The Complete Guide to Spring 5 and Spring Boot 2

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One-to-Many Bidirectional Relationship

This lesson shows how to create a one-to-many relationship.

We'll cover the following

- @ManyToOne
- Cascade type
- @OneToMany

In this lesson we will create a bidirectional one-to-many relationship where a `Player` can have many `Registration`s.

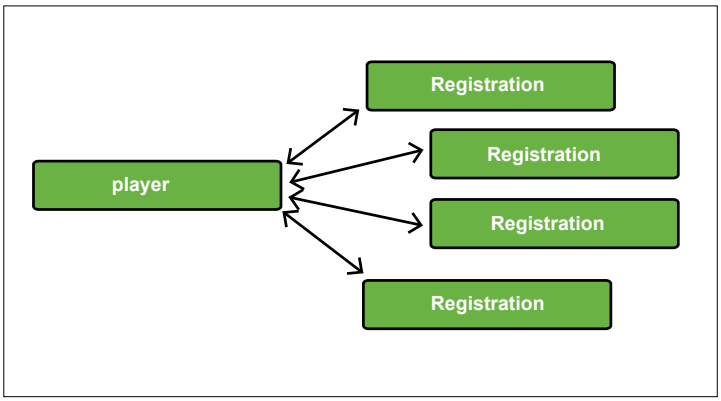
Let's add some real life constraints to the model.

- The first one being that every `Registration` object must be associated with a `Player` object.
- Secondly, when we delete a `Registration` object, the associated `Player` object should not be deleted.

A bidirectional association between `Player` and `Registration` means that we can get all the `Registration` objects if we have a `Player` object and vice versa, we can get a `Player` by using the `Registration`. Compare this to the unidirectional one-to-many relationship, where we could find the `Registration` objects given a `Tournament` but we could not find the `Tournament` from a `Registration` object.

GET request to /tournaments and /registrations

The inverse of one-to-many relationship is many-to-one, where many registrations map to one player.



1. For the bidirectional relationship example, create a new package named **bi** inside the **onetomany** package. Copy the `Registration` and `Tournament` classes from the **onetomany.uni** package and the `Player` and `PlayerProfile` classes from the **onetoone** package along with the associated repository, service and controller classes to the **onetomany.bi** package.
2. We will start with updating the `Registration` class. To have a bidirectional relationship, we will add a `player` field in the `Registration` class. Generate getter and setter methods for the new field and update the constructor and `toString` methods.

```
@Entity
public class Registration {
    @Id
    @GeneratedValue(strategy=GenerationType.SEQUENCE)
    private int id;
    private Date registrationDate;

    private Player player;
    //getters and setters
    //constructor
    //toString method
}
```

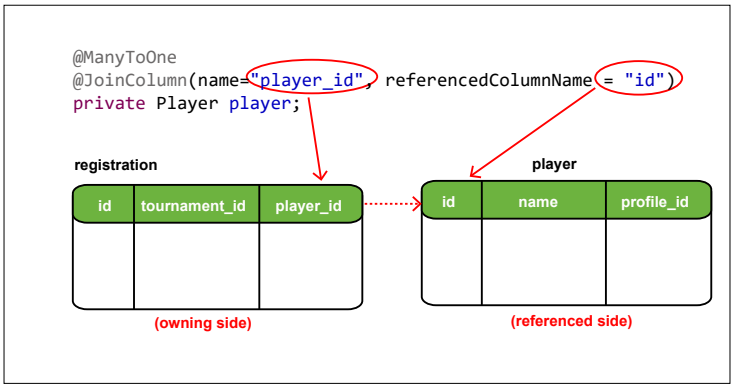
@ManyToOne

2. There is a many-to-one relationship between the `Registration` and `Player` classes where many registrations can map to one player. The many side of a many-to-one bidirectional relationship is *always* the owning side of the relationship.

   To model this relationship, we will use the `@ManyToOne` annotation with `@JoinColumn` specifying the column that corresponds to the foreign key column in the **registration** table. The **player** table has a column `id` which will become the foreign key column `player_id` in the **registration** table. This is how the `Registration` knows how to find its `Player`.

   ```
   @ManyToOne
   @JoinColumn(name="player_id", referencedColumnName = "id")
   private Player player;
   ```

   The `@JoinColumn` annotation also shows that this is the owning side of the relationship.



Cascade type

3. Next, we will choose the cascade type for this relationship. If a `Registration` object is deleted, the associated `Player` should not be deleted. This means that the delete operation should not be cascaded. Since we have fine grain control over the cascade types, we will list all of them except for `REMOVE`.

   ```
   @ManyToOne(cascade={CascadeType.PERSIST, CascadeType.MERGE,
                       CascadeType.DETACH,  CascadeType.REFRESH}
   @JoinColumn(name="player_id", referencedColumnName = "id")
   private Player player;
   ```

4. Now we will update the `Player` class to show tournament registrations. Since a player can have multiple registrations, we will add a `List` of `Registration`s as a new field to the class.

   ```
   private List<Registration> registrations = new ArrayList<>();
   //generate getter and setter methods
   ```

@OneToMany

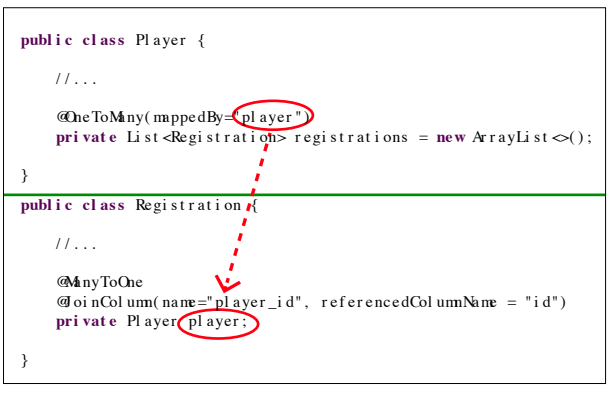
5. The `Player` class has a one-to-many relationship with the `Registration` class as one player can register for many tournaments. This can be modelled by the `@OneToMany` annotation.

   Since the *many* side (`Registration`) is the owning side of a bidirectional relationship, we will use the `mappedBy` attribute here (in the `Player` class) to specify that this is the inverse side of the relationship.

   ```
   @OneToMany(mappedBy="player", cascade= CascadeType.ALL)
   private List<Registration> registrations = new ArrayList<>();
   ```

   We are using cascade type `ALL` here because we want a player's registrations to be deleted when the player record is deleted.

   The `player` in the `mappedBy` attribute references the `player` field in the `Registration` class. Hibernate looks at the `@JoinColumn` annotation on the `player` field to find the foreign key column.



Next, we will add a method to the `Player` class that sets the bidirectional relationship. In this method, we will add a `Registration` object to the `Player` and also update the `Registration` to reflect that it belongs to this `Player`.

```
//set up bidirectional relationship with Registration class
public void registerPlayer(Registration reg) {
    //add registration to the list
```

```
    registrations.add(reg);
    //set the player field in the registration
    reg.setPlayer(this);
}
```

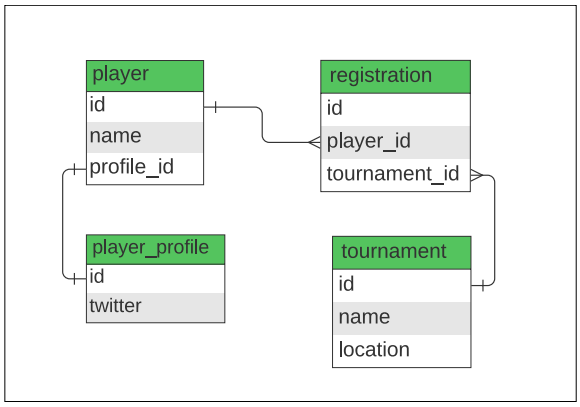
In the `PlayerController` class, we will add a new **PUT** mapping to associate a `Registration` with **registration_id** with a `Player` having **id** as key as follows:

```
@PutMapping("/{id}/registrations/{registration_id}")
public Player assignRegistration(@PathVariable int id, @PathVariable int registration_id) {
   Registration registration = registrationService.getRegistration(registration_id);
   return service.assignRegistration(id, registration);
}
```

The controller class method invokes the service class method `assignRegistration` with the player's `id` and a `Registration` object. The method in `PlayerService` class is shown:

```
public Player assignRegistration(int id, Registration registration) {
    Player player = repo.findById(id).get();
    player.registerPlayer(registration);
    return repo.save(player);
}
```

After setting up the bidirectional relationship between `Player` and `Registration` entities, the updated ERD of our database is shown below. The same can be verified from the web console of H2 database (at http://localhost:8080/h2-console with *jdbc:h2:mem:testdb* as the connection URL).




```
package io.datajek.databaserelationships.onetomany.bi;

import java.util.ArrayList;
import java.util.List;

import javax.persistence.CascadeType;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.OneToMany;
import javax.persistence.OneToOne;

import com.fasterxml.jackson.annotation.JsonIdentityInfo;
import com.fasterxml.jackson.annotation.JsonIgnoreProperties;
import com.fasterxml.jackson.annotation.ObjectIdGenerators;

@Entity
@JsonIdentityInfo(generator= ObjectIdGenerators.PropertyGenerator.class, property="id")
public class Player {
        @Id
        @GeneratedValue(strategy = GenerationType.IDENTITY)
        private int id;

        private String name;

    @OneToOne(cascade=CascadeType.ALL)
    @JoinColumn(name = "profile_id", referencedColumnName = "id")
    private PlayerProfile playerProfile;

    @OneToMany(mappedBy="player", cascade= CascadeType.ALL)
```

> For the code widget given above, use the URL at which the application is running in place of http://localhost:8080/. For example, **/players** means http://localhost8080/players for *local dev environment*. If using POSTMAN with code widget above, use the URL shown under the code widget to access **/players**.

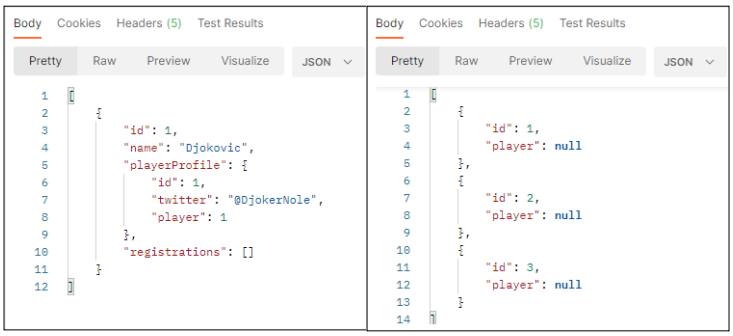
To test the application, first create a player object by sending a **POST** request to **/players** as follows:

```
{
    "name": "Djokovic",
    "playerProfile": {
        "twitter" : "@DjokerNole"
    }
}
```

Next, create three registration entities by sending **POST** requests to **/registrations** with an empty request body:

```
{}
```

Right now the `Player` and `Registration` objects are not connected as can be seen from the image below:



GET requests to /players and /registrations

To set up a bidirectional mapping, send a **PUT** request to **/players/1/registrations/1**. This will connect the `Player` with `id` 1 with the `Registration` having `id` 1.

To assign `Registration` object with `id` 3 to the same player send another **PUT** request to **/players/1/registrations/3**.

We can confirm the bidirectional association by sending **GET** requests to **/players** and **/registrations**.

Get request to /players and /registrations after creating bidirectional association

To confirm if the cascade is working correctly, delete one registration associated with the player by sending a **DELETE** request to **/registrations/3**. The registrations table has two records left. A **GET** request to **/players** confirms that delete operation is not cascaded and the player exists in the database. Only the registration record is removed from the player. The results can also be verified from the H2 database.

Delete from registration table not cascaded to player table

Back

One-to-Many Unidirectional Relationship

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Next

Many-to-Many Unidirectional Relationship