

University of M'sila

Faculty of Mathematics and Computer Science

Department of Computer Science

Course: Distributed Information Systems (ISIL 3rd year)

Year: 2025-2026

Duration: 2 hours

Final Exam

Q1. (3 points)

1. Define the following concepts: Distributed System, RMI.

Distributed system: collection of autonomous computers linked by a computer network and equipped with distributed system software. This software enables computers to coordinate their activities and to share the resources of the system hardware, software, and data. (0.5 pt)

RMI: (Remote Method Invocation) is an API that provides a mechanism to create distributed application in java. The RMI allows an object to invoke methods on an object running in another Java Virtual Machine. (0.5 pt)

2. What are the naming functions used in distributed systems? Why do distributed systems need them?

Rebind(): used by the server side to associate or bind a name with an object reference (0.5 pt)

Lookup(): used by the client side to retrieve a reference for a remote object associated with a given name. (0.5 pt)

3. Why do remote objects in distributed systems need to be registered in a registry?

Remote objects in distributed systems (such as Java RMI) need to be registered in a registry primarily to allow clients to locate and access them using lookup method. (1 pt)

Q2. (3 points, 1 pt for each)

- Compare between java RMI applications and web applications based on components, middleware, and performance.

Java RMI applications	Web applications
Components: interface, client, server	Browser, server
Middleware: RMI+ network	HTTP protocol through the network
Performance: Generally faster than web applications (especially for complex object transfers) in high-performance, controlled network environments.	Generally slower due to the protocol and data formatting overhead

Q3. (5 points)

Select ONE choice from the following:

1. Which of the following is responsible for marshalling and unmarshalling arguments in RMI?
 - a. RMI Registry
 - b. Interface
 - c. Binder
 - d. Stub and Skeleton
2. What is the purpose of UnicastRemoteObject?
 - a. To create a remote object that is valid only during the process lifetime
 - b. To handle exceptions
 - c. To create a stub
 - d. All
3. What is a "Client-side proxy" in RMI called?
 - a. Thin client
 - b. Thick client
 - c. Stub
 - d. Skeleton
4. System that offers services according to standard rules that describe the syntax and semantics of those services is:
 - a. Open
 - b. Scalable
 - c. Secure
 - d. None
5. In information systems, the presentation layer is responsible for:
 - a. Interaction with other systems by accepting operations and getting responses
 - b. Communication with the external entities both humans and systems
 - c. All of the mentioned
 - d. None of the mentioned

Q4. (9 points)

Develop a library management system using Java RMI where different types of users can get the following services:

1. Search for books: checks if a **specific book** exists in the library
2. Display books: displays the available **scientific books**
3. Borrow books: checks if **copies** of a specific book exist so it can be borrowed.

Hint: Build your database in a way that helps you implement this distributed application.

The code will be added soon