Hibernate Mapping

Lesson Objectives

1. Understand the basic annotations be used in hibernate.
2. Understand the type of hibernate relationship.
3. Able to use annotation in hibernate mapping.
4. Understand the Composite key and how to implement it.
5. Able to distinguish Lazy loading and Eager loading.

Agenda

- Basic Annotations
- Hibernate Relationships
- Collection Mapping
- Lazy loading and Eager loading

Lecture 01

BASIC ANNOTATIONS

Annotations

- **@Entity**: marks a class as an entity bean.
- **@Table:** allows you to specify the details of the table that will be used to persist the entity in the database.
  - ✓ **catalog, schema:** catalogs and schemas are "namespaces" that you define on the server side of the database. Some databases contains schemas, some contains catalogs, and some contains both.
  - ✓ **indexes** = { @Index(name = "IDX_MYIDX1", columnList = "id, name,surname") }
  - ✓

```
uniqueConstraints = {@UniqueConstraint(columnNames = "stock_name"),
                     @UniqueConstraint(columnNames = "stock_code") }
```

- **@Id**: each entity bean will have a primary key, which you annotate on the class with the **@Id** annotation.

Annotations

- **@GeneratedValue**: Let database generate (auto-increment) the id column.
  - ✓ **strategy** = GenerationType.***IDENTITY***
  - ✓ **strategy** = GenerationType.**AUTO**
  - ✓ **generator** uses **sequences object** if they're supported by our database, and switches to table generation if they aren't.
- **@Column**: used to specify the details of the column to which a field or property will be mapped.
  - ✓ **name** attribute permits the name of the column to be explicitly specified.
  - ✓ **length** attribute permits the size of the column used to map a value particularly for a String value.
  - ✓ **columndefinition**: defines a column include data type, null or not.

Ex:
```
@Column(name = "price_open", columnDefinition = "NUMERIC(12,2) NULL",
                                                 unique = false, nullable = true)
```

Annotations

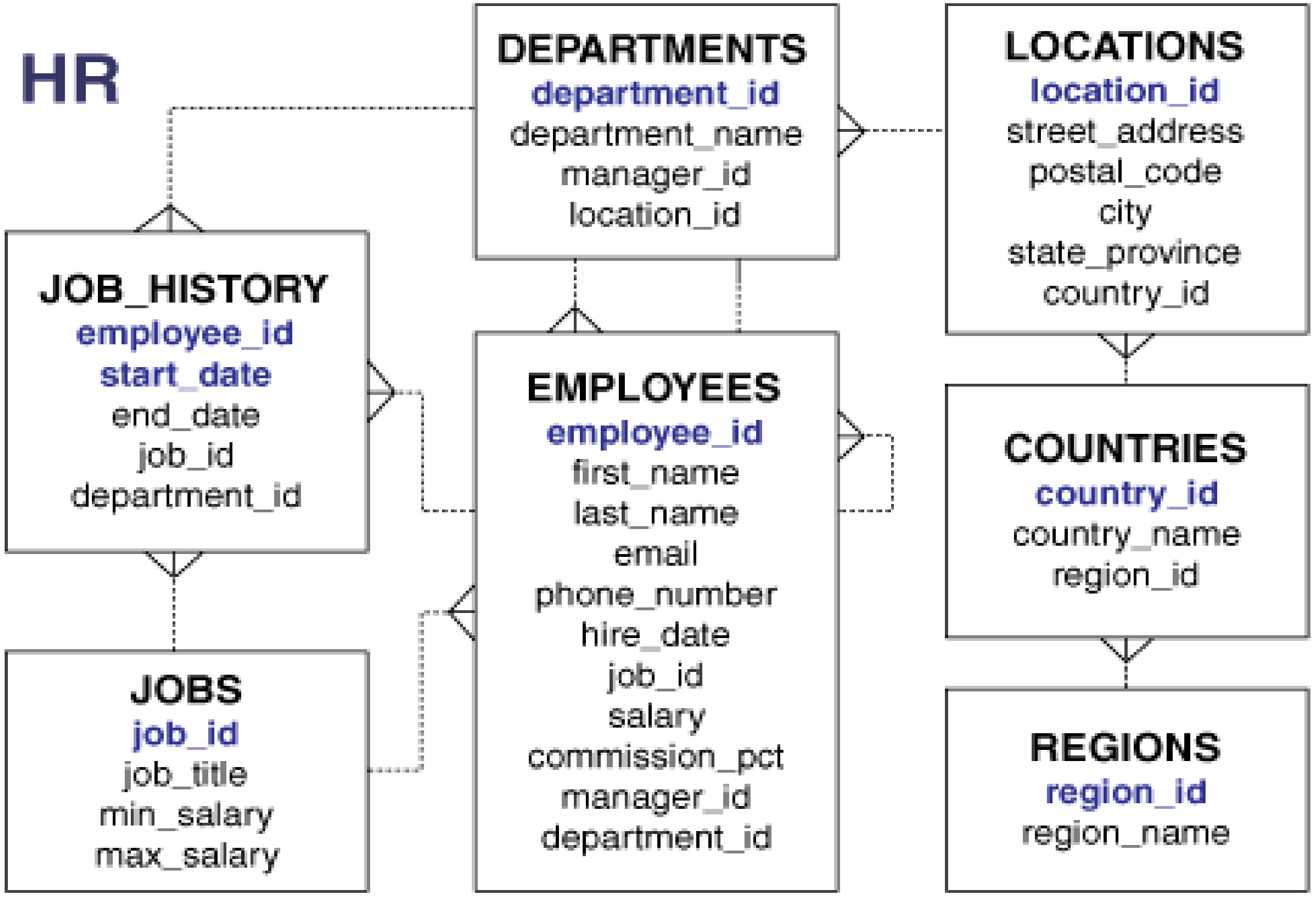
- **@Temporal**: This annotation must be specified for persistent fields or properties of type **java.util.Date** and **java.util.Calendar**. It may only be specified for fields or properties of these types.

  Ex:
  ```
  @Temporal(TemporalType.DATE)
  private java.util.Date creationDate;
  ```

- **@OrderBy:** Sort your data using @OrderBy annotation. In example below, it will sort all contacts in a company by their firstname in ascending order.

  Ex:
  ```
  @OrderBy("first_name ASC")
  private Set<Contact> contacts; // first_name
  ```

Database sample

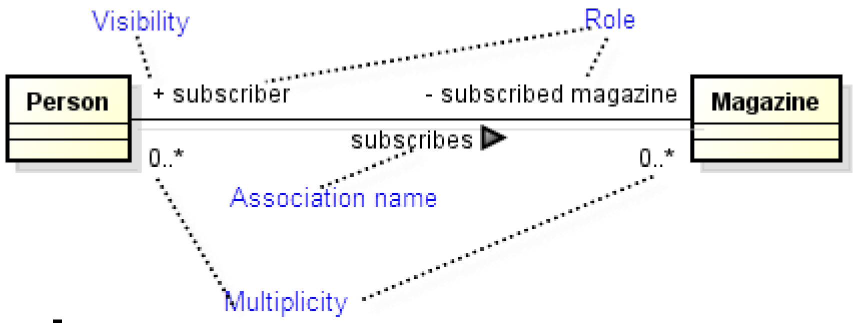


Section 02

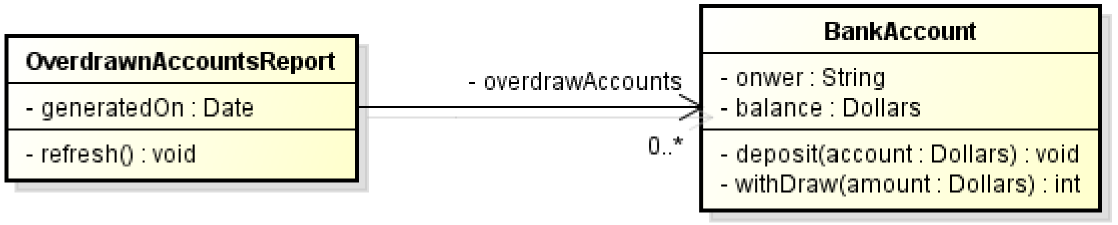
HIBERNATE RELATIONSHIPS

Association Relationship

- Represents the static relationship shared among the objects of two classes.
- **Bi-directional:**
  - ✓ both classes are aware of each other and their relationship

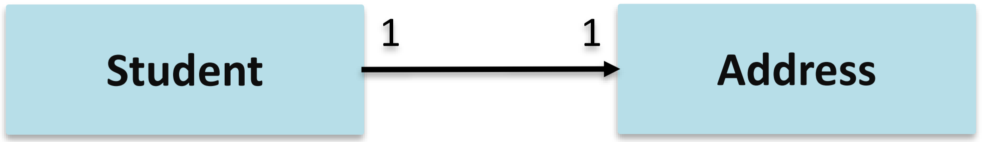


- **Uni-directional:**
  - ✓ two classes are related, but only one class knows that the relationship exists (overdrawn: thấu chi, counselor: nhân viên)

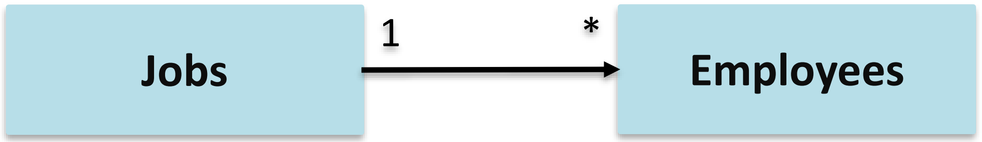


Association Relationship

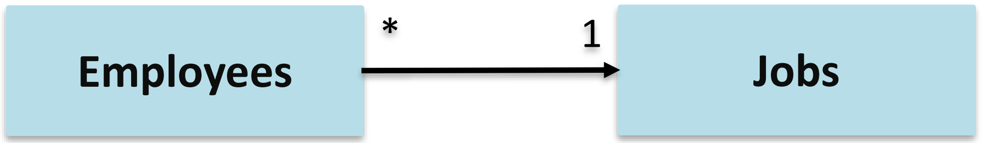
- **Hibernate mapping** is one of the essential features of Hibernate: “*how the objects of persistent classes are associated with each other*”. Hibernate provides four types of association mapping:
  - ✓ One To One



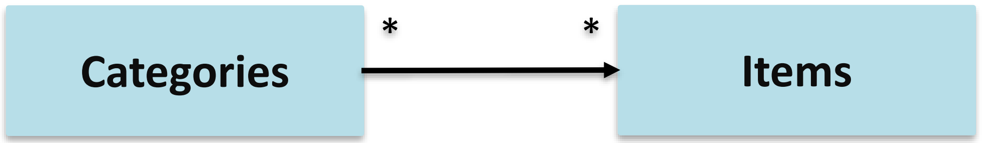
  - ✓ One To Many



  - ✓ Many To One

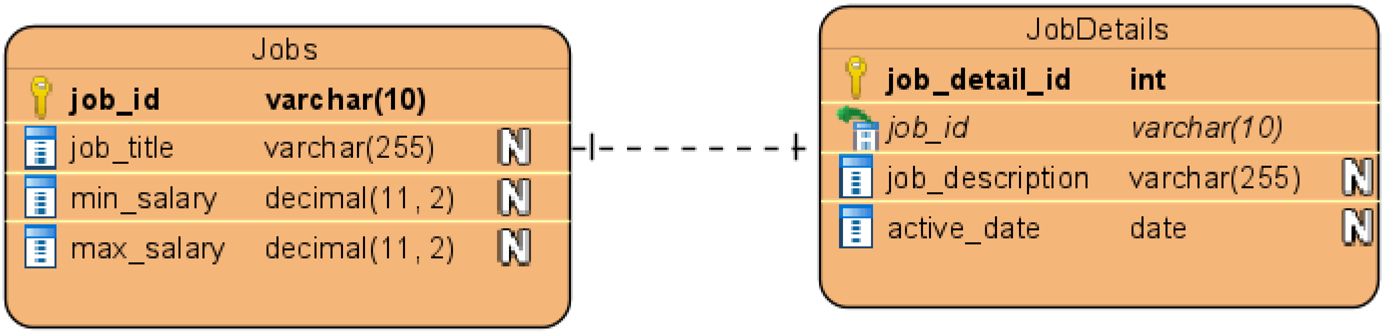


  - ✓ Many To Many



One-to-One Mapping Annotation
@JoinColumn

- The most widely used and uses a **foreign key column in one of the tables**.
- Use **@OneToOne** **mappedBy** and **@JoinColumn** & attribute when foreign key is held by one of the entities.
- **Example**:



```
@OneToOne(mappedBy = "job")
private JobDetails jobDetail;
```

```
@OneToOne
@JoinColumn(name = "job_id")
private Jobs job;
```

One-to-One Mapping Annotation

@JoinColumn

```
@Entity
@Table(schema = "dbo", name = "Jobs",
      indexes = {@Index(columnList = "job_id, job_title", name = "IDX_ID_TITLE") })
public class Jobs {

    @Id
    @Column(name = "job_id", length = 10)
    private String jobId;

    @Column(name = "job_title", length = 255, nullable = false, unique = true)
    private String jobTitle;

    @Column(name = "min_salary", precision = 11, scale = 2)
    private double minSalary;

    @Column(name = "max_salary", precision = 11, scale = 2)
    private double maxSalary;

    @OneToOne(mappedBy = "job")
    private JobDetails jobDetail;

    public Jobs() {

    }

    // Constructors with params
    // getter and setter methods
    public JobDetails getJobDetail() {
        return jobDetail;
    }

    public void setJobDetails(JobDetails jobDetail) {
        this.jobDetail = jobDetail;
    }
}
```

One-to-One Mapping Annotation

@JoinColumn

```
@Entity
@Table(name = "JobDetails", schema = "dbo")
public class JobDetails {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    @Column(name = "job_detail_id")
    private int jobDetailId;

    @Column(name = "job_description", length = 255)
    private String jobDescription;

    @Column(name = "active_date")
    private LocalDate activeDate;

    @OneToOne
    @JoinColumn(name = "job_id", referencedColumnName = "job_id")
    private Jobs job;

    public JobDetails() {

    }

    // Constructors with params
    // getter and setter methods

    public Jobs getJob() {
        return job;
    }

    public void setJob(Jobs job) {
        this.job = job;
    }
}
```

One-to-One Mapping Annotation

@JoinColumn

- "cascade" attribute: An entity defines "cascade=CascadeType.ALL" and it essentially means that any change happened on Jobs must cascade to JobDetails as well.
  - ✓ If you save a Job, then a JobDetail will also be saved into database.
  - ✓ If you delete a Job then a JobDetail associated with that Job also be deleted.
- If we only want to cascade one of operations, then we can use one of cascade types as below:
  1. **CascadeType.PERSIST** : cascade type `presist` means that save() or persist() operations cascade to related entities.
  2. **CascadeType.MERGE** : cascade type `merge` means that related entities are merged when the owning entity is merged.
  3. **CascadeType.REFRESH** : cascade type `refresh` does the same thing for the refresh() operation.
  4. **CascadeType.REMOVE** : cascade type `remove` removes all related entities association with this setting when the owning entity is deleted.
  5. **CascadeType.DETACH** : cascade type `detach` detaches all related entities if a "manual detach" occurs.
  6. **CascadeType.ALL** : cascade type `all` is shorthand for all of the above cascade operations.

One-to-One Mapping Annotation
@JoinColumn

- Update Jobs class:

```
@Entity
@Table(schema = "dbo", name = "Jobs",
      indexes = {@Index(columnList = "job_id, job_title", name = "IDX_ID_TITLE") })
public class Jobs {

    // …

    @OneToOne(cascade = CascadeType.ALL, mappedBy = "job")
    private JobDetails jobDetail;

    public Jobs() {

    }

    // Constructors with params
    // getter and setter methods

    public JobDetails getJobDetail() {
        return jobDetail;
    }

    public void setJobDetails(JobDetails jobDetail) {
        this.jobDetail = jobDetail;
    }
}
```

One-to-One Mapping Annotation

@JoinColumn

- Create a JobDao class:

```java
public class JobDaoImpl implements JobDao {

    @Override
    public boolean save(Jobs job) throws Exception {
        Session session = null;
        Transaction transaction = null;

        try {
            session = HibernateUtils.getSessionFactory().openSession();
            transaction = session.beginTransaction();

            Serializable result = session.save(job);

            transaction.commit();

            return (result != null);

        } finally {
            if (session != null) {
                session.close();
            }
        }
    }
}
```

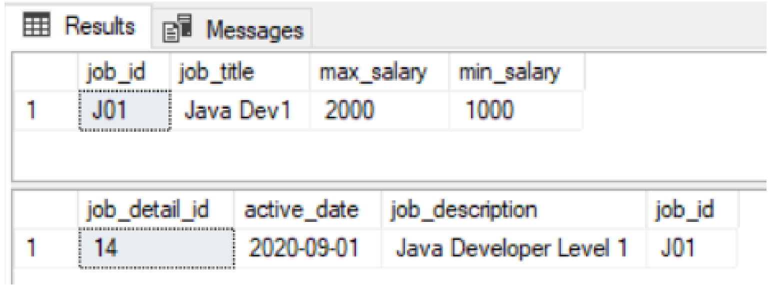
One-to-One Mapping Annotation

@JoinColumn

```java
class JobDaoTest {
    static JobDao jobDao;

    @BeforeAll
    static void setUpBeforeClass() throws Exception {
        jobDao = new JobDaoImpl();
    }

    @Test
    void testSave1() throws Exception {
        JobDetails jobDetail = new JobDetails("Java Developer Level 1", LocalDate.of(2020, 9, 1));
        Jobs job = new Jobs("J01", "Java Dev1", 1000, 2000);

        job.setJobDetails(jobDetail);
        jobDetail.setJob(job);

        assertEquals(true, jobDao.save(job));
    }
}
```

```
Oct 05, 2020 10:16:35 AM org.hibernate.engine.transaction.jta.platform.internal.JtaPlatformInitiator initiateService
INFO: HHH000490: Using JtaPlatform implementation: [org.hibernate.engine.transaction.jta.platform.internal.NoJtaPlatform]
Hibernate: select next value for hibernate_sequence
Hibernate: insert into dbo.Jobs (job_title, max_salary, min_salary, job_id) values (?, ?, ?, ?)
Hibernate: insert into dbo.JobDetails (active_date, job_id, job_description, job_detail_id) values (?, ?, ?, ?)
```

Results:


Results | Messages

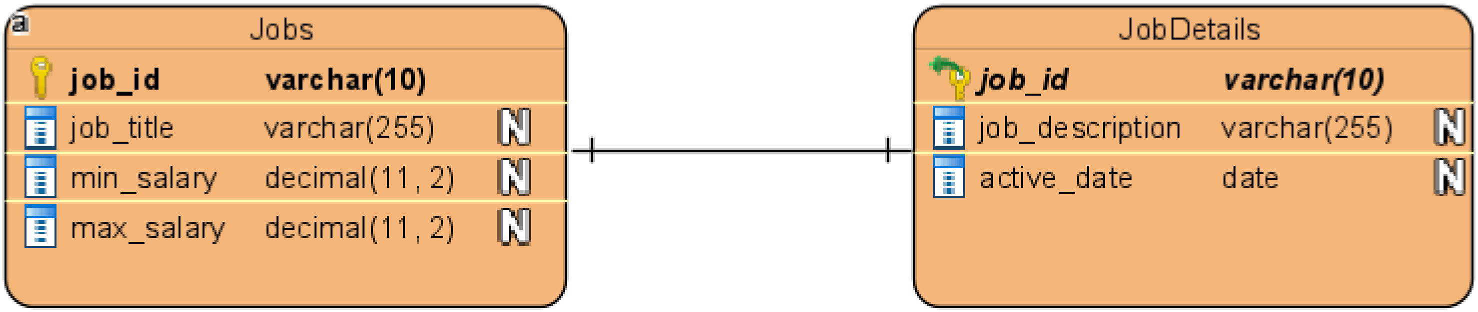
	job_id	job_title	max_salary	min_salary
1	J01	Java Dev1	2000	1000

	job_detail_id	active_date	job_description	job_id
1	14	2020-09-01	Java Developer Level 1	J01

One-to-One Mapping Annotation

@PrimaryKeyJoinColumn

- A technique is something new which uses a **common primary key value in both the tables**.
- Use **@OneToOne mappedBy and @PrimaryKeyJoinColumn** for associated entities sharing the same primary key.
- **Example**:



```
@OneToOne
@PrimaryKeyJoinColumn
private JobDetails jobDetail;
```

```
@OneToOne(mappedBy = "userDeta
private Jobs job;
```

One-to-One Mapping Annotation

@PrimaryKeyJoinColumn

```java
@Entity
@Table(schema = "dbo", name = "Jobs", indexes = {@Index(columnList = "job_id, job_title", name = "IDX_ID_TITLE") })
public class Jobs {

    @Id
    @Column(name = "job_id", length = 10)
    private String jobId;

    @Column(name = "job_title", length = 255, nullable = false, unique = true)
    private String jobTitle;

    @Column(name = "min_salary", precision = 11, scale = 2)
    private double minSalary;

    @Column(name = "max_salary", precision = 11, scale = 2)
    private double maxSalary;

    @OneToOne (cascade = CascadeType.ALL)
    @PrimaryKeyJoinColumn
    private JobDetails jobDetail;

    public Jobs() {

    }
    // Constructors with params
    // getter and setter methods
    public JobDetails getJobDetail() {
        return jobDetail;
    }

    public void setJobDetails(JobDetails jobDetail) {
        this.jobDetail = jobDetail;
    }
}
```

One-to-One Mapping Annotation

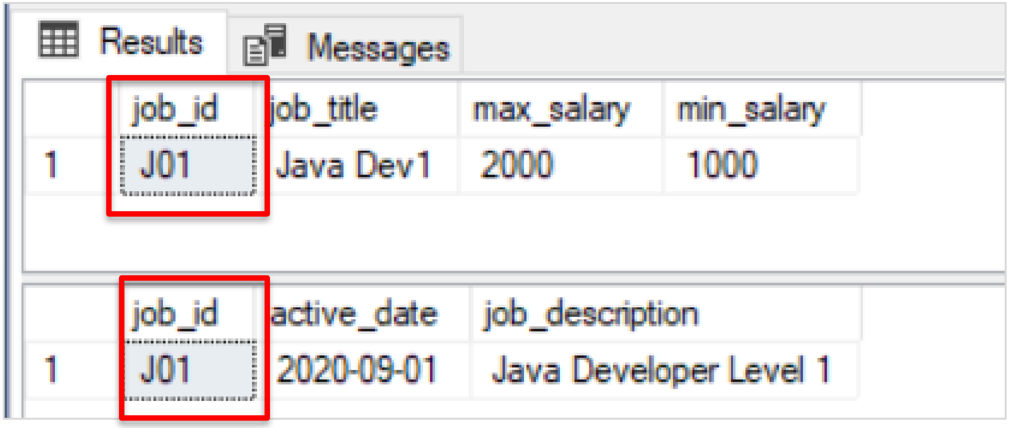
@PrimaryKeyJoinColumn

```java
@Entity
@Table(name = "JobDetails", schema = "dbo")
public class JobDetails {
    @Id
    @GeneratedValue(generator = "foreigngen")
    @GenericGenerator(parameters = {
            @Parameter(name = "property", value = "job") }, strategy = "foreign", name = "foreigngen")
    @Column(name = "job_id")
    private String jobDetailId;

    @Column(name = "job_description", length = 255)
    private String jobDescription;

    @Column(name = "active_date")
    private LocalDate activeDate;

    @OneToOne(mappedBy = "jobDetail")
    private Jobs job;

    public JobDetails() {
    }
    // Constructors with params
    // getter and setter methods

    public Jobs getJob() {
        return job;
    }

    public void setJob(Jobs job) {
        this.job = job;
    }
}
```

One-to-One Mapping Annotation

@PrimaryKeyJoinColumn

- Re-run the above test case script, we get the following result:



Results | Messages

	job_id	job_title	max_salary	min_salary
1	J01	Java Dev1	2000	1000

	job_id	active_date	job_description
1	J01	2020-09-01	Java Developer Level 1

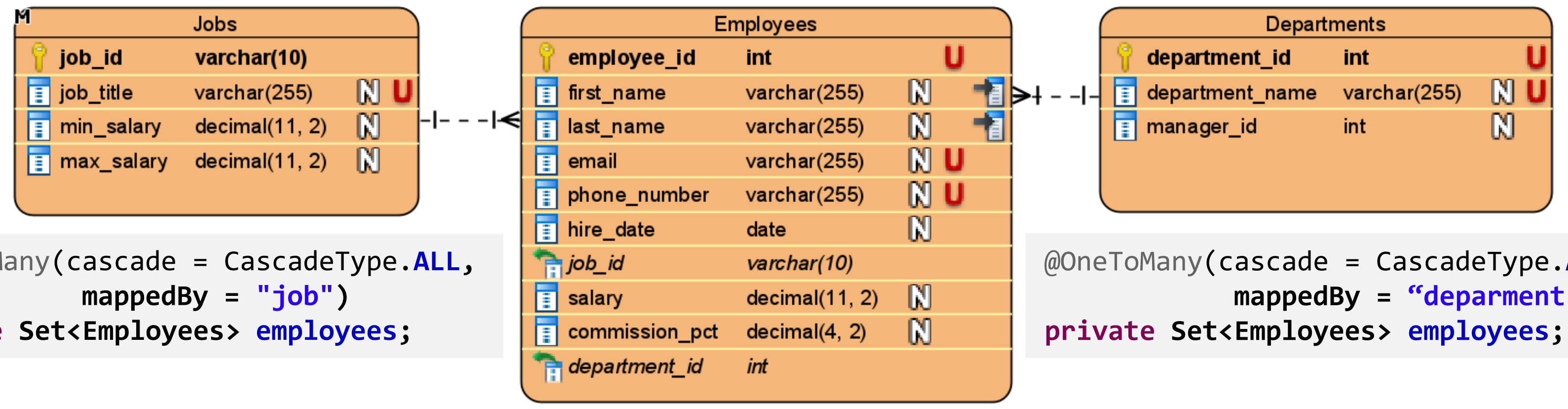
Section 03

COLLECTION MAPPING

One-to-Many Mapping Annotation

@JoinColumn

- The most widely used and uses a **foreign key column in one of the tables**.
- Use **@OneToOne** **mappedBy** and **@JoinColumn** & attribute when foreign key is held by one of the entities.
- **Example**:



Jobs

job_id	varchar(10)		
job_title	varchar(255)	N	U
min_salary	decimal(11, 2)	N	
max_salary	decimal(11, 2)	N	

Employees

employee_id	int		U
first_name	varchar(255)	N	
last_name	varchar(255)	N	
email	varchar(255)	N	U
phone_number	varchar(255)	N	U
hire_date	date	N	
job_id	*varchar(10)*		
salary	decimal(11, 2)	N	
commission_pct	decimal(4, 2)	N	
department_id	*int*		

Departments

department_id	int		U
department_name	varchar(255)	N	U
manager_id	int	N	

```
@OneToMany(cascade = CascadeType.ALL,
           mappedBy = "job")
private Set<Employees> employees;
```

```
@OneToMany(cascade = CascadeType.ALL,
           mappedBy = “deparment")
private Set<Employees> employees;
```

```
@ManyToOne
@JoinColumn(name = "job_id", columnDefinition = "job_id",
            referencedColumnName = "job_id")
private Jobs job;
```

One-to-Many Mapping Annotation
@JoinColumn

- Update Jobs class:

```java
@Entity
@Table(schema = "dbo", name = "Jobs", indexes = {
        @Index(columnList = "job_id, job_title", name = "IDX_ID_TITLE") })
public class Jobs {
    // …

    @OneToMany(cascade = CascadeType.ALL, mappedBy = "job")
    private Set<Employees> employees;

    public Set<Employees> getEmployees() {
        return employees;
    }

    public void setEmployees(Set<Employees> employees) {
        this.employees = employees;
    }
}
```

One-to-Many Mapping Annotation
@JoinColumn

```
@Entity
@Table(name = "Employees", schema = "dbo", indexes =
       {@Index(columnList = "first_name, last_name",
       name = "IDX_EMP_NAME") })
public class Employees {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    @Column(name = "employee_id")
    private int employeeId;

    @Column(name = "firstName", length = 255, nullable = false)
    private String first_name;

    @Column(name = "lastName", length = 255, nullable = false)
    private String last_name;

    @Column(name = "email", length = 255, unique = true)
    private String email;

    @Column(name = "phone_number", length = 255, unique = true)
    private String phoneNumber;

    @Column(name = "hire_date")
    private LocalDate hireDate;

    private double salary;

    @Column(name = "commission_pct")
    private double commissionPct;

    @ManyToOne
    @JoinColumn(name = "job_id", columnDefinition = "job_id",
                referencedColumnName = "job_id")
    private Jobs job;

    public Employees() {

    }
```

```
    public Jobs getJob() {
        return job;
    }

    public void setJob(Jobs job) {
        this.job = job;
    }
}
```

One-to-Many Mapping Annotation

@JoinColumn

❖ Create a EmployeeDaoImpl class:

```
public class EmployeeDaoImpl implements EmployeeDao{

    @Override
    public boolean save(Employees employee) throws Exception {
        Session session = null;
        Transaction transaction = null;

        try {
            session = HibernateUtils.getSessionFactory().openSession();
            transaction = session.beginTransaction();

            Serializable result = session.save(employee);

            transaction.commit();

            return (result != null);

        } finally {
            if (session != null) {
                session.close();
            }
        }
    }

}
```

One-to-Many Mapping Annotation
@JoinColumn

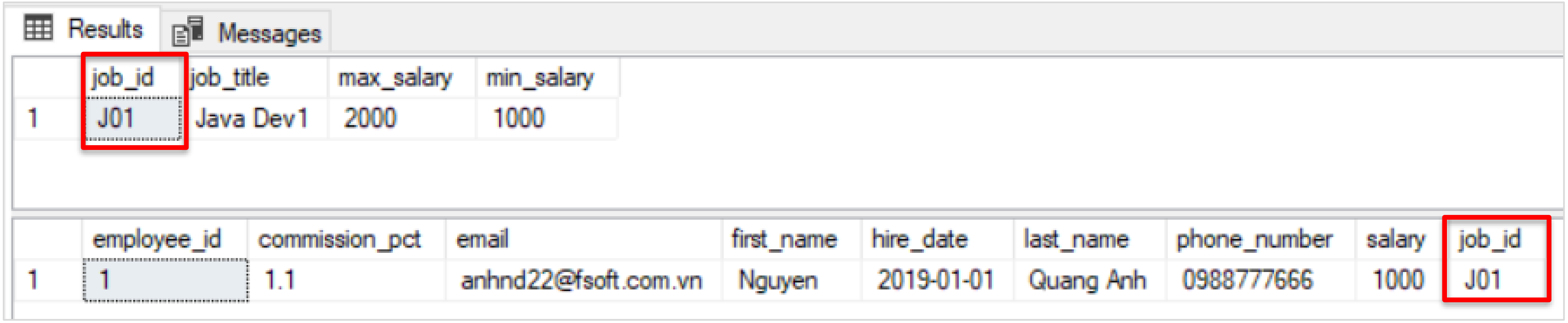
- Create a Unit Test Script to test the above EmployeeDaoImpl class:

```
class EmployeeDaoTest {
    static EmployeeDao employeeDao;

    @BeforeAll
    static void setUpBeforeClass() throws Exception {
        employeeDao = new EmployeeDaoImpl();
    }

    @Test
    void testSave() throws Exception {
        Employees employee = new Employees("Nguyen", "Quang Anh",
                "anhnd22@fsoft.com.vn", "0988777666", LocalDate.of(2019, 1, 1), 1000, 1.1);

        employee.setJob(job);

        assertTrue(employeeDao.save(employee));

    }

}
```

One-to-Many Mapping Annotation

@JoinColumn

❖ Results:



Results | Messages

	job_id	job_title	max_salary	min_salary
1	J01	Java Dev1	2000	1000

	employee_id	commission_pct	email	first_name	hire_date	last_name	phone_number	salary	job_id
1	1	1.1	anhnd22@fsoft.com.vn	Nguyen	2019-01-01	Quang Anh	0988777666	1000	J01

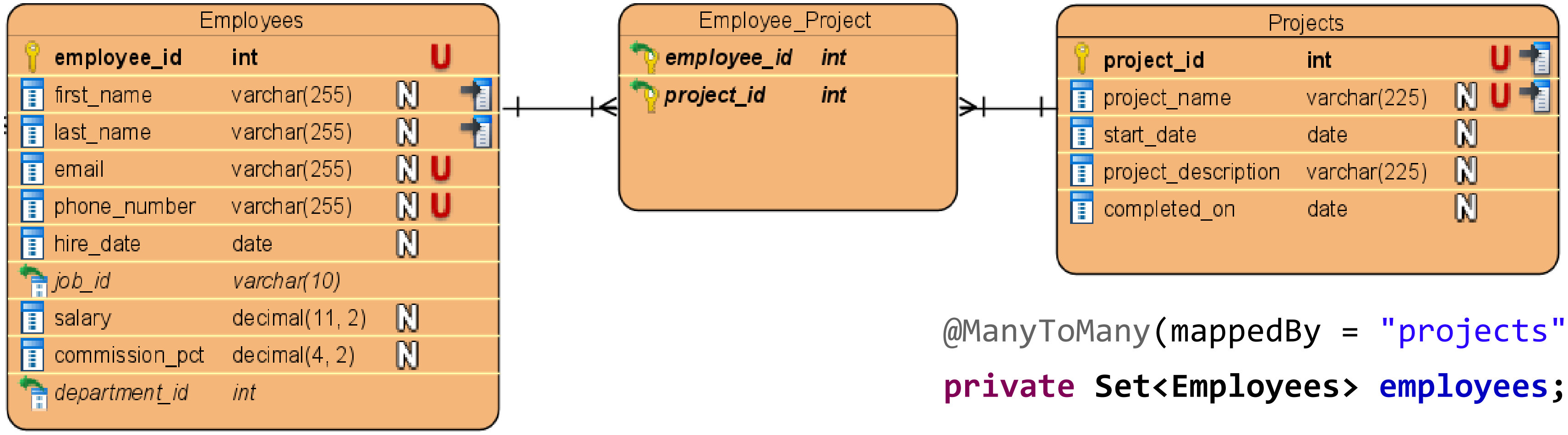
❖ Console:

```
Hibernate: create table dbo.Employees (employee_id int identity not null, commission_pct double precision, email varchar(255), first_name va
last_name varchar(255) not null, phone_number varchar(255), salary double precision not null, job_id varchar(10), primary key (employee_id))
Hibernate: create index IDX_EMP_NAME on dbo.Employees (first_name, last_name)
Hibernate: alter table dbo.Employees drop constraint UK_76snkombmttoxvdljjqo42mmc
Hibernate: alter table dbo.Employees add constraint UK_76snkombmttoxvdljjqo42mmc unique (email)
Hibernate: alter table dbo.Employees drop constraint UK_ivjoyqecd8hc1w4411q70eqri
Hibernate: alter table dbo.Employees add constraint UK_ivjoyqecd8hc1w4411q70eqri unique (phone_number)
Hibernate: alter table dbo.Employees add constraint FKsrmrlbhpjhvfet64uvyt0j7cw foreign key (job_id) references dbo.Jobs
Oct 05, 2020 11:34:00 AM org.hibernate.engine.transaction.jta.platform.internal.JtaPlatformInitiator initiateService
INFO: HHH000490: Using JtaPlatform implementation: [org.hibernate.engine.transaction.jta.platform.internal.NoJtaPlatform]
Hibernate:     select jobs_.job_id, jobs_.job_title as job_titl2_2_, jobs_.max_salary as max_sala3_2_, jobs_.min_salary as min_sala4_2_
               from dbo.Jobs jobs_ where jobs_.job_id=?
Hibernate:     insert into dbo.Employees (commission_pct, email, first_name, hire_date, job_id, last_name, phone_number, salary)
               values (?, ?, ?, ?, ?, ?, ?, ?)
```

Many-to-Many Mapping Annotation

@JoinTable

- To map a many-to-many association, we use the *@ManyToMany*, *@JoinTable* and *@JoinColumn* annotations.



```
@ManyToMany(mappedBy = "projects")
private Set<Employees> employees;
```

```
@ManyToMany(cascade = CascadeType.ALL)
@JoinTable(name = "Employee_Project", schema = "dbo",
        joinColumns = {@JoinColumn(referencedColumnName = "employee_id") },
        inverseJoinColumns = { @JoinColumn(
                                  referencedColumnName = "project_id") })
private Set<Projects> projects;
```

Many-to-Many Mapping Annotation

@JoinTable

❖ Update Employees class:

```
@Entity
@Table(name = "Employees", schema = "dbo", indexes = {
        @Index(columnList = "first_name, last_name", name = "IDX_EMP_NAME") })
public class Employees {
    // …

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    @Column(name = "employee_id")
    private int employeeId;

    @ManyToMany(cascade = CascadeType.ALL)
    @JoinTable(name = "Employee_Project", schema = "dbo",
           joinColumns = { @JoinColumn(referencedColumnName = "employee_id") },
           inverseJoinColumns = { @JoinColumn(referencedColumnName = "project_id") })
    private Set<Projects> projects;

    public Set<Projects> getProjects() {
        return projects;
    }

    public void setProjects(Set<Projects> projects) {
        this.projects = projects;
    }
   // …
   // Constructors with params (if need)
   // getter and setter methods
}
```

Many-to-Many Mapping Annotation
@JoinTable

- Create Projects class:

```
@Entity
@Table(name = "Projects", schema = "dbo")
public class Projects {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    @Column(name = "project_id")
    private int projectId;

    @Column( name = "project_name", length = 255,
             nullable = false, unique = true)
    private String projectName;

    @Column(name = "start_date")
    private LocalDate startDate;

    @Column(name = "project_description")
    private String projectDescription;

    @Column(name = "completed_on")
    private LocalDate completedOn;

    @ManyToMany(cascade = CascadeType.ALL, mappedBy = "projects")
    private Set<Employees> employees;
```

```
    public Projects() {

    }

   // Constructors with params (if need)
   // getter and setter methods

    public Set<Employees> getEmployees() {
        return employees;
    }

    public void setEmployees(Set<Employees> employees) {
        this.employees = employees;
    }
}
```

Many-to-Many Mapping Annotation
@JoinTable

❖ Create class ProjectDaoImpl:

```
public class ProjectDaoImpl implements ProjectDao {

    @Override
    public boolean save(Projects project) {
        Session session = null;
        Transaction transaction = null;

        try {
            session = HibernateUtils.getSessionFactory().openSession();
            transaction = session.beginTransaction();
            Serializable result = session.save(project);
            transaction.commit();

            return (result != null);

        } finally {
            if (session != null) {
                session.close();
            }
        }
    }

}
```

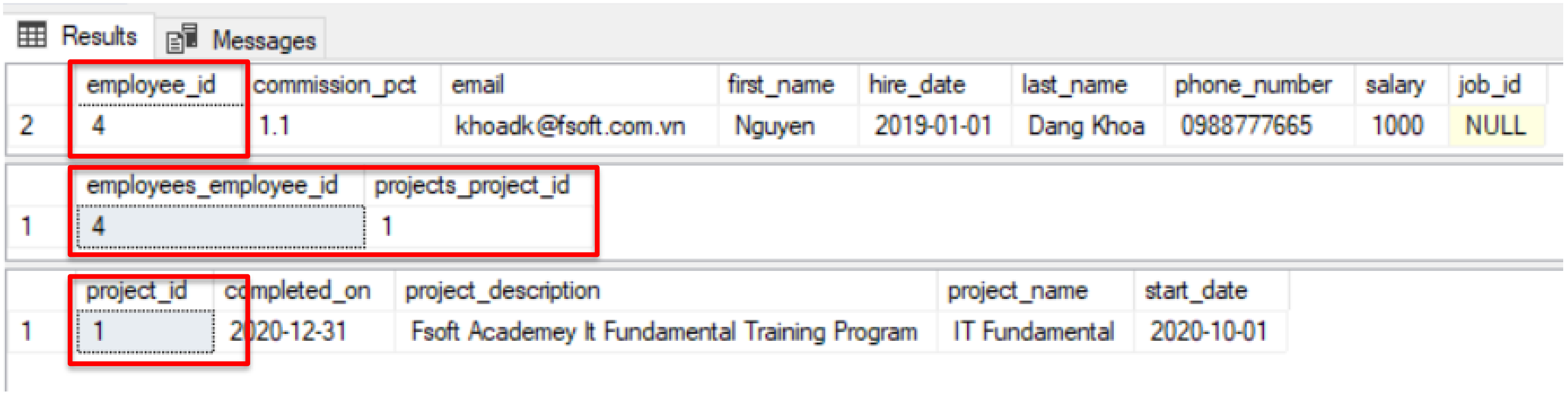
Many-to-Many Mapping Annotation
@JoinTable

- Create a Unit Test Script to test the ProjectDaoImpl above class:

```java
class ProjectDaoTest {
    static ProjectDao projectDao;

    @BeforeAll
    static void setUpBeforeClass() throws Exception {
        projectDao = new ProjectDaoImpl();
    }

    @Test
    void testSave() throws Exception {
        Employees employee = new Employees("Nguyen", "Dang Khoa",
                "khoadk@fsoft.com.vn", "0988777665", LocalDate.of(2019, 1, 1), 1000, 1.1);

        Projects project = new Projects("IT Fundamental", LocalDate.of(2020, 10, 1),
                "Fsoft Academey It Fundamental Training Program", LocalDate.of(2020, 12, 31));

        Set<Employees> employees = new HashSet<>();
        employees.add(employee);

        Set<Projects> projects = new HashSet<>();
        projects.add(project);

        project.setEmployees(employees);
        employee.setProjects(projects);

        assertTrue(projectDao.save(project));
    }

}
```

Many-to-Many Mapping Annotation
@JoinTable

Results:



	employee_id	commission_pct	email	first_name	hire_date	last_name	phone_number	salary	job_id
2	4	1.1	khoadk@fsoft.com.vn	Nguyen	2019-01-01	Dang Khoa	0988777665	1000	NULL

	employees_employee_id	projects_project_id
1	4	1

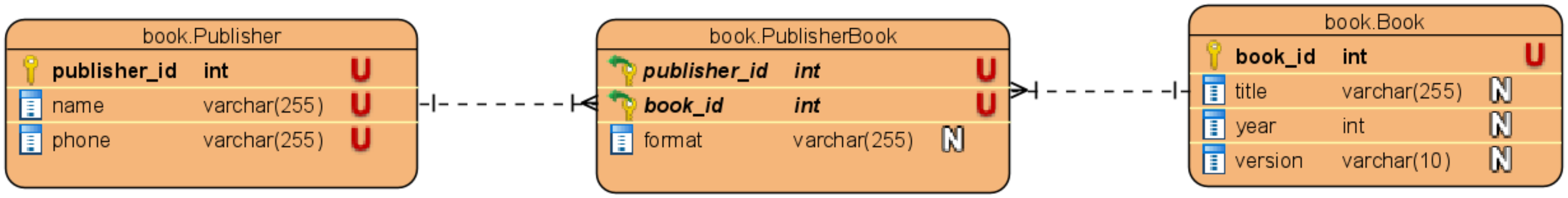
	project_id	completed_on	project_description	project_name	start_date
1	1	2020-12-31	Fsoft Academey It Fundamental Training Program	IT Fundamental	2020-10-01

Console:

```
Oct 05, 2020 3:29:02 PM org.hibernate.engine.transaction.jta.platform.internal.JtaPlatformInitiator initiateService
INFO: HHH000490: Using JtaPlatform implementation: [org.hibernate.engine.transaction.jta.platform.internal.NoJtaPla
Hibernate:  insert into dbo.Projects (completed_on, project_description, project_name, start_date) values (?, ?, ?,
Hibernate:  insert into dbo.Employees (commission_pct, email, first_name, hire_date, job_id, last_name, phone_numbe
            values (?, ?, ?, ?, ?, ?, ?, ?)
Hibernate:  insert into dbo.Employee_Project (employees_employee_id, projects_project_id) values (?, ?)
```

Many-to-Many Mapping Annotation

- Map a **many-to-many** association with extra columns.



```
@OneToMany(cascade = CascadeType.ALL,
           mappedBy = "publisher")
private Set<PublisherBook> publisherBook;
```

```
@OneToMany(cascade = CascadeType.ALL,
           mappedBy = "book")
private Set<PublisherBook> publisherBook;
```

- **Many-to-Many Using a Composite Key**
- Note, that there're some **key requirements, which a composite key class has to fulfill**:
  - ✓ We have to mark it with *@Embeddable*
  - ✓ It has to implement *java.io.Serializable*
  - ✓ We need to provide an implementation of the *hashcode()* and *equals()* methods
  - ✓ None of the fields can be an entity themselves.

Many-to-Many Mapping Annotati

```
@Entity
@Table(name = "Publisher_Book", schema = "book")
public class PublisherBook implements Serializable {

    private static final long serialVersionUID = 1L;

    @Id
    @ManyToOne
    @JoinColumn(name = "publisher_id")
    private Publisher publisher;

    @Id
    @ManyToOne
    @JoinColumn(name = "book_id")
    private Book book;
    // getter and setter methods

    @Override
    public int hashCode(){}

    @Override
    public boolean equals(Object obj)
}
```

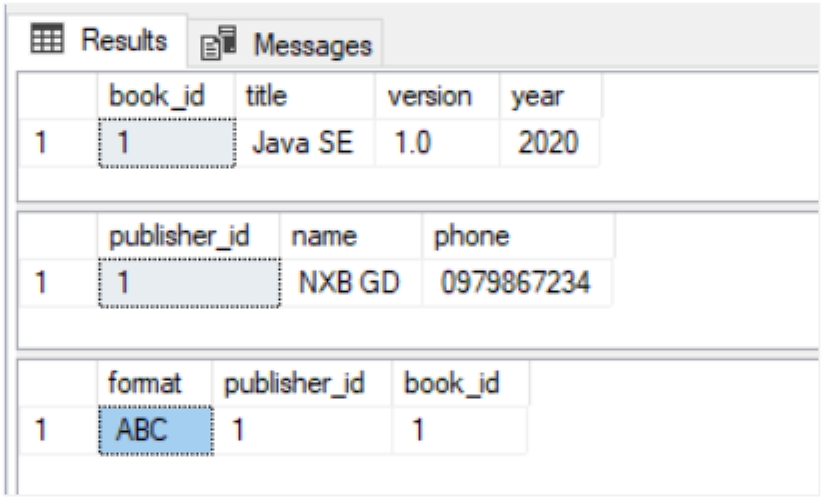
Many-to-Many Mapping Annotati

❖ Create a test script to check:

```
class PublisherBookDaoTest {
    static PublisherBookDao publisherBookDao;
    static BookDao bookDao;
    static PublisherDao publisherDao;

    @BeforeAll
    static void setUpBeforeClass() throws Exception {
        publisherBookDao = new PublisherBookDao();
        bookDao = new BookDao();
        publisherDao = new PublisherDao();
    }

    @Test
    void testSave2() throws Exception {
        Book book = new Book(1, "Java SE", 2020, "1.0");
        assertTrue(bookDao.save(book));

        Publisher publisher = new Publisher(1, "NXB GD", "0979867234");
        assertTrue(publisherDao.save(publisher));

        PublisherBook publisherBook = new PublisherBook(publisher, book, "ABC");

        assertTrue(publisherBookDao.save(publisherBook));
    }
}
```

Many-to-Many Mapping Annotati

- **Results:**



Results | Messages

	book_id	title	version	year
1	1	Java SE	1.0	2020

	publisher_id	name	phone
1	1	NXB GD	0979867234

	format	publisher_id	book_id
1	ABC	1	1

- **Console:**

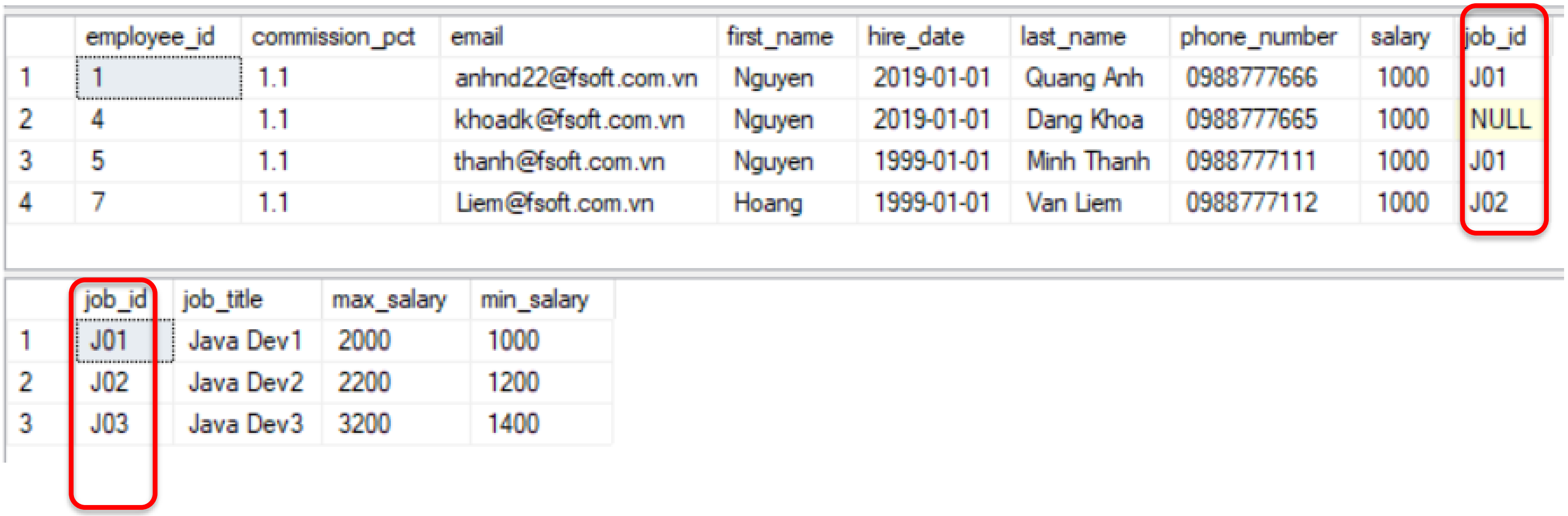
```
Hibernate: create table book2.Book (book_id int identity not null, title varchar(255), version varchar(10), year int not null, primary key (
Hibernate: create table book2.Publisher (publisher_id int identity not null, name varchar(255), phone varchar(255), primary key (publisher_i
Hibernate: create table book2.Publisher_Book (format varchar(255), publisher_id int not null, book_id int not null, primary key (publisher_i
Hibernate: alter table book2.Book drop constraint UK_odppys65lq7q1xbx8o6p6fgxj
Hibernate: alter table book2.Book add constraint UK_odppys65lq7q1xbx8o6p6fgxj unique (title)
Hibernate: alter table book2.Publisher drop constraint UK_era79tsdasvick3e38j0e9b6v
Hibernate: alter table book2.Publisher add constraint UK_era79tsdasvick3e38j0e9b6v unique (name)
Hibernate: alter table book2.Publisher drop constraint UK_lfeio9fee753ckef2tac2vfku
Hibernate: alter table book2.Publisher add constraint UK_lfeio9fee753ckef2tac2vfku unique (phone)
Hibernate: alter table book2.Publisher_Book add constraint FKt533ea1vy9qjr586kng5g2y0b foreign key (publisher_id) references book2.Publisher
Hibernate: alter table book2.Publisher_Book add constraint FKeylcdt22y4uw61t576re0ps8i foreign key (book_id) references book2.Book
Oct 11, 2020 3:58:30 PM org.hibernate.engine.transaction.jta.platform.internal.JtaPlatformInitiator initiateService
INFO: HHH000490: Using JtaPlatform implementation: [org.hibernate.engine.transaction.jta.platform.internal.NoJtaPlatform]
Hibernate: insert into book2.Book (title, version, year) values (?, ?, ?)
Hibernate: insert into book2.Publisher (name, phone) values (?, ?)
Hibernate: insert into book2.Publisher_Book (format, publisher_id, book_id) values (?, ?, ?)
```

Section 04

LAZY LOADING AND EAGER LOADING

Lazy loading and Eager loading

- **Eager Loading** is a design pattern in which data initialization occurs on the spot
- **Lazy Loading** is a design pattern which is used to defer initialization of an object as long as it's possible



	employee_id	commission_pct	email	first_name	hire_date	last_name	phone_number	salary	job_id
1	1	1.1	anhnd22@fsoft.com.vn	Nguyen	2019-01-01	Quang Anh	0988777666	1000	J01
2	4	1.1	khoadk@fsoft.com.vn	Nguyen	2019-01-01	Dang Khoa	0988777665	1000	NULL
3	5	1.1	thanh@fsoft.com.vn	Nguyen	1999-01-01	Minh Thanh	0988777111	1000	J01
4	7	1.1	Liem@fsoft.com.vn	Hoang	1999-01-01	Van Liem	0988777112	1000	J02

	job_id	job_title	max_salary	min_salary
1	J01	Java Dev1	2000	1000
2	J02	Java Dev2	2200	1200
3	J03	Java Dev3	3200	1400

Lazy loading and Eager loading

❖ Differences

- ✓ One **Jobs** can have multiple **Employees**. **In eager loading strategy, if we load the *Jobs* data, it will also load up all employees associated with it and will store it in a memory**.
- ✓ When lazy loading is enabled, if we pull up a *JobsLazy*, *Employees* data won't be initialized and loaded into a memory until an explicit call is made to it.

❖ Loading Configuration

```
@Entity
@Table(schema = "dbo", name = "Jobs", indexes = {
        @Index(columnList = "job_id, job_title", name = "IDX_ID_TITLE") })
public class Jobs {

    // …

    @OneToMany(cascade = CascadeType.ALL, mappedBy = "job", fetch=FetchType.LAZY)
    private Set<Employees> employees;

}
```

Working with lazy associations

- Does not actually load all the children when loading the parent.
- Load children when requested to do it
- Lazy loading can help improve the performance
- Create findById() method:

```
@Override
    public Jobs findById(String jobId) throws Exception {
        Session session = null;

        try {
            session = HibernateUtils.getSessionFactory().openSession();

            Jobs job = session.get(Jobs.class, jobId);

            return job;

        } finally {
            if (session != null) {
                session.close();
            }
        }
    }
```

Working with lazy associations

- Use **Eager loading**:

```
Hibernate: sas max_sala3_10_0_, jobs0_.min_salary as min_sala4_10_0_,
employees1_.job_id as job_id9_7_1_, employees1_.employee_id as employee1_7_1_,
employees1_.employee_id as employee1_7_2_, employees1_.commission_pct as commissi2_7_2_,
employees1_.email as email3_7_2_, employees1_.first_name as first_na4_7_2_,
employees1_.hire_date as hire_dat5_7_2_, employees1_.job_id as job_id9_7_2_,
employees1_.last_name as last_nam6_7_2_, employees1_.phone_number as phone_nu7_7_2_,
employees1_.salary as salary8_7_2_ from dbo.Jobs jobs0_ left outer join dbo.Employees
employees1_ on jobs0_.job_id=employees1elect jobs0_.job_id as job_id1_10_0_,
jobs0_.job_title as job_titl2_10_0_, jobs0_.max_salary _.job_id where jobs0_.job_id=?

Jobs [jobId=J01, jobTitle=Java Dev1, minSalary=1000.0, maxSalary=2000.0]
```

- Use **Lazy loading**:

```
Hibernate: select jobs0_.job_id as job_id1_10_0_, jobs0_.job_title as job_titl2_10_0_,
jobs0_.max_salary as max_sala3_10_0_, jobs0_.min_salary as min_sala4_10_0_ from dbo.Jobs
jobs0_ where jobs0_.job_id=?

Jobs [jobId=J01, jobTitle=Java Dev1, minSalary=1000.0, maxSalary=2000.0]
```

References

- **Hibernate reference documentation**
  - ✓ http://docs.jboss.org/hibernate
  - ✓ www.hibernate.org
- **Hibernate example**
  - ✓ http://www.mkyong.com/hibernate/
- **Hibernate course**
  - ✓ http://courses.coreservlets.com/Course-Materials/hibernate.html

Thank you!

Q&A