DISTRIBUTED COMPUTER SYSTEMS
Group Assignment (100%)

1. Synopsis

This assignment aims to evaluate students' in terms of two skill sets: Communication skills and Digital skills. The first skill set carries 60% weight of marks and the second skill set carries 40% weight of marks.

PLO5 – Communication skills

PLO6 – Digital skills

CLO2	Demonstrate the ability to implement sub-component of stand-alone application using RMI distributed technology (A3, PLO6)	Group Assignment
CLO3	Explain the technique used in the development of RMI application, related to cloud computing and virtualization for distributed environment (A4, PLO5)	Group Assignment

2. Scenario

BHEL is a startup company that currently manages their HR records using a manual system that combines spreadsheets and paper-based records. However, they have realized that this manual system is prone to errors, delays, and inefficiencies. As a result, there is dissatisfaction among employees and HR staff in managing employee data, benefits, recruitment, and training. Therefore, BHEL is seeking a modern and automated HRM(Human Resource Management) system that will streamline their HR data and ensure accuracy.

Task: The proposed solution involves the implementation of a user-friendly and scalable HRM system using a RMI distributed computing technology. This involves writing both the server and the client program. Client program can use either a command line interface or a graphical user interface.

The system will include the following key features:

- The system should allow HR staff to register employee data with the First Name, Last Name, and IC/Passport number.
- The system should allow employees to access the HRM system to update their profiles and family details, check their leave balance, apply for leave, and check the status of their leave application.
- Centralized database for storing and managing employee information.
- The system should allow the HR staff to generate a yearly report of an employee regarding profile, family details, and leave history.

You may develop the system using any other Java collection or external database of your choice. The system should also ensure that communication between the employee and the HRM System is secure.

Notes:

The tools are not limited to the above scenario; you can use any tool such as NetBeans IDE, Eclipse, IntelliJ IDEA, etc.

You can develop your system using only the JAVA programming language, but you have the flexibility to choose any database or file system.

It is required to **develop a client server-based application** using **RMI.**

3. Tasks:

1. Identify the problem statement and the background requirements for the given scenario.
2. Explain the role of multi-threading, serialization, and Object-Oriented Programming (OOP) in solving problems in distributed systems.
3. Develop a distributed application that follows the organization's needs.
4. The system should secure communication between the employee/HR and the PRS(Payroll System).
5. Present a fault-tolerant distributed application and evaluate the implemented application based on quality requirements such as usability, maintainability, and heterogeneity.
6. Provide a clear use case model diagram for the distributed application developed.
7. Facilitate constructive recommendations for PRS to use cloud computing/virtualization for future enhancement.
8. Explain the necessary protocols recommended for use in distributed systems.

9. Create a project plan for the given scenario in the Gantt chart.

10. Choose any testing to provide the necessary testing manual for the RMI system.

11. Justify how useful the distributed system is compared with the centralized system.

4. Guidelines for the Report:

Document the results of your work professionally and systematically, in the form of a computerized report. A softcopy of your documentation is to be uploaded in Moodle. Your completed documentation should include the following sections:

1. Table of contents

2. Gantt chart

3. Abstract, Introduction, Problem Background and Requirements

4. Research and evaluation

5. The role of multi-threading, serialization, and Object-Oriented Programming (OOP) in solving problems in distributed systems.

6. Use case diagram

7. Implementation of Distributed Application (Individual)

8. Protocols

9. Testing (Individual)

10. Conclusion

11. Future enhancement

12. References

13. Appendices and Workload Matrix

5. Submission requirements

1. You are required to complete the assignment individually and submit (Online) it through **Moodle**.

2. Your assignment will be checked for Plagiarism through Turnitin. **Plagiarism** is a serious offence and will automatically be awarded **zero** (0) marks.

3. You need to ensure that you maintain originality in all your discussions and justifications. Copy paste work will not be entertained. Your reference list should be complete and accurate. Also, make sure that you cite other people's work properly.

4. You are allowed to refer books, including electronic books, journals, articles, conference papers and online trusted data center web sites.

5. Not allowed to refer from blogs and forums.

6. Your report must be typed using Microsoft Word with Times New Roman font.

7. There are two report submissions. Individual and Group Reports. Individual report carries the section 7 & 9, and the group report carries the section 1,2,3,4,5,6,8,10,11,12 & 13.The word limit for group report is 3,000 words, and the individual report is between 1500 to 2000 words. You need to include a word count at the end of the report (excluding title, source code of program & contents pages) Report should be in 1.5 spaces.

8. Group Report Submission is on Week 10; Individual Report Submission is on Week 14.

9. The report has to be well presented and should be *typed*.

10. The report should have a one (1") margin all around the page as illustrated below:
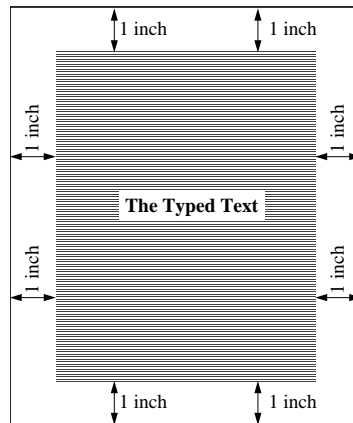
11. Every report must have a *front cover*. The front cover should have the following details:-

    a) Name
    b) Intake code.
    c) Subject.
    d) Project Title.
    e) Date Assigned (the date the report was handed out).
    f) Date Completed (the date the report is due to be handed in).

12. **All** information, figures and diagrams obtained from external sources **must** be referenced using the APA referencing system accordingly.