

Chapter 3

A Top-Level View of Computer Function And Interconnection – Part 04

Dr. Mostafa Elhosseini

PCI

| Agenda

-  Intro
-  ISA Bus
-  PCI
-  Different version of PCI

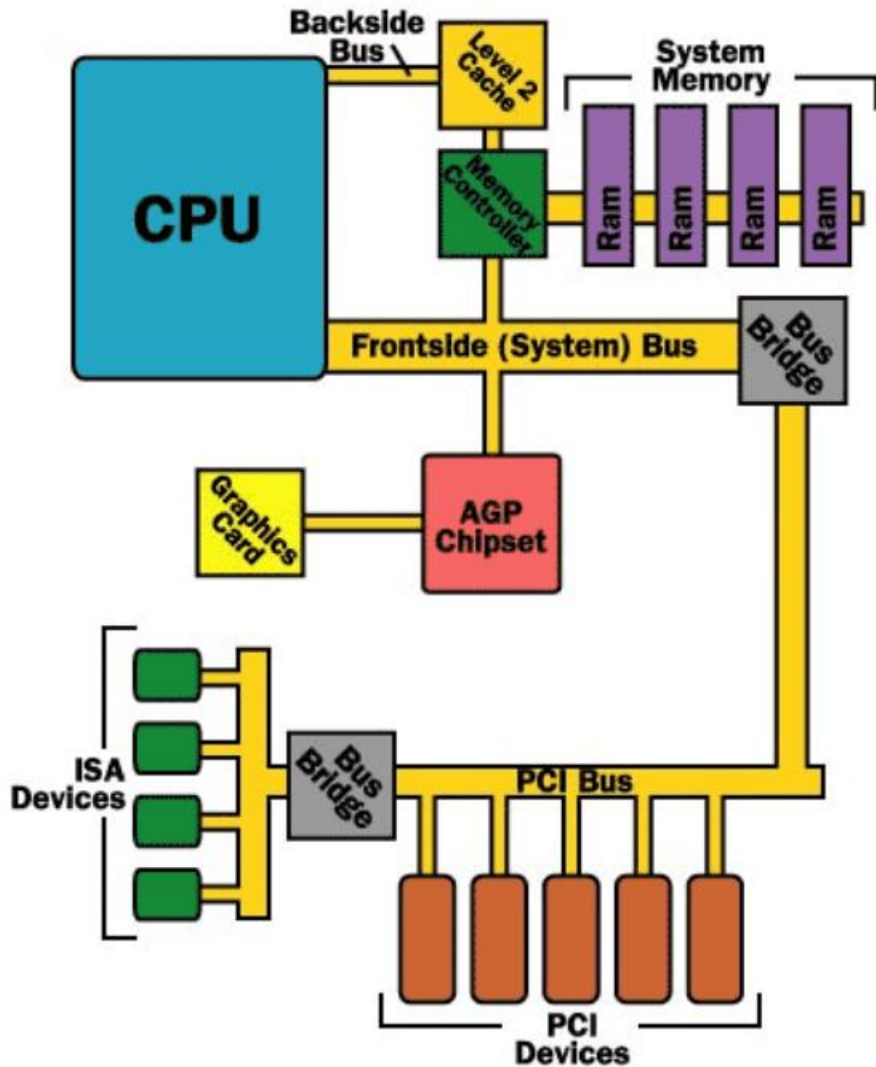
| Intro...

- Essentially, a bus is a channel or path between the components in a computer.
- Having a high-speed bus is as important as having a good transmission in a car.
 - If you have a 700-horsepower engine combined with a cheap transmission, you can't get all that power to the road.
- There are many different types of buses

| Bus

- Connect components to the computer's processor.
 - Hard disks, memory, sound systems, video systems
 - To see what your computer is doing, you normally use a CRT or LCD screen
- You need special hardware to drive the screen, so the screen is driven by a graphics card.
- A graphics card is a small printed circuit board designed to plug into the bus.
- The graphics card talks to the processor using the computer's bus as a communication path.

| Peripheral Component Interconnect PCI



| ISA Bus

- The original PC bus in the original IBM PC was 16 bits wide and operated at 4.77 MHz
- It officially became known as the **ISA bus**.
- This bus design is capable of passing along data at a rate of up to **9 MBps** (megabytes per second) or so, fast enough even for many of today's applications.

| EISA – VL Bus

- As technology advanced and the ISA bus failed to keep up, other buses were developed.
 - Extended Industry Standard Architecture (EISA) , and
 - Vesa Local Bus (VL-Bus).
 - VL-Bus was typically used only for connecting a graphics card, a component that really benefits from high-speed access to the CPU

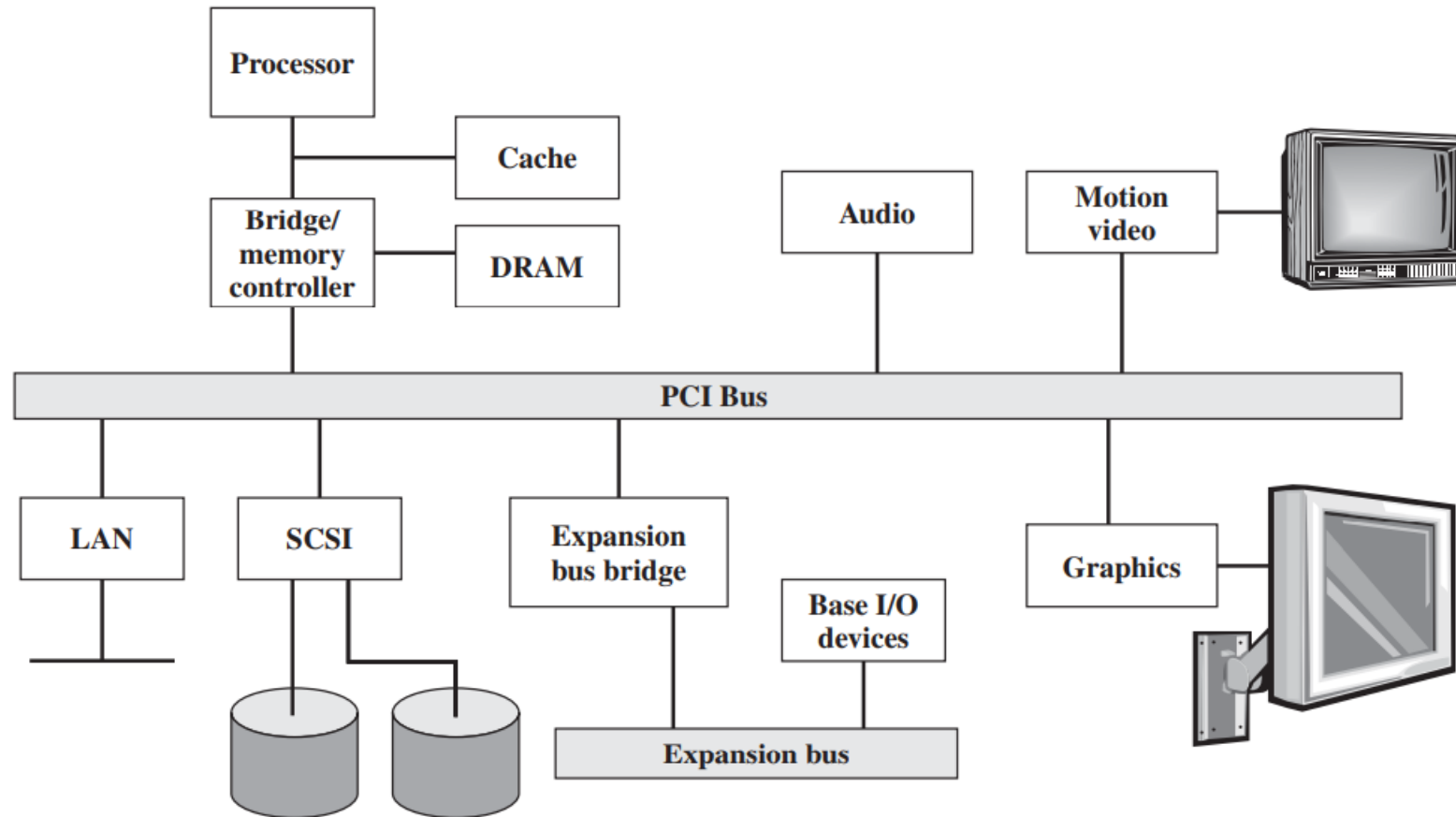
| Peripheral Component Interconnect PCI

- The PCI bus is an internal synchronous bus for interconnecting chips, expansion boards, and processor/memory subsystems.
- The peripheral component interconnect (PCI) is a popular high-bandwidth, processor-independent bus that can function as a mezzanine or peripheral bus.
- Compared with other common bus specifications, PCI delivers better system performance for high-speed I/O subsystems (e.g., graphic display adapters, network interface controllers, disk controllers, and so on).

| Peripheral Component Interconnect PCI

- The original PCI bus had a width of 32 bits and a frequency of 33 MHz
- PCI 64 bits have a transport speed of 33 MHz and work at 264 MBps.
- PCI 64 bits have a transport speed of 66 MHz and work at 512 MBps.
- PCI 64 bits have a transport speed of 66 MHz and work at 1 GBps.

| Peripheral Component Interconnect PCI



| Peripheral Component Interconnect PCI

- A combined DRAM controller and bridge to the PCI bus provides tight coupling with the processor and the ability to deliver data at high speeds.
- The bridge acts as a data buffer so that the speed of the PCI bus may differ from that of the processor's I/O capability
- The use of bridges keeps the PCI independent of the processor speed yet provides the ability to receive and deliver data rapidly

| Peripheral Component Interconnect PCI

- The original PCI standard required 5 V power and signal levels. As the standard evolved, the option for 3.3 V was added. The latest standard provides for 3.3 V only.
- The 32-bit PCI connector has 62 pins and 124 contacts (62 per side).
- Thirty-two of the contacts are used for both a 32-address and 32 bits of data, which are multiplexed.
- The remaining pins are used for command-and-control signals, power, ground, etc.
- A 64-bit PCI connector has an additional 32 pins for a total of 94. The 32-bit PCI connector is shown in Figure 13–55. It has 64 pins of which 62 are used.

PCI

PIN	SIDE A	SIDE B	
1	-12 V	TRST#	JTAG port pins
2	TCK	+12 V	
3	Gnd	TMD	
4	TDO	TDI	
5	+5 V	+5 V	Interrupt lines
6	+5 V	INTA#	
7	INTB#	INTC#	
8	INTD#	+5 V	
9	PRSNT1#	Reserved	Indicates 7.5 or 24 W power
10	Reserved	IOPWR	+5 V or +3.3 V
11	PRSNT1#	Reserved	Indicates 7.5 or 24 V power
12	Gnd	Gnd	Key notch for 3.3 V cards
13	Gnd	Gnd	
14	Reserved	3.3 Vaux	
15	Gnd	RST#	
16	CLK	IOPWR	33 MHz/66 MHz clock
17	Gnd	GNT#	Bus grant motherboard to card
18	REQ#	Gnd	Bus request card to motherboard
19	IOPWR	PME#	Power management event/3.3 V
20	AD[31]	AD[30]	Address/data bus
21	AD[29]	+3.3 V	
22	Gnd	AD[28]	
23	AD[27]	AD[26]	
24	AD[25]	Gnd	
25	+3.3 V	AD[24]	
26	C/BE[3]#	IDSEL	
27	AD[23]	+3.3 V	
28	Gnd	AD[22]	
29	AD[21]	AD[20]	
30	AD[19]	Gnd	
31	+3.3 V	AD[18]	
32	AD[17]	AD[16]	

33	C/BE[2]#	+3.3 V	Bus transfer in progress
34	Gnd	FRAME#	
35	IRDY#	Gnd	
36	+3.3 V	TRDY#	
37	DEVSEL#	Gnd	Target ready
38	Gnd	STOP#	Target selected
39	LOCK#	+3.3 V	Target halt request
40	PERR#	SMBCLK	Locked transaction
41	+3.3 V	SMBDAT	Parity error/SMBus clock
42	SERR#	Gnd	SMBus data
43	+3.3 V	PAR	System error
44	C/BE[1]#	AD[15]	Even parity over AD bus
45	AD[14]	+3.3 V	
46	Gnd	AD[13]	
47	AD[12]	AD[11]	
48	AD[10]	Gnd	Address/data bus
49	MGGEN/Gen	AD[09]	
50	Gnd	Gnd	
51	Gnd	Gnd	
52	AD[08]	C/BE[0]#	Key notch for +5 V cards
53	AD[07]	+3.3 V	
54	+3.3 V	AD[06]	
55	AD[05]	AD[04]	
56	AD[03]	Gnd	Address/data bus
57	Gnd	AD[02]	
58	AD[01]	AD[00]	
59	IOPWR	IOPWR	
60	ACK64#	REQ64#	For 64-bit expansion
61	+5 V	+5 V	
62	+5 V	+5 V	
63			
64			

| PCI Versions

- The PCI-X Bus
- The PCI-Express Bus