

# COMPUTER SCIENCES

KNOWING YOUR COMPUTER II  
(COMPONENTS: GRAPHICS CARD,  
MOTHERBOARD)

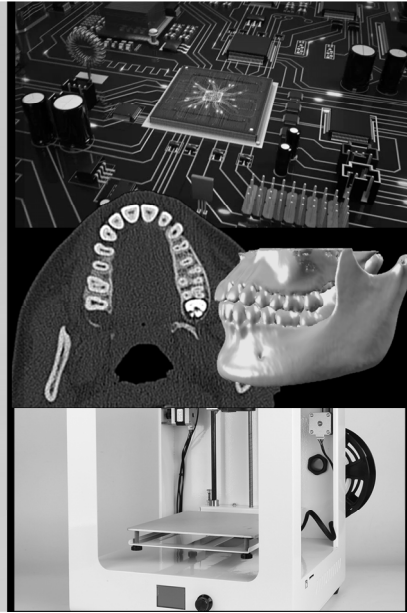
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# COMPUTER COMPONENTS

Desktop computer



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# COMPUTER COMPONENTS II

- Graphics/Video Card 顯示卡 ➤ Display output、GPU computing
- MotherBoard 主機板 ➤ Integration of all components

Please download handouts from (Week 4)  
[http://cflu.lab.nycu.edu.tw/CFLU\\_course\\_CompSci.html](http://cflu.lab.nycu.edu.tw/CFLU_course_CompSci.html)

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# GRAPHICS CARD

- Higher performance display (in addition to CPU built-in display)
- Display output, efficient computing, geometry computing, 3D mapping, audio and video decoding

## Knowing a graphic card...

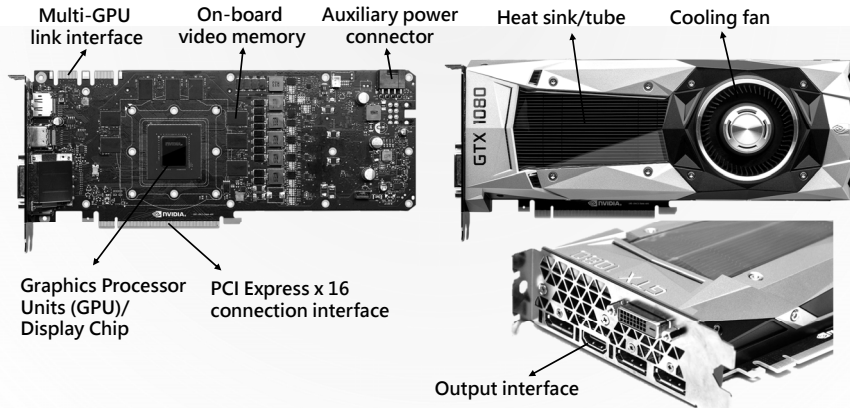
- Exterior and Cooling Components
- GPU Graphics Processor Units/ Display Chip
- On-board Video Memory
- Output Interface
- Connector Interface (Pin)

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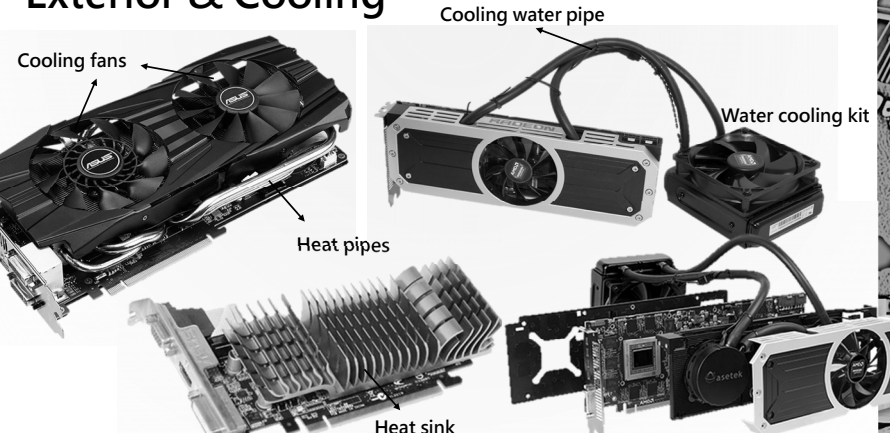
## Exterior Of Graphic Card



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## Exterior & Cooling



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## GPU/ DISPLAY CHIP

- GPU: Graphic Processing Unit
- Next-generation GPUs are capable of efficient computing, far surpassing the computational power of CPUs
- Major manufacturers
  - AMD: Radeon series
  - NVIDIA: GeForce series



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## NVIDIA GEFORCE RTX 3080 TI

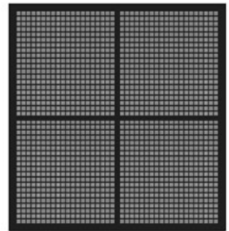
CUDA: Compute Unified Device Architecture 統一計算設備架構

		GEFORCE RTX 3080 TI
<b>GPU Engine Specs:</b>	NVIDIA CUDA® Cores	10240
	Boost Clock [GHz]	1.67
	Base Clock [GHz]	1.37
<b>Memory Specs:</b>	Standard Memory Config	12 GB GDDR6X
	Memory Interface Width	384-bit

GPU has thousands of cores to efficiently handle parallel computing.



CPU  
MULTIPLE CORES



GPU  
THOUSANDS OF CORES

<https://www.nvidia.com.tw>

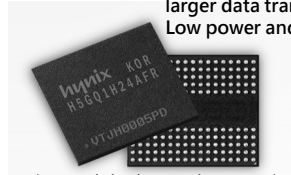
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## VIDEO MEMORY

- Temporary storage data generated by GPU computing
  - texture, light and shadow, image processing
- Graphics Double Data Rate (GDDR) chips · 1~16GB

- GDDR6/GDDR6X
- GDDR5/GDDR5X
- GDDR4
- GDDR3



GDDR is more powerful than DDR  
larger data transfer bandwidth and  
Low power and heat generation.

The newer the generation and the larger the capacity,  
the more expensive it is!

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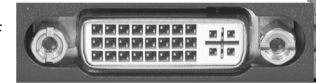
## Output Interface/ Connector

- D-Sub: also known as VGA (Video Graphics Array)
  - The main output interface in the traditional analog era. (Digital-to-analog quality is poor.)
  - The most common connector used in projectors.
- DVI: Digital Visual Interface
  - Eliminating the need to convert the digital signal of the graphics card into an analog signal for monitor.

D-sub (VGA) connector



DVI connector



DVI to D-sub adaptor



Video output only!

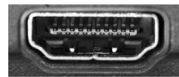
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## Output Interface/ Connector

- HDMI: High Definition Multimedia Interface
  - Resolutions up to 1920 x 1080, Full HD 1080p or higher.
  - Blue-ray generation
- DP: Display Port
  - Next Generation Video Display Interface
  - Higher transmission bandwidth above 10.8 Gbps (up to 32.4 Gbps in v1.4)

HDMI connector



DP connector



Video and audio can be output simultaneously!

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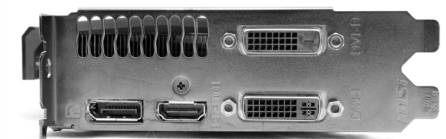
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## Common Output Configurations

- Newer graphics cards have removed the D-Sub output port.
- Multiple output ports → multi-monitor display



output interface ↔ monitor



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# Mainstream Graphics Cards

For workstation: Quadro, FirePro  
GPU computing: Tesla

- AMD (美商超微)
  - Radeon series
    - RX 6900/6800/6400/5600
    - RX 5700
    - RX 590
    - RX 580
    - RX 570
    - RX 560
- NVIDIA (輝達/英偉達)
  - GeForce series
    - RTX 4090 } Ada Lovelace architecture
    - RTX 4080 }
    - RTX 3090 } Ampere architecture
    - RTX 3080 }
    - RTX 3060 }
    - RTX 2080 }
    - RTX 2070 }
    - RTX 2060 } Turing architecture
    - GTX 1660 }
    - GTX 1650 }
    - GTX 1080 } Pascal architecture

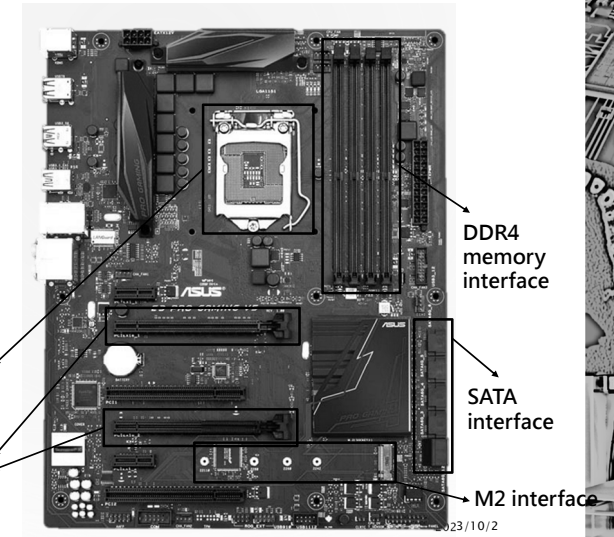


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# MOTHERBOARD 主機板

- Base for installing and integrating all computer components
- Power supply for each component



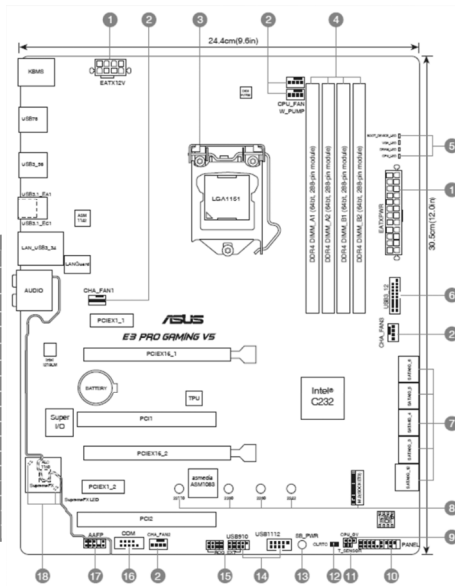
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# MOTHERBOARD

The layout design of each motherboard is different, please refer to the user manual for more details.

- 連接插槽/跳線選擇區/插槽
1. ATX 主機板電源插槽 (24-pin EATXPWR、8-pin ATX12V)
  2. 中央處理器風扇/水泵機殼風扇電源插槽 (4-pin CPU\_FAN、4-pin W\_PUMP、4-pin CHA\_FAN1-3)
  3. Intel® LGA1151 中央處理器插槽
  4. DDR4 記憶體插槽
  5. Q 指示燈 (BOOT\_DEVICE\_LED、VGA\_LED、DRAM\_LED、CPU\_LED)
  6. USB 3.0 擴充套件排線插槽 (20-1 pin USB3\_12)
  7. Intel® C232 Serial ATA 6.0Gb/s 裝置連接插座 (7-pin SATA6G\_1-6)
  8. M.2 Socket 3
  9. 處理器過壓設定跳線 (3-pin CPU\_OV)
  10. 系統控制面板連接排針 (20-5 pin PANEL)
  11. 溫度傳感器連接排針 (2-pin T\_SENSOR)
  12. CMOS 組態資料清除跳線 (2-pin CLRTC)
  13. 電力指示燈 (SB\_PMR)
  14. USB 2.0 擴充套件排線插槽 (10-1 pin USB910、USB1112)
  15. ROG 擴充連接排針 (18-1 pin ROG\_EXT)
  16. TPM 連接排針 (14-1 pin TPM)
  17. 前面板音效連接排針 (10-1 pin AAFP)
  18. SupremeFX 指示燈



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# Specification Of Motherboard

- Component slot/socket/interface
- Chipset
- Back-plate I/O ports
- Power connections

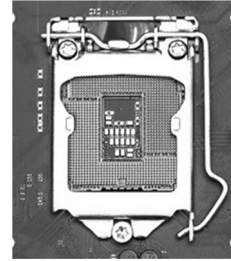
Be sure to match the interface of the CPU, memory, graphics card, and hard disk.

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## Component Slot/Socket/Interface

- CPU Socket
  - Intel® Socket 1151 for Xeon® E3-1200 v5 and 6<sup>th</sup> generation Core™, Pentium® and Celeron® Processors
  - Supports Intel® 14 nm CPU
  - Supports Intel® Turbo Boost Technology 2.0

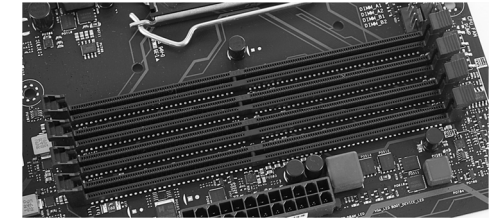


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## Component Slot/Socket/Interface

- Memory Modules
  - 4 x DIMM, Max. 64GB, DDR4 2133 MHz ECC, Non-ECC, Un-buffered Memory
  - Dual Channel Memory Architecture



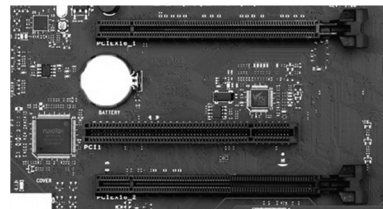
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## Component Slot/Socket/Interface

- Graphics Card
  - Supports AMD Quad-GPU CrossFireX™ Technology
  - Supports AMD 2-Way CrossFireX Technology

Don't support NVIDIA SLI Technology!



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## Component Slot/Socket/Interface

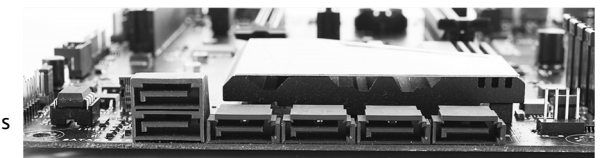
- Storage
  - 1 x M.2 Socket 3, with M Key design, type 2242/2260/2280/22110 storage devices support
  - (Supports both SATA & PCIE SSD)\*2
  - 6 x SATA 6Gb/s port(s), Support Raid 0, 1, 5, 10



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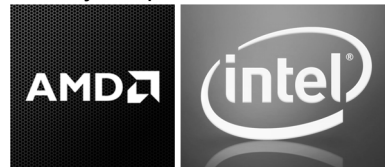
SATA III  
SATA Express  
eSATA



## Chipset 晶片組

- General manager of motherboard
- Determine the supported CPUs, memory, graphics cards, storage media, and their interconnections
- Determine the ports, expansion slots and features available on the motherboard

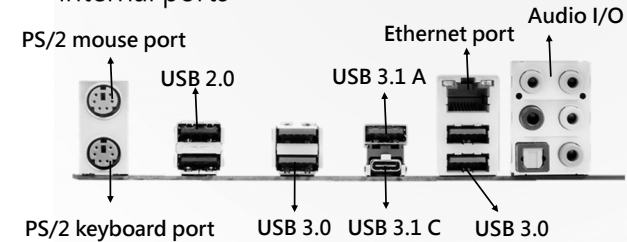
Major chip manufacturers



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## I/O Ports

- Supported Peripheral devices
- Including back-plate and front panels, and internal ports



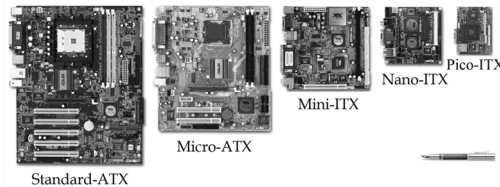
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## Specification Terminology

- Motherboard size
  - ITX · ATX · M-ATX · MiniATX
- Display output
  - 1A1D1H1DP: VGA\*1、DVI\*1、HDMI\*1、DP\*1
- Storage interface
  - U3: USB 3.0/3.1
  - S6: SATA 6Gbps
- AX/AC+BT5.1
  - IEEE 802.11 AX/AC wireless
  - Bluetooth 5.1



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## THE END

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