Solving problems with actors

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How I learned to love actors

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Writing a chat proxy server for phones

Chat proxy: the problem

- long-lived connections

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- usually idle, with short bursts of traffic

Chat proxy, take 1

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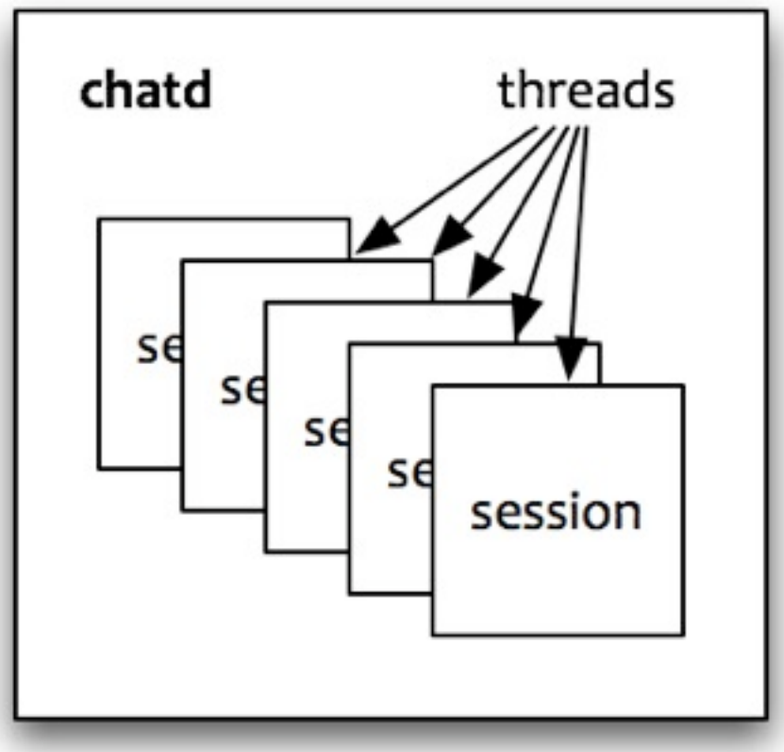

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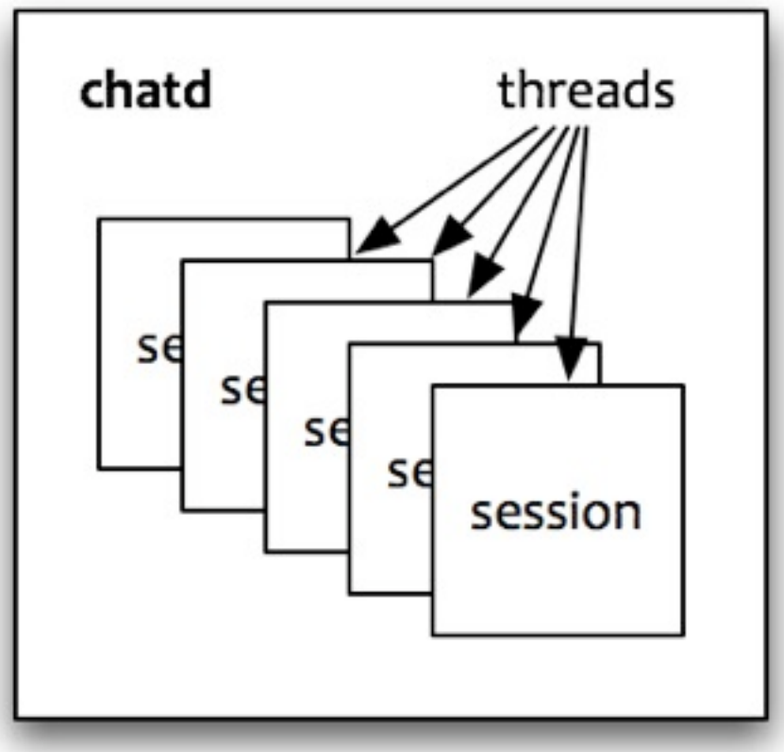

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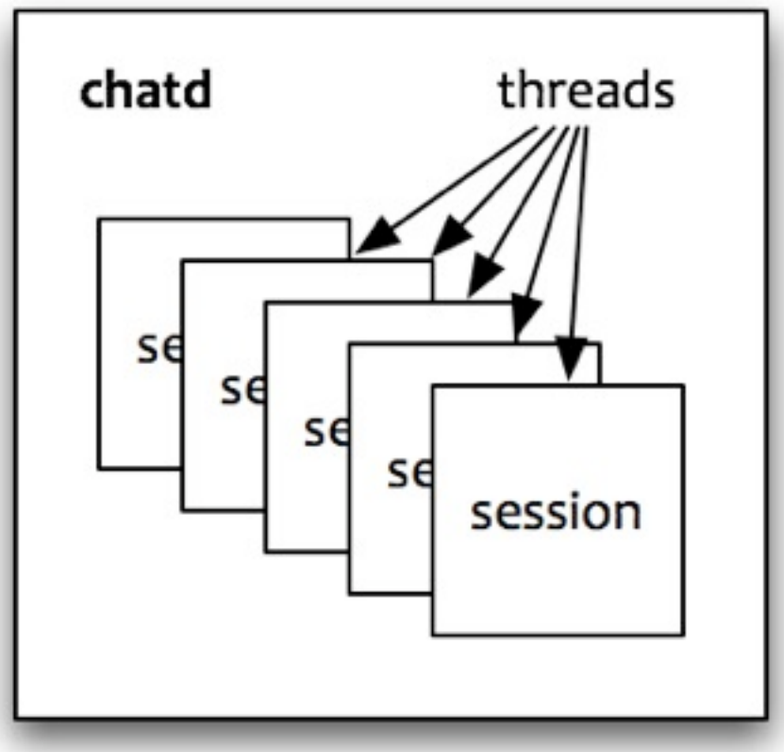

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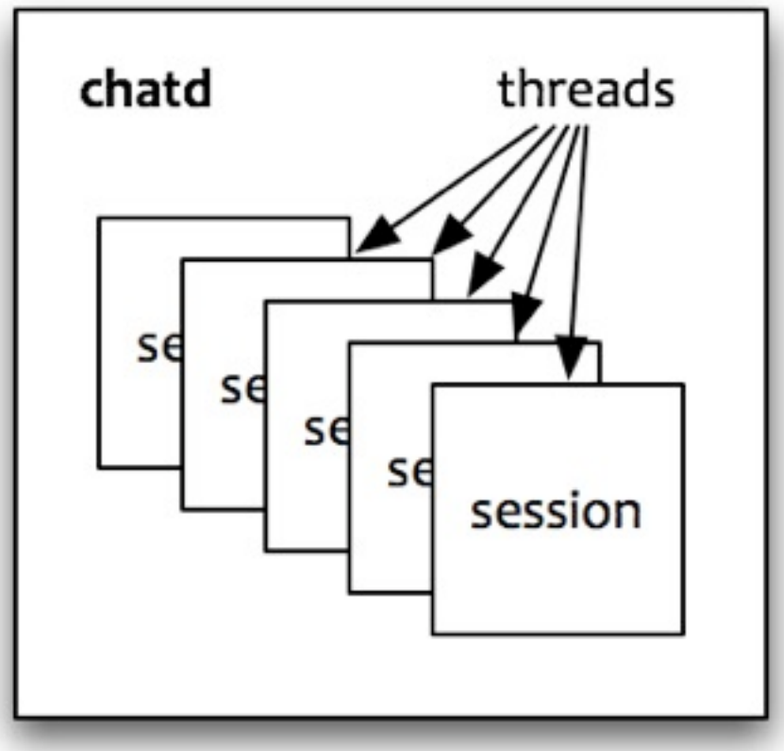

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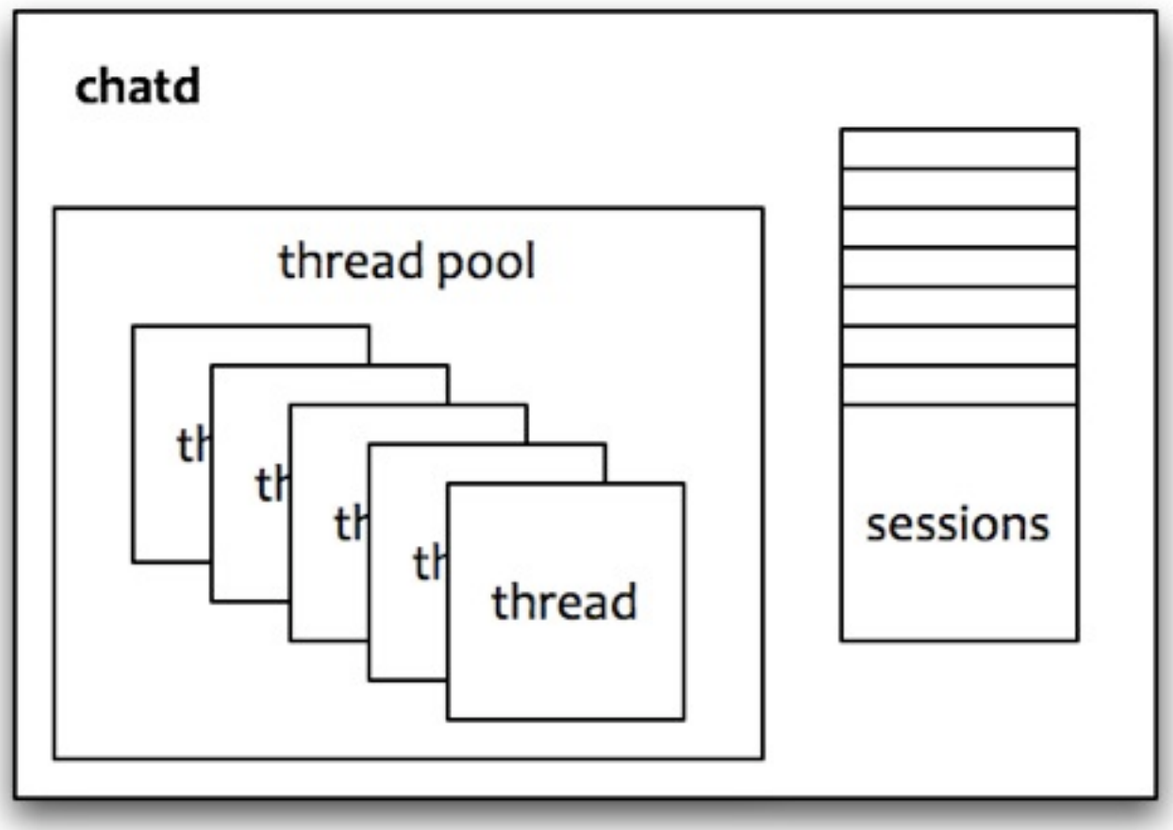
```
class ChatSession {
  public void start(Socket s) {
    // sequential code...
  }
}
```

Chat proxy, take 2

- thread pool and async I/O



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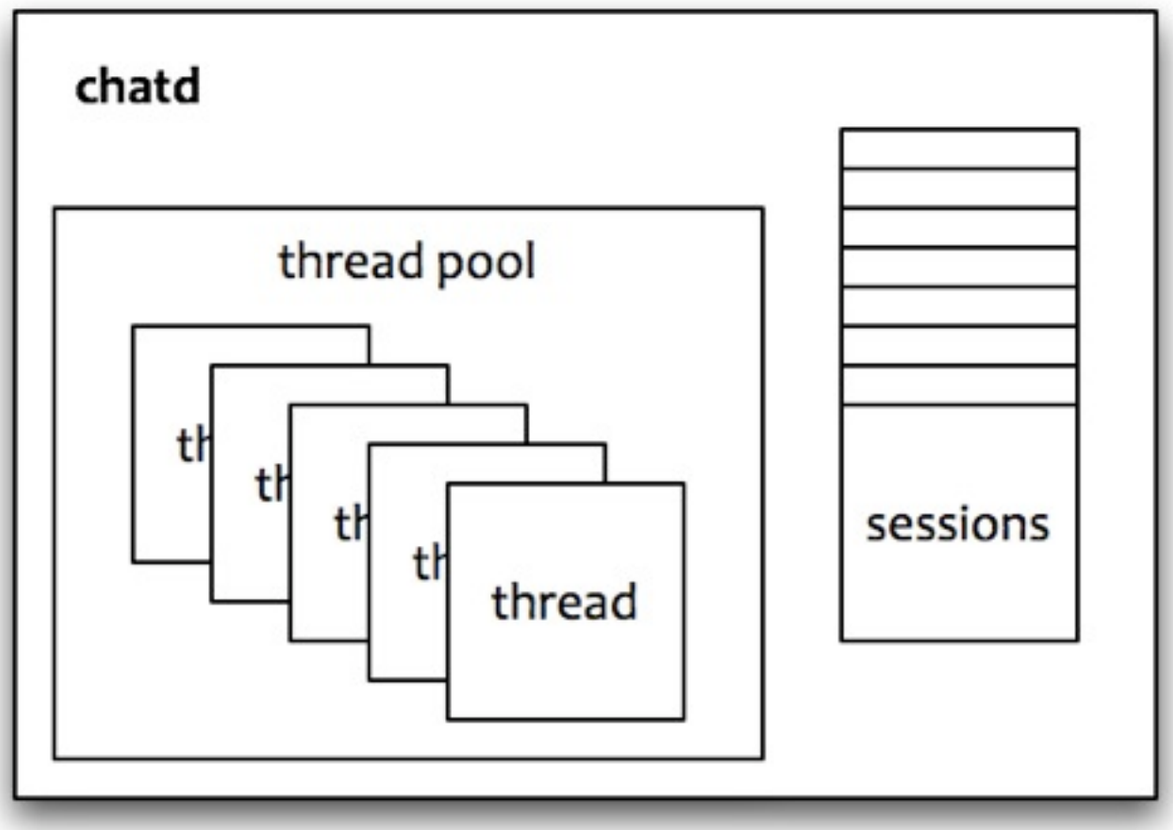

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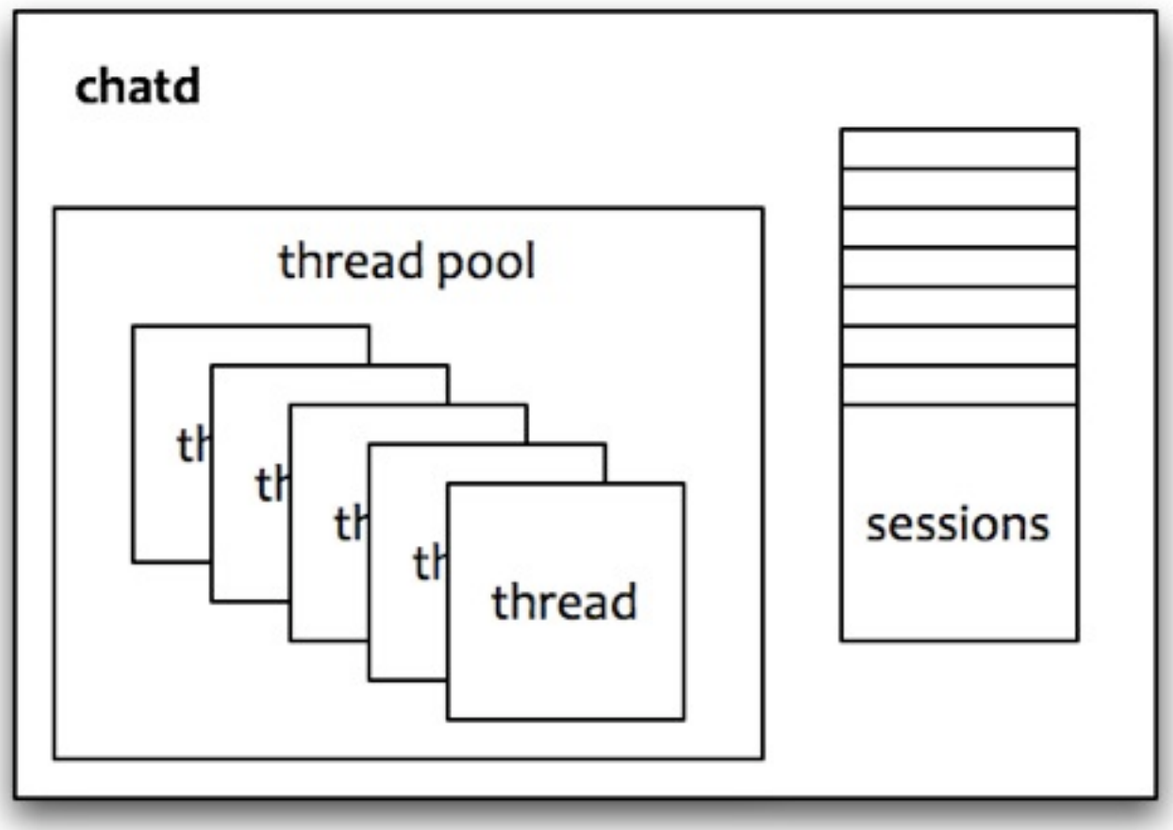

Chat proxy, take 2

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```
class ChatSession {
  public void gotData(byte[] data) {
    // buffer, decode
    // check state...
  }
}
```

Chat proxy, take 2

- fatal flaw: blocking on other services

```
// download profile image:
byte[] data = HTTPClient.get(url);
// oh noes! now it may be 2 seconds later!
```

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- fatal flaw: blocking on other services
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- sync I/O inside async callbacks

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Chat proxy, take 3

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```
HTTP.get(url, new HTTPCallback() {
  public void success(byte[] data) {
    sendImageToPhone(transcode(data));
    // continue processing client request
  }
  public void failure(Exception x) { ... }
});
```

Chat proxy, take 3

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- if it doesn't fit on a slide, it ain't good code

Actors for I/O

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```
react {
  case DataReceived(data) => ...
  case SessionClosed => ...
}
```

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Kestrel

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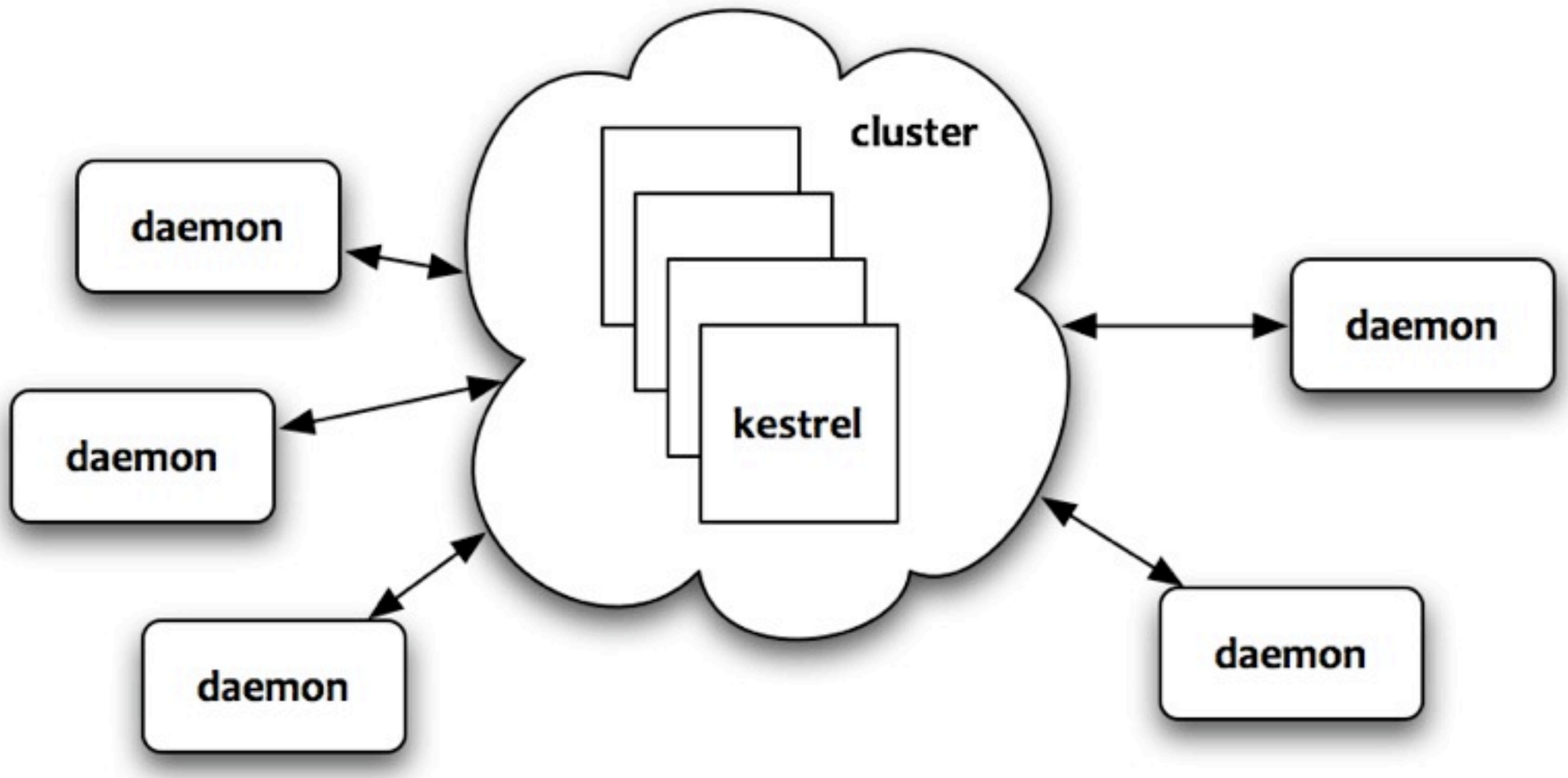

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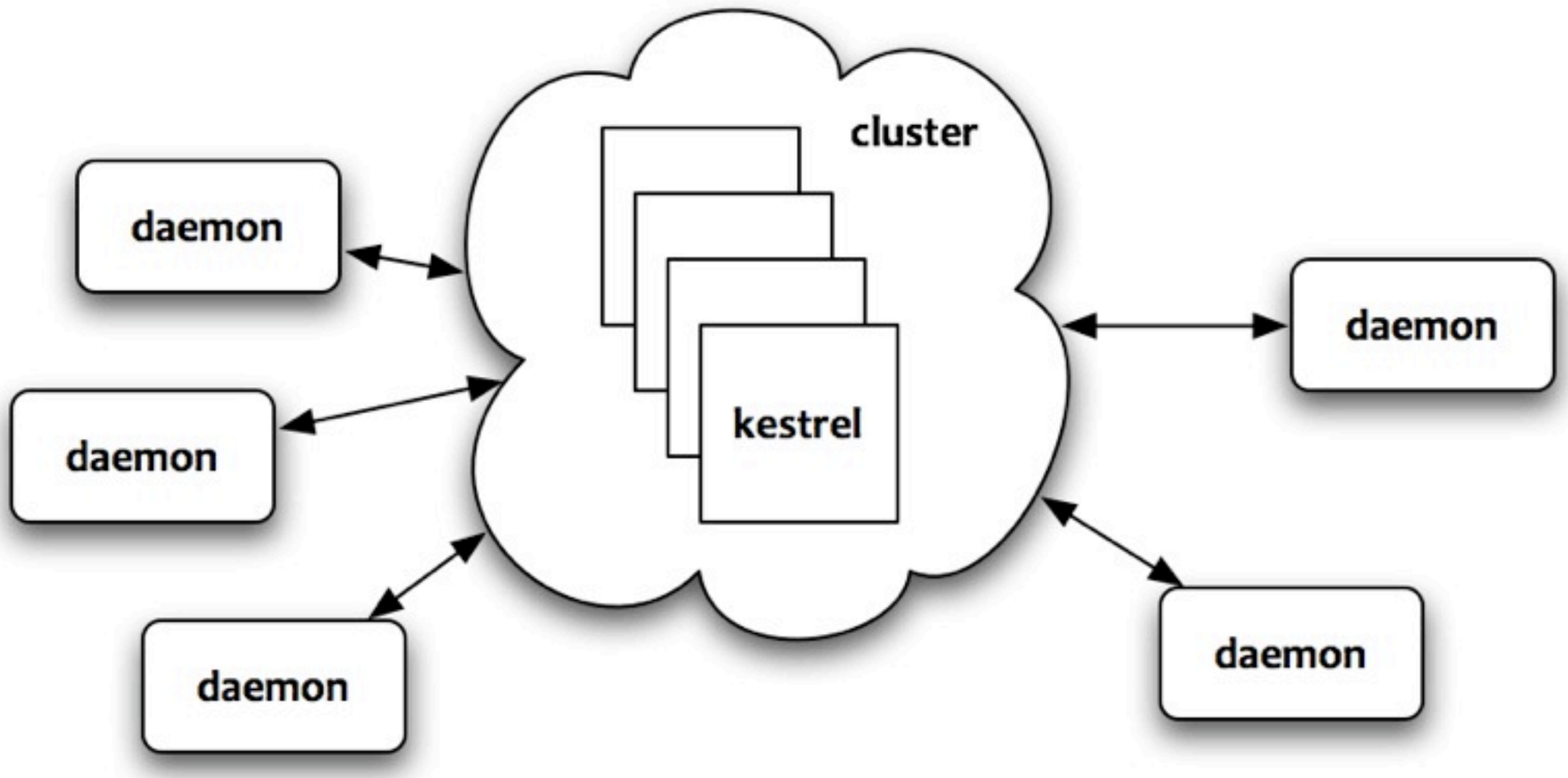

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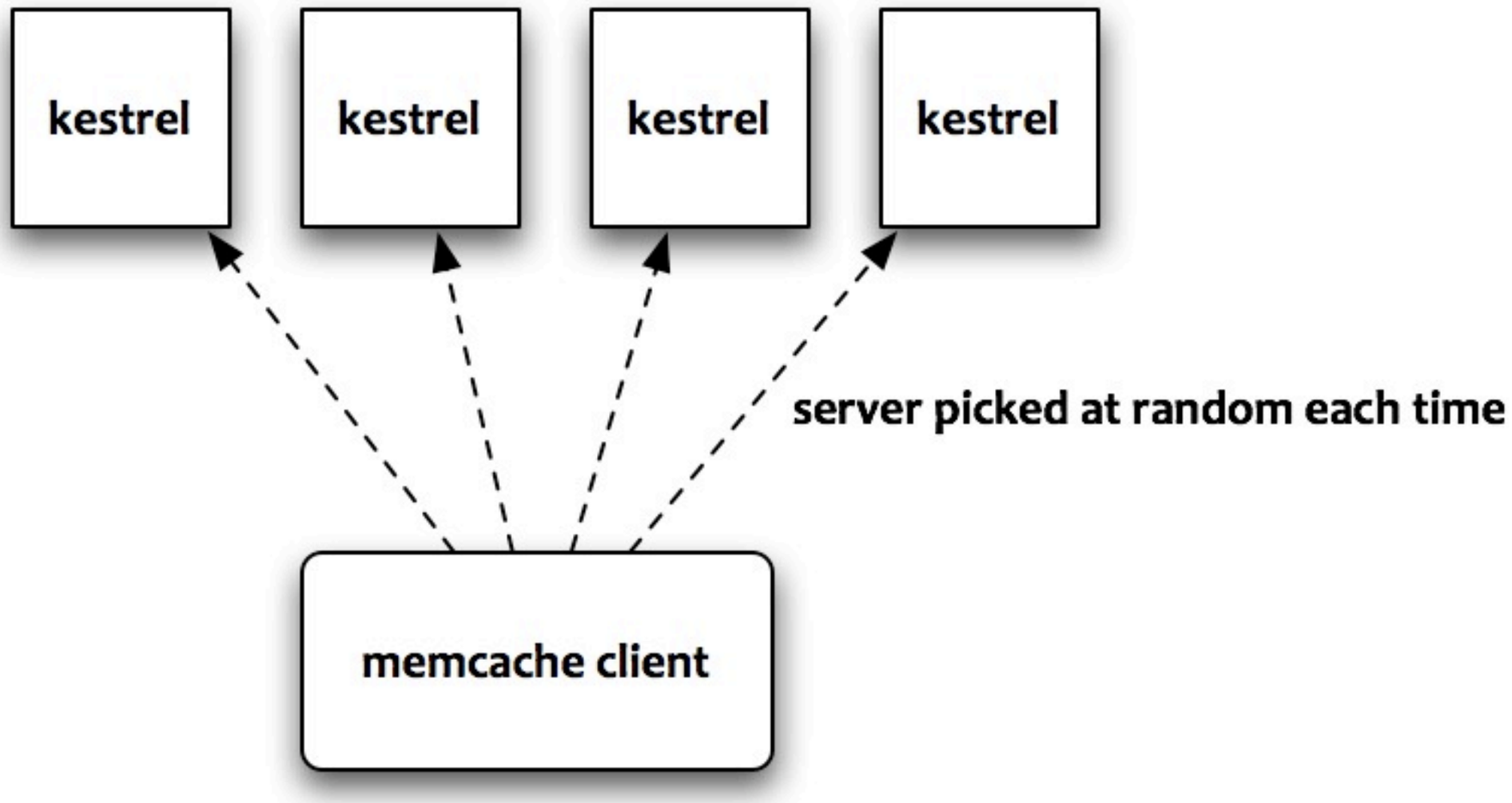

Kestrel

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- ...making the whole cluster loosely ordered

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- (sound familiar?)

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- using naggati, one actor per client
- memcache protocol interface as a mina plugin
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- 7 class files (+ 8 test files)

Kestrel

wins

scala: about half the lines of code as java

actors: avoided concurrency puzzles

mina: complete async I/O library

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```
>stats
STAT uptime 3138307
STAT cmd_get 4090226689
STAT cmd_set 1631380861
STAT bytes_written 237156246614
```

Serendipity

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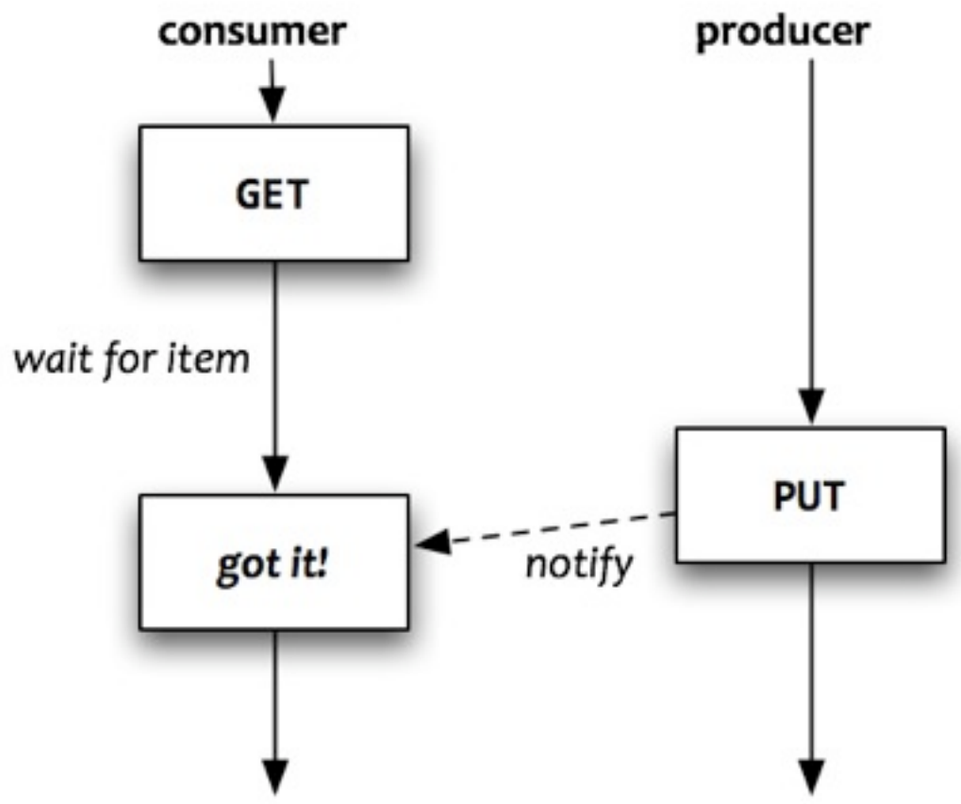

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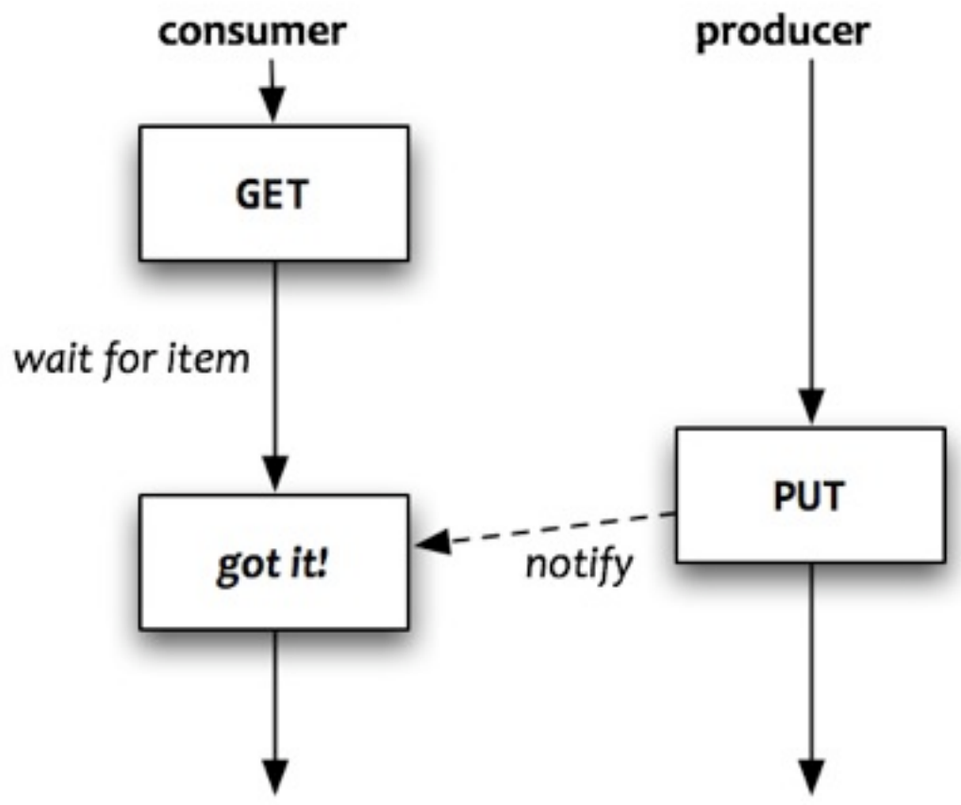
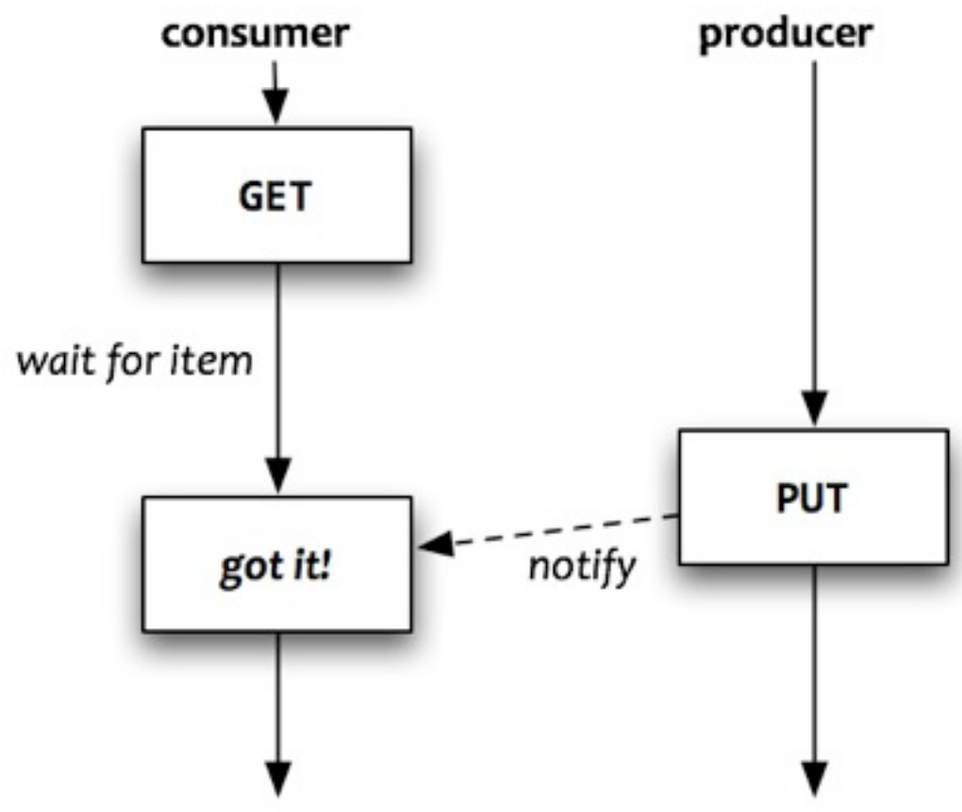


Serendipity

- actors are just one of many tools
- can be combined with locks/etc
- example: want to "hand off" a queue item from a producer to a consumer



Serendipity

```
val waiters = new ArrayBuffer[Actor]

def put(item: QItem) {
  ...
  synchronized {
    if (waiters.size > 0) {
      waiters.remove(0) ! ItemArrived
    }
  }
}
```

Serendipity

```
def removeWithin(timeout: Long) {
  synchronized {
    if (queue.isEmpty) {
      waiters += self
      receiveWithin(timeout) {
        case ItemArrived => remove()
        case TIMEOUT => None
      }
    }
  }
}
```

Serendipity

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- find this out with profiling -- don't guess!

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- scala 2.8 should have significant improvements / simplifications

FIN