

Computer Build

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1 Parts

Part	Spec	Amount	Power
[x] Motherboard	ASUS Prime X670-P Wifi CSM AM5 ATX Motherboard	\$339.36	30-50W
[x] CPU	AMD Ryzen 9 7900X 12 Core AM5 5.6GHz CPU Processor	\$599	170W
[] RAM	Kingston 64GB (2x32GB) KF560C36BBEAK2-64 Fury Beast RGB 6000MHz DDR5 RAM	\$309	10W
[] Memory	Crucial T705 1TB CT1000T705SSD5 PCIe 5.0 2280 M.2 NVMe SSD - with Heatsink	\$289	11.55W
[] Memory	Seagate Barracuda 1TB (2016)	-	
[] Cooler	Thermalright Phan- tom Spirit 120 SE ARGB CPU Cooler - >166mm	\$59	
[x] Case	Thermaltake View 200 TG ARGB Mid Tower ATX Case	\$78.78	
[x] GPU	RTX3090	350W	
[] PSU	Thermaltake Tough- power GF A3 Snow 1050W Power Supply	\$219	
[] Fans	3x 120mm	\$35	

2 1. Central Processing Unit (CPU)

The CPU is vital for data preprocessing, running ML algorithms, and managing overall system operations. For ML tasks, a CPU with high core count and strong multi-threading capabilities is essential.

Component	Recommendation			Key Features	Price Range (AUD)
CPU	AMD	Ryzen 9 7950X	9	16 cores / 32 threads, 4.5 GHz base, 5.7 GHz boost, AM5 socket	~1,050
	AMD	Ryzen 9 7900X	9	12 cores / 24 threads, 4.7 GHz base, 5.6 GHz boost, AM5 socket	~750
	AMD	Ryzen 7 7700X	7	8 cores / 16 threads, 4.5 GHz base, 5.4 GHz boost, AM5 socket	~525

Recommendation:

The **AMD Ryzen 9 7950X** is highly recommended for ML development due to its high core and thread count, which enhances parallel processing capabilities essential for handling complex ML tasks and large datasets.

3 2. Graphics Processing Unit (GPU)

GPUs are the backbone of modern ML workloads, especially for deep learning tasks. NVIDIA GPUs are typically preferred due to their CUDA cores and extensive support in ML frameworks.

Component	Recommendation	Key Features	Price Range (AUD)
GPU	NVIDIA GeForce RTX 4090	24 GB GDDR6X, 16,384 CUDA cores, PCIe 4.0, excellent for large-scale ML models	~2,400
	NVIDIA GeForce RTX 4080	16 GB GDDR6X, 9,728 CUDA cores, PCIe 4.0, great performance for ML	~1,800
	NVIDIA RTX A6000	48 GB GDDR6, 10,752 CUDA cores, ECC memory, optimized for professional ML workloads	~6,750
	NVIDIA GeForce RTX 4070 Ti	12 GB GDDR6X, 7,680 CUDA cores, PCIe 4.0, balanced performance and cost	~1,200

Recommendation:

For the best ML performance, the **NVIDIA GeForce RTX 4090** is ideal due to its superior CUDA core count and large VRAM, enabling efficient training of complex models. If budget constraints exist, the **RTX 4080** or **RTX 4070 Ti** offer excellent performance at a more accessible price.

4 3. Motherboard

A compatible motherboard ensures seamless integration of all components, supports multiple GPUs, offers ample RAM slots, and provides reliable power delivery.

Component	Recommendation	Key Features	Price Range (AUD)
Motherboard	ASUS PRIME X670-P WIFI	AM5 socket, 1 x PCIe 4.0 x16 slots 1 x PCIe 4.0 x8, DDR5 support, WiFi 6E, robust VRMs	~219.99
	MSI MPG X670E Carbon WiFi	AM5 socket, Triple PCIe 5.0 x16 slots, DDR5, WiFi 6E, high-quality VRMs	~675
	Gigabyte X670E AORUS Elite	AM5 socket, Triple PCIe 5.0 x16 slots, DDR5, advanced thermal design	~600
	ASRock X670E Taichi	AM5 socket, Triple PCIe 5.0 x16 slots, DDR5, premium build quality	~900
	ASUS TUF Gaming X670E-Plus	AM5 socket, 1 x PCIe 5.0 x16 slots, 1 x PCIe 4.0 x4, DDR5, military-grade components	~749
	ASUS ProArt X670E-Creator	AM5 socket, 2 x PCIe 5.0 x16 slots, 1 x PCIe 4.0 x2, DDR5	~768
	ASUS ROG Strix X670E Gaming	AM5 socket, 1 x PCIe 5.0 x16 slots, 1 x PCIe 4.0 x4, DDR5	~639

Recommendation:

The **ASUS PRIME X670-P WIFI** offers a balanced mix of features, including dual PCIe 5.0 x16

slots suitable for dual GPU setups, robust power delivery, and DDR5 memory support, making it an excellent choice for ML development.

5 4. Memory (RAM)

Ample and fast RAM is crucial for handling large datasets and ensuring smooth multitasking during model training and evaluation.

Component	Recommendation	Key Features	Price Range (AUD)
RAM	G.Skill Trident Z5 RGB DDR5 64GB (2x32GB) 6000MHz	High-speed DDR5, RGB aesthetics, low latency	~450
	Corsair Vengeance DDR5 32GB (2x16GB) 6000MHz	Reliable performance, high speed	~225
	Kingston Fury Beast DDR5 128GB (4x32GB) 6000MHz	Massive capacity for extensive datasets	~900
	Crucial Ballistix DDR5 32GB (2x16GB) 5600MHz	Budget-friendly, decent performance	~195

Recommendation:

For most ML applications, **64 GB DDR5 RAM** (e.g., **G.Skill Trident Z5 RGB DDR5 64GB**) strikes a good balance between capacity and speed. However, for very large datasets or complex models, opting for **128 GB DDR5 RAM** (e.g., **Kingston Fury Beast DDR5 128GB**) is advisable.

6 5. Storage

Fast and ample storage ensures quick data access, efficient model saving/loading, and smooth system performance.

Component	Recommendation	Key Features	Price Range (AUD)
Primary Storage	Samsung 980 PRO 1TB NVMe SSD	PCIe 4.0, high read/write speeds, reliable	~150
Secondary Storage	WD Black SN850X 2TB NVMe SSD	PCIe 4.0, larger capacity for datasets	~300
	Samsung 990 PRO 2TB NVMe SSD	Latest generation, PCIe 4.0, extremely fast	~375
	Crucial P5 Plus 4TB NVMe SSD	PCIe 4.0, massive storage for extensive datasets	~675
	Seagate FireCuda 530 1TB NVMe SSD	PCIe 4.0, excellent endurance and reliability	~180
	Corsair MP600 Pro XT 2TB NVMe SSD	PCIe 4.0, robust thermal management	~330

Recommendation:

A combination of a 1 TB NVMe SSD for the operating system and frequently accessed data (e.g., **Samsung 980 PRO 1TB**) and a 2 TB NVMe SSD for larger datasets and model storage (e.g., **WD Black SN850X 2TB**) is ideal. For maximum storage needs, consider adding a 4 TB NVMe SSD.

7 6. Power Supply Unit (PSU)

A reliable PSU ensures stable power delivery to all components, especially when running multiple GPUs.

Component	Recommendation	Key Features	Price Range (AUD)
PSU	EVGA SuperNOVA 1200 G6 1200W	80+ Gold, fully modular, high wattage for dual GPUs	~450
	Corsair RM1000x 1000W 80+ Gold	Fully modular, reliable performance	~270
	Seasonic Focus GX-850 850W	80+ Gold, fully modular	~195
	Be Quiet! Straight Power 11 1000W	80+ Platinum, fully modular	~300
	Corsair HX1200i 1200W	80+ Platinum, high efficiency	~450

Recommendation:

For dual GPU configurations, a **1200W PSU** like the **EVGA SuperNOVA 1200 G6** or **Corsair HX1200i** is recommended to ensure ample power headroom and stability, especially under heavy loads.

8 7. Cooling Solutions

Effective cooling is essential to maintain optimal performance and prolong the lifespan of your components, particularly the CPU and GPUs.

Component	Recommendation	Key Features	Price Range (AUD)
CPU Cooler	Corsair iCUE H150i Elite Capellix	360mm AIO, RGB lighting, high-performance cooling	~300
	Noctua NH-D15 chromax.Black	Dual tower air cooler, extremely efficient and quiet	~150
	be quiet! Dark Rock Pro 4	High-performance air cooling, near-silent operation	~135
	NZXT Kraken Z73 RGB	360mm AIO, customizable LCD display, premium cooling	~375
	Arctic Liquid Freezer II 360	360mm AIO, excellent cooling performance	~225

Recommendation:

For optimal CPU cooling, consider a **high-performance AIO liquid cooler** like the **Corsair iCUE H150i Elite Capellix** or a top-tier **air cooler** like the **Noctua NH-D15 chromax.Black**. These options ensure your CPU remains cool during intensive ML tasks.

9 8. Computer Case (Chassis)

A spacious and well-ventilated case ensures that all components, especially multiple GPUs, have adequate airflow and space.

Component	Recommendation	Key Features	Price Range (AUD)
Case	Fractal Design Meshify 2	ATX, excellent air-flow, spacious interior	~225
	Thermaltake Core P8	ATX, open-frame design, maximum air-flow	~300
	NZXT H710	ATX, sleek design, good cable management	~240
	Lian Li PC-O11 Dynamic	ATX, stylish with excellent cooling and showcase features	~225
	Phanteks Eclipse P600S	ATX, hybrid cooling support, sound-dampening	~300
	Corsair Obsidian Series 750D	ATX, large and versatile, robust build quality	~255

Recommendation:

For dual GPU setups, the **Fractal Design Meshify 2** or **Thermaltake Core P8** are excellent choices due to their spacious interiors and superior cooling support, ensuring that multiple GPUs can operate efficiently without overheating.

10 9. Operating System

Choose an OS that best supports your ML tools and frameworks. **Ubuntu** is widely used in ML environments due to its compatibility and support for NVIDIA drivers and ML frameworks.

Component	Recommendation	Key Features	Price Range (AUD)
Operating System	Ubuntu 22.04 LTS	Free, widely supported in ML environments	0
	Windows 11 Pro	Comprehensive support for various ML tools	~210

Recommendation:

Ubuntu 22.04 LTS is highly recommended for ML development due to its robust support for NVIDIA drivers, compatibility with popular ML frameworks like TensorFlow and PyTorch, and extensive community support.

11 10. Networking (Optional)

For distributed ML workloads or high-speed data transfers, high-speed networking can be beneficial.

Component	Recommendation		Key Features	Price Range (AUD)
Network Card	Intel	X550-T2 10GbE	Dual 10 Gigabit Ethernet ports, PCIe 3.0	~450
	ASUS	XG-C100C 10Gb Ethernet	PCIe 3.0, reliable performance	~225

Recommendation:

If your ML workflows involve significant data transfers over the network, consider adding a **10Gb Ethernet Card** like the **Intel X550-T2** for high-speed connectivity.

12 11. Peripherals (Optional)

Quality peripherals can enhance your workflow and overall user experience.

Component	Recommendation	Key Features	Price Range (AUD)
Monitor	Dell UltraSharp U2720Q	27-inch 4K, IPS panel, excellent color accuracy	~900
	LG 27GN950-B	27-inch 4K, IPS, high refresh rate	~1,200
Keyboard	Logitech MX Keys	Ergonomic, wireless, backlit	~150
	Corsair K95 RGB Platinum	Mechanical, RGB lighting, programmable keys	~300
Mouse	Logitech MX Master 3	Ergonomic, wireless, multiple programmable buttons	~150
	Razer DeathAdder V2	High-precision sensor, ergonomic design	~105
External Storage	Samsung T7 Portable SSD 2TB	Fast USB 3.2 connectivity, portable	~375
	WD My Passport 4TB	Large capacity, reliable performance	~180
Uninterruptible Power Supply (UPS)	APC Back-UPS Pro 1500VA	Reliable backup power, surge protection	~375
	CyberPower CP1500PFCLCD	Pure sine wave, LCD display, high capacity	~300

Recommendation:

Investing in high-quality monitors like the **Dell UltraSharp U2720Q** and ergonomic peripherals like the **Logitech MX Keys** and **MX Master 3** can significantly enhance your productivity and comfort during long ML development sessions.

13 Complete Component List for an AMD-Based ML Development PC

Component	Recommendation	Price (AUD)
Motherboard	ASUS PRIME X670-P WIFI CSM DDR5 AM5 ATX	450
CPU	AMD Ryzen 9 7900X	750
GPU	NVIDIA GeForce RTX 4090	2,400
RAM	G.Skill Trident Z5 RGB DDR5 64GB (2x32GB) 6000MHz	450
Primary Storage	Samsung 980 PRO 1TB NVMe SSD	150
Secondary Storage	WD Black SN850X 2TB NVMe SSD	300
CPU Cooler	Corsair iCUE H150i Elite Capellix (AIO Liquid Cooler)	300
Power Supply	EVGA SuperNOVA 1200 G6 1200W, 80+ Gold Fully Modular	450
Case	Fractal Design Meshify 2	225

450 + 1050 + 2400 + 450 + 150 + 300 + 300 + 450 + 225 - 2400

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14 Additional Tips for Building an ML Development PC

1. **Ensure Compatibility:** Double-check that all components are compatible with each other, especially the motherboard, CPU, and RAM. Use tools like PCPartPicker to verify compatibility and prevent issues during assembly.
2. **Prioritize Cooling:** ML workloads generate significant heat, especially with dual GPUs. Invest in high-quality cooling solutions to maintain system stability and prolong component lifespan.
3. **Cable Management:** A well-organized build not only looks clean but also promotes better airflow. Use modular PSUs and manage cables efficiently within the case.
4. **Future-Proofing:** Select components that offer room for upgrades, such as additional RAM slots, PCIe lanes, and storage options, to accommodate growing ML demands.
5. **Driver and Software Setup:** After assembling your workstation, ensure that you install the latest drivers for your GPU (NVIDIA) and set up ML frameworks like TensorFlow, PyTorch, and others with GPU support.
6. **Backup Solutions:** Implement regular backup strategies to protect your datasets and models. Consider using both local (external SSDs) and cloud-based backup solutions.

7. **Monitor Cooling and Performance:** Use software tools to monitor system temperatures and performance metrics to ensure that your ML tasks are running efficiently without thermal throttling.

15 Computer Setup

- proxmox server
 - Ubuntu
 - Windows
 - NAS
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