Csci 4131 Internet Programming
Fall 2021
September 8th

Instructor: Dr. Dan Challou

Agenda

- Course Logistics – Intro and Overview
- History of the Internet
- How Computers represent text
- Overview of WWW
  - Hardware and Software Models of WWW function
  - Course Technologies - HTML, CSS, JavaScript, …
  - A brief look at HTML
  - A 5000 foot view of the URI's, URL's, HTTP & HTTPS Protocols

Contact Info

- **Instructor:** Dan Challou
- email: chal0006@umn.edu
- office phone: 612 625-8207 (but it is currently not working very well…)
- In Person and Virtual Office Hours – Zoom Meeting Information posted on the class Canvas site

Who is Dr. Dan Challou?

- A bit on my background

TA's / Office Hours (In-person and Virtual, zoom meeting info on Class Canvas Site)

- **Tianming Cui**, **email:** cuixx327@umn.edu
- **Chase Johnson, email:** joh13266@umn.edu

In Person and Virtual office Hours, Posted Along with Dr Dan's on the class Google Calendar accessible through the class Canvas site:

https://canvas.umn.edu/courses/268388/modules/items/6706225

Mr Tianming Cui

Mr. Chase Johnson

Course Logistics

The Syllabus and Schedule can be all found on class website on Canvas – *lets have a look!*

https://canvas.umn.edu/courses/268388/assignments/syllabus

https://canvas.umn.edu/courses/268388/modules/items/6757818

Lecture Slides, Examples (Programs), and Homework assignments will be posted on Canvas, and you will submit your homework assignments via through Canvas as well

Please Check the Course Schedule (in the Resources Module at the top of the Home Page on the Class Canvas site regularly for changes to the course schedule) for weekly reading, tutorials

Exams will be given via GradeScope – online, fixed time

Course email: csci4131help-f21@umn.edu

Course Logistics, Continued

And finally, a look at the structure of Canvas for this course on canvas.umn.edu

https://canvas.umn.edu/courses/268388

Home Page / Resources Module + weekly modules

Lecture Slides Initial Version (Before Class) and Final Version (After Class)

Syllabus

Textbook

Assignments

Discussions

Announcements

Discussions

Grades

Files

…

Media Gallery

Course Logistics, Covid-related

- Must wear a mask here in class
- No mask, must leave
- Please comply – otherwise I have been directed to call UMPD to remove you, and then contact the office of Community standards, who will put you on probabtion or worse (kick you out of school for the semester).
- Finally, request you sit in the same seat each week

Reading and Tutorials(will enable you to complete HW1)

- Read and do the Exercises in Zybook Chapter 1
  - Do the HTML tutorial on w3schools
  - https://www.w3schools.com/html/default.asp
- For next week: -
- Read and do the assigned exercises in Zybook Chapter
- Do the online Tutorials
  - http://www.w3schools.com/css/
  - http://www.w3schools.com/js/

- **Homework Programming Assignment 1 will be out soon (by end of THIS week – and it will be short).**

Lecture Q & A / Technology Policy

- ***Feel free to ask questions***
- ***Put your phone in your backpack and mute it.***
- ***Unless you are taking notes on your computer, close it – but do bring it to class, you we will use it***

Prerequisites

- Operating Systems

Exercise 1: Positive Class Participation Encouraged – Raise your hand!

Please feel free ask questions!

Course Objectives

- Learn a set of technologies that enable you to build your own personal website, and require you to use them.
- Build a “full stack” application over the course of the semester
- This semester – we will start with your some sort of list/table/schedule (which you will create a webpage for as part of your first homework).

What this course does not do

- Give you the ALL the knowledge necessary to build a production ready-for-deployment website

- Please venture a guess as to what issue(s) prevent us from completing the bullet above in this course?

“Client” Side Technologies in Course Scope (Subject to Change)

- HTML /Forms
- CSS
- JavaScript / Forms
- Jquery (maybe, lots of info on this is out there, it is more important to learn the underlying technology – JavaScript)
- DOM
- HTTP Protocol
- XML
- Ajax (Asynchonous Javascript and XML) / JSON

“Server” Side Technologies in Course Scope (Subject to Change)

- SQL
- Database – MySQL; NoSQL Database?
- Node.js
- PhP?
- Python (one assignment, possibly part of another – not major part of the full stack application we will build and deploy)
- Google Maps API
- Possibly the Twitter API
- A list of other APIs of your choosing

Exercise 2- **Submit via the Lecture 1, Exercise 2 Link in the week 1 module on the Class Canvas site**

Take 5 minutes (Or so) to think about the following and answer the following:

1) Why are you taking this class?
2) 2 or 3 topics in the scope of this course that are of most interest to you
3) Your assessment of your expertise (beginner, intermediate, expert) in or with HTML, CSS, JavaScript, DOM, jQuery, AJAX, node.js, XML, JSON, PhP, Python, Perl, SQL, MySQL, express;
4) Experience, if any, with Client Side Scripting and Server Side Scripting

Please raise your hand when done!

One More Note

- HW 1 will come out this week, and be due NEXT Friday 9/17 – so watch the Canvas site and your email for the Announcement of its availability!!!

Questions?

What the heck is the Internet?

- https://www.youtube.com/watch?v=Dxcc6ycZ73M
- http://www.businessinsider.com/what-is-the-internet-and-how-the-internet-works2011-6
- Jay and Silent Bob have a different view **(warning, this is egregiously stupid, and you may find it offensive)**:
  - https://www.youtube.com/watch?v=nv_F3nAPjsI

How does the Internet Work? (A High – Level view)

- https://www.youtube.com/watch?v=7_LPdttKXPc

History of the Internet

- Leonard Kleinrock – Packet Switching 1961
  - Showed the viability of Packet Switching vs. Circuit Switching (a physical connected path between two “terminals”)
- ARPANET, funded by DARPA, up and working in October 1969 (UCLA connected with SRI)
- First Transmission Protocol – Network Control Protocol - 1972
- Transmission Control Protocol / **Internet Protocol (TCP/IP) -** January 1, 1983

A Note on IP Addresses

- An Internet Protocol (IP) address is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the Internet Protocol for communication.[1]

- IP address serves two principal functions:
  - host or network interface identification,
  - location addressing.

- Its role has been characterized as follows:
  - "A name indicates what we seek.
  - An address indicates where it is.
  - A route indicates how to get there."[2]

Format of an Internet Address

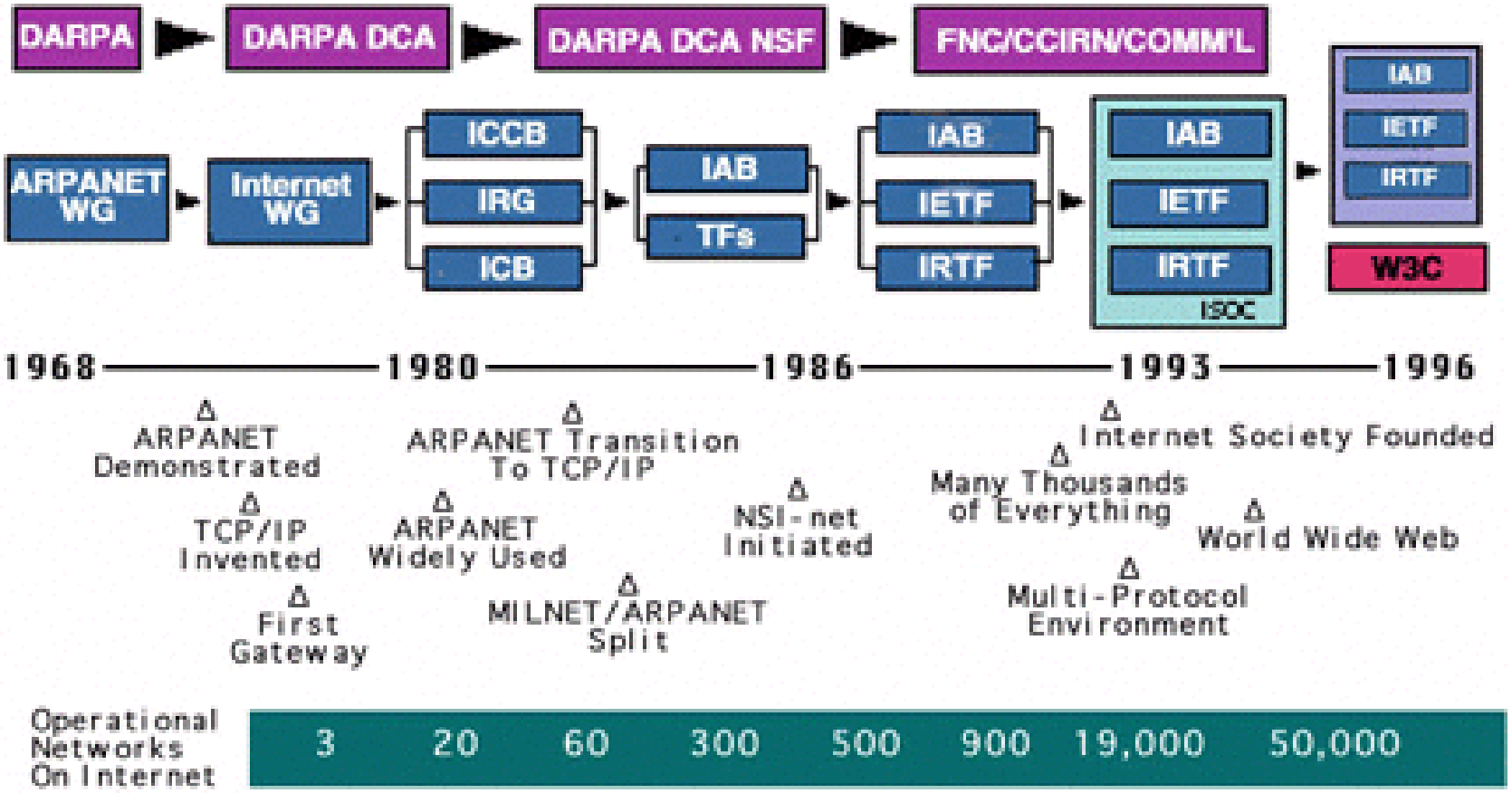
- Initially – Internet Protocol Version 4.
- Format - 172.16.254.1 (for IPv4) – 32 bits
- How many devices can be addressed using this format?
- 2^{32} = 4,294,967,296

Question

- Are 2^{32} = 4,294,967,296 IP addresses sufficient?
- Sites that might be helpful:
  - http://www.internetlivestats.com/internet-users/
  - https://iot-analytics.com/state-of-the-iot-update-q1-q2-2018-number-of-iot-devices-now-7b/
  - *Show of hands to vote…*

Internet = World Wide Web?
(Yes or no – show of hands)

Timeline – Evolution of The Internet

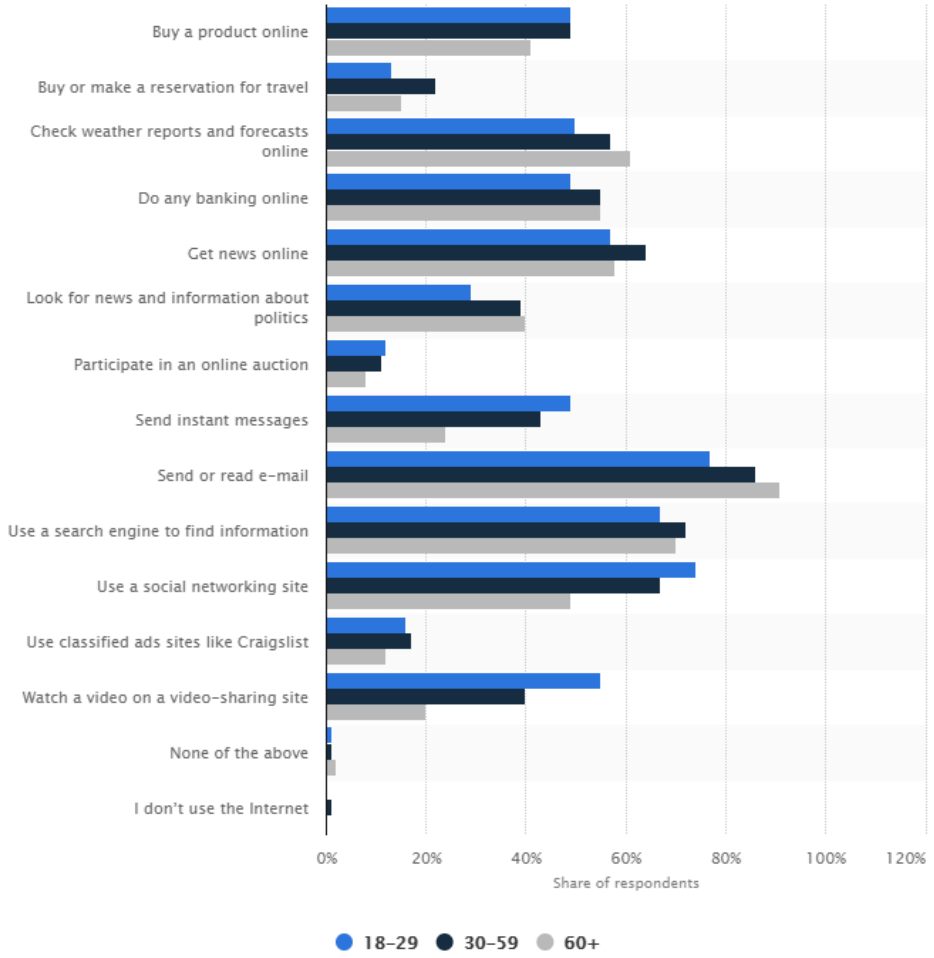


http://www.internetsociety.org/internet/what-internet/history-internet/brief-history-internet#LK64

Most Popular Browser ? (venture a guess with your voice)

- http://www.w3schools.com/browsers/browsers_stats.asp

Most popular daily online activities of adult internet users in the United States as of February 2017, by age group



DOWNLOAD SETTINGS SHARE

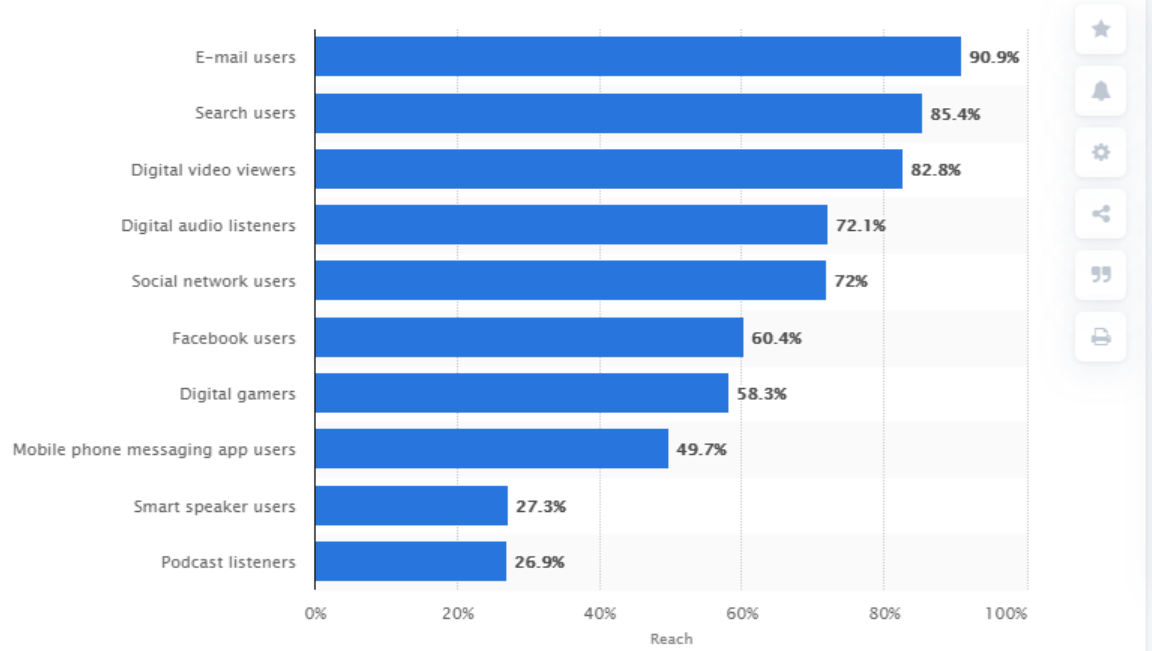
PNG PDF XLS PPT

DESCRIPTION SOURCE MORE INFORMATION

This graph shows the typical daily online activities of internet users in the United States as of February 2017, sorted by age group. During the survey period, 50 percent of respondents aged 18 to 29 years checked the weather online on a daily basis.

https://www.statista.com/statistics/184541/typical-daily-online-activities-of-adult-internet-users-in-the-us/

Share of internet users in the United States participating in select digital activities as of August 2019



DOWNLOAD

PDF XLS PNG PP

Source
→ Show sources information
→ Show publisher information

Release date
January 2020

Region
United States

Survey time period
August 2019

https://www.statista.com/statistics/184559/typical-daily-online-activities-of-adult-internet-users-in-the-us/

A DifferentPoint of View

- http://www.pewinternet.org/fact-sheet/internet-broadband/

Questions?

Let’s start understanding the Elements that are used to make up the internet

- The internet was created to enable the exchange of information (by who)
- Information is exchanged in various ways
  - Text
  - Audio/ Voice / Music
  - Pictures / Videos
  - Touch (Haptic)
  - Smell (e.g. Pheremones)

- Let’s start with text (and some rudimentary sounds)

Evolution of How Computers Represent Text

- Before Digital Images, Digital Video, Digital Music, etc. :
  - Computers were used to manipulate numbers
  - Earliest machines were used in number crunching – computing artillery firing tables, decrypt codes used by opposing forces to transmit messages, etc

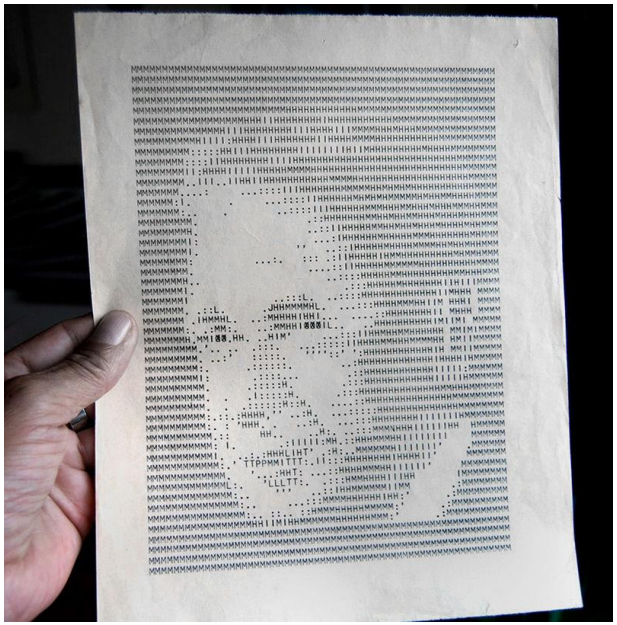
And then there was ASCII

- American Standard Code for Information Exchange (circa 1960)
- Numeric Scheme for encoding characters of the English Alphabet
- Created by Bell Telephone Laboratories (aka – "The Phone Company") to support their tele-printers

http://en.wikipedia.org/wiki/ASCII

USASCII code chart

b_7 b_6 b_5 →	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
b_4 b_3 b_2 b_1 ↓ Row / Column →	0	1	2	3	4	5	6	7
0 0 0 0	0	NUL	DLE	SP	0	@	P	`	p
0 0 0 1	1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	2	STX	DC2	"	2	B	R	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s
0 1 0 0	4	EOT	DC4	$	4	D	T	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	i	y
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z
1 0 1 1	11	VT	ESC	+	;	K	[	k	{
1 1 0 0	12	FF	FS	,	<	L	\	l	|
1 1 0 1	13	CR	GS	-	=	M	]	m	}
1 1 1 0	14	SO	RS	.	>	N	^	n	~
1 1 1 1	15	SI	US	/	?	O	_	o	DEL



Question: Why would anyone ever need any other character/number encoding standard (please venture an answer)?

- So – what was the answer to ASCII's shortcomings?

  – Unicode Transformation Format (UTF)

Unicode 8 seems to be the Defacto Standard

- Unicode 8 – not big or little endian (does not depend on how computer hardware is implemented)
  - Big Endian - most significant byte in smallest (lowest) address
  - Little Endian – most significant byte in largest (highest) address
- Supports the legacy ASCII character set

Additional Supplemental Reading

- http://unicode.org/standard/WhatIsUnicode.html
- https://en.wikipedia.org/wiki/Unicode
- http://doc.cat-v.org/bell_labs/utf-8_history

UTF Enables Web Browsers to Know How to Display HTML

- Hyper-text Markup Language is used to mark up text, which is represented in Unicode
- To correctly process HTML, a web browser must ascertain which Unicode characters are represented by the encoded form of an HTML document. In order to do this, the web browser must know what encoding was used
- http://en.wikipedia.org/wiki/Unicode_and_HTML

Questions?

Next Time –

- HTML revisited (you will have seen it in your zybook assignment)
  - Basics (paragraphs, links, …) revisited
  - Lists revisited
  - Tables

Make sure to do the readings and tutorials for Week 1 listed in the Week1 Module on the Class Canvas site **(and in the course schedule in Resources Module)**

Watch for the Announcement of HW 1 Availability!!!