**Proof of Concept**

Using Spring Cloud Config to consolidate and serve runtime configuration from different sources simultaneously.

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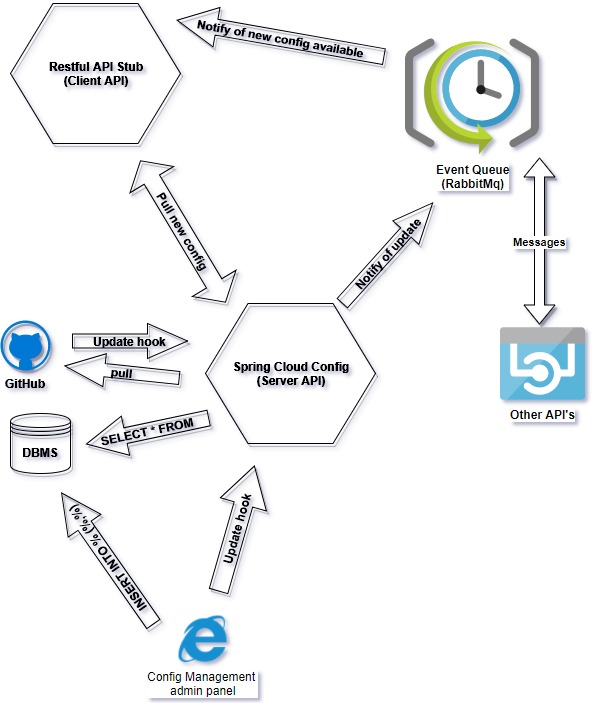
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# Scope

* Find out if it is possible to reliably serve configuration from git and DBMS system simultaneously.
* Check if it is possible to Spring Cloud Config server in combination with Event Queue.
* Implement the system with different DBMS and evaluate them.
* Check if it is possible to store and serve configuration data in JSON format, explore limitations as there might be some in relational DBMS.

# Design



# Investigation

## Supported backends

* Local filesystem
* Git
* MySQL
* MySQL(MariaDB)
* MongoDB
* Cosmos DB

Azure Cosmos DB offers MongoDB API as a service at the protocol level.

* PostgreSQL

## Configuration file/document structure

One of the requirements is to ensure that we have several labels and profiles for the same applications.

### Theoretical folder structure in git repository:

/{application}/{profile}[/{label}]

/{application}-{profile}.yml

/{label}/{application}-{profile}.yml

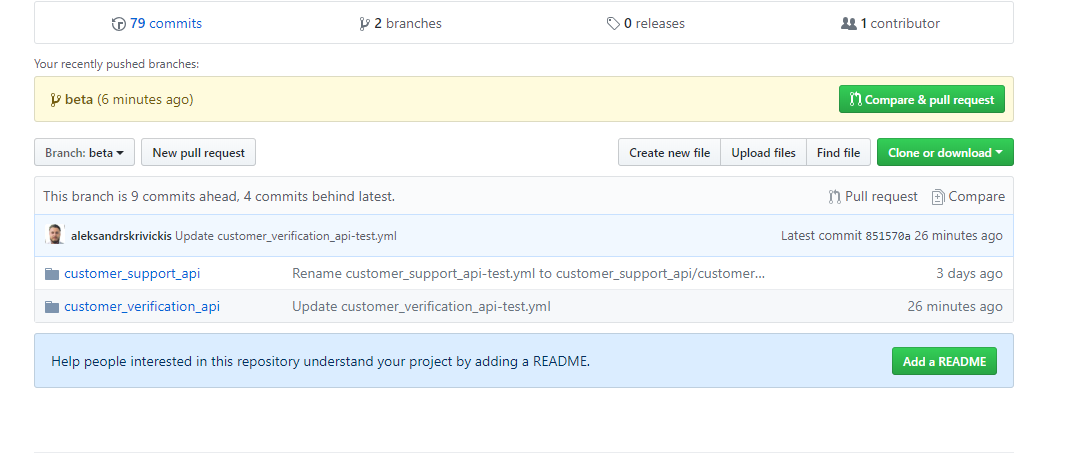
/{application}-{profile}.properties

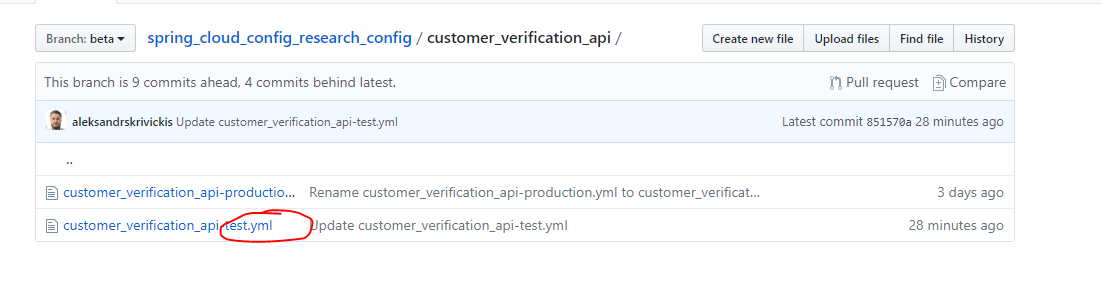
/{label}/{application}-{profile}.properties

### Folder structure example

Let’s imagine that we have an application **customer\_support\_api** and **customer\_verification\_api** with **production** and **test** profiles, all labelled as **latest** and **beta.**

* **Application’s name** is defined by a folder’s name on GitHub
* **Version** is defined by the name of branch on Github
* **Profile** is the file’s name



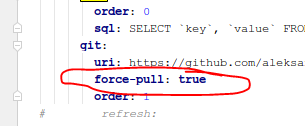


## GitHub with Spring Cloud Config Server

<https://github.com/aleksandrskrivickis/spring_cloud_config_research_config>

It is served in a way which is different from JDBC. For every label on GitHub user has to create separate branch.

Also, there is a feature **force-pull,** that allows to pull git repo and serve fresh config data on-demand. Theoretically there is no need to create a callback/hook from GitHub.



### Features

#### Using multiple repositories

spring:

cloud:

config:

server:

git:

uri: https://git/common/config-repo.git

force-pull: **true**

repos:

team-a:

pattern: team-a-\*

uri: http://git/team-a/config-repo.git

force-pull: **true**

team-b:

pattern: team-b-\*

uri: http://git/team-b/config-repo.git

force-pull: **true**

team-c:

pattern: team-c-\*

uri: <http://git/team-a/config-repo.git>

local:

pattern: local\*

uri: file:/home/configsvc/config-repo

#### Git url placeholders:

Spring Cloud Config Server supports a git repository URL with placeholders for the {application} and {profile} (and {label} if you need it, but remember that the label is applied as a git label anyway). So you can easily support a "one repo per application" policy using (for example):

spring:

cloud:

config:

server:

git:

uri: https://github.com/myorg/{application**}**

#### Defining url pattern:

The pattern property in the repo is actually an array, so you can use a YAML array (or [0], [1], etc. suffixes in properties files) to bind to multiple patterns. You may need to do this if you are going to run apps with multiple profiles. Example:

spring:

cloud:

config:

server:

git:

uri: https://github.com/spring-cloud-samples/config-repo

repos:

development:

pattern:

- '\*/development'

- '\*/staging'

uri: https://github.com/development/config-repo

staging:

pattern:

- '\*/qa'

- '\*/production'

uri: https://github.com/staging/config-repo

#### Search path

Spring Cloud Config Server also supports a search path with placeholders for the {application} and {profile} (and {label} if you need it). Example:

spring:

cloud:

config:

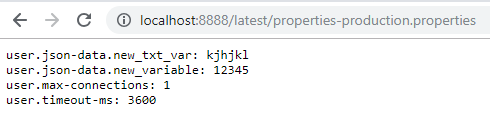
server:

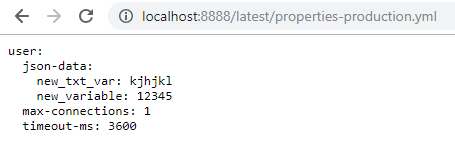
git:

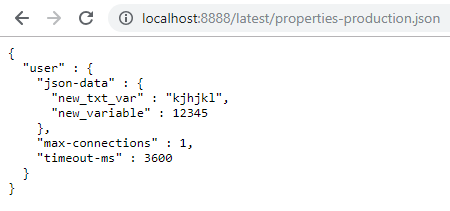
uri: https://github.com/spring-cloud-samples/config-repo

searchPaths: '{application}'

searches the repository for files in the same name as the directory (as well as the top level). Wildcards are also valid in a search path with placeholders (any matching directory is included in the search).



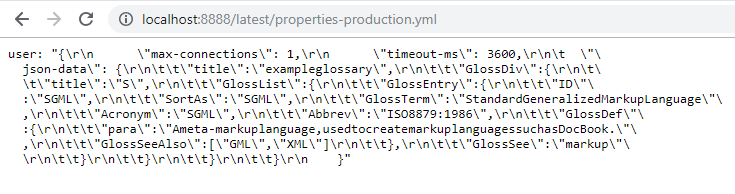


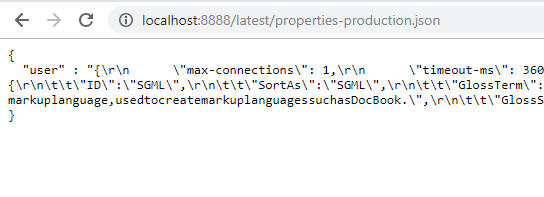


## MySQL with Spring Cloud Config Server

Same limitations and structure of response as with MariaDB. Different driver has to be used for establishing connection.

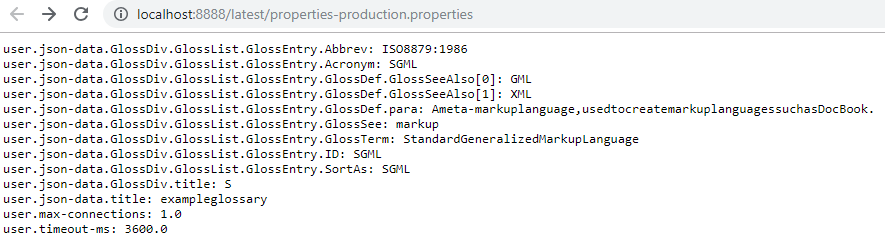


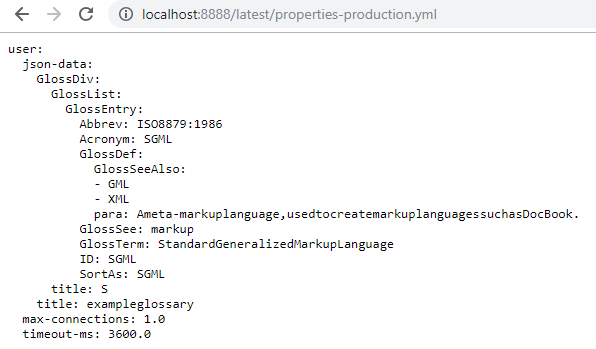




## MongoDB with Spring Cloud Config Server

It is possible to serve MongoDB database in three different formats: properties, yml/yaml, json. In order to display json with indents property “**spring.jackson.serialization.indent\_output=true**” has to be set.

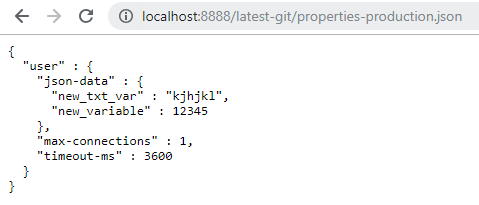


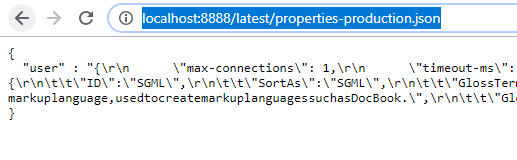




## GitHub and MySQL with Spring Cloud Config Server

It is possible to combine GitHub and MySQL data sources. Unfortunately, there is one limitation – GitHub and MySQL data can’t have the same label. For example: in case if we want to use label “**latest**” to fetch data from MySQL database we can’t create a branch with name “**latest**” as Spring Cloud application will throw an exception and none of data will be available. Unfortunately, to make both data sources work together we have to create an empty branch named “**latest**” and branch named “**latest-git**” in a Git repository. This is the only way for now.

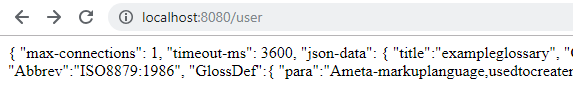


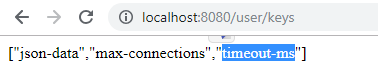


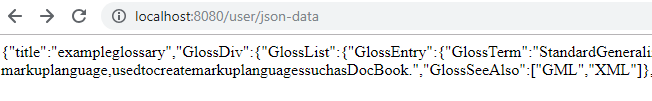
In the next chapter I will try to set-up Spring Cloud Config Client.

## GitHub and MySQL with Spring Cloud Config served to a Spring Boot API

I have managed to set-up Spring Cloud Config client, that successfully fetches data from Spring Cloud Config Server and makes it available inside of a class.







## GitHub and MySQL with Spring Cloud Config served to a Spring Boot API through Event Queue

I have successfully set-up Spring Cloud Config Server(**Publisher**) that allows re-translating and combining information from GitHub and MySQL database to Spring Boot Application(**Subscriber**). It is possible thanks to **Spring Cloud Bus** module, that is using **RabbitMQ** server as a message broker. Also, I have implemented RabbitMQ noise generator to imitate real situation, where API is subscribed to multiple topics.

### Versions used

org.springframework.boot=2.0.5.RELEASE

spring-cloud-starter-bus-amqp=latest

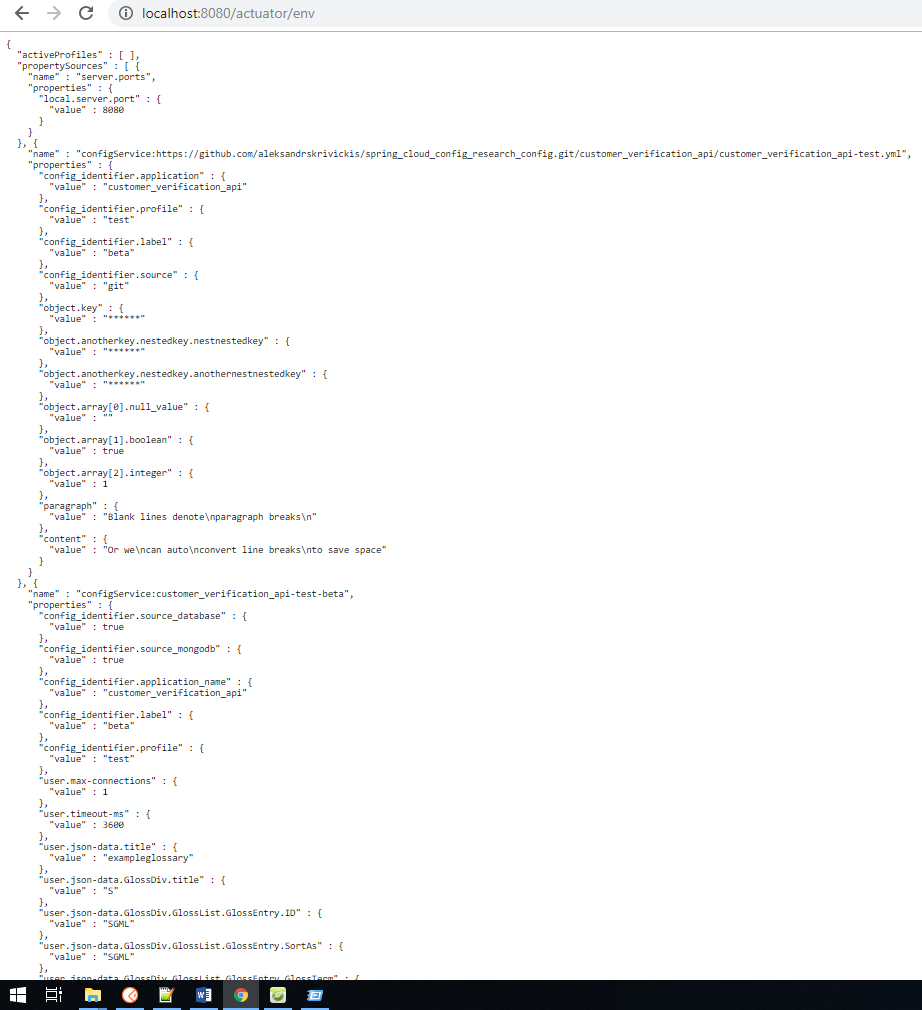
mysql-connector-java=8.0.12

springfox-swagger2=2.8.0

## Configuration from GitHub and MongoDB served to a Spring Boot API and updated through Event Queue.

It is also possible to combine both MongoDB and GitHub data sources under one Spring Cloud Config server, which will be able to broadcast configuration to Spring Boot applications. I have created an endpoint, <http://host:port/monitor>, that serves as a webhook for notifying Spring Boot API’s (consumers) of the configuration file update. Although, I have had a version combability issue because component “spring-cloud-config-server-mongodb” was not compatible with spring boot 2.0.5.RELEASE. In order to make it work I had to use 1.5.18.BUILD-SNAPSHOT. This doesn’t mean that 1.5.18 is the latest compatible.

Below is the example list of all endpoints available in Spring Boot API, that includes configuration values from both GitHub and MongoDB sources:



**Configuration repository has been set-up under following link:**

<https://github.com/aleksandrskrivickis/spring_cloud_config_research_config>

**Proof-of concept project files are based in following repository:**

<https://github.com/aleksandrskrivickis/spring_cloud_config_research>

# Limitations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Feature** | **MySQL** | **MongoDB** | **Cosmos DB** | **GitHub** |
| Value column character length | 4,294,967,295 | N/A | | |
| Max document size | N/A | 16 MB | 2 MB | 100 MB+ |
| Storage data format | Key-value format | JSON | | \*.yml or \*.properties format |
| Serves JSON | Yes | | | |
| Access nested JSON values | Yes | | | |
| Triggering Web-hook for config update. | By use of scheduler or by implementing webhook in database management portal. | | | Supports native WebHooks integration |

# Conclusions

* It is possible to combine and efficiently serve configuration from both MySQL and GitHub sources using latest version of Spring Boot.
* It is possible to combine and efficiently serve configuration from MongoDB and GitHub sources using earlier versions of Spring Boot.
* It is possible to trigger configuration update from outer environment with use of WebHooks.
* Configuration can be stored in (\*.yml or properties for GitHub, JSON for MongoDB, key-value for MySQL) and retrieved in JSON format with a very high data size limitation threshold.
* Theoretically, it is also possible to serve configuration from Local file system, Microsoft SQL or any other DBMS supported by Oracle JDBC.

# References

* <https://github.com/spring-cloud-incubator/spring-cloud-config-server-mongodb>
* <https://medium.com/@nani2ratna/spring-cloud-config-server-with-jdbc-55de8f7ec86d>
* <https://cloud.spring.io/spring-cloud-static/Edgware.SR2/single/spring-cloud.html#_spring_cloud_config>
* <https://dev.mysql.com/doc/refman/8.0/en/data-types.html>
* <https://start.spring.io/>
* <http://cloud.spring.io/spring-cloud-config/single/spring-cloud-config.html>
* <https://www.baeldung.com/spring-cloud-bus>
* <https://www.rabbitmq.com/tutorials/tutorial-one-spring-amqp.html>