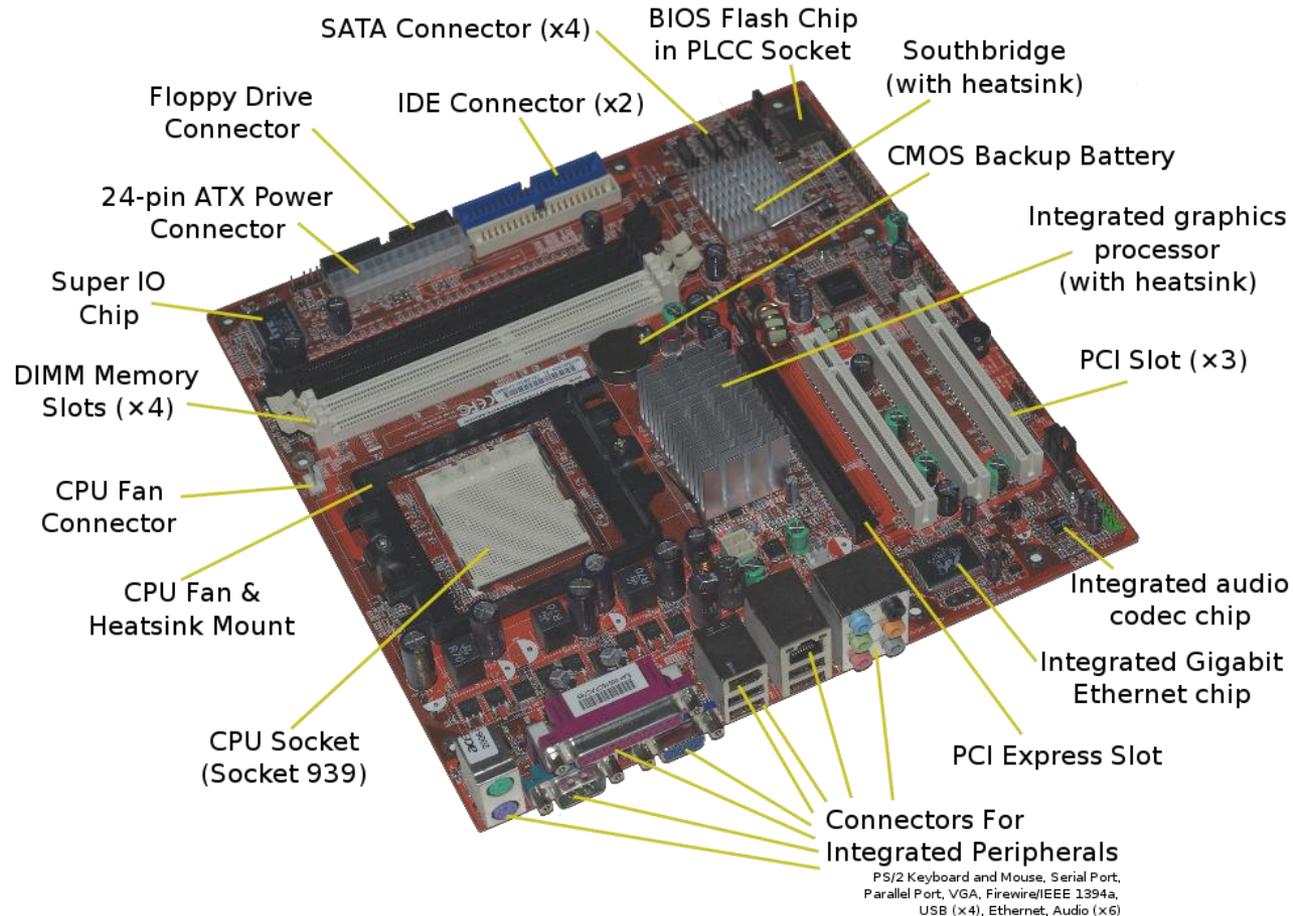


# Computer Hardware

Created by: Joseph Boyd

# Motherboard

In personal computers, a motherboard is the central printed circuit board (PCB) in many modern computers and holds many of the crucial components of the system, providing connectors for other peripherals. The motherboard is sometimes alternatively known as the mainboard, system board, or, on Apple computers, the logic board.[1] It is also sometimes casually shortened to mobo.



# Processor and Heatsink



A microprocessor incorporates the functions of a computer's central processing unit (CPU) on a single integrated circuit, or at most a few integrated circuits. It is a multipurpose, programmable device that accepts digital data as input, processes it according to instructions stored in its memory, and provides results as output. It is an example of sequential digital logic, as it has internal memory. Microprocessors operate on numbers and symbols represented in the binary numeral system. The advent of low-cost computers on integrated circuits has transformed modern society. General-purpose microprocessors in personal computers are used for computation, text editing, multimedia display, and communication over the Internet.

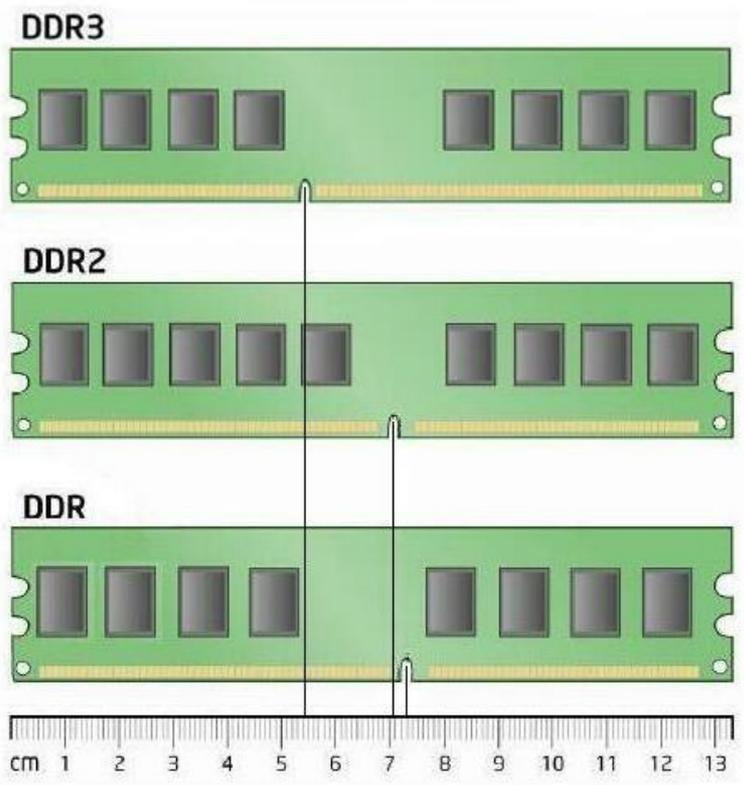
A heat sink is a term for a component or assembly that transfers heat generated within a solid material to a fluid medium, such as air or a liquid. Examples of heat sinks are the heat exchangers used in refrigeration and air conditioning systems and the radiator (also a heat exchanger) in a car. Heat sinks also help to cool electronic and optoelectronic devices, such as higher-power lasers and light emitting diodes (LEDs).

# Processor Types

Special Features	Explanation	Processors Using Feature
<b>Intel Features</b>		
<b>Hyper Threading</b>	The operating system treats the processor as two processors instead of one. This increases the speed of the computer.	Pentium 4, Core i7, Core i5, Core i3
<b>Turbo Boost</b>	Allows the processor to intelligently overclock themselves so long as thermal and electrical requirements are still met.	Core i7, Core i5
<b>Intel QuickPath Interconnect (QPI)</b>	A new Intel technology which replaced Front Side Bus (FSB) -- similar in purpose to AMD's competing HyperTransport technology.	Implemented in some fashion in all Intel core iX series processors
<b>Execute Disable Bit</b>	Prevents certain viruses from infecting the system by labeling some data "executable."	Current Intel processors
<b>vPro</b>	Best for IT people trying to maintain several workstations. It is able to detect systems, even in powered-off states. Synchronizes remote desktop, security, and other multi-station support features. Decreases desk-side maintenance visits.	Core Duo, Core 2 Duo
<b>ViiV technology</b>	Intel's bundle for enhancing multimedia. Supports HD resolutions 720p up to 1080i.	Pentium D, Extreme, Core Duo, Core 2: Duo, Extreme, Quad.
<b>AMD Features</b>		
<b>Hyper Transport</b>	Feature that allows for faster processing speed and better energy efficiency.	Current AMD processors
<b>Cool'n'Quiet</b>	Reduces heat and noise of processors allowing for increased energy efficiency.	Phenom I & II, Athlon, Sempron (with exceptions)
<b>Turbo Core</b>	Turbo Core allows for contextual overclocking of the processor to optimize performance subject to electrical and thermal requirements/specifications.	Phenom II X6
<b>Octo-Core</b>	Eight-core architecture Codenamed as "Bulldozer"	FX 8150
<b>CoolCore</b>	Limits unused elements of the processor such that power is conserved -- allows for increased notebook battery life on a single charge.	Phenom I & II, Turion

Synchronous dynamic random access memory (SDRAM) is dynamic random access memory (DRAM) that is synchronized with the system bus. Classic DRAM has an asynchronous interface, which means that it responds as quickly as possible to changes in control inputs. SDRAM has a synchronous interface, meaning that it waits for a clock signal before responding to control inputs and is therefore synchronized with the computer's system bus. The clock is used to drive an internal finite state machine that pipelines incoming instructions. This allows the chip to have a more complex pattern of operation than an asynchronous DRAM, enabling higher speeds.

Memory	Technology	Rated Clock	Real Clock	Maximum Transfer Rate
PC66	SDRAM	66 MHz	66 MHz	533 MB/s
PC100	SDRAM	100 MHz	100 MHz	800 MB/s
PC133	SDRAM	133 MHz	133 MHz	1,066 MB/s
DDR200	DDR-SDRAM	200 MHz	100 MHz	1,600 MB/s
DDR266	DDR-SDRAM	266 MHz	133 MHz	2,100 MB/s
DDR333	DDR-SDRAM	333 MHz	166 MHz	2,700 MB/s
DDR400	DDR-SDRAM	400 MHz	200 MHz	3,200 MB/s
DDR2-400	DDR2-SDRAM	400 MHz	200 MHz	3,200 MB/s
DDR2-533	DDR2-SDRAM	533 MHz	266 MHz	4,264 MB/s
DDR2-667	DDR2-SDRAM	667 MHz	333 MHz	5,336 MB/s
DDR2-800	DDR2-SDRAM	800 MHz	400 MHz	6,400 MB/s
DDR3-800	DDR3-SDRAM	800 MHz	400 MHz	6,400 MB/s
DDR3-1066	DDR3-SDRAM	1066 MHz	533 MHz	8,528 MB/s
DDR3-1333	DDR3-SDRAM	1333 MHz	666 MHz	10,664 MB/s
DDR3-1600	DDR3-SRAM	1600 MHz	800 MHz	12,800 MB/s



# SDRAM (Synchronous dynamic random- access memory)

# Power Supply

A power supply unit (PSU) supplies direct current (DC) power to the other components in a computer. It converts general-purpose alternating current (AC) electric power from the mains (110 V to 120 V at 60 Hz [115 V nominal] in North America, parts of South America, Japan, and Taiwan; 220 V to 240 V at 50 Hz [230 V nominal] in most of the rest of the world) to low-voltage (for a desktop computer: 12 V, 5 V, 5VSB, 3V3, -5 V, and -12 V) DC power for the internal components of the computer. Some power supplies have a switch to select either 230 V or 115 V. Other models are able to accept any voltage and frequency between those limits and some models only operate from one of the two mains supply standards.

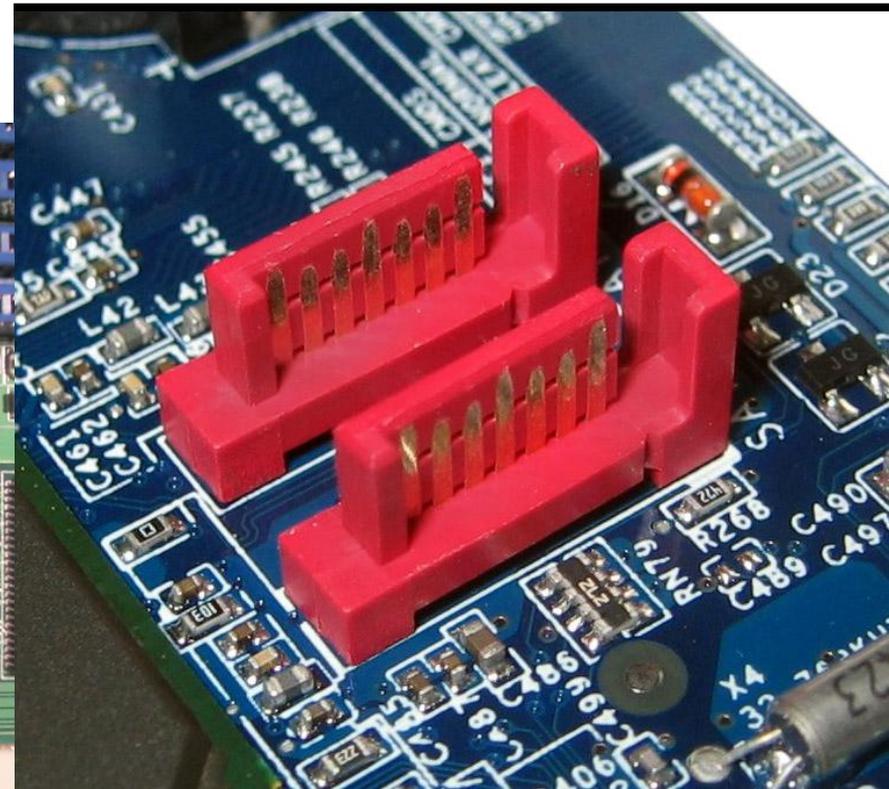
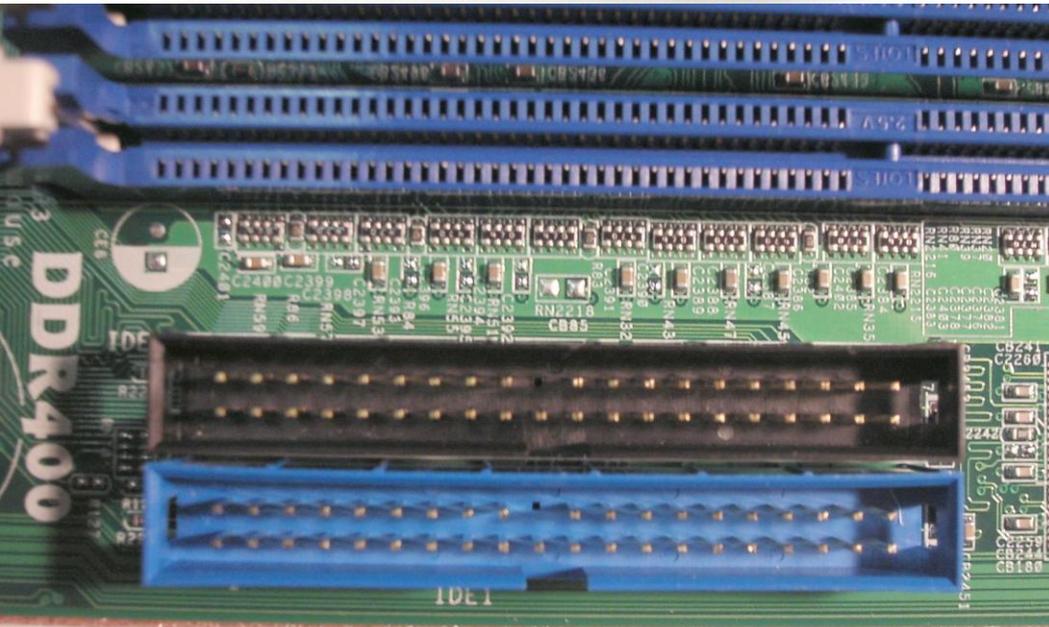
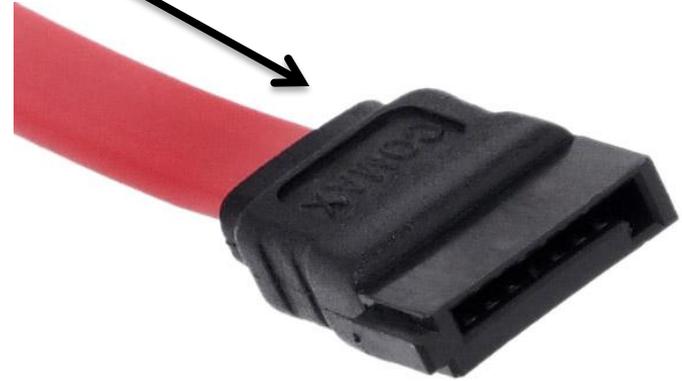


Most modern desktop computer power supplies conform to the ATX form factor. ATX power supplies are turned on and off by a signal from the motherboard. They also provide a signal to the motherboard to indicate when the DC power lines are correct so that the computer is able to boot up. While an ATX power supply is connected to the mains supply it provides a 5 V stand-by (5VSB) line so that the standby functions on the computer and certain peripherals are powered. The most recent ATX PSU standard is version 2.31 of mid-2008.

## Connectors:



# IDE and SATA Connectors



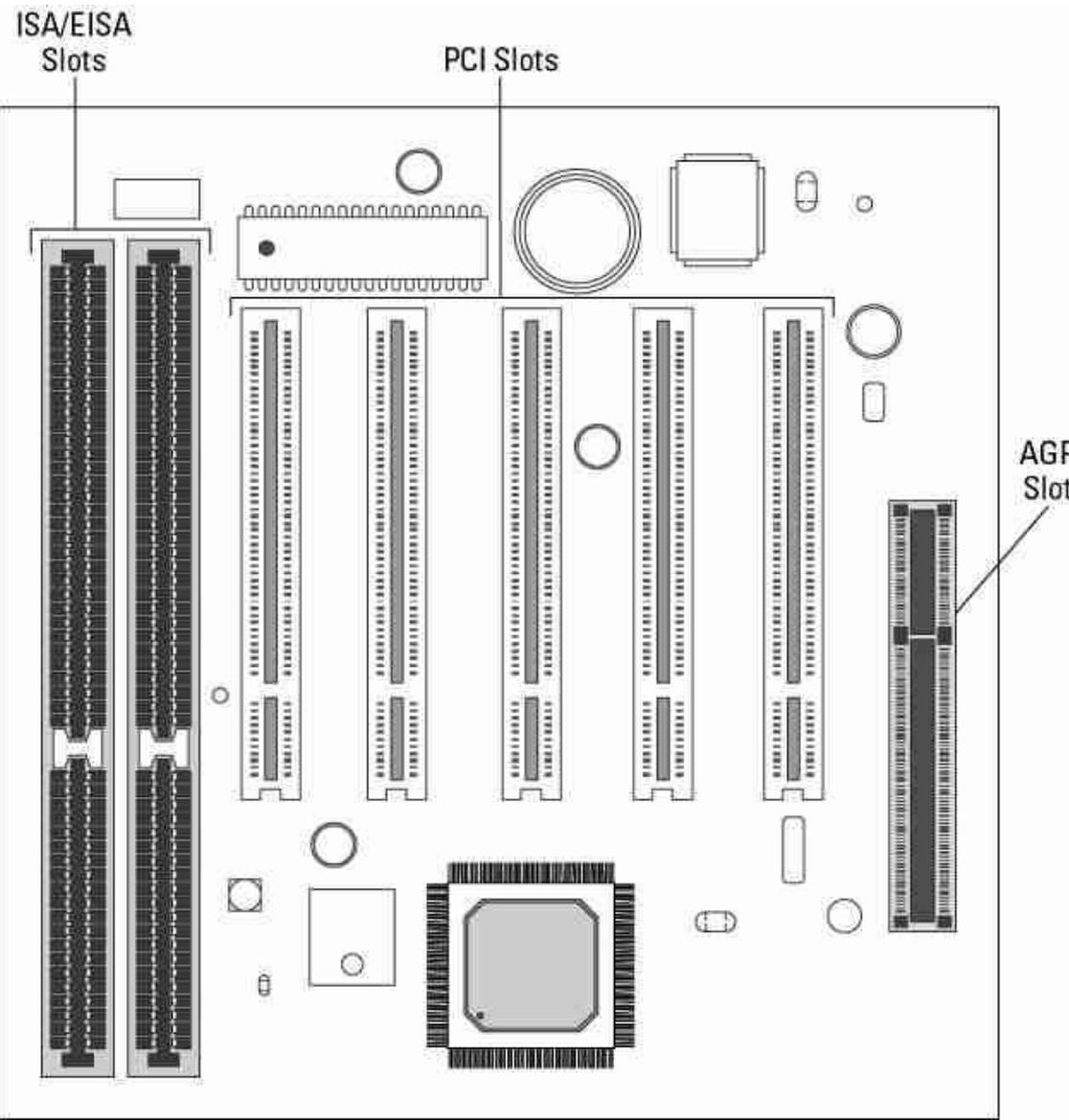
# Serial ATA

Serial ATA (SATA or Serial Advanced Technology Attachment) is a computer bus interface for connecting host bus adapters to mass storage devices such as hard disk drives and optical drives. Serial ATA was designed to replace the older ATA (AT Attachment) standard (also known as EIDE), offering several advantages over the older parallel ATA (PATA) interface: reduced cable-bulk and cost (7 conductors versus 40), native hot swapping, faster data transfer through higher signaling rates, and more efficient transfer through an (optional) I/O queuing protocol.

# Parallel ATA

Parallel ATA cables have a maximum allowable length of only 18 in (457 mm). Because of this limit, the technology normally appears as an internal computer storage interface. For many years ATA provided the most common and the least expensive interface for this application. It has largely been replaced by Serial ATA (SATA) in newer systems.

# Expansion Slot Types



## PCI Express Example Connectors

**x1**

### BANDWIDTH

Single direction: 2.5 Gbps/200 MBps  
Dual Directions: 5 Gbps/400 MBps



**x4**

### BANDWIDTH

Single direction: 10 Gbps/800 MBps  
Dual Directions: 20 Gbps/1.6 GBps



**x8**

### BANDWIDTH

Single direction: 20 Gbps/1.6 GBps  
Dual Directions: 40 Gbps/3.2 GBps



**x16**

### BANDWIDTH

Single direction: 40 Gbps/3.2 GBps  
Dual Directions: 80 Gbps/6.4 GBps



# PCI

Conventional PCI (PCI is an initialism formed from Peripheral Component Interconnect, part of the PCI Local Bus standard and often shortened to PCI) is a computer bus for attaching hardware devices in a computer. These devices can take either the form of an integrated circuit fitted onto the motherboard itself, called a planar device in the PCI specification, or an expansion card that fits into a slot. The PCI Local Bus was implemented in PCs, where it displaced ISA and VESA Local Bus as the standard expansion bus, and it in other computer types. PCI is being replaced by PCI-X and PCI Express, but as of 2011, many motherboards are still made with one or more PCI slots

# AGP

The Accelerated Graphics Port (often shortened to AGP) is a high-speed point-to-point channel for attaching a video card to a computer's motherboard, primarily to assist in the acceleration of 3D computer graphics. Since 2004 AGP has been progressively phased out in favor of PCI Express (PCI-e). By mid-2009 PCI-e cards dominated the market; AGP cards on motherboards were still produced, but OEM driver support was minimal.

# PCI-e

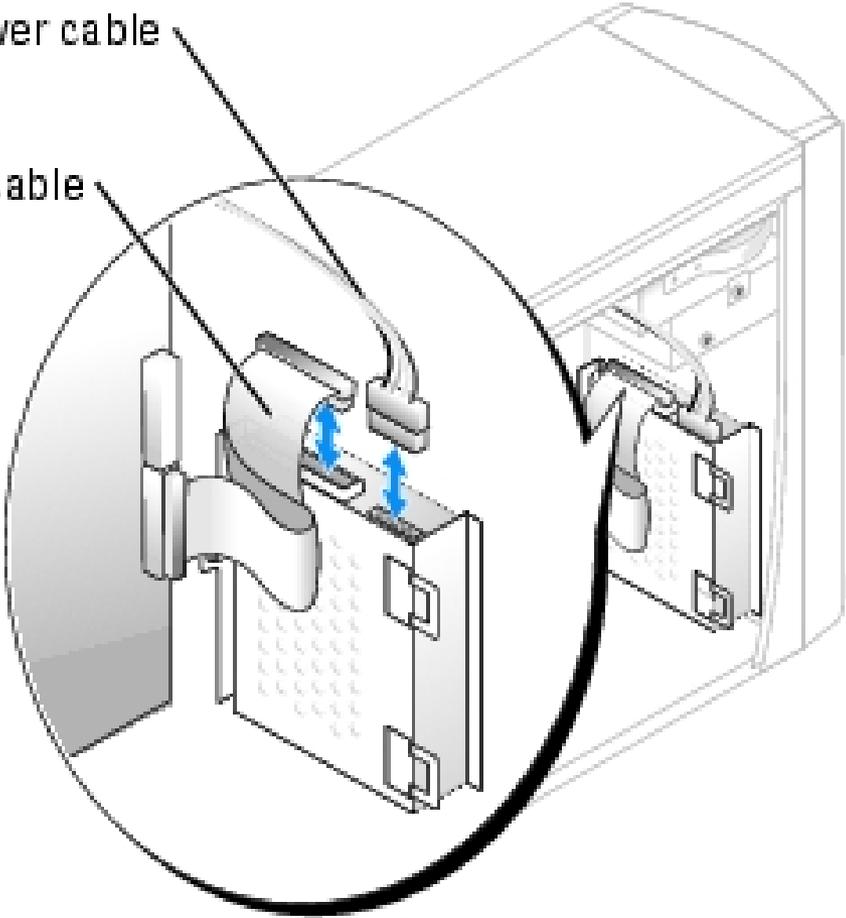
PCI Express (Peripheral Component Interconnect Express), officially abbreviated as PCIe, is a computer expansion card standard designed to replace the older PCI, PCI-X, and AGP bus standards. PCIe has numerous improvements over the aforementioned bus standards, including higher maximum system bus throughput, lower I/O pin count and smaller physical footprint, better performance-scaling for bus devices, a more detailed error detection and reporting mechanism, and native hot plug functionality. More recent revisions of the PCIe standard support hardware I/O virtualization.

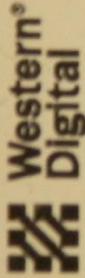
Not-inter-compatible

REMOVING THE Hard Drive Disk



power cable  
data cable



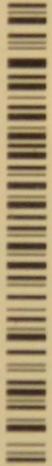


www.westerndigital.com

WD Caviar

Enhanced IDE Hard Drive

Drive Parameters: LBA 117187500

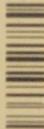


S/N: WMA8F2969700

MDL: WD600BB - 75CAA0  
DATE: 01 MAR 2003  
DCM: DSEHNA2AH



DS/N MY - 00X439 - 12555 - 331 - 03QN



Rev A00

DP/N 00X439

C/D MY



HDD S/N: WD - WMA8F2969700



LR68850



E101550



M3565



E-NH1-11-000

DO NOT COVER ANY DRIVE HOLES  
FRAGILE

WD6000

60.0 GB

5VDC --- 0.80A  
12VDC --- 0.45A

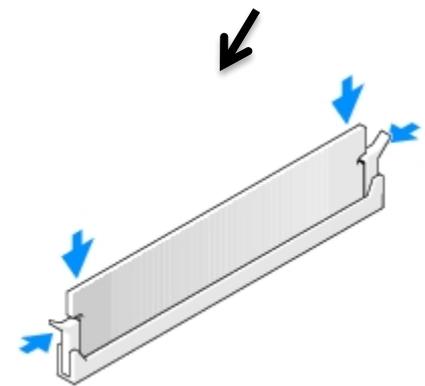
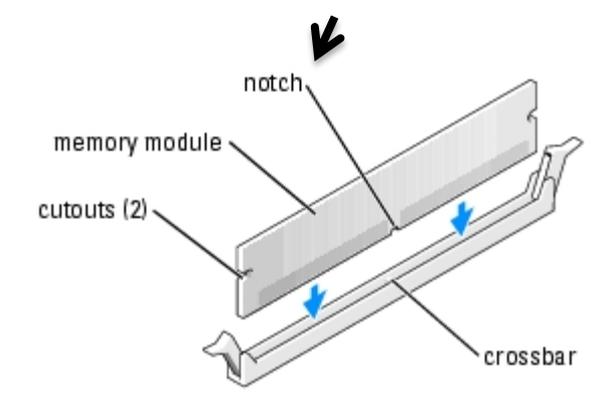
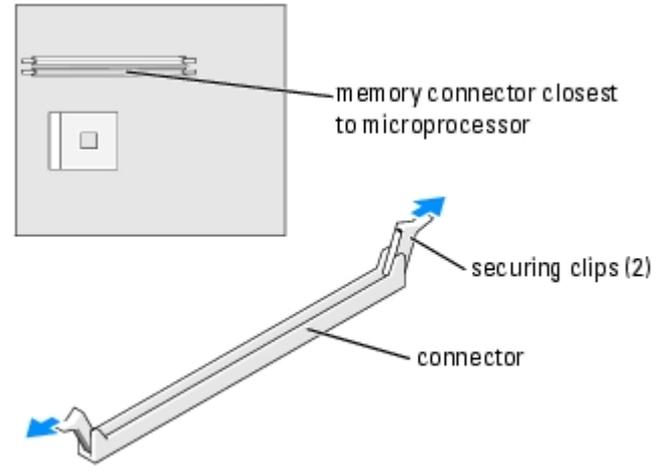
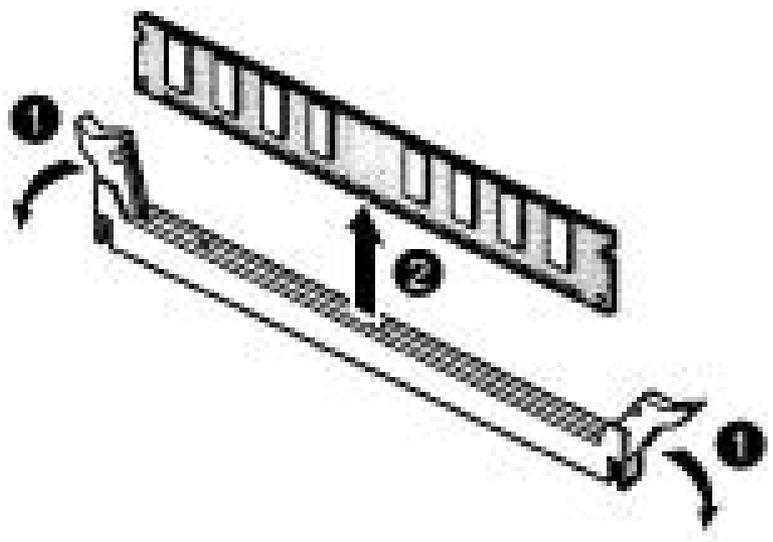
Product of Malaysia

Product warranty will be void if seal, label or cover is removed or damaged

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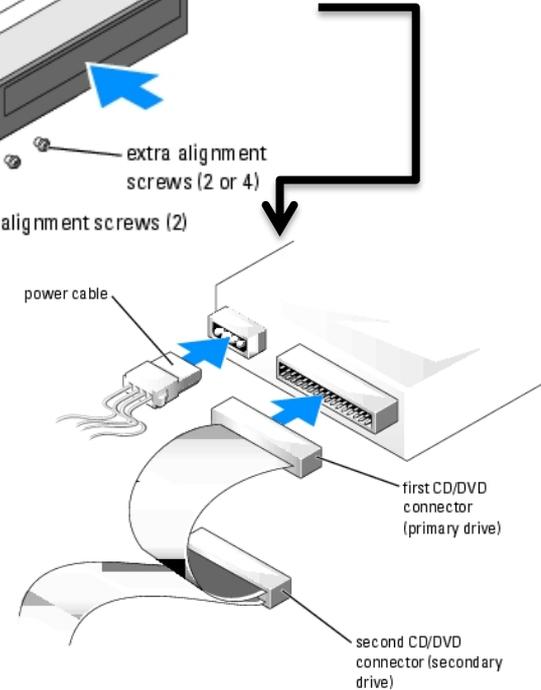
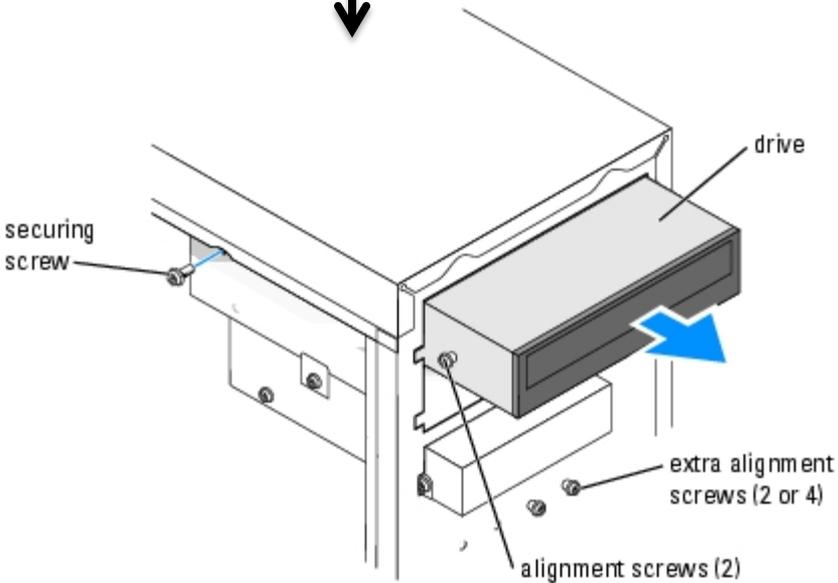
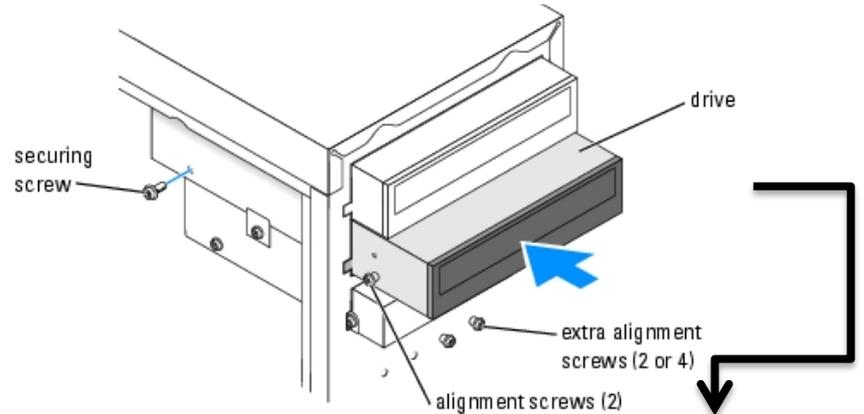
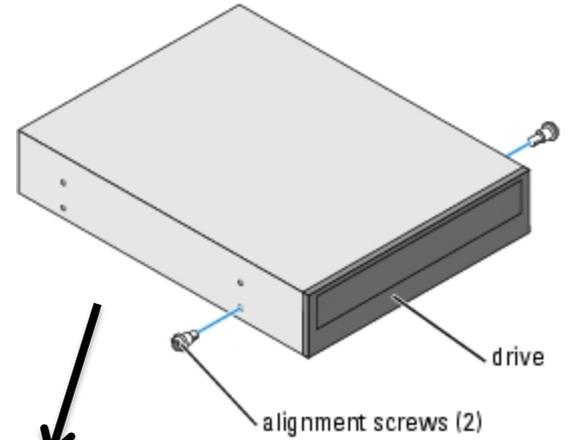
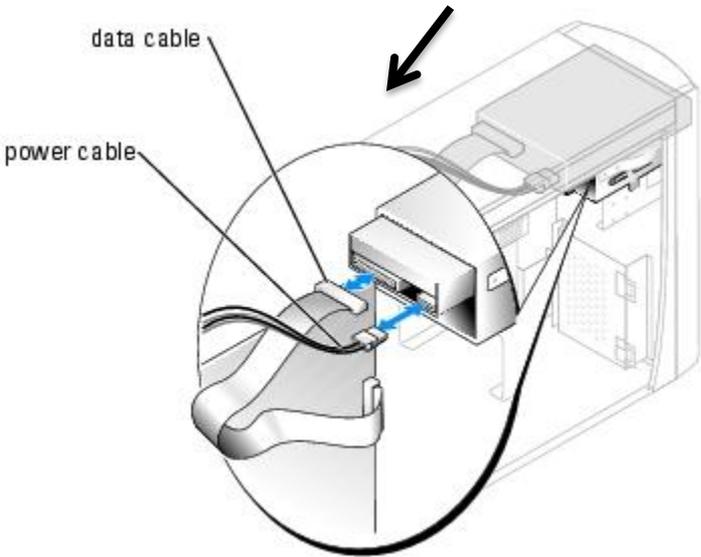
APL

# REMOVAL AND INSTALLATION OF RAM



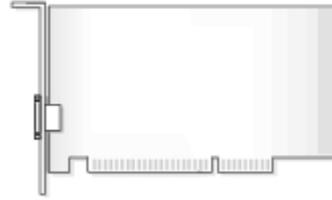


# Removing and Installing CD/DVD Drive

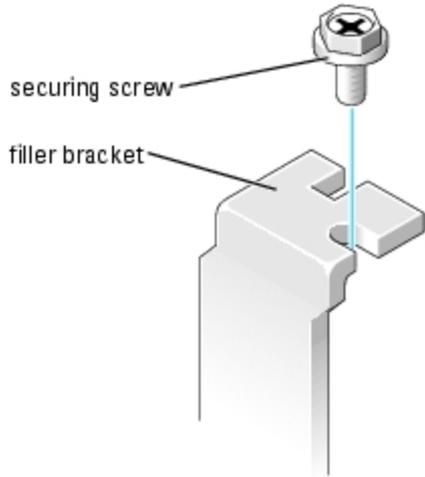




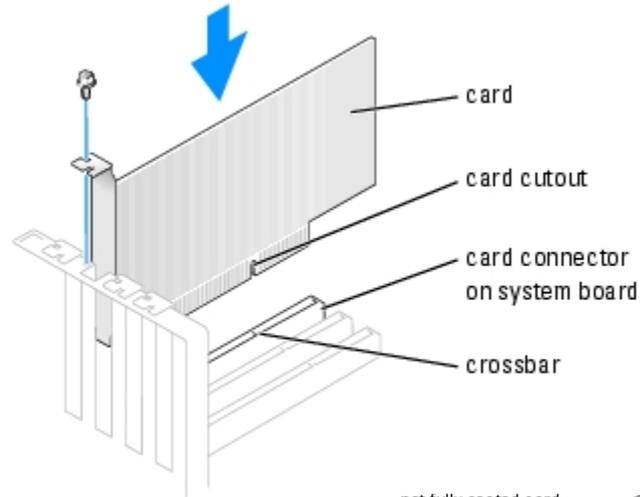
# Installing PCI Cards



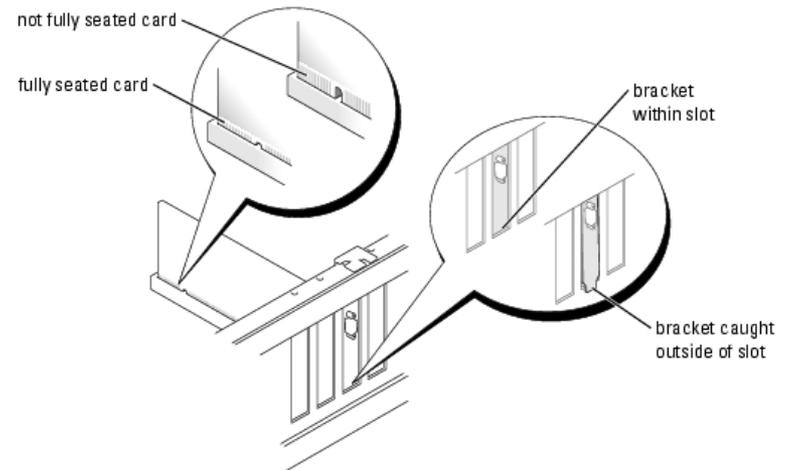
1.



2.



3.



4. Use the securing screw to attach the card firmly to the case and motherboard.