CPSC471 - PROJECT PROPOSAL

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1. Introduction

Accounting for payroll/salary is a major issue for many companies. We need a way to keep track of hours, overtime hours and other benefits in order to come up with accurate figures for employees. Our project aims to tackle these issues by designing a modest web interactable database. Since solutions exist already, our primary motivation is that of exercise purposes and to explore an important learning opportunity in databases.

The format of the proposal will go into more detail about the problem definition and then an explanation into the proposed solution. We then will reiterate our motivations for the project and then wrap it up in the end with a conclusion tying all points together.

2. Problem Definition

Businesses and companies have been a significant part of human societies for centuries now. One direct consequence of managing a company is having to pay your employees a salary. Therefore, it is important for a company to keep a record of all their employees, and all information related to their salary. Traditionally, this has been done manually by accountants using pen and paper. In recent times however, there has been a shift towards using automated systems. Automated, computer-based systems are typically preferred because they save time and they reduce the risk of calculation errors. Thus arises the problem: **How can a company easily and conveniently set up an automated computer-based system to manage its payroll?**

This problem is interesting because it has rather significant ramifications. If solved incorrectly, a company can leave itself open to litigation if it ends up having inaccurate information in its payroll.

The problem usually arises in one of 2 scenarios

- An existing company which already has a payroll that is manually recorded and wants to transition to a computer-based database
    - A recent survey by Clutch showed that 25% of small businesses still record their finances manually on paper. As we continue into the future, it's plausible that many of these companies may decide at one point to upgrade to a computer-based system.
- A newly formed company which wants to set up a computer-based payroll database from scratch
    - Ideally, a new company would want to set off on the right foot and simply jump straight to an automated database.

In practice, the problem that we aim to tackle has already been solved. There are programs which give managers the ability to create and manage a payroll on a computer. The most common solution offered by software development companies is to create PC applications which can be installed and operated by a business manager/owner. There are also some web applications which offer similar functionality, but they are far less common.

One system which is similar to the one we propose is called Intuit Payroll. This is a system which can automatically generate paychecks as well as calculate tax deductions and other details relating to the paycheck. Intuit Payroll also has a feature that allows managers to chat online with 'payroll specialists' in case of any difficulties.

One thing we noticed when we were researching current solutions to the problem is that they were almost exclusively designed for the management side. In other words, most automated payroll systems are designed to only be interacted with by company managers/owners. One possible improvement would be to create a portable system which can also be used by employees (albeit with fewer privileges obviously). For example, an employee could log onto the system to view the details of their paycheck, or maybe even apply for a pay raise, which would then be reviewed by the manager. A manager's account would have elevated privileges, so they can choose to grant the raise or not as they see fit.

3. Proposed Solution

The project will produce a centralized payroll management system that can be maintained with a companion website. The underlying data will be saved in a database while the website will serve as the frontend for the system. The management system produced will be able to incorporate functionalities like adding/removing an employee to the payroll, giving an employee a pay raise, search for employees based on the salaries they receive, calculate tax deductions to pay employees.

The automated nature of the database means that it is less prone to human recording errors and thus achieves better accuracy. It also tracks and limits the people who access the database to make changes, which increases security and holds managers who make changes accountable to what they did. This is a marked improvement from the ledger system of managing payroll, which can be modified by someone to sabotage the company. As 8% of companies make manual entry mistakes in the payroll system and 48% of companies do not even notice such a mistake until an employee contacts management about it, this system not only offers valuable measures to prevent the data integrity of the payroll system from being compromised, but also improves the maintainability of the company payroll. The project also achieves other desirable features such as streamlining the payroll system and ensuring quick payment to employees due to its centralized nature.

The project also meets expectations for design, as it can be expanded to have as many employees as required at no cost design-wise.

The features of this system include:

- *Calculating salary paid after tax deductions:* This feature is used to calculate the effective amount of money sent to employees and keeps track of the amount of money to be sent to the Government as part of taxes. It is also useful for allocating money to other programs such as Retirement Savings, Employment Insurance etc. This is done by using the base salary and performing operations on it to separate the taxes and net salary.
- *Adding and removing employees from the payroll system*: This feature is used when new employees join a company and when existing employees terminate their services. This feature is implemented with a query to add or remove an entry and is done such that all other tables that have the employee's key remove that particular entry as well to keep the database in a consistent state.
- *Increasing and decreasing the salary of an employee*; *editing features of employees and payments:* This feature is used to offer employees a pay raise or offer bonuses. It can also be used to change the categorization of an employee – such as changing the currency in which an employee is paid. This feature is implemented with a query that updates the base salary attribute of an employee.
- *Generating reports based on money spent paying salaries:* This feature allows companies to compare how much they spend on salaries, allowing them to make strategic decisions regarding employment. This feature is implemented by relevant factors from the data in the table (deriving them) and displaying them on the website.
- *Searching for employees based on their data:* A feature that allows searching for employees with certain markers. This allows the company to narrow down on who is paid the highest or whether a certain subset of employees is receiving adequate benefits. This feature uses a search query that can accept existing attributes of employees to search and display results.
- *Maintaining a log of changes:* This feature enables the company to track down which user made changes to the database in case of unauthorized alterations. This feature is implemented by recording every modifying action in a table and presenting the table when a query for the log is issued.
- *Maintaining a login system*: This feature allows managers or administrators of a company to make their own account to manage the payroll system. The username and password are stored in the database itself and entries to log in are checked against that table.

4. Motivation

It's a common need for every company to need a payroll database to manage benefits and salary. In addition, since most of the current software tends to be very archaic and legacy in this particular area, it would be a good idea to come up with a fresh take on the issue. Lastly, as mentioned in the problem definition, most of the existing payroll management systems are programs which need to be installed on a computer. The web app we create will be portable and accessible from multiple devices.

Granted, web-based payroll management systems do exist even if they are uncommon so our project is more of an exercise and a learning opportunity since the current solutions already do exist.

5. Conclusion

In conclusion, there is a strong desire for institutions to manage precise pay information for their employees. The problem we aim to solve is the problem of setting up and managing an automated payroll management system. Our motivation is primarily as practice to be exposed to a prominent part of computer science which is involving databases. Our solution will be in the form of a web database running on a local host.

Below is a tentative timeline that we aim to follow in the development of our solution. It is loosely based on the deadlines mentioned in the Project Specification document that is on D2L.

- May 17th - May 23rd: Create an Enhanced Entity-Relationship Diagram (EERD)
- May 24th - May 30th: Converts the EERD into a Relational Model Diagram.
- May 31st - June 6th: Construct UML and Sequence Diagrams which outline the design of our product's functionalities
- June 7th - June 17th: Use the design described in the previous step to develop our product and construct the final report.

In addition, we will also set internal timelines for our group members such as midweekly meetups after class on Wednesdays to ensure project is on track.

6. References

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