CLIENT ADMINISTRATIVE MONITORING OF THE PREVENTIVE PREDICTIVE MAINTAINENCE EXPERT SYSTEM

GRADUATE PROJECT REPORT

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ABSTRACT

This project consists of the design, analysis and implementation of a stand-alone Graphical User Interface (GUI) for client/administrator monitoring of the Preventive And Predictive Maintenance Expert System (PPMES) being developed for the Corpus Christi Army Depot (CCAD). The project also requires the creation of a relational database containing real-time operational data, in addition to knowledge data and historical data from the systems that will be used for the client administrative monitoring of the PPMES. The front-end for the GUI will be built such that the end-user will be able to track, monitor, query and maintain relevant operational data. Also, reports will be generated about various users, shops, systems, aircraft, equipment and other components involved in the operational flow for the repair and maintenance of the aircraft.
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Narrative

The Client/Administrative Monitoring of the PPMES, has a “DATA MART” composed of real-time knowledge data from the various systems involved. This DATA MART is a relational database consisting of 16 tables (details of the tables are shown in Appendix A). This database contains information about the different users, groups, shops, systems, aircraft, production items and equipment, plus the interrelated tables for the various components involved in the operational flow of the maintenance of the aircraft. For example the different types of data are aircraftdata like aircraftmodel number, aircraft name; production data like serial number, barcode; equipment data like itemid, itemname, partnumber, national stock number; user data like username, password, firstname, lastname, DOB; groupdata like groupname; shopdata like shopname, buildingname; systemdata like systemname, barcode, stocknumber, serialnumber.

The Graphical User Interface (GUI) enables the end-user (engineers and technicians) to have insight about the data. For example, the engineers who have a through knowledge of the system and the software capabilities can perform data manipulations and methodological analysis so as to increase the labor and machine availability. Similarly, the technicians who have a through knowledge of the systems and are not very computer knowledgeable, can look into the details of the association and flow of data between various main components like the systems, shops, aircraft’s, equipment’s, production and users. The data manipulations assist in performing the day-
to-day operations, and monitor and keep track of PPMES. These operations also enable the scheduling of maintenance and repair of various components involved in the operational flow. Reports can be generated for the shops, users, systems, equipment items, and production items.

A Help (tutorial) has been provided for the end-users to enable them to understand the software and to navigate to the various forms and reports.

**Major Components**

The GUI can generate 11 main forms and 10 interrelated reports. The user can navigate through forms and reports using the main menubar and pull-down menus. The main menu bar has Data Forms, Report, Help and Print options. For navigating from various forms and reports the user need not close the existing form or report, but has the choice of navigating collectively through the menu-bar options provided.

The following are the forms and reports have been generated:

1. A form called Logon, prompting for the username and password to be entered by the end-user in order to use the software module.

2. The main-menu form called Client/Administrator Monitoring of PPMES, with the menu item options for editing data forms, generating reports, printing and help. It has a status bar on the bottom of the form with the date, time, name of the user and job category of the user.
3. A form called Shops, generating the list of the shops and the options of performing data manipulations like insert, update and delete for the records.

4. A form called Systems, generating the list of different main systems involved and the options of performing data manipulations like insert, update and delete for the records.

5. A form called Aircrafts, generating the list of aircrafts present and the options of performing data manipulations on the list like insert, update and delete.

6. A form called Users, generating the list of users involved in the systems, shops and the options of performing data-manipulation operations like insert, update and delete for the records in the list.

7. A form called Groups, generating the list of groups under which each user is identified, and the options of performing data manipulation operation like insert, update and delete for the records in the list.

8. A form called Production Items, generating the list of production items involved in the production, and the options of performing data manipulations like insert, update and delete for the records in the list.

9. A form called Equipment Items, generating the list of equipment items involved in the shops and systems, and the options of performing data manipulations like insert, update and delete for the records in the list.

10. A form called Blade Shop Dollies, generating the list of dollies involved in the movement of the blades from one place to another, and the options of performing data manipulations like insert, update and delete for the records in the list.
11. A form called Aircraft Blade Blankets, generating the list of aircraft blade blankets used in the curing of the blades, and the options of performing data manipulations like insert, update and delete for the records in the list.

12. A report called Users/Groups Report, to generate the names of the different users and groups under which each user is classified.

13. A report called Systems Report, to generate the details of the various systems involved.

14. A report called Shops Report, to generate the details of the various shops involved.

15. A report called Aircrafts Report, to generate the details of the various aircrafts involved.

16. A report called Shop-System-Aircraft Report, to generate the names of the various shops, systems, aircraft involved.

17. A report called Operators/Shops Report, to generate the list of operators associated with the various shops.

18. A report called Production Items Report, to generate the list of production items.

19. A report called Equipment Items Report, to generate list of equipment items.

20. A report called Aircraft Blade Blankets Report, to generate a list of aircraft blade blankets used.

21. A report called Dollies Report, to generate a list of dollies used.

The general descriptions for each form and report are explained in the following sections:

1) **Logon** – a form prompting for the username and password to be entered by the end-user.
This is the starting form where the user of the system must enter his username and password to be able to use the software module.

2) **Client/Administrator Monitoring of the PPMES** – a form with the menu options for editing data forms, generating reports, printing and help.

This is the main form from which the user can navigate to the following:

i) **Data Form** menu item with a pull-down menu for performing the data manipulations to the records for shops, systems, aircraft, production items, users, groups, technicians, aircraft blankets and bladeshop dollies.

ii) **Report** menu item with a pull-down menu to generate reports for shops, systems, aircraft, production items, users, groups, technicians, curing blankets and bladeshop dollies.

iii) **Print** menu item to print reports for the shops, systems, aircraft, production items, equipment items, curing blankets and blade shop dollies.

iv) **Help** menu item to provide information about the system operational flow and the steps on how to navigate through the software.

v) **Status bar** with the information like date, time, name of the user and job category of the user.

3) **Shops** – a form generating the list of the shops and the options of performing data-manipulation operations like insert, update and delete.

This form gives the end-user the name of the shop and its location. The user can perform an insert, update or delete operation for records for the shop. If the user
would like to insert a new shop record then he has an option to add related information in the dependent-child tables. Similarly, for an update operation the child tables are updated, and for a delete operation the child records are deleted in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.

4) **Systems** – a form generating the list of the different main systems involved and the option of performing data-manipulation operations like insert, update and delete.

This form gives the end-user the name of the system, local_id_or_barcode, stock number, serial number and mfr_part_num of the system. The user can perform insert, update or delete operations for records for the systems. If the user wants to insert a new system record, then he has an option to add related information to the dependent-child tables. Similarly, for an update the child tables are updated automatically, and for a delete operation the child records are deleted automatically in the dependent child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.

5) **Aircraft** – a form generating the list of aircrafts present and the option of performing the data-manipulation operations like insert, update and delete.
This form gives the end-user the model number and name of the aircraft. The end-user can perform an insert, update or delete operation for records for the aircraft. If the user would like to insert a new aircraft record, then he has an option to add related information to the dependent-child tables. Similarly, for an update the child tables are updated automatically and for a delete operation the child records are deleted automatically in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.

6) **Users** – a form generating the list of users involved in the operation of equipment, shops, systems and the option of performing the data-manipulation operations like insert, update and delete.

This form gives the end-user (the administrator) the username, password, firstname, lastname, middle_initial and job category of personnel (users) involved in the operation-flow of the entire system. The administrator can perform an insert, update or delete operation for records for the user. If the administrator would like to insert a new user record, then he has an option to add related information to the dependent-child tables. Similarly, for an update the child tables are updated automatically and for a delete operation the child records are deleted automatically in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.
7) **User/Group** – a form generating the list of groups under which each user is identified and the option of performing the data-manipulation operations like insert, update and delete.

This form gives the end-user (the administrator) the list of the different groupnames under which different users are classified. The administrator can perform an insert, update or delete operation for records for the group. If the administrator would like to insert a new user record then he has an option to add related information to the dependent-child tables. Similarly, for an update the child tables are updated automatically and for a delete operation the child records are deleted automatically in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.

8) **Production Items** – a form generating the list of production items involved in the operational flow and the option of performing the data-manipulation operations like insert, update and delete.

This form gives the end-user the serial number of the production item and model number of the aircraft to which it is associated. The end-user can perform an insert, update or delete operation for records for the production item. If the user would like
to insert a new production item record, then he has an option to add related information to the dependent-child tables. Similarly, for an update the child tables are updated automatically and for a delete operation the child records are deleted automatically in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.

9) **Equipment Item** – a form generating the list of equipment items involved in the operational flow and the option of performing the data-manipulation operations like insert, update and delete.

This form gives the end-user the item_id, item name, part number, cage code, national stock number, and FSC (stock code) of the equipment item. The end-user can perform an insert, update or delete operation for records for the equipment item. If the user would like to insert a new equipment-item record then he has an option to add related information to the dependent-child tables. Similarly, for an update operation the child tables are updated automatically and for a delete operation the child records are deleted automatically in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.
10) Dollies – a form generating the list of dollies involved in the movement of the blades from one place to another and the option of performing the data-manipulation operations like insert, update and delete.

This form gives the end-user the list of dollies that are currently being used. The end-user can perform an insert, update or delete operation for records for the dollies. For an update operation the child tables are updated automatically, and for a delete operation the child records are deleted automatically in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.

11) Aircraft Blade Blankets – a form generating the list of aircraft blade blankets used during the curing of the blade and the option of performing the data-manipulation operations like insert, update and delete.

This form gives the end-user the list of aircraft blade blankets that are currently used. The end-user can perform an insert, update or delete operation for records for the blankets. For an update operation the child tables are updated automatically, and for a delete operation the child records are deleted automatically in the dependent-child tables. The user can perform an insert, update or delete operation by selecting from the buttons provided. The user can navigate through the records by selecting the First, Next, Previous and Last buttons provided.
12) **Users/Groups Report** - a report to generate a list of the different users and the groups under which each user is classified.

The end-user (the administrator) can generate a report with the list of users and the groups under which they are classified.

13) **Systems Report** – a report to generate a list of the various systems involved.

The end-user (the administrator) can generate a report with the list of systems involved and details like the classification of the different systems.

14) **Shops Report** – a report to generate a list of the various shops involved.

The end-user (the administrator) can generate a report with the list of shops involved and details like category of the shop and their location.

15) **Aircrafts Report** – a report to generate a list of the various aircrafts involved.

The end-user (the administrator) can generate a report with the list of aircrafts involved and details like model number and name of the different aircraft used.

16) **Shops-System-Aircraft Report** - a report to generate a list of the various shops, systems, aircraft involved.

The end-user (the administrator) can generate a report with the list of the different systems involved along with the list of associated shops and aircrafts.
17) Operators-Shops Report - a report to generate a list of the operators associated with various shops.

The end-user (the administrator) can generate a report with the list of username of the operators and the names of the shops to which they are associated.

18) Production Items Report - a report to generate a list of production items.

The end-user (the administrator) can generate a report with the list of production items and the names of the aircraft to which they are associated.

19) Equipment Items Report - a report to generate a list of equipment items.

The end-user (the administrator) can generate a report showing the various equipment items in use, along with details such as the name of the system to which they belong, and the name of the aircraft to which they are associated.

20) Aircraft Blade Blankets Report – a report to generate a list of blankets used.

The end-user (the administrator) can generate a report with the list of serial numbers of curing blankets used in the curing of the blades for the autoclave operation.

21) Dollies Report – a report to generate a list of dollies used.

The end-user (the administrator) can generate a report with the list of serial numbers of the dollies used in the movement of the blades from one location to another for the autoclave operation.