springone 2GX
DALLAS
2014

Centralized Application Configuration with Spring and Apache ZooKeeper

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How do you configure your applications?

http://b.socrative.com/login/student/

config2gx

Who is Dealer.com?

We make software that car dealers use
to fulfill their digital marketing vision.

The Remote Configuration Project

Some ways we had configured our applications

- Hardcoded values in code
- Properties file – per environment or merged
- Host files for database
- JNDI context files

Motivating factors

- Developer Efficiency
  - Redeploying an application just to change a configuration is a drag
  - Having to edit *N* config files whenever a single application changed is a hassle

- Security Compliance
  - Limit access to production databases
  - Auditing and approval process for configuration changes

- Systems Engineering
  - Can’t make certain changes without involving developers

Framework Development – Guns n Roses style

"Welcome to the jungle"
Thanks.

"We've got fun and games"
Cool.

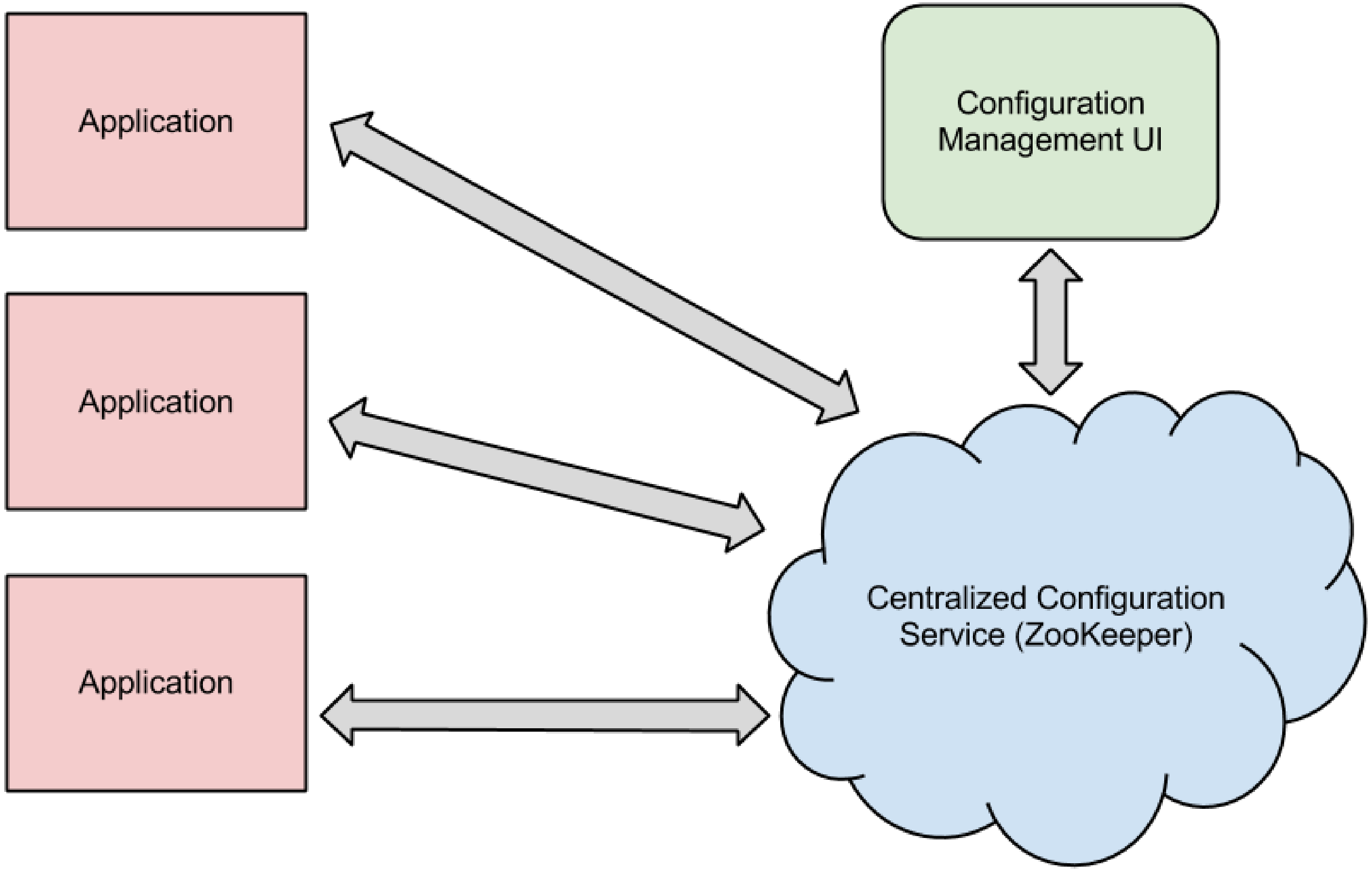
"You're in the jungle"
We've established this

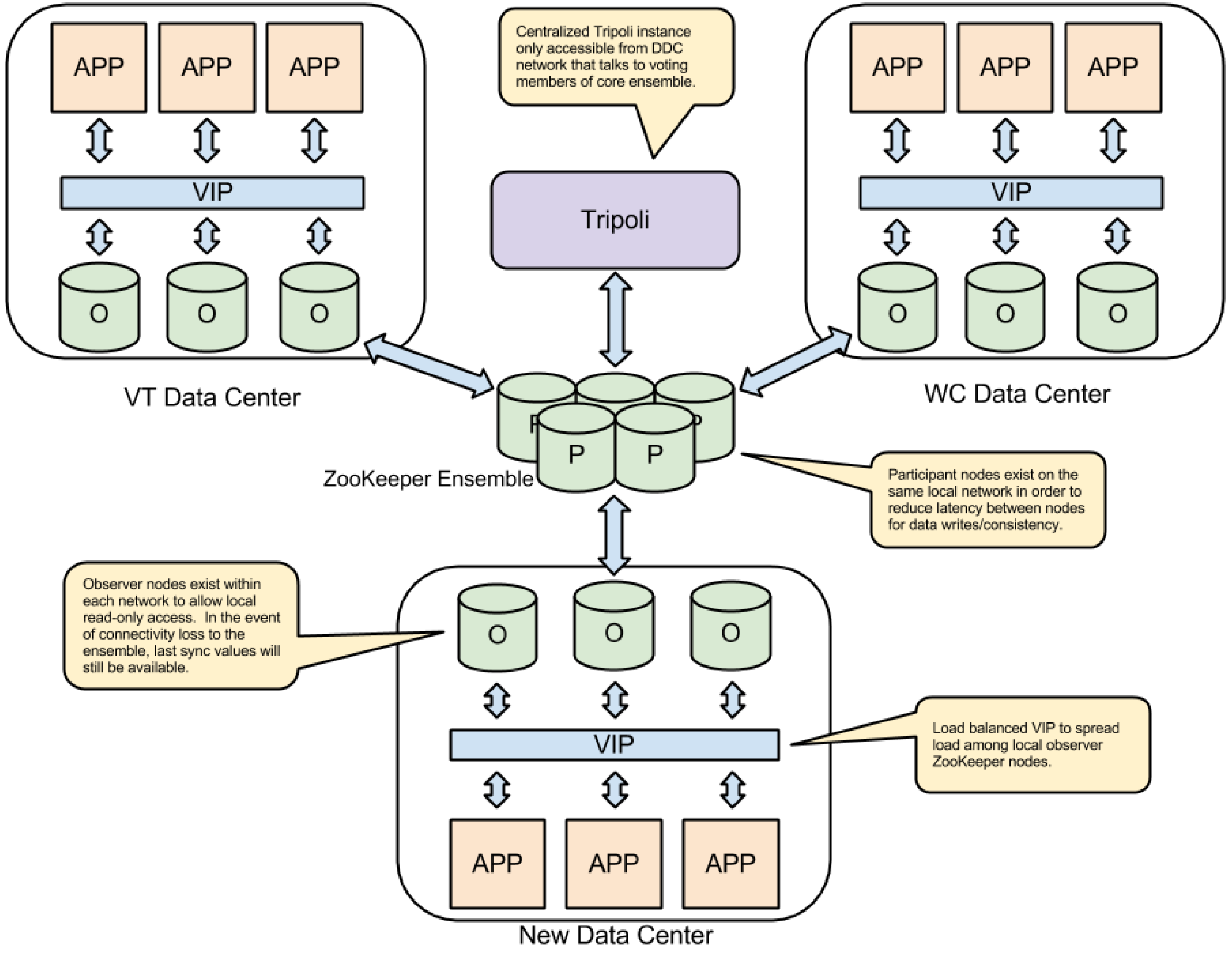
"You're gonna die!"
Wait what?

https://twitter.com/OhNoSheTwitnt/status/469838190141255680

High Level Overview

Three main components


Application
Application
Application
Configuration Management UI
Centralized Configuration Service (ZooKeeper)


APP
APP
APP
VIP
O
O
O
VT Data Center
Centralized Tripoli instance only accessible from DDC network that talks to voting members of core ensemble.
Tripoli
APP
APP
APP
VIP
O
O
O
WC Data Center
P
P
P
P
P
ZooKeeper Ensemble
Participant nodes exist on the same local network in order to reduce latency between nodes for data writes/consistency.
Observer nodes exist within each network to allow local read-only access. In the event of connectivity loss to the ensemble, last sync values will still be available.
O
O
O
VIP
Load balanced VIP to spread load among local observer ZooKeeper nodes.
APP
APP
APP
New Data Center

Key Concepts in the Remote Configuration

Configuration

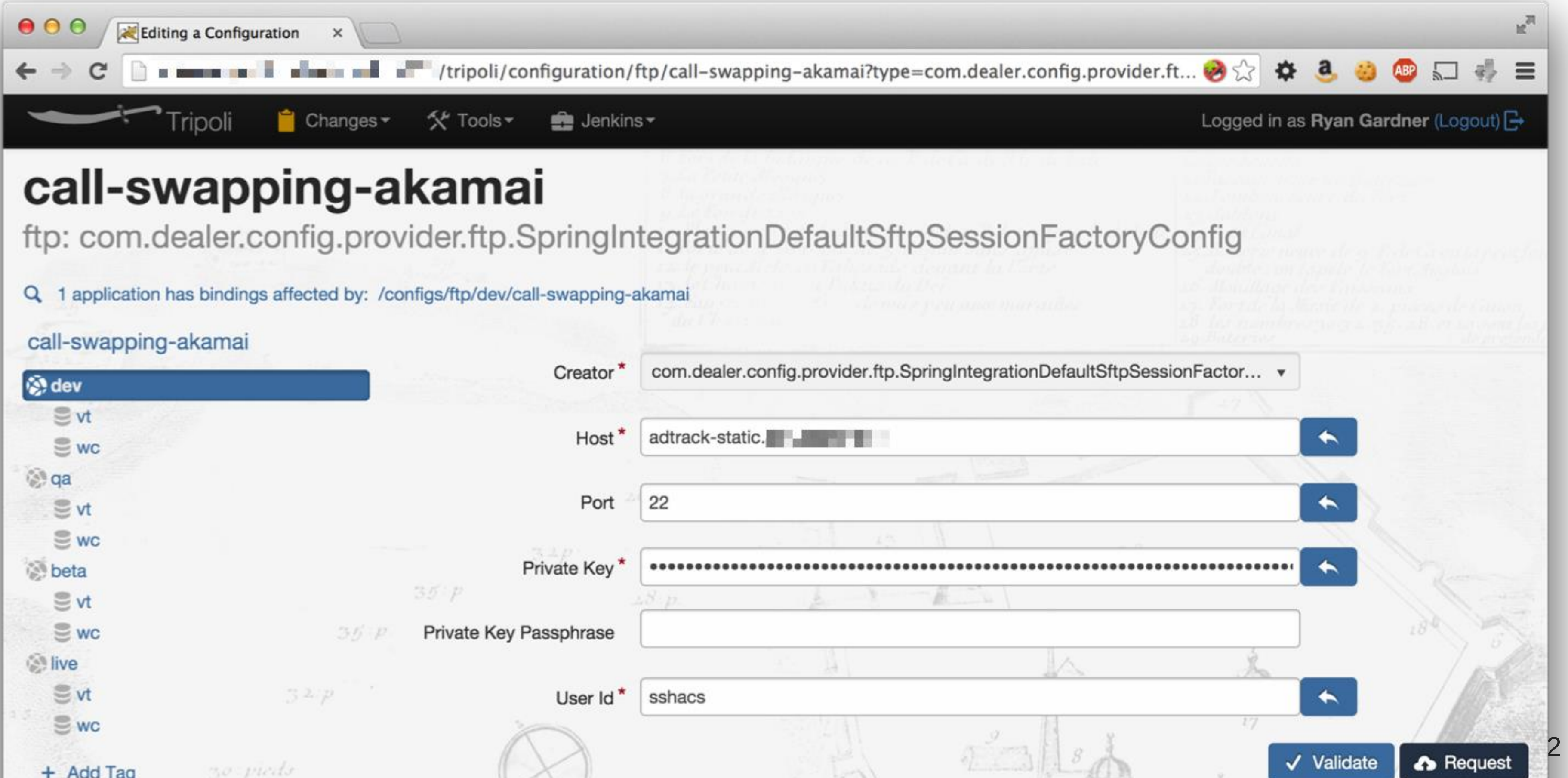
A set of properties or values necessary to create an object.

Examples:

Database configuration, FTP endpoint configuration,

HTTP Proxy Factory Bean Configuration,

Tripoli – editing a configuration



Editing a Configuration

[redacted]/tripoli/configuration/ftp/call-swapping-akamai?type=com.dealer.config.provider.ft...

call-swapping-akamai

ftp: com.dealer.config.provider.ftp.SpringIntegrationDefaultSftpSessionFactoryConfig

1 application has bindings affected by: /configs/ftp/dev/call-swapping-akamai

call-swapping-akamai

- dev
  - vt
  - wc
- qa
  - vt
  - wc
- beta
  - vt
  - wc
- live
  - vt
  - wc

+ Add Tag

Creator *	com.dealer.config.provider.ftp.SpringIntegrationDefaultSftpSessionFactor...
Host *	adtrack-static.[redacted]
Port	22
Private Key *	••
Private Key Passphrase	
User Id *	sshacs

Separation of environments

- We edit our configurations in one spot, but applications are only able to retrieve configurations for the environment they are running in
- Secrets – such as passwords or encryption keys – are encrypted with an environment-specific key
  - Tripoli has all the keys, each environment will only have a key specific to it

Configuration inheritance – avoiding copy & paste

By Environment

- Configuration can be set at a global level and overridden at each environment

By Path

- Nodes added with /'s in the name will inherit data from nodes above them.
  - `/remoting/core-services/UserLocator` inherits values from `/remoting/core-services`

Key Concepts in the Remote Configuration

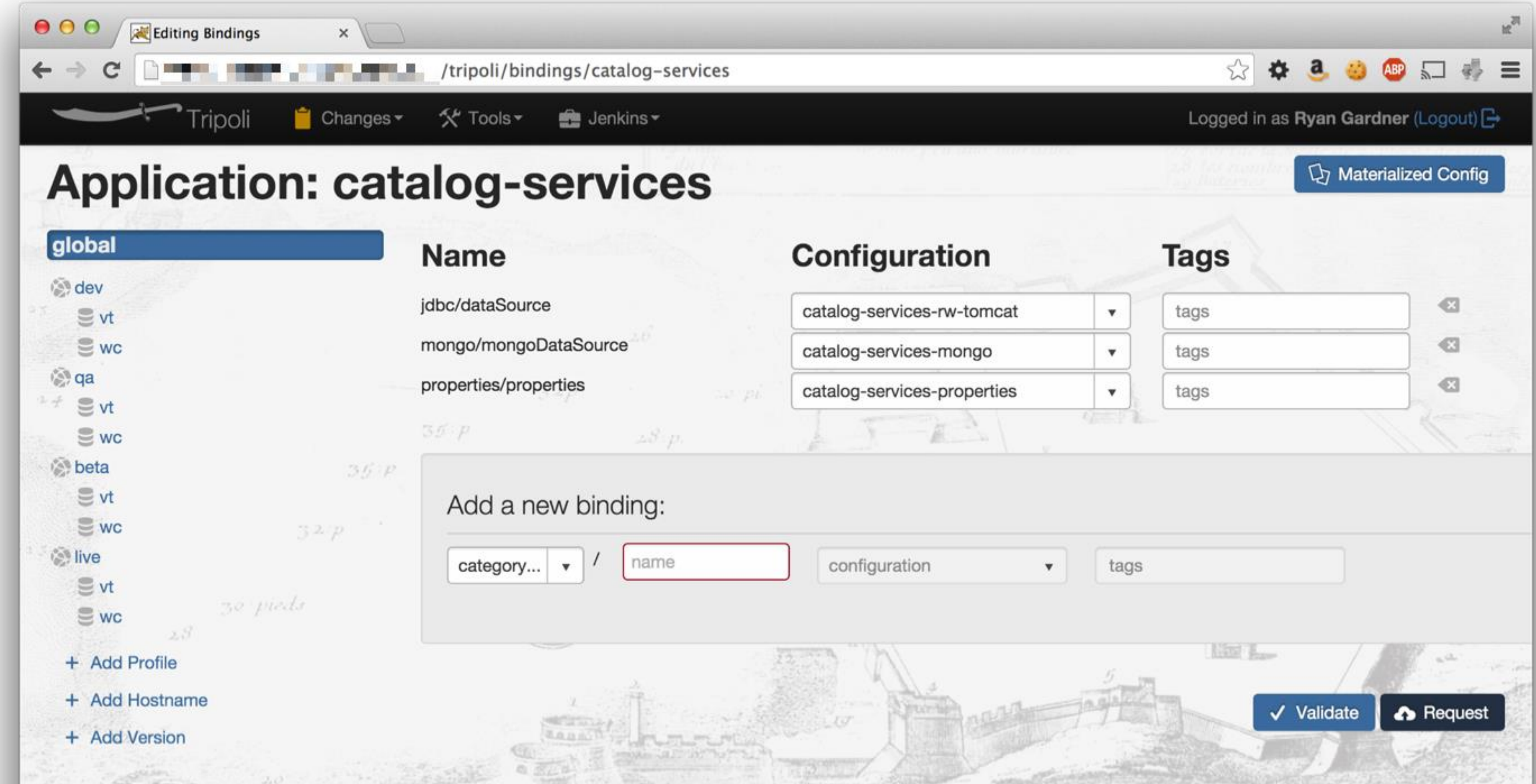
Bindings

Identifying which configurations an application uses, and what the application wants to call them

Example: An application that needs to talk to a certain database, look up users from a remote service, and send data to a remote SFTP site would have bindings such as:

`jdbc/user-database` is bound to the configuration called **`user-database-config`**

Tripoli – editing bindings



Editing Bindings

[redacted]/tripoli/bindings/catalog-services

Tripoli | Changes | Tools | Jenkins | Logged in as **Ryan Gardner** (Logout)

Application: catalog-services

Materialized Config

- **global**
  - dev
    - vt
    - wc
  - qa
    - vt
    - wc
  - beta
    - vt
    - wc
  - live
    - vt
    - wc
- + Add Profile
- + Add Hostname
- + Add Version

Name	Configuration	Tags
jdbc/dataSource	catalog-services-rw-tomcat	tags
mongo/mongoDataSource	catalog-services-mongo	tags
properties/properties	catalog-services-properties	tags

Add a new binding:

category... / name | configuration | tags

✓ Validate | Request

Creating objects, not properties*

- Configure once – use everywhere
- Avoid having to copy-and-paste boilerplate setup code

* *properties are supported too*

Behind the Scenes

Apache Zookeeper

- Hierarchical data registers
- Designed for high-throughput, low-latency, highly-available
- Nodes in zookeeper are called “znodes”
  - Each path can stored data
- Designed for storing *small amounts of data* in the znodes (KB, not MB)

- For more info:
  - https://cwiki.apache.org/confluence/display/ZOOKEEPER/ProjectDescription

Where do we store this data?

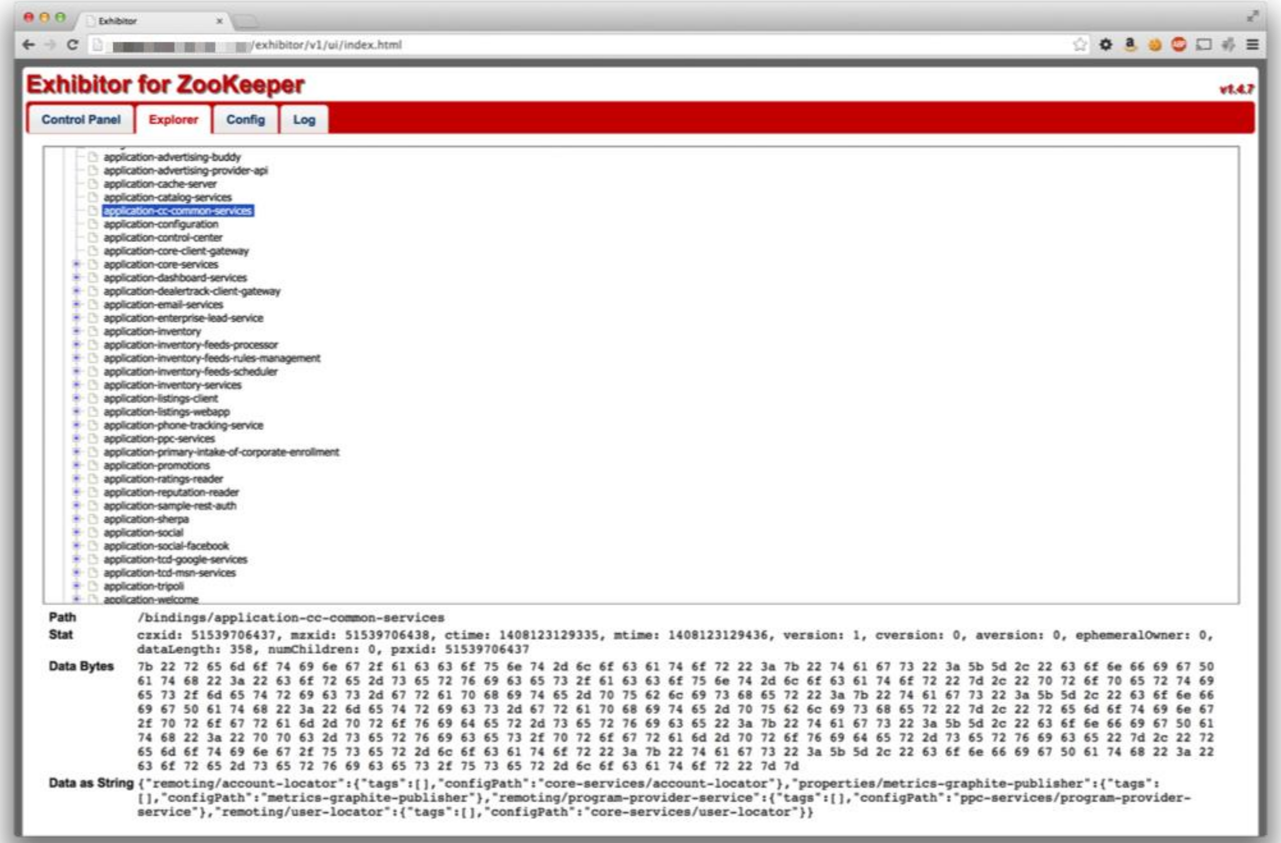
- Versioned configuration in ZooKeeper as JSON
- In ZooKeeper znodes:
  - `/bindings/<binding name>`

  overrides:
  - `/bindings/<habitat>/<datacenter>/<binding name>`
  - `/configurations/<configuration name>/`

Talking to ZooKeeper

- Use Curator framework
- We use ACLs in ZooKeeper ensure apps can’t read data for other environments
- We use a SASL config file on the machines to provide the ZooKeeper credentials

Exhibitor – makes managing ZooKeeper easier



Exhibitor

[redacted]/exhibitor/v1/ui/index.html

Exhibitor for ZooKeeper v1.4.7

Control Panel | Explorer | Config | Log

```
application-advertising-buddy
application-advertising-provider-api
application-cache-server
application-catalog-services
application-cc-common-services
application-configuration
application-control-center
application-core-client-gateway
application-core-services
application-dashboard-services
application-dealertrack-client-gateway
application-email-services
application-enterprise-lead-service
application-inventory
application-inventory-feeds-processor
application-inventory-feeds-rules-management
application-inventory-feeds-scheduler
application-inventory-services
application-listings-client
application-listings-webapp
application-phone-tracking-service
application-ppc-services
application-primary-intake-of-corporate-enrollment
application-promotions
application-ratings-reader
application-reputation-reader
application-sample-rest-auth
application-sherpa
application-social
application-social-facebook
application-tcd-google-services
application-tcd-msn-services
application-tripoli
application-welcome
```

```
Path            /bindings/application-cc-common-services
Stat            czxid: 51539706437, mzxid: 51539706438, ctime: 1408123129335, mtime: 1408123129436, version: 1, cversion: 0, aversion: 0, ephemeralOwner: 0,
                dataLength: 358, numChildren: 0, pzxid: 51539706437
Data Bytes      7b 22 72 65 6d 6f 74 69 6e 67 2f 61 63 63 6f 75 6e 74 2d 6c 6f 63 61 74 6f 72 22 3a 7b 22 74 61 67 73 22 3a 5b 5d 2c 22 63 6f 6e 66 69 67 50
                61 74 68 22 3a 22 63 6f 72 65 2d 73 65 72 76 69 63 65 73 2f 61 63 63 6f 75 6e 74 2d 6c 6f 63 61 74 6f 72 22 7d 2c 22 70 72 6f 70 65 72 74 69
                65 73 2f 6d 65 74 72 69 63 73 2d 67 72 61 70 68 69 74 65 2d 70 75 62 6c 69 73 68 65 72 22 3a 7b 22 74 61 67 73 22 3a 5b 5d 2c 22 63 6f 6e 66
                69 67 50 61 74 68 22 3a 22 6d 65 74 72 69 63 73 2d 67 72 61 70 68 69 74 65 2d 70 75 62 6c 69 73 68 65 72 22 7d 2c 22 72 65 6d 6f 74 69 6e 67
                2f 70 72 6f 67 72 61 6d 2d 70 72 6f 76 69 64 65 72 2d 73 65 72 76 69 63 65 22 3a 7b 22 74 61 67 73 22 3a 5b 5d 2c 22 63 6f 6e 66 69 67 50 61
                74 68 22 3a 22 70 70 63 2d 73 65 72 76 69 63 65 73 2f 70 72 6f 67 72 61 6d 2d 70 72 6f 76 69 64 65 72 2d 73 65 72 76 69 63 65 22 7d 2c 22 72
                65 6d 6f 74 69 6e 67 2f 75 73 65 72 2d 6c 6f 63 61 74 6f 72 22 3a 7b 22 74 61 67 73 22 3a 5b 5d 2c 22 63 6f 6e 66 69 67 50 61 74 68 22 3a 22
                63 6f 72 65 2d 73 65 72 76 69 63 65 73 2f 75 73 65 72 2d 6c 6f 63 61 74 6f 72 22 7d 7d
Data as String  {"remoting/account-locator":{"tags":[],"configPath":"core-services/account-locator"},"properties/metrics-graphite-publisher":{"tags":
                [],"configPath":"metrics-graphite-publisher"},"remoting/program-provider-service":{"tags":[],"configPath":"ppc-services/program-provider-
                service"},"remoting/user-locator":{"tags":[],"configPath":"core-services/user-locator"}}
```

How do the objects get created?

- Two classes for each remotely-configurable object, the config and the creator

- Configs use bean-validation annotations and a special annotation on the config-field to explain what the config field does.
  - This populates the tool-tips in the browser window and is used to ensure that only valid entries are put into the fields

An example config class

```
@ConfigCategory("ftp")
public class SpringIntegrationSftpSessionFactoryConfig extends Config {

    @Required
    @ConfigField(description = "The host name of the SFTP server.")
    private String host;

    @Port
    @ConfigField(description = "The port of the SFTP server.  Defaults to 22.")
    private Integer port;

    …
```

A config class (continued)

```
@Required
@Password
@ConfigField(description = "The private key used to establish the SFTP
      connection.”)
private ConfigPassword privateKey;

@Password
@ConfigField(description = "The passphrase for the private key. Defaults to
      empty string.”)
private ConfigPassword privateKeyPassphrase;
```

Creators take the config and return an object

```
public class ExampleObjectCreator extends
    ObjectCreator<SomeConfig,ExampleObject> {

    @Override
    public ExampleObject create(SomeConfig) {
        // do whatever is needed to create the object
        return new ExampleObject();
    }
}
```

Kinds of creators we have made

- Database connection (various connection pools)
- Mongo connection pools
- RPC remoting proxies (Spring HTTP Invoker, etc)
- REST resources
- Redis connections
- Properties / System properties
- FTP and SFTP connections
- Executor services
- RabbitMQ
- SOLR
- ElasticSearch
- … more

How do apps use this?

First pass – XML namespace parser

```
<beans … xmlns:remote-config="http://www.dealer.com/schema/remote-config"
…>
    <remote-config:lookup id="dataSource" name="jdbc/my-datasource" />

    <remote-config:remote-config-property-source id="myProps"
     name="properties/my-props" />
</beans>
```

Second pass – Auto-config with XML

```
<beans … xmlns:remote-config="http://www.dealer.com/schema/remote-config"
…>
    …

    <remote-config:auto-create />
    …
</beans>
```

Third pass - @EnableRemoteConfig

```
@EnableRemoteConfig
public class ApplicationConfig {
    // insert tweetable app here.
}
```

Accessing properties

Integrating remote properties into spring

- We create a PropertySource
- And we create a PropertySourcesPlaceholderConfigurer

Using properties via @Value

```
@Bean
public SomeBean someBean (@Value(“${some.value}”) someValue) {
	return new SomeBean(someValue)
}
…
@Value(“${some.remote.property.value}”)
private String someValue;
```

Deeper dive – demo & look at some of the code

Future plans & extensions for this

Questions?

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@springcentral | spring.io/video