Democratic Map: Customized for GNDEC

Synopsis

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Abstract

This project mainly discuss about OpenStreetMap. Geographical data (geo data) is not free in many parts of the world. Generally these places have given the task of mapping to various government agencies who in return get to make money by selling the data back to you and me. The main disadvantage of Google Maps is that data is copyrighted and owned by multiple organisations like the Ordnance Survey. Google/whoever just licenses it. If we were to use it, we'd have to pay for it. This leads to the increasing demand of OSM.

You can use OSM by picking an area that you know well and use the OpenStreetMap viewer to see how well the map data corresponds to your own knowledge. As on Wikipedia, it's easy to edit, so you can help!. Also, this project is completely open source and the entire code is available to the user as and when required.

There is complete developer's Blog reference alongwith it that helps using it a lot easier. The data and software is owned by you, the contributors. By making your system an OSM tile server not only you can edit the map but can use it offline also. You can change the styling of the map like color of the roads fonts style and amny more as per your requirments.

The core part of OSM is implemented using Mapnik library and database for rendering, mod tile and slippy for web interface. Bash Shell Scripting has been used to automate the installation. There is an organisation called the OpenStreetMap Foundation which exists to protect, promote, and support the project, but does not own the data. There are lots of ways to contribute to the OpenStreetMap project.

Acknowledgements

I, student of Guru Nanak Dev Engineering College, Ludhiana, have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

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Finally, I would thanks to all whoever have contributed in this report work with Amritpal Singh (D4 IT) and all other trainees. Without their encouragement, it would not have been possible to complete this project in such an efficient manner.

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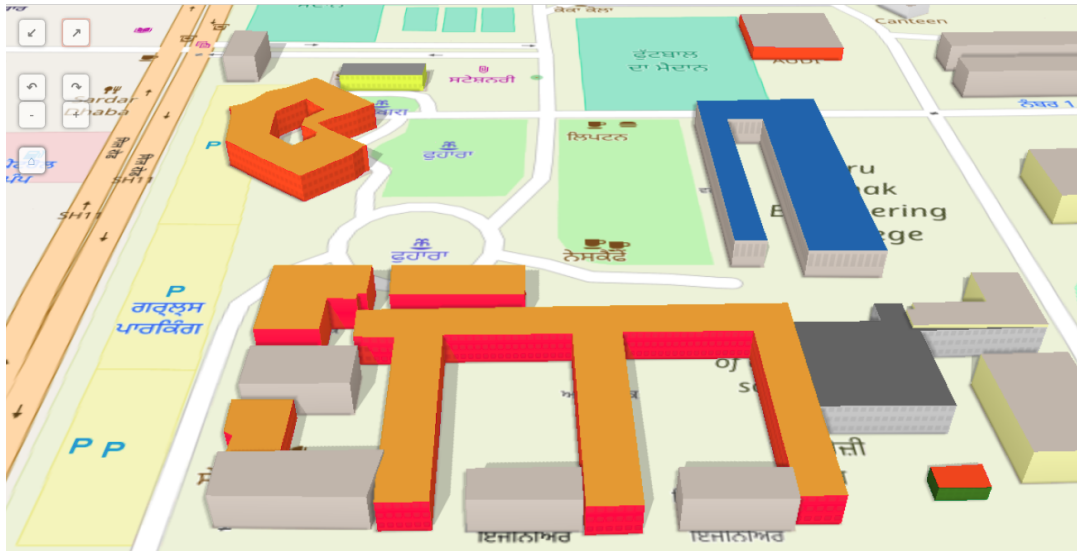
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1.1 Overview

Figure 1.1: OpenStreetMap

OpenStreetMap (OSM) is an open-source, free web-based software, owned by you, the contributors.OpenStreetMap is an online open data platform to collect the world's geographic data based on the Wikipedia model of crowdsourcing. The project started in 2004 by Steve Coast and is now governed by the non profit OpenStreetMap Foundation based in the UK.

OpenStreetMap is a free editable map of the whole world. It is made by people like you. Which means the database will always be subject to the whims, experimentation, and mistakes of the community. This is precisely OSMs strength since, among other things, it allows our data to quickly accommodate changes in the physical world.

By making your system an OSM tile server not only you can edit the map but can use it offline also. You can change the styling of the map like color of the roads fonts style and amny more as per your requirments.

The core part of OSM is implemented using Mapnik library and database for rendering, mod_tile and slippy for web interface. Bash Shell Scripting has been used to automate the installation.

My training being not based on particular language or technology, different type of open-source softwares and technologies are used in this project and many during my training which are not used in this project like CGI (for web interface through c++).

1.2 Existing System

Geographical data (geo data) is not free in many parts of the world.If you collect data from Google Maps in this way, you are creating a "derived work". Any such data retains the copy-

right conditions of the original. In practice, this means your data is subject to the licensing fees, and contractual restrictions, of these map providers. That's exactly what OpenStreetMap is trying to avoid. The data is copyrighted and owned by multiple organisations like the Ordnance Survey. Google/whoever just licenses it. If we were to use it, we'd have to pay for it.

In areas where there are no such data sources (most areas) we have to start from a blank slate, and head out there to survey the streets ourselves. Despite starting from scratch, we have achieved a good level of completion in many places.

"Also, you may not use Google Maps in a manner which gives you or any other person access to mass downloads or bulk feeds of numerical latitude and longitude coordinates."

Limitations of the existing system

- We can't edit the maps.

- Data may be inaccurate.

- They are costly.

- Can't create own map server.

- Mass downloads or bulk feeds of numerical latitude and longitude coordinates is sometime impossible.

1.3   User Requirement Analysis

User Requirements Analysis for a software system is a complete description of the requirements of the User. It includes functional Requirements and Non-functional Requirements. Non-functional requirements are requirements which impose constraints on the design or implementation.

- **Purpose**: OpenStreetMap (OSM) is an open collaborative project to create a free editable map of the world and the main purpose of this project is to:

  1. To create a free editable map of the world.
  2. To gather location data using GPS, local knowledge, and other free sources of information and upload it.
  3. To encourage the growth, development and distribution of free geospatial data.
  4. To provide geospatial data for anyone to use and share.
  5. Reduce the time for analysis.
  6. The OpenStreetMap Foundation is an international not-for-profit organization supporting, but not controlling, the OpenStreetMap Project.

1.3.1   Users of the System

1. Provides beautiful GUI (Graphical User Interface) for GNE Tour and animations.

2. A full editing history is stored for each user.

3. Provide on-line way to analysis so that individual does not have to install anything.

4. Users can attach Wikipedia-like edit summaries to their edits, and there is a History tab on the main page that shows recent edits to the selected area.

5. The user can download the data in *.pbf or *.osm file format.

6. Both techinal and non-technical users can use OSM.

7. User can make own OSM tile server.

8. User can run script for automatic installation.

9. They can search places with ease.

1.3.2 Functional Requirements

- **Specific Requirements**: This phase covers the whole requirements for the system. After understanding the system we need the input data to the system then we watch the output and determine whether the output from the system is according to our requirements or not. So what we have to input and then what we'll get as output is given in this phase. This phase also describe the software and non-function requirements of the system.

- **Input Requirements of the System**

    1. Guess points and name of the places.
    2. Precision
    3. Required point at which value is to be found
    4. Knowledge of latitude and longitude.

- **Output Requirements of the System**

    1. Final output of the location of the particulaar area.
    2. Shops, restaurants and many more are represented through icon and images.

- **Special User Requirements**

    1. Taking bulk input values through html forms.

- **Software Requirements**

    1. Programming language: C++, Python
    2. software: LaTeX
    3. Web Languages: php, javascript, html
    4. Database: Postgresql
    5. Documentation: Doxygen 1.8.3

6. Text Editor: Vim

7. Operating System: Ubuntu 14.04 or 15.10

8. Revision System: Git

1.3.3   Non functional requirements

1. Scalability: System should be able to handle a number of users. For e.g., handling around thousand users at the same time.

2. Usability: Simple user interfaces that a layman can understand.

3. Speed: Processing input should be done in reasonable time i.e. we can say maximum 24 hrs.

1.4   Feasibility Study

Feasibility study aims to uncover the strengths and weaknesses of a project. In its simplest term, the two criteria to judge feasibility are cost required and value to be attained. As such, a well-designed feasibility analysis should provide a historical background of the project, description of the project or service, details of the operations and management and legal requirements.

The objective of the feasibility study is to establish the reasons for developing the software that is acceptable to users, adaptable to change and conformable to established standards. Objectives of feasibility study are listed below:

- To analyze whether the software will meet organizational requirements.

- To determine whether the software can be implemented using the current technology and within the specified budget and schedule.

- To determine whether the software can be integrated with other existing software.

Generally, feasibility analysis precedes technical development and project implementation. These are some feasibility factors by which we can determine that the project is feasible or not:

1.4.1   Types of Feasibility Study

Various types of feasibility that are commonly considered include technical feasibility, economic feasibility, and behaviourial feasibility.

1.4.1.1   Technical Feasibility

The Technical feasibility assessment is focused on gaining an understanding of the present technical resources of the organization and their applicability to the expected needs of the proposed system. It is an evaluation of the hardware and software and how it meets the need of the proposed system. This assessment is based on an outline design of system requirements, to determine whether the company has the technical expertise to handle completion of the project.

This whole project is based on Open Source Environment and is part of an open source software which would be deployed on any OS.

The project is developed such that the necessary functions and performance are achieved within the constraints. The project is developed within latest technology. Through the technology may become obsolete after some period of time, due to the fact that never version of same software supports older versions, the system may still be used. So there are minimal constraints involved with this project. The system has been developed using Java the project is technically feasible for development.

Democratic Maps is technically feasible as it is built up using various open source technologies and it can run on any platform.

1.4.1.2 Economic Feasibility

The purpose of the economic feasibility assessment is to determine the positive economic benefits to the organization that the proposed system will provide. It includes quantification and identification of all the benefits expected. This assessment typically involves a cost/ benefits analysis.

Economic feasibility is the cost and logistical outlook for a business project or endeavor. Prior to embarking on a new venture, most businesses conduct an economic feasibility study, which is a study that analyzes data to determine whether the cost of the prospective new venture will ultimately be profitable to the company. Economic feasibility is sometimes determined within an organization, while other times companies hire an external company that specializes in conducting economic feasibility studies for them.

In addition, it is necessary to consider the benefits that can be achieved by developing the software. Software is said to be economically feasible if it focuses on the issues listed below.

- Cost incurred on software development to produce long-term gains for an organization.

- Cost required to conduct full software investigation (such as requirements elicitation and requirements analysis).

- Cost of hardware, software, development team, and training.

Since the system is developed as part of project work, there is no manual cost to spend for the proposed system. Also all the resources are already available, it give an indication of the system is economically possible for development.

1.4.1.3 Behavioral Feasibility

Behavioral feasibility assesses the extent to which the required software performs a series of steps to solve business problems and user requirements. It is a measure of how well the solution of problems or a specific alternative solution will work in the organization. It is also measure of how people feel about the system. If the system is not easy to operate, than operational process would be difficult. The operator of the system should be given proper training. The system should be made such that the user can interface the system without any problem.

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the

requirements identified in the requirements analysis phase of system development. The operational feasibility assessment focuses on the degree to which the proposed development projects fits in with the existing business environment and objectives with regard to development schedule, delivery date,corporate culture, and existing business processes.

To ensure success, desired operational outcomes must be imparted during design and development. These include such design-dependent parameters such as reliability, maintainability, supportability, usability, producibility, disposability, sustainability, affordability and others. These parameters are required to be considered at the early stages of design if desired operational behaviors are to be realized. A system design and development requires appropriate and timely application of engineering and management efforts to meet the previously mentioned parameters. A system may serve its intended purpose most effectively when its technical and operating characteristics are engineered into the design. Therefore, operational feasibility is a critical aspect of systems engineering that needs to be an integral part of the early design phasesThis feasibility is dependent on human resources (software development team) and involves visualizing whether the software will operate after it is developed and be operative once it is installed. Operational feasibility also performs the following tasks.

- Determines whether the problems anticipated in user requirements are of high priority.

- Determines whether the solution suggested by the software development team is acceptable.

- Analyzes whether users will adapt to a new software.

- Determines whether the organization is satisfied by the alternative solutions proposed by the software development team.

This includes the following questions:

- The project provids sufficient support for the users as the tiles are already stored in system.

- The proposed system would not cause any harm as it is running on a server rather than a client side.

- The project would be beneficial because it satisfies the objectives when developed and installed. All behavioral aspects are considered carefully and conclude that the project is behaviorally feasible.

1.5 Objectives of Project

The main objective of this project is to help GNE freshers to locate the places like labs, Admin Block, TCC etc from phone or laptop easily. The map is provided in Punjabi language. They can easily search the place by typing in the search button. In order to entertain them, the projects includes animations, GNE Tour and lot more.

1. The map includes 3-D View with the shadows of buildings.

2. Styling of the map by adding international boundary of India.

3. Automation for making the system an OSM tile server.

2.1 Flowchart

A flowchart is a type of diagram that represents an algorithm, work flow or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows and the flowchart 2.1 of Democratic maps showing the flow of control and Data in the software.

2.1.1 Detailed Description

The basic implementation of this project is almost done in form of prototype. There is need to modify the structure of the project. We have to divide the task into there parts:

1. **Front end** It will deal with how the Democratic maps will look to the user like in form of toolbars, menus etc. This part will include two parts:

   (a) **Rebar Addon toolbar/menus** It contains a list of different animations.

   (b) **Dialog box** User can input latitude and longitude of the point to locate the point.

2. **Back End** The slippymap send to render the tiles on the fly. The tiles are stored for caching the tiles mapnik creates the tiles. The utility osm2pgsql is used to convert raw data to postgresql database. At backend openstreetma-carto fetch the database and create beautiful maps and displayed on the browser.

2.1.2 DFD's

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated. DFDs to serve a tile is as following:
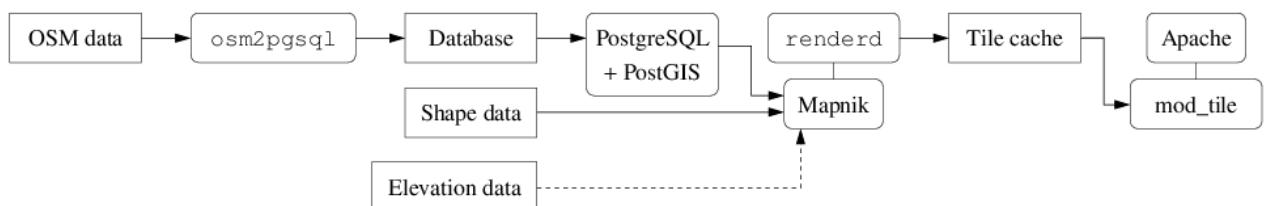

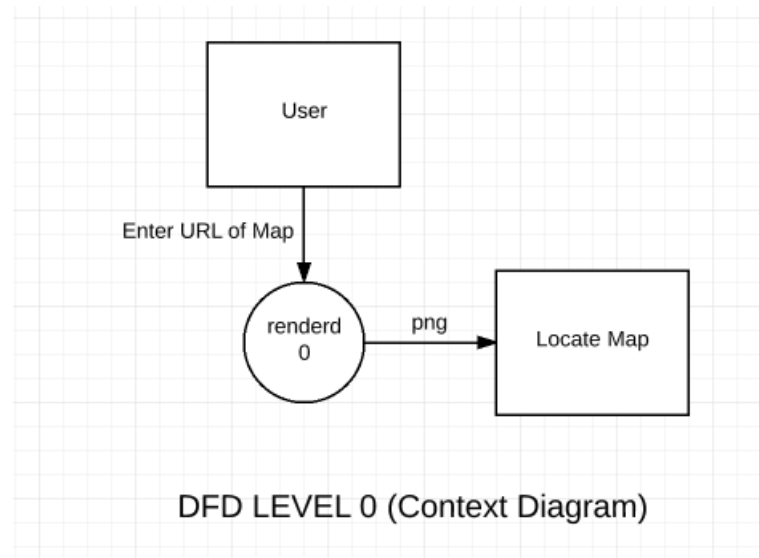Figure 2.1: Flowchart of Democratic Maps
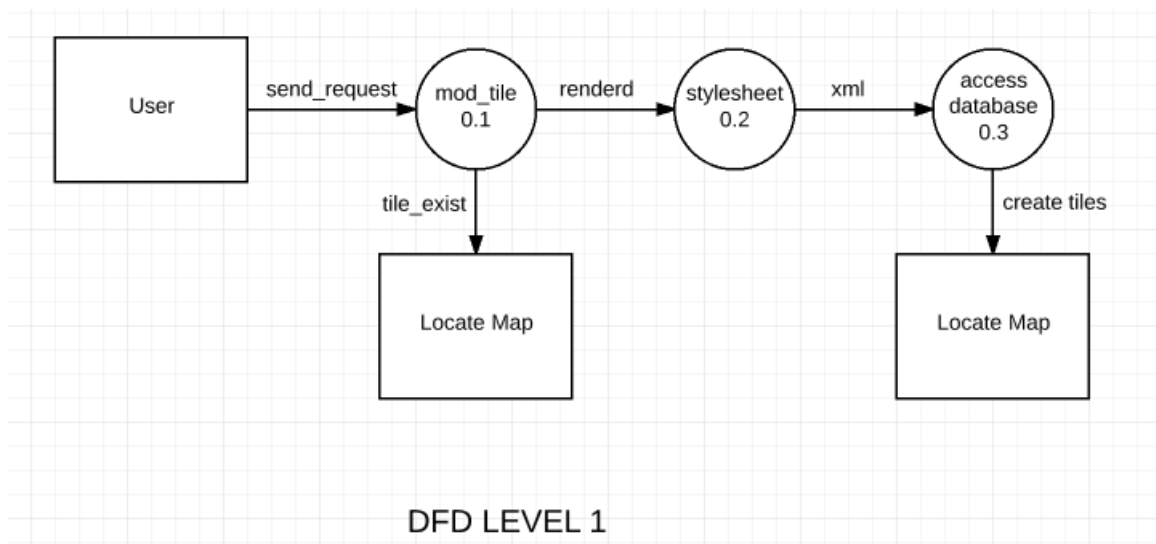
Figure 2.2: Data Flow Diagram Level 0

Figure 2.3: Data Flow Diagram Level 1

CHAPTER 3

DEVELOPMENT AND IMPLEMENTATION

3.1 Implementation

Development of OSM started with development in phases which focus on particular need of project. Various phases and their detail are given below -:

- Phase I (Setup OSM Server) -:
  During Phase I, install all the dependecies(components) as mentioned above to make your own osm tile sever. After installing the softwares download the map in pbf(may be osm) format and render your own tile server. You can see your map on the browser after moving to the location which is being downloaded.
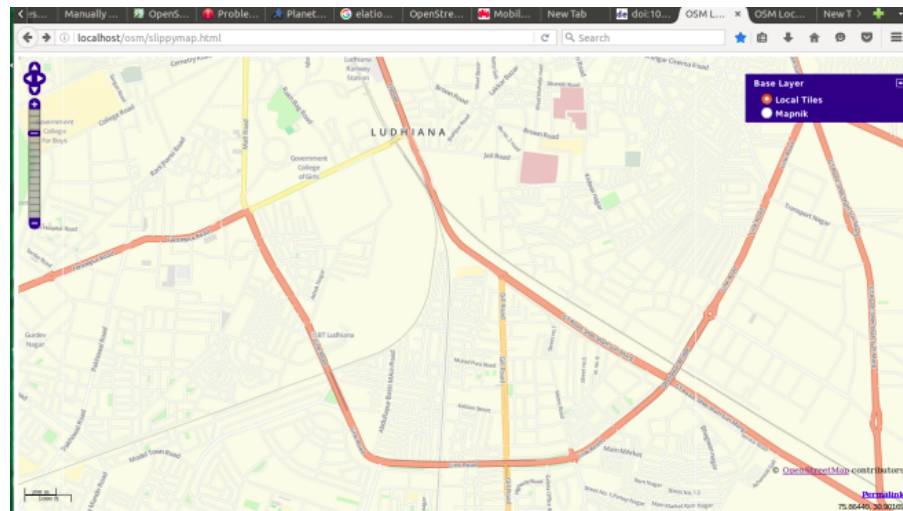

Figure 3.1: OSM Map on Web browser