

CSc 317

Runnable, Threads, AsyncTask

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Announcements

- Exam 1
- The next two PAs
- The next quiz

Processes and Threads

- **Process:** In computing, a process is the instance of a computer program that is being executed by one or many threads. It contains the program code and its activity. (*wikipedia*)

[https://en.wikipedia.org/wiki/Process_\(computing\)](https://en.wikipedia.org/wiki/Process_(computing))

- **Thread:** In computer science, a thread of execution is the smallest sequence of programmed instructions that can be managed independently by a scheduler, which is typically a part of the operating system. (*wikipedia*)

[https://en.wikipedia.org/wiki/Thread_\(computing\)](https://en.wikipedia.org/wiki/Thread_(computing))

Processes on a Computer

Spotify



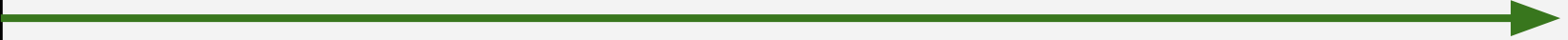
```
graph LR; Spotify[Spotify] --> Arrow1[ ]; Chrome[Tab in Google Chrome] --> Arrow2[ ]; Program[Running your program for 110] --> Arrow3[ ]
```

Tab in Google
Chrome

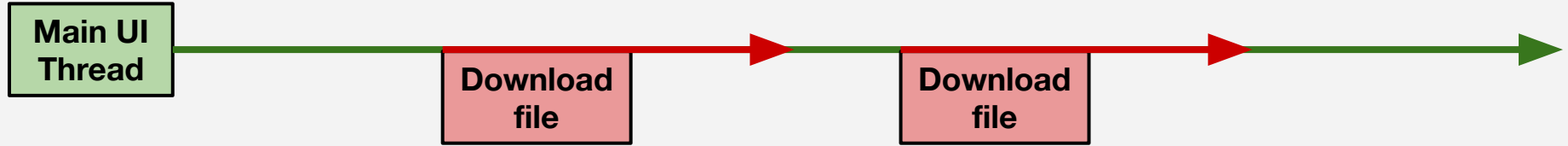
Running your
program for 110

Application Process

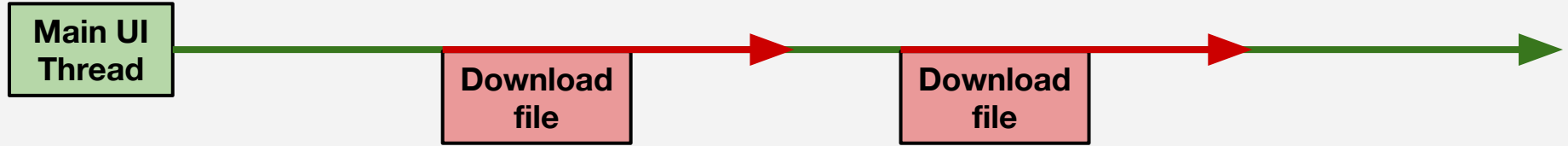
Main UI
Thread



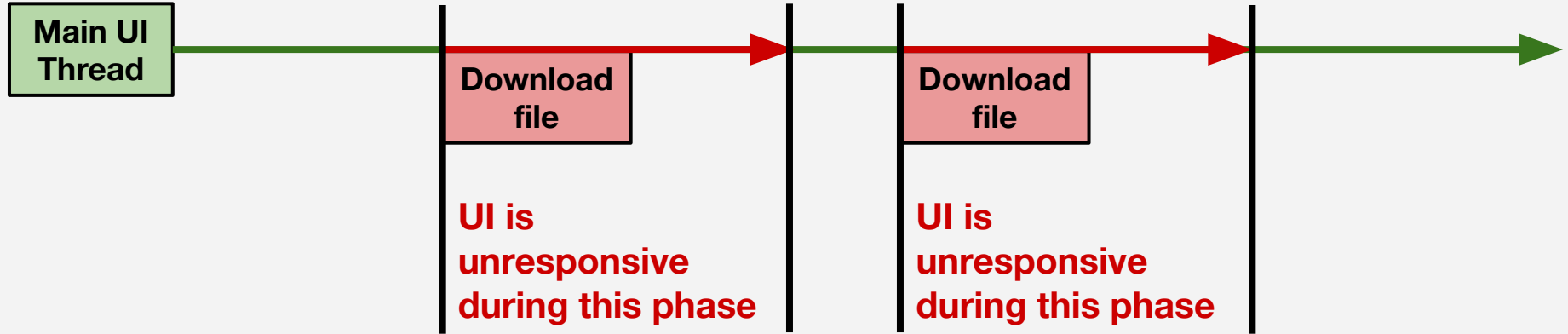
Application Process



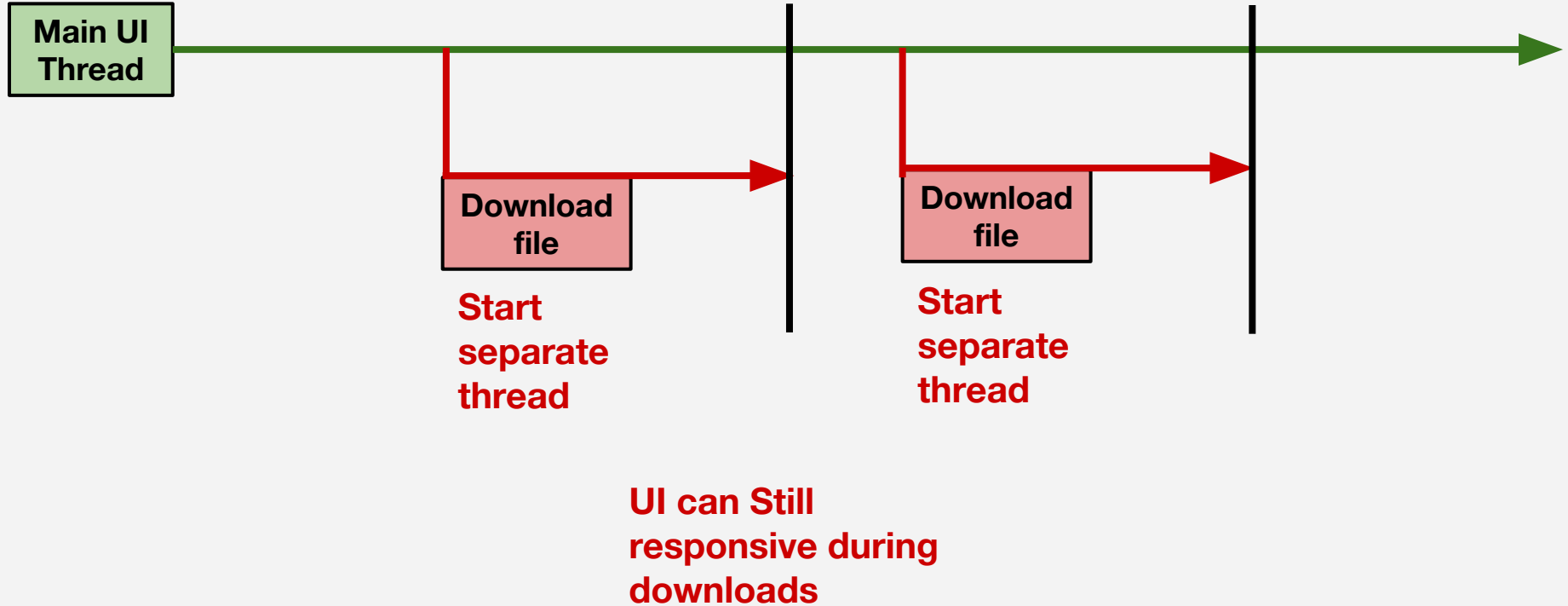
Application Process

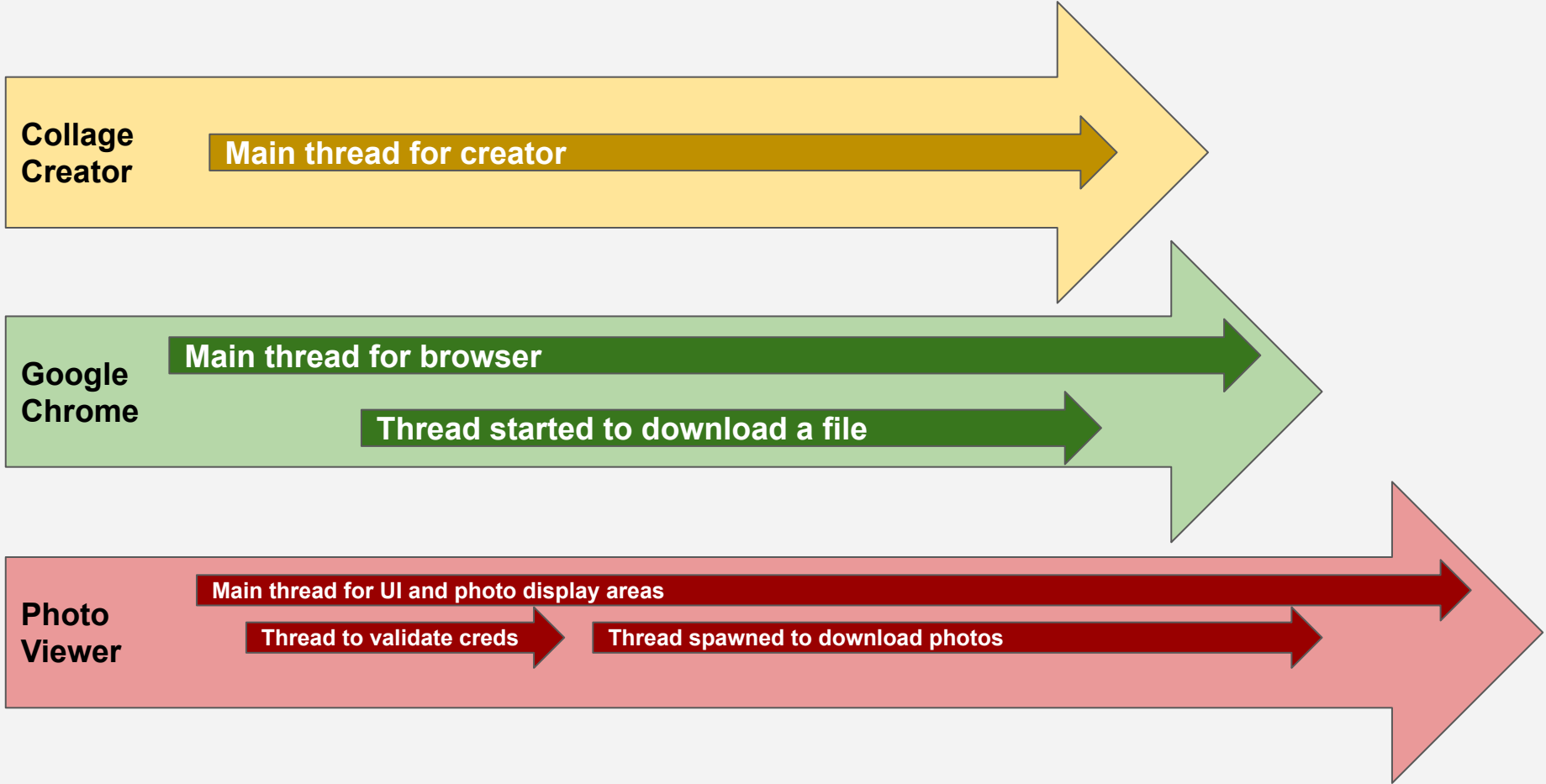


Application Process



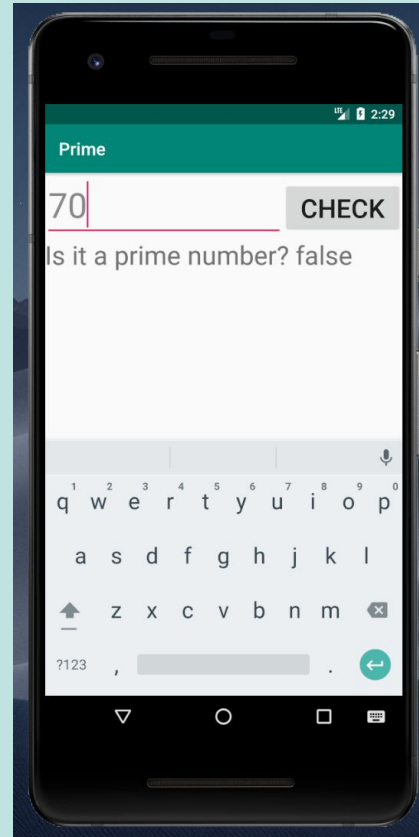
Application Process





Prime application

- Download the prime app
- Test it with a few small numbers:
7, 8, 20, 491
- Test with some large numbers:
111111111111, 2012312311



The Runnable Class

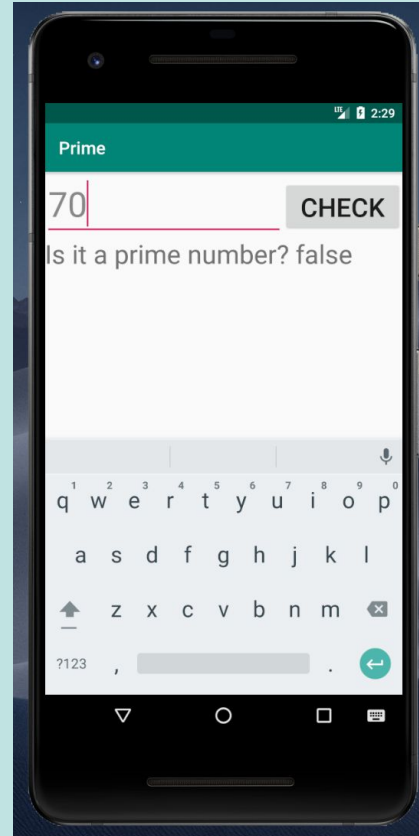
```
public class SomeTaskRunnable implements Runnable {  
  
    public SomeTaskRunnable() {  
        /* Constructor */  
    }  
    ...  
    @Override  
    public void run() {  
        /*  
         * Code you want to run on the thread and/or calls to other functions.  
         */  
    }  
    ...  
}
```

Start a Runnable with a Thread

```
SomeTaskRunnable task = new SomeTaskRunnable();  
  
Thread t = new Thread(task);  
  
t.start();
```

Prime application

- Create a new Java class called **PrimeRunnable** that extends **Runnable**
- A **Runnable** object defines a task to be run, that can be spun-up in a Thread



Prime application

- Start the runnable from the MainActivity
- What happens?

```
PrimeRunnable pr = new PrimeRunnable(this, maxNumber);  
  
(new Thread(pr)).start();
```

Prime application

- Need to set the value of the **textView** after the thread is done calculating!
- Run this from within the Runnable:

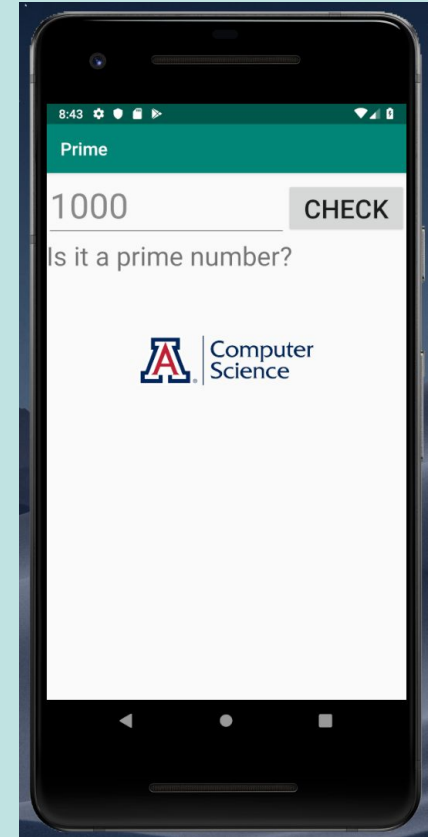
```
invokerActivity.runOnUiThread(new Runnable() {  
    public void run() {  
        // Run the UI update code here  
    }  
});
```


Images in Application

- As some of you have run into: Large images can bog apps down, or cause them to not work!
- What if instead of including them as a drawable, download them from the internet!

Download an image

- In **ActivityMain**'s onCreate function:
- Download an image with the **getBitmapFromURL** function
- Display the image in the imageview
- Try it!

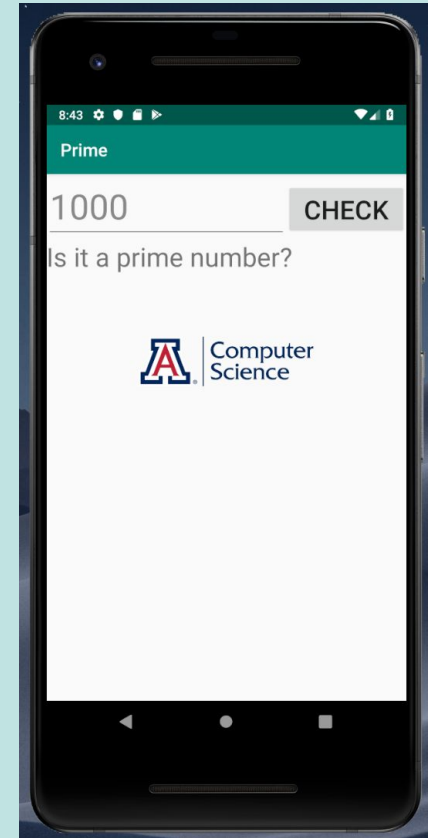


Download an image

- In **ActivityMain**'s onCreate function:
- Download an image with the **getBitmapFromURL** function
- Display the image in the imageview
- Try it!

Did you get a

android.os.NetworkOnMainThreadException ?



Prime application

- Create a new Java class, or use the existing class, called **ImageRunnable** that extends **Runnable**
- Download in there

Also, permissions:

```
<?xml version="1.0" encoding="utf-8"?>
<manifest . . .>

    <application . . .
        android:usesCleartextTraffic="true">
        <activity android:name=".MainActivity">
            . . .
        </activity>
    </application>

    <uses-permission
        android:name="android.permission.INTERNET" />

</manifest>
```

Prime application

- Create a new Java class, or use the existing class, called **ImageRunnable** that extends **Runnable**
- Download in there

