

Overview of the stack technology for visualization and storing data in developing of Geo-Information system

Renat Mustakayev¹, Shafkhat Batkayev^{2*}

¹Doctoral of Kazakh National University, IT-developer, Almaty, Kazakhstan

²Fourth-year student of Kazakh-British technical university, IT-developer, Almaty, Kazakhstan

*Corresponding author's e-mail: shafkhat.batkaev@gmail.com

Abstract

For creating and developing of Geo-Information system, required to use certain steps, which help. In case, which will be considered, Geo-Information system is a software product, allowing users to search, analyze and edit both the digital map of the terrain, and additional information about objects. The reason for creating this type of system, can be the fact, that there is no such system in Kazakhstan, as well as the huge potential of renewable energy sources in Kazakhstan. Stack of technology, which will be described, is more than comfortable for visualization and storing this type of data.

Keywords: Renewable Energy Sources, Database, Geo-Information system, Visualization

1 Introduction

Using of renewable energy sources (RES) allows, in comparison with traditional methods, to improve the ecological condition of the territory, improve the stability of energy supply and, if necessary, provide greater autonomy. The topic of RES is quite relevant in our time, especially in Kazakhstan. The most modern and comfortable method for analysis renewable energy sources, and benefit-sharing is creating Geo-Information system. In considered case, for developing Geographic information system, used steps:

- Collecting of data (information, maps) about regions of Kazakhstan
- Import this data in format we need
- Processing data
- Visualization and storage data

2 Stack of technologies for visualization and storage

Descry more carefully the fourth step: **visualization and storage data**. Under this article, it is recommended to use stack of technologies, which will be discussed in this part of article.

Stack looks like that:

1. PostgreSQL + PostGis extension
2. Geoserver (as a part of our backend)
3. OpenLayers (JS library)
4. Bootstrap, JavaScript, JQuery

In comparison with the stack considered in another article [1], stack in our article has several advantages, which will be discussed carefully.

3 PostgreSQL + PostGis extension

PostgreSQL is a powerful, open source object-relational database system. The main advantage of this database, the opportunity to solve many problems in store huge data and voluminous work, and it will be free. Also very strong

argument in favor of PostgreSQL is **PostGis extension**. PostGIS is a spatial database extender for PostgreSQL object-relational database. It adds support for geographic objects allowing location queries to be run in SQL. It's very important.

It's impossible to miss the fact about wide using PostgreSQL. It means, search of information about all solutions is very fast. It's huge vantage for process of developing.

PostGis extension keeps maps and their data in tables. For example, PostGis gives an opportunity to import shape file, which keeps data about all buildings around Almaty region. All information, about these buildings (like location coordinate, names etc) PostGis keeps in tabular data.

4 GeoServer

Go ahead. After upload maps files with needing data in PostGis, connect it with our next technology in our stack. It's **GeoServer**.

GeoServer is Java-based soft server, with open source software for managing geographic information systems (GIS) data sources and access to such data using Web services, Web Feature Service (WFS) and Web Map Service (WMS). It allows to view, edit and work with geographical data.

Take from PostGis, 3 layers, for example shapefiles. Layers have information about buildings, reserves, reservoirs. GeoServer allows publish all these layers with OpenLayers tools, edit, add styles etc.

After that, take all information about our 3 layers, process it by Java and do the analysis by Bayesian method. There is no need to describe it carefully, because, this is considered in another part of article.

5 OpenLayers (JS library)

Take our aggregated information, after processing, and get

to frontend. Developing of good frontend in projects like this is not simple task. For creating and working with maps based on a programming interface (API), like the GoogleMap API or the Bing Maps API, use **OpenLayers JS library**.

OpenLayers – is an open source library written in JavaScript, it allows quickly and easily create a web-based interface for displaying cartographic materials presented in various formats and located on different servers. In OpenLayers, the developer has the ability to create, for example, his own map, including layers provided by WMS (and WFS) servers, such as Mapserver, ArcIMS or Geoserver, and Google map service data.

OpenLayers is the most usable and popular library for working with maps at the Web level.

Take aggregated information, and by dint of OpenLayers, create maps, with so-called substrates (administrative and satellite etc), and layers from GeoServer with information about objects, and how comfortable and profitable to build a power, wind or solar station.

Of course, it's necessary to co-operate OpenLayers library with such well-known tools for web development

References

- [1] Muhamedyev R, Ishmanov A, Andreev A, Muhamedijeva J, Alikhodzhayev I 2015 Technological preconditions of monitoring of renewable energy sources of the Republic of Kazakhstan *Proceedings of*

like **Bootstrap** and **JQuery**.

7 Conclusions

In the paper approaches in the implementation of systems for estimating the potential of renewable energy have been considered. It is shown that when developing such systems, databases of both national (including EC level) and local are widely used. The described systems are unique developments applied for a specific territory and country. In order to support decision-making processes in the field of RES, the concept of a multi-layer intellectual geo-information decision support system.

In particular in the details described the visualization and proper storage of data with convenient tools.

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