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APAP-A

Tutorial 7
Membuat Web Service Menggunakan Spring Boot Framework

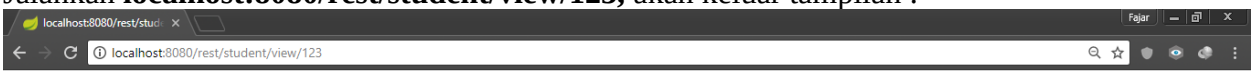
Membuat Service *Producer*

1. Import berkas-berkas yang ada di tutorial 5 untuk Service producer ini.
2. Buat *package* baru com.example.rest, atau sesuaikan dengan *package* Anda masing-masing
3. Buat class baru yaitu **StudentRestController.java pada package com.example.rest**

StudentRestController.java

```java
package com.example.rest;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RestController;

import com.example.model.StudentModel;
import com.example.service.StudentService;

@RestController
@RequestMapping("/rest")
public class StudentRestController {
    @Autowired
    StudentService studentService;

    @RequestMapping("/student/view/{npm}")
    public StudentModel view (@PathVariable(value="npm") String npm) {
        StudentModel student = studentService.selectStudent(npm);
        return student;
    }
}
```

Jalankan **localhost:8080/rest/student/view/123,** akan keluar tampilan :



{"npm":"123","name":"Fajar","gpa":3.3,"courses":[{"idCourse":null,"name":"MPKT","credits":6,"students":null}]}

Gunakan JSON View untuk merapihkan tampilan

String parse


```
{
   "npm":"123",
   "name":"Fajar",
   "gpa":3.3,
   "courses":[
      {
         "idCourse":null,
         "name":"MPKT",
         "credits":6,
         "students":null
      }
   ]
}
```


JS eval


```
{
   "npm":"123",
   "name":"Fajar",
   "gpa":3.3,
   "courses":[
      {
         "idCourse":null,
         "name":"MPKT",
         "credits":6,
         "students":null
      }
   ]
}
```

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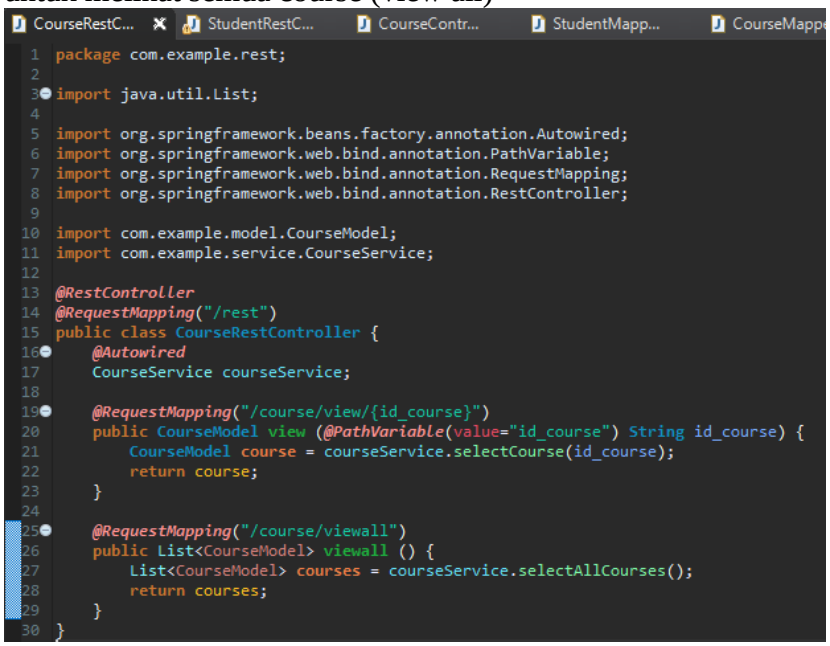
Latihan

1. **Latihan 1:** Buatlah *service* untuk mengembalikan seluruh student yang ada di basis data. *Service* ini mirip seperti *method* viewAll di Web Controller. *Service* tersebut di-*mapping* ke **"/rest/student/viewall".**

```
@RequestMapping("/student/viewall")
public List<StudentModel> viewall () {
    List<StudentModel> students = studentService.selectAllStudents();
    return students;
}
```

2. **Latihan 2:** Buatlah *service* untuk class Course. Buatlah *controller* baru yang terdapat *service* untuk melihat suatu course dengan masukan ID Course (view by ID) dan *service* untuk melihat semua course (view all)




```
package com.example.rest;

import java.util.List;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RestController;

import com.example.model.CourseModel;
import com.example.service.CourseService;

@RestController
@RequestMapping("/rest")
public class CourseRestController {
    @Autowired
    CourseService courseService;

    @RequestMapping("/course/view/{id_course}")
    public CourseModel view (@PathVariable(value="id_course") String id_course) {
        CourseModel course = courseService.selectCourse(id_course);
        return course;
    }

    @RequestMapping("/course/viewall")
    public List<CourseModel> viewall () {
        List<CourseModel> courses = courseService.selectAllCourses();
        return courses;
    }
}
```

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"/rest/course/view/{id_course}"

{"idCourse":"CSC124","name":"SDA","credits":3,"students":[{"npm":"124","name":"Ammar","gpa":3.25,"courses":null}]}

String parse


```
{
  "idCourse":"CSC124",
  "name":"SDA",
  "credits":3,
  "students":[
    {
      "npm":"124",
      "name":"Ammar",
      "gpa":3.25,
      "courses":null
    }
  ]
}
```


"/rest/course/viewall"

[{"idCourse":"CSC123","name":"PSP","credits":4,"students":[{"idCourse":"CSC123","name":"PSP","credits":4,"students":[{"npm":"124","name":"Ammar","gpa":3.25,"courses":null}]}]},
{"idCourse":"CSC124","name":"SDA","credits":3,"students":[{"idCourse":"CSC124","name":"SDA","credits":3,"students":[{"npm":"124","name":"Ammar","gpa":3.25,"courses":null}]}]},{"idCourse":"CSC125","name":"DDP
1","credits":4,"students":[{"idCourse":"CSC125","name":"DDP 1","credits":4,"students":[]}]},{"idCourse":"CSC126","name":"MPKT","credits":6,"students":[{"idCourse":"CSC126","name":"MPKT","credits":6,"students":
[{"npm":"123","name":"Fajar","gpa":3.3,"courses":null}]}]}]

String parse


```
[
  {
    "idCourse":"CSC123",
    "name":"PSP",
    "credits":4,
    "students":[
      {
        "idCourse":"CSC123",
        "name":"PSP",
        "credits":4,
        "students":[
          {
            "npm":"124",
            "name":"Ammar",
            "gpa":3.25,
            "courses":null
          }
        ]
      }
    ]
  },
  {
    "idCourse":"CSC126",
    "name":"MPKT",
    "credits":6,
    "students":[
      {
        "idCourse":"CSC126",
        "name":"MPKT",
        "credits":6,
        "students":[
          {
            "npm":"123",
            "name":"Fajar",
            "gpa":3.3,
            "courses":null
          }
        ]
      }
    ]
  }
]
```


String parse


```
},
{
  "idCourse":"CSC124",
  "name":"SDA",
  "credits":3,
  "students":[
    {
      "idCourse":"CSC124",
      "name":"SDA",
      "credits":3,
      "students":[
        {
          "npm":"124",
          "name":"Ammar",
          "gpa":3.25,
          "courses":null
        }
      ]
    }
  ]
},
```


String parse


```
},
{
  "idCourse":"CSC125",
  "name":"DDP 1",
  "credits":4,
  "students":[
    {
      "idCourse":"CSC125",
      "name":"DDP 1",
      "credits":4,
      "students":[
      ]
    }
  ]
},
```

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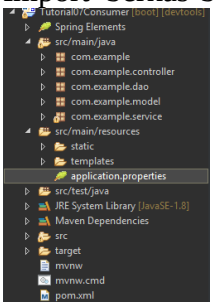
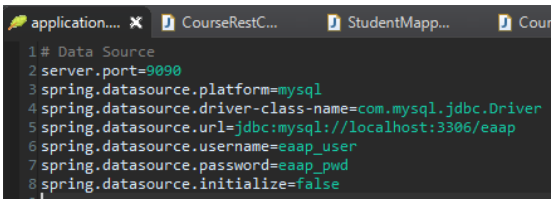
Membuat Service *Consumer*

1. Import berkas-berkas yang ada di tutorial 6 untuk Service Consumer ini.

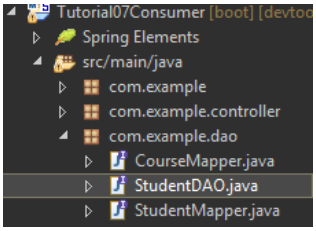


2. Karena *Service Producer* dan *Service Consumer* harus dijalankan secara bersamaan, ubah berkas **application.properties** yang ada di folder resources dengan menambahkan baris

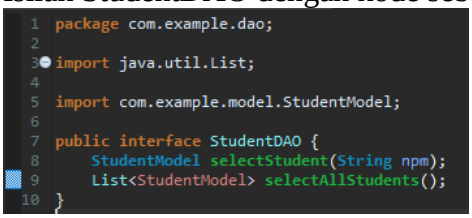


Nantinya Aplikasi *Service Producer* akan dijalankan di localhost:8080 sedangkan *Service Consumer* akan dijalankan di localhost:9090

3. Di DAO tambahkan ***interface*** dengan nama StudentDAO



4. Isilah StudentDAO dengan kode sebagai berikut:



```
package com.example.dao;

import java.util.List;

import com.example.model.StudentModel;

public interface StudentDAO {
    StudentModel selectStudent(String npm);
    List<StudentModel> selectAllStudents();
}
```

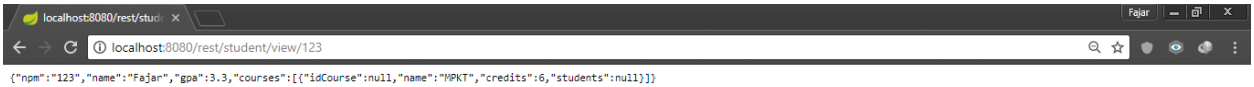
5. Selanjutnya kita akan membuat implementasi kelas StudentDAO tersebut dengan nama kelas StudentDAOImpl.java. Isinya adalah sebagai berikut

```
package com.example.service;

import java.util.List;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.client.RestTemplate;

import com.example.dao.StudentDAO;
import com.example.model.StudentModel;

public class StudentDAOImpl implements StudentDAO{
    @Autowired
    private RestTemplate restTemplate;

    @Override
    public StudentModel selectStudent(String npm) {
        StudentModel student = restTemplate.getForObject("http://localhost:8080/rest/student/view/"+npm, StudentModel.class);
        return student;
    }

    @Override
    public List<StudentModel> selectAllStudents() {
        return null;
    }
}
```

6. Selanjutnya, kita ingin mengubah agar StudentService mengambil data dari *web service* bukan dari *database* . Kita tidak perlu menghapus *class* **StudentServiceDatabase**. Karena *scalable system* , kita cukup menambahkan *class* baru yaitu **StudentServiceRest** yang mengimplement StudentService di *package* service
7. Isinya adalah sebagai berikut :

```
import org.springframework.stereotype.Service;
import com.example.dao.StudentDAO;
import com.example.model.StudentModel;
import com.mysql.jdbc.log.Log;

import lombok.extern.slf4j.Slf4j;

@Slf4j
@Service
@Primary
public class StudentServiceRest implements StudentService{
    @Autowired
    private StudentDAO studentDAO;

    @Override
    public StudentModel selectStudent(String npm) {
        log.info("REST - select student with npm {}", npm);
        return studentDAO.selectStudent(npm);
    }

    @Override
    public List<StudentModel> selectAllStudents() {
        log.info("REST - select all students");
        return studentDAO.selectAllStudents();
    }

    @Override
    public void addStudent(StudentModel student) {}

    @Override
    public void deleteStudent(String npm) {}

    @Override
    public void updateStudent(StudentModel student) {}

    @Override
    public void addCourse(String npm, String idCourse) {}
}
```

8. Jalankan kedua project Spring Boot untuk *Service Producer* dan *Service Consumer* tersebut
9. Pastikan *service producer* sudah berjalan dengan menjalankan **localhost:8080/rest/student/view/123**



10. Untuk menguji *service consumer* buka **localhost:9090/student/view/123**

Latihan

1. **Latihan 3:** Implementasikan *service consumer* untuk view all Students dengan melengkapi *method* selectAllStudents yang ada di kelas **StudentServiceRest**.
   - Implementasi pada method **selectAllStudents** di kelas **StudentDAOImpl.java**

```
@Override
public List<StudentModel> selectAllStudents() {
    List<StudentModel> allStudents = restTemplate.getForObject("http://localhost:8080/rest/student/viewall",List.class);
    return allStudents;
}
```

   - Implementasi pada method **selectAllStudents** di kelas **StudentServiceRest**

```
@Override
public List<StudentModel> selectAllStudents() {
    log.info("REST - select all students");
    return studentDAO.selectAllStudents();
}
```

Penjelasan : Implementasikan method tersebut dengan membuat List of Student Model yang mengambil object dari Rest Template **localhost:8080/rest/student/viewall** dengan objectnya yang berupa list

2. **Latihan 4:** Implementasikan *service consumer* untuk *class* CourseModel dengan membuat *class-class* DAO dan *service* baru
   - **Buat interface CourseDAO**

```
package com.example.dao;

import java.util.List;

import com.example.model.CourseModel;

public interface CourseDAO {
    CourseModel selectCourse(String id_course);
    List<CourseModel> selectAllCourse();
}
```

   - **Implementasikan CourseDAOImpl.java**

```
package com.example.dao;

import java.util.List;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Service;
import org.springframework.web.client.RestTemplate;

import com.example.model.CourseModel;

@Service
public class CourseDAOImpl implements CourseDAO{
    @Autowired
    private RestTemplate restTemplate;

    @Override
    public CourseModel selectCourse(String id_course) {
        CourseModel course = restTemplate.getForObject("http:8080/rest/course/view/"+id_course, CourseModel.class);
        return course;
    }

    @Override
    public List<CourseModel> selectAllCourse() {
        List<CourseModel> allCourses = restTemplate.getForObject("http:8080/rest/course/viewall", List.class);
        return allCourses;
    }
}
```

   - **Implementasikan CourseServiceRest**

```
package com.example.service;

import java.util.List;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.context.annotation.Primary;
import org.springframework.stereotype.Service;

import com.example.dao.CourseDAO;
import com.example.model.CourseModel;

import lombok.extern.slf4j.Slf4j;

@Slf4j
@Service
@Primary
public class CourseServiceRest implements CourseService {
    @Autowired
    private CourseDAO courseDAO;

    @Override
    public CourseModel selectCourse(String id_course) {
        log.info("REST - select course with id_course ()",id_course);
        return courseDAO.selectCourse(id_course);
    }

    @Override
    public List<CourseModel> selectAllCourse() {
        log.info("REST - select all course");
        return courseDAO.selectAllCourse();
    }
}
```

- **Tambahkan implementasi viewall pada CourseController**

```
package com.example.controller;

import java.util.List;

@Controller
public class CourseController {
    @Autowired
    CourseService courseDAO;

    @RequestMapping("/course/view/{id_course}")
    public String viewCourse (Model model,
            @PathVariable(value = "id_course") String id_course)
    {
        CourseModel course = courseDAO.selectCourse (id_course);

        if (course != null) {
            model.addAttribute ("course", course);
            return "viewcourse";
        } else {
            model.addAttribute ("id_course", id_course);
            return "not-found";
        }
    }

    @RequestMapping("course/viewall")
    public String viewall(Model model) {
        List<CourseModel> courses = courseDAO.selectAllCourse();

        if(courses != null) {
            model.addAttribute("courses", courses);
            return "viewAllCourses";
        }
        else {
            return "not-found";
        }
    }
}
```

Penjelasan : Langkah implementasi yaitu pertama, buat interface CourseDAO, kemudian buat CourseDAOImpl yang mengimplementasikan CourseDAO. Dimana pad akelas ini kita akan mengambil object dari RestTemplate ke url localhost:8080. Kemudian buat kelas CourseServiceRest yang mengimplement CourseService agar dapat digunakan pada Controller. Kemudian, lengkapi method pada kelas CourseController dan coba jalankan program.

Lesson learned :
Pada tutorial ke-7 ini saya mempelajari bagaimana membuat web service menggunakan spring boot framework. Saya juga mempelajari bagaimana menggunakan REST pada Spring. Selain itu, saya juga mempelajari adanya pembagian pada *Service Consumer* dan *Service Producer* untuk saling bertukar data.