Input/output Channel

IBM370

ꙮ *I/O Channel* is a line of communication between the I/O Bus or memory to the CPU or computer peripherals.

ꙮ I/O Processor in the **IBM 370** computer is called a **Channel**.

ꙮ Each System configures a number of channels & attached with One or more Input/output devices.

ꙮ CPU communicates directly with the channels via dedicated Control Lines & indirectly via reserved storage areas in memory.

Types of Channels :

Multiplexer :

- ✓ Connected to Slow & Medium Speed Devices
- ✓ Capable of operating with a no.of devices simultaneously.

Selector :

- ✓ Designed to handle one I/O operation at a time.
- ✓ Commonly used to control one High Speed Device.

Block-Multiplexer :

- ✓ Combinational features of Multiplexer and Selector.
- ✓ Can connect a no.of high speed devices, but transfer as entire block of data.

Instruction Format

Operation Code	Channel Address	Device Address

Operation Code :

‼ Specifies one of the 8 I/O instructions. Such as :

- ➤ Start I/O
- ➤ Start I/O fast release
- ➤ Test I/O
- ➤ Clear I/O
- ➤ Half I/O
- ➤ Half Device
- ➤ Test Channel
- ➤ Store channel identification

‼ Channel & Device Address :

- ➤ Respond to each of the I/O instructions & executes it.
- ➤ Sets one of the 4 condition codes in the processor register called PSW.
- ➤ In general it specifies the whether the channel or the device is busy.
- ➤ If the I/O operation had successfully started ,and whether the status word was stored in memory by the channel.

Channel Status Word Format

Key	Address	Status	Count

➢ Key is a protection technique used to prevent from other users to use it.
➢ Address field in the status word gives the address of the last command used by the channel.
➢ Status field identifies the error occurred during the transfer.
➢ The count field gives the residual count when the transfer was terminated & shows Zero when the transfer is successfully done.
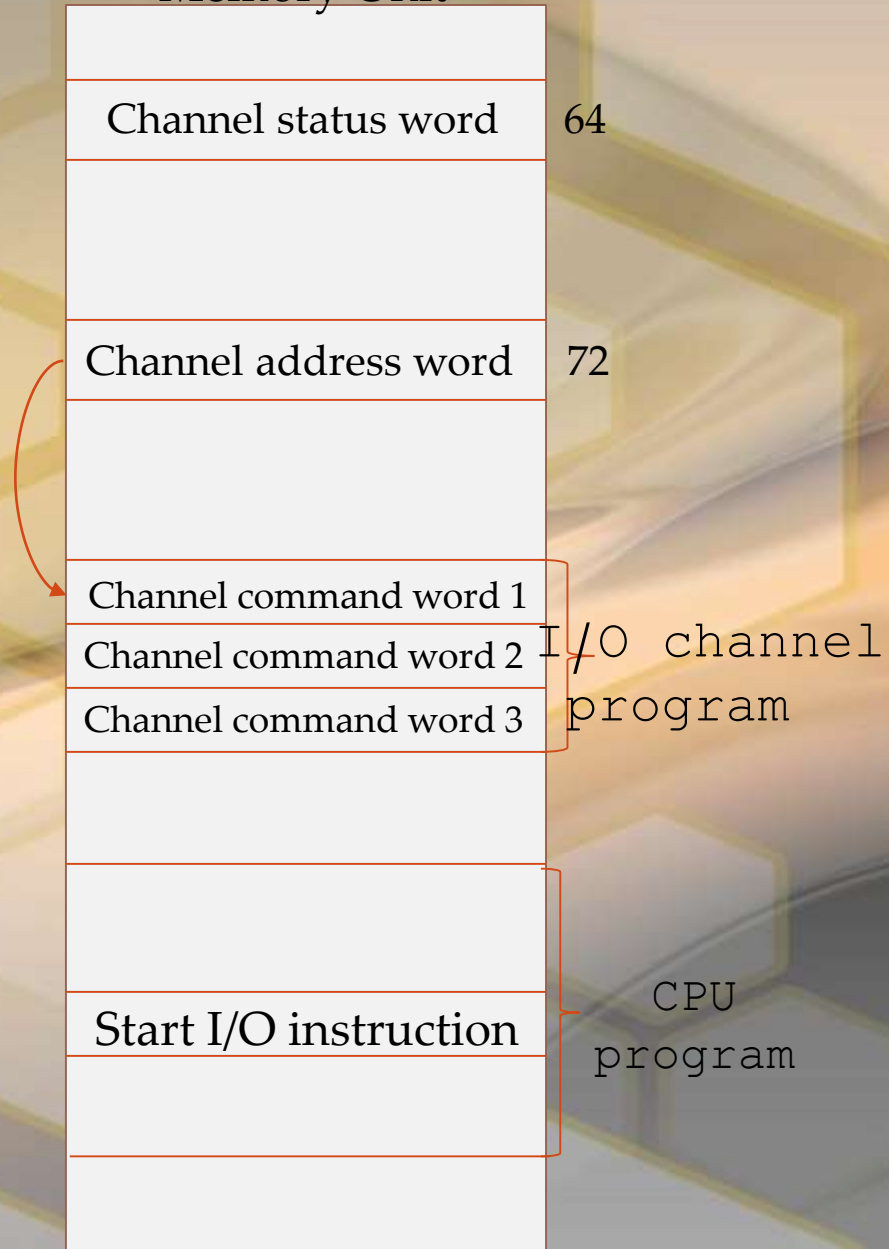
Command Code	Data Address	Flags	Count

➢ Data address specifies the first address of a memory buffer & count gives the no.of bytes used in the transfer.
➢ Command specifies an I/O operation & Flag bits provides additional information for the channel.

➤ Command field operates with one of the six basic types of I/O operations:

❖ *Write* – transfer data from memory to I/O device

❖ *Read* – transfer data from I/O device to memory

❖ *Read backward* – read magnetic tape in backward direction

❖ *Control* – process such as rewinding or disk access management

❖ *Sense* – informs the channel to transfer its status word to memory location.

❖ *Transfer* – gives the command word to be next executed.

Location of information in memory for I/O operations in IBM 370

Memory Unit

Channel status word	64
Channel address word	72
Channel command word 1	
Channel command word 2	I/O channel
Channel command word 3	program
Start I/O instruction	CPU
	program

The operation begins when the CPU program encounters a start I/O instruction. The IOP the goes to memory location 72 to obtain a channel address word. This word contains the starting address of the I/O channel program. The channel the proceeds to execute the program specified by the channel command words. The channel constructs a status word during the transfer and stores it I the location 64. Upon interruption, the CPU can refer to memory location 64 for the status word.

Thank You!

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