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Development and use of collaboration database management system

Zubaidah Abdul Rahman[1*)], Siti Sarah Malini Mohd Hanifa[2], Rasmaliza Rashid[2]
[1]Dep. of Electrical Engineering, Politeknik Kuala Terengganu, Malaysia
[2]Dep. of Information and Communication Technology, Politeknik Kuala Terengganu, Malaysia

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ABSTRACT

e-Collab8 is a centralized system that helps manage collaboration information at Politeknik Kuala Terengganu (PKT). The system allows intended users to perform information management online. The problem faced by the management is that the data of the companies conducting the collaboration is not stored centrally in one database and is difficult to access at any time. The objective of this project is to collect records of the number of industries working with PKT and can be accessed by any officer in charge. In addition, collaboration activities can be updated at the departmental and unit level, subsequently reports can be generated for top management needs. The display of company activity status can also be viewed in real time by all users. The research method used is prototype methodology. In conclusion, the e-Collab8 system can help officers in charge and other users to access information related to collaboration easily and quickly.

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Corresponding Author:

Zubaidah Abdul Rahman,
Dep. of Electrical Engineering, Politeknik Kuala Terengganu, Terengganu, Malaysia
Email: zubaidah@pkt.edu.my

Introduction

Modern information technology has evolved the internet computer network over the past ten years into a well-developed infrastructure that houses centers, databases for scientific and legal information, global libraries, and numerous governmental and commercial organizations (Pursky & Mazoha, 2018). In today's culture, databases and database systems are a need. The majority of us engage in a number of database-related activities each day (Elmasri & Navathe, 2016). The database structure and access to the data stored in the database are managed by a group of programmes known as a database management system (DBMS) (Colonel et al., 2011). Due to the availability of the internet, mobile devices such as smartphones, laptops, and personal digital assistants enable immediate access to web-based applications as well as learning settings. hence it is convenient to find the needed information online (Garcia et al., 2020). Collaboration is one of the activities carried out at the Polytechnic every year. Prior to this, recording, monitoring, and making reports were done decentralized and through the filing process. Information stored in paper format is consequently challenging to manage and update and is vulnerable to loss and erasure. (Sasikumar & Marjudi, 2022; Chen et al, 2019). In addition, a list of information of collaborating companies is also difficult to access quickly. It is difficult for management to see the latest collaboration information directly because of the need to request reporting through the collaboration coordinator.

This project aims to develop a centralize collaboration system called eCollab8. With the use of this system can facilitate the collaboration coordinator to manage data more systematically to produce high -impact collaboration. It helps in reducing the workload and user effort to record all of the data in a database (Yin & Ramli, 2022). Previously all collaboration-related information was recorded manually and would take time to prepare different reports requested by management to meet the Key Performance Index (KPI). Additionally, it is simpler to record actions, and each department's coordinator may update information to be watched over by the coordinator. It is also simple to determine an inactive company's status and take prompt action. Another issue is that it is challenging to identify students that participate in industrial training through partnerships with businesses, which results in the knowledge being lost. Besides, stakeholders can also view and monitor the activities that have been implemented as well as the list of active companies. Through the eCollab8 system, generating reports for management needs become easier.

Method

In this project, the prototype methodology is used as a software development guide. The system analysis phase, the system design phase, the system implementation phase, and the inquiry and early planning phase are the four key phases of the prototype methodology (Mohd Tahar, 2022; Azahari & Hamid Ali, 2022). When a system is built to illustrate an experimental design, the prototype system is used to determine whether the suggested design is feasible (Sommerville, 2007). Figure 1 shows the process of prototype development according to Sommerville (2007).

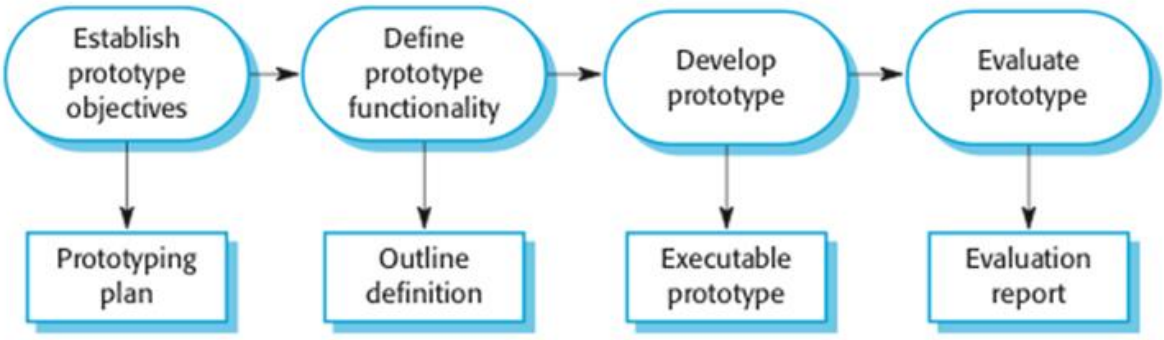

Figure 1. The process of prototype development

In the first phase which is planning phase, important information related to user needs by the PKT Cooperation unit will be collected and documented. The method of obtaining information is to conduct an interview session with a collaborative collaborator on the problems encountered using current methods and possible solutions that can be implemented. In the analysis phase, the user needs that have been discussed will be developed. This will involve all activities that meet all stakeholder needs. Specification analysis will involve evaluating, recording, verifying and handling software or hardware requirements. After identifying the initial requirements, information collection and analysis will be conducted to determine the context diagram (CD) and Entity Relationship Diagram (ERD) to show the relationships between entities and also to identify and show the processes and data flow in the system. Figure 2 shows the boundaries of system for each entity involve and figure 3 shows the system entity relationship diagram.

Next in the design phase, functional module design, flowchart, system's database design and user interface design will be created. The results of this phase will produce and describe the actual system presentation. Various factors will be taken into account such as risk, technology to be used and also team skills. In the implementation phase, the actual prototype will be coded and developed according to the user's requirements. Improvements will be made after receiving feedback, corrections and repairing processes to ensure the application meets customer requirements. The database will start working at this time. The programming languages used are Hypertext Markup Language 5 (HTML5), Cascading Style Sheet (CSS3), JavaScript, PHP: Hypertext Preprocessor (PHP) and JQuery.

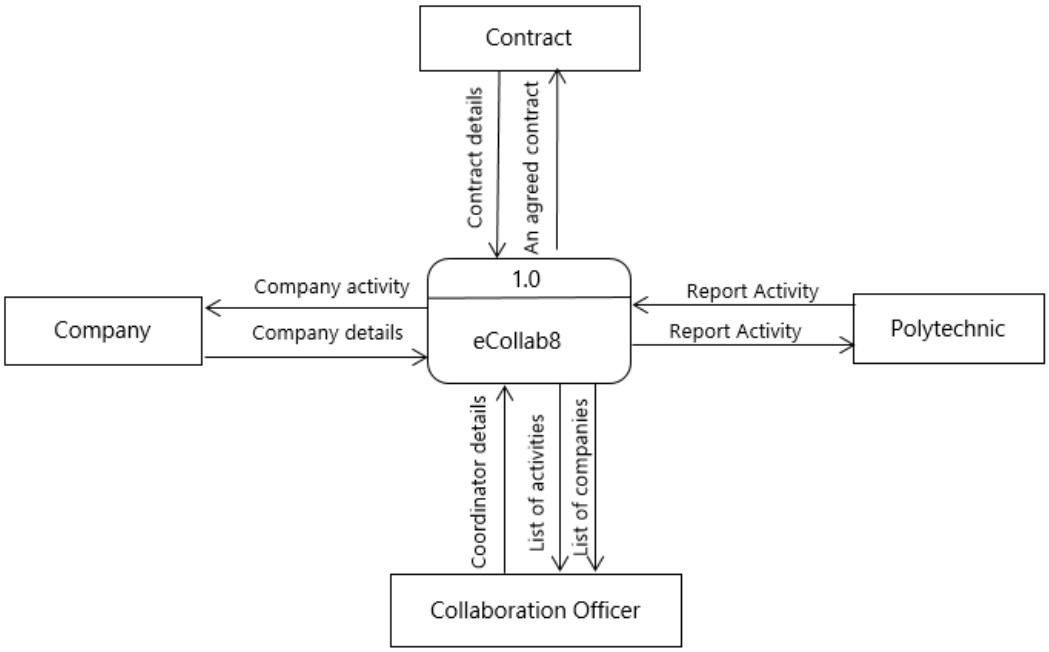

Figure 2. Context Diagram (CD)

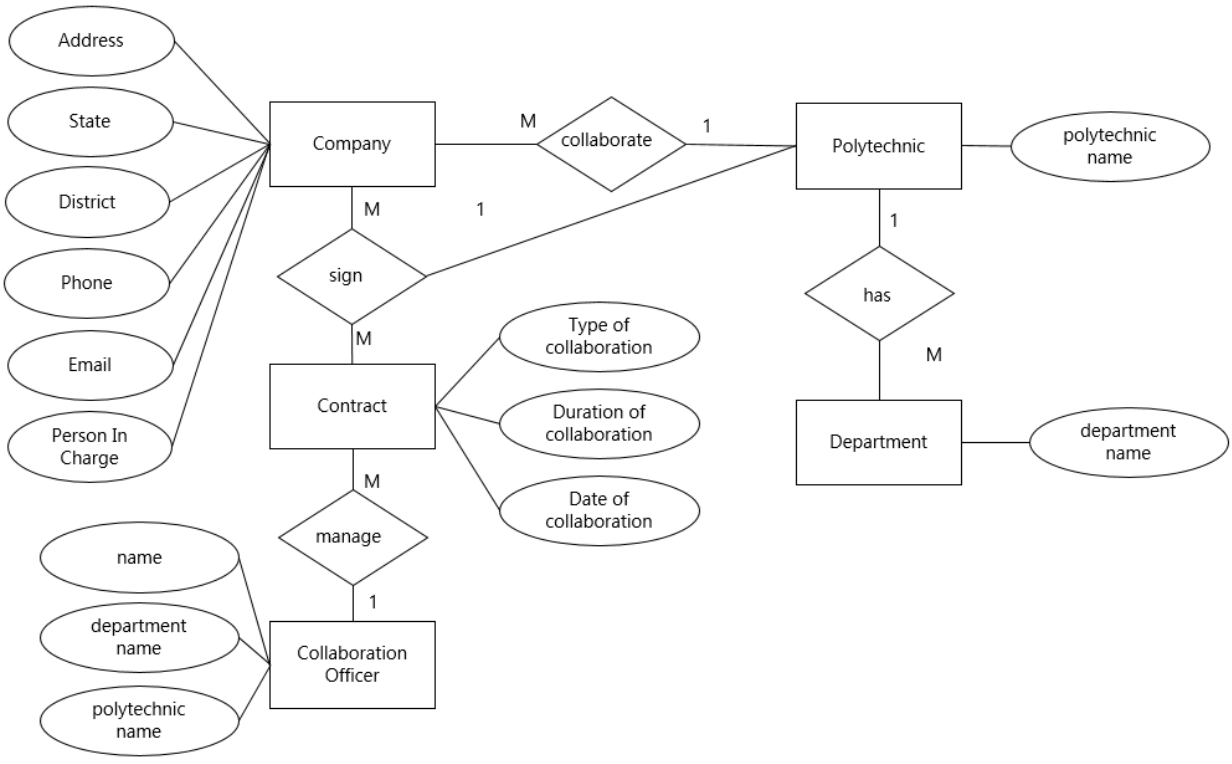

Figure 3. Entity Relationship Diagram (ERD)

There are two methods used in the testing phase namely unit test plan and user acceptance test. The unit test plan is a test of all modules and functions of the system to ensure everything works as described in the previous phase. A testing process is carried out to identify if there are any errors that occur while the system is in use. Table 1 shows the unit test plan.

Table 1. Unit Testing Plan

Test Case Name	Test Procedure	Pre-Condition	Expected Result	Result (Pass/Failure)
Sign up	Collaboration Officer must register user account for name, department, email, phone number and user role.	User must have email account and handphone number	Register successful	Pass
Sign In (Login)	User is required to fill the username and password field before access the system.	Collaboration Officer already registered user account.	Login successful.	Pass
Company	Collaboration Officer or Coordinator Officer required to fill the company details to system	Company details are not yet registered on the system	Redundancy data successfully avoided Company details successful added to system	Pass Pass
Activity	Collaboration Officer or Coordinator Officer required to fill the activities details to system	Activity details are not yet registered on the system	Redundancy data successfully avoided Activity details successful added to system	Pass Pass
Polytechnic	Collaboration Officer or Coordinator Officer required to fill the company profile and activities involved with Polytechnic	Activity details are not yet registered on the system	Activity details successful added to system	Pass
Change Password	User can change their password if they need it	User must login first	Data was Secure	Pass
Report	Collaboration Officer or Coordinator Officer can view and generate activities with each company	Report details are not yet registered on the system	All reports successful added to the system	Pass
Log out	User required to log out	None		Pass

For user acceptance testing, users are provided with information on the procedures for using this system. Users will be given a form to fill out when they try to use the system. They can choose to accept or decline the requirements listed on the form. In this phase, the user is satisfied with the performance of the system and meets the objectives and all modules function efficiently. Table 2 shows the user acceptance test.

Table 2. User Acceptance Test

No.	Acceptance requirement	Test Result
1	Registration and login module working well	Pass
2	Company registration module works fine	Pass
3	Generation of company list activity	Pass
4	Generation of activity list	Pass

Conclusions

This project serves to collect all the information of collaboration in PKT centrally in one database. The effectiveness of this system can be seen through the efficiency of the officer's work through systematic data storage and saving time searching for collaborative information. Previously, multiple units that required a list of companies actively collaborating would go through a collaboration coordinator. The coordinator will prepare different lists and reports according to the requirements of different units. Through this system, each different unit requirements have been set in the database and they only need to generate and print reports according to their needs. Activity records and a list of active companies can also be displayed by designated users. This will reduce the time of preparing the report and waiting for the report to be completed.

For further study, this system can be improved by several functions written on one program file will reduce the number of navigations on the system display. The impact will speed up the process of running the program, which will indirectly speed up the end user's work process when using the system. With the outcome of this project can facilitate and save the time of those involved. In addition, in order to avoid long loading pages on the browser display, all the data displayed on the system is stored in a table on the base and does not use hardcoded code insertion in the built program files. In addition, this system is suitable to be proposed to the Jabatan Pengajian Politeknik dan Kolej Komuniti (JPPKK) to be used by the collaboration coordinators of all Malaysian polytechnics

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