Taking Application Design To The Next Level with MVC

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About Me

- Geographic Information Systems (GIS) Analyst for a water resources/reclamation agencyin in Northern California
  - Working with ColdFusion since 2002 (CF 4.5)
  - Lots of spatial and non-spatial data modeling, data management, intranet application development
- Tools I Use:
  - Adobe ColdFusion, JavaScript (incl. jQuery & Bootstrap), Microsoft SQL Server, Python, Esri ArcGIS Desktop and Server, Geocortex, Safe FME (spatial ETLs), etc…
- Adobe Community Professional for ColdFusion
- Unreformed DIY remodeler
- Passionate about craft beer! (should become obvious in a few minutes)

My Journey to MVC...

- Wrote/Maintained Procedural CFML apps 2002-2016
  - Mostly .CFM files
  - Custom tags
  - Some components (.CFCs)

- Complete overhaul of intranet map portal starting spring 2016
  - Rewrite CFML portion from scratch
  - "We're going to do it right" = Go MVC
  - Working prototype within 3 weeks

Agenda

- Prerequisites for this talk
- Brief review of procedural applications
  - Definition
  - Sample procedural code
  - Drawbacks
- Introduction to Model-View-Controller concept
  - MVC frameworks for ColdFusion
  - Sample MVC code
  - How MVC works
  - Pros/cons of MVC

What Do I Need to Know?

- CFML language (syntax, functions/tags, etc.)
- Basic understanding of components
  - How are they structured?
  - How do I use them
    - CreateObject()
    - New
    - CFInvoke
    - CFObject
  - ColdFusion request cycle
  - Also helpful:
    - CFScript syntax (similar to JavaScript syntax)

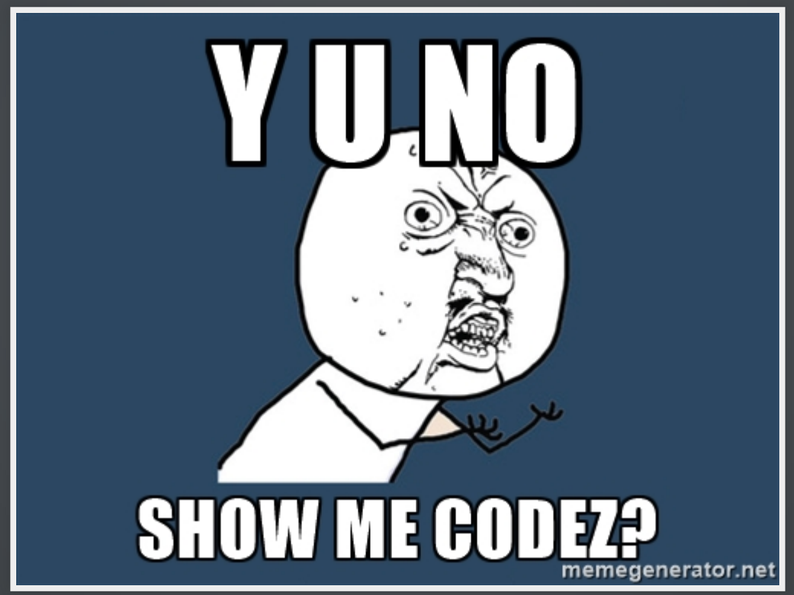
What Is a Procedural Application?

- CFM page for each URL in application
- Pages execute from top to bottom
- Typically 100's of lines of code per page
- Mix of business logic and display code
- Maybe some code reuse via <cfinclude> or custom tags

Disclaimer

The code you are about to see is simplified for clarity. It does not represent best practices, does not include security measures, and does not include user input validation/sanitation.--Me

What Does a Procedural App Look Like?



Downside of Procedural Code

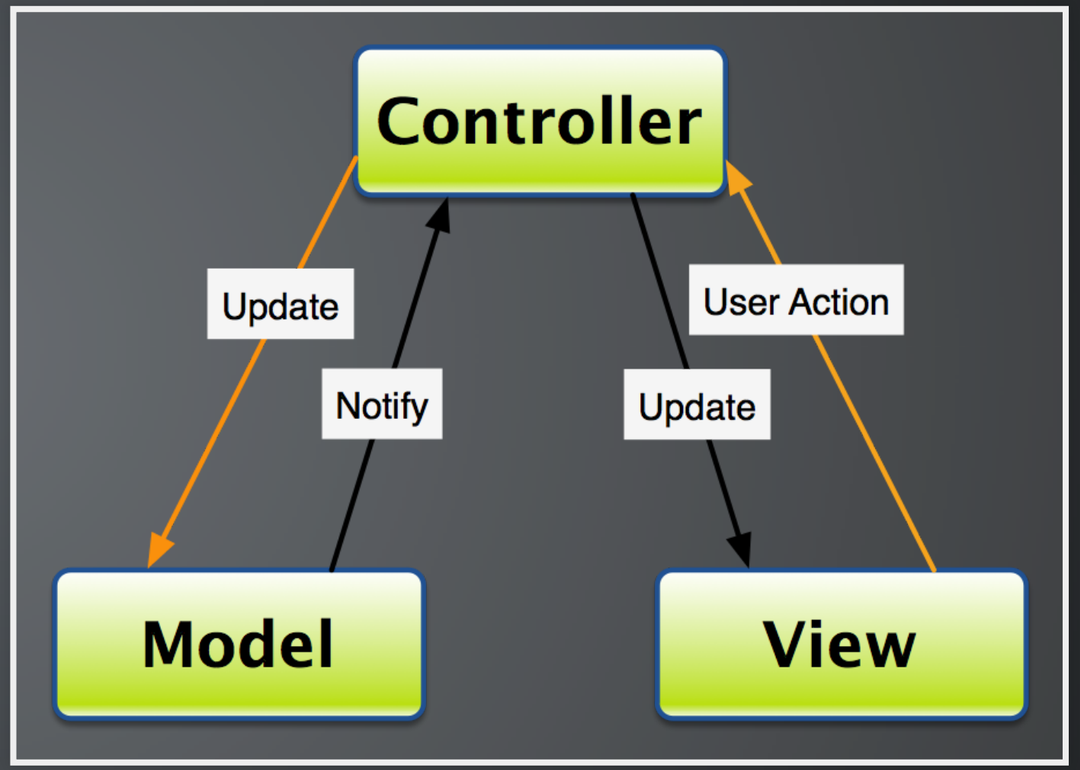
- Increasingly hard to maintain, expecially as application evolves
- Hard to distribute work to teams
- Potentially lots of code duplication
  - Violates the DRY principle
- Can't build an API from the business logic
  - Intertwined with display code
- Can't perform automated unit tests on the business logic

Is There a Better Way?

- YES!
- MVC
  - (You knew I was going to say that)

What Is MVC?

- Model-View-Controller design pattern
- Separates concerns (business logic vs. view code)
- Common pattern in OO languages
- Usually leverage MVC framework
  - Rails (Ruby)
  - Django (Python)
  - ASP.Net MVC
  - Express/Sails (Node.js)
  - Laravel/CakePHP (PHP)
  - Spring (Java)



MVC in ColdFusion

- MVC can be done without a framework
  - Unless your hobby is reinventing the wheel, why would you?
- Frameworks offer lots of functionality you don't have to reinvent
  - Dependency Injection (DI)/Inversion of Control (IoC)
  - URL Routes
  - Layout/View templating
  - Data rendering (JSON, XML, text, custom)
  - Modules/Subsystems
- Frameworks often improve code organization

MVC Frameworks for ColdFusion

- Framework-One (FW/1)

What is Framework-One (FW/1)

- Created by Sean Corfield in 2009
- Version 4.1 recently released
- Small, lightweight
  - MVC portion is one file, *one.cfc* (137KB)
  - Two related files:
    - *ioc.cfc* - (aka DI/1) Dependency Injection/Inversion of Control
    - *aop.cfc* - Aspect-Oriented Programming
- Convention-Over-Configuration

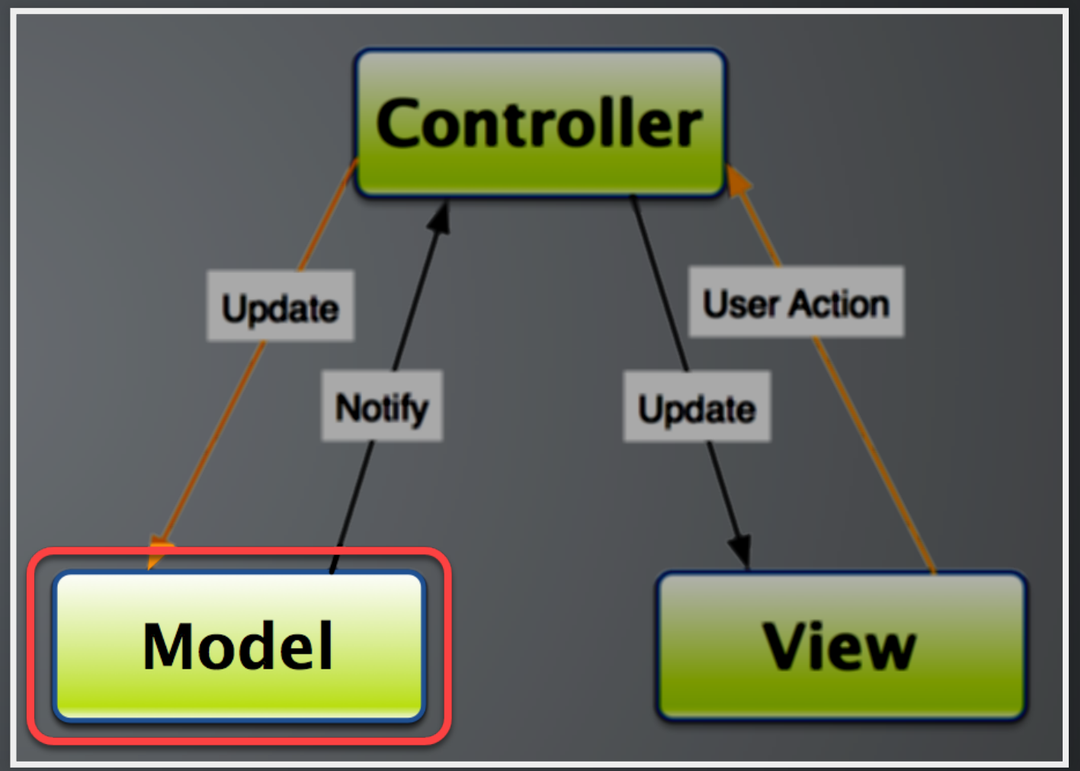
What is "Convention Over Configuration"

- Structure application folders per recommendations and the framework figures out the rest
- Only need to specify configuration settings to:
  - Override defaults
  - Deviate from the recommended structure
  - Deviate from the file naming conventions

Model Layer

- Business logic
  - Database interactions (CRUD)
  - SOAP/REST service calls
  - File system interactions
  - Helper Services
- Validation
- Responds to requests from controllers
- Should not know anything about the framework (including controllers and views)*
- Not accessible from web browser

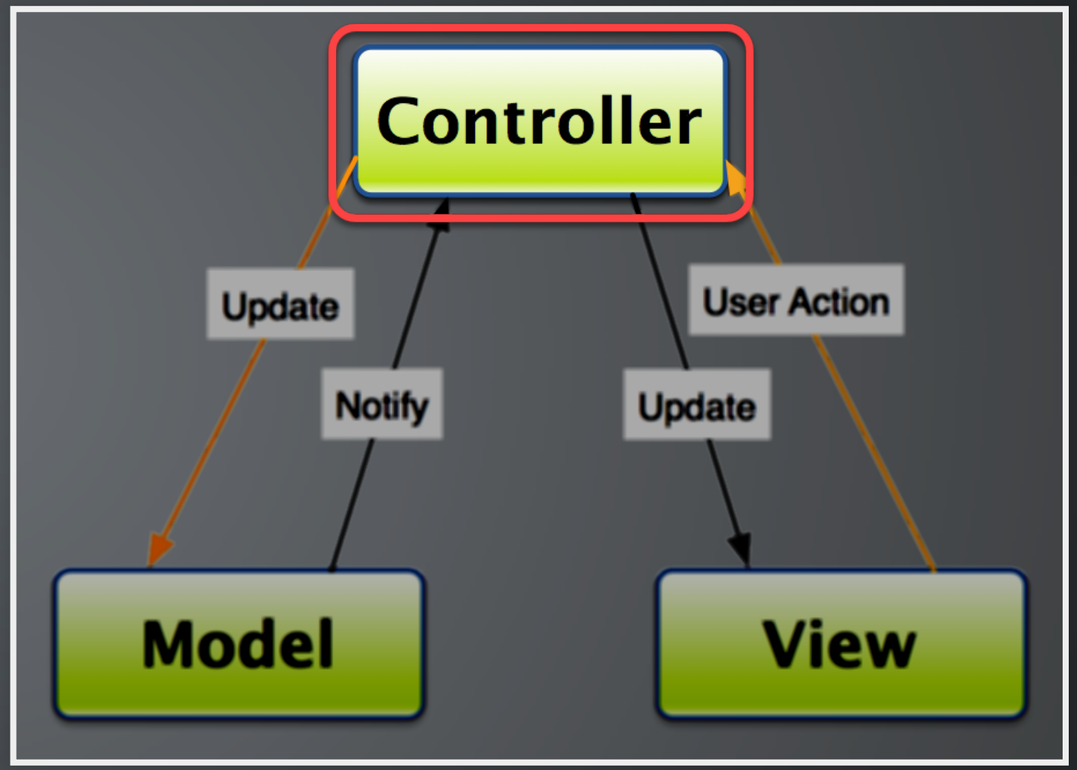
* Some exceptions: DI/IOC framework methods and helper modules loaded by DI/IOC.



Controller Layer

- Controls the flow of the application
- Examines each incoming request (URL/FORM scope variables or path)
- Calls relevant business logic (model objects/components)
- Places results from business logic into "RC" object for layouts/views

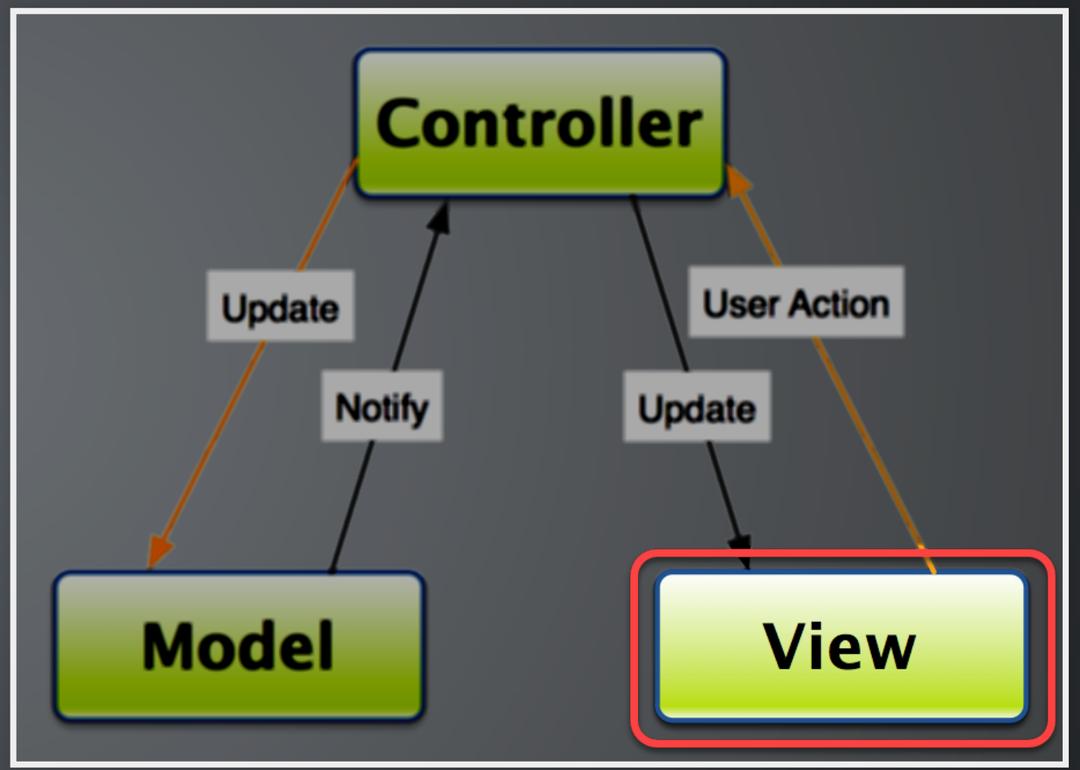
- Minimal validation
- Short controller functions



View Layer

- User interface
- HTML/CSS/JavaScript
- Minimal CFML logic for display control
- NO business logic!!!
  - No SQL code here!!!
- Layouts and views

- Should not know anything about the model
- Relies on controller to put required data in "RC"



What the heck is "RC"?

- RC struct = alias for request context
- Sort of another scope (like Application, Session, Request, etc.)
- Mechanism for passing data between framework, controller, and views
- FW/1 automatically populates RC with URL and Form variables
- Write controller methods to insert anything else your layouts/views need

Anatomy of a URL

https://localhost/index.cfm?action=section.item&somevariables.foo

action	• FW/1 looks for this URL parameter to decide what to do
section	• Name of controller to call (/controllers/*section*.cfc) • If a *section*.cfm file is found in /layouts, it will be applied before the default layout.
item	• Name of method (function) to call in /controllers/*section*.cfc • FW/1 will look for this view: /views/*section*/*item*.cfm

What Does a FW/1 MVC App Look Like?

Talk is cheap. Show me the code.

– Linus Torvalds

A Note About Dependency Injection (DI)

Depenency Injection simplifies managing dependencies

```
// This component depends on object "foo", which
// depends on objects "bar" and "baz"
component {
    public myObject function init( ) {
        var bar = new model.services.bar();
        var baz = new model.services.baz();
        variables.fooService = new model.services.foo( bar, baz
    }
    // ...other functions/methods
}
```

```
// This is foo.cfc
component {
    public foo function init ( bar, baz ) {
        variables.barService = arguments.bar;
        variables.bazService = arguments.baz;
    }
    // ...other functions/methods
}
```

```
// This component depends on object "foo", which
// depends on objects "bar" and "baz"
component {
    property fooService;
    ...
}
```

```
// This is foo.cfc
component {
    property barService;
    property bazService;
    ...
}
```

MVC - The Good and The Bad

Pros

- Promotes DRY (code reuse)
- Assists team efforts
  - Different parts of model, controllers, views can be worked on simultaneously
- Common pattern/terminology
- Enforces better code organization
- Business logic is now testable (Unit Tests/TDD/BDD)

Cons

- Have to learn some new concepts, even if already an excellen procedural programmer
- Might seem to end up with more files to manage
  - But each file will be more focused and on-point

Migrating Legacy Apps

- Don't have to "eat the elephant" all at once:
  - Choose logical sections/modules of an app to migrate
  - Start new work in MVC pattern
  - Move code in phases
    - Move business logic into "fat controllers"
    - Move display code into layouts or layouts and views
- MVC code can coexist with procedural code
  - With combination of configuration settings and web server rewrite rules

Key Takeaways

- MVC isn't as hard as it seems
- It will make application code maintenance easier for the future

MVC Framework Resources

- Docmentation and Downloads
  - Framework-One
    - Docs: https://framework-one.github.io/
    - Download: https://github.com/framework-one/fw1/
    - CommandBox installation:

```
install fw1-commands // Only have to do this once
fw1 create app MyApp basic
```

  - ColdBox
    - Docs/Download: https://www.coldbox.org
    - CommandBox installation:

```
box coldbox create app myApp
```

- Discussion Groups
  - Framework-One Google Group
  - ColdBox Google Group
- Real-Time Assistance
  - CFML Slack Team
    - FW/1 Channel
    - Box-Products Channel

Thank You!!!

- Contact Me:
  - Email: carl.vonstetten1@gmail.com
  - Twitter: @cfvonner
  - GitHub: cfvonner
  - CFML Team on Slack: @cfvonner

- Code/Slides: https://github.com/cfvonner/Intro-To-MVC-ColdFusion