

COMPUTURE ARCHITECTURE

ACCC4003

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Course title:

Computer Architecture

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Lecturing on IT modules and supervising IT

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Objectives:

The Purpose of this subject is to give students an understanding of the essential characteristics of computer system and components. To give the students the fundamental understanding of the computing system, capacity and transfer of speed in settings of the real-time PC

Demonstrate an understanding of number systems, data capacities and transfer speeds in the context of typical PC environments. 2. Demonstrate an understanding of the essential characteristics and concepts of computer systems and components 3. Identify, discuss and make recommendations regarding suitable hardware and/or software for computing related scenarios

Finding:

Upon the effective finishing of this module, the understudy ought to have the ability to identify suitable software and hardware for different needs. Moreover, will have the ability to identify best of options and have the capacity to give recommendations.

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1. 1st, Scenario

As the requirement is to build a computer for older people at the beginning of this work it is included a study regarding elderly people perceptions of tablets. As apple tablet is the most simple and easy to work with the suggestion is to buy an old apple on a price no more than £400 which does everything that is required in here.

Therefore, require some more discoveries on this subject. Unexpectedly most of the psychological researches are showing the contrary. Although, most of old people are willing to use the new technologies like tablets they are showing apprehension when something is not made as clear as they wish. Understanding older adults' perceptions of technology is crucial when building a computer system for them. (SA, 2017)

Moreover, a different research is showing that the elderlies are feeling more comfortable with Desktop computers. Latter can come with lots of processing power and storage capacity, but in our case the need is no less than 4GB of RAM. More than plenty of space for photos will be 16 GB of memory which is enough for browsing web and e mails. This kind of machines can also be upgraded easier. Clearly no batteries to worry about as the power cable is connected directly. (Lee, 2020)

Considering the studies and our task requirements our computer will have no more than 8GB (4GB will do as well) of RAM Window 10 can work on as little as 2 GB of memory. Jet Google chrome is occupying a lot of memory, so the 8 GB option looks better choice. Older people can get frustrated if something takes longer time than expected. A decent size monitor as well as keyboard will be another vital requirement. Finding a bargain will be crucial because large monitors are expensive. As our dear seniors are willing to make a video calls a simple set of mike and speakers will be included!

Part	Product	Price	Store Link
Case	THERMALTAKE VERSA H17 GAMING CASE	£29	https://www.scan.co.uk/products/thermatake-versa-h17-chassis-black-usb-30-120mm-fan-included-120-240-280-radiator-support-microatx
Processor	Intel® Pentium® Gold G5400 Processor 4M Cache, 3.70 GHz	£48.99/on discount	/www.amazon.co.uk/Intel-Pentium-4-Thread-Processor-Graphics/dp/B07CNK4NZJ/ref=pd_lpo_147_t_0/257-7845795-9573521?_encoding=UTF8&pd_rd_i=B07CNK4NZJ&pd_rd_r=7d6edd53-5aed-417c-afa3-bdd19594f1fe&pd_rd_w=fiU5p&pd_rd_wg=pa1kP&pf_rd_p=7b8e3b03-1439-4489-abd4-4a138cf4eca6&pf_rd_r=YYDYAPBD97MFMEGP2C2H&pvc=1&refRID=YYDYAPBD97MFMEGP2C2H
Motherboard	Asus PRIME H310M-R R2.0 Intel H310 DDR4 Micro-ATX Motherboard - LGA 1151	£48	https://www.awd-it.co.uk/asus-prime-h310m-r-r2.0-intel-h310-ddr4-micro-atx-motherboard-lga-1151.html?gclid=EAlaIqobChMI7p-nzqyz6QIVkOvtCh2NqAx3EAQYAIAEgIQVPD_Bw
Memory/RAM	Corsair CMK8GX4 M1A2400C16 Vengeance LPX 8 GB (1 x 8 GB) DDR4 2400 MHz C16 XMP 2.0	£35.98	https://www.amazon.co.uk/Corsair-CMK8GX4M1A2400C16-Vengeance-Performance-Desktop/dp/B01ARHBBPS/ref=asc_df_B01ARHBBPS/?tag=googshopuk-21&linkCode=df0&hvadid=310762440393&hvpos=&hvnetw=g&hvrnd=16595965734887384915&hvpone=&hvptwo=&hvgmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9044959&hvtargid=pla-329825128976&pvc=1&th=1&pvc=1
Graphic Card	Integrated Graphic Accelerator	£0	Feeling lucky here as mi choice of processor is really good. From a good make. Moreover, comes with internal graphic card for free.

Storage Drive	WD Green 120GB 2.5" SATA 3D NAND SSD/Solid State Drive	£23.80	https://www.scan.co.uk/products/120gb-wd-green-3d-25-ssd-sata-iii-6gb-s-3d-nand-read-545mb-s-retail
Power supply	CORSAIR 350W VS SERIES™	£34.99GBP	https://www.corsair.com/uk/en/Categories/Products/Power-Supply-Units/vs-series-config/p/CP-9020095-UK
Power Cable	Aptii UK Plug to IEC Kettle Lead 1m Power Cord Cable PC Mains	£5.11	https://www.amazon.co.uk/Aptii-Kettle-Power-Cable-Mains/dp/B005M1QE3Y/ref=sr_1_21?dchild=1&keywords=UK+POWER+CABLE+%28KETTLE+LEAD%29&qid=1589465053&s=computers&sr=1-21
Wi-Fi	TP-Link TL-WN881ST 300 Mbps Wireless N PCI Express Adapter	£11.99	https://www.amazon.co.uk/TL-WN881ND-Wireless-Interface-Low-Profile-2-6-24-4-1/dp/B006BSPTAQ/ref=sr_1_3?dchild=1&keywords=WIRELESS+N+CARD&qid=1589466311&s=computers&sr=1-3
USB	USB 3.1 Gen 1 front-panel connector	£0	Build in
Monitor	AOC (E2270SWDN) 21.5" Full HD LED	£69.77	https://www.amazon.co.uk/AOC-e2270Swdn-Widescreen-Monitor-1920x1080/dp/B016UPDUBO/ref=sr_1_3?dchild=1&keywords=AOC%2B21.5%22%2BE2270SWDN%2BMONITOR&qid=1589467457&s=computers&sr=1-3&th=1
Monitor Cable	DVI to DVI 6 Feet Cable, Benfei DVI-D to DVI-D Single Link Cable with Ferrites	£5.95	https://www.amazon.co.uk/Cable-Benfei-DVI-D-Single-Ferrites/dp/B07JGT83NV/ref=sr_1_9?crid=3ANGHHKZ3HPVN&dchild=1&keywords=dvi+cable&qid=1589468460&s=computers&sprefix=dvi+cable%2Ccomputers%2C145&sr=1-9
Headset with microphone	Trust Chat Headset with Microphone for PC and L	£8.99	https://www.amazon.co.uk/Trust-Headset-Microphone-Laptop-Connection/dp/B086NHQWC6/ref=sr_1_3?crid=2EEWHV9YREHZ7&dchild=1&keywords=headsets+with+microphone&qid=1589468776&s=computers&sprefix=He%2Ccomputers%2C149&sr=1-3
Camera with microphone	JaneDrean Webcam with Microphone Rotable USB Computer Web Camera for PC Laptop Online Teaching Working Video	£9.83	JaneDrean Webcam with Microphone Rotable USB Computer Web Camera for PC Laptop Online Teaching Working Video
Keyboard and Mouse set	Microsoft Wired Desktop 600 Keyboard and Mouse Set, UK	£17.17	Microsoft Wired Desktop 600 Keyboard and Mouse Set, UK Layout - Black
Total		£359	

Figure 1. Configuration No1 links from: Amazon.co.uk, www.awd-it.co.uk, www.corsair.com, www.scan.co.uk and www.awd-it.co.uk, 2020

In the CPU configuration Figure 1 we can see a very decent CPU for an elderly couple. Couple is a key word; and this was the reason for including speakers separate from the microphone. It has been added a webcam as their people want to see them too.



Roll over image to zoom in

The case used here is looking good and massive. Psychologically good approach when dealing with seniors' people perception about computers.



Next thing to consider was the monitor size and the quality. A product with decent amount of reviews and most of them positive. The price is a real bargain here:



★★★★☆ 2,434 ratings
| 508 answered questions

Sale: **£69.77** FREE delivery.

New (12) from **£72.90** + FREE Shipping

Size Name: **21.5 inch**

21.5 inch **21.5 inch** 23.6 inch

27 inch

Style Name: **DVI,VGA**

HDMI, VGA and DP **DVI,VGA**

VGA DVI,VGA & Speakers

HDMI, DVI,VGA & Speakers

LED-Lit IPS Monitor

Pattern Name: **Single**

Single Monitor + 0.9m HDMI to D

Monitor + 1.83m HDMI to DVI Cable

Good size keyboard with mouse has been included in the specification. Right ports are present.



Microsoft Wired Desktop 600
Keyboard and Mouse Set, UK Layout -
Black

by Microsoft
★★★★☆ 533 ratings
| 53 answered questions
Amazon's Choice for "keyboard and mouse set"

RRP: ~~£29.99~~
Price: **£17.17** & **FREE Delivery** on your first
eligible order to UK or Ireland. [Details](#)
You Save: **£12.82 (43%)**
New (21) from **£17.17** & **FREE Shipping** on orders over
£20.00

Style Name: **Business**

Business Standard

While the CPU is a little bit more pricy compare to his counterparts it comes with integrated graphic card Intel UHD 610 Graphic. Clearly no dedicated graphic device needed. Moreover, Intel® Pentium® Gold G5400 Processor 4M Cache, 3.70 GHz has decent durability.

Motherboard has the right sockets for the CPU and RAM. Moreover, Integrated graphics processor - Intel® HD Graphics support and 4 x USB ports. 6 x USB 2.0/1.1 ports

As already mention a bit more RAM than required is making working on the device smoother and enjoyable.

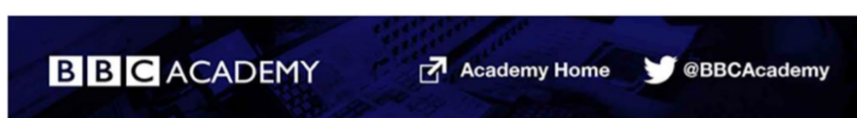
Clearly very little storage drive is required so the use of only 128GB is wouldn't affect the loading gap. If needs change this configuration can be upgraded easily.

2nd Scenario

UHD production and what do we need to know?

In this vast industry of video production that has been so difficult and extremely expensive to enter nowadays is not as expensive. The system that will be build today for approximately £2.5k is the ultimate and most innovative. This excludes the video camera, speakers, headphones, and the surround monitoring system.

4k video content nowadays is the other name of UHD. This is a production for commissioners, producers, editors. Whereas, the definition 4k means more pixels this is the cinema standard. The dimension ratio is (1.9:1 for 4K). To fully appreciate the display of UHD screen needs to be 3840 pixels wide and have a enough colour range. While editing quite a few thinks must be taken in consideration: the vast colour variety and in post-production the high resolution, zooming and re-framing as well as image stabilisation. Internet stability and storage. Clearly storage must be planned very well. Drives speed must be minimum 100/Mb/s. The use of linear tape is more secure than a disk and more efficient, applying a compressor could compromise quality and ought to be utilise very cautiously. (ACADEMY, 2020)



How long it takes to transfer UHD footage

These tables show how fast drives need to be to transfer raw footage of programmes from memory card to storage device. It assumes the rushes are:

- UHD (3840 x 2160)
- In the highest quality colour scheme (4:4:4)
- With the most accurate colour and depth of contrast (12 bit)

One hour of footage shot at a high frame rate (100 frames per second)

Name of drive	Speed of drive	Time to transfer
USB2	(60MB/sec)	62 hours 12 mins
Firewire 800	(100MB/sec)	37 hours 18 mins
USB3	(625MB/sec)	6 hours
Thunderbolt	(2.25GB/sec)	1 hour 20 mins

One hour of footage shot at a standard frame rate (25 frames per second)

Name of drive	Speed of drive	Time to transfer
USB2	(60MB/sec)	15 hours 33 minutes
Firewire 800	(100MB/sec)	9 hours
USB3	(625MB/sec)	1 hour 30 minutes
Thunderbolt	(2.25GB/sec)	25 minutes

One solution to explore is applying a mezzanine compression. Mezzanine is a relatively gentle compression. Nonetheless, be careful that it doesn't significantly compromise the quality.

One hour of footage with mezzanine compression (Apple ProRes @200Mb/sec)

Name of drive	Speed of drive	Time to transfer
USB2	(60MB/sec)	25 minutes
Firewire 800	(100MB/sec)	15 minutes
USB3	(625MB/sec)	2 minutes 22 seconds
Thunderbolt	(2.25GB/sec)	40 seconds

Figure 2. Data transferring while using 4k (ACADEMY, 2020)

When starting an editing business, you need to consider what type of machines are needed based on what projects and what kind of work to be performed. How tangible they are? Is just a single shot or single camera? Could be animations, VXF or multi-camera shooting. The type of footage and most important is whether it's going to be online or offline. When editing online a custom configured/custom built machine costs \$8,000 and more. (Videomaker, 2020)

The main core and foundation for an editing pc is the processor. It depends on the CPU how fast an editing task will be completed. An intelligent decision is to invest in a good processor. Consider the budget the choice is stopping on AMD Ryzen 9 3900X. It comes on a price more than 10% under the rival intel- Core-i99900K. AMD's 16-core R93950X, AMD's 24-core TR 3960X are the best processors for editing on the market but this is not a good option in our case scenario. (www.logicalincrements.com, 2020)

For a case: Corsair CC-9011110-WW Crystal Series 570X RGB Windowed Mid-Tower ATX Tempered Glass Case with RGB Case Fans – White. Looks cool and its inspiring "piece of art". Dimensions are good. Plenty of space for future upgrades. Managing the cable will be easy too.

The Motherboard connects all together. The sockets of must be AM4 in order to make all the components work together. The specification of the motherboard won't affect the editing performance. Jet must consider the number of supported USB ports. The motherboard must support USB 3. Considering the number of hard drives necessary as well as SATA connections. In future RAID enclosure might be necessary. Jet this depends on the numbers of shootings. (www.logicalincrements.com, 2020)

The chosen one is the necessary sockets and plenty of ports and USB 3 included:



ASUS TUF Gaming X570-Plus ATX Motherboard, AMD Socket AM4, Ryzen 3000, 12+2 Dr. MOS, PCIe 4.0, M.2, DDR4, LAN, HDMI, USB 3.2, Aura Sync RGB

(Amazon.co.uk, 2020)

Choosing a graphic card must be take in consideration that doesn't needs to be on the top of the range if not editing with DaVinci Resolve. Actually, it isn't really necessary to have a graphic card for most of the editing software. But the advantages of having even a mid class devise are immense. Therefore, an investment in an powerful graphic card looks a good. (www.logicalincrements.com, 2020)

In this configuration the following MSI GAMING GeForce GTX 1060 6GB GDDR5 192-bit HDCP Support DirectX 12 Dual Fan VR Ready OC Graphics Card (GTX 1060 ARMOR 6G OCV1) is included and this will fit perfectly in the budget as well as performance in editing 4K and more. (www.logicalincrements.com, 2020)

In video editing having enough RAM and storage is decisive. The minimum recommended for 4K is 16GB. Although when prioritizing comes on 3rd place. It is worth investing in Sufficient amount of RAM. CORSAIR VENGEANCE LPX 64GB (2 x 32GB) DDR4 3200 (PC4-25600) C16 1.35V Desktop Memory - Black is a solid decision which will last for a couple more years.

Another area where using creativeness is necessary is when comes to the point of choosing storage. Preferable storage is SSDs because of the quality pf performance when dealing with complex tasks. Like multiple editing shootings and numerous videos playing on a playback simultaneously and when dealing with 4K. (www.logicalincrements.com, 2020)

The first SSD [Samsung 860 EVO 1 TB SATA 2.5 Inch Internal Solid State Drive \(SSD\) \(MZ-76E1T0\)](#) for the second : Seagate 8 TB IronWolf 3.5 Inch 7200 RPM Internal Hard Drive for 1-8 Bay NAS Systems (256 MB Cache, 180 TB/Year Workload Rate, Up to 210 MB/s)for storage, projects, shootings, source footage. It's better to use only SSD here, because we are dealing with 4K video editing, but this hard disk is reliable and going we will be able to keep within budget frames.

Before buying a power supply for a video editing PC contacting an electrician is a must to do. Considering a good rating of minimum 80+ of bronze will ensure the PC uses the current more profi- ciently. The fans and cooling system would run smoother too. (www.logicalincrements.com, 2020)

The chosen one is Corsair RM750x 80 PLUS Gold, 750 W Fully Modular ATX Power Supply Unit – Black. will provide enough power and will help with cooling and air flow.

The soundcard has SPDIF ports in order to use the sound system available.

The keyboard and mouse set is sleek and nice easy to use and comfortable when using it.

High quality thermal paste is one of the best on the market

On the figure 3 below all the components are included and as the price is £150 more than the budget here is includet another monitor option. This one is suitable for 4k video editing with the necessary 60Hz 4k uhd and all necessary ports and colour contrast: Dell U2720Q 27 Inch LED-backlit, InfinityEdge, 3H Hard Coating, USB C Monitor - (5 ms Response, 4K UHD 3840x2160 at 60Hz, 1300:1 Contrast, with Swivel, Pivot and Tilt, USB C, HDMI and USB 3.0). on the price of £573.57 straight from amazon. And the linkis: <https://www.amazon.co.uk/gp/product/B084KX3HQ8?tag=rtings-u-mn-21&ie=UTF8&th=1>. The total price will be: £2.558 On top of this a decent headphone. The coast of which is no more than £50

Part	Products	Price
CPU	AMD Ryzen 9 3900X Processor (12C/24T, 70 MB Cache, 4.6 GHz Max Boost)	£407.99
Case	Corsair CC-9011110-WW Crystal Series 570X RGB Windowed Mid-Tower ATX Tempered Glass Case with RGB Case Fans - White	£179.99
motherboard	ASUS TUF Gaming X570-Plus ATX Motherboard, AMD Socket AM4, Ryzen 3000, 12+2 Dr. MOS, PCIe 4.0, M.2, DDR4, LAN, HDMI, USB 3.2, Aura Sync RGB	£189.94
Graphick card	MSI GAMING GeForce GTX 1060 6GB GDDR5 192-bit HDCP Support DirectX 12 Dual Fan VR Ready OC Graphics Card (GTX 1060 ARMOR 6G OCV1)	£275.10
RAM	CORSAIR VENGEANCE LPX 64GB (2 x 32GB) DDR4 3200 (PC4-25600) C16 1.35V Desktop Memory - Black	£299.99
Storage 2	Seagate 8 TB IronWolf 3.5 Inch 7200 RPM Internal Hard Drive for 1-8 Bay NAS Systems (256 MB Cache, 180 TB/Year Workload Rate, Up to 210 MB/s) - Silver	£235.00
Storage 1	Samsung 860 EVO 1 TB SATA 2.5 Inch Internal Solid State Drive (SSD) (MZ-76E1T0)	£136.99
Power Supply	Corsair RM750x 80 PLUS Gold, 750 W Fully Modular ATX Power Supply Unit - Black	£129.98
Power cable	C2G 3 Metre UK Power Cable (IEC320C13 to BS 1363) 9 Foot Kettle Lead/Power Cord	£6.38
Thermal Paste	MX-4 (current edition) - Quality thermal compound for all CPU coolers, extremely high thermal conductivity, low thermal resistance, safe use, long durability, 4g	£4.99
Memory card Reader	UGREEN SD Card Reader USB 3.0 CF Memory Card Adapter Hub 5Gbps Read 4 Cards Simultaneously for UHS-I CFI,CF,SDXC,SDHC,SD, Micro SD, Micro SDXC, Micro SDHC,MMC,MS etc.	£13.99
Sound card	ASUS 90YA00T0-M0UA00 Xonar SE 5.1 Gaming Soundcard PCIe Hi-Res Audio 300ohm 116dB SNR Headphone Amp :: (Components > Sound Cards)	£58.99
Monitor	LG 27UK650 27 inch 4K UHD HDR 10 Height Adjustable IPS Monitor (3840 x 2160, 2x HDMI, DisplayPort, 350 cd/m2, 5ms, AMD Freesync) White	£686.41
keyboard	Wireless Keyboard & Mouse, TedGem 2.4G Wireless Keyboard and Mouse Set Ergonomic Wireless Mouse Keyboard 2-in-1 USB Nano for PC Desktops Laptops Mac OS & Windows (Ultra-slim Quiet & UK Layout)	£43.99
Monitor cables	AmazonBasics High-Speed 4K, Ultra HD, HDMI 2.0 Cable - 1.8m / 6 Feet (Latest Standard) Supports Ethernet, 3D, Audio Return (Not for connecting to SCART or VGA ports)	£5.99
Total:		£2,675.72

Figure 3 configuration No2 (Amazon.co.uk, 2020)



(Amazon.co.uk, 2020)

Additional storage

When we are aiming to use SSD but because of its price it is good to use HDDs. They are cheap and long lasting. Moreover for storing shootings and massive projects SSDs isn't the right choice, the resolution is RAID enclosure which use a couple of HDDs devices organised together.

(www.logicalincrements.com, 2020)

Part	Link and Product Name	Units	Price
RAID enclosure	Icybox External 4-Bay RAID Enclosure for 4 x 3.5 inch SATA I/II/III HDDs	<u>1</u>	155.76
HDDs	Seagate 14 TB IronWolf Pro 3.5 Inch Internal Hard Drive for 1-24 Bay NAS Systems (7200 RPM, 256 MB Cache, up to 210 MB/s, 300 TB/Year Workload Rate)	<u>4</u>	434.98
	Total		1895.68

Figure 4. Additional Storage

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