springone 2GX
DALLAS
2014

Experiences using Grails in a Microservice Architecture

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springone 2GX

Who Am I

- Jeff Beck
- TechLead at ReachLocal
- @beckje01 everywhere

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What I mean by Microservice

- Single concern
- Deployable in isolation

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Our Architecture

Over the course of acquisitions and expanding the products we have come out with a polyglot architecture including Java, Groovy, Ruby, PHP, Node, and PERL. In order to take advantage of our existing talent and software, we have started down the micro-service path.

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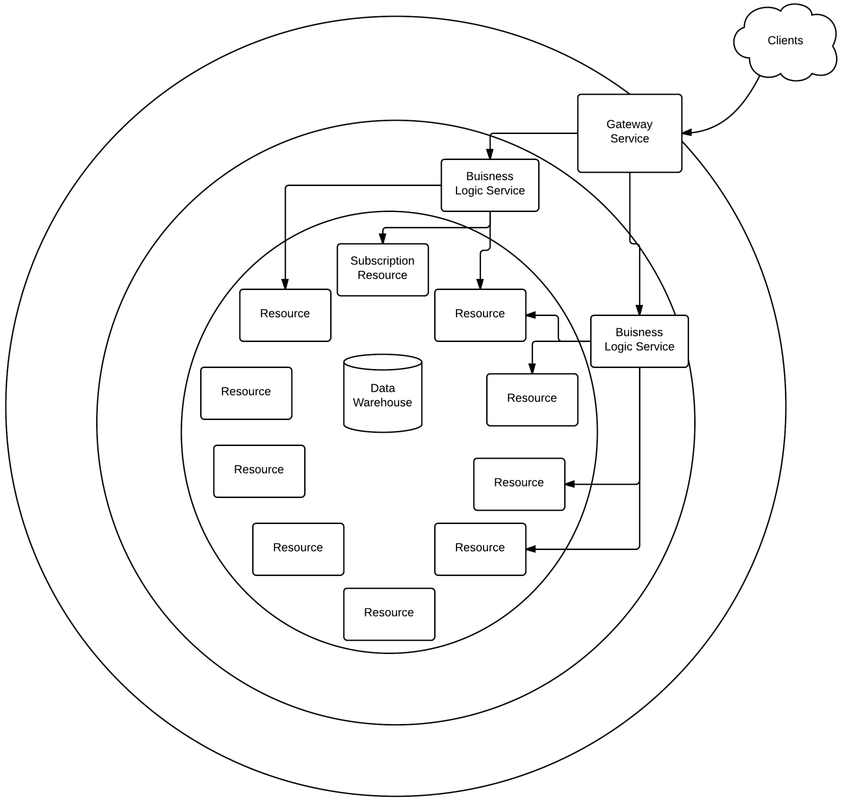
Our Architecture



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Our Architecture

- Layered Microservices
- Asynchronous Broadcast Event System
- REST calls can be either Synchronous or Asynchronous

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Where Grails Fits

- REST Resources
- GORM

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Where Grails Doesn't Fit

- Batch Jobs
- Lacking any web endpoint

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Example Service

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Subscription Service

Acts as the source of truth about subscriptions.

- Exposes the Subscription REST Resource
- Emanates Events

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Requirements

- Application Monitoring
- Security
- Server Setup
- Builds
- Deployments

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Building Our Service

All our Grails micro services start out the same way.

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Project Setup

- Grails create-app
- Change Java Version to 1.7
- Add Internal Nexus

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Project Setup - Plugins

- Add our normal plugins
    - code-coverage
    - console
    - cucumber
- Remove the extra standard plugins
    - scaffolding
    - asset-pipeline
    - jquery

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Project Setup - Plugins Config

- Set up cucumber plugin
- Configure GORM

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Build and Repo Setup

- Commit everything as the starting point
- Add the new CI job
- Bring up a dev server

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Customizing Our Service

We add scenarios, using cucumber allows us to keep our testing more DRY.

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```
Scenario: Get nonexistent subscription by ID
 Given I am a valid api client
 And A valid subscription ID which does not match any subscription
 When I request a subscription by ID
 Then I get a 404 response
```

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```
Scenario: Get existing subscription by ID
 Given I am a valid api client
 And A valid subscription ID which matches a subscription
 When I request a subscription by ID
 Then I get a 200 response
```

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```
Given(~'^A valid subscription ID which matches a subscription$') { ->
    //Have a valid subscription which exposes an ID
}
Given(~'^A valid subscription ID which does not match any
subscription$') { ->
    //Have an ID which is valid but no matching subscription
}
When(~'^I request a subscription by ID$') { ->
    //Do actual request
}
Then(~'^I get a (\\d+) response$') { int statusCode ->
    if (response.statusCode != statusCode) {
        println response.asString()
    }

    assert response.statusCode == statusCode
}
```

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What We Reused

- Health Checks
- Security
- Server Setup
- Deployments
- SI Components

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Health Checks

To support reusable monitoring we expose a health check in a known way that attempts to be both human readable and programmatically useful.

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Example 200 Status

```
{
  "dependencies": {
    "database":"OK",
    "file-access":"WARN"
  }
}
```

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What Was Exposed

Via a Grails plugin we share

- Common Grails focused health check implementations
- Controller that supports the expected output

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Sharing Outside Grails

Via a JAR

- Common health check implementations
- A registry of health checks

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Security

We do server to server authentication with a token. So checking the Authorization header the plugin authenticates a client.

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Our Plugin

- Expects a known GORM object that has an ID which is the token.
- Uses a static list of resource names to secure
- Intended to be as light weight as possible

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Experiences With Our Plugin

- Moving away from our custom implementation towards a SpringSecurity based Grails plugin
- Was opt in security which was easy to miss a controller
- Intently lacked roles which we have found a use-case for now

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How We Shared The Plugins

We use an internal Nexus repo, and release plugins to that.

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Experiences

- Supports Versioning
- Dependency resolution works the way the rest of Grails does
- Changes don't reload

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Guide for Internal Plugins

- Tend to adding features allowing customization.
- Each plugin is a project it needs CI, CodeNarc, etc
- Use Versioning
- CI pushing out SNAPSHOT versions is very helpful

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Server Setup

We use puppet to automate our server setup. Using classes we share default setup for a Tomcat server.

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init.pp

```
class apps_subscription_api (
  $heap_min = '256m',
  $heap_max = '1024m',
  $permgen_size = '1024m'
 ){
  class { 'standard_tomcat7_web_server':
  minimum_heap => $heap_min,
  maximum_heap => $heap_max,
  permgen_size => $permgen_size,
  }

  include apps_subscription_api::config

  base::nagios::hostgroup { "rsubscription_api_servers": }
  base::nagios::hostparam { "_healthuri": value => '/health' }
 }
```

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config.pp

```
class apps_subscription_api::config {

     file { '/rl/path/configs/subscription-config.groovy':
      ensure => present,
      owner => tomcat7,
      group      => tomcat7,
      mode       => '0400',
      content    => template('apps_subscription_api/subscription-
config.groovy.erb'),
      require    => File['/rl/path/configs']
      }
    }
```

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Deployments

We automate our deployments via custom bash scripts kicked off by bamboo deployments.

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Changes per Service

- Server List
- Artifact Name
- Deployment permissions

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Spring Integration Components

Our spring integration apps tend to need the same filters and transformers for our Events. Grails apps are not the only users of these components.

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Shared via a Jar

- Exposes a Pojo that represents our internal idea of an Event
- De-duplication filter
- An Event deserializer that supports our Builder
- Built to include the least dependencies

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Logging

As a single request can spread out across the graph of microservices it is helpful to have some way to correlating all the work back together.

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Correlation ID

We use Log4J's MDC to log a correlation ID throughout the requests life in Grails.

```
MDC.put('correlationId', ", CorrelationId=${correlationId}")
```

The Grails Filter

```
new EnhancedPatternLayout(conversionPattern: '
%d{ISO8601}%d{ z}{GMT+0} %-5p [%t] %c{2}(:%L) - %m
%X{correlationId}%n')
```

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Correlation ID Pitfalls

- LB calls without Correlation ID generating noisy logs
- Passing further on to other systems transparently is tricky without some standards for http clients etc
- Passing the correlation id around explicitly is messy

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Log Aggregation

We use Splunk for log aggregation for all applications.
Allowing a query across many apps for a single correlation id.

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Splunk Correlation ID and Transactions

With Splunk we can use our correlationId as a transaction key, so we see log messages grouped together in spunk

```
index=my_api | transaction correlationId keepevicted=true
```

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Centralized Monitoring

- Nagios
- NewRelic
- Starting to use dashboards of health checks

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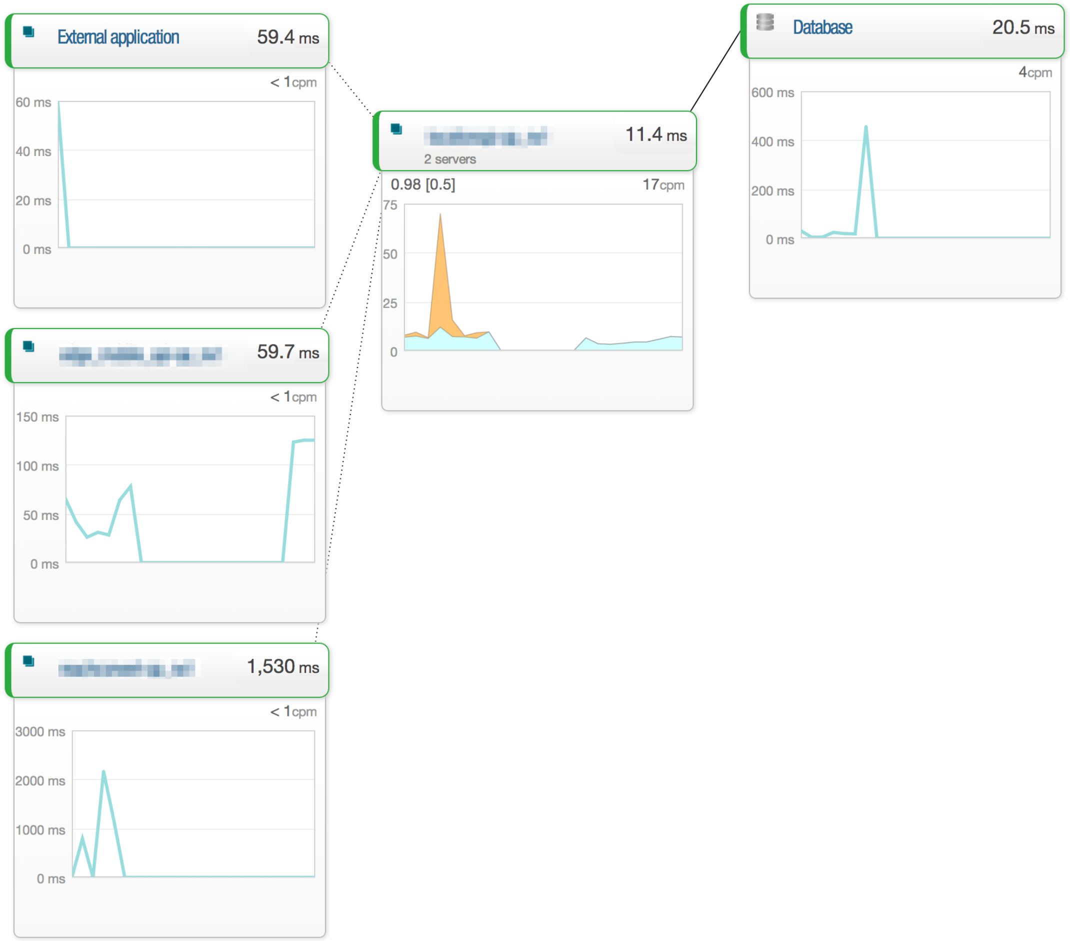
NewRelic Map



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NewRelic + Grails

Grails Service

```groovy
import com.newrelic.api.agent.Trace

class SubscriptionService {

  @Trace
  def save(Subscription subscription) {
    //Work Here
  }
```

newrelic.yml

```yaml
#enable_custom_tracing is used to allow @Trace on methods
 enable_custom_tracing: true
```

Blog Post

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Compensation

Account for failures across the system building a convergent system.

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Compensation

- Spring Batch for jobs and batching up the work
- POST to a REST(ful) endpoint that will do the work
- Reuse the same code/libraries to do the compensation work that would have done the work in real time

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Pitfalls

- Poor communications between teams gets worse
- Coordinating Releases
- Development to spec vs finished service
- Leaving in -SNAPSHOT dependencies
- Poor monitoring in lower than production environments
- Lacking log aggregation in lower environments

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Grails Microservice Checklist

- ☐ Low overhead to start new projects
- ☐ Internal maven repo
- ☐ Automated deployments
- ☐ Server configuration management
- ☐ Good team to team communication

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Open Questions

- Correct size of Microservices
- Pure REST vs RESTful
- Security: Centralized vs Decentralized

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Learn More. Stay Connected

Thinking about Microservices? Make sure to complete the checklist first!

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