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Experiment – 10

1. **Aim:** To implement the concept of run time program management through exception handling using Java

2. **Objective:** After performing the experiment, the students will be able to implement
   - Create a thread and Perform simple thread operations
   - Synchronize the threads
   - Exception handling

3. **Lab objective mapped:** To **understand** alternative paradigm through concurrent programming fundamentals and **design**, **develop** applications based on concurrent programming (PSO2) (PO2)

4. **Prerequisite:** Basics of Java programming- classes, objects, functions, data abstraction

5. **Requirements:** The following are the requirements – Java (JDK8) Compiler

6. **Pre-Experiment Theory:**

Concurrency generally refers to events or circumstances that are happening or existing at the same time. In programming terms, concurrent programming is a technique in which

- Two or more processes start
  - Run in an interleaved fashion through switching and complete in an overlapping time period by managing access to shared resources process
- Process means any program is in execution.
- Process control block contains information about processes for example Process priority, process id, process state, CPU, register, etc.
- A process can create other processes which are known as **Child Processes**.
- Process takes more time to terminate and it is isolated means it does not share memory with any other process.
- Process is called heavy-weight process **Thread**
- One or more **threads** run in the context of the **process**.
- A **thread** is the basic unit to which the operating system allocates processor time.
- A **thread** can execute any part of the **process** code, including parts currently being executed by another **thread**
- □ **Thread is called light weight process Synchronization**
- Multithreaded programs may often come to a situation where multiple threads try to access the same resources and finally produce erroneous and unforeseen results.
- So it needs to be made sure by some synchronization method that only one thread can access the resource at a given point of time.
- Java provides a way of creating threads and synchronizing their task by using synchronized blocks.
- Synchronized blocks in Java are marked with the synchronized keyword.
- A synchronized block in Java is synchronized on some object.
  - All synchronized blocks synchronized on the same object can only have one thread executing inside them at a time.

- Synchronized method is used to lock an object for any shared resource.
- When a thread invokes a synchronized method, it automatically acquires the lock for that object and releases it when the thread completes its task.

Exception Handling

The **Exception Handling in Java** is one of the powerful *mechanism to handle the runtime errors* so that the normal flow of the application can be maintained. The core advantage of exception handling is **to maintain the normal flow of the application**.

The try statement allows you to define a block of code to be tested for errors while it is being executed.

The catch statement allows you to define a block of code to be executed, if an error occurs in try block.

7. Laboratory Exercise

A. Steps to be implemented

□ 1. **Compilation using JDK 8 using Turbo C**

- Write the code in notepad and save as .java file.
- Run command prompt and set the path (Eg. Set path= ‘C:\Users\m09mu\Desktop\Javacodes’)
- Compile the code using the command ‘javac name_of_file.java’
- Correct compile time errors (if any) and rerun the code
- After successful compilation, run the code using the command ‘java name_of_file’

□ 2. **Using Online IDE for C/C++/Java**

- Log on to www.onlinegdb.com,/ www.jdoodle.com
- Select the programming language for coding
- Create new project
- Save the project using CTRL+S
- Run the program using F9
- For debugging use F8, along with step-into function of onlinegdb

B. Program Code

1. WAP in Java to implement thread synchronization
2. WAP in Java to implement exception handling using try and catch blocks

8. Post Experimental Exercise-

A. Questions:

1. What are various methods to create thread.
2. Explain the concept of deadlock in java

B. Results/Observations/Program output:

Present the program input/output results if any and comment on the same.

C. Conclusion:

1. Write what was performed in the experiment
2. Write which tools you used to perform the experiment
3. Write what you inferred from the output obtained

D. References:

[1] Michael L Scott, “Programming Language Pragmatics”, Third edition, Elsevier publication [2] Doug Lea, “Concurrent Programming in Java: Design Principles and Pattern