
5Ws of DSLs
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DRW Trading


Agenda


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how to get started


what
is a DSL

Domain Specific Language

a computer programming language of limited expressiveness focused on a particular domain.

Martin Fowler

computer programming language

a DSL is used to instruct a computer to do something, as well as helping communication between humans.

buy 50 GEZ0 if Px is < 9805; hedge w/put

buy 50 GEZ0 if Px is < 9805; hedge w/put

```
if (Px.of(GEZ0) < 9805)
    buy(50).of(GEZ0).andHedgeWithPut();

buy(50.GEZ0).and_hedge_with_put if
     GEZO.px < 9805
```

language nature

a DSL is a programming language, and as such should have a sense of fluency where the expressiveness comes not just from individual expressions but also the way they can be composed together.

for eurodollar future 2010 a March of.

```
Future future = new Future();
future.setMonth(March);
future.setYear(2010);
future.setInstrument(‘eurodollar);
```

a eurodollar future for March of 2010.

---

a().eurodollar().future().forMarch().of(2010)

limited expressiveness

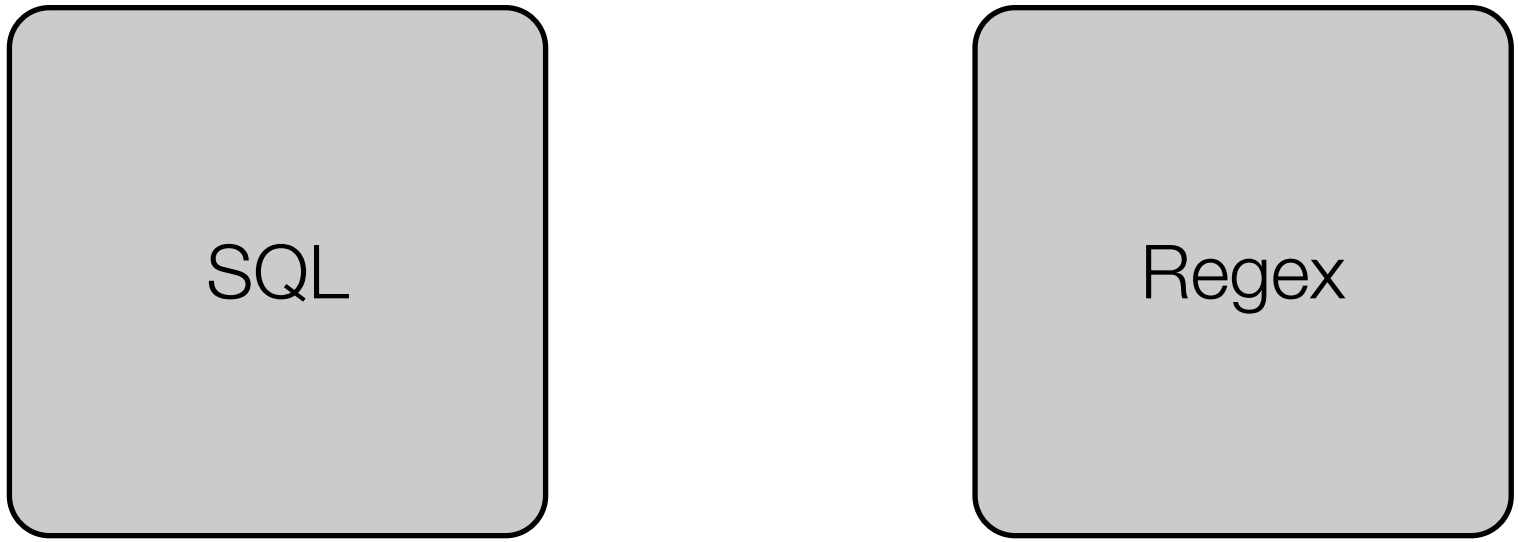
a DSL supports a bare minimum of features needed to support its domain. You can't build an entire software system in a DSL, rather you use a DSL for one particular aspect of a system.

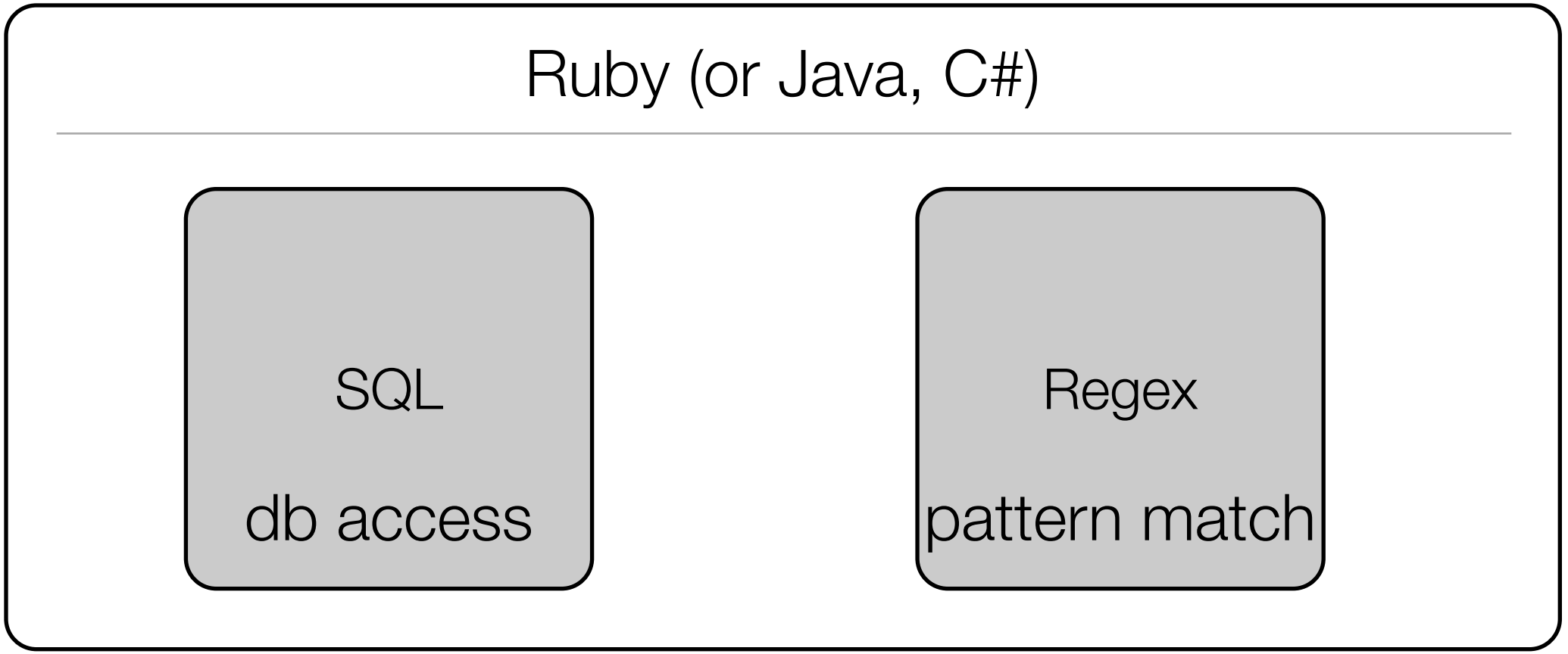
regular expressions

-reading and writing to a file
-access to standard out
-public, protected, and private visibility
-int, double, float, big decimal

domain focus

a limited language is only useful if it has a clear focus on a limited domain. The domain focus is what makes a limited language worthwhile.


SQL
Regex


Ruby (or Java, C#)
SQL
db access
Regex
pattern match

Types of Domain Specific Languages

internal

```
context.checking(new Expectations() {
    one(clock).time();
        will(returnValue(loadTime));
    one(clock).time();
        will(returnValue(fetchTime))

    allowing(reloadPolicy).shouldRel
        will(returnValue(false));

    one(loader).load(KEY); will(retu
}});


context.checking(new Expectations() {
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Types of Domain Specific Languages

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written in host language

conventionally use of subset of host language syntax

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external

```
elect¬
SUM(impressions) AS impressions,¬
SUM(clicks) AS clicks,¬
ROUND(SUM(cost), 2) AS cost,¬
IF (SUM(cost)= 0, 0.00, ROUND( (SUM(cos
IF (SUM(impressions)= 0, 0.00, ROUND( (
IF ((current_status = 'Paused' || adgro
keyword_name, keyword_type, max(cost_cu
FROM aggr_keyword_stats¬
WHERE merchant = 'ThoughtWorks' and fro
GROUP BY played_keyword_id HAVING impre
order by clicks desc, concat(keyword_na
limit 100;¬
¬
select id, played_keyword_id, cost, con
```

Types of Domain Specific Languages

internal

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separate to host language

needs a compiler/interpreter to execute.

Types of Domain Specific Languages

Interpreted

Interpret input directly or compile to intermediate representation and execute that.

```
Account.find(:first,
    :conditions =>
    {:first_name => ‘jay’})
```

Domain Specific Language Output

Interpreted

Interpret input directly or compile to intermediate representation and execute that.

```
Account.find(:first,
    :conditions =>
    {:first_name => ‘jay’})
```

Compiled

Usually code generation

Complicates Build

```
struct Table {
  1: i32 length
  2: i32 width
}
```

Domain Specific Language Output

gray area | everywhere

XML Configuration File

Java : External DSL

ActionScript : Internal DSL

Domain Specific Language / Framework API

gray area | everywhere

gray area | everywhere

gray area | everywhere

```
<beans>

   <bean id="myDataSource"
    class="org.apache.commons.BasicDataSource"
    p:url="jdbc:mysql://localhost:3306/mydb"
    p:username="someone"/>
```

```
task :default => [:test]

 task :test do
   ruby "test/unittest.rb"
 end
```

It Doesn’t Matter To Us


Who
DSLs are for

You

Domain Specific Languages should make your job easier. DSLs should fill certain specific needs, relieving you from solving those problems.

You

Domain Specific Languages should make your job easier. DSLs should fill certain specific needs, relieving you from solving those problems.

sql, regular expressions, spring config, linq

Stakeholders (but, you again)

A DSL designed to express the rules of your business can help you review your code with a domain expert. This should lead to less bugs in your domain model.

Stakeholders (but, you again)

```
buy(50.GEZ0).and_hedge_with_put if
    GEZO.px < 9805
```

Stakeholders (truly this time)

You can design a DSL that the domain experts can use to define the domain rules of the application

Stakeholders (truly this time)

buy 50 GEZ0 if Px is < 9805; hedge w/put

Programmer
Read / Write

- JMock
- Mockito
- Active Record

internal & external

Domain Specific Language Target

Programmer Read / Write	Domain Expert Readable	
- JMock - Mockito - Active Record	- RSpec - Your Domain Model	
internal & external	internal & external	

Domain Specific Language Target

Programmer Read / Write	Domain Expert Readable	Domain Expert Read / Write
- JMock - Mockito - Active Record	- RSpec - Your Domain Model	- JBehave - RSpec Scenarios
internal & external	internal & external	generally external

Domain Specific Language Target

Programmer Read / Write

Programmer Read / Write

terse

Programmer Read / Write

as readable as possible

Programmer Read / Write

no custom error handling

Programmer Read / Write

exploit IDE features

Programmer Read / Write

apply programming best practices

Programmer Read / Write

language “noise” acceptable

Programmer Read / Write

design from the consumer perspective

```
//Mockito (http://code.google.com/p/mockito/)

//mock creation
List mockedList = mock(List.class);

//using mock object
mockedList.add("one");
mockedList.clear();

//verification
verify(mockedList).add("one");
verify(mockedList).clear();
```

Mockito

Programmer Read/Write

Domain Expert Readable

Domain Expert Readable

verbose

Domain Expert Readable

as readable as possible

Domain Expert Readable

use common domain idioms

Domain Expert Readable

no custom error handling

Domain Expert Readable

exploit IDE features

Domain Expert Readable

apply programming best practices

Domain Expert Readable

language “noise” should be hushed

Domain Expert Readable

collaborate on design

```ruby
describe Account do

  it "should have status silver when it has greater than 24 points" do
    account = Account.new
    account.credit(25.points)
    account.status.should == 'Silver'
  end

  it "should have status gold when it has greater than 49 points" do
    account = Account.new
    account.credit(50.points)
    account.status.should == 'Gold'
  end

  it "should have status platinum when it has greater than 74 points" do
    account = Account.new
    account.credit(75.points)
    account.status.should == 'Platinum'
  end

end
```

RSpec | Domain Expert Readable

Domain Expert Read / Write

Domain Expert Read / Write

verbose

Domain Expert Read / Write

as readable as possible

Domain Expert Read / Write

use common domain idioms

Domain Expert Read / Write

custom error handling

Domain Expert Read / Write

design your own editor

Domain Expert Read / Write

ignore programming best practices

Domain Expert Read / Write

language “noise” should not exist

Domain Expert Read / Write

domain expert designs the language

```
Given I am not logged in
When I log in as Liz with a password JBehaver
Then I should see a message, "Welcome, Liz!"

Given I am logged in
When I logout
Then I should see a message, "Thank you, you are now logged out"
```

JBehave

Domain Expert Read/Write


Where
DSLs already live

you use several | right now

you use several | right now

you use several | right now

ActiveRecord Validations

JMock

NUnit

LINQ

Regular Expressions

Rhino Mocks

Mockito

Rake

JUnit

RSpec

you use several | **right now**

Spring Config

Thrift

Prototype Effects

Ant

JBehave

SQL

HTML

CSS

YAML

RSpec Scenairos

YUI widgets

JQuery

db deploy

you use several | **right now**

Spring Config

Thrift

Prototype Effects

Ant

JBehave

SQL

HTML

CSS

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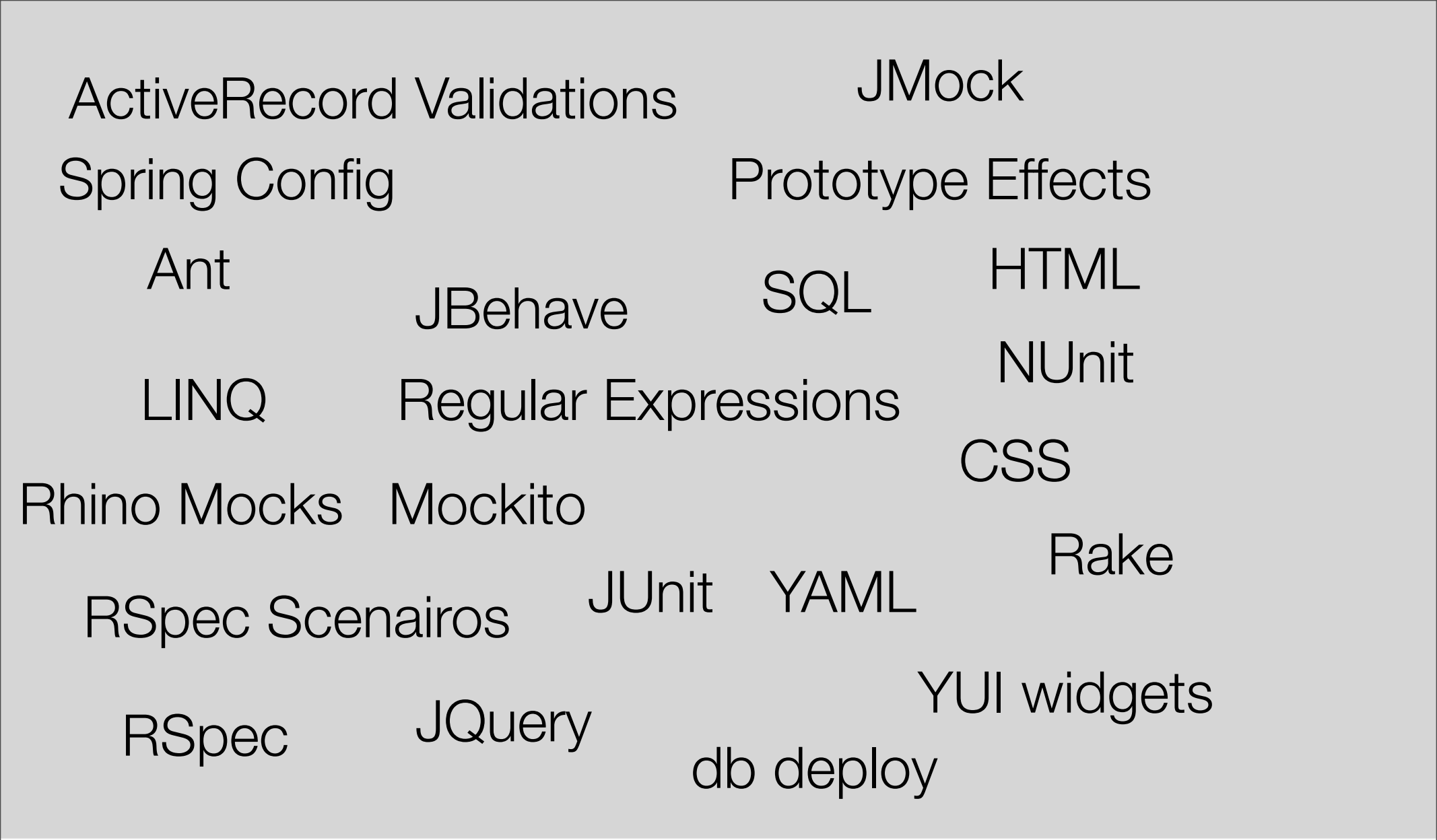
YUI widgets

JQuery

db deploy

you use several | **right now**



you use several | right now

Thrift

you use several | right now


When
to create a DSL

Programmer Read / Write

Programmer Read / Write

simplify repetitive tasks

Programmer Read / Write

framework for solving a specific problem

Programmer Read / Write

abstract problems to a higher level

Domain Expert Readable

Domain Expert Readable

designing the domain model

Domain Expert Readable

testing the domain model

Domain Expert Readable

application configuration

Domain Expert Read / Write

Domain Expert Read / Write

---

frequent rule changes

Domain Expert Read / Write

large amount of similar logic

Domain Expert Read / Write

time to market criticality


Why
DSLs are important

in a word: Productivity

Imagine your life without:

in a word: Productivity

Imagine your life without:

regular expressions

in a word: Productivity

Imagine your life without:

SQL

in a word: Productivity

Imagine your life without:

CSS

in a word: Productivity

Imagine your life without:

Spring

in a word: Productivity

Imagine your life without:

LINQ

in a word: Productivity

Imagine your life without:

JUnit / RSpec / NUnit .....

in a word: Productivity

Imagine your life with:

in a word: Productivity

Imagine your life with:

Domain experts verifying behavior visually

in a word: Productivity

Imagine your life with:

Domain experts writing tests

in a word: Productivity

Imagine your life with:

Domain experts writing the business rules

in a word: Productivity

Imagine your life with:

Testing complex domain graphs easily

in a word: Productivity

Imagine your life with:

Seamless persistence

in a word: Productivity

Imagine your life with:

Seamless resource pub/sub

in a word: Productivity

Imagine your life with:

... being rid of any complicated issue ...


Questions
?


How
to get
started

Programmer Read / Write

Design your next framework with expressiveness as a core requirement.

Your next steps depend on your target

Programmer Read / Write

Design your next framework with expressiveness as a core requirement.

Domain Expert Readable

Ask your domain expert to look though your domain logic or the domain logic tests and come up with a syntax your are both comfortable using.

Your next steps depend on your target

Programmer Read / Write

Design your next framework with expressiveness as a core requirement.

Domain Expert Readable

Ask your domain expert to look though your domain logic or the domain logic tests and come up with a syntax your are both comfortable using.

Domain Expert Read / Write

Identify the highly similar domain logic that changes regularly and attempt to design a language the domain expert would be comfortable using.

Your next steps depend on your target

Martin Fowler: DSL - Work in Progress

www.martinfowler.com/dslwip

Jay Fields: BNL - DSL for Domain Experts

bnl.jayfields.com

Google For: Language Workbenches, Intentional Software, JetBrains MPS, Internal DSL, External DSL

interesting information | **on DSLs**


thanks
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DRW Trading