(Go To: [Top](#) | [General Summary](#) | [Directory Report](#))

This report lists the directories from which files were requested. (The figures for each directory include all of its subdirectories.)



The wedges are plotted by the number of requests for pages.

www.usc.edu server – Daily Summary

Daily Summary

(Go To: [Top](#) | [General Summary](#) | [Daily Summary](#) | [Hourly Summary](#) | [Daily Report](#) | [Domain Report](#) | [File Type Report](#) | [Browser Summary](#) | [Browser Report](#) | [Status Code Report](#) | [File Size Report](#) | [Directory Report](#) | [User Report](#) | [User Failure Report](#) | [Referring Site Report](#) | [Referrer Report](#) | [Failed Referrer Report](#) | [Request Report](#) | [Failure Report](#))

This report lists the total activity for each day of the week, summed over all the weeks in the report.

Each unit (+) represents 50,000 requests for pages or part thereof.

day	pages	%pages	
Sun	1607424	15.88%	+++++++++++++
Mon	1871083	18.49%	+++++++++++++
Tue	1657183	16.38%	+++++++++++++
Wed	1246742	12.32%	++++++
Thu	1336664	13.21%	++++++
Fri	1321152	13.05%	++++++
Sat	1079698	10.67%	++++++

Busiest day is Thursday

www.usc.edu server - Hourly Summary

Hourly Summary

(Go To: [Top](#) | [General Summary](#) | [Daily Summary](#) | [Hourly Summary](#) | [Daily Report](#) | [Domain Report](#) | [File Type Report](#) | [Browser Summary](#) | [Browser Report](#) | [Status Code Report](#) | [File Size Report](#) | [Directory Report](#) | [User Report](#) | [User Failure Report](#) | [Referring Site Report](#) | [Referrer Report](#) | [Failed Referrer Report](#) | [Request Report](#) | [Failure Report](#))

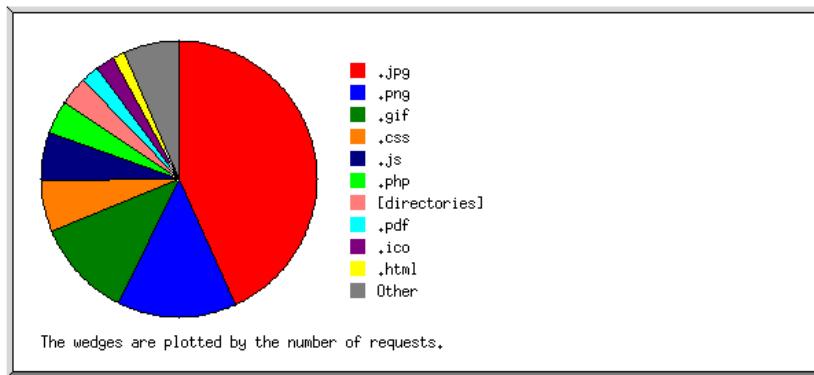
This report lists the total activity for each hour of the day, summed over all the days in the report.

Each unit (+) represents 15,000 requests for pages or part thereof.

hour	pages	% pages	
0	350231	3.46%	+++++
1	284391	2.81%	+++++
2	264679	2.62%	+++++
3	286046	2.83%	+++++
4	334919	3.31%	+++++
5	328765	3.25%	+++++
6	360285	3.56%	+++++
7	418181	4.13%	+++++
8	467798	4.62%	+++++
9	491594	4.86%	+++++
10	518858	5.13%	+++++
11	506394	5.00%	+++++
12	507957	5.02%	+++++
13	500862	4.95%	+++++
14	494160	4.88%	+++++
15	478903	4.73%	+++++
16	496615	4.91%	+++++
17	444155	4.39%	+++++
18	453277	4.48%	+++++
19	440543	4.35%	+++++
20	458062	4.53%	+++++
21	449325	4.44%	+++++
22	420454	4.15%	+++++
23	363492	3.59%	+++++

Heaviest usage
occurs around
10:00am and 3-4:00pm

www.usc.edu server - File Type Report



Listing extensions with at least 100 requests, sorted by the number of requests.

reqs	%reqs	extension
51106345	43.22%	.jpg
16419044	13.89%	.png
13752632	11.63%	.gif
7180193	6.07%	.css
6585509	5.57%	.js
4727107	4.00%	.php
3896000	3.29%	[directories]
2636279	2.23%	.pdf
2569218	2.17%	.ico
1669310	1.41%	.html
1537254	1.30%	.woff
1131667	0.96%	.json
984306	0.83%	.svg
979952	0.83%	.xml
698695	0.59%	.eot
634992	0.54%	.xls
535816	0.45%	.htm
250355	0.21%	.swf
135597	0.11%	.txt
91414	0.08%	.doc
83147	0.07%	JPG
78705	0.07%	.15
63086	0.05%	[no extension]
62924	0.05%	

gif/jpg/png account
for 73% of files
requested

USC Has Many Web Servers Running

The screenshot shows a Mac OS X browser window displaying the Netcraft search results for the domain usc.edu. The search query is "site:usc.edu". The results table lists 101 sites, each with columns for Site, Site Report, First seen, Netblock, and OS. The first few entries are:

Site	Site Report	First seen	Netblock	OS
1. www.usc.edu	[document icon]	august 1995	university of southern california	windows server 2003
2. groong.usc.edu	[document icon]	january 2002	university of southern california	unknown
3. www-scf.usc.edu	[document icon]	august 1995	university of southern california	unknown
4. www-bcf.usc.edu	[document icon]	april 1996	university of southern california	unknown
5. mirrors.usc.edu	[document icon]	june 2003	university of southern california	linux - centos
6. www.usc.edu.au	[document icon]	march 1999	university of the sunshine coast	f5 big-ip
7. itservices.usc.edu	[document icon]	april 2014	university of southern california	windows server 2003
8. usc.edu	[document icon]	september 2003	university of southern california	netscaler windows server
9. www.cs.usc.edu	[document icon]	april 2000	university of southern california	server

The sidebar on the left contains links to various Netcraft services and security features. A large advertisement for Atlantic.net SSD Cloud VPS is visible on the right.

- Netcraft lists **101** separate web servers with usc.edu in their name, e.g.
 - www.usc.edu
 - mat.usc.edu
 - www.cs.usc.edu
 - dornsife.usc.edu
 - web-applusc.edu
 - www-scf.usc.edu
- However, some may not be connected to USC, e.g.
 - www.usc.edu.au

Web Browsers Use Standard Layout Engines

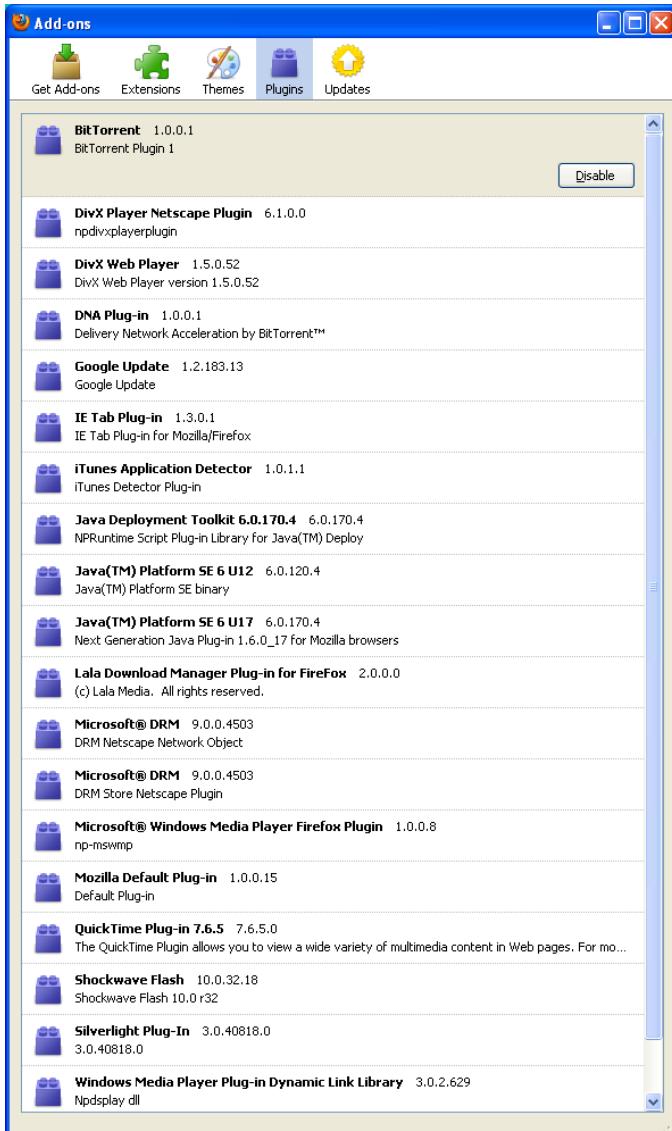
- **WebKit** is a software component used to render web pages; it is open source.
 - It is used by Google's Chrome and Apple's Safari web browsers
 - WebKit is also the name of the Mac OS X system framework version of the engine that's used by Safari, Dashboard, Mail, and many other OS X applications;
- **Gecko** is a layout engine developed by Mozilla Corporation, known as the layout engine of the Firefox web browser.
 - It is used to display web pages and, in some cases, an application's user interface.
 - It offers a rich programming API that makes it suitable for a wide variety of roles in Internet-enabled applications, such as web browsers
 - Its development originated with Netscape Communications Corporation
- Some web kits and the browsers that use them
 - **Gecko-based:** FireFox (Mozilla), Flock, Netscape
 - **Trident-shells:** Internet Explorer (Microsoft)
 - **WebKit-based:** Chrome and Android (Google), Midori, Safari and Mobile Safari (Apple), Symbian^3 (Nokia) and many others
 - **Presto-based:** Opera, Nintendo DS, Opera Mini, Opera Mobile
 - **Java-based:** HotJava, Lobo
 - **Mobile Browsers:** Blazer, Bolt, Firefox, Ibis, Internet Explorer, Opera, Safari

Capabilities of a Browser

- Web browsers fetch and display documents from other WWW sites; their capabilities include:
 - A mouse-driven graphical user interface
 - Display of
 - Hypertext documents conforming to latest HTML standard
 - Text with fonts, styles, and varying point sizes
 - Foreign-language character sets conforming to ISO-8859
 - Forms composed of edit boxes, check boxes, radio boxes, lists, text areas, etc.
 - Graphics in different formats (GIF, JPEG, MPEG, PNG, XBM) including monochrome, color

GIF = graphic interchange format, MPEG = Motion Picture Experts Group, JPEG = Joint Photographic Experts Group, PNG = Portable Network Graphics, XBM = x bitmap

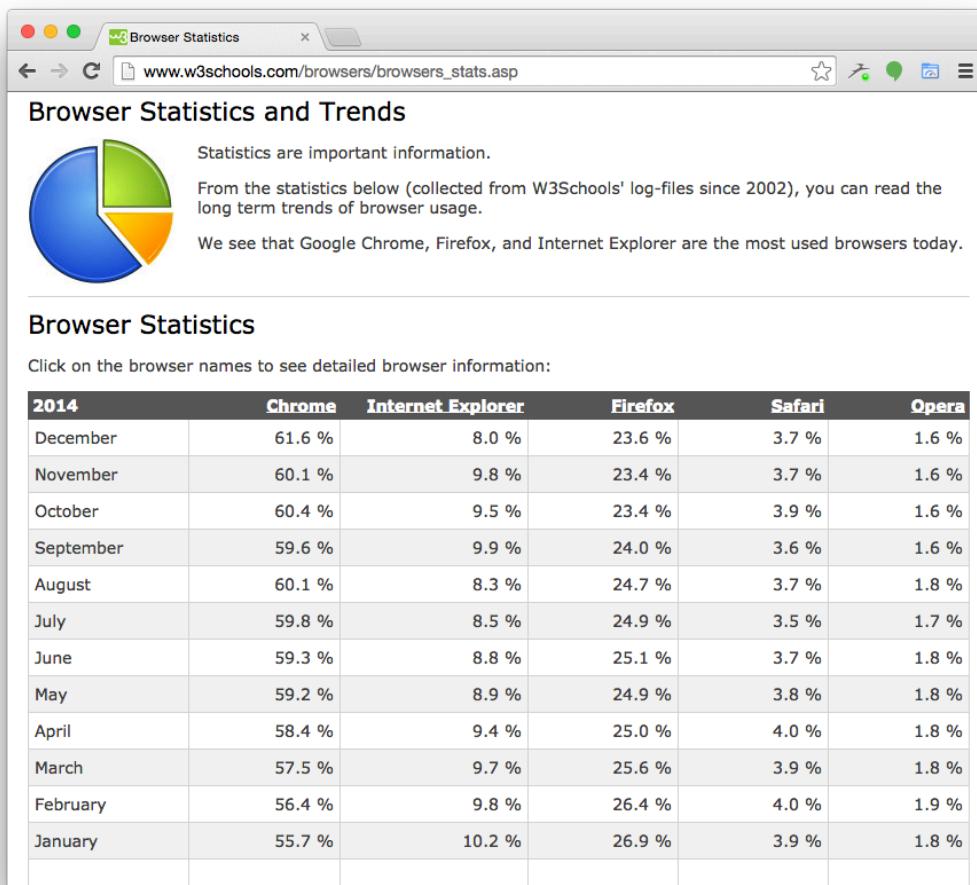
Capabilities of a Browser



- Knowledge of Internet services such as FTP, TELNET
- Ability to invoke helper applications and plug-ins, e.g.
 - *Adobe Acrobat* - used to view pdf files
 - *Windows Media Player* to play digital sound files
 - Adobe Flash Player, used to display video e.g. YouTube, etc.)
- Ability to communicate over a secure channel, using SSL
- Ability to maintain and exchange digital certificates
- Ability to run Java applets, JavaScript, and Active X components

The Browser Wars

Desktop Statistics

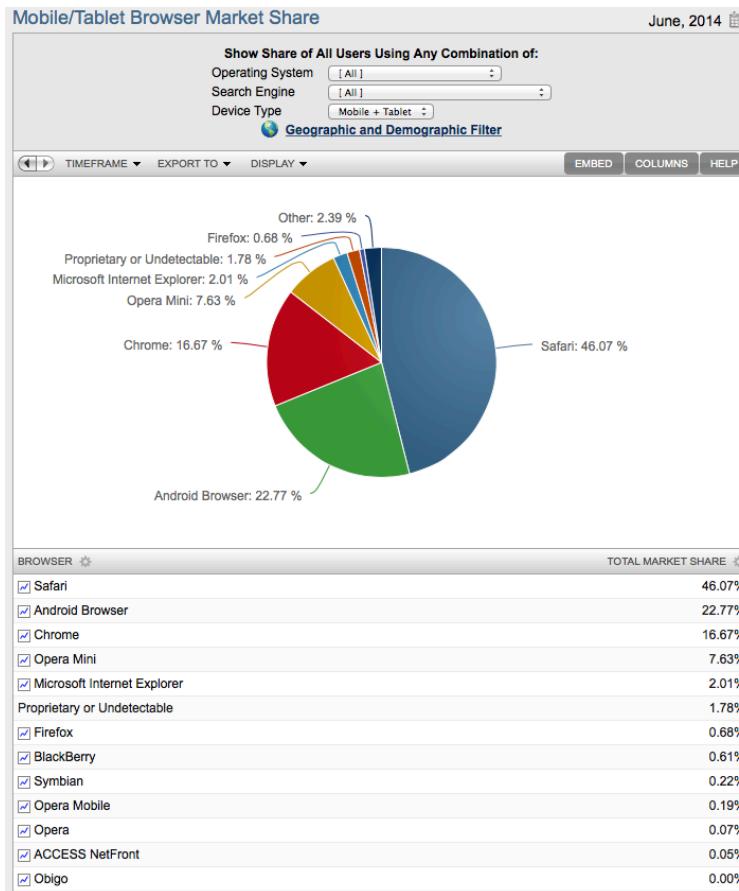


Conclusion of the above study:

- Chrome is the clear winner
- Firefox comes second
- Internet Explorer is losing ground
- Safari and Opera having small percentages

- See http://www.w3schools.com/browsers/browser_stats.asp
- See also <http://www.upsdell.com/BrowserNews/stat.htm>

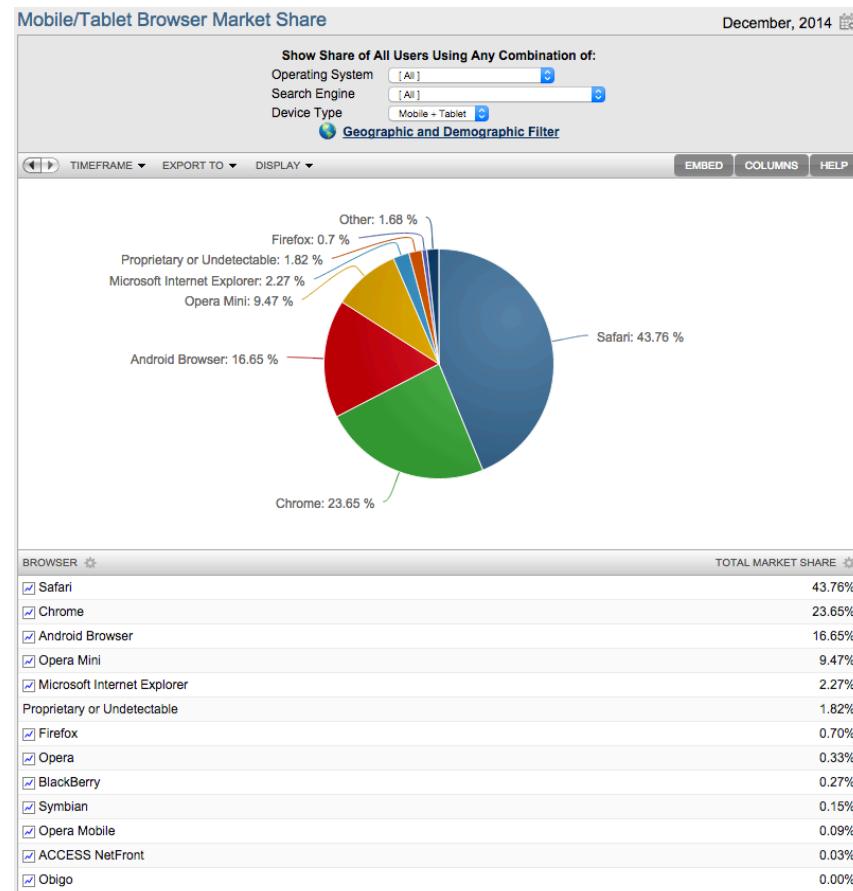
Mobile/Tablet Browser Market Share Statistics



June, 2014

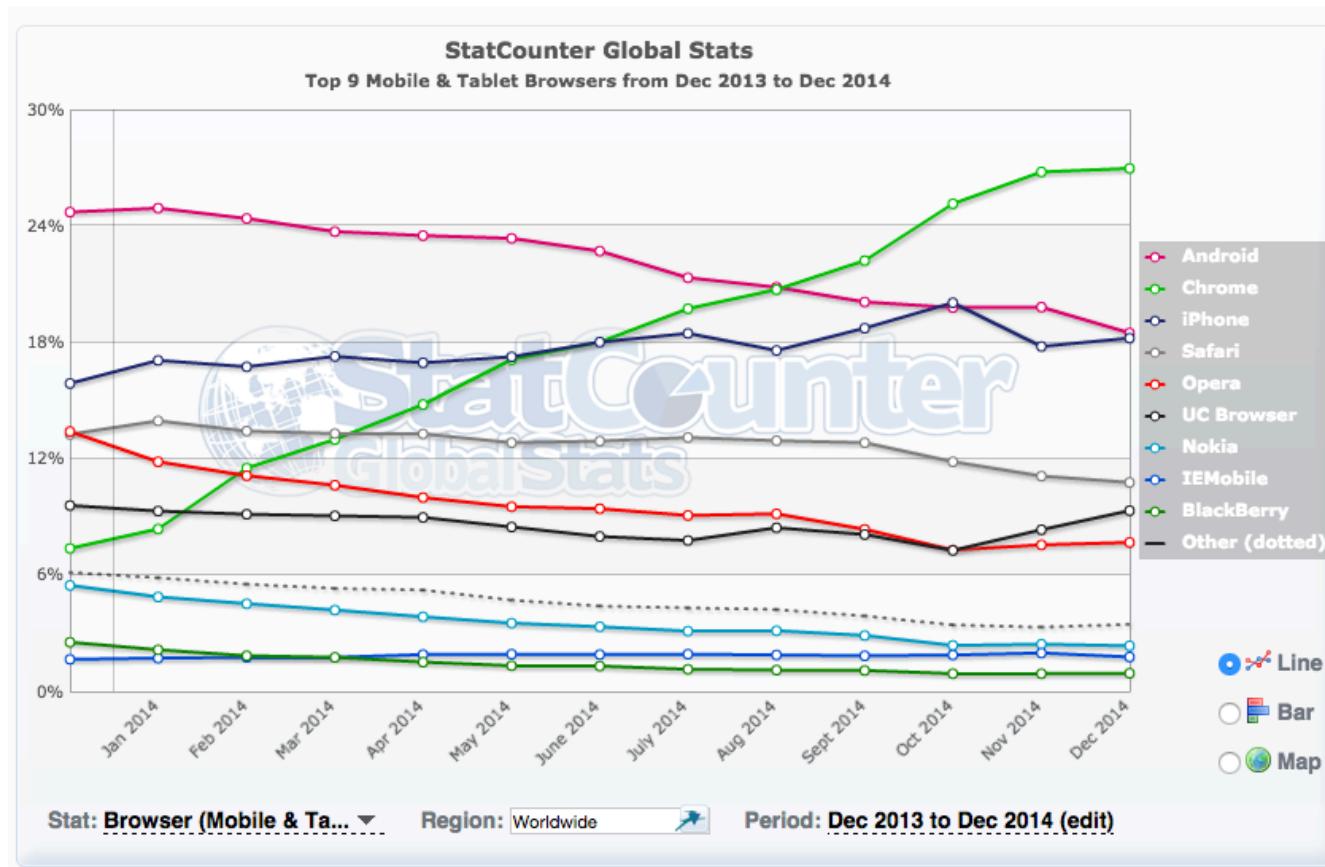
<http://www.netmarketshare.com/>

Safari leads with about 44% market share over Chrome 24%, which surpassed Android browser
 Webkit (used by iOS, Android, Blackberry, Nokia) has over 90% market share



December, 2014

The Browser Wars Comparison (cont'd)



StatCounter Global Stats, December, 2013 – December, 2014, See <http://gs.statcounter.com/>

Chrome has the lead with about 27% followed by iPhone and Android at 18%

Browsers are the Gateway to the Web/Internet

Despite Netscape's failure, there is now a new business model for browsers; e.g. Google will pay Mozilla \$300 million/year for the next 3 years to keep Google its default search engine.
(Dec. 25, 2011)

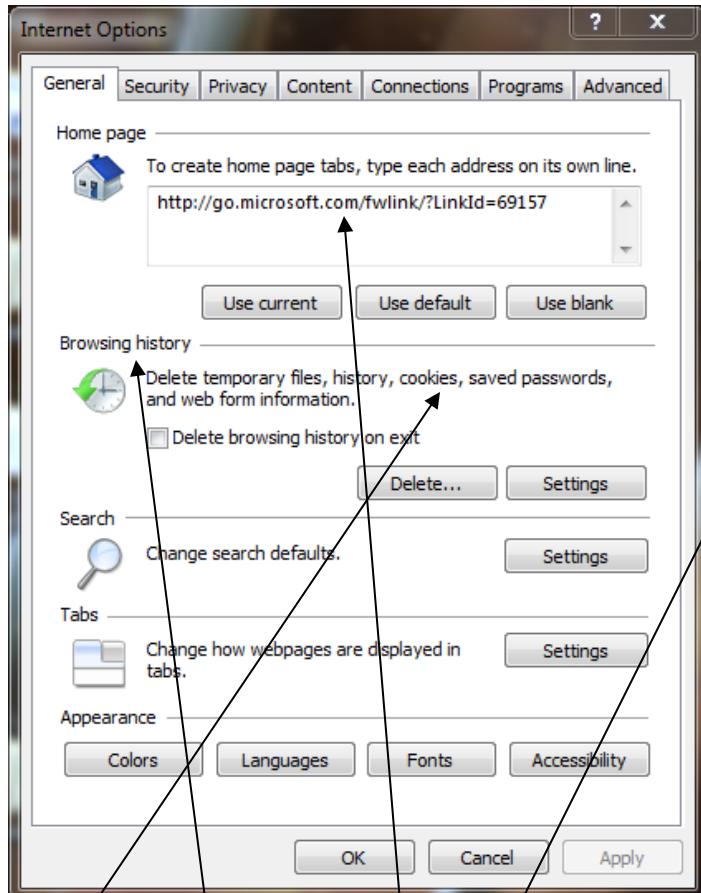
Similarly, Google is rumored to have been paying Apple \$1 billion in 2011 to keep Google the default search engine for Safari on iOS devices and OS X.
(http://articles.businessinsider.com/2012-03-09/tech/31138467_1_google-maps-ben-schachter-google-searches)

June, 2014: Apple announces DuckDuckgo will be another built-in search engine on Safari (no user tracking)

The screenshot shows a Mozilla Firefox window with the title bar "Netscape Founder Backs New Browser - NYTimes.com - Mozilla Firefox". The address bar shows the URL "http://www.nytimes.com/2009/08/14/technology/internet/14browser.html?_r=1&scp=1&sq=browser%20wars&st=cse". The main content area displays an article titled "Netscape Founder Backs New Browser" by MIGUEL HELFT, published on August 13, 2009. The article discusses how SAN FRANCISCO — It has been 15 years since Marc Andreessen developed the Netscape Internet browser that introduced millions of people to the Internet. It mentions that after early success, Netscape was defeated by Microsoft in the browser wars of the 1990s. The article notes that Mr. Andreessen is backing a start-up called RockMelt, staffed with some of his close associates, that is building a new Internet browser. Below the article is a photo of Marc Andreessen speaking at a podium with a "NETSCAPE" logo. To the right of the article are several social sharing options: SIGN IN TO RECOMMEND, E-MAIL, SEND TO PHONE, PRINT, REPRINTS, and SHARE. A small graphic for "WHIP IT OCT 9" is also visible.

Browser Options Menus for IE and Firefox

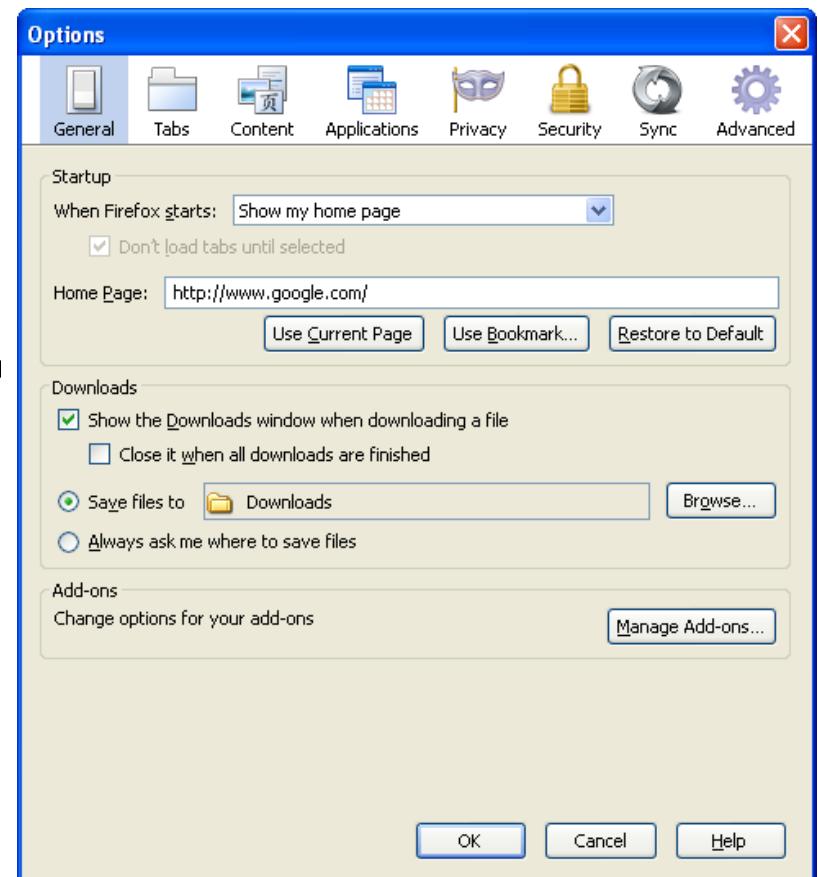
Click on Tools -> Internet Options



Internet Explorer

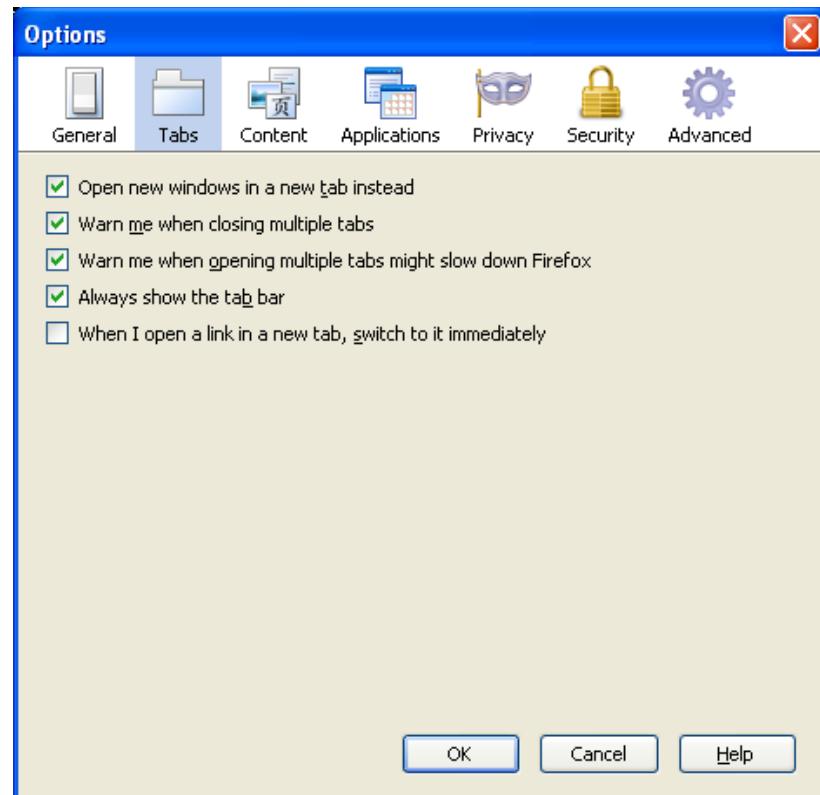
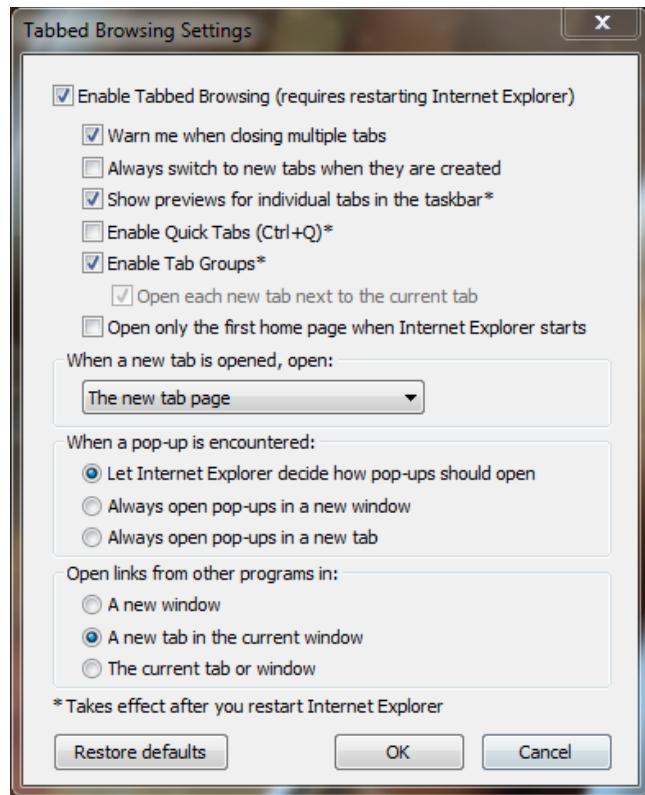
Cookies, History, default opening page

Click on Tools -> Options



Firefox – Tools | Options

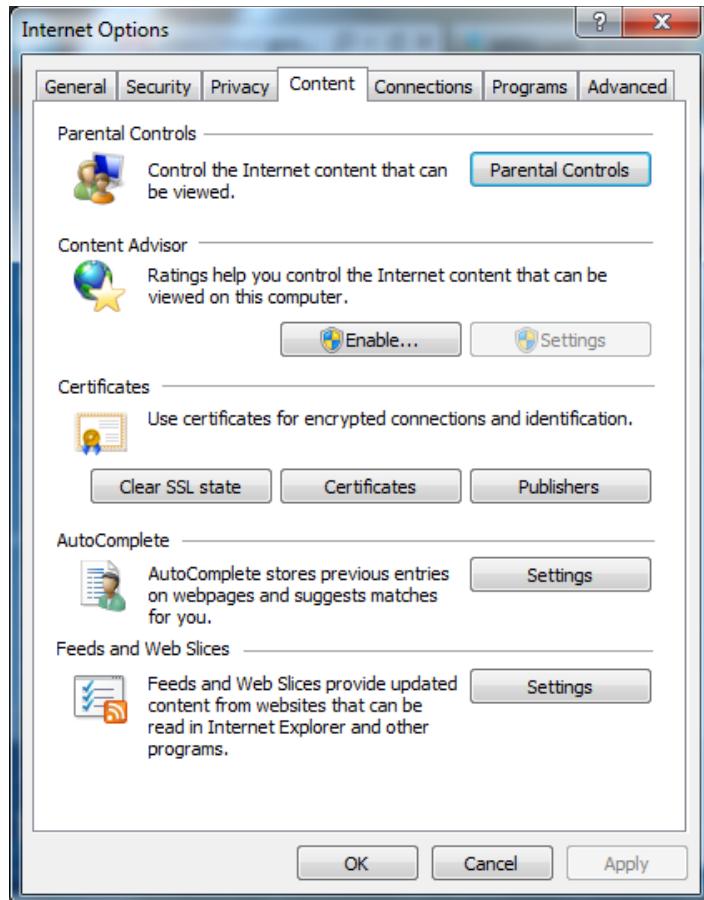
IE and Firefox Tab Control Options



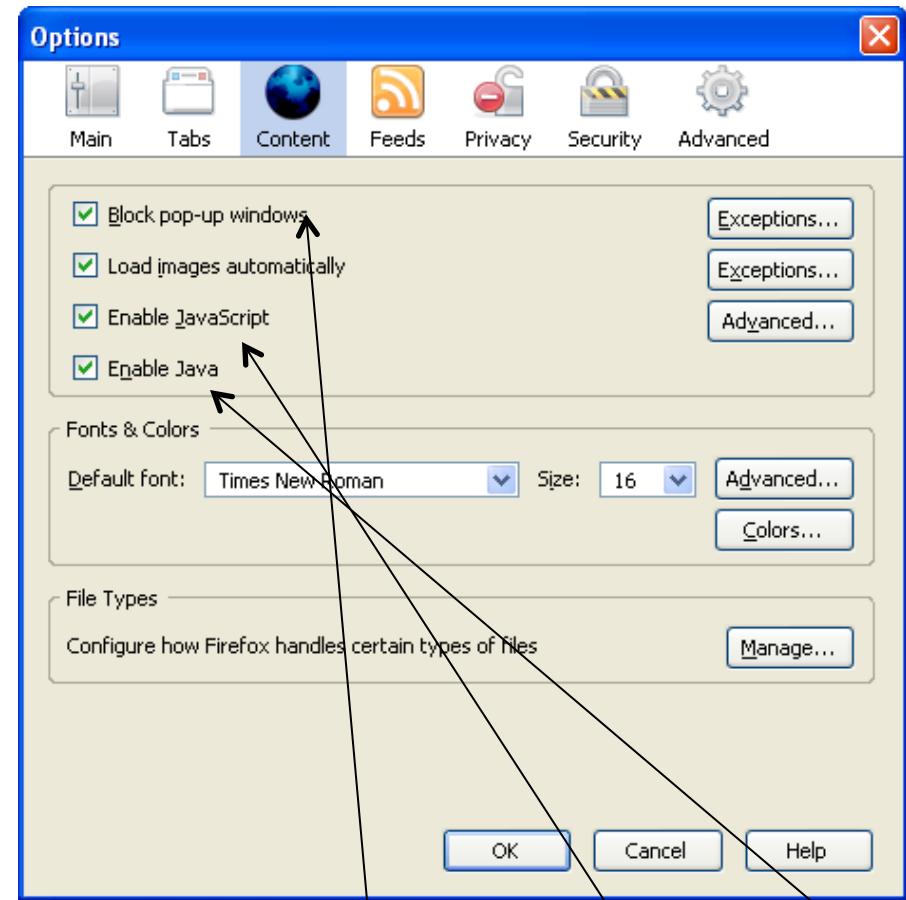
Internet Explorer

Firefox

IE and Firefox - Content Options

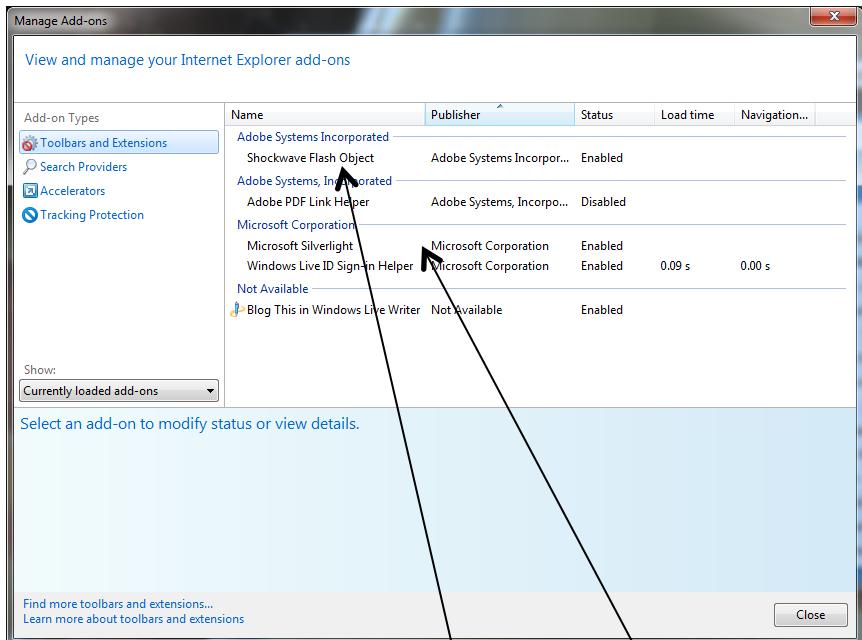


Internet Explorer

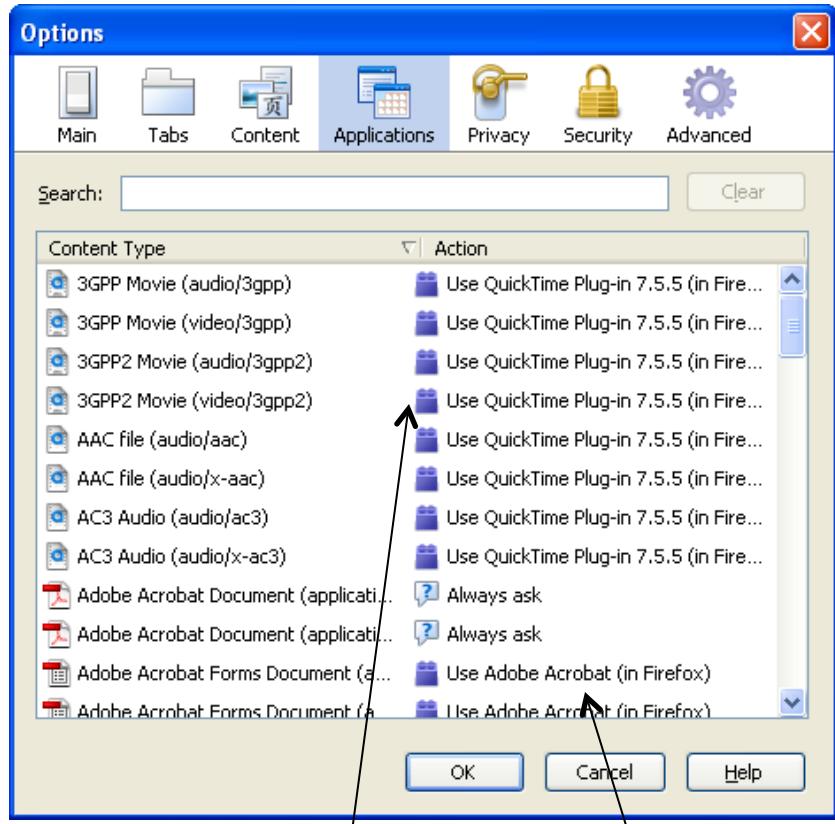


Firefox (PopUps, JavaScript, Java)

IE and Firefox Applications Options

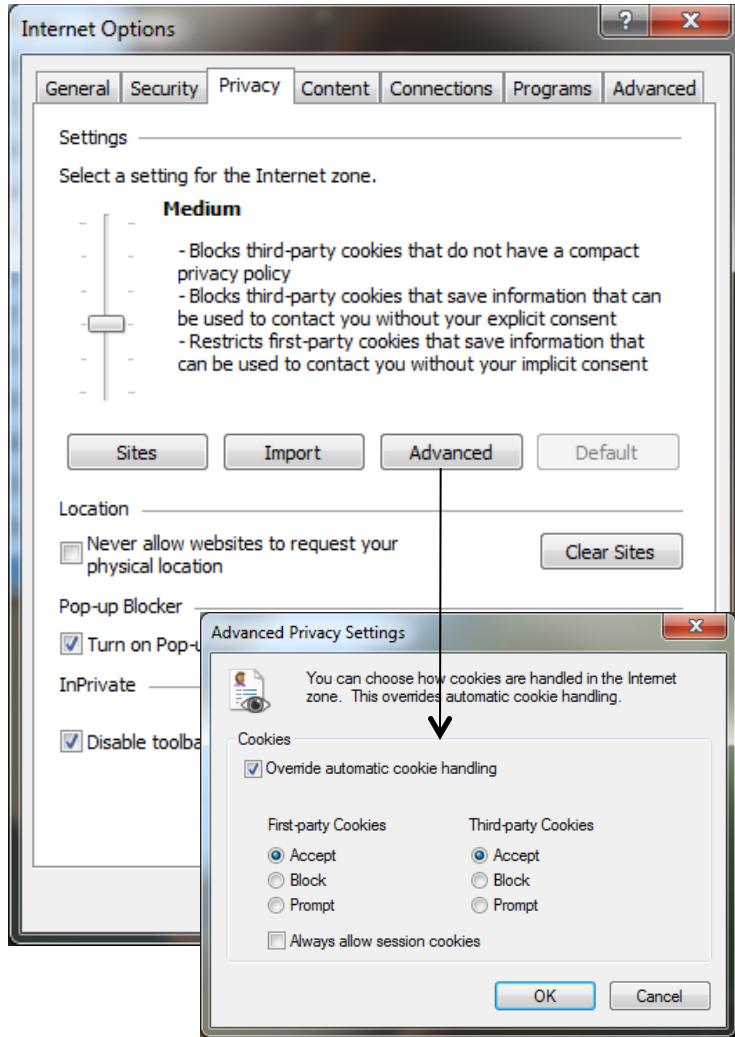


Internet Explorer (Adobe, Silverlight)
(Microsoft has now dropped Silverlight)



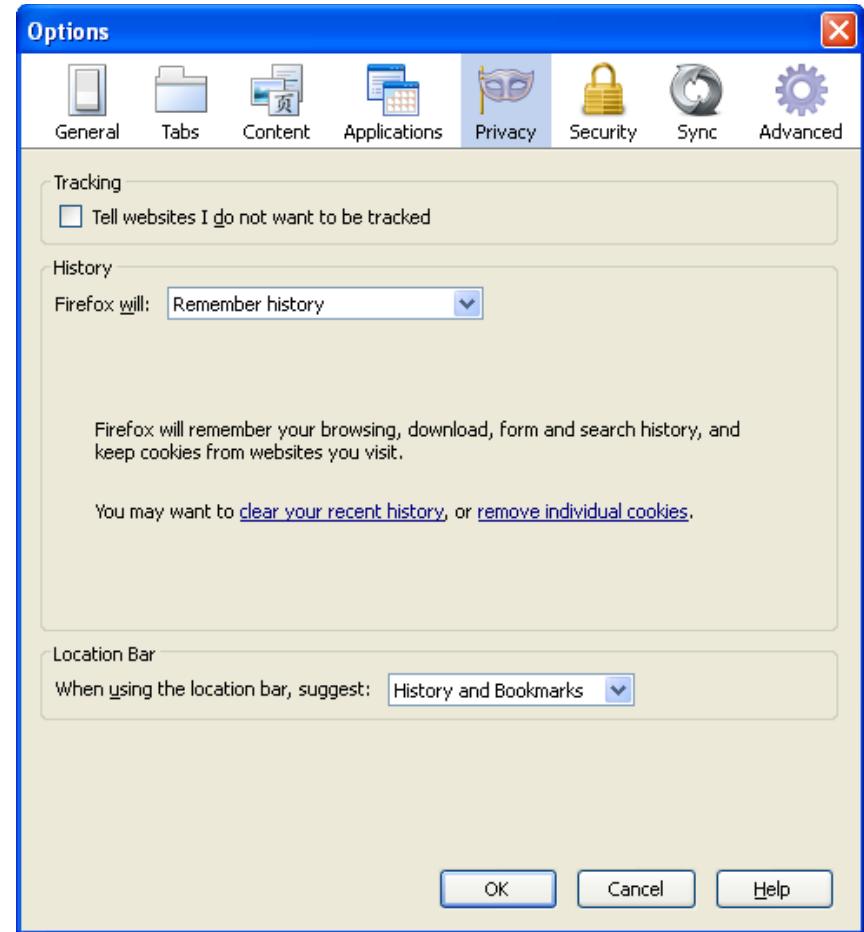
Firefox (Quicktime, Acrobat)

IE and Firefox Privacy Options



Internet Explorer (Cookies)

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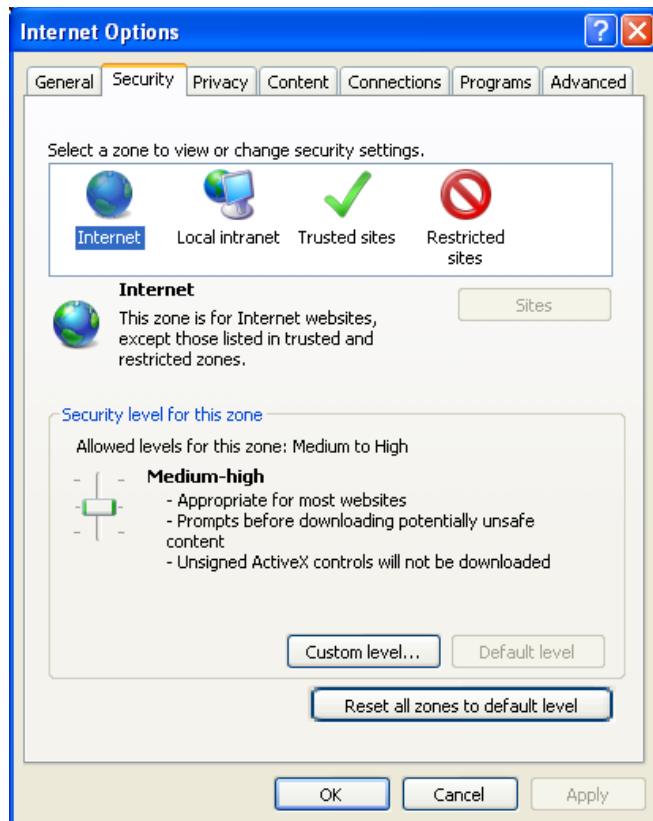


Firefox (History, Cookies)

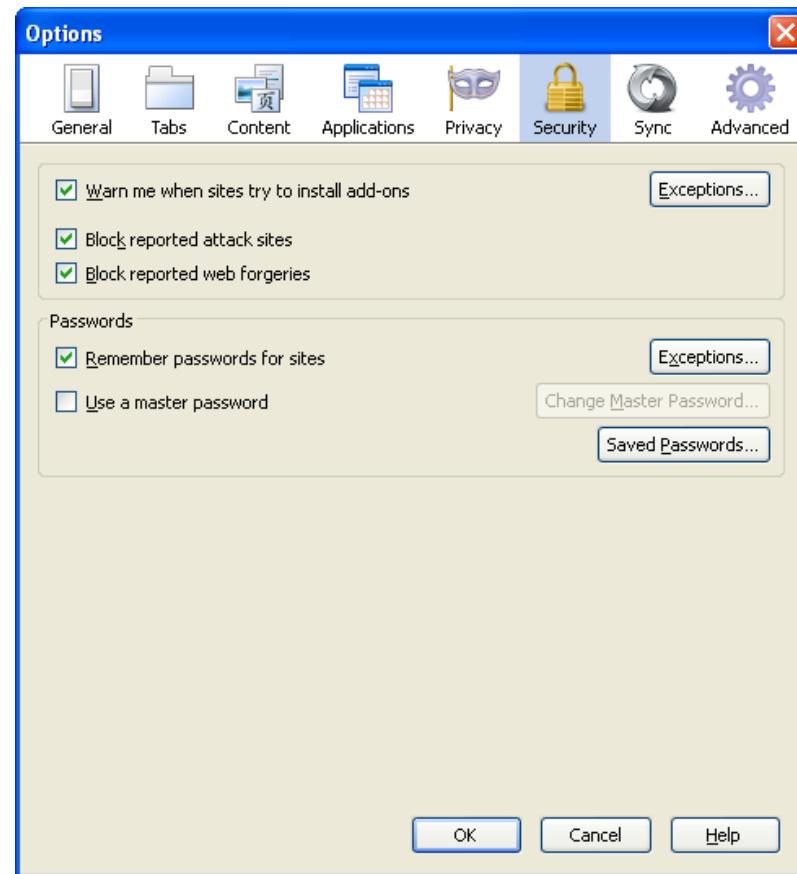
Course Intro

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IE and Firefox Security Options

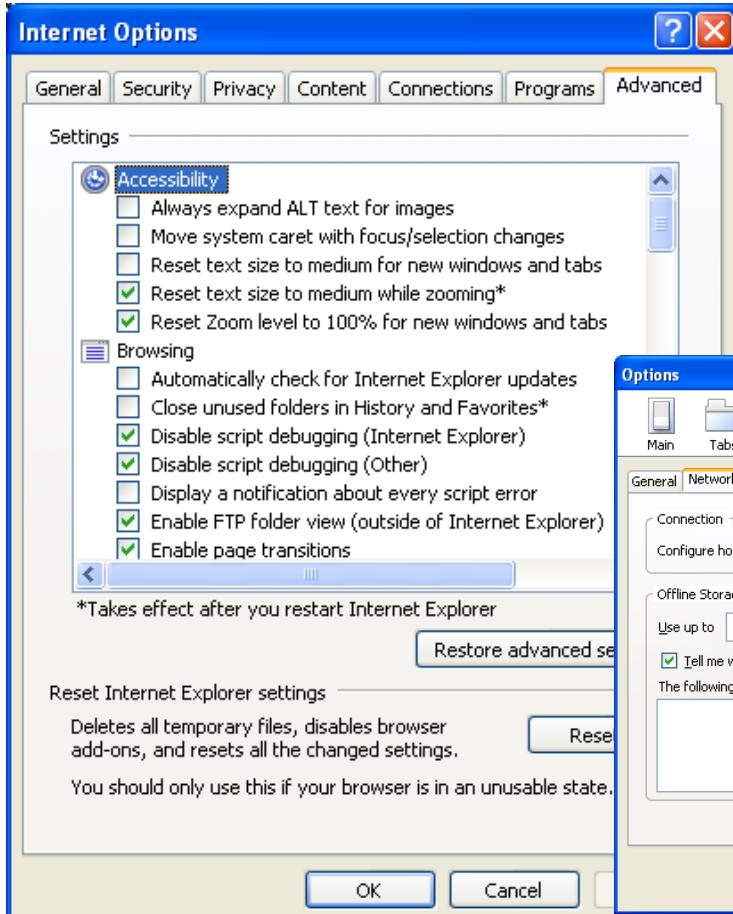


Internet Explorer

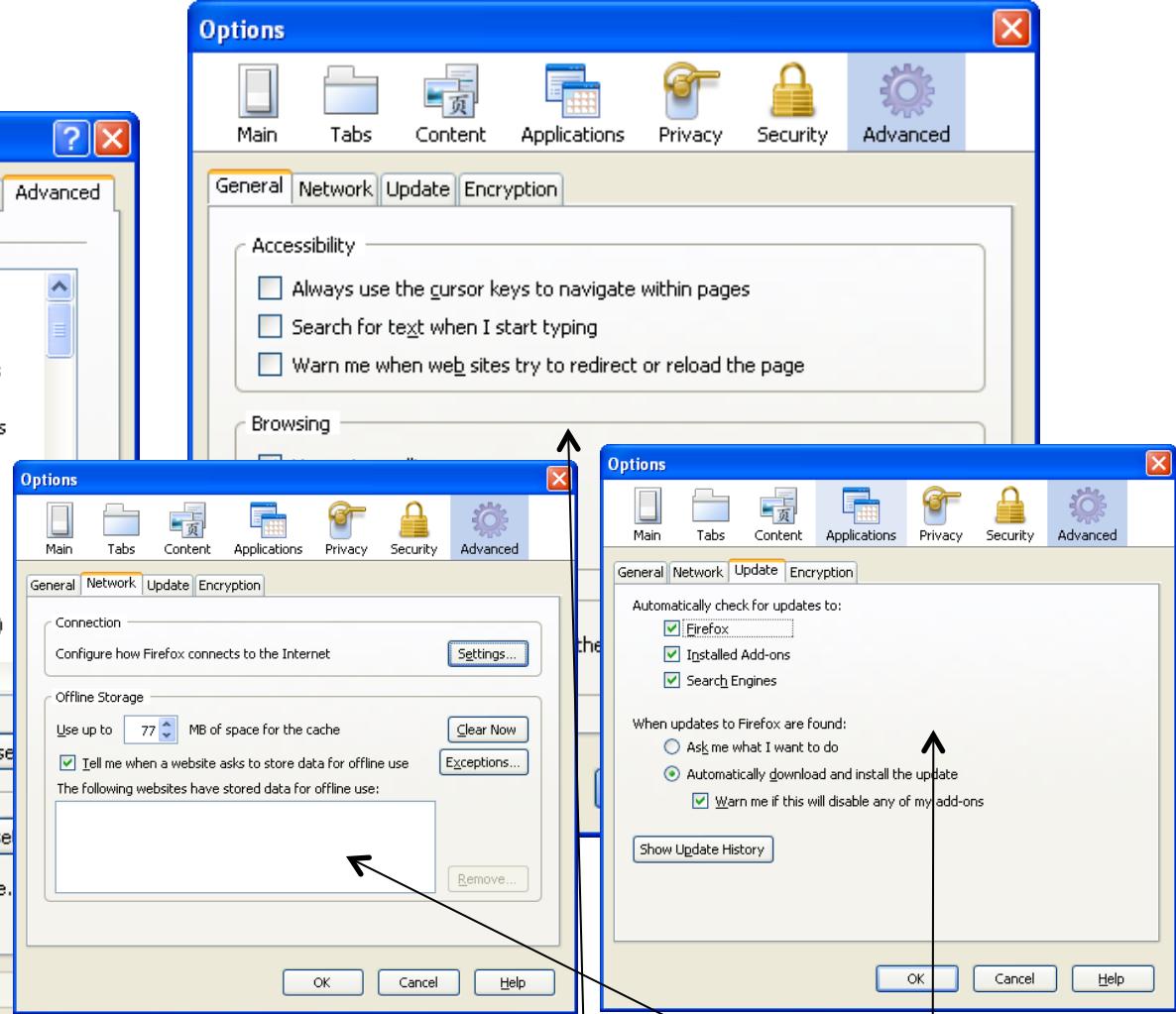


Firefox

IE and Firefox Advanced Options

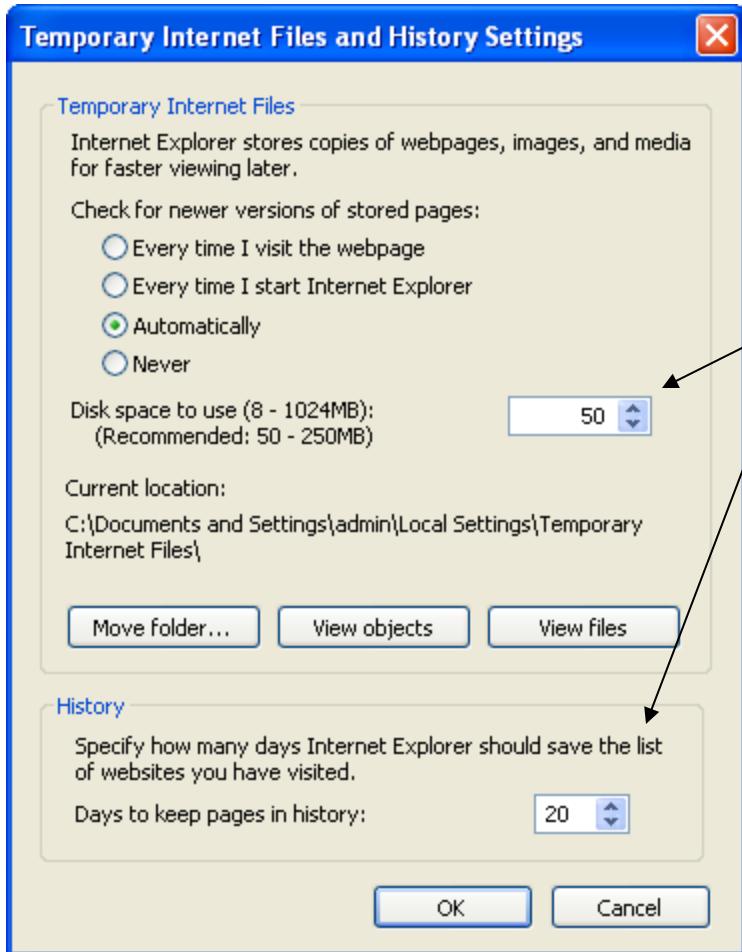


Internet Explorer



Firefox (General, Network, Update)

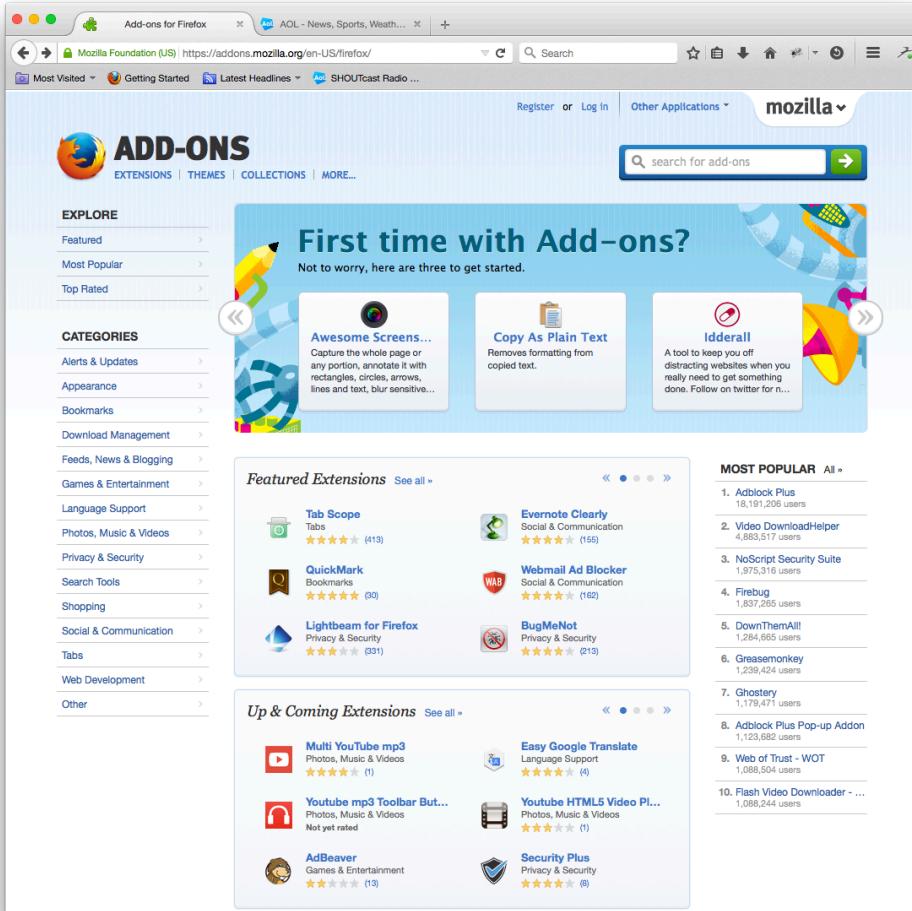
Internet Explorer Browser Caching



- History
 - Links and URLs that have been accessed by the browser over a period of time
- Disk cache
 - Temporary internet files, a folder on the disk that contains cached copies of files
- Memory cache
 - Session-based information that is cached during the session
- Offline content
 - Web content is downloaded when online and viewed offline

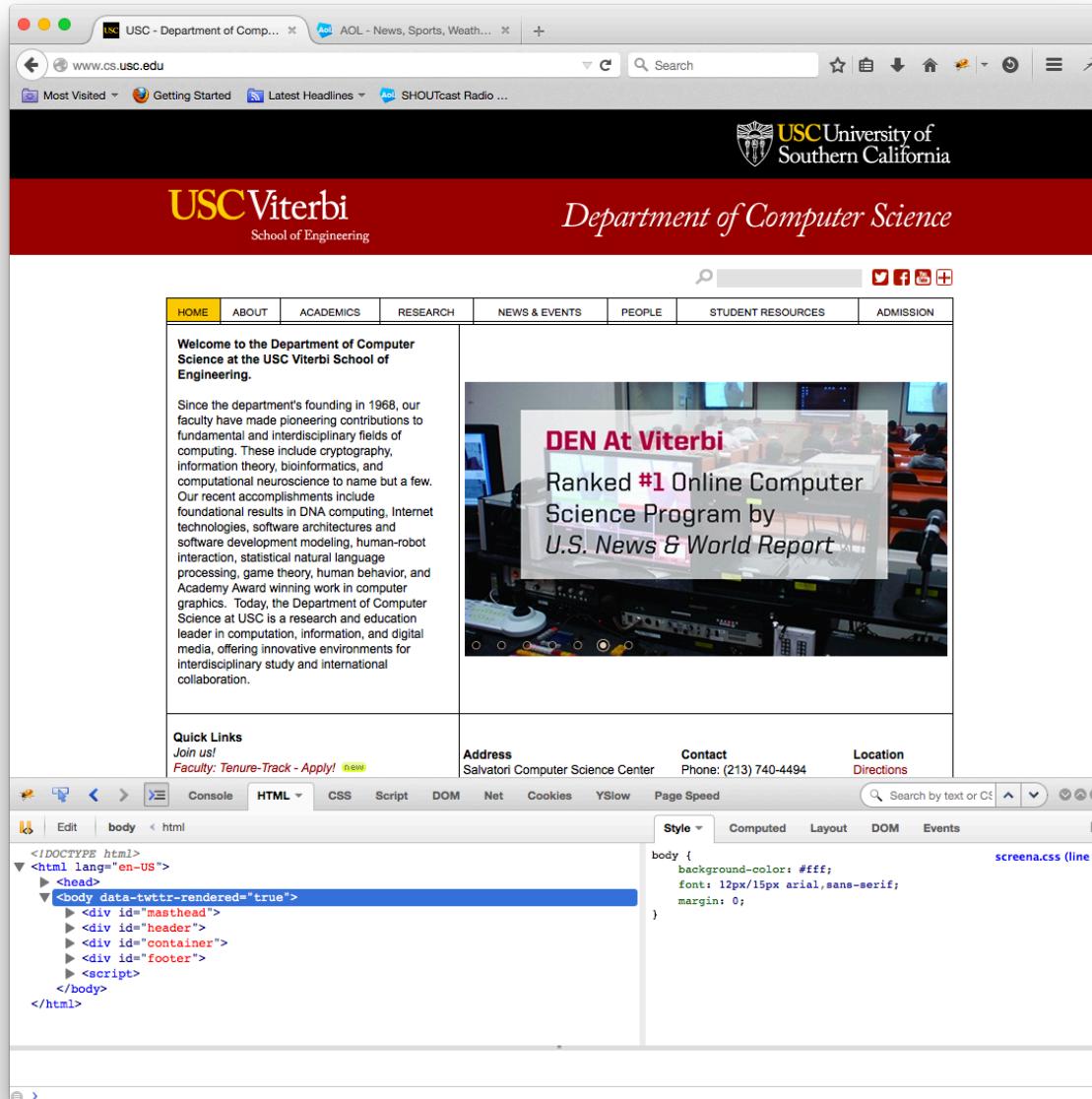
IE caching options screen (Tools | Options | General | Browsing History)

Browsers Have Many Plugins Available

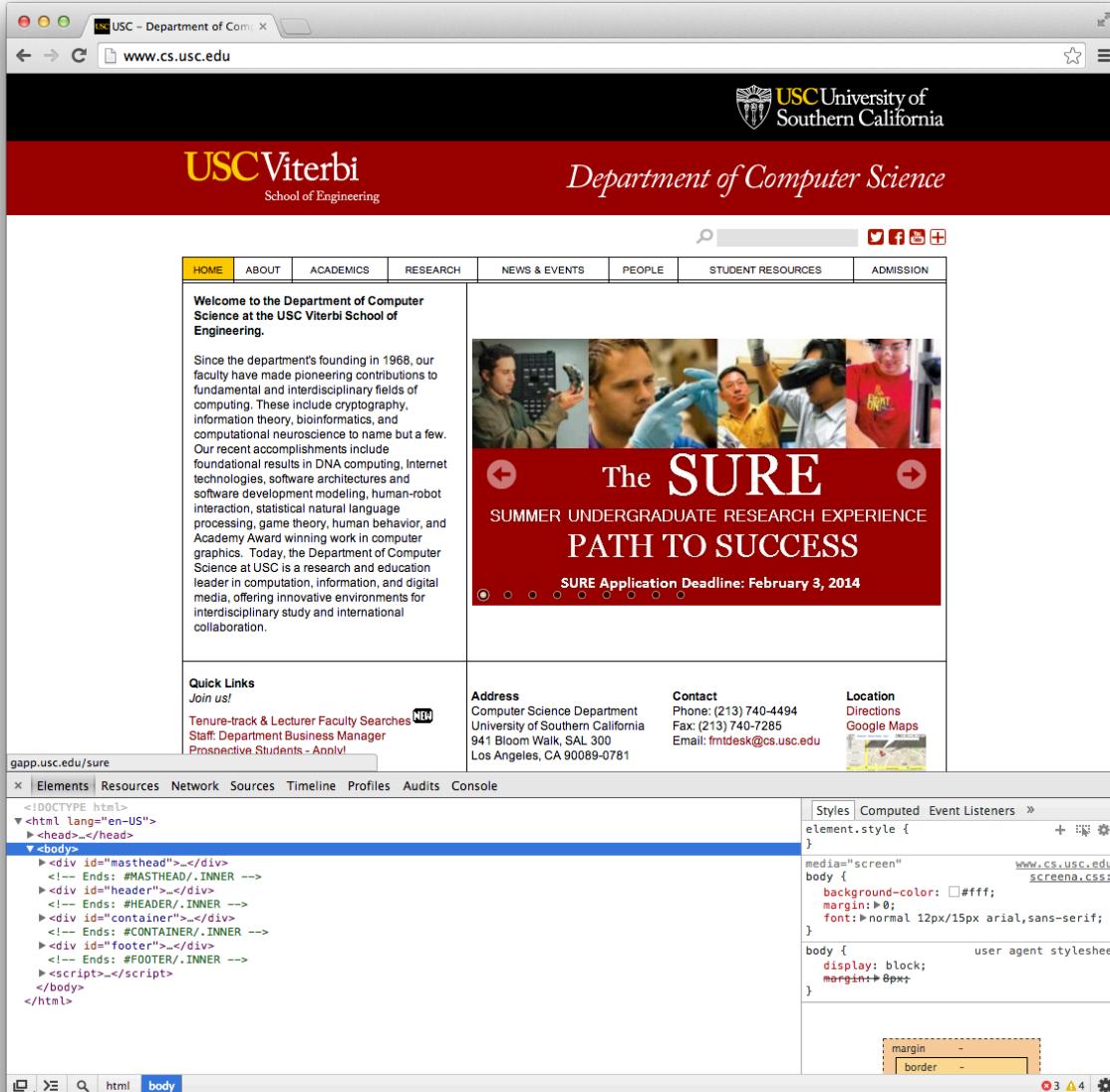


- Three Firefox plug-ins that will be especially useful in this course are:
 - Live HTTP Headers
 - Firebug
 - YSlow
- Available at:
 - addons.mozilla.org
- More about them later on in the semester

Firefox: Tools | Web Developer | Firebug



Chrome: Menu | More tools | Developer Tools



Evolution of Web Sites

