Environmental Monitoring System.

Group Members

Arachchi R W M 100039D

Bandara K A M N 100056C

Bashani J P S 100059M

Pemasiri H T A S 100374A

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1. **Task:** Design a database system for the Colombo city mayor. Colombo city mayor wants to setup an environmental monitoring system which collects data from a set of sensors situated around the city. Different sensors will have different attributes. Multiple types of sensors can be located at the same location. Database should assist in providing information for reporting and analysis of the environmental condition in the city.

2. **Description:** Colombo mayor is the person who is responsible and controls various kinds of activities which are running in Colombo city area. As that Colombo is a city which is very much crowded, busy and the capital of Sri Lanka. Most important and highly official conferences, events are organized in the Colombo city area in most of the times. There for environmental issues must be taken into consideration on organizing events and activities. Therefore Mayor has decided to establish sensor system throughout the Colombo city and monitor environmental conditions and issues.

3. Purposes of maintaining an environmental monitoring system

- Avoid from harmful effects from natural hazards.
- Gather information to design specific pollution prevention .
- Respond to emergencies.

4. **Purpose of the project:** Develop a database system, which enables to store data which are generated through the sensor system established in the Colombo city area under the pre-defined specifications. Also Colombo city mayor and other authorized parties would be allowed to retrieve the data to support an Environmental Monitoring System (EMS). And the EMS application can analyze the data on the database, manipulate and make interpretations. For normal users, data can be retrieved, just to be aware of environment condition.

5. **Scope:** The database system will have several tables which will store the different types of data. These tables will facilitate to store different attributes which are received by the sensors or are generated or calculated using data received from sensors. Using the EMS application these data can be analyzed and interpreted.

6. **Requirement Overview:** When implemented this database should be able to store the data received from the sensors (Assumption- Sensor output has been converted to Standard UNICODE format), allow the application program of EMS to access data in the database, and output the data needed by the program in form which is compatible to the application program. (Assumption- Standard UNICODE format)

   After the implementation of overall system, the user (the mayor) should be able to retrieve raw data or to get analyzed data on his demand. Moreover some functions (eg : Generating monthly report on a certain attribute) should be carried out in predefined time intervals.

Functionality

7. Functional Requirements:

7.1. Database

- Store the locations of the sensors
- Store the data(update) from the sensors so that database contains the latest data
- Given the location display the attributes which can be retrieved from the database
- Given the location and the attribute, output the updated value of the attribute.

7.2.Overall System

- Generate monthly report on temperature variation, humidity variation etc. (monthly, yearly or at demand)
- Analyze environmental condition(tables, graphs)
- Predict whether
- Access control(to edit and to view by different users)

8. Non- functional requirements

8.1.Database

- Atomicity
- Consistency
- Isolation
- Recovery Management
- Concurrent control
- Durability
- Data integrity

- Space management

8.2. Overall System

- Data integrity and security
- Confidentiality of data
- Speed of operations
- Accuracy
- Concurrency control
- User friendliness

9. Requirements in descriptive level

- Storing Data
  Each sensor will automatically update the EMS in pre-defined time intervals. Data will be store under several tables as there as different kind of sensors. Each data will store with a timestamp and which will be helpful in analyzing and data mining.

- Retrieving Data
  Data retrieving would be done under several ways. According to the specific commands such as environmental data of a specific location, specific area, specific time interval, a daily summery, monthly report and etc. According to the command the relevant data would be retrieved and display through the EMS application after analyzing and organizing in the correct manner.

- Data Mining
  EMS would be allowed to predict weather through the data mining. EMS would be allowed to predict weather through the data mining. It will analyze, identify and plot patterns in data

- Add New Sensor
  Facility to add a new sensor to the system and to remove a sensor from a system should be considered while development.

10.System constrains

- When retrieving data, their level of being updated will be depend on the time interval which has been assigned to the sensor