Auto Generation of ID's - Sequences
(for databases that supports this, like Oracle and Derby)

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We can control how a Sequence is generated or map it to an existing sequence.

```
Class Book{
...
  @ID
  @GeneratedValue(strategy = GenerationType.SEQUENCE,generator="s1")
  @SequenceGenerator(name="s1",sequenceName = "My_SEQ",
                          initialValue = 200000,allocationSize = 1)
```

These annotations will:

- **Create a sequence as sketched below, if we are creating tables from Entities**
- **Map to the existing sequence if we are creating Entities from tables**

Table Create Script

```
DROP SEQUENCE My_SEQ RESTRICT;
CREATE SEQUENCE My_SEQ START WITH 200000 INCREMENT BY 1;
```

Auto Generation of ID's - Tables

All databases can use a separate Table as their strategy to provide a "next id" value

This is usually the default when you select: **`GenerationType.AUTO`**

```
Class Book{
...
  @Id
  @GeneratedValue(strategy = GenerationType.TABLE,generator="s1")
  @TableGenerator(name="s1",table = "My_SEQ",
  initialValue = 200000,allocationSize = 50)
```

These annotations will:

- **Create a table for auto id's if we are creating tables from Entities**
- **Map to the existing table if we are creating Entities from tables**

Auto Generation of ID's - IDENTITY

MySQL does not provide **Sequences** to generate a unique value for new Rows.
MySQL provides a construct AUTO_INCREMENT as sketched below:

```
CREATE TABLE Persons
(
  ID int NOT NULL AUTO_INCREMENT,
  Name varchar(80),
  PRIMARY KEY (ID)
)
```

This is how you Signal JPA to use this strategy for automatic key generation:

```
@GeneratedValue(strategy = GenerationType.IDENTITY)
 private Integer id;
```

There is no way, as for the other two strategies, to provide a start value and allocation size via JPA.
Se exercises for an example script you can use to insert data without conflicting with JPA.

Composite Primary Keys

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Composite primary keys can be defined in two ways:

Using an **Id Class**

```
@Entity @IdClass(ProjectId.class)
public class Project {
    @Id int departmentId;
    @Id long projectId;
     :
}

Class ProjectId {
    int departmentId;
    long projectId;
}
```

Using an **Embeddable Class**

```
@Entity
public class Project {
  @EmbeddedId ProjectId id;
     :
}
@Embeddable
Class ProjectId {
    int departmentId;
    long projectId;
}
```

The main purpose of both the `IdClass` and the `Embeddable` Class is to be used as the structure passed to the `EntityManager find()` and `getReference()` AP

Date Time and Transient Properties

```
@Temporal(TemporalType.DATE)
private Date dateOfBirth;

@Temporal(TemporalType.TIMESTAMP)
private Date creationDate;

@Transient
private int age;
```

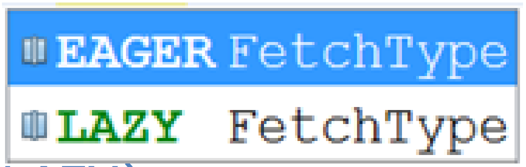
Enums

```
public enum CustomerType {
  GOLD,
  SILVER,
  IRON,
  RUSTY
}
```

```
      public class Customer {
        ...
        @Enumerated(EnumType.STRING)
        private CustomerType customerType;

      }
```

Collections and Maps of Basic Types


EAGER FetchType
LAZY FetchType

```
@ElementCollection(fetch = FetchType.LAZY)
private List<String> hobbies= new ArrayList();


@ElementCollection(fetch = FetchType.LAZY)
@MapKeyColumn(name = "PHONE")
@Column(name = "Description")  //Name of the Value column
private Map<String, String> phones = new HashMap();
```