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RUBY ON RAILS

CSCI 5448 – Fall 2012 Presentation

Prashanth Mannar

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OUTLINE

Outline

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What and why…

RUBY

What is RUBY?

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- An Object oriented, Open source programming language
- Developed by Yukihiro Matsumoto in the 1990s.
- A blend of “Matz” favourite languages - Perl, Smalltalk, Eiffel, Ada, and Lisp
- Available for Windows, Mac OS, Unix/Linux, Java, .NET and Android.

RUBY – Why?

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- According to 'Matz', Ruby is productive and fun because it was designed on following principles…
  - **Principle of Conciseness**

    "… short, concise code…"
  - **Principle of Consistency**

    "… a small set of rules covers the whole Ruby language…"
  - **Principle of Flexibility**

    "… should not restrict the flow of human thought …"

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RUBY – Syntax features…

- Whitespace is not significant (unlike Python)
- Statements separated by semicolons or carriage returns
- Statement can span a newline
- Parentheses can often be omitted

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What, why and features…

RAILS

What is RAILS?

- An Open-source full stack web application framework for Ruby.
- *David Heinemeier Hansson* extracted Ruby on Rails from his work on Basecamp, a project management tool by 37signals.
- Open source and free. Growing community since 2004.

RAILS – Why?

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- a lot less code
- a lot less configuration data
- bringing up basic functionality quickly
- building out new functionality incrementally integrated testing

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RAILS – Features… (1)

- Can be used in multiple environments
  - *Development, testing, production*
- Rails embraces test-driven development
  - *Unit testing, Functional testing, Integration testing*
- Multiple database support
  - *Oracle, DB2, SQL Server, MySQL, PostgreSQL, SQLite*

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RAILS – Features… (2)

- DRY principal
- Generate boilerplate code
- Full stack MVC Framework
  - *The Framework provides all three MVC layers*
- Convention over Configuration
  - *No XML Configuration files*
- Scaffolding
  - *Automatically creates a full set of CRUD operations and views on any database table.*

RAILS – MVC

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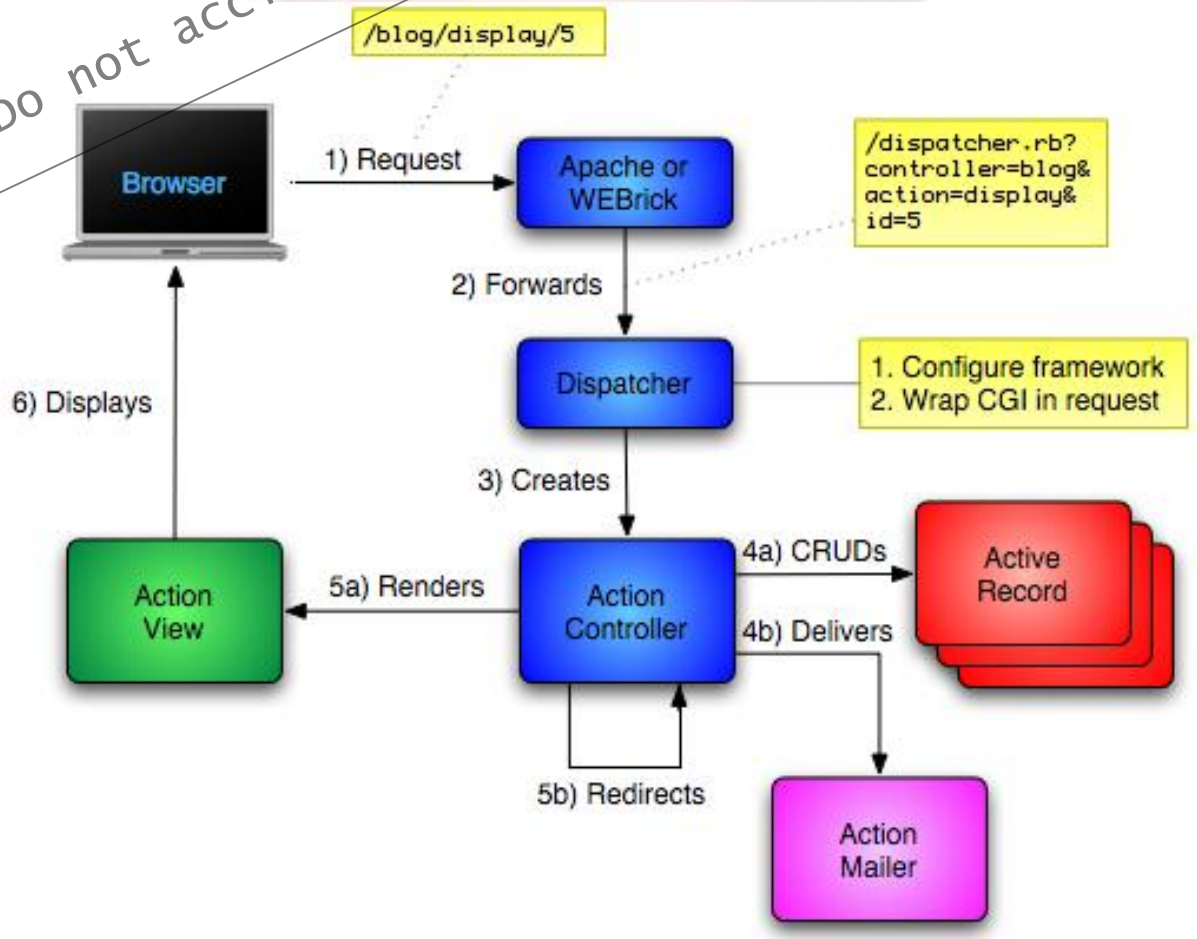

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ActiveRecords, Action Pack, CRUD, Migrations…

MORE ON RoR…

Active Records… (1)

- “Database Wrapping” instead of “Database Mapping”
- Each active record object represents a row in a table
- Each record object has CRUD methods for database access

Active Records… (2)

- Adds attributes automatically, based on the columns in the database
- Adds relational management through a custom internal language
- Naming convention allow database to discover specific fields
- Schema migration “baked in” Rails

Action Pack… (1)

- Bundles both views and controllers
- The view and controller parts of MVC are pretty intimate
- The controller supplies data to the view
- The controller receives events from the pages generated by the views
- Rails provides a clear separation for control and presentation logic

Action Pack – Views…

- Creating either all or part of a page to be displayed in a browser
- Dynamic content is generated by templates
  - rhtml
    - Embeds snippets of Ruby code within the view's HTML
  - rxml
    - Lets you construct XML documents using Ruby code
    - The structure of the generated XML will automatically follow that of the code
  - rjs
    - Allows you to create JavaScript fragments on the server which are to be executed on the browser
    - Great for creating dynamic Ajax interfaces

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Action Pack – Controller…

- Coordinates the interaction between the user, the views, and the model
  - Rails handles most of this interaction behind the scenes
    - You only need to add the application-level functionality
- Other responsibilities
  - Routing external requests to internal actions
  - Managing caching
    - Give applications orders-of-magnitude performance boosts
  - Managing helper modules
    - Extend the capabilities of the view templates without bulking up their code
  - Managing sessions
    - Giving users the impression of ongoing interaction with the applications

CRUD…

CRUD

Create Read Update Delete

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CRUD – Create…(1)

- Create row by creating object

```
an_order = Order.new
an_order.name = “Dave Thomas”
an_order.address = “122 Main”
an_order.phone = 2125551212
an_order.save
```

```
an_order = Order.new(
   :name => “Dave Thomas”,
   :address => “122 Main”,
   :phone => 2125551212 )
an_order.save
```

```
Order.new do |o|
   o.name = “Dave Thomas”
   o.address = “122 Main”
   o.phone = 2125551212
   o.save
end
```

Note: We didn’t need to set a primary key. Rails assumes “id” is primary key and set autoincrement

CRUD – Create…(2)

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- Can also use create method
- Creates a new object and saves it
- Takes a hash or an array of hashes

```
an_order = Order.create(
   :name => “Dave Thomas”,
   :address => “122 Main”,
   :phone => 2125551212 )
```

```
an_order = Order.create(
  [ {  :name => “Dave Thomas”,
       :address => “122 Main”,
       :phone => 2125551212
    },
    {  :name => “Another Name”,
       :address => “blah”,
       :phone => 1234567890
    } ] )
```

CRUD – Read… (1)

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- We need to specify which rows we want
  - Rails will return objects containing the data from those rows in the database
- Use the find method with one or more primary keys
  - an_order = Order.find(27)
  - product_list = Order.find(params[“product_list”])
- find() will throw a RecordNotFound exception if any of the requested primary keys cannot be found

CRUD – Read… (2)

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- find() also has other options
  - can pass :all or :first along with other parameters
    - :conditions => “name = ‘Dave’”
      - corresponds to WHERE clause
    - :order => “name”
      - corresponds to ORDER BY clause
    - :limit => pagesize
      - corresponds to LIMIT
    - :offset => pagenum * pagesize
      - use in connection with :limit to step through query results
- an_order = Order.find(:first,
  :conditions => “name = ‘Dave Thomas’”)
- orders = Order.find(:all,
  :conditions => “name = ‘Dave’”,
  :order => “pay_type, shipped_at DESC”,
  :limit => 10)

CRUD – Read… (3)

- Allowing for externally generated parameters
  - pname = params[:name]
    orders = Order.find(:all,
    :conditions => [“name = ?”, pname])
  - orders = Order.find(:all,
    :conditions => [“name = :name”,
    {:name => pname}])
- Can also write your own SQL
  - orders = Orders.find_by_sql(“select * from orders”)
  - single parameter - SQL string
  - May also be an array where first element is SQL with place holders. The rest is a list of values or hash
  - Nice for hard queries or performance

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CRUD – Update… (1)

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- Simple
  - find the row or rows using find
  - update necessary fields
  - save

```
order = Order.find(123)
order.name = "Fred"
order.save
```

- Also works with an array for multiple update
  - orders = Order.find(:all, :conditions => "name like 'Dave%'")
    orders[0].name = "Fred"
    etc.
- May also use update() or update_all()
  - order = Order.update(123, :name => "F", :address => "blah")
    - finds, updates, saves, and returns object
  - result = Order.update_all("set clause", "where clause")
    - returns number of rows updated

CRUD – Delete… (1)

- delete & delete_all
  - Order.delete(123)
  - Order.delete([1,2,3,4])
  - Order.delete_all([“price > ?”, maxprice])
- destroy & destroy_all
  - order.find(123)
  - order.destroy
  - Order.destroy_all([“price > ?”, maxprice])
- destroy and destroy_all ensure that ActiveRecord callback and validation functions are invoked
  - preferred methods

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Migrations… (1)

- Rails is set up to encourage agile development
  - always making changes
  - even to the database
- To support this, Rails provides a mechanism to set up and modify the database
- Goal 1: Apply only those changes necessary to move a database from version x to version y
- Goal 2: Shield the developer from the specific implementation details of the underlying database

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Migrations… (2)

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- Migration skeleton files are created every time you generate a model
  - contained in db/migrate
- Run the migration using rake
  - rake db:migrate
- Migration files have a sequence number
  - acts as a version number
  - apply all migrations with sequence number greater than the database version
- Can pick a specific version
  - rake db:migrate VERSION=12

Migration Methods…

- create_table
  - accepts a table name and a ruby block
- add_column and remove_column
  - accepts table name and column name
  - and column type if adding a column
- rename_column
  - accepts table name, column name, new column name
- change_column
  - accepts table name, column name, new type
- drop_table
  - accepts table name

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Pros and Cons…

ADVANTAGES AND DISADVANTAGES…

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Disadvantages

- No big corporate backer
- Very few expert Ruby programmers, and universities and TAFEs have not picked it up
- Runs slowly (Java ~ 5 times faster but Ruby may be improved by new VM - YARV)
- Poor editor support and very slow debugger
- No clustering, failover
- No two-phase commit
- Does not support compound primary keys
- Internationalization support is weak
- No off-the-shelf reporting tool

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Advantages

- Standard directory structure for source
- Can build prototype very quickly
- Can add to and change prototype easily
- Can generate scaffolding, if app is more complex, and build on this
- Very powerful, high-level commands
- Ruby has great short-hand code for common patterns, eg the Value Object
- Built in testing, migration, and some version control
- Does not constrain the programmer like other frameworks

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Reference and Learning Materials

CONCLUSION

Points to noted…

- Can only be used for web-based, specifically HTML-based, applications
- Designed for small to medium CRUD-based applications
- Cross-platform
- Large tools and software base
- Ruby and Rails are each very powerful in their own right.

References…

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- **The Ruby Programming Language** - David Flanagan and Yukihiro Matsumoto
- **Engineering Long Lasting Software** - Armando Fox and David Patterson
- http://en.wikipedia.org/wiki/Ruby_on_Rails
- http://www.ruby-lang.org/en/
- http://rubyonrails.org/

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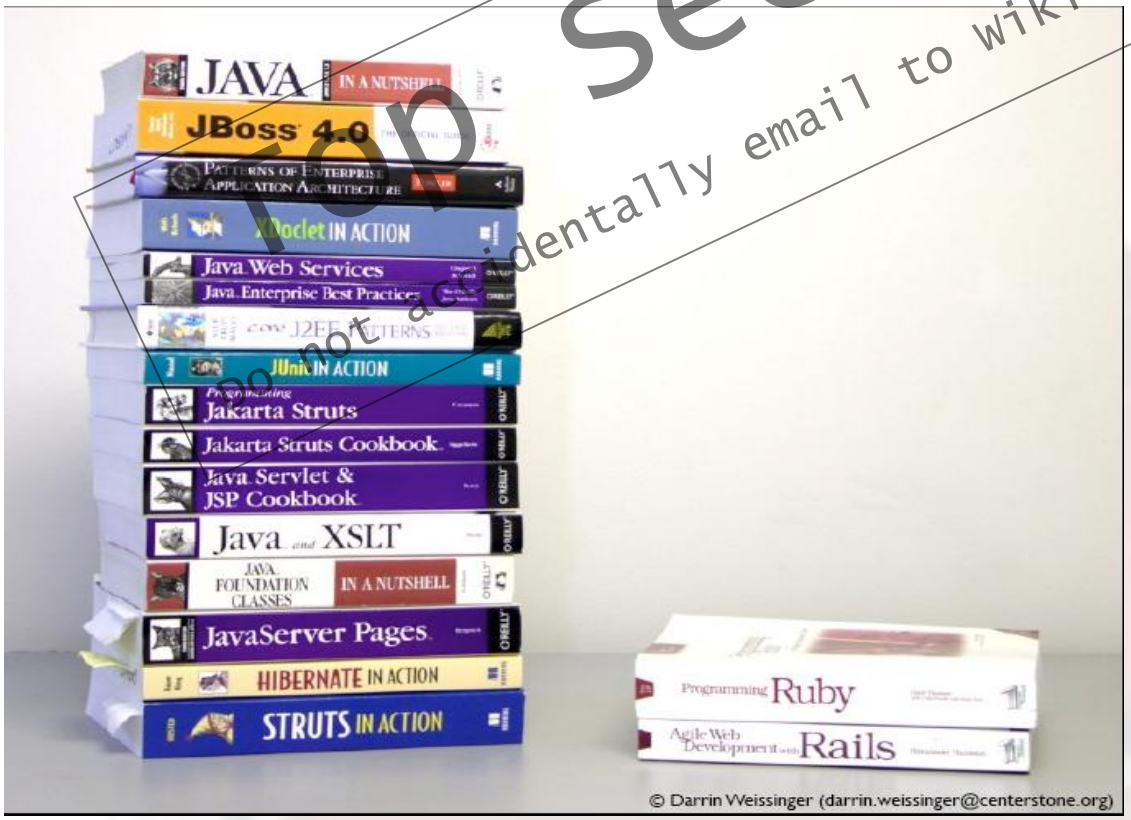
Books…

- **The Ruby Programming Language** - David Flanagan and Yukihiro Matsumoto
- **Ruby on Rails Bible** - Timothy Fishe
- **Agile Web Development with Rails -** Sam Ruby, Dave Thomas and David Heinemeier Hansson
- **Ruby on Rails : Up and Running**

Online Resources…

- http://ruby.railstutorial.org/
- http://www.ruby-doc.org/
- http://www.digitalmediaminute.com/article/1816/top-ruby-on-rails-tutorials
- Rails mailing list



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David Heinemeier Hansson (Ruby on Rails creator) explained, "Once you've tried developing a substantial application in Java or PHP or C# or whatever," he says, "the difference in Rails will be readily apparent. You gotta feel the hurt before you can appreciate the cure."

FROM THE CREATOR…