



# Computer Systems I

National Workshop 3, Session 6

# Overview of the Session

<b>Part 1</b> 14:00 – 14:30	Hitomezashi Stitching and ASCII (warm-up activity)
<b>Movement Break</b> 14:30 - 14:35	
<b>Part 2</b> 14:35 - 15:25	Computer systems part picker activity
<b>Movement Break</b> 15:25-15:25	
<b>Part 3</b> 15:30 - 15:45	Presentation and discussion on activity

## Everything is 1s and 0s

All information that passes through a computer is formed from the controlled flow of electricity through its various components.

The information contained in this electricity flow is interpreted as: **On = 1** and **Off = 0**.

We can, therefore consider information flow through a computer in terms of 1s and 0s.

But how is this flow of 1s and 0s turned into something useful (and how do we turn something useful into 1s and 0s so that it may be worked on by a computer)?

# Hexadecimal

Base 16 number system (i.e. it has 16 digits, decimal has 10, binary has 2)

0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

Human-friendly gateway between decimal and binary

Used most notably for encoding colour information:

Hex colouring system each of Red, Green and Blue can be a value from 00 to FF (0 – 255)

# is black

# is white

# is greenish

Example website: <https://www.color-hex.com/>

## ASCII, Unicode, UTF8

Character encoding standards are used to ensure smooth and consistent information exchange

ASCII uses 7 bits to encode 128 different characters ( $2^7$ !)

These include the Arabic numerals and the English alphabet.

Unicode is an extension of this and allows for other alphabetic symbols to be encoded and transmitted.

UTF (Unicode Transformation Format) 8 is the most common format

# ASCII Characters in Hexadecimal

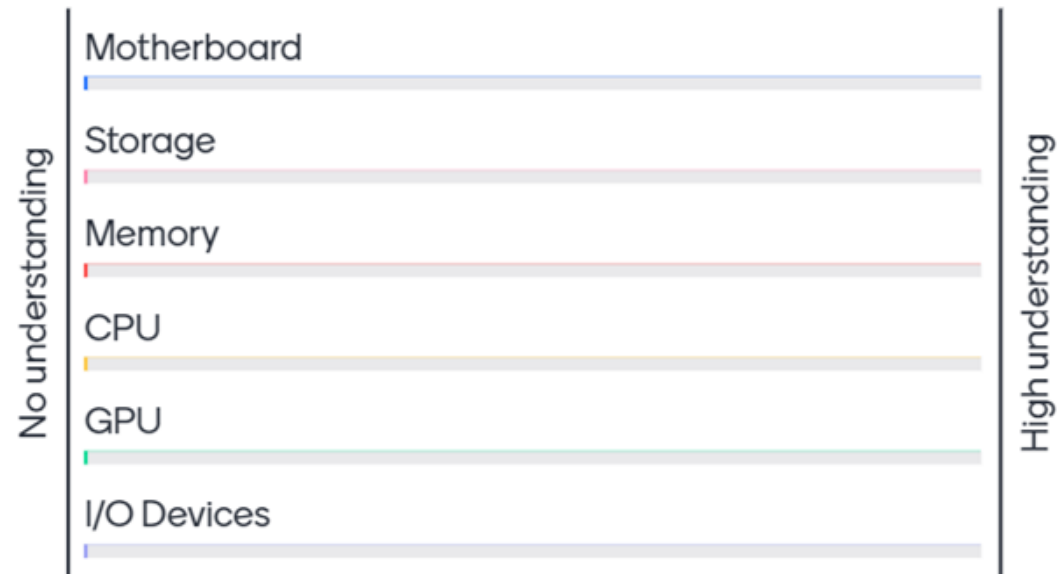
Hex	Value	Description	Hex	Value	Description	Hex	Value	Description	Hex	Value	Description
40	@	"at" symbol	50	P	Capital P	60	`	Grave / accent	70	p	Small p
41	A	Capital A	51	Q	Capital Q	61	a	Small a	71	q	Small q
42	B	Capital B	52	R	Capital R	62	b	Small b	72	r	Small r
43	C	Capital C	53	S	Capital S	63	c	Small c	73	s	Small s
44	D	Capital D	54	T	Capital T	64	d	Small d	74	t	Small t
45	E	Capital E	55	U	Capital U	65	e	Small e	75	u	Small u
46	F	Capital F	56	V	Capital V	66	f	Small f	76	v	Small v
47	G	Capital G	57	W	Capital W	67	g	Small g	77	w	Small w
48	H	Capital H	58	X	Capital X	68	h	Small h	78	x	Small x
49	I	Capital I	59	Y	Capital Y	69	i	Small i	79	y	Small y
4A	J	Capital J	5A	Z	Capital Z	6A	j	Small j	7A	z	Small z
4B	K	Capital K	5B	[	left/opening bracket	6B	k	Small k	7B	{	left/opening brace
4C	L	Capital L	5C	\	back slash	6C	l	Small l	7C		vertical bar
4D	M	Capital M	5D	]	right/closing bracket	6D	m	Small m	7D	}	right/closing brace
4E	N	Capital N	5E	^	caret/circumflex	6E	n	Small n	7E	~	tilde
4F	O	Capital O	5F	_	underscore	6F	o	Small o	7F	DEL	delete



# Computer Systems - Components

Go to [www.menti.com](http://www.menti.com) and use the code 62 80 46

## How well do you understand what the following computer components do?





# The Main Components of a Computer

The **Motherboard** is a Printed Circuit Board (PCB) that acts as the central hub of the computer. All devices and components are connected to it and all communication between devices is done through it.

**Storage**, either on Hard Disk Drives (HDD) or Solid State Drives (SSD) is where the Operating System, software, and files are stored and accessed by other components, as required. HDDs are cheap and can hold large amounts of data. SSDs are faster but currently more expensive for larger sizes.

**Memory.** Random Access Memory (RAM) is where the computer will temporarily store information required to complete tasks or keep software running. RAM is accessed/written faster than a disk drive. More RAM means that more and larger files can be stored and accessed at any one time, leading to more efficient and quicker performance. Anything stored in RAM will erase when the power is turned off.

## The Main Components of a Computer

The **Central Processing Unit (CPU)** can be likened to being the engine or brain of the computer. The CPU performs the vast majority of the computational tasks in a computer. The speed of a CPU depends on a number of factors including clock speed and the number of cores.

The **Graphics Processing Unit (GPU)** is a type of CPU designed specifically for performing computational tasks relating to the creation/manipulation of images. One way in which GPUs accomplish this is by being highly parallel in nature – they can perform many small computations simultaneously, rather than fewer, larger ones as on a CPU.

**I/O Devices** are any components/peripherals which enable interaction between the computer and the user, e.g. disk drives, monitors, keyboard, etc.

# Group Activity / Breakout



## Breakout task – Build a Computer

Each group will be asked to research, design and price a computer so a particular set of criteria.

Various websites are available to help you in this, including:

<https://pcpartpicker.com/>

<https://www.reddit.com/r/buildapc/>

<https://www.komplett.ie/build-your-own-desktop/90002034/product>

<https://www.tomshardware.com/topics/pc-builds>

Please feel free to find and share your own sources of help!

When you have created your computer, please take a screen shot of the build or the machine and put it in the relevant page of the google doc for sharing/discussion later.

## Breakout task – Build a Desktop Computer

	Specification	Budget
<b>Groups 1 &amp; 6</b>	General purpose home office computer	€500
<b>Groups 2 &amp; 7</b>	Budget gaming rig	€800
<b>Groups 3 &amp; 8</b>	Content creator's machine for video editing	€800
<b>Groups 4 &amp; 9</b>	A no compromises, simply ludicrous machine	€5000
<b>Groups 5 &amp; 10</b>	High-end gaming rig	€2000

## Things to think about

What are the unique requirements of each computer's intended function?

What will the users of these machines require in order to work most effectively?

Compromises will have to be made. There may be no one best compromise to make.







# Discussion and Presentation



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