

Lecture

CS571 - Course Introduction

CS571: Web Technologies

- Instructor: Prof. Marco Papa
- Office hours: on **Zoom**:
 - **Mon day 5:00PM-6:00PM PDT**
 - **Meeting ID: 924 6746 7426**
 - **Passcode: 629843**
 - **iCalendar (.ics) available on D2L**
- E-mail: papa@usc.edu
- Zoom Lectures stored on DEN Desire2Learn (D2L)
- 24/7 Q&A access: Piazza, **3 min. average response time**
- Producer access: daily (6 days / week)
- Instructor access: weekly
- Quick way to ask a “personal” question: Private message to Instructors on Piazza

General Information

- Lectures:
 - **Session 30378D: Tue, Thu 5:30PM – 7:20PM (SGM 124)**
 - **Session 30016D: Tue, Thu 5:30PM – 7:20PM (DEN)**
 - **Session 30338D: Tue, Thu 5:30PM – 7:20PM (ONLINE)**
- Producers: Zoom office hours on course website and Piazza
- Course website: <https://www.csci571.com>
- DEN's D2L for Zoom Lectures: <https://courses.uscden.net>
- Assignments – yes, attendance – up to you
- Two **Exams**, one at half course and one towards the end
- Exams auto-graded using **D2L Quiz Tool**
- Mobile Application – final “comprehensive” project live demo
- Web storage: **GitHub Pages**
- Cloud Storage: **Google Cloud**

General Rules

NO FACULTY D-CLEARANCE

Unless you are a “superstar” undergrad ☺

NO COURSE OVERLAP

Unless you agree it is “your” problem

Fixed dates / times:

Exam #1: February 22, 6PM PDT

Exam #2: April 26, 6PM PDT

Final Mobile Project: May 5

Exams electronically graded using D2L Quiz Tool

Final Mobile project/presentation Zoom video uploaded to D2L

General In Person Class Rules

NO CONTACT

Do not approach Professor at lectern
BEFORE, DURING or AFTER lecture

Wear N95, K95 or surgical masks

Post questions on Zoom

Grader will answer during lecture or table for answering in Piazza

Benefits of Prof. Papa CSCI571

- Top 20 students in each section offered available Grader/Producer positions at end of semester. **BY INVITATION ONLY**
- Students that are invited to **MS Honors Program** and scored an A will be provided with **Recommendation Letter** (14 “recommended” students already awarded MS Honors)
- Students that score an “A”, can request “proof of skill” for H1B applications.
- Prof. Papa will act as “reference” in job applications

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)
 - HyperText Transfer Protocol (HTTP)
 - Web servers, their configuration and performance properties
 - Server-Side programming using JavaScript and Python
 - Client-side programming using JavaScript and JS Frameworks
 - Ajax Development Style
- Newer Technologies of Interest
 - Responsive Website Design (Bootstrap, etc.)
 - JS Frameworks (Angular, React and Node.js)
 - Web Services (REST)
 - Web security, TOR, Dark web
 - Native Mobile frameworks (Java / Android and Swift / iOS)
 - React (native)
 - Cloud computing (AWS, GCP, Azure)
 - Serverless Applications, Containers, Docker
 - AWS Lambda, Google Cloud Functions, Azure Functions

Software and Storage

- **Student Disk space on GitHub Pages:**
 - <https://pages.github.com/>
 - **GitHub Student Developer Pack:**
<https://education.github.com/pack>
 - Allows GitHub Pages with “private” repository
 - 1GB of free web space
 - Used for homework 2 and 3 and Table of Exercises
- **Website / Web Services in the cloud**
 - Amazon’s Elastic Compute Cloud (AWS)
 - **Google Cloud Platform (GCP) Preferred!!!**
 - Microsoft Azure
 - AWS Lambda, Google Cloud Functions, Azure Functions
 - Serverless.com
 - Node.js
 - Docker

Other Issues

- Piazza class news group
 - Activate your membership by self-joining at:
piazza.com/usc/spring2022/csci571
 - Class Access Code: **lafc3252usc**
- 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; do not download code online; do not post code online; we use MOSS to check for plagiarism (similar code). We scan all the exams. See "Academic Integrity Policy".
- Downloading course slides and software
 - Class slides access. Username: **csci571**, password: **notes1**
 - All software and installation instructions can be downloaded from the class website.

Student Evaluations

- Comments:
 - "Amazing assignments. Learnt a lot on the course."
 - "Projects seemed similar to an actual client for web development would ask for."
 - "Even though the assignments were hard I learnt a lot from them."
 - "It is not a fair game for beginners. I've spent almost 3 weeks to do a homework, and I still can not finish it on time."
 - "Course projects are impressive!"
 - "This class has posted assignments easily x10 times larger than other classes."
 - "HW8 and HW9 take *forever*."
 - "The homework assignments are so difficult."
 - "I had to do so much googling on my own to learn about concepts used in the homework assignments."
 - "Tough class with a lot of valuable assignments."
 - "Massive assignments."
 - "The workload of this course is too much, especially the last two homework."

Academic Integrity Violations

- Spring 2018 violations (16):
 - Sanctioned: 16
 - Appeals to Engineering Panel Review: 8, no changes
 - Appeals to Engineering Dean: 2, no changes
 - **F in course:** 12
 - 0 + full letter grade reduction: 4 (C-, C-, C-, B-)
- Fall 2018 violations (0):
 - None!
- Spring 2019 violations (4):
 - **F in course:** 1
 - 0 + full letter grade reduction: 1 (B-)
 - C in the course: 2
- Fall 2019 violations (6):
 - **F in course:** 1
 - 0 + full letter grade reduction: 5 (B-, C)
- Spring 2020 violations (4):
 - 0 + full letter grade reduction: 1 (A-, C)
- Spring 2021 violations (2)
 - Full letter grade reduction

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 "CSCI 571 (20 unread) https://piazza.com/class/hxnr3zbzv156m". The main content area displays the Piazza course interface for "CSCI 571".

Class at a Glance (Updated 1 minute ago)

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

Student Enrollment ..out of 350 (estimated)
13 enrolled

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=hxnr3zbzv156m&auth=ff4abc4
Opening this link in the same browser will log you out as horowitz@usc.edu

Recent Posts

- Instr Tip 1: Add link to a question (2 Mon)
- Instr Homework #3: Practice Writing (41 Mon)
- Instr Homework #2: Creating Your... (44 Mon)
- Instr Homework #1: Join the Clas... (6 Mon)
- Instr Welcome to CSCI 571! (5 Mon)
- WEEK 7/13 - 7/19 (7/15/14)
 - Private Introduce Piazza to your stud... (1)
 - Private Get familiar with Piazza (1)
 - Private Tips & Tricks for a success... (1)
- Welcome to Piazza! (7/15/14)
 - Piazza is a Q&A platform designed to get you great answers from classmates and instructors fast. We've put together thi

Who am I?

- PhD in CS from USC, class of '88
- PhD Advisor: Prof. Ellis Horowitz
- Initial career: MS Windows, Commodore Amiga developer
- System Architect -> Team Lead -> IT Project Manager -> VP Engineering
- CTO (Chief Technology Officer) at Luckman Interactive and CareerBuilder
- Faculty at USC since 2003
- Chief Technologist at LASC (Los Angeles Superior Court) since 2002
- O365 SharePoint Project Manager since 2014
- Active member of LA CTO Forum (invitation only group of Silicon Beach CTOs)
- Season ticket holder of USC Football and  LAFC (Los Angeles Football Club) and  supporter

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
- 50,000,000 pages are either new or changed each day
- 65% of the web pages are in English

(From Personal Computer World, Optenet, Sep. 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/>

(From BBC, July 2013) :

- Claim: is porn 4% or 37%?
- <http://www.bbc.com/news/technology-23030090/>

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
 - They **moved to Ebay!**
 - <https://www.ebay.com/str/fogdog>
 - F5 BIG-IP OS, Apache 2.0.64 web server

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 (now **AutoWeb**)
 - Market Cap: \$33.92M (Dec. 2019)
 - Quarterly Revenues: \$28.6M (3rd Quarter 2019)
 - Lead traffic: 31.7M visits (3rd Quarter 2019)
 - Mobile version launched in 2012
 - Stock symbol: **AUTO** (Nasdaq)
- Original Microsoft solution:
 - Microsoft Windows Server
 - Microsoft IIS 7.5 web server
 - Microsoft SQL server database
 - Akamai CDN
- Today:
 - Windows Server, Microsoft IIS/7.5 web server

Sample Web Sites (large size)

- The facts:
 - **www.etrade.com**, online investing services and resources
 - Market Cap: \$10.37B (Dec. 2019)
 - Yearly Revenues: \$2.9B (12/2018)
 - 60 million-page views per month
 - average of 53,000 unique visitors per day
 - 4.9 million accounts (Jan. 2015)
 - 25,000 new retail accounts opened (Oct 2015)
 - 1,952,000 customer transactions per month
 - Taken over by Morgan Stanley in 2020 for \$13 billion
- The solution:
 - IBM 90 xSeries running Linux/**Citrix Netscaler, Apache** and Tomcat web servers, AWS Route 53 (DNS)
 - 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**
<https://www.ionos.com>
 - **GoDaddy.com**
<http://www.godaddy.com/products/secure-hosting.aspx?ci=72738>
 - **Yahoo**
<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 “monthly” prices
 - <http://www.pcmag.com/category2/0,2806,2269,00.asp>

Web Hosting Services

TOP 10 WEB HOSTING PROVIDERS - Updated December 2021

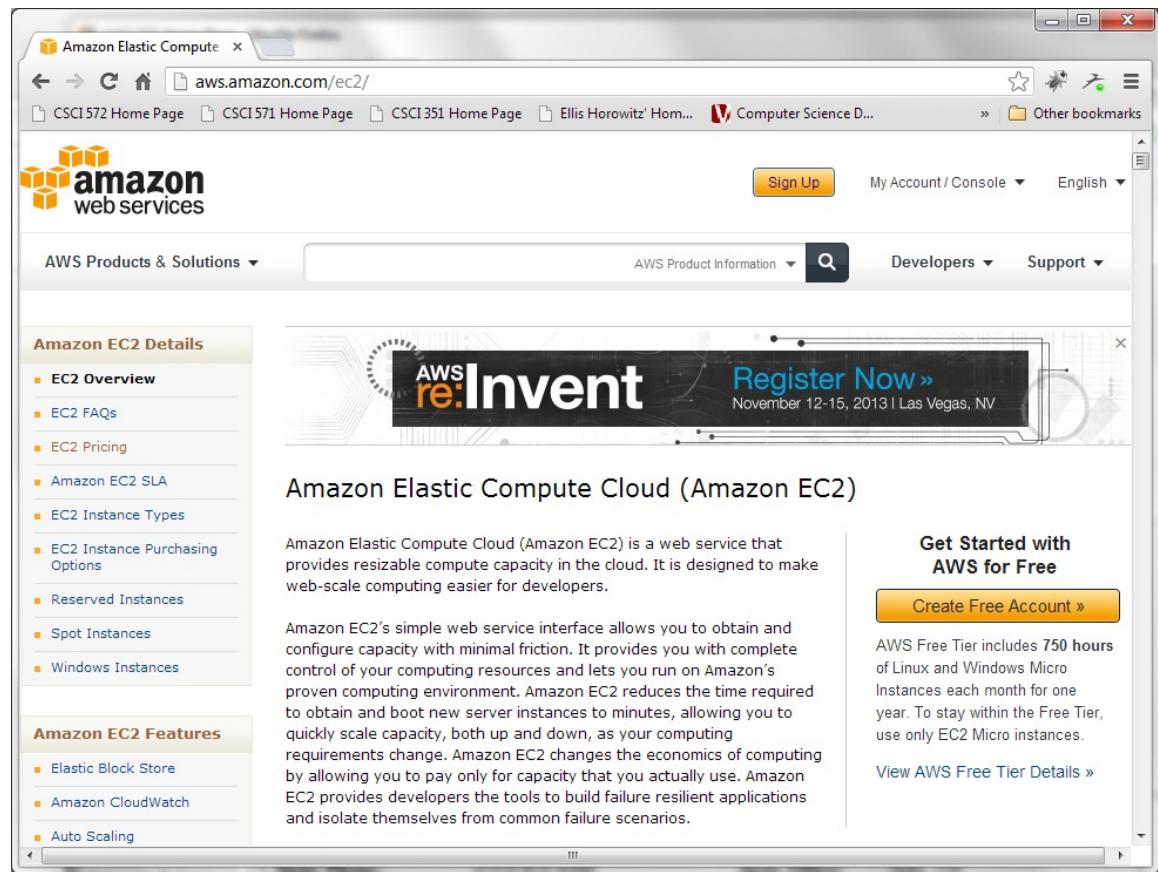
RANK	SHARED WEB HOST	PRICE	SALES INDEX	TREND	UPTIME SPEED	CUSTOMER REVIEWS	EDITOR'S REVIEW	SCORE INDEX	VISIT
1	 HostPapa MORE ▾	\$3.95					 Read	94%	Visit Site
2	 iPage MORE ▾	\$3.25					 Read	89%	Visit Site
3	 HostGator MORE ▾	\$3.95					 Read	88%	Visit Site
4	 TRUSTED BY OVER 10 MILLION CUSTOMERS MORE ▾	\$4.99					 Read	87%	Visit Site
5	 GoDaddy MORE ▾	\$6.29					 Read	86%	Visit Site
6	 TMD Hosting THE MOST DEDICATED MORE ▾	\$2.95					 Read	85%	Visit Site
7	 bluehost MORE ▾	\$3.95		-			 Read	85%	Visit Site
8	 YAHOO! Akco Small Business MORE ▾	\$3.99		-			 Read	84%	Visit Site
9	 SiteGround MORE ▾	\$6.99					 Read	83%	Visit Site
10	 A2 HOSTING MORE ▾	\$3.92					 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 Amazon, Google, Microsoft, Salesforce, Skytap, HP, IBM, Amazon, Google and Apple (iCloud).

An Example - Amazon's Elastic Compute Cloud

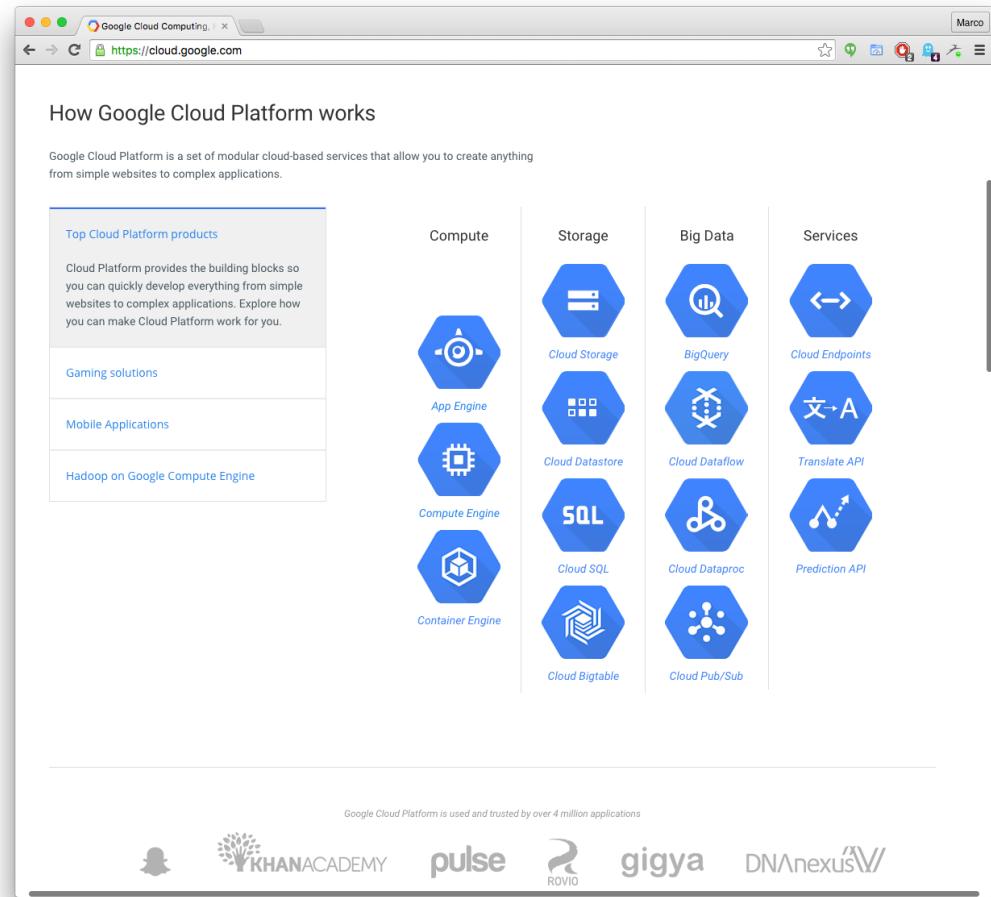
- A web service providing resizable compute capacity
- The “elastic” nature means the service instantly scales to meet demand with no up-front investment
- Users create an Amazon Machine Image (AMI), a virtual computer running your selected operating system (Linux, Windows, etc)
- Users use Amazon’s 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)

An Example - Google Cloud Platform

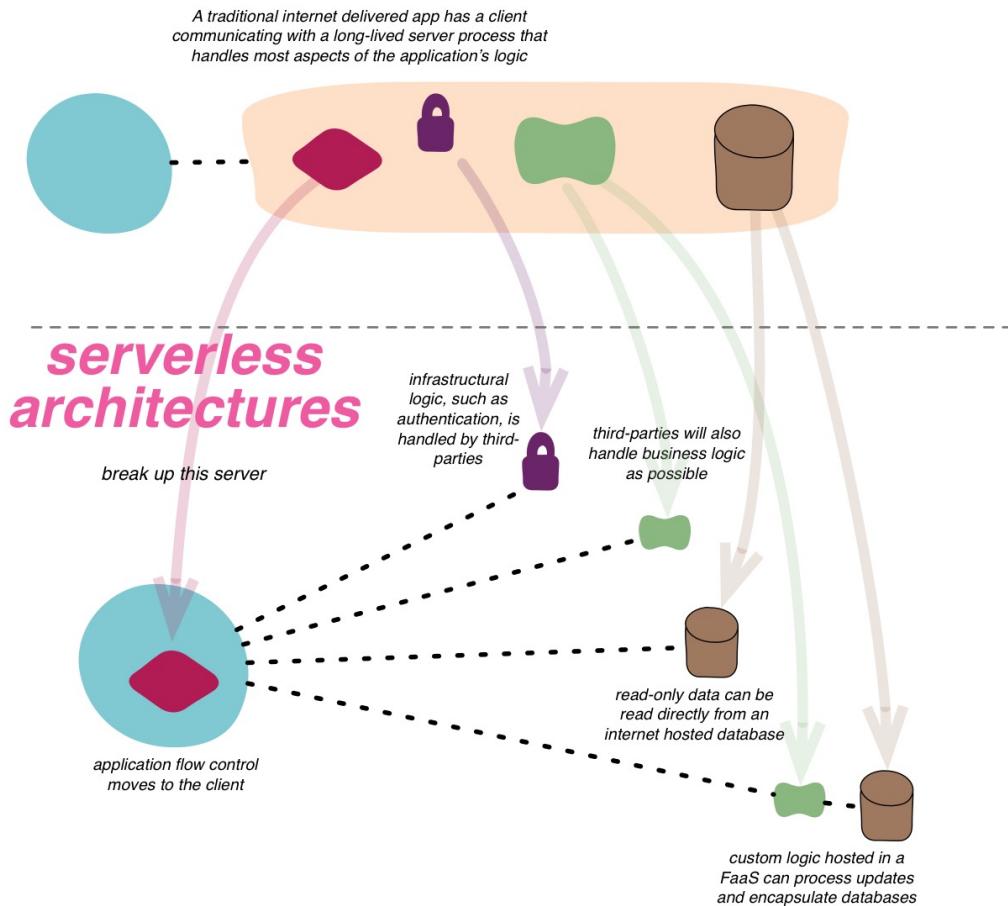
- A web service providing basic Compute, Storage, Big Data and Services.
- Additional services for massively scalable Gaming solutions, Mobile Applications backend, and Apache Hadoop.
- App Engine – A platform for building scalable web applications and mobile backends. App Engine scales applications automatically in response to the amount of traffic it receives.
- Compute Engine - Offers predefined virtual machine configurations: Debian, CentOS, CoreOS, SUSE, Ubuntu, Red Hat, FreeBSD, or Windows 2008/2012.



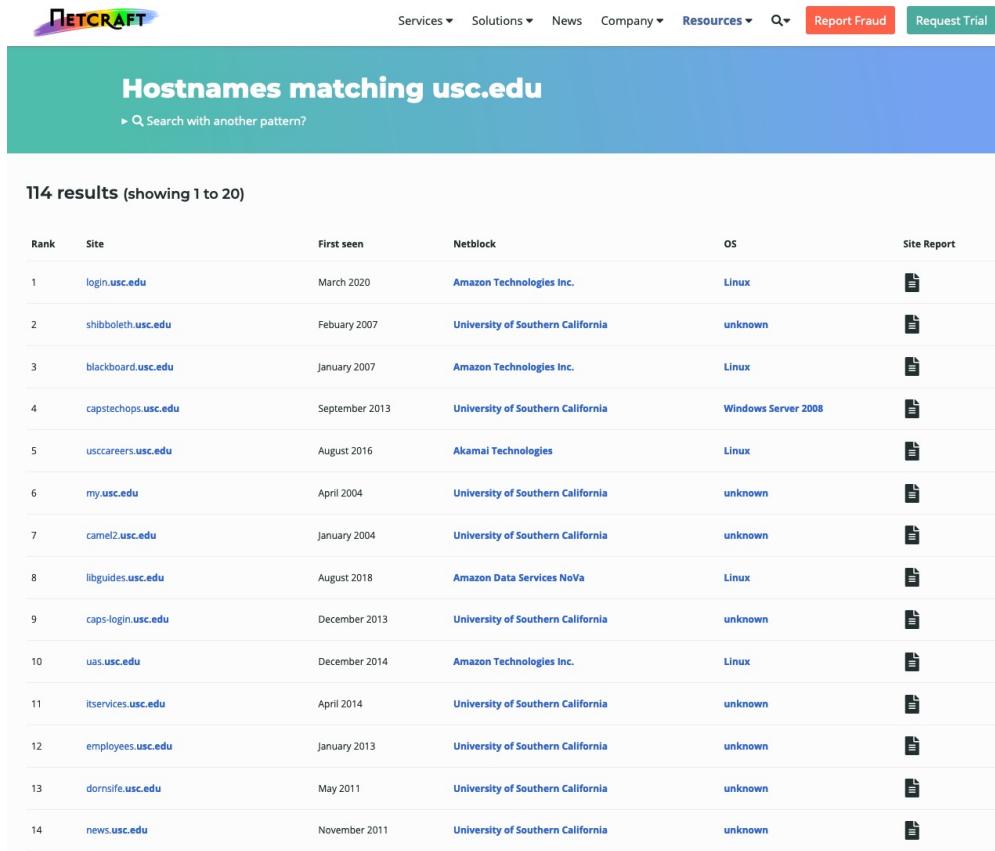
Google uses software-defined networking technology to route packets across the globe and enable fast edge-caching so that data is where it needs to be to serve users.

Serverless Architecture

- Internet based systems where the application development does not use the usual server process.
- They rely solely on a combination of:
 - third-party services, or Backend as a Service (BaaS)
 - client-side logic
 - service hosted remote procedure calls, or Function as a Service (FaaS).
- AWS Lambda is one of the most popular implementations of FaaS at present, but there are others. See:
<https://aws.amazon.com/lambda/>
- Serverless and contains will be covered later in the course



USC Has Many Web Servers Running



The screenshot shows a search results page from Netcraft. The header includes the Netcraft logo, navigation links for Services, Solutions, News, Company, Resources, a search bar, a Report Fraud button, and a Request Trial button. The main title is "Hostnames matching usc.edu". Below it is a search bar with placeholder text "Search with another pattern?". A subtitle indicates "114 results (showing 1 to 20)". The results table has columns: Rank, Site, First seen, Netblock, OS, and Site Report. The data shows 14 entries, all from the University of Southern California, with various first seen dates and netblocks like Amazon Technologies Inc., University of Southern California, and Akamai Technologies.

Rank	Site	First seen	Netblock	OS	Site Report
1	login.usc.edu	March 2020	Amazon Technologies Inc.	Linux	Report
2	shibboleth.usc.edu	February 2007	University of Southern California	unknown	Report
3	blackboard.usc.edu	January 2007	Amazon Technologies Inc.	Linux	Report
4	capstechops.usc.edu	September 2013	University of Southern California	Windows Server 2008	Report
5	usccareers.usc.edu	August 2016	Akamai Technologies	Linux	Report
6	my.usc.edu	April 2004	University of Southern California	unknown	Report
7	camel2.usc.edu	January 2004	University of Southern California	unknown	Report
8	libguides.usc.edu	August 2018	Amazon Data Services NoVa	Linux	Report
9	caps-login.usc.edu	December 2013	University of Southern California	unknown	Report
10	uas.usc.edu	December 2014	Amazon Technologies Inc.	Linux	Report
11	itservices.usc.edu	April 2014	University of Southern California	unknown	Report
12	employees.usc.edu	January 2013	University of Southern California	unknown	Report
13	dornsife.usc.edu	May 2011	University of Southern California	unknown	Report
14	news.usc.edu	November 2011	University of Southern California	unknown	Report

- Netcraft lists **106** separate sites / 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
- Check at:
<https://searchdns.netcraft.com>

Web Browsers Use Standard Layout Engines

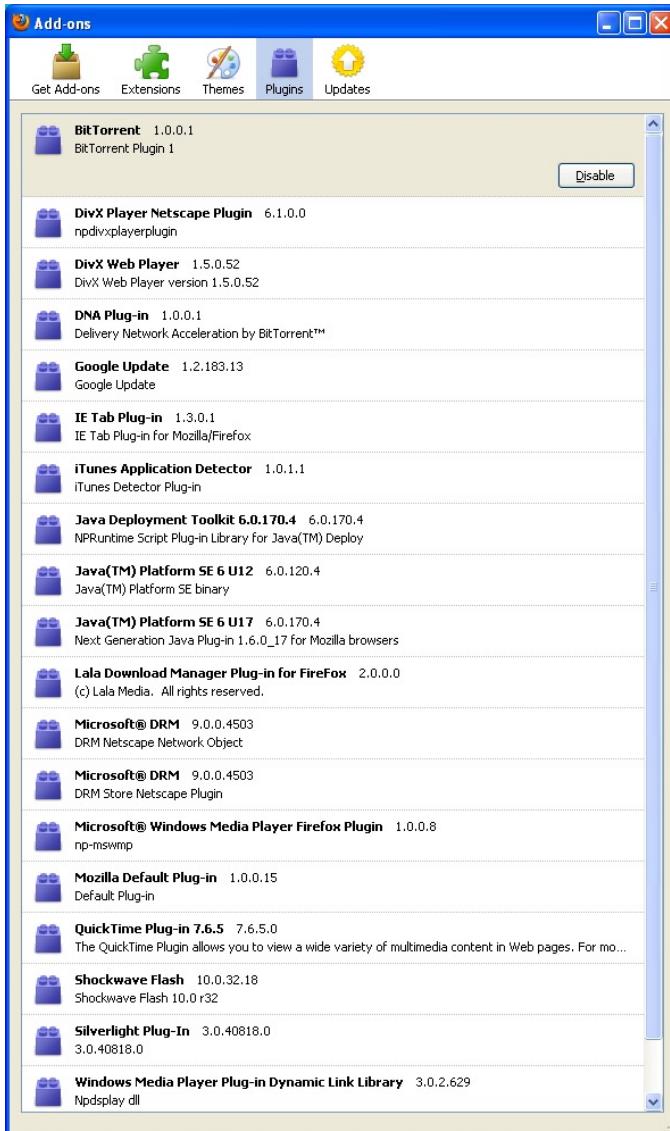
- **WebKit** is a software component used to render web pages; it is open source.
 - It is used by Google's Chrome and Apple's Safari web browsers
 - WebKit is also the name of the Mac OS X system framework version of the engine that's used by Safari, Dashboard, Mail, and many other OS X applications;
- **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, retired)
 - **EdgeHTML:** Edge Legacy (Microsoft), fork of Trident 7, retired in Aug. 2021
 - **WebKit-based:** Chrome and Android (Google), Midori, Safari and Mobile Safari (Apple), Symbian^3 (Nokia) and many others
 - **Chromium-based:** Chrome, Microsoft Edge (2021)
 - **Presto-based:** Opera, Nintendo DS, Opera Mini, Opera Mobile
 - **Java-based:** HotJava, Lobo

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



- Ability to invoke helper applications and plug-ins, (**Obsoleted in HTML5**) e.g.
 - *Adobe Acrobat* - used to view pdf files
 - *Windows Media Player* to play digital sound files
 - *Adobe Flash Player*, used to display video. **Retired in 2020.**)
- Ability to communicate over a secure channel, using SSL
- Ability to maintain and exchange digital certificates
- Ability to run scripts in JavaScript
- Ability to run *Java applets* and *Active X components* (**also obsoleted in HTML5**)

The Browser Wars - Desktop Statistics

2021	Chrome	Edge	Firefox	Safari	Opera
November	80.0 %	6.8 %	5.8 %	3.9 %	2.4 %
October	80.3 %	6.7 %	5.7 %	3.9 %	2.3 %
September	80.9 %	6.5 %	5.6 %	3.6 %	2.2 %
August	81.4 %	6.1 %	5.6 %	3.3 %	2.1 %
July	81.6 %	6.0 %	5.6 %	3.3 %	2.2 %
June	81.7 %	5.9 %	5.6 %	3.4 %	2.2 %
May	81.2 %	5.8 %	5.8 %	3.5 %	2.4 %
April	80.7 %	5.6 %	6.1 %	3.7 %	2.4 %
March	80.8 %	5.5 %	6.3 %	3.7 %	2.3 %
February	80.6 %	5.4 %	6.6 %	3.9 %	2.3 %
January	80.3 %	5.3 %	6.7 %	3.8 %	2.3 %
2020	Chrome	Edge/IE	Firefox	Safari	Opera
December	80.5 %	5.2 %	6.7 %	3.7 %	2.3 %
November	80.0 %	5.3 %	7.1 %	3.9 %	2.3 %
October	80.4 %	5.2 %	7.1 %	3.7 %	2.1 %
September	81.0 %	4.9 %	7.2 %	3.6 %	2.0 %
August	81.2 %	4.6 %	7.3 %	3.4 %	2.0 %
July	81.3 %	4.3 %	7.6 %	3.4 %	2.0 %
June	80.7 %	3.9 %	8.1 %	3.7 %	2.1 %
May	80.7 %	3.5 %	8.5 %	4.1 %	1.6 %
April	80.7 %	3.4 %	8.6 %	4.2 %	1.5 %
March	81.4 %	3.5 %	8.7 %	3.7 %	1.3 %
February	82.0 %	3.4 %	8.7 %	3.4 %	1.2 %
January	81.9 %	3.0 %	9.1 %	3.3 %	1.3 %

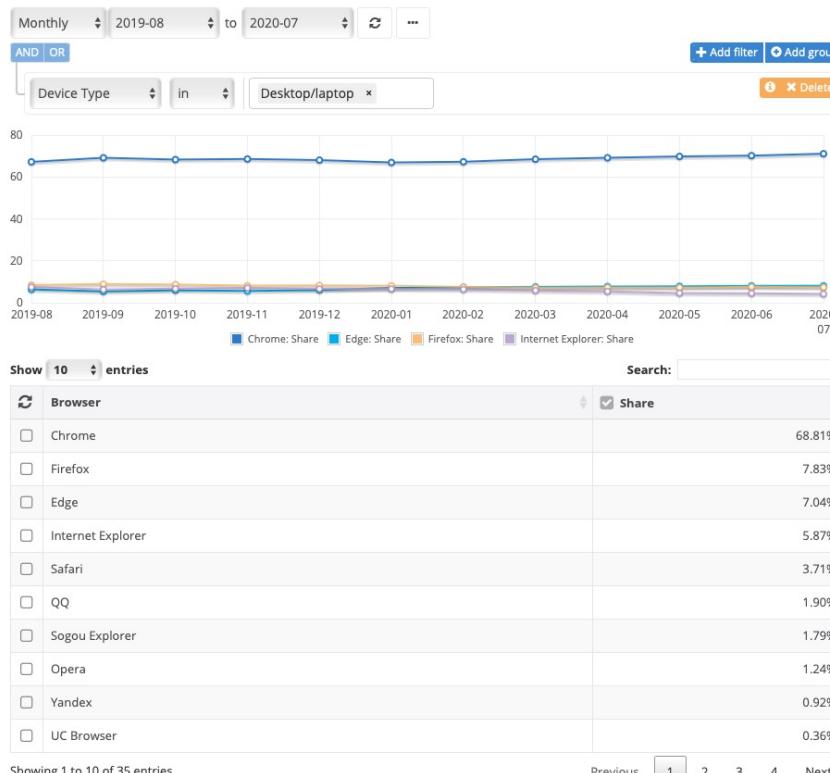
Conclusion of the above study:

- Chrome is the clear winner
- Firefox comes second, but losing ground
- Edge next
- Safari and Opera having small percentages
- WebKit total over 84%

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

Desktop/laptop Browser Market Share Statistics

Browser Market Share

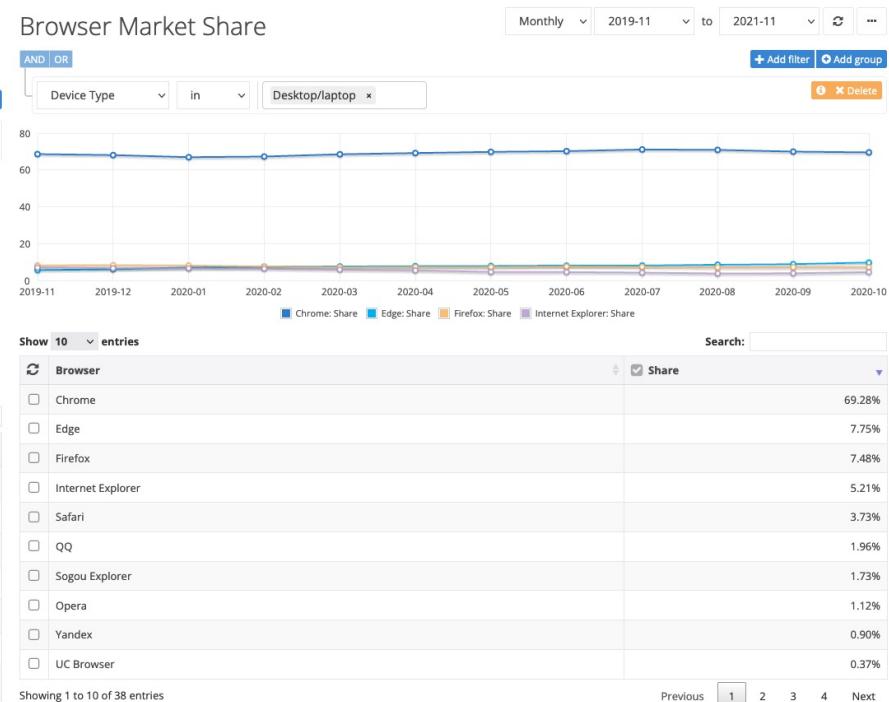


August 2020

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

Chrome leads with 69% market share.

Browser Market Share



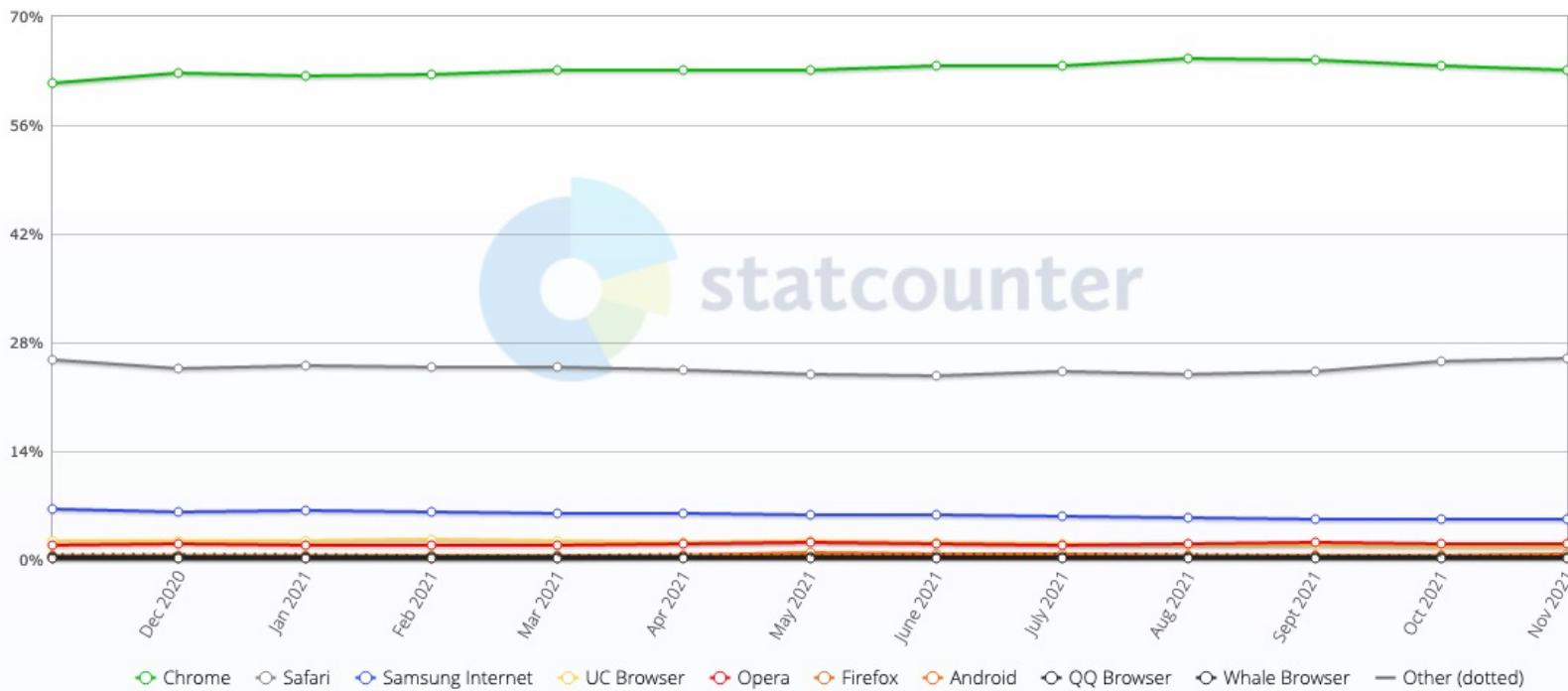
December 2021

The Browser Wars Comparison (cont'd)

Mobile Browser Market Share Worldwide

Nov 2020 - Nov 2021

Edit Chart Data



Save Chart Image (.png)

Download Data (.csv)

Embed HTML

<div id="mobile_browser-ww-monthly-202011-202111" width="600" he

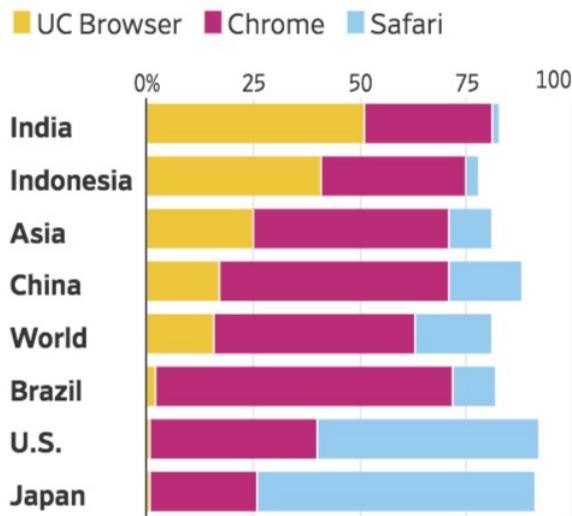
StatCounter Global Stats, May 2020 – April 2021, See <http://gs.statcounter.com>
Chrome has the lead with about 60%, followed by Safari at 24%, Samsung at 6%
and UC Browser from UCWeb of Alibaba Group of China at 3%.

The Browser Wars Comparison (cont'd)

Browser for the Next Billion

Alibaba's mobile browser, UC Browser, has a larger market share than Google's Chrome in India and Indonesia, where many of the world's 'next billion users' are getting online for the first time.

Mobile web browser market share



Note: Data Oct.-Dec. 2016 through Oct.-Dec. 2017.

Source: StatCounter

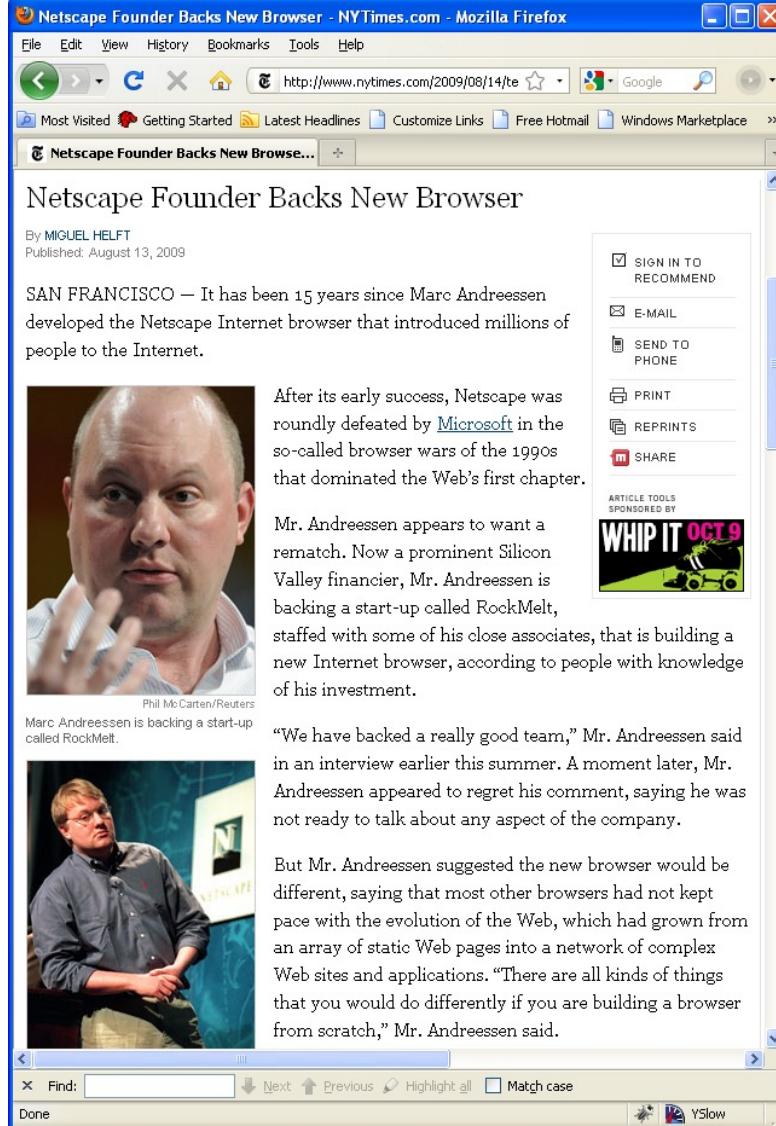
StatCounter Global Stats, Oct.-Dec. 2016 through Oct.-Dec. 2017, See
<https://www.wsj.com/articles/a-browser-youve-never-heard-of-is-dethroning-google-in-asia-1514808002>

Browsers are the Gateway to the Web/Internet

Despite Netscape's failure, there is now a new business model for browsers; Google will pay Mozilla \$300 million/year for 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

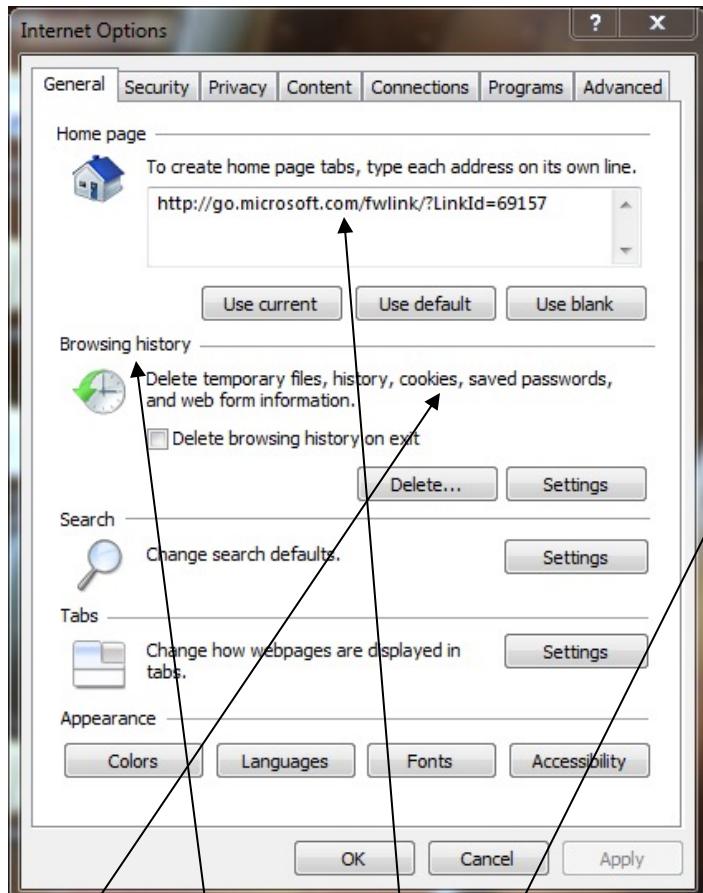
June, 2014: Apple announces DuckDuckGo will be another built-in search engine on Safari (no user tracking)



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 Marc Andreessen's support for RockMelt, a new browser he is backing. It includes a photo of Andreessen and a quote from him. On the right side of the browser window, there is a sidebar with social sharing options like "SIGN IN TO RECOMMEND", "E-MAIL", "SEND TO PHONE", "PRINT", "REPRINTS", and "SHARE". Below the sidebar, there is an advertisement for "WHIP IT OCT 9". The bottom of the browser window shows standard navigation and search controls.

Browser Options Menus for IE and Firefox

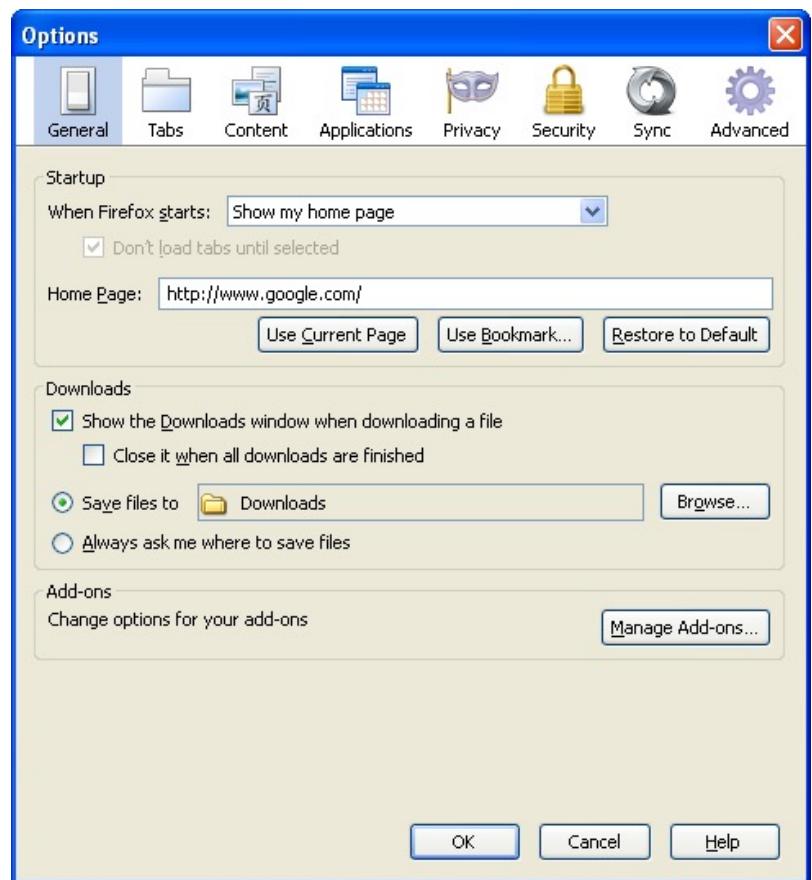
Click on Tools -> Internet Options



Internet Explorer

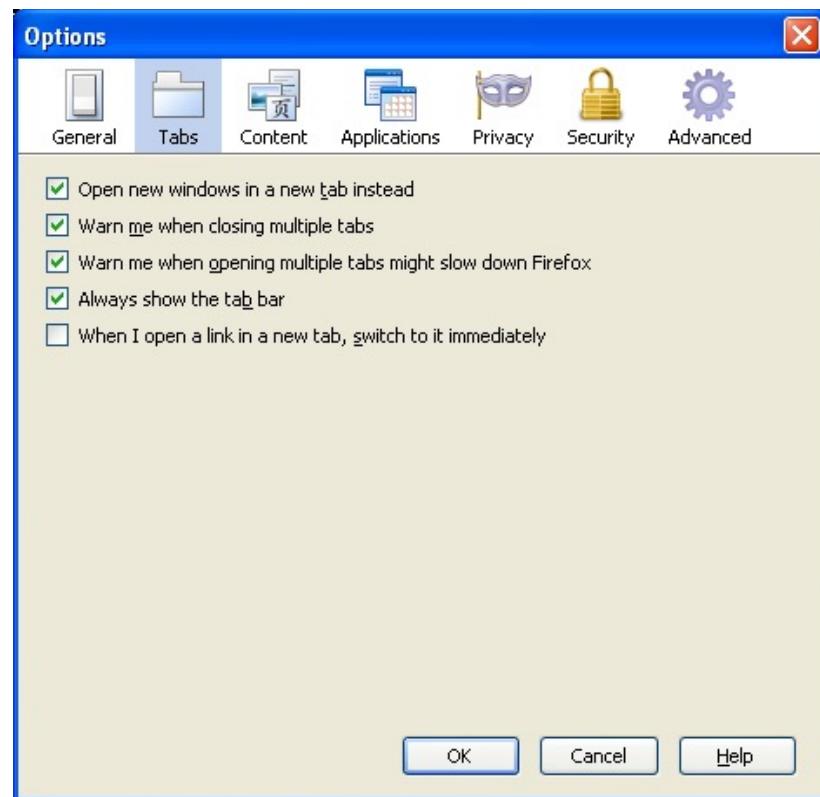
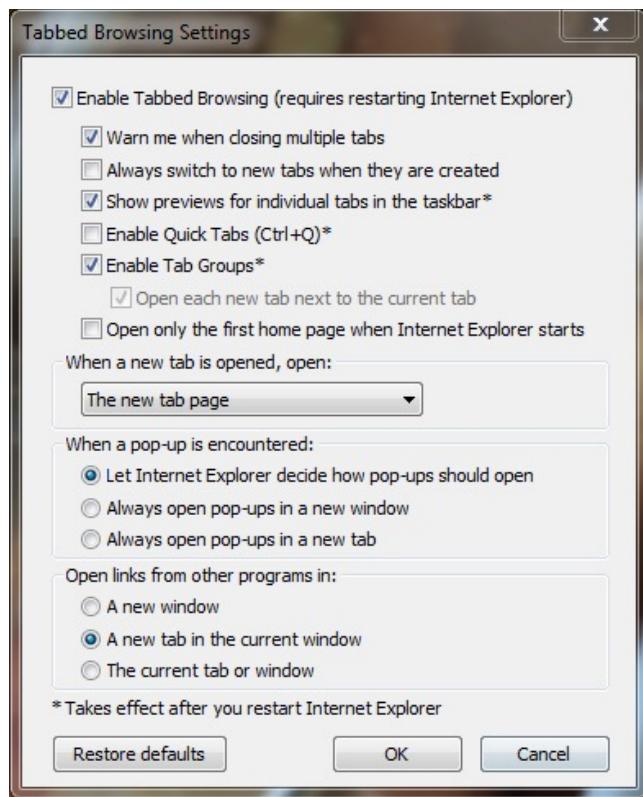
Cookies, History, default opening page

Click on Tools -> Options



Firefox – Tools | Options

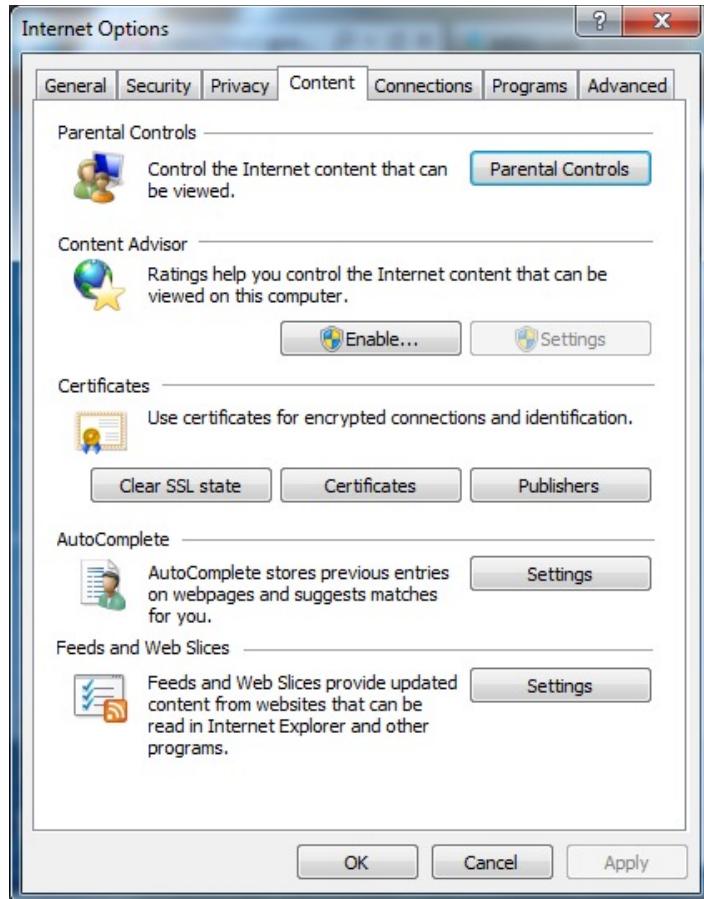
IE and Firefox Tab Control Options



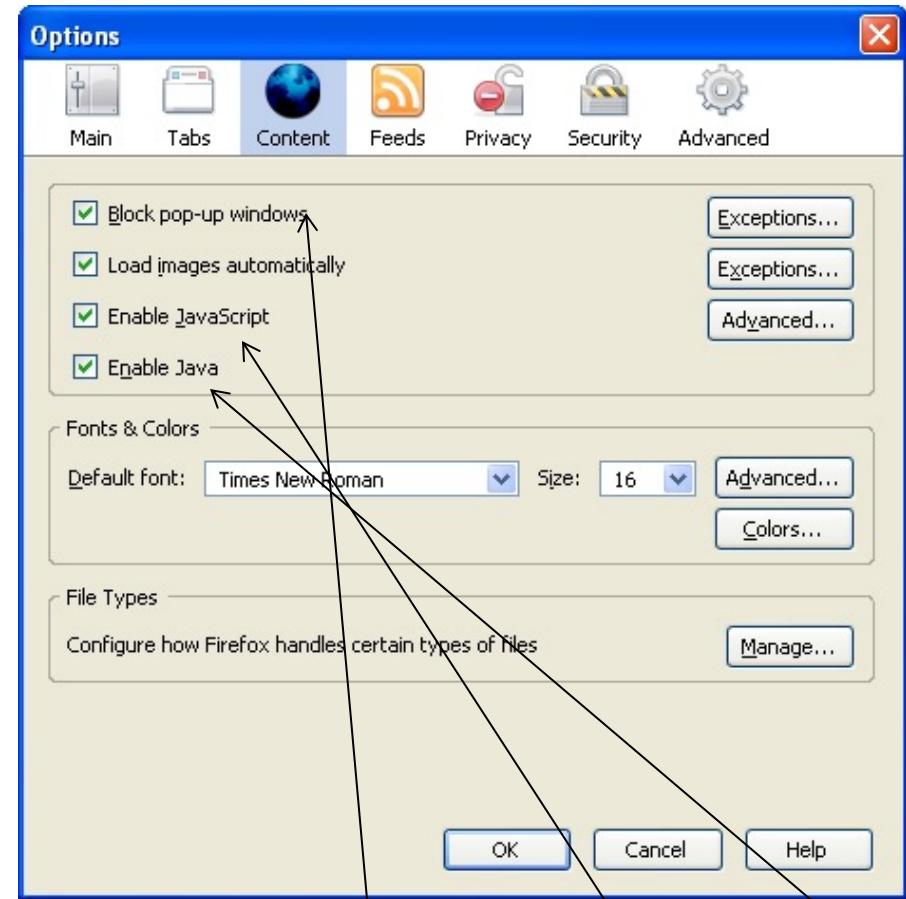
Internet Explorer

Firefox

IE and Firefox – Content Options

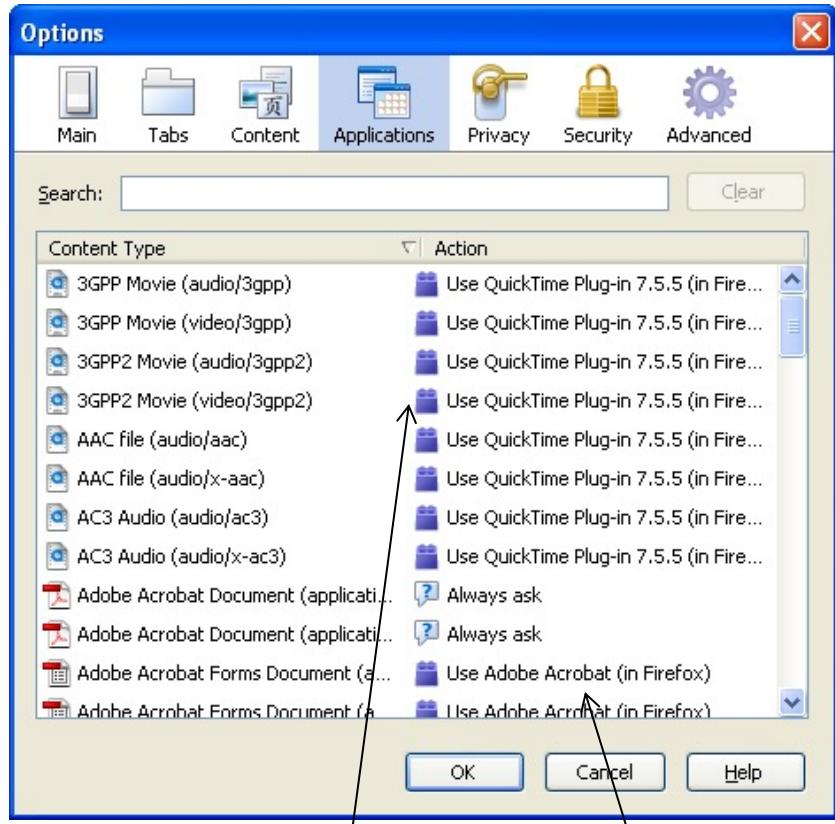
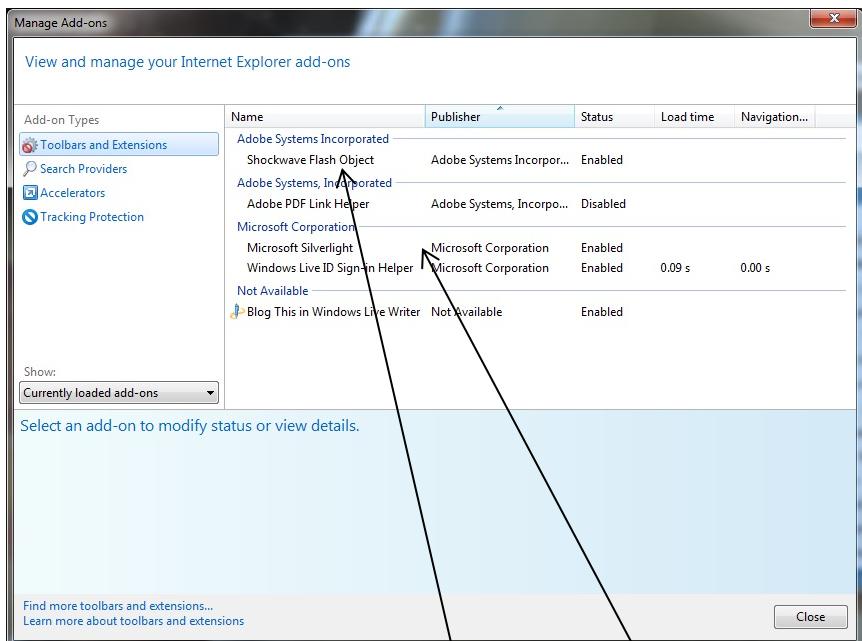


Internet Explorer



Firefox (PopUps, JavaScript, Java)

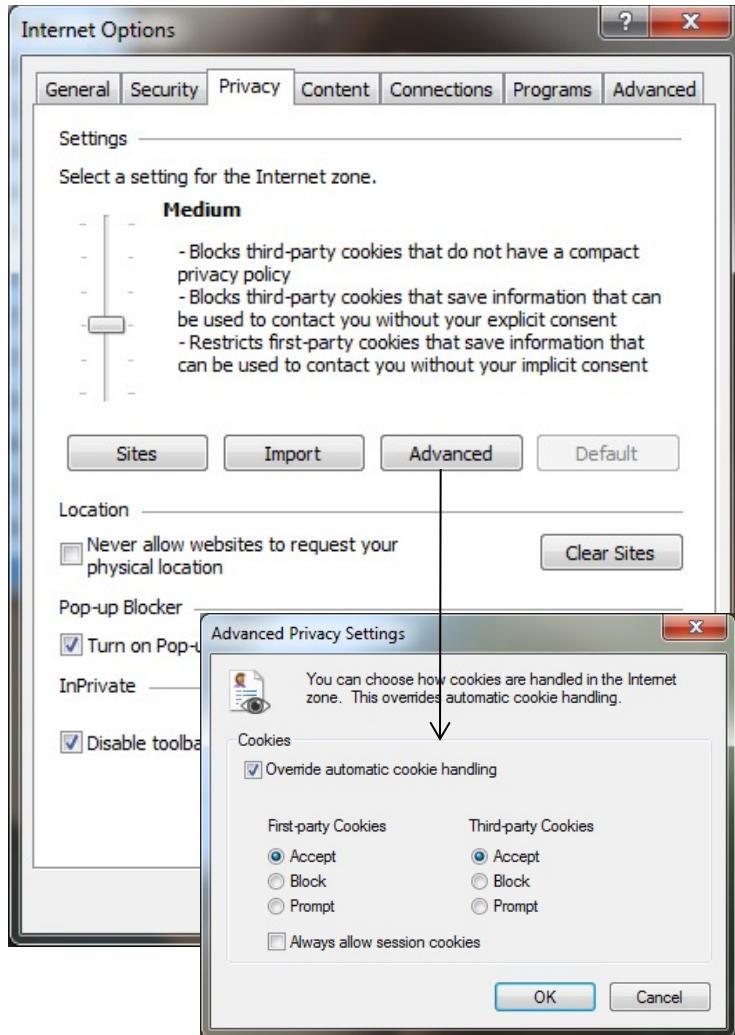
IE and Firefox Applications Options



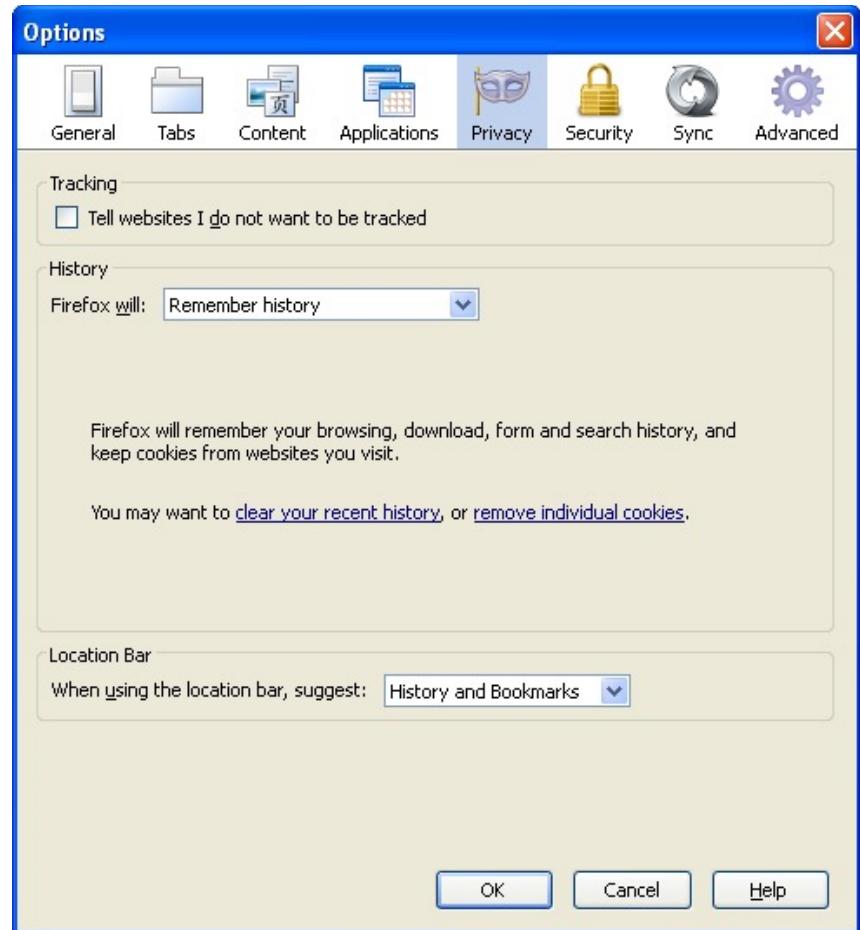
Internet Explorer (Adobe, Silverlight)
(Microsoft has now dropped Silverlight)

Firefox (Quicktime, Acrobat)

IE and Firefox Privacy Options

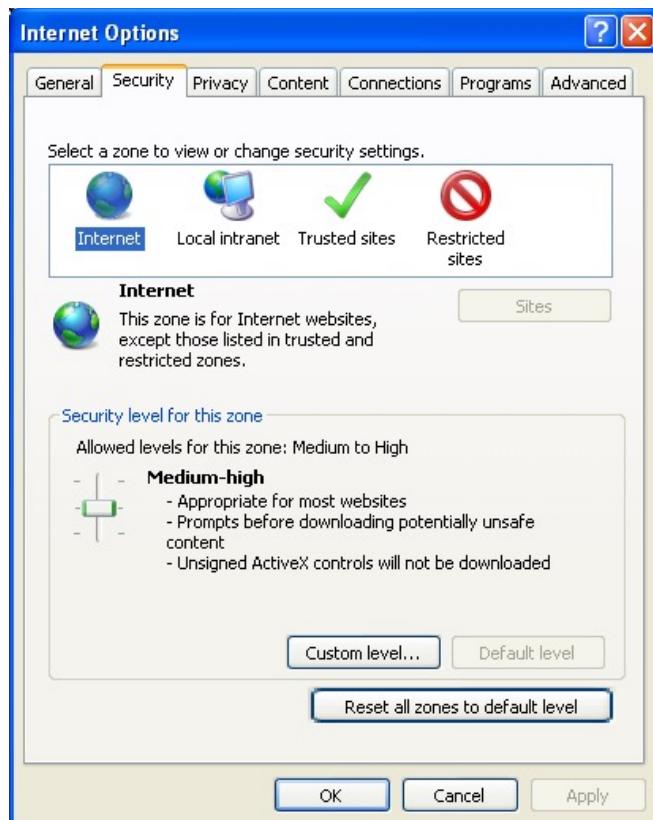


Internet Explorer (Cookies)

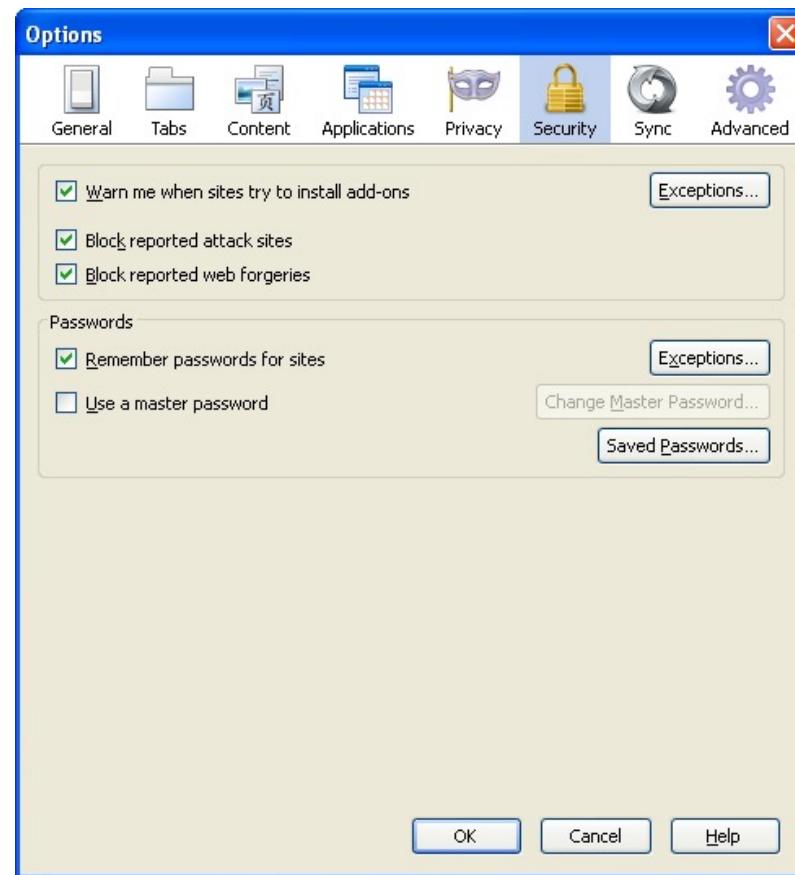


Firefox (History, Cookies)

IE and Firefox Security Options

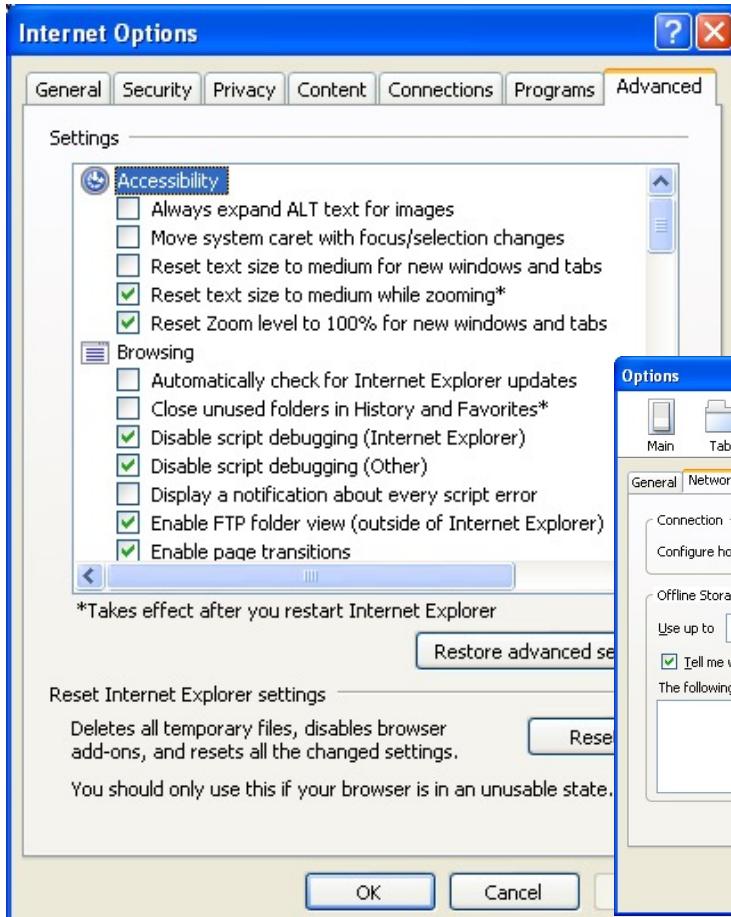


Internet Explorer



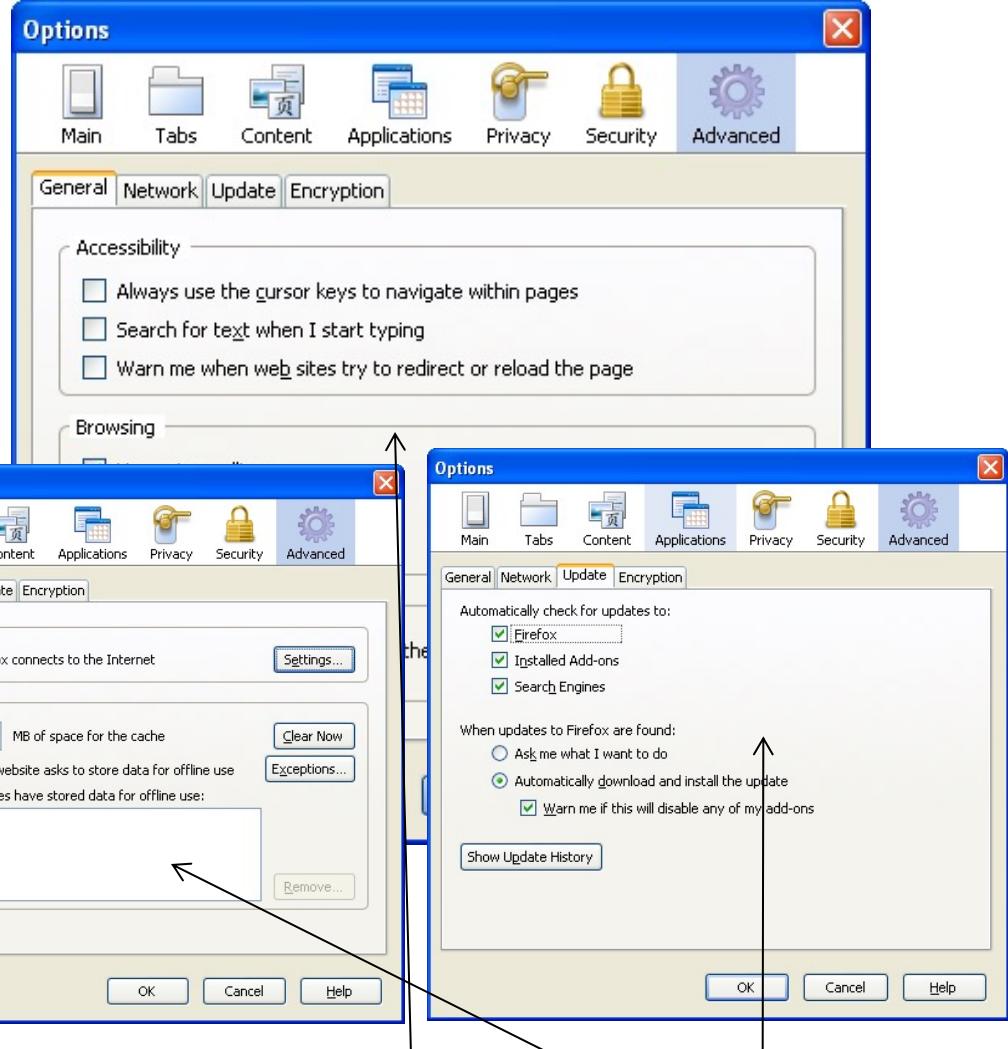
Firefox

IE and Firefox Advanced Options



Internet Explorer

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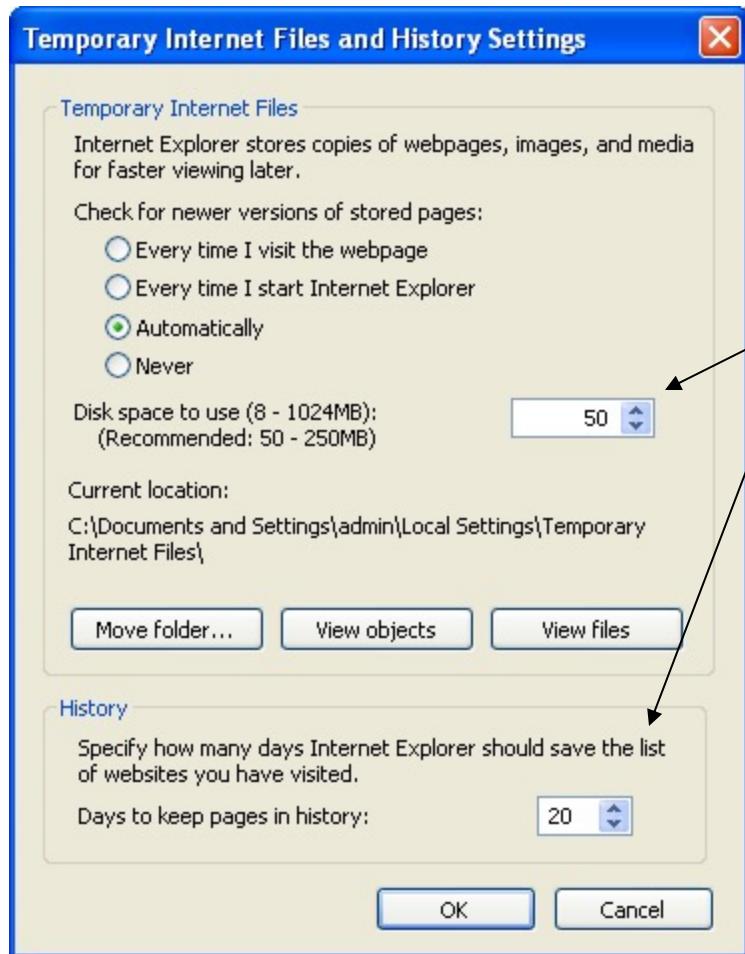


Firefox (General, Network, Update)

Course Intro

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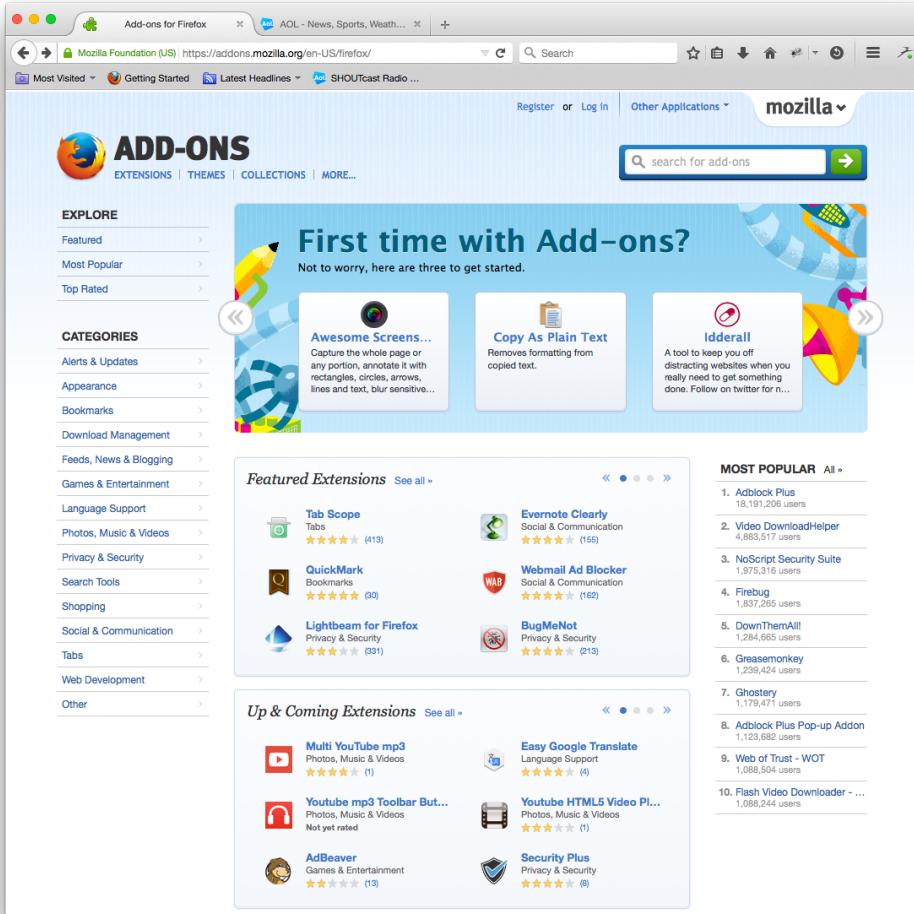
Internet Explorer Browser Caching



- 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

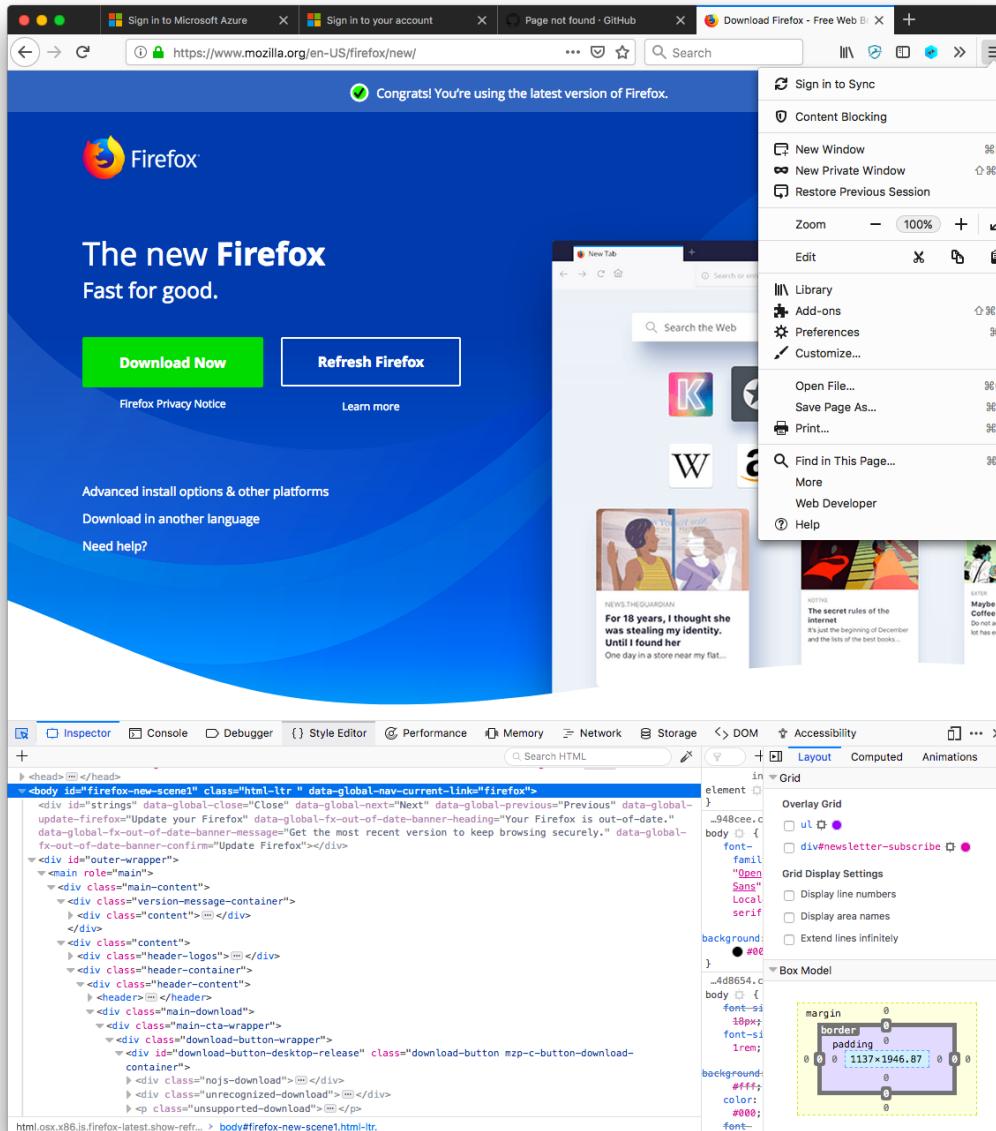
IE caching options screen (Tools | Options | General | Browsing History)

Browsers Have Many Plugins Available

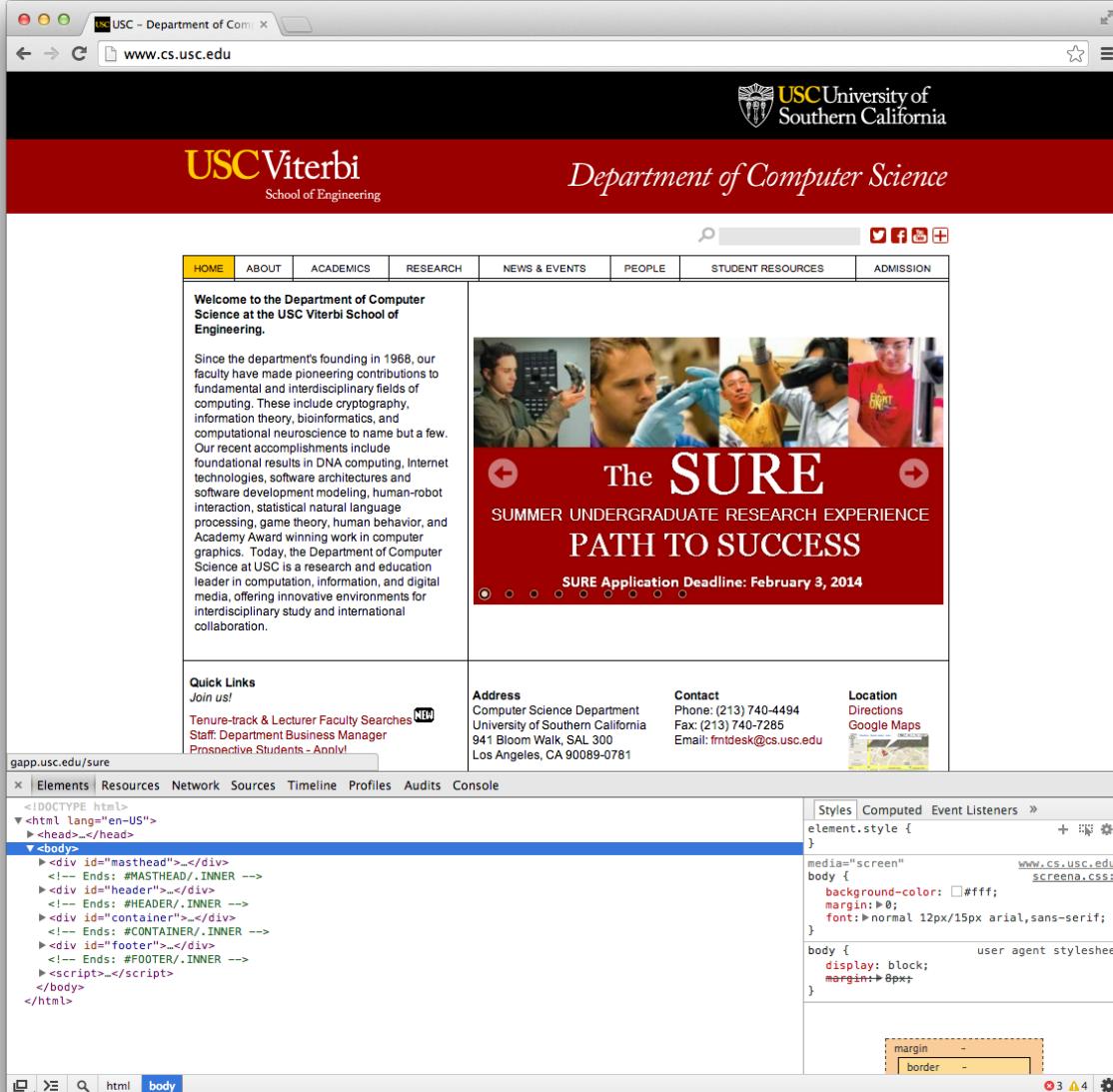


- Plug-ins are also listed as “Extensions”
- Firefox plug-ins that will be especially useful in this course are:
 - HTTP Header Live
- HTML5 does away with most video / audio plug-ins

Firefox: Tools | Web Developer



Chrome: Menu | More Tools | Developer Tools



Evolution of Web Sites

Client-centric Static	Server Applications	Web services	Service Oriented Arch.	Multi-platform (desktop, tablet, phone)	IoT, Wearables, Cloud computing, Serverless Arch. (BaaS, FaaS) Docker
	Databases	Multiple layers	(SOA)	Client-centric	
	Dynamic web pages	Business and service Integration		Client-centric	
HTML Scripts CGI	ODBC, JDBC ASP Applets, ActiveX	XML, WML, SQL, .NET COM+, Beans	Ajax, Web 2.0, JSON	HTML5, CSS3, JS gestures navigation	JS Frameworks AWS, GCP, Azure Microservices containers
1 st gen	2 nd gen	3 rd gen	4 th gen	5 th gen	6 th gen
1991	1997	2000	2005	2008	2014