

Raluca Moraru 2014107 - Computer Systems Fundamentals

by Raluca Moraru

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Computer Systems Fundamentals Report

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Module: Computer Systems Fundamentals (ACCA4028)

Lecturer: Gareth Jones

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1. Introduction

In this report I will be reflecting on my own personal computer specifications, IP address, MAC address and router DHCP server and its purpose. In the last section of the report, I will build up a Home Theatre PC that is connected to a Television as a display and also connected to a separate Hi-Fi AV amplifier and speakers with Dolby Digital 5.1 surround sound. I will include details of the CPU and motherboard, amount of RAM, type and size of non-volatile storage, the input/output ports needed, case, power supply, monitor and speakers. At the end of the report, I will include an amazon shopping list of the components.

2. My own personal computer's specifications

- Make and model: Lenovo 20H1CTO1WW
- RAM: 16 GB
- Non-volatile storage: 500 GB
- CPU: Intel(R) Core (TM) i5-7200U CPU
- CPU Clock Speed: 2.5-3.1GHz
- Cache Size: 3MB
- L1 cache: 128 HB
- L2 cache: 512 KB
- L3 cache: 3.0 MB
- Intel HyperThreading
- 1xUSB 3.0 and 2xUSB 2.0 – I personally use them for USB wireless mouse and sometimes a keyboard, for USB headphones and smartphone data transfer.
- HDMI 1.4 – I use it for connecting to the TV.
- Ethernet (RJ-45) – I use it for connecting to the Internet router.
- Audio / microphone jack – I use it for earphones and microphone.
- SD Card slot – I use it for reading SD cards.

System Information		
File Edit View Help		
System Summary		
Hardware Resources	Item	Value
Components	System Manufacturer	LENOVO
Software Environment	System Model	20H1CTO1WW
	System Type	x64-based PC
	System SKU	LENOVO_MT_20H1_BU_Think_FM_ThinkPad E470
	Processor	Intel(R) Core(TM) i5-7200U CPU @ 2.50GHz; 2701 Mhz; 2 Cor
	BIOS Version/Date	LENOVO R0DETA3W (2.03), 05/06/2020
	SMBIOS Version	3.0
	Embedded Controller Version	2.03
	BIOS Mode	UEFI
	BaseBoard Manufacturer	LENOVO
	BaseBoard Product	20H1CTO1WW
	BaseBoard Version	SDK0J40697 WIN
	Platform Role	Mobile
	Secure Boot State	On
	PCR7 Configuration	Elevation Required to View
	Windows Directory	C:\Windows
	System Directory	C:\Windows\system32
	Boot Device	\Device\HarddiskVolume1
	Locale	United States
	Hardware Abstraction Layer	Version = "10.0.17763.2061"
	User Name	RAKI-LAPTOP\Raki
	Time Zone	GMT Standard Time
	Installed Physical Memory (RAM)	16.0 GB
	Total Physical Memory	15.9 GB
	Available Physical Memory	8.76 GB
	Total Virtual Memory	18.3 GB

Figure 1

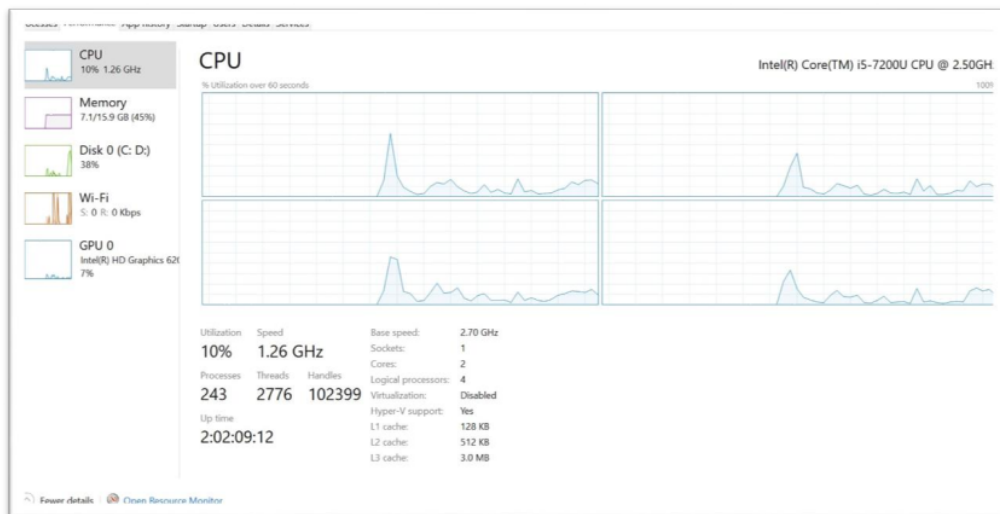


Figure 2

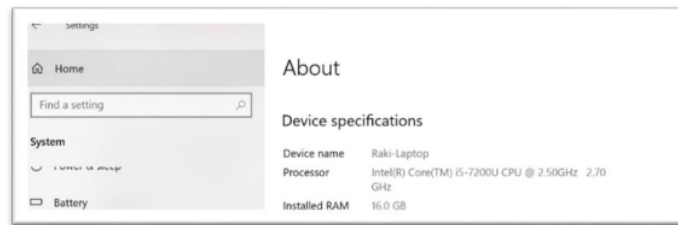


Figure 3

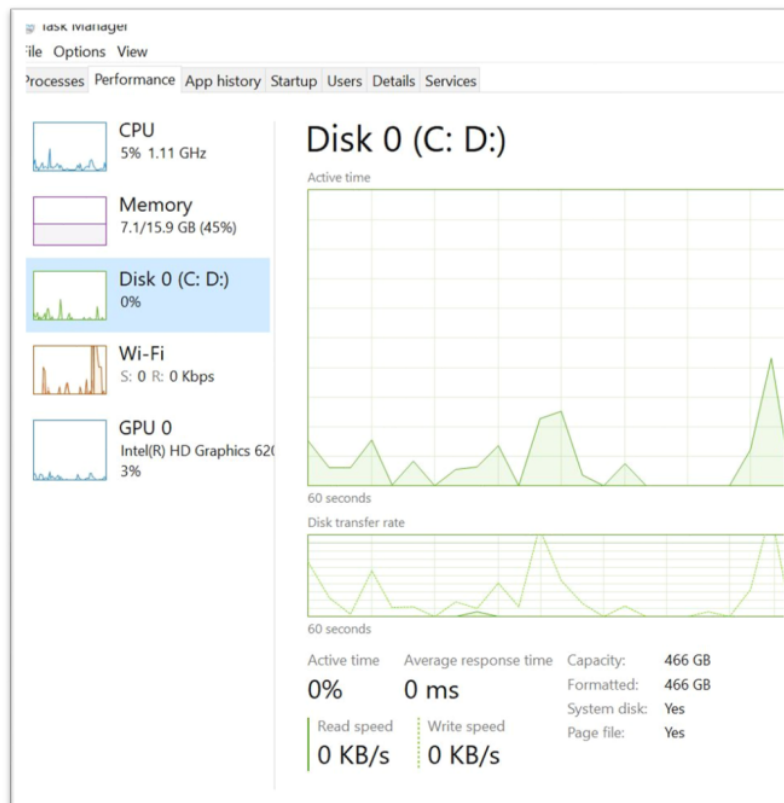


Figure 4



Figure 5

3. My own machine IP and MAC address and its purpose

IP (Internet Protocol) addresses are unique series of numbers that identify devices on the internet. It gives away the location and the individual online activity. Every device that has Internet connection, such as computers, laptops, tablets, mobile phones, needs an IP address.

IPv4 provides for a maximum 4.29 billion 32-bit addresses and IPv6 provides for 340 undecillion 128-bit addresses. IPv6 was launched after the number of people accessing the Internet increased dramatically. [1]

A MAC (Media Access Control) address is a unique number assigned to all network interface devices and it is used to distinguish and target the devices attached to a network. [2]

MAC addresses are 48-bit used by most network technologies, and 64-bit used by IPv6 and FireWire.

In the screenshots below it shows that I have used ipconfig to find my machine IP and MAC address.

```
Microsoft Windows [Version 10.0.17763.2300]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Raki>ipconfig/all

Windows IP Configuration

Host Name . . . . . : Raki-Laptop
Primary Dns Suffix . . . . . : 
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : lan

Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : lan
Description . . . . . : Realtek PCIe GbE Family Controller
Physical Address. . . . . : 
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 1:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : 
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
Physical Address. . . . . : 
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : 
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
Physical Address. . . . . : 
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
```

Figure 6

```
Wireless LAN adapter Local Area Connection* 1:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : 
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
Physical Address. . . . . : 
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : 
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
Physical Address. . . . . : 
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix . : lan
Description . . . . . : Intel(R) Dual Band Wireless-AC 8265
Physical Address. . . . . : 
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IPv6 Address. . . . . : 
Temporary IPv6 Address. . . . . : 
Link-local IPv6 Address . . . . . : 
IPv4 Address. . . . . : 
Subnet Mask . . . . . : 
Lease Obtained. . . . . : 02 December 2021 17:42:18
Lease Expires . . . . . : 05 December 2021 19:41:06
Default Gateway . . . . . : 
DHCP Server . . . . . : 
DHCPv6 IAID . . . . . : 
DHCPv6 Client DUID. . . . . : 
DNS Servers . . . . . : 
NetBIOS over Tcpip. . . . . : Enabled
Connection-specific DNS Suffix Search List :
```

Figure 7

Using the website <https://www.speedtest.net/> I have checked my Internet connection, Upload/Download speeds and Latency timings as following:

- Broadband: TalkTalk
- Download speed: 67.98Mbps
- Upload speed: 18.59Mbps
- PING: 15ms

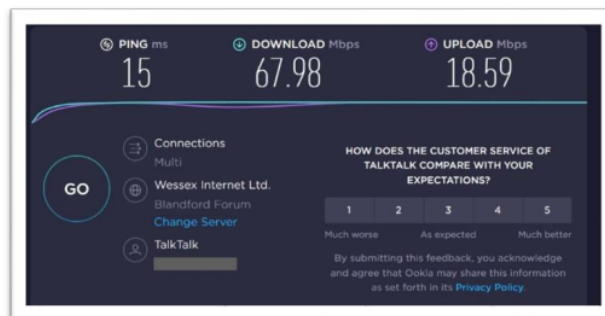


Figure 8

4. My own router DHCP server and its purpose

“Dynamic Host Configuration Protocol (DHCP) is the system that automatically assigns IP addresses to hosts, and Domain Name System (DNS) resolves fully qualified domain names to IP addresses.” [3]

“DHCP removes the need for manual configuration of these parameters on every device and provides a convenient method for them to share a limited pool of IP addresses.” [4]

I have chosen to use 2.4 GHz frequency instead of 5 GHz as my laptop is plugged into the router which is positioned far away from where I use my other devices, and 2.4 GHz frequency has a longer range and can penetrate solid objects more easily.

For security reasons I have changed the router password, the network name and password. I use a WPA2 Personal, and the Firewall is enabled and on a high level.

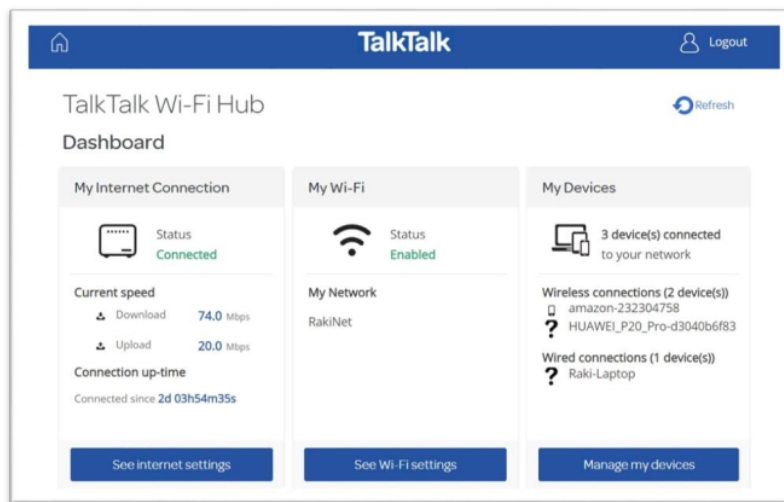


Figure 9

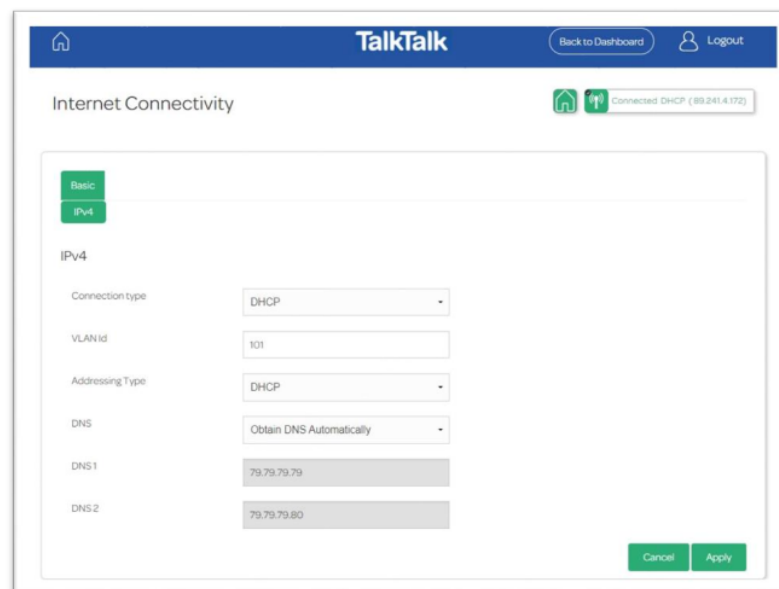


Figure 10

Figure 11Figure 12

Wi-Fi	
2.4 GHz Wi-Fi SSID	[Redacted]
Status	Enabled
Uptime	2d 04h40m11s
MAC address	[Redacted]
Mode	802.11 b,g,n
Security	WPA2 Personal
5.0 GHz Wi-Fi SSID	[Redacted]
Status	Disabled
Uptime	---
MAC address	[Redacted]
Mode	802.11 a,n,ac
Security	WPA2 Personal

Figure 13

5. Building a HTPC (Home theatre PC)

In this chapter I will produce a sensible specification for the HTPC connected to a Television as a display and to a separate Hi-Fi AV amplifier & speakers with Dolby Digital 5.1 surround sound, and I will include the components and features, and the reason I choose them.

Processor

Intel Core i7-10700K 3.80GHz LGA1200 125 Watt

I have chosen a 10th generation Core i7 processor which supports 8 CPU cores and 16 processing threads as I believe it will be ideal for downloading movies and playing games on the TV, with a big screen.

This Intel processor is unlocked for overclocking and comes with a 3.8 GHz base clock speed and a 5.1 GHz turbo boost speed.

I have chosen this processor because it also comes with Intel UHD Graphics 630, and I will not add a separate graphic card.

Looking on the amazon website reviews, it has 4.8 stars out of 5.

Motherboard

MSI Z590-A PRO Motherboard ATX LGA 1200 - 12 Duet Rail 55A VRM, DDR4 Boost (5333MHz OC), PCIe 4.0 x16, 3 x M.2 Gen4/3 x4, 4K/60Hz HDMI, 2.5G LAN

I have chosen ASROCK Z590M Motherboard as it is compatible with the processor, supports max 128GB memory and it is not very expensive.



Picture 1 [5]

Memory RAM

Crucial Ballistix MAX BLM2K8G44C19U4B 4400 MHz, DDR4, DRAM, 16GB (8GB x2), CL19

I have chosen 2 x 8GB DDR4 memory RAM of 4400MHz compatible with Intel platforms and ideal for overclocking.



Picture 2 [6]

Non-volatile storage

Seagate 3.5 Inch 2 TB BarraCuda Internal Hard Drive

For storage I have chosen Seagate Barracuda Hard Drive because it has 2TB SATA 3 6Gb/s with 7200 RPM and 256MB Cache, with very good reviews on amazon website.



Picture 3 [7]

Case

Gigabyte AC300W ATX Mid-Tower PC Case with RGB Fusion, USB-C and HDMI Front Inputs and Transparent Side Window

I have chosen Gigabyte AC300W ATX Mid-Tower PC Case for its' HDMI Front Inputs that I want to connect with the TV, for the USB Type-C I/O Panel, for the design and also because it can be positioned vertical or horizontal. It also has a dust filter and fully ventilated airflow.



Picture 4 [8]

Power supply

Seasonic FOCUS Plus Gold 750W (80+Gold, ATX 12V) PSU/Power Supply , SSR-750FX

I have chosen a 750W power supply for its' compact size and a hybrid silent fan.



Picture 5 [9]

Mouse

Logitech MX Master Wireless Mouse, Bluetooth or 2.4 GHz with USB Unifying Mini-Receiver, 1000 DPI, 5-Buttons

I have chosen a fast, 5-buttons wireless mouse that can be used for games because it is both Bluetooth and Unifying receiver compatible, it is comfortable, the buttons can be customized, has good battery life and 1000 DPI.



Picture 6 [10]

Keyboard

Vivefox Wireless Keyboard, 2.4GHz Ultra Slim Rechargeable with Numeric Keypad

I have chosen a wireless slim keyboard, with numeric pads because it is silent, rechargeable and it is a good value for money.



Picture 7 [11]

Optical drive

ASUS DRW-24D5MT DVD Super Multi DL Black Internal Optical Disc Drive

I have also added an Asus 24x DVD-RW Optical drive for the DVD movies and games.



Picture 8 [12]

Sound card

Asus Strix Raid Pro 7.1 Gaming Soundcard Kit

I have added an Asus Strix Raid Pro 7.1 Gaming Soundcard compatible with the amplifier and speakers. I have chosen this one for the crystal-Clear Audio 124dB SNR with access controls and raid mode. It is also a powerful headphone amp with 600ohm and clear detailed sound.



Picture 9 [13]

Wi-Fi adapter

TP-Link Archer T6E AC1300 Wi-Fi PCI Express Adapter with Two Antennas

I have chosen TP-Link Wi-Fi Adapter because it has Bluetooth 5.0 and up to 2.4 GBPS speed with ultra-low latency and uninterrupted wireless range for connected devices and supports WPA3.



Picture 10 [14]

Monitor

Sharp 1T C32BB3IE1NB 32 Inch TV, HD Ready LED Display with Harman/Kardon Speakers, Dolby Digital Audio Decoder, 3 x HDMI Ports, 2 x USB Ports, Scart Socket and Freeview HD

I have chosen Sharp 32-inch TV that can be attached to the PC because has HD clarity, has many ports, it is slim and can be wall mounted.



Picture 11 [15]

Amplifier and speaker package

Fenton 5.1 Surround Sound Speaker System with Subwoofer and Home Cinema Theatre FM Radio Bluetooth Amplifier

I have chosen a 5.1 Surround Sound Speaker System because it is suitable for home theatre and hi-fi, it is equipped with wireless 2.1, 200W active subwoofer, with 3-way and 2-way bass reflex technology and works with all latest devices. Has a nice, elegant design and it is a good value for money.



Picture 12 [16]

Setting up

I have made a diagram showing how I would set up the sound system in terms of positioning. The sound system is connected to the TV with a HDMI connector and the PC is connected with the TV the same way, with a HDMI cable, as show in the picture below. The PC and TV can be connected to the internet via Wi-Fi or Ethernet cable.

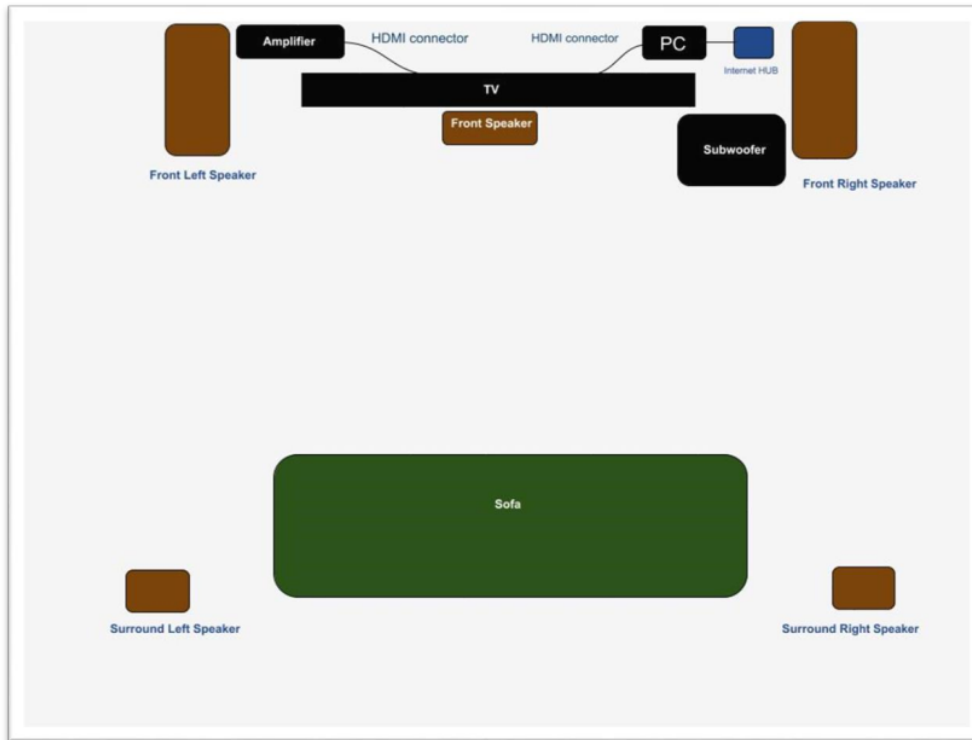


Figure 14

6. HTPC components shopping list

Components Name and web address	Price
Intel Core i7-10700K 3.80GHz LGA1200 125 Watt	£292.99
MSI Z590-A PRO Motherboard ATX - Supports Intel Core 11th Gen Processors, LGA 1200 - 12 Duet Rail 55A VRM, DDR4 Boost (5333MHz OC), PCIe 4.0 x16, 3 x M.2 Gen4/3 x4, 4K/60Hz HDMI, 2.5G LAN	£139.98
Crucial Ballistix MAX BLM2K8G44C19U4B 4400 MHz, DDR4, DRAM,16GB (8GB x2), CL19	£109.00
Seagate BarraCuda 2TB Internal Hard Drive HDD 3.5 Inch SATA 6Gb/s 7200 RPM	£46.99
Gigabyte AC300W ATX Mid-Tower PC Case with RGB Fusion, USB-C and HDMI Front Inputs and Transparent Side Window	£145.57
Seasonic FOCUS Plus Gold 750W (80+Gold, ATX 12V) PSU/Power Supply SSR-750FX	£138.00

Logitech MX Master Wireless Mouse, Bluetooth or 2.4 GHz with USB Unifying Mini-Receiver, 1000 DPI Any Surface Laser Tracking, 5-Buttons	£34.99
Vivefox Wireless Keyboard, 2.4GHz Ultra Slim Rechargeable Wireless Keyboard with Numeric Keypad	£26.98
ASUS DRW-24D5MT DVD Super Multi DL Black Internal Optical Disc Drive	£19.30
Asus Strix Raid Pro 7.1 Gaming Soundcard Kit	£108.86
TP-Link Archer T6E AC1300 Wi-Fi PCI Express Adapter with Two Antennas, PCIe Network Interface Card for Desktop, Low-Profile Bracket Included, Support Beamforming Tech	£36.40
Sharp 1T C32BB3IE1NB 32 Inch TV, HD Ready LED Display with Harman/Kardon Speakers, Dolby Digital Audio Decoder, 3 x HDMI Ports, 2 x USB Ports	£189.00
Fenton 5.1 Surround Sound Speaker System with Subwoofer and Home Cinema Theatre FM Radio Bluetooth Amplifier	£399.00

Total price £1687.05

7. References / Bibliography

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39737678&s=computers&sprefix=seagate%2B3.5%2Binch%2B2%2Btb%2Bbarracuda%2Binternal%2Bhard%2Bdrive%2Ccomputers%2C81&sr=1-1&th=1 [Accessed Dec. 22, 2021].

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FINAL GRADE

GENERAL COMMENTS

Instructor

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GRADING FORM: GJ_2019

RALUCA MORARU

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ENGAGEMENT WITH LITERATURE



Fairly good evidence of engagement with literature. Good use of the IEEE referencing system. Could have added even more material though - e.g. in researching DD 5.1 positioning ?

68

KNOWLEDGE AND UNDERSTANDING



Competent level of knowledge and understanding demonstrated

68

COGNITIVE AND INTELLECTUAL



Excellent level of justification presented for the component choices etc.

72

PRACTICAL APPLICATION



Excellent use of tools to provide the system information. The spec of the HTPC is fine - albeit perhaps a little extravagant in places :-). Its very high spec!!

73

TRANSFERABLE SKILLS



Very well laid out and presented. Try to avoid using the "I" first person style for your assignments.

72