Unit 36, Assignment 2

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Task One (P2)

Task 1

In this task you are going to investigate hardware. Complete the table below for each of the shown types of platform.

	Xbox Series X	**iPhone 13**	**Chromecast with Google TV**
CPU Name	Custom AMD Zen 2	Apple A15 Bionic	Amlogic S905D3
Number of Cores	8 Cores	6 Cores (two high perf, four energy-saving)	4 ARM Cortex A55 cores
Speed;	3.8GHz, 3.6GHz	3.23GHz	1.9GHz
Cache;		32MB	
Bus width	32 bits		
GPU Name	Custom RDNA2 GPU	Custom, 4-cores	Mali G31 MP2
Speed;	1.825GHz		
Graphics memory;	Shared	Shared	Shared
Dedicated/ shared memory	16GB	Shared	Shared
Address/data bus;	10GB @ 560GB/s 6GB @ 336GB/s		
Memory	Shared	Shared	Shared
Graphics Memory;	Shared	Shared	Shared
System RAM	16GB	4GB	2GB
Average capacity;	10GB + 6GB		
Type (e.g. DDR);	GDDR6	LPDDR4X	
Display Type:			
Built-in or external.	External	Built-in	External

Display Type:	Television	6.1” OLED Touch	TV via HDMI
Sound Type:	Surround	Stereo	Surround
Compatible Interface devices:			
Number of ports;	5	1	1
Wireless or Wired	Wired and Wireless	Wired and Wireless	Wired (power) and Wireless (data)
Analogue or Digital	Digital	Digital	All Digital
***Connectivity*:**			
Port types	USB	Lightning (USB 2)	USB-C for power HDMI male for display output
local area network (LAN);	Yes	No	Yes, with adapter
Internet connection	Yes	Yes	Yes
Cellular	No	Yes	No
Wi-Fi;	Yes	Yes	Yes
Bluetooth®	Yes	Yes	Yes
Display output.	HDMI 2.1	Yes, with dongle	HDMI
***Power supply* Type:**	External	Battery	USB-C Power
Voltage and Consumption	160-200W	5V	5W
Storage			
Amount?	1TB	Up to 512GB	8GB

Proprietary mediums? (Yes/ No: State type)	Yes, Solid State	Solid State	
Flash Memory? (please state type)	Custom NVMe SSD	Custom NVMe SSD	
Optical Disc	Blu-Ray	None	N/A
Anti-piracy protection	Yes	Yes, Apps only installable with App Store	Apps only installable with Google Play Store, many have DRM

This provides evidence for P2

Task 2

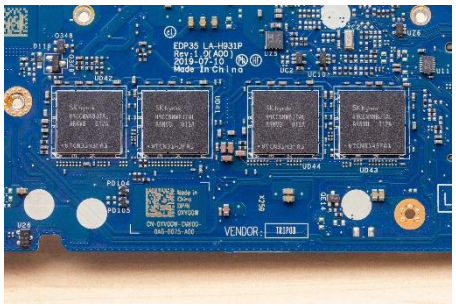
Minecraft	PC Game	Console Game	Mobile Game
OS Version Needed	Windows 7+ macOS 10.9+ Linux from 2014+ 64-bit recommended	Latest version of respective console operating system	Android 5+ iOS, iPadOS 10+
Drivers Required (if required)	Appropriate graphics drivers for accelerated graphics	N/A	N/A
Extra Software required	Minecraft Launcher to launch game	N/A	N/A
Runtimes Needed	Java 7. Java 8 for 1.12 onwards.	N/A	N/A
Connectivity Required	Internet connectivity required for initial download of game files or for multiplayer.	Internet connectivity required for initial download of game files or for multiplayer.	Internet connectivity required for initial download of game files or for multiplayer.

Task 3a—Game Console Hardware (P2, M2, D2)

CPU

All computer systems, from consoles to phones, have a CPU—a central processing unit. This is the "brain" of the device, where most calculations and instructions are run and performed. A CPU with a higher clock speed will be able to perform more instructions per second[1] and more cores allows simultaneous processing of instructions.

RAM



The random-access memory of a system is where data that needs to be accessed frequently and often by the CPU.

On a personal computer, additional RAM allows more programs to be ran at once[2].

On a games system, more RAM will allow more of a games' world to be loaded in at one time, which reduces the number of times the storage needs to be accessed. If the storage medium is slow, such as an optical disc or a hard disk drive, loading in data from this may cause 'pop in,' where textures do not appear as suddenly as required.

GPU

Graphics Processing Units are dedicated chips for computing things such as 3D models, lighting and physics. They are responsible for outputting an image to the screen[3].

A more powerful GPU allows more complex visual fidelity to be generated, opening the possibility to even more lifelike virtual worlds for gamers to immerse themselves in.

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[1] https://www.intel.co.uk/content/www/uk/en/gaming/resources/cpu-clock-speed.html
[2] https://www.crucial.com/articles/about-memory/support-what-does-computer-memory-do
[3] https://www.intel.com/content/www/us/en/products/docs/processors/what-is-a-gpu.html

Connectivity

The connectivity of a device is how it is able to interface with peripherals, other devices and the internet. This could be done wirelessly.

Connectivity to the internet allows updates to games to be given remotely as well as facilitating online multiplayer gameplay.

Form Factor

The form factor of a device relates to its size, connectivity and class of device[4]. For example, a mobile phone has a significantly smaller footprint than an arcade machine or a games console. They are members of different form factors.

A game platform that is positioned in a static position, such as a desktop computer or a games console is better suited to a more theatrical experience while a game platform that is small and portable, such as a smartphone, is more inviting to games that are pick-up-and-play and do not require extended amounts of time to complete.

Input Methods

An input method is how a user interacts with a given device.

Some input methods are better suited for certain types of games and interfaces. Players of competitive first-person-shooters appreciate the precision and accuracy of a keyboard and mouse, while someone playing a racing game will prefer the analogue nature of a joystick or steering wheel. Touch screens lend themselves to puzzle games and interfaces with larger buttons and tap-targets, as do controllers. This is contrast to some complex interfaces of PC games whose usage benefits heavily when relying on a keyboard and mouse.

How They Differ Between Platforms

CPU, RAM, GPU

On a PC, the CPU, RAM and the GPU are all individual components that must be selected based on their compatibility with each other and the desired processing power required or the games the user wishes to play.

[4] https://www.crucial.com/articles/pc-builders/what-is-a-form-factor

This decision could be made by the manufacturer of a pre-built PC/laptop or an individual building their own computer.

For those seeking the maximum performance possible, an expensive gaming computer with top-end components would be the first choice.

On a console, the selection of internal components is often completely overlooked by gamers. As long as the system is able to play the games that the player wishes to play, they do not take an interest in the power or internals of the console. Console hardware is similar to a PC, though often the specific components used are custom designed to reach a specific performance target and to run a certain class of game.

Consoles often do not have top-of-the-line hardware, but games are often optimised well enough to perform adequately and oftentimes better than a similarly priced PC. This is since many consoles are sold at a loss, with manufactures expecting to recoup by selling games and subscriptions[5].

As with consoles, **mobile devices** share the same core components. Again, however, little attention is often paid by the consumer as to what exact components are in the device. The majority of smartphones make use of an SoC (System on a Chip) that contains the CPU, GPU, RAM and often more components all in one dedicated chip[6]. This is in contrast to the other gaming platforms mentioned where each component is usually distinct from one another.

A **TV stick** such as a Chromecast or the Amazon Fire share a similar story to mobile phones, though their hardware is often significantly weaker. This is since their first priority is media playback rather than the performance of games that can be ran.

[5] https://www.theverge.com/2021/5/6/22422691/microsoft-xbox-consoles-profit-software-services-revenue-apple-epic-games-trial
[6] https://www.howtogeek.com/769198/what-is-a-system-on-a-chip-soc/

Form Factor & Input Devices

The form factor of a smartphone is different to that of a desktop PC which is different to that of a games console. Each form factor lends itself to a particular class of games, as mentioned previously.

Regarding input devices, a PC is the easy victor since it allows all manner of options to be connected and configured. You could stick to the more accurate, efficient combination of a keyboard and mouse or choose to use a controller for a more comfortable experience playing a racing game[7]. Some games even make use of alternative input methods, such as the rhythm game Osu which is commonly played with a drawing tablet and a pen[8].

Some modern consoles now allow the use of a keyboard and mouse, though due to the distinct advantage this can sometimes give to players, those choosing this input method could be segregated from their controller-using counterparts in multiplayer experiences. Additionally, not all games support being played in this manner on a console[9].

Smartphone games are traditionally designed around a touchscreen, with on-screen joysticks and buttons. Games specifically designed as a mobile experience will feature larger UI elements such as health bars and inventories to facilitate easier use. Many phone games will also support external controllers and smartphones designed for gaming often come with built-in hardware control methods.

TV games can often be played with a regular TV remote, though often controllers can be connected for a more ergonomic experience.

[7] https://www.intel.com/content/www/us/en/gaming/resources/keyboard-controller.html
[8] https://osu.ppy.sh/wiki/en/Guides/Tablet_Purchase
[9] https://www.howtogeek.com/744745/how-to-connect-a-mouse-and-keyboard-to-your-xbox/

Task 3b—Game Console Software (P3, M3, D3)

PC Considerations

When purchasing a game for a computer, there are many considerations that must be taken into account. The requirements of the game must be considered to ensure the game runs as expected. As well as minimum hardware requirements, there are minimum software requirements.

These can include the version of the operating system and any other external software or libraries required. For example, a game may only run on Windows 10 since the latest version of the DirectX 3D libraries are only supported on this version and beyond.

For high-performance graphics cards and unique hardware to function correctly, a device driver may be required for the operating system to interface with it.

On PCs many games require a "launcher." These are usually bundled with a game to enable easier updates and management of game files. Many games have DRM (digital rights management) that aim to detect illegitimately obtained pirate copies of games.

Console Considerations

On a games console, the experience is simpler. It is only necessary to check that the game is supported on the chosen console. Though the underlying operating system and underlying happenings are similar to a PC, to a gamer this is abstracted.

Game Engines & Runtimes

Games are commonly developed using an engine, which is a software framework for developing games. They often include the ability to import 3D models and contain pre-made code for lighting and physics. Many game engines allow a game to be built (exported) for many different platforms which can ease development and decrease the time spent creating the game since different versions for different platforms do not need to be made individually.