

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 16/11/2013
No. of Questions: (3)
Time: 90 Minutes
Total Grade:

University of Palestine

MidTerm Exam
First Semester 2013/2014

Instructor Name: Najwa Baraka
College Name: Faculty of Applied Engineering and Urban Planning
Dep. / Specialist: Software Engineering Department
Student No.:
Student Name:

Question One:

(10 Points)

▪ **Mark each statement True (T) or False (F), as appropriate:**

1. If a schedulable object is active in a memory area, all calls to new create the object in that memory area
2. *currentThread* method allows a thread to determine if the target thread has terminated
3. The memory associated with objects allocated in immortal memory is subject to garbage collection and is never released during the lifetime of the application
4. Java offers a strong guarantees that the highest priority runnable thread will always be the one executing
5. If no thread is waiting, then notify and notifyAll have no effect
6. All synchronization mechanisms which are based on mutual exclusion suffer from priority inversion
7. Synchronized methods do not require the lock and, therefore, can be called at any time
8. Objects allocated in scoped memory have a random life time
9. An ATC is a non-returnable transfer of control, this means that real-time thread resume execution at the point in its code where the ATC was delivered
10. RTSJ generalizes the entities that can be scheduled from schedulable objects to the notion of threads

Question Two:

(5 Points)

• **Write the appropriate term for the each of the following definitions:**

1. A mechanism that react to events that occur outside a thread; for example, input from an interface of an application.
2. A method used to identity of the currently running thread
3. A method allows a thread to determine if the target thread has terminated
4. Data that is shared between all objects created from the class
5. An approach that requires the JVM to monitor the memory and release chunks which are no longer being use

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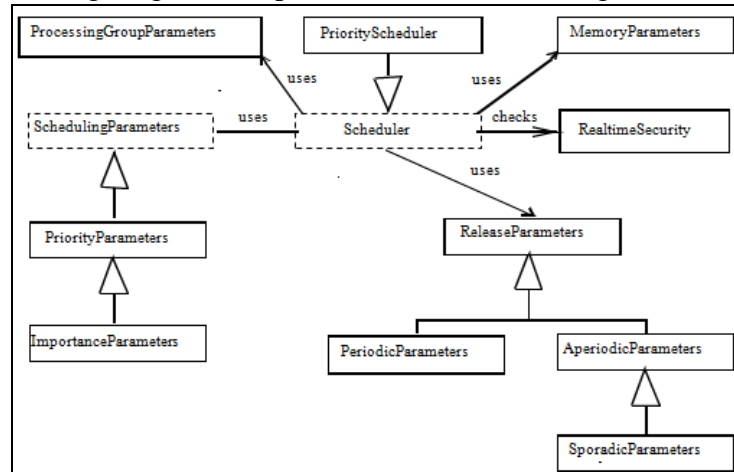
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Question Three:

(45 points)

1. Based on the following diagram , Explain the RTSJ scheduling



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2. Fill in the following comparison Table

Multiprogramming	Distributed Processing
Periodic Parameters	Sporadic Parameters
Native Threads	Green Threads
memoryConsumed();	memoryRemaining();
entry protocol	exit protocol
WaitFreeWriteQueue	WaitFreeReadQueue

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Soft real-time	Hard real-time
Block synchronization	Method modifier synchronized

3. By Drawing and description, Explain Java Thread States

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4. What is the output for the following program

```
public class ThraedExample{  
  
public static void main(String args[]){  
    Thread threadA = new Thread(new Runnable(){  
        public void run(){  
            for(int i =0; i<2; i++){  
                System.out.println("This is thread " + Thread.currentThread().getName());  
  
            }  
        }  
    }, "Thread A");  
  
    Thread threadB = new Thread(new Runnable(){  
        public void run(){  
            for(int i =0; i<3; i++){  
                System.out.println("This is thread : " + Thread.currentThread().getName());  
            }  
        }  
    }, "Thread B");  
    threadA.start();  
    threadB.start();  
  
}
```

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5. Write a java code that contain producer and consumer threads, the producer quickly fills the buffer with characters and then waits for the consumer to consume these characters from the buffer (with removing)

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6. Explain the following issues related to memory management :
- Challenges for memory management in general

- Problems of memory management in standard java

- Solutions of memory management in RTSJ

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- Write a java program that uses the different types of memory areas in RTSJ, the program run three threads using these different memory areas and each thread print out the : name of memory area, the consumed memory of that area

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7. Based on National Institute of Standards and Technology (NIST) requirements for real-time extensions to the Java platform, conduct a detailed review for these requirements regarding standard Java (*mention 9 aspects at least*)

Best of Luck

"النجاح فى الحياة لا يأتى مصادفة... ولكنه نتيجة تخطيط وجهد، فإن اردت ان تتنبأ بمستقبلك فقم ببنائه الآن... وكل نجاح عظيم بدأت شرارته الأولى بقرار" د.ابراهيم الفقي