

Chapter 2: How Hardware and Software Work Together

Objectives

In this chapter, you will learn:

- How hardware and software interact
- How system resources help hardware and software communicate

System Resources Defined

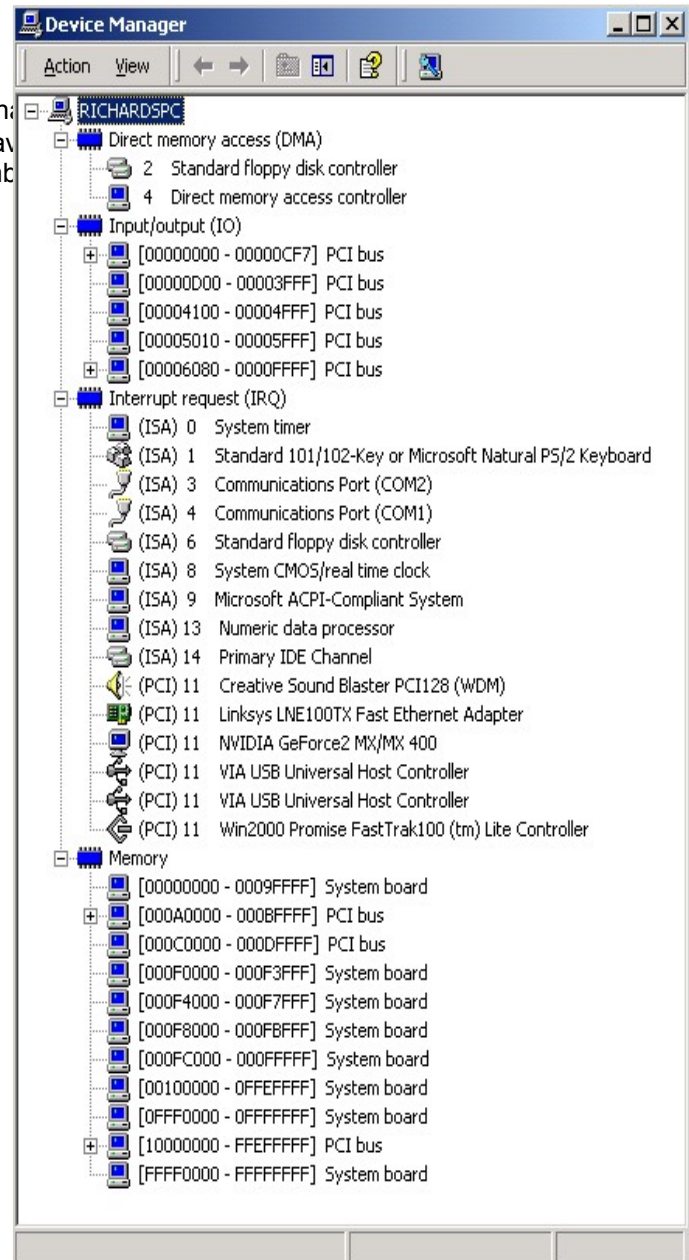
- **IRQ** – A line of a system board bus that a hardware device needs attention. Some lines have multiple devices. Each IRQ line is identified by a single number.

What is wrong with Polling?

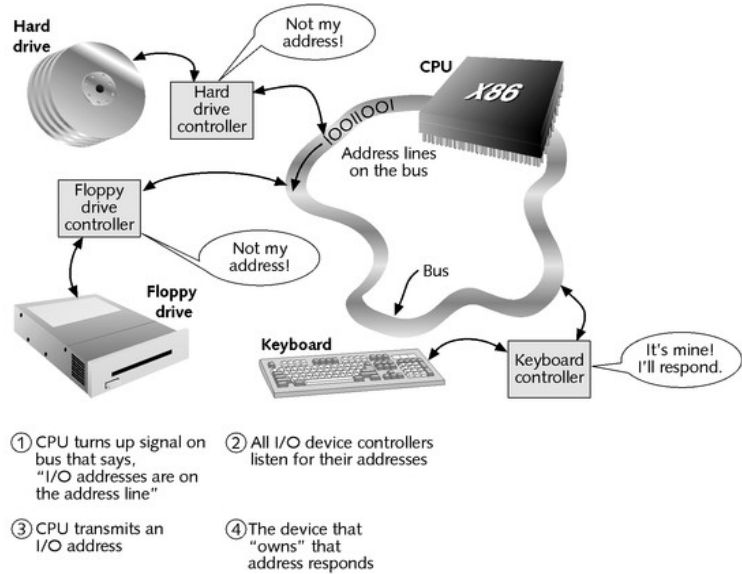
IRQ sharing.

Start counting from 0, not 1

The IRQ vector table



- **I/O Address** – Numbers assigned to hardware devices that software uses to get devices' attention and to interact with them. Each device "listens" for these numbers and responds to the ones assigned to it.



- **Memory Addresses** – Numbers that are assigned to physical memory located either in RAM or ROM chips. Software can then access this memory by using these addresses.

- **DMA Channel** – A number designating a channel whereby the device can pass data to memory without involving the CPU. Think of a DMA channel as a shortcut for data moving to/from the device and memory.

1. What is another name for I/O address?
2. List the four main categories of system resources.
3. What feature of Windows simplifies viewing the allocation of system resources?

Converting Hex to Binary to Decimal

Dec	Binary	Hex	128	64	32	16	8	4	21
1	0001	1							
2	0010	2							
3	0011	3							
4	0100	4							
5	0101	5							
6	0110	6							
7	0111	7							
8	1000	8							
9	1001	9							
10	1010	A							
11	1011	B							
12	1100	C							
13	1101	D							
14	1110	E							
15	1111	F							

Terms:

DMA (direct memory access) controller chip — A chip that resides on the system board and provides channels that a device may use to send data directly to memory, bypassing the CPU.

Hardware interrupt — An event caused by a hardware device signaling the CPU that it requires service.

Interrupt handler — A program (either BIOS or a device driver), that is used by the CPU to process a hardware interrupt.

Interrupt vector table — A table that stores the memory addresses assigned to interrupt handlers. Also called a vector table.

I/O addresses — Numbers that are used by devices and the CPU to manage communication between them.

IRQ (interrupt request number) — A line on a bus that is assigned to a device and is used to signal the CPU for servicing. These lines are assigned a reference number (for example, the normal IRQ for a printer is IRQ 7).

Polling — A process by which the CPU checks the status of connected devices to determine if they are ready to send or receive data.

System BIOS — Basic input/output system chip(s) residing on the system board that control(s) normal I/O to such areas as system memory and floppy drives. Also called on-board BIOS.