

REST APIs for DB services using Django

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Abstract

Most of the databases now are shared between different tenants giving it a more complex architecture. Hence any updates being made to the database have to be properly authenticated and verified that the changes are for that specific tenant only. This project report introduces the process of creating a REST API service to manage database changes with integrated authentication using Django. REST is acronym for **RE**presentational **S**tate **T**ransfer. It is architectural style for distributed hypermedia systems. Django is an open-source high-level Python Web framework that encourages rapid development and clean, pragmatic design. By the features of Django and Django REST Framework these updates to the database are much simpler and protected.

Keywords: rest, django, database

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Chapter 1

Introduction

In any service dealing with the database it becomes extremely important to have a constant database structure in place before moving on towards the business logic. In Django we define the service in terms of `app`, `models`, `views` and `services`. These four parts represent the core logic service. **Views** take care of the exchange of the request and response objects from APIs. Usually when a API is called, a request object is sent to the server containing information about the request being made. The server then has to return the appropriate Response object which then the browser parses and outputs for the user. This exchange between request and response is a part of Views.

1.1 Background

Turtlemint has a separate database which records most of the things related to insurance policy issuance. This data is very volatile and is expected to change every month. Due to this, it becomes harder to change the database everytime there is a change in the information. To handle this issue, the purpose of the project is to create a new service which would wrap the information change in terms of database calls and let the user seamlessly update the information.

1.2 Significance

The new service will be able to handle all information changes related to the database. Moreover the service would have an integrated authentication and authorization which allows multiple users to use this service at a time. Previously, someone from the development team had to intervene with the data team to manually create database queries and update accordingly. This process was not only time consuming but also was inefficient. The new service would solve this issue and would allow the data team itself to update the database.

1.3 Method used

The service is built using Django and Django Rest Framework (DRF) which are two Python packages built for faster development of database-driven web applications. Django is also open-source and allows users to modify the report, modify any bugs if they found any. This helps for long term support applications. Django has three major parts: **models**, **views** and **templates**. Models are used to create database schema, views contain the business logic and templates are used for user interface.

1.4 Limitations

Django being open-source does help in most issues. Although, since Django was built to reduce the development time significantly it might still not have all features of a system with independent database architecture. Django also introduces the concept of migrations which are a set of database schema changes maintained as a set of files. These migrations can be difficult to manage if an application is prone to a lot of database changes.

1.5 Project Structure

Django has already defined its project structure. Every Django project has some applications. Every applications represents set of logic related to one purpose or business objective. Every project can have any number of applications inside it. There is a common `settings.py` file which is used for managing settings for all applications.

The basic structure of the project can be represented as below:

```
project
├── settings.py
├── app1
│   ├── models
│   ├── views
│   └── templates
└── app2
    ├── models
    ├── views
    └── templates
```

Chapter 2

Preliminary

There are three important parts of this project:

- Django (for API developement)
- Postgresql (for database requirements)
- Social Auth (for authentication)

2.1 Django

Django takes care of integrating the database, authentication and authorization of the application. For this, Django asks us to construct each of models, views and templates for the application. Its important to note that all of the three parts are to be defined for every application in the project.

2.1.1 Models

Every model represents a table in the database. We will be forming up the basic model structure and follow them throughout the entire project. Every model can be defined in the `models.py` file which is recognized by django or in the `models` module.

The overall model structure would look like this:

```
project
├── app1
│   └── models
│       ├── modela.py
│       ├── modelb.py
│       └── modelc.py
└── app2
    └── models
        ├── modela.py
        └── modelb.py
```

2.1.2 Views

Every view represents the exchange of data between every API call. Every view gets a request object and is expected to return a response object. The request contains all information regarding the API call including the user who initiated it. Also all of the required parameters for the API call are passed in the same request object.

Views too can be distributed across multiple files for convenience.

2.1.3 Templates

Templates are used for the user interface which are automatically rendered by Django in html. By default, Django comes with the `admin` template. The admin page on Django lets user to modify any of the existing models and settings. Multiple templates can be added representing the user interface. The templates are also convenient in authentication since we can use variables inside templates.

2.2 Postgresql

We've used Postgresql for our database requirements. Because postgres can scale on high requirement environment and is one of the best options for production databases. The postgresql can be installed as a separate package and is available on all platforms including Linux, Windows and MacOS making it ideal for deployment and development purpose.

Postgres related settings can be configured inside `settings.py` file inside project directory. We can also specify the requirements as a part of the environment file to avoid exposing the credentials. The database setting is generic in Django meaning you can use the database identically as any other database driver. Hence, it is very easy to switch between database if we ever wanted to.

2.3 Social Auth

For authentication there is a separate package known as *Python Social Auth* which takes care of our social authentication. Social authentication is important because many users now try to avoid remembering username and password and hence, using one of the social auth method will bypass the need to remember usernames and passwords. This authentication is based on one of the social media platforms including Google, Facebook, Twitter, etc. These platforms providing authentication flow known as *OAuth*. The common user fields like email address, name are automatically obtained from these platforms and a *token* is created for the user to communicate with the application.

Everyone in Turtlemint have their email with domain *turtlemint.com* which lets us use Google OAuth2 to authenticate the user before logging it on our application. The email address and name is obtained from Google and appropriate permissions are issued to the user based on his access level.