Computer Based Payroll System Implementation For E-Governance at Punjab Agricultural University

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Abstract: - Payroll is a critical operation for every organization to pay employee accurately their salary and emoluments on time. For a big organization, the idea of taking control of employees pay calculations is quite daunting. This computer based payroll system aims to explain in simple terms what payroll involves and demystify the payroll processes. Moreover it is a powerful tool to streamline the time consuming and complex tasks of employee payroll scheduling and planning. This system provides multiple user data access. Each user walks through the entire payroll process as per rights allocated from adding new employee to generate pay slips with clear step by step instructions. Furthermore the system is flexible to implement changes in pay scales. This Computer based payroll system is capable of keeping a record of employee data including their pay, allowances, deductions and taxes on monthly bases so that fresh definitions are reflected from the month onwards, which leaves all the past data intact. This system has been developed using PHP, HTML, CSS, JavaScript and Ajax and database has been designed using MySQL. The proposed computer based payroll system is advantageous as it provides a user friendly environment. This payroll system increases security and minimizes human calculation errors.

Keywords: - Computer Based Payroll System, PHP, MySQL, JavaScript, CSS, HTML, Ajax.

I. INTRODUCTION

A. Computer based payroll system

In an organization, there are several departments and each department has a payroll section to manage its payroll activities. Each section has to perform necessary personnel operations like data collection and preparation, entry, updates, monitoring and reporting of data. Many of these existing practices and procedures need to be reassessed at this time of changing needs, changing demands of employees and changing technologies [13]. So an organization needs an integrated computer based payroll system that would integrate personnel and payroll related data collection, processing in individual departments and payroll audit in a more efficient and streamlined way.

With this computer based payroll system, payroll section would be able to keep a record of employees including their personnel data, pay band, allowances, deductions, savings and taxes etc.. Net pay of each employee is calculated by using the information about his allowances and deductions. All these complex calculations have been incorporated here in. Many optional allowances and deductions for the employees are added by specifying the corresponding details. The individual pay slips and deduction vouchers are printed out as a receipt. Pay bands, grade pay, allowances, deductions and tax information are updated if there is any amendment in salary structure.

This proposed computer based payroll system has been developed in accordance with requirements of Punjab Agricultural University. Presently a clipper based payroll system is being used at PAU which has to be separately installed in each department and timely updated only by a particular person. This proposed system is secure, easy to use and provides online access to PAU employees from any web enabled computer at any time. The computer based payroll application is a web-based design. The server-side of this application is partitioned in terms of logic into three-tiers or layers [6] as shown in Fig. 1 Each layer has a different responsibility in the overall deployment and within each layer, there are one or more components.

The layer partitioning is as follows.

1) Presentation Layer: is the user interface for displaying data to the user and accepting input from the user. This is a part of the application which enables the user to see the functionality of each and every component [2]. In case of web applications the web browser (Internet Explorer, Mozilla 2 Firefox) is known as presentation layer. Presentation layer has been built using technologies like HTML, JavaScript, AJAX and CSS in this proposed system.

2) Business Layer: is for data validation. The business logic is the code running on the server that contains processing instructions utilizing technologies such as PHP, ColdFusion Markup Language, Perl etc. The proposed computer based payroll system uses PHP in business layer to implement dynamic pages.

3) Data Access Layer: comprises database communication, constructing SQL queries and executing them via the relevant API. The data tier is containing all the user information, username, and passwords for web application.
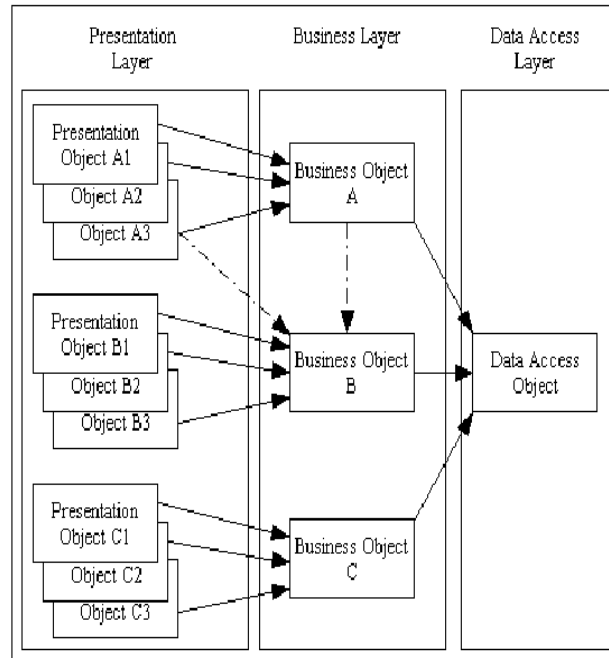

Fig.1 3-Tier Architecture

B. Software Development Life Cycle for Computer based payroll system

Software Development Life Cycle (SDLC) is a framework that describes the activities performed at each stage of a software development project [8]. It starts with the system analysis, design, and implementation, and continues through the maintenance and disposal of the system.
The steps given below describe implementation of proposed system:

1) System Analysis: Analysis involves a detailed study of the current clipper based system, leading to specifications of a new computer based payroll system. During analysis, data are collected on the available files, decision points and transactions handled by the present system. Interviews, on-site observations and questionnaire are the tools used for system analysis of present system. System Analysis also includes sub-dividing of complex process involving the entire system, identification of data store and manual processes.

2) Existing system: Payroll is financial record of employee's basic salary, allowances, deductions and net pay. Punjab Agricultural University is a vast institution which is known worldwide for its tremendous contribution in the field of agricultural and scientific research and education. The university has really a good pool of scientists, faculty, administrative and non academic staff [1]. In existing payroll system of PAU all the calculations are done by clipper based system, it is not a fully computer based system. The main disadvantage of this system is that majority of work is done by hand. The whole procedure involving delivery of an employees pay is very tedious, time consuming and frequent verification is required so as to avoid the risk of human error.

3) Proposed System: The proposed system is a web based system [5]. The base of the proposed system is a database, which stores all the information pertinent to personnel, allowances, deductions, taxes, savings and net pay. The payroll system will stay up to date with pay checks and tax filings [3]. This includes calculating allowances, taxes and other deductions, printing individual pay slips and deduction vouchers.

4) The major operations performed by the proposed system are shown in Table I.

Table I: Operations performed by the proposed system

Sr.No.	Operations performed by the proposed system
1	Payroll system has multiple users which are created by administrator and the system can generate a separate check for each user category.
2	Each user has different rights and he can access only allowable modules.
3	Administrator and HOD can add new employee and update his record also.
4	Administrator, HOD and Operator can calculate pay of employees.
5	Allows the administrator to register basic data as (college, departments, schemes, employee types, users) in a simple and easy way.
6	Maintains personnel records, salary histories, employment histories of employees.
7	Payroll System can manage payroll processing and tax reporting efficiently and accurately.
8	Calculate and process numerous allowances and deduction types for each employee.
9	Automate tax information reporting monthly and annually. This information helps the user to submit the required forms and tax deposits on time.
10	Inquire into an employee's record at any time the user wants in order to check employment history.
11	Allows administrator to change, delete inquire, print and display all transaction data that occurred on the employee.
12	Process pay slips for employees on monthly bases.
13	This system generates reports of CPF, GPF, NPS, House rent, TWF, GIS, LIC and Faculty club.
14	Allows the users to search for records by more than one method: employee name or college name or department name.

5) Feasibility analysis: In the field of computer and technology, a feasibility study should be conducted in order to see the benefits of automation over manual system as well as other alternatives. In current system the feasibility study is based on research on both the current practices and the proposed project and its impact on the organization operations. The feasibility study also includes advantages and disadvantages of both the current system and the proposed plan.

Schedule feasibility, a schedule is a list of events that must occur at a specific period of time. In this proposed system the objective of schedule feasibility is divide the task and time in proper way, then implement and terminate it effectively. The schedule feasibility has been decided at the time of synopsis submission by defining time period for each step and the schedule work-flow diagram shows the progress, the schedules of each process in a project and the total project time.

Technical Feasibility means to investigate the technologies to be used in proposed project. Some Technology issues to be considered for this project are: Performance, Ease of learning, Ease of deployment, Ease of support, Interoperability with other technologies, Scalability.

Economic feasibility, Economic analysis is the most frequently used method for evaluating the effectiveness of a new system. More commonly known as cost/benefit analysis, the procedure is to determine the benefits and savings that are expected from a proposed system and compare them with costs. If benefits outweigh costs, then the decision is made to design and implement the system [4]. In the current system, the initial monetary costs of development, the expected monetary costs of operating and supporting the application, and the expected future monetary benefits of using the application are identified to perform cost/benefit analysis.

Operational feasibility means to maintain and support this proposed system once it is in production. Here it is a measure of how well a proposed system adds, updates the employee payroll record as per the requirements identified in the requirements analysis phase of system development.

6) Requirement analysis: Requirement analysis is process of understanding user needs and expectations from a proposed computer based system. Requirement analysis phase of this proposed project includes following points: How does the proposed system interact with user, the system's hardware, other hardware, and other systems? What is the speed, availability, response time, recovery time of various system functions and system modules? What are the portability, correctness, maintainability, security, and other considerations of the current system? What are the design constraints for implementing this system?

7) Steps in the Requirements Analysis Process: Fix system boundaries: at this stage, the connection of this prototype application has been checked with other Punjab Agricultural University systems like budget system. The scope of this project is concise within the university is also decided here.

Identify the customer, next step in requirement analysis is to identify the users of this computer based payroll system. Users are those persons who tell about complete functioning of the system [10]. Clerks, senior assistants, HOD of different departments and administrator are users of this proposed application.

Requirements elicitation, in the requirements elicitation stage, information has been gathered from the multiple users (clerks, senior assistant, employees, HOD) identified in previous step. Required questions are put to each of these groups about what their requirements from the proposed application and what they expect the application to accomplish. After considering the views of multiple users, the list of requirements has been prepared.

Tools used in Requirements Elicitation process of proposed project are given here under, the requirements elicitation process of this current system has used the methods like flowcharting of organization processes, existing payroll documentation, organizational charts, process models, systems or process specifications, on-site analysis, interviews with end-users for gathering valid requirements. Some other requirements elicitation tools used in this system are: Prototypes, Data flow diagrams.

8) Requirements Analysis Process: In this proposed system once all the user requirements have been gathered, a structured analysis and modeling of the requirements has done.

9) Requirements Specification: Requirements Specification serves as a starting point for software, hardware and database design. In proposed system after eliciting, modeling and analyzing, the requirements have been documented in clear and unambiguous terms. A written requirement document has been prepared and circulated among different user-groups and concerned authorities. Requirements Specifications of proposed system are documented separately as User Requirements written in clear, precise language with plain text, System Requirements expressed as a programming or mathematical model.

10) Requirements Management: At requirements management stage of this computer based payroll system, all the system requirements have been checked for ambiguity. The final requirement list has prepared after required omissions and error checking.

11) Data flow Diagram (DFD) is a diagrammatical representation of the "flow" of data through an information system. It is a documentation aid which is understood by both programmers and nonprogrammers. A physical DFD specifies from where data flows and who processes the data and to whom the processed data is sent. Proposed system's context Level DFD given below in Fig 2.
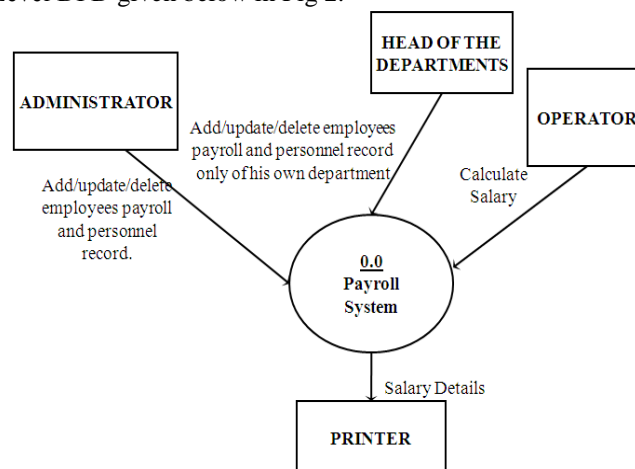

Fig.2 Context level DFD

12) Design: The purpose of the design phase is to plan a solution of the problem specified by the requirement document. The logical system design of payroll system arrived at as a result of systems analysis is converted into physical system design. The design of current system proceeds in following two stages:

 System design of this proposed system identified the modules, specification of these modules, and how they interact with each other to produced desired output.

Detailed Design, At this stage, the design of the proposed system became more structured. Internal logic of each module of current system has been decided and their data structure and algorithmic are designed. Moreover which system components are needed and how to implement them is decided at this step. Finally the programming languages PHP, MySQL, HTML, and JavaScript have chosen for this system.

13) Coding: The system design needs to be implemented to make proposed system a workable project. This demands the coding of design into computer understandable language, i.e., programming language. The given proposed project.s coding has done with the help of PHP, MySQL, JavaScript and Html. In this phase, the program specifications of detailed design have converted into PHP, MySQL, HTML, and JavaScript instructions. The programs generated from these languages coordinate the data movements and control the entire process in a computer based payroll system.

14) Testing: Before actually implementing the proposed system into operation, a test run of the system is done for removing the bugs. The testing processes of current application identified all the defects encounter in it. Using the test data following test run are carried out for current system:

Unit testing is the testing of different modules separately. In proposed payroll system, each module interface has tested to ensure that information properly flows into and out of the program unit.

Integration Testing, After each module of current system tested exclusively, its integration with other modules has been checked. In order to ensure no errors in parameter passing and when one module invokes another, each module of this system has tested.

System Test, Finally system test has designed to test fully developed payroll system to assure that it meets the user requirements. At this stage the test is done on actual data. The complete system is executed on the actual data. In addition, the results or output of the system is analysed [9]. In the proposed payroll system the system testing has been done by clerks, senior assistants, HOD.

15) Implementation: The implementation phase started after users acceptance of the proposed system developed. Implementation means conversion of basic application to a complete replacement of a computer system. The major steps involved in this phase are: Acquisition and Installation of Hardware and Software, Conversion, User Training.

Firstly the local Wamp Server has installed on system. After that the data from the old payroll system has been converted to operate in proposed system. During this phase, all the programs of the proposed system have loaded onto the user's computer.

The Parallel run strategy has been used to shift from older clipper based system to new computerized payroll system. After loading the system, users (clerk, senior assistant, HOD) have been trained by giving proper instructions.

16) Maintenance: Maintenance of proposed system has been done to eliminate errors which are encountered during parallel run. Maintenance is a review of the proposed system from time to time. The review of the proposed system has done for checking its capabilities, knowing the additional changes and requirements and studying its performance.

II.   CONCLUSION

The goal of this research "Computer Based Payroll System Implementation for E-Governance at Punjab Agricultural University" was to a web based payroll system using PHP, Html, CSS, MySQL and JavaScript. This computer based Payroll system is accessible on the internet and calculates, maintains and records the payroll information of employees.

This Application will help to automate payroll system of an organization. Multiple authorized users will be able to login and logout from a web browser. Login checks (username, password) are controlled by administrator. Administrator will have total web based control to completely customize the payroll system. Head of the department will be able to authenticate new employees, update existing employees pay, view reports while the operator may calculate pay and can only view reports. The system is user friendly. Whenever there is an error in entering data, it immediately shows an error. The application is equipped with tools for updating salary records, tax calculation, add new allowances, deduction and savings and many other features that are easy to be operated by users. Every individual element in system can be added, viewed and updated online as per indi-

vidual's rights. The system has also provision for full salary history including all payroll elements and changes that have been implemented.

The prototype computer based payroll system is complete in itself and ready to be implemented but changes and growth in requirements will be a reality on every software project so there is need to timely update them. The same applies to this payroll system.

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