



# Merit Badge Class

Programming and Digital Technology



Mister Merit Badge

THERE ARE ONLY



TYPES OF PEOPLE

THOSE WHO UNDERSTAND

BINARY

AND THOSE WHO DON'T


# Ones and Zeros

## What is Binary?

A numeral system, also called Base-2, that uses only two digits: Zero and One.

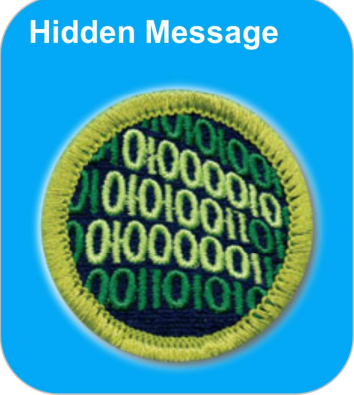
- b - A single binary digit is a Bit.
- B - Eight bits (8b) are a Byte (1B)
- kb, Mb, Gb, Tb - A kilobit (kb) is 1,024 bits. A megabit (Mb) is 1,024 kilobits. A gigabit (Gb) is 1,024 megabits. A terabit (Tb) is 1,024 gigabits.
- KB, MB, GB, TB - A kilobyte (KB) is 1,024 bytes. A megabyte (MB) is 1,024 kilobytes. A gigabyte (GB) is 1,024 megabytes. A terabyte (TB) is 1,024 gigabytes.

Byte



Bit

Hidden Message



Mister Merit Badge

There are 256 different combinations for a single byte. The American Standard Code for Information Interchange (ASCII) is a method for mapping bytes to characters. The binary on the Programming Merit Badge reads 42 53 41. In ASCII 42 = B, 53 = S and 41 = A. The Hidden Message is BSA.



# Digitizing Media

## Text

The characters from a text message are stored using Unicode, each character is a single byte. Unicode is a method for mapping bytes to characters, based on ASCII but with millions more possible characters. This allows the support of multiple languages, and emojis.

## Pictures

A digital picture is stored in a series of small dots called pixels.

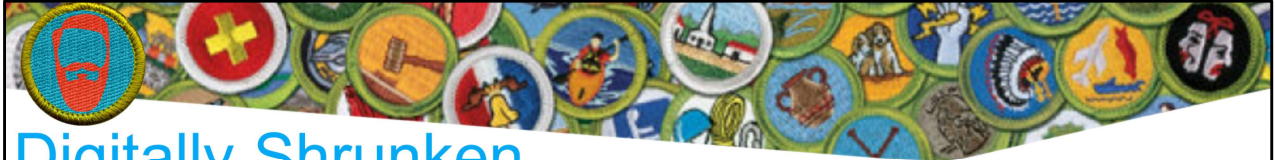
- Monitors are rated by their resolution, so example a monitor that is 1024x768 has 1,024 pixels in the horizontal row and 768 in the vertical row.
- Cameras are rated by mega-pixels, so a 13 mega-pixel camera will have 13 million pixels in every picture taken

## Audio

With a digital audio recording, the device captures the analog signal using a microphone, or another audio input, and it processes through a analog-to-digital converter chip. When you replay the file it goes through a digital-to-analog chip that turns it back to a sound wave.

## Video

A digital video is stored the same way pictures are, but a video is a series of pictures. The pictures, or frames, are shown very quickly typically 30-60 frames per seconds. The sound is synced with the video.



# Digitally Shrunk

We use compression to make files smaller, allowing them to download faster and take up less storage space. What is removed in compression? Redundancy of data, patterns are recognized and shortened using key tables, any unnecessary data, audio tones beyond human hearing. There are two types of compression.

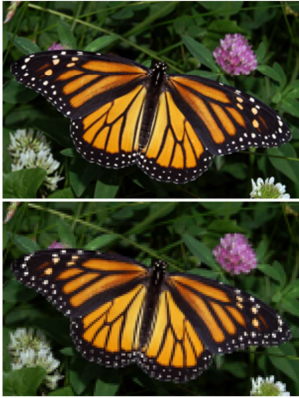
**Lossy**

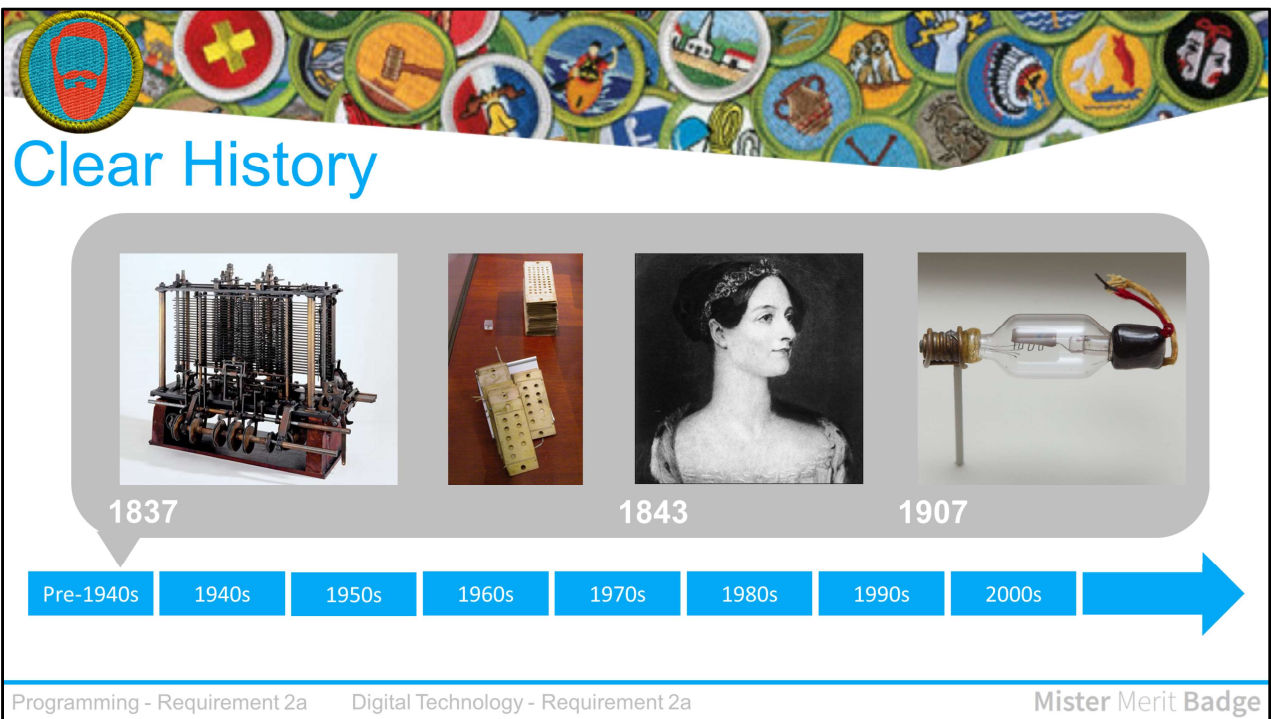
Compression of a file where some data is lost. Shrinking a picture for email, web, or text

**Lossless**

Compression where all information is retained. Text files, Databases, and retain original picture size.

Media	Example Lossy Format	Example Lossless Format
Images	JPEG	PNG
Audio	MP3	FLAC





**1837** – The Analytical Engine was a mechanical computer proposed by Charles Babbage. The concept of the design is considered to be the the first design for a general-purpose computer ever created, because it incorporated an arithmetic logic unit, control flow in the form of conditional branching and loops, and integrated memory.

**Punch Cards** – A Punch Card is a piece of stiff paper that can be used to contain digital information represented by the presence or absence of holes in predefined positions. Punch Cards were originally invented in 1725 for the defining weaving patterns for looms, but later used to give various machines instructions. Punch Cards were used by the Analytical Engine and were still used in computers well into the 20th century.

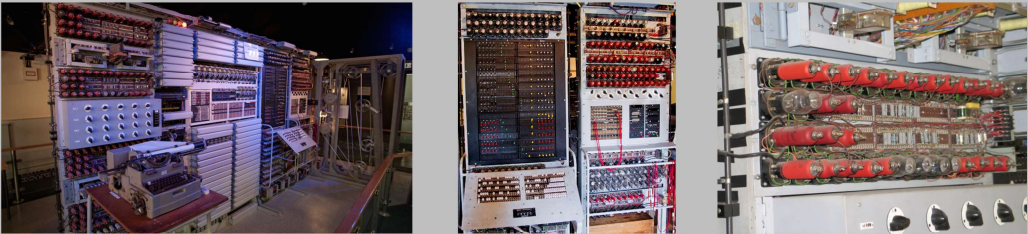
**1843** – Mathematician Ada Lovelace translated an article on the Analytical Engine from French to English, in addition to the translation she included detailed notes on how to instruct the Analytical Engine to calculate Bernoulli numbers. Her notes are considered the first program ever written.

**1907** – Triode Vacuum Tube was invented. While not the first type of vacuum tube, the triode was the first to amplify signal, allowing more powerful electronics using less electricity.

# Clear History

First Generation: Vacuum Tubes

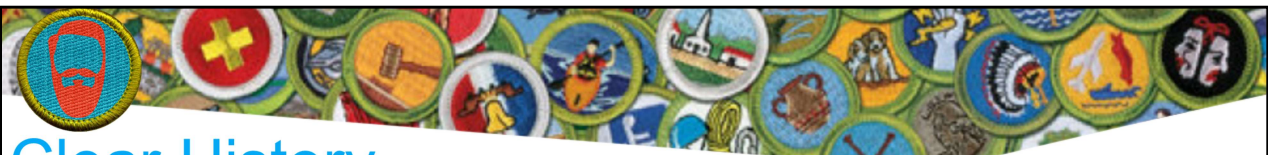
1943



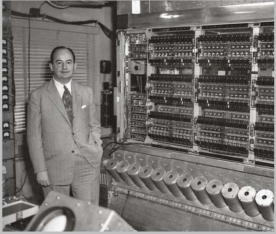
Pre-1940s 1940s 1950s 1960s 1970s 1980s 1990s 2000s

Programming - Requirement 2a Digital Technology - Requirement 2a Mister Merit Badge


**1943** – The Colossus Mark 1 was a prototype computer developed by British codebreakers during WWII to help decode the Lorenz cipher; 10 versions of the Colossus computers were made between 1943 and 1945. The Colossus Mark 1 was the world's first programmable, electronic, digital computer. It was also the first computer to use switches and cables for programming.




# Clear History



1945



1947



1949

Pre-1940s

1940s

1950s


1960s

1970s

1980s

1990s

2000s



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</SourceCode>

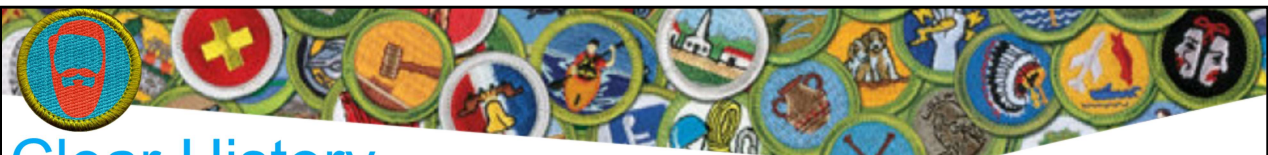
```
00000000 7f 45 4c 46 01 01 01 00 00 00 00 00 00 00
00000010 01 00 03 00 01 00 00 00 00 00 00 00 00 00
00000020 c5 00 00 00 00 00 00 00 34 00 00 00 02 00
00000030 04 00 03 00 01 00 00 00 00 00 00 00 00 00
00000040 00 00 04 00 00 00 00 00 00 00 00 00 00 00
00000050 00 10 00 00 01 00 00 00 a0 00 00 00 a0 04 00
00000060 a0 00 04 00 00 00 00 00 00 00 00 00 00 00
00000070 00 10 00 00 00 00 00 00 00 00 00 00 00 00
00000080 1a 0a 00 00 00 10 a0 00 04 00 00 01 00 00 10
00000090 04 00 00 00 c0 00 00 01 00 00 00 c0 00 00 00
000000a0 40 65 6c 6f 2c 20 77 6f 72 6c 64 21 0a 00 2a
000000b0 73 60 73 74 72 74 61 62 00 2a 74 65 70 74 00 2a
000000c0 64 61 74 61 00 00 00 00 00 00 00 00 00 00
000000d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000000e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000000f0 00 00 00 00 01 00 00 00 00 00 00 00 00 00
00000100 00 00 00 00 1c 00 00 00 00 00 00 00 00 00
00000110 10 00 00 00 00 00 00 00 11 00 00 00 01 00 00
00000120 03 00 00 00 a0 00 00 00 a0 00 00 00 00 00 00
00000130 00 00 00 00 00 00 00 00 04 00 00 00 00 00
00000140 01 00 00 00 03 00 00 00 00 00 00 00 00 00
00000150 a0 00 00 00 1f 00 00 00 00 00 00 00 00 00
00000160 01 00 00 00 00 00 00 00
```

**1945** – John Von Neumann wrote the first published description of the logical design of a computer using the stored-program concept. A Stored-Program Computer is a computer where a program can be electronically stored in memory instructions could be modified and run by the computer.

**1947** – The transistor was invented. A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power. Transistors are the key active component in practically all modern electronics and are considered it to be one of the greatest inventions of the 20th century.

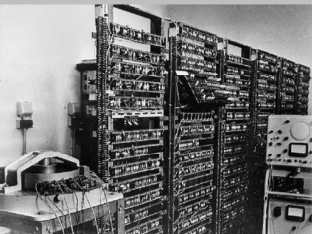
**1949** – John Von Neumann’s design for a self-reproducing computer program is considered the world's first computer virus.

**Machine Code** – During this time, if a computer could electronically store programs, programmers had manually write their programs as machine code. Each instruction in Machine Code performs a very specific task in a CPU register or memory.



# Clear History

Second Generation: Transistors



1953

</SourceCode>

```

section .text
global _start

_start:

    mov edx,len
    mov ecx,msg
    mov ebx,1
    mov eax,4
    int 0x80

    mov eax,1
    int 0x80

section .data
msg db 'Hello, world!',0xa
len equ $ - msg

```

Pre-1940s

1940s

1950s


1960s

1970s

1980s

1990s

2000s



Programming - Requirement 2a

Digital Technology - Requirement 2a

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**Second Generation Computers** – Second Generation computers used transistors instead of vacuum tubes.

**1953** – Manchester Transistor Computer was the first computer to use the transistor instead of vacuum tubes.

**Assembly Language** – Assembly is a low-level programming language for a programmable device. Code is written by the programmer in assembly and then compiled, or translated, in Machine Code. Each assembly language is specific to a particular computer architecture.



# Clear History



1955

## Software Bug



Pre-1940s

1940s

1950s

1960s

1970s

1980s

1990s

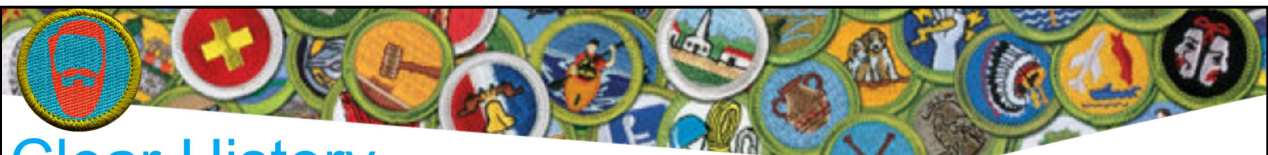
2000s

Programming - Requirement 2a

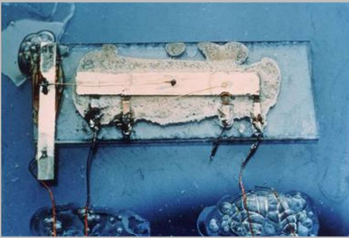
Digital Technology - Requirement 2a

Mister Merit Badge

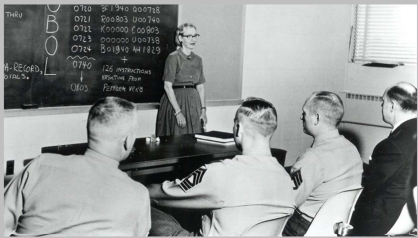
**Bug** – In 1947, while investigating performance issues with a computer Grace Hopper discovered a moth that was stuck in machine, causing the issue.



# Clear History



1958



1959

</SourceCode>

```

000100 IDENTIFICATION DIVISION.
000200 PROGRAM-ID.        HELLOWORD.
000300
000400*
000500 ENVIRONMENT DIVISION.
000600 CONFIGURATION SECTION.
000700 SOURCE-COMPUTER.  RM-COBOL.
000800 OBJECT-COMPUTER.  RM-COBOL.
000900
001000 DATA DIVISION.
001100 FILE SECTION.
001200
001300 PROCEDURE DIVISION.
100100
100200 MAIN-LOGIC SECTION.
100300 BEGIN.
100400     DISPLAY " " LINE 1 POSITION 1
ERASE EOS.
100500     DISPLAY "Hello world!" LINE
15 POSITION 10.
100600     STOP RUN.
100700 MAIN-LOGIC-EXIT.
100800     EXIT.

```

Pre-1940s

1940s

1950s

1960s

1970s

1980s

1990s

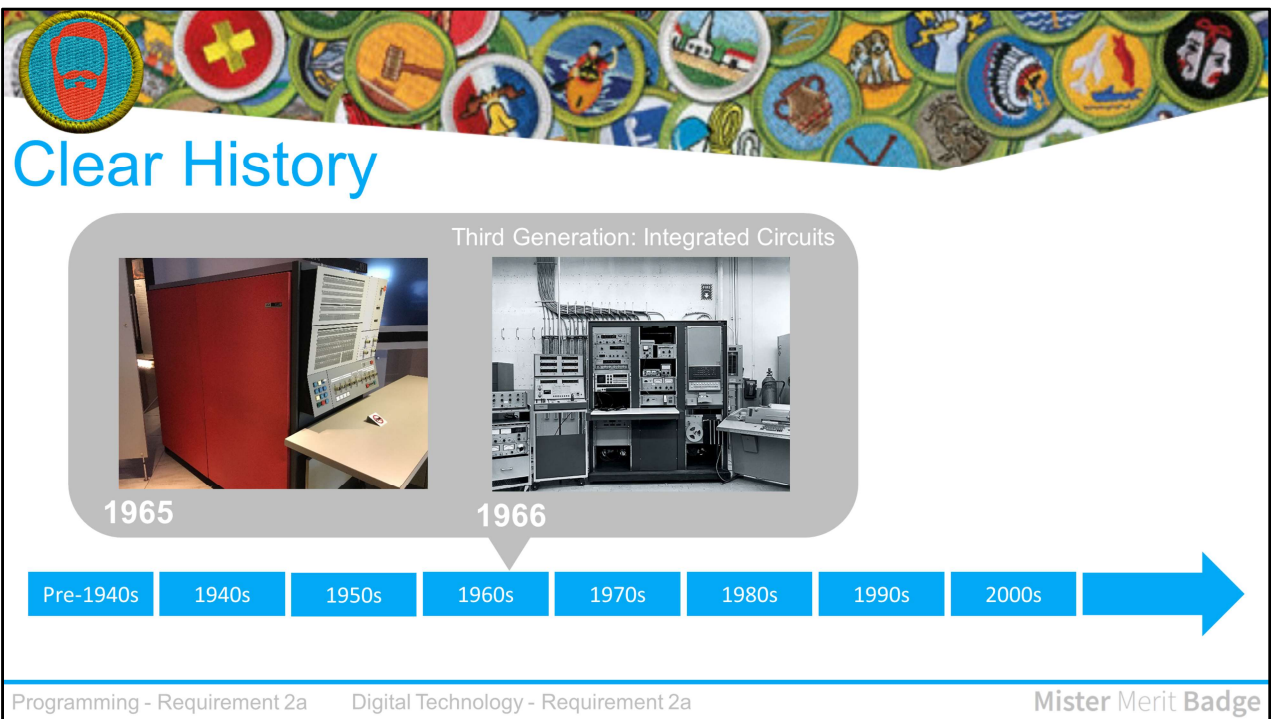
2000s

Programming - Requirement 2a
Digital Technology - Requirement 2a
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**1958** – The Integrated Circuit is invented. The integrated circuit is a set of electronic circuits on one small flat piece (or "chip") of semiconductor material, normally silicon. The integration of large numbers of tiny transistors into a small chip results in circuits that were significantly smaller, cheaper, and faster than those constructed of individual electronic components.

**1959** – Influenced by the design FLOW-MATIC, and the belief that programming languages should be machine-independent, Grace Hopper helped create COBOL.

**COBOL code sample**



**1965** – IBM released the System/360 series of computer. The System/360 family of computers could all run the same software, but with different performances, and at different prices. The computers could be upgraded as the users' needs grew, meaning they could move up to larger computers, and still keep all of their investment in programs, data and storage media.

**Third Generation Computers** – Third Generation computers feature integrated circuits.

**1966** – Hewlett-Packard begins selling their first computer, the HP 2116A which features integrated circuits.

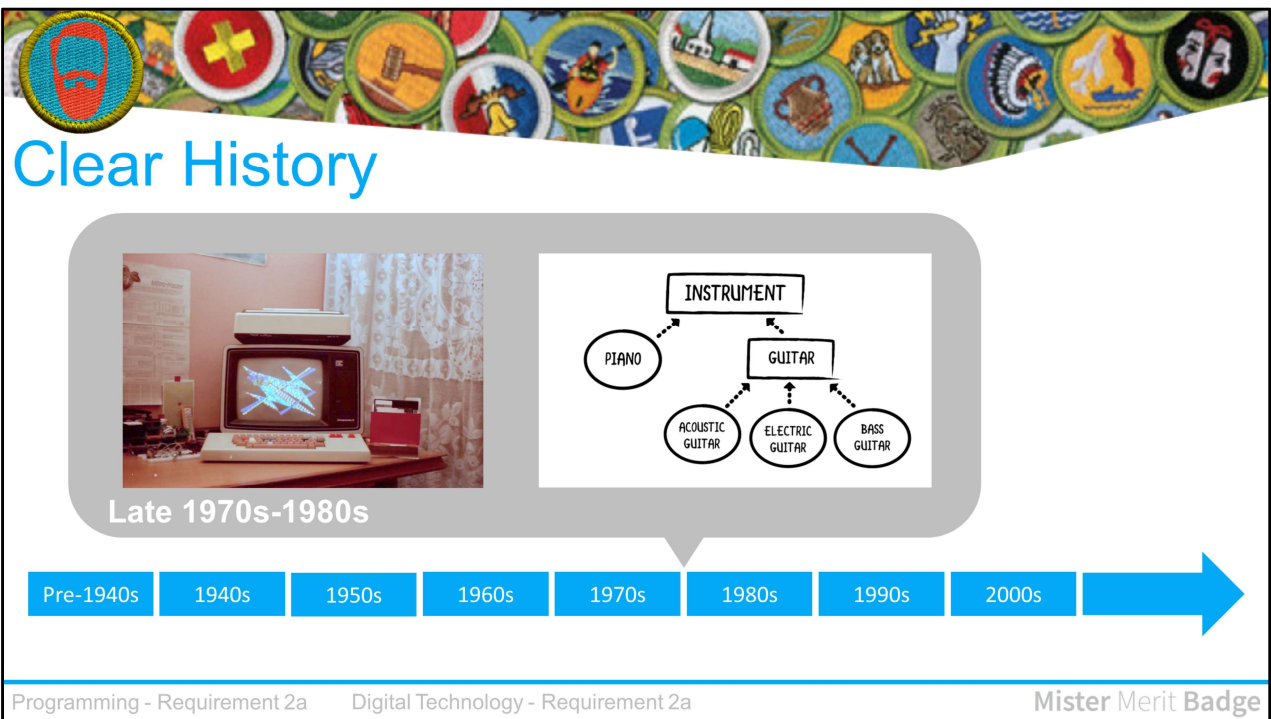


**1971** – Intel releases it's first commercially available microprocessor by Intel. A microprocessor is a computer processor which incorporates the functions of a computer's central processing unit (CPU) on a single integrated circuit.

**Fourth Generation Computers** – Fourth Generation computers include microprocessors.

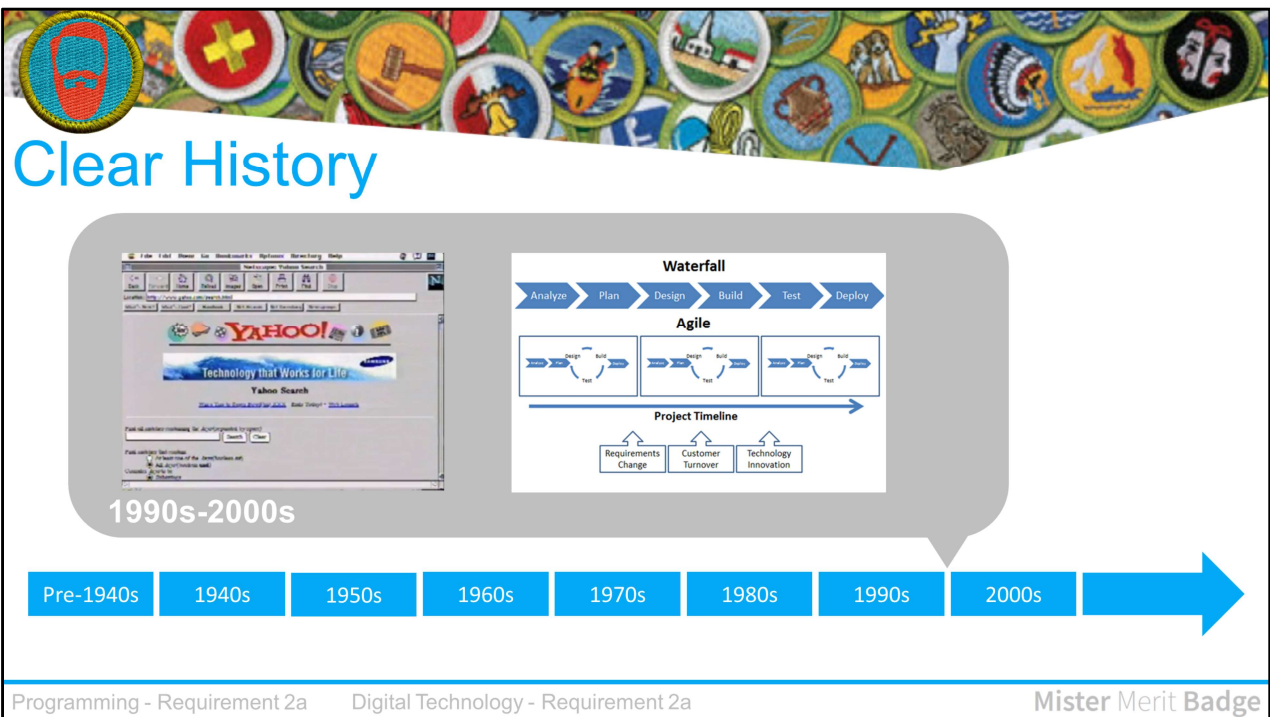
**1975** – MITS' Altair 8800 is released. First sold as a build it yourself kit, then later as a fully assembled computer, the Altair 8800 was the first commercially successful personal computer.

**Altair BASIC** – The first programming language designed for the Altair 8800, Altair BASIC, was the first product by a new company called Microsoft.



**Late 70s-1980s** – Computers become more common place, in both businesses and homes.

**Object-oriented programming** – Object-oriented programming is a programming paradigm based on the concept of classes, which are made up of attributes; and small portion of code known as methods. The overall perpose of this is reusable code, for example, a class can inherit attributes from another class.



**1990-2000s** – The internet is introduced further expanding the need and uses of computers. Web based programming languages are also introduced.

**Software Development Methodologies** – While programming languages continue to evolve, the principles of software development do too. Different software development methods, like Agile, begin gaining in popularity, rather than the traditional Waterfall method.



## Clear History

- History review.
- How does digital technology in your lifetime compare to older generations?
- What kinds of computers or devices do you imagine will be available when you are an adult?
- In what ways have programming and programming languages evolved?



Pre-1940s

1940s

1950s

1960s

1970s

1980s

1990s

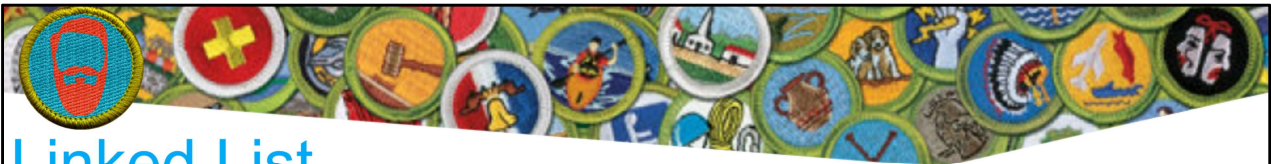
2000s

Programming - Requirement 2b

Digital Technology - Requirement 2b

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## Discussion

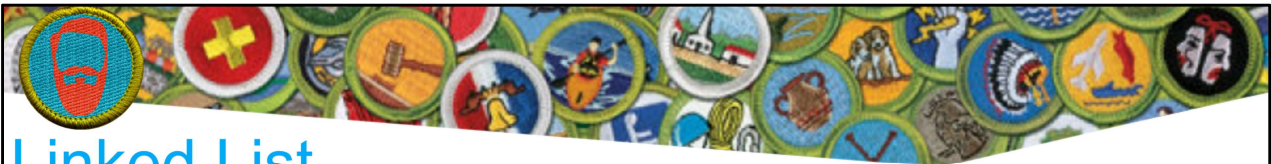


## Linked List

Language	Description	Primary Uses	Used By	Sample Program
Pascal	Create by Niklaus Wirth in 1970. Pascal is a high-level programming language, designed for teaching structured programming and data structuring. Commercial versions widely used throughout the 1980s.	Teaching Programming Objective Pascal, a derivative of the original Pascal, is commonly used for Windows application development.	Apple Lisa (1983) Skype	<pre>program HelloWorld(output); begin   Write('Hello, world!') end.</pre>
C	Created by Dennis Ritchie in 1972. C is a General-purpose, low-level programming language, initially created for Unix systems. It is the 2 <sup>nd</sup> most popular programming language. Many leading languages are derivatives of C, including C#, Java, JavaScript, Perl, PHP, and Python	Cross-platform programming, system programming, Unix programming, computer game development	Unix (1973 rewrite) Early web servers & clients.	<pre>#include &lt;stdio.h&gt;  int main(void) {   printf("hello, world\n"); }</pre>
C++	Created by Bjarne Stroustrup in 1983. C++ is a Intermediate-level, Object-oriented programming language. C++ is an extension of C, with enhancements such as classes, virtual functions, and templates	Commercial application development, embedded software, server/client applications, video games	Google Chrome Mozilla Firefox Microsoft Internet Explorer	<pre>#include &lt;iostream&gt;  int main() {   std::cout &lt;&lt; "Hello, world!\n";   return 0; }</pre>

Programming - Requirement 3a
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A list of popular programming languages



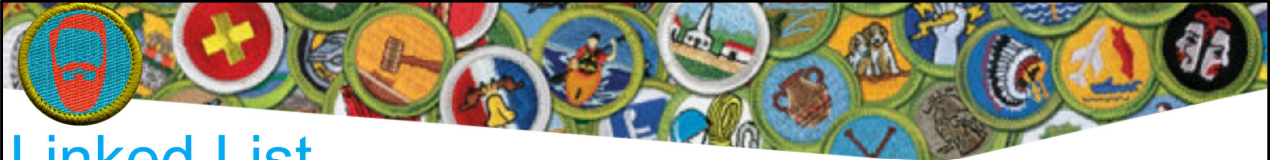
## Linked List

Language	Description	Primary Uses	Used By	Sample Program
Objective-C	Create by Brad Cox and Tom Love in 1983. Objective-C is a General-purpose, high-level programming language. Objective-C expanded on C, adding message-passing functionality based on Smalltalk language.	Apple programming.	Apple OS X Apple iOS	<pre>int main (int argc, const char * argv[]) {     NSAutoreleasePool *pool = [[NSAutoreleasePool alloc] init];     NSLog (@"Hello, World!");     [pool drain];     return 0; }</pre>
Perl	Created by Larry Wall in 1987. Perl is a General-purpose, high-level programming language. Perl was created for report processing on Unix systems. Today it's known for high power and versatility.	CGI, database applications, system administration, network programming, graphics programming	IMDb Amazon Priceline Ticketmaster	<pre>print "Hello, World!\n";</pre>

Programming - Requirement 3a

Mister Merit Badge

A list of popular programming languages



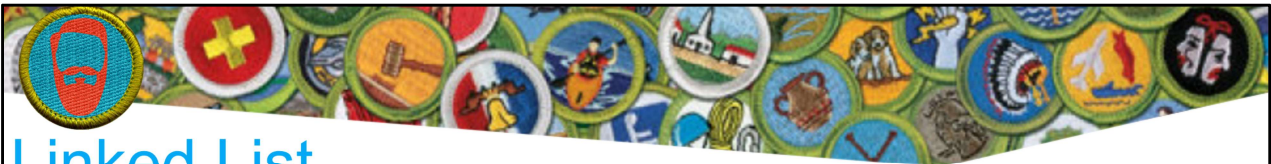
## Linked List

Language	Description	Primary Uses	Used By	Sample Program
Python	Created by Guido Von Rossum in 1991. Python is a General-purpose, high-level programming language. Python was created to support a variety of programming styles and be fun to use. Tutorials, sample code, and instructions often contain Monty Python references.	Web applications, software development, information security	Google Yahoo Spotify	<pre>print("Hello, World!")</pre>
Ruby	Created by Yukihiro Matsumoto in 1993. Ruby is a General-purpose, high-level programming language. Ruby is a teaching language influenced by Perl, Ada, Lisp, Smalltalk, etc... Ruby was designed for productive and enjoyable programming.	Web application development, Ruby on Rails	Twitter Hulu Groupon	<pre>puts "Hello World"</pre>
Java	Created by James Gosling in 1995. Java is a General-purpose, high-level programming language. Java was made for an interactive TV project and has cross-platform functionality. Java is currently the world's most popular programming language.	Network programming, web application development, software development, Graphical User Interface development	Android OS Android apps	<pre>class HelloWorldApp {     public static void     main(String[] args) {         System.out.println("Hello         World!");     } }</pre>

Programming - Requirement 3a

Mister Merit Badge

A list of popular programming languages



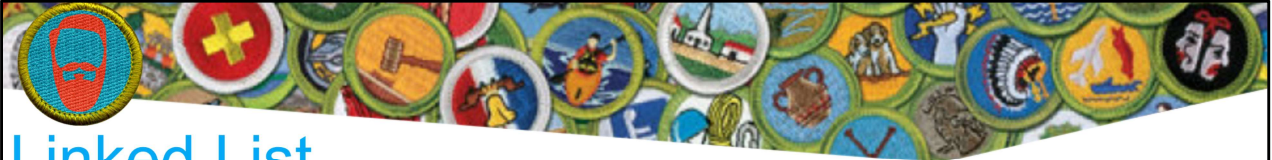
## Linked List

Language	Description	Primary Uses	Used By	Sample Program
PHP	Created by Rasmus Lerdorf 1995. PHP is an open-source, general-purpose programming language. PHP is for building dynamic web pages. Most widely used open-source software by enterprises.	Building/maintaining dynamic web pages, server-side development	Facebook Wikipedia Digg WordPress Joomla	<pre>&lt;html&gt;   &lt;body&gt;     &lt;?php       echo "Hello World!";     ?&gt;   &lt;/body&gt; &lt;/html&gt;</pre>
JavaScript	Created by Brendan Eich in 1993. JavaScript is a high-level programming language. JavaScript was created to extend web page functionality. JavaScript is used by dynamic web pages for form submission/validation, interactivity, animations, user activity tracking, etc...	Dynamic web development, PDF documents, web browsers	Gmail Adobe Photoshop	<pre>&lt;html&gt;   &lt;body&gt;     &lt;script&gt;       alert('Hello, world!');     &lt;/script&gt;   &lt;/body&gt; &lt;/html&gt;</pre>

Programming - Requirement 3a


Mister Merit Badge

A list of popular programming languages



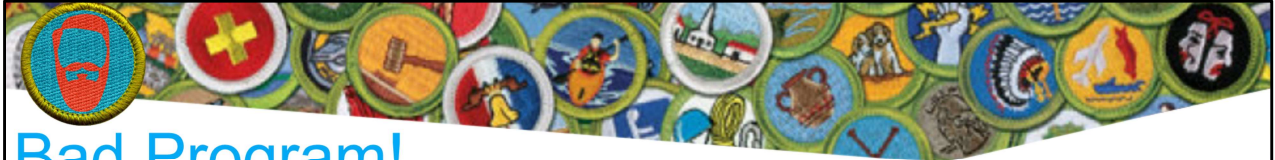
## Linked List

- What a program or app is and how it is created?
- Name 4 programs or apps you or your family use and explain how each helps.
- Describe three different programmed devices you rely on every day
- Name 10 popular programming languages used today and how they are used.



Programming - Requirement 3b    Digital Technology - Requirement 4a-b    Mister Merit Badge

### Discussion



# Bad Program!


Malicious software used to refer to a variety of forms of hostile or intrusive software. Types of malware include:

- Computer viruses
- Worms
- Trojan horses
- Ransomware
- Spyware
- Adware
- Scareware

How can you protect your devices and data from malware?



## Discussion




# Intellectual Property

Intellectual property refers to creations of the mind, such as inventions, literary works, artistic works, designs, symbols, names, and images used in commerce:

- Copyright
- Patents
- Trademarks
- Trade secrets

Why do that exist?



Programming - Requirement 4a    Digital Technology - Requirement 7a    Mister Merit Badge


**Copyright** – A copyright is geared toward literary and artistic works, such as books and videos.

**Patent** – A patent is a right, granted by the government, to exclude others from making, using, or selling your invention/idea.

**Trademark** – A trademark protects items that help define a company brand, such as its logo.

**Trademark** – A trademark protects items that help define a company brand, such as its logo.

**Trade Secrets** – A Trade Secret is something used by a business not generally known by others by which gives the business an economic advantage over competitors.



# Intellectual Property

The drawing comes from 2 revisions of the same Apple iPhone Design patent application, the solid lines in the drawings are related to the patent, and the dotted lines are portions not claimed in this particular patent.

The drawings shows the bezel and front of the iPhone, the first revision didn't include the screen but the patent was updated to include the screen. We can compare the drawings from the patent to the actual Samsung Galaxy S 4G design.

D593087  
first embodiment




FIG. 3

Screen  
not claimed

D593087  
second embodiment





FIG. 11

Screen  
claimed

Samsung Galaxy S 4G

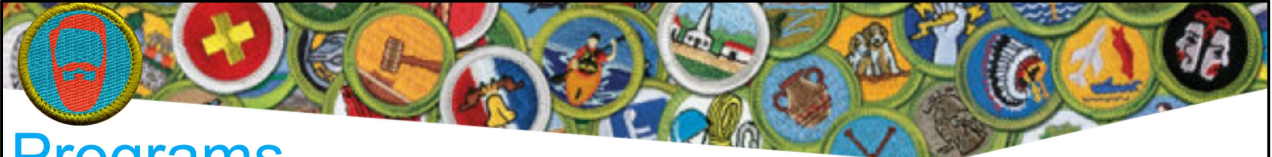


Screen different or screen same  
Still infringing

Figure 3

Digital Technology - Requirement 7c
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This patent was specifically for the design of the front of the iPhone, not the technical specifics of the phone so it doesn't matter what type of the screen just the overall look/design. Apple sued Samsung over the Galaxy S 4G and two other phones for patent infringement for this particular patent along with some other patent, and a court found that Samsung did infringe on the design, with total damages of \$163,018,625



# Programs

When can you accept a free copy of a program from a friend?

What is the difference between licensing and owning software?

What are the differences between freeware, open source, and commercial software? What is important to understand the differences?



Programming - Requirement 4b-c    Digital Technology - Requirement 7b

Mister Merit Badge

## Discussion



# Education

**Computer Engineering**  
Typically involves software, hardware and the development of systems involving software, hardware, and communications.

**Computer Science**  
Typically covers a broad range of topics with an emphasis on the underlying science aspects.

**Information Systems**  
Typically focuses on computing in an business organizational context.

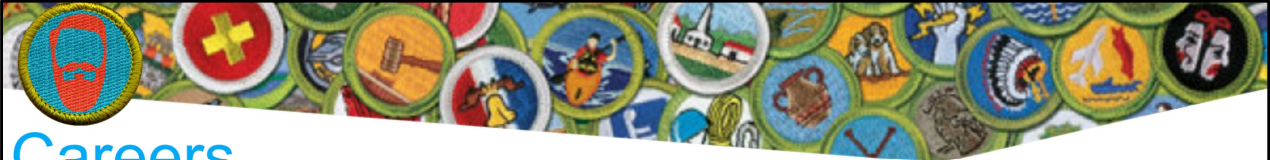
**Information Technology**  
Focuses on computing infrastructure and needs of individual users; tends to involve a study of systems.

**Software Engineering**  
Focuses on large-scale software systems; employs certain ideas from the world of engineering in building reliable software systems.

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Programming - Requirement 6      Digital Technology - Requirement 9a      Mister Merit Badge

Find out about three career opportunities. Pick one and find out the education, training, and experience required. Discuss this with your counselor and explain why this career might be of interest to you.



# Careers

## Information Technology Management

Average Annual Salary - \$123,081

IT managers supervise information technology departments and ensure that all systems run smoothly. Students who major in information technology management can earn a higher-than-average salary after graduation. Earnings are often dependent on employer and experience level, but in general, IT professionals with an MBA earn more than those with only a bachelor's degree.

## Software Engineering

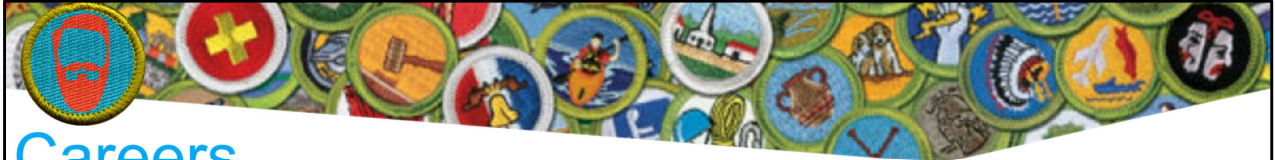
Average Annual Salary - \$97,742

Software engineering majors learn to develop and test computer software and systems. Most software engineers specialize in either systems or applications. On average, engineers who work with systems earn slightly more than those who work with applications. A bachelor's degree is almost always necessary for either specialization, but a graduate degree is usually preferred.

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Programming - Requirement 6      Digital Technology - Requirement 9a      Mister Merit Badge

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## Careers

**Database Administration**  
Average Annual Salary - \$94,430

Students who major in database administration ensure database systems are secure, organized and working properly. Most database administrators work for search portals, Internet service providers, government agencies and data processing firms. Earnings can vary by industry; database administration majors who work in computer systems design and similar industries tend to earn the most.

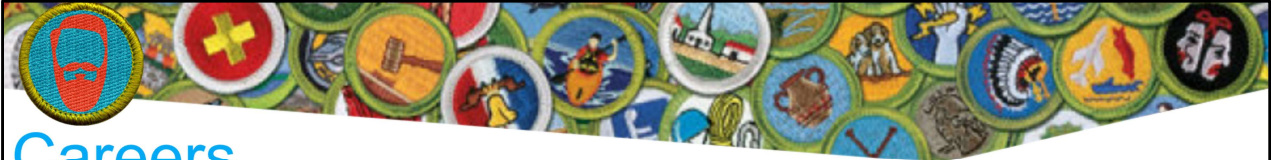
**Video Game Programming**  
Average Annual Salary - \$92,151

Video game programmers work with various software systems to program games for computers, consoles and other gaming devices. Higher salaries and promotions may be awarded to those who stay on the cutting edge of this ever-changing field.

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Programming - Requirement 6      Digital Technology - Requirement 9a      Mister Merit Badge

Find out about three career opportunities. Pick one and find out the education, training, and experience required. Discuss this with your counselor and explain why this career might be of interest to you.



## Careers

**Web Development**  
Average Annual Salary - \$78,848

Web developers create and program content for websites. Although a degree is not always required in this industry, many employers prefer to see some type of education or proof of expertise, like professional certification.

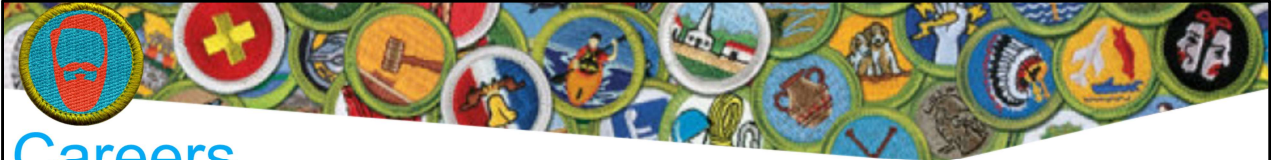
**Computer Programming**  
Average Annual Salary - \$78,624

Computer programming majors learn to write and test computer programs. A degree is not always required for this career, but it's easier to secure a job with some type of education or certification. The best-paid programmers may earn \$100,000 or more per year.

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Programming - Requirement 6      Digital Technology - Requirement 9a      Mister Merit Badge

Find out about three career opportunities. Pick one and find out the education, training, and experience required. Discuss this with your counselor and explain why this career might be of interest to you.



## Careers

### Network Engineering

Average Annual Salary - \$78,389

Network engineering majors are responsible for the design and implementation of local area networks (LAN) and wide area networks (WAN). A degree is almost always a must to secure a position as a network engineer. Certifications are also highly recommended.

### Game Design

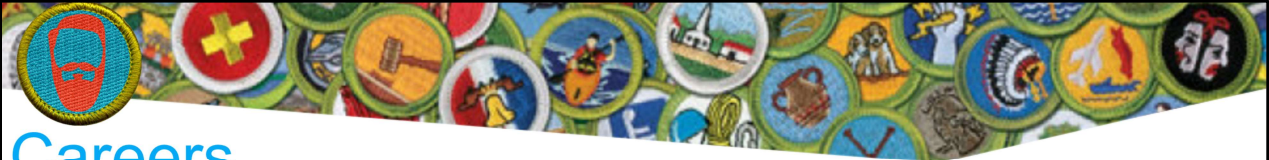
Average Annual Salary - \$75,065

Game designers create video games for computers, consoles and other gaming devices. Entry-level game designers with less than 3 years of experience can make about \$54,600 per year. The video game design industry is one of the fastest growing areas of the tech sector; it's also very competitive.

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Programming - Requirement 6      Digital Technology - Requirement 9a      Mister Merit Badge

Find out about three career opportunities. Pick one and find out the education, training, and experience required. Discuss this with your counselor and explain why this career might be of interest to you.



## Careers

### System Administration

Average Annual Salary - \$72,904

System administrators design, install and maintain computer systems. Some system administrators are also responsible for supporting entire networks. A degree is not always required; experience and certifications can sometimes be substituted for a formal education. However, system administrators who have at least a bachelor's degree tend to have an advantage in the job market.

### Network Management

Average Annual Salary - \$68,347

Network managers oversee a variety of different networks, including computer networks and fiber optic networks. Students who earn a degree in network management may end up working as operators, administrators or planners. Experienced network management professionals can earn significantly more than entry-level professionals.

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Programming - Requirement 6      Digital Technology - Requirement 9a      Mister Merit Badge

Find out about three career opportunities. Pick one and find out the education, training, and experience required. Discuss this with your counselor and explain why this career might be of interest to you.

# #BattleScars

## Programming Related Injuries

A Repetitive strain injury (RSI) is any damage to the tendons, nerves, muscles, and other soft tissues of the body caused by specific repeated movements which overstress the tissues.

- What type of injuries can occur during programming activities?
- How can these injuries be prevented and/or treated?



The diagram shows two side-by-side illustrations of a person sitting at a desk with a computer. The left illustration shows poor ergonomics: the person is slumped forward, their neck is strained, and their arms are at awkward angles. Red circles with minus signs are placed on the neck, shoulder, and wrist to indicate areas of stress or injury. The right illustration shows good ergonomics: the person is sitting upright, their feet are flat on the floor, their arms are at a 90-degree angle, and the monitor is at eye level. Green circles with plus signs are placed on the neck, shoulder, and wrist to indicate areas of relief or health. A green line indicates a 30-degree angle for the neck and a distance of greater than 50 cm for the arms.



A cartoon illustration of a person sitting at a desk with a computer. The person has a large, jagged headache, indicated by several starburst symbols above their head. They are slumped over their desk, looking at the monitor.

Programming - Requirement 1b

Mister Merit Badge

Example injuries: Posterior cervical dorsal syndrome (“computer back”), “Mouse shoulder”, Carpal tunnel syndrome, Tennis elbow, Lumbar sprains and strains, Disc injuries, eye strain.

Prevention and treatment: Proper posture, ergonomic equipment, desk and chair adjustments, stretching, exercise, taking break.



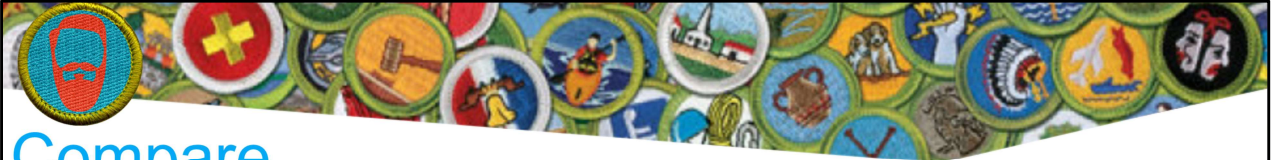
# Compare

PLAYSTATION 4 PRO - SPECIFICATIONS		XBOX ONE X - SPECIFICATIONS	
Main processor	Single-chip custom processor CPU: x86-64 AMD "Jaguar", 8 cores @ 2.1 GHz GPU: AMD RADEON clock speed @ 911MHz	Main processor	Single-chip custom processor CPU: x86-64 (Jaguar Evolved) 8 core @ 2.3 GHz GPU: AMD RADEON clock speed @ 1172MHz
Memory	GDDR5 8GB	Memory	GDDR5 12GB
Storage size	1TB	Storage size	1TB
BD/ DVD drive (read only)	BD x 6 CAV DVD x 8 CAV	BD/ DVD drive (read only)	BD x 6 CAV, Ultra HD Blu-ray DVD x 8 CAV
Input/ Output	Super-Speed USB (USB 3.1 Gen1) x 3 AUX port x 1	Input/ Output	Super-Speed USB (USB 3.1 Gen1) x 3
Networking	Ethernet (10BASE-T, 100BASE-TX, 1000BASE-T) x 1 IEEE 802.11 a/b/g/n/ac Bluetooth® 4.0 (LE)	Networking	Ethernet (10BASE-T, 100BASE-TX, 1000BASE-T) x 1 IEEE 802.11 a/b/g/n/ac Bluetooth® 4.0 (LE)
AV output	HDMI™ out port (supports 4K/HDR) DIGITAL OUT (OPTICAL) port	AV output	HDMI™ out port (supports 4K/HDR) DIGITAL OUT (OPTICAL) port 7.1 Dolby Atmos HDMI™ in port (supports 4K/HDR)

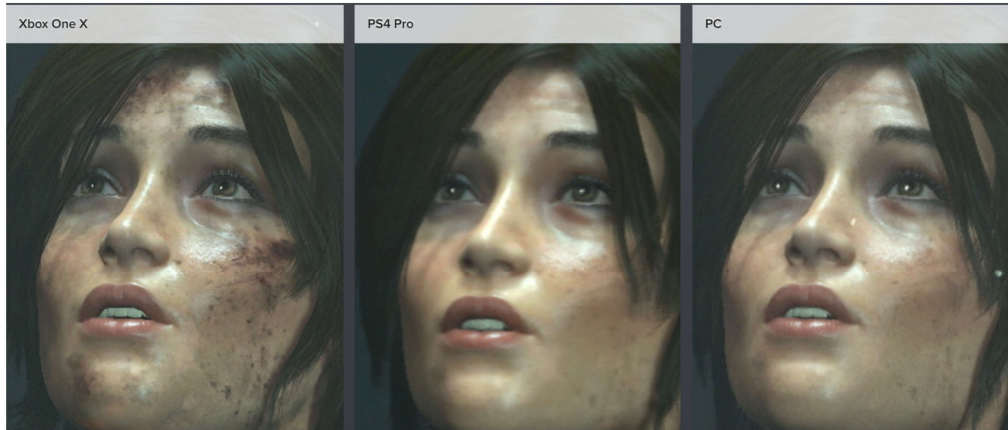
Digital Technology - Requirement 3c

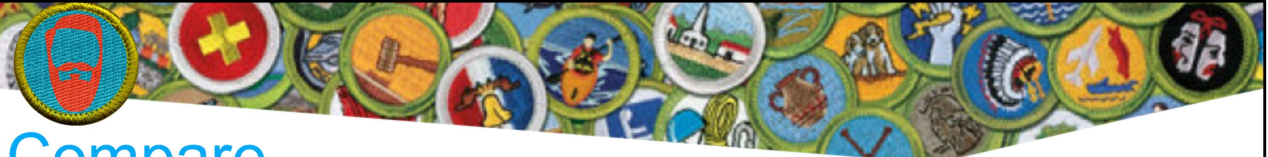
Mister Merit Badge

Describe two digital devices and how they are made more useful by their programming.

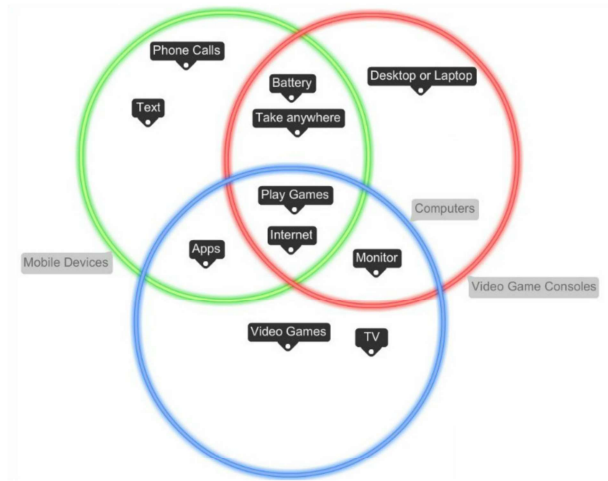


## Compare

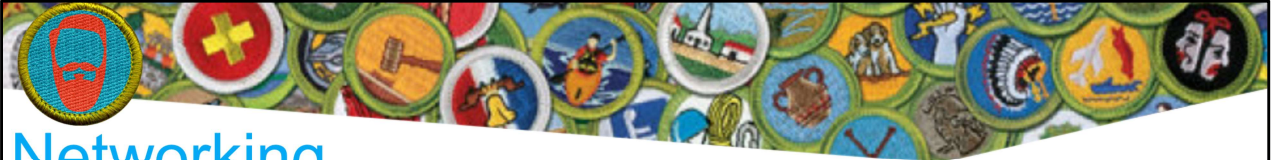




## Compare



Discuss the similarities and differences between computers, mobile devices, and gaming consoles



# Networking

A computer network exists where two or more devices are linked together to share data, hardware, software, and/or resources.

- What is the purpose of a computer network?
- How do digital devices connect to the Internet?

## HTTP vs HTTPS

Anytime you visit a site using HTTP (HyperText Transfer Protocol), data sent between your computer and the web server is insecure, as opposed to HTTPS (HTTP Secure) which uses SSL certificates to create an encrypted connection between two points. That means sensitive info like login credentials or credit card numbers can be captured by hackers looking to steal your data.




## Discussion



Manufacturers are changing processes minimizing hazardous chemicals by:

- Reducing/eliminating lead solder
- Mercury-free LCD's & arsenic-free glass
- Bromine-free & chlorine-free circuit boards



- 

## 37

# Get(Coding)

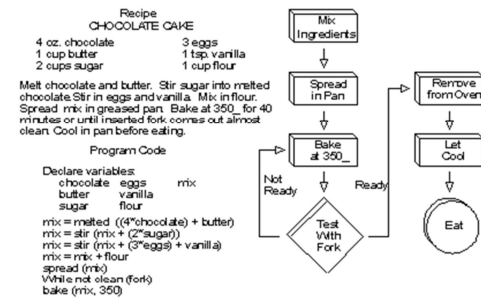
## Programming Resources:

- Interactive Python tutorial  
<http://www.learnpython.org>
- Tutorials for JavaScript, PHP, and other aspects of web development  
<http://www.W3schools.com>
- Free tutorials and introductions to programming  
<http://www.code.org>
- Beginner information about programming for Visual Basic and PHP  
<http://howtostartprogramming.com>
- Free tutorials and other resources on how to program in C++  
<http://learncpp.com>
- Tutorials for Android app building  
<http://developer.android.com/training/index.html>

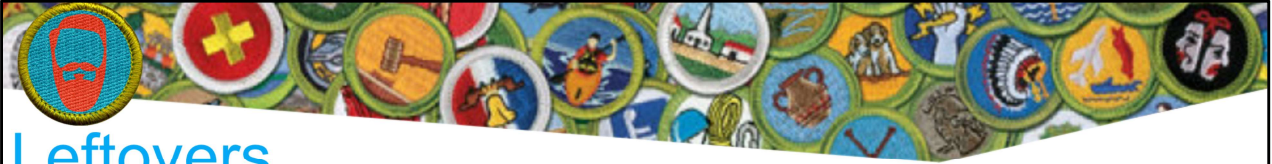
## Write, Test and Run You Own Code:

Repl.it is an online compiler that supports multiple languages and can run on almost any device with a web browser.

<https://repl.it/languages>



A few suggestions to help you with your Programming projects.



# Leftovers

## Requirements not covered in class:

### Cyber Chip (if not presented today)

- Programming – Requirement 1a
- Digital Technology – Requirement 1

### Programming Projects

- Programming – Requirement 5
  - Remember the 3 different programming languages should be pre-approved.
  - If sending SourceCode, the code should be commented and include your name to help the me review it

### Internet search and HTTPs websites

- Digital Technology – Requirement 5b-c

### Digital Technology Projects

- Digital Technology – Requirement 6
  - Google Docs, Sheets, and Slides are an easy way to create and share some of the projects listed





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