Mobile Application Development

Higher Diploma in Science in Computer Science

Produced by

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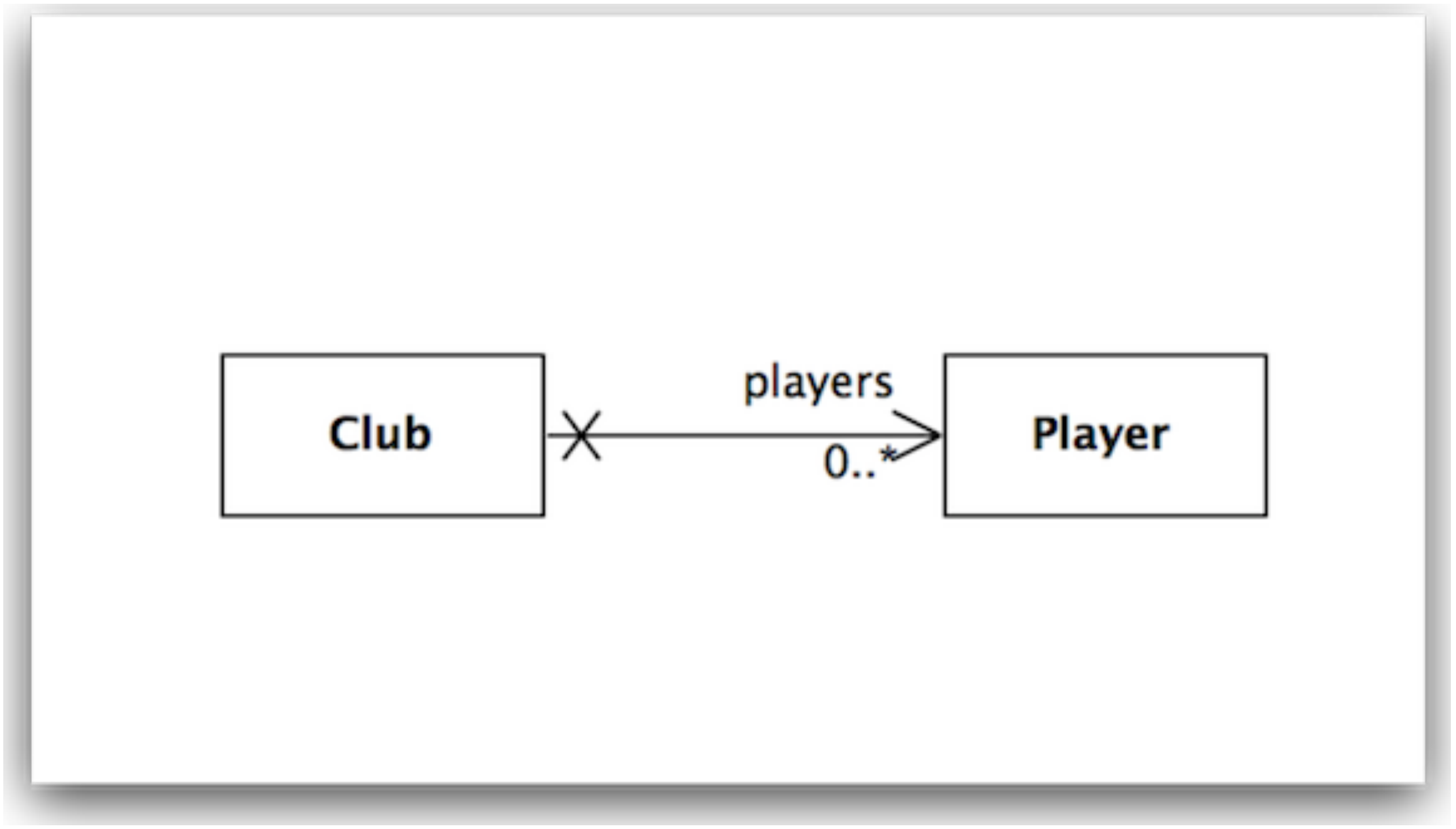
eLearning support unit

Modeling & JPA 2

OneToMany

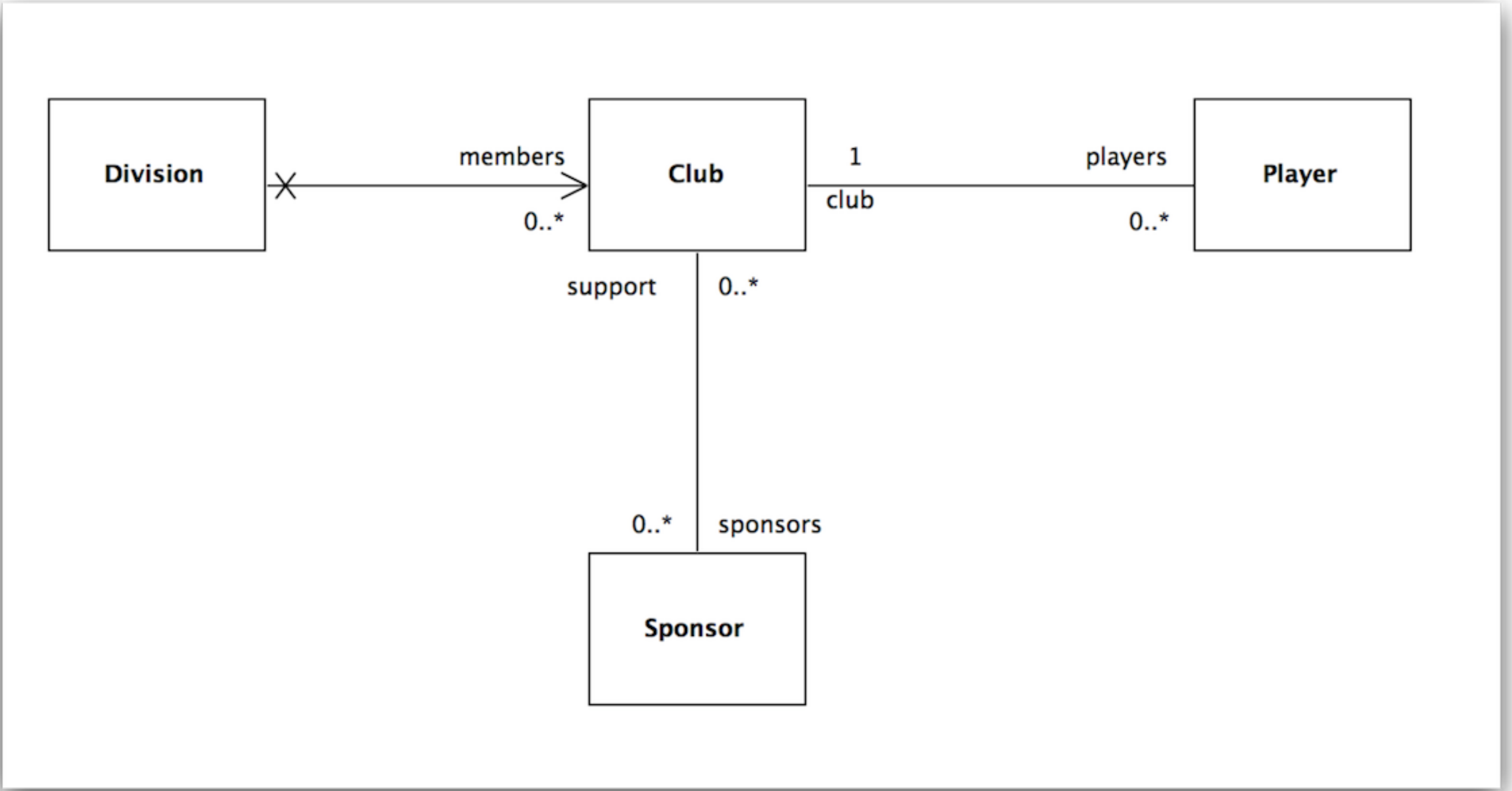


OneToMany - Unidirectional

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

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

  public Club(String name)
  {
    this.name = name;
    this.players = new ArrayList<Player>();
  }

  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;

  public Division(String name)
  {
    this.name = name;
    members = new ArrayList<Club>();
  }

  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;

  @ManyToMany
  public List<Sponsor> sponsors;

  public Club(String name)
  {
    this.name = name;
    this.players = new ArrayList<Player>();
    this.sponsors = new ArrayList<Sponsor>();
  }
  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;

  //..
}
```

```
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;

  public Sponsor(String name)
  {
    this.name = name;
    support = new ArrayList<Club>();
  }

  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;

  @ManyToMany
  public List<Sponsor> sponsors;

  public Club(String name)
  {
    this.name = name;
    this.players = new ArrayList<Player>();
    this.sponsors = new ArrayList<Sponsor>();
  }
  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

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

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
```

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

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

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

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

```
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();
  }
```

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

```
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
```

Test Data

```
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();
  }
```

‘Sanity’ Tests

```
@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 testDivisionClub()
{
  Division senior  = Division.find("byName", "senior").first();
  Club     dunmore = Club.find("byName", "dunmore").first();
  Club     tramore = Club.find("byName", "tramore").first();

  assertTrue (senior.members.contains(dunmore));
  assertTrue (senior.members.contains(tramore));
}

@Test
public void testClubSponsorShort()
{
  Sponsor  newsagent = Sponsor.find("byName", "newsagent").first();
  Club     dunmore   = Club.find("byName", "dunmore").first();
  Club     tramore   = Club.find("byName", "tramore").first();

  assertTrue(newsagent.support.contains(dunmore));
  assertTrue(newsagent.support.contains(tramore));

  assertTrue(dunmore.sponsors.contains(newsagent));
  assertTrue(tramore.sponsors.contains(newsagent));
}
```

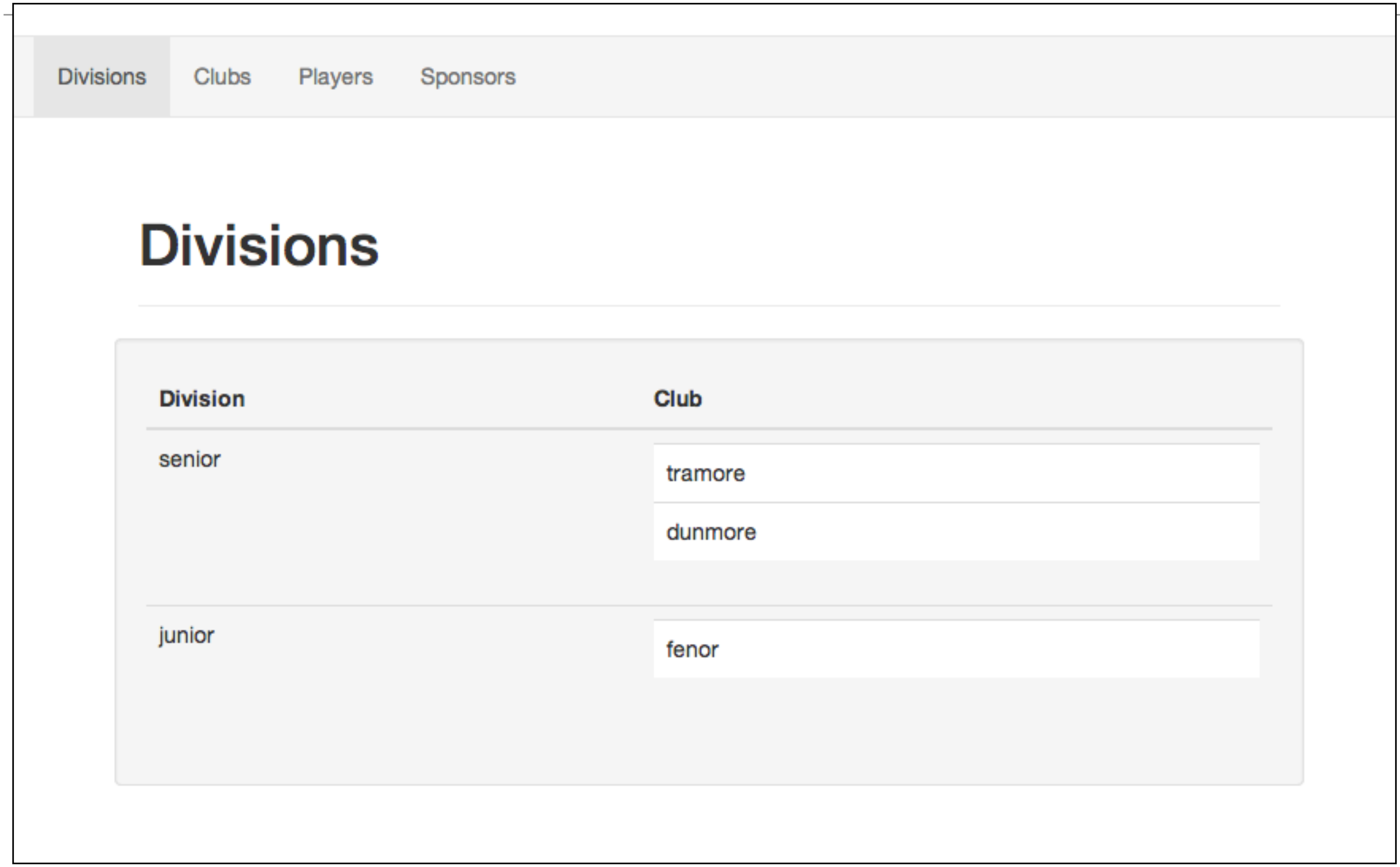
‘Long’ Tests

```
@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 testDivisionClubLong()
{
  Division senior = Division.find("byName", "senior").first();
  assertNotNull(senior);
  assertEquals(2, senior.members.size());

  Club c1 = senior.members.get(0);
  Club c2  = senior.members.get(1);

  assertTrue (c1.name.equals("tramore") || c1.name.equals("dunmore"));
  assertTrue (c2.name.equals("tramore") || c2.name.equals("dunmore"));
}
```

‘Edit’ Tests

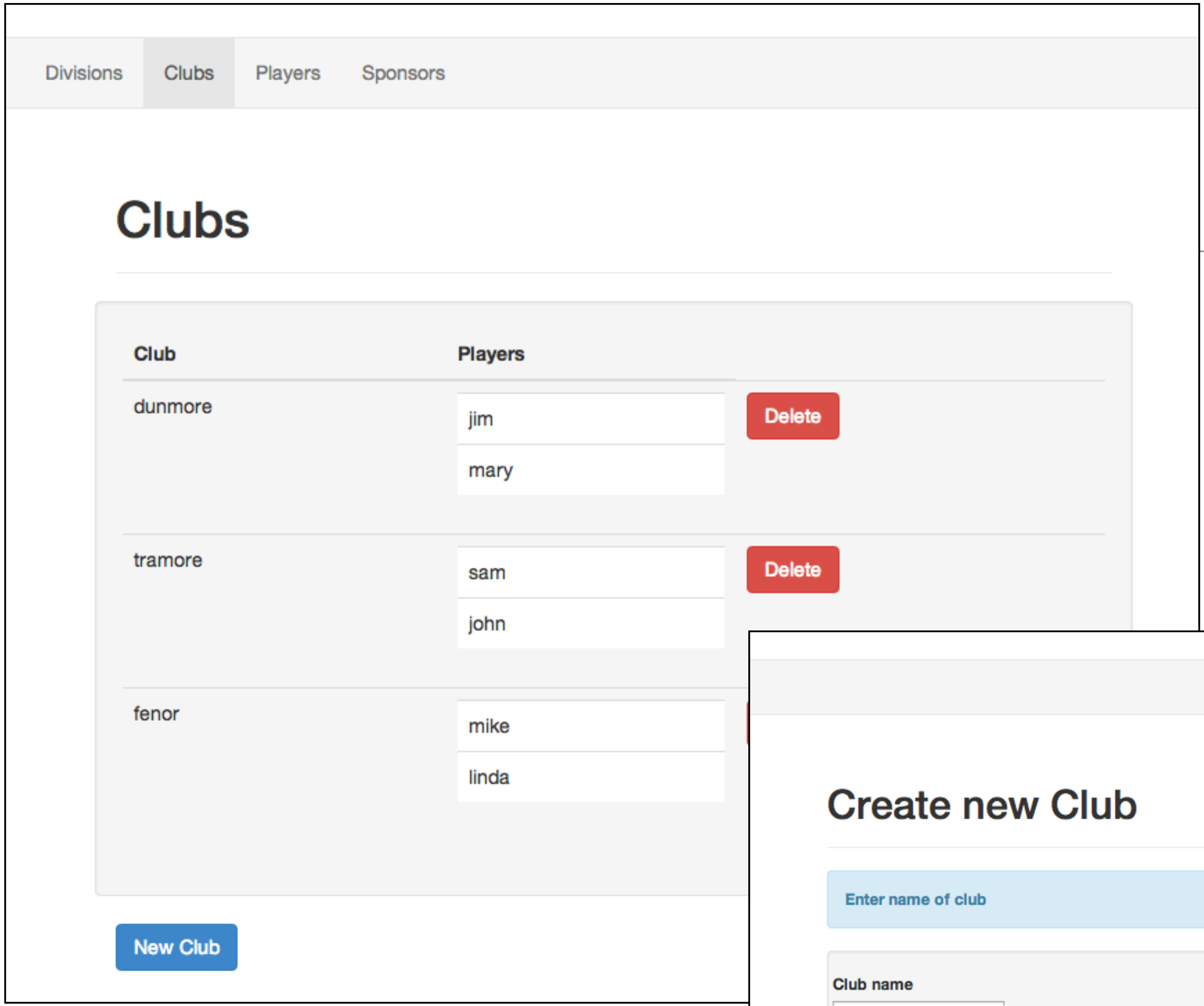
```
@Test
public void testEditPlayerClub()
{
  Club   dunmore = Club.find("byName", "dunmore").first();
  Player jim     = Player.find("byName", "jim").first();
  Player mary    = Player.find("byName", "mary").first();

  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);
}

@Test
public void testEditClubSponsor()
{
  Sponsor  newsagent = Sponsor.find("byName", "newsagent").first();
  Club     dunmore   = Club.find("byName", "dunmore").first();

  assertEquals(2, newsagent.support.size());

  newsagent.support.remove(dunmore);
  dunmore.sponsors.remove(newsagent);

  newsagent.save();
  dunmore.save();

  assertEquals(1, newsagent.support.size());
}
```

Schema App



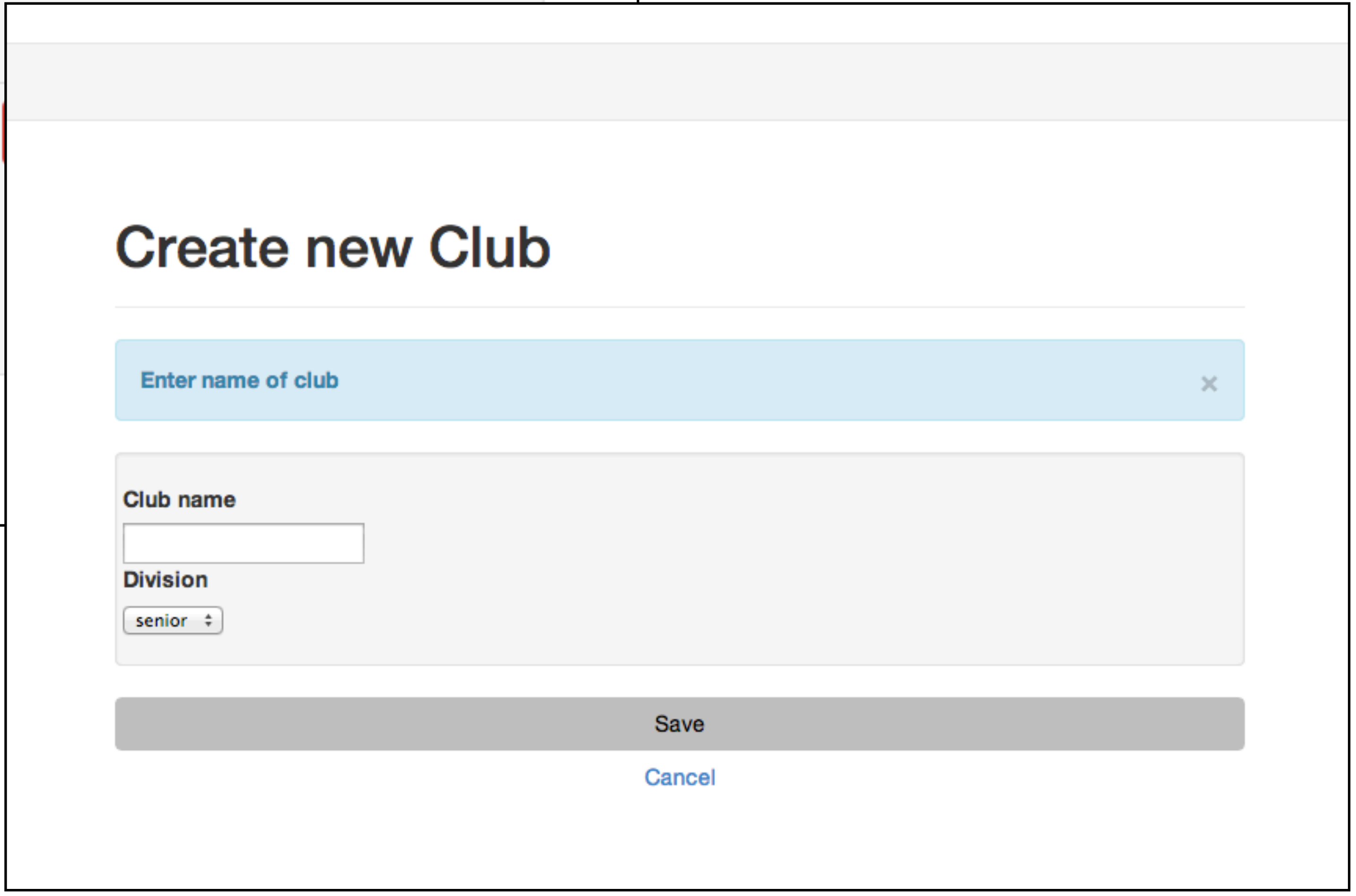
Divisions

Division	Club
senior	tramore dunmore
junior	fenor



Clubs

Club	Players
dunmore	jim mary
tramore	sam john
fenor	mike linda



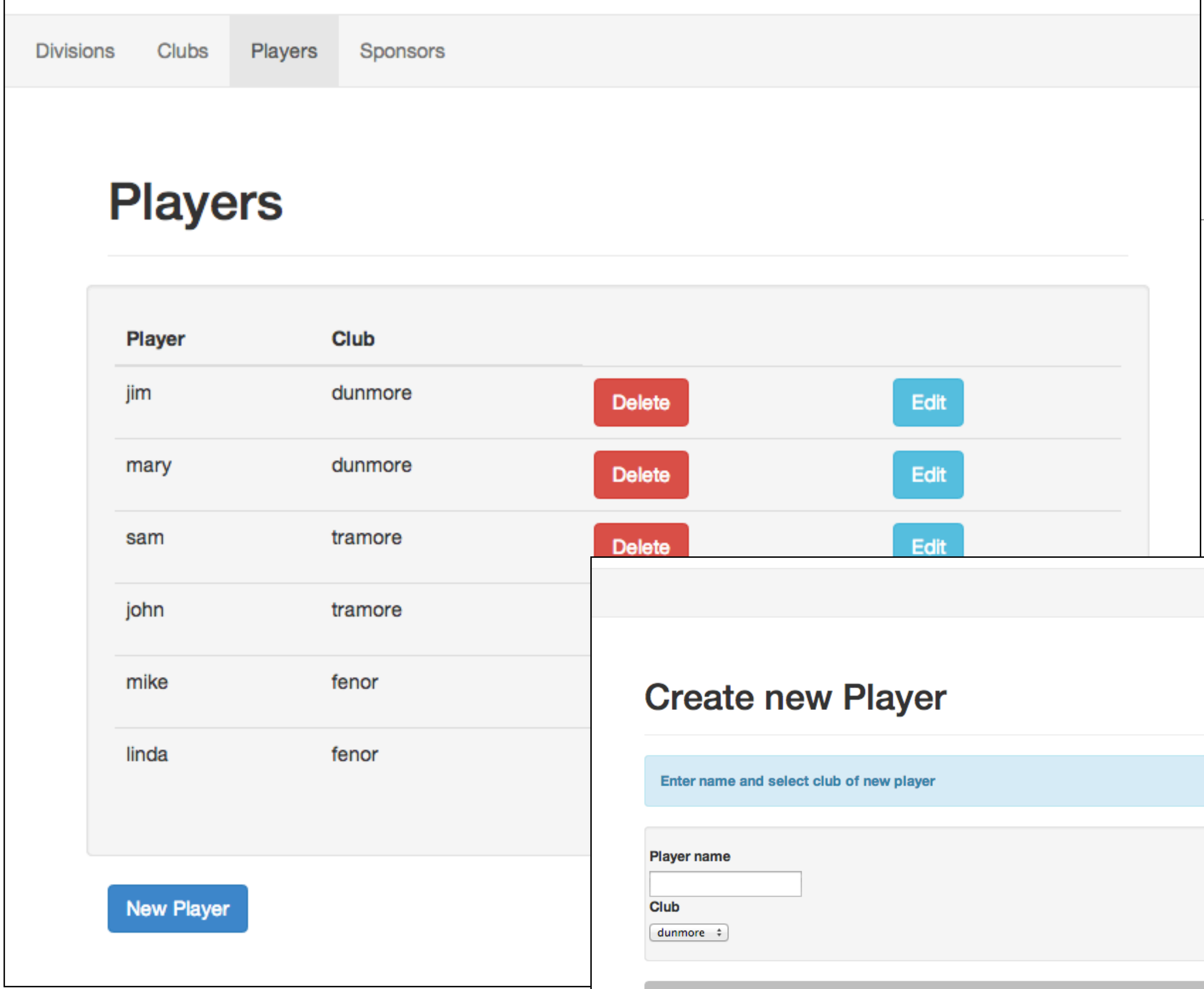
Create new Club

Enter name of club

Club name

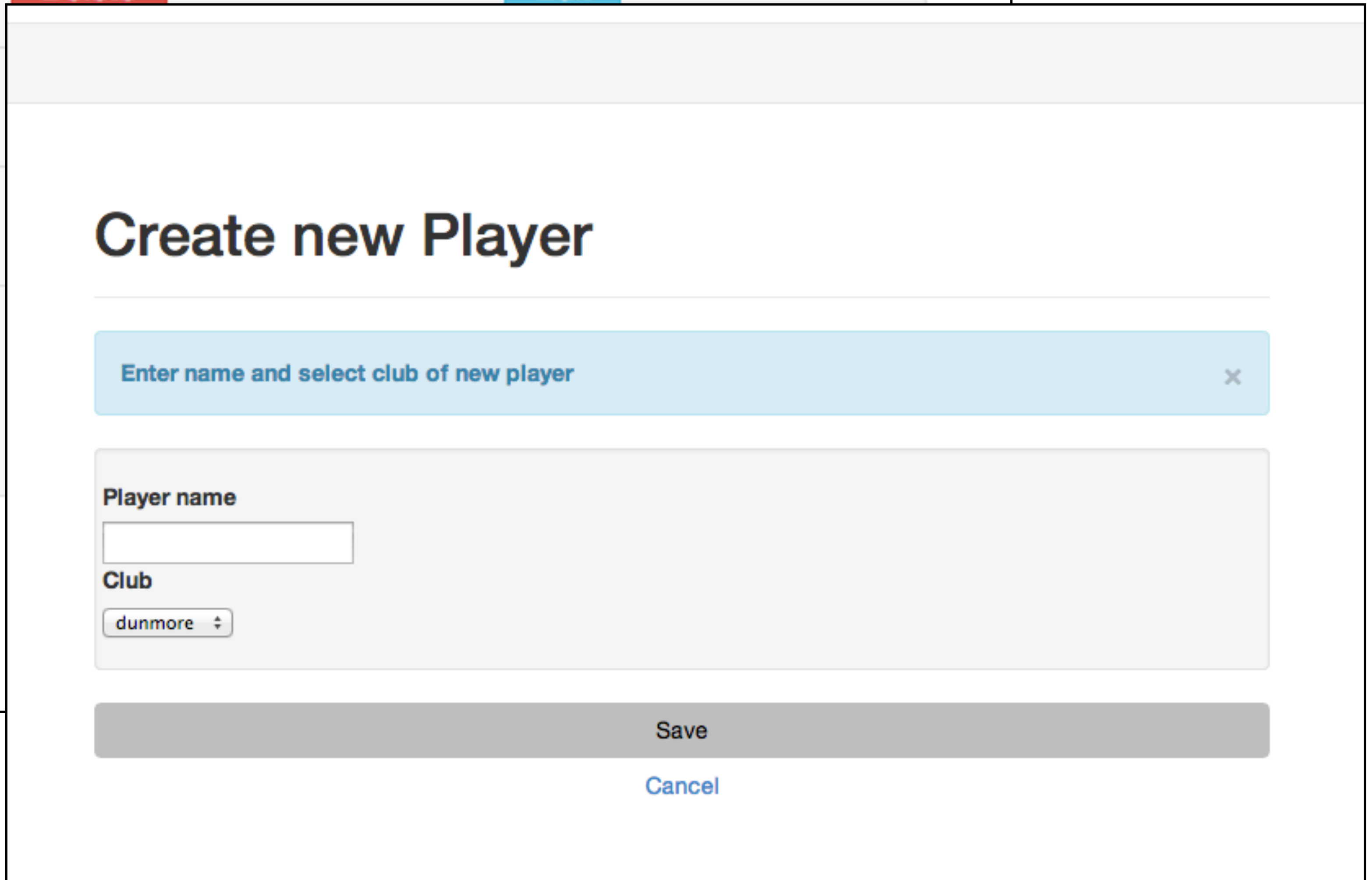
Division

senior



Players

Player	Club		
jim	dunmore	Delete	Edit
mary	dunmore	Delete	Edit
sam	tramore	Delete	Edit
john	tramore		
mike	fenor		
linda	fenor		

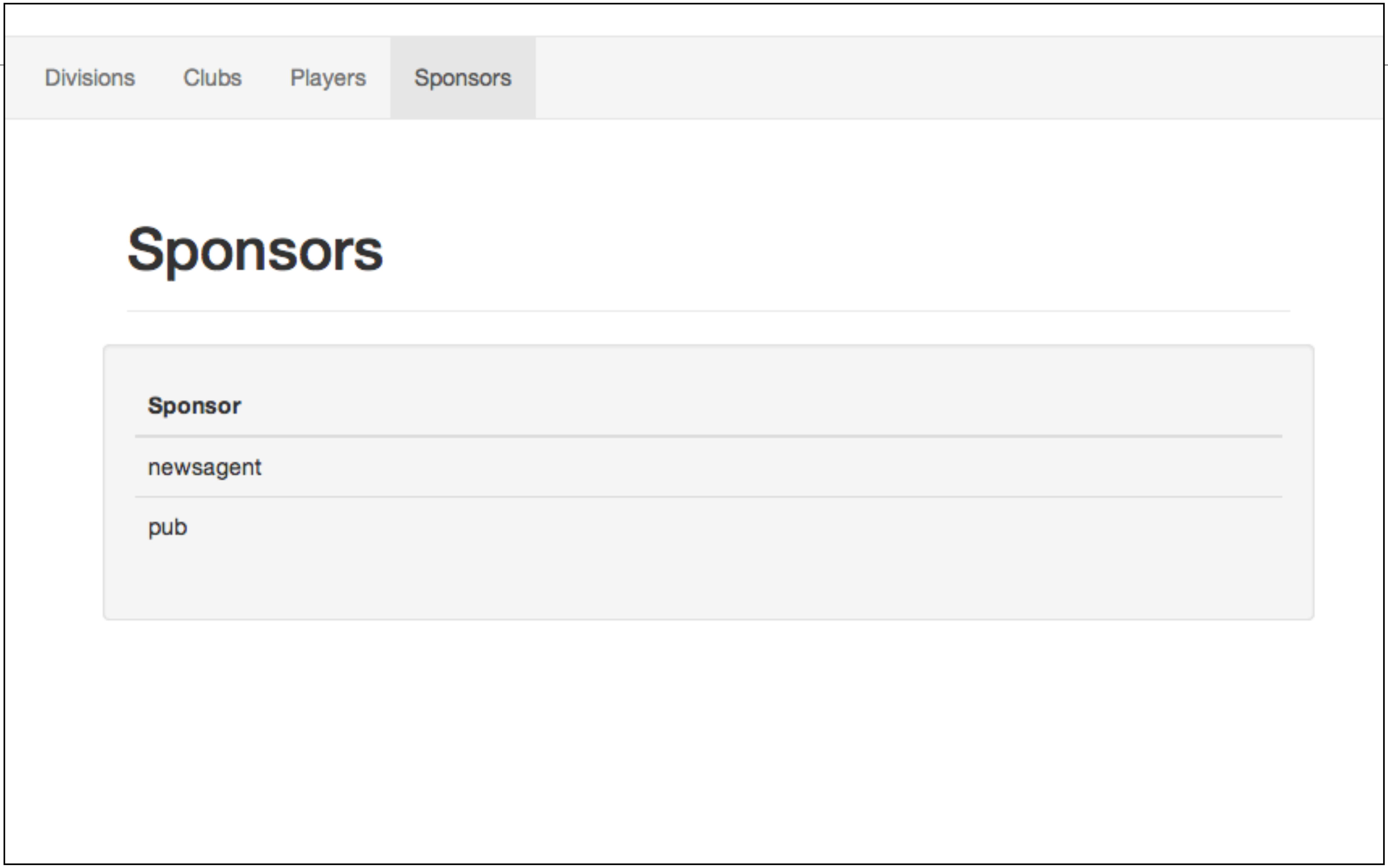


Create new Player

Enter name and select club of new player

Player name

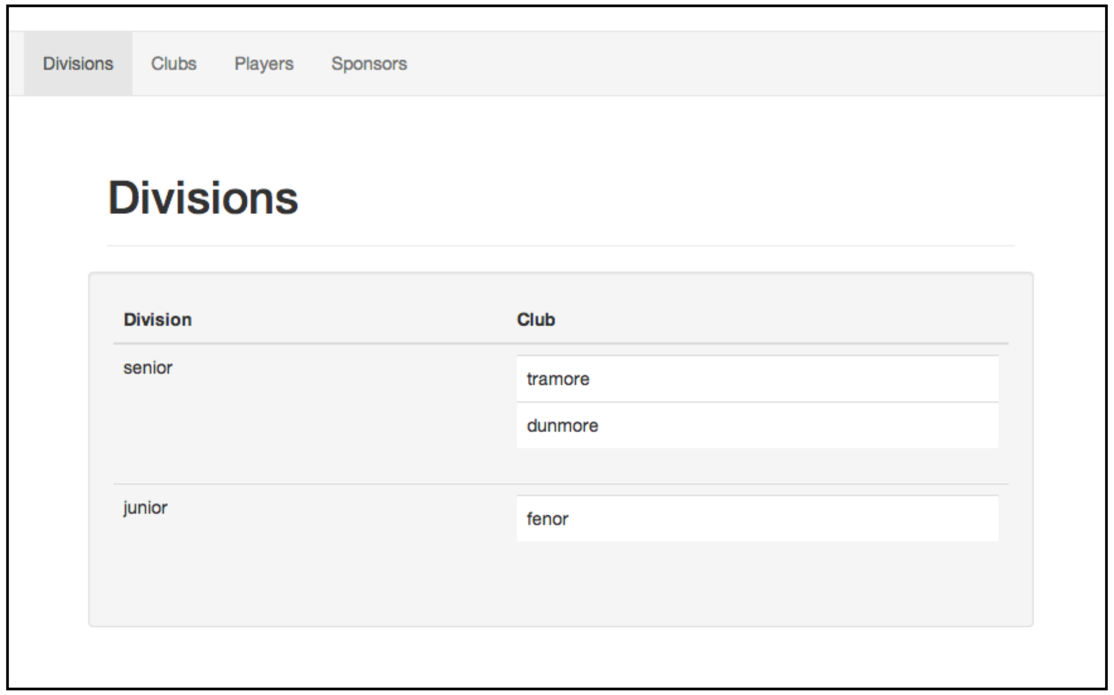
Club: dunmore



Sponsors

Sponsor
newsagent
pub

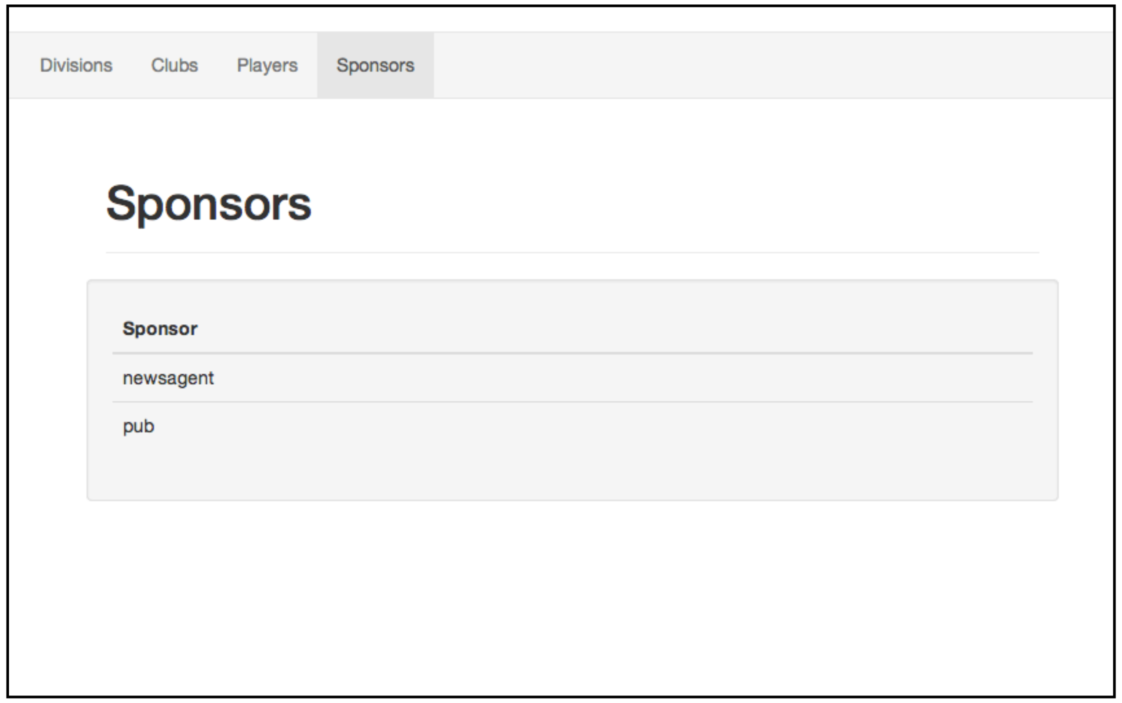
Division & Sponsors Controllers



Divisions

Division	Club
senior	tramore
	dunmore
junior	fenor

```
public class DivisionController extends Controller
{
  public static void index()
  {
    List<Division> divisions = Division.findAll();

    render (divisions);
  }
}
```

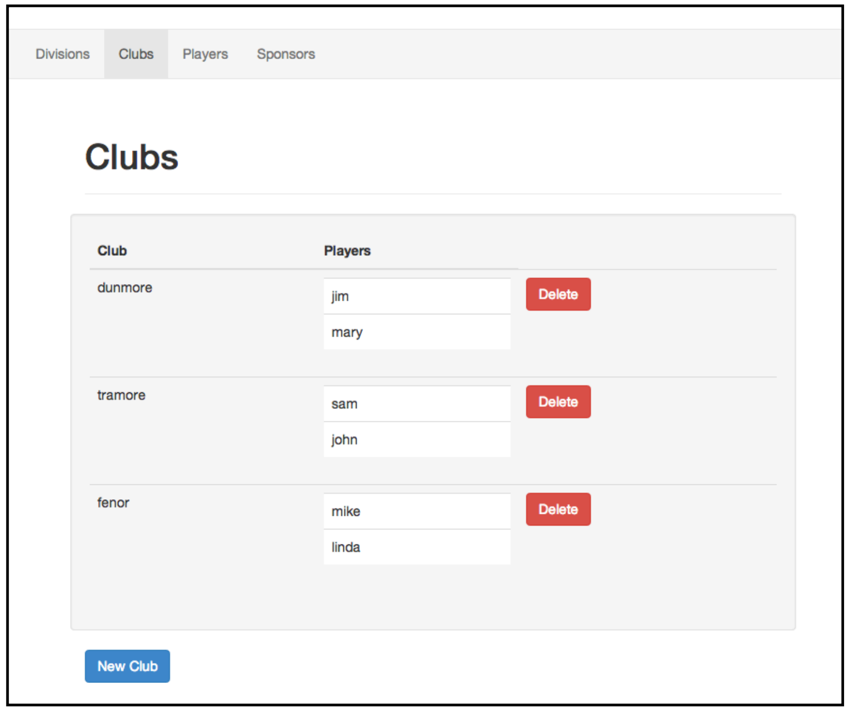


Sponsors

Sponsor
newsagent
pub

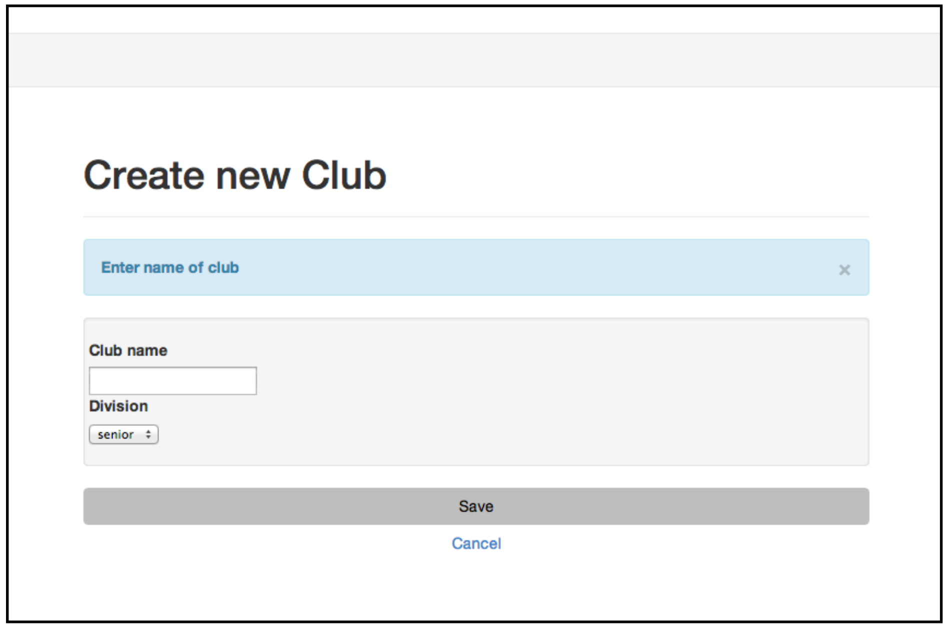
```
public class SponsorsController extends Controller
{
  public static void index()
  {
    List<Sponsor> sponsors = Sponsor.findAll();
    render (sponsors);
  }
}
```

Clubs Controller (1)



Clubs

Club	Players	
dunmore	jim	Delete
	mary	
tramore	sam	Delete
	john	
fenor	mike	Delete
	linda	



Create new Club

Enter name of club

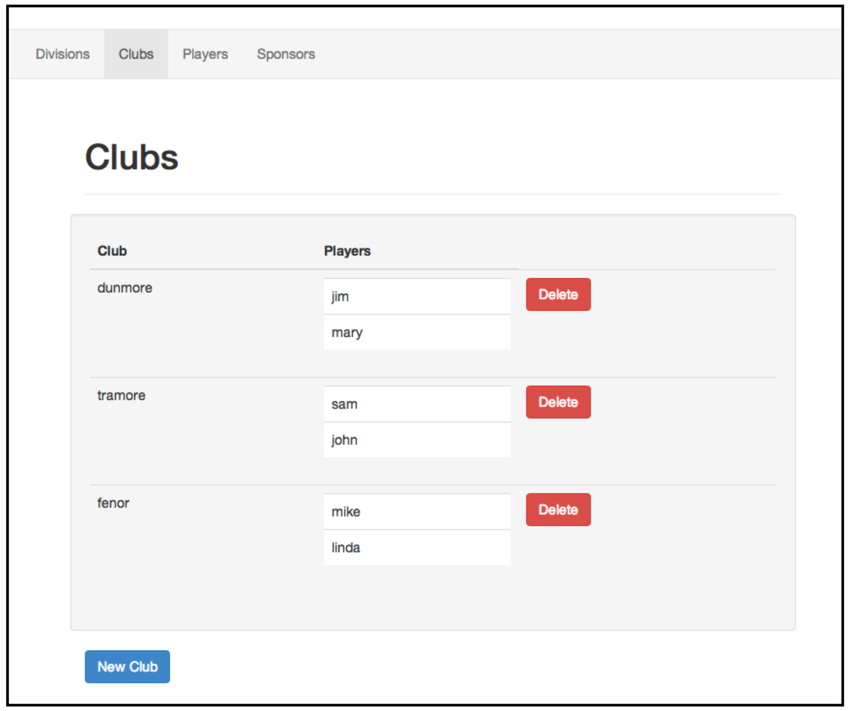
Club name

Division

senior

```
public class ClubsController extends Controller
{
  public static void index()
  {
    List<Club> clubs = Club.findAll();
    render (clubs);
  }

  public static void newClub()
  {
    List<Division> divisions = Division.findAll();
    render(divisions);
  }


  public static void createClub (String name, String division)
  {
    Logger.info("name: " + name + "Division: " + division);

    Club club = new Club(name);
    club.save();

    Division theDivision = Division.findByName(division);
    if (theDivision != null)
    {
      theDivision.addClub(club);
      theDivision.save();
    }
    index();
  }

...

}
```

Clubs Controller (2)

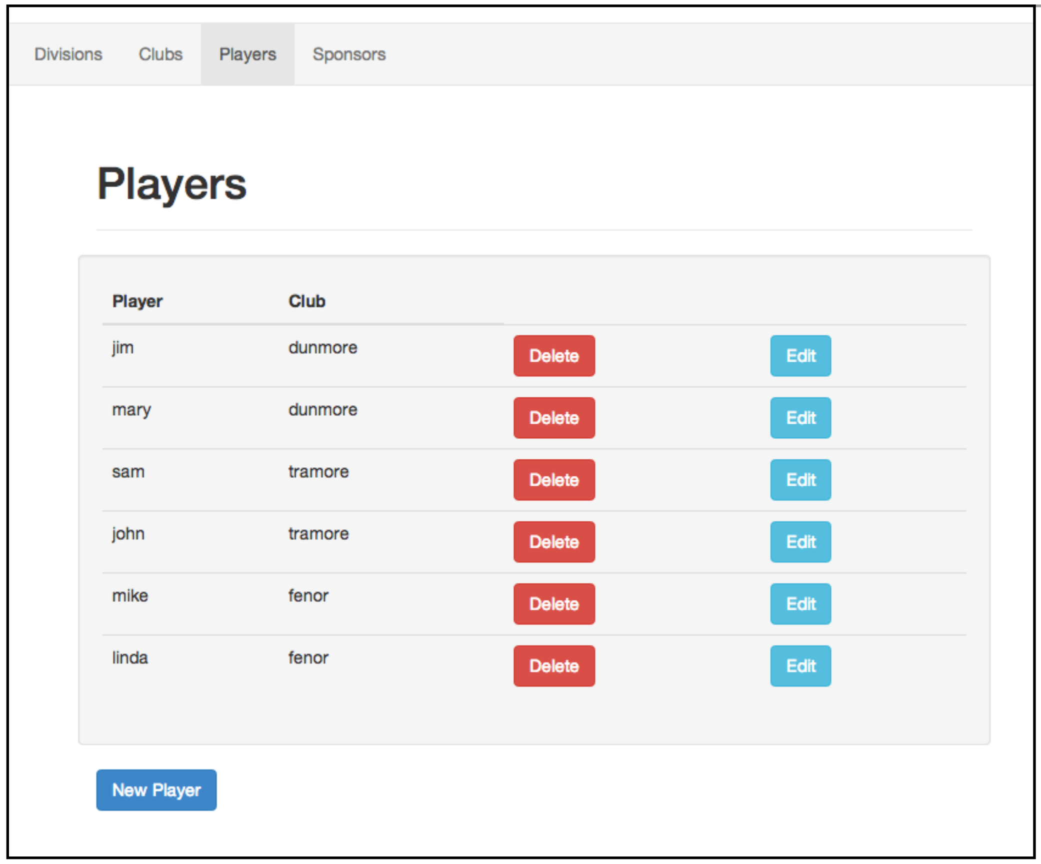


Clubs

Club	Players
dunmore	jim mary
tramore	sam john
fenor	mike linda

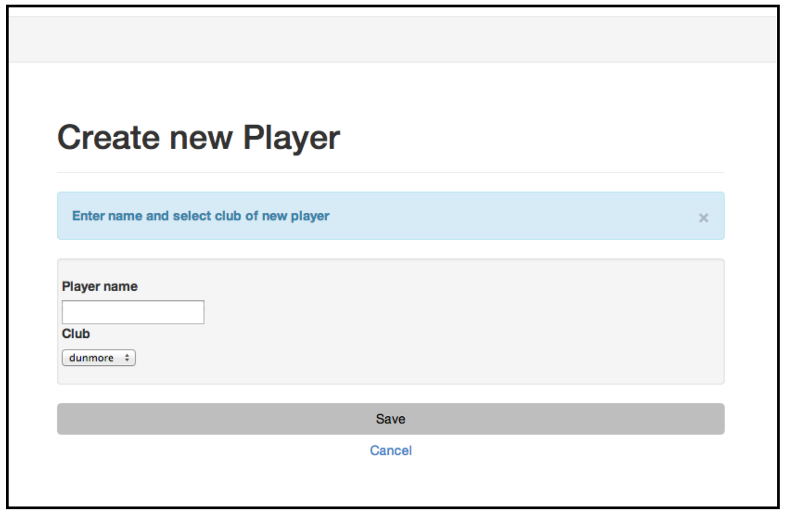
```
public class ClubsController extends Controller
{

  //...
  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();
  }


}
```

Players Controller (1)



Players

Player	Club		
jim	dunmore	Delete	Edit
mary	dunmore	Delete	Edit
sam	tramore	Delete	Edit
john	tramore	Delete	Edit
mike	fenor	Delete	Edit
linda	fenor	Delete	Edit



Create new Player

Enter name and select club of new player

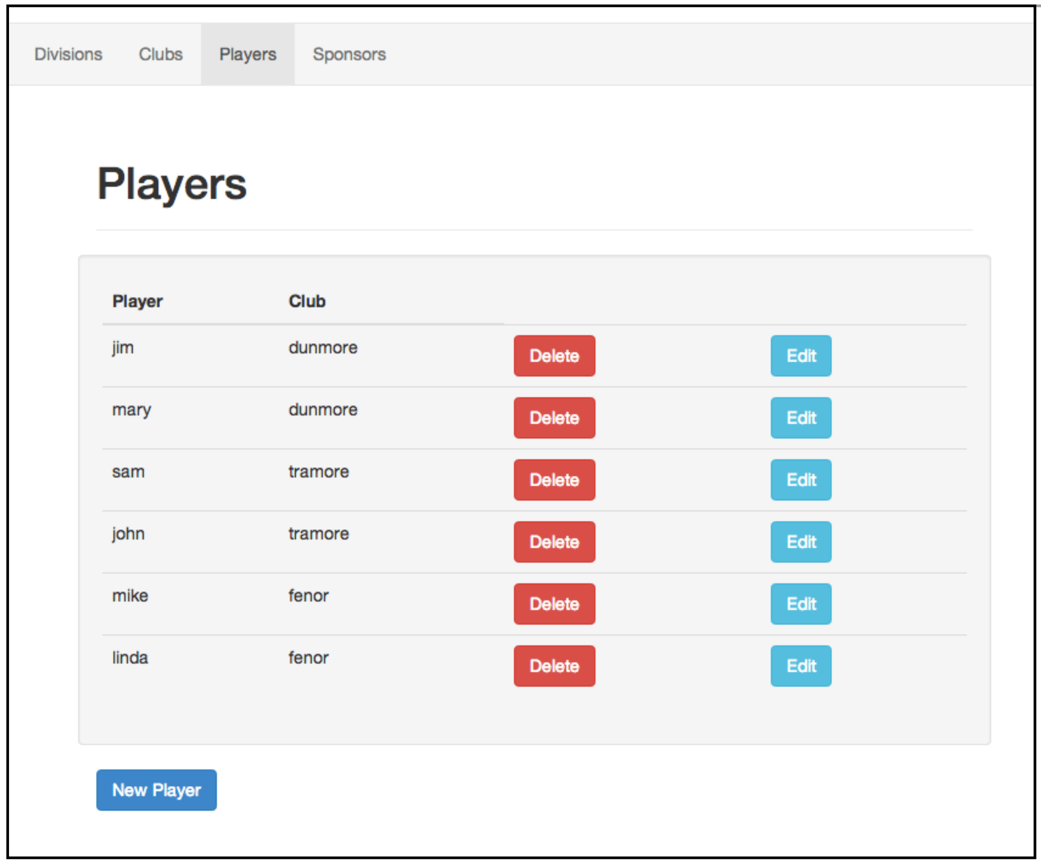
Player name

Club

dunmore

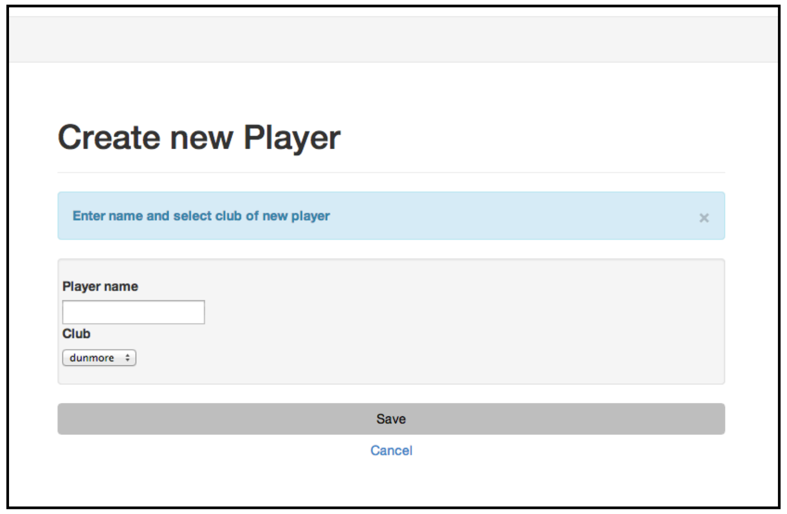
```
public class PlayersController extends Controller
{
  public static void index()
  {
    List<Player> players = Player.findAll();
    render (players);
  }

  public static void delete(Long id)
  {
    Player player = Player.findById(id);
    if (player != null)
    {
      player.club.removePlayer(player);
      player.club.save();
      player.delete();
    }
    index();
  }

  public static void newPlayer()
  {
    List<Club> clubs = Club.findAll();
    render(clubs);
  }

  public static void createPlayer(String name, String club)
  {
    Logger.info("Name: " + name + ": Club: " + club);

    Player player = new Player (name);
    Club theClub = Club.findByName(club);
    if (theClub != null)
    {
      theClub.addPlayer(player);
      theClub.save();
    }
    index();
  }
```

Players Controller (2)



Players

Player	Club		
jim	dunmore	Delete	Edit
mary	dunmore	Delete	Edit
sam	tramore	Delete	Edit
john	tramore	Delete	Edit
mike	fenor	Delete	Edit
linda	fenor	Delete	Edit



Create new Player

Enter name and select club of new player

Player name

Club

dunmore

```java
public class PlayersController extends Controller
{

  //...
  public static void changePlayer(Long id, String name, Long club)
  {
    Player player = Player.findById(id);
    if (player != null)
    {
      player.name = name;
      Club theClub = Club.findById(club);
      player.club = theClub;
      player.save();
    }
    index();
  }

  public static void editPlayer(Long id)
  {
    Player player = Player.findById(id);
    List<Club> clubs = Club.findAll();
    Integer clubIndex = clubs.indexOf(player.club);
    clubIndex++;
    render(player, clubs, clubIndex);
  }
}
```

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