CSSE 220

Multithreading

Checkout *Multithreading* project from SVN

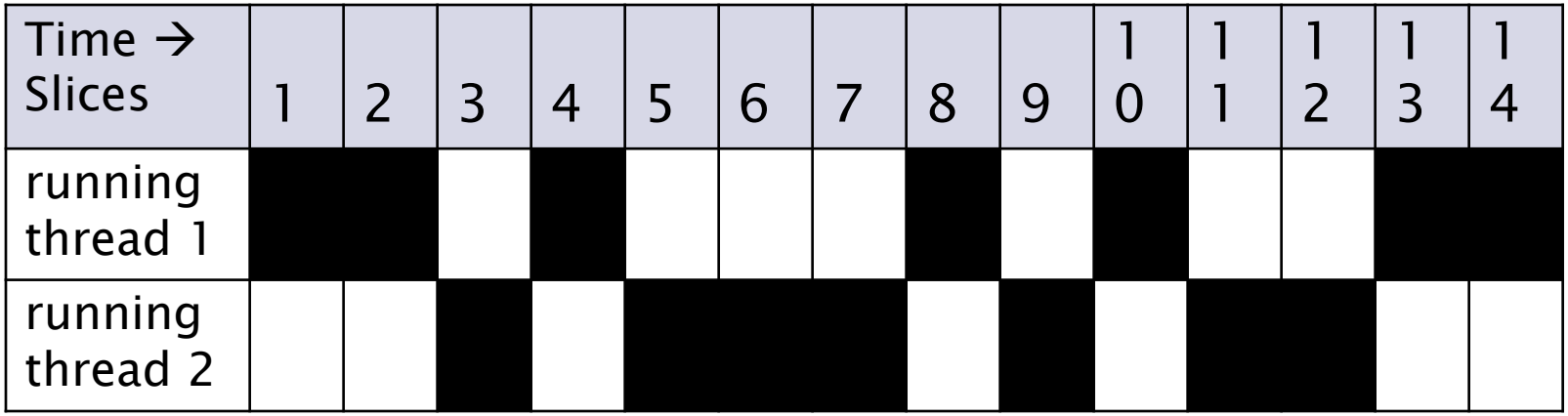
Joe Armstrong,
Programming in Erlang

THE WORLD IS CONCURRENT

Q1

Multithreading

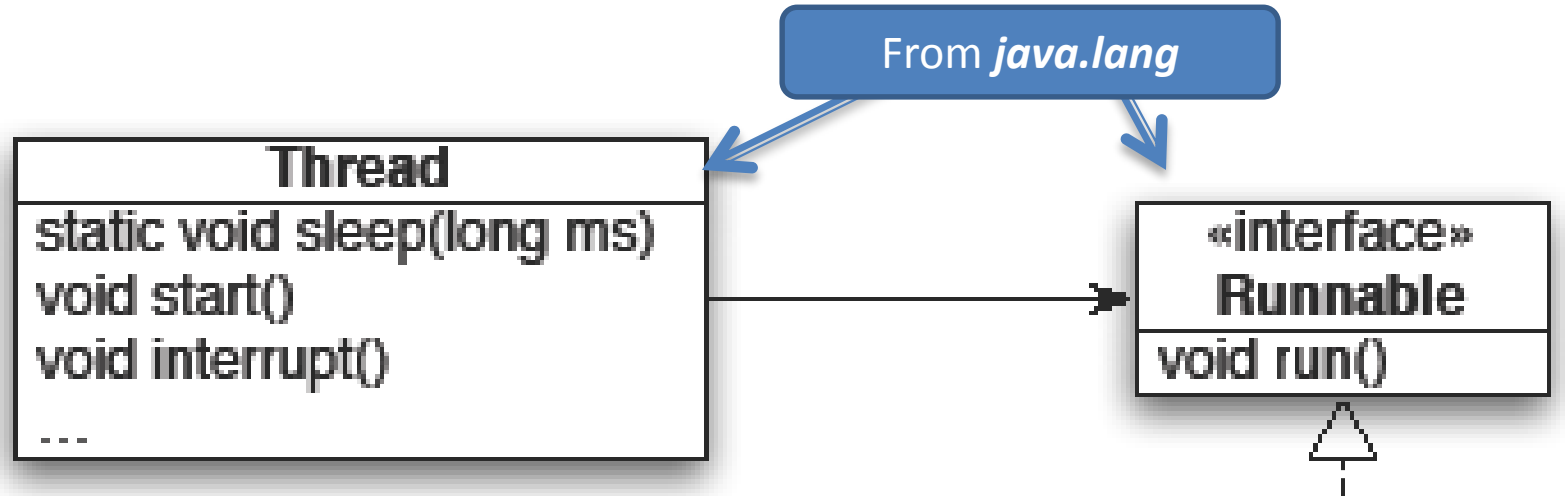
- A technique to:
  - Run multiple pieces of code “simultaneously” on a single machine



  - Run different parts of a program on different processor cores

Q2

Running Our Own Code Concurrently




```
public class R implements Runnable {
    ...
    public void run() {
        while (true) {
            ... maybe Thread.sleep(...);
        }
    }
}
```

Wherever you want to start the Thread:

```
new Thread(object of type R).start();
```

Q3

Animation with Threads

- Example 1: A single object
  - "Animate" it with button clicks
  - Animate it with a Timer

```
Timer timer = new Timer(50, animatorButton);
timer.start();
```

  - Animate it by using a thread

```
public class R implements Runnable {
    ...
    public void run() {
        while (true) {
            ... maybe Thread.sleep(...);
        }
    }
}
```

Wherever you want to start the Thread:

```
new Thread(object of type R).start();
```

Animation with Threads

- Example 2: Multiple objects
  - Use separate thread for each object's "brain"
  - Another thread asks Java to update the GUI

http://www.roadsideamerica.com/story/8543

Other Uses for Threads

- Web servers: many users connecting
- Desktop applications:
  - layout, spellchecking, auto-save, …
- Scientific computing
- Weather forecasting
- …

Caution!

- What if one thread is in the middle of performing an action when its time slice ends?
- What if a second thread's action interferes with the first's action?
- See bank example in today's project

Optional: For a way to fix this, see Big Java Section 20.4

Q4

Work time

Be sure everyone is getting a chance to drive.

TEAM PROJECT

Q5-6