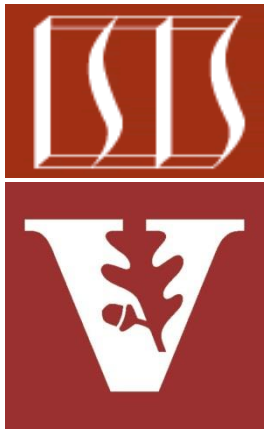
# Visualizing the Java Monitor Object Coordination Example

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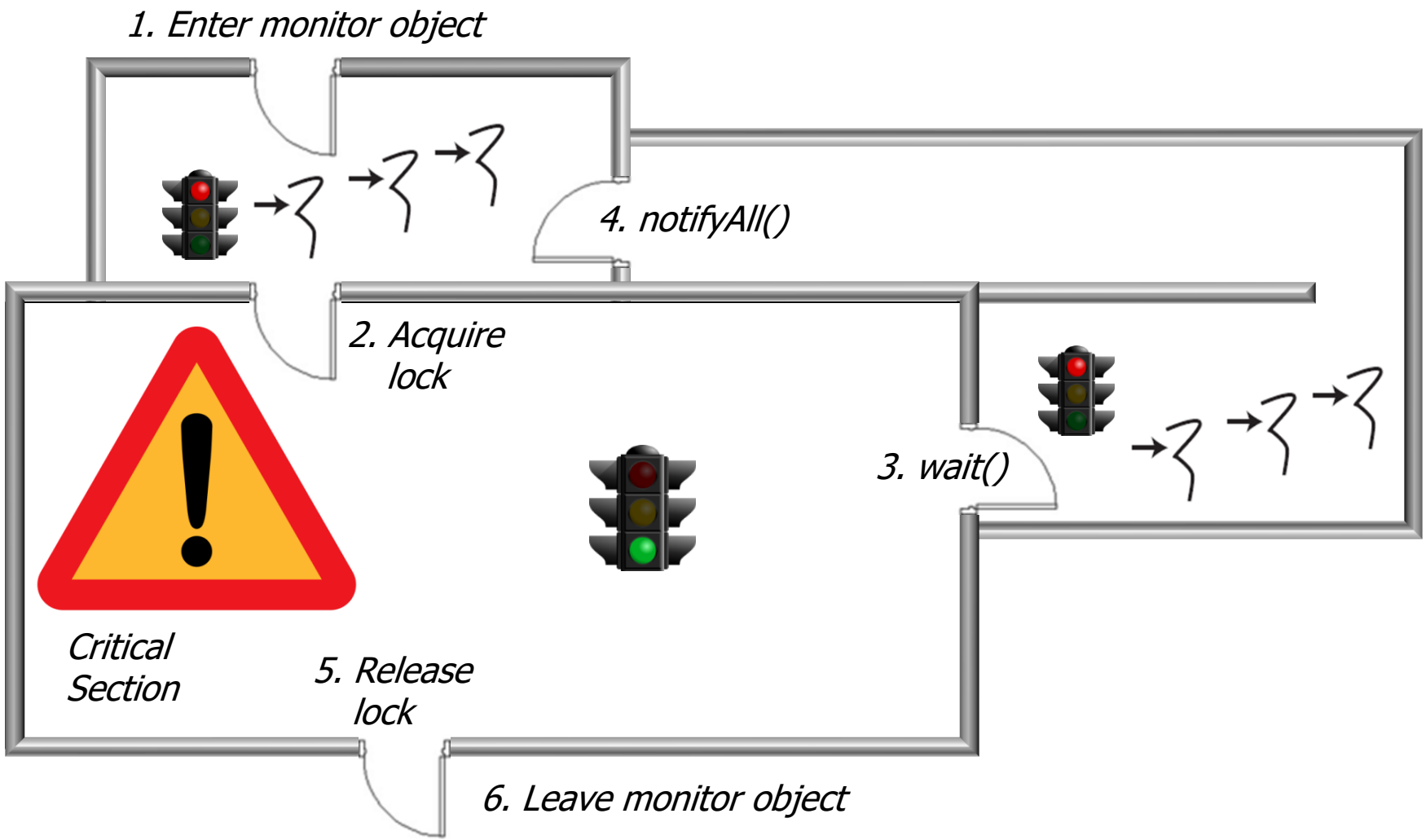
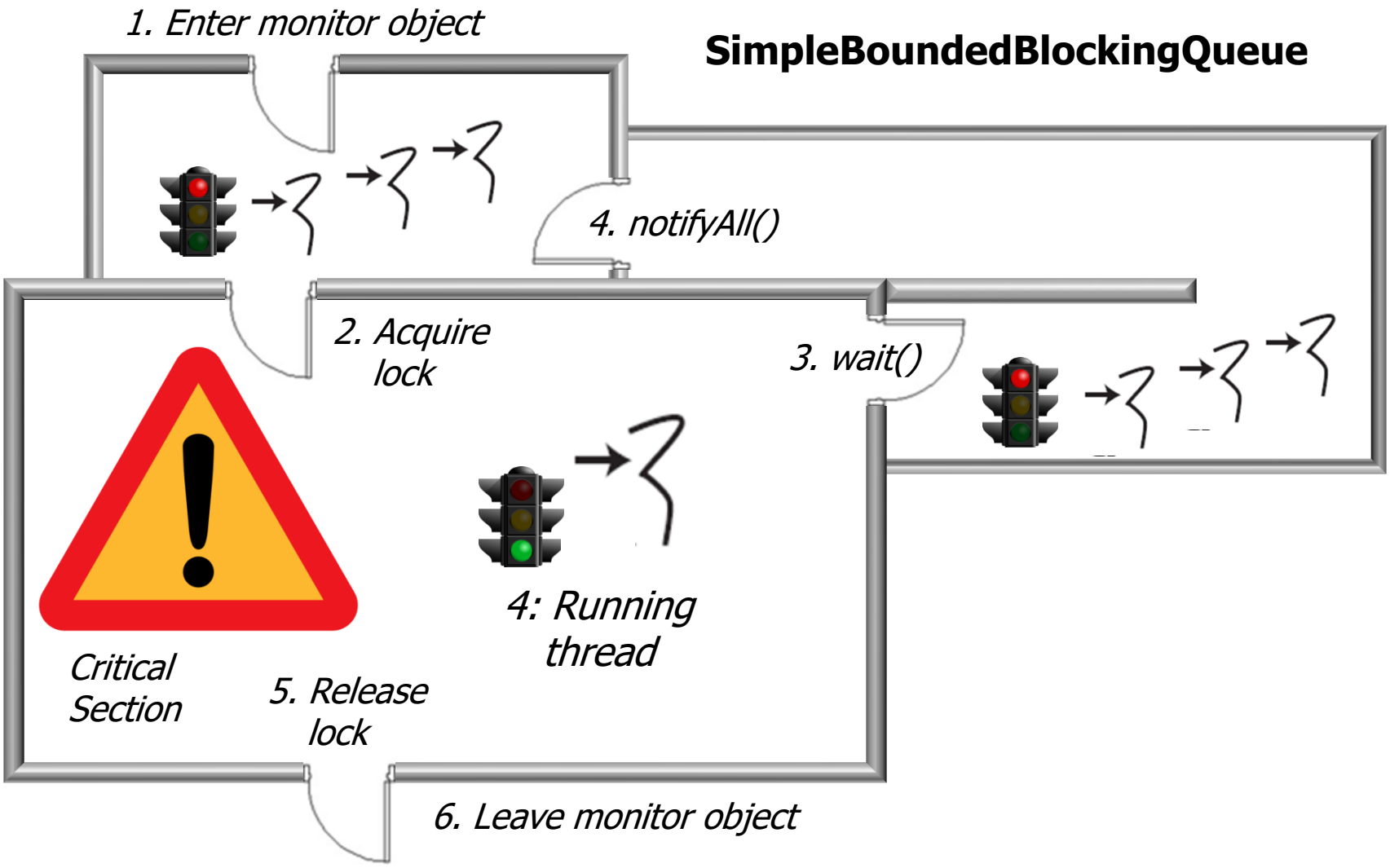
# Learning Objectives in this Part of the Lesson

- Learn how to fix a buggy concurrent Java program using Java's wait & notify mechanisms, which provide *coordination*
- Visualize how Java monitor objects can be used to ensure mutual exclusion & coordination between threads running in a concurrent program



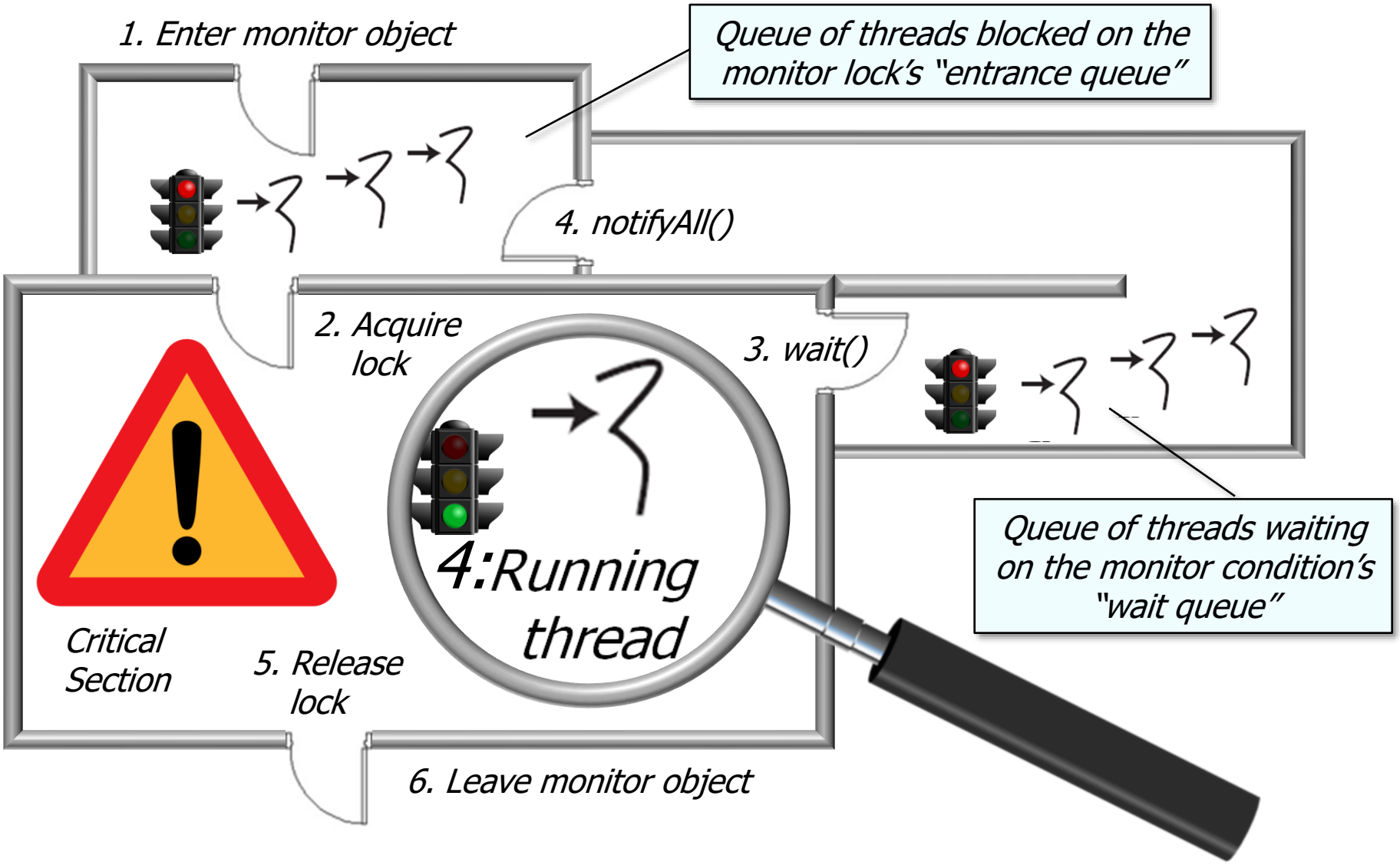
# Visual Analysis of the SimpleBlockingBounded Queue Example

# Visual Analysis of SimpleBoundedBlockingQueue



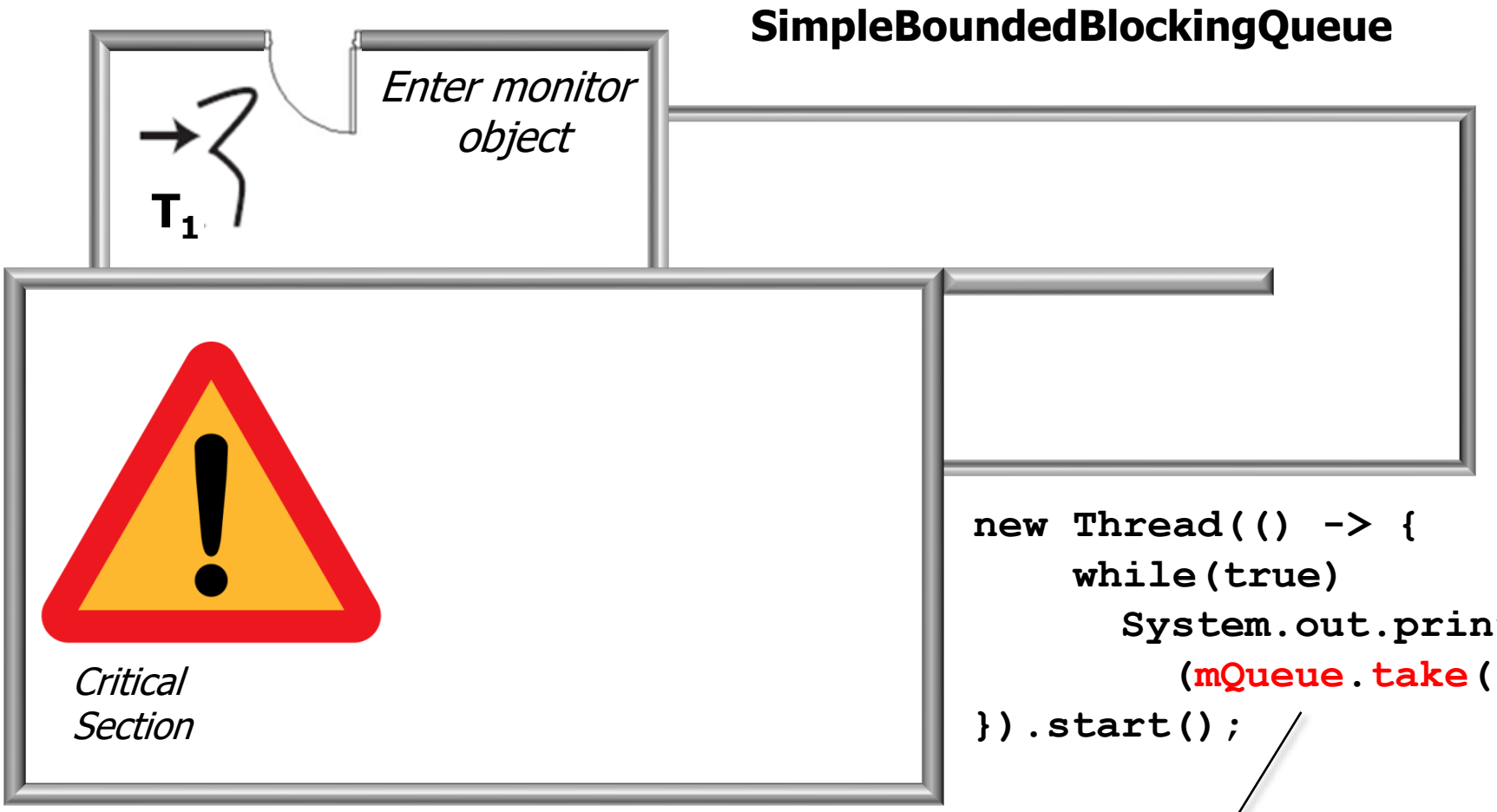

See github.com/douglascraigschmidt/POSA/tree/master/ex/M3/Queues/SimpleBoundedBlockingQueue

# Visual Analysis of SimpleBoundedBlockingQueue




See en.wikipedia.org/wiki/Monitor_(synchronization)#Implicit_condition_variable_monitors

# Visual Analysis of SimpleBoundedBlockingQueue



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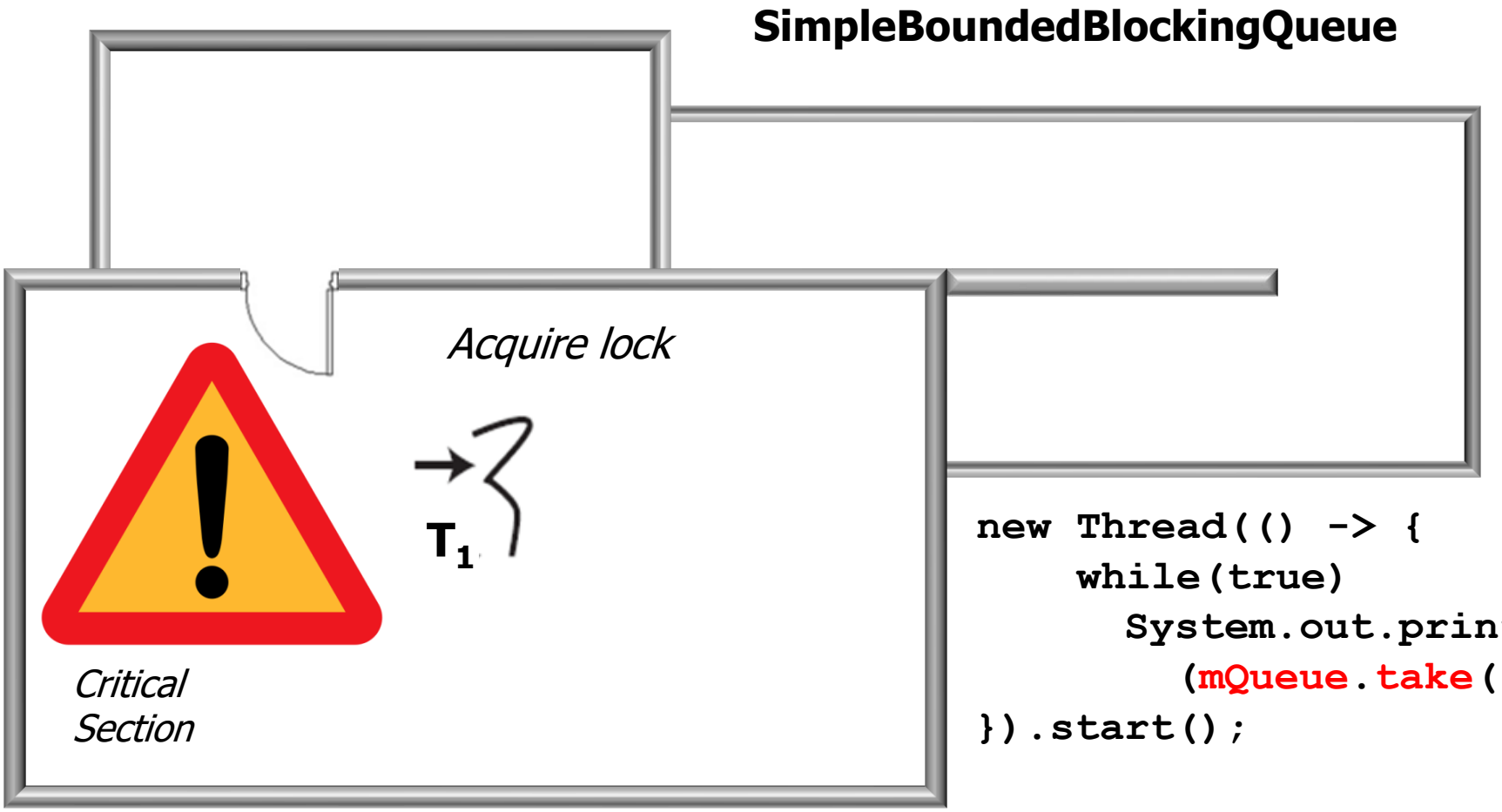


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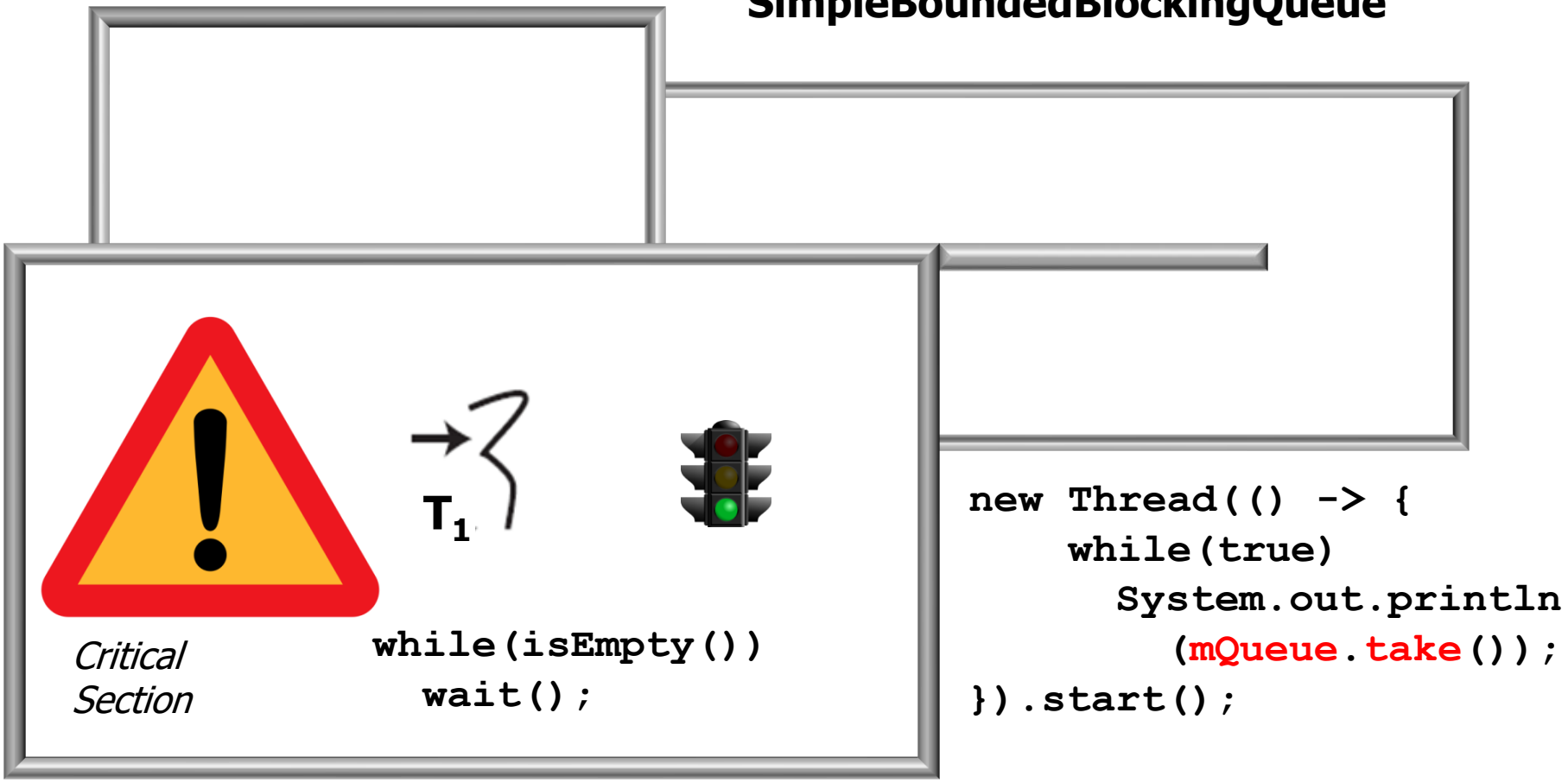
new Thread(() -> {
     while(true)
       System.out.println
         (mQueue.take());
}).start();
```

# Visual Analysis of SimpleBoundedBlockingQueue



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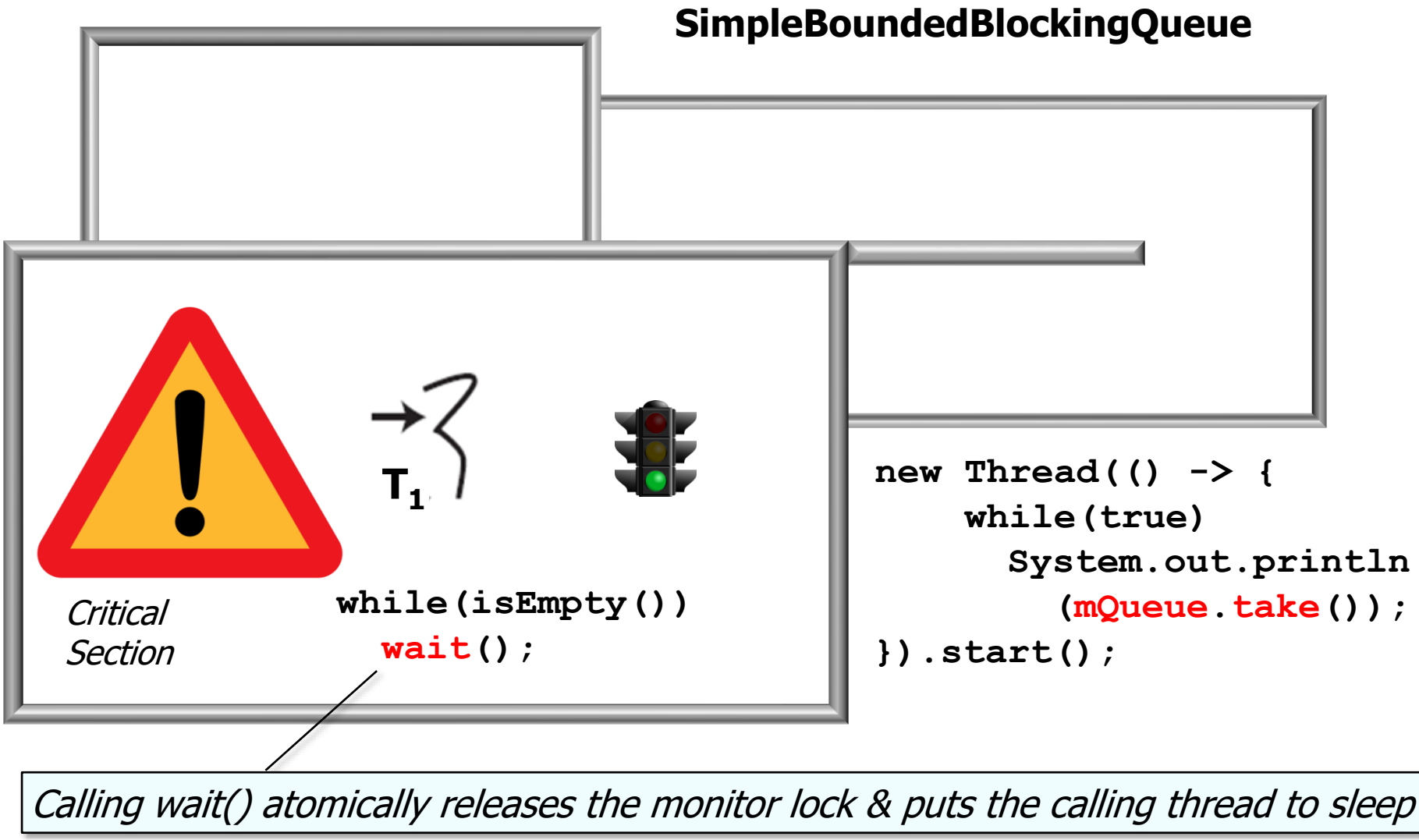

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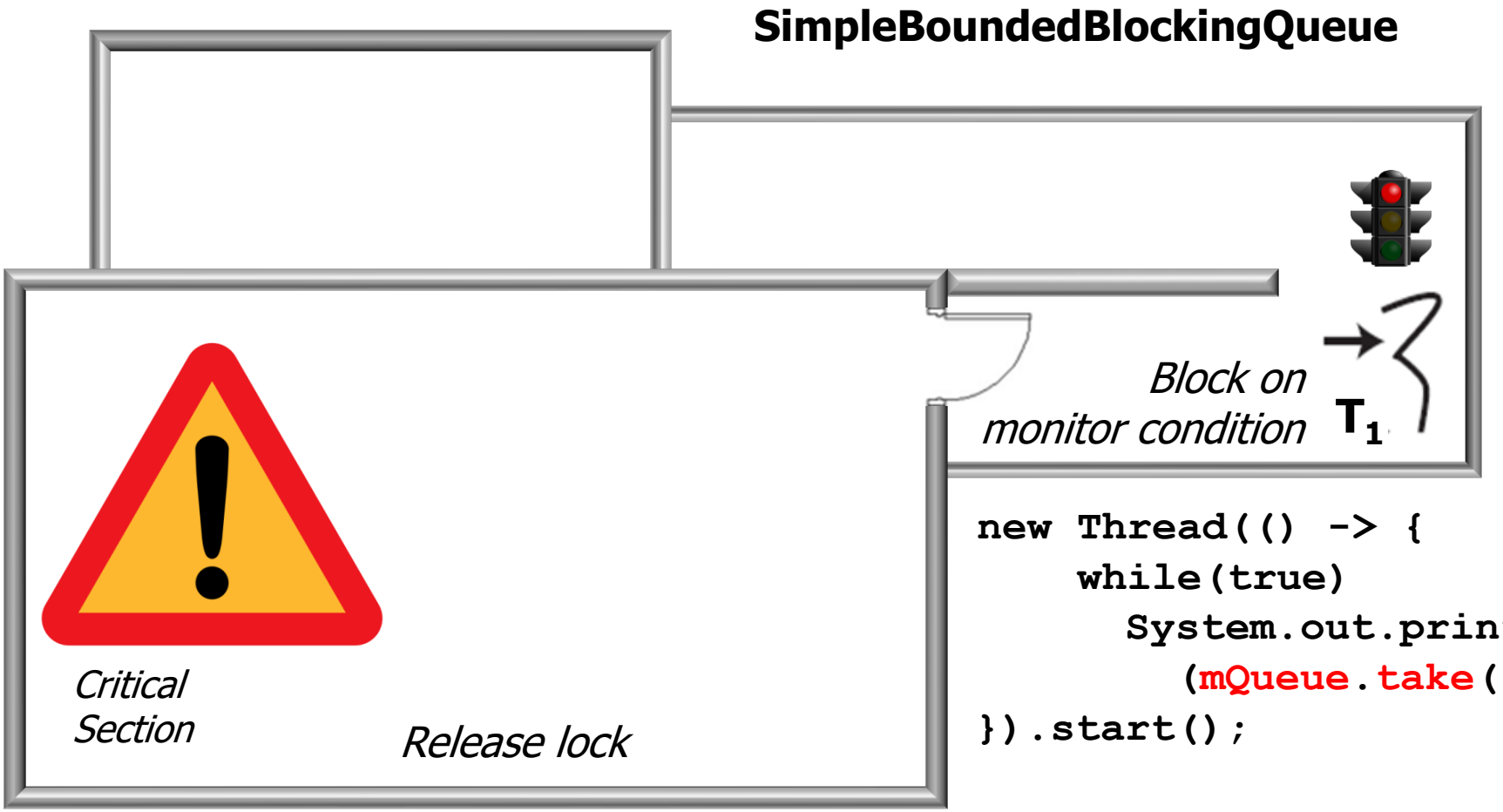


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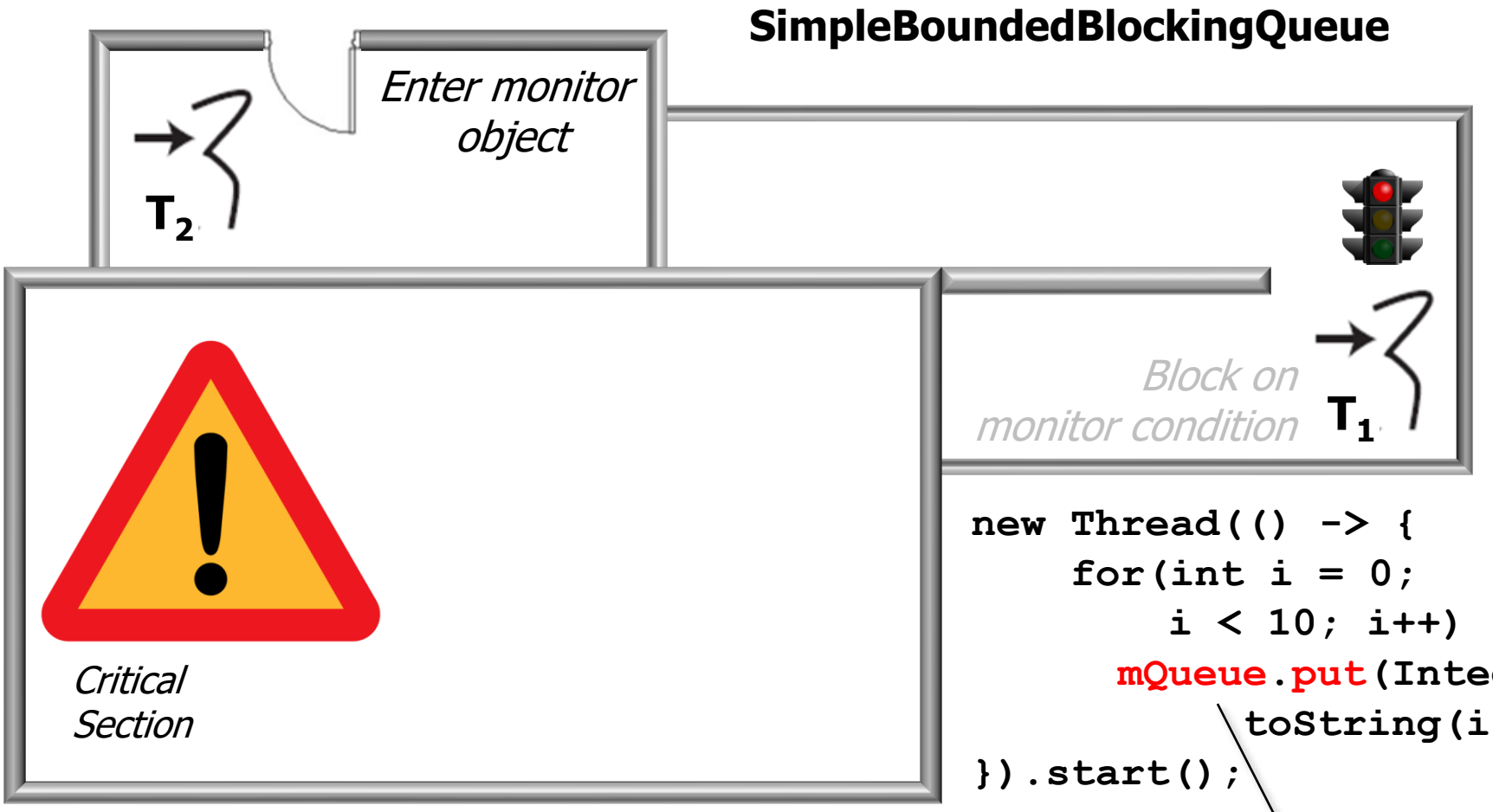
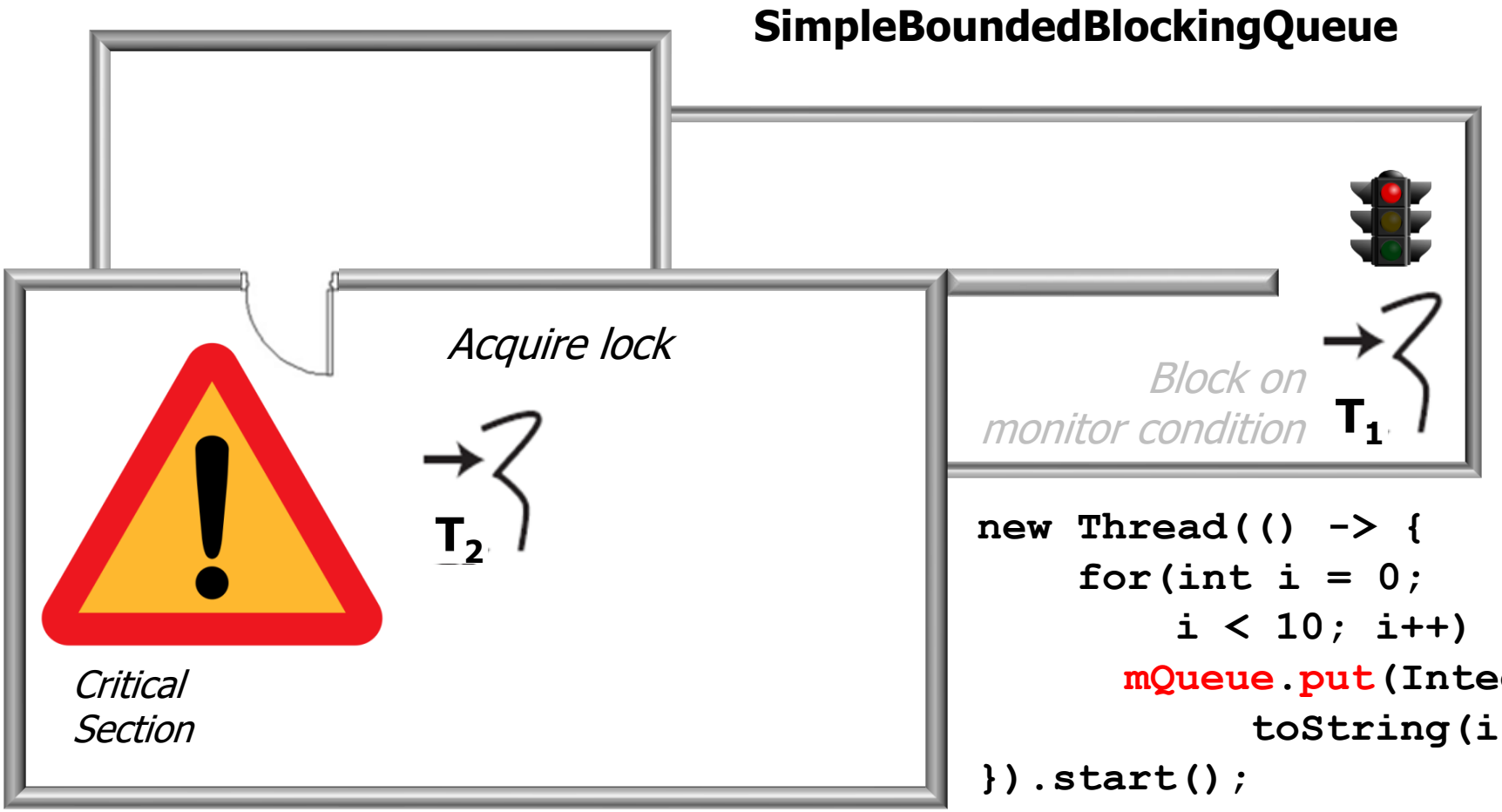



```
new Thread(() -> {
    for(int i = 0;
        i < 10; i++)
      mQueue.put(Integer.
          toString(i));
}).start();
```

*We'll assume the queue is not full*

# Visual Analysis of SimpleBoundedBlockingQueue

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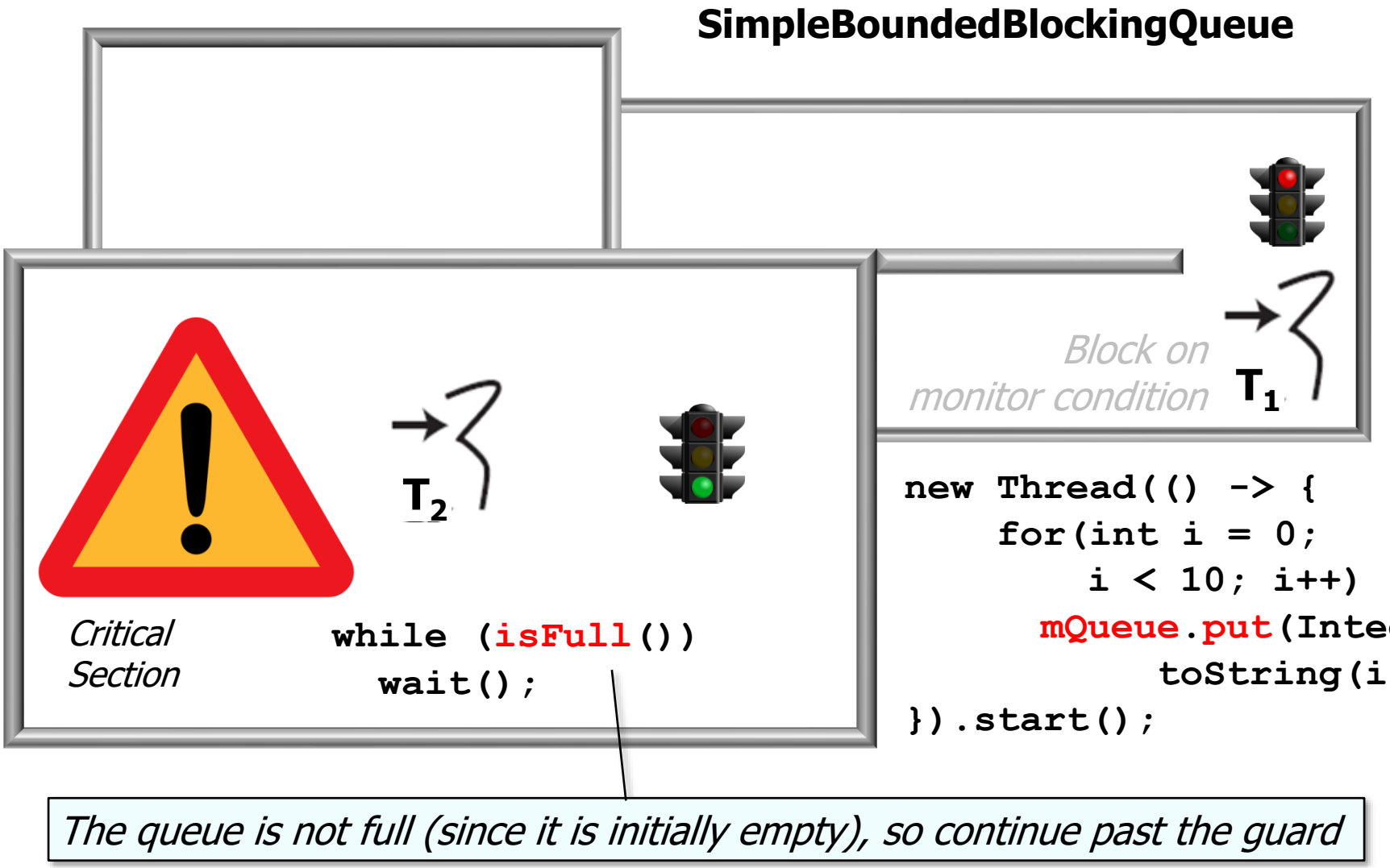

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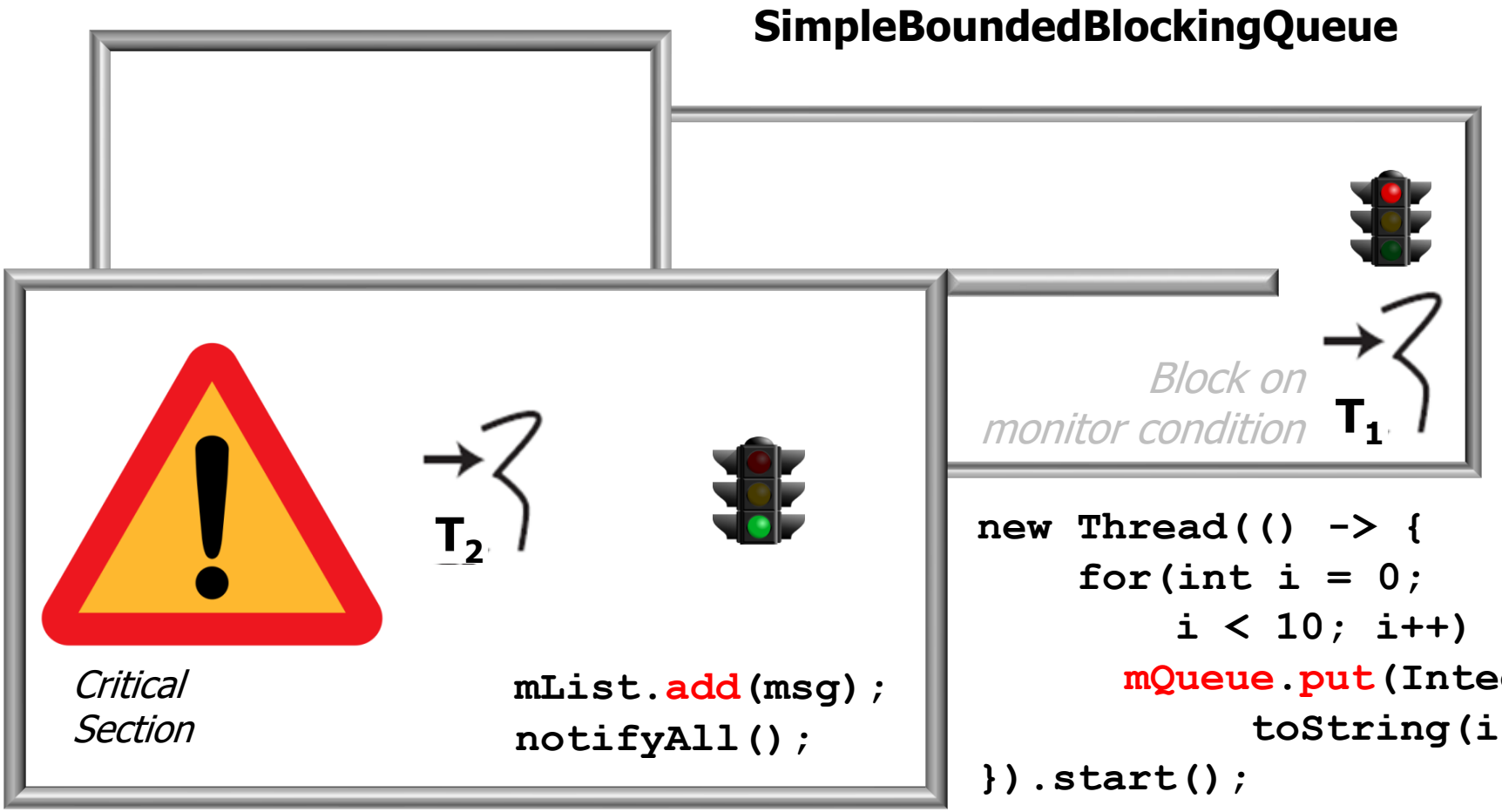

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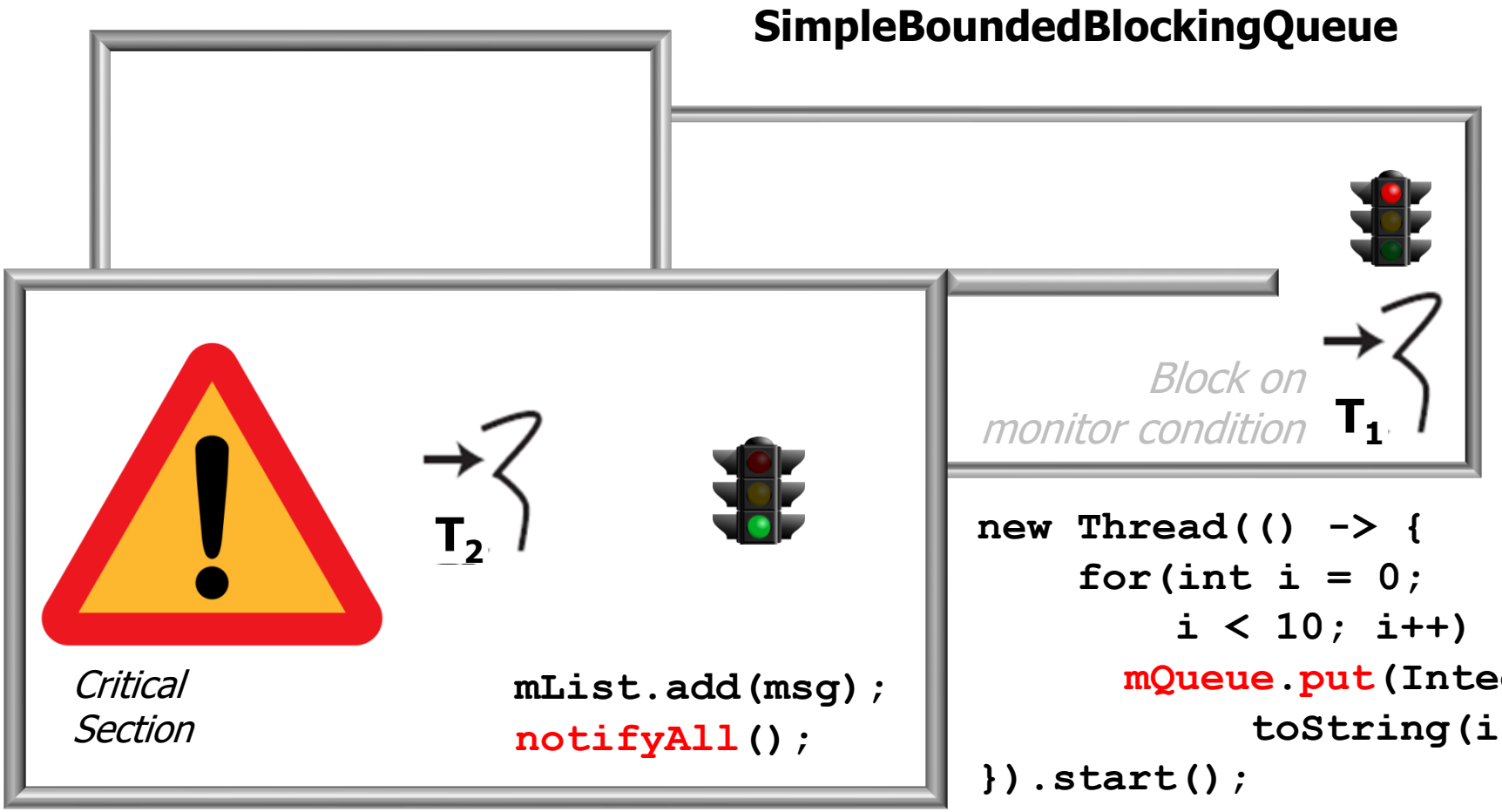

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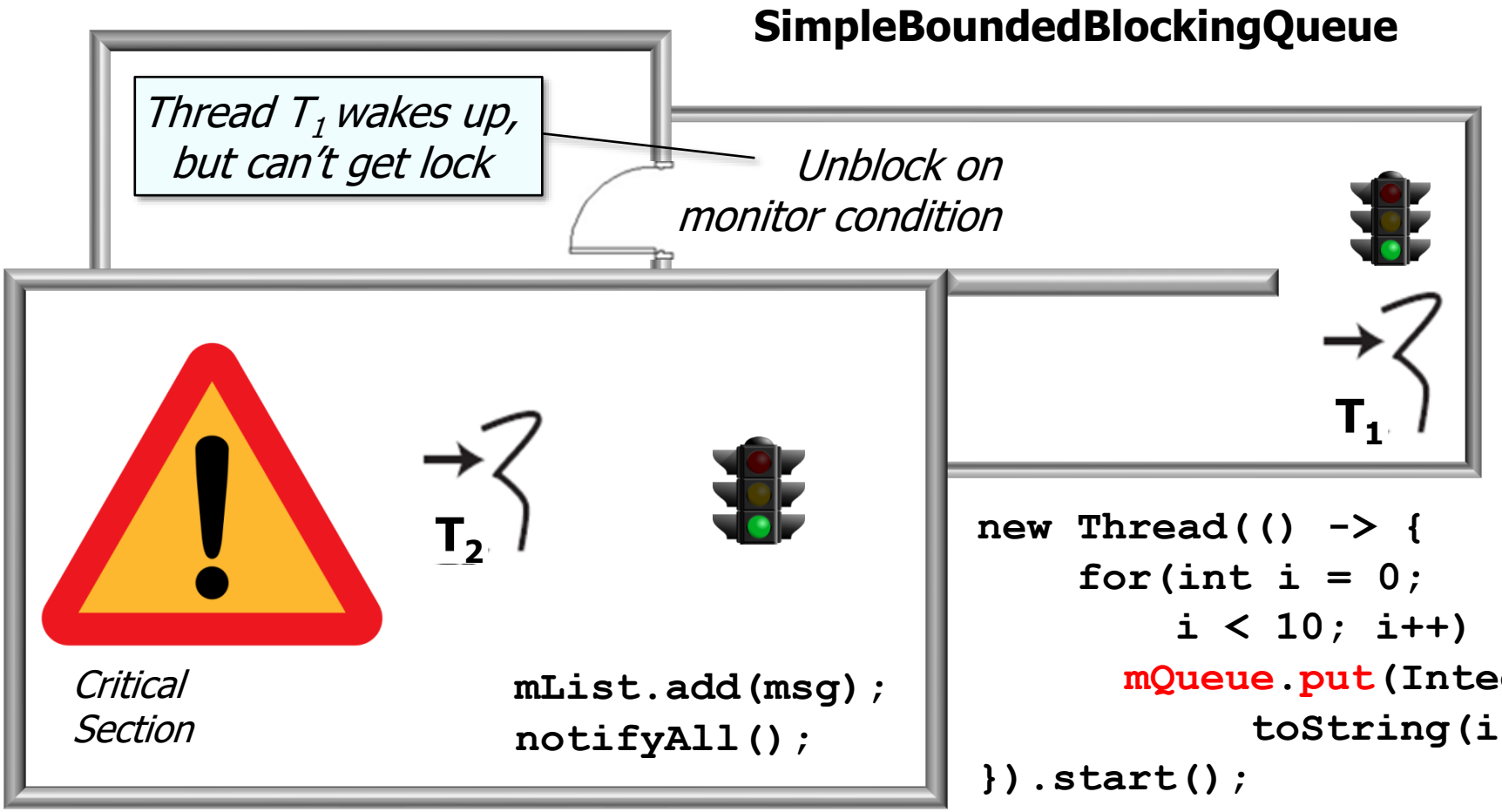

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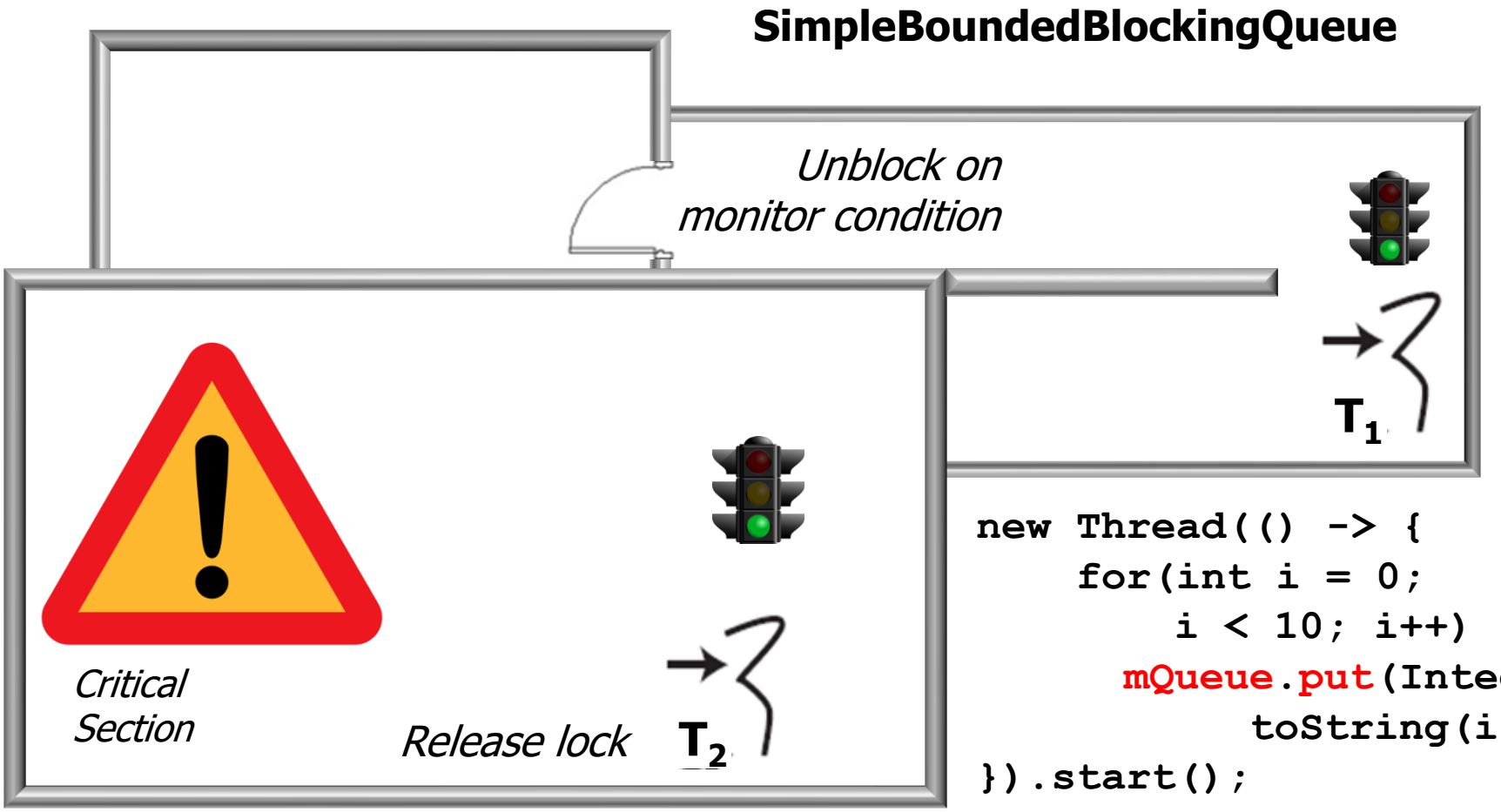


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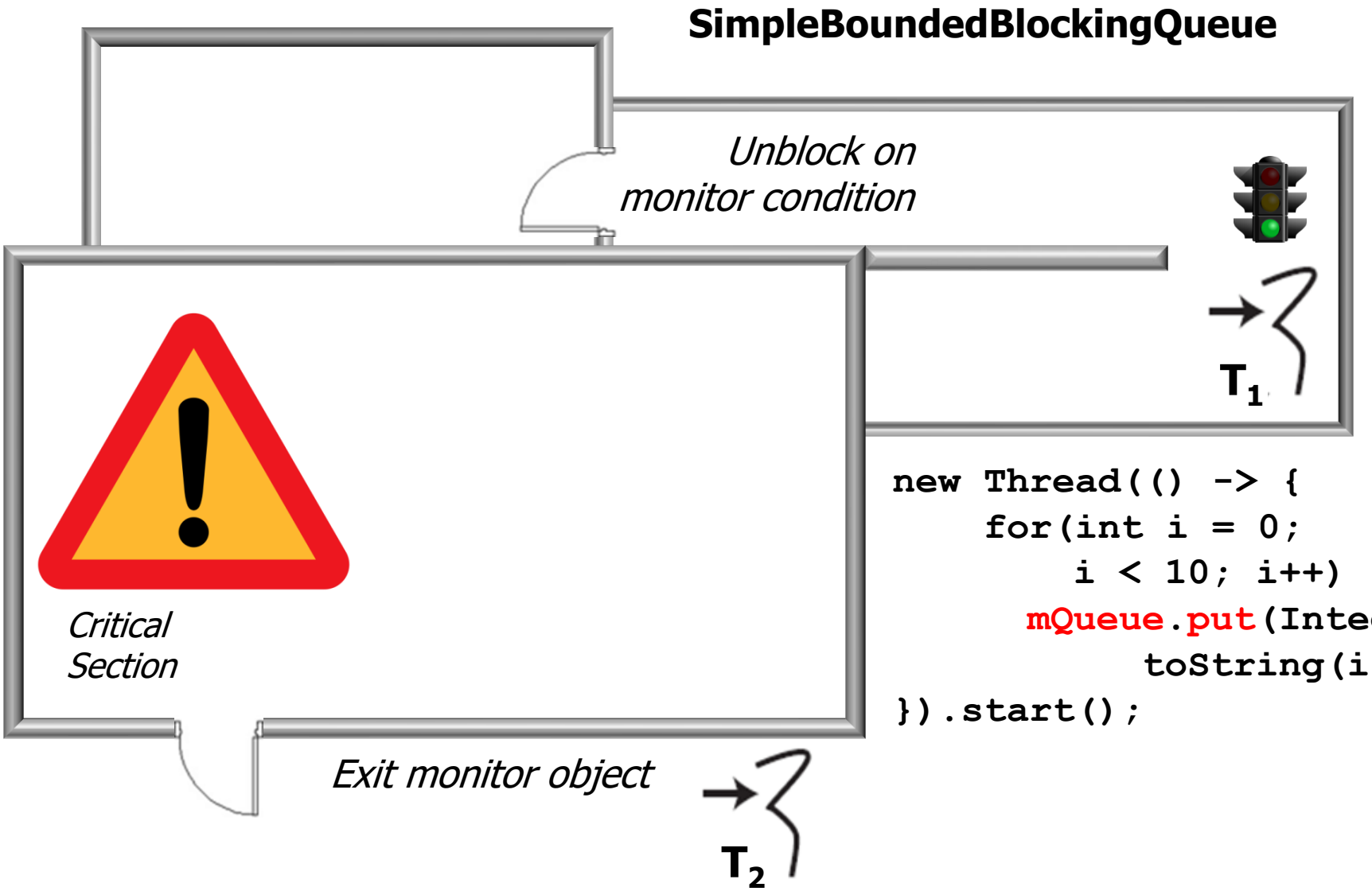


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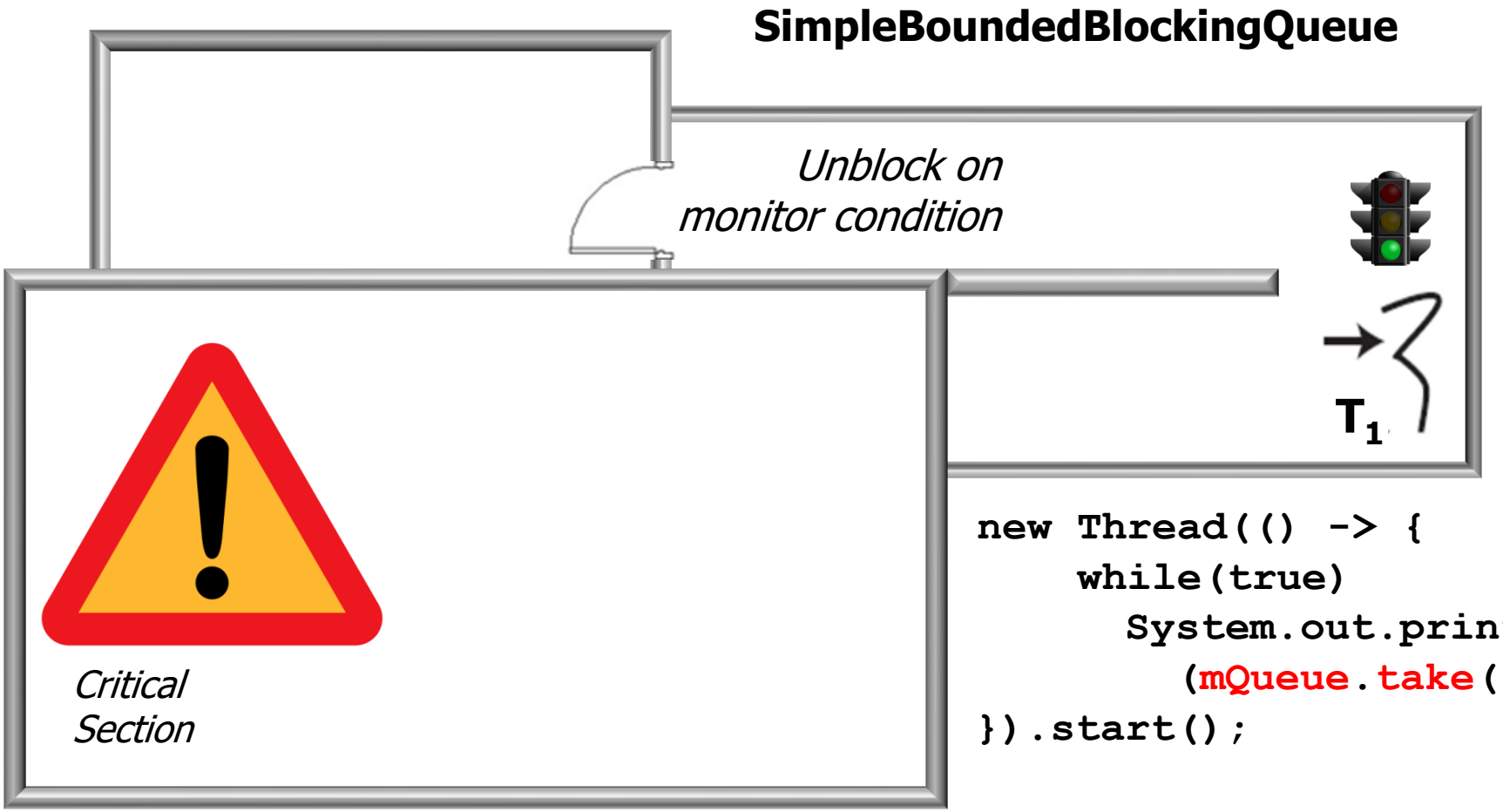


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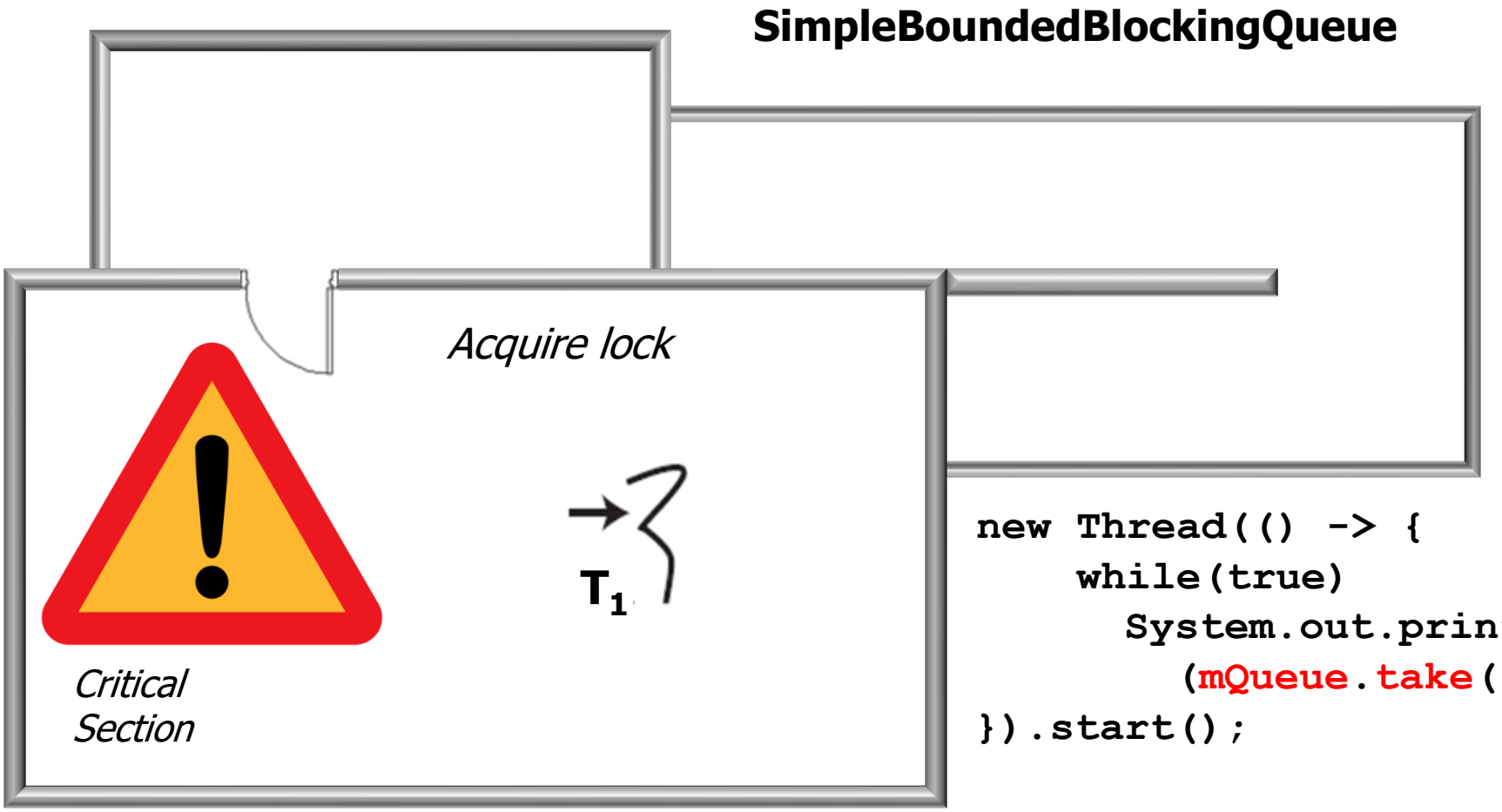


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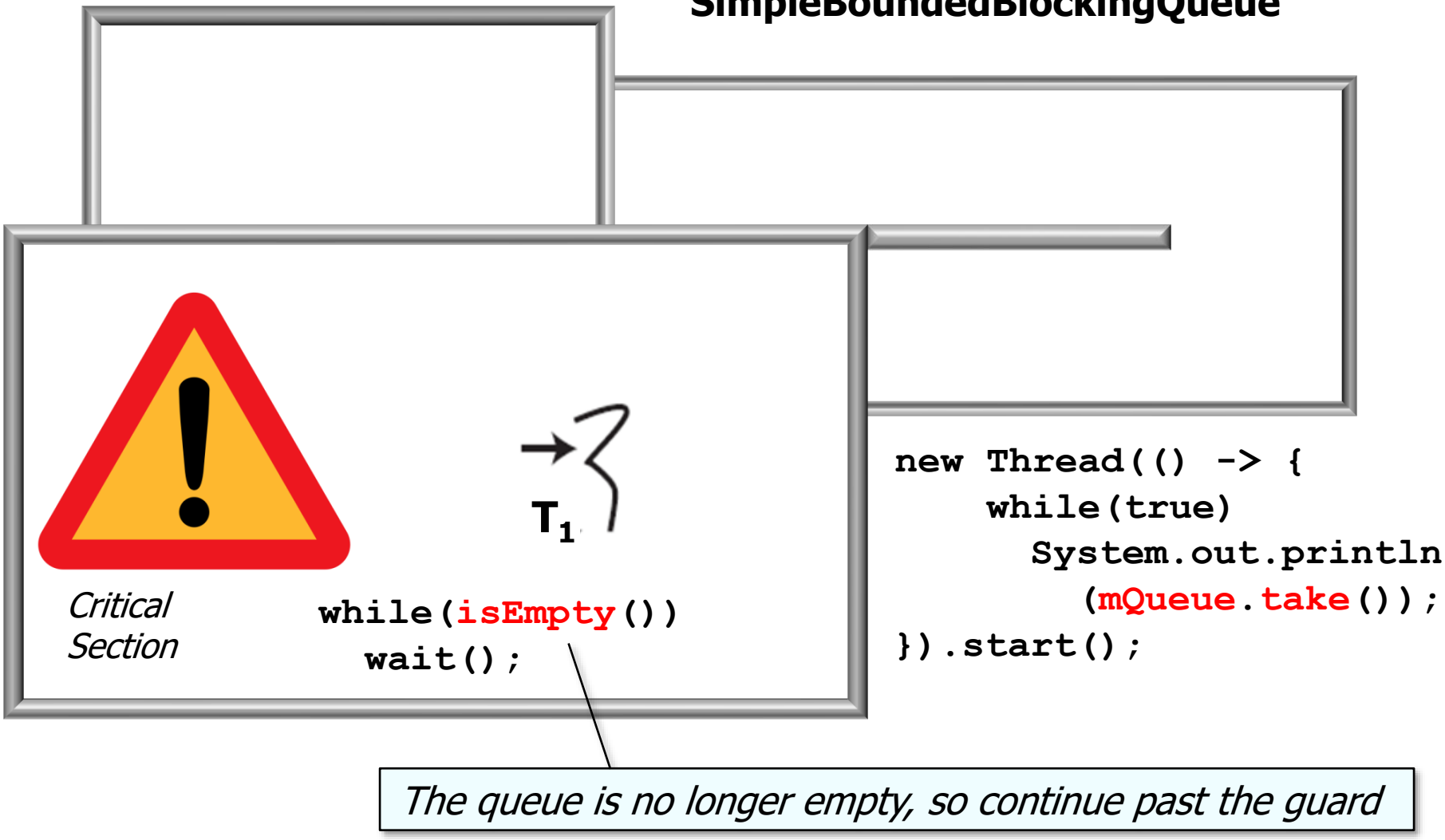
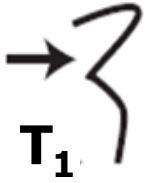


# Visual Analysis of SimpleBoundedBlockingQueue

**SimpleBoundedBlockingQueue**

*Critical Section*

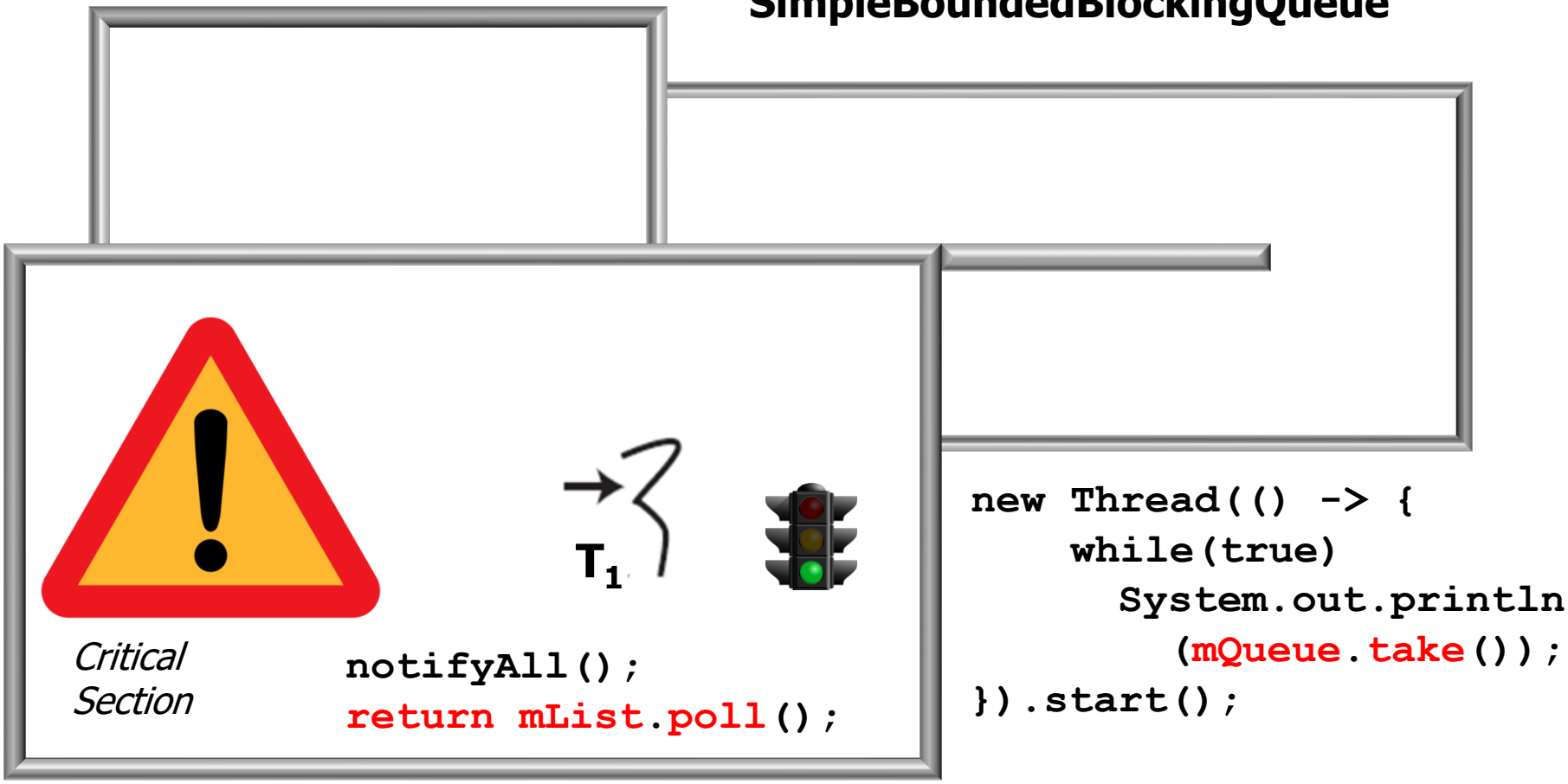



```
notifyAll();
return mList.poll();
```

```
new Thread(() -> {
    while(true)
      System.out.println
        (mQueue.take());
}).start();
```

*Calling notifyAll() before removing/returning the front item in the queue is ok since the monitor lock is held & only one method can be in the monitor object*

# Visual Analysis of SimpleBoundedBlockingQueue



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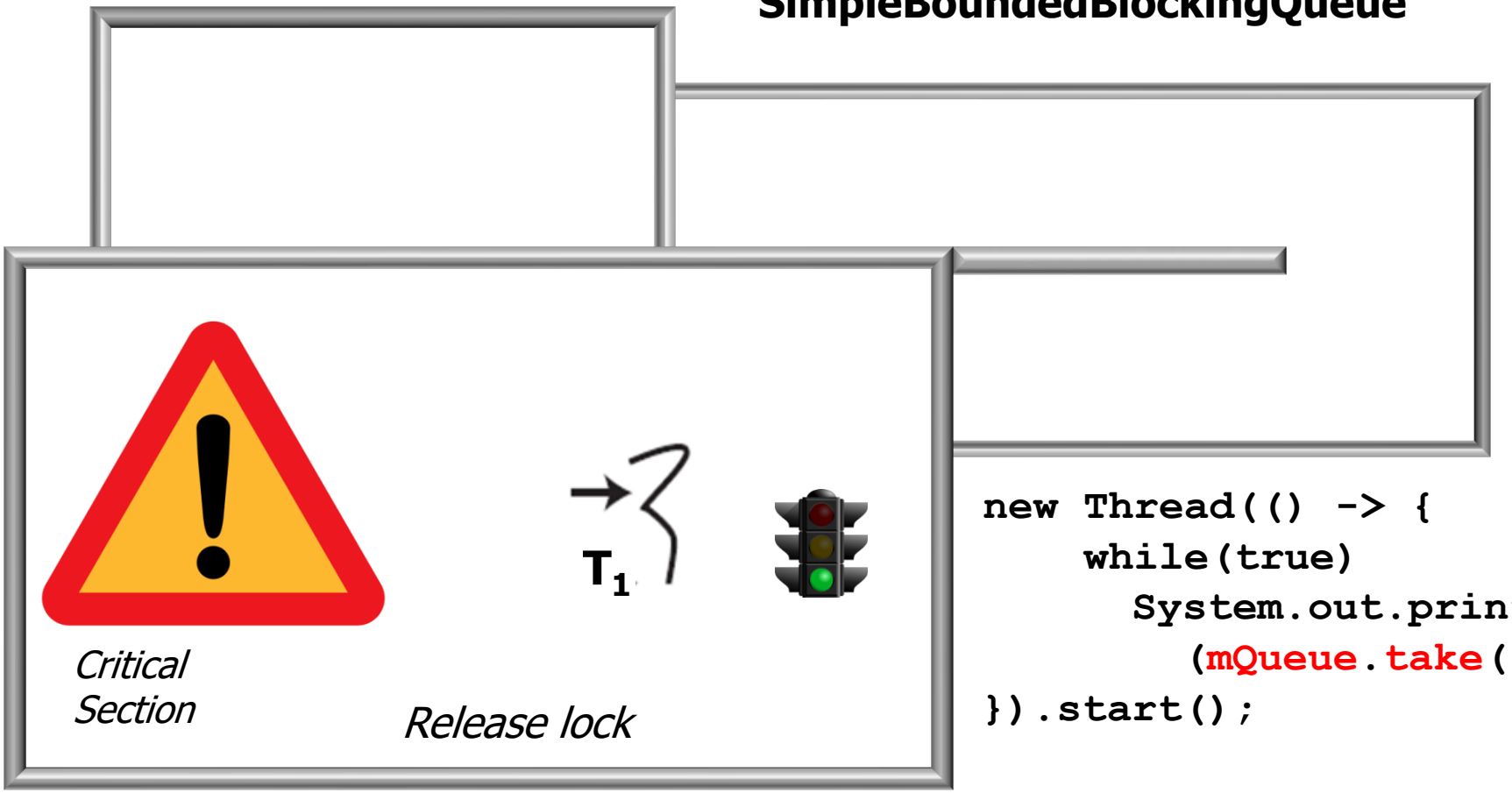


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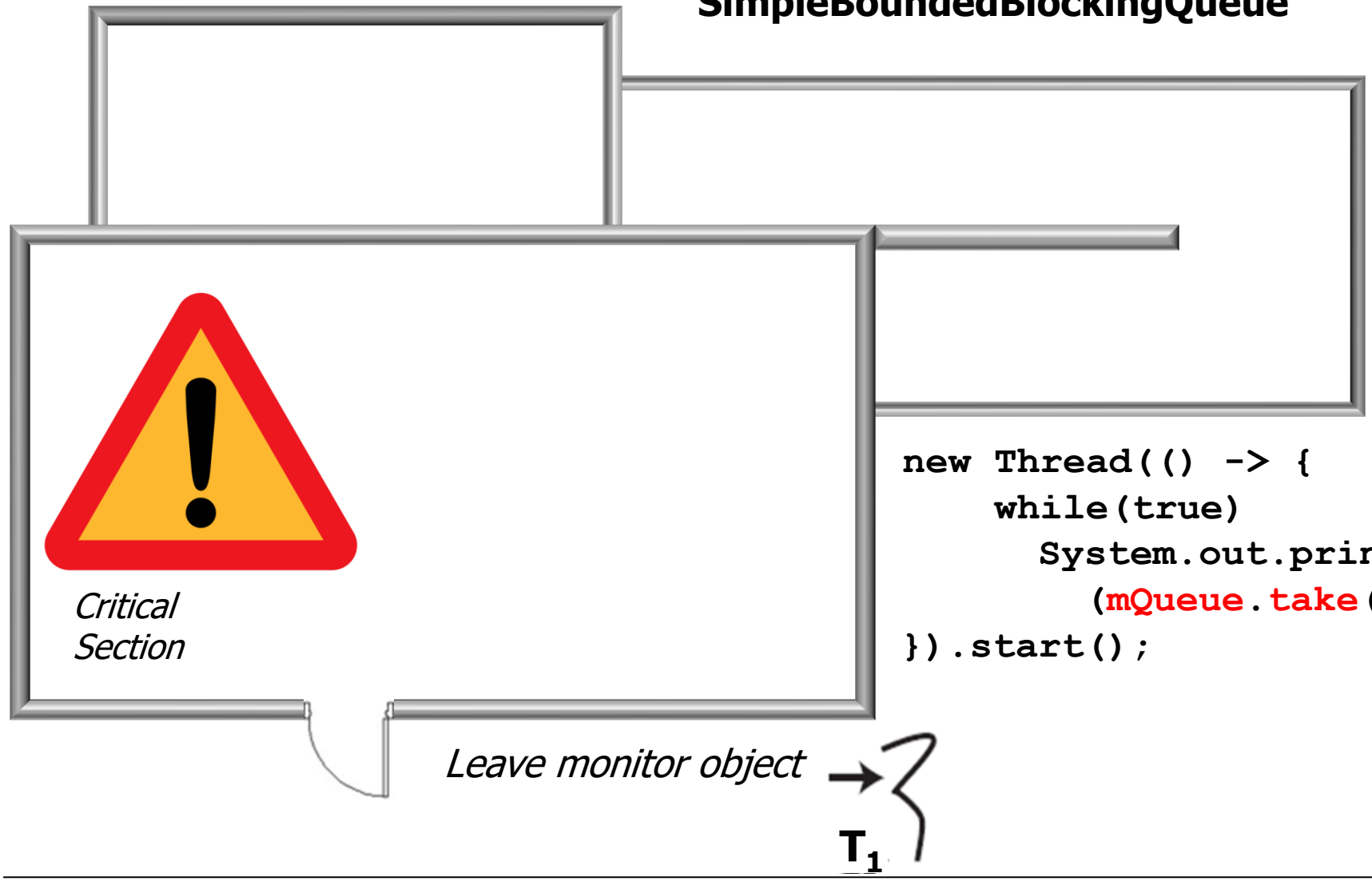

# End of Visualizing the Java Monitor Object Coordination Example