

A System for Generating and Rendering Map Components

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Abstract - Maps are a very popular way to visualize existence and movement of any object on a two dimensional surface. To show objects on a map, there are many libraries in various web development frameworks. But these libraries for maps deal only with the front end part which will make development difficult in the backend part. So this project associates a popular Jersey based java backend to the existing systems to solve these problems.

1. INTRODUCTION

A map may be a symbolic depiction emphasizing relationships between elements of some space, like objects, regions, or themes. Cartography or map-making is that the study and practice of crafting representations of the world upon a flat surface (see History of cartography), and one who makes maps is named as a cartographer.

Road maps are perhaps the foremost widely used maps today, and form a subset of navigational maps, which also include aeronautical and nautical charts, railroad network maps, and hiking and bicycling maps. In terms of quantity, the most important number of drawn map sheets is perhaps made up by local surveys, administered by municipalities, utilities, tax assessors, emergency services providers, and other local agencies. Many national surveying projects are administered by the military, like British Ordnance Survey: a civilian agency, internationally renowned for its comprehensively detailed work.

In addition to location information, maps can also be wont to portray contour lines indicating constant values of elevation, temperature, rainfall, etc.

To show maps there are various front end libraries, which only deal with the front end part. This project deals with this limitation and adds a backend.

2. OBJECTIVE

- The objective of the project is to create a system for Generating and Rendering Map Components.
- Creating a backend which interacts with front end libraries to reduce the complexity by developers.

3. METHODOLOGY

Creating front end with following features:

1. Login interface
2. Map interface with different map components
3. A web page interface for more information about each map component

Creating backend with following features:

1. Authentication
2. DB, Cache Connection
3. Map component generators
4. Web page generator for more information about each map component

4. TOOLS USED

4.1 Jersey Framework

Jersey RESTful Web Services framework is open source, production quality, framework for developing RESTful Web Services in Java that provides support for JAX-RS APIs and serves as a JAX-RS (JSR 311 & JSR 339) Reference Implementation. Jersey framework is more than the JAX-RS Reference Implementation. Jersey provides its own API that extends the JAX-RS toolkit with additional features and utilities to further simplify RESTful service and client development. Jersey also exposes numerous extension SPIs so that developers may extend Jersey to best suit their needs.

4.2 PostgreSQL

PL/pgSQL is a loadable procedural language for the PostgreSQL database system. The design goals of PL/pgSQL were to create a loadable procedural language that can be used to create functions and trigger procedures, adds control structures to the SQL language, can perform complex computations, inherits all user-defined types, functions, and operators, can be defined to be trusted by the server, and is easy to use.

4.3 Redis

Redis is an open source (BSD licensed), in-memory arrangement store, used as a database, cache and message broker. It supports data structures like strings, hashes, lists, sets, sorted sets with range queries, bitmaps, hyperloglogs, geospatial indexes with radius queries and streams. Redis has built-in replication, Lua scripting,

4.4 React

React is a JavaScript library for building user interfaces that are Component based, Declarative, Learn Once, Write Anywhere.

5. IMPLEMENTATION

Various submodules of the projects are discussed in this section. The Chart-1 represents the System architecture of the project.

5.1 Map and web elements generator

Map elements such as Markers, Regions and Lines are generated in the backend with information provided by Redis cache and Database which is made of Postgres. It creates a JSON Array in which the front end understands in a standardized way. Web pages are generated in the backend which specify information about each map component.

5.2 HTTP Connection

The connection between the frontend and backend is done with the help of Jersey RESTful Web Services framework. It contains various Application program interfaces for different operations such as map display or web interface display. In the backend the requests are forwarded to corresponding Java classes. In front end

5.3 Login interface

Login is implemented with Google O-Auth which redirects the user to google login page, and requests for delegating access for basic user information to the system. It involves exchanging authorization codes and obtaining user's O-Auth code to get users basic details in the front end server. This can also be extended to limiting access to specific domain addresses of email.

5.4 Map interface

It is one of the interfaces which comes under the Home submodule. It contains 3 main components. They are

1. Markers : Markers are used to tick a point on the map, making it easy to notice and identify.
2. Region : Regions are polygons which can be used to represent a area on map
3. Line : Lines are the lines which connect different points on the map. It can be used to represent movements of the vehicles or objects

5.5 Web interface

Web interfaces are used to show extra information about any map component. It is a List of Cards with specific styles and parameters. It can be used to represent list of

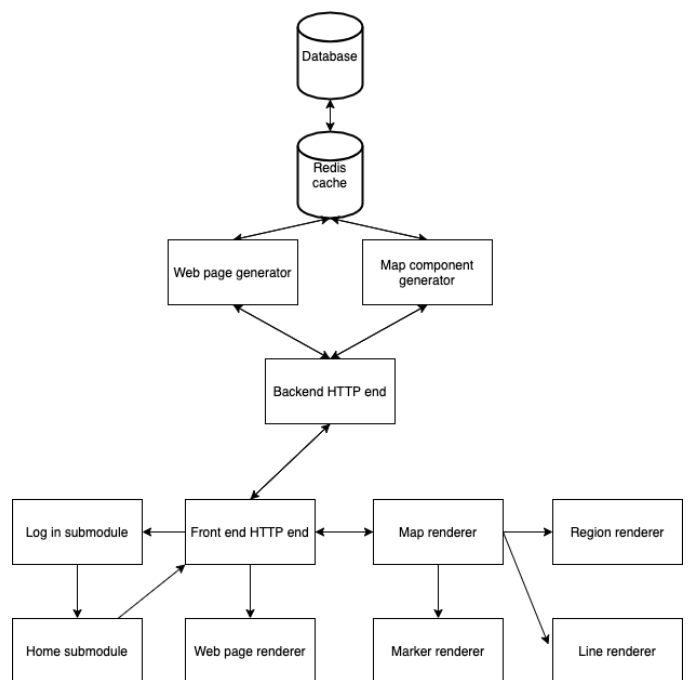


Chart -1: System Architecture

6. CONCLUSION

This project may create a standard for interaction between front end map libraries and backend, which may solve many complexities faced by developers. Authentication provided by this backend should reduce security risks faced by the community.

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