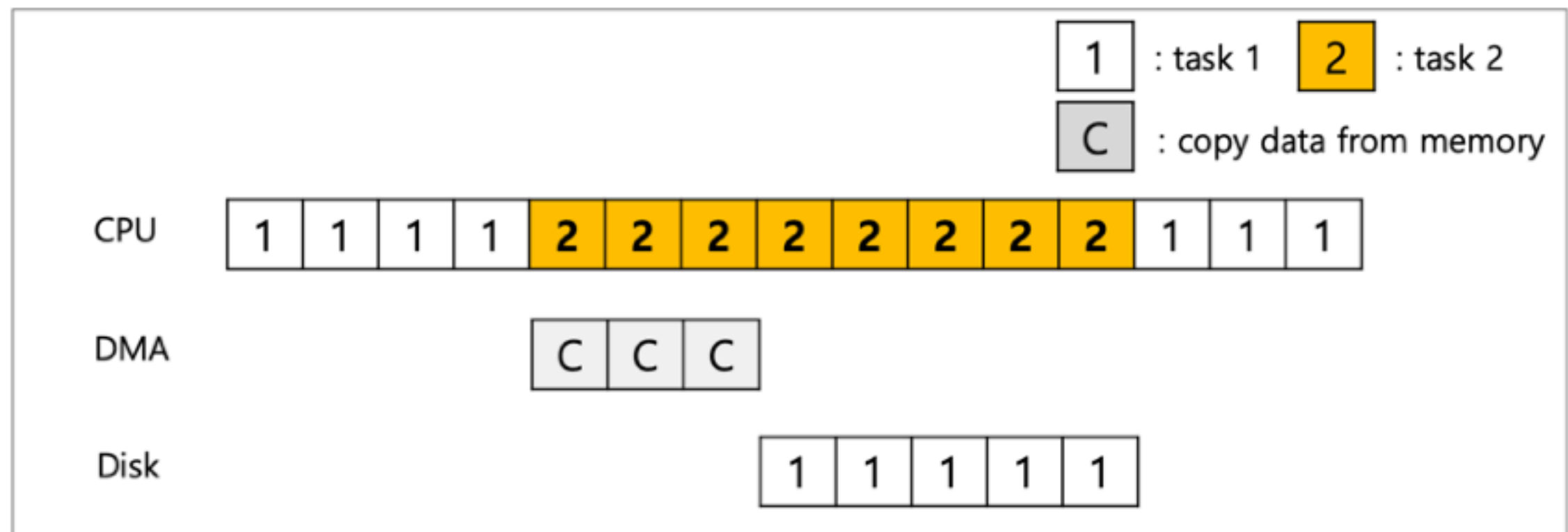# DMA (Direct Memory Access)

1. OS writes DMA command block into memory

2. DMA bypasses CPU to transfer data directly between I/O device and memory

3. When completed, DMA raises an interrupt

Diagram of CPU utilization by DMA

Example : IDE disk read with DMA

1. device driver is told to transfer disk data to buffer at address X

2. device driver tells disk controller to transfer C bytes from disk to buffer at address X

CPU

cache

5. DMA controller transfers bytes to buffer X, increasing memory address and decreasing C until C = 0

6. when C = 0, DMA interrupts CPU to signal transfer completion

DMA/bus/ interrupt controller

CPU memory bus

memory ^{x} buffer

PCI bus

IDE disk controller

3. disk controller initiates DMA transfer

4. disk controller sends each byte to DMA controller

disk disk

disk disk