

6. Quiz Application 2

1. Rest Controller Layer

The **QuestionController** handles all incoming HTTP requests related to questions. This controller calls the service layer to fetch, save, or retrieve questions.

```
@RestController
@RequestMapping("question")
public class QuestionController {

    @Autowired
    QuestionService questionService;

    @GetMapping("allQuestions")
    public List<Question> getAllQuestions() {
        return questionService.getAllQuestions();
    }

}
```

- **Key Methods:**
 - **getAllQuestions()**: Fetches all the questions in the database.
 - **URL:** /question/allQuestions (HTTP GET)
 - **getQuestionsByCategory(String category)**: Fetches questions filtered by category (like Java, Python, etc.).
 - **URL:** /question/category/{category} (HTTP GET)
 - **addQuestion(Question question)**: Adds a new question to the database.
 - **URL:** /question/add (HTTP POST)

2. Repository Layer

The repository interacts with the database using Spring Data JPA. This layer abstracts the database queries.

```
@Repository
public interface QuestionRepository extends JpaRepository<Question, Integer> {
    public List<Question> findByCategory(String category);
}
```

- **findByCategory(String category)**: Custom query method to fetch questions by their category.

3. Service Layer

The service layer contains the business logic for fetching or storing data. It acts as a bridge between the controller and repository layers.

```
@Service
public class QuestionService {

    @Autowired
    QuestionRepository questionRepository;

    public List<Question> getAllQuestions() {
        return questionRepository.findAll();
    }

}
```

- **Key Methods:**
 - **getAllQuestions()**: Calls the repository to fetch all questions.
 - **getQuestionsByCategory(String category)**: Calls the repository to fetch questions by category.
 - **addQuestion(Question question)**: Adds a question to the database.

4. Entity

The **Question** class represents the database table structure. It maps the object fields to columns in the database.

```
@Entity
@Data
@NoArgsConstructor
public class Question {

    @Id
    @GeneratedValue(strategy = GenerationType.SEQUENCE, generator = "question_seq")
    @SequenceGenerator(name = "question_seq", sequenceName = "question_sequence", allocationSize = 1,
                       initialValue = 11)

    private Integer id;
    private String questionTitle;
    private String option1;
    private String option2;
    private String option3;
    private String option4;
    private String category;
    private String rightAnswer;
    private String difficultyLevel;
}
```

- **Fields:**

- **id**: The primary key for each question.
- **questionTitle**: The question text.
- **option1**, **option2**, **option3**, **option4**: Multiple-choice options for the question.
- **rightAnswer**: The correct answer.
- **category**: The category of the question (e.g., Java, Python).
- **difficultyLevel**: Difficulty of the question (Easy, Medium, Hard).

6. SQL Insert Queries for Populating the Database

The following SQL scripts are used to insert questions into the **question** table for different categories like **Java**, **Python**, **C++**, **JavaScript**, and **PHP**.

Java Category:

```
INSERT INTO question (id, category, difficulty_level, option1, option2, option3, option4, question_title, right_answer) VALUES  
(1, 'Java', 'Easy', 'C++', 'Java', 'Python', 'Ruby', 'What programming language is primarily used for Android development?', 'Java'),  
(2, 'Java', 'Easy', 'JVM', 'JRE', 'JDK', 'JAVAC', 'Which one is the Java Virtual Machine?', 'JVM'),  
(3, 'Java', 'Medium', 'Static', 'Dynamic', 'Both', 'None', 'In Java, method overloading is an example of _____ polymorphism.', 'Static'),  
(4, 'Java', 'Medium', 'Encapsulation', 'Inheritance', 'Polymorphism', 'Abstraction', 'What is the main feature of Object-Oriented Programming?', 'Encapsulation'),  
(5, 'Java', 'Easy', 'new', 'this', 'super', 'self', 'Which keyword is used to create an object in Java?', 'new');
```

Python Category:

```
INSERT INTO question (id, category, difficulty_level, option1, option2, option3, option4, question_title, right_answer) VALUES  
(6, 'Python', 'Easy', 'Python', 'Java', 'C++', 'C#', 'Which language is known as the "batteries included" language?', 'Python'),  
(7, 'Python', 'Medium', 'List', 'Tuple', 'Set', 'Dictionary', 'Which of the following is an immutable data type in Python?', 'Tuple'),  
(8, 'Python', 'Easy', '2', '3', '4', '5', 'How many built-in data types does Python have?', '9'),  
(9, 'Python', 'Medium', 'def', 'func', 'function', 'method', 'What keyword is used to define a function in Python?', 'def');
```

C++ Category:

```
INSERT INTO question (id, category, difficulty_level, option1, option2, option3, option4, question_title, right_answer) VALUES  
(10, 'C++', 'Easy', 'No', 'Yes', 'Maybe', 'Depends', 'Does C++ support multiple inheritance?', 'Yes'),  
(11, 'C++', 'Medium', 'A', 'B', 'C', 'D', 'What is the default access modifier for class members in C++?', 'Private'),  
(12, 'C++', 'Easy', '2', '4', '8', '16', 'How many bytes is a pointer in C++ on a 32-bit system?', '4'),  
(13, 'C++', 'Medium', 'new', 'malloc', 'calloc', 'All of the above', 'Which operator is used to allocate memory in C++?', 'new');
```

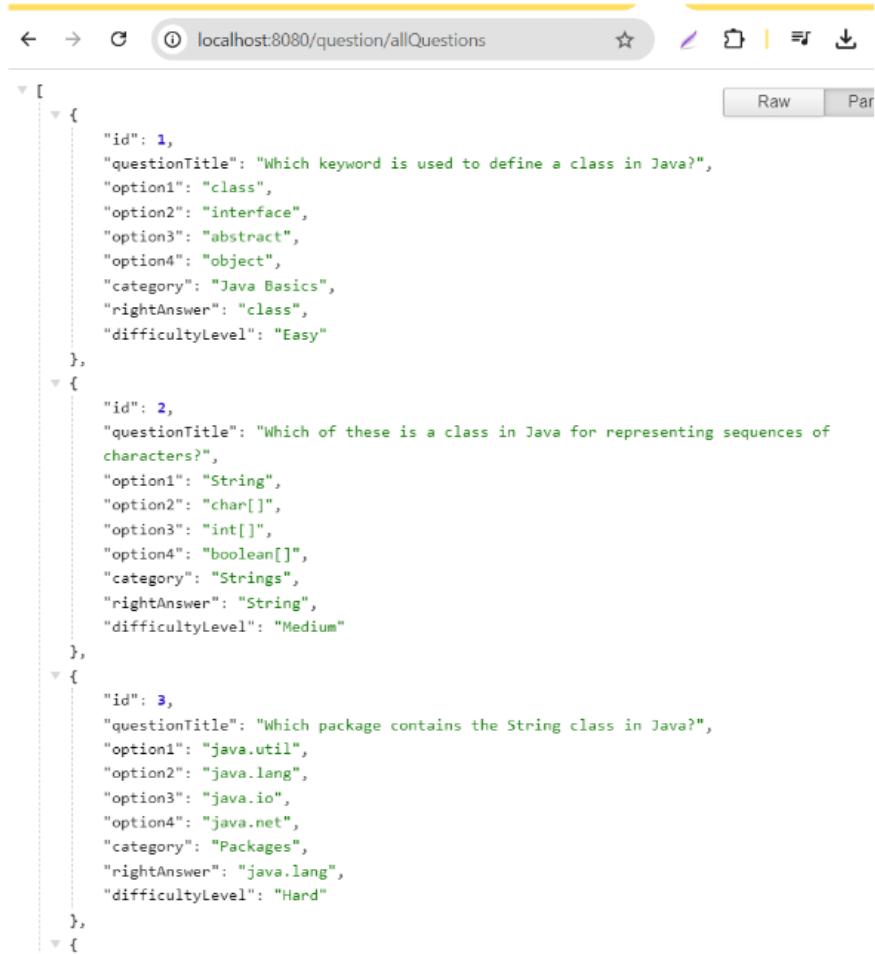
JavaScript Category:

```
INSERT INTO question (id, category, difficulty_level, option1, option2, option3, option4, question_title, right_answer) VALUES  
(14, 'JavaScript', 'Easy', 'Java', 'JavaScript', 'C++', 'C#', 'Which language is primarily used for web development?', 'JavaScript'),  
(15, 'JavaScript', 'Medium', 'var', 'let', 'const', 'All of the above', 'Which of the following is not a keyword in JavaScript?', 'None');
```

```
mysql> use questiondb;  
Database changed  
mysql> select * from question;  
+----+-----+-----+-----+-----+-----+-----+  
| id | category | difficulty_level | option1 | option2 | option3 | option4 | question_title |  
|    |          |                 |          |          |          |          |  
+----+-----+-----+-----+-----+-----+-----+  
| 1 | Java     | Easy           | C++      | Java      | Python    | Ruby      | What programming language is primarily used for Andro  
id development? | Java |  
| 2 | Java     | Easy           | JVM       | JRE       | JDK       | JAVAC     | Which one is the Java Virtual Machine?  
| JVM |  
| 3 | Java     | Medium          | Static    | Dynamic   | Both      | None      | In Java, method overloading is an example of _____  
| Static |  
| 4 | Java     | Medium          | Encapsulat | Inheritance | Polymorphism | Abstraction | What is the main feature of Object-Oriented Programmi  
ng?  
| Encapsulat |  
| 5 | Java     | Easy            | new       | this      | super     | self      | Which keyword is used to create an object in Java?  
| new |  
| 6 | Java     | Easy            | A         | B         | C         | D         | What will be the output of "System.out.println(10 + 2  
+ "30");"?  
| 1030 |  
| 7 | Java     | Hard            | try       | catch     | throw     | all of the above | Which keywords are used for exception handling in Java?  
| all of the above |  
| 8 | Java     | Medium          | Arrays    | Collections | Lists     | All of the above | What does ArrayList in Java use for storing elements?  
| Collections |  
| 9 | Java     | Hard            | static    | void      | main      | all of the above | Which keyword is used to define a main method in Java?  
| static |  
| 10 | Java    | Easy            | 4         | 5         | 6         | 7         | How many bytes does an int take in Java?  
| 4 |  
| 11 | Python  | Easy            | Python    | Java      | C++      | C#        | Which language is known as the "batteries included" language?  
| Python |  
| 12 | Python  | Medium          | List      | Tuple     | Set       | Dictionary | Which of the following is an immutable data type in Python?  
| Tuple |  
| 13 | Python  | Easy            | 2         | 3         | 4         | 5         | How many built-in data types does Python have?  
| 9 |  
| 14 | Python  | Medium          | def       | func     | function  | method    | What keyword is used to define a function in Python?  
| def |
```

Test URL:

For allQuestions:



The screenshot shows a browser window with the URL `localhost:8080/question/allQuestions`. The page displays a JSON array of three questions. Each question object contains fields such as id, questionTitle, option1, option2, option3, option4, category, rightAnswer, and difficultyLevel. The JSON is formatted with collapsible sections for each question.

```
[{"id": 1, "questionTitle": "Which keyword is used to define a class in Java?", "option1": "class", "option2": "interface", "option3": "abstract", "option4": "object", "category": "Java Basics", "rightAnswer": "class", "difficultyLevel": "Easy"}, {"id": 2, "questionTitle": "Which of these is a class in Java for representing sequences of characters?", "option1": "String", "option2": "char[]", "option3": "int[]", "option4": "boolean[]", "category": "Strings", "rightAnswer": "String", "difficultyLevel": "Medium"}, {"id": 3, "questionTitle": "Which package contains the String class in Java?", "option1": "java.util", "option2": "java.lang", "option3": "java.io", "option4": "java.net", "category": "Packages", "rightAnswer": "java.lang", "difficultyLevel": "Hard"}]
```