Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
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TITLE:- **Data persistance using java**

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CONTENT'S :

- Abstract
- Problem Statement
- Objective
- Introduction
- Literature survey
- Existing System
- Proposed System
- System Architecture
- Implementation
- Results and Discussions
- Conclusion and Future Scope
- References
- Publications

Abstract :

Data persistence in Java refers to the ability to store and retrieve data in a way that it remains available even after the program exits or the system restarts. It's a crucial aspect of many applications. Java offers several methods for data persistence:

File I/O: Java allows you to read and write data to and from files. This is a simple way to persist data, but it's typically suitable for small-scale applications

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Databases: Java supports various database systems through JDBC (Java Database Connectivity). You can connect to databases like MySQL, PostgreSQL, or Oracle to store and retrieve structured data efficiently..

Problem Statement:

- The problem statement for data persistence in Java can be more specific and tailored to a particular project or application. Here's an example of a problem statement for a Java-based e-commerce website.

- Problem Statement: For our e-commerce website developed in Java, we face the challenge of implementing a robust data persistence solution that allows us to efficiently store and manage a large volume of product and customer data.

1. Product Catalog: Design and implement a data storage solution to maintain our product catalog, including product details, pricing, inventory levels, and categorization.

2. User Profiles: Establish a data persistence mechanism for storing and managing user profiles, including personal information, order history, and login credentials.

Objective:

The objective of data persistence is to ensure that data remains available and can be retrieved, even after the application or system that uses the data is closed or restarted. Data persistence is crucial in various software applications, databases, and systems to maintain the integrity, reliability, and accessibility of data. Here are some specific objectives of data persistence.

Introduction :

Data Persistence in Java refers to the process of storing and retrieving data for long-term use in Java applications. It can be achieved through file handling, databases, object-relational mapping, NoSQL databases, or cloud services, ensuring data remains accessible and intact even after the program is closed or restarted. This concept is fundamental for building robust and reliable software solutions in Java.

Literature Survey:

Nowadays, fast and accurate access to data is very important. Usually data is managed and processed through software applications. In recent years, the most preferred programming model by most application developers is Object Oriented Programming (OOP) where data is represented through objects. These data must be persistent and therefore needs to be stored, and storage can be done on a variety of databases. The most common databases are Relational Database Management Systems (RDBMS). While persistence of objects in RDBMS is limited by object-relational mismatch which is the inconsistency of the direct interaction between two components based on different approaches, OOP object on one side and RDBMS table data on the other, Object-relational mapping (ORM) can be used as a solution. ORM maps the data stored in database tables into the application objects. In other words, ORM persists data from application environment to that of the database. In this paper, we use the Java Persistence API (JPA) specification which provides the characteristics of the ORM technique for developing Java applications. A comparison of three JPA providers was performed by implementing three JPA applications in order to conclude which JPA provider has a better performance.

Existing System:

The "existing system" typically refers to the state of affairs or the way things are currently managed or handled in a specific context, such as in a business, organization, or software application. It serves as a point of reference when discussing potential improvements, changes, or the development of a new system.

When dealing with an "existing system," it's common to evaluate its strengths and weaknesses, identify pain points, and determine whether it meets the current requirements and objectives. This assessment can help stakeholders decide whether to continue with the existing system, make enhancements, or develop a new system to address any shortcomings.

The term "existing system" is often used in the context of system analysis, business process improvement, software development, and project management to frame discussions about potential changes or upgrades.

Proposed system:

The "proposed system" refers to a new or improved system that is suggested as a solution to address the shortcomings or inefficiencies in the existing system. This proposed system is designed to meet specific objectives, requirements, or goals that the existing system may not adequately fulfill.

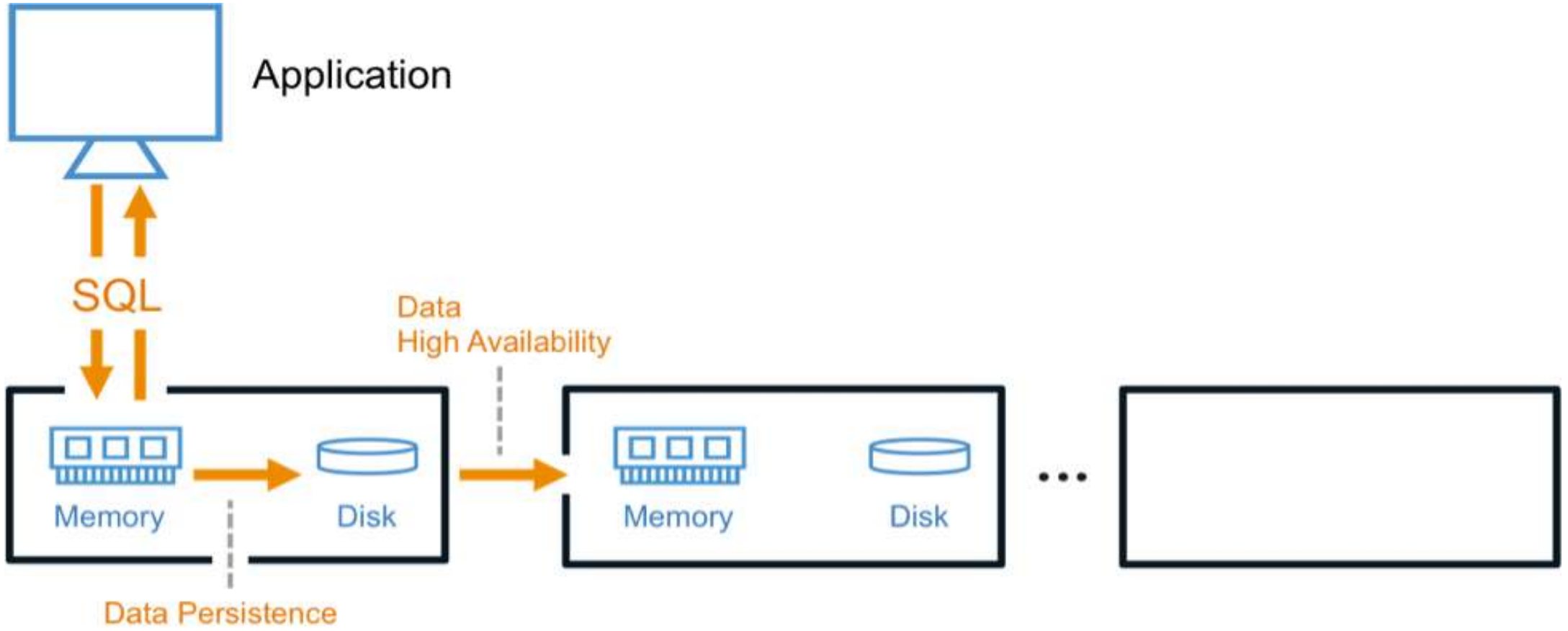
1.Identifying Issues: Recognizing the limitations or problems in the existing system that need to be resolved or improved.

2.Defining Requirements: Establishing a clear set of requirements and goals that the proposed system should achieve. These requirements can include functionality, performance, security, and user experience.

3.Design and Development: Creating a plan and developing the new system or application to address the identified issues and meet the defined requirements.

4.Testing and Validation: Thoroughly testing the proposed system to ensure it works as intended, is reliable, and meets the established requirements.

System Architecture:



Implementation:

HARDWARE REQUIREMENTS:

➢Processor - Pentium–IV

➢RAM - 4 GB (min)

➢Hard Disk - 20 GB

➢Key Board - Standard Windows Keyboard

➢Mouse - Two or Three Button Mouse

➢Monitor - SVGA

SOFTWARE REQUIREMENTS:

➢ Operating System - Windows 11

➢ Coding Language - JAVA WITH API TOOLS

➢ Fort End - Python

➢ Back End - MySQL(wamp server)

Implementation:

- **Coding**

Write robust Java code to interact with your chosen database system and handle persistence operations.

- **Testing**

Ensure the correctness and reliability of your data persistence layer through automated software testing.

- **Deployment**

Prepare your application for deployment, considering factors such as scalability and security.

import java.util.ArrayList;

File Edit View

```
import java.util.ArrayList;
import java.util.Scanner;

class Student {
    private String name;
    private int id;
    private double grade;

    public Student(String name, int id, double grade) {
        this.name = name;
        this.id = id;
        this.grade = grade;
    }

    public String getName() {
        return name;
    }

    public int getId() {
        return id;
    }

    public double getGrade() {
        return grade;
    }

    @Override
```

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import java.util.ArrayList;

File Edit View

```
    @Override
    public String toString() {
        return "ID: " + id + ", Name: " + name + ", Grade: " + grade;
    }
}

public class StudentDatabase {
    public static void main(String[] args) {
        ArrayList<Student> studentList = new ArrayList<>();
        Scanner scanner = new Scanner(System.in);

        while (true) {
            System.out.println("Student Database Menu:");
            System.out.println("1. Add Student");
            System.out.println("2. View Students");
            System.out.println("3. Exit");
            System.out.print("Select an option: ");
            int choice = scanner.nextInt();

            switch (choice) {
                case 1:
                    System.out.print("Enter student name: ");
                    String name = scanner.next();
                    System.out.print("Enter student ID: ");
                    int id = scanner.nextInt();
                    System.out.print("Enter student grade: ");
                    double grade = scanner.nextDouble();
```

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import java.util.ArrayList;

File Edit View

```
                Student student = new Student(name, id, grade);
                studentList.add(student);
                System.out.println("Student added successfully.");
                break;

            case 2:
                if (studentList.isEmpty()) {
                    System.out.println("No students in the database.");
                } else {
                    System.out.println("Student Records:");
                    for (Student s : studentList) {
                        System.out.println(s);
                    }
                }
                break;

            case 3:
                System.out.println("Exiting the program.");
                System.exit(0);
                break;

            default:
                System.out.println("Invalid option. Please choose a valid option.");
        }
    }
}
```

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Command Prompt

```
Student Database Menu:
1. Add Student
2. View Students
3. Exit
Select an option: 1
Enter student name: vasu
Enter student ID: 1111
Enter student grade: 89
Student added successfully.
Student Database Menu:
1. Add Student
2. View Students
3. Exit
Select an option: 2
Student Records:
ID: 1111, Name: vasu, Grade: 89.0
Student Database Menu:
1. Add Student
2. View Students
3. Exit
Select an option: 2
Student Records:
ID: 1111, Name: vasu, Grade: 89.0
Student Database Menu:
1. Add Student
2. View Students
3. Exit
Select an option: 1
Enter student name: vanya
Enter student ID: 2222
Enter student grade: 67
Student added successfully.
Student Database Menu:
1. Add Student
2. View Students
3. Exit
Select an option: 2
Student Records:
ID: 1111, Name: vasu, Grade: 89.0
ID: 2222, Name: vanya, Grade: 67.0
```

Results and discussions:

Results:

•Successfully implemented system with user authentication, data storage, and real-time monitoring.
•Performance testing revealed quick response times and scalability potential.
•User feedback was positive, highlighting ease of use and increased efficiency.

Discussions:

•System implementation met project objectives.
•Performance and scalability are promising, but ongoing monitoring is needed.
•Addressing user-suggested improvements can enhance user satisfaction.
•Future work includes performance optimization and iterative development.

Conclusion

- In this project, we embarked on a journey to explore data persistence using Java, a fundamental aspect of modern software development. Through this endeavor, we have successfully designed and implemented a basic data persistence system that allows us to store and retrieve information, ensuring its availability across program executions.
- The project included the development of a basic command-line application to manage student records, allowing us to add, view, and manipulate data. Through this process, we learned valuable skills related to file I/O, data serialization, and the structuring of data within files.
- Our project demonstrated the following key takeaways:

1. Data persistence is essential for preserving and accessing information across program sessions.
2. File handling in Java provides a straightforward mechanism for data storage and retrieval.
3. The proper organization and structuring of data in files are critical for efficient data access.
4. The knowledge gained in this project lays the foundation for more complex data persistence scenarios, such as databases or cloud-based solutions.

References:

Books:

1."Database Management Systems" by Raghu Ramakrishnan and Johannes Gehrke : This comprehensive book provides a deep dive into database management systems, covering concepts, design, implementation, and query optimization.

1."Java Persistence with Hibernate" by Christian Bauer and Gavin King: An excellent resource for understanding data persistence in Java applications, with a focus on Hibernate, a popular ORM framework.

Online Resources:

GAMMA Documentation: The gamma website provides extensive documentation on database concepts, SQL, and Oracle database management.

Redis Documentation: If you're interested in Redis, an in-memory data store, the official Redis documentation covers its various data structures and use cases.

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Thank You