

# Overview of the Java Memory Model



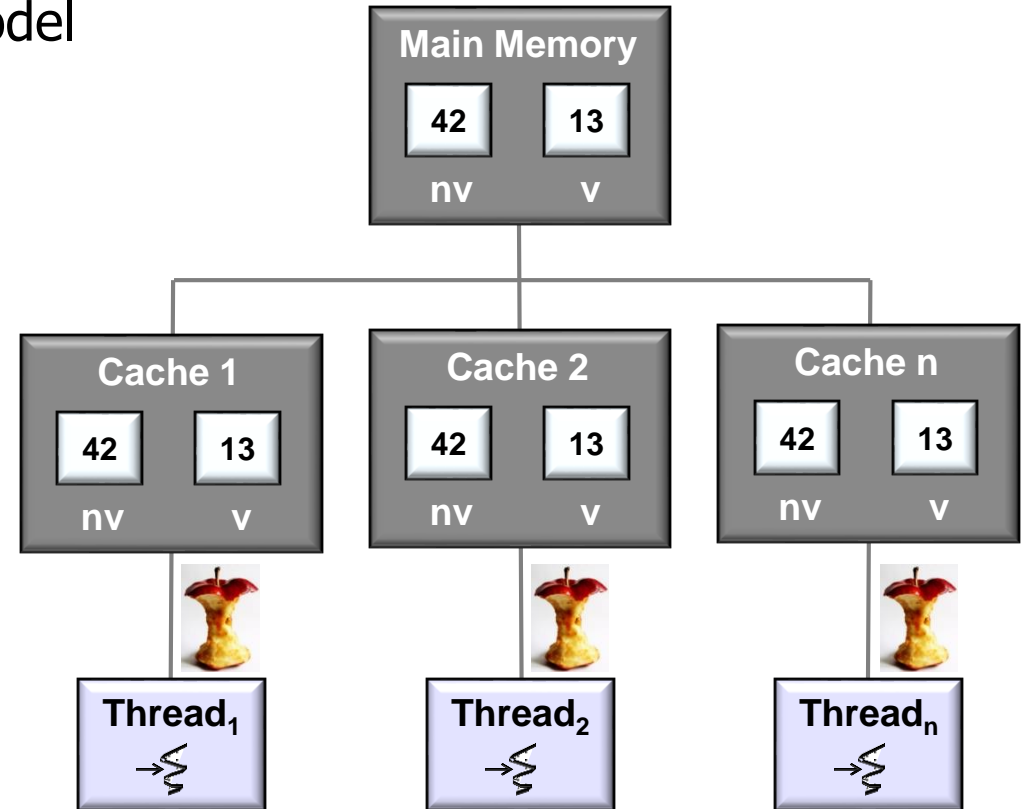
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# Learning Objectives in this Part of the Lesson

- Be aware of the Java memory model

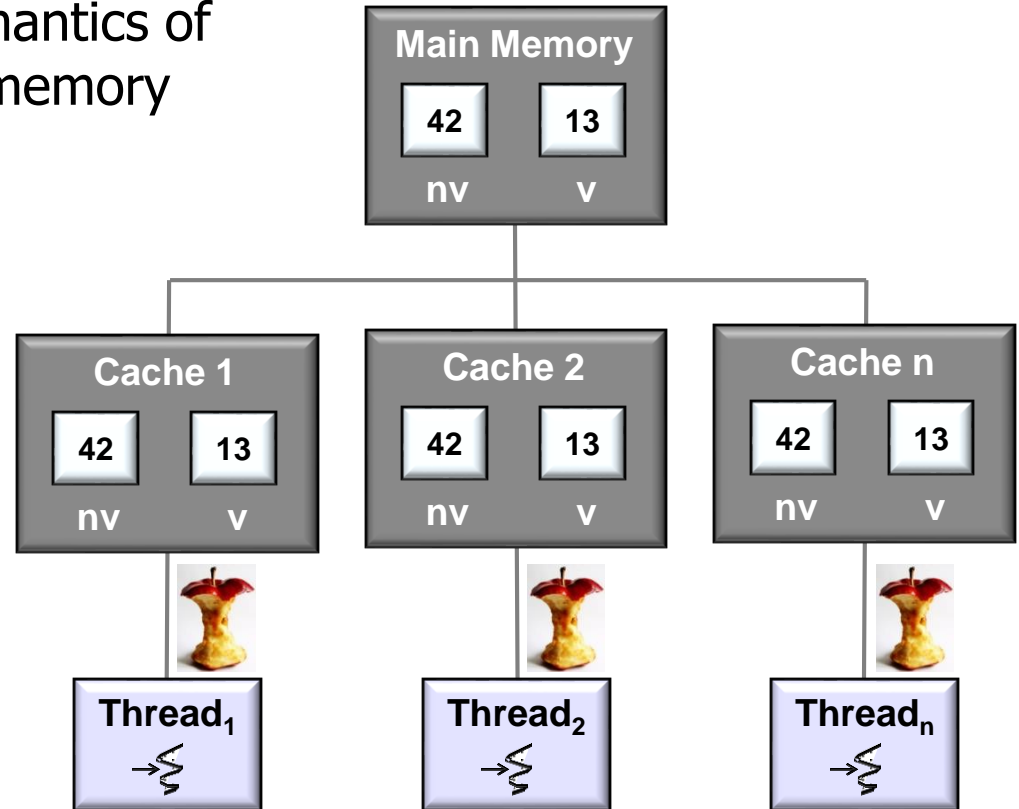


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- Java's memory model defines semantics of multi-threaded access to shared memory

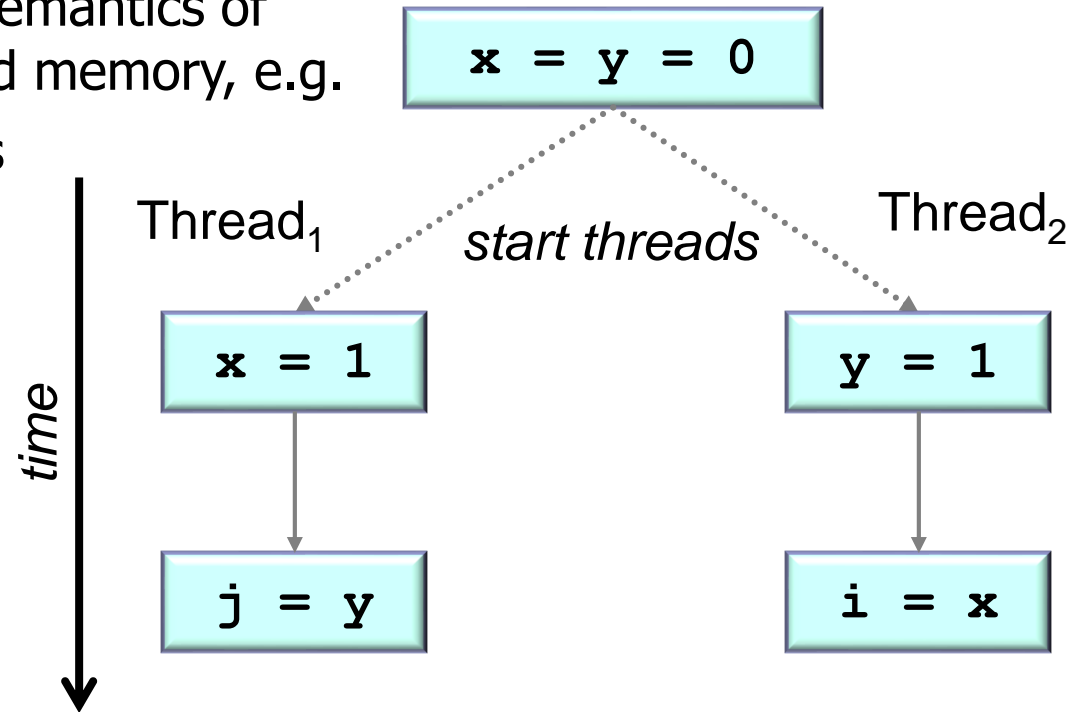


See [gee.cs.oswego.edu/dl/cpj/jmm.html](http://gee.cs.oswego.edu/dl/cpj/jmm.html)

# Overview of the Java Memory Model

- Java's memory model defines semantics of multi-threaded access to shared memory, e.g.
  - Which instruction reorderings are allowed in memory

**OUT OF ORDER**

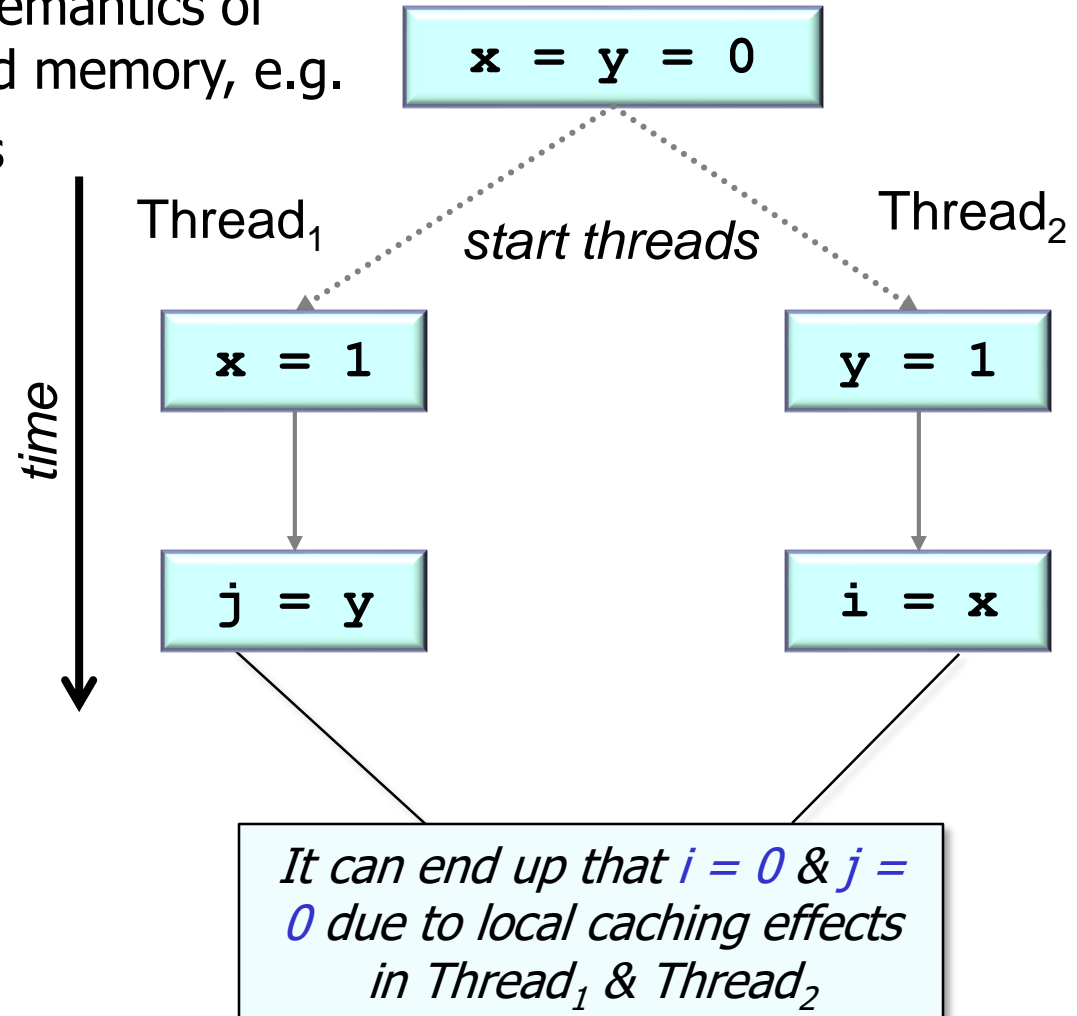


There are various potential sources of reordering, e.g., the Java compiler, the Just-In-Time (JIT) compiler, processor instruction pipelines, caches, etc.

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- Java's memory model defines semantics of multi-threaded access to shared memory, e.g.

- Which instruction reorderings are allowed in memory
- Should not be overly restrictive, to enable hardware optimizations

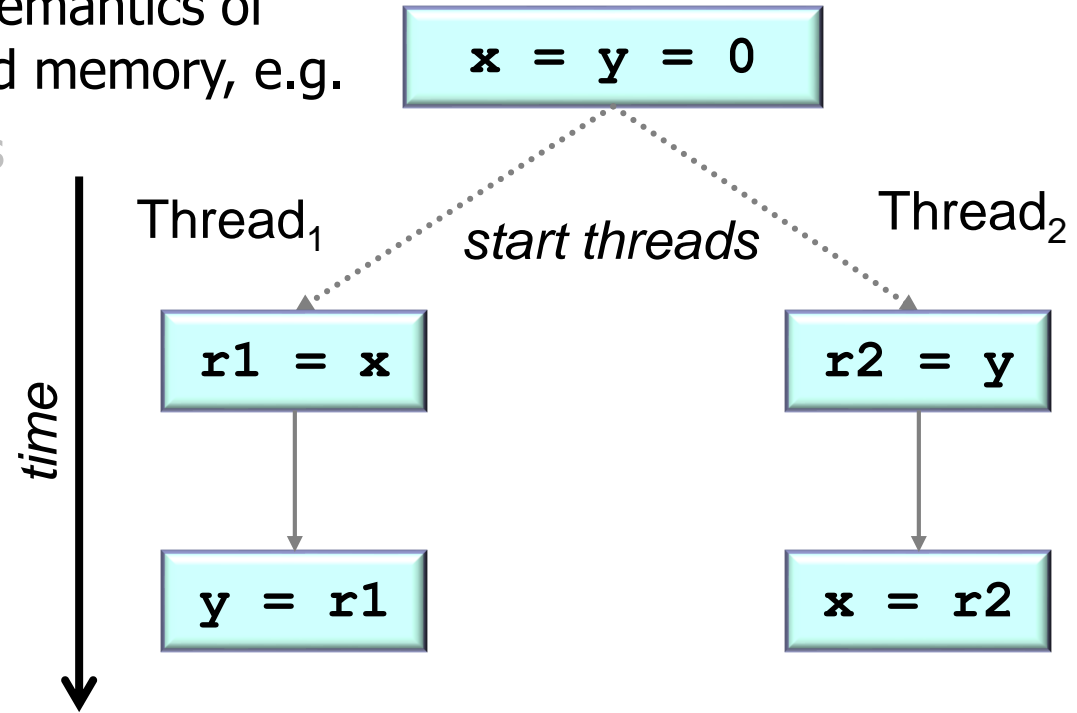


See [en.wikipedia.org/wiki/Memory\\_ordering](https://en.wikipedia.org/wiki/Memory_ordering)

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- Java's memory model defines semantics of multi-threaded access to shared memory, e.g.

- Which instruction reorderings are allowed in memory
- Which program outputs may occur in a correct JVM implementation

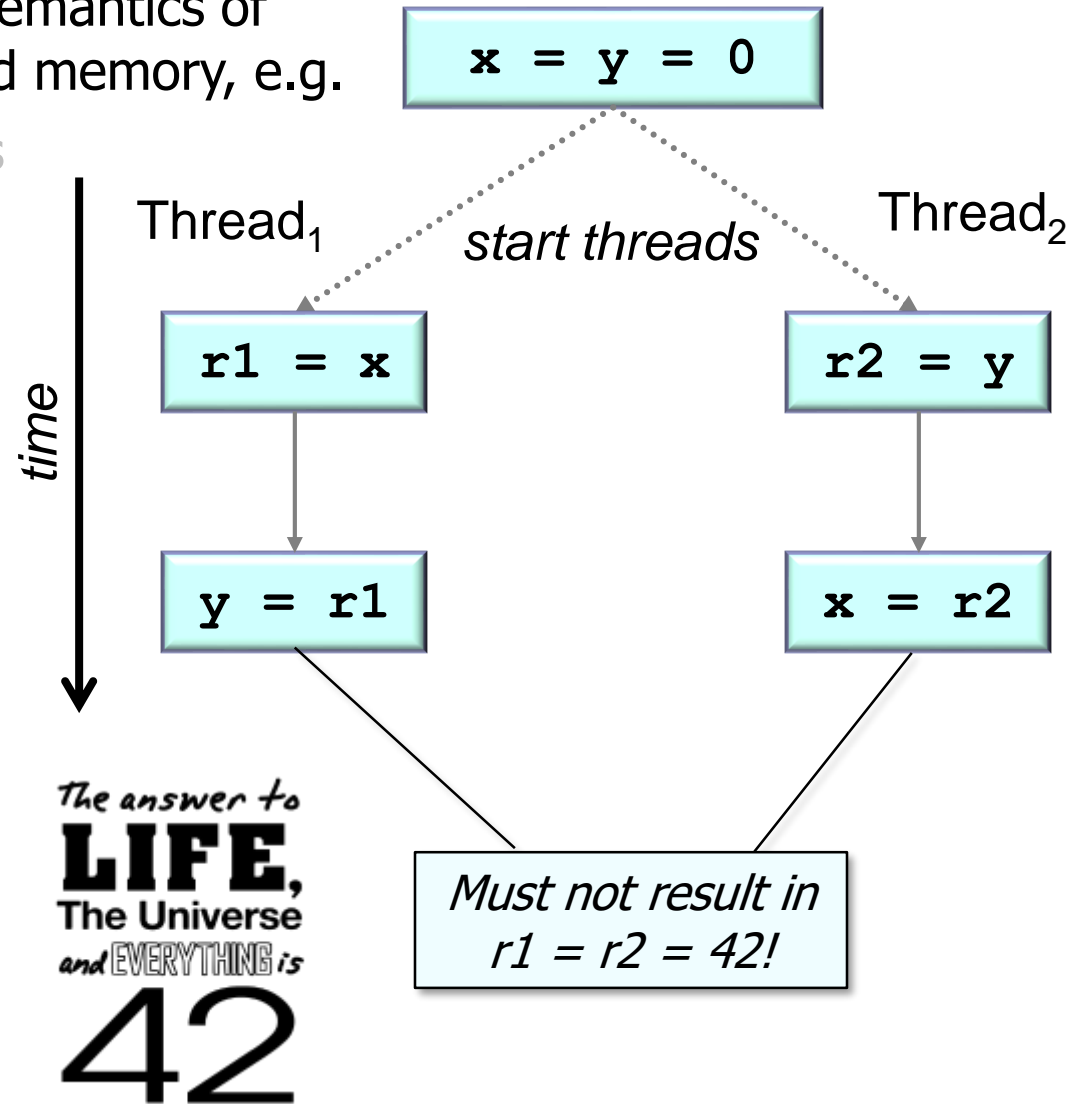


See [docs.oracle.com/javase/specs/jls/se7/html/jls-17.html#jls-17.4.3](https://docs.oracle.com/javase/specs/jls/se7/html/jls-17.html#jls-17.4.3)

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- Java's memory model defines semantics of multi-threaded access to shared memory, e.g.

- Which instruction reorderings are allowed in memory
- Which program outputs may occur in a correct JVM implementation
  - Reordering should not be so generous such that values appear randomly!



See [simple.wikipedia.org/wiki/42\\_\(answer\)](http://simple.wikipedia.org/wiki/42_(answer))



# Overview of the Java Memory Model

- Reading about Java's memory model is as much fun as watching paint dry..



See [www.cs.umd.edu/users/pugh/java/memoryModel/jsr-133-faq.html](http://www.cs.umd.edu/users/pugh/java/memoryModel/jsr-133-faq.html)

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Fortunately, you needn't understand all these memory model details  
– you just need to know how to use Java synchronizers properly!!

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# End of Overview of the Java Memory Model