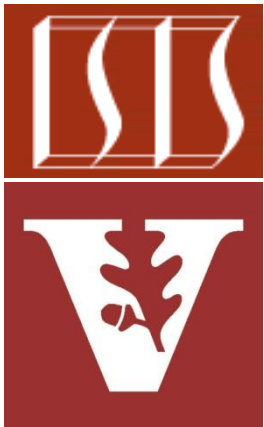


Java ConditionObject (Part 2)



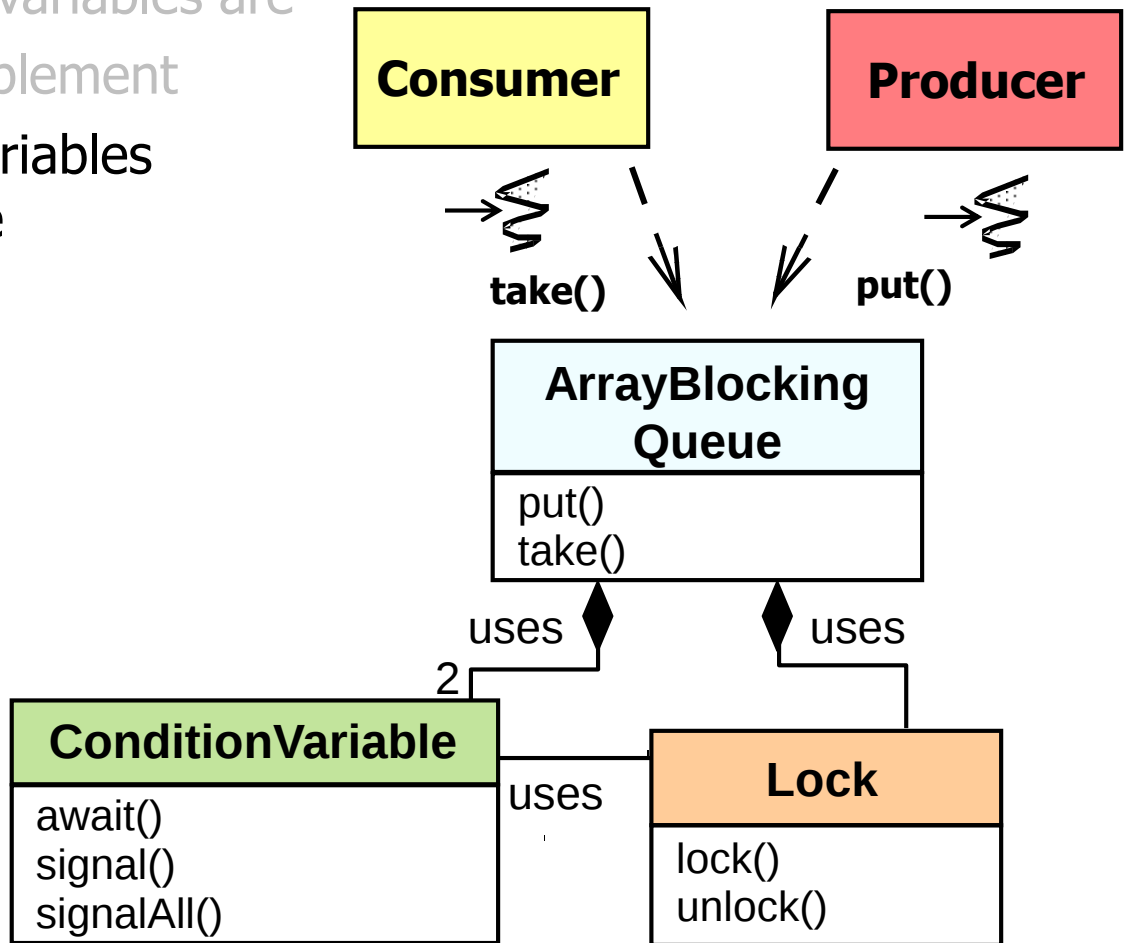
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Integrated Systems
Vanderbilt University
Nashville, Tennessee, USA**



Learning Objectives in this Part of the Lesson

- Understand what condition variables are
- Know what pattern they implement
- Recognize how condition variables are often applied in practice



Learning Objectives in this Part of the Lesson

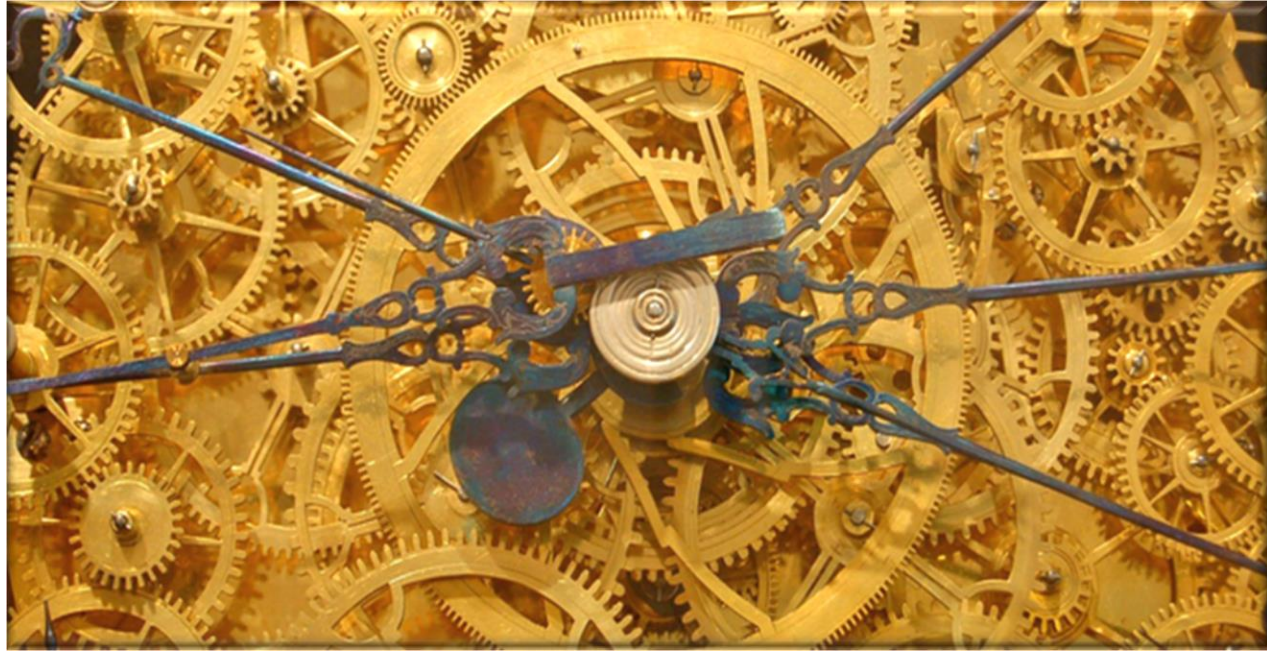
- Understand what condition variables are
- Know what pattern they implement
- Recognize how condition variables are often applied in practice
- Be aware of a human known use of condition variables



Applying Condition Variables in Practice

Applying Condition Variables in Practice

- CVs are powerful, but can be hard to grok & apply correctly

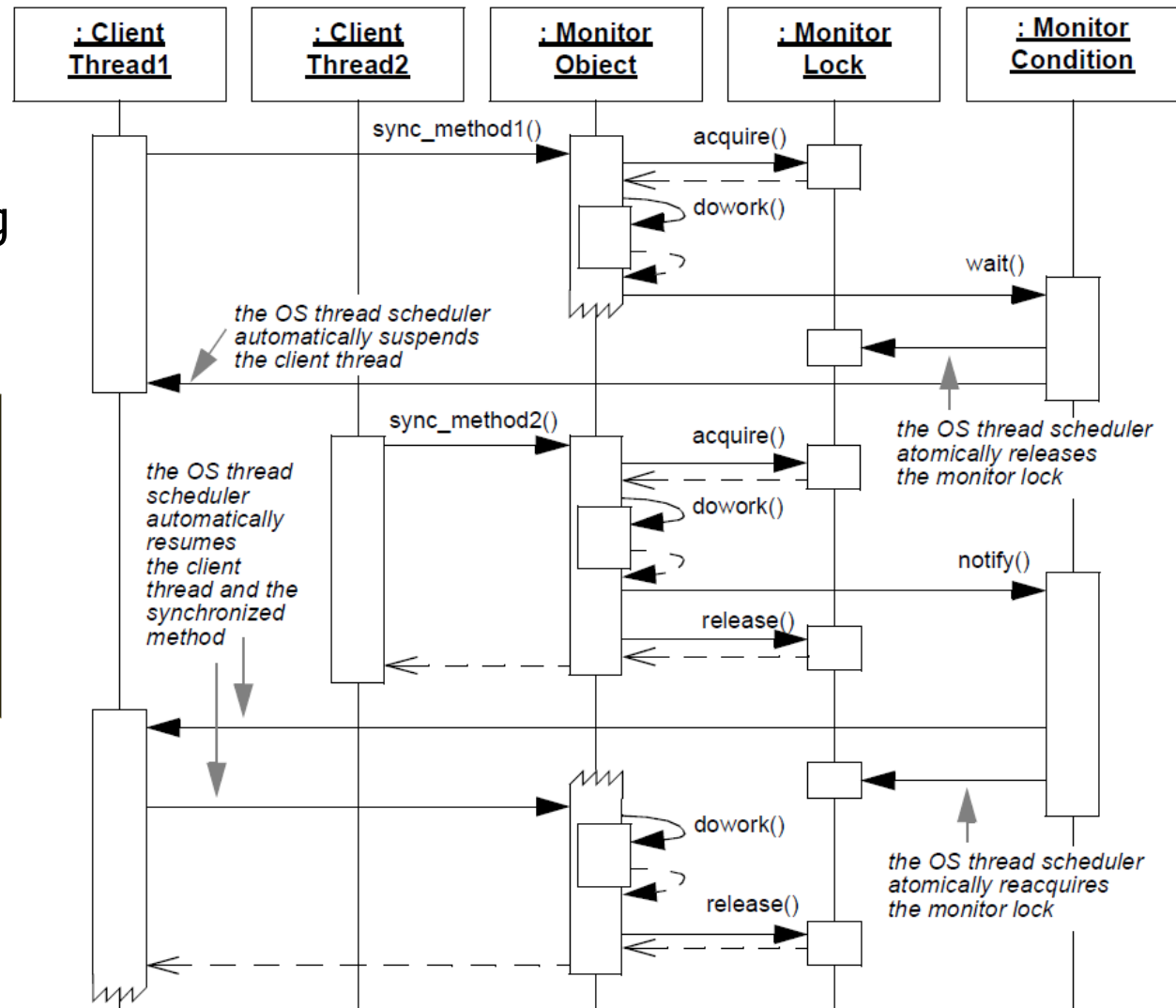


See en.wikipedia.org/wiki/Grok

Applying Condition Variables in Practice

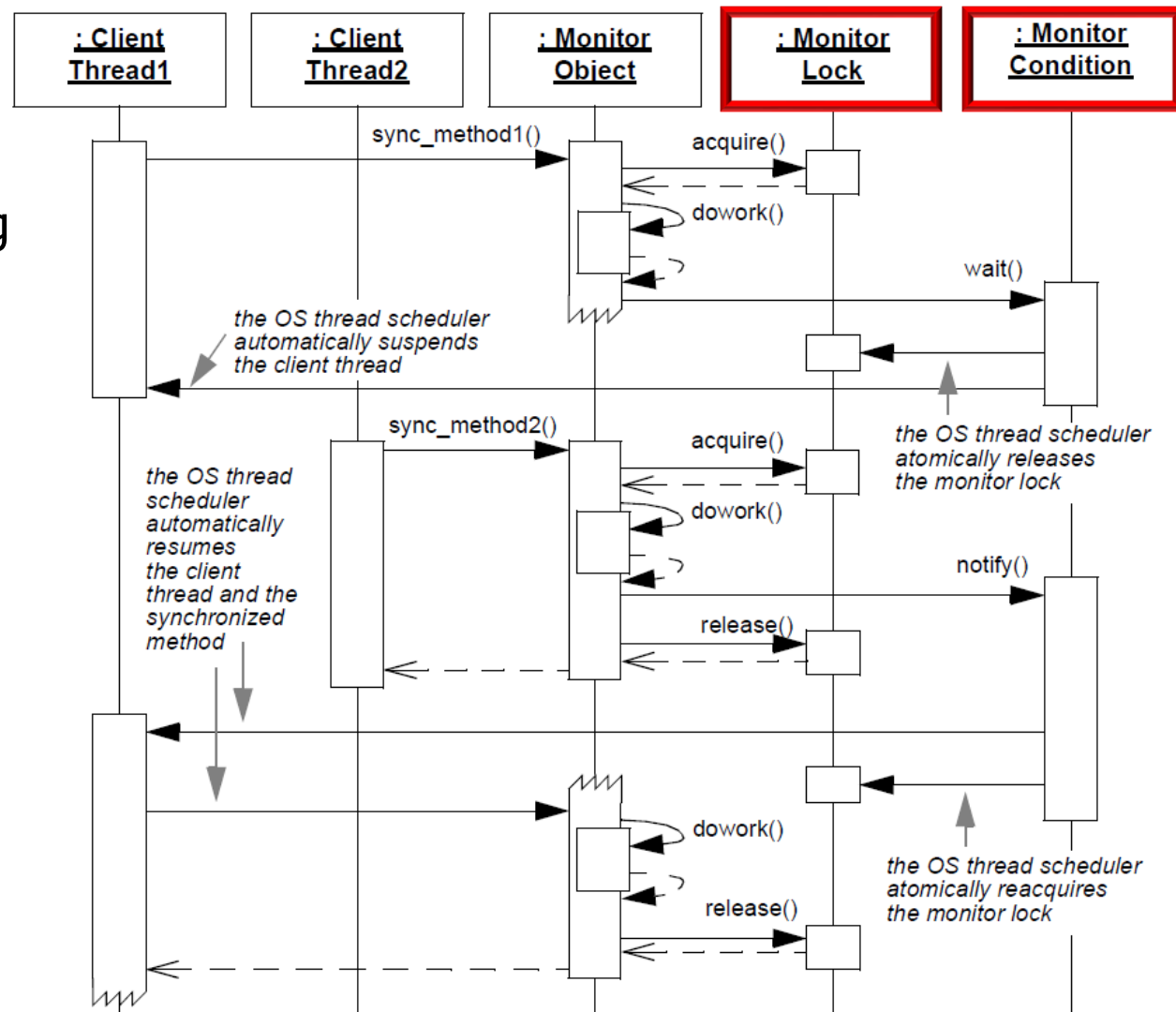
- CVs are powerful, but can be hard to grok & apply correctly, e.g.
- The protocol for using CVs involves several “moving parts”

CAUTION
BE ALERT!!
MOVING PARTS



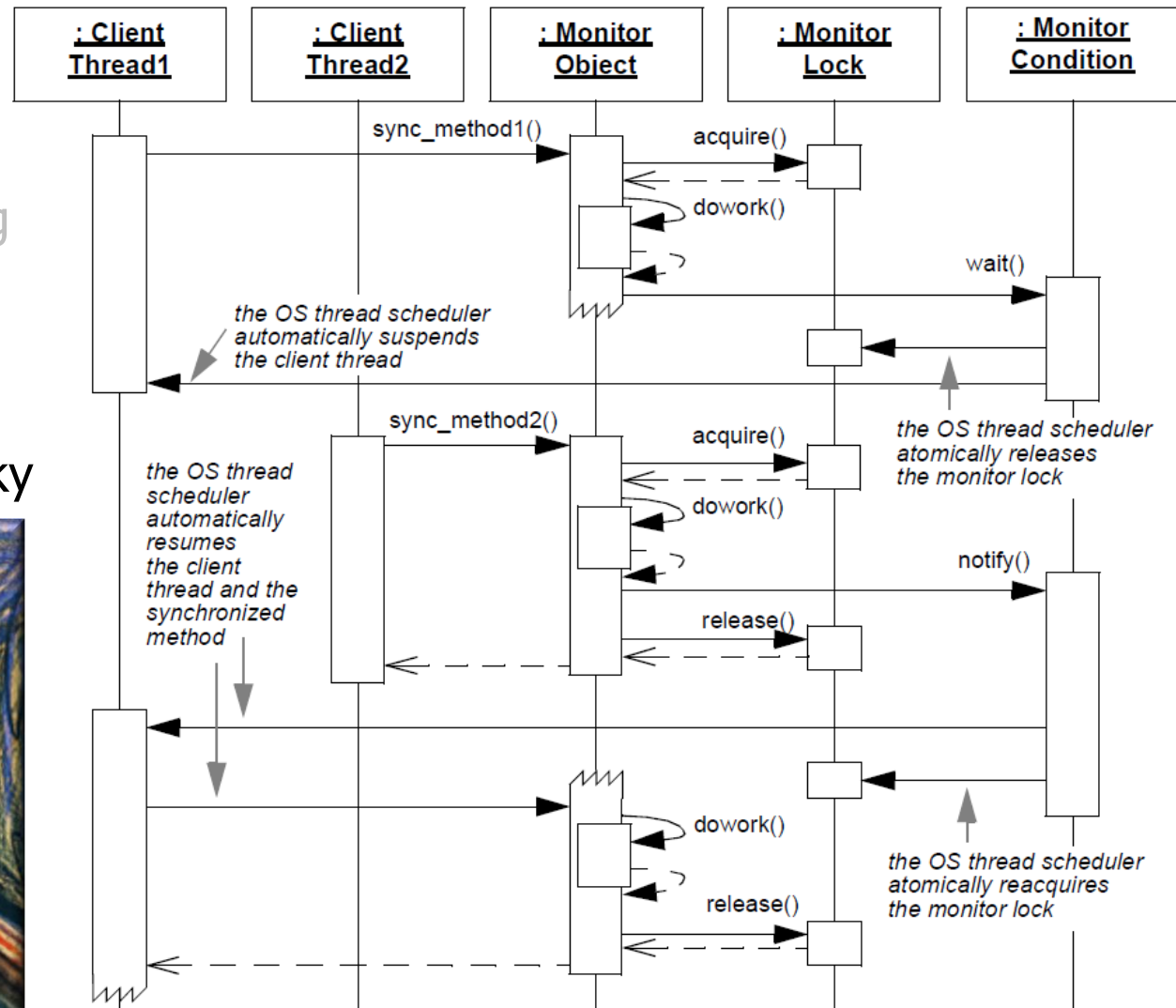
Applying Condition Variables in Practice

- CVs are powerful, but can be hard to grok & apply correctly, e.g.
- The protocol for using CVs involves several “moving parts”
- i.e., a condition variable & a lock



Applying Condition Variables in Practice

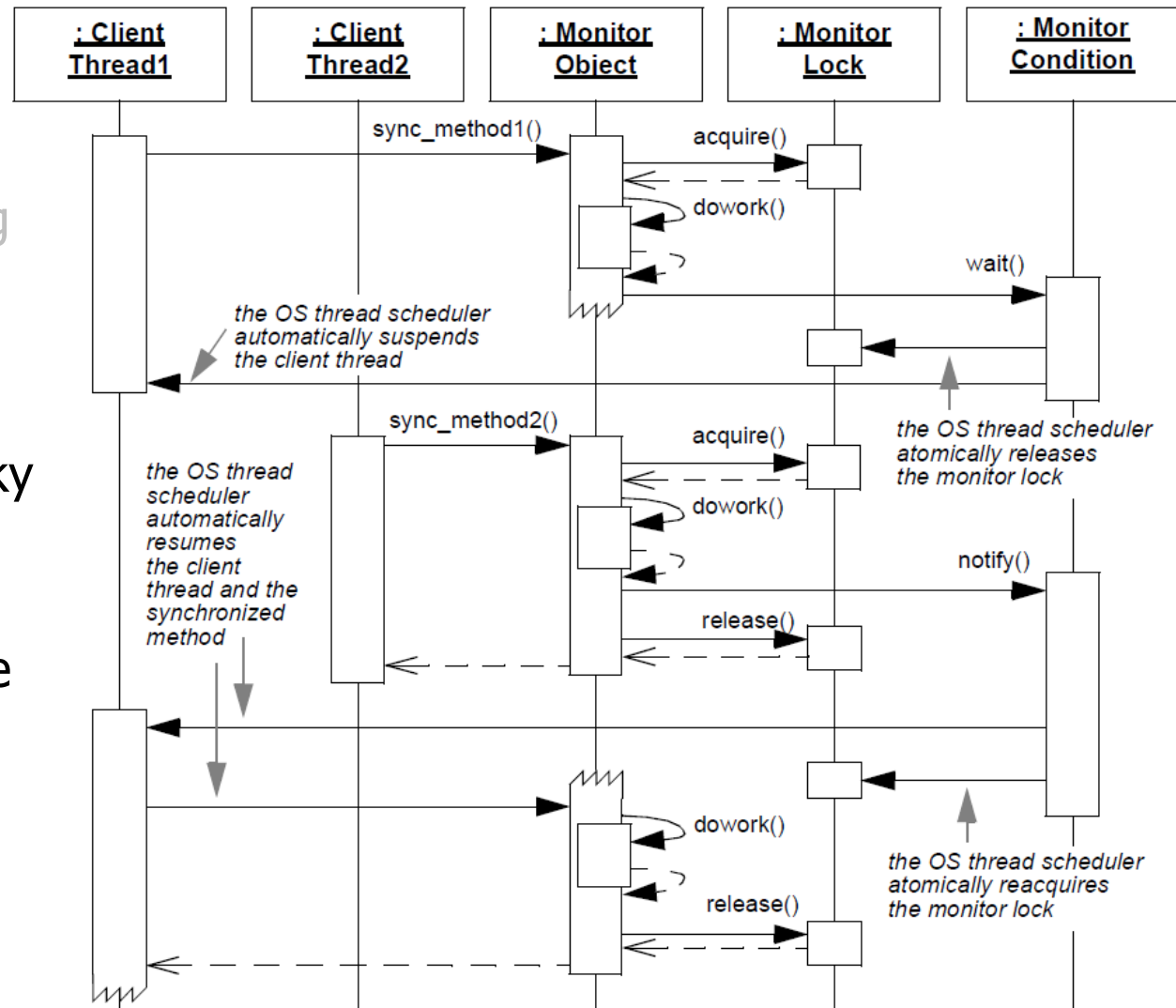
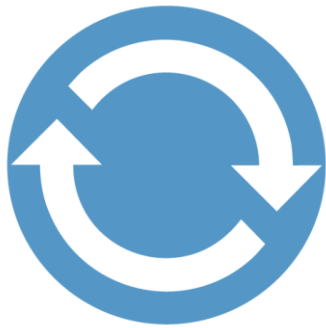
- CVs are powerful, but can be hard to grok & apply correctly, e.g.
 - The protocol for using CVs involves several “moving parts”
 - The non-determinism of concurrency is tricky



See en.wikipedia.org/wiki/Nondeterministic_algorithm

Applying Condition Variables in Practice

- CVs are powerful, but can be hard to grok & apply correctly, e.g.
 - The protocol for using CVs involves several “moving parts”
- The non-determinism of concurrency is tricky
 - i.e., a loop may be needed to ensure a resource is available



See stackoverflow.com/a/38313778

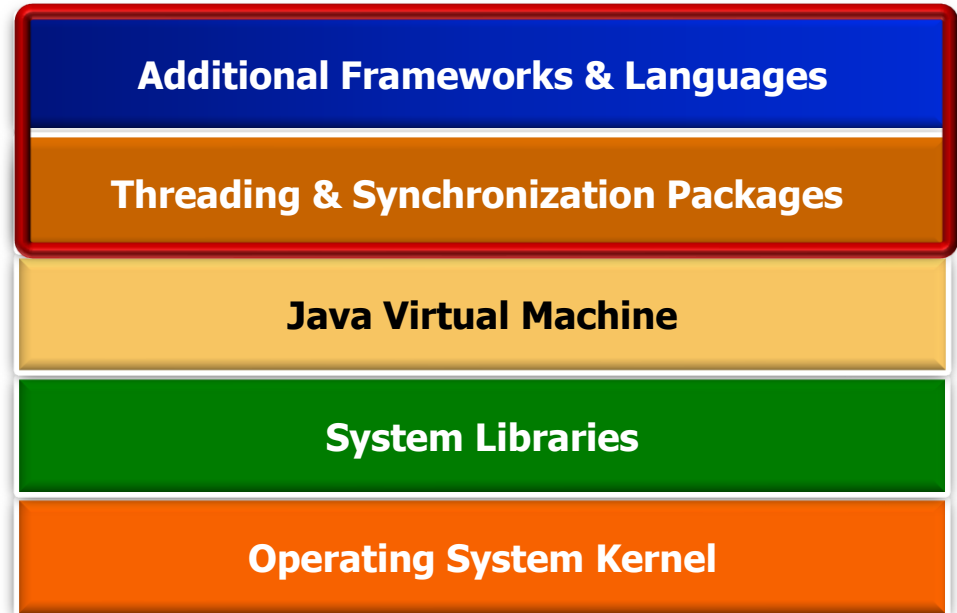
Applying Condition Variables in Practice

- CVs are therefore often not used directly by apps, but instead are “hidden” within other abstractions



Applying Condition Variables in Practice

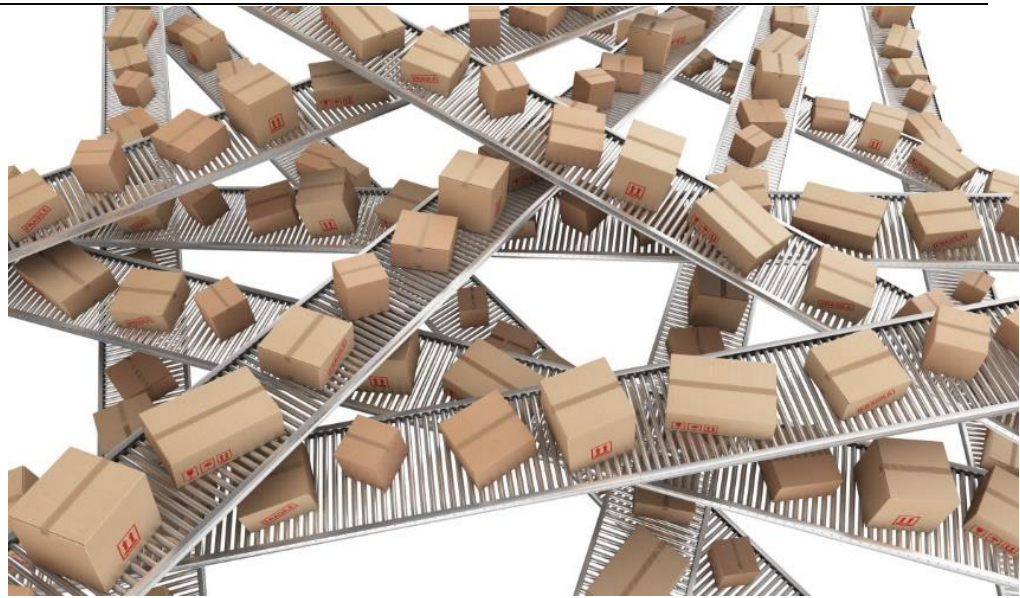
- CVs are therefore often not used directly by apps, but instead are “hidden” within other abstractions
- CVs form the basis for higher-level synchronizers in Java



See docs.oracle.com/javase/8/docs/api/java/util/concurrent/locks/AbstractQueuedSynchronizer.ConditionObject.html

Applying Condition Variables in Practice

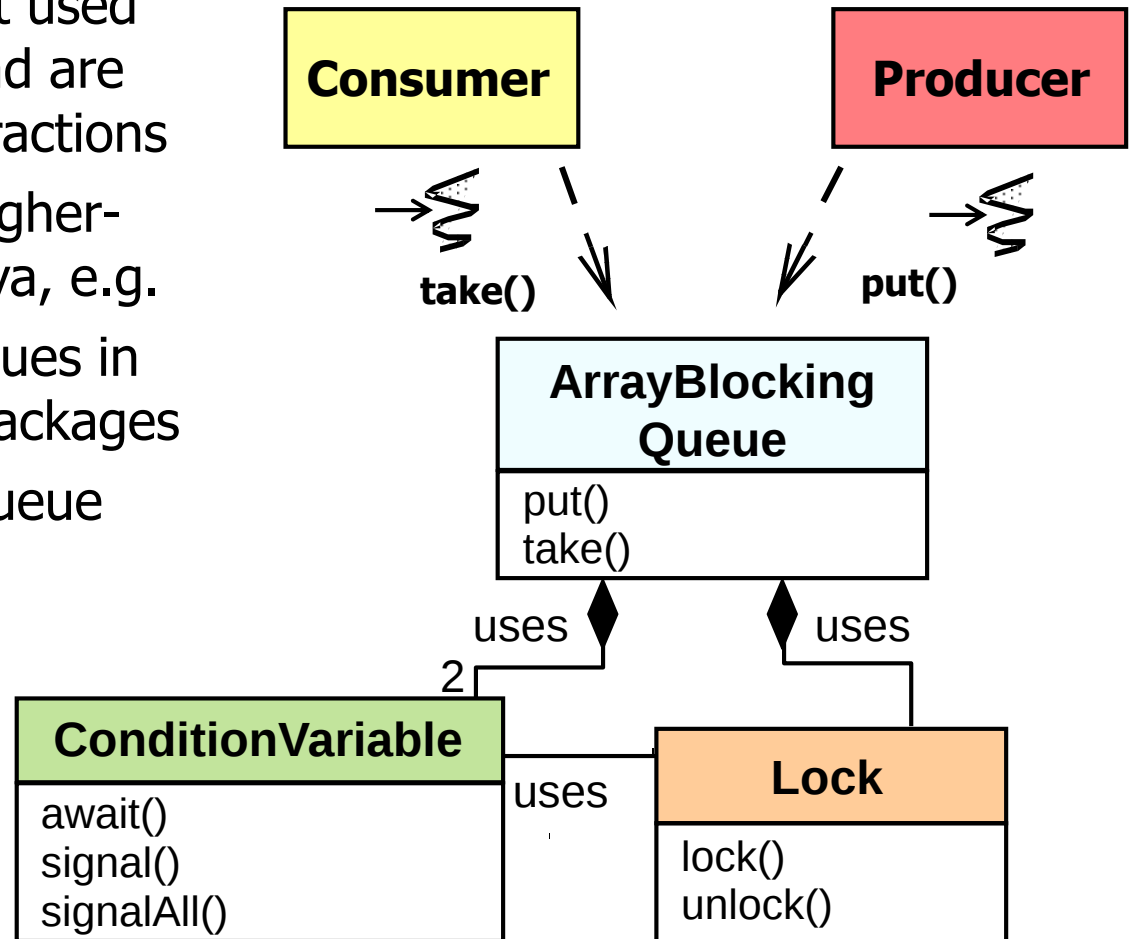
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 - Blocking queues & deques in `java.util.concurrent*` packages



See docs.oracle.com/javase/tutorial/collections/implementations/queue.html

Applying Condition Variables in Practice

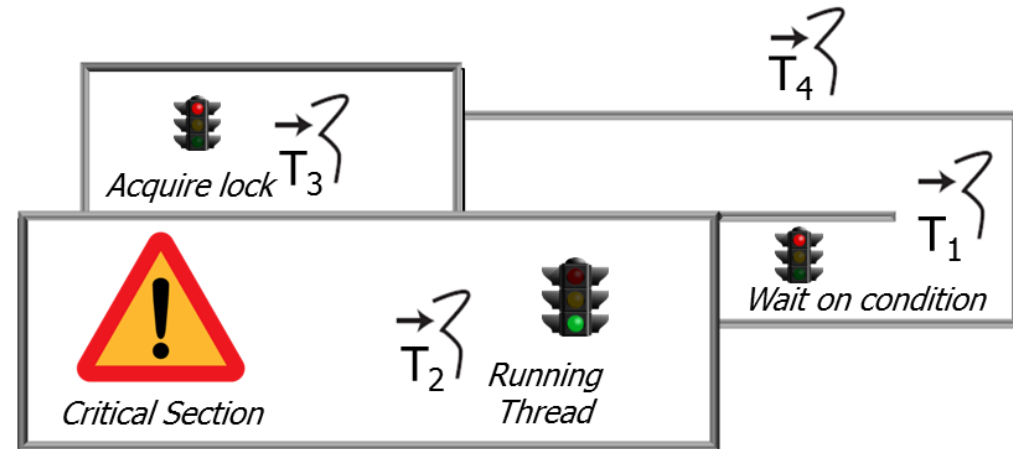
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- CVs form the basis for higher-level synchronizers in Java, e.g.
 - Blocking queues & deques in `java.util.concurrent*` packages
 - e.g., `ArrayBlockingQueue`



See upcoming discussion in part 5 of “*Java ConditionObject*”

Applying Condition Variables in Practice

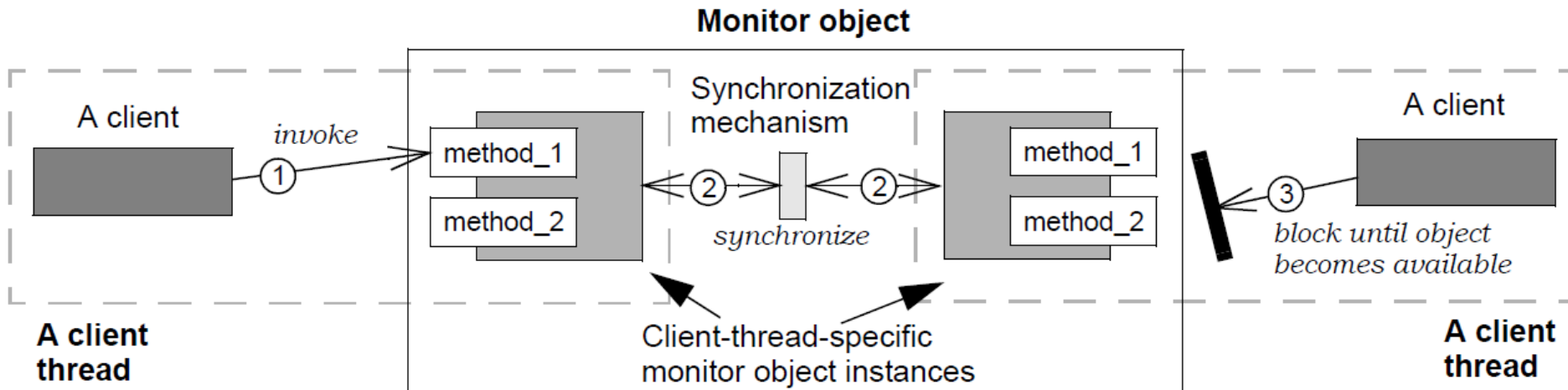
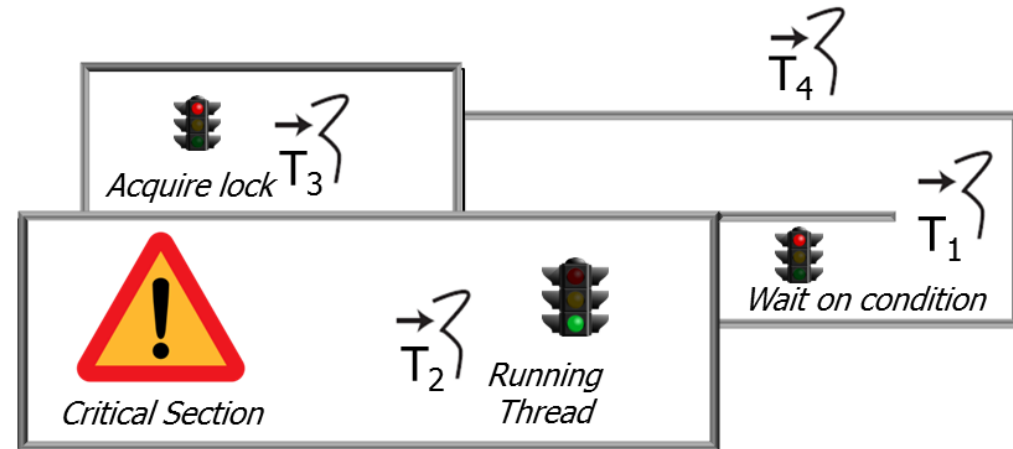
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 - Blocking queues & deques in `java.util.concurrent*` packages
 - Java built-in monitor objects



See upcoming lesson on “*Java Built-in Monitor Objects*”

Applying Condition Variables in Practice

- CVs are therefore often not used directly by apps, but instead are “hidden” within other abstractions
- CVs form the basis for higher-level synchronizers in Java, e.g.
 - Blocking queues & deques in `java.util.concurrent*` packages
 - Java built-in monitor objects
 - The *Monitor Object* pattern



See www.dre.vanderbilt.edu/~schmidt/PDF/monitor.pdf

Human Known Use of Condition Variables

Human Known Uses of Condition Variables



- A human known use is a pizza delivery protocol
 - Must acquire both the pizza & the keys to deliver the pizza

End of Java ConditionObject (Part 2)