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Tasks Management Application System

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Abstract:
Tasks management application systems are becoming popular and an essential part of managing and enhancing organizational departments and project team activities, as well as improving communication between management and staff. In this work, a web based task management for NesmaCompany was developed. This system was developed for three types of users, which are IT manager, the Oracle project manager, and the technical support manager. In addition, this system was designed for end users as well. For this work, the non functional requirement of the task management system is portability, reliability, scalability, and data handling. The functional requirement of this system is to enable the manager to designated and monitor the management of the task through the system. The architecture of the task management application is a multi-layer architecture, which is comprised of presentation layer, application layer and data access layer. The web based task management system was tested. The outcome of the test has shown that the task management system was able to identify the required command and it has executed the outcome accordingly.

Keywords: *Task management, system, data, application, Saudi Arabia*

1. INTRODUCTION

Task Management is the process of planning, monitoring, scheduling, controlling the tasks assigned to all members of an organization or department through the completion of its life cycle, monitoring the progress of the task, and sharing information on the task with others [1]. Task Management is very important for both individual and large organizations to achieve objectives or share knowledge on common objectives. The complexity of the task is differentiated from low to high.The method of handling duties efficiently involves the management of all elements of a job, including its position, place, moment, allocation of natural and economic resources, and notifications, which can be drawn into account and placed into the core operations of task management [2]. Task management may be part of project management

and process management and may serve as the foundation for an efficient workflow in a company [3].

Information systems have become an important part of daily life and business activities where everything is now integrated with an information system, from finance, transactions, business management and projects to simple day-to-day activities [4]. In Pearlson et al. [5] defined the system as a set of interrelated components with a defined boundary, working together to achieve certain objectives. Information technologies play a key role in the expansion of company [6]. It can assist to improve all types of companies, make the business process more efficient and effective, manage decision-making and work organization cooperation. Information Systems can be structured into three types of systems, i.e. Management Information Systems (MIS), Transactional Processing Systems (TPS) and Expert Systems [7]. Systems that are used in organizations can be classified into two groups: systems that help business processes and activities, and systems that support company decision-making [7].

Organizations have extended their attention to other systems that are now very helpful to them and can be component of both dictionaries and activities such as project management systems, reporting systems and task management systems [8]. The task management system is a system for tracking the organization's mission in terms of the goals set out in the official plan developed by the organization. It enables company executives, stakeholders and customers to regulate expenses and handle budgeting, quality management, paperwork, and can also be used as an administration system [9]. The system is also used for cooperation and communication between project stakeholders. Looking at the state of the industry and current technologies today, it is clear that the most recent real systems are based on web services, reflecting the fact that web services technologies have matured to the point where they can be used to build critical applications [9].

There are several works that has been reported with regards to task management system. Gerasimov and Gerasimov [10] presented a work on modeling a management system for an organization and found that the application of management system has effectively increased productivity of the organization. Marshall et al. [11] presented a work on management system based on electronic platform for hospital administration and found that the system enabled easy work transition among the hospital staffs during their end of shift. Matsumoto et al. [12] demonstrated a work that developed a task management system based on information and communication technology for assisting hospital management with stroke patients. The outcome of this work has shown that this management system managed to reduce door to needle time in the hospital and it has enhanced the overall work efficiency.The research of Matsuda and Nakamura [13] provided a novel technique for task management, where graphic pictures are used for task management, and the result proved that this sort of scheme was efficient for task visualization and effective management.

Nesma is a leading company established in Saudi Arabia in 1979. Their reputation has grown through partnerships, joint ventures and subsidiary companies. It is currently difficult and time-consuming for the IT Manager to track resources, assign tasks, and see whether employees are free or overloaded. Each time a supervisor has to enter a system, a task or a project to find out who is working with what and when he is going to finish. The current process for assigning tasks is followed by meetings, phone calls, or emails from top managers to junior staff. There are, however, many weaknesses that are time consuming and without any real-time updates. Therefore, this work was done to develop a implementing a web based task management for Nesma. This system will make it

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possible for management to update its tasks and resources, to have more access to the team, to make it easier to follow up and to increase the collaboration between all employees in the department.

2. SYSTEM ANALYSIS

2.1 User Functional Requirement

There are three users for this system, which are; the IT manager, the Oracle project manager, and the technical support manager. Furthermore, there are also the end users that work under the super users. For all the user, they should be able interact with the application, be able to log in to their accounts using the username and password provided, and be able to log in from their profiles. As for the admin, they shouldbe able to modify the structure of the web pages, to be able to add, delete and modify the database, to be able to add and delete users and set the authority, and to be able to monitor the system. Likewise, the managers should be able to be able to view all tasks (dashboards), to be able to view the list of employees they have, to be able to view all user tasks, to be able to create, edit and delete tasks, to be able to assign tasks, to be able to generate reports, to be able to participate in the discussion room, to be able to search for tasks and staff, to be able to differentiate between users under different divisions and to be able to notice the editing's and the changes made by the users. For the end users, they should be able to be able to view their tasks, to be able to view the dashboard, to be able to work in more than one task, to be differentiated from their divisions, to be able to adjust the priority, progress and time estimation of the tasks, to be able tobe able to participate in a discussion room, to be able to change their status every hour, to be notified by email when editing takes place, or to change their status.

2.2 Non Functional Requirement

The non functional requirement of the system includes portability, user friendly, speed, reliability, scalability, availability, data currency, data retention, disaster recovery, error handling, internationalization, and security. The total description of the non-functional requirement is shown in Table 1.

Table 1. Non functional requirement

Non functional requirement	Description.
Portability	The system should be easily and quickly ported to any server
User-Friendly	The system should have a friendly graphical interface.
Speed	The system should load the pages quickly and have minimum response time.
Reliability	The system should be reliable by all the users.
Scalability	The system should adopt the addition of new chapters and or activities when needed.
Availability	The system should operate 24 hours a day.
Data currency	The system should always have real time updates, delays are not acceptable.
Data retention	The system should be able to store only the useful data, and data that will be used later on.
Disaster recovery	The system should be able to recover from an outage. And should back up data.
Error-handling	The system should be able to handle unexpected errors quickly and easily.
Internationalization	The system should be user friendly with people from different backgrounds and languages.
Security	The system needs to handle user privacy and their privileges.

2.3 User Cases

In the task management application system, there are three actors, which are an admin, manager and an end user. All users in task management can

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interact with the system, log in with their username and password, and log out of the system. The admin will be able to modify the structure of the web pages, delete , add and modify database, manage user access, grants access rights and monitor the system. The manager will be able to view all task, view the list of the employees, view list of all user task, create edit and cancel task and projects, assign task and projects, generate reports, participate in the discussion forum, search for task and employees, view user actions and write notifications. The end user cases include the ability to view their own tasks, edit task progress, and participate in the forum.

2.4 Entity Relationship Diagram

In this work, the entity relationship diagram (ERD) is comprised of several elements where each division has only one manager. Divisions have one or more employees. One project has many tasks. One task only belongs to one division. Employees work for only one division. Employees can work on more than one task. One task can be assigned by more than one employee. Figure 1 shows the ERD of the task management system.

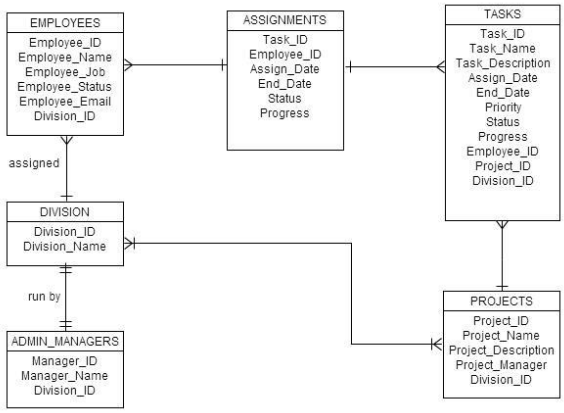

Figure 1. Entity relationship diagram (ERD)

3. SYSTEM DESIGN

3.1 User Interface & Accessibility Consideration

The system should be user-friendly, secure and provide reliable and up-to-date information; ensure privacy and allow only authorized users to access and modify appropriate modules.

3.2 Database Requirements

The database design should enhance the storage, retrieval and manipulation of all data associated with the database. Databases should be secured in such a way that sensitive data can not be accessed. The database should be organized in such a way as to help the Manager generate reports.

3.3 System Architecture

The architecture of the task management application system is a multi-layer architecture, which is the client-server architecture. It has three separated layers, which are the presentation layer, the application layer, and the data layer. The multi-layer architecture is made up of three layers (Figure 2). The layer is consistingof presentation layer: deals with user interfaces. There are many general frameworks in place for this layer. The Application Layer: controls the functionality of the different systems by performing detailed processing and functions. Data Access Layer: access data stored in databases and use the functions of the databases.

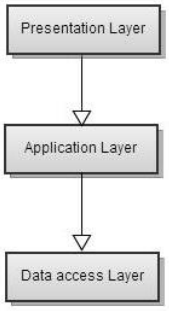

Figure 2. System layers

3.4 Sequence diagram and operating requirement

For the task management system, there are two sequence diagrams. The first sequence diagram is for the manager. It represents the sequence flow between the manager, the task management application and the database. The second sequence

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diagram is for the employee. This sequence diagram represents the sequence flow between the manager, the task management application and the database. The comprehensive details of the sequence diagram for the manager and the employee is shown in Figure 3 and Figure 4, respectively. Furthermore, the minimal operating requirement needed for the task management system is dual Pentium 4/1.6GHz, 2MB Ram and windows xp or windows 7 as operating system.

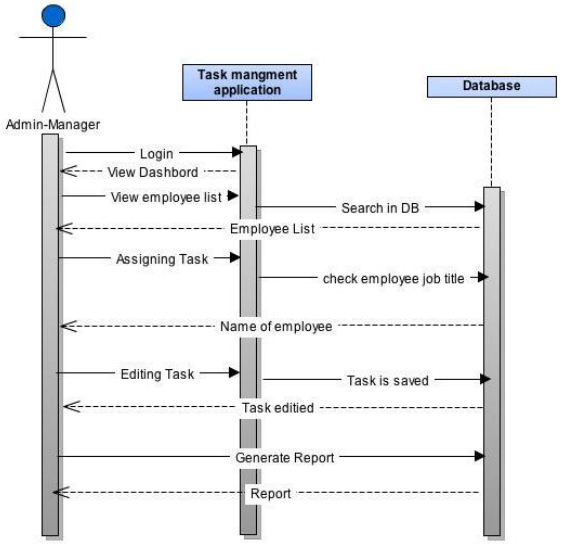

Figure 3. Manager sequence diagram

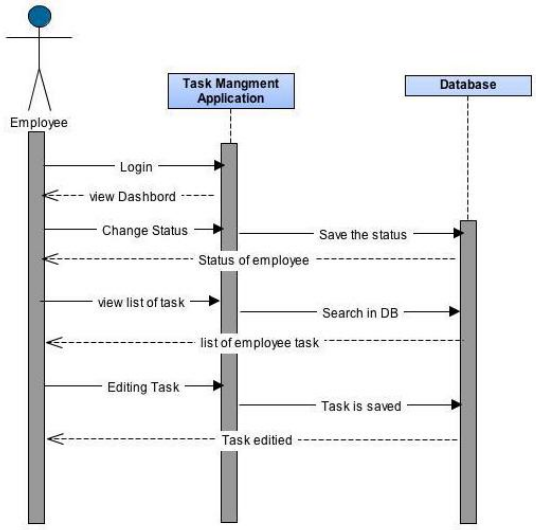

Figure 4. Employee sequence diagram

4. IMPLEMENTATION AND TESTING

Figure 5 shows the login page. User enters his user name and password in the login page, and then depending on which type of user they will be directed to the profile or page.

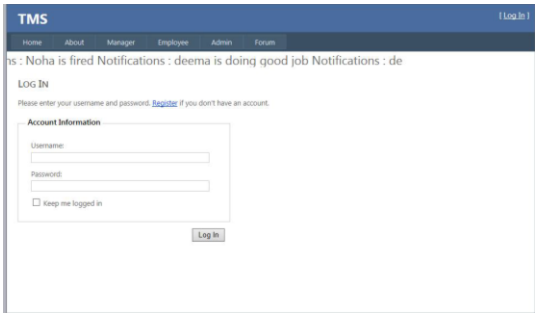

Figure 5. Main interface

Figure 6 shows the manager homepage. This page is the most important page, it contains a dashboard that has the current active tasks that employees are working on and their related information, which the manager can comment on and edit from the edit box. When the manager clicks on the task name, he or she will be directed to another page where all the information is available and he or she can edit the information. There are different tabs in the top that address the different functionalities of the application.

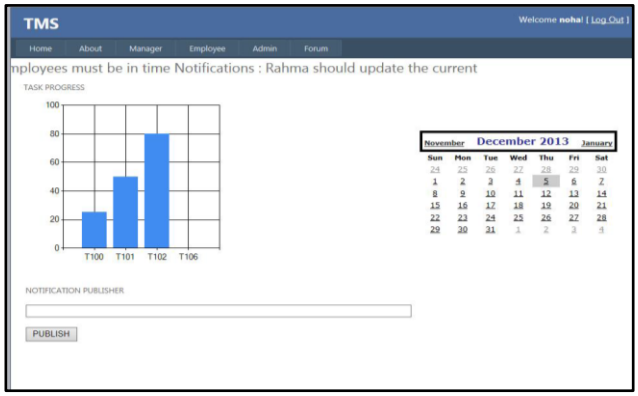

Figure 6. Manager Homepage

Figure 7 shows the admin task page. On this page, the manager can assign tasks to a specific employee, enter their name or search from the database, and attach a file as well.

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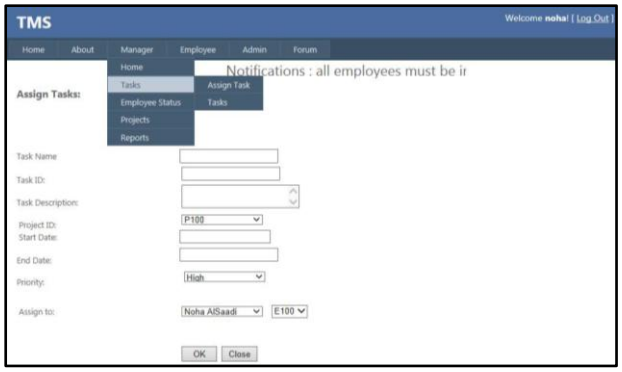

Figure 7. Admin task page

Figure 8 shows the employee task page.The tasks are sorted by the date. The information needed is on the right, the status and progress are updated by the employee. When the user clicks on the task, he will see all the details of the task. When the task is completed, it only has to check the box near the name of the task. The user can also sign a task as important.

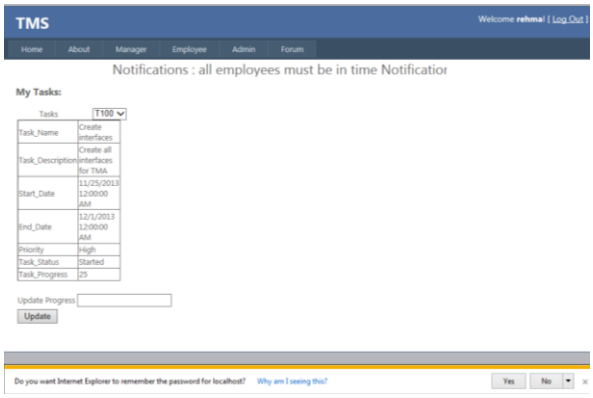

Figure 8. Employee list of task

Table 2 shows the test result for the task management system. Based on Table 2, it is observed that for each use case and scenario, the task management system has responded accordingly. Most of the use case showed successful outcome. The comprehensive details for each use case is described in Table 2.

Table 2. Task management system test results

Use Case	Scenario	Expected system behavior	Actual system behavior	Result
Log in (employee)	Enter username =“Rehma” and password = “1234567”	Access as an “Employee” user. The system will allow this user to view and edit their tasks.	Access as an “Employee” user. The system will allow this user to view and edit their tasks.	
Log in	Enter username = ”Ahmed” and password=”3464564	Access is not granted to user	Access is not granted to user	Success
Delete, Add and modify database (Admin)	The admin can make modification	The system will allow admin to make modification to database	The system will allow admin to make modification to database	Success
View task	The manager wants to see all employees task	The manager can see all employee task	The manager can see all employee task	Success
View dashboard (manager)	The manager can see the dashboard in the system	The manager can see dashboard and employee task	The manager can see dashboard and employee task	Success
Create, edit, and delete task (Manager)	The manager selects task name	The manager can create, edit and delete tasks	The manager can create, edit and delete tasks	Success
Write in a forum	The user opens the forum	The system will allow the user to write in the forum	The system will allow the user to write in the forum	Success
Create, edit, and delete	The manager selects the project	The manager can	The manager can	Success

project name		create, edit and delete projects	create, edit and delete projects	
View notification	Manager will write comments	Comments will be displayed on notification line	comments will be displayed on notification line	Success
Assign task	Manager will assign task to an employee	Employee will be assigned with new task	Employee will be assigned with new task	Success
Generate report	Manager generates a weekly report	Weekly report will be generated	Weekly report will be generated	Failed

5. OVERALL DISCUSSION

This work has demonstrated the development of a web based task management for Nesmacompany. The outcome of this work has shown that the task management system has been successful in managing the task set by the admin and the users. This system will be an essential element for NesmaCompany and it will improve the overall task management process. The outcome of this work is inline with the work of El Said [14] where it was confirmed that task management system improves the overall management efficiency for a company. In addition, the work of Muto et al. [15] where it was found that the task management system had improved the management process for product services, where the pending tasks, completed tasks and future tasks were automatically aligned through the management system.

6. CONCLUSION

The mainaim of this work was to develop a system that meets the needs and wishes of the client and was a task management application where the manager could monitor and assign tasks to the employees. The system focused on being used by all users of the Nesma Holdings IT department. The developed task management system demonstrated the required outcome during the implementation and testing phase.Thus, based on the outcome of this work, the aim has been fulfilled.The authors recommend integrating the application to the other departments in NesmaCompany. For future work, the interface of the system may be enhanced for a more dynamic application.

REFERENCES

[1] Noe, R. A., Hollenbeck, J. R., Gerhart, B., & Wright, P. M. (2017). *Human resource management: Gaining a competitive advantage*. New York, NY: McGraw-Hill Education.

[2] Dashtipour, P., &Vidaillet, B. (2019). Introducing the french psychodynamics of work perspective to critical management education: Why do the work task and the organization of work matter?. *Academy of Management Learning & Education*, (ja).

[3] Harrison, F., & Lock, D. (2017). Advanced project management: a structured approach. Routledge.

[4] Laudon, K. C., & Laudon, J. P. (2015). Management Information Systems: Managing the Digital Firm Plus MyMISLab with Pearson eText--Access Card Package. Prentice Hall Press.

[5] Pearlson, K. E., Saunders, C. S., &Galletta, D. F. (2016). Managing and using information systems, binder ready version: a strategic approach. John Wiley & Sons.

[6] Sun, Z., Strang, K., &Firmin, S. (2017). Business analytics-based enterprise information systems. *Journal of Computer Information Systems*, *57*(2), 169-178.

[7] Laudon, K. C., & Laudon, J. P. (2016). *Management information system*. Pearson Education India.

[8] Jia, Q., Guo, Y., & Barnes, S. J. (2017). Enterprise 2.0 post-adoption: Extending the information system continuance model based on the technology-Organization-environment framework. *Computers in Human Behavior*, *67*, 95-105.

[9] Wu, D., Zeng, G., He, D., Qian, Z., & Zhang, Q. (2016). Task coordination organization model and the task allocation algorithm for resource contention of the syncretic system. *Tsinghua Science and Technology*, *21*(4), 459-470.

[10] Gerasimov, B. N., & Gerasimov, K. B. (2015). Modeling the development of organization management system. *Asian Social Science*, *11*(20), 82.

[11] Marshall, S., Warren, B., Roodenburg, O., Smolenaers, F., Leon, G., McKimm, A., ... &Stripp, A. (2016, September). An Electronic Task Management (ETM) system for after hours hospital work and subsequent socially mediated effects of task completion. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 60, No. 1, pp. 566-570). Sage CA: Los Angeles, CA: SAGE Publications.

[12] Matsumoto, S., Koyama, H., Hatano, T., Sadamasa, N., Kai, Y., Saka, M., ... & Tokunaga, K. (2017). The development of visual task management ICT system for acute stroke care. *Journal of the Neurological Sciences*, *381*, 619.

[13] Matsuda, K., & Nakamura, S. (2018, May). PhoToDo: image-based task management system by visual trigger. In *Proceedings of the 2018 International Conference on Advanced Visual Interfaces* (p. 75). ACM.

[14] El Said, G. R. (2015). Understanding Knowledge Management System antecedents of performance impact: Extending the Task-technology Fit Model with intention to share knowledge construct. *Future Business Journal*, *1*(1-2), 75-87.

[15] Muto, K., Kimita, K., Tanaka, H., Numata, E., Hosono, S., Izukura, S., & Shimomura, Y. (2016). A task management method for product service systems design. *Procedia CIRP*, *47*, 537-542.