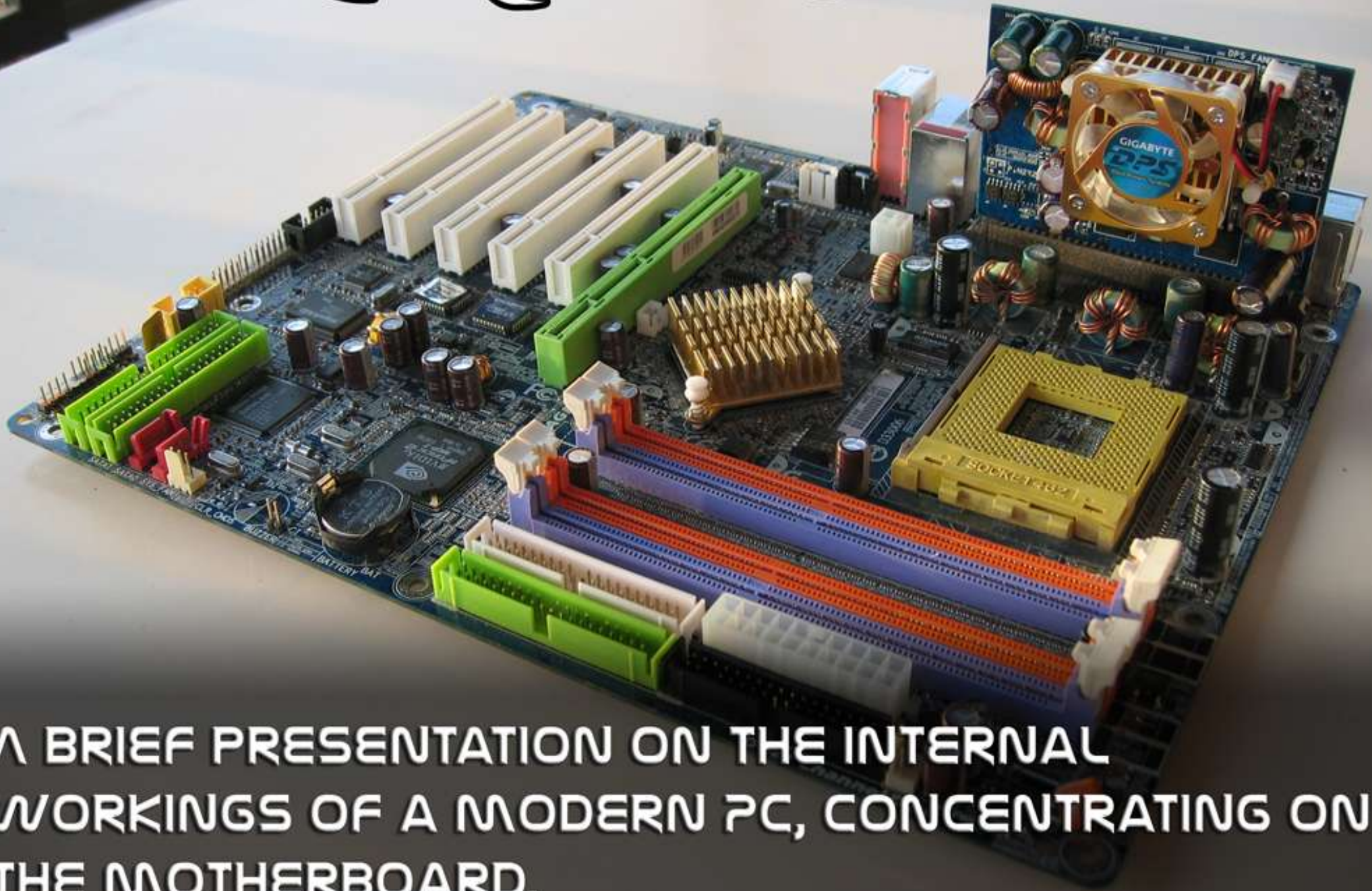


THE ROBMEERMAN SHOW



A BRIEF PRESENTATION ON THE INTERNAL WORKINGS OF A MODERN PC, CONCENTRATING ON THE MOTHERBOARD.

Who am I?

- Expertise
 - Recent graduate of Warwick University, UK
 - 2:1 in Computer Science (BSci)
 - Final Year Project was hardware-based (USB Implementation for Game Boy Advance)
- Personal
 - Life-long expatriate
 - Cyprus as a permanent address since ~1990
 - Currently taking a break before looking for work

The Motherboard

- Main circuit board of a PC
- Everything important plugs into it
- Responsible for providing power and logical channels to devices.
- Typically provides common ports (Parallel, Serial, USB, LAN, PS/2, Audio)



OVERVIEW



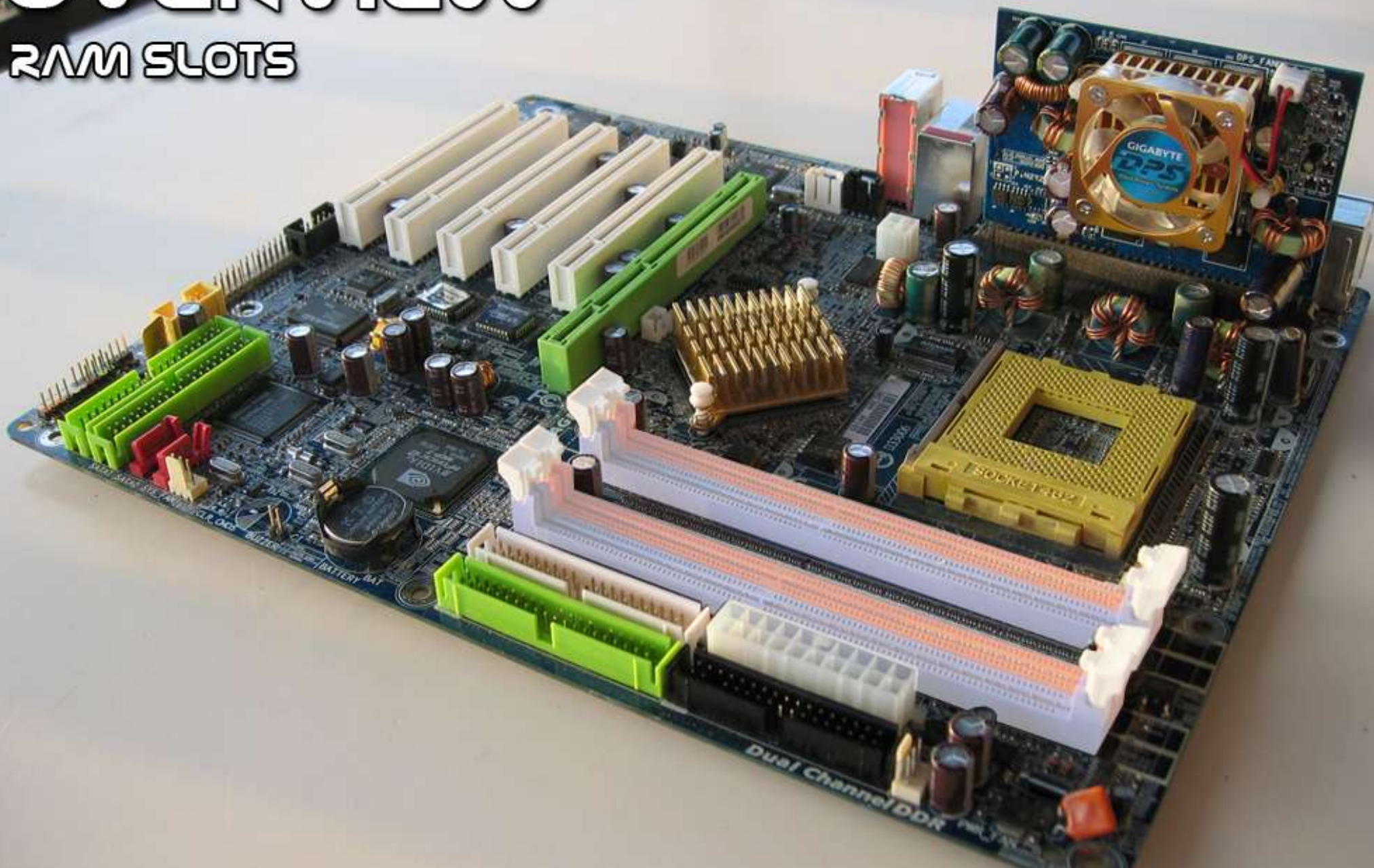
OVERVIEW

CPU SOCKET



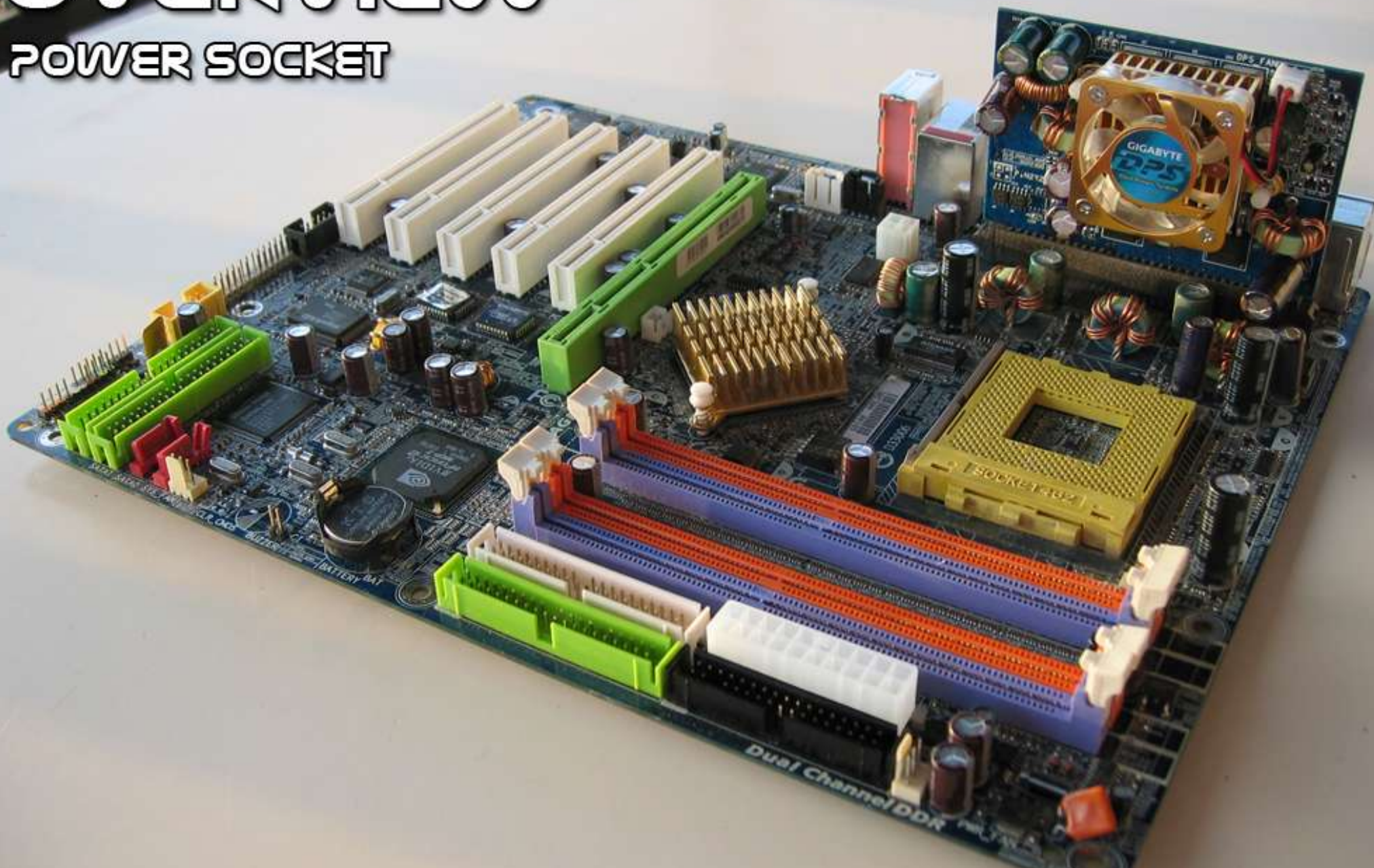
OVERVIEW

RAM SLOTS



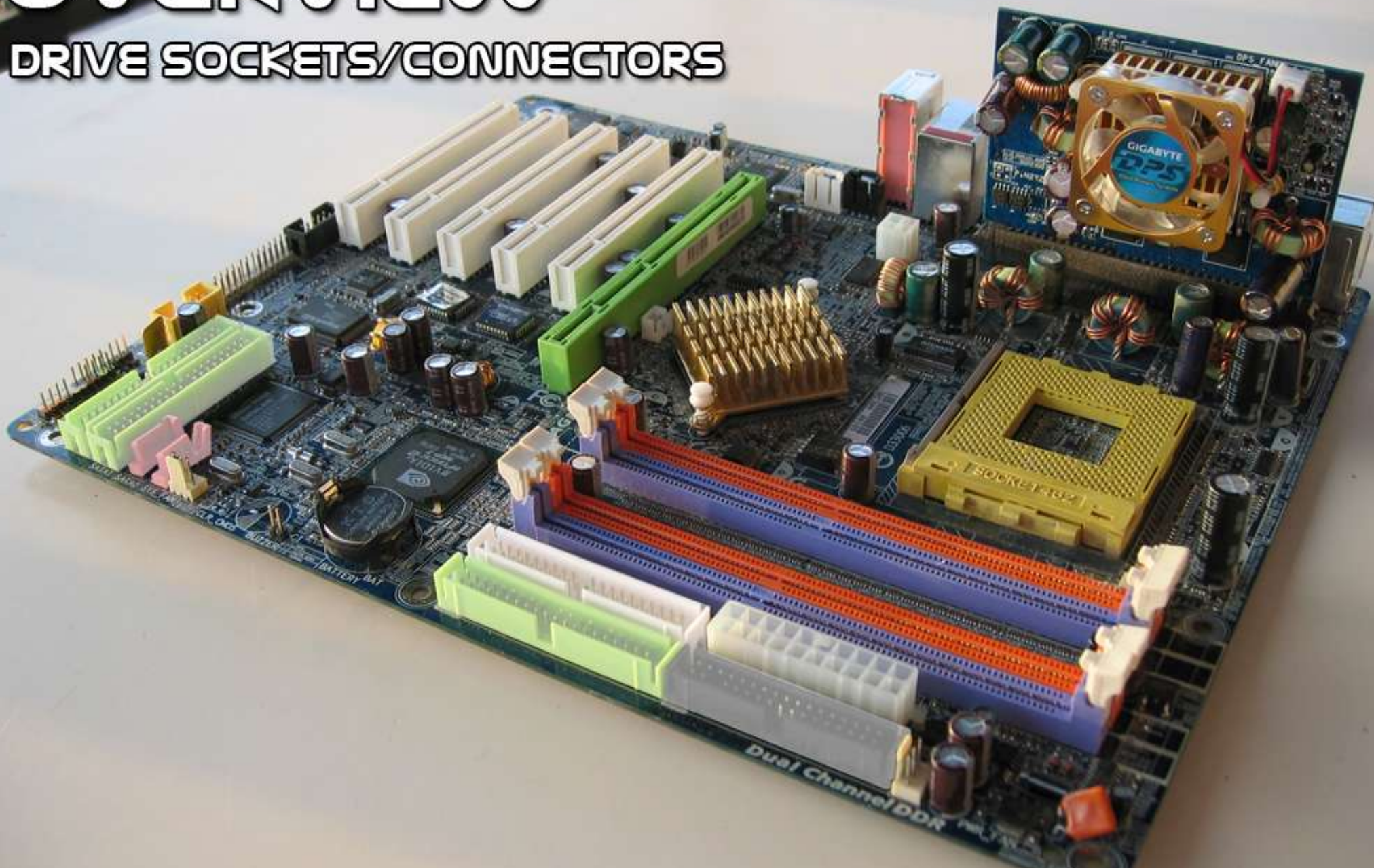
OVERVIEW

POWER SOCKET



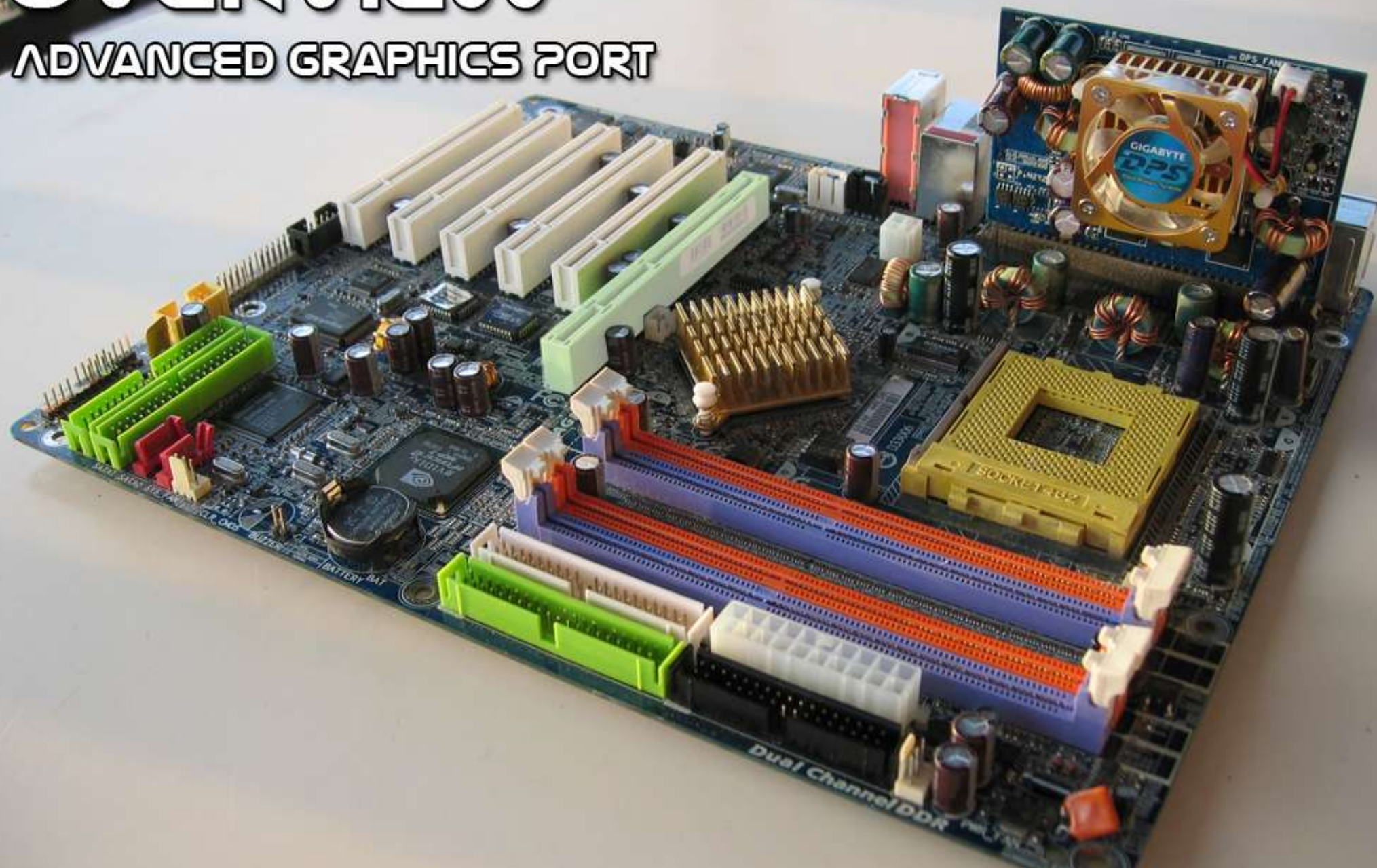
OVERVIEW

DRIVE SOCKETS/CONNECTORS



OVERVIEW

ADVANCED GRAPHICS PORT



OVERVIEW

EXPANSION SLOTS



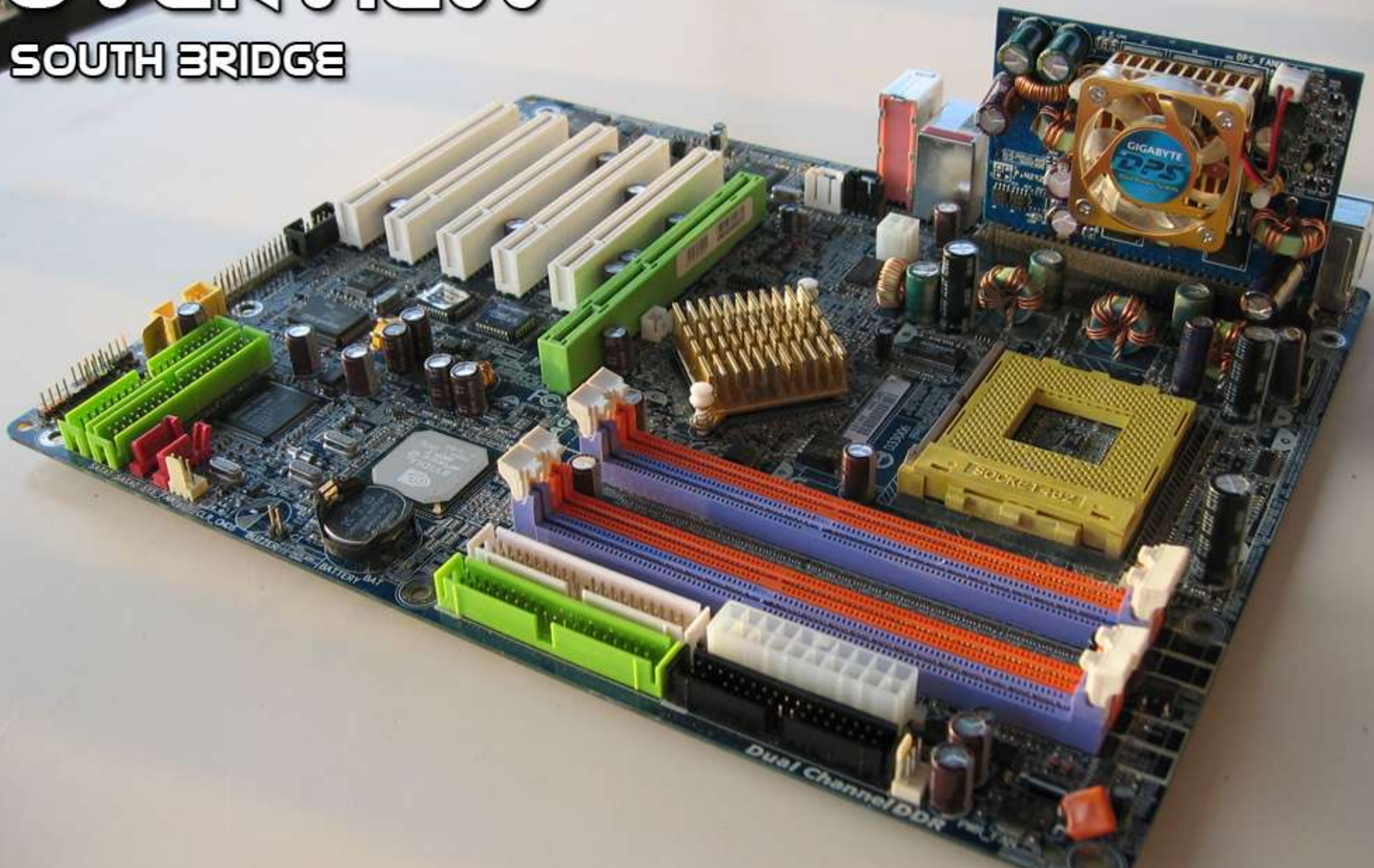
OVERVIEW

NORTH BRIDGE



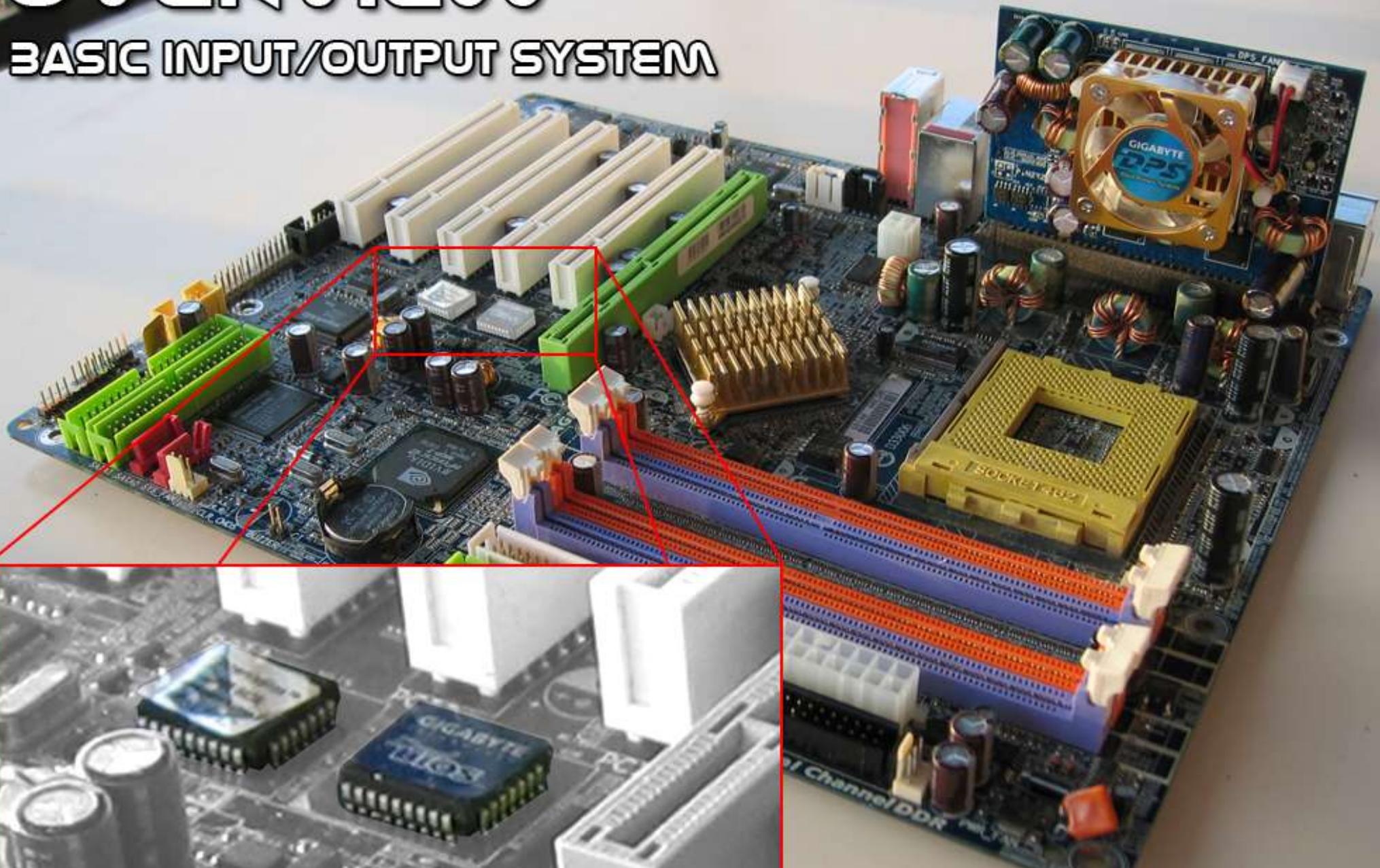
OVERVIEW

SOUTH BRIDGE



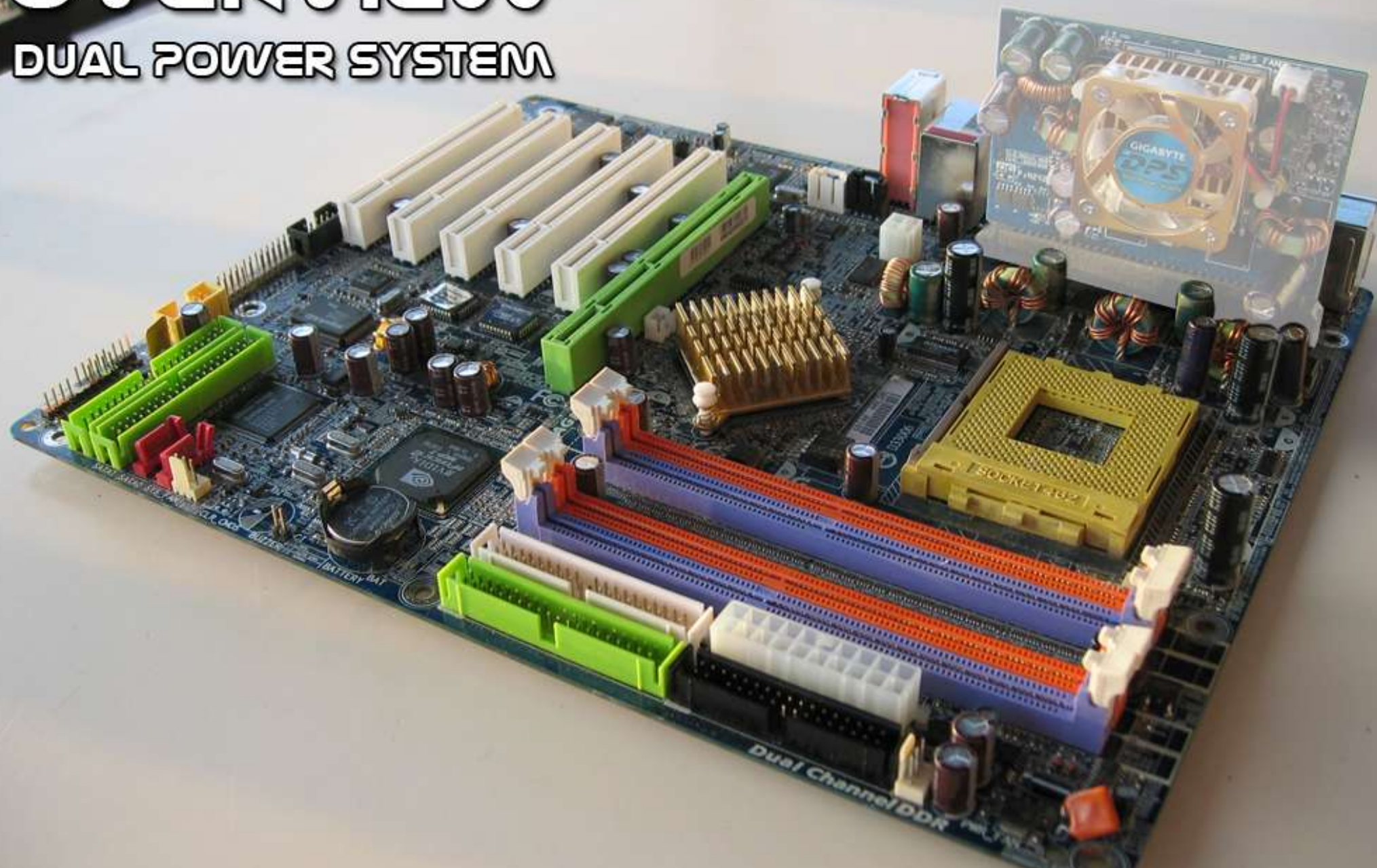
OVERVIEW

BASIC INPUT/OUTPUT SYSTEM



OVERVIEW

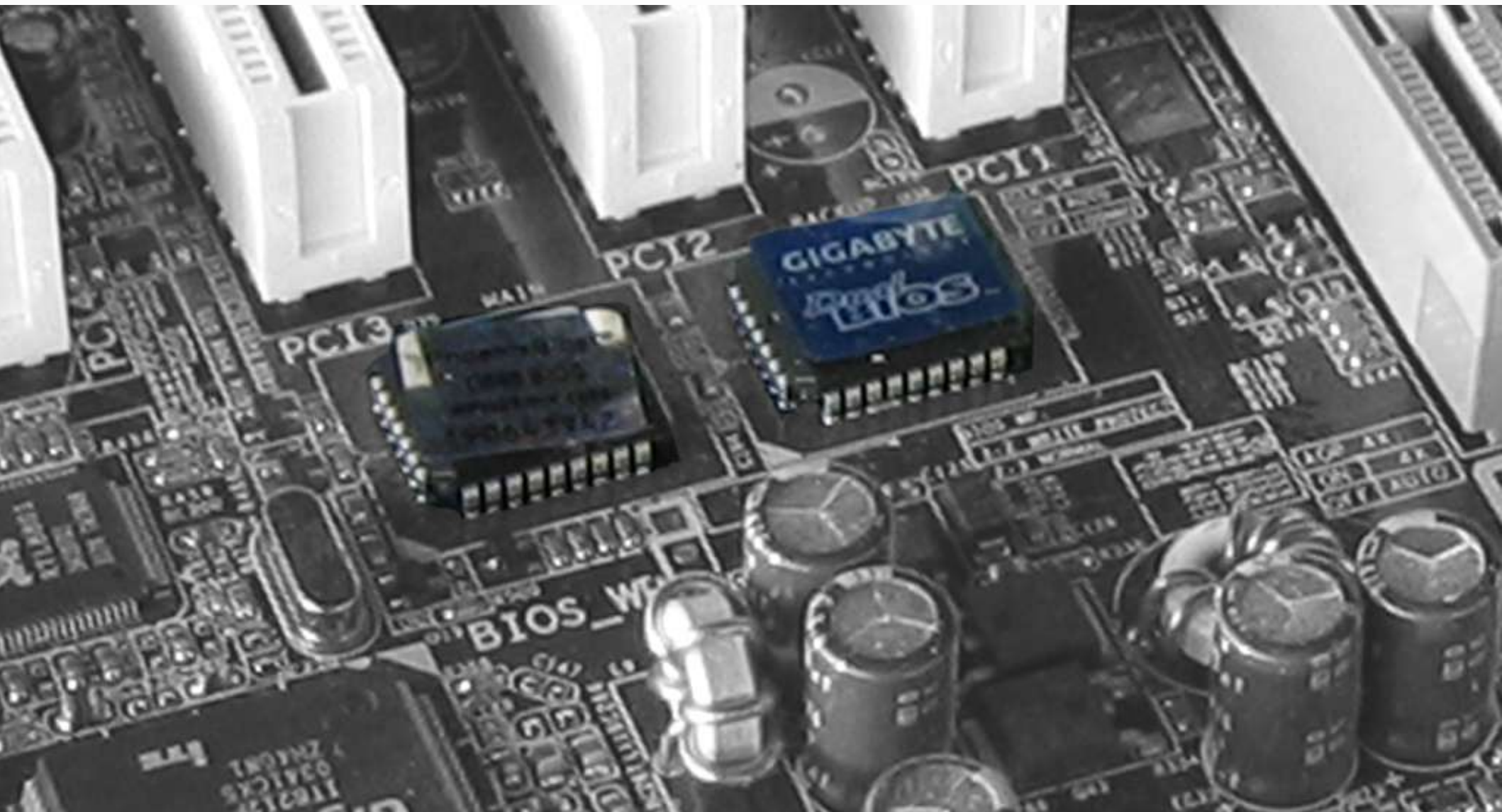
DUAL POWER SYSTEM



Power Management

- A Power Supply Unit (PSU) plugs into the board, and is controlled by the board
 - Power / Reset buttons are software-controlled – don't always work as expected!
- The motherboard is always powered, allowing certain nifty features:
 - Wake On LAN
 - Wake on user input (used to exit suspended state)
 - Power-On by time
- Idle devices can power-save/suspend

Basic Input/Output System (BIOS)



Basic Input/Output System (BIOS)

- Responsible for setting up logical systems
- Configures devices (Plug'n'Play)
 - Reads configuration data from devices
 - Assigns 'hardware' addresses
 - Configures speeds and voltages as applicable
 - “Overclocking”
- Performs basic system diagnostics
 - CPU present & functional
 - RAM present & functional
 - Keyboard attached (optional in modern machines)

Basic Input/Output System (BIOS)

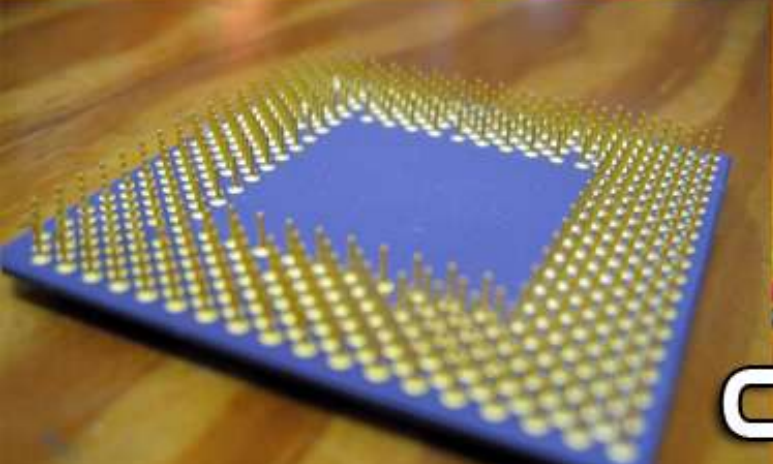
- Allows user to configure higher-level functions
 - Influence auto-configuration (IRQ / DMA)
 - Choose which screen to use in mutli-screen systems
 - Disable “on-board” devices, such as sound/video/LAN
- Keeps system time
 - Board has a removable battery
- Finally, boots operating system

Central Processing Unit & Socket

- All calculations and decisions are made here
 - Even BIOS instructions are executed here
- CPUs are
 - Very complex
 - Very small
 - Very good at making heat



HEATSINK & FAN

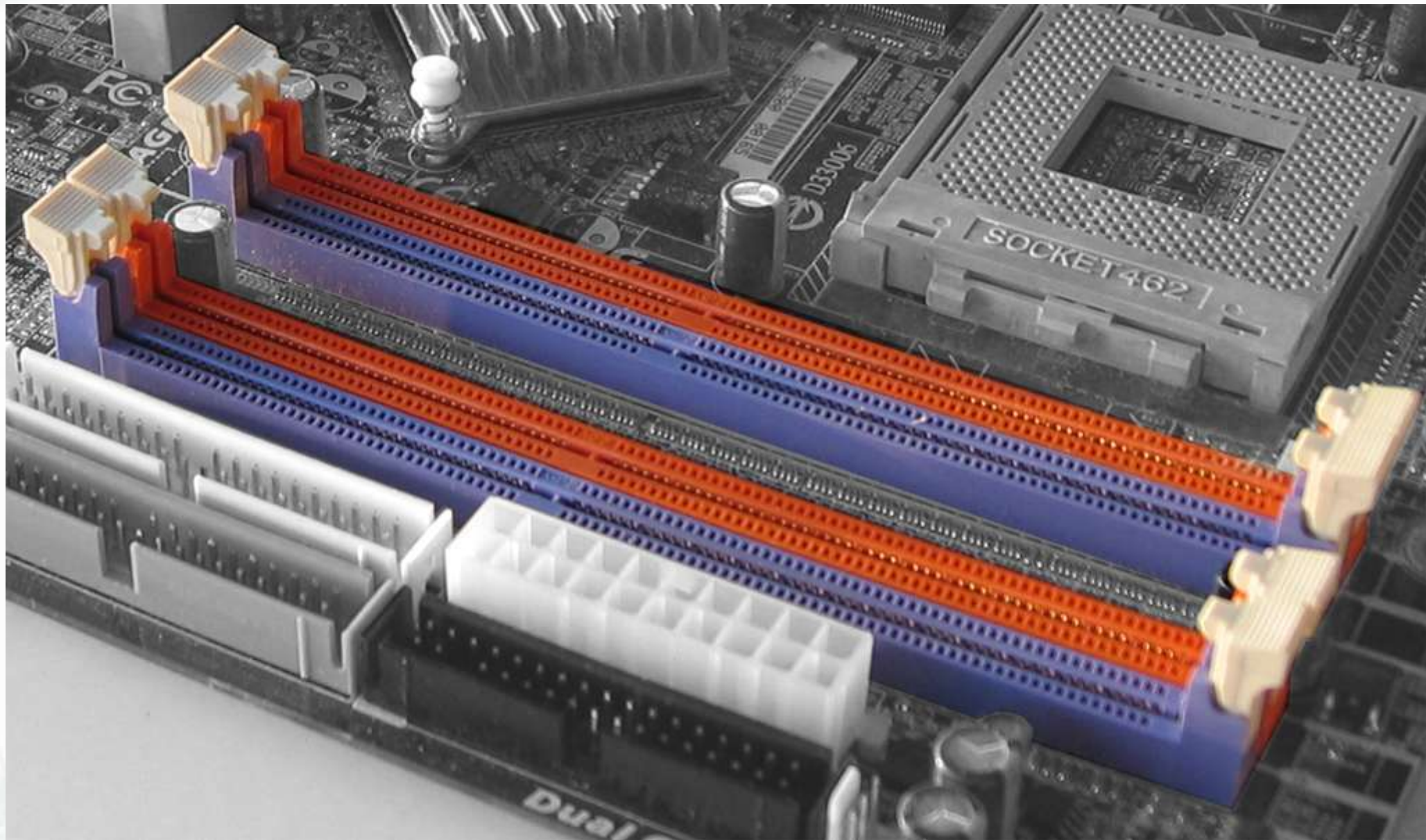


CENTRAL PROCESSING UNIT

Random Access Memory (RAM)

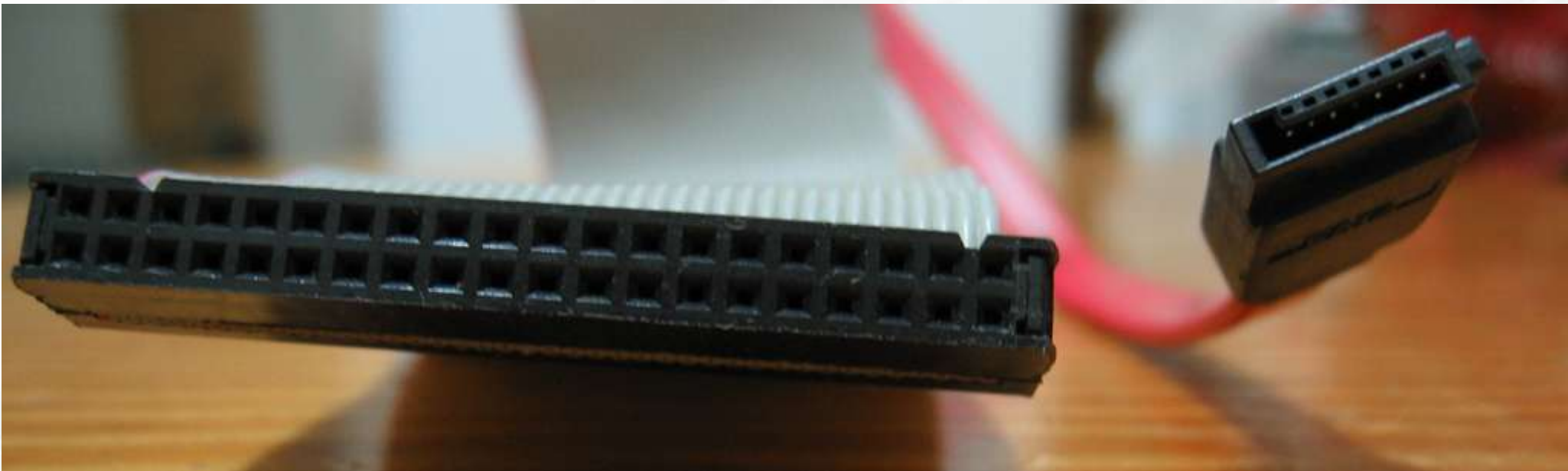
- System memory
 - Volatile – Akin to a person's “Short term memory”
- Generally a computer's most important factor with regard to perceived “speed”
 - Too little RAM results in swapping
 - Intensive applications (i.e. games) access RAM very frequently
- Not all RAM is equal
 - Different technologies, some faster than others

Dual-Channel RAM



Drives

- Typically do not allow random access (blocks)
- Vastly cheaper per MegaByte then RAM
- Non-Volatile
 - More akin to a bookshelf, than a person's “long term memory”

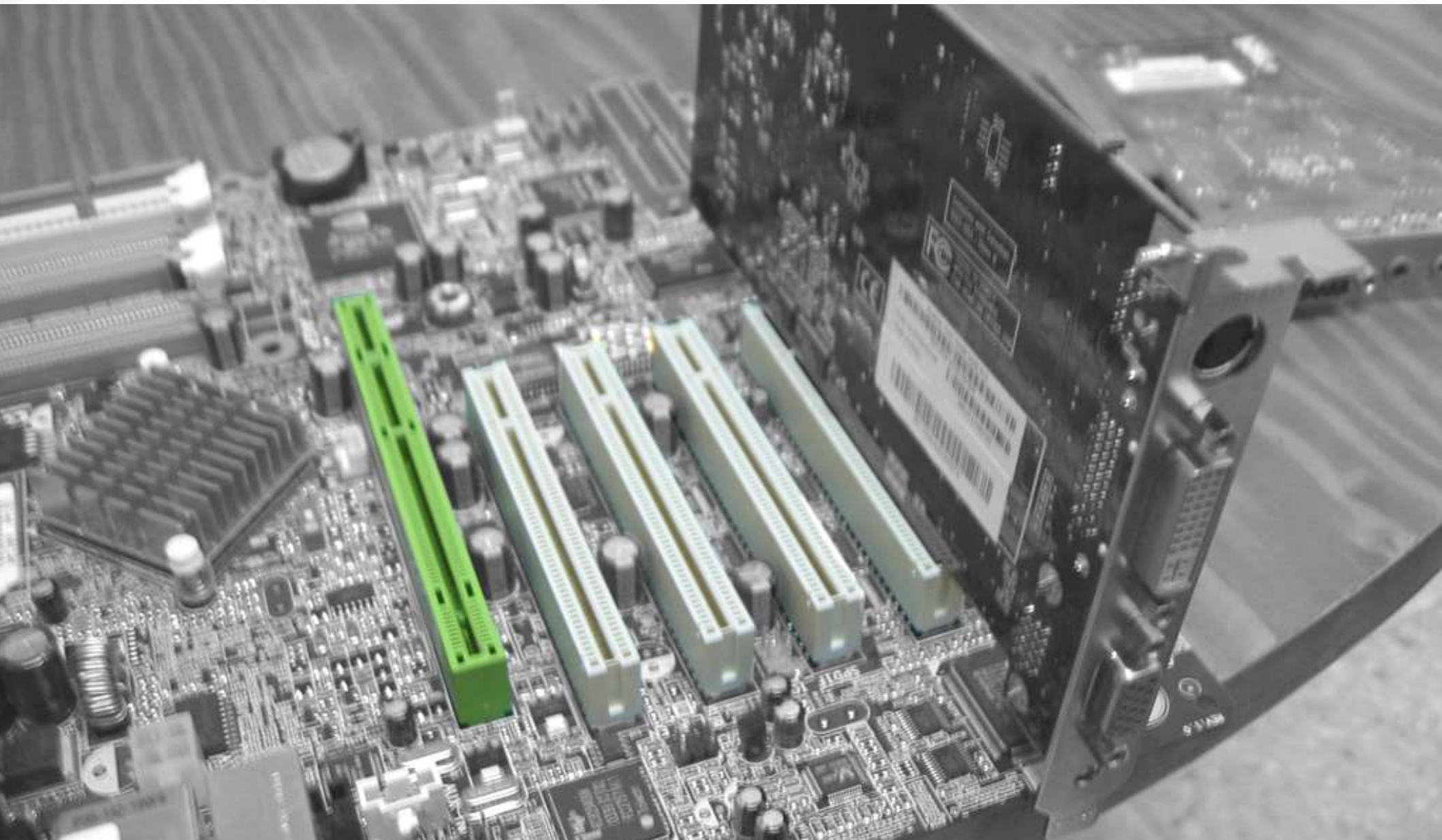


North/South Bridges

- The bridges connect different “layers” of circuitry
 - So called due to “map” analogy
- NorthBridge connects directly to CPU and RAM
- SouthBridge connects NorthBridge to everything else (PCI, USB, OnBoard chips)



Expansion Slots



Expansion Slots

- Used to extend the capabilities of the machine
 - Sound cards (Stereo/Surround/Professional Recording)
 - Video cards (Playback/Capture)
 - 3D Acceleration Graphics cards (GPUs)
- Connected to the SouthBridge
- Fast communications with CPU, and sometimes directly with RAM (DMA)
- Current favourite is “Peripheral Component Interconnect” (PCI), slowly being replaced by PCI-Express

Accelerated Graphics Port (AGP)

- Much faster than PCI
 - Connected directly to NorthBridge
 - Effectively jumps to the front of the queue, in a flash sports car
- Almost exclusively used with graphics, by gamers
- However, PCI Express is faster still, and newer high-end graphics cards use PCIe



Questions?