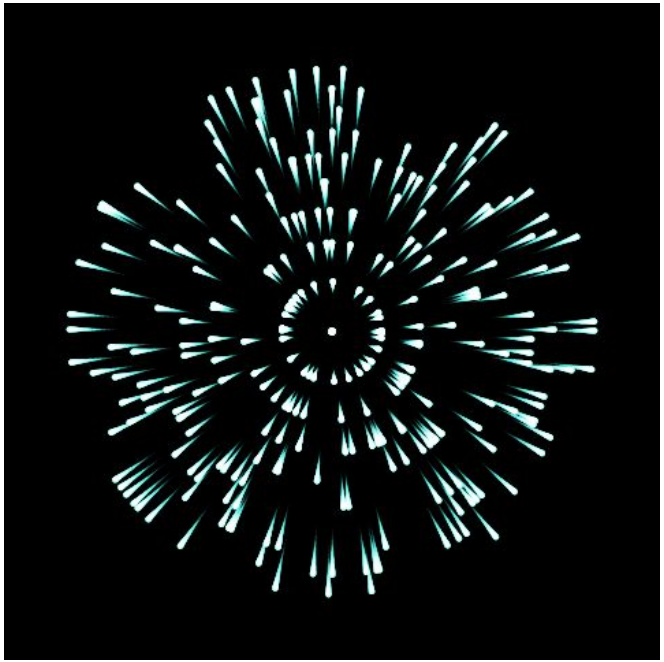
INFO 654 – Information Technologies

Week 1: Introduction to the Course

Welcome!



TODAY

first:

We'll review the course outline, structure, and approach

then:

break

then:

A starting introduction to information technology concepts

Course Goals and Approach

Introducing fundamental concepts of computing, networking, and other information technologies, with an emphasis on the role these technologies play in creating, manipulating, storing, and accessing information.

Keeping informed of topics essential to the work roles and responsibilities of information professionals and understanding key points to have in mind for tech change and implementations in the workplace.

Seeing relationships of past, current, and emerging future information technologies to our professional practice.

Course Goals (by course completion)

- Understand, use, discuss, and be able to help others with core computing technologies, including hardware, operating systems, software applications, Internet/web technologies and assistive technologies.
- Evaluate different technologies to determine the most appropriate infrastructure, systems, and tools needed to solve a problem or achieve a goal.
- Use relevant web technologies to edit a substantial website and employ online technology-focused educational resources.
- Use critical approaches when evaluating information technologies, including the evaluation of technology-related current events.

Introductions

Let's get to know each other! Tell us:

1. Your name (as you prefer to be called)
2. Your program (e.g. LIS and libraries/and archives, DAV, IXD, MDC, etc.) and general area interest within that field
3. One thing that led to your interest in the field

About me

Name/pronouns

- Rachel Daniell
- she or they
- you can call me “Rachel” or “professor” as you prefer!

Research Interests

information and human rights, data visualization and online storytelling, geospatial information, temporal information, visual representation of time-space data, metadata, archives, social memory

Teaching

- at Pratt SI: Foundations of Information, Information Technologies
- elsewhere: Interactive Web Mapping, Design & UX for Mapping, Interactive Data Visualization (D3), workshops in data visualization

Background

human rights organizations, tech consulting to nonprofit organizations, geospatial data research, publishing (earlier!)
MS from Pratt SI in DAV, PhD in Anthropology from GC CUNY

About the Course - Practical Info

Tuesday, 3:00p-5:50p, Room PMC 606

Work accessed and framed via: course Canvas, syllabus

Primary communication method: via email (directly or through the Canvas system), chat in Canvas (with each other)

Right after class!, 6:00p-7:00p Tuesdays, in person, Room PMC 607 + other times by appointment via Zoom (email rdaniell@pratt.edu to request an appt)

About the Course - Waiver Option

Students with significant incoming technology experience may apply to waive taking INFO 654 Information Technologies. First, you should review the syllabus to assess your existing familiarity with the topics covered. Then, if you wish to apply to waive the course, send the following to **si@pratt.edu** for review:

- A few sentences describing your past/current technology work and why you would like to waive the course
- Your resume
- A portfolio (or other demonstration of your work), if you have one

If you are approved for the course waiver, you will be notified within one week and a letter to that effect will be added to your file.

A Note on Our Course Environment: Supporting Each Other in Lifelong Tech Learning

Being part of this class means making a commitment to contribute to a respectful and supportive environment for shared learning. This course is designed to be inclusive and inviting, dedicated to empowering students to explore new technical skills. Everyone is able to get more out of the course when people feel comfortable – comfortable to try new things, to make technical errors, to explore new tools. For learning new tech skills, it's important to cultivate an awareness of how to co-create a productive space for all.

Let’s open Canvas and look at the class structure together

(Canvas is available via onePratt or as a direct link at bottom of Pratt website in footer area)

Themes!

What fun stuff do we get to cover…?

Hardware, Software, & Systems

Networking & the Internet

HTML

CSS

Digital Graphics, Multimedia, & Digital Design

Programming Concepts, Programming in JavaScript

Programming (cont.), JavaScript (cont.), + APIs

UX & User-Centered Design + CMS tools + Accessibility

Data & Databases

Structured Data: XML, JSON, GeoJSON,

Data Analysis & Visualization Fundamentals

Info security, privacy, ethics, & law + Big Data

Information Systems & Systems Analysis

+ Information Technology of the Future…

Weekly Flow

What will you do each week for class?

Practicalities:

- go to the Canvas course site and see what is under next week's date
- read/watch/explore as indicated
- do hands-on tutorials as indicated (these may need larger blocks of your dedicated time than readings do)
- before 3:00 on the class day: do any Discussion Posts assigned and turn in any Assignments due

Overall:

- early weeks and later weeks have more reading
- mid-course has lots of hands-on work
- mid-course has 1 larger project (Web Fundamentals)
- end-of-course has 1 larger project (Group Project)

Session Flow

What will our class sessions be like?

- Start with announcements, events, news
- Summary of what the session will cover and reminders of any upcoming deadlines

- Current Events Presentations (on most weeks) (and see list of news links for potential inspiration)

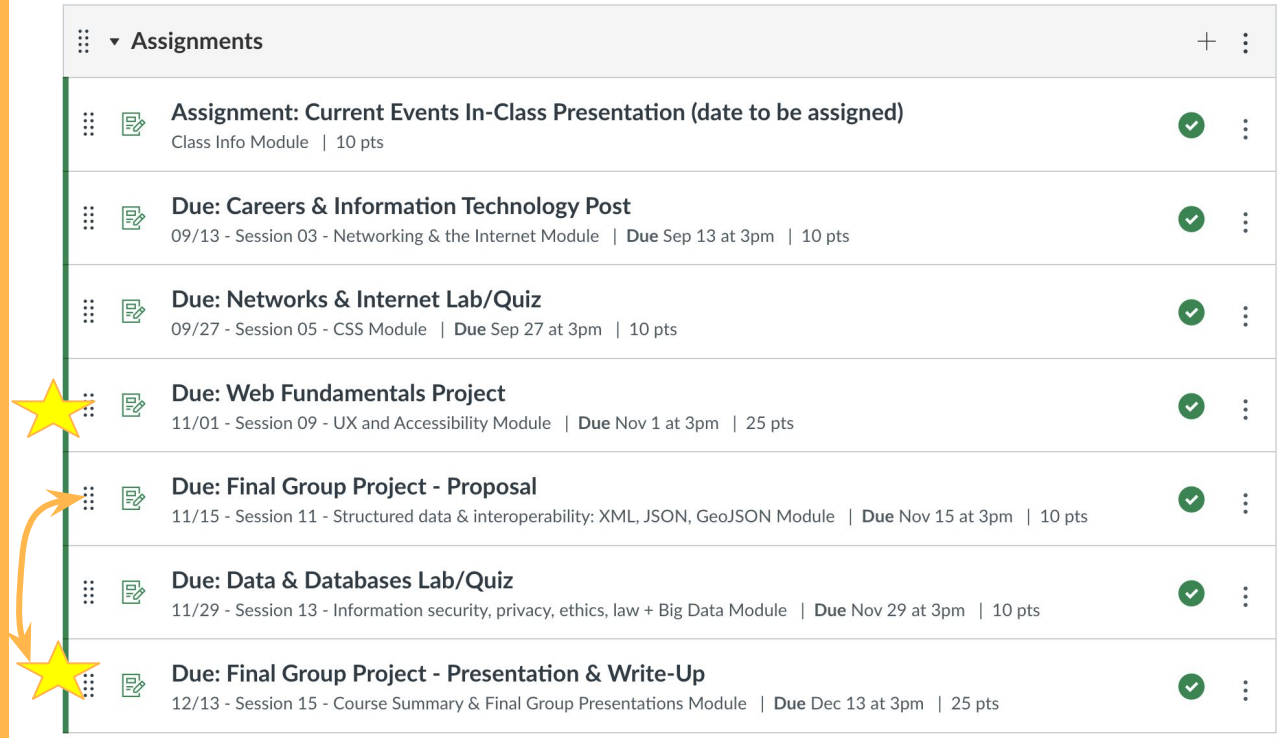
- A topic and/or tutorial

- a <break>!

- A further topic and/or tutorial
- Wrap up

Assignments Overview

2 Long-Form
4 Short-Form



Assignment Example

Careers & Information Technology Post

Careers & Information Technology Post
(due for week #3)

https://docs.google.com/document/d/10gIFzLwHfNZzH08BoQ38T_sxAp2Y_qY0CVvRPHely-k/edit?usp=sharing

Syllabus

Let’s review page by page

Open your Canvas course site to review the Syllabus

Expectations / learning commitments / our class culture

Expectations between you and I

Expectations related to assignments and deadlines

Expectations with each other and the class environment

and inviting each other into tech -- let's review:
https://www.recurse.com/social-rules

(because, let's face it, tech culture has the potential to be as toxic as it does to be tantalizing….)

Resources

- Tech Tutor
  - email: techtuto@pratt.edu
  - (one-on-one assistance; web/project development)
- Library tech resources
  - Lynda.com tutorials, ebooks on coding, etc.
  - research guides, ask-a-librarian chat, etc.
- My office hours
  - right after class! 6:00 - 7:00 Tuesdays, Room 607
  - also by appt., typically via zoom, email me to schedule (rdaniell@pratt.edu)
- Each other (chat, in person, etc.)
  - online chat or in-person in front of a computer are both GREAT ways to debug code together

Class Overall

moves from more material-physical and communications tech with more attention to history

to

hands-on coding, text markup, ux, information communication

to

data structures, data types, data analysis

to

backing out into information systems, security, ethics

to

information futures

Approaches/Reflections: on working with technology as an information professional

Technology is always changing.

We are all new beginners all the time.

A lifetime of learning.

Exciting!

<break!>

Let’s break for 20 minutes

Introduction to Information Technology:
basic information concepts

A closer look at the “Information” in “IT”

- Information is a constant in our lives as human beings and intersects many of our ways of being and doing together
- Information is one of an organization’s most valuable resources
- *Information* is often confused with the term *data*

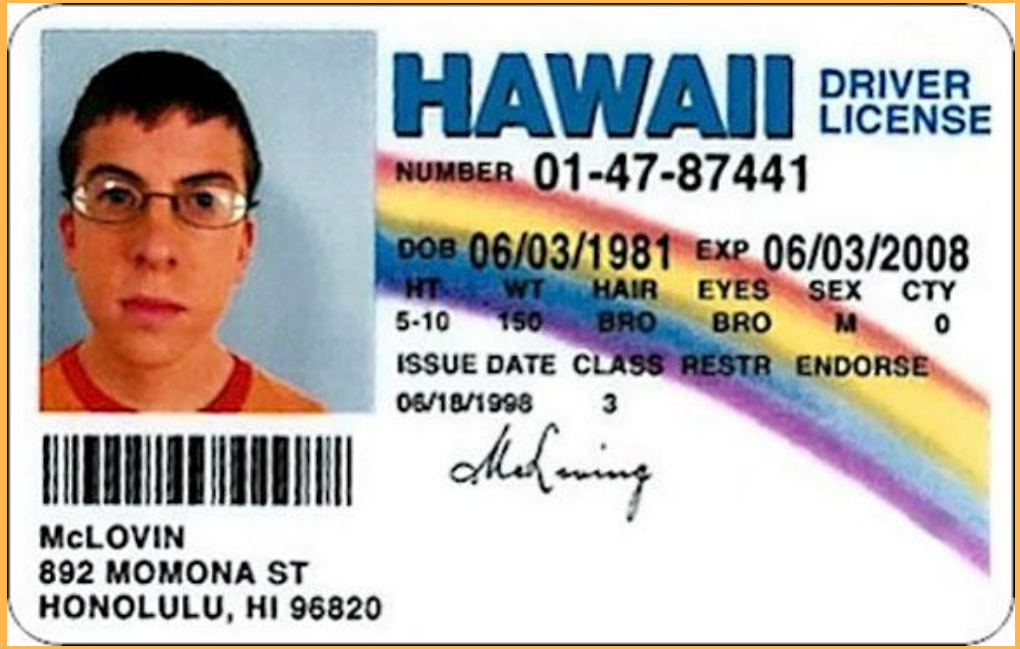
  What do we need to know how they are distinct?

What is Information? (classical understandings of terms)

- Data:
  - “Raw” facts (e.g., may be logged automatically by a system)
- Information:
  - Collection of facts organized in such a way that they have value beyond the facts themselves
- Process:
  - Set of logically related tasks performed to achieve a defined outcome
- Knowledge:
  - Awareness and understanding of a set of information and the ways it can be made useful to support a task

Data or Information?

- Momona
- 01
- 6/3/2008
- Bro
- 150
- M
- HI



Information:

- Collection of facts organized in such a way that they have *meaning*

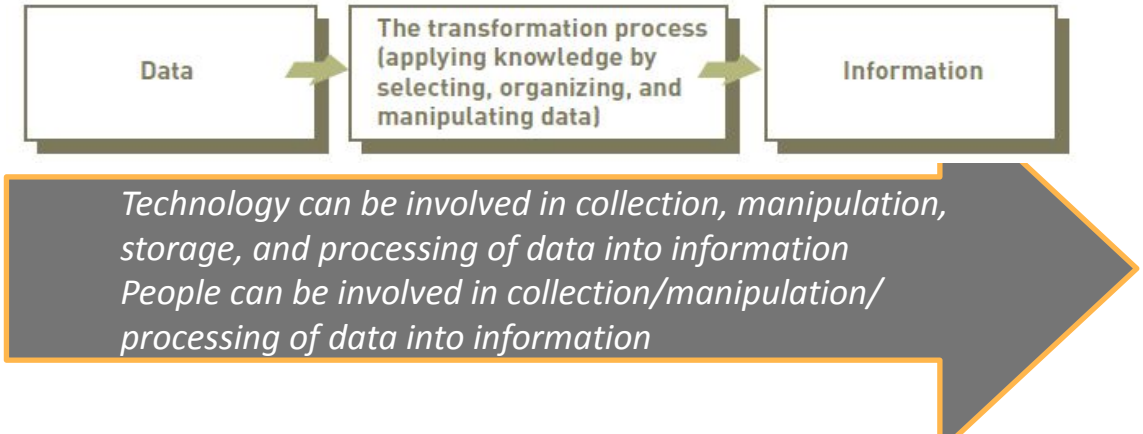
Question: How does data become information?

How does data become information?

We might be dealing with data of various types

Data	Represented by
Alphanumeric data	Numbers, letters, and other characters
Image data	Graphic images and pictures
Audio data	Sound, noise, or tones
Video data	Moving images or pictures

Data is transformed into *information*



Computer-Based Information Systems - *“bare-bones”/general definition*

An Information System is:

- A set of:
  - hardware,
  - software,
  - databases,
  - telecommunications,
  - additional infrastructures
  - procedures/rules/processes
  - and people’s labor

- That are configured to collect, manipulate, store, and process data into information
  + (frequently) to communicate or circulate information into different uses

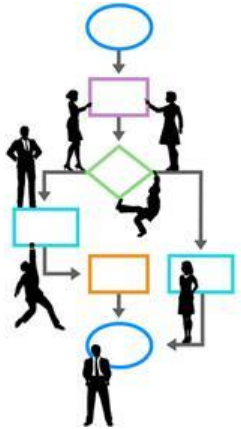
Information Technology Infrastructure - *baseline definitions*

- Hardware:
  - Consists of computer equipment used to perform input, processing, storage, and output activities
- Software:
  - Consists of the computer programs that govern the operation of the computer
- Database:
  - Organized/structured collection of facts and information, typically consisting of two or more related data files
- Telecommunications
  - The electronic transmission of signals for communications
  - Networks connect computers to enable electronic communication (e.g. the Internet)

Most Importantly...

- **People are the single most important element** in almost all computer-based information systems

- Procedures and processes are also key: these can include strategies, policies, methods, and rules for using the system(s) (and are typically determined by people, in the context of how such things are shaped by information technology technics and traditions)



Another way to examine “What is Technology?”: Technoliteracy

Technoliteracy “refuses to draw a neat division between physical devices and social values” and, “[...] it involves actively intervening in technologies—at the level of systems, applications, and devices—as key ingredients in the everyday production of knowledge and culture. Thus, the question for nonessentialist investments in technoliteracy is. Technology, but for whom, by whom, under what assumptions, and to what effects?”

-- J. Sayers, “Technology” in *Keywords for American Cultural Studies* (full text on Canvas as an optional reading)

Role of Information Professionals in IT

Understand the technological infrastructure

- Information professionals often play role of “translator” between user and systems
- May be responsible for decision-making and budgeting

Understanding the possibilities and perils

- and help individuals, organizations, and society navigate them
- attend to information ethics within the context of their work and profession’s role

“Computing professionals' actions change the world. To act responsibly, they should reflect upon the wider impacts of their work, consistently supporting the public good.” https://www.acm.org/code-of-ethics *(Association for Computing Machinery)*

Information Technology forms we will attend to/"listen" for throughout the course

materials/materiality

software/apps/interactions/platforms/languages/HCI

networks, systems, linkages

processes

forms/structures

information storage, markup, organization

Information Technology-related broader contexts we will attend to/"listen" for

ways humans work with information, move it around, and make it do things

culture, socio-political environments

histories

inequalities, biases, invisibilities

access

pedagogy, training, expansion of skills/knowledges

risks & benefits

upcoming emerging futures

navigating these in the context of an information profession job

three hypothetical cases…

suppose that in future you were working at……..

at an Archive / Museum

working in GLAM, at an archive or museum that is about to launch a records/artifacts digitization project

technology needs questions might include:

Do we have a sufficient Digital Asset Management/Collections Management system?

How big will all these image/pdf files get? What resolutions and sizes should we target for different uses (online/public, researcher/specialist, etc.)?

What kind of server space will we need? Local or in the cloud? Purchase or service (and $)?

What IT support will we need? What tech support will our visitors/clients/publics need?

What kinds of metadata data fields should the DAM/database include to make it highly searchable by the public?

Will we want different interfaces for different users (public/general vs. specialist/researcher)?

at a Nonprofit Organization

working at a nonprofit about to launch an online data visualization project related to a human rights issue

technology needs questions might include:

What screens and devices should we assume the project will be viewed on? What is the "technology context" of our audience for the project?

Will we need it to look OK on both desktop and mobile devices? And, if so, can the same general visual/information design work for both or do we need varying, highly responsive versions?

Will it need to be seen in low-bandwidth Internet situations or can we assume high--bandwidth for how the data is processed and the visuals generated?

Will we need descriptive text in multiple languages for display in different contexts?

at a Community/Public Library

working at a small library on planning for training events and budgeting for library tools

technology needs questions might include:

What kinds of software and apps will our community members most want to use (ebook readers, discovery tools, productivity software, etc.)? Will we need to provide tech support and training for them or will they just use them on their own?

What software, services, and repositories will we provide in person in the library vs. what will we offer for the community to connect with from home? Given those decisions, what networking/software/hardware/user log-ins management/etc. are implied and how will we manage them?

Of course, the process of making these organizational information technology decisions would be made with a team, not as an individual, and might involve working with outside consultants. But, as an information professional, having a good overview of the technology landscape is key to making these projects work.

Histories of Information Technology

Computer History Timeline activity

Let's do this in class together

- Open the course site in Canvas
- Navigate to today in the "Home" or "Modules" view
- Find the link to the Computer History Museum's timeline of computer history
- Find the year you were born, find the year one of your parents or grandparents or an older relative were born, and pick any year between 2010 and the latest one available -- check out the museum archives for those years
- ~~~ explore ~~~ (15 mins)
- Turn to your neighbors and discuss what you've noticed

Representing Information Digitally

(a brief introduction)

What do we mean by the term digital?

Analog vs. Digital

- "Analog" comes from the same root as "analogous”
  - It is meant to convey the idea of values that change smoothly.
  - Much of what we deal with in the physical world is analog!
- How are these controls operated? Which of the below would you consider analog?

- Digital systems deal with *discrete values*; there are only a limited number of possible values

Digital vs. Analog: Which is which? Why?

Digitizing Discrete Information

- The dictionary definition of *digitize* is to **represent information with digits.**

- Digitizing uses whole numbers to *stand for things*.
  - What kinds of *things*?

So Why Digital?

Digital data is easy to work with

- It can be stored, transported, and processed in many ways regardless of its original source, which is not true for analog information
- Digital information can be compressed by squeezing out redundant or unimportant information.
- It can be encrypted for security and privacy
- It can be merged with other data
- It can be copied without error
- It can be shipped anywhere via the Internet
- It can be stored in an endless variety of devices

Much of this is simply not possible or is to cumbersome with analog information

Fundamental Information Representation

In the *physical world*, the most fundamental form of information is the **presence** or **absence** of a physical phenomenon

From a *digital* information point of view, the amount of a phenomenon is not important as long as it is reliably detected

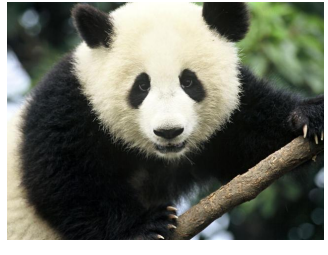
> Whether there is some information or none;
>
> i.e. whether it is **present** or **absent**

The PandA Representation

- **PandA** is the name used for two fundamental patterns of digital information:
  - Presence
  - Absence

- PandA is the mnemonic for "***Presence and Absence***"
  - A key property of PandA is that the phenomenon is either present or not

- The presence or absence can be viewed as "true" or "false"



A Binary System: Bits Form Symbols

- The PandA encoding has two patterns: present and absent
  - *Two patterns* make it a ***binary system***

- In the PandA representation, the **unit** is a specific place where the presence or absence of the phenomenon can be set and detected (e.g. full, full, full, empty, empty, empty)

How many units do we have?

- The PandA *unit* is known as a **bit**
  - **Bit** is a contraction for "**binary digit**"
  - Only two values can be represented for each bit (0 and 1 in combination)

- Bit sequences can be interpreted as binary numbers
  - *Groups of bits* form **symbols**
  - the two patterns are combined into multiple sequences to create enough symbols to encode information

- patterns of **on-off, present-absent, 1-0**
  - `00`
  - `01`
  - `11`
  - `10`
- can then be used in groups of bits to form longer chains of patterns to encode information

Bits in Computer Memory

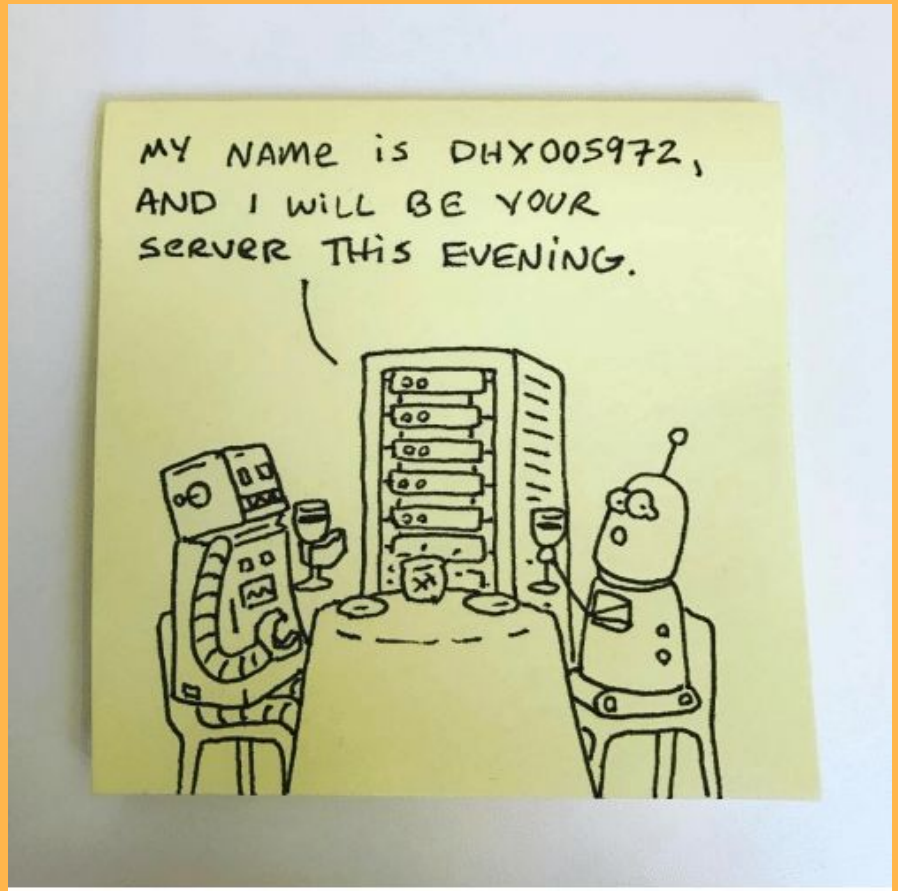
- Computing devices use electronic circuits called **two-state**
  - Only two states are possible, either **ON** (usually represented by a 1) or **OFF** (represented by a 0)
- **Bits** are typically represented by an electrical state or voltage
- Memory is arranged inside a computer in a *very, very, very, very, very long sequence of bits*
  - This means places where the physical phenomenon encoding the information can be set and detected, i.e. determine **presence or absence**

ASCII	0000 0000	0000 0001	0000 0010	0000 0011	0000 0100	0000 0101	0000 0110	0000 0111	0001 0000	0001 0001	0001 0010	0001 0011	0001 0100	0001 0101	0001 0110	0001 0111
0000	$^{N}_{U}$	$^{S}_{H}$	$^{S}_{X}$	$^{E}_{X}$	$^{E}_{T}$	$^{E}_{Q}$	$^{A}_{K}$	$^{B}_{L}$	$^{B}_{S}$	$^{H}_{T}$	$^{L}_{F}$	$^{Y}_{T}$	$^{F}_{F}$	$^{C}_{R}$	$^{S}_{0}$	$^{S}_{I}$
0001	$^{D}_{L}$	$^{D}_{1}$	$^{D}_{2}$	$^{D}_{3}$	$^{D}_{4}$	$^{N}_{K}$	$^{S}_{Y}$	$^{E}_{\Sigma}$	$^{C}_{N}$	$^{E}_{M}$	$^{S}_{B}$	$^{E}_{C}$	$^{F}_{S}$	$^{G}_{S}$	$^{R}_{S}$	$^{U}_{S}$
0010		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
0111	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	$^{D}_{T}$
1000	$^{8}_{0}$	$^{8}_{1}$	$^{8}_{2}$	$^{8}_{3}$	$^{I}_{N}$	$^{N}_{L}$	$^{S}_{S}$	$^{E}_{S}$	$^{H}_{S}$	$^{H}_{J}$	$^{Y}_{S}$	$^{P}_{D}$	$^{P}_{V}$	$^{R}_{I}$	$^{S}_{2}$	$^{S}_{3}$
1001	$^{D}_{C}$	$^{P}_{1}$	$^{P}_{Z}$	$^{S}_{E}$	$^{C}_{C}$	$^{M}_{M}$	$^{S}_{P}$	$^{E}_{P}$	$^{O}_{8}$	$^{O}_{Q}$	$^{O}_{A}$	$^{C}_{S}$	$^{S}_{T}$	$^{O}_{S}$	$^{P}_{M}$	$^{A}_{P}$
1010	$^{A}_{0}$	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	-	®	¯
1011	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
1100	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
1101	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	β
1110	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
1111	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	Þ	ÿ

Figure 7.3 ASCII, the American Standard Code for Information Interchange.

Note: The original 7-bit ASCII is the top half of the table; the whole table is known as Extended ASCII (ISO-8859-1). The 8-bit symbol for a letter is the four row bits followed by the four column bits (e.g., A = 0100 0001, while z = 0111 1010). Characters shown as two small letters are control symbols used to encode nonprintable information (e.g., $^{B}_{S}$ = 0000 1000 is backspace). The bottom


To be continued next week with:
HARDWARE & SOFTWARE



When you go out for a byte

Next Week

- Before class time: do week 2 readings/explorations on Canvas
- Do very informal discussion posts as described on Canvas
- Fill out your past tech survey form! (link on Canvas)
- Review the major assignment due dates and the assignment details for the Careers & Information Technology Post due in Week 3

- Next week: **Hardware & Software**

thank you for being here!
and see you next week

email me with questions and/or for waiver inquiries:
rdaniell@pratt.edu