

6th Nov 2015 wk 6

4 pm COMPUTER SYSTEMS

Jed Gibbs
for
Charlton Rodda

BUSES

Bus width determines Max. memory of the system
Usually up to 32k ??

Control Bus

Allows/denies each CPU to have 'bus master' access to the I/O to output / disk drives etc.



Busses - parallel lines on circuit board, ribbon cables or row of pins on pci card

Old ISA bus standard permitted 2/3 party add-ons.

ISA expansion bus \approx 100 MB/s fine for modems, SCSI, serial. Fast bus needed for system functions.

ISA began 8 bit, then 16 bit from 1984. linked to CPU speeds.

TRIPLE BUS	1 - System	RAM + CPU
	2 - Fast	Graphics cards, gigabit ethernet LAN
	3 - Slow	modem, serial

Slide: example Synchronous Timing Diagram

Complex and slow.

PCI Bus Peripheral Component Interconnection

Intel early 1990's, 32 bit (or 64 bit for servers)

Requires handshake protocol so a card can take over the bus, use it and release it.

USB Universal Serial Bus.

Ideal for low speed I/O Devices

Expandable up to 127 devices

Simple configuration and design, easy to manufacture -
(4^{wires} in all)

Four kinds of 'frames' or modes. inc. 'bulk'

PCIe: PCI express

2 to 32 channels per bus.

small slot with 1 lane 1 GB/s

16 lanes for graphics card = 5.6 GB/s

PCIe mini for laptops.

Hard Disk Busses

- IDE 1 or 2 Devices
 - SATA serial bus 1.5 → 3 GB/s
 - SCSI now mainly SAS (scsi parallel) SAS is serial SCSI
 - Fibre channel (older) 126 devices, good for long distances, 126 devices
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SCSI upto 320 MB/s

SAS = Serial Attached SCSI

fast serial SCSI uses IP protocol so can be networked
compatible with latest SATA,

SSDs so much faster - use PCIe

NVM express - fast, supports long command queue (64k)

SAN - Storage Area Network. (NOT NAS which is more domestic)

scalable, typically need server switches,
caching, many terabytes appearing as one device.

FIBRE Channel

Fibre-channel SCSI 2 Gbit/s approx 200 MB/s

external drive test by KIRK - e-sata approx
twice as fast as USB-2. USB 3 same speed as
e-sata (so presumably as fast as drive could
transmit).

I2C simple 2 wire bus for small peripherals
such as sensors and fans. 1 clock wire, 1 signal.
www.i2c-bus.org/i2c-primer/ data
- send and
receive

READING: Stallings ch. 3

also see SPI bus

see slide for links.

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