

Feasibility of Waterfall Model to Enhance Human Resource Management System

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Abstract— Organisations may try to improve the effectiveness of the supply chain by managing HR across organisational boundaries. This might be a particularly effective strategy if a client organisation focuses on increasing the use of 'good' or high performance working practices in its suppliers, as there is considerable evidence that such practices can contribute directly to organisational success and lead to higher employee well-being. An additional advantage of such a strategy might be to help protect the client organisation's reputation and brand image by insuring that suppliers provide employees with working conditions that customers perceive as decent. Managing HR across organisational boundaries therefore provides a mechanism by which HR practices can be diffused throughout the supply chain. Waterfall development is a widely used way of working in software development companies with a great impact on HR management.

Index Terms— HRMS, Supply Chain, Waterfall, Entity, Data, Management.

1 INTRODUCTION

IN recent years the user can use this software by using the internet from anywhere in the world. In online based Human Resource Management system (HRMS) can do store company employee information by this online software from anywhere in the world by using internet. It has four panels such as HR, Admin, Manager and Employee. It has a secure login system which is helped to protect form unauthorized access and we use hash or encrypted user password so it is proper and secure for the faithful management. In our software we provide some update information, important report generation, deleting and printing facilities. We have developed Human Resource Management system (HRMS) to following purpose, to make a user friendly system for company management, ensure online HR management using web base software system and secure management. User can easily use all of functionalities of this software. In this software, a graphical user interface is given so that user can easily handle all the facilities [1]. All of menus are organized in the software which help the user can easily understand what about he/she want to do. In the code segment is ensured that the accurate calculation of arithmetic and logical expression. If a user input some raw data that will be help to find desired output but in the processing time if wrong arithmetic and logical calculation perform then desired output is not possible. So it is most important to ensure accurate calculation. Nowadays, companies try to enhance their management and have a better control over their employees [2]. In order to fulfill these requirements in a more efficient way they need software called Human Resource Management System. HR Management System is soft-

ware which satisfies the needs of the Human Resources Department of a company to manage employees' personal data, annual leaves, payroll, trainings, skills, performance evaluation and so on. Designed HR Management System will meet the needs for managing the personal data, system authentication and authorization of an employee. It is being developed for Siemens who wants to control and manage their employee's data in a more appropriate and neat way. With the help of the paper company will have better software to manage their personal data, control mechanism to authorize and authenticate for the employees entry

2 PROPOSED SYSTEM MODEL

In this paper, a system model which has been proposed which has three main parts, such as the encoding and decoding state of the message, the encoding and decoding state of the input and the peak signal to noise ratio calculation as determining the new proposed method performances with the old ones.

2.1 Existing System

The existing system is manual management system. There are many problems of manual management system such as: manual system is very weak to management. Its information storage system is manual file management system so it is so difficult for management. It's boring to all time updateing employees' information. It takes more time to search, so it is a time killing process.

2.2 Proposed System

This paper proposed a software system which will be overcome all of drawback of manual management system. The proposed system is called Human Resource Management System (HRMS).

2.3 System Specifications

2.3.1 Hardware Requirements

- Pentium Dual CPU (Processor).

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- Operating System: Windows XP/7/8
- 512MB RAM
- Hard disk 40GB
- Microsoft compatible 101 keys keyboard or any other
- Internet connection must

2.3.2 Software Requirements

- Web browser (Mozilla Firefox)
- PHP (Hypertext Preprocessor)
- MySQL (xampp)
- Apache server Internet connection must

3 HR MANAGEMENT SYSTEM

3.1 Manual HR Management System

Manual system is slower than digital system. In this system employee information process by using paper document which are stored in a file. So it is very difficult to maintain huge number of employee's related information. Manually they have stored all of information into some files by the follow manual file management system and difficult time to time update information, so it is time killing process [3]. So it's very difficult maintain to the management.

3.2 Digital HR Management System

When we will integrate all of management relevant things into a software system then it will be very helpful to manage HR Management easily. It makes easier to proper utilization of management relevant resources with faithful manner and high security. It stores all of information into database so there is no way for any corruption. We need small amount of time to find out any stored information from database. It makes HR, Admin, Manager and employees satisfaction and ensures the secure login and report generation facilities. Not only HR its can use Admin, Manager & Others employees. Admin can give job circulation and applicant can apply for the job using the online software.

3.3 Flowchart of HRMS

The user extracts the hidden information about all the working personnel of an organization is depicted in Fig 1.

4 SOFTWARE DEVELOPMENT METHODOLOGY

The establishment and use of sound engineering principles in order to obtain economically developed software that is reliable and works efficiently on real machines is called software engineering.

Software engineering is the discipline whose aim is:

1. Production of quality software
2. Software that is delivered on time
3. Cost within the budget
4. Satisfies all requirements.

Software process is the way in which we produce the software. Apart from hiring smart, knowledgeable engineers and buying the latest development tools, effective software

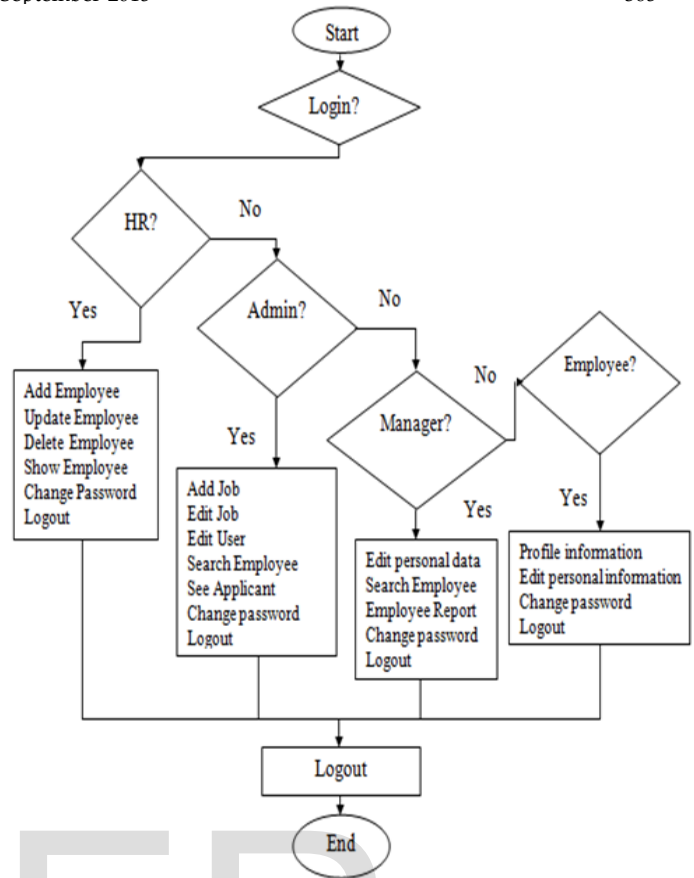


Fig. 1. The system flow-chart of the designed system

development process is also needed, so that engineers can systematically use the best technical and managerial practices to successfully complete their projects. A software life cycle is the series of identifiable stages that a software product undergoes during its lifetime [4]. A software lifecycle model is a descriptive and diagrammatic representation of the software life cycle. A life cycle model represents all the activities required to make a software product transit through its lifecycle phases. It also captures the order in which these activities are to be taken.

5 SYSTEM DESIGN

Design is the first step in the development phase for any techniques and principles for the purpose of defining a device, a process or system in sufficient detail to permit its physical realization. Once the software requirements have been analyzed and specified the software design involves three technical activities - design, coding, implementation and testing that are required to build and verify the software. The design activities are of main importance in this phase, because in this activity, decisions ultimately affecting the success of the software implementation and its ease of maintenance are made. These decisions have the final bearing upon reliability and maintainability of the system [5]. Design is the only way to accurately translate the customer's requirements into finished software or a system. Design is the place where quality is fostered in development. Software design is a process through which requirements are translated into a representation of

software. Software design is conducted in two steps. Preliminary design is concerned with the transformation of requirements into data.

5.1 Design Tool-kits

Designing task is very important tailings to implement a project with these tools to implement a project in an efficient way. For the implementation of the project, we used some well-known design tool, for different purposes. A brief description of all the used tools is discussed in this section.

5.1.1 Hypertext Markup language (HTML)

HTML is a language for describing web pages. HTML stands for Hyper Text Markup Language. It is a markup language. A markup language is a set of markup tags this tags describe document content. HTML documents contain HTML tags and plain text. Its documents are also called web pages HTML markup tags are usually called HTML tags [6].

- HTML tags are keywords (tag names) surrounded by angle brackets like <html>
- HTML tags normally come in pairs like and
- The first tag in a pair is the start tag, the second tag is the end tag
- The end tag is written like the start tag, with a forward slash before the tag name
- Start and end tags are also called opening tags and closing tags.

5.1.2 Cascading Style Sheet (CSS)

CSS defines HOW HTML elements are to be displayed. Styles are normally saved in external .css files. External style sheets enable you to change the appearance and layout of all the pages in a Web site, just by editing one single file.

- CSS stands for Cascading Style Sheets
- Styles define how to display HTML elements
- Styles were added to HTML 4.0 to solve a problem
- External Style Sheets can save a lot of work
- External Style Sheets are stored in CSS files

5.1.3 PHP: Hypertext Preprocessor

PHP files can contain text, HTML tags and scripts. Its files are returned to the browser as plain HTML [7]. It files have a file extension of ".php", ".php3", or ".phtml".

- PHP23 stands for PHP: Hypertext Preprocessor
- PHP is a server-side scripting language, like ASP
- PHP scripts are executed on the server
- PHP supports many databases (MySQL, Informix, Oracle, Sybase, Solid, PostgreSQL, Generic ODBC, etc.)
- PHP is an open source software
- PHP is free to download and use

5.1.4 MySQL

MySQL pronounced either "My S-Q-L" or "My Sequel," is an open source relational database management system. It is

based on the structure query language (SQL), which is used for adding, removing, and modifying information in the database. Standard SQL commands, such as ADD, DROP, INSERT, and UPDATE can be used with MySQL [8].

MySQL can be used for a variety of applications, but is most commonly found on Web servers. A website that uses MySQL may include Web pages that access information from a database. These pages are often referred to as "dynamic," meaning the content of each page is generated from a database as the page loads. So, Website can be used dynamically. Many database-driven websites that use MySQL, such as Sharpener.net, use a Web scripting language like PHP to access information from the database. MySQL commands can be incorporated into the PHP code, allowing part or all of a Web page to be generated from database information. Because both MySQL and PHP are both open source (meaning they are free to download and use), the PHP/MySQL combination has become a popular choice for database-driven websites. It shows

- Good Scalability and Flexibility
- High Performance & Availability
- Robust Transactional Support
- Web and Data Warehouse Strengths
- Strong Data Protection

6 SYSTEM IMPLEMENTATION

6.1 Software Process

A software process is a set of activities that leads to the production of a software product. These activities may involve the development of software from scratch in a standard programming language like Java or C. Increasingly, however, new software is developed by extending and modifying existing systems and by configuring and integrating off-the-shelf software or system components. Software processes are complex and, like all intellectual and creative processes, rely on people making decisions and judgements. Because of the need for judgement and creativity, attempts to automate software processes have met with limited success. Computer-aided software engineering (CASE) tools can support some process activities. However, there is no possibility, at least in the next few years, of more extensive automation where software takes over creative design from the engineers involved in the software process. One reason the effectiveness of CASE tools is limited is because of the immense diversity of software processes. There is no ideal process, and many organisations have developed their own approach to software development. Processes have evolved to exploit the capabilities of the people in an organisation and the specific characteristics of the systems that are being developed [9]. For some systems, such as critical systems, a very structured development process is required. For business systems, with rapidly changing requirements, a flexible, agile process is likely to be more effective.

6.2 Software process model

Software process model is an abstract representation of a software process. Each process model represents a process from a particular perspective, and thus provides only partial information about that process. In this section, I introduce a number of very general process models (sometimes called process paradigms) and present these from an architectural perspective. That is, we

see the framework of the process but not the details of specific activities.

These generic models are not definitive descriptions of software processes. Rather, they are abstractions of the process that can be used to explain different approaches to software development. You can think of them as process frameworks that may be extended and adapted to create more specific software engineering processes. The process models that I cover here are:

1. The waterfall model this takes the fundamental process activities of specification, development, validation and evolution and represents them as separate process phases such as requirements specification, software design, implementation, testing and so on.
2. Evolutionary development this approach interleaves the activities of specification, development and validation. An initial system is rapidly developed from abstract specifications. This is then refined with customer input to produce a system that satisfies the customer's needs.
3. Component-based software engineering this approach is based on the existence of a significant number of reusable components. The system development process focuses on integrating these components into a system rather than developing them from scratch. These three generic process models are widely used in current software engineering practice. They are not mutually exclusive and are often used together, especially for large systems development.

6.3 Designed Model

The first published model of the software development process was derived from more general system engineering processes (Royce, 1970). This is illustrated in Fig 2 Because of the cascade from one phase to another, this model is known as the waterfall model or software life cycle. The principal stages of the model map onto fundamental development activities:

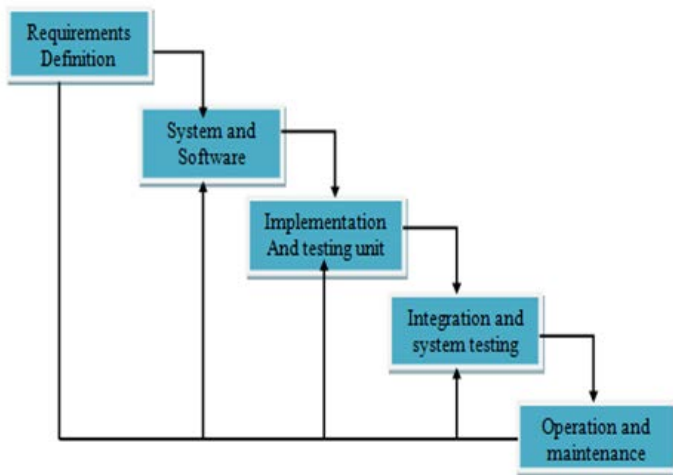


Fig. 2. The designed waterfall model

6.4 Waterfall Model Phase

The waterfall model is the oldest and most widely used model in the field of software development. There are certain advantages of this model, which makes it, one of the most widely, used models as yet. Here all the phases are described below

1. Requirements analysis and definition the system's services,

constraints and goals are established by consultation with system users. They are then defined in detail and serve as a system specification.

2. System and software design the systems design process partitions the requirements to either hardware or software systems. It establishes overall system architecture. Software design involves identifying and describing the fundamental software system abstractions and their relationships.

3. Implementation and unit testing during this stage, the software design is realised as a set of programs or program units. Unit testing involves verifying that each unit meets its specification.

4. Integration and system testing the individual program units or programs are integrated and tested as a complete system to ensure that the software requirements have been met. After testing, the software system is delivered to the customer.

5. Operation and maintenance normally (although not necessarily) this is the longest life-cycle phase. The system is installed and put into practical use. Maintenance involves correcting errors which were not discovered in earlier stages of the life cycle, improving the implementation of system units and enhancing the system's services as new requirements are discovered [10].

6.5 Costs Analysis

Roughly 60% of costs are development costs, 40% are testing costs. For custom software, evolution costs often exceed development costs [11]. Costs vary depending on the type of system being developed and the requirements of system attributes such as performance and system reliability. Distribution of costs depends on the development model that is used. Overall cost is depicted in Fig 3.

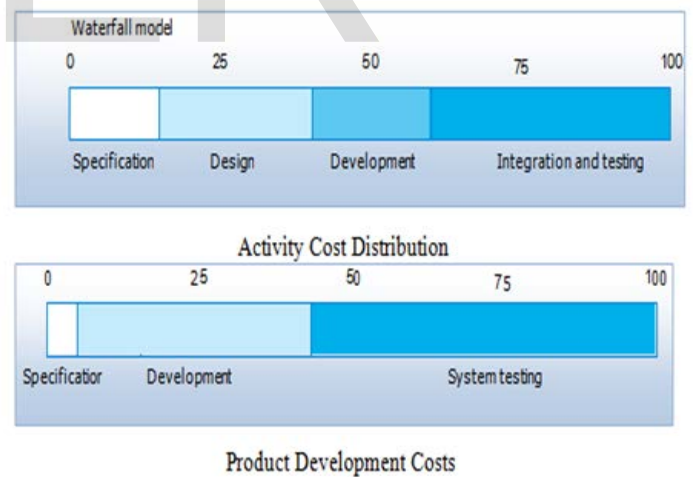


Fig. 3. The designed system cost analysis

6.6 Database Design

In this research, MySQL Database is used. In this section we have shown some important fig which we used in our Software development. The all of underline attributes of all tables which are called primary key. We have followed database normalization process such as first normal form; second normal form and third normal form for design our tables perfectly.

Field	Type	Field	Type	Field	Type
<input type="checkbox"/> id	int(10)	<input type="checkbox"/> id	int(10)	<input type="checkbox"/> id	int(10)
<input type="checkbox"/> dept_id	int(10)	<input type="checkbox"/> id1	int(10)	<input type="checkbox"/> id1	int(10)
<input type="checkbox"/> employee_id	varchar(15)	<input type="checkbox"/> language1	varchar(10)	<input type="checkbox"/> iname	varchar(70)
<input type="checkbox"/> name	varchar(40)	<input type="checkbox"/> reading	varchar(10)	<input type="checkbox"/> cgpa	float
<input type="checkbox"/> designation	varchar(30)	<input type="checkbox"/> writing	varchar(10)	<input type="checkbox"/> group0	varchar(30)
<input type="checkbox"/> department	varchar(20)	<input type="checkbox"/> speaking	varchar(10)	<input type="checkbox"/> pyear	int(10)
<input type="checkbox"/> salary	varchar(20)	<input type="checkbox"/> language2	varchar(10)	<input type="checkbox"/> iname1	int(70)
<input type="checkbox"/> jdate	date	<input type="checkbox"/> reading1	varchar(10)	<input type="checkbox"/> cgpa1	int(10)
<input type="checkbox"/> cperiod	varchar(15)	<input type="checkbox"/> writing1	varchar(10)	<input type="checkbox"/> group1	int(30)
<input type="checkbox"/> aaprisal	varchar(20)	<input type="checkbox"/> speaking1	varchar(10)	<input type="checkbox"/> pyear1	int(10)
<input type="checkbox"/> increment	int(10)			<input type="checkbox"/> iname2	int(70)
<input type="checkbox"/> decnoticce	varchar(20)			<input type="checkbox"/> cgpa2	int(10)
<input type="checkbox"/> referance	varchar(50)			<input type="checkbox"/> group2	int(30)
<input type="checkbox"/> praddress	varchar(50)				
<input type="checkbox"/> pmaddress	varchar(50)				
<input type="checkbox"/> fname	varchar(30)				
<input type="checkbox"/> mname	varchar(30)				
<input type="checkbox"/> experience	varchar(50)				
<input type="checkbox"/> mobile	varchar(15)				

Employee table

Language table

Education table

Field	Type
<input type="checkbox"/> id	int(10)
<input type="checkbox"/> id1	int(10)
<input type="checkbox"/> t_title	varchar(50)
<input type="checkbox"/> t_topics	varchar(50)
<input type="checkbox"/> t_iname	varchar(70)
<input type="checkbox"/> t_loc	varchar(50)
<input type="checkbox"/> t_year	int(10)
<input type="checkbox"/> t_duration	varchar(20)

Traning table

Field	Type
<input type="checkbox"/> id	int(10)
<input type="checkbox"/> department	varchar(30)
<input type="checkbox"/> job_title	varchar(40)
<input type="checkbox"/> qualification	varchar(50)
<input type="checkbox"/> responsibility	varchar(50)
<input type="checkbox"/> experience	varchar(50)
<input type="checkbox"/> posting_date	date
<input type="checkbox"/> application_date	date

Job list table

Field	Type
<input type="checkbox"/> id	int(10)
<input type="checkbox"/> Job_id	int(10)
<input type="checkbox"/> applicant_id	varchar(20)
<input type="checkbox"/> name	varchar(40)
<input type="checkbox"/> position	varchar(40)
<input type="checkbox"/> date	date
<input type="checkbox"/> email	varchar(20)
<input type="checkbox"/> mobile	varchar(15)
<input type="checkbox"/> praddress	varchar(50)
<input type="checkbox"/> pmaddress	varchar(50)
<input type="checkbox"/> fname	varchar(40)
<input type="checkbox"/> mname	varchar(40)
<input type="checkbox"/> experience	varchar(50)
<input type="checkbox"/> photo	varchar(20)
<input type="checkbox"/> iname	varchar(50)
<input type="checkbox"/> cgpa	float
<input type="checkbox"/> group	varchar(15)
<input type="checkbox"/> pyear	int(4)
<input type="checkbox"/> iname1	varchar(50)
<input type="checkbox"/> cgpa1	float
<input type="checkbox"/> group1	varchar(40)

Applicant form table

Field	Type
<input type="checkbox"/> id	int(10)
<input type="checkbox"/> firstname	varchar(20)
<input type="checkbox"/> lastname	varchar(20)
<input type="checkbox"/> email	varchar(30)
<input type="checkbox"/> username	varchar(20)
<input type="checkbox"/> password	varchar(20)

Applicant registration table

Field	Type
<input type="checkbox"/> id	int(10)
<input type="checkbox"/> id1	int(10)
<input type="checkbox"/> employee_id	varchar(15)
<input type="checkbox"/> password	varchar(50)
<input type="checkbox"/> user_type	int(10)
<input type="checkbox"/> hash	int(10)

User login table

Fig. 4. The designed system detail database [12]

7 DESIGNED MANAGEMENT SYSTEM PERSEPECTIVE

HRMS which is an online intranet System will be used by four types of employees, these types who have different roles can be stated as; admin, manager, HR, employee. Every user enters the main authentication page and after that, system will grant them authorization. After being authorized according to their permissions (role type) users will basically query and edit the database via HRMS [13]. In Fig 5 user detail interface diagram is depicted

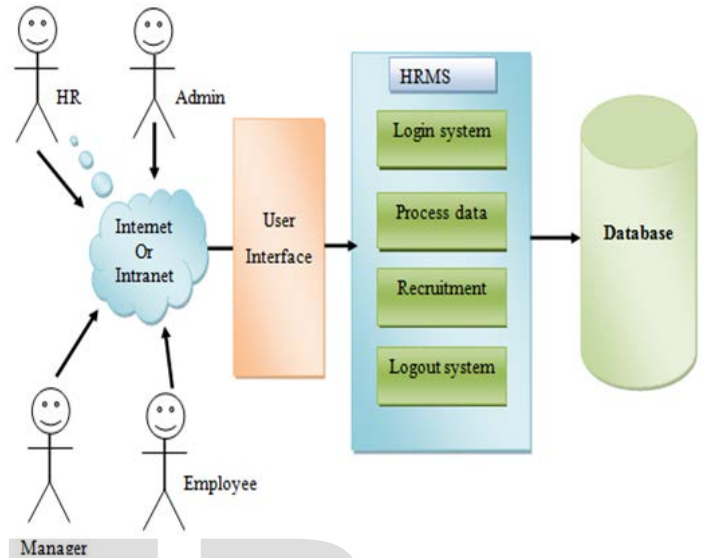


Fig. 5. The designed system user interface

7.1 Entity-Relationship (ER) diagram

An entity-relationship (ER) diagram is a specialized graphic that illustrates the relationships between entities in a database. ER diagrams often use symbols to represent three different types of information. Squire box commonly used to represent entities. Oval represents attributes. Diamonds represents operations. Lines represent relationships between entities.

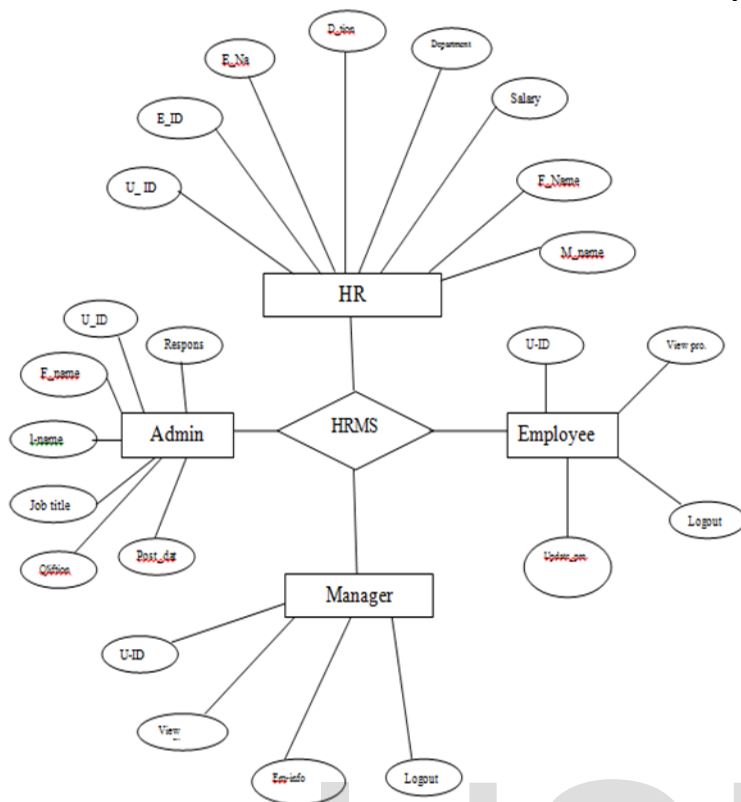


Fig. 6. The designed system ER

7.2 User Panel Block

There are four user panels in our HRMS such as HR, Manager, Admin and Employee in our software depicted in Fig 7. In the security reason, an every panel can access the different functionalities.

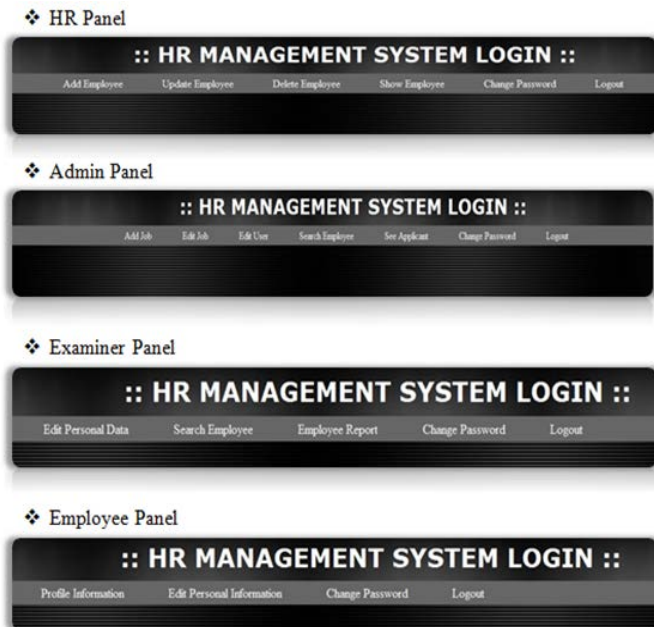


Fig. 7. The designed system User panel

3 Update Employee Information

ne of the user control of employee information is depicted in 8.



Fig. 8. The designed system Employee User panel

8 CONCLUSION

Human Resource Management System changes manual Management system to make faster the whole Management process, save working hours, security and management policy. There is no doubt about this software of Human Resource Management System will be helpful for all of company. After implementing this project it will be efficient to company authority to use. In this research project we present the Human Resource Management System, which consist of an integration of both new and existing information tools. This system takes full advantage of module-based system that can deal with thousands of record effectively. For including main functionalities on this software we searched in multiple books, journals, CDs, references in a very efficient way. In future more new functionality can be added in Human Resource Management System to extend the software functional area [14]. Online Management facility can also be introduced. And this can merge it with an Enterprise Resource Planning system during social communication system for all users to get effective output in a more advance way.

REFERENCES

- [1] Nicholas Bloom and John Van Reenen, "Human Resource Management and Productivity", NBER Working Paper No. 16019, May 2010.
- [2] Huselid, Mark, 1995. 'The Impact of Human Resource Management Practices on Turnover, Productivity and Corporate Financial Performance', Academy of Management Journal, 38, 635-672.
- [3] Sun, Z, "A waterfall model for knowledge management and experience management", Fourth International Conference on Hybrid Intelligent Systems, 5-8 December 2004, 472-475, IEEE 2004.

- [4] Royce, W.: Managing the development of large software systems: Concepts and techniques. In: Proc. IEEE WESCOM. IEEE Computer Society Press, Los Alamitos (1970).
- [5] Raccoon, L.B.S.: Fifty years of progress in software engineering. SIG-SOFT Softw. Eng. Notes 22(1), 88-104 (1997).
- [6] Jones, C.: Patterns of Software Systems: Failure and Success. International Thomson Computer Press (1995).
- [7] Anderson, D.J.: Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results (The Coad Series). Prentice Hall PTR, Englewood Cliffs (2003).
- [8] Sametinger, J.: Software engineering with reusable components: with 26 tables Springer, Berlin (1997).
- [9] Yin, R.K.: Case Study Research: Design and Methods, 3rd edn. Applied Social Research Methods Series, vol. 5. Prentice Hall, Englewood Cliffs (2002).
- [10] Karlström, D., Runeson, P.: Combining agile methods with stage-gate project management, IEEE Software 22(3), 43-49 (2005).
- [11] Bergmann R. Experience Management: Foundations, Development Methodology and Internet-Based Applications. LNAI 2432. Berlin: Springer 2002.
- [12] Mitchell HJ. Technology and knowledge management: Is technology just an enabler or does it also add value? In: Coakes 66-78.
- [13] Sun Z, Finnie G. Brain-like architecture and experiencebased reasoning. In: Proc. 7th JCIS, Sept 26-30, 2003 Cary, North Carolina, USA, 1735-38
- [14] Sun Z and Finnie G. Intelligent Techniques in E-Commerce: A Case-based Reasoning Perspective. Heidelberg: Springer-Verlag, 2004.

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