MODULE 12

ENTITY BEANS

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TABLE OF CONTENT

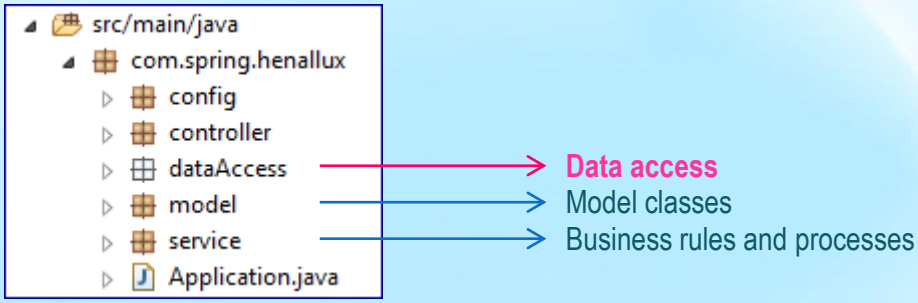
Entity Bean

- Server-side component representing persistent data maintained in a database
- The link between the application and the database
- Entity beans mirror the data model
  - Each entity bean (or entity class) is **the mirror of one table**

  ⇨ Access these entities rather than directly accessing the DB

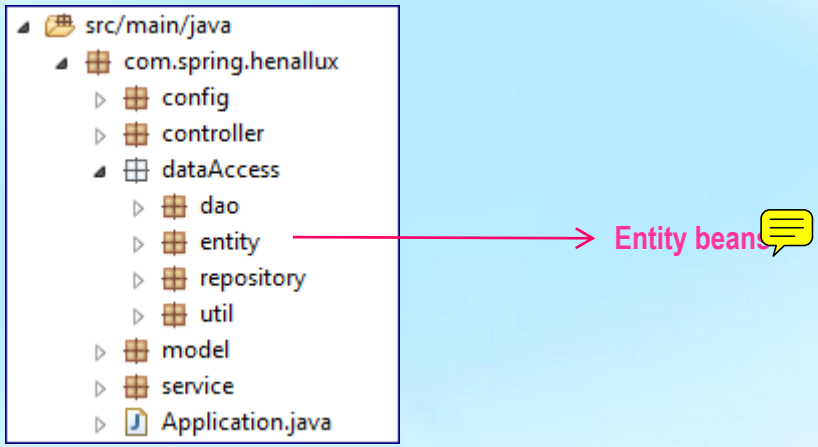
Entity Bean

- Structure of the application including data access



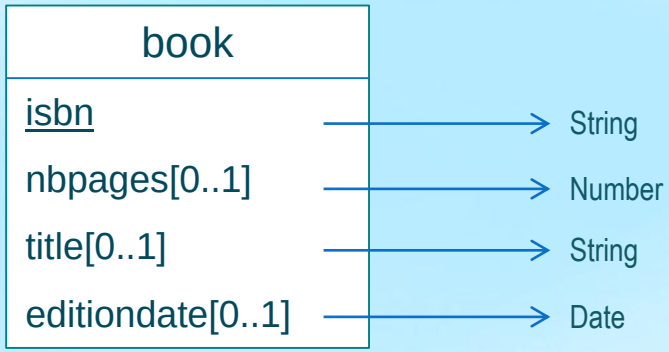
Entity Bean

- Create ***entity*** package in ***dataAccess*** package

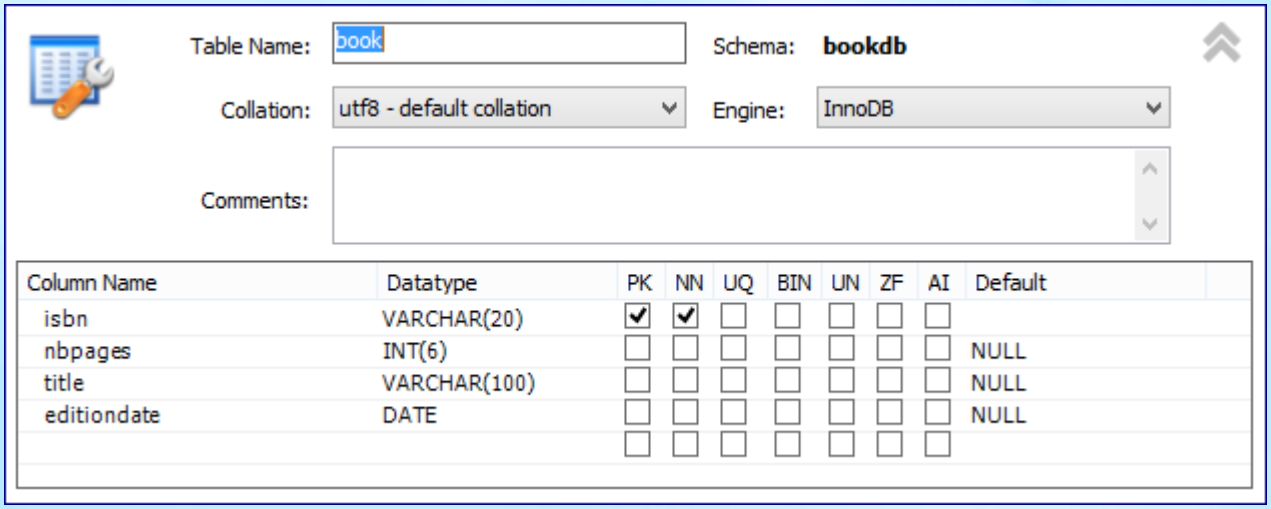


Entity Bean

- E.g, The MySQL ***Book*** table



Entity Bean




```
CREATE TABLE `book` (
  `isbn` varchar(20) NOT NULL,
  `nbpages` int(6) DEFAULT NULL,
  `title` varchar(100) DEFAULT NULL,
  `editiondate` date DEFAULT NULL,
  PRIMARY KEY (`isbn`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
```

Entity Bean

- A Entity Bean (or Entity class) is a POJO with
  - ***@Entity*** annotation
  - No-argument default constructor
    - But may have other constructors
  - Private persistent properties
    - ↳ Accessed through public getters and setters
  - Neither the class nor its methods nor its persistent instance variables declared final
  - The class declared Serializable if entities are transferred
    - E.g. through remote call

Entity Bean Annotations

- Annotation on Entity class
  - ***@Entity***
  - ***@Table*** **:** table in the database corresponding to the entity class
    - ***name*** attribute
- If no ***@Table***
  - The table name will be the class name

Entity Bean Annotations

- Annotation on instance variable (property)
  - ***@Id*** : identifier
  - ***@Column*** : column of the table corresponding to the property
    - ***name*** attribute

Entity Bean Annotations

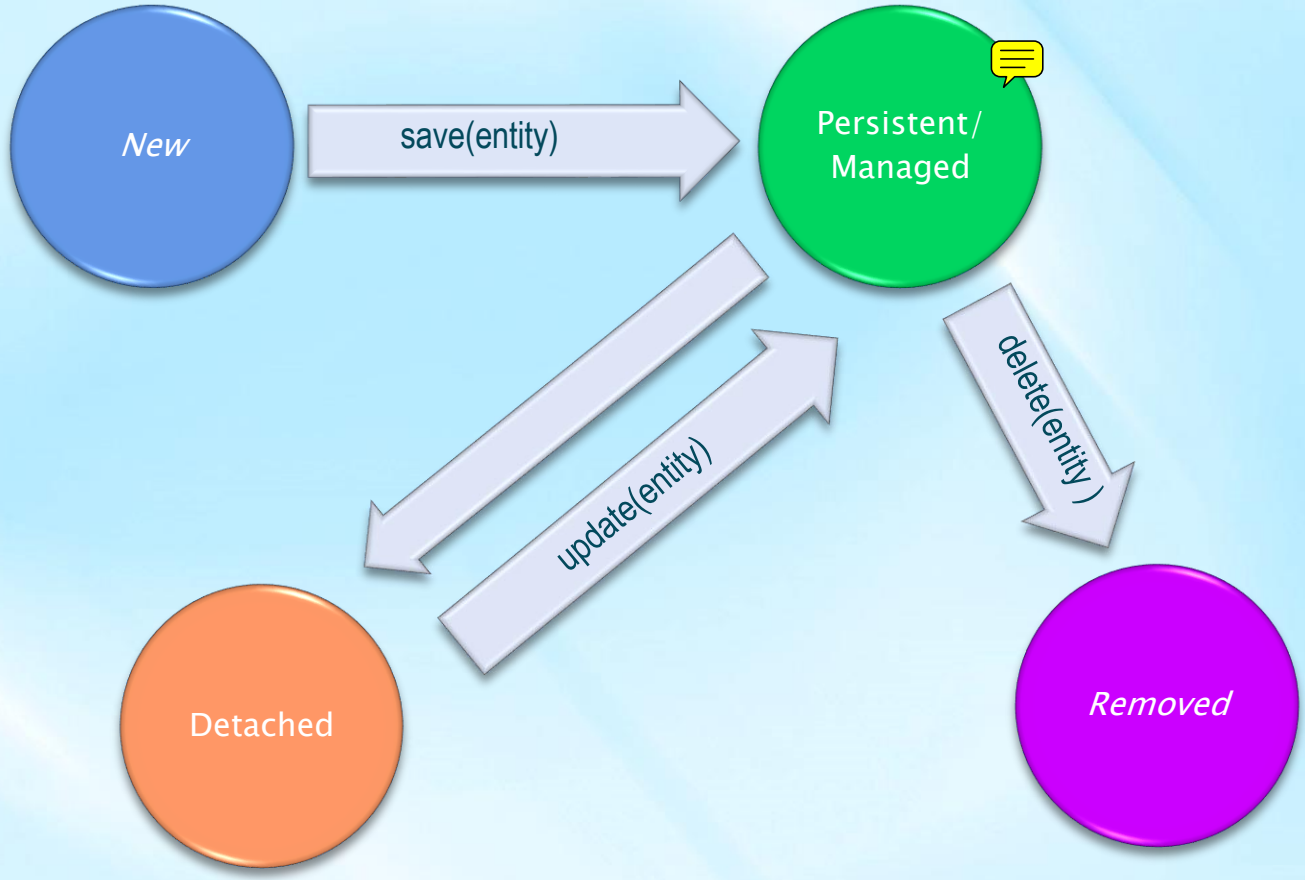
- E.g,

```
import javax.persistence.*;

@Entity
@Table(name="book")
public class BookEntity {

    @Id
    @Column(name="isbn")
    private String isbn;

    @Column(name="title")
    private String title;

    @Column(name="nbpages")
    private Integer nbPages;

    @Column(name="editiondate")
    private java.util.Date editionDate;
```

Entity Bean States

- Entity instances are managed by invoking operations on them
- Entity instances are in one of four states
  - New (transient)
  - Persistent (Managed)
  - Detached
  - Removed

Entity Bean States



Entity Bean States

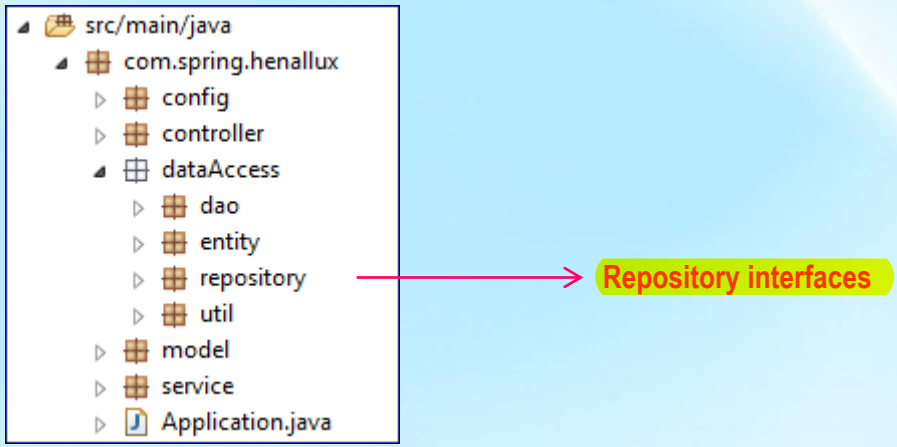
- New (transient)
  - New entity instances created (after call of the **new** operator)
  - New entity instance not mapped to any database table row
- Managed (persistent)
  - After call of the **save** method
  - Entity instance associated with database table row
- Detached
  - Entity instances manipulated by the client
  - Entity instances not currently mapped to any database table row
- Removed
  - After call of the **delete** method
  - Entity instance mapped to a database table row and scheduled for removal from the data store

Data Repository

- Spring Data repository abstraction
  - To significantly reduce the amount of boilerplate code required to implement data access layers for various persistence stores
- Interface created for each entity class containing access methods
  - **CRUD**
  - To create, locate, modify and delete entities in the database

Data Repository

- Create ***repository*** package in ***dataAccess*** package



Data Repository

Interface générique

- Create an interface extending ***JpaRepository<T,ID>***
  - *org.springframework.data.jpa.repository.JpaRepository*
- Arguments
  - T : The entity class to manage
  - ID :The id type of the entity class
- ***@Repository*** annotation

```
Les 2 arguments :
T => entity classe
ID => type de l'identifiant
```

Data Repository

- E.g,

```
import org.springframework.data.jpa.repository.JpaRepository;
import org.springframework.stereotype.Repository;
import com.spring.henallux.entity.BookEntity;

@Repository
public interface BookRepository extends JpaRepository<BookEntity, String>{
}
```

- N.B. *No implementation to write for the repository interface!*

Data Repository

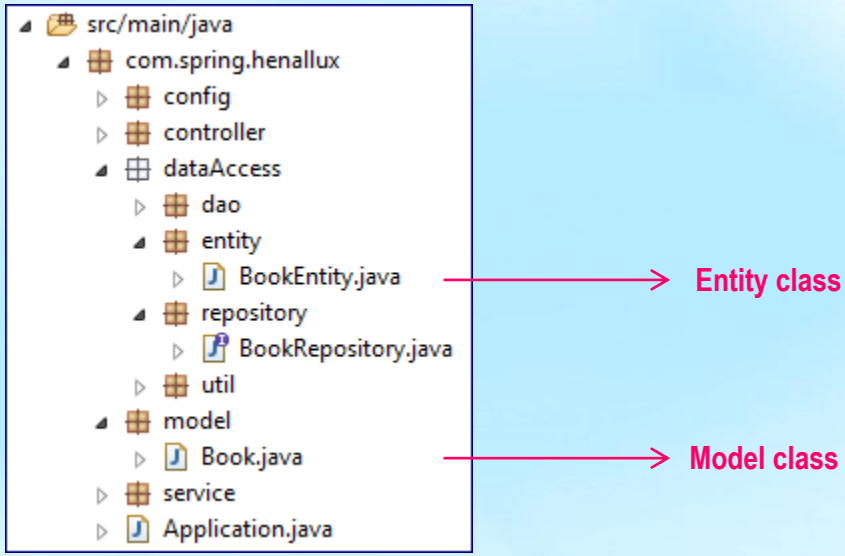
- Some of available methods (no need to implement!)
  - <S extends T> S **save**(S entity) `soit un objet de bookEntity ou une sous classe`
  - void **delete**(T entity)
  - T **findOne**(ID primaryKey)
  - List<T> **findAll**() `retourne une arrayList`
  - Long **count**() `nbr ligne dans la table`
  - boolean **exists**(ID primaryKey)

Entity Class <> Model Class

- In order to be reused in other applications and contexts, model classes should not be dependant of persistence choice
  - E.g, in another application, data could be persisted in xml files instead of relational databases
- Neither ***@Table*** nor ***@Column*** annotations on Model classes

  ⇨ Model classes ≠ Entity classes

Entity Class <> Model Class

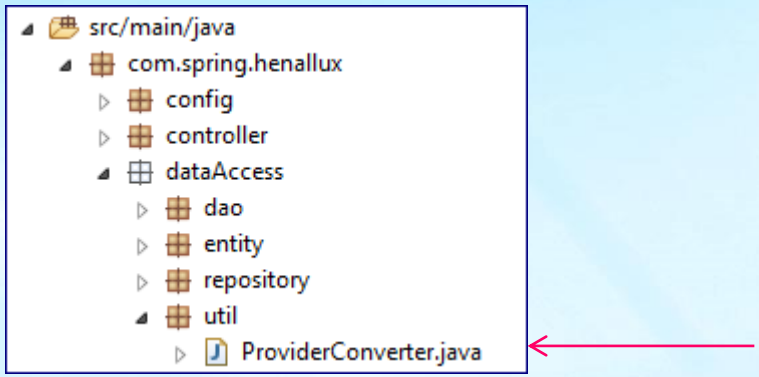


Entity Class <> Model Class

Model classes ≠ Entity classes

⇨ Create a ***util*** package in ***dataAccess*** package

- Containing Converter classes
  - To convert model objects to entity objects
  - To convert entity objects to model objects
  - Use ***@Component*** annotation



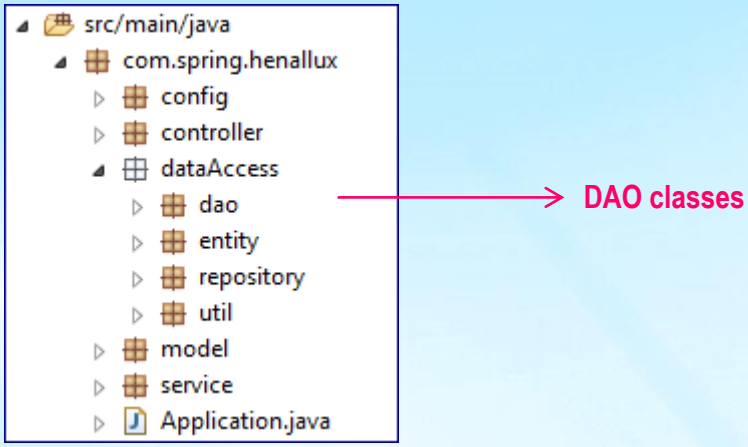
Entity Class <> Model Class

- E.g,

```
@Component
public class ProviderConverter {

    public BookEntity bookModeltoBookEntity(Book book) {
        BookEntity bookEntity = new BookEntity();
        bookEntity.setIsbn(book.getIsbn());
        bookEntity.setTitle(book.getTitle());
        bookEntity.setNbPages(book.getNbPages());
        bookEntity.setEditionDate(book.getEditionDate());
        return bookEntity;
    }

    public Book bookEntityToBookModel(BookEntity bookEntity) {
        Book book = new Book();
        book.setIsbn(bookEntity.getIsbn());
        book.setTitle(bookEntity.getTitle());
        book.setNbPages(bookEntity.getNbPages());
        book.setEditionDate(bookEntity.getEditionDate());
        return book;
    }
```

DAO Class

- Create a ***dao*** package in ***dataAccess*** package
- DAO classes contain methods to persist Model classes
  - Call of corresponding repository
    - Through bean injection
    - Use ***@Autowired***



DAO Class

- E.g,

```
@Service
public class BookDAO {

    @Autowired  Récupération des référence de ce qui est auto généré par srin
    private BookRepository bookRepository;

    @Autowired
    private ProviderConverter providerConverter;

    public Book save(Book book) {
        BookEntity bookEntity = providerConverter.bookModeltoBookEntity(book);
        bookEntity = bookRepository.save(bookEntity);
        return providerConverter.bookEntityToBookModel(bookEntity);
    }

    public ArrayList<Book> getAllBooks()
    {    List <BookEntity> bookEntities = bookRepository.findAll();
         ArrayList <Book> books = new ArrayList<>();
         for (BookEntity entity : bookEntities)
         {Book book= providerConverter.bookEntityToBookModel(entity);
         books.add(book);}
         return books;
    }
}
```

interface

Customized Query

- Additional queries can be generated in repository interface
  - By combining logical keywords and attribute names

Logical keyword	Keyword expressions
AND	And
OR	Or
AFTER	After, IsAfter
BEFORE	Before, IsBefore
CONTAINING	Containing, IsContaining, Contains
BETWEEN	Between, IsBetween
ENDING_WITH	EndingWith, IsEndingWith, EndsWith
EXISTS	Exists
FALSE	False, IsFalse
GREATER_THAN	GreaterThan, IsGreaterThan
GREATER_THAN_EQUALS	GreaterThanEqual, IsGreaterThanEqual
IN	In, IsIn
IS	Is, Equals, (or no keyword)

http://docs.spring.io/spring-data/jpa/docs/1.4.1.RELEASE/reference/html/jpa.repositories.html

Customized Query

- Continue

IS_NOT_NULL	NotNull, IsNotNull
IS_NULL	Null, IsNull
LESS_THAN	LessThan, IsLessThan
LESS_THAN_EQUAL	LessThanEqual, IsLessThanEqual
LIKE	Like, IsLike
NEAR	Near, IsNear
NOT	Not, IsNot
NOT_IN	NotIn, IsNotIn
NOT_LIKE	NotLike, IsNotLike
REGEX	Regex, MatchesRegex, Matches
STARTING_WITH	StartingWith, IsStartingWith, StartsWith
TRUE	True, IsTrue
WITHIN	Within, IsWithin

http://docs.spring.io/spring-data/jpa/docs/1.4.1.RELEASE/reference/html/jpa.repositories.html

Customized Query

- E.g,

And	findByLastnameAndFirstname	… where x.lastname = ?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
GreaterThan	findByAgeGreaterThan	… where x.age > ?1
After	findByStartDateAfter	… where x.startDate > ?1
Before	findByStartDateBefore	… where x.startDate < ?1
IsNull	findByAgeIsNull	… where x.age is null
IsNotNull,NotNull	findByAge(Is)NotNull	… where x.age not null
Like	findByFirstnameLike	… where x.firstname like ?1
NotLike	findByFirstnameNotLike	… where x.firstname not like ?1

http://docs.spring.io/spring-data/jpa/docs/1.4.1.RELEASE/reference/html/jpa.repositories.html

Customized Query

- E.g (continue),

OrderBy	findByAgeOrderByLastnameDesc	… where x.age = ?1 order by x.lastname desc
Not	findByLastnameNot	… where x.lastname <> ?1
In	findByAgeIn(Collection<Age> ages)	… where x.age in ?1
NotIn	findByAgeNotIn(Collection<Age> age)	… where x.age not in ?1
True	findByActiveTrue()	… where x.active = true
False	findByActiveFalse()	… where x.active = false

http://docs.spring.io/spring-data/jpa/docs/1.4.1.RELEASE/reference/html/jpa.repositories.html

Customized Query

- E.g (continue),

StartingWith	findByFirstnameStartingWith	… where x.firstname like ?1 (parameter bound with appended %)
EndingWith	findByFirstnameEndingWith	… where x.firstname like ?1 (parameter bound with prepended %)
Containing	findByFirstnameContaining	… where x.firstname like ?1 (parameter bound wrapped in %)

http://docs.spring.io/spring-data/jpa/docs/1.4.1.RELEASE/reference/html/jpa.repositories.html