Passing Parameters to a Java Thread

Douglas C. Schmidt
d.schmidt@vanderbilt.edu
www.dre.vanderbilt.edu/~schmidt

Institute for Software Integrated Systems
Vanderbilt University
Nashville, Tennessee, USA
Learning Objectives in this Part of the Lesson

- Understand how Java threads support concurrency
- Learn how our case study app works
- Know alternative ways of giving code to a thread
- Learn how to pass parameters to a Java thread
Passing Parameters to a Java Thread
Passing Parameters to a Java Thread

- The `run()` methods defined in Java Thread & Runnable take no parameters.

This raises the question of how to parameters can be passed to a Java thread!
Passing Parameters to a Java Thread

- Parameters passed to run() can be supplied via one of two other means
Passing Parameters to a Java Thread

- Parameters passed to run() can be supplied via one of two other means, e.g.
  - As parameters to a class constructor

```java
public class GCDRunnable extends Random implements Runnable {
```

Passing Parameters to a Java Thread

• Parameters passed to run() can be supplied via one of two other means, e.g.
• As parameters to a class constructor

public class GCDRunnable extends Random implements Runnable {
  private final MainActivity mActivity;
  ...

Define field(s) to store parameters passed to a runnable or thread object
• Parameters passed to run() can be supplied via one of two other means, e.g.
  • As parameters to a class constructor

```java
public class GCDRunnable extends Random implements Runnable {
    private final MainActivity mActivity;

    public GCDRunnable(MainActivity mainActivity) {
        mActivity = mainActivity;
        ...
    }
}
```

*Add the parameter(s) to the constructor signature & store them in the field(s)*
• Parameters passed to run() can be supplied via one of two other means, e.g.
  • As parameters to a class constructor

    public class GCDRunnable extends Random implements Runnable {
        private final MainActivity mActivity;

        public GCDRunnable(MainActivity mainActivity) {
            mActivity = mainActivity;
        }

        public void run() {
            final String threadString =
                " with thread id " + Thread.currentThread();
            mActivity.println("Entering run()" + threadString);
            ...
        }
    }

Use the field(s) within the thread’s run() hook method to customize its behavior
Passing Parameters to a Java Thread

• Parameters passed to run() can be supplied via one of two other means, e.g.
  • As parameters to a class constructor

public class GCDRunnable extends Random implements Runnable {
  private final MainActivity mActivity;

  public GCDRunnable(MainActivity mainActivity) {
    mActivity = mainActivity;
  }

  public void run() {
    final String threadString =
    " with thread id " + Thread.currentThread();
    mActivity.println("Entering run()" + threadString);
    ...

  }

public class MainActivity ... { ...
  public void runRunnable(View v) { ...
    new Thread(new GDCRunnable(this));
    ...

  }

  // Pass the parameter(s) when the runnable or thread is created
Passing Parameters to a Java Thread

- Parameters passed to run() can be supplied via one of two other means, e.g.
  - As parameters to a class constructor
  - As parameters to “setter” methods

```java
public class GCDThread extends Thread {
```

Passing Parameters to a Java Thread

• Parameters passed to run() can be supplied via one of two other means, e.g.
  • As parameters to a class constructor
  • As parameters to “setter” methods

```java
public class GCDThread extends Thread {
    private MainActivity mActivity;
    private Random mRandom;
    ...
```

*Define field(s) to store parameters passed to a runnable or thread object*
Parameters passed to run() can be supplied via one of two other means, e.g.

- As parameters to a class constructor
- As parameters to “setter” methods

```java
public class GCDThread extends Thread {
    private MainActivity mActivity; private Random mRandom;

    public GCDThread setActivity(MainActivity activity) {
        mActivity = activity; return this;
    }

    public GCDThread setRandom(Random random) {
        mRandom = random; return this;
    }
    ...
```

Define setter methods that update field(s)
• Parameters passed to `run()` can be supplied via one of two other means, e.g.
  • As parameters to a class constructor
  • As parameters to “setter” methods

```java
public class GCDThread extends Thread {
    private MainActivity mActivity; private Random mRandom;

    public GCDThread setActivity(MainActivity activity) {
        mActivity = activity; return this;
    }

    public GCDThread setRandom(Random random) {
        mRandom = random; return this;
    }
    ...

Note use of “fluent interfaces,” which enables “chaining” of method calls
```

See [en.wikipedia.org/wiki/Fluent_interface](en.wikipedia.org/wiki/Fluent_interface)
Passing Parameters to a Java Thread

- Parameters passed to run() can be supplied via one of two other means, e.g.
  - As parameters to a class constructor
  - As parameters to “setter” methods

```java
public class GCDThread extends Thread {
    private MainActivity mActivity; private Random mRandom;

    public GCDThread setActivity(MainActivity activity)
    { mActivity = activity; return this; }

    public GCDThread setRandom(Random random)
    { mRandom = random; return this; }

    ...

    public void run() { ...
        mActivity.println("Entering run()" + threadString);
        ...
        int number1 = mRandom.nextInt();
        int number2 = mRandom.nextInt(); ...
```
Passing Parameters to a Java Thread

- Parameters passed to run() can be supplied via one of two other means, e.g.
  - As parameters to a class constructor
  - As parameters to “setter” methods

```
public class GCDThread extends Thread {
  ...

public class MainActivity ... { ...
  public void runThread(View v) { ...
    Thread thread =
      new GCDThread()
        .setActivity(this)
        .setRandom(new Random());
  ...

Use the fluent interface to pass parameter(s) when the runnable or thread is created
```
End of Passing Parameters to a Java Thread