



K. R. MANGALAM UNIVERSITY

THE COMPLETE WORLD OF EDUCATION

Operating System Lab

(ENCS351)

Lab File Submitted to

K. R. Mangalam University

for

Bachelor of Technology

in

Computer Science and Engineering

Submitted by

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Lab Sheet 2

Summary of Objectives

The objective of this experiment is to simulate how an operating system manages startup, process creation, and shutdown. Through this experiment, we understand how multiple processes can be created, executed concurrently, and terminated in a controlled manner.

By using Java's Thread class and Logger, we replicate the functionality of the Python multiprocessing and logging modules, demonstrating system-level behavior in a simplified manner. Each simulated process logs its lifecycle — from start to end — and the system records these events in a log file to reflect real OS operations.

This simulation enhances our understanding of process management, concurrency, and logging mechanisms in modern operating systems.

Sub-Tasks:

1. **Sub-Task 1:** Initialize the logging configuration to capture timestamped messages.
2. **Sub-Task 2:** Define a function that simulates a process task (e.g., sleep for 2 seconds).
3. **Sub-Task 3:** Create at least two processes and start them concurrently.
4. **Sub-Task 4:** Ensure proper termination and joining of processes, and verify the output in the log file.

Sol-

```
1 import java.io.IOException;
2 import java.util.logging.*;
3 import java.util.*;
4
5 public class LabSheet2 {
6
7     // Logger setup
8     private static final Logger logger = Logger.getLogger(LabSheet2.class.getName()); 8 usages
9
10    static {
11        try {
12            FileHandler fileHandler = new FileHandler( pattern: "process_log.txt", append: true);
13            fileHandler.setFormatter(new SimpleFormatter());
14            logger.addHandler(fileHandler);
15            logger.setUseParentHandlers(false); // avoid console duplication
16        } catch (IOException e) {
17            System.err.println("Error setting up logger: " + e.getMessage());
18        }
19    }
20
21    // Simulated system process (task)
22    static class SystemProcess extends Thread { no usages
23        private String taskName; 4 usages
24
25        public SystemProcess(String taskName) { no usages
26            super(taskName);
27            this.taskName = taskName;
28        }
29
30        @Override
31        public void run() {
32            try {
33                logger.info( msg: taskName + " started");
34                Thread.sleep( millis: 2000); // Simulate process execution
35                logger.info( msg: taskName + " ended");
36            } catch (InterruptedException e) {
37                logger.warning( msg: taskName + " interrupted");
38            }
39        }
40    }
41}
```

```
public static void main(String[] args) {
    System.out.println("System Starting...");
    logger.info( msg: "System Boot Sequence Initiated");

    // Create simulated processes
    SystemProcess p1 = new SystemProcess( taskName: "Process-1");
    SystemProcess p2 = new SystemProcess( taskName: "Process-2");

    // Start processes concurrently
    p1.start();
    p2.start();

    // Wait for both to finish
    try {
        p1.join();
        p2.join();
    } catch (InterruptedException e) {
        logger.warning( msg: "Main system thread interrupted");
    }

    System.out.println("System Shutdown.");
    logger.info( msg: "System Shutdown Completed");
}
```

Output-

```
"C:\Program Files\Java\jdk-21\bin\java.  
System Starting...  
System Shutdown.
```

```
Process finished with exit code 0
```

Process Log

© Main.java pom.xml (OS_Lab) © ProcessManagement.java LabSheet2.java process_log.txt x

os\OS_Lab

```
1  | Oct 07, 2025 10:45:30 PM LabSheet2 main
2  | INFO: System Boot Sequence Initiated
3  | Oct 07, 2025 10:45:30 PM LabSheet2$SystemProcess run
4  | INFO: Process-1 started
5  | Oct 07, 2025 10:45:30 PM LabSheet2$SystemProcess run
6  | INFO: Process-2 started
7  | Oct 07, 2025 10:45:32 PM LabSheet2$SystemProcess run
8  | INFO: Process-2 ended
9  | Oct 07, 2025 10:45:32 PM LabSheet2$SystemProcess run
10 | INFO: Process-1 ended
11 | Oct 07, 2025 10:45:32 PM LabSheet2 main
12 | INFO: System Shutdown Completed
13 | Oct 07, 2025 10:46:22 PM LabSheet2 main
14 | INFO: System Boot Sequence Initiated
15 | Oct 07, 2025 10:46:22 PM LabSheet2$SystemProcess run
16 | INFO: Process-1 started
17 | Oct 07, 2025 10:46:22 PM LabSheet2$SystemProcess run
18 | INFO: Process-2 started
19 | Oct 07, 2025 10:46:24 PM LabSheet2$SystemProcess run
20 | INFO: Process-1 ended
21 | Oct 07, 2025 10:46:24 PM LabSheet2$SystemProcess run
22 | INFO: Process-2 ended
23 | Oct 07, 2025 10:46:24 PM LabSheet2 main
24 | INFO: System Shutdown Completed
25 |
```