Java 物件導向程式語言

多執行緒程式設計

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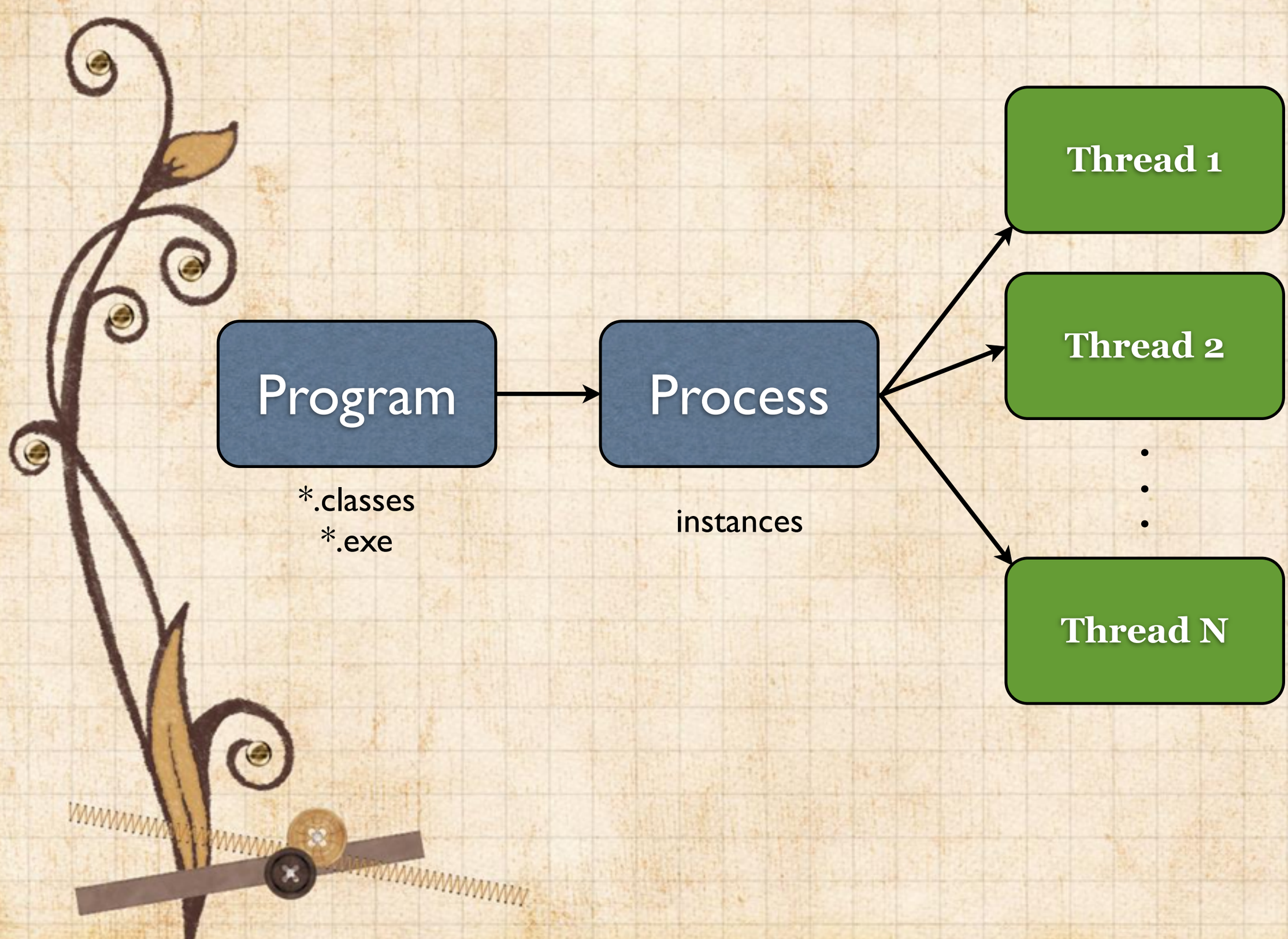
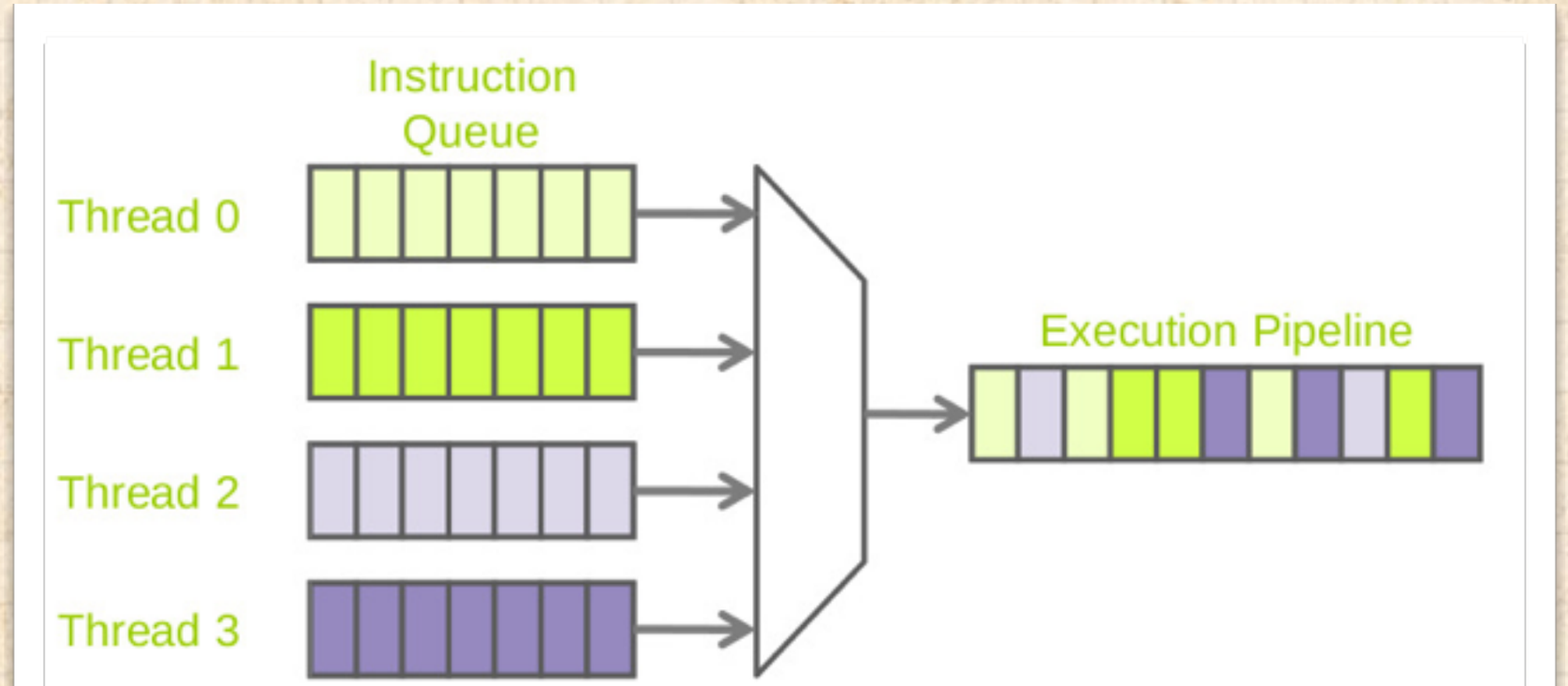
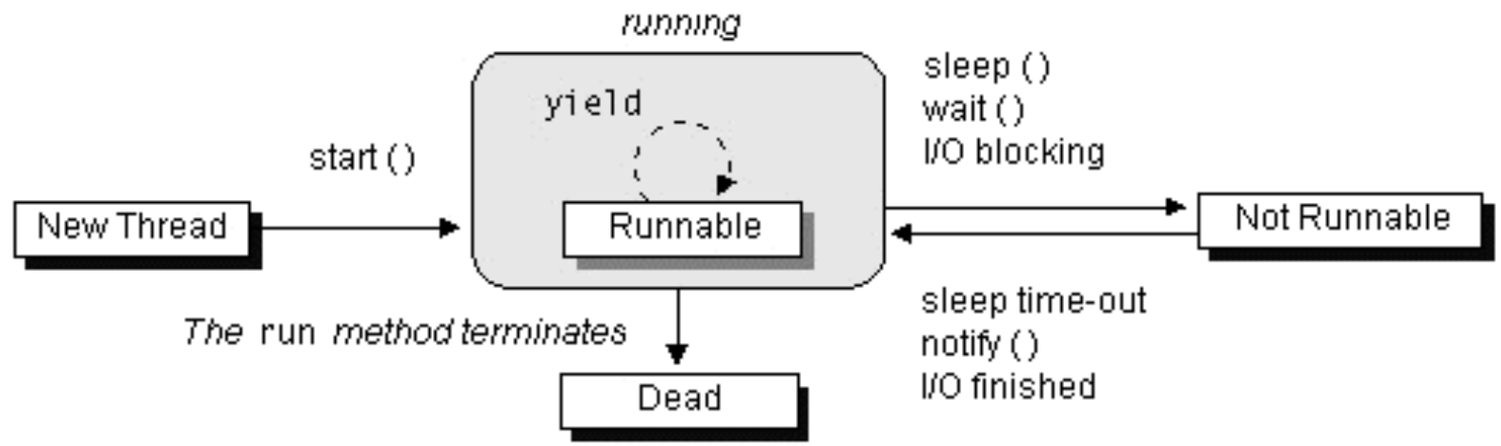
http://goo.gl/8Hc1iX


Program
Process
Thread 1
Thread 2
Thread N
*.classes
*.exe
instances

多執行緒處理佇列

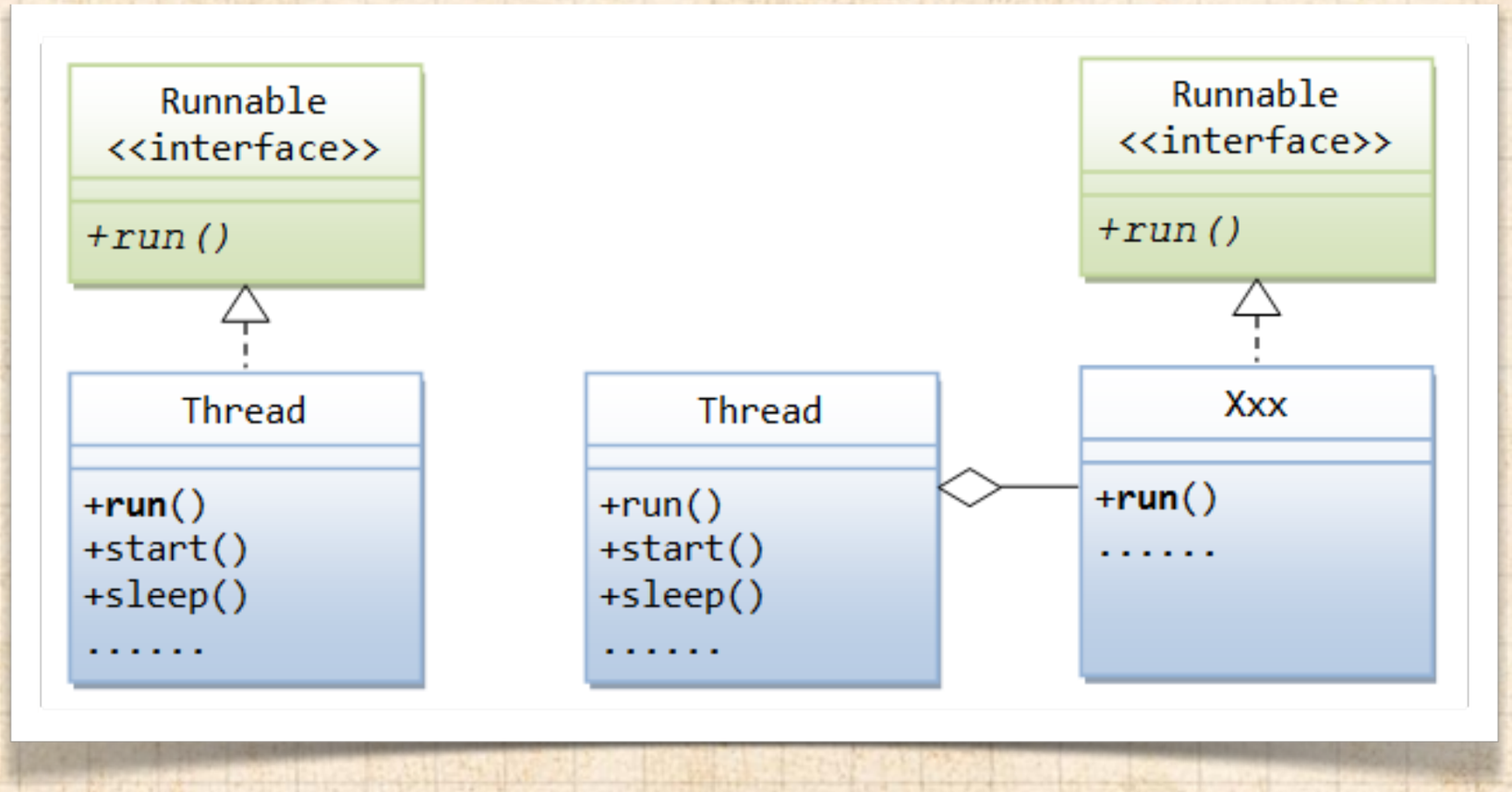

Instruction
Queue
Thread 0
Thread 1
Thread 2
Thread 3
Execution Pipeline

Thread Life Cycle



執行緒生命週期

Thread and Runnable



Create a Thread

```
Thread thread = new Thread();
```

Write a HelloThread class

```
class HelloThread extends Thread {

    @Override

        public void run() {

            System.out.println("Hello");

        }

}
```

Thread .start()

```
Thread thread1 = new HelloThread();

thread1.start();
```

HelloThread with constructor

```
class HelloThread extends Thread {
    private final String who;
    public HelloThread(String name) {
        who = name;
    }
    @Override
    public void run() {
        System.out.println("Hello " + who);
    }
}
```

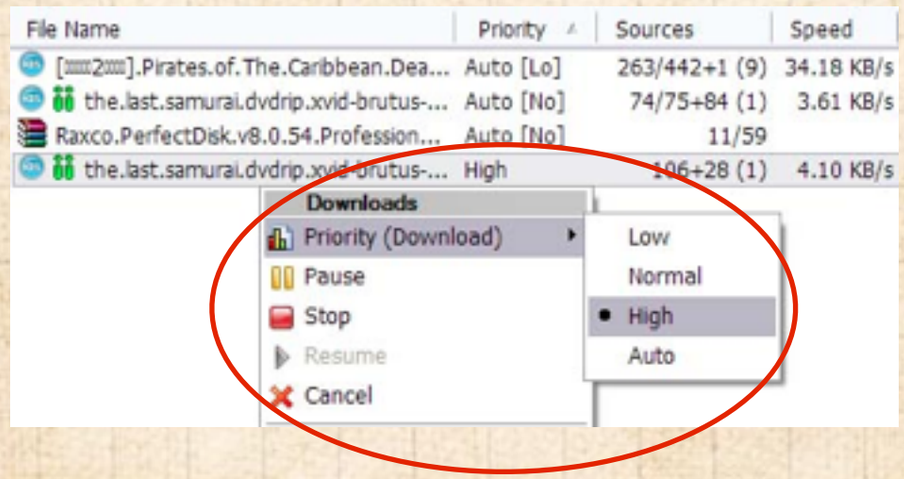
Start three thread

```
Thread thread1 = new HelloThread("John");

Thread thread2 = new HelloThread("Mary");

Thread thread3 = new HelloThread("Kyle");

// 猜猜執行結果？

thread1.start();

thread2.start();

thread3.start();
```

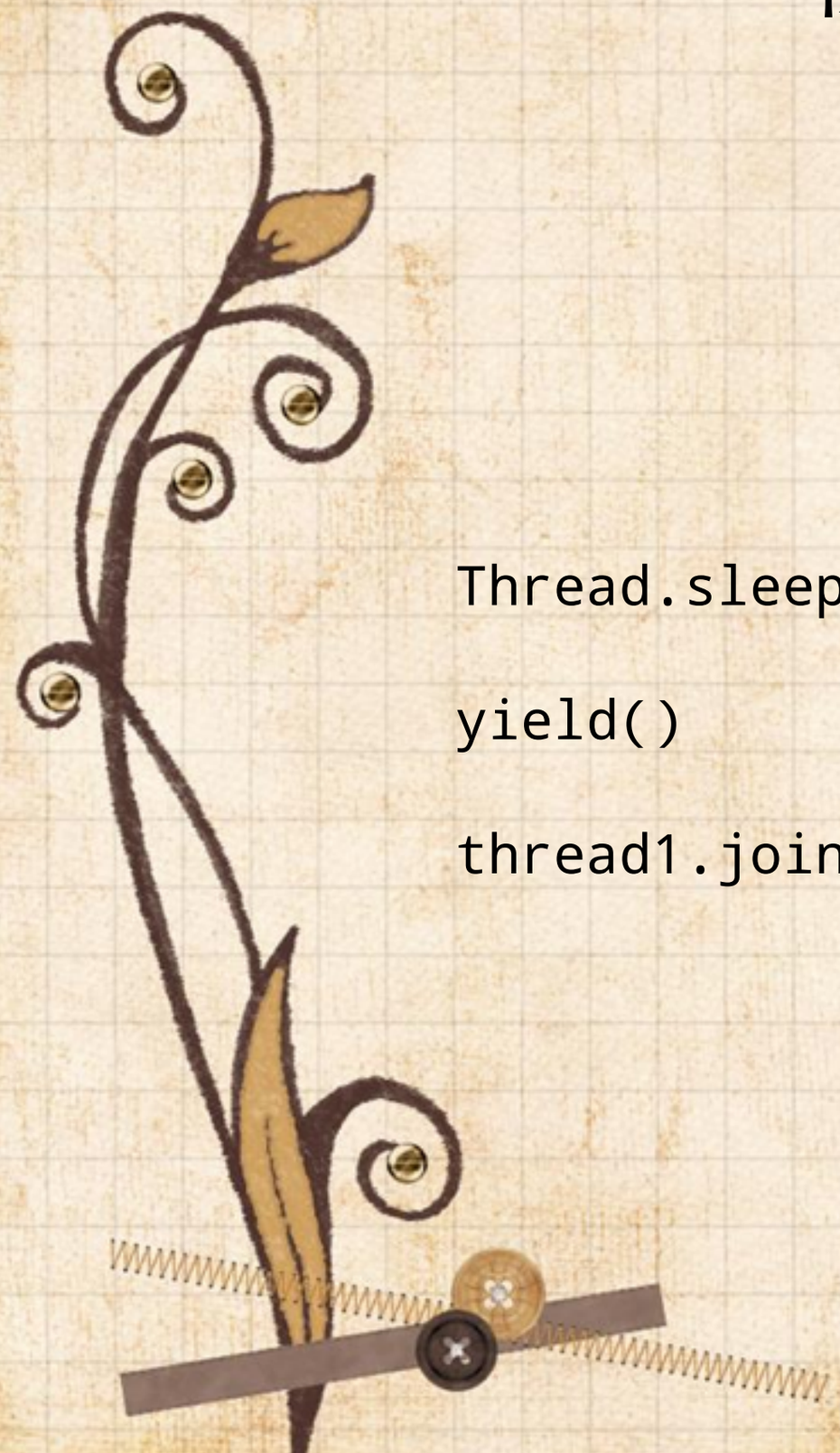
Thread Priority

```
Thread.MAX_PRIORITY     //10

Thread.MIN_PRIORITY     //1

Thread.NORM_PRIORITY    //5
```

//優先權高，得到處理器時間的機會較高，但是"不保證"



執行緒控制



```
Thread.sleep(int time)   //讓目前的執行緒休息

yield()                  //讓給其他執行緒先處理

thread1.join()           //等thread1結束再處理
```

CoundDownThread

```
class CountDownThread extends Thread {
    private final int num;
    public CountDownThread(int num) {
        this.num = num;
    }
    @Override
    public void run() {
        for (int i = num; i >= 0; i--) {
            System.out.println(i);
        }
    }
}
```

Count Down !!!

```
Thread thread1 = new CountDownThread(100);

thread1.start();


System.out.println("END");
```

Count Down with join()

```
Thread thread1 = new CountDownThread(100);

thread1.start();


thread1.join();


System.out.println("END");
```

Sleep ...

```
System.out.println(new Date());

Thread.sleep(5000);

System.out.println(new Date());
```

Counter

```
class Counter {
    public int count = 0;
    private Object obj = new Object();
    public void plus() { count++; }
    public synchronized void syncPlus() { count++; }
    public void syncPlus2() {
        synchronized(obj) {
            count++;
        }
    }
}
```

CounterThread

```
class CounterThread extends Thread {
    private final Counter counter;
    public CounterThread(Counter counter) {
        this.counter = counter;
    }
    @Override
    public void run() {
        counter.plus();
        //counter.syncPlus();
        //counter.syncPlus2();
    }
}
```

停止執行緒

```
Thread thread1 = new SomeThread();

//deprecated

~~thread1.stop();~~
```

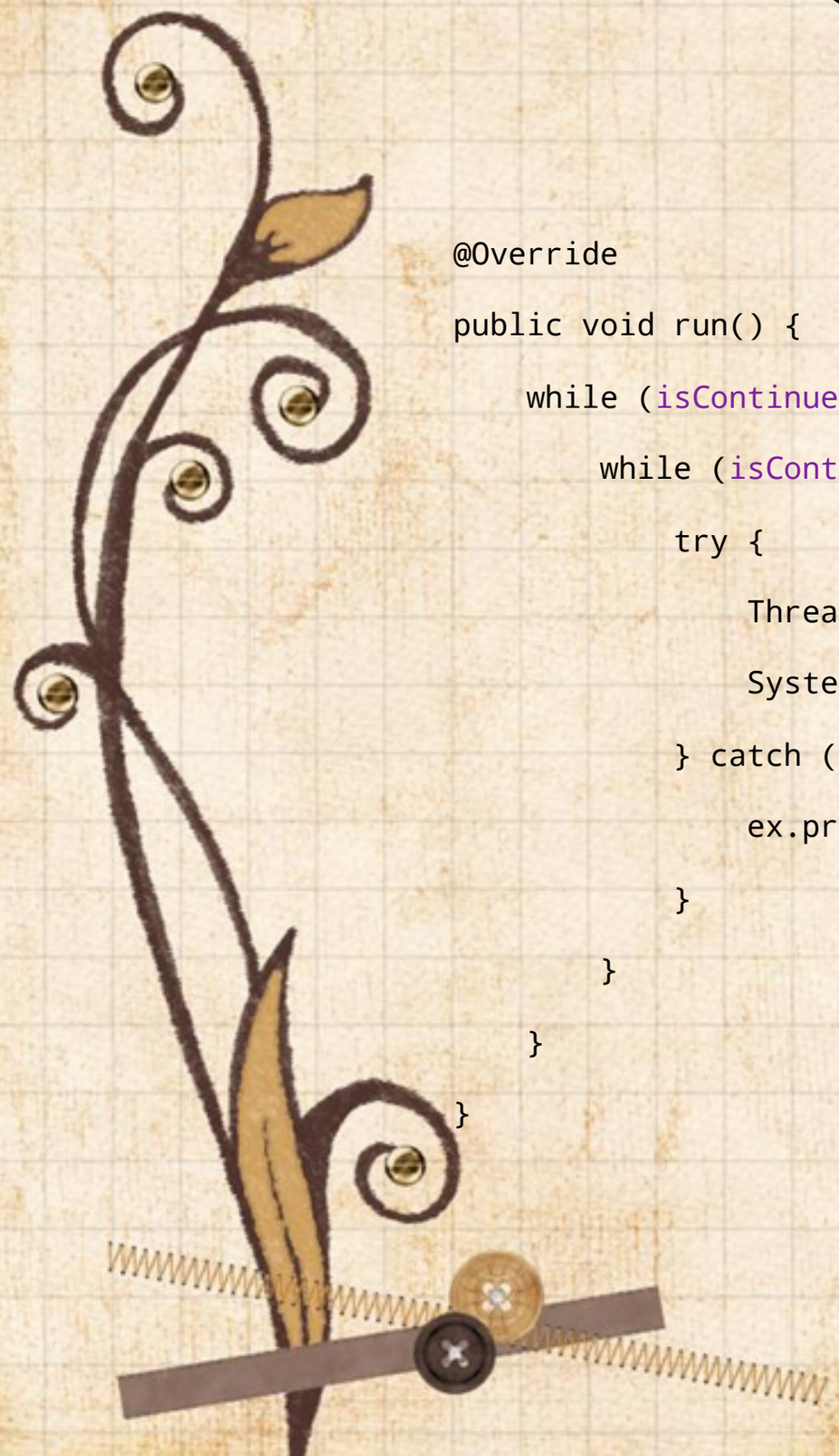
暫停、繼續執行緒

```
Thread thread1 = new SomeThread();

//deprecated

~~thread1.suspend();~~

~~thread1.resume();~~
```

Game

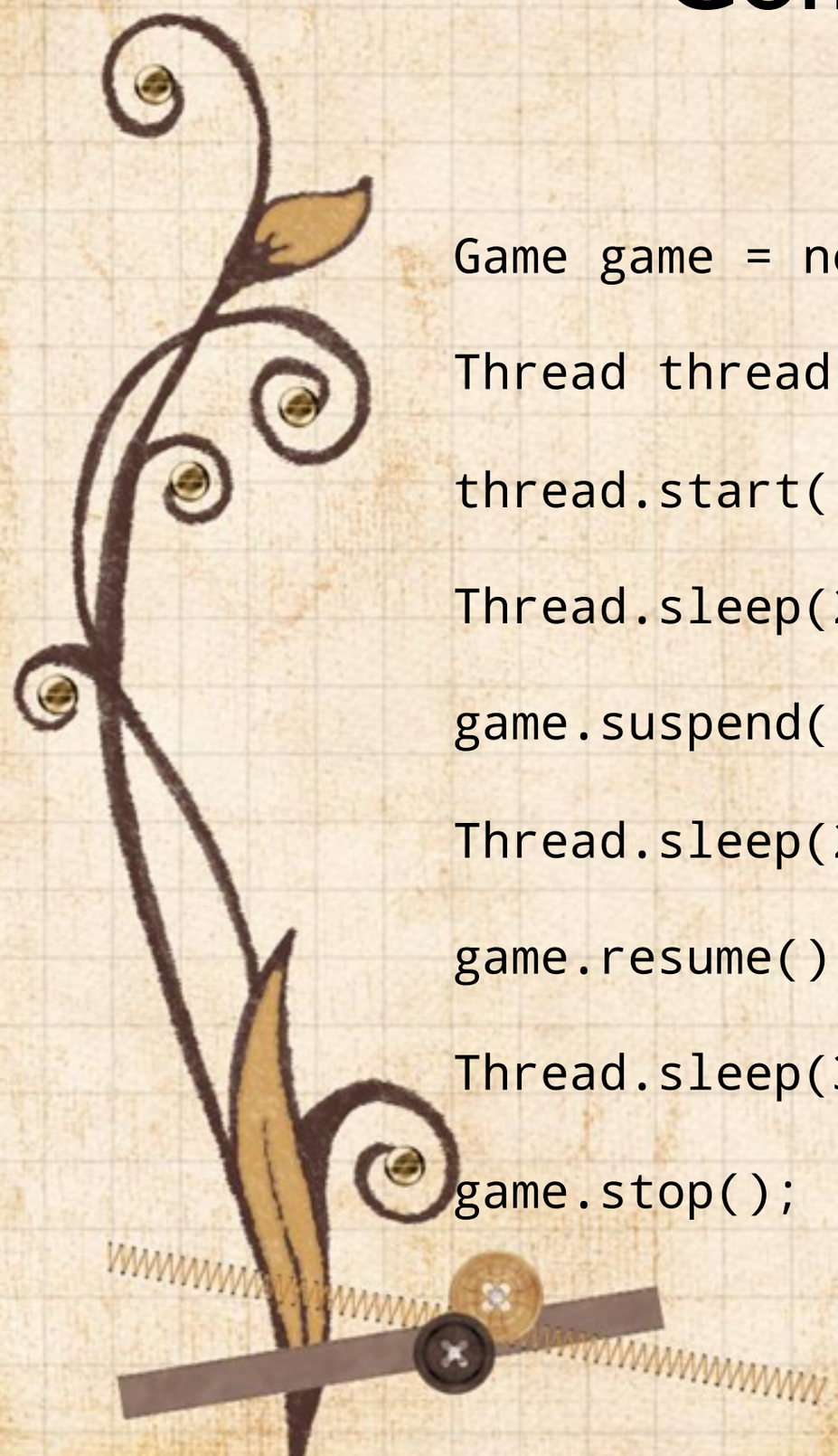
```
class Game implements Runnable {
    private boolean isContinue = true;
    private boolean isSuspend = false;
    private int round = 0;
    @Override
    public void run() {
        //...
    }
    public void stop() { isContinue = false; }
    public void suspend() { isSuspend = true; }
    public void resume() { isSuspend = false; }
}
```

Game run()



```
@Override
public void run() {
    while (isContinue) {
        while (isContinue && !isSuspend) {
            try {
                Thread.sleep(1000);
                System.out.println("round " + ++round);
            } catch (InterruptedException ex) {
                ex.printStackTrace();
            }
        }
    }
}
```

Control the Game



```
Game game = new Game();

Thread thread = new Thread(game);

thread.start();

Thread.sleep(2000);

game.suspend();

Thread.sleep(2000);

game.resume();

Thread.sleep(3000);

game.stop();
```

Swing Counter Practice

Start

1

2

3

4

5

6

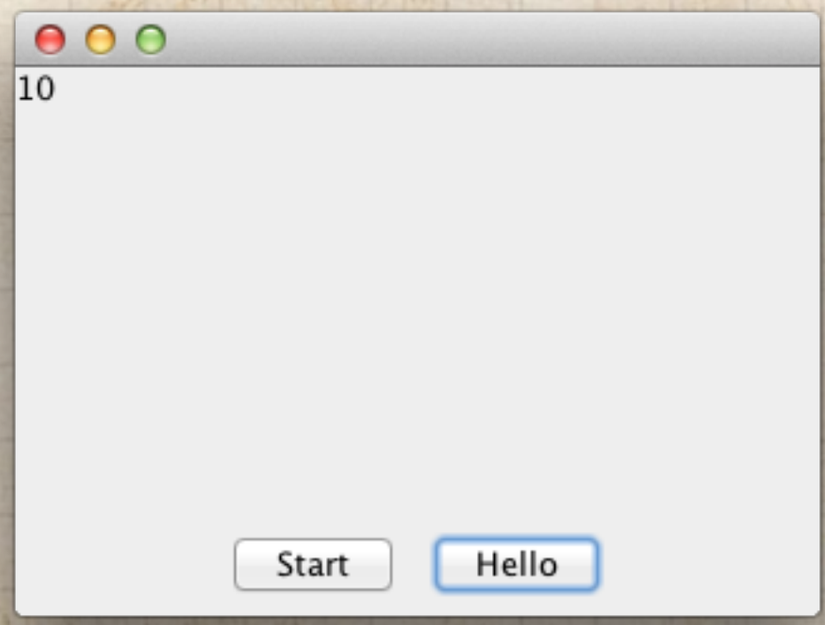
7

8

Hello

9

10



File Downloader Practice

```
URLConnection conn = url.openConnection();

conn.connect();

InputStream stream = conn.getInputStream();

File saveToFile = new File(destPath, url.getFile());

OutputStream outputStream = new FileOutputStream(saveToFile);

int len = 0;

byte[] bytes = new byte[1024];

while ((len = stream.read(bytes)) >= 0) {

    System.out.printf("Get %d bytes from %s\n", len, url);

    outputStream.write(bytes, 0, len);

}
```

範例程式原始碼下載

https://github.com/lyhcode/JavaThread