

# Analytical Data Representation

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**Abstract** — Electricity, gas and water are the basic needs of our life. We cannot imagine our life without these resources. To sustain our lives and make our household living easier, we depend on these different resources. The household living can only get better if we're able to utilize the resources efficiently and in a sustained manner. Analytical Data Representation helps to study the data related to different events to help and analyze various related activities to aid in several purpose. The idea of Analytical Data Representation in this project is to track and keep the record of consumption of various resources like water, gas, electricity and others of a building of a certain area. It is highly recommended and required for modern lifestyle as it reduces the time to retrieve the information and details of resource consumption easily. Calculating the resource consumption details of a building manually requires more time and effort and if the consumption target is to be set or consumption details of previous year or month has to be viewed, it's another hard work. This tiresome work can be automated using the concept of Analytical Data Representation.

**Keywords**— Resources, Sustain, Efficiency, Consumption, Recommended

## I. INTRODUCTION

Analytical Data Representation is a technique to represent and study the data related to different events and scenarios to help and analyze different related activities, done manually or automatically through applications to aid in utilization of resources and to serve several other purpose. Analytical Data Representation in this project is used in a web application through which the consumed unit of essential household resources like water, gas and electricity are tracked and updated frequently by the concerned authority so that the users can view their consumption details instantly and in a hassle free way. In recent years, research into energy saving has been increasing in view of dealing with environmental problems and effectively using energy resources to help the users analyze the pattern of the consumption[1] and depletion of the resources as well.

Analytical Data Representation allows consumers not only to track the resources consumed but the features like tracking of consumption helps them to analyze their consumption pattern as well as help them to examine the inappropriate use of the resources by them which makes the users aware to do their part in decreasing the crisis of Natural Resources[2]. Similarly for distributors, it helps them to find which resources are mostly consumed and on which area or place the resources are mostly used so as to prepare themselves for scenarios pertaining to different cases and to make people aware about their consumption patterns. If this is to be done manually, it consumes a lot of time. The users have to note and store the consumption details in a

piece of paper or elsewhere and that might get lost or damaged, they cannot set the target for consumption then and it is almost impossible to retrieve the consumption data of past years easily.

A platform in the shape of web application can be developed where the users need to Sign-Up on the website and request for their property. After the request has been accepted, Admin would track the total consumption of each building and update the consumption details of respective buildings as well. The users can view their weekly/monthly/yearly consumption details on their desktop screen and even export or print it. The users can set their consumption target and try to consume the resources accordingly to meet their set target.

The rest of the paper is organized as follows. The next section discusses the problem definition, section 3 discusses the solution strategy. Implementation details and results and discussion are discussed in section 4 and 5 respectively. Section 6 discusses the conclusion and future scope of the work done.

## II. PROBLEM DEFINITION

In most countries, keeping the record of various resources like electricity, water, gas is still done in the traditional way where the monthly consumed unit is written and stored in a piece of paper which might lead to the mismatch or loss of information during analysis. Customers have to travel different offices and the departments and stand in a queue to

get information about their consumption details. For example, if the user wants to find the consumed unit of any resources of previous year, they have to again visit respective offices and search for their details from a pile of files.

So, the manual tracking of consumed units of different resources is difficult, cumbersome and makes no sense and apart from all this, sometimes a misinformation might lead to inaccuracy and problems in the future. The habit of using the resources recklessly also has its own negative impacts on the environment.

### III. SOLUTION STRATEGY

The project proposes a solution where a web-application would be developed which would ease the process of tracking of the consumption details of the household. The system would provide a platform where a user would sign in to the system and after successful authentication, they would be able to search and request for their property and the request would be sent to the Admin, the admin then would approve the request and start updating the consumption details of that requested building either by implementing automatic Meter reading system [3][4] or manually.

After the request has been approved, a user can login and view their consumed details from Laptop or mobile devices. They can also set the consumption target for the coming term and can view the consumption details of any date/time they wish. They can even generate the report and store it as a PDF file and get it printed.

The tracking of the consumed unit becomes easier, less error prone and requires less manpower as well. The users don't have to visit different offices to retrieve their consumed data as all the consumed information can be viewed from laptop/mobile devices itself.

### IV. IMPLEMENTATION DETAILS

The various tools, languages, technologies used for the development of this project are given below:

1. **PHP:** Hypertext Preprocessor (or simply PHP) is a general-purpose programming language originally designed for web development. PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites. All of the backend work in this project is done in Php and Codeigniter, a Php Framework.

2. **JavaScript:** JavaScript is a very powerful client-side scripting language. JavaScript is used mainly for enhancing the interaction of a user with the webpages. In other words, webpages can be made more lively and interactive, with the help of JavaScript. In this project, javascript has been used

to provide responsive interfaces, improve the user experience and provide dynamic functionality in the webpages. Some of the features of javascript like validating users input, handling date and times are implemented in this project.

3. **Google Chart :** Google Charts is a pure JavaScript based charting library meant to enhance web applications by adding interactive charting capability. Google Charts provides wide variety of charts. For example, line charts, spline charts, area charts, bar charts, pie charts and so on. Here in this project Google Chart is specially used so that users can view the consumption results in more interactive way.

4. **Grocery CRUD:** Grocery CRUD (Create, Read, Update, Delete) is an open source library that makes a developer's life easier. Few simple lines of code and we can create full functioning CRUD system. Creating, Reading, Updating and Deleting operations as well as data-grid listing with paging, sorting, searching by field are made easy with the help of Grocery Crud.

5. **MySQL:** MySQL is an open source, fast reliable, and flexible relational database management system, used with PHP. MySQL is a database system, used for developing web-based software applications. For database related task, MySql has been used in the system.

First of all, for the development of this application, Software Development Life Cycle (SDLC) approach was followed. At first, all the required softwares like IDE, XAMPP, phpMyAdmin etc were installed in a system and all the required documents were gathered. In the second phase, basic architecture of the system was designed from all the gathered documents.

Implementation phase was the most important phase in this project. In this phase, actual coding was done and the system was implemented.

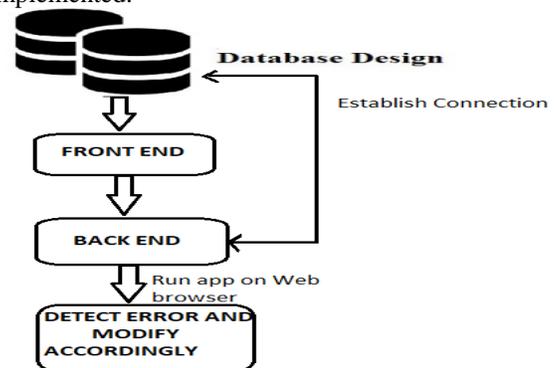


Figure 1. Flow of implementation of the application

Figure 1 demonstrates the flow of implementation of the application. Firstly a database for different module like Users,



Firstname:

Lastname:

Address:

State:

Phone:

Postal Code:

Email:

Activate Windows

Go to Settings to activate Windows



Figure 2. SignUp Page

Building, Consumption etc were created with the help of phpMyAdmin. Then the front end part was implemented for better user interface. For the front end part, HTML, CSS and Javascript were used. After the completion of frontend, backend was implemented using PHP. In backend, users registration and their validation, building search and request, Google chart, Grocery CRUD etc features were handled and implemented.

After the completion of backend part, connection between database and backend was established to fetch and post the data to and from the database. After the successful connection, the system started validating users and their inputs. The last step of the implementation phase was to test the application in a browser after deployment to check for any minor bugs. The reported bugs were handled, the system was modified accordingly else the implementation phase was considered successful.

## V. RESULTS AND DISCUSSION

The implemented software has all the functionality including user registration and validation, requests and graphs generation and analysis. The software has clean UI and is user friendly as well. The application has different events and multiple error handling techniques has been applied. Different activities of this application has been discussed below:

Figure 2 demonstrates the signup page where the users can register themselves in the system. For the registration to complete, the users have to provide their details like name, address, phone number and others.

Figure 3 demonstrate the login page where a users login in to their existing account with their email id and password.



ALREADY A MEMBER?  
**Sign In**

EMAIL / USERNAME  
newuser@gmail.com

PASSWORD  
.....

Remember me [Forgot password?](#)

**SIGN IN**

[Create New Account](#)

Figure 3. Login Page

**EZY**

Home My Properties

Request for a new property

Search Building:  
nh32

**NH324-building - 1** Rectangular Snip kathmandu, nepal

Message:  
please approve

Cancel Request

NH324-building Approved

Hamro Sano ghar sansar Approved

Activate Windows  
Go to Settings to activate Windows.

Figure 4. Building request page

Figure 4 represents a page where a user can search their buildings and place a request. After the request has been sent, If the user is new to the system then they have to create the account first.

The admin will accept the request and start tracking the consumed details of the requested building.

Figure 5 demonstrates the graphical representation of the consumed data. The users can view Target 1, Target 2, total consumed unit and consumed unit of same resources in previous years.

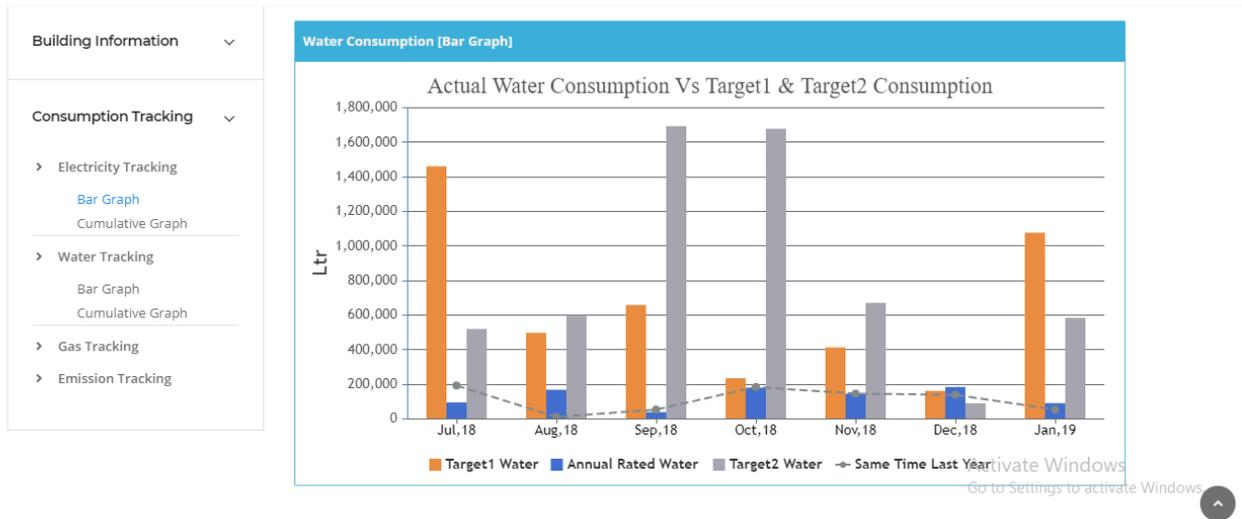


Figure 5. Graphical representation

## VI. CONCLUSION AND FUTURE SCOPE

The main objective of this project was to implement a system which not only helped to control the depletion of both renewable and non-renewable natural resources but also to provide full privacy, transparency and control over the consumed data of the users.

On the other hand, implementation of such system helps to prevent the errors in data, helps to complete the task faster which may otherwise require a lot of time and manpower.

The project has a very vast scope in future. It can be updated very easily as and when requirement for the same arises, as it is very flexible in terms of expansion. Some of the enhancements that can be made are as follows:

- Online Payment system can be introduced where users can pay the money for their consumed unit digitally.
- iOS and Android application can be developed for user friendly experience and maximum consumers outreach.
- Automatic meter reading features can be implemented.

The users can also request for multiple buildings for resource consumption tracking in this system. They can view the data in bar graph as well as cumulative graph and can even export and get it printed for further analysis.

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## Authors Profile

*Sandip Mishra* received his B.E degree in Computer Engineering from Sikkim Manipal Institute of Technology, Sikkim, India in 2019. He is currently working as a web developer in a IT based company in Nepal.

