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1. Introduction

Students are introduced to databases and given a basic understanding of database systems in the foundations of database system course. This course, which is a part of our curriculum, covers data models, entity and attribute definitions, database design, database building and manipulation, and the database management software that underpins all of these concepts.

Based on the task, we selected a local construction company that can be taken as a perfect candidate to implement what we learned from the course. This documentation is prepared to underline the requirements and the purpose of our project. The purpose of the document and what is included in the document is briefly explained on the next section. As a course assignment, we were required to build a database system for a certain company that will facilitate and manage business activities.

The section on customer specifications offers information about the company's history and requirements. The company's history and an explanation of the industries it mostly works in will be provided in the company's background. This requirement analysis document explains how various project-related tasks, such as managing employees, capital, expenses, and so on, may be handled while still meeting the client's requirements. These inquiries form the core of the project and must be addressed in a way that ensures the client provides unambiguous answers.

The corporate database is built based on the requirement analysis of the entire project. The project's domain is where the majority of record-keeping and business administration issues are resolved. Setting the project's scope and functionality is made simpler by the information provided in the requirement. The project users section clearly states who is able to modify, update, and maintain the system. These users are client workers who are authorized to consume data and create queries for making business decisions. The project type and platform section offer insights on the project's application areas and operating conditions.

1. Purpose of the document

This document is prepared is prepared to give a general road-map of how DBDLS(database development life cycle) can be implemented while building the database system. From the table of content section each part is on their own will be briefly explained.

Building a system without a requirement analysis and underlying system mission and objective would be a much difficult. This document offers those things independently. Client requirement are specified in a clear way, this helps identifying and conceptually building system data model.

Entity relational diagram is included from the requirements set by the client. Company background is there for knowing for what type of enterprise is our system will be built.

In the project overview section project scope and users are obtained from background of company and their requirements. The system we are building includes a range of users in the company. This section is included to get what are the daily users of this system and at what extent the project covers.

1. Client specification

We have gathered a bunch of information that can be used as an input for our project. Based on client feedback and their requirement we are able to identify the core areas and problems this database system will be able to solve. Before jumping to company requirement its better to know for what kind of organization the project is.

3.1 Company background

**Huang He Construction and** **Trade** is established in 2018, a private profitable company that is mainly engaged constructing structures and supplying construction materials to construction sites. On day to day basis a large amount of data is generated on each and every activity of the company. Constructing an information system in this case a enterprise database system helps to track the progress, activity, transaction effectively and in efficient manner. The database system can be taken us a perfect candidate for this purpose. The system should support ingesting data, updating and querying information that can lead to business-driven decision.

The company supports many employees in different profession, those professionals bring a huge asset to the growth and performance. Wide range of skill set is offered to projects taken. There is a belief and bureaucracy which is based on treating employees in professional way can create better working environment, it is one of the guidelines.

Every project, company activity is facilitated by the company capital, those capitals are known as vehicles, machines, trucks, equipment. A proper management and tracking of capital are crucial. Starting from the foundation this company is increasing the number of capitals. New machines and vehicles are being part of projects, some equipment is being worn out and replaced by other. All this activity should be organized.

Customers of the company include clients offering a project and potential client that are looking forward to work with. Huang He has identified several trends that they believe will cause explosive growth in the demand for their service. They include tracking projects with centralized information system taking employees and capitals as part of process. This approach can lead to a good management system. Implementing a good management system offers increase productivity, a well-organized employee management and finishing projects within the time span. Other approach, recording what has been achieved on daily project activities. There are customers tied with the company for material supply, this approach works best for them. When a material supplied for certain client for instance: what material, which truck, time are recorded as part of projects.

The final activity is expense management. employee salary, purchasing materials, full-filling are some of them. Expense is not limited to what is listed. Finance sector can be helped with a system that can record every expense. Query can be generated as aggregate for determining on which time there is more expense, reports on data leading a discission that is informative.

Currently there is a record system that keeps track of all those activities. It provides a general information about Huang He, its projects, almost all the activates listed above. The system is record based, that can promote redundancy and inconsistency of data.

Problems with the current system include:

* The information available on the record based system is too limited and it is much harder to access it because of improper organization of data, access time is very large.
* The existence of a record-based system means information is often recorded repetitively and there is no guarantee for recording again.
* Updating information is inconsistent, changes made to certain part is not reflected to the whole system.
* Generating a report is a huge task, time consuming because of the above problems.

3.2 company requirement

In this section of the document project requirement is briefly addressed. Requirements are collected using questionary method, Huang He record office was responsible for giving insights on the company background. Activities, transaction business guidelines listed on company background sub section. Requirement is the continuation and related to the above.

Responsibility of the database system:

1. Provide employee management that keep recording of every individual personnel working for the company, this sub-system must specify the role, salary, project participation, full profile of an employee.
2. A capital management for organizing and listing all capitals owned by the company, allows providing information which capital is currently in use, specifies which employee is currently administrating the capital.
3. Project held by should be available in a system, includes employee participation and capital management as association for generating information effectively.
4. Expense should be recorded in consistent manner, that can easily be modified when needed, recording expense is required to be a robust and inclusiveness of every type of expense the company can have.
5. They system must allow users to generate a specific information from sub-system.
6. Updating and modifying data should be facilitated in the system.

On the completion of project above requirements must be addressed fully. The next E-R Diagram section uses them for conceptualizing the potential system structure.

1. E-R Diagram

This sub-section of the document elaborates the requirements set above. An Entity relational diagram can be used to conceptualize the system in an easy and explanative way. Non-technical users of the system can take this diagram to check whether it meets the ways of solving old system problems.

The diagram has sub-components technically called entities as building block of its visual representation. Each block is carefully designed to meet the goals of system, there is a separate illustration that explains working atomic units, interconnection as well.

From listed system requirements these entities and attributes are able to be driven:

* A lot of employees share a common trait that can be mentioned as profession, the date they are part of the company (employed date), name, sex, address, employee identification, contact number. All these atomic units are part of a single, whole inclusiveness entity named **Employee**.
* Every capital in the company has these characteristics capital name, owned date, capital identification, how the capital is used or purpose. Capital identification is some sort of semantic numbering that is given to every capital. This could be used to identify capitals one from other.
* Project name, start date, deadline date, project address, client potential owner of project. The dates project taken and put in action, the date agreed to finish represent start and deadline date respectively. Project address is for the place where the project is taking place.
* The last sub-part is expense entity that has its own attributes like expense name, amount of expense, how much unit, expense name, date and description. The way will be used to identify each expense is joining expense date with its name. the main reason for this is if we have more than one expense of same name an attribute units is there for how many times that expense has occurred. So, units are simply couniting number of expenses on same date. This helps to identify each attribute uniquely.

While on the stage of identifying each object entity for the system relationship was found among them. These relationships are set of practices, a way of conducting activities in the enterprise and illustrate how each particular business-related work is done.

Their relationship as follows:

* All the capitals owned by the company has administrators which are employees. In this case a many capitals are administrated by a number of employees. Many to many relationships is existed here, the company rule guides any capitals have to administrated by someone, hence this is a total participation. An employee is perfectly allowable not to admis rate. Start date refers to the date an employee started or taken responsibility to watch over a capital.
* Relationship between employee and project is a many employees are allowed to work on many projects as business rule insists. Neither employee nor project hasn’t to be existed without one other, a total participation is included. Start date refers the date an employee started working on certain project. The number of hours an employee spent working is tracked with an attribute name working hour.
* Capital-expense relationship is a type constructed for keeping track of expenses related to capital. These could be property rent, vehicle fuel-fillings and many more, many capitals has number of expense, a capital is expected to have expense but it doesn’t give sense for an expense to have capital, the participation of expense in this relationship is partial.
* Employee-expense relationship is same as capital-relationship in terms of participation, which is must to be included. One thing different is salary attributes is included.
* The final odd relationship is between capital and project this relationship expresses the usage of capitals and managing capitals in projects. In one certain project a lot of capitals is put in operation. Total participation is must for both entities. Unlike the above relationships we are not be able to find attributes between them.

Entities and relationships on their own doesn’t give a complex understanding over the system. E-R diagram below includes every entity and relationship among.

1. Project overview

5.1 project architecture

The database system is local system that is to be installed personal computer. It is designed to support a single tier architecture with a single user who will be responsible for updating and manipulating. A Postgres database managing software is required to run the system, this software is installed on user’s machine.