Introduction to Computer Systems and Platform Technologies

Study Period 3, 2021 – CPT160

Assignment 2

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Table of Contents

Part A: System Architecture – 120 Marks

1. For each of the 8 components labeled A, B, C, D, E, F, G, H, I and J in the above diagram:

From Inspection of the images and vague reference to a "moderner commercial laptop motherboard" for a "Microsoft Surface Laptop" I believe this motherboard/logic board from my personal experience repairing laptops to be for a "Microsoft Surface 2" Model 1769.

This model came in a few revisions in relation to the processor (Intel i5/Intel I7), Ram and SSD Capacity so without an exact part number for this board the following answers cannot be 100% specific in all cases.

As I have both Boardview files and a schematic of this model motherboard part number: M1088058-002, I will be using that to reference any part numbers and component details.

A.

a) *What is the name generally given to that component?*
The name generally given to this component is CPU or APU, in this case I believe this is a APU (Accelerated Processing Unit) which combines both a CPU and a GPU.

b) *What is that component designed for and given details about the component*
As previously mentioned, I believe this is an APU which combines both a CPU and a GPU. In this case its designed to perform the roles of both CPU which processes information from application with various instructions and a GPU which allows it to render images on the computers display.

This Model of Surface had the following APU Options:
Intel Core m3-7Y30 – Intel HD Graphics 615
Intel Core i5-7200U – Intel UHD Graphics 620
Intel Core i7-7660U – Intel Iris Plus 640

B.

a) *What is the name generally given to that component?*
The name generally given to this item is RAM or System Memory

b) *What is that component designed for and given details about the component*
RAM (Random Access Memory) is a critical part of a computer system as it allows applications to store information for both reading and writing on a short-term basis, depending on the user's workload higher capacity ram or even faster clocked ram may be required.

In the case of this motherboard, we are looking at 4 DDR3 modules, this model come in two variants' both an 8GB and 16GB models were available.

C.

a)   What is the name generally given to that component?

To the layman this would look simply like any other IC (Integrated circuit). In this case this IC is a TPM (Trusted Platform Module)

b)   What is that component designed for and given details about the component

A Trusted Platform Module/TPM is a secure crypto-processor made for the sole purpose of carrying out various cryptographic operations and is used by various operating systems (when enabled and functional) to encrypted users' data.

For example, a bit locker driver on a system with a TPM enabled cannot easily be copied to another system with or without a TPM as each TPM has a unique key and the new system would be unable to decrypt the data, however Microsoft has several recovery methods that work around this such as using a Microsoft account on the creation of the bit locker drive.

D.

a)   What is the name generally given to that component?

These are more integrated circuits; however, these 4 chips are part of the touch screen circuitry for touch and gesture detection and are part of the I/O of this system (Input/Output)

b)   What is that component designed for and given details about the component

These components are designed to detect a user touching the touchscreen and converting that user input into binary singles that system will understand.

In this case we have 3x BGA82 surface mount IC's and a single BGA64 surface mount IC which connect to each other and the 80pin "Sense connector" ribbon cable above on the left of the selected area and the 50 pin "Drive connector" ribbon cable above on the right on the selected area

E.

a)   What is the name generally given to that component?

This is generally referred to as an IC. In this case it is a PMIC (power management integrated circuit)

b)   What is that component designed for and given details about the component

A PMIC (power management integrated circuit) is designed regulated and manage power output to an upstream circuit or IC. In this case the two PMICs in question are manufactured by Texas Instruments with manufacture part number TPS62085RLTR and cost about $3 when purchased singly.

This PMIC is designed to take a voltage of 2.5v – 6v and output 0.8 – 6v with a max output draw of 3 Amps, This PMIC is part of the SSD power circuit.

F.

a) *What is the name generally given to that component?*

Electronically Erasable Programmable read-only memory OR EEPROM for short.

b) *What is that component designed for and given details about the component*

This component is designed to store information or be used as memory by a microcontroller and functions similar to other forms of computer memory however it doesn't require power source to retain data, these are commonly used to store firmware/software such as a BIOS (basic input/output system).

In the case of this motherboard as its part of the onboard WIFI controller circuitry it most likely contains firmware used by the Wireless + Bluetooth controller.

This particular EEPROM is made by Atmel with a part number of AT24C16D-MAHM-T and is designed to store information for 100 years with a total of 16K of storage space and uses the I2C interface. This chip costs $0.43 if buying a single chip.

G.

a) *What is the name generally given to that component?*

This is generally referred to as a flash rom or IC Flash

b) *What is that component designed for and given details about the component*

This component is designed to be used as storage. This particular component on this motherboard is manufactured by WindBond Electronics with a manufacturer part number: W25Q128JVPIQ.

This IC Flash uses NOR Memory 16MB X 8 supporting a total storage capacity of 128MBs and supports the following interface types SPI - Quad I/O (Serial Peripheral Interface – Quad Input/Output), QPI (Intel QuickPath Interconnect), DTR (Dual Transfer Rate). This IC Flash costs $2.77 when purchased individually.

This IC Flash is part of the UEFI (Unified Extensible Firmware Interface) circuitry and is used to store the UEFI bios firmware.

H.

a) *What is the name generally given to that component?*

I/C Comparator

b) *What is that component designed for and given details about the component*

This component is designed to two compare two inputs and return a high or low depending if the inputs match or not, commonly found in sensor systems and battery power level detection systems.

This component is manufactured by Texas Instruments – TLV3011.
This component is part of the Camera Infrared (IR) Circuit and is used to detect IR Errors.

I.

　　a) *What is the name generally given to that component?*
　　Sound Chip / Amp

　　b) *What is that component designed for and given details about the component*
　　This competent is designed to control the audio output to the amplifier circuit.

　　This component on this motherboard is manufactured by Realtek with manufacturer part number ALC1304.

　　Unfortunately, I wasn't able to obtain a datasheet for this chip as Realtek still keep the datasheets under lock and key.

J.

　　a) *What is the name generally given to that component?*
　　Sound Chip / DAC

　　b) *What is that component designed for and given details about the component*
　　This component is designed to convert digital signals to analog signals that we can hear via speakers, they can also convert analog signals to digital signals this is done when using a microphone.

　　This component on this motherboard is manufactured by Realtek with manufacturer part number ALC3269C-GRT.

　　Unfortunately, I wasn't able to obtain a datasheet for this chip as Realtek still keep the datasheets under lock and key.

2. For each of the following headers or set of pins or internal/external expansion connectors or communications ICs (integrated circuits), Labelled, K, L, M, and N

K.

   a) *What is the name generally given to that component?*
   IC SSD

   b) *Give a typical example of what might connect to it or what communication is provided*
   The chip located at K position is an M.2 SSD Manufactured by SK Hynix – Part Number: HFB1M8MO331A0MR

   c) *What standard(s) are supported by that connector/IC? Provide details where relevant or appropriate, such as the versions(s) of standards supported, and their maximum bandwidth if relevant*
   PCIe Gen3
   Sequential Read: up to 1500MB/s
   Sequential Write: up to 780MB/s
   Supports 128KB and 4K Alignment
   Capacity: 256GB

L.

   a) *What is the name generally given to that component?*
   WIFI SoC

   b) *Give a typical example of what might connect to it or what communication is provided*
   Allows connection to wireless networks and also allows connections to Bluetooth devices

   c) *What standard(s) are supported by that connector/IC? Provide details where relevant or appropriate, such as the versions(s) of standards supported, and their maximum bandwidth if relevant*
   This SoC is manufactured by NXP, manufacturer part number 88W8897 and is target at mobile computing and high-definition multimedia applications.
   Dual Band (2.4/5Ghz)
   IEEE® 802.11a/b/g/n/ac
   Bluetooth 5 + EDR/BDR/high-speed/low-energy dual-mode controller
   MIMO (Multiple Input Multiple Output)
   WIFI Certified Miracast
   802.11e Quality of Service (QoS)
   Dynamic rapid channel switching (DRCS)

   Generic Interfaces include:
   High-speed inter-chip (HSIC)
   USB 2.0,
   SDIO 3.0
   low-power PCI Express
   High-speed UART
   PCM interfaces for connecting WLAN and Bluetooth to the host processor

M.

a) What is the name generally given to that component?
mDP (Mini Display Port)

b) Give a typical example of what might connect to it or what communication is provided
mDP to HDMI adapter
mDP to DP adapter
LCD Monitor
Television
Projector

c) What standard(s) are supported by that connector/IC? Provide details where relevant or appropriate, such as the versions(s) of standards supported, and their maximum bandwidth if relevant
DisplayPort 1.2
Resolutions up to 4096×2160 (4K)
Supports VGA, DVI and HDMI with adapters
Supports Audio output

N.

a) What is the name generally given to that component?
USB Port (USB 3.0 Type A)

b) Give a typical example of what might connect to it or what communication is provided
Portable hard-drives, flash drives, printers, scanners, keyboard, mobile phones are all able to connect via the Universal Serial Bus (USB)

c) What standard(s) are supported by that connector/IC? Provide details where relevant or appropriate, such as the versions(s) of standards supported, and their maximum bandwidth if relevant
Transfer Speeds up to 5Gbit/s
Backwards compatible with USB 2.0
900 mA Max Current

3. As you observe the design of the "Microsoft Surface Laptop" it is quite different to a usual desktop. Please answer the following questions
   i. Describe the type of core architecture of this CPU. You must state the type of processor, the CPU architecture, the number of cores, the number of levels of cache memory.

   The Intel CPUs used in the "Microsoft Surface Laptop" are CISC architecture based as they contain a large amount of complex instruction sets that differ from each other but have specialised tasks that they are intended to be used for.

   The processor options for this model belong to Intel's 7th Generation of "I" Series Processors. The 7th Generation code name was "Kaby Lake"

Processor	Base / Turbo (Ghz)	Core / Threads	Levels of Cache Memory
Intel Core m3-7Y30	1.00Ghz / 2.60Ghz	2C / 4T	3
Intel Core i5-7200U	2.50Ghz / 3.10Ghz	2C /4T	3
Intel Core i7-7660U	2.50Ghz / 4.00Ghz	2C / 4T	3

   It is important to make note that these CPUs are actually APU's (Advanced Processing Unit) as they chip contains both a CPU and a GPU on the same processor package, meaning a dedicated graphics card is not required.

   ii. The name and structure of the GPU and its number of levels of cache and their size

Processor	Graphics
Intel Core m3-7Y30	Intel HD Graphics 615
Intel Core i5-7200U	Intel UHD Graphics 620
Intel Core i7-7660U	Intel Iris Plus Graphics 640

GPU	Execution Units @ Clock	Cache Levels	Cache Size
Intel HD Graphics 615	24 @ 1.05Ghz	0	0
Intel UHD Graphics 620	24@ 1.05Ghz	0	0
Intel Iris Plus Graphics 640	48 @ 1.05Ghz	0	0

   All three of these GPUs do not have dedicated memory or cache as they are "intergraded graphics units" they do however share the Level 3 cache with the CPU that they are accompanied with and require "system memory", they can access system memory via the CPU interface with a 2x 64bit memory bus width.

Pricing Question

a) What is the best price approximately) of this motherboard, from Australian computer shops/eBay?

The following mainboard options can be found on eBay:

i5 – 7200U, 4GB RAM, 128GB SSD - $219 inclusive of postage and handling

i5 – 7200U, 8GB RAM, 256GB SSD - $365 inclusive of postage and handling

Part B: Building a Recommended Platform Machine – 78 Marks

1. Fill out the following table – part model and price – for each of the categories.

Parts	Model	Cost	Link
Motherboard	Asus PRIME X570-PRO/CSM AM4	$372.90	https://www.compuworld.com.au/product/asus-prime-x570-pro-csm-am4-motherboard
CPU	AMD Ryzen 9 5950X 16 Core 3.4GHz	$1,067.00	https://www.compuworld.com.au/product/amd-ryzen-9-5950x-16-core-3-4-ghz-cpu-100-100000059wof
Memory	Corsair CMK32GX4M2B3200C16 32G (2x16G) D4-3200 Vengeance	$214.50	https://www.compuworld.com.au/product/corsair-corsair-vengeance-lpx-32gb-2x16gb-ddr4-dram-dimm-3200mhz-unbuffered-16-18-18-36-black-heat-spreader-1-35v-xmp-2-0
Storage	Samsung 1TB 980 Pro MZ-V8P1T0BW M.2 SSD 7000R/5000W PCIe 4.0	$264.00	https://www.compuworld.com.au/product/samsung-1tb-980-pro-mz-v8p1t0bw-m-2-ssd-7000r-5000w-pcie-4-0
Graphics	Asus TUF-RX6900XT-O16G-GAMING RX6900XT OC	$2269.00	https://www.compuworld.com.au/product/asus-tuf-rx6900xt-o16g-gaming-rx6900xt-oc-video-card
Display	AOC C27G2 27" Curve Gaming monitor FHD 165Hz 1ms FreeSync	$346.50	https://www.compuworld.com.au/product/aoc-c27g2-27-gaming-monitor-fhd-165hz-1ms-freesync
Power	Corsair RM850X CP-9020180-AU 80+ Gold modular PSU	$216.70	https://www.compuworld.com.au/product/corsair-corsair-rmx-series-rm850x-80-plus-gold-fully-modular-atx-power-supply
CPU Cooler	Corsair H150i Pro RGB water cooling CW-9060031-WW	$261.80	https://www.compuworld.com.au/product/corsair-h150i-pro-rgb-water-cooling-cw-9060031-ww-1
Case	Corsair Obsidian 500D RGB SE ATX	$399.30	https://www.compuworld.com.au/product/corsair-corsair-obsidian-series-500d-rgb-se-premium-mid-tower-case
Total Cost	**$5,411.70**		

2. Ensure that these main components that you purchase pass the compatibility test via e.g., https://pcpartpicker.com/

The main components passed the test on "pcpartpick.com" with one warning that I completely expected.

1. "The Asus PRIME X570-P/CSM ATX AM4 Motherboard supports the AMD Ryzen 9 5950X 3.4 GHz 16-Core Processor with BIOS version 2606. If the motherboard is using an older BIOS version, upgrading the BIOS will be necessary to support the CPU."

My link for my "pcpartspicker.com" build: https://pcpartpicker.com/list/z7wgDc

3. Install an appropriate RAID system explaining the reasons you have bought this configuration.

Honestly, for a gaming system with the chosen storage device RAID would be pointless due to the speeds available on the chose storage device 7,000 MB/s Read and 5,000 MB/s Write.

However, if we had other data on the system such as personal photos, videos etc. I would add 3x 2.5" 4TB Hard Drives in a RAID-5 configuration. This would allow for a single disk failure and give the system 8TB of "spinning rust" storage with the added benefit of 2x the read speed of a conventional mechanical drive, however there would be no write speed gains.

The user should still be using the 3-2-1 Backup Rule to protect important information as RAID is NOT a backup:
https://www.backblaze.com/blog/the-3-2-1-backup-strategy/

4. Install an appropriate cooling system explaining the reasons you bought this configuration

I selected the "Corsair H150i Pro RGB" All in one water cooler due to the core count on the AMD Ryzen 9 5950x processor (16 Core / 32 Threads) @ 3.4Ghz Base and 4.9GHz Turbo. During heavy workloads, keeping the CPU cool enough to sustain the boost clock rate is important, otherwise performance of the system will be hindered when the CPU begins to thermal throttle.

The other reason for such a large water-cooling system is that this CPU is unlocked for overclocking, which allows us to tweak power and various other settings to push the CPU even harder. Which in turn will generally create more heat that needs to be drawn away from the CPU.

Using a smaller water-cooling setup would probably be fine however, we would run in to "heat saturation issues" with the cooler a lot faster while overclocking.

At a low 25DB at full throttle this cooling system will still be quitter than a lot of fan only cooling systems, and for the most part will be mostly idle.

Part C: Recent Technology – 40 Marks

1. What are the differences between 3D NAND and 2D NAND memory?

- 3D NAND has memory cells stack vertically in layers whereas 2D NAND memory is laid out horizontally in a two-dimensional matrix
- 3D NAND as its three-dimensional allows for a larger storage capacity in a smaller footprint, where with 2D NAND to meet the same capacity would require a much larger footprint.
- 3D NAND whilst offering larger capacity as the memory cells are stacked connection paths are a lot shorter connection paths between the layers giving us fast access performance. Where in 2D as they are laid out horizontally the connection paths end up longer costing us performance due to latency
- 3D NAND is more difficult to manufacture than 2D NAND as there is more chance for error or contamination to occur during the manufacturing process.

2. Explain the difference between NVMe and M.2

- M.2 is a form factor for solid state drives and is the most preferred at this current time
- NVMe (Non-volatile Memory Express) is bus type that uses the PCIe data lanes on the motherboard. NVMe can reach read and write speeds of over 4000MB/s which is considerably faster than the older/cheaper SATA interface

3. Give details of purchasing a 1TB NVMe/M.2. Details include the price and its specifications. E.g., read/write speeds. You must also describe the type of flash memory e.g., SLC or MLC, EMLC, TLC, QLC etc.

Samsung 1TB 980 Pro - $264

- Sequential Read Speeds of Up to 7,000MB/s
- Sequential Write Speeds of Up to 5,000MB/s
- Random Read (4KB) up to 1,000,000 IOPS (input/output operations per second)
- Random Write (4KB) up to 1,000,000 IOPS (input/output operations per second)
- PCIe Gen 4.0 x4
- NVMe 1.3c
- 1GB Low Power DDR4 SDRAM (Cache)
- MLC flash memory

MLC (Multi Level Cell) – is a consumer level flash memory due to its low production costs, however has less read/write cycles than eMLC (Enterprise Multi-Level Cell) which has 20,000 – 30,000ish read/write cycles compared to the 10,000ish cycles for MLC.

MLC and eMLC can store 2 data bits per cell which is an improvement over SLC (single-level cell) however SLC with its lower capacity generally has better performance than MLC.

4. Give details of purchasing a 1TB SATA/M.2. Details include the price and its specifications. E.g., read/write speeds. You must also describe the type of flash memory e.g., SLC or MLC, EMLC, TLC, QLC etc.

Western Digital WD WDS100T2B0B 1TB M.2 Blue SSD - $150.70

- Sequential Read Performance: 560MB/s
- Sequential Write Performance: 530MB/s
- Random Read (4K) up to 95,000 IOPS (input/output operations per second)
- Random Write (4K) up to 84,000 IOPS (input/output operations per second)
- SATA III 6Gb/s
- TLC Flash Memory (3D NAND)

TLC (triple-level cell) is very similar to MLC however rather then store 2 bits per cell like MLC, TLC stores 3 bits per cell. Again, like MLC, TLC is slower than SLC, and technically will be slower than MLC, even though the marketing material with this device claims otherwise.

All the negatives with MLC in production are increased with TLC, however, TLC still benefits from higher storage density and lower cost.

There are also eTLC (Enterprise Triple-Level Cell) variants apparently available.

Part D: Question 4 – Advanced Question (30 Marks)

a) Explain the concept of virtual memory. Do you worry about if you are going to have enough virtual memory addresses (explain your answer)? Do you worry about if you are going to have enough physical addresses, or is there going to be any concern in terms of performance (explain your answer)?

Virtual Memory is an operating system feature that was more commonly used back when system memory (RAM) was expensive. Under Linux it is referred to as SWAP space. Virtual Memory uses hard drive / storage space as memory for applications that have entered a "sleep" state, the operating system moves its data from the faster system memory to the virtual memory space until the application or data is needed again then it swaps it back to system memory, which is why Linux refers virtual memory as SWAP.

Virtual Memory is not recommended to be used on systems with an SSD as it wears out the flash memory, Microsoft Windows will do this by default, however Linux and other operating systems do not, in the Linux community is just expected that you know not to create a swap partition on an SSD.

Should you worry if you are going to have enough virtual memory? In terms of a system using a mechanical drive or drives, its generally recommended that your virtual memory matches or exceeds your total physical memory. Running out of virtual memory is probably the least of your worries as performance will be degraded already if you have run out of physical system memory. Systems with SSDs shouldn't be using virtual memory or even have it enabled

Should you worry about having enough physical addresses, or is there going to be any concern in terms of performance? Yes, you should be concerned about running out of physical memory, physical memory is quite considerably faster than virtual memory which is only as fast as the storage device, running out of physical memory and being reliant on virtual memory will degrade the system performance considerable both in latency and processing time. Drive access times and life will also be degraded due to the consistent read and writes to the virtual memory.

b) Assuming a cache miss, a data item is requested with its virtual memory address. Illustrate clearly how the corresponding page is located by using the page table directly. Explain if there are performance issues with the direct use of page table, and how the performance can be improved

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Question 4 – Western Digital WD WDS100T2B0B 1TB M.2 Blue SSD (Purchase Link)
Accessed: 17/11/2021
https://www.compuworld.com.au/product/westernal-digital-wd-wds100t2b0b-1tb-m-2-ssd

**Question 4 - Western Digital WD WDS100T2B0B 1TB M.2 Blue SSD**
Accessed: 17/11/2021
https://www.westerndigital.com/en-au/products/internal-drives/wd-blue-sata-m-2-ssd#WDS100T2B0B

https://documents.westerndigital.com/content/dam/doc-library/en_us/assets/public/western-digital/product/internal-drives/wd-blue-ssd/product-brief-wd-blue-3d-nand-sata-ssd.pdf

Part D)

Appendix

Part B) Screen Shots
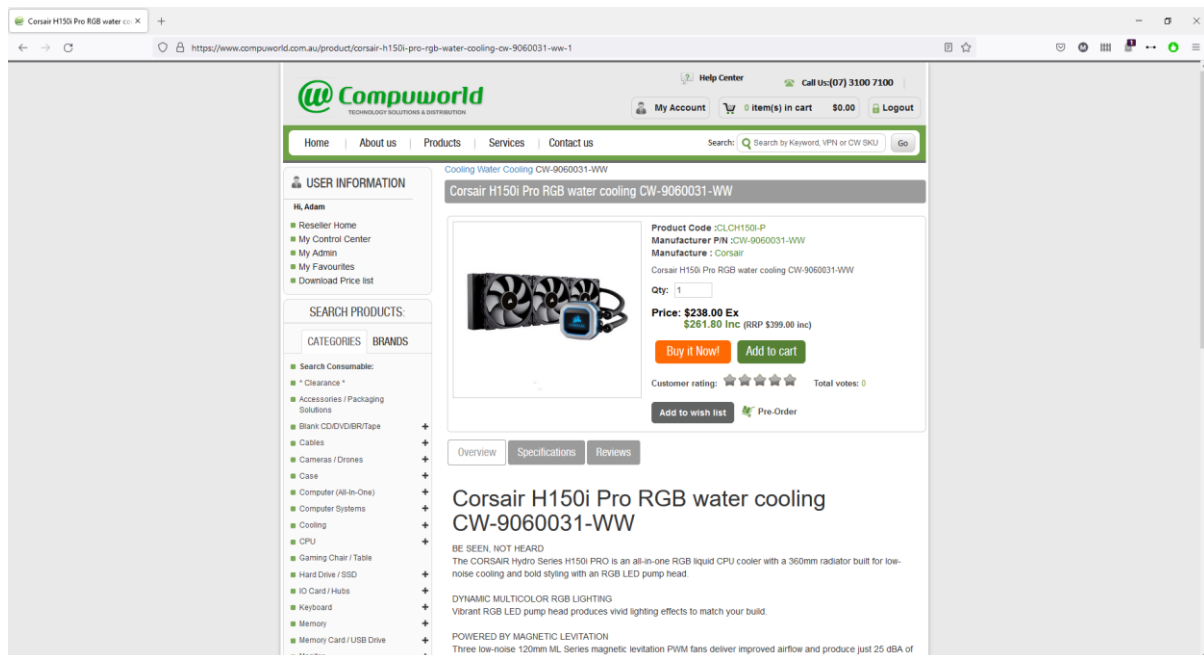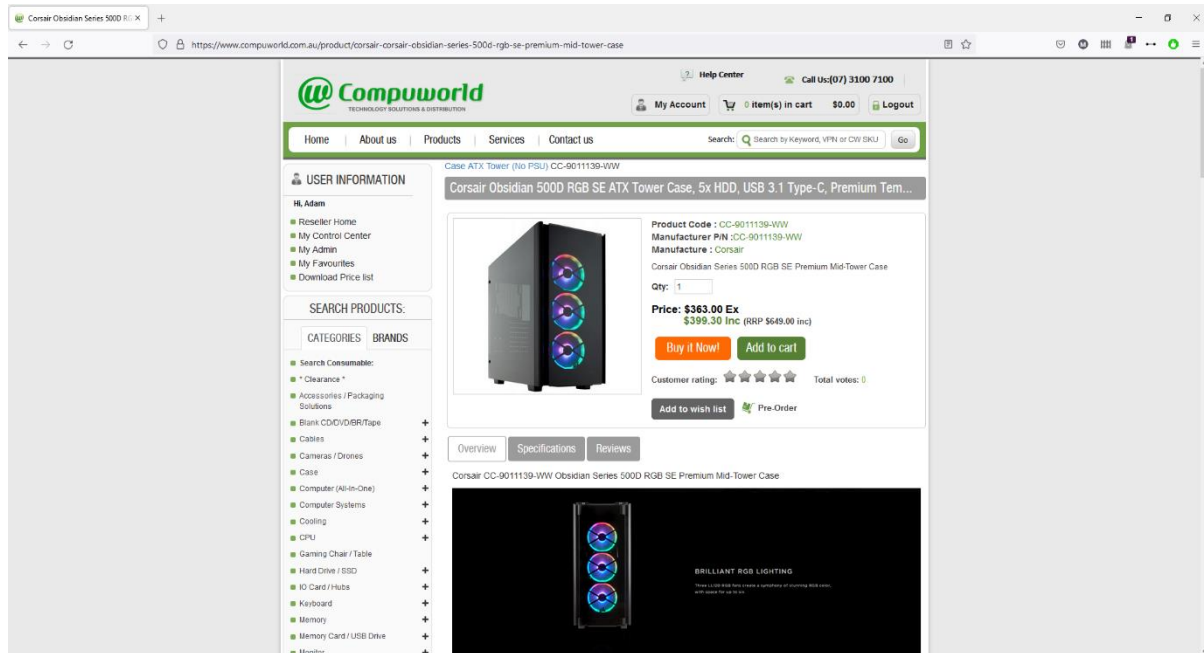
https://www.compuworld.com.au/product/amd-ryzen-9-5950x-16-core-3-4-ghz-cpu-100-100000059wof

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CPU AMD AM4 CPU 100-100000059WOF

AMD Ryzen 9 5950X 16 Core 3.4GHz CPU 100-100000059WOF No fan

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■ CPU   +
■ Gaming Chair / Table
■ Hard Drive / SSD   +
■ IO Card / Hubs   +
■ Keyboard   +
■ Memory   +
■ Memory Card / USB Drive   +
■ Monitor   +

Product Code :CPUR95950X
Manufacturer P/N :100-100000059WOF
Manufacture : AMD

AMD Ryzen 9 5950X 16 Core 3.4 Ghz CPU 100-100000059WOF

Qty: 1

Price: $970.00 Ex
$1,067.00 Inc

Buy it Now!   Add to cart

Customer rating: ⭐⭐⭐⭐⭐   Total votes: 0

Add to wish list   10+

Frequently brought together

☑ Gigabyte GA-B550-GAMING-X AM4 ATX motherboard
Price: $203.50 Inc
Price: $185.00 Ex

☑ Kaspersky VPN Secure Connection 5 Devices 1 Yr License Email
Price: $40.70 Inc
Price: $37.00 Ex

☑ Microsoft 365 Family Office 6 Users 1 Year licence Email
Price: $105.60 Inc
Price: $96.00 Ex

☑ Kaspersky Total Security 2021 3 Devices 1 Year Key
Price: $16.50 Inc
Price: $15.00 Ex

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https://www.compuworld.com.au/product/aoc-c27g2-27-gaming-monitor-fhd-165hz-1ms-freesync

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Monitor 27"-31" Monitor C27G2

AOC C27G2 27" Curve Gaming monitor FHD 165Hz 1ms FreeSync

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■ Cooling   +
■ CPU   +
■ Gaming Chair / Table
■ Hard Drive / SSD   +
■ IO Card / Hubs   +
■ Keyboard   +
■ Memory   +
■ Memory Card / USB Drive   +
■ Monitor   +

Product Code :MOAOC27G2
Manufacturer P/N :C27G2
Manufacture : AOC

AOC C27G2 27" Gaming monitor FHD 165Hz 1ms FreeSync

Qty: 1

Price: $315.00 Ex
$346.50 Inc (RRP $409.00 inc)

Buy it Now!   Add to cart

Customer rating: ⭐⭐⭐⭐⭐   Total votes: 0

Add to wish list   Pre-Order

Frequently brought together

☑ Kaspersky Total Security 2021 3 Devices 1 Year Email Key
Price: $16.50 Inc
Price: $15.00 Ex

Asus PRIME X570-PRO/CSM AM4 ...   +

https://www.compuworld.com.au/product/asus-prime-x570-pro-csm-am4-motherboard

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Motherboard AMD AM4 PRIME X570-PRO/CSM

Asus PRIME X570-PRO/CSM AM4 motherboard

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- Cooling   +
- CPU   +
- Gaming Chair / Table
- Hard Drive / SSD   +
- IO Card / Hubs   +
- Keyboard
- Memory   +
- Memory Card / USB Drive   +
- Monitor   +

Product Code :MBX570-PRO/CSM
Manufacturer P/N :PRIME X570-PRO/CSM
Manufacture : Asus

Asus PRIME X570-PRO/CSM AM4 motherboard

Qty: 1

Price: $339.00 Ex
$372.90 Inc

Buy it Now!   Add to cart

SALE

Customer rating: Total votes: 0

Add to wish list   On Order

Overview   Specifications   Reviews

Asus PRIME X570-PRO/CSM AM4 motherboard

AMD AM4 ATX motherboard with PCIe 4.0, 14 DrMOS power stages, dual M.2, HDMI, SATA 6Gb/s, USB 3.2 Gen 2 front-panel connector and Aura Sync RGB lighting

- AMD AM4 Socket: Ready for 3rd and 2nd Gen AMD Ryzen™ processors

---

Corsair CORSAIR RMx Series RM...   +

https://www.compuworld.com.au/product/corsair-corsair-rmx-series-rm850x-80-plus-gold-fully-modular-atx-power-supply

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Power Power Supply CP-9020180-AU

Corsair RM850X CP-9020180-AU 80+ Gold modular PSU

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- Cooling   +
- CPU   +
- Gaming Chair / Table
- Hard Drive / SSD   +
- IO Card / Hubs   +
- Keyboard   +
- Memory   +
- Memory Card / USB Drive   +
- Monitor   +

Product Code :CSPSCSRM850X
Manufacturer P/N :CP-9020180-AU
Manufacture : Corsair

CP-9020180-AU(RM850X)

Qty: 1

Price: $197.00 Ex
$216.70 Inc (RRP $249.00 inc)

Buy it Now!   Add to cart

Customer rating: Total votes: 0

Add to wish list   Pre-Order

Overview   Specifications   Reviews

CORSAIR RMx Series™ RM850x — 850 Watt 80 PLUS® Gold Certified Fully Modular PSU (AU)

DECIBELS.

CORSAIR RMx series fully modular power supplies are built with the highest quality components to deliver 80 PLUS Gold efficient power

Screenshot 1 — Samsung 1TB 980 Pro product page

Samsung 1TB 980 Pro MZ-V8P1 ✕ | +

https://www.compuworld.com.au/product/samsung-1tb-980-pro-mz-v8p1t0bw-m-2-ssd-7000r-5000w-pcie-4-0

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Hard Drive / SSD SSD M.2 MZ-V8P1T0BW

Samsung 1TB 980 Pro MZ-V8P1T0BW M.2 SSD 7000R/5000W PCIe 4.0

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■ Cooling   +
■ CPU   +
■ Gaming Chair / Table
■ Hard Drive / SSD
■ IO Card / Hubs   +
■ Keyboard
■ Memory   +
■ Memory Card / USB Drive   +
■ Monitor   +

Product Code :SSDM2-1TS-980P
Manufacturer P/N :MZ-V8P1T0BW
Manufacture : Samsung

Samsung 1TB 980 Pro MZ-V8P1T0BW M.2 SSD 7000R/5000W PCIe 4.0

Qty: 1

Price: $240.00 Ex
$264.00 Inc (RRP $359.00 inc)

Buy it Now!   Add to cart

Customer rating: ☆☆☆☆☆   Total votes: 0

Add to wish list   On Order

Overview | Specifications | Reviews

Samsung 1TB 980 Pro MZ-V8P1T0BW M.2 SSD 7000R/5000W PCIe 4.0

Next-level SSD performance

Unleash the power of the Samsung PCIe 4.0 NVMe SSD 980 PRO for your next-level computing. Leveraging the PCIe 4.0 interface, the 980 PRO delivers double the data

Screenshot 2 — Westernal Digital WD WDS100T2B0B product page

Westernal Digital WD WDS100T: ✕ | +

https://www.compuworld.com.au/product/westernal-digital-wd-wds100t2b0b-1tb-m-2-ssd

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Hard Drive / SSD SSD M.2 WDS100T2B0B

Westernal Digital WD WDS100T2B0B 1TB M.2 Blue SSD

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■ Computer (All-In-One)   +
■ Computer Systems   +
■ Cooling   +
■ CPU   +
■ Gaming Chair / Table
■ Hard Drive / SSD
■ IO Card / Hubs   +
■ Keyboard   +
■ Memory   +
■ Memory Card / USB Drive   +
■ Monitor   +

Product Code :SSDM2-1TWBLUE
Manufacturer P/N :WDS100T2B0B
Manufacture : WD

Westernal Digital WD WDS100T2B0B 1TB M.2 SSD

Qty: 1

Price: $137.00 Ex
$150.70 Inc (RRP $199.00 inc)

Buy it Now!   Add to cart

Customer rating: ☆☆☆☆☆   Total votes: 0

Add to wish list   Pre-Order

Overview | Specifications | Reviews

Specifications	
Cache	
Capacity	1TB
Controller	
Flash Technology	
Form Factor	M.2 2280
Interface	SATA III 6 Gb/s
Read Speed	560 MB/s
Series	WD Blue SSD (3D nand)
Warranty	3 Years

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