

Corporation Information Management System (E-governance Solution; based on PARIS Technology)

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Abstract: -

“**Parametric rule based Information System**’ (PARIS) may not be a new technology but its application in Municipal GIS is relatively new. PARIS technology is based on the concept of real world modeling (OOPS Concept) in GIS environment and it has the inherent characteristics of Project Administration, Project Modeling, and centralized Project database, moreover data capturing and data analysis is carried out in a single environment. This paper is an effort to explain a systematic implementation of PARIS technology in Municipal GIS, in order to provide an integrated Corporation Information Management System (CIMS), which can be used by the different departments of the Municipal Corporation, as well as other government departments and by the common man also. This paper describe a model project CIMS by using PARIS technology.

Introduction: -

Corporation Information Management System (**CIMS**) is an Integrated Information Management System for Municipal Corporations, which is designed specially for Indian environment but having an international standard of applicability. High Resolution Satellite (IKONOS) Data has been used for preparation of land base data so that a high level of accuracy can be maintained, especially for locating and assessing the Corporation’s immovable

property e.g. Building, Roads, and Parks etc.

Idea behind designing CIMS is to provide an e-governance solution, which would be cost effective, and which would provide a real world scenario for the planners and decision makers to work with. After reviewing the tools available in the market, our search ended with PARIS.

PARIS (Parametric rule Based Information System), as evident from its name, is a kind of tool, which is driven by set of rules which can be defined by a user as per his need.

PARIS Technology is based on OOPS Concept, which in turn is based on concept of real world modeling. This helps PARIS to provide a possible real world scenario, an ultimate objective of any GIS solution. Still most of the GIS solutions are working on the principle of "**Entity**" rather than concept of "**Object**". When an entity inherent certain characteristic of its class, it becomes an Object e.g. a line drawn in any GIS package may represent a Cable or a Pipeline for a user. But for system, it's nothing but an entity. Only we are assuming that it's a Cable or a Pipeline. Of course, we can assign some value in the form of attribute data for the sake of analysis based on our requirement as Cable No, Type or Voltage etc. But it is not making any difference in the nature of entity inside the system. Still an entity that is representing a Cable can be connected with another entity, which is representing a Pipeline. Is it possible in real world? Answer should be the no! If these "Entity" had been the "Object", it would not have happened because a Cable in terms of its use and characteristics is different from a Pipeline.

GIS solutions based on PARIS technology works on the concept of object, driven by user-defined rules. For example, as a Pipe with 80 mm diameter cannot be connected with to a pipe, which does not have same diameter without a connecting sleeve of appropriate diameters. Similarly a one way road should not be included for calculating the shortest path between two places if that road is not allowing traffic from the starting point to destination point's direction.

Let us see the architecture of PARIS and how an object is created and administered.

PARIS Architecture: -

PARIS has been developed on Client and Server architecture and can be divided into four modules based on their functionality as given below

- 1) Administration
- 2) Modeling
- 3) Data Capturing
- 4) Analysis and Data Display

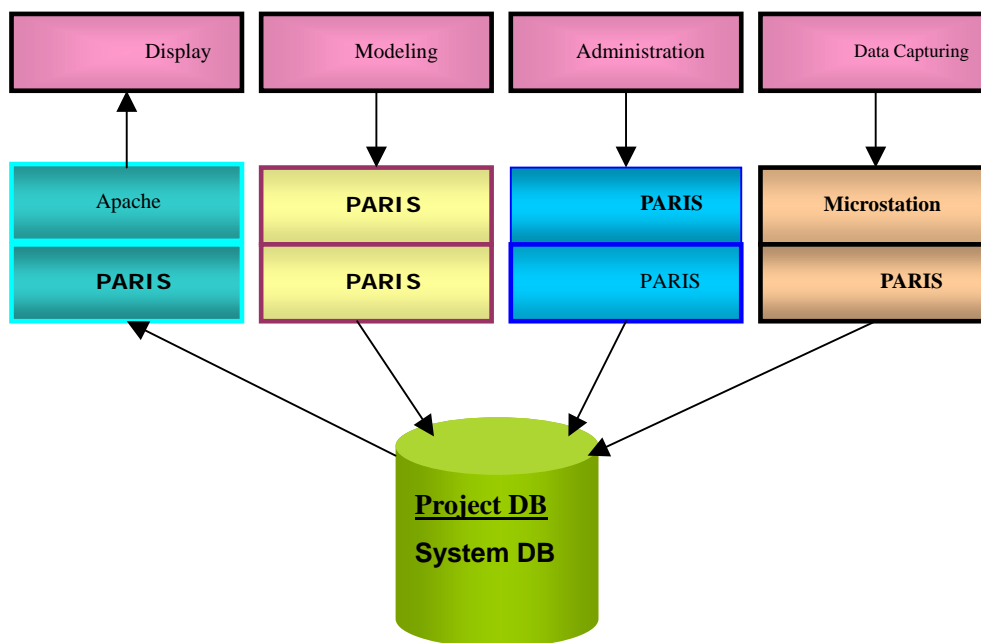


Fig 1: PARIS Architecture Model

- 1) Administration:** - This module is for the project specific administration as well as the user administration. It is responsible for registering and administering all the project specific resources such as Symbols, Fonts etc. It provides a central Project Administration and is responsible for maintaining a specific user level of security. It is possible to define certain users for a project with specific usage rights (as Read only, editing, or even a View or area specific). It is also possible to track the changes made by a user in a specific period. By this, it's very easy to monitor production and quality of a user and project as well, on

day-to-day basis.

- 2) Modeling:** - Modeling is the unique feature of PARIS technology. It provides a facility to create object, define a class and set the rules for the object. These rules can be multi layer. A class can be defined based on appearance and behavior of the object. It can be interrelate with real world scenario as load balancing for an electrical network, uninterrupted power supply for any particular area etc.

- 3) Data capturing:** - As it is suggested by its name, it is meant for capturing the data by using PARIS operating system which is capable to read the data from Microstation environment and converting this "entity" based data to an "object" as per the rule defined for this class in PARIS Modeling Module.

- 4) Analysis and Data Display:** -This module is for Query, analysis and displaying the result. It is a web enabled Module. For query and analysis user need not to have PARIS client. Only requirement is Microsoft Internet explorer and a SVG viewer. The SVG viewer is freely downloadable.

Corporation Information Management System: An Overview

CIMS has been designed in such a way so that it can be used by Corporation's decision makers, Maintenance engineers and by government's other department also such as Town planning, Police and Fire control etc. Use of CIMS is not only confined to various government departments but it can be use by the Public to get the information about Bus routes, finding nearest facilities such as hospitals, Schools, etc. Corporation Information Management System (CIMS) has been divided into four functional modules. They are

1. Revenue
2. Civic facilities
3. Water Network
4. Road Network

- 1) Revenue:** - The revenue module takes care of all the property tax assessment, water charges in such a way that it is very easy to find out properties that are not assessed or is not

constructed as per the building approval plan. This information can also be made easily available to the public so that they can very easily get their properties assessed if they have not been assessed, as well as pay their property taxes and water charges promptly. This module would be particularly useful for cash strapped municipal corporations.

2) Civic Facilities - The civic facilities module of CIMS is concerned with managing and administration of all the civic facilities owned and operated by the municipal corporation like

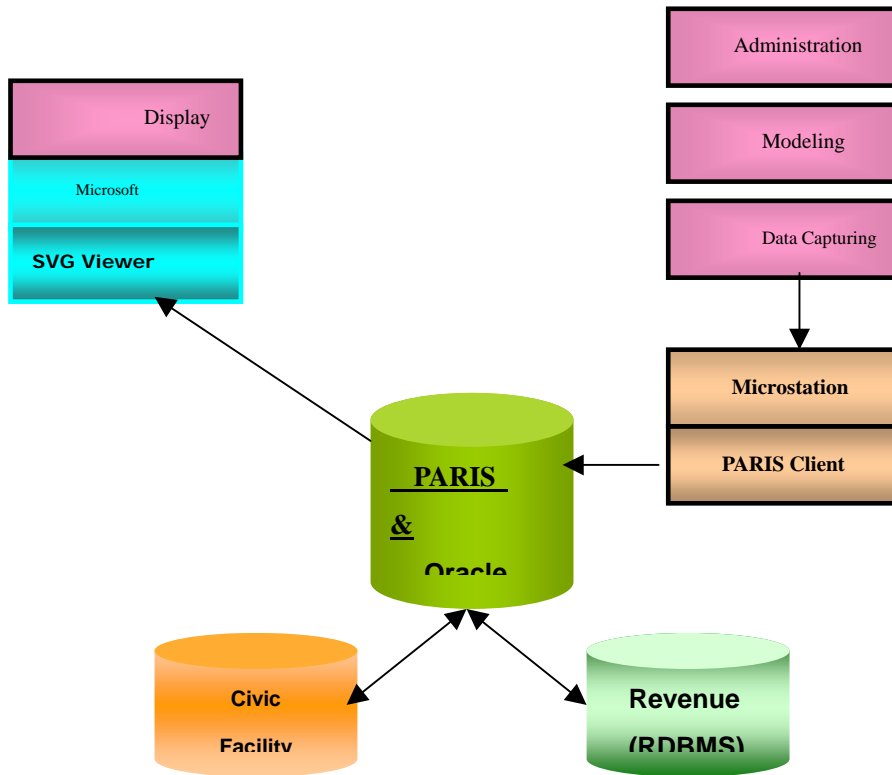
- Street Lights
- Light Poles
- Garbage collection Box
- Reading Rooms
- Daily Markets
- Bore Wells
- Hand Pumps
- Public Fountains etc.

This module will be particularly useful to plan and allocate resources scientifically such that it benefits the maximum number of people with minimum cost incurred

3) Road Network - The road network module of CIMS is a value addition to CIMS, such that it benefits the public by plotting for them the shortest path, bus route within the municipal corporation limits. This module particularly is very useful for the tourist industry in the municipal corporations

4) Water Network - The water network module of CIMS is useful in managing the pipe water network in corporations. It is a hydrological model that takes care of technical issues in water networks like supply balancing, the optimum path for laying of new water pipes etc

CIMS: Applied Model



CIMS Salient Features: -

Apart from standard features of any GIS solution CIMS have following specific features.

Tax Reporter: - Tax reporter gives the information about the properties whose taxes are due in any area or ward at any given point of time. This tool can also be used to verify whether buildings have been built according to the approved plan or whether there has been any unauthorized construction.

Bus Route Finder: - This tool is useful in directing tourists and newcomers to the city to find the bus routes, timings and fares for their various destinations. The location of bus stops and the frequency of the service also can be known.

Garbage Collection Route Allotter: - This tool is used to allocate the optimal garbage collection routes based on variable resources (vehicles) on a day-to-day basis. For example, today if the corporation has only 8 vehicles (different load capacity) available for garbage collection out of the total 10, the tool can be used to plot the routes for all the available vehicles individually so that no area has been missed out inspite of the shortfall in vehicles. The tool is also equipped to provide the length of each route as well as the number of trips for a vehicle.

Garbage Bin Capacity Analyzer: - The Garbage Bin Capacity Analyzer can be used to relocate the position of existing garbage bins based on their capacity and proximity to the public. This tool can also be used for deciding the capacity of a new garbage box at any purposed site.

Water Supply Balancing: - The water supply balancing tool is used to calculate the optimum pressure to be maintained in the pipes for the supply to reach the furthest parts of the water pipe network. Through CIMS it is capable to increase or decrease the pressure in any particular area, by identifying the location of the proposed pressure control valve. This tool can also be used to trace underground leaks, unauthorized tapping of water from the network.

SCADA interface for Automatic Street Light operation: - The SCADA interface for Automatic Street Light Operation can be used to generate a report on the functioning or otherwise of individual street lights through the collection and analyzing of real time power consumption data. This helps in instantaneous replacement of faulty streetlights.

Street Light Planner: - The street light planner can be used to calculate the number and type of street lights along with the height of poles required in a street as per Standard set by the Government.

Site Suitability Analysis: - This tool can be used to find out what type of land the government has designated for what types of activities. This is very useful for a common man to find the designated areas for various purpose and also it is possible to decide and apply a building approval plan.

Further more CIMS functionalities can be used for establishing Fault Repair Call Centers (FRCC) for drinking water supply, online verification for death and birth certificates, decentralized planning for the available resources (just by adding up the demographic data), GPS based vehicle tracking system etc.

Cost and benefits Analysis: -

Cost: -

Implementation cost: - CIMS is built on Thin Client/ server architecture, operated on central data base which is cutting down the cost of costly client side software's. Existing standard hardware and software of the organization can be used for data display and analysis. Even on server side also, GIS solution based on PARIS technology is cheaper than the others available in market. This is the major advantage of CIMS on PARIS from the implementation perspective.

Operational Cost: - In CIMS all processing capabilities are centralized, so in case of data update and editing there is no need to change in all the PCs. This has significantly reduced the operational cost. Working with CIMS is as simple as Internet browsing therefore a minimum training is required for corporation staff.

Benefits: -

Benefit to Municipal Corporation

1) Faster Collection of revenue: -CIMS provides information (synoptic) about the person/ property who are not paying the tax in any particular ward or street, even a Report also can be generated for these persons and a tax collector/reminder can be send.

2) Quick Delivery of Services: -After CIMS implementation, corporation will be able to process the request from citizen quickly, because most of the information will be readily available within no time for required action.

3) Opportunity for new revenue: - CIMS is able to provide information about un-assessed property in any area. Those properties can be assessed immediately. Street light poles are very good source for revenue by leasing them to advertising agencies.

CIMS is providing the information about each pole in corporation limit, which makes easier for corporation authority to decide and calculate the lease rate for any particular road as par its importance.

Benefits to citizens: - CIMS is not beneficial only for corporation but citizens will get the ultimate benefit of CIMS either directly or indirectly. Some major benefits are as:

1) Time saving: - Citizens can get the information about their dues (Property tax and water charges) from the web, incase if they did not get their bill on time.

2) City Information: -Citizens will be able to get information about bus routes, shortest routes between two places, nearest school and hospital and other services.

3) Site Selection: - An entrepreneur can decide on the optimal location for establishing any new ventures based on his services and querying for the areas of potential clients.

Implementation Issues: -

In developing countries, where the infrastructure development and deployment has not been in a predefined fashion, it is quiet difficult to collect, tabulate and verify the huge volume of

data that is the heart of any GIS system. The cost of collecting and reorganizing the data is nevertheless going to be a one time cost and since GIS has been proved one of the most powerful tools for planning, developing and managing large countries, it is better that a start be made in this direction, before the costs escalate further.

Data updating on a regular basis is another implementation issue but this can be overcome by having a central system of data sharing that can eliminate data redundancy and bring down the implementation cost.

Resistance in staff for moving towards new systems can also be an obstacle in the implementation which can be eliminated by rigorous interactive sessions on importance of GIS and its implementation.

Conclusion: -

Corporation Information Management System (CIMS) will provide a cost effective, efficient and an integrated GIS solution for Municipal Corporations. CIMS functionalities don't end here; in fact it's a beginning towards playing an instrumental role for corporations in getting a status of fully e Governed Corporation. The benefit of CIMS is unlimited and umpteen number of value additions can be incorporated by an IT savvy visionary administrator.