App Development & Modeling

BSc in Applied Computing

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eLearning support unit

UML & JPA Modeling

Agenda

- Introduce UML Class Diagram modeling using Visual Paradigm
- Define a simple model and implement it in Play
- Write comprehensive unit tests to exercise the model

JPA Model Project

Start by creating a brand new Play project. Do this by determining the parent folder (most likely your workspace) and running a command prompt. Then type:

```
play new jpamodel
```

Once this has completed, change into the folder just created (jpamodel) and run the eclipsify command:

```
cd jpamodel
play eclipsify
```

We will make one small change to the default 'conf/dependencies.yml':

```
# Application dependencies

require:
    - play
    - play -> cloudbees 0.2.2
```

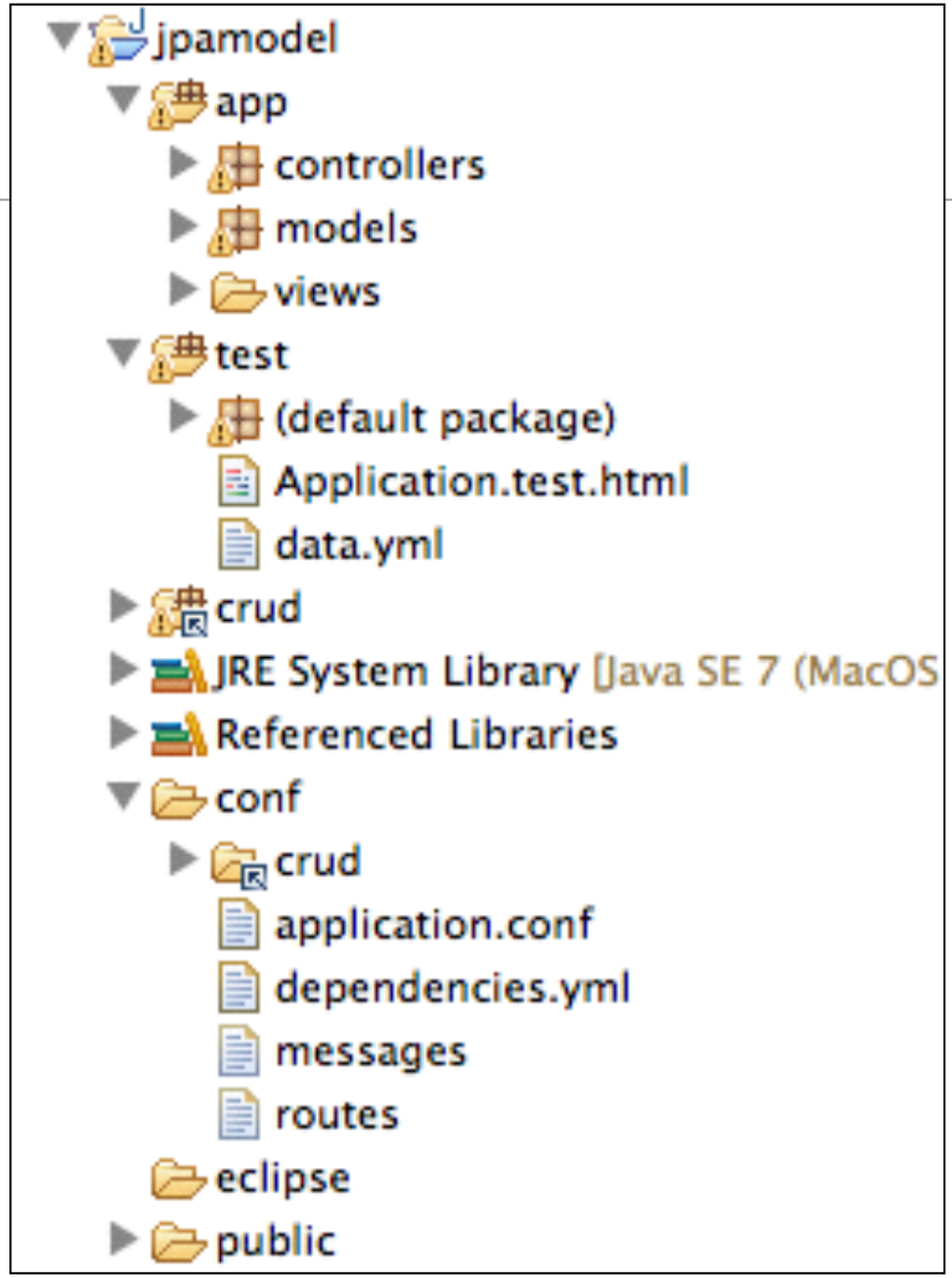
For this to take effect you will need to do two commands again:

```
play deps
play eclipsify
```

Back in eclipse, refresh (File->Refresh) the project.

Finally, in conf/application.conf, uncomment the following line:

```
db=mem
```


jpamodel
app
controllers
models
views
test
(default package)
Application.test.html
data.yml
crud
JRE System Library [Java SE 7 (MacOS
Referenced Libraries
conf
crud
application.conf
dependencies.yml
messages
routes
eclipse
public

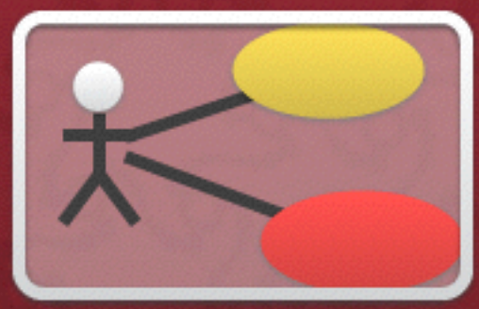
Visual Pardigm

Visual Paradigm for UML

Model-Code-Deploy Platform

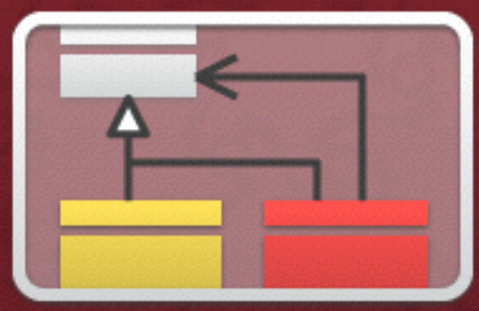
- An intuitive interface helps hit the ground running with deliverables
- Able to scale to best fit your needs
- Effortless translation between design and code

What VP-UML Provides | Tutorials



Requirements Capturing

Capture system requirements with use case diagram, SysML requirement diagrams and textual analysis.



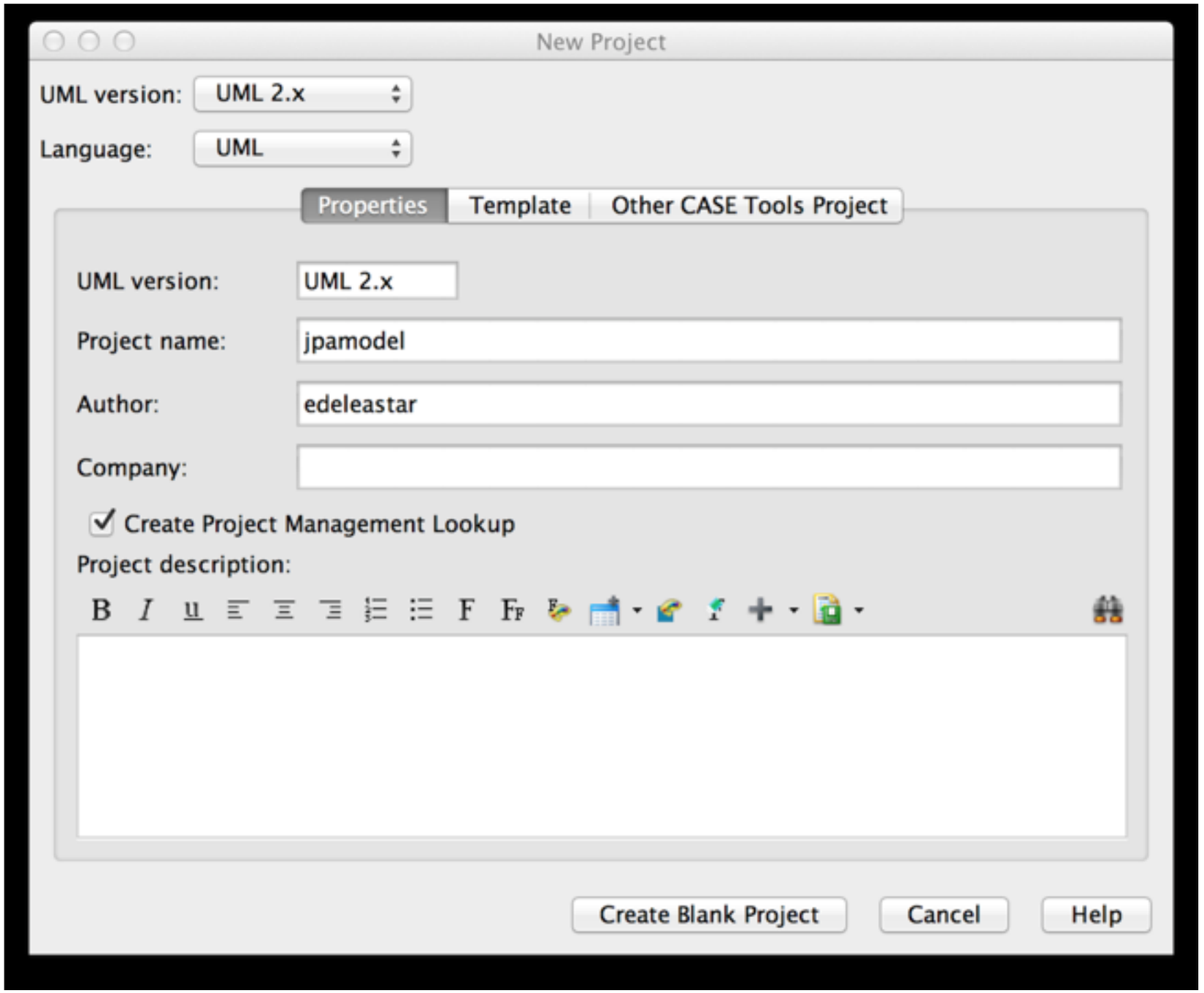
Software Design

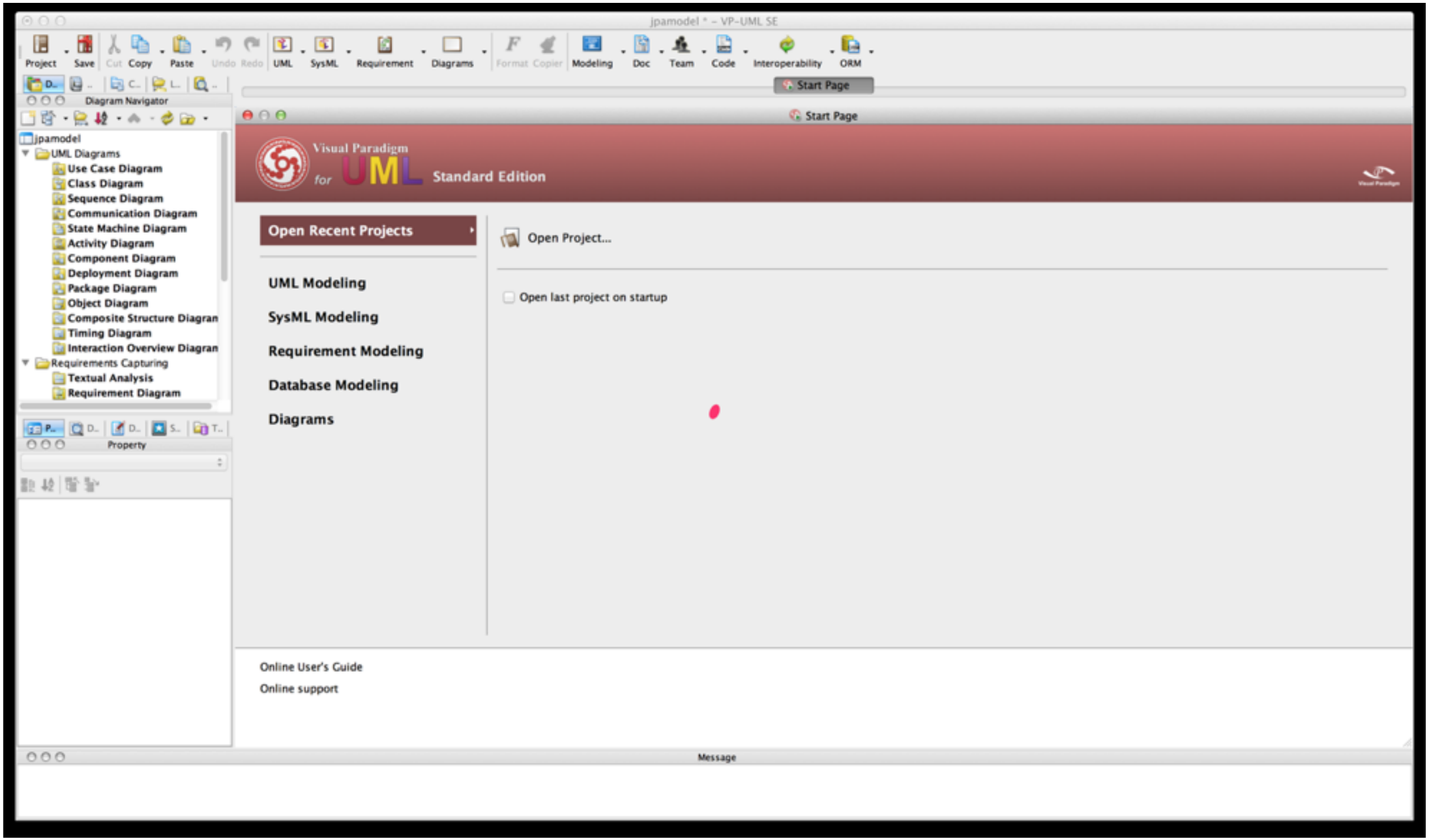
Design system structure with Class Diagram, composite structure diagram. Model interactions with Sequence Diagram.

Database and Code Generation

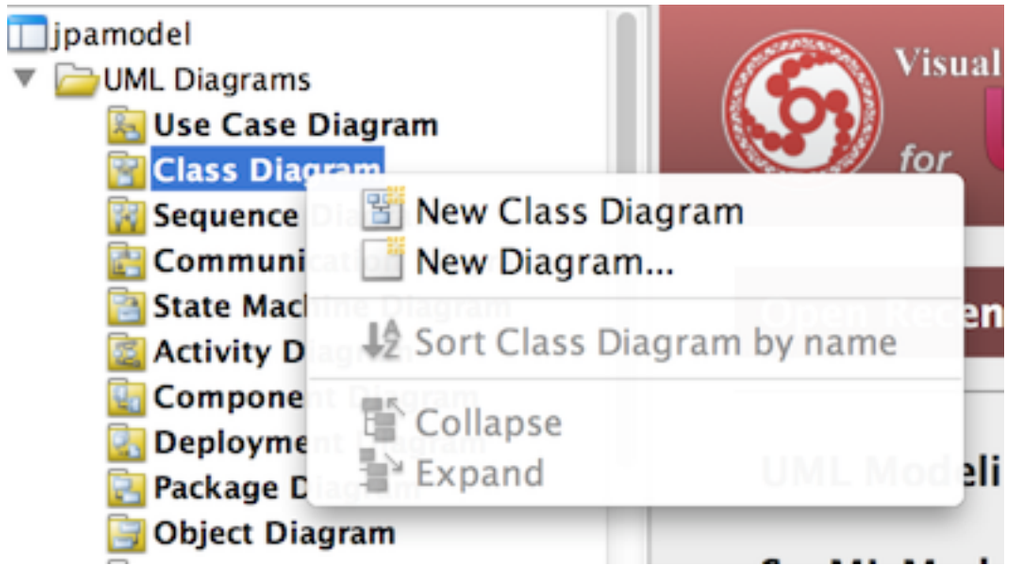
Design database with entity relationship diagram. Generate UML class diagram.

Create new Model

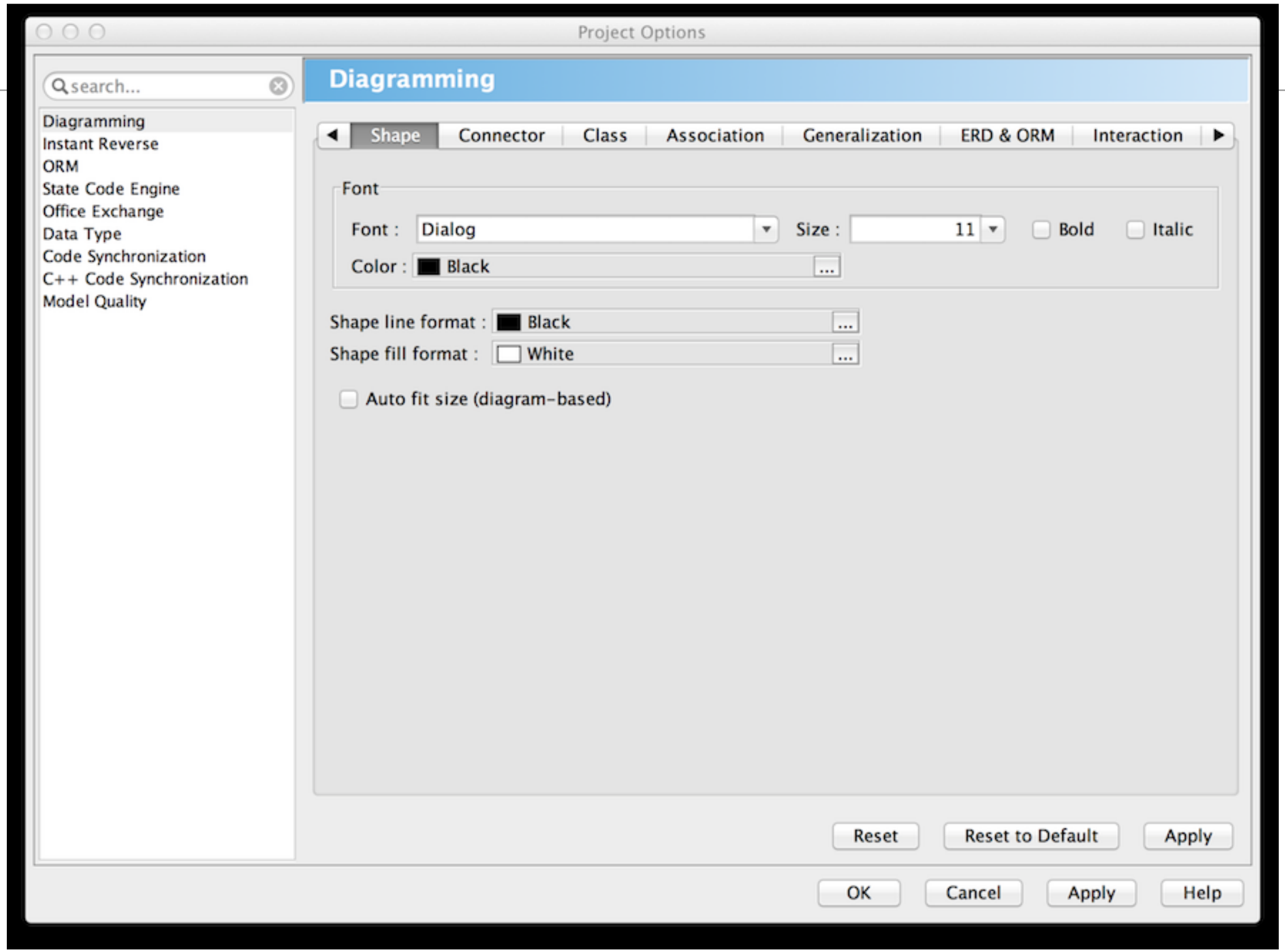



jpamodel * – VP-UML SE
Project
Save
Cut
Copy
Paste
Undo
Redo
UML
SysML
Requirement
Diagrams
Format
Copier
Modeling
Doc
Team
Code
Interoperability
ORM
Start Page
Diagram Navigator
jpamodel
UML Diagrams
Use Case Diagram
Class Diagram
Sequence Diagram
Communication Diagram
State Machine Diagram
Activity Diagram
Component Diagram
Deployment Diagram
Package Diagram
Object Diagram
Composite Structure Diagran
Timing Diagram
Interaction Overview Diagran
Requirements Capturing
Textual Analysis
Requirement Diagram
Property
Start Page
Visual Paradigm
for UML
Standard Edition
Open Recent Projects
UML Modeling
SysML Modeling
Requirement Modeling
Database Modeling
Diagrams
Open Project...
Open last project on startup
Online User's Guide
Online support
Message

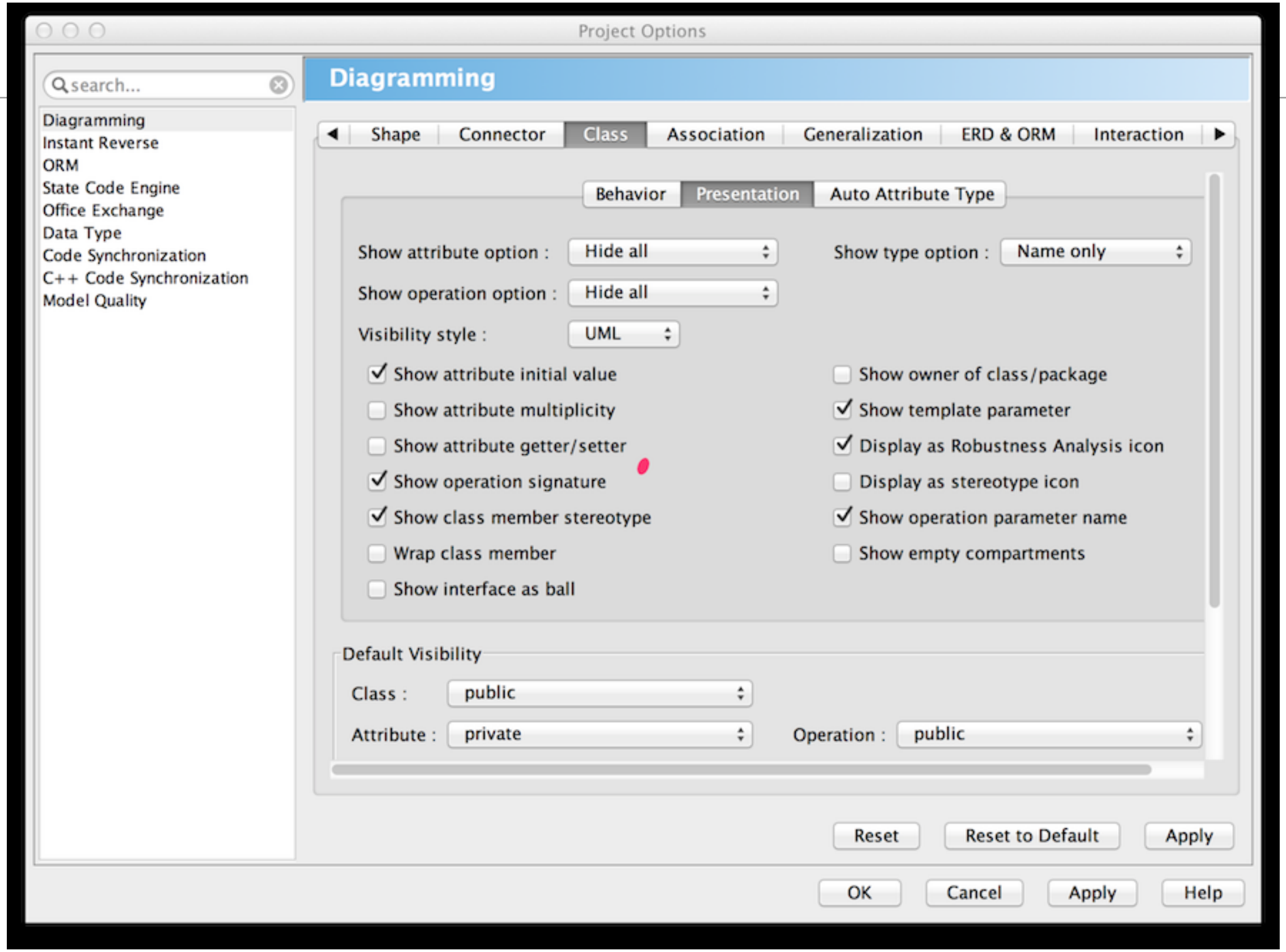
Create New Class Diagram



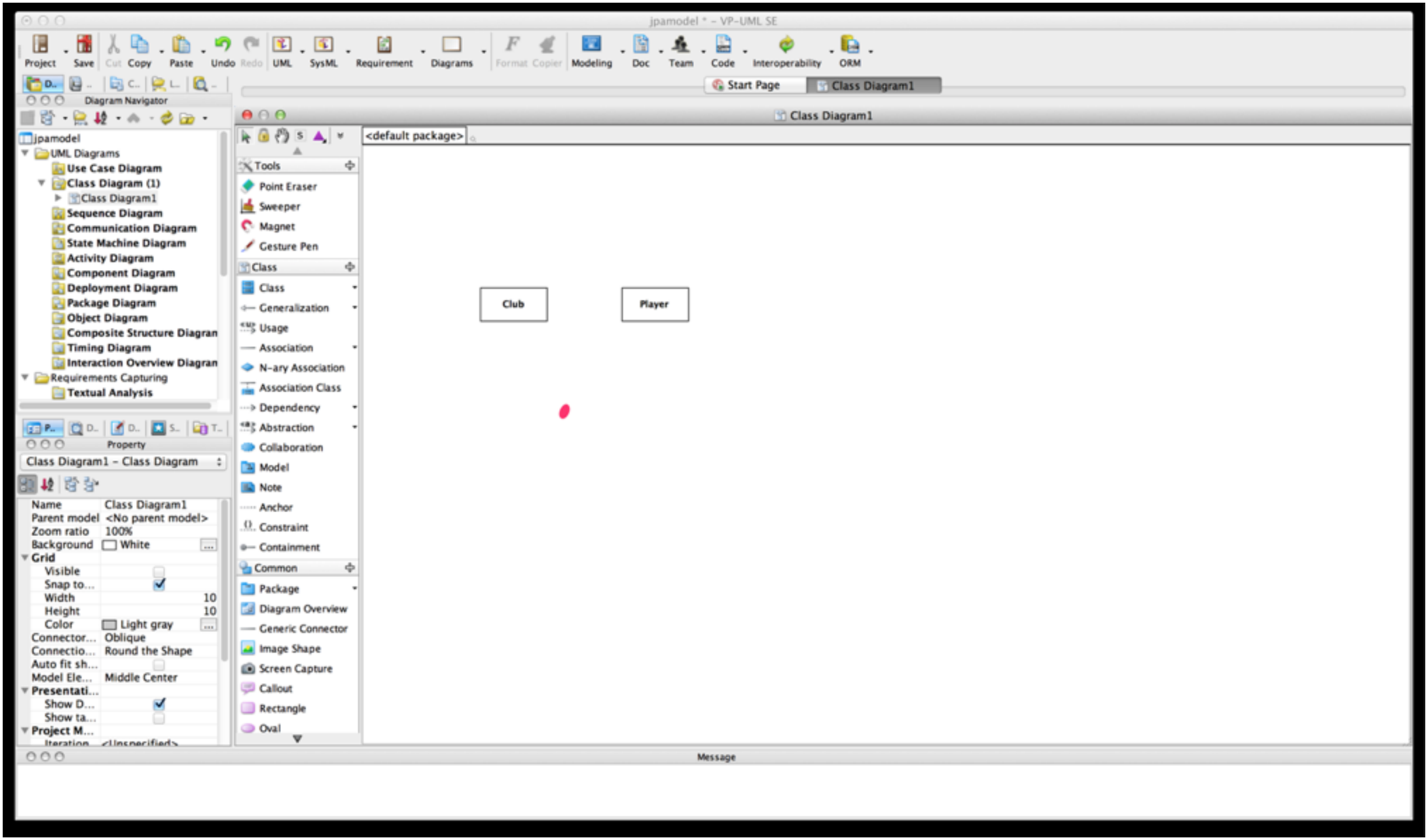
Customize Visual Paradigm - Shape Fill Format



Customize Visual Paradigm - ‘Show’ options...



Create 2 classes



Club Class

```
package models;

import javax.persistence.Entity;
import play.db.jpa.Model;

@Entity
public class Club extends Model
{
  public String name;

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

Player Class

```
package models;

import javax.persistence.Entity;
import play.db.jpa.Model;

@Entity
public class Player extends Model
{
  public String name;

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

ClubTest

```
import org.junit.*;

import java.util.*;
import play.test.*;
import models.*;

public class ClubTest extends UnitTest
{
  @Before
  public void setup()
  {
  }

  @After
  public void teardown()
  {
  }

  @Test
  public void testCreate()
  {

  }
}
```

PlayerTest

```
import org.junit.*;

import java.util.*;
import play.test.*;
import models.*;

public class PlayerTest extends UnitTest
{
  @Before
  public void setup()
  {
  }

  @After
  public void teardown()
  {
  }

  @Test
  public void testCreate()
  {

  }
}
```

Run the app now in 'test' mode:

```
play test
```

...and navigate to the test runner page:

- http://localhost:9000/@tests

Select the Club and Player tests - and they should be green.

Also try the database interface:

- http://localhost:9000/@db

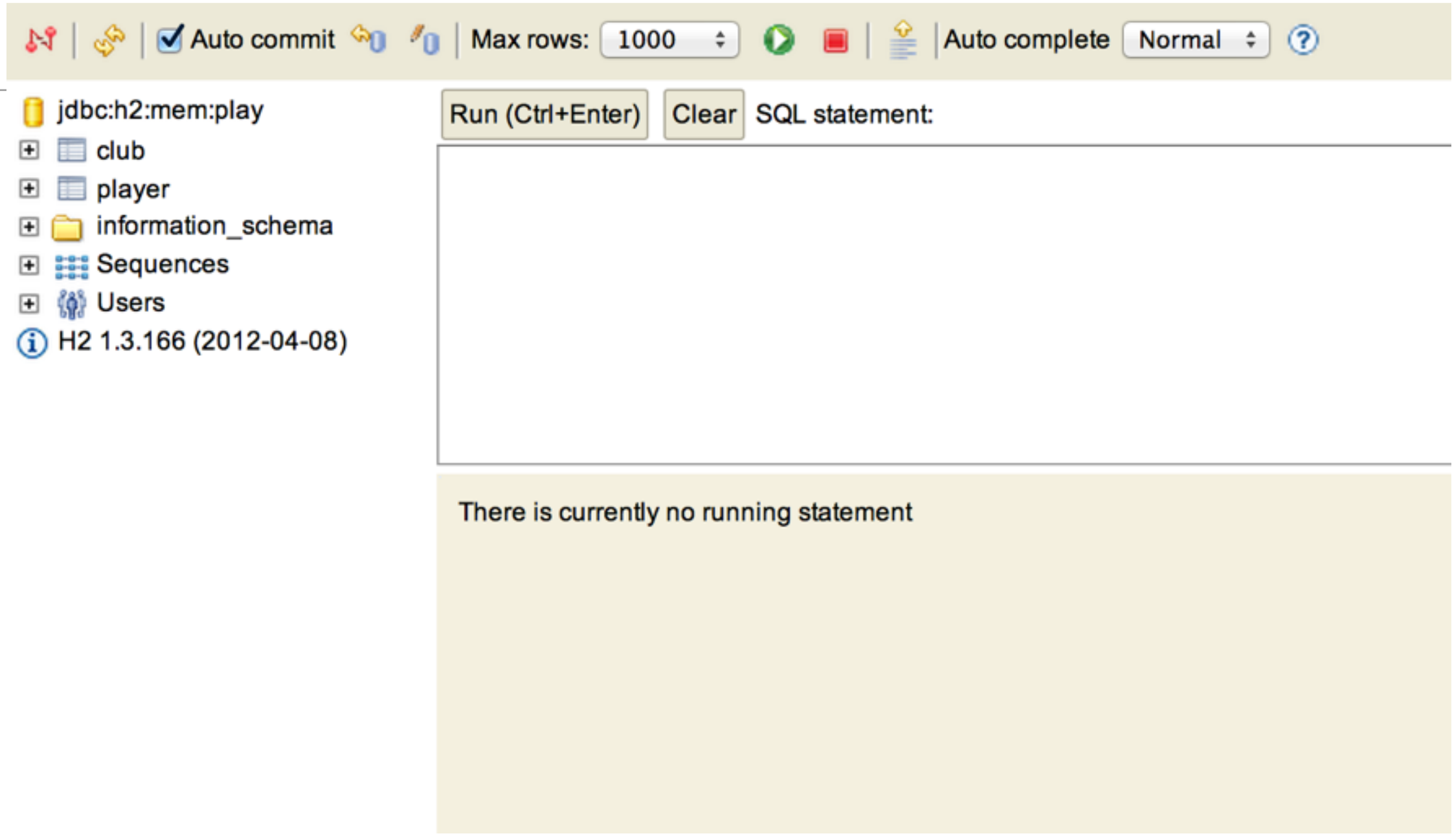
PlayerTest

```
public class PlayerTest extends UnitTest
{
  private Player p1, p2, p3;

  @Before
  public void setup()
  {
    p1 = new Player("mike");
    p2 = new Player("jim");
    p3 = new Player("frank");
    p1.save();
    p2.save();
    p3.save();
  }

  @After
  public void teardown()
  {
    p1.delete();
    p2.delete();
    p3.delete();
  }

  @Test
  public void testCreate()
  {
  }
}
```


Auto commit
Max rows:
1000
Auto complete
Normal
jdbc:h2:mem:play
club
player
information_schema
Sequences
Users
H2 1.3.166 (2012-04-08)
Run (Ctrl+Enter)
Clear
SQL statement:
There is currently no running statement

toString + //@After

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

  @ManyToOne
  public Club club;

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

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

- We can use db interface while project is in ‘test’ mode
- Enables us to understand model as we evolve classes and their relationships

```
public class PlayerTest extends UnitTest
{
  private Player p1, p2, p3;

  @Before
  public void setup()
  {
    p1 = new Player("mike");
    p2 = new Player("jim");
    p3 = new Player("frank");
    p1.save();
    p2.save();
    p3.save();
  }

  //@After
  public void teardown()
  {
    p1.delete();
    p2.delete();
    p3.delete();
  }

  @Test
  public void testCreate()
  {
    Player a = Player.findByName("mike");
    assertNotNull(a);
    assertEquals("mike", a.name);
    Player b = Player.findByName("jim");
    assertNotNull(b);
    assertEquals("jim", b.name);
    Player c = Player.findByName("frank");
    assertNotNull(c);
    assertEquals("frank", c.name);
  }
```

Auto commit | Max rows: 1000 | Auto complete Normal

jdbc:h2:mem:play
- club
- player
- information_schema
- Sequences
- Users

H2 1.3.166 (2012-04-08)

Run (Ctrl+Enter) Clear SQL statement:

```
SELECT * FROM PLAYER
```

SELECT * FROM PLAYER;

ID	NAME	CLUB_ID
1	mike	*null*
2	jim	*null*
3	frank	*null*
4	mike	*null*
5	jim	*null*
6	frank	*null*

(6 rows, 2 ms)

Edit

```
private Player p1, p2, p3;

public void setup()
{
  p1 = new Player("mike");
  p2 = new Player("jim");
  p3 = new Player("frank");
  p1.save();
  p2.save();
  p3.save();
}
```

Some Player Tests

```
@Test
public void testCreate()
{
  Player a = Player.findByName("mike");
  assertNotNull(a);
  assertEquals("mike", a.name);
  Player b = Player.findByName("jim");
  assertNotNull(b);
  assertEquals("jim", b.name);
  Player c = Player.findByName("frank");
  assertNotNull(c);
  assertEquals("frank", c.name);
}

@Test
public void testNotThere()
{
  Player a = Player.findByName("george");
  assertNull(a);
}
```

ClubTest

```
public class ClubTest extends UnitTest
{
  private Club c1, c2, c3;

  @Before
  public void setup()
  {
    c1 = new Club("tramore");
    c2 = new Club("dunmore");
    c3 = new Club("fenor");
    c1.save();
    c2.save();
    c3.save();
  }

  @After
  public void teardown()
  {
    c1.delete();
    c2.delete();
    c3.delete();
  }
```

```
  @Test
  public void testCreate()
  {
    Club a = Club.findByName("tramore");
    assertNotNull(a);
    assertEquals("tramore", a.name);
    Club b = Club.findByName("dunmore");
    assertNotNull(b);
    assertEquals("dunmore", b.name);
    Club c = Club.findByName("fenor");
    assertNotNull(c);
    assertEquals("fenor", c.name);
  }

  @Test
  public void testNotThere()
  {
    Club a = Club.findByName("bunmahon");
    assertNull(a);
  }
}
```