Basic GORM

The Grails Domain Layer

In This Session

We'll cover how Grails interacts with your database.

GORM - Grails Object Relational Mapping

- GORM provides the database, or domain, layer for Grails
- Based on Hibernate - really just a thin wrapper
- Use object-oriented syntax to access the database
  - `Employee.list()` returns a list of employees
- Populates domain objects from the database values
- GORM conventions make you more productive

Hibernate

- Helps with the paradigm mismatch between object-oriented software and relational DBs
- Maps between Groovy/Java data types and SQL/JDBC data types
- Extensive support for queries, populating domain objects from query results
- Manages transactions and caching
- Hibernate wraps your domain classes with dynamic proxies
  - Knows if an object has been modified (is dirty)
  - Marshals and unmarshals from JDBC types

grails-app/domain

- Where the GORM magic happens
- GORM wraps each class under this folder
- Each class maps to one table in the database
- Each property on a class maps to a column in the table
- By default, connects to one database (can have more)
- With Grails, all things can be customized

Creating a Domain Class

- Create it under **grails-app/domain**
- Typically in a package underneath this folder
- Can use your favorite text editor, IDE
- ...or the command line

Generated Domain Class

```
package com.opi

class Question {
    static constraints = {
    }
}
```

Adding some properties

```
package com.opi

class Question {
    String title
    String text
    String answer
    String username

    static constraints = {
    }
}
```

What does this do?

GORM will create a table named QUESTION, with the following columns:

- ID - a unique sequence number
- VERSION - used to prevent concurrent modifications
- TEXT - your property
- TITLE - your property
- ANSWER - your property
- USER_NAME - your property

Some default GORM conventions

- GORM creates the database schema (using Hibernate's schema creation)
- Each domain class maps to a table
- Each property in the domain class maps to a column in the table
- Each table has a unique key field called 'ID'
- Don't worry, you can customize things to use legacy databases
- You can also tell GORM not to create the schema (typical for production)

Let's see it

```
> grails run-app
...
| Server running. Browse to http://localhost:8080/basic-gorm
```

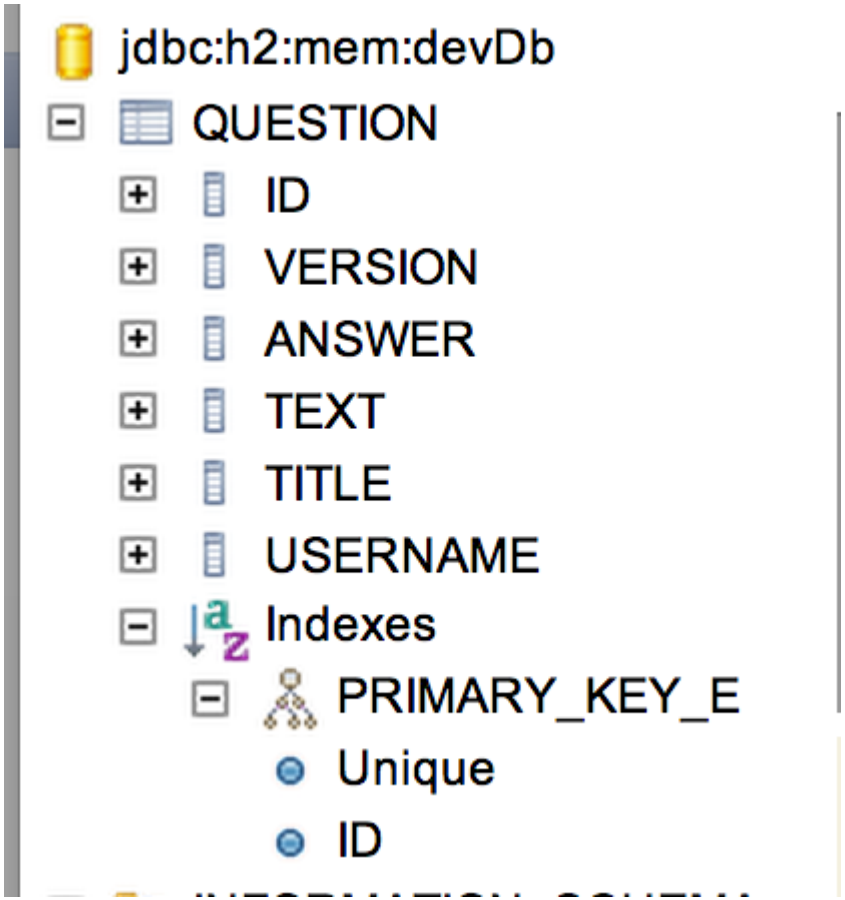
The DB console

- Starting with Grails 2.0
- Can view the in-memory H2 development database.
- Can run queries, updates, and so on.
- Very handy view into your application's database.

http://localhost:8080/basic-gorm**/dbconsole**

Using the DB console

The QUESTION table looks like:



H2 Built-in Database

Grails includes the H2 in-memory database

- Written in Java
- Automatically starts in development environment
- DB cleared and refreshed each time you run application

Typical Workflow

- Initial development
  - Let GORM and Hibernate manage schema
  - Quickly change database, especially with H2
  - Every developer has a DB
  - No maintenance of DB (restarts each time)
- As things settle down
  - Examine schema for things like performance
  - Modify domain classes as appropriate
  - Test on actual database (Oracle, SQL Server, etc.)
- Into production
  - Control domain class changes
  - Turn off dbCreate mode
  - Manage data migrations

What to do with Domain Classes?

Now that you set up the database, what next?

- Populate and manage data
- Query database
- Validate data

Basic CRUD operations

```
def q = new Question(title:'Help me',
    text:"I've fallen and I can't get up.")
q.save()

def q = Question.get(id)
q.title = "Question?"
q.save(flush: true, failOnError: true)
q.delete()

def questions = Question.list(offset:10, max:20,
          sort:"title", order:"asc")
```

GORM CRUD Operations

- GORM augments your domain classes using the Active Record pattern (similar to Rails).
- With this style, you don't need a DAO layer.
- You can save, update and delete from the domain objects.
- You can still use services to control transaction boundaries.
- The list() method automatically supports pagination.

Using Dynamic Finder Methods

Grails also creates dynamic finder methods

- findBy* finds one row
- findAllBy* finds all rows

```
def questions = Question.findAllByTitle("Shouldnotgethere
   bytecode error?")

questions =
    Question.findByDateCreatedBetween(firstDate,
secondDate)

questions = Question.findAllByTitleLike('%bytecode%')
```

Validation

GORM automatically validates against the constraints you define:

```
class Question {
    String title
    String text

    static constraints = {
        title nullable: false, blank: false, maxSize: 200
        text nullable: false, blank: false, maxSize: 10000
    }
}
```

Using validation in your code

- validate() runs the validation
- GORM will automatically validate on calls to save()
- hasErrors() returns true if there are errors
- The field *errors* holds the errors
- Uses underlying Spring validation error types for the errors
- By default, all domain class properties are not nullable. (ie. they have an implicit *nullable: false* constraint)

Built-In Constraints Include

blank
creditCard
email
inList
matches
max
maxSize
min
minSize
notEqual
nullable
range
scale
size
unique
url
validator

Checking Validation

```
Question q = new Question()   // No required fields

if (q.validate()) {
   // OK ...
} else {
    // Has errors...
}

if (q.hasErrors() {
   // Houston, we have a problem...
}
```

Validation Messages

- Grails comes with default messages in the **grails-app/i18n** folder
- You almost always want to change the messages

Edit grails-app/i18n/messages.properties and add:

```
question.title.blank=You must enter a title.
question.text.blank=You must enter the question text.
```

The format is:

```
[domain].[property].[constraint]
```

Custom Validators

- Grails has a good set of built-in validators
- Sometimes you need more
  - Compare multiple values
  - Perform an external look up
- Create a custom validator

Custom Validator Code

```
class Question {
String title
...
static constraints = {
    title blank: false, maxSize: 200,
        validator: { val, obj ->
            if (val.contains('JVM')) {
                return "jvm.questions.not.allowed"
            }
        }
        text nullable: false, blank: false, maxSize: 1000
    }
}
```

Unit testing domain classes

When using the command line to create a domain class, Grails creates a unit test as well.

Spock is the default testing framework.

Generated unit test

```
import grails.test.mixin.TestFor
import spock.lang.Specification

@TestFor(Question)
class QuestionSpec extends Specification {
    def setup() {
    }
    def cleanup() {
    }
    void "test something"() {
    }
}
```

Adding a test method

```
void "Question should validate"() {
    when:
    def q = new Question(title: 'What is def?',
        text:'Please explain this thing called def.',
        answer: "def is an alias of Object",
        username: "opie")

    then:
    q.validate()
}
```

Run this test

```
> grails test-app com.opi.Question
```

Relating Domain Objects

GORM supports:

- one-to-one
- many-to-one
- one-to-many
- many-to-many

Adding More Domain Objects

Create 2 new domain objects

```
> grails create-domain-class com.opi.User

> grails create-domain-class com.opi.Answer
```

Simple Many to One

```
class Question {
    User user
    String username
    ...
}

class Person {
}
```

Relating Domain Objects - hasMany

```
class Question {
    static hasMany = [answers: Answer]
    String answer
    String title
    String text
    ...

    static constraints = {
        title nullable: false, blank: false, maxSize: 200,
        ...
    }
}
```

Mapping the Other Side

```
class Answer {
    static belongsTo = [question:Question]

    String text

    static constraints = {
        text nullable: false, blank: false, maxSize: 10000
    }
}
```

But Wait, There's More

There's *a lot more* to relationships:

- GORM II session
- Online docs
  - http://grails.org/doc/latest/guide/GORM.html

Conveniences - Modified Dates

```
class Question {
    static hasMany = [answers: Answer]

    String title
    ...
    Date dateCreated
    Date lastUpdated

    static constraints = {
        title nullable: false, blank: false, maxSize: 200
        text nullable: false, blank: false, maxSize: 10000
    }
}
```

Conveniences - implicit id & version

```
class Question {
    Long id   // Inserted by GORM, not you
    Long version
    static hasMany = [answers: Answer]

    String title
    ...

    static constraints = {
        title nullable: false, blank: false, maxSize: 200
        ...
    }
}
```

Workshop - Basic GORM - 15 min

- Create a class for a User
  - user name
  - first name
  - last name
  - email address
- Allow a User to be an author of each question and each Answer.
- Choose a reasonable size for the name fields, such as 30 characters.

Bonus:

- Add a custom validator to reject any user with 'Justin' and 'Bieber' as the name.

Workshop Solution

How do you know you are successful?

- Update the unit test to prove a User is necessary to save a Question.

See ‘introToGormFinish’ Branch

- More details
- One possible solution
- Additional unit tests

For More on GORM

http://grails.org/doc/latest/guide/GORM.html
http://grails.org/doc/latest/ref/Constraints/validator.html

The GORM II session

Plugins:

- http://www.grails.org/plugin/db-reverse-engineer
- http://www.grails.org/plugin/database-migration