

JAVA Programming Language Homework V: Threads

ID:

Name:

1. Which of the following is true?

- A. A program will terminate only when all user threads stop running.
- B. A program will terminate only when all daemon stop running.
- C. A daemon thread always runs at Thread.MIN_PRIORITY.
- D. None of the above.

ANS: A

執行緒分為：使用者執行緒(user) 和 背景執行緒(daemon)，
當 JVM 要關閉程式時，若發覺仍有使用者執行緒，則程式將不會結束，必須等待
所有使用者執行緒(user threads)停止後才能終止程式。

補充：在呼叫 start()方法前，可透過 setDaemon 方法變更其為背景執行緒，如：

```
myThread.setDaemon(true); myThread.start();
```

且其優先權等於 NORM_PRIORITY

2. Given the following Java code:

```
1. class B implements Runnable{
2.     public void run() {}
3. }
4. class A {
5.     public static void main(String[] args) {
6.         Thread my1 = new Thread();
7.         Thread my2 = new Thread("B");
8.         Thread my3 = new Thread(new B());
9.         Thread my4 = new Thread("B", new B());
10.    }
11. }
```

What is the result?

- A. A compile-time error is generated at line 6
- B. A compile-time error is generated at line 7
- C. A compile-time error is generated at line 8
- D. A compile-time error is generated at line 9
- E. None of the above

ANS: D

Thread 並無該選項之建構子。Thread 建構子如下：

Thread()

Thread(Runnable target)

Thread(String name)

Thread(Runnable target, String name)

Thread(ThreadGroup group, Runnable target)

Thread(ThreadGroup group, String name)

Thread(ThreadGroup group, Runnable target, String name)

Thread(ThreadGroup group, Runnable target, String name, long stackSize)

3. Given the following Java code: [5 points]

```
1.     class B extends Thread {
2.         public String x;
3.         B(String in) {
4.             x = in;
5.         }
6.         public void run() {
7.             for(int i=1; i<5; i++) {
8.                 System.out.println(x+"-"+i);
9.             }
10.        }
11.    }
12.
13.    class A {
14.        public static void main(String[] args) {
15.            B obj1 = new B("o");
16.            B obj2 = new B("x");
17.            obj1.setPriority(1);
18.            obj2.setPriority(10);
```

```
19.         obj1.start();
20.         obj2.start();
21.     }
22. }
```

Which of the following is true?

- A. This program will go exception when compiling.
- B. Obj1 runs at Thread.MIN_PRIORITY.
- C. Obj2 runs at Thread.MIN_PRIORITY.
- D. The Thread.setDaemon method can change Thread.MIN_PRIORITY.
- E. None of the above.

ANS: B

Thread.MIN_PRIORITY 代表數值是 1
Thread.NORM_PRIORITY 代表數值是 5
Thread.MAX_PRIORITY 代表數值是 10
Thread.setDaemon 優先權屬於 **NORM_PRIORITY**

4. Given the following Java code:

```
1.     class A extends Thread {
2.         private String i;
3.         public void run() {
4.             i = "A";
5.         }
6.         public static void main(String[ ] args) {
7.             A a = new A();
8.             a.start();
9.             System.out.print(a.i);
10.        }
11.    }
```

Which of the following are possible results of attempting to compile and run the program?

- A. prints: A
- B. prints: 0
- C. prints: null
- D. prints: i

E. Compile-time error

ANS: C

當執行緒物件建立之後，呼叫 `start()` 方法之時，並不會立即執行 `run` 裡的內容，所以此題在未更新成員變數 `i` 的值之前，便已先執行第 9 行而印出 `null`。

5. Given the following Java code:

```
1.     public B extends Thread {
2.         public void run() {
3.             System.out.print("A");
4.         }
5.     }
6.     class A {
7.         public static void main (String[] args) {
8.             B obj = new B() ;
9.             obj.start() ;
10.            obj.start() ;
11.        }
12.    }
```

What is the result of attempting to compile and run the program?

- A. The program compiles and runs fine but prints nothing.
- B. prints: A
- C. Compiler error
- D. An `IllegalThreadStateException` is thrown at run-time
- E. None of the above

ANS: D

當呼叫 `start()` 方法之後，不可再呼叫一次 `start()` 方法，雖然可以編譯成功，但會發生執行階段時的例外。

6. Given the following Java code:

```

1.    public class Hello implements Runnable {
2.        public void run () {
3.            System.out.print ( "running" );
4.        }
5.        public static void main ( String[] args ) {
6.            Thread t = new Thread ( new Hello());
7.            t.run ();
8.            t.run ();
9.            t.start ();
10.        }
11.    }

```

What is the result?

- A. Compilation fails
- B. An exception is thrown at runtime
- C. The code executes and prints "running"
- D. The code executes and prints "runningrunning"
- E. The code executes and prints "runningrunningrunning"

ANS: E

- 第 7 列呼叫 run(), 是以一般物件方法呼叫並輸出 "running"
- 第 8 列與第 7 列相同
- 第 9 列以執行緒方式啟動 t 的 Thread 中的 run()並輸出"running"

7. Given the following Java code:

```

12. class A extends Thread {
13.     public void m1() {
14.         System.out.print("A" );
15.     }
16.
17.     public void m2() {
18.         synchronized(System.out) {
19.             try {
20.                 Thread.sleep(1000) ;
21.                 System.out.print("B" );
22.             }
23.             catch(InterruptedException e) { }

```

```
24.     }
25. }
26.
27. public void run() {
28.     this.m1();
29.     this.m2();
30. }
31.
32. public static void main(String args[] ) {
33.     A obj1 = new A();
34.     obj1.start();
35.     A obj2 = new A();
36.     obj2.start();
37. }
38. }
```

Which of the following are possible results of attempting to compile and run the program?

- A. ABAB
- B. BABA
- C. AABB
- D. BBAA
- E. ABBA

ANS: A

由於 m2 方法裡有一個 synchronized 的方法，以及暫停 thread 的敘述，所以流程如下：

- 呼叫 obj1.m1 輸出 A
- 暫停執行緒 1 秒
- 呼叫 obj1.m2 輸出 B
- 呼叫 obj2.m1 輸出 A
- 暫停執行緒 1 秒
- 呼叫 obj2.m2 輸出 B

8. Given the following Java code:

```
1. class A implements Runnable {
2.     boolean obj1_ok = false;
3.     A(){
4.         Thread obj1 = new Thread(this, "o");
5.         Thread obj2 = new Thread(this, "x");
6.         obj2.start( );
7.         obj1.start( );
8.     }
9.
10.    public synchronized void my( ) {
11.        if(Thread.currentThread( ).getName( ).equals("x")) {
12.            while( !obj1_ok) {
13.                try {
14.                    System.out.print("A");
15.                    wait( );
16.                } catch(InterruptedException e) { }
17.            }
18.        }
19.        System.out.print("B");
20.        obj1_ok = true ;
21.        notifyAll( );
22.    }
23.
24.    public void run( ) {
25.        my( );
26.    }
27.    public static void main (String[ ] args) {
28.        A obj = new A( );
29.    }
30. }
```

Which of the following are possible results of attempting to compile and run the program?

- A. ABA
- B. BAB
- C. AAB

D. BBA

E. ABB

ANS: E

程式執行流程如下：

- obj1_ok = false
- 輸出 A (第 14 行)
- obj1 執行緒暫停 (第 15 行)
- 輸出 B (第 19 行)
- obj1_ok = true
- 喚醒 obj1 (第 21 行)
- 輸出 B (第 19 行)