


Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine

Final 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:

(20 Points)

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

1. Scheduling parameters are used by a scheduler to determine which object is currently the most eligible for execution
2. Concurrent program is a collection of autonomous processes, executing sequentially
3. The correctness of real time system depends only on its logical result
4. Data acquisition system is an example of hard real time system
5. The interaction between the real world objects and their controllers can event triggered only
6. When a particular memory area is entered, all object allocation is performed within that area
7. The JVM is responsible for managing the heap
8. One or more AEH can be associated with one or more events, and a single AEH can be associated with a single event
9. Threads can begin their execution before the start method in the Thread class is called
10. The thread remains in the dead state until it is garbage collected
11. Static data is shared between all objects created from the class
12. Memory parameters can be given when real-time threads and asynchronous event handlers are created
13. Standard Java programs support predictability and, hence, Java's use for real-time systems implementation is severely limited
14. Asynchronous event handlers react to events that occur inside a thread; for example, input from an interface of an application.
15. Once a schedulable object has been released, it is eligible for execution
16. The RTSJ generalizes Java event handlers to be schedulable entities
17. GC may be performed either when the heap is full or incrementally
18. The time needed or bandwidth required to send the schedulable objects' messages across the network is considered as a software resource

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine

Final 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:

19. if the object is periodic or sporadic then an interval time is given
20. It is difficult to execute the handlers on a single processor system as the handlers assume no contention for shared resources

Question Two:

(15 Points)

- **Write the appropriate term for the each of the following definitions:**
 1. Processes multiplex their executions on several processors which do not share memory
 2. Any information processing system which has to respond to externally generated input stimuli within a finite and specified period
 3. Can be considered as an object where each of its operation executes in mutual exclusion and has a state and lock
 4. A protocol which determines whether any blocked operations can now proceed.
 5. A method which periodically test to see if a thread has been interrupted
 6. A java class helps in deciding how much memory space is required
 7. An abstract class from which all RTSJ memory areas are derived
 8. An object which implements the Schedulable interface
 9. Allow an additional numerical priority scheduling metric to be assigned
 10. It is responsible for scheduling its associate schedulable objects
 11. A bounded buffer which allows both blocking and non-blocking read and write operations
 12. The ordering of thread executions so that the underlying hardware resources and software resources are efficiently and predictably used
 13. A means of predicting the worst-case behaviour of the system when the policy and mechanism are applied
 14. A metric which indicates the schedulable objects contribution to the overall functionality of the application.
 15. An alternative to thread-based programming which consists from events and their handlers

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine



Final 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 Three:

(65 points)

1. **Compare** between :

a. Time Triggered Systems and Event Triggered Systems

b. Online Analysis and Off-line Analysis

c. scheduling policy and scheduling mechanism

2. *“Threads Considered Harmful”* ...**Discuss this statement in detail**

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine

Final 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:

3. **Explain how** Event-based Programming works?

4. **What** are the FPS requirements

5. **Explain** the policy and the mechanism for priority scheduler

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine



Final 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:

6. **List** six areas in which the RTSJ enhances standard Java

7. **Explain** what is “Mode Changes”?

8. **List and Explain** the information needed for scheduling feasibility analysis

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine

Final 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:

9. **List and Explain** the sources of information needed for scheduling feasibility analysis

10. **Define** Readers/Writers Problem , then **write** complete enhanced java code to solve this problem

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine



Final 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:

11. **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

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine



Final 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:

12. What is the output for the following program

```
public static void main(String args) {
    AsyncEventHandler hdlrA = new AsyncEventHandler() {
        public void handleAsyncEvent() {
            do {
                System.out.print("Handler A executed.");
            } while (getAndDecrementPendingFireCount() > 0);
        }
    };
    AsyncEvent event1 = new AsyncEvent();

    event1.addHandler(hdlrA);
    System.out.println("AsyncEvent Test.\n");
    event1.fire();
    System.out.println("Event fired.\n");
}
```


Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine

Final 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:

For Midterm Exam only (20 Points)

1. Consider a robot that can move in three dimensions. A separate motor controls movement in each dimension and these motors can be operated simultaneously to move the robot to the required position. According to the figure 1 and figure 2 design two versions of java code that manage the movement of this robot

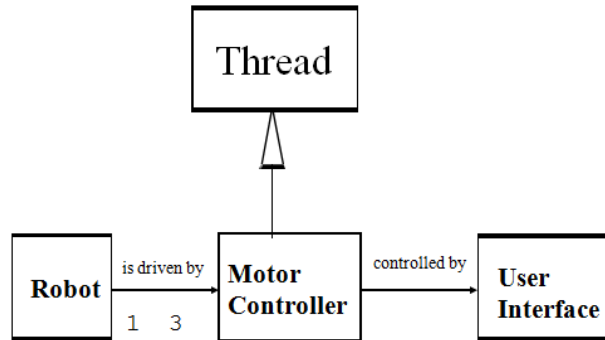


Figure 1: Using thread Class

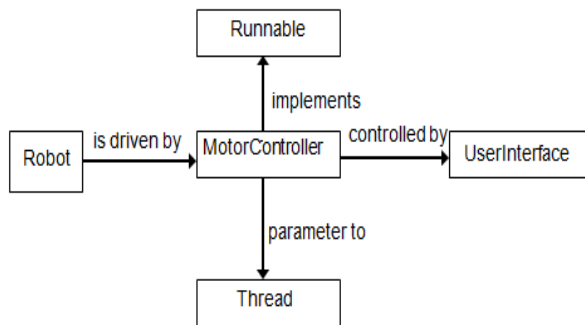


Figure 2: Using Runnable Interface

Course No: SWE4412
Course Title: Concurrent and Real-Time Programming
Date: 6/1/2014
No. of Questions: (3)
Time: 120 Minutes
Total Grade:

University of Palestine



Final 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:

Best of Luck

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