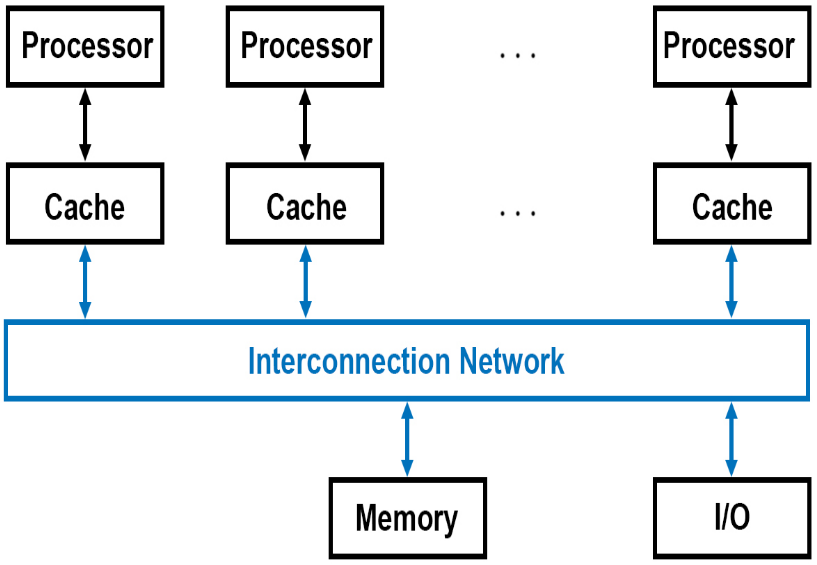
The video and the CYU problems that follow assume a multiprocessor without an L2 cache as shown below:



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CACHE COHERENCE

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2:03 / 2:03 1.0x

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1. CHECK YOUR UNDERSTANDING (1/1 point)

Which one of the following scenarios would produce a stale copy of block A in the cache of CPU 2?

- CPU 1 reads block A from memory then CPU 2 reads block A from memory.
- CPU 2 reads block A from memory then CPU 1 reads block A from memory.
- [✓ CPU 1 reads block A from memory, CPU 2 reads block A from memory, then CPU 1 writes to block A in its cache.] ✓
- CPU 2 reads block A from memory, CPU 2 writes to block A in its cache, then CPU 1 reads block A from memory.

EXPLANATION

In the first two scenarios, both CPUs have read the same block from memory so they are the same.

In the third scenario, after both CPUs read the data, CPU 1 writes the data, creating a stale copy of the block in the cache of CPU 2.

In the fourth scenario, CPU 2 writes the block and then CPU 1 obtains a stale copy.

Final Check Save Hide Answer *You have used 1 of 2 submissions*

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MESI SOLUTION

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2. CHECK YOUR UNDERSTANDING (1/1 point)

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Consider the application of the MESI cache coherence protocol when CPU 1 and CPU 2 both have a copy of block A in the *Shared* state. CPU 1 writes to the block after which CPU 2 reads it. Which of the following actions will be taken to ensure that CPU 2 does not end up reading a stale copy of the data?

- [✓ Before CPU 1 writes to the block, it will first send an *Invalidate A* message to CPU 2.] ✓
- Before CPU 1 writes to the block, it will first erase the stale copy in memory.
- Before CPU 2 reads the block, it will first send an *Invalidate A* message to CPU 1.
- Before CPU 2 reads the block, it will change its state to *Invalid*.

EXPLANATION

According to the MESI protocol, CPU 1 must invalidate other copies before writing to a block that is marked as *Shared*. When CPU 2 reads the block, because its state is *Invalid*, it will miss, and CPU 1 will provide the block, since it has the most up to date copy.

Final Check | **Save** | **Hide Answer** *You have used 1 of 2 submissions*

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