

Models

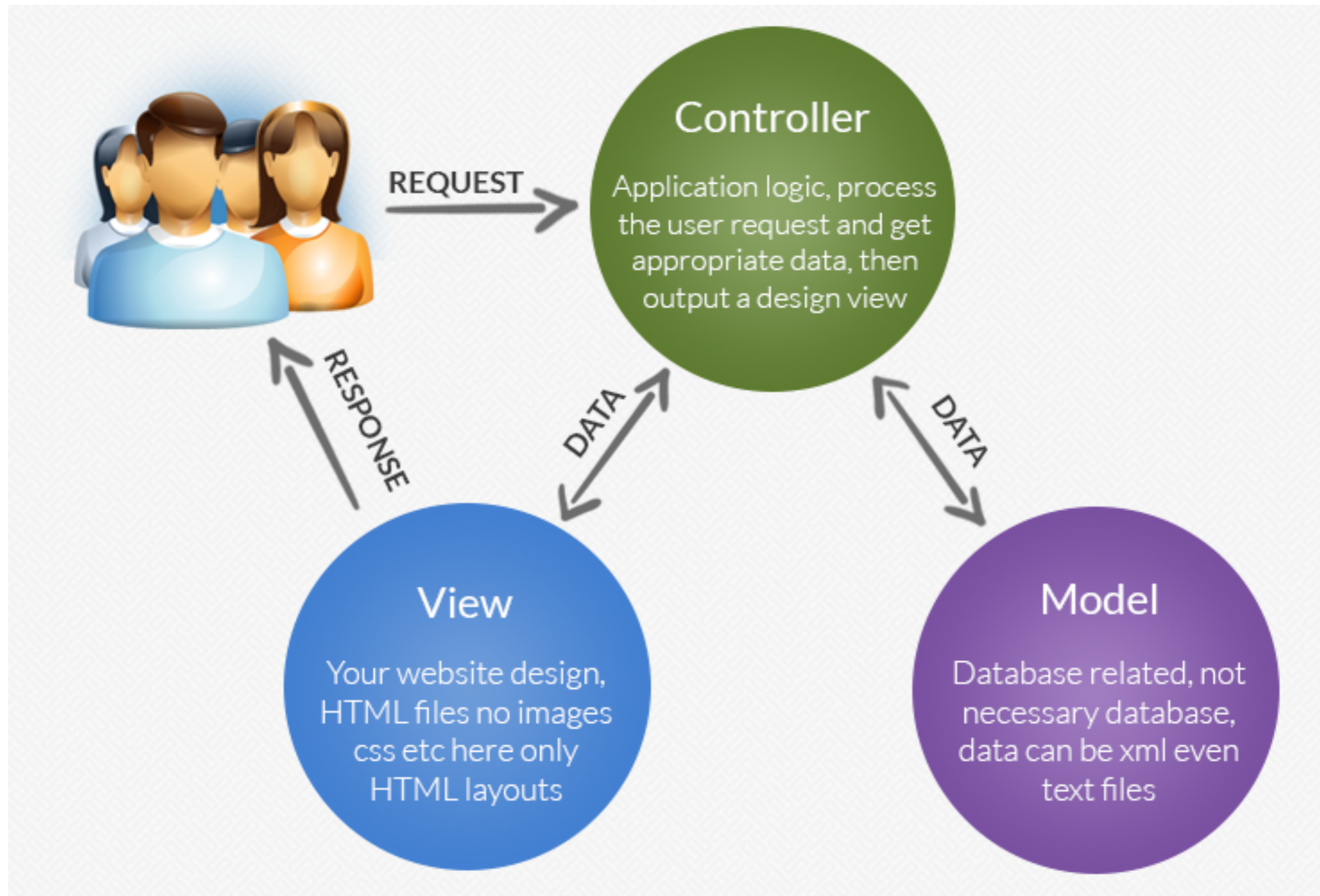
SELECT * FROM SONG;

ID	ARTIST	DURATION	TITLE
1	Beethoven	0	Piano Sonata No. 3
2	Beethoven	0	Piano Sonata No. 7
3	Beethoven	0	Piano Sonata No. 10
4	Beethoven	0	Piano Concerto No. 27
5	Beethoven	0	Piano Concertos No. 17
6	Beethoven	0	Piano Concerto No. 10

(6 rows, 6 ms)

Edit

Model View Controller



Database in Play

Configuration file
specifies a
database that will
be integrated into
the application

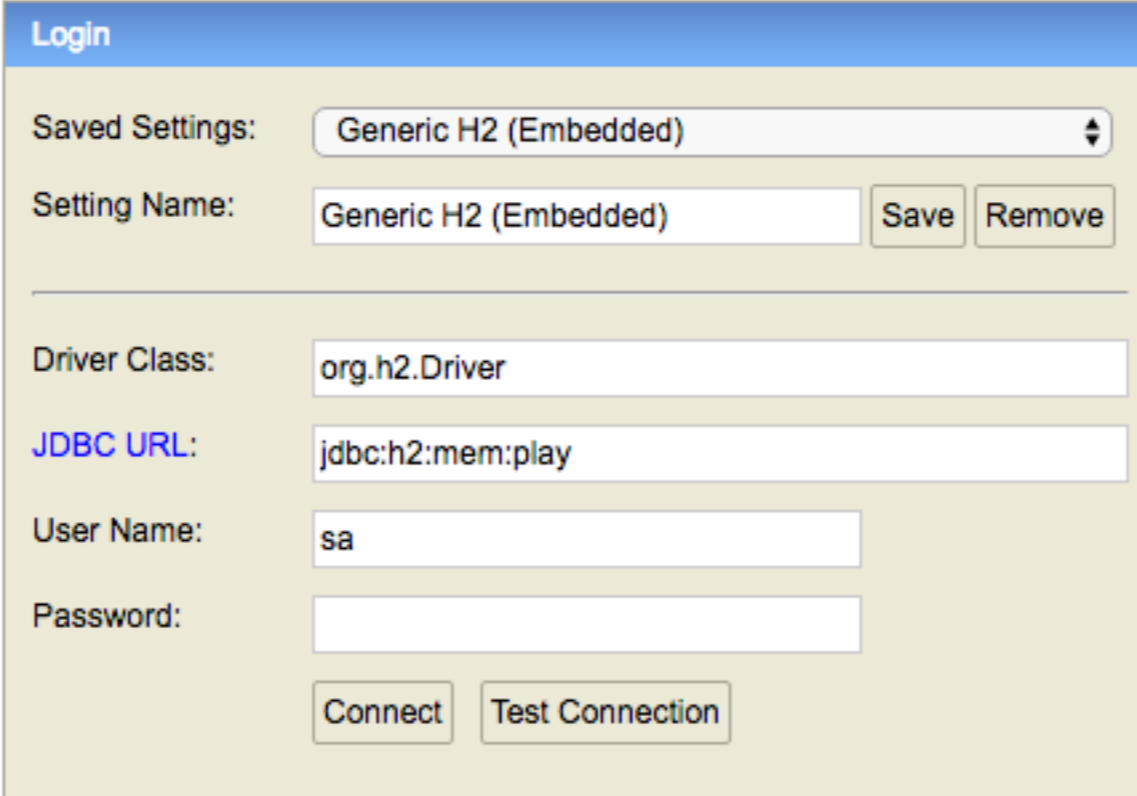
conf/application.conf

```
...  
# Database configuration  
# ~~~~~  
# Enable a database engine if needed.  
#  
# To quickly set up a development database, use either:  
#   - mem : for a transient in memory database (H2 in memory)  
#   - fs  : for a simple file written database (H2 file stored)  
db.default=mem  
...
```

In Memory test database
Full SQL support
Replaced with 'production'
database at a later stage

Inspecting the Database in Play

When app is running, browse to  <http://localhost:9000/@db>



The screenshot shows a web interface titled "Login" for a database. It contains the following fields and controls:

- Saved Settings:** A dropdown menu showing "Generic H2 (Embedded)".
- Setting Name:** A text input field containing "Generic H2 (Embedded)", with "Save" and "Remove" buttons to its right.
- Driver Class:** A text input field containing "org.h2.Driver".
- JDBC URL:** A text input field containing "jdbc:h2:mem:play".
- User Name:** A text input field containing "sa".
- Password:** An empty text input field.
- Buttons:** "Connect" and "Test Connection" buttons at the bottom.

log in to database

Database console

Database
Tables



The screenshot shows the Database console interface. At the top, there is a toolbar with icons for connection, auto-commit, max rows (set to 1000), and auto-complete (set to Off). Below the toolbar is a tree view of the database structure for 'jdbc:h2:mem:play'. The tree view shows the following structure:

- playlist
 - id
 - duration
 - title
 - Indexes
- playlist_song
 - playlist_id
 - songs_id
 - Indexes
- song
 - id
 - artist
 - duration
 - title
 - Indexes
- information_schema
- Sequences
- Users
- H2 1.4.193 (2016-10-31)

Below the tree view is a large empty area for the SQL statement. To the right of this area is a large arrow pointing from the text 'SQL Panel' to the SQL statement input area.

Below the SQL statement input area is a section titled 'Important Commands' with a table of shortcuts:

		Displays this Help Page
		Shows the Command History
	Ctrl+Enter	Executes the current SQL statement
	Shift+Enter	Executes the SQL statement defined by the text selection
	Ctrl+Space	Auto complete
		Disconnects from the database

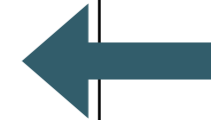
Below the 'Important Commands' section is a section titled 'Sample SQL Script' with a table of actions and their corresponding SQL commands:

Delete the table if it exists	DROP TABLE IF EXISTS TEST;
Create a new table with ID and NAME columns	CREATE TABLE TEST(ID INT PRIMARY KEY, NAME VARCHAR(255));
Add a new row	INSERT INTO TEST VALUES(1, 'Hello');
Add another row	INSERT INTO TEST VALUES(2, 'World');
Query the table	SELECT * FROM TEST ORDER BY ID;
Change data in a row	UPDATE TEST SET NAME='Hi' WHERE ID=1;
Remove a row	DELETE FROM TEST WHERE ID=2;
Help	HELP ...

Below the 'Sample SQL Script' section is a section titled 'Adding Database Drivers' with the following text:

Additional database drivers can be registered by adding the Jar file location of the driver to the the env CLASSPATH. Example (Windows): to add the database driver library C:/Programs/hsqldb/lib/hsqldb.jar, H2DRIVERS to C:/Programs/hsqldb/lib/hsqldb.jar.

SQL
Panel



Preloading the Database - YAML

https://en.wikipedia.org/wiki/YAML

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YAML

From Wikipedia, the free encyclopedia

YAML (/ˈjæməl/, rhymes with *camel*) is a **human-readable data serialization language**. It is commonly used for **configuration files**, but could be used in many applications where data is being stored (e.g. debugging output) or transmitted (e.g. document headers). YAML targets many of the same communications applications as **XML**, but has taken a more minimal approach which intentionally breaks compatibility with **SGML**.^[1] YAML 1.2 is a **superset** of **JSON**, another minimalist data serialization format where braces and brackets are used instead of indentation.^[2]

Custom data types are allowed, but YAML natively encodes **scalars** (such as **strings**, **integers**, and **floats**), **lists**, and **associative arrays** (also known as hashes or dictionaries). These data types are based on the **Perl** programming language, though all commonly-used high-level programming languages share very similar concepts. YAML supports both **Python**-style indentation to indicate nesting, and a more compact format that uses [] for lists and {} for hashes.^[1] The colon-centered syntax used to express **key-value pairs** is inspired by **electronic mail headers** as defined in **RFC 0822**^[2], and the **document separator** "--" is borrowed from **MIME (RFC 2045)**^[2]. **Escape sequences** are reused from **C**, and whitespace wrapping for multi-line strings is inspired from **HTML**. Lists and hashes can contain nested lists and hashes, forming a **tree structure**; arbitrary **graphs** can be represented using YAML aliases (similar to XML in **SOAP**).^[1] YAML is intended to be read and written in streams, a feature inspired by **SAX**.^[1]

Support for reading and writing YAML is available for several programming languages.^[3] Some source code editors such as **Emacs**^[4] and various **integrated development environments**^{[5][6][7]} have features that make editing YAML easier, such as folding up nested structures or automatically highlighting syntax errors.

YAML

Filename extension	.yaml, .yml
Internet media type	<i>not registered</i>
Initial release	11 May 2001; 15 years ago
Latest release	1.2 (Third Edition) (1 October 2009; 7 years ago)
Type of format	Data interchange
Open format?	Yes
Website	yaml.org ^[2]

YAML is a widely used notion for representing structured information

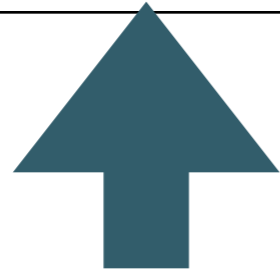
YAML Example

An invoice expressed via YAML. Structure is shown through indentation (one or more spaces). Sequence items are denoted by a dash, and key value pairs within a map are separated by a colon.

```
invoice: 34843
date   : 2001-01-23
bill-to: &id001
  given  : Chris
  family : Dumars
  address:
    lines: |
      458 Walkman Dr.
      Suite #292
    city   : Royal Oak
    state  : MI
    postal : 48046
ship-to: *id001
product:
  - sku      : BL394D
    quantity : 4
    description : Basketball
    price     : 450.00
  - sku      : BL4438H
    quantity : 1
    description : Super Hoop
    price     : 2392.00
tax   : 251.42
total: 4443.52
comments: >
  Late afternoon is best.
  Backup contact is Nancy
  Billsmer @ 338-4338.
```

java

```
Song s1 = new Song("Piano Sonata No. 3", "Beethoven");  
Song s2 = new Song("Piano Sonata No. 7", "Beethoven");  
Song s3 = new Song("Piano Sonata No. 10", "Beethoven");  
Playlist p1 = new Playlist("Beethoven Sonatas");  
p1.songs.add (s1);  
p1.songs.add (s2);  
p1.songs.add (s3);
```



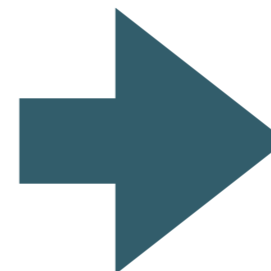
Embedded in a compiled
program.

When running, objects
occupy appropriate in
memory data structures.

Just a File format.

Used to represent structured
information in a flat file.

Must be processed by various
tools in order to be useful.



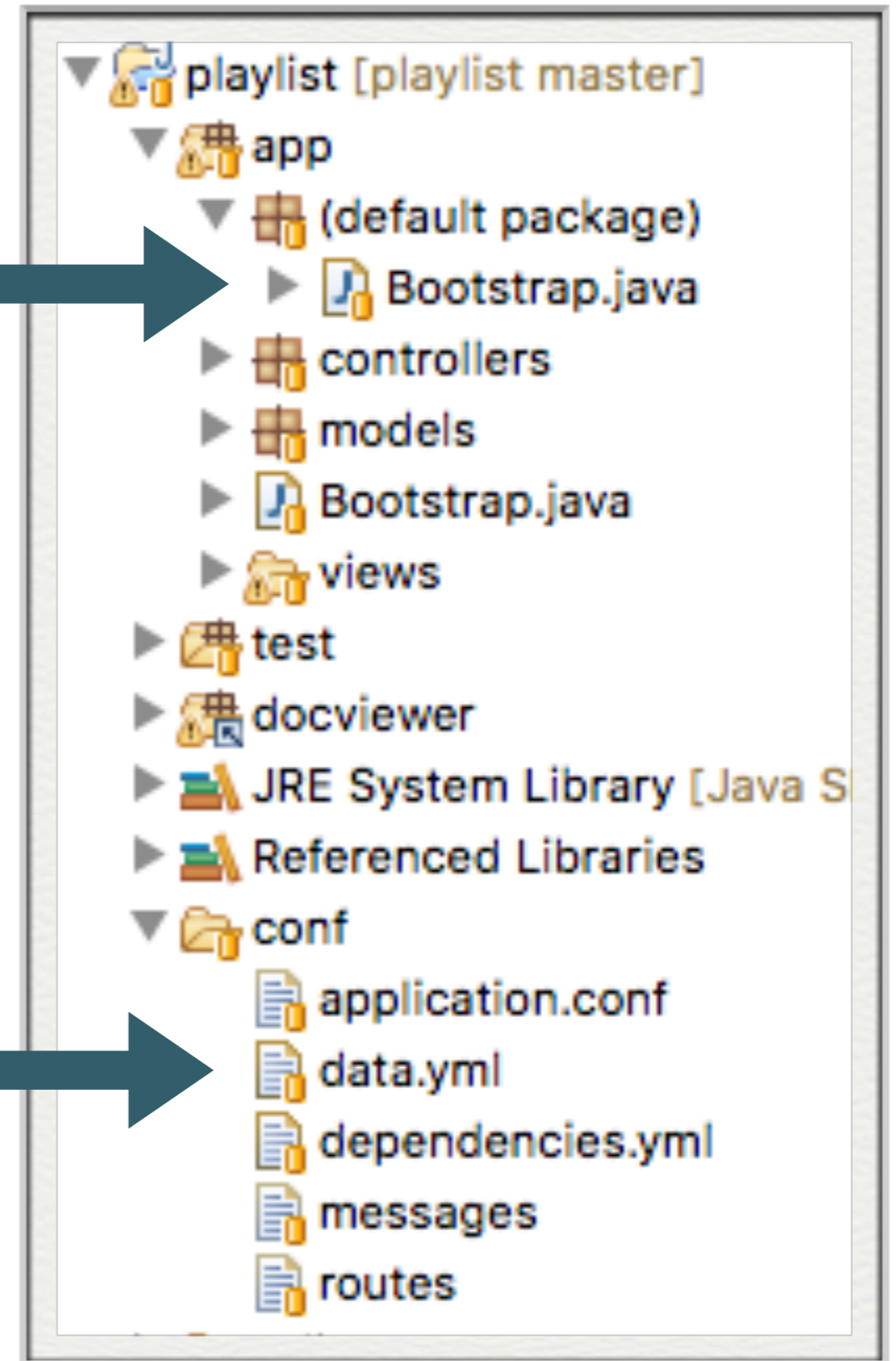
yaml

```
Song(s1):  
  title: Piano Sonata No. 3  
  artist: Beethoven  
  duration: 5  
Song(s2):  
  title: Piano Sonata No. 7  
  artist: Beethoven  
  duration: 6  
Song(s3):  
  title: Piano Sonata No. 10  
  artist: Beethoven  
  duration: 8  
  
Playlist(p1):  
  title: Bethoven Sonatas  
  duration: 19  
  songs:  
  - s1  
  - s2  
  - s3
```


yaml in Play

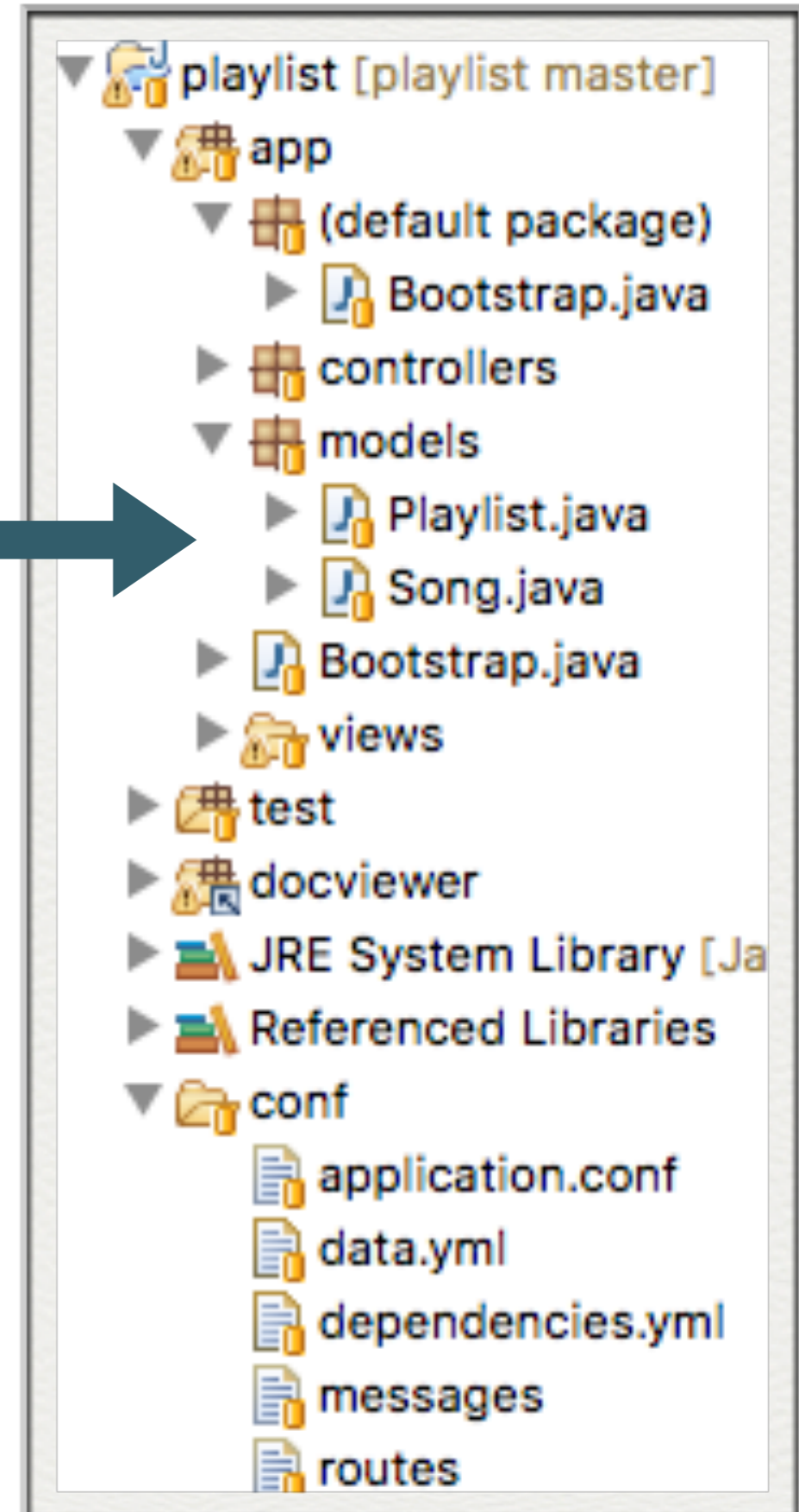
Bootstrap class
contains instruction
to load a model from
yaml file

data.yml contains the
model representation



yaml in Play

Model data will be loaded into model objects



Revised Model Class: Song

Plain Old Java Object (POJO)

```
package models;

public class Song
{
    public String title;
    public String artist;

    public Song(String title, String artist)
    {
        this.title = title;
        this.artist = artist;
    }
}
```

Entity Model Object

```
package models;

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

@Entity
public class Song extends Model
{
    public String title;
    public String artist;
    public int duration;

    public Song(String title, String artist, int duration)
    {
        this.title = title;
        this.artist = artist;
        this.duration = duration;
    }
}
```

“extends” from Model
class (inheritance).
Marked as
“@Entity” (Annotation).

Revised Model Class: Playlist

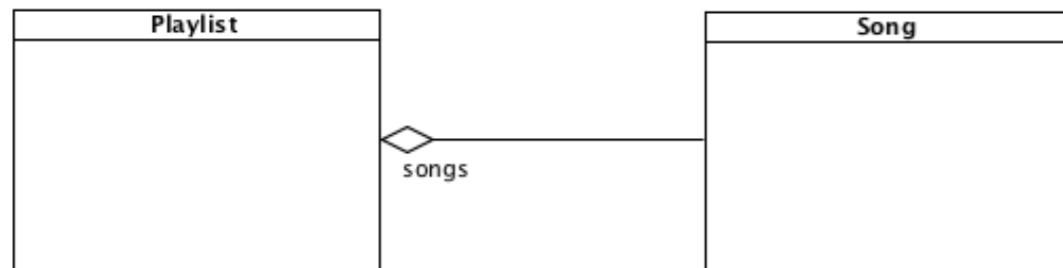
Plain Old Java Object (POJO)

```
package models;

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

public class Playlist
{
    public String title;
    public List<Song> songs = new ArrayList<Song>();

    public Playlist(String title)
    {
        this.title = title;
    }
}
```



“extends” from Model class (inheritance).
Marked as
“@Entity” (Annotation).

Entity Model Object

```
package models;

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

import javax.persistence.CascadeType;
import javax.persistence.Entity;
import javax.persistence.OneToMany;

import play.db.jpa.Model;

@Entity
public class Playlist extends Model
{
    public String title;

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

    public Playlist(String title, int duration)
    {
        this.title = title;
        this.duration = duration;
    }
}
```

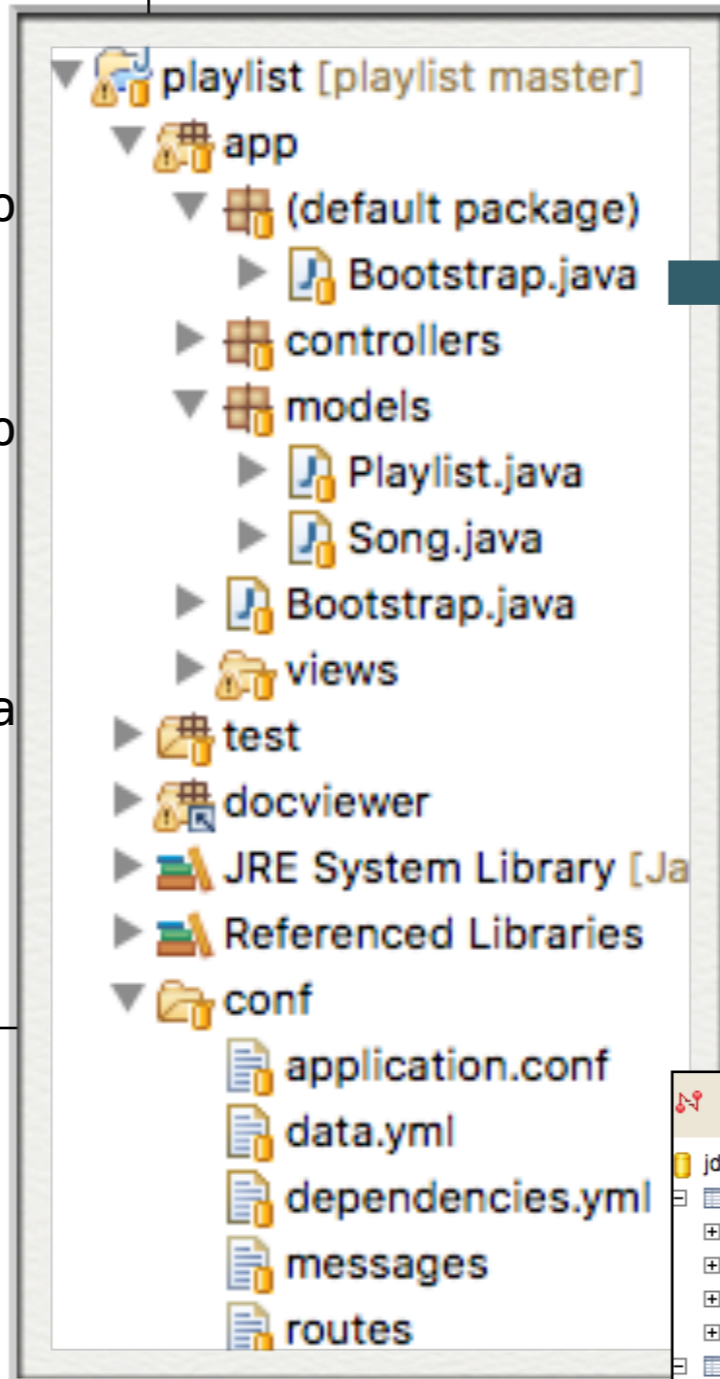
“@OneToMany” (Annotation)
describes Playlist->Song
relationship for database

Song(s1):
 title: Piano Sonata No. 3
 artist: Beethoven
 duration: 5

Song(s2):
 title: Piano Sonata No
 artist: Beethoven
 duration: 6

Song(s3):
 title: Piano Sonata No
 artist: Beethoven
 duration: 8

Playlist(p1):
 title: Bethoven Sonata
 duration: 19
 songs:
 - s1
 - s2
 - s3



```
import java.util.List;

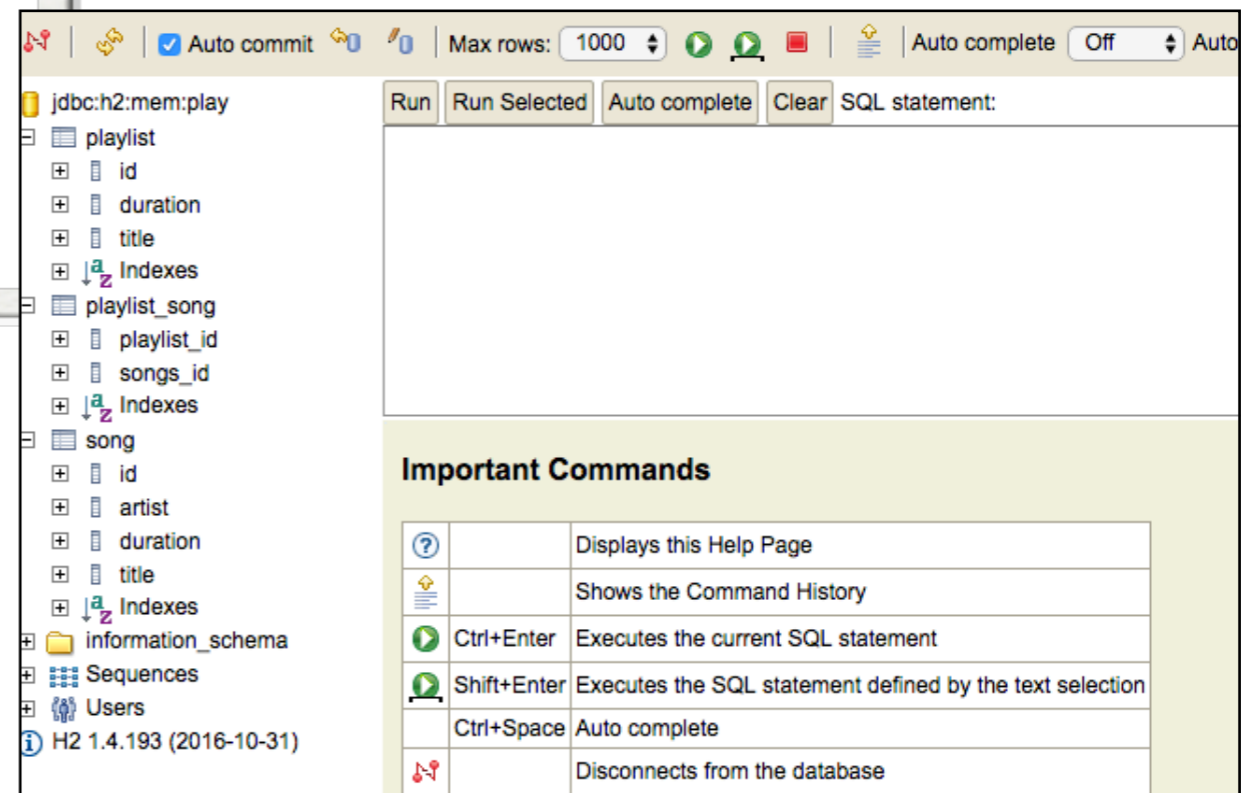
import play.*;
import play.jobs.*;
import play.test.*;

import models.*;

@OnApplicationStart
public class Bootstrap extends Job
{
    public void doJob()
    {
        Fixtures.loadModels("data.yml");
    }
}
```

localhost:9000/@db

When play app starts -
 Bootstrap.doJob() called



Bootstrap class

```
2. Python
~ using java version "1.8.0_60"
objc[95621]: Class JavaLaunchHelper is implemented in both /Library/Java/JavaVirtualMachines/jdk1.8.0_60.jdk/Contents/Home/bin/java (0x101a074c0) and /Library/Java/JavaVirtualMachines/jdk1.8.0_60.jdk/Contents/Home/jre/lib/libinstrument.dylib (0x101b1a4e0). One of the two will be used. Which one is undefined.
Listening for transport dt_socket at address: 8000
12:54:29,755 INFO ~ Starting /Users/edelestar/repos/modules/web/ict-2017/prj/labprj/playlist
12:54:30,497 WARN ~ You're running Play! in DEV mode
12:54:30,595 INFO ~ Listening for HTTP on port 9000 (Waiting a first request to start) ...
~ Server is up and running
12:54:45,457 INFO ~ Connected to jdbc:h2:mem:play;MODE=MYSQL for default
12:54:46,226 INFO ~ HHH000262: Table not found: Playlist
12:54:46,228 INFO ~ HHH000262: Table not found: Playlist_Song
12:54:46,229 INFO ~ HHH000262: Table not found: Song
12:54:46,231 INFO ~ HHH000262: Table not found: Playlist
12:54:46,232 INFO ~ HHH000262: Table not found: Playlist_Song
12:54:46,234 INFO ~ HHH000262: Table not found: Song
12:54:46,235 INFO ~ HHH000262: Table not found: Playlist
12:54:46,237 INFO ~ HHH000262: Table not found: Playlist_Song
12:54:46,238 INFO ~ HHH000262: Table not found: Song
12:54:46,322 INFO ~ Application 'playlist' is now started !
12:54:47,503 INFO ~ Rendering Start
```

```
import java.util.List;

import play.*;
import play.jobs.*;
import play.test.*;

import models.*;

@OnApplicationStart
public class Bootstrap extends Job
{
    public void doJob()
    {
        Fixtures.loadModels("data.yml");
    }
}
```

Console shows attempted access to database by bootstrap / yml

Inspecting the Playlist Table

The screenshot shows a database client interface with a toolbar at the top containing icons for navigation and execution, and settings for 'Auto commit', 'Max rows' (set to 1000), 'Auto complete' (set to Off), and 'Auto select' (set to On). On the left, a tree view shows the database structure for 'jdbc:h2:mem:play', including tables 'playlist' and 'playlist_song', and a 'song' table. The 'playlist' table is expanded, showing columns 'id', 'duration', and 'title'. The 'SQL statement' field contains the query: `SELECT * FROM PLAYLIST`. Below the query, the results are displayed in a table with columns 'ID', 'DURATION', and 'TITLE'. The results show two rows: one with ID 1, DURATION 0, and TITLE 'Bethoven Sonatas'; and another with ID 2, DURATION 0, and TITLE 'Bethoven Concertos'. Below the table, it indicates '(2 rows, 3 ms)' and an 'Edit' button.

Run Run Selected Auto complete Clear SQL statement:

```
SELECT * FROM PLAYLIST
```

```
SELECT * FROM PLAYLIST;
```

ID	DURATION	TITLE
1	0	Bethoven Sonatas
2	0	Bethoven Concertos

(2 rows, 3 ms)

Edit

localhost:9000/@db

Inspecting the Songs Table

The screenshot shows a database client interface with a toolbar at the top containing icons for navigation and execution, along with settings for 'Auto commit', 'Max rows: 1000', 'Auto complete', and 'Auto select'. On the left, a tree view displays the database structure, including tables like 'playlist', 'playlist_song', and 'song', along with 'Indexes', 'information_schema', 'Sequences', and 'Users'. The main area shows the SQL statement 'SELECT * FROM PLAYLIST_SONG' and its execution results. The results are displayed in a table with two columns: 'PLAYLIST_ID' and 'SONGS_ID'. Below the table, it indicates '(6 rows, 4 ms)' and an 'Edit' button.

Run Run Selected Auto complete Clear SQL statement:

```
SELECT * FROM PLAYLIST_SONG
```

```
SELECT * FROM PLAYLIST_SONG;
```

PLAYLIST_ID	SONGS_ID
1	1
1	2
1	3
2	4
2	5
2	6

(6 rows, 4 ms)

Edit

localhost:9000/@db