



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-

```
LabSheet2
```

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

Process finished with exit code 0

Process Log

```
dos\OS_Lab
```

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