



Modern Topics in IT – IT4020

4th Year – 1st Semester

Assignment 04 – Report (Microservices)

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Declaration

We declare that this is our own work, and this report does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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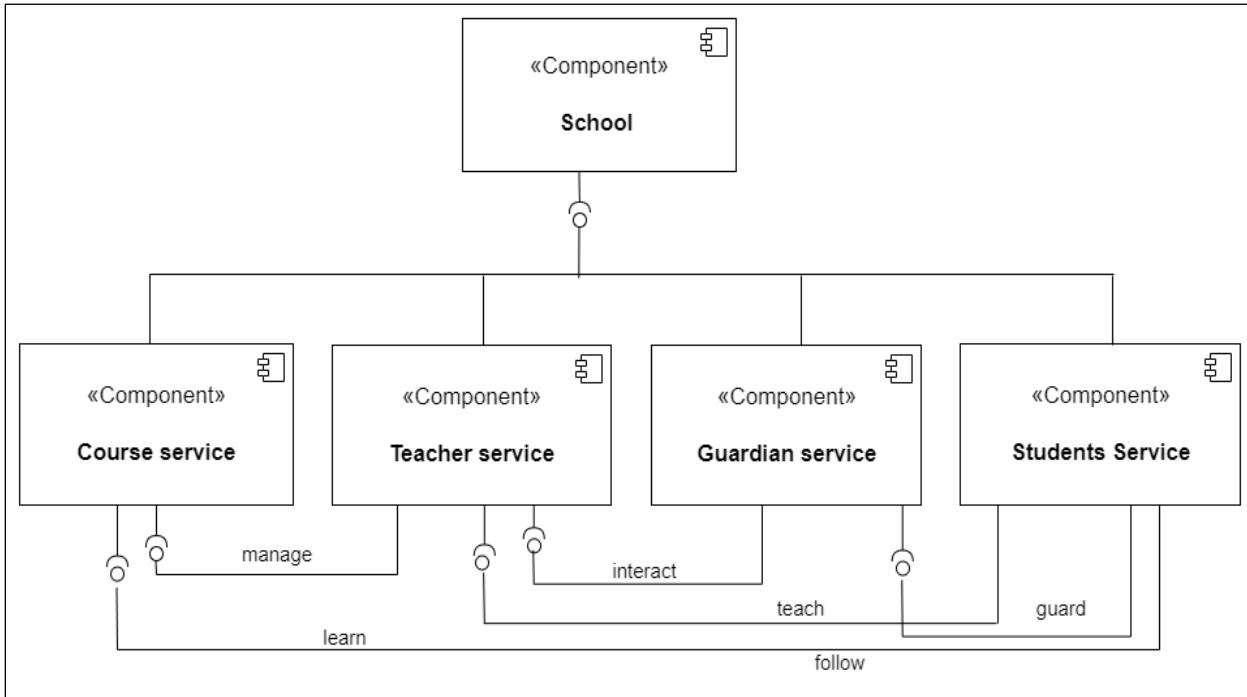
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1. Contribution

IT Number	Student Name	Contribution
IT19015422	Perera B.A.A.W.S	<ul style="list-style-type: none">• Implementing Teachers service• Integrate all microservices together• Postman implementations
IT19015040	Rasuni Wageesha H.A	<ul style="list-style-type: none">• Implementing Student service• Integrate all microservices together• Postman implementations
IT18077698	Thennakoon T.M.B.C.K	<ul style="list-style-type: none">• Implementing Guardian service• Integrate all microservices together• Postman implementations
IT19011608	Senanayaka S.A.M.A.B.M	<ul style="list-style-type: none">• Implementing Course service• Integrate all microservices together• Postman implementations

2. Component diagram



2.1 Solution

This scenario is based on School management system that contain some microservices. Those are Student management, Teacher management, Guardian management and Course management. In here all the microservices are interact with each service. In the given microservices contains,

- Teacher service can manage course service and student service.
- Student service is interacting with course service, teacher service and guardian service.
- Every guardian service has a connection with teacher service and student service.

In the School management system contains all the crud functions (Insert, Delete, Update, View).

- Teachers can add students, guardian, courses after adding they can view it. If want to do any updates or delete it also work here.
- Students can view their courses and do any updates. And view guardian details.
- Guardians allows to view their details, update, or delete their current details.

3. Product Implementation

- **IT19015422 – Teacher Service implementation**

The screenshot shows the Spring Tool Suite interface with the 'TeacherController.java' file open in the editor. The code implements a REST controller for teachers, utilizing annotations like @RestController, @RequestMapping, and @PostMapping to define endpoints for creating, reading, updating, and deleting teachers.

```
package com.example.demo.controller;
import java.util.List;
import org.springframework.web.bind.annotation.*;
import com.example.demo.entity.Teacher;
import com.example.demo.repository.TeacherRepository;
import com.example.demo.service.TeacherService;
import com.example.demo.serviceimpl.TeacherServiceImpl;

@RestController
@RequestMapping("/api/")
public class TeacherController {
    private TeacherService teacherService;

    @Autowired
    public TeacherController(TeacherService teacherService) {
        this.teacherService = teacherService;
    }

    @GetMapping(path = "hello")
    public String sayHelloTeacher() {
        return "hello teacher!";
    }

    @PostMapping(path = "/teacher")
    public Teacher saveTeacher(@RequestBody Teacher teacher) {
        return teacherService.saveTeacher(teacher);
    }

    @GetMapping(path = "/teacher")
    public List<Teacher> getAllTeachersList() {
        return teacherService.getAllTeachersList();
    }

    @GetMapping(path = "/teacher/{id}")
    public Teacher fetchTeacherById(@PathVariable("id") int id) {
        return teacherService.fetchTeacherById(id);
    }

    @DeleteMapping(path="/teacher/{id}")
    public String deleteTeacherById(@PathVariable("id") int id) {
        teacherService.deleteTeacherById(id);
        return "Teacher deleted successfully";
    }

    @PutMapping(path="/teacher/{id}")
    public Teacher updateTeacher(@PathVariable("id") int id, @RequestBody Teacher teacher) {
        return teacherService.updateTeacher(id,teacher);
    }
}
```

Figure 3.1: Teacher Controller

The screenshot shows the Spring Tool Suite interface with the following details:

- Project Explorer** (left sidebar):
 - Course_SpringBoot_Mtt [boot] (devtools)
 - Guardian_SpringBoot_Mtt [boot] (devtools)
 - Integrated_SpringBootProject_Mtt [boot] (devtools)
 - Scheduler-Demo Application [boot] (devtools)
 - Springboot-DemoApplication [boot] (devtools)
 - Students_SpringBootProject_Mtt [boot] (devtools)
 - Teachers_SpringBoot_Mtt [boot] (devtools)
 - src/main/java
 - com.example.demo
 - com.example.demo.controller
 - TeacherController.java
 - com.example.demo.entity
 - Teacher.java
 - com.example.demo.repository
 - com.example.demo.service
 - com.example.demo.serviceimpl
 - src/main/resources
 - src/test/java
 - JRE System Library [JavaSE-1.8]
 - Project and External Dependencies
 - bin
 - gradle
 - build.gradle
 - gradlew
 - gradlew.bat
 - HELP.md
 - settings.gradle
- Editor Area (right):** Displays the `Teacher.java` and `TeacherController.java` files.

Teacher.java (Content):

```
13 package com.example.demo.entity;
14 
15 import javax.persistence.Entity;
16 import javax.persistence.GeneratedValue;
17 import javax.persistence.GenerationType;
18 import javax.persistence.Id;
19 
20 import org.springframework.stereotype.Component;
21 
22 @Entity
23 @Table(name = "teacher_tbl")
24 public class Teacher {
25 
26     @Id
27     @GeneratedValue(strategy = GenerationType.AUTO)
28     private int id;
29     private String firstName;
30     private String lastName;
31     private String email;
32     private int mobile;
33     private Double salary;
34 
35     public Teacher(int id, String firstName, String lastName, String email, int mobile, Double salary) {
36         super();
37         this.id = id;
38         this.firstName = firstName;
39         this.lastName = lastName;
40         this.email = email;
41         this.mobile = mobile;
42         this.salary = salary;
43     }
44 
45     public Teacher() {
46     }
47     public int getId() {
48         return id;
49     }
50     public void setId(int id) {
51         this.id = id;
52     }
53     public String getFirstName() {
54         return firstName;
55     }
56     public void setFirstName(String firstName) {
57         this.firstName = firstName;
58     }
59     public String getLastName() {
60         return lastName;
61     }
62     public void setLastName(String lastName) {
63         this.lastName = lastName;
64     }
65 }
```

TeacherController.java (Content):

```
1 package com.example.demo.controller;
2 
3 import org.springframework.beans.factory.annotation.Autowired;
4 import org.springframework.web.bind.annotation.*;
5 
6 import com.example.demo.entity.Teacher;
7 import com.example.demo.service.TeacherService;
8 
9 @RestController
10 @RequestMapping("/api/teachers")
11 public class TeacherController {
12 
13     @Autowired
14     private TeacherService teacherService;
15 
16     @GetMapping
17     public List<Teacher> getAllTeachers() {
18         return teacherService.getAllTeachers();
19     }
20 
21     @PostMapping
22     public Teacher createTeacher(@RequestBody Teacher teacher) {
23         return teacherService.createTeacher(teacher);
24     }
25 }
```

Figure 3.2: Teacher Entity

The screenshot shows the Spring Tool Suite 4 interface with the project 'teachers_springboot_mtt' open. The 'Project Explorer' view on the left lists various Spring Boot projects and dependencies. The central editor area displays the code for the `TeacherRepository.java` interface:

```
1 package com.example.demo.repository;
2
3 import org.springframework.data.jpa.repository.JpaRepository;
4
5 @Repository
6 public interface TeacherRepository extends JpaRepository<Teacher, Integer> {
7
8 }
```

Figure 3.3: Teacher Repository

The screenshot shows the Spring Tool Suite 4 interface with the project 'teachers_springboot_mtt' open. The 'Project Explorer' view on the left lists various Spring Boot projects and dependencies. The central editor area displays the code for the `TeacherService.java` interface:

```
1 package com.example.demo.service;
2
3 import java.util.List;
4
5 public interface TeacherService {
6
7     public Teacher saveTeacher(Teacher teacher);
8
9     public List<Teacher> getAllTeachersList();
10
11    public Teacher fetchTeacherById(int id);
12
13    public void deleteTeacherById(int id);
14
15    public Teacher updateTeacher(int id, Teacher teacher);
16
17 }
```

Figure 3.4: Teacher Service

```

13 *Service
14 public class TeacherServiceImpl implements TeacherService {
15     @Autowired
16     private TeacherRepository teacherRepository;
17
18     public Teacher saveTeacher(Teacher teacher) {
19         return teacherRepository.save(teacher);
20     }
21
22     @Override
23     public List<Teacher> getAllTeachersList() {
24         return teacherRepository.findAll();
25     }
26
27     @Override
28     public Teacher fetchTeacherById(int id) {
29         return teacherRepository.findById(id).get();
30     }
31
32     @Override
33     public void deleteTeacherById(int id) {
34         // TODO Auto-generated method stub
35         teacherRepository.deleteById(id);
36     }
37
38     @Override
39     public Teacher updateTeacher(int id, Teacher teacher) {
40         Teacher teacherDb = teacherRepository.findById(id).get();
41
42         if(Objects.nonNull(teacher.getFirstName()) && !"".equalsIgnoreCase(teacher.getFirstName())) {
43             teacherDb.setFirstName(teacher.getFirstName());
44         }
45         if(Objects.nonNull(teacher.getLastName()) && !"".equalsIgnoreCase(teacher.getLastName())) {
46             teacherDb.setLastName(teacher.getLastName());
47         }
48         if(Objects.nonNull(teacher.getEmail()) && !"".equalsIgnoreCase(teacher.getEmail())) {
49             teacherDb.setEmail(teacher.getEmail());
50         }
51         if(Objects.nonNull(teacher.getMobile())) {
52             teacherDb.setMobile(teacher.getMobile());
53         }
54         if(Objects.nonNull(teacher.getSalary())) {
55             teacherDb.setSalary(teacher.getSalary());
56         }
57
58         return teacherRepository.save(teacherDb);
59     }
60 }

```

Figure 3.5: Teacher Service Implementation

- IT19015040 – Student Service implementation

```

17 import java.util.List;
18
19 @RestController
20 @RequestMapping("/api")
21 public class StudentController {
22
23     @Autowired
24     private StudentService studentService;
25
26     @GetMapping(path = "/hello")
27     public String sayHelloStudent() {
28         return "Hello student!";
29     }
30
31     @PostMapping(path = "/student")
32     public Student saveStudent(@RequestBody Student student) {
33         return studentService.saveStudent(student);
34     }
35
36     @GetMapping(path = "/student")
37     public List<Student> getAllStudentsList() {
38         return studentService.getAllStudentsList();
39     }
40
41     @GetMapping(path = "/student/{id}")
42     public Student fetchStudentById(@PathVariable("id") int id) {
43         return studentService.fetchStudentById(id);
44     }
45
46     @DeleteMapping(path = "/student/{id}")
47     public String deleteStudentById(@PathVariable("id") int id) {
48         studentService.deleteStudentById(id);
49         return "Student deleted successfully!";
50     }
51
52     @PutMapping(path = "/student/{id}")
53     public Student updateStudent(@PathVariable("id") int id, @RequestBody Student student) {
54         return studentService.updateStudent(id, student);
55     }
56 }

```

Figure 3.6: Student Controller

The screenshot shows the Spring Tool Suite IDE interface. The left pane displays the Project Explorer with various project files and dependencies. The right pane shows the code editor with the `Student.java` file open. The code defines a Java class `Student` with fields for id, firstName, lastName, email, mobile, and registrationDate, and corresponding getters and setters.

```
13 @Entity
14 @Table(name = "student_tbl")
15 public class Student {
16
17     @Id
18     @GeneratedValue(strategy = GenerationType.AUTO)
19     private int id;
20     private String firstName;
21     private String lastName;
22     private String email;
23     private int mobile;
24     private String registrationDate;
25
26     public Student(int id, String firstName, String lastName, String email, int mobile, String registrationDate) {
27         super();
28         this.id = id;
29         this.firstName = firstName;
30         this.lastName = lastName;
31         this.email = email;
32         this.mobile = mobile;
33         this.registrationDate = registrationDate;
34     }
35     public Student() {
36     }
37     public int getId() {
38         return id;
39     }
40     public void setId(int id) {
41         this.id = id;
42     }
43     public String getFirstName() {
44         return firstName;
45     }
46     public void setFirstName(String firstName) {
47         this.firstName = firstName;
48     }
49     public String getLastName() {
50         return lastName;
51     }
52     public void setLastName(String lastName) {
53         this.lastName = lastName;
54     }
55 }
```

Figure 3.7: Student Entity

The screenshot shows the Spring Tool Suite IDE interface. The left pane displays the Project Explorer with various project files and dependencies. The right pane shows the code editor with the `StudentRepository.java` file open. The code defines a Java interface `StudentRepository` that extends `JpaRepository<Student, Integer>`.

```
1 package com.example.demo.repository;
2
3 import org.springframework.data.jpa.repository.JpaRepository;
4
5 @Repository
6 public interface StudentRepository extends JpaRepository<Student, Integer> {
7
8 }
```

Figure 3.8: Student Repository

```

package com.example.demo.service;
import java.util.List;
public interface StudentService {
    public Student saveStudent(Student student);
    public List<Student> getAllStudentsList();
    public Student fetchStudentById(int id);
    public void deleteStudentById(int id);
    public Student updateStudent(int id, Student student);
}

```

Figure 3.9: Student Service

```

@Service
@Autowired
private StudentRepository studentRepository;
@Override
public Student saveStudent(Student student) {
    return studentRepository.save(student);
}
@Override
public List<Student> getAllStudentsList() {
    return studentRepository.findAll();
}
@Override
public Student fetchStudentById(int id) {
    return studentRepository.findById(id).get();
}
@Override
public void deleteStudentById(int id) {
    studentRepository.deleteById(id);
}
@Override
public Student updateStudent(int id, Student student) {
    Student studentDb = studentRepository.findById(id).get();
    if(Objects.nonNull(student.getFirstName()) && !"".equalsIgnoreCase(student.getFirstName())) {
        studentDb.setFirstName(student.getFirstName());
    }
    if(Objects.nonNull(student.getLastName()) && !"".equalsIgnoreCase(student.getLastName())) {
        studentDb.setLastName(student.getLastName());
    }
    if(Objects.nonNull(student.getEmail()) && !"".equalsIgnoreCase(student.getEmail())) {
        studentDb.setEmail(student.getEmail());
    }
    if(Objects.nonNull(student.getMobile())) {
        studentDb.setMobile(student.getMobile());
    }
    if(Objects.nonNull(student.getRegistrationDate()) && !"".equalsIgnoreCase(student.getRegistrationDate())) {
        studentDb.setRegistrationDate(student.getRegistrationDate());
    }
    return studentRepository.save(studentDb);
}

```

Figure 3.10: Student Service Implementation

- IT18077698 – Guardian Service implementation

```

1  package com.example.demo.controller;
2
3  import java.util.List;
4
5  import org.springframework.beans.factory.annotation.Autowired;
6  import org.springframework.http.ResponseEntity;
7  import org.springframework.web.bind.annotation.DeleteMapping;
8  import org.springframework.web.bind.annotation.GetMapping;
9  import org.springframework.web.bind.annotation.PathVariable;
10 import org.springframework.web.bind.annotation.PostMapping;
11 import org.springframework.web.bind.annotation.PutMapping;
12 import org.springframework.web.bind.annotation.RequestBody;
13
14 import com.example.demo.Guardian;
15 import com.example.demo.repository.GuardianRepository;
16
17 @RestController
18 @RequestMapping("/api/")
19 public class GuardianController {
20
21     @Autowired
22     private GuardianService guardianService;
23
24     @GetMapping(path = "/hello")
25     public String sayHelloGuardian() {
26         return "hello guardian!";
27     }
28
29
30     @PostMapping(path = "/guardian")
31     public Guardian saveGuardian(@RequestBody Guardian guardian) {
32         return guardianService.saveGuardian(guardian);
33     }
34
35     @GetMapping(path = "/guardian")
36     public List<Guardian> getAllGuardiansList() {
37         return guardianService.getAllGuardiansList();
38     }
39
40     @GetMapping(path = "/guardian/{id}")
41     public Guardian fetchGuardianById(@PathVariable("id") int id) {
42         return guardianService.fetchGuardianById(id);
43     }
44
45     @DeleteMapping(path = "/guardian/{id}")
46     public String deleteGuardianById(@PathVariable("id") int id) {
47         guardianService.deleteGuardianById(id);
48         return "Guardian deleted successfully!";
49     }
50
51     @PutMapping(path = "/guardian/{id}")
52     public Guardian updateGuardian(@PathVariable("id") int id, @RequestBody Guardian guardian) {
53         return guardianService.updateGuardian(id, guardian);
54     }
55
56 }

```

Figure 3.11: Guardian Controller

```

1  package com.example.demo.entity;
2
3  import javax.persistence.Entity;
4  import javax.persistence.GeneratedValue;
5  import javax.persistence.GenerationType;
6  import javax.persistence.Id;
7
8  @Entity
9  @Table(name = "guardian_tbl")
10 public class Guardian {
11
12     @Id
13     @GeneratedValue(strategy = GenerationType.AUTO)
14     private int id;
15
16     private String name;
17
18     private String email;
19
20     private int mobile;
21
22     private String address;
23
24     public Guardian(int id, String name, String email, int mobile, String address) {
25         super();
26         this.id = id;
27         this.name = name;
28         this.email = email;
29         this.mobile = mobile;
30         this.address = address;
31     }
32
33     public Guardian() {
34     }
35
36     public int getId() {
37         return id;
38     }
39
40     public void setId(int id) {
41         this.id = id;
42     }
43
44     public String getName() {
45         return name;
46     }
47
48     public void setName(String name) {
49         this.name = name;
50     }
51
52     public String getEmail() {
53         return email;
54     }
55
56     public void setEmail(String email) {
57         this.email = email;
58     }
59
60     public int getMobile() {
61         return mobile;
62     }
63
64 }

```

Figure 3.12: Guardian Entity

The screenshot shows the Spring Tool Suite interface with the project 'guardian.springboot_mtt' open. The 'GuardianRepository.java' file is selected in the editor. The code defines a repository interface for 'Guardian' entities:

```
1 package com.example.demo.repository;
2
3 import org.springframework.data.jpa.repository.JpaRepository;
4
5 @Repository
6 public interface GuardianRepository extends JpaRepository<Guardian, Integer> {
```

Figure 3.13: Guardian Repository

The screenshot shows the Spring Tool Suite interface with the project 'guardian.springboot_mtt' open. The 'GuardianService.java' file is selected in the editor. The code defines a service interface for managing 'Guardian' entities:

```
1 package com.example.demo.service;
2
3 import java.util.List;
4
5 public interface GuardianService {
6
7     public Guardian saveGuardian(Guardian guardian);
8
9     public List<Guardian> getAllGuardiansList();
10
11    public Guardian fetchGuardianById(int id);
12
13    public void deleteGuardianById(int id);
14
15    public Guardian updateGuardian(int id, Guardian guardian);
16
17 }
```

Figure 3.14: Guardian Service

```

GuardianServiceImpl.java - Spring Tool Suite 4

File Edit Source Refactor Navigate Search Project Run Window Help
Project Explorer X
src/main/java/com/example/demo/controller/GuardianController.java
src/main/java/com/example/demo/repository/GuardianRepository.java
src/main/java/com/example/demo/service/GuardianService.java
src/main/java/com/example/demo/serviceimpl/GuardianServiceImpl.java
src/main/resources/templates/application.properties
src/test/java
IRE System Library [JavaSE-1.8]
Project and External Dependencies
bin
gradle
src
build.gradle
gradlew
gradlew.bat
HELP.md
settings.gradle
integrated.springboot_mtt [boot] [devtools]
scheduler-demoApplication [boot]
springboot-demoApplication [boot] [devtools]

GuardianServiceImpl.java
14 public class GuardianServiceImpl implements GuardianService {
15     @Autowired
16     private GuardianRepository guardianRepository;
17
18     @Override
19     public Guardian saveGuardian(Guardian guardian) {
20         return guardianRepository.save(guardian);
21     }
22
23     @Override
24     public List<Guardian> getAllGuardiansList() {
25         // TODO Auto-generated method stub
26         return guardianRepository.findAll();
27     }
28
29     @Override
30     public Guardian fetchGuardianById(int id) {
31         // TODO Auto-generated method stub
32         return guardianRepository.findById(id).get();
33     }
34
35     @Override
36     public void deleteGuardianById(int id) {
37         // TODO Auto-generated method stub
38         guardianRepository.deleteById(id);
39     }
40
41     @Override
42     public Guardian updateGuardian(int id, Guardian guardian) {
43         // TODO Auto-generated method stub
44         Guardian guardianDb = guardianRepository.findById(id).get();
45
46         if(Objects.nonNull(guardian.getNome()) && !"".equalsIgnoreCase(guardian.getNome())) {
47             guardianDb.setNome(guardian.getNome());
48         }
49         if(Objects.nonNull(guardian.getEmail()) && !"".equalsIgnoreCase(guardian.getEmail())) {
50             guardianDb.setEmail(guardian.getEmail());
51         }
52         if(Objects.nonNull(guardian.getAddress()) && !"".equalsIgnoreCase(guardian.getAddress())) {
53             guardianDb.setAddress(guardian.getEmail());
54         }
55     }
56
57     return guardianRepository.save(guardianDb);
}

```

Figure 3.15: Guardian Service Implementation

- IT19011608 – Course Service implementation

```

CourseController.java - Spring Tool Suite 4

File Edit Source Refactor Navigate Search Project Run Window Help
Project Explorer X
src/main/java/com/example/demo/controller/CourseController.java
src/main/java/com/example/demo/service/CourseService.java
src/main/java/com/example/demo/repository/CourseRepository.java
src/main/java/com/example/demo/entity/Course.java
src/main/java/com/example/demo/controller/CourseController.java
src/main/java/com/example/demo/repository/CourseRepository.java
src/main/java/com/example/demo/service/CourseService.java
src/main/java/com/example/demo/serviceimpl/CourseServiceImpl.java
src/main/resources/templates/application.properties
src/test/java
IRE System Library [JavaSE-1.8]
Project and External Dependencies
bin
gradle
src
build.gradle
gradlew
gradlew.bat
HELP.md
settings.gradle
integrated.springboot_mtt [boot] [devtools]
scheduler-demoApplication [boot]
springboot-demoApplication [boot] [devtools]

CourseController.java
1 package com.example.demo.controller;
2
3 import java.util.List;
4
5 @RestController
6 @RequestMapping("/api/")
7 public class CourseController {
8
9     @Autowired
10    private CourseService courseService;
11
12    @GetMapping(path = "/hello")
13    public String sayHelloCourse() {
14        return "Hello course";
15    }
16
17    @PostMapping(path = "/course")
18    public Course saveCourse(@RequestBody Course course) {
19        return courseService.saveCourse(course);
20    }
21
22    @GetMapping(path = "/course")
23    public List<Course> getAllCoursesList() {
24        return courseService.getAllCoursesList();
25    }
26
27    @GetMapping(path = "/course/{id}")
28    public Course fetchCourseById(@PathVariable("id") int id) {
29        return courseService.fetchCourseById(id);
30    }
31
32    @DeleteMapping(path = "/course/{id}")
33    public String deleteCourseById(@PathVariable("id") int id) {
34        courseService.deleteCourseById(id);
35        return "Guardian deleted successfully!";
36    }
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1355
1356
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1357
13
```

The screenshot shows the Spring Tool Suite interface with the 'Course.java' file open in the editor. The code defines a JPA entity named 'Course' with attributes: id (@GeneratedValue(strategy = GenerationType.AUTO)), courseId (String), title (String), and description (String). The editor shows syntax highlighting and code completion suggestions.

```
13 @Entity
14 @Table(name = "course_tbl")
15 public class Course {
16     @Id
17     @GeneratedValue(strategy = GenerationType.AUTO)
18     private int id;
19     private String courseId;
20     private String title;
21     private String description;
22     public Course(int id, String courseId, String title, String description) {
23         super();
24         this.id = id;
25         this.courseId = courseId;
26         this.title = title;
27         this.description = description;
28     }
29     public int getId() {
30         return id;
31     }
32     public void setId(int id) {
33         this.id = id;
34     }
35     public String getCourseId() {
36         return courseId;
37     }
38     public void setCourseId(String courseId) {
39         this.courseId = courseId;
40     }
41     public String getTitle() {
42         return title;
43     }
44     public void setTitle(String title) {
45         this.title = title;
46     }
47     public String getDescription() {
48         return description;
49     }
}
```

Figure 3.17: Course Entity

The screenshot shows the Spring Tool Suite interface with the 'CourseRepository.java' file open in the editor. The code defines a Spring Data JPA repository interface named 'CourseRepository' extending 'JpaRepository<Course, Integer>'. It includes imports for 'org.springframework.data.jpa.repository.JpaRepository' and 'com.example.demo.Course'.

```
1 package com.example.demo.repository;
2
3 import org.springframework.data.jpa.repository.JpaRepository;
4
5 @Repository
6 public interface CourseRepository extends JpaRepository<Course, Integer> {
```

Figure 3.18: Course Repository

The screenshot shows the Spring Tool Suite interface with the 'CourseService.java' file open in the editor. The code defines a service interface with methods for saving, fetching, deleting, and updating courses.

```
1 package com.example.demo.service;
2
3 import java.util.List;
4
5 public interface CourseService {
6
7     public Course saveCourse(Course course);
8
9     public List<Course> getAllCoursesList();
10
11    public Course fetchCourseById(int id);
12
13    public void deleteCourseById(int id);
14
15    public Course updateCourse(int id, Course course);
16
17 }
18
19 }
```

Figure 3.19: Course Service

The screenshot shows the Spring Tool Suite interface with the 'CourseServiceImpl.java' file open in the editor. This is the implementation of the CourseService interface, using a CourseRepository to handle database operations.

```
13 @Service
14 public class CourseServiceImpl implements CourseService {
15     @Autowired
16     private CourseRepository courseRepository;
17
18     @Override
19     public Course saveCourse(Course course) {
20         return courseRepository.save(course);
21     }
22
23     @Override
24     public List<Course> getAllCoursesList() {
25         // TODO Auto-generated method stub
26         return courseRepository.findAll();
27     }
28
29     @Override
30     public Course fetchCourseById(int id) {
31         // TODO Auto-generated method stub
32         return courseRepository.findById(id).get();
33     }
34
35     @Override
36     public void deleteCourseById(int id) {
37         // TODO Auto-generated method stub
38         courseRepository.deleteById(id);
39     }
40
41     @Override
42     public Course updateCourse(int id, Course course) {
43         Course courseDb = courseRepository.findById(id).get();
44         if(Objects.nonNull(course.getCourseId()) && !"".equalsIgnoreCase(course.getCourseId())) {
45             courseDb.setCourseId(course.getCourseId());
46         }
47         if(Objects.nonNull(course.getTitle()) && !"".equalsIgnoreCase(course.getTitle())) {
48             courseDb.setTitle(course.getTitle());
49         }
50         if(Objects.nonNull(course.getDescription()) && !"".equalsIgnoreCase(course.getDescription())) {
51             courseDb.setDescription(course.getDescription());
52         }
53
54         return courseRepository.save(courseDb);
55     }
56 }
```

Figure 3.20: Course Service Implementation

4. CRUD operations

- IT19015422 – Teacher Service Postman implementation

The screenshot shows the Postman application interface. On the left, the sidebar displays 'My Workspace' with collections like 'rez1' and 'test_collection'. The main area shows a 'PUT' request to 'http://localhost:8080/api/teacher/2'. The 'Body' tab is selected, showing a JSON payload:

```
1  {
2     "id": 2,
3     "firstName": "niruththara",
4     "lastName": "perera",
5     "email": "niruththtra123@gmail.com",
6     "mobile": "0712759004",
7     "salary": "75000"
```

Below the request, the response is displayed in 'Pretty' format:

```
1  {
2     "id": 2,
3     "firstName": "niruththara",
4     "lastName": "perera",
5     "email": "niruththtra123@gmail.com",
6     "mobile": 712759004,
7     "salary": 75000.0
```

Figure 4.1: Teacher service PUT method

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there is a collection named 'rez1'. The main workspace displays a POST request to 'http://localhost:8080/api/teacher'. The 'Body' tab is selected, showing a JSON payload:

```

1
2   ...
3     "firstName": "niruththara",
4     "lastName": "perera",
5     "email": "niru@gmail.com",
6     "mobile": "071275004",
7     "salary": "60000"
8

```

Below the body, the response status is shown as 200 OK with a time of 15 ms and a size of 279 B. The response body is also displayed in JSON format:

```

1
2   {
3     "id": 16,
4     "firstName": "niruththara",
5     "lastName": "perera",
6     "email": "niru@gmail.com",
7     "mobile": 71275004,
8     "salary": 60000.0
9
10
11   [
12     {
13       "id": 1,
14       "firstName": "rasika",
15       "lastName": "jayakodi",
16       "email": "rasika@gmail.com",
17       "mobile": 71275004,
18       "salary": 50000.0
19     },
20     {
21       "id": 17,
22       "firstName": "niruththara",
23       "lastName": "perera",
24       "email": "niru@gmail.com",
25       "mobile": 71275004,
26       "salary": 60000.0
27     }
28   ]
29

```

Figure 4.2: Teacher Service POST method

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there is a collection named 'rez1'. The main workspace displays a GET request to 'http://localhost:8080/api/teacher'. The 'Headers' tab is selected. A 'Description' box is present, stating: 'This is the request meta data which shows up in Postman documentation. These are not sent with your HTTP request.' Below the headers, the response status is shown as 200 OK with a time of 7 ms and a size of 395 B. The response body is displayed in JSON format:

```

1
2   [
3     {
4       "id": 1,
5       "firstName": "rasika",
6       "lastName": "jayakodi",
7       "email": "rasika@gmail.com",
8       "mobile": 71275004,
9       "salary": 50000.0
10      },
11      {
12        "id": 17,
13        "firstName": "niruththara",
14        "lastName": "perera",
15        "email": "niru@gmail.com",
16        "mobile": 71275004,
17        "salary": 60000.0
18      }
19    ]
20

```

Figure 4.3: Teacher service GET method for all teachers

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there is a collection named 'rez1'. The main workspace displays a GET request to 'http://localhost:8080/api/teacher/2'. The 'Params' tab is selected, showing a single query parameter 'Key' with the value 'Value'. The 'Body' tab shows a JSON response with the following data:

```
1 "id": 2,
2   "firstName": "niruththara",
3   "lastName": "perera",
4   "email": "niru@gmail.com",
5   "mobile": 71275004,
6   "salary": 60000.0
```

Figure 4.4: Teacher service GET method based on "Id"

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there is a collection named 'rez1'. The main workspace displays a DELETE request to 'http://localhost:8080/api/teacher/2'. The 'Params' tab is selected, showing a single query parameter 'Key' with the value 'Value'. The 'Body' tab shows a text response indicating success: '1 Teacher deleted successfully!'

Figure 4.5: Teacher service DELETE method

- IT19015040 – Student Service Postman implementation

The screenshot shows the Postman application interface. The left sidebar includes sections for Collections, APIs, Environments, Mock Servers, Monitors, Flows, and History. The main workspace displays a PUT request to `http://localhost:8080/api/student/14`. The Body tab is selected, showing a JSON payload:

```

1 {
2   "id": 14,
3   "firstName": "nilupul",
4   "lastName": "manodya",
5   "email": "nilupul123@gmail.com",
6   "mobile": "712750000",
7   "registrationDate": "2018-11-20"
8 }

```

The response status is 200 OK, with a time of 43 ms and a size of 298 B. The response body is also displayed in JSON format:

```

1 {
2   "id": 14,
3   "firstName": "nilupul",
4   "lastName": "manodya",
5   "email": "nilupul123@gmail.com",
6   "mobile": 712750000,
7   "registrationDate": "2018-11-20"
8 }

```

Figure 4.6: Student service PUT method

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there are collections like 'rez1' and 'test_collection'. The main workspace shows a POST request to 'http://localhost:8080/api/student'. The 'Body' tab is selected, displaying the following JSON payload:

```

1
2   "firstName": "rishen",
3   "lastName": "perera",
4   "email": "rishen@gmail.com",
5   "mobile": "71275004",
6   "registrationDate": "2021-10-10"
7

```

Below the body, the response status is 200 OK with a time of 254 ms and a size of 291 B. The response body is also shown in JSON format:

```

1
2   "id": 12,
3   "firstName": "rishen",
4   "lastName": "perera",
5   "email": "rishen@gmail.com",
6   "mobile": 71275004,
7   "registrationDate": "2021-10-10"
8

```

Figure 4.7: Student service POST method

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there are collections like 'rez1' and 'test_collection'. The main workspace shows a GET request to 'http://localhost:8080/api/student'. The 'Body' tab is selected, displaying the following JSON response:

```

1
2   [
3     {
4       "id": 12,
5       "firstName": "rishen",
6       "lastName": "perera",
7       "email": "rishen@gmail.com",
8       "mobile": 71275004,
9       "registrationDate": "2021-10-10"
10      },
11      {
12        "id": 13,
13        "firstName": "kalana",
14        "lastName": "zoysa",
15        "email": "kalana@gmail.com",
16        "mobile": 71275004,
17        "registrationDate": "2020-11-20"
18      }

```

Figure 4.8: Student service GET method for all students

The screenshot shows the Postman interface with a successful API call. The URL is `http://localhost:8080/api/student/12`. The response body is a JSON object:

```
1
2   "id": 12,
3   "firstName": "rishen",
4   "lastName": "perera",
5   "email": "rishen@gmail.com",
6   "mobile": 71275004,
7   "registrationDate": "2021-10-10"
```

Figure 4.9: Student service GET method based on "Id"

The screenshot shows the Postman interface with a successful API call. The URL is `http://localhost:8080/api/student/14`. The response body is a simple message:

```
1 Student deleted successfully!
```

Figure 4.10: Student service DELETE method

- IT18077698 – Guardian Service Postman implementation

The screenshot shows the Postman application interface. The left sidebar displays 'My Workspace' with collections like 'rez1' and 'test_collection'. The main area shows a 'PUT' request to 'http://localhost:8080/api/guardian/11'. The 'Body' tab is selected, showing a JSON payload:

```

1
2   ...
3     "name": "kasun",
4     "email": "kasun@gmail.com",
5     "mobile": "071275804",
6     "address": "colombo"
7
  
```

The response tab shows a status of 200 OK with a response body identical to the request body.

Figure 4.11: Guardian service PUT method

The screenshot shows the Postman application interface. The left sidebar displays 'My Workspace' with collections like 'rez1' and 'test_collection'. The main area shows a 'POST' request to 'http://localhost:8080/api/guardian'. The 'Body' tab is selected, showing a JSON payload:

```

1
2   ...
3     "name": "kasun",
4     "email": "kasun@gmail.com",
5     "mobile": "071275804",
6     "address": "gampaha"
7
  
```

The response tab shows a status of 200 OK with a response body identical to the request body.

Figure 4.12: Guardian service POST method

```

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
{
  "id": 5,
  "name": "sadun",
  "email": "sadun@gmail.com",
  "mobile": 71275004,
  "address": "colombo"
},
{
  "id": 4,
  "name": "buddhika",
  "email": "b@gmail.com",
  "mobile": 71275004,
  "address": "gampaha"
},
{
  "id": 6,
  "name": "gayan",
  "email": "gayan@gmail.com",
  "mobile": 71275004,
}

```

Figure 4.13: Guardian service GET method for all guardians

```

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
{
  "id": 11,
  "name": "kasun",
  "email": "kasun@gmail.com",
  "mobile": 71275004,
  "address": "colombo"
}

```

Figure 4.14: Guardian service GET method based on "Id"

The screenshot shows the Postman interface with the following details:

- Header Bar:** Postman, File, Edit, View, Help, Home, Workspaces, API Network, Reports, Explore, Search Postman.
- Left Sidebar:** My Workspace (Collections, APIs, Environments), Mock Servers, Monitors, Flows, History.
- Request URL:** http://localhost:8080/api/guardian/11
- Method:** DELETE
- Params:** (empty)
- Authorization:** (empty)
- Headers:** (8)
- Body:** (green dot) - Body tab selected. Shows a table for Query Params with one row: Key (Key) and Value (Value). Below it, the Body content is shown in JSON format:


```
1   "Guardian deleted successfully!"
```
- Tests:** (empty)
- Settings:** (empty)
- Response:** Status: 200 OK, Time: 153 ms, Size: 194 B, Save Response.

Figure 4.15: Guardian service DELETE method

- **IT19011608 – Course Service Postman implementation**

The screenshot shows the Postman interface with the following details:

- Header Bar:** Postman, File, Edit, View, Help, Home, Workspaces, API Network, Reports, Explore, Search Postman.
- Left Sidebar:** My Workspace (Collections, APIs, Environments), Mock Servers, Monitors, Flows, History.
- Request URL:** http://localhost:8080/api/course/1
- Method:** PUT
- Params:** (empty)
- Authorization:** (empty)
- Headers:** (8)
- Body:** (green dot) - Body tab selected. Shows a table for Body type selection with options: none, form-data, x-www-form-urlencoded, raw, binary, GraphQL, JSON. The JSON option is selected. Below it, the Body content is shown in JSON format:


```
1   {
2     "courseId": "IT5020",
3     "title": "SQA",
4     "description": "Functional testing + Non functional testing"
5   }
```
- Tests:** (empty)
- Settings:** (empty)
- Response:** Status: 200 OK, Time: 23 ms, Size: 266 B, Save Response.

Figure 4.16: Course service PUT method

Postman

File Edit View Help

Home Workspaces API Network Reports Explore

My Workspace

Overview POST http://localhost:8080/api/course

POST http://localhost:8080/api/course

Params Authorization Headers (8) Body Pre-request Script Tests Settings

Body (JSON)

```

1 {
2   "id": 8,
3   "courseId": "IT3010",
4   "title": "DBMS",
5   "description": "sql query injection"
6 }

```

Body Cookies Headers (5) Test Results

Pretty Raw Preview Visualize JSON

Status: 200 OK Time: 271 ms Size: 243 B Save Response

Figure 4.17: Course service POST method

Postman

File Edit View Help

Home Workspaces API Network Reports Explore

My Workspace

Overview POST http://localhost:8080/api/course

GET http://localhost:8080/api/course

Params Authorization Headers (6) Body Pre-request Script Tests Settings

Query Params

KEY	VALUE	DESCRIPTION	Bulk Edit
Body	Cookies	Headers (5)	Test Results

Pretty Raw Preview Visualize JSON

```

1 [
2   {
3     "id": 8,
4     "courseId": "IT3010",
5     "title": "DBMS",
6     "description": "sql query injection"
7   },
8   {
9     "id": 9,
10    "courseId": "IT4010",
11    "title": "NIT",
12    "description": "cloud computing"
13  },
14  {
15    "id": 10,
16    "courseId": "IT5020",
17    "title": "SQA",
18    "description": "Functional testing"
19  }
20 ]

```

Status: 200 OK Time: 171 ms Size: 400 B Save Response

Figure 4.18: Course service GET method for all courses

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there are sections for Collections, APIs, Environments, Mock Servers, Monitors, Flows, and History. The main workspace shows a GET request to `http://localhost:8080/api/course/2`. The 'Params' tab is selected, showing a single query parameter 'Key'. The 'Body' tab displays the JSON response:

```
1 "id": 2,
2 "courseId": "IT4010",
3 "title": "MITI",
4 "description": "cloud computing"
```

Figure 4.19: Course service GET method based on "Id"

The screenshot shows the Postman application interface. In the left sidebar, under 'My Workspace', there are sections for Collections, APIs, Environments, Mock Servers, Monitors, Flows, and History. The main workspace shows a DELETE request to `http://localhost:8080/api/course/3`. The 'Params' tab is selected, showing a single query parameter 'Key'. The 'Body' tab displays the response text:

```
1 Course deleted successfully!
```

Figure 4.20: Course service DELETE method