# Spring Data Introduction

## Spring Data, Repositories, Services


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# Questions

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## sli.do

## #Java-DB

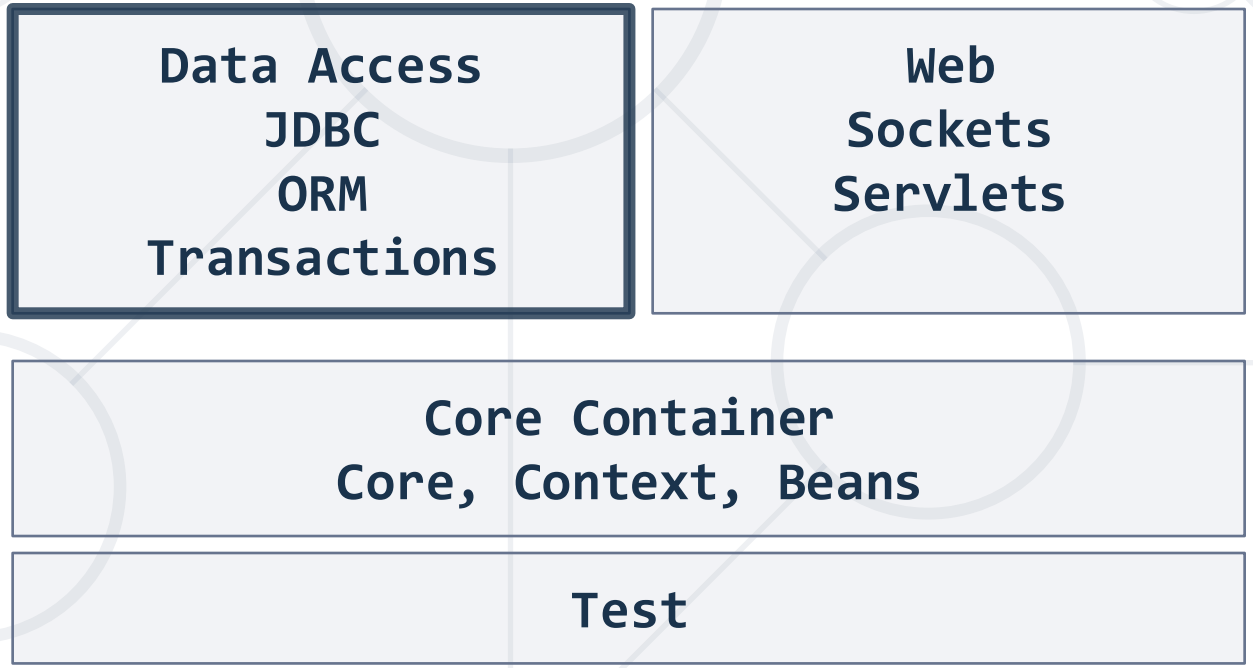

# Spring Data Framework

## Spring Framework Ecosystem

# What is Spring Framework

- Application framework for the Java Platform
  - Technology stack - includes several modules that provide a rang e of services

Spring Data Component

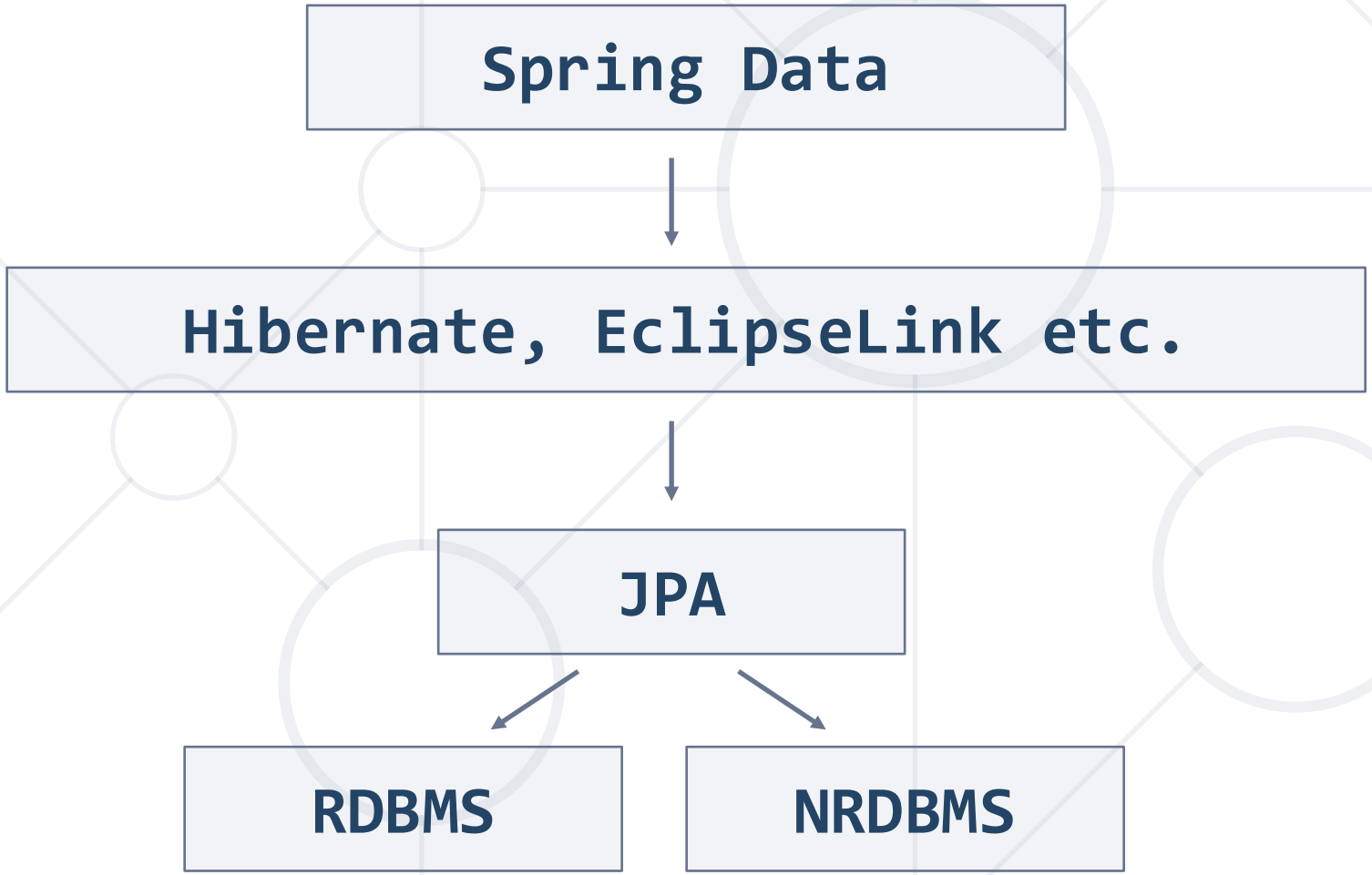



Spring Framework Overview

# What is Spring Data

- Library that adds an **extra layer of abstraction** on the top of our JPA provider
- Provides:
  - Dynamic query derivation from repository method names
  - Possibility to integrate custom repositories and many more
- What Spring Data is not:
  - **Spring Data JPA is not a JPA provider**

# Spring Data Role




Extra layer of abstraction over the used ORM

# Spring Boot – Convention over configuration


- Creates stand-alone Spring applications
  - Provide opinionated 'starter' POMs to simplify your Maven confi guration
- Automatically configure Spring whenever possible
- Absolutely no code generation and no requirement for XML con figuration

# Dependencies

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pom.xml

```
<parent>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-parent</artifactId>
    <version>2.1.3.RELEASE</version>
</parent>
```

# Dependencies (2)

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pom.xml

```
<dependencies>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-data-jpa</artifactId>
        </dependency>

        <dependency>
            <groupId>mysql</groupId>
            <artifactId>mysql-connector-java</artifactId>
        </dependency>
    </dependencies>
```

Spring Data

MySQL Connector

# Build

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**pom.xml**

```
<build>
        <plugins>
            <plugin>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-compiler-plugin</artifactId>
                <version>3.8.0</version>
                <configuration>
                    <source>12</source>
                    <target>12</target>
                </configuration>
            </plugin>
        </plugins>
    </build>
```

Java compile version

# Configuration

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- Spring boot configurations are held in a **application.properties** file

**application.properties**

```
#Data Source Properties
spring.datasource.driverClassName =
com.mysql.cj.jdbc.Driver
spring.datasource.url =
jdbc:mysql://localhost:3306/school?useSSL=false
spring.datasource.username = root
spring.datasource.password = 1234

#JPA Properties
spring.jpa.properties.hibernate.dialect =
org.hibernate.dialect.MySQL8Dialect
spring.jpa.properties.hibernate.format_sql = TRUE
spring.jpa.hibernate.ddl-auto = create-drop
```

Database Connection

JPA properties

# Configuration (2)

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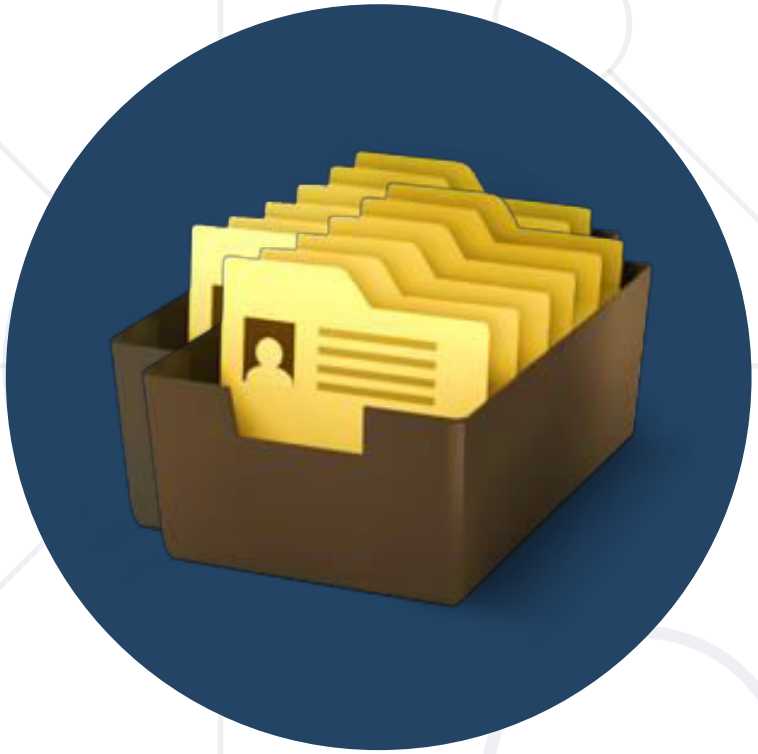
**application.properties**

```
…
###Logging Levels
# Disable the default loggers
logging.level.org = WARN
logging.level.blog = WARN

#Show SQL executed with parameter bindings
logging.level.org.hibernate.SQL = DEBUG
logging.level.org.hibernate.type.descriptor = TRACE
```

Loggin settings



# Spring Data Repositories

## Spring Framework Ecosystem

# Spring Repository

- Abstraction to significantly reduce the amount of boilerplate co de required to implement data access layers
  - Perform CRUD Operations
  - Automatically generates JPQL/SQL code
  - Highly customizable

# Built-in CRUD Operations

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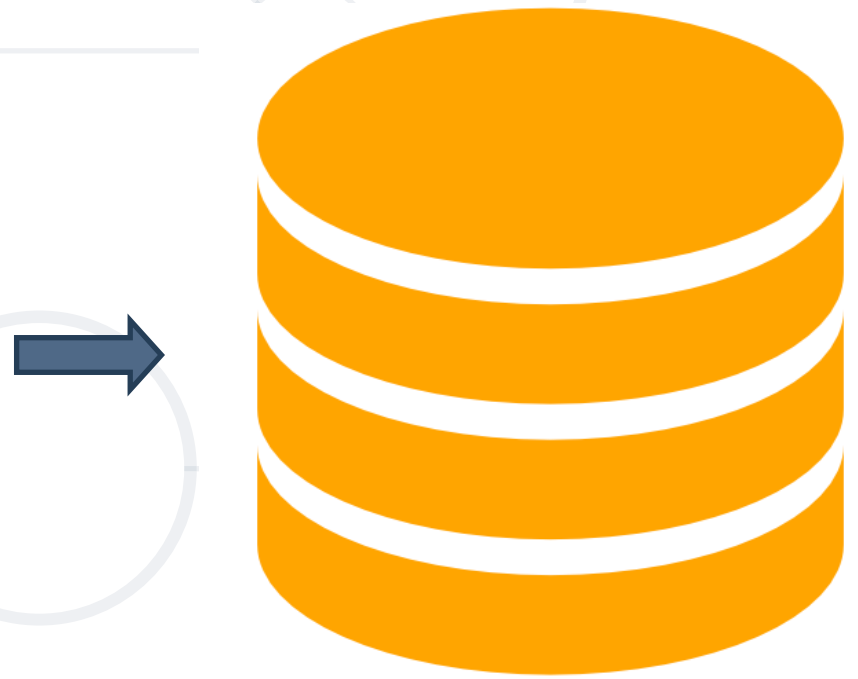
```
JPA REPOSITORY
- <S extends T> S save(S var1);
- <S extends T> Iterable<S>
save(Iterable<S> var1);
- T findOne(ID var1);
- boolean exists(ID var1);
- Iterable<T> findAll();
- long count();
- void delete(ID var1);
void deleteAll();
…
```



# Spring Data Query Creation

## Building Mechanism

# Query Creation

- Queries are created via a query builder mechanism built into Sp ring Data
  - Strips the prefixes like `find…By`, `read…By`, `query…By` and sta rts parsing the rest of it
- Spring Data JPA will do a property check

and traverse nested properties

# Custom CRUD Operations

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**StudentRepository.java**

```
@Repository
public interface StudentRepository extends
CrudRepository<Student, Long> {
    List<Student> findByMajor(Major major);
}
```

Custom method

**SQL**

```
SELECT s.*
  FROM students AS s
 INNER JOIN majors AS m
    ON s.major_id = m.id
 WHERE m.id = ?
```

# Query Lookup Strategies

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| Keyword | Sample | JPQL |
|---|---|---|
| And | findByLastnameAndFirstName | … where x.last_name = ?1 and x.firstname = ?2 |
| Or | findByLastnameOrFirstname | … where x.lastname = ?1 or x.firstname = ?2 |
| Between | findByStartDateBetween | … where x.startDate between 1? and ?2 |
| LessThan | findByAgeLessThan | … where x.age < ?1 |
| Containing | findByFirstnameContaining | … where x.firstname like ?1 (par ameter bound wrapped in %) |
| In | findByAgeIn(Collection<Age> ages) | … where x.age in ?1 |

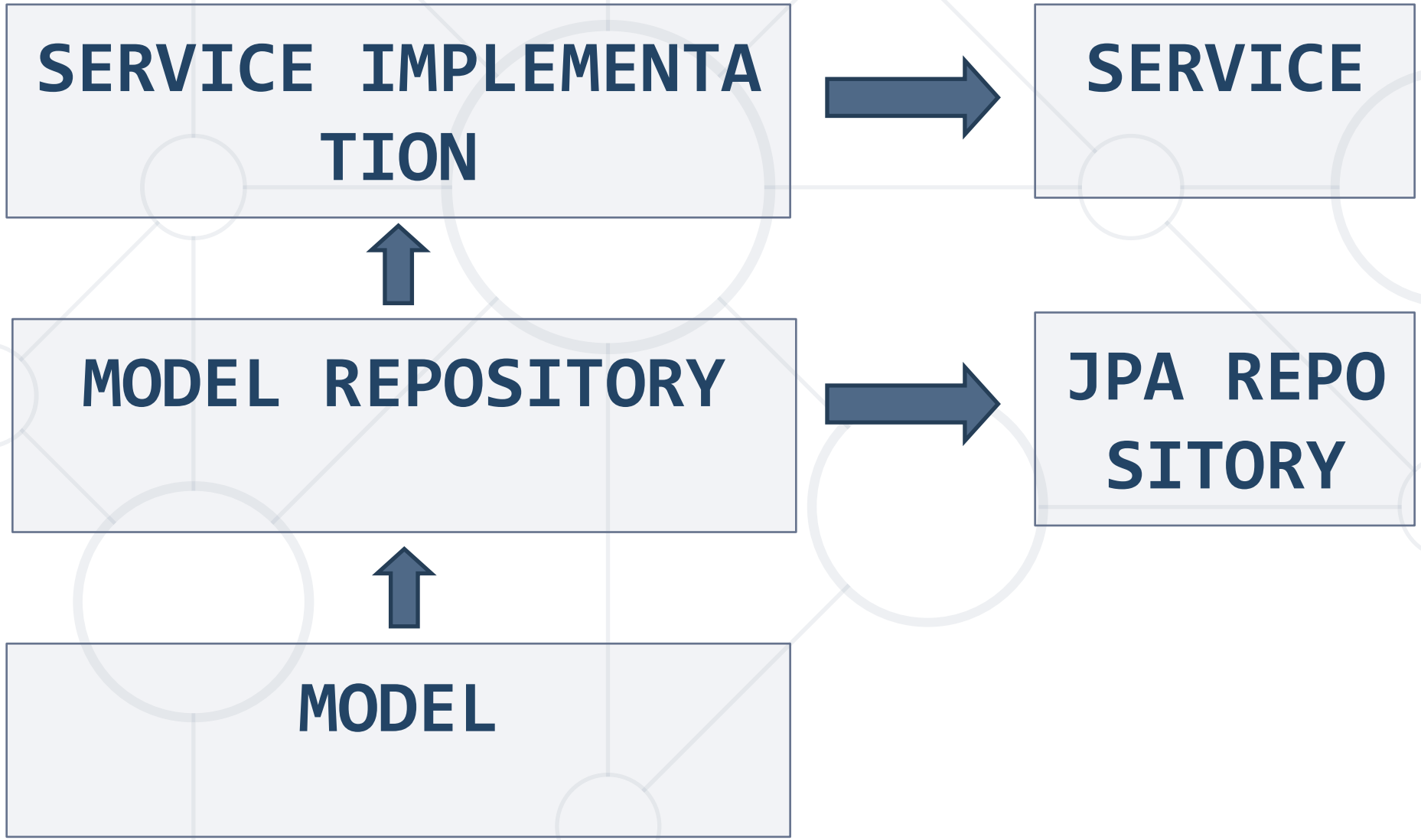
# Spring Data Services

## Encapsulating Business Logic

# Service Pattern

- Service Layer is a design pattern of organizing business logic into layers
  - Service classes are categorized into a particular layer and share functionality
- Main concept is **not exposing details** of internal processes on entities
  - Services **interact closely** with Repositories

# Spring Data Architecture



# Services

StudentService.java

```
public interface StudentService {

    void register(Student student);

    void expel(Student student);

    void expel(long id);

    Student findStudent(long id);

    List<Student> findSampleByMajor(Major major);
}
```

Business Logic

# Services

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StudentServiceImpl.java

```
@Service
public class StudentServiceImpl implements StudentService {

    @Autowired
    private StudentRepository studentRepository;

    @Override
    public void register(Student student) {
        studentRepository.save(student);
    }

    @Override
    public void expel(Student student) {
        studentRepository.delete(student);
    }
}
```

Service Implementation

StudentRepository injection

Method implementation

# Entry Point

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MainApplication.java

```
@SpringBootApplication
public class MainApplication {
    public static void main(String[] args) {
        SpringApplication.run(MainApplication.class,args);
    }
}
```

Spring Boot Entry Point

# Command Line Runner

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CommandLineRunner.java

```
@Component
public class ConsoleRunner implements CommandLineRunner {
    @Autowired
    private StudentService studentService;

    @Autowired
    private MajorService majorService;

    @Override
    public void run(String... strings) throws Exception {
        Major major = new Major("Java DB Fundamentals");
        Student student = new Student("John",new Date(), major);
        majorService.create(major);
        studentService.register(student);
    }
}
```

Component

Student service

Major service

Persist data

# Summary

- Spring Data is part of the Spring Framework
  - It is not a JPA Provider, just an abstraction over it
- Spring Data builds queries over conventions
- Main concept of Spring Data are Repositories and Services

# Questions?

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