App Development & Modeling

BSc in Applied Computing

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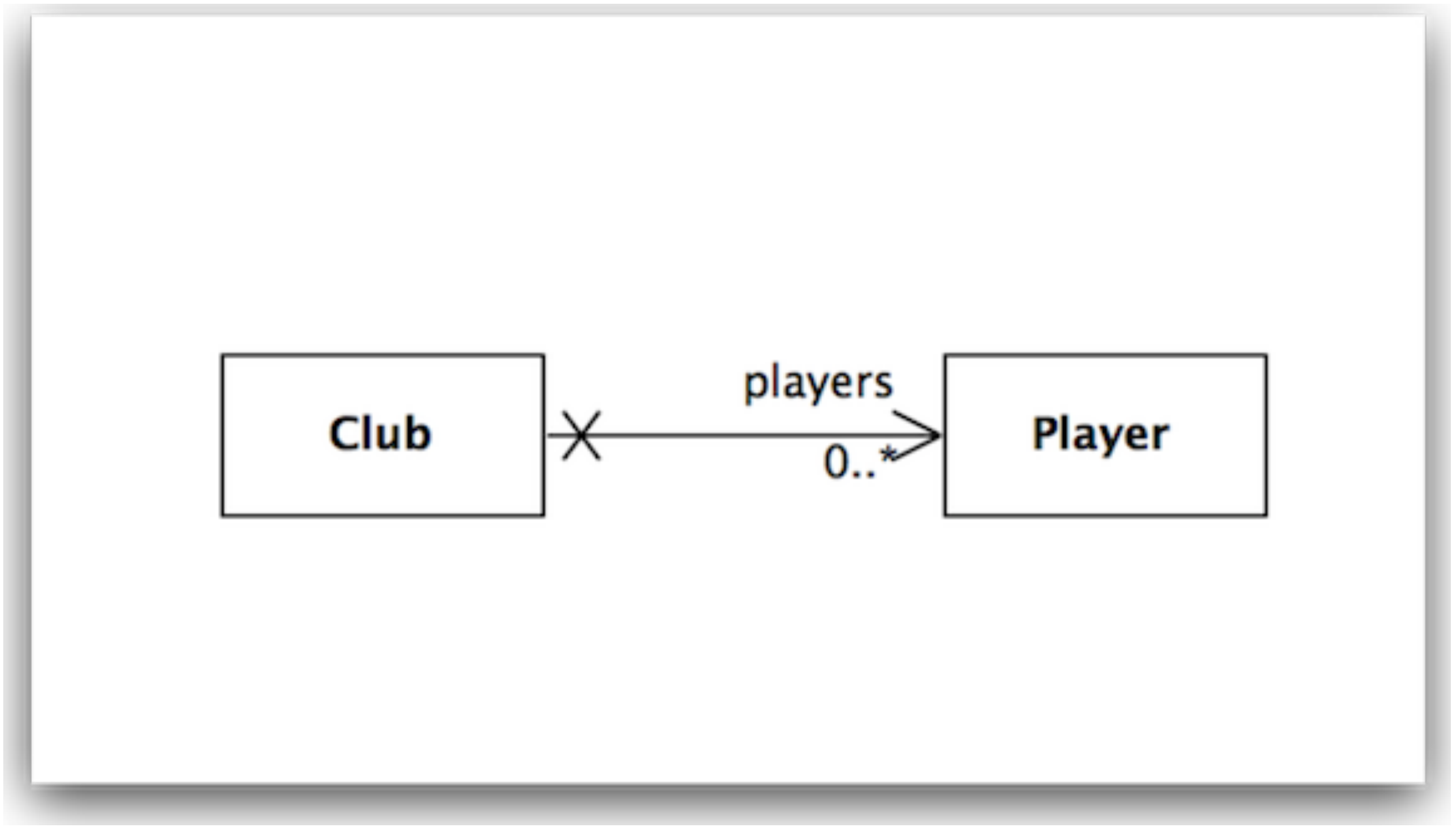
eLearning support unit

Modeling & JPA

OneToMany

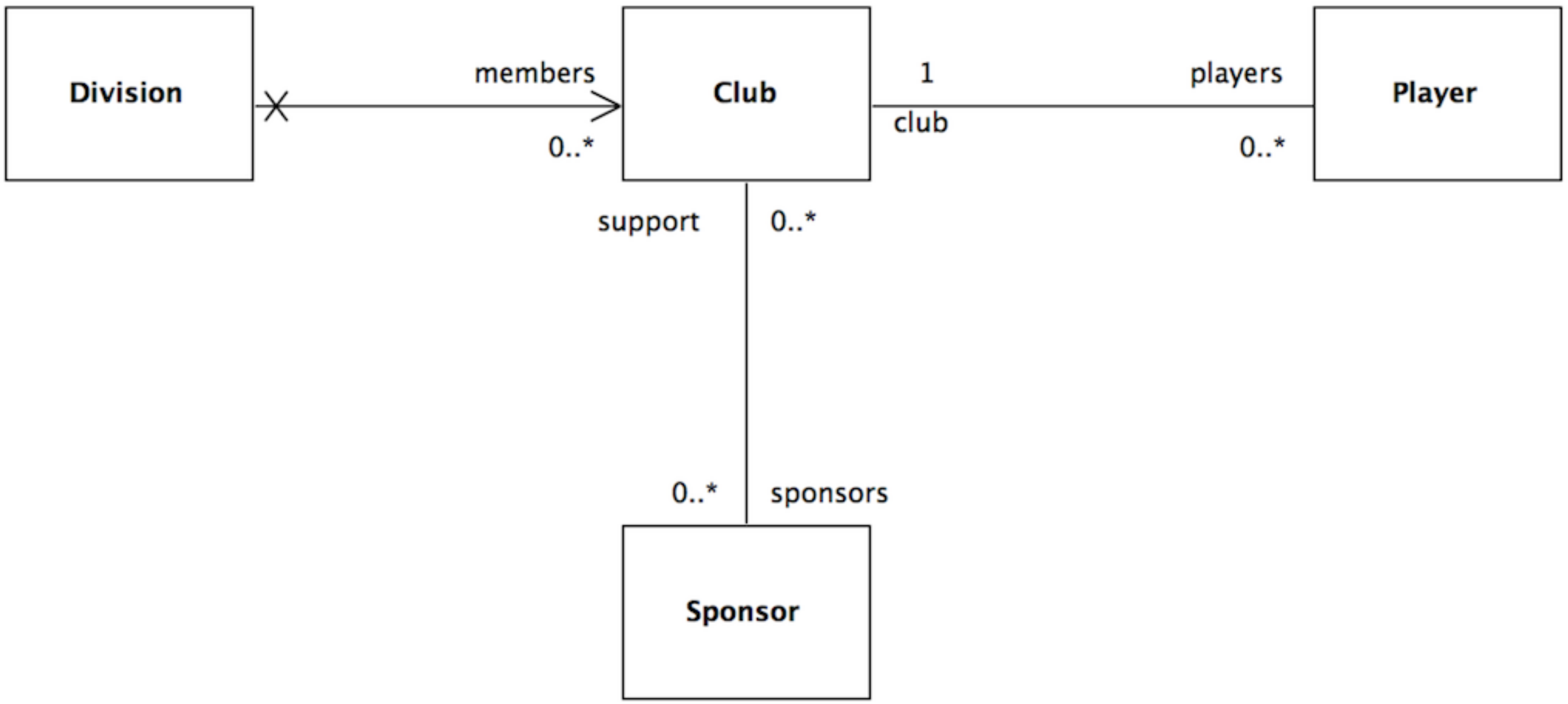


OneToMany - Unidirectional

```
public class Club extends Model
{
  public String name;

  @OneToMany(cascade=CascadeType.ALL)
  public List<Player>
            players = new ArrayList<Player>();

  public Club(String name)
  {
    this.name = name;
  }

  public String toString()
  {
    return name;
  }

  public void addPlayer(Player player)
  {
    players.add(player);
  }
}
```

```
public class Player extends Model
{
  public String name;


  public Player(String name)
  {
    this.name = name;
  }

  public String toString()
  {
    return name;
  }
}
```

OneToMany, ManyToOne, ManyToMany



OneToMany

```java
public class Division extends Model
{
  public String name;

  @OneToMany(cascade=CascadeType.ALL)
  public List<Club> members new ArrayList<Club>();

  public Division(String name)
  {
    this.name = name;
  }

  public void addClub(Club club)
  {
    members.add(club);
  }

  public String toString()
  {
    return name;
  }

  public static Division findByName(String name)
  {
    return find("name", name).first();
  }
}
```

```java
public class Club extends Model
{
  public String name;

  @OneToMany(mappedBy="club", cascade=CascadeType.ALL)
  public List<Player> players = new ArrayList<Player>();

  @ManyToMany
  public List<Sponsor> sponsors = new ArrayList<Sponsor>();

  public Club(String name)
  {
    this.name = name;
  }
  public String toString()
  {
    return name;
  }
  public static Club findByName(String name)
  {
    return find("name", name).first();
  }
  public void addPlayer(Player player)
  {
    player.club = this;
    players.add(player);
  }
  public void addSponsor(Sponsor company)
  {
    sponsors.add(company);
  }
  public void removePlayer(Player player)
  {
    players.remove(player);
  }
}
```

ManyToOne

```
public class Club extends Model
{
  public String name;

  @OneToMany(mappedBy="club", cascade=CascadeType.ALL)
  public List<Player> players = new ArrayList<Player>();

  //..
}
```

```
public class Player extends Model
{
  public String name;

  @ManyToOne
  public Club club;

  public Player(String name)
  {
    this.name = name;
  }

  public String toString()
  {
    return name;
  }

  public static Player findByName(String name)
  {
    return find("name", name).first();
  }
}
```

ManyToMany

```
public class Sponsor extends Model
{
  public String name;

  @ManyToMany (mappedBy="sponsors")
  public List<Club> support = new ArrayList<Club>();

  public Sponsor(String name)
  {
    this.name = name;
  }

  public void addSuport(Club club)
  {
    support.add(club);
  }

  public String toString()
  {
    return name;
  }
}
```

```
public class Club extends Model
{
  public String name;

  @OneToMany(mappedBy="club", cascade=CascadeType.ALL)
  public List<Player> players = new ArrayList<Player>();

  @ManyToMany
  public List<Sponsor> sponsors = new ArrayList<Sponsor>();

  public Club(String name)
  {
    this.name = name;
  }
  public String toString()
  {
    return name;
  }
  public static Club findByName(String name)
  {
    return find("name", name).first();
  }
  public void addPlayer(Player player)
  {
    player.club = this;
    players.add(player);
  }
  public void addSponsor(Sponsor company)
  {
    sponsors.add(company);
  }
  public void removePlayer(Player player)
  {
    players.remove(player);
  }
}
```

Tests

data.yml

- For more complex models, create fixtures in data.yml.
- These models can be loaded in unit tests

```
Club(dunmore):
    name: dunmore

Club(tramore):
    name: tramore

Club(fenor):
    name: fenor

Player(jim):
    name: jim
    club: dunmore

Player(mary):
    name: mary
    club: dunmore

Player(sam):
    name: sam
    club: tramore

Player(john):
    name: john
    club: tramore

Player(mike):
    name: mike
    club: fenor

Player(linda):
    name: john
    club: fenor

Division(senior):
    name: senior
    members:
            - tramore
            - dunmore

Division(junior):
    name: junior
    members:
            - fenor

Sponsor(newsagent):
    name: newsagent

Sponsor(pub):
    name: pub
```

data.yml

```
Club(dunmore):
    name: dunmore

Club(tramore):
    name: tramore

Club(fenor):
    name: fenor

Player(jim):
    name: jim
    club: dunmore

Player(mary):
    name: mary
    club: dunmore

Player(sam):
    name: sam
    club: tramore

Player(john):
    name: john
    club: tramore

Player(mike):
    name: mike
    club: fenor

Player(linda):
    name: john
    club: fenor

Division(senior):
    name: senior
    members:
            - tramore
            - dunmore

Division(junior):
    name: junior
    members:
            - fenor

Sponsor(newsagent):
    name: newsagent

Sponsor(pub):
    name: pub
```

ComprehensiveTest

```java
public class ComprehensiveTest extends UnitTest
{
  @Before
  public void setup()
  {
    Fixtures.deleteDatabase();
    Fixtures.loadModels("data.yml");
  }

  @After
  public void teardown()
  {
    Fixtures.deleteAllModels();
  }
```

Test Strategy

- For each relationship:
  - ‘short’ test - quick sanity check
  - ‘long’ test - full exercise of relationship, in both directions if present
  - ‘edit’ test - perform change on objects

Player/Club

```
 @Test
public void testPlayerClub()
{
  Club   dunmore = Club.find("byName", "dunmore").first();
  Player jim     = Player.find("byName", "jim").first();
  Player mary    = Player.find("byName", "mary").first();
  assertNotNull(mary);

  assertTrue (dunmore.players.contains(jim));
  assertTrue (dunmore.players.contains(mary));
}
```

```
@Test
public void testPlayerClubLong()
{
  Player jim;
  Club   dunmore;

  jim = Player.find("byName", "jim").first();
  assertNotNull(jim);
  assertEquals(jim.name, "jim");

  dunmore = jim.club;
  assertEquals("dunmore", dunmore.name);

  dunmore = Club.find("byName", "dunmore").first(
  assertNotNull(dunmore);
  assertEquals("dunmore", dunmore.name);
  assertEquals(2, dunmore.players.size());

  Player p1 = dunmore.players.get(0);
  assertTrue (p1.name.equals("jim") || p1.name.equals("mary"));
  Player p2 = dunmore.players.get(1);
  assertTrue (p2.name.equals("jim") || p2.name.equals("mary"));
}
```

```
@Test
public void testEditPlayerClub()
{
  Club   dunmore = Club.find("byName", "dunmore").first();
  Player jim     = Player.find("byName", "jim").first();
  Player mary    = Player.find("byName", "mary").first();

  dunmore.players.remove(mary);
  mary.delete();
  dunmore.save();

  assertEquals (dunmore.players.size(), 1);
  assertTrue (dunmore.players.contains(jim));

  assertEquals(0, Player.find("byName", "mary").fetch().size());

  Player sara     = new Player("sara");
  dunmore.addPlayer(sara);
  dunmore.save();
  assertEquals (dunmore.players.size(), 2);
}
```

Forward References

- In yaml files, representing many-to-many relationships cannot be easily represented.
- e.g:
    - dunmore->newsagent
    - newsagent->dunmore

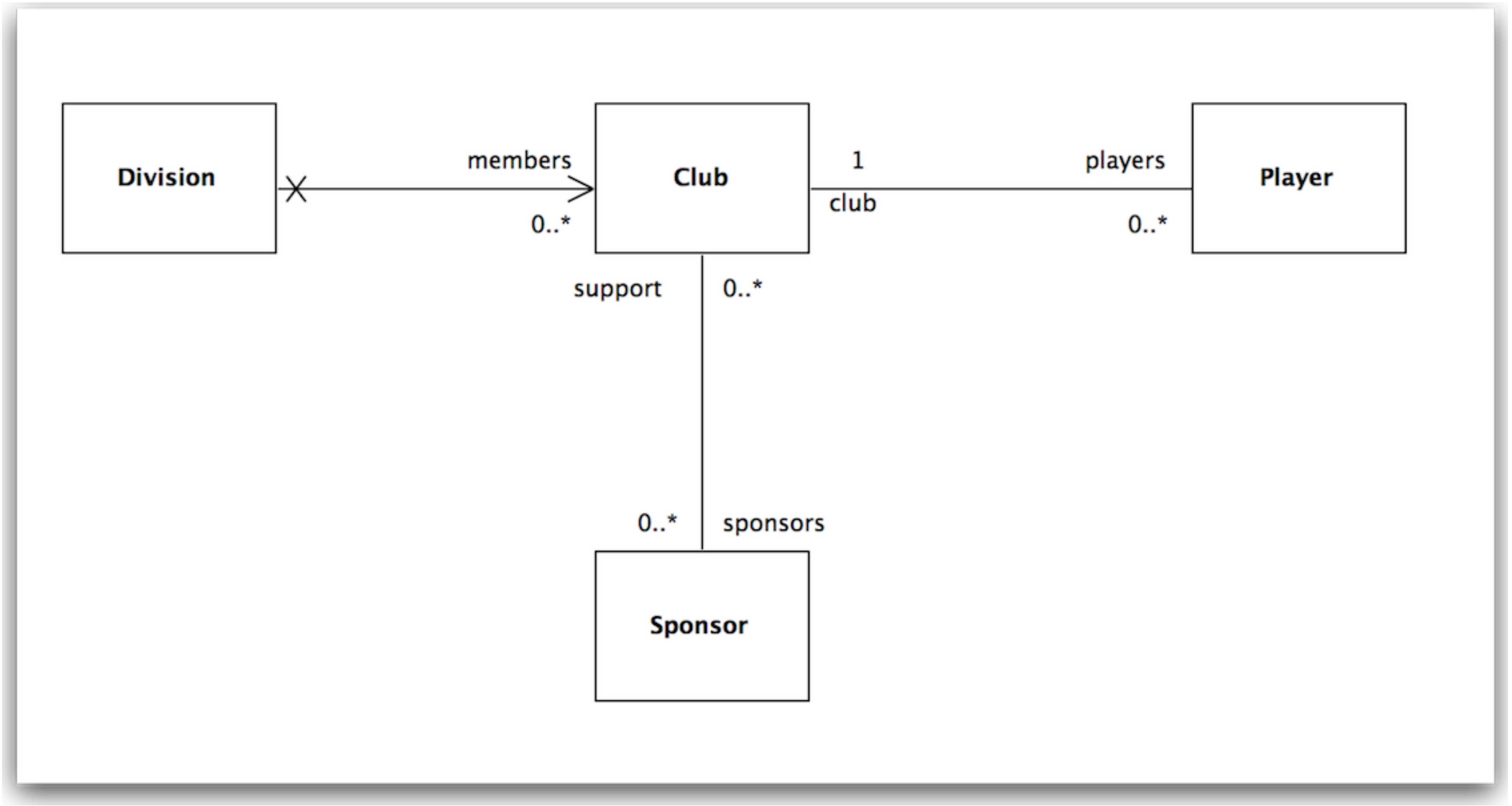
```
Club(dunmore):
    name: dunmore

Player(jim):
    name: jim
    club: dunmore

Player(mary):
    name: mary
    club: dunmore

Division(junior):
    name: junior
    members:
            - dunmore

Sponsor(newsagent):
    name: newsagent
```

Forward References - Workaround

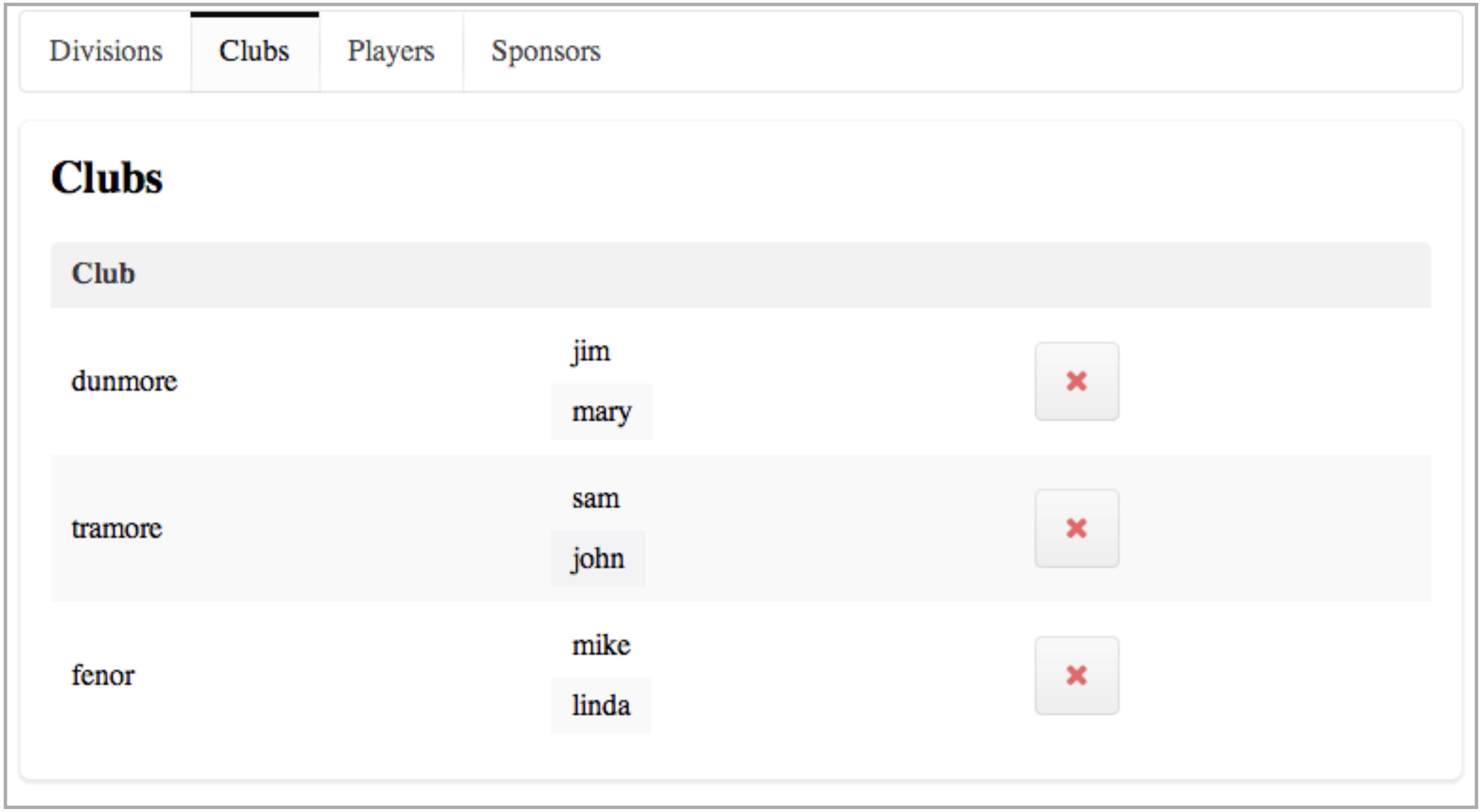
- Load the data.yaml model without ManyToMany
- Establish the relationship after the fixture is loaded

```java
public class ComprehensiveTest extends UnitTest
{
  public static void loadSponsorships()
  {
    Club    tramore   = Club.find("byName", "tramore").first();
    Club    dunmore   = Club.find("byName", "dunmore").first();
    Sponsor newsagent = Sponsor.find("byName", "newsagent").first();

    tramore.addSponsor(newsagent);
    dunmore.addSponsor(newsagent);

    newsagent.addSuport(tramore);
    newsagent.addSuport(dunmore);

    tramore.save();
    dunmore.save();
    newsagent.save();
  }

  @Before
  public void setup()
  {
    Fixtures.loadModels("data.yml");
    loadSponsorships();
  }
```

OneToMany, ManyToOne, ManyToMany



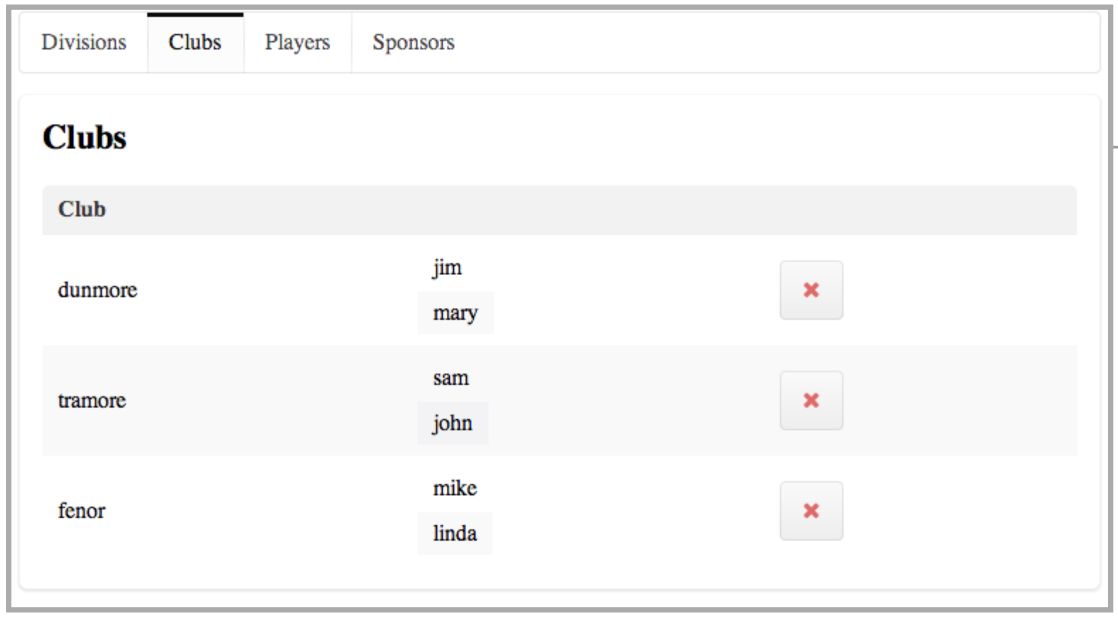
Delete Club



Clubs

Club		
dunmore	jim mary	✖
tramore	sam john	✖
fenor	mike linda	✖

Delete Club

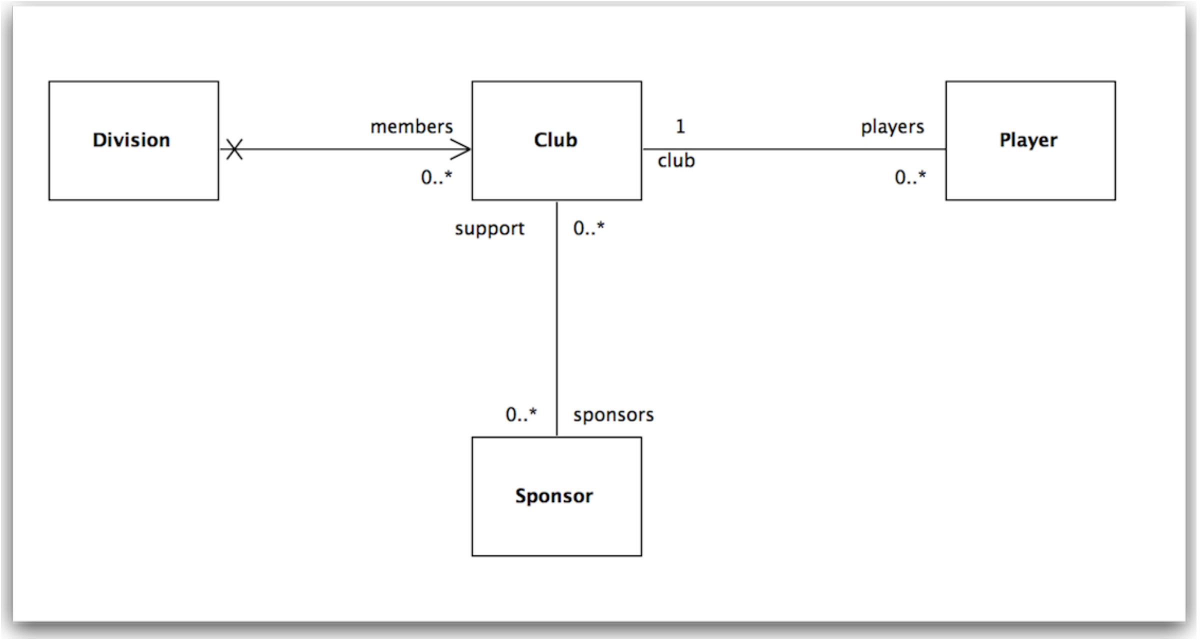


Clubs

Club		
dunmore	jim mary	✖
tramore	sam john	✖
fenor	mike linda	✖

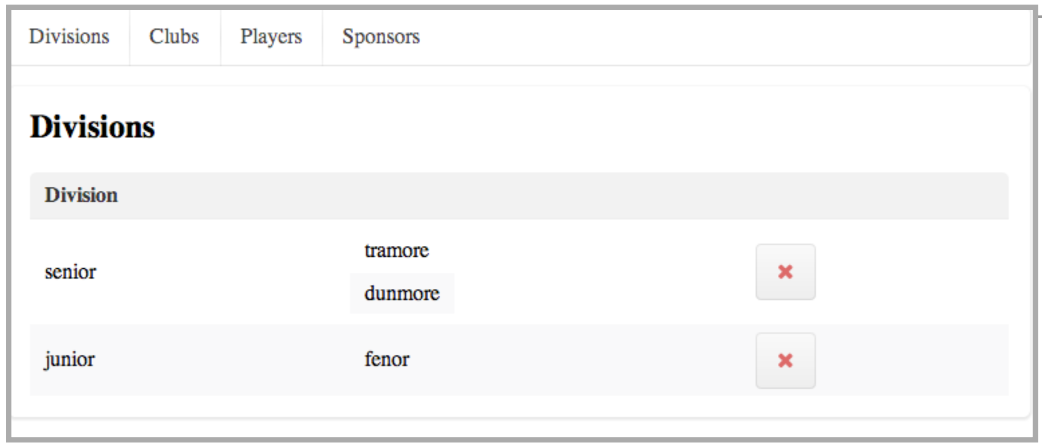
```
<td>
  <a class="ui ui icon button" href="/clubs/delete/${club.id}">
   <i class="delete red icon"></i>
  </a>
</td>
```

```
GET     /clubs/delete/{id}                          Clubs.delete
```



```
public static void delete(Long id)
{
  Club club = Club.findById(id);
  if (club != null)
  {
    Logger.info("Trying to delete " + club.name);
    List<Division> divisions = Division.findAll();
    for (Division division : divisions)
    {
      if (division.members.contains(club))
      {
        division.members.remove(club);
        division.save();
        Logger.info ("removing club from division");
      }
    }
    club.delete();
  }
  index();
}
```

Delete Division



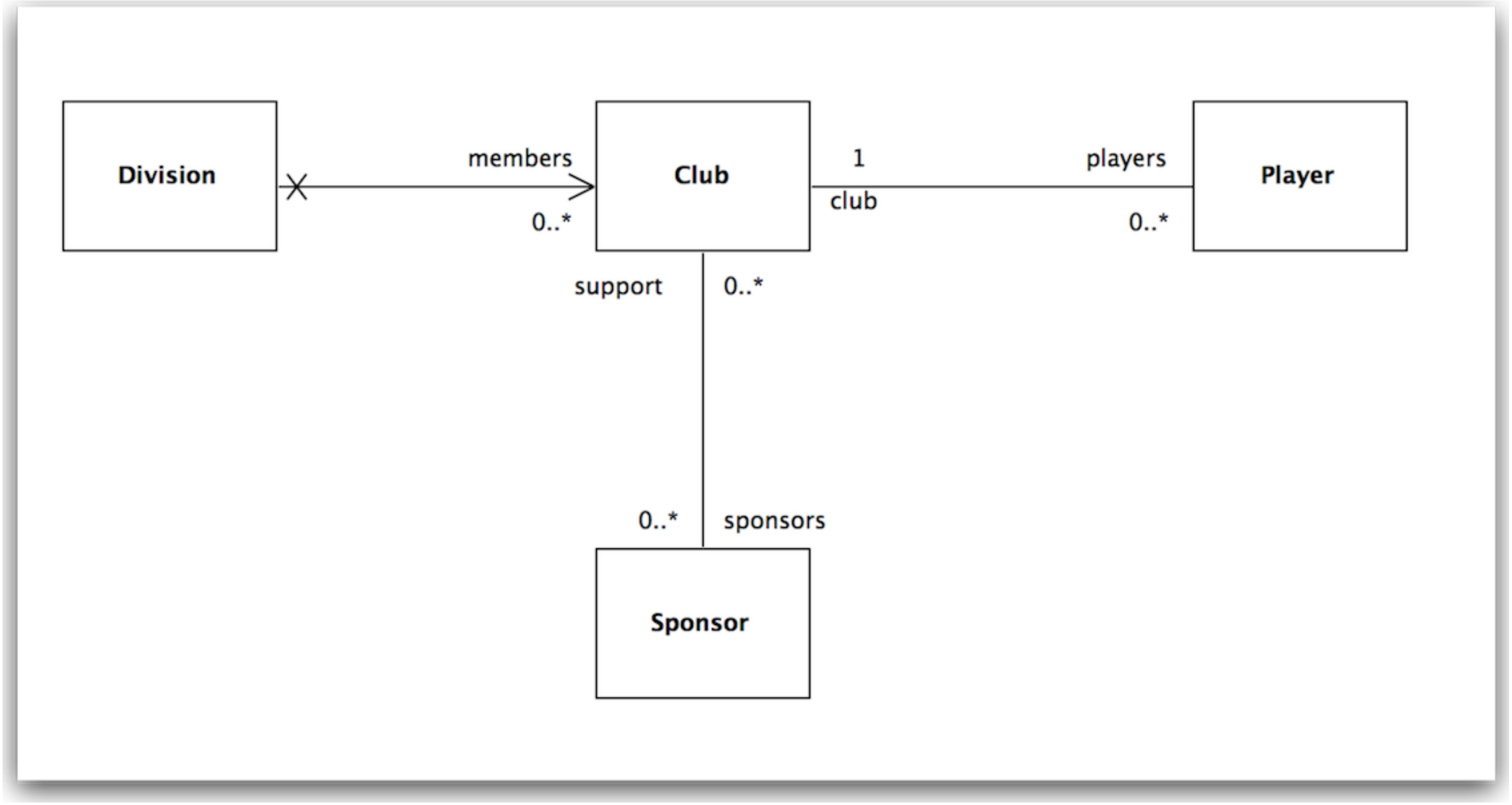
Divisions

Division		
senior	tramore dunmore	✖
junior	fenor	✖

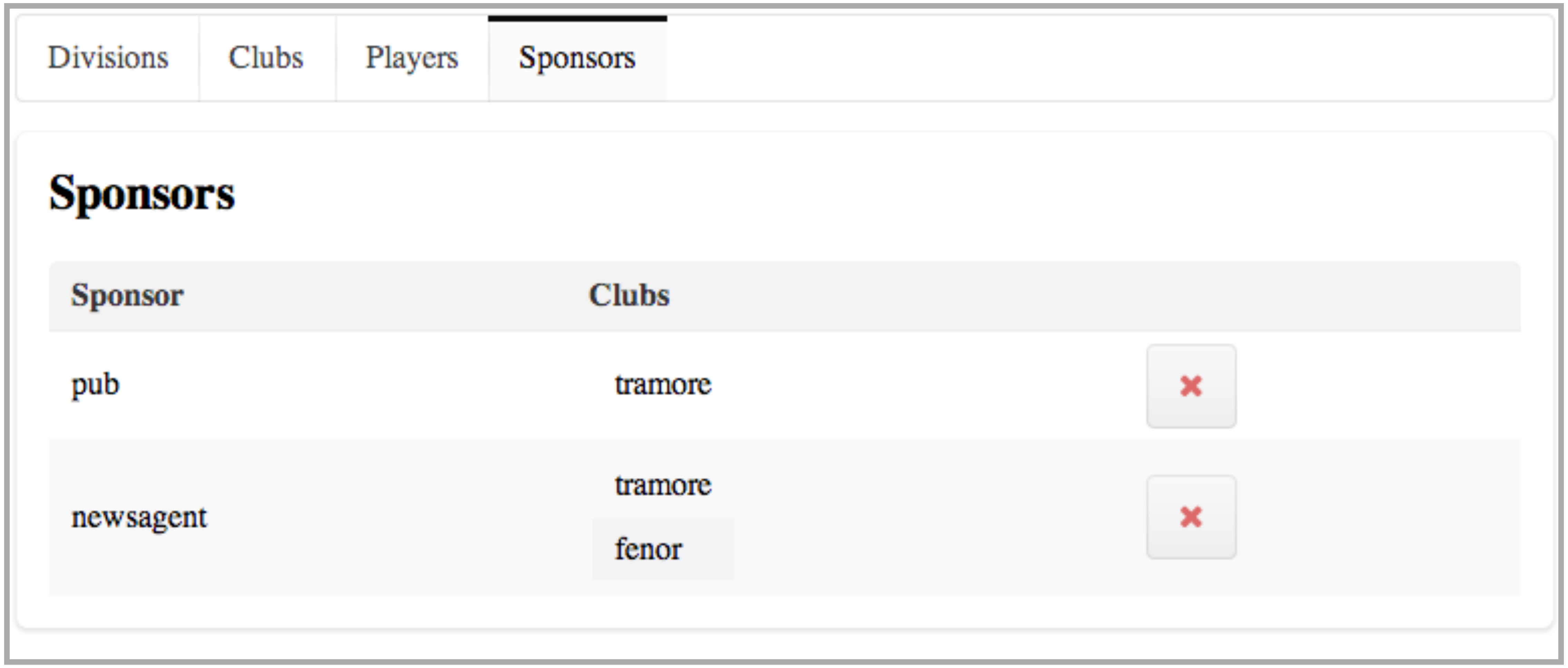
```
        <td>
          <a class="ui ui icon button" href="/divisions/delete/${division.id}">
           <i class="delete red icon"></i>
          </a>
        </td>
```

```
GET     /divisions/delete/{id}                          Divisions.delete
```

```
public static void delete(Long id)
{
  Division division = Division.findById(id);
  division.delete();
  index();
}
```



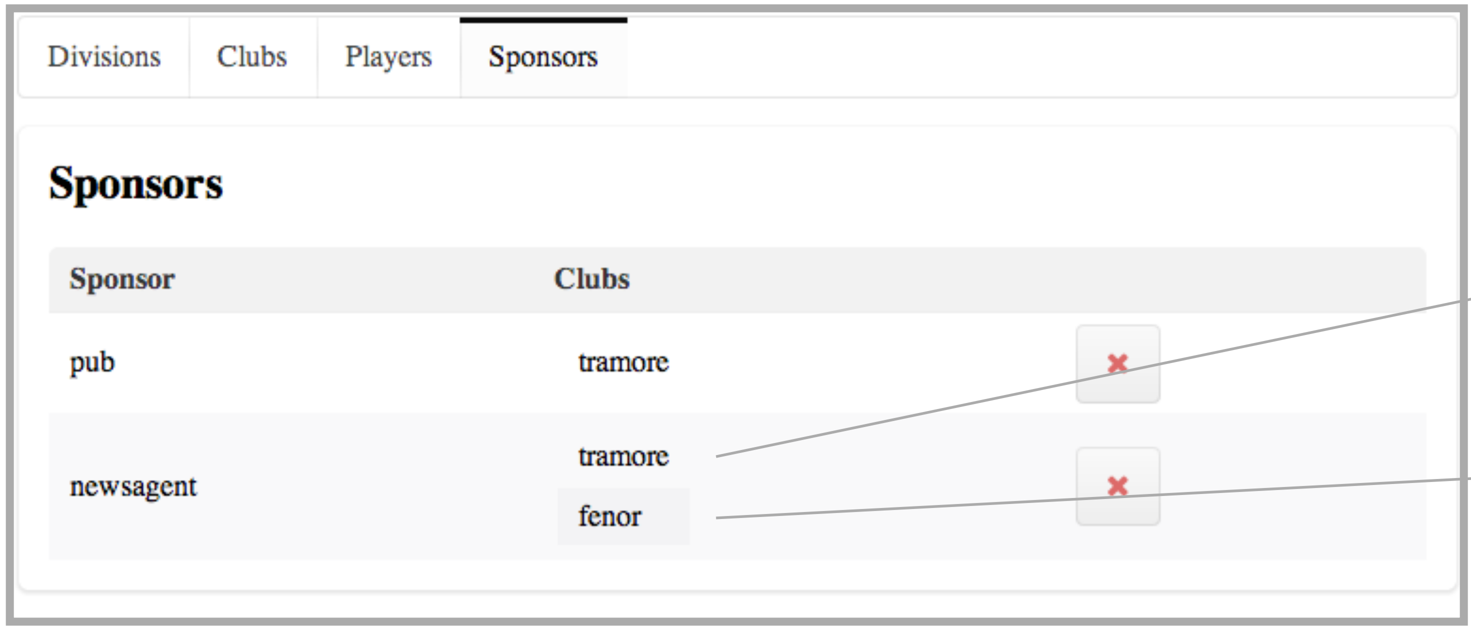
Show Sponsors Clubs



Sponsors

Sponsor	Clubs	
pub	tramore	✖
newsagent	tramore fenor	✖

Table inside a table



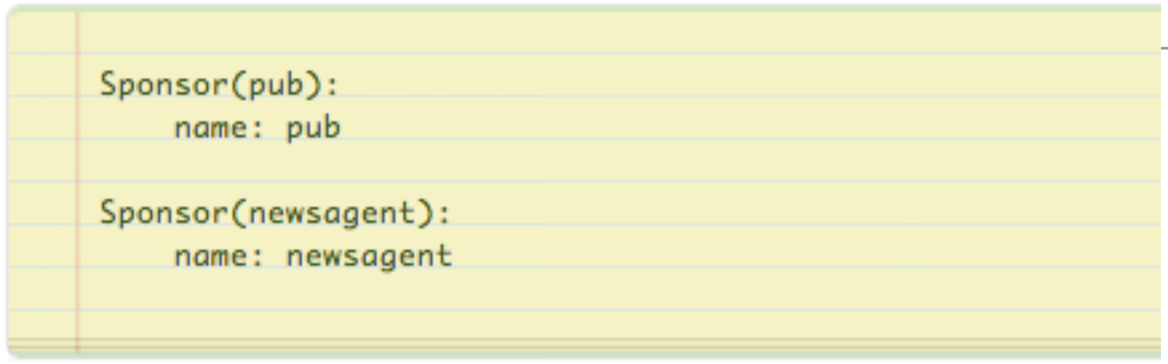
Sponsors

Sponsor	Clubs
pub	tramore
newsagent	tramore fenor

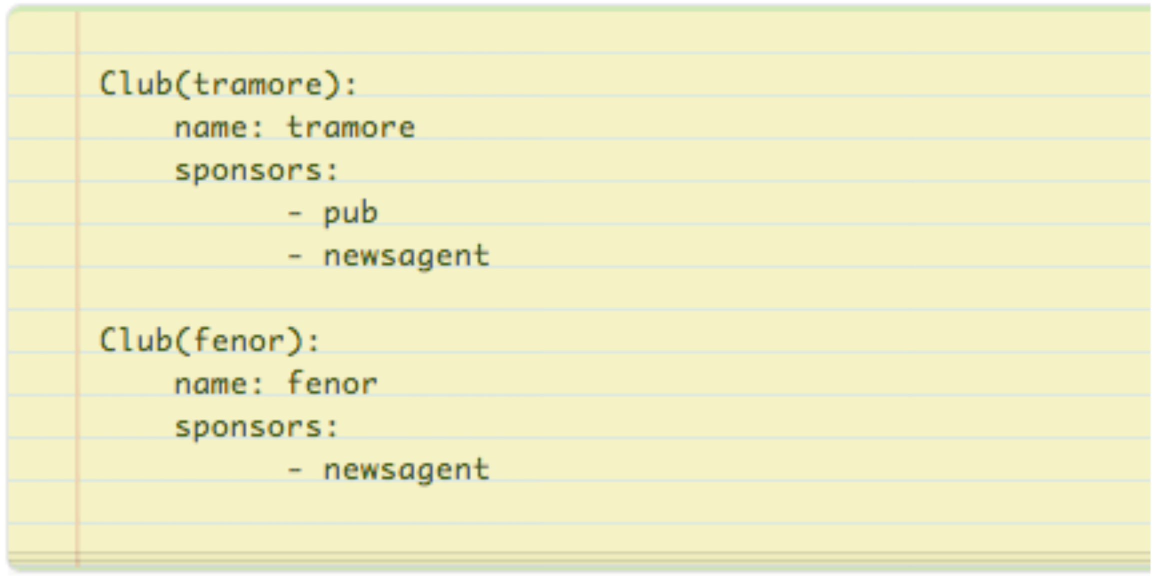
```
<table class="ui table">
  <thead>
    <tr>
      <th>Sponsor</th>
      <th>Clubs</th>
      <th></th>
    </tr>
  </thead>
  <tbody>
      #{list items:sponsors, as:'sponsor'}
        <tr>
          <td>${sponsor.name}</td>
        <td>
          <table class "ui table">
            <tr>
             #{list items:sponsor.support, as:'club'}
               <td>${club.name}</td> </tr>
             #{/list}
             </tr>
           </table>
        </td>
          <td></td>
        </tr>
      #{/list}
  </tbody>
</table>
```

Yaml file - Froward References

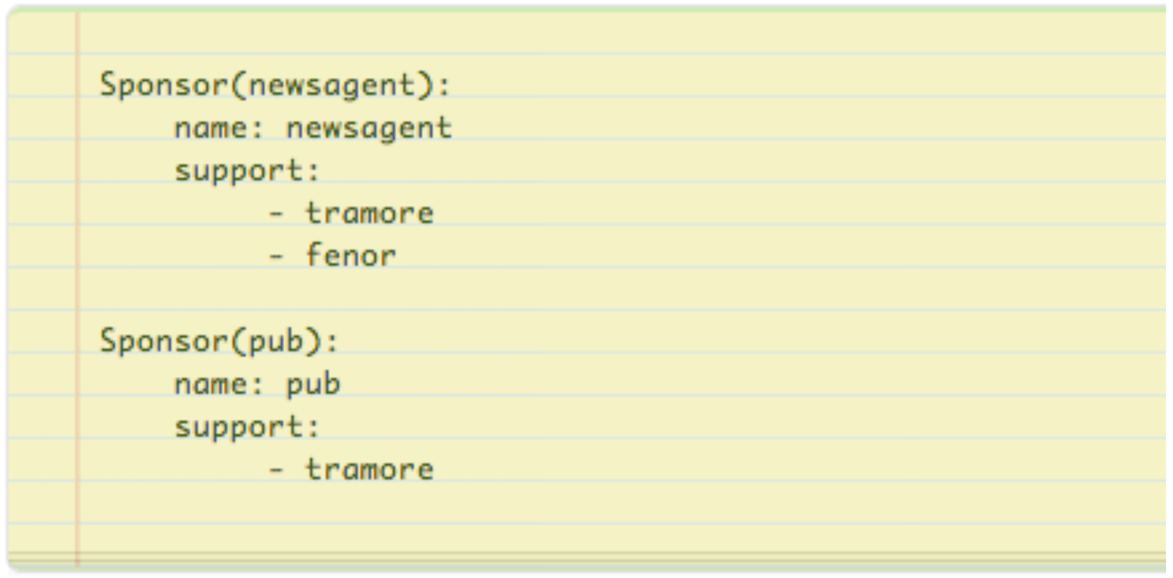
- Test data in Yaml file cannot refer to objects that have not been seen in the file yet (reading from top to bottom)
- Bidirectional references can be included by including the objects twice
  - Once at top (partial)
  - Once at end (complete)



```
Sponsor(pub):
    name: pub

Sponsor(newsagent):
    name: newsagent
```

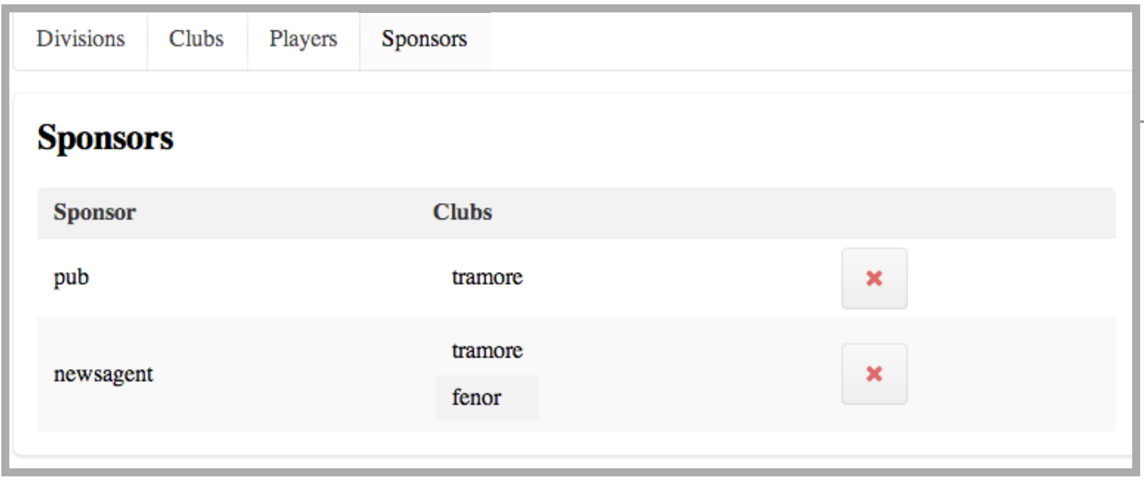


```
Club(tramore):
    name: tramore
    sponsors:
          - pub
          - newsagent

Club(fenor):
    name: fenor
    sponsors:
          - newsagent
```



```
Sponsor(newsagent):
    name: newsagent
    support:
         - tramore
         - fenor

Sponsor(pub):
    name: pub
    support:
         - tramore
```

Delete Sponsors



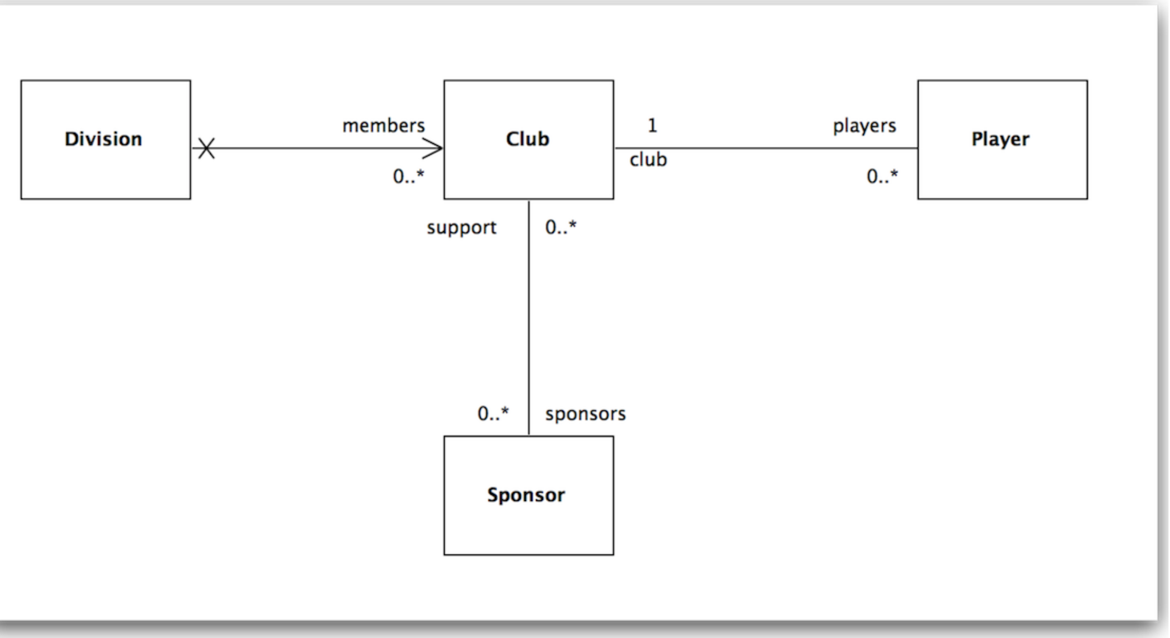
Sponsors

Sponsor	Clubs	
pub	tramore	✖
newsagent	tramore fenor	✖

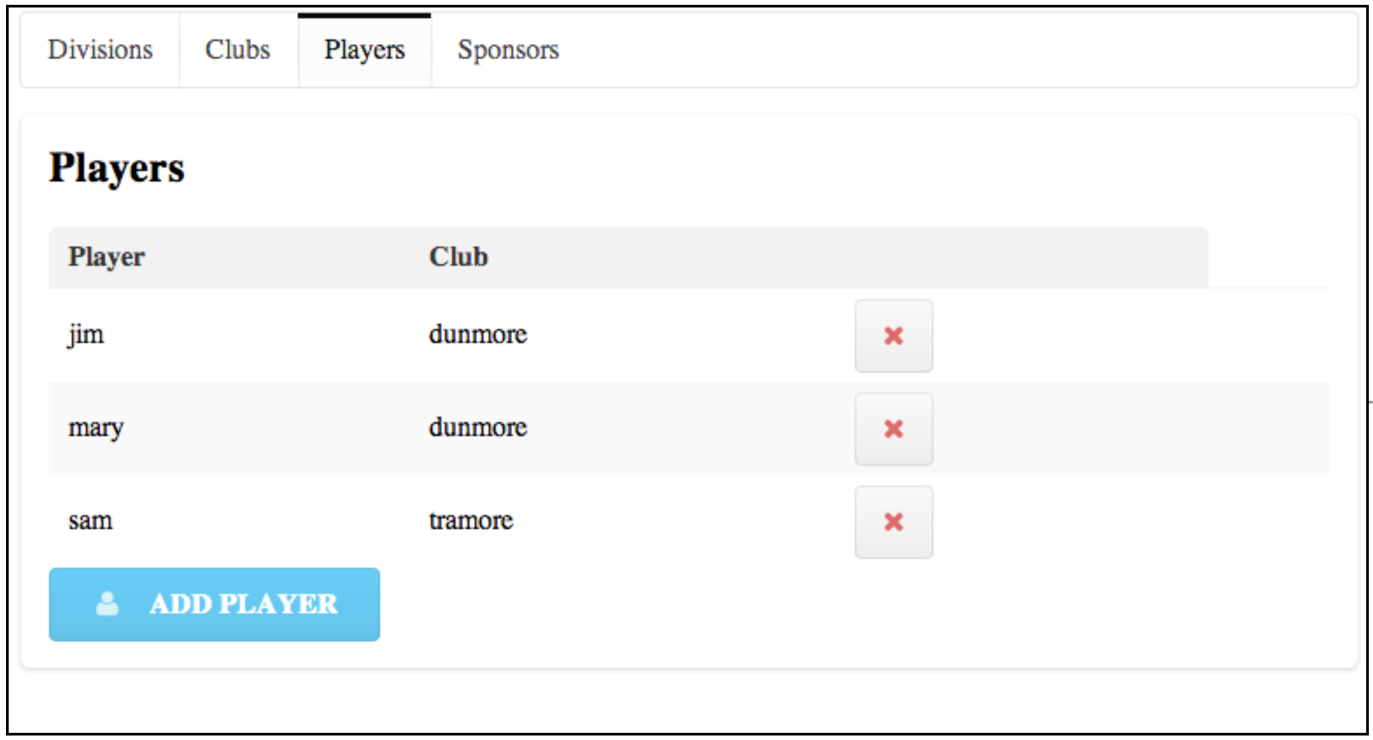
```
        <td>
          <a class="ui ui icon button" href="/sponsors/delete/${sponsor.id}">
           <i class="delete red icon"></i>
          </a>
        </td>
```

```
GET     /sponsors/delete/{id}                        Sponsors.delete
```

```
public static void delete(Long id)
{
  Sponsor sponsor = Sponsor.findById(id);

  for (Club club  : sponsor.support)
  {
    club.sponsors.remove(sponsor);
    club.save();
  }

  sponsor.delete();
  index();
}
```



Create Player



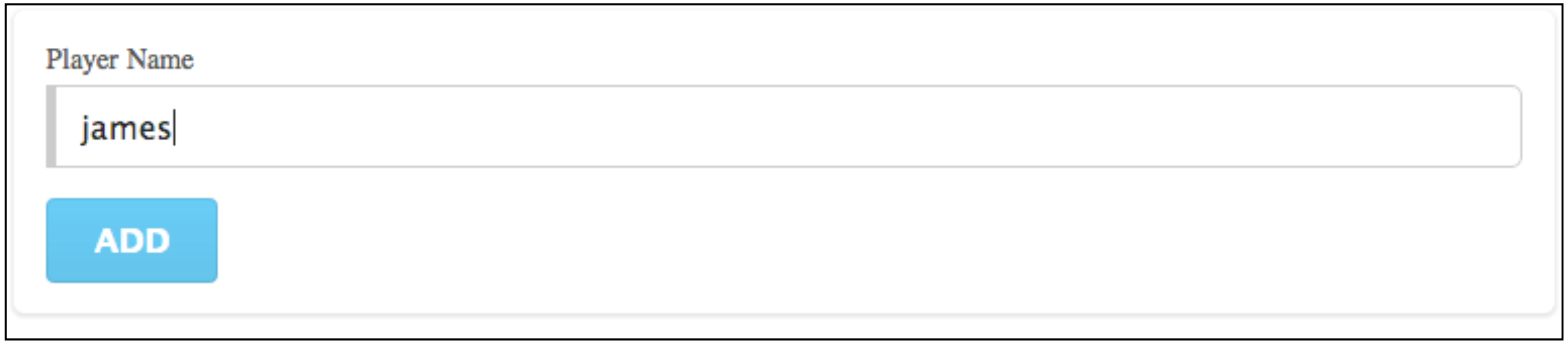
Players

Player	Club
jim	dunmore
mary	dunmore
sam	tramore

```
GET     /players/addplayer                  Players.addPlayer
POST    /players/newplayer                  Players.newPlayer
```

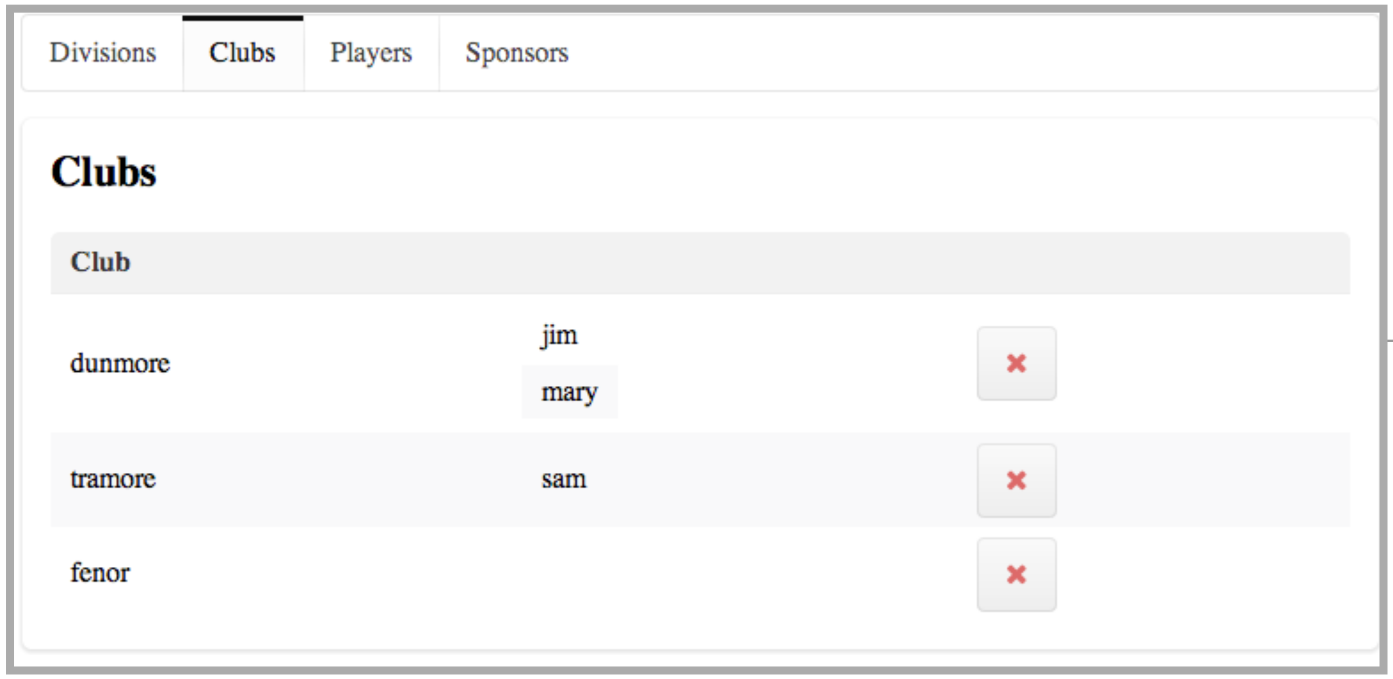
```
#{extends 'main.html' /}
#{set title:'Player Details' /}

<section class="ui raised form segment">
  <form action="/players/newplayer" method="POST">
    <div class="field">
      <label> Player Name </label>
      <input type="text" name="name">
    </div>
    <button class="ui blue submit button">Add</button>
  </form>
</section>
```

```
  public static void addPlayer()
  {
    render();
  }

  public static void newPlayer(String name)
  {
    Player player = new Player (name);
    player.save();
    index();
  }
```



Player Name

james



Clubs

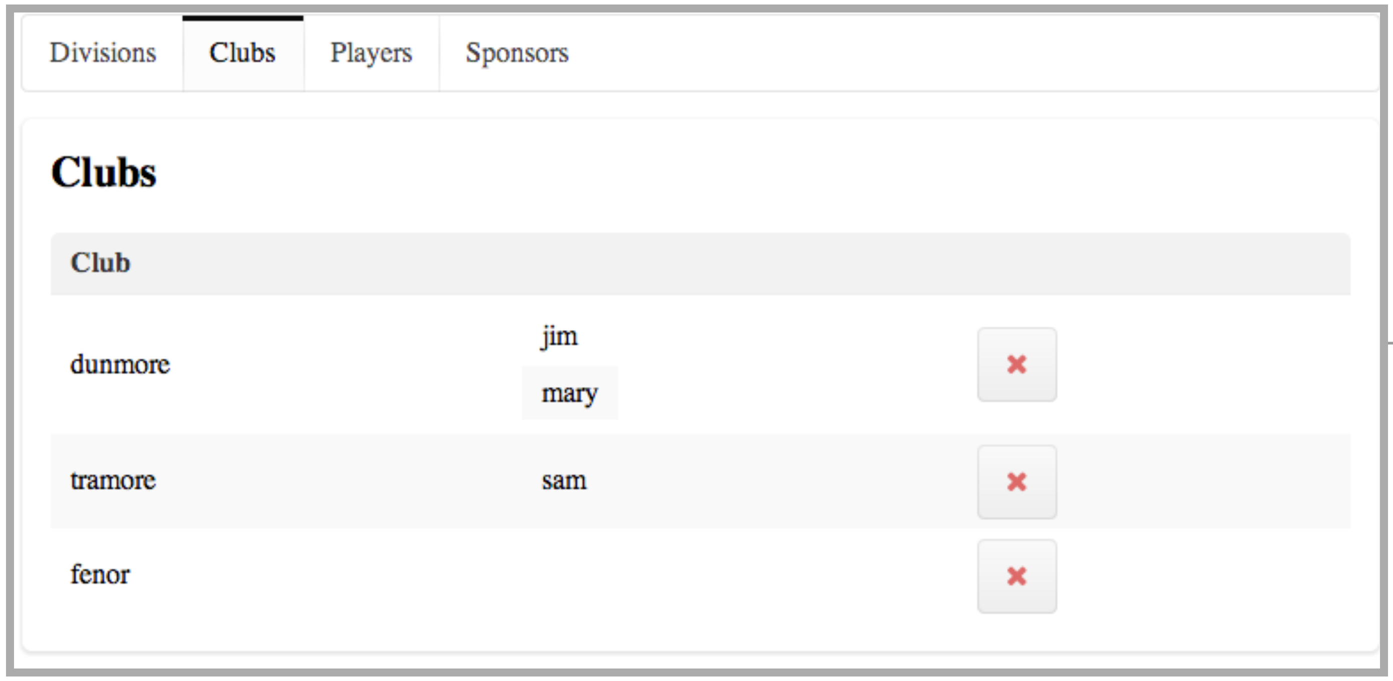
Club		
dunmore	jim mary	✖
tramore	sam	✖
fenor		✖

Null Deference error in Templates

- If the player is not in a club
  - then null type violation error here
  - Attempt to dereference null reference - there is no club member in player

```
#{list items:players, as:'player'}
  <tr>
    <td>${player.name}</td>
    <td>  ${player.club.name} </td>
    <td>
    <a class="ui ui icon button" href="/players/delete/${player.id}">
     <i class="delete red icon"></i>
    </a>
  </td>
    <td></td>
  </tr>
#{/list}
```

Null Safe Operator in Templates



Clubs

Club		
dunmore	jim mary	✖
tramore	sam	✖
fenor		✖

```
#{list items:players, as:'player'}
  <tr>
    <td>${player.name}</td>
    <td>  ${player.club?.name} </td>
    <td>
    <a class="ui ui icon button" href="/players/delete/${player.id}">
     <i class="delete red icon"></i>
    </a>
  </td>
    <td></td>
  </tr>
#{/list}
```

player.club.?name

- .? is a 'null-safe' operator
- i.e. if there is a club, retrieve its name member, if not, then dont.

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