

iMaintenance

Technical Documentation

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Definition, Investigation And Analysis

Problem Definition

The Organization

Trivandrum International School (TRINS) is a co-educational international school situated in Thiruvananthapuram, Kerala, India.

The school offers the International General Certificate of Secondary Education and is accredited by the Cambridge International Examinations and the Council for the Indian School Certificate Examinations. The school opened in 2003 with Mr Hillebrand as headmaster. The school now teaches about 500 ad has over 100 staff members.



The Present System

The present system for maintenance involves keeping multiple hand written ledgers, when information is needed to be accessed for various purposes. A manual look up is in order frequently, to be reminded of periodic future maintenance. Receipts for these maintenance are filed in separately, identifiable by reference code noted down on the ledger.

Forms Of Data

All data is handwritten into the ledgers.

All logs are maintained in writing by Mr Shankar, the client.

Inefficiencies of The Present System

- Difficult access to data
- Has little to no access restrictions
- Data cannot be edited
- Searching through data is time consuming
- No way to sort the data
- Data cannot be collected from multiple sources

Investigation And Analysis

Interview

The main form of data collection I have used is Interview, due to the fact that almost all of the maintenance logs are maintained by Mr. Shankar . An extensive interview was done with him to obtain vital information about the working of all the sub systems in maintenance logging. So the investigation will involve an interview with Mr Shankar and analyzing the current system which is all in hard copies.

Interview(24/9/2014)

Trevor: Good Morning

Mr. Shankar: Morning, Have a seat Trevor.

Trevor: So If you have a couple minutes to spare, I have some questions about the current system so that I may analyze and suggest and alternative solution to improve this system.

Mr. Shankar: I guess I have a couple of minutes to spare. What would you like to know about?

Trevor: First of all, could you give me a brief description of how you take maintenance requests and log them once you are done with them?

Mr. Shankar: Oh, that's pretty simple actually. The staff member or student reports to me personally about any of the school property that is in need of repairs. I enter these logs myself into one of the ledger. After the repairing has been taken care of I write down the specifics of the repairs on a ledger and mark the job as complete.

Trevor: These specifics you talk of, could you please give me the details as to exactly what is written down.

Mr Shankar: Well, there is the date, type of maintenance, the cost, a small description of the repairs and also the name of the staff member who had originally reported.

Trevor: There must be a lot drawbacks to maintaining these logs manually. Could you explain some of these, so that I may design a system that incorporate solutions to these problems

Mr Shankar: It is really time consuming for me find a specific record as there are hundreds of logs that I need to go through before I find the right one. There's no way I am able to sort these logs. Moreover, it would be nice if you could include a way for the staff or a student to add a log themselves and I could later just add in the details.

Trevor: That wouldn't be a problem. It can certainly be done. Is there anything else you would like to add?

Mr Shankar: No that would be all.

Trevor: Thank you for time. Bye

Solution

Automated solution is ideal for this situation. The programming language VB.net 2005 will be used for building this software. This software will be custom built to incorporate the specific requirements put forward by the client.

Alternate

Requirement Specification

- Login
- Home
 - Overview of logs
- Logs
 - View logs
 - View all logs (Admin only)
 - Sort logs
 - Filter logs
 - Add new logs
 - Edit existing logs
- Settings
 - Help
 - Change password
 - Change admin (Admin only)
 - Create a new user (Admin only)

Technical Requirements

Hardware Requirements

- Pointing Device
- Keyboard
- Display (800*600) or more

Minimum Requirement

- Windows XP
- 1GB RAM
- 1 GHz Intel Core 2 Duo

Recommended

- Windows 7 Service Pack 2 or later
- 2 GB RAM
- 1.2 GHz Intel Core 2 Duo

Design

Nature of the Solution

Database

Logs

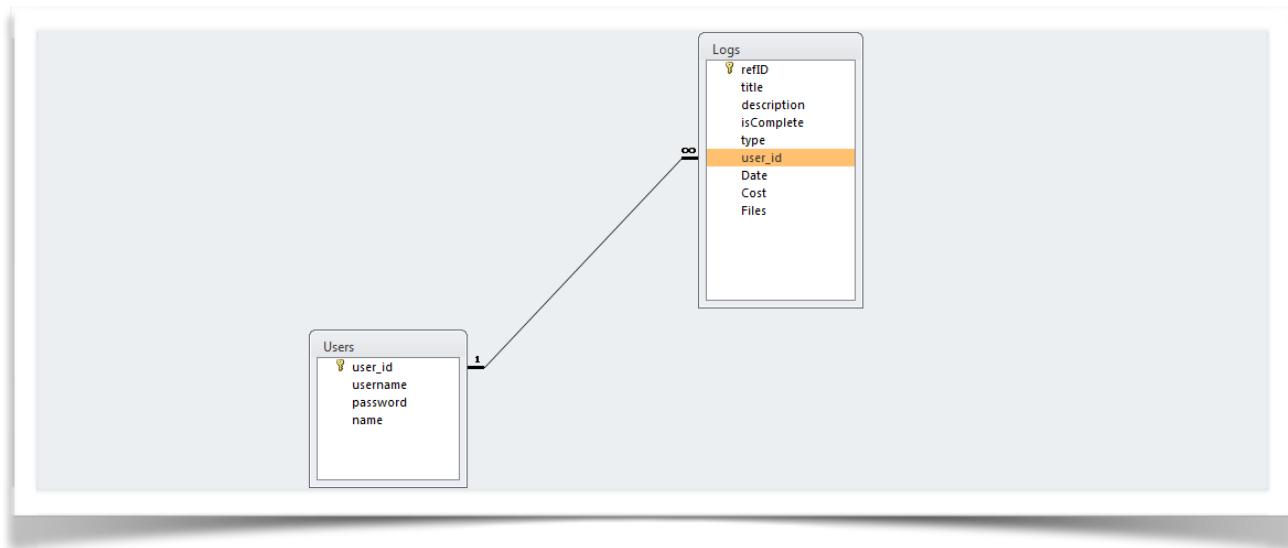
Field Name	Data Type	Description
refID	Text	Unique ID given to each maintenance log
title	Text	A name that briefly describes the maintenance logs
description	Memo	Details pertaining to the log
isComplete	Yes/No	Boolean value stating whether the issue has been taken care of
type	Text	Category of the log
user_id	Text	User ID of the user who added the log
Date	Text	Date the log was added
Cost	Number	Total expenditure

Users

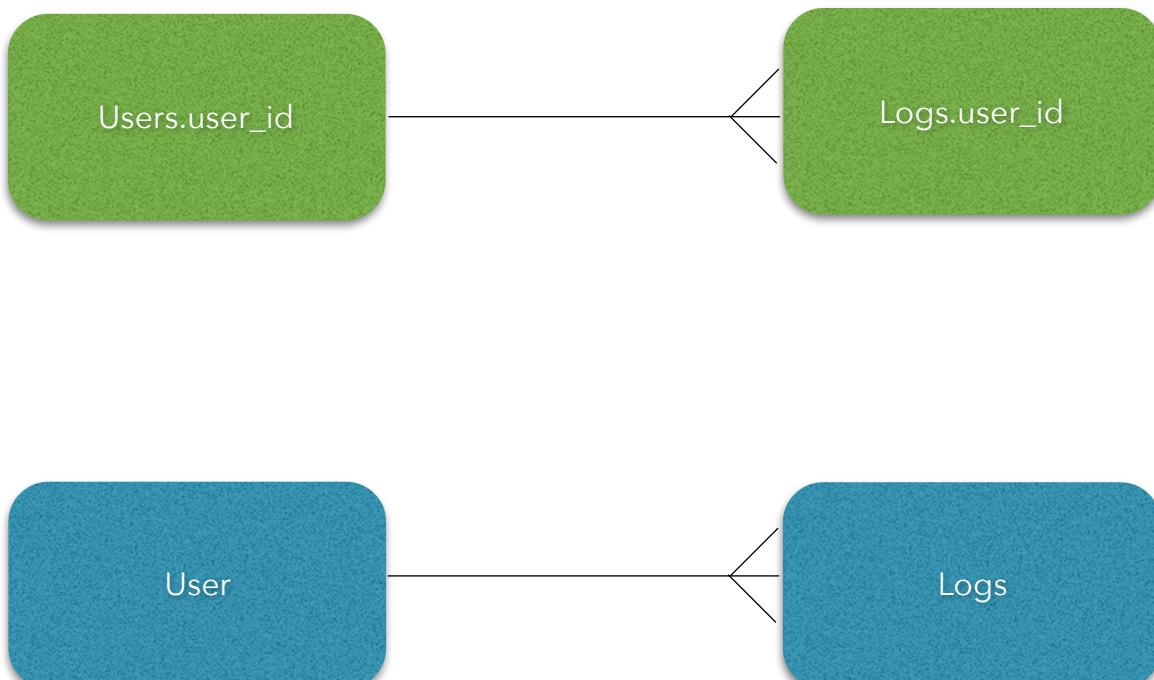
Field Name	Data Type	Description
user_id	Text	Unique identifier for each user
username	Text	Self assigned ID used to login
password	Text	A confidential string of characters used to authorize login
name	Text	Full name of the user

Relationships

- Tables



- Entity Relationship Diagram



Validations

Login

- Presence check.
- Username and password match.

Change Password

- Presence check for all fields
- Current password matches with the user logged in
- New passwords match

New user

- Presence check for all fields
- Username is unique

Logical

Name	Process
Form_Load	<p>Sets the size of the front</p> <p>Calls <code>themelInit()</code></p> <p>Calls <code>controlsInit()</code></p> <p>Sets variable <code>curPage</code> to "Login"</p> <p>Calls subroutine <code>changePage()</code></p> <p>Calls method <code>conn.Open()</code></p> <p>Opens the OLEDB connection to the Microsoft Access database</p>
themelInit	<p>Stores theme related information in an array</p> <p>The arrays index is selected by using <code>nextTheme()</code></p>
nextTheme	<p>Reads value from the file <code>theme.txt</code></p> <p>Adds 1 to this number</p> <p>Overwrites the new number back into the file</p> <p>Returns the new number</p>
controlsInit	<p>Sets various control properties such as color, location, size, etc.</p> <p>Stores all buttons into a hashtable.</p> <p>Adds the MouseHover event handler of all buttons to subroutine <code>button_MouseHovers</code>.</p> <p>Adds the MouseLeave event handler of all buttons to subroutine <code>button_MouseLeave</code></p>

Name	Process
changePage	<p>Check if any unsaved changes exist If <code>hasEdited</code> = <code>True</code> Asks the user to confirm changes</p> <p>Calls <code>resetPage()</code></p> <p>Changes page depending on the value present in the global variable <code>curPage</code></p> <p>If <code>curPage</code> = "Home" Displays panel</p> <p>If <code>curPage</code> = "Logs" Calls <code>dbLoad()</code> Displays a data grid containing logs</p> <p>If <code>curPage</code> = "Login" Displays panel that prompts user to login.</p> <p>If <code>curPage</code> = "Settings" Displays a panel containing various preferences the user may change</p>
resetPage	Removes all non general controls
login_button_Click	<p>Checks database for a record with entered username and password combination.</p> <p>If username and password combination exist</p> <p>User is allowed to login</p>
close_button_Click	<p>Calls method <code>Me.Close()</code> Closes the form</p>
nav_button_Click	Displays a panel with buttons that allow the user to change the current page
home_button_Click	<p>Sets the value of <code>curPage</code> to "Home"</p> <p>Calls <code>changePage()</code></p>
logs_button_click	<p>Sets the value of <code>curPage</code> to "Logs"</p> <p>Calls <code>changePage()</code></p>
search_text_TextChanged	Searches the displayed records for entered value
logs_dataGrid_CellEndEdit	<p>Sets the value of <code>hasEdited</code> to <code>True</code></p> <p>If the edited cell was from a new row Validates the new row Stores the new row into a hashtable</p> <p>If the edited cell was from an existing row Stores the cell's row number and column number into an array</p>

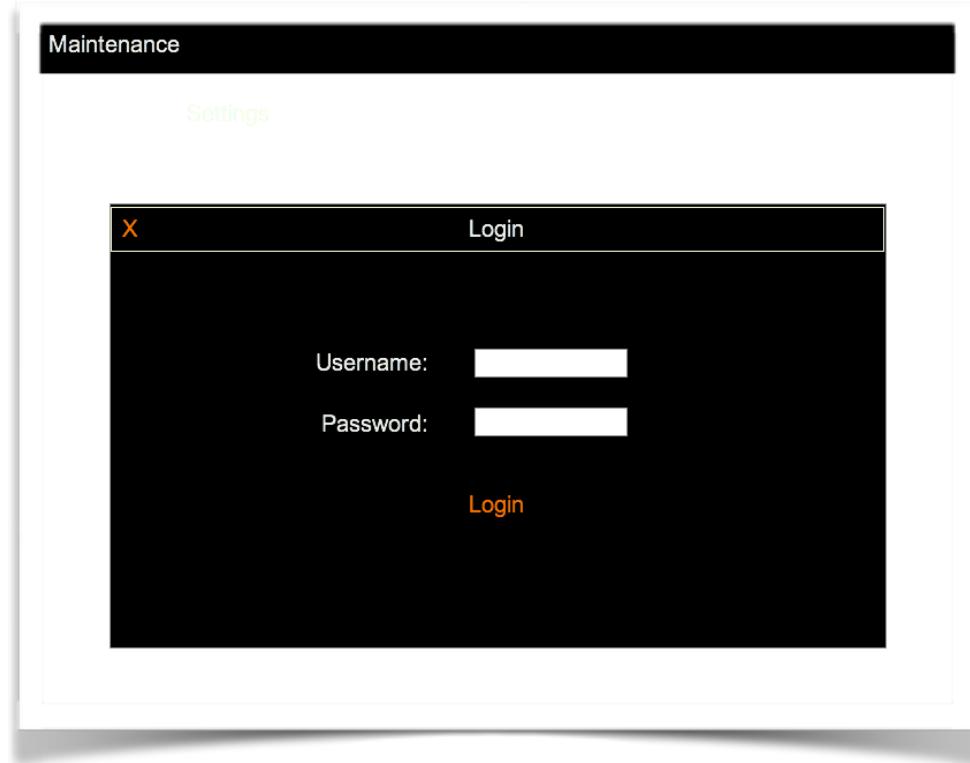
Name	Process
logs_dataGrid_UserAddedRow	Stores the newly added row into a hashtable
save_button_Click	<p>Sets the value of <code>hasEdited</code> to <code>False</code></p> <p>Calls <code>confirmAction("Do you want to save changes?")</code> To confirm whether the user really wants to make changes.</p> <p>If yes then Calls <code>saveChanges()</code> Else Calls <code>changePage()</code></p>
saveChanges	<p>Iterates through the array containing the row and column numbers of the edited cells and adds them into the database.</p> <p>Iterates through the hashtable containing the newly added rows and adds them into the database.</p>
settings_button_Click	<p>Sets the value of <code>curPage</code> to "Settings"</p> <p>Calls <code>changePage()</code></p>
resetPassword_button_Click	<p>Displays a panel prompting the user to fill in text boxes pertaining to - Old Password: New Password: Retype Password:</p>
doneResetPassword_button_Click	<p>Check if the old password matches with the existing record</p> <p>Checks if new password matches with the retyped password</p> <p>Updates the password in the database</p>
backResetPassword_button_Click	Takes the user back to the settings page.
newUser_button_Click	<p>Displays a panel prompting the user to fill in the following textboxes - First Name: Last Name: Username: Password:</p>
doneNewUser_button_Click	<p>Check if all fields have been filled</p> <p>Check if username is unique</p> <p>Adds the new user to the database</p>
backNewUser_button_Click	Takes the user back to the settings page.

Name	Process
changeAdmin_button_Click	Prompts the admin to select a new user as the new admin from a combo box.
doneChangeAdmin_button_Click	Swaps the userID of the current admin with the user who is to be the next admin.
backChangeAdmin_button_Click	Takes the user back to the settings page.
help_button_Click	Opens a PDF of the user manual
confirmAction	Displays a panel prompting the user verify an action.
dialog	Displays a panel with text
name_button_Click	Displays a panel with a logout button
logout_button_Click	<p>Calls method <code>conn.close()</code> <i>Closes the connection to the database</i></p> <p>Sets the value of <code>curPage</code> to "Login"</p> <p>Calls <code>changePage()</code></p>

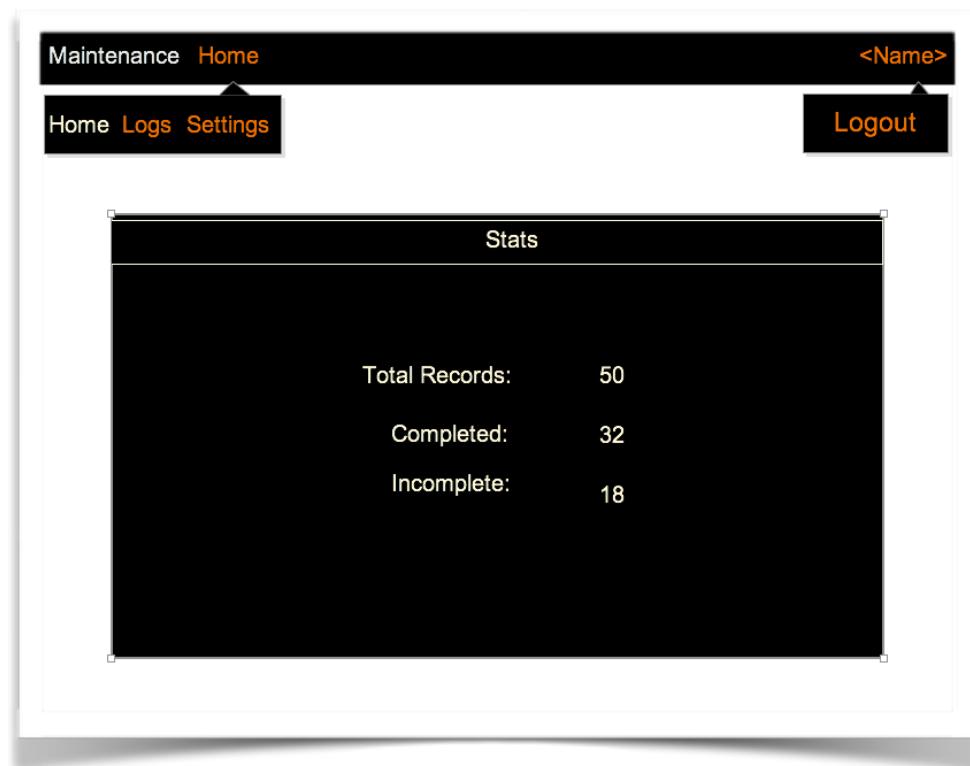
User Interface

COMPUTER GENERATED MOCK-UPS

- Login



- Home



- Logs

The screenshot shows the 'Logs' section of the iMaintenance application. At the top, there is a navigation bar with 'Maintenance' and 'Logs' on the left, and '<Name>' and 'Logout' on the right. Below the navigation bar is a table with columns: Title, Description, Category, Cost, Completed, Date, and User Added. The table has 10 rows, all of which are currently empty. Underneath the table, there are three status indicators: 'Total Records: 50', 'Completed: 32', and 'Incomplete: 18'.

- Settings

The screenshot shows the 'Settings' section of the iMaintenance application. At the top, there is a navigation bar with 'Maintenance' and 'Settings' on the left, and '<Name>' and 'Logout' on the right. Below the navigation bar is a large black rectangular area labeled 'Settings'. Inside this area, there are three text fields with labels: 'Name: <Name>', 'Username: <Username>', and 'Password: Change Password'. At the bottom of the black area, there are two buttons: 'New User' on the left and 'Change Admin' on the right.

Test Plan

Login

No	Test	Test Data	Expected Output
1	Check if blank username or password is accepted	Blank text	A dialog should appear asking the user to fill in the necessary details
2	Check if invalid username and password combination is accepted	Invalid username and password	A dialog should appear telling the user that an incorrect username or password has been entered.
3	Check if valid username and password combination is accepted.	Valid username and password	The page is changed from 'Login' to 'Home'.

Home

No	Test	Test Data	Expected Output
1	Check if the user's name is displayed on the top right corner	Name of the user logged in	The button <code>name_button</code> should contain the user's name.
2	Check if an overview of the logs contained in the database show.	None	A panel should be visible showing the total logs, the number of completed logs and the incomplete logs.

Logs

No	Test	Test Data	Expected Output
1	Check if the user can view the logs	None	DataGrid that is populated with logs should be visible.

No	Test	Test Data	Expected Output
2	Check if logs only pertaining to the user who is currently logged in visible	Valid User Login	DataGrid should only show the logs that were previously added by the user
3	Check if all logs are visible when the admin is logged in	Valid Admin Login	DataGrid should be populated with all the logs from the database regardless of the user who added it.
4	Check if user is able to add new logs into the database.	None	The user is able to enter details in a new row of the DataGrid.
5	Check if user is able to edit the existing records	None	The user is able to edit details of an existing row of the DataGrid.
6	Check if confirmation dialogue is shown	None	Once the user has made changes on the DataGrid, a dialog is shown asking the user whether he wishes to save changes when the user is clicks on the save_button or when he changes the page without clicking on the save_button .
7	Check if the user can search through data	None	When the user types into the search text, the DataGrid should refresh showing the filtered data.
8	Check if the user is able to sort the data	None	When clicked on one of the column headers of the DataGrid, the user should be able to sort data by that column.

Settings

No	Test	Test Data	Expected Output
1	Check if user details are displayed.	The full name and username of a user	A panel should be visible containing labels which display the current user's full name and username.
2	Check if the user is able access the change password screen	None	When clicked on Change Password, the user should be presented with a prompts to change password.
3	Check if the admin is able access the change admin screen	Valid Admin Login	When clicked on Change Admin, the user should be presented with a prompts to change the admin to another user.
4	Check if the admin is able access the new user screen	Valid admin login	When clicked on New User, the user should be presented with a prompts to change the admin to another user.
5	Check if the User Manual can be accessed	None	User Manual should open up in the default PDF viewer

Reset Password

No	Test	Test Data	Expected Output
1	Check if incorrect current password is entered	Incorrect password	A dialog should pop up saying incorrect password has been entered
2	Check if valid current password is entered	Valid password	If the current password matches with username of the user logged in and if the entered new passwords match, the password is changed of the user should be updated in the database
3	Check if the new passwords that don't match are accepted	Mismatched strings of characters	A dialog should pop up saying that the passwords do not match
4	Check if the new passwords that match are accepted	Matching strings of characters	If the current password matches with username of the user logged in and if the entered new passwords match, the password is changed of the user should be updated in the database

Change Admin

No	Test	Test Data	Expected Output
1	Check if the comboBox correctly populated	List of users in the database The current admin	The comboBox should contain the names of all the users registered except the admin.
2	Check if the admin is able to change admins	Valid Admin Login	After the admin has selected a user who is to be the next admin and click on the doneChangeAdmin_button, the current admin loses his privileges while the selected user gains admin privileges.

New User

No	Test	Test Data	Expected Output
1	Check if all details are entered	Valid Admin Login New user details	A dialog should pop up asking to fill in all the required fields
2	Check if existing username is accepted	Valid Admin Login An existing username	A dialog should pop up saying the username already exists

Benefits

Digital Data

- Data need not be maintained manually
 - Data can be easily manipulated
 - Data can achieve a sorted view to accommodate user requirement
 - Data can be filtered with ease
 - Data can be copied or moved without displacing any physical object
 - Data can be protected easily without the need of any physical container that restricts access
-

User Interface

- User friendly interface allows the use of software without the requirement of any technical knowledge
 - User interface is designed with control, conveyance and continuity in mind, so that the user never feels lost operating the software.
-

Multi-User

Multiple users can add records to the database

Access Privileges

Each user can only view and edit the logs they have added. On the other hand, the admin has access to all logs. Implementing such a system using ledgers, can be very challenging.

Limits

Printing

There isn't a built in feature to output the data in a printer friendly format. This feature could be included in a later revision of this software.

Backup and Archiving

No built in feature to backup or archive data is included with the current revision. This feature could be included in a later revision of this software.

Space Requirements

Logs

Name	Data Type	Size (Bytes)	Number	SubTotal
User_ID	String	1 - 2		20 - 40
Username	String	5 - 15		100 - 300
Password	String	4 - 30	20	80 - 600
Name	Boolean	10 - 30		200 - 600
Total (Bytes)				400 - 1540

Users

Name	Data Type	Size (Bytes)	Number	SubTotal
refID	String	3 - 4		1500 - 2000
Title	String	5 - 12		2500 - 6000
Description	String	50 - 200		25000 - 100000
Type	String	4 - 6		2000 - 3000
IsComplete	Boolean	1		500
Date	String	11		5500
Cost	Integer	10		5000
User_ID	String	1 - 2		500 - 1000
Total (Bytes)				42,500 - 117,500
Total (KiloBytes)				41.5 - 114.7

Software Development, Testing and Implementation

Software Development

Name : Maintenance

Version: 1.0

Language: Visual Basic.Net 2005

Source Code

MAIN.VB

```
'     iMaintenance  
'     Copyright (c) 2015 Trevor Xander. All rights reserved  
  
'Allows the reading and writing  
'of text files  
Imports System.IO  
  
Public Class Main  
  
    Structure Theme  
        Dim background As System.Drawing.Bitmap  
        Dim buttonActiveColor As Color  
        Dim buttonInactiveColor As Color  
    End Structure  
  
    Structure Cell  
        Dim row As Integer  
        Dim column As Integer  
    End Structure  
  
    Dim userID As String  
    Dim userName As String  
    Dim password As String  
    Dim fullName As String  
    Dim isAdmin As Boolean  
  
    Dim themes(4) As Theme  
    Dim inactiveColor As Color  
    Dim activeColor As Color  
  
    Dim curPage As String  
  
    Dim button As New Hashtable  
  
    Dim adminCommand As String  
    Dim userCommand As String
```

```
Dim adminSearchCommand As String
Dim userSearchCommand As String

Dim adapter As OleDb.OleDbDataAdapter
Dim dataSet As New DataSet

Dim hasEdited As Boolean

Dim editedCells(0) As Cell
Dim newRows As New Hashtable

Dim confirm As Boolean
Dim deny As Boolean

Sub dialog(ByVal actionText As String)

    'To prevent user from navigating to another screen/page
    name_button.Enabled = False
    nav_button.Enabled = False

    centerControl(dialog_panel)

    'Displays text describing the action
    dialog_text.Text = actionText
    dialog_text.Location =
        New Point(((dialog_panel.Width - _
            dialog_text.Width) \ 2), _ 
            (dialog_text.Location.Y))

    dialog_panel.BringToFront()
    dialog_panel.Visible = True

    'Initializing
    confirm = False

    'Halts program till user clicks on the button
    While confirm = False

        'To keep the program from being unresponsive
        Application.DoEvents()

    End While

    dialog_panel.Visible = False

    'Re-enabling controls for free navigation
    name_button.Enabled = True
    nav_button.Enabled = True

End Sub

'To confirm with the user if an action needs to be done
Function confirmAction(ByVal actionText As String) As Boolean

    'To prevent user from navigating to another screen/page
    resetPage()
```

```
centerControl(confirmAction_panel)
'Displays text describing the action
actionText.Text = actionText

actionText.Text.Location = _
New Point((confirmAction_panel.Width - _
           actionText.Text.Width) \ 2), _
           (actionText.Text.Location.Y))

confirmAction_panel.Visible = True

'Initializing
confirm = False
deny = False

'Halts program till user clicks on a button
While confirm = False And deny = False

    'To keep the program from being unresponsive
    Application.DoEvents()

End While

confirmAction_panel.Visible = False

'Re-enabling controls for free navigation
name_button.Enabled = True
nav_button.Enabled = True

>Returns value depending on the button clicked
If confirm = True Then
    Return True
Else
    Return False
End If

End Function

'Initializes the properties of the dataGridView
Sub logsInit()

Dim type_combo As New DataGridViewComboBoxColumn

logs_dataGrid.Location = New Point(0, _
header_panel.Height + settings_button.Height + 14)

logs_dataGrid.Width = Me.Width - 17
logs_dataGrid.Height = Me.Height - 125

logs_dataGrid.Columns(0).Visible = False

'Renaming columns
logs_dataGrid.Columns(5).HeaderText = "Completed"
If userID = 0 Then
```

```

    logs_dataGrid.Columns(7).HeaderText = "User Added"
    logs_dataGrid.Columns(7).AutoSizeMode =
        DataGridViewAutoSizeColumnsMode.AllCells
    logs_dataGrid.Columns(7).ReadOnly = True
End If

'Adjusting the column size modes
logs_dataGrid.Columns(1).AutoSizeMode =
    DataGridViewAutoSizeColumnsMode.DisplayedCells
logs_dataGrid.Columns(3).AutoSizeMode =
    DataGridViewAutoSizeColumnsMode.DisplayedCells
logs_dataGrid.Columns(4).AutoSizeMode =
    DataGridViewAutoSizeColumnsMode.DisplayedCells
logs_dataGrid.Columns(5).AutoSizeMode =
    DataGridViewAutoSizeColumnsMode.DisplayedCells
logs_dataGrid.Columns(6).AutoSizeMode =
    DataGridViewAutoSizeColumnsMode.DisplayedCells

logs_dataGrid.Columns(2).AutoSizeMode =
    DataGridViewAutoSizeColumnsMode.Fill

logs_dataGrid.RowHeadersWidthSizeMode =
    DataGridViewRowHeadersWidthSizeMode.AutoSizeToAllHeaders

End Sub

'Centers controls relative to the form
Sub centerControl(ByVal ctrl As Control)

If ctrl.Location.Y > header_panel.Height Then
    ctrl.Location = New Point((ClientSize.Width -
                                ctrl.Width) \ 2,
                                (ClientSize.Height - ctrl.Height) \ 2)
End If

End Sub

'Loads and displays the database on a dataGrid
Sub dbLoad()

    dataSet = New DataSet

    'Clearing the dataGrid
    logs_dataGrid.DataSource = Nothing

    'Selects all logs from all users
    adminCommand = ("SELECT refID, " & _
                    "Title, " & _
                    "Description, " & _
                    "Type, " & _
                    "Cost, " & _
                    "isComplete, " & _
                    "Date, " & _
                    Users.Name FROM Logs " & _
                    "INNER JOIN Users ON " & _
                    Logs.user_id=Users.user_id " & _
                    "ORDER BY " & _

```

```

        "isComplete DESC, " & _
        "Date DESC, " & _
        "type ASC, " & _
        "title ASC;")

'Selects only logs added by the current user
userCommand = ("SELECT refID, " &
               "Title, " & _
               "Description, " & _
               "Type, " & _
               "Cost, " & _
               "isComplete, " & _
               "Date FROM Logs " & _
               "WHERE user_id ='" & userID & "' " & _
               "ORDER BY isComplete DESC, Date DESC, type ASC ;")

If isAdmin Then
    adapter = New OleDb.OleDbDataAdapter(adminCommand, conn)
Else
    adapter = New OleDb.OleDbDataAdapter(userCommand, conn)
End If

adapter.Fill(dataSet)
logs_dataGrid.DataSource = dataSet.Tables(0)

logsInit()
logs_dataGrid.Visible = True

End Sub

Sub changePage()

'Displays name of current page on button
nav_button.Text = curPage

resetPage()

'To confirm whether user wants to save changes
If hasEdited Then
    Dim obj As New Object
    save_button_Click(obj, New System.EventArgs)
End If

'Shows controls for the selected page
If curPage = "Home" Then

    nav_button.Visible = True
    name_button.Visible = True
    home_button.ForeColor = Color.White
    home_button.Cursor = Cursors.Default

    statsInit()

    centerControl(stats_panel)
    stats_panel.Visible = True
    |

ElseIf curPage = "Login" Then

```

```
centerControl(login_panel)
login_panel.Visible = True

ElseIf curPage = "Logs" Then
    nav_button.Visible = True
    name_button.Visible = True

    logs_button.ForeColor = Color.White
    logs_button.Cursor = Cursors.Default

    dbLoad()

    search_text.Visible = True
    search_text.Location =
        New Point(((ClientSize.Width - search_text.Width) \ 2), -
                  (logs_dataGrid.Location.Y - search_text.Height))

    save_button.Visible = True
    save_button.Location =
        New Point((search_text.Location.X + search_text.Width), -
                  search_text.Location.Y)

ElseIf curPage = "Settings" Then
    nav_button.Visible = True
    name_button.Visible = True

    settings_button.ForeColor = Color.White
    settings_button.Cursor = Cursors.Default

    centerControl(settings_panel)
    settings_panel.Visible = True

    If userID = 0 Then
        changeadmin_button.Visible = True
        newUser_button.Visible = True
    Else
        changeadmin_button.Visible = False
        newUser_button.Visible = False
    End If
End If

End Sub

'Displays panel containing details of the log
Sub statsInit()

    Dim ds As New DataSet
    Dim adapter As OleDb.OleDbDataAdapter

    If userID = 0 Then
        'Admin is able to see details of all logs
        adapter =
            New OleDb.OleDbDataAdapter("SELECT refID FROM Logs " & _
                                         "WHERE True", conn)
    Else
        'User is able to see details of the logs added by him
        adapter =

```

```
        New OleDb.OleDbDataAdapter("SELECT refID FROM Logs " & _
                                    "WHERE user_Id=''" & userID & "", conn)
    End If

    adapter.Fill(ds)
    totalRecords_label.Text = ds.Tables(0).Rows.Count
    ds.Clear()

    If userID = 0 Then
        adapter =
            New OleDb.OleDbDataAdapter("SELECT refID FROM Logs " & _
                                        "WHERE isComplete = True", conn)
    Else
        adapter =
            New OleDb.OleDbDataAdapter("SELECT refID FROM Logs " & _
                                        "WHERE isComplete = True " & _
                                        "AND user_ID=''" & userID & "", conn)
    End If

    adapter.Fill(ds)
    CompletedRecords_label.Text = ds.Tables(0).Rows.Count
    IncompleteRecords_label.Text = Val(totalRecords_label.Text) - _
                                    Val(CompletedRecords_label.Text)

End Sub

Sub resetPage()

    'Clears the page of controls
    nav_button.Visible = False
    name_button.Visible = False
    save_button.Visible = False
    add_panel.Visible = False
    search_text.Visible = False
    logs_dataGrid.Visible = False
    settings_panel.Visible = False
    resetPassword_panel.Visible = False
    changeAdmin_panel.Visible = False
    login_panel.Visible = False
    stats_panel.Visible = False

    'Resets the color of buttons
    home_button.ForeColor = inactiveColor
    settings_button.ForeColor = inactiveColor
    logs_button.ForeColor = inactiveColor

    'Resets cursor types of buttons
    settings_button.Cursor = Cursors.Hand
    home_button.Cursor = Cursors.Hand
    logs_button.Cursor = Cursors.Hand

End Sub

Sub controlsInit()

    Me.MinimumSize = New Point(800, 640)
```

```
nav_button.Location = New Point(125, 4)

name_button.Location = New Point((Me.Size.Width.ToString) -
(name_button.Size.Width + 15), 4)

header_panel.Location = New Point(0, 0)
header_panel.BackColor = Color.FromArgb(36, 36, 36)
header_panel.Size = New Size(Me.Size.Width, 40)

logout_panel.BackColor = header_panel.BackColor
logout_panel.Location = _
New Point((Me.Size.Width) - 
(110), name_button.Location.Y + 40)

nav_panel.Location = _
New Point(header_panel.Location.X, logout_panel.Location.Y)

nav_panel.BackColor = header_panel.BackColor
nav_panel.Size = _
New Size((home_button.Width + _
logs_button.Width + _
settings_button.Width) + 5, _
home_button.Height + 5)

logs_dataGrid.Location = _
New Point(0, header_panel.Height + 
settings_button.Height + 14)

settings_panel.BackColor = Color.FromArgb(150, 0, 0, 0)

resetPassword_panel.BackColor = Color.FromArgb(150, 0, 0, 0)

changeAdmin_panel.BackColor = Color.FromArgb(150, 0, 0, 0)

login_panel.BackColor = Color.FromArgb(150, 0, 0, 0)

confirmAction_panel.BackColor = Color.FromArgb(150, 0, 0, 0)

dialog_panel.BackColor = Color.FromArgb(200, 0, 0, 0)

stats_panel.BackColor = Color.FromArgb(150, 0, 0, 0)

newUser_panel.BackColor = Color.FromArgb(150, 0, 0, 0)

'Storing all buttons in a hashtable
button.Add(nav_button.Name.ToString, nav_button)
button.Add(name_button.Name, name_button)
button.Add(logout_button.Name, logout_button)
button.Add(logs_button.Name, logs_button)
button.Add(home_button.Name, home_button)
button.Add(settings_button.Name, settings_button)
button.Add(resetPassword_button.Name, resetPassword_button)
button.Add(changeadmin_button.Name, changeadmin_button)
button.Add(close_add.Name, close_add)
```

```

button.Add(save_button.Name, save_button)
button.Add(backResetPassword_button.Name, _
           backResetPassword_button)
button.Add(doneResetPassword_button.Name, _
           doneResetPassword_button)
button.Add(doneChangeAdmin_button.Name, doneChangeAdmin_button)
button.Add(backChangeAdmin_button.Name, backChangeAdmin_button)
button.Add(close_button.Name, close_button)
button.Add(login_button.Name, login_button)
button.Add(confirmAction_button.Name, confirmAction_button)
button.Add(denyAction_button.Name, denyAction_button)
button.Add(backNewUser_button.Name, backNewUser_button)
button.Add(doneNewUser_button.Name, doneNewUser_button)
button.Add(newUser_button.Name, newUser_button)
button.Add(ok_button.Name, ok_button)
button.Add(help_button.Name, help_button)

'Iterates through 'button' hashtable and
  adds MouseHover and MouseLeave event handlers
  to sub routines
Dim entry As DictionaryEntry
For Each entry In button

    Dim btn As New Label
    btn = entry.Value

    'To change color of button on these events
    AddHandler btn.MouseHover, AddressOf button_MouseHovers
    AddHandler btn.MouseLeave, AddressOf button_MouseLeave

    btn.Cursor = Cursors.Hand
    btn.ForeColor = inactiveColor
    btn.BackColor = Color.Transparent
Next

End Sub

'Chooses the wallpaper and button colors for the form
Sub themeInit()

    'Storing themes into an array
    Dim blueOrange As New Theme
    blueOrange.background = My.Resources.blueOrange
    blueOrange.buttonActiveColor = Color.FromArgb(133, 82, 19)
    blueOrange.buttonInactiveColor = Color.DarkOrange
    themes(0) = (blueOrange)

    Dim bluePink As Theme
    bluePink.background = My.Resources.bluePink
    bluePink.buttonActiveColor = Color.FromArgb(139, 17, 11)
    bluePink.buttonInactiveColor = Color.FromArgb(249, 46, 49)
    themes(1) = (bluePink)

    Dim green As Theme
    green.background = My.Resources.green
    green.buttonActiveColor = Color.FromArgb(0, 94, 53)
    green.buttonInactiveColor = Color.FromArgb(21, 183, 113)

```

```
themes(2) = (green)

Dim greenBlue As Theme
greenBlue.background = My.Resources.greenBlue
greenBlue.buttonActiveColor = Color.FromArgb(8, 55, 106)
greenBlue.buttonInactiveColor = Color.FromArgb(3, 114, 237)
themes(3) = (greenBlue)

Dim yellowBlue As Theme
yellowBlue.background = My.Resources.yellowBlue
yellowBlue.buttonActiveColor = Color.FromArgb(192, 121, 4)
yellowBlue.buttonInactiveColor = Color.FromArgb(251, 199, 1)
themes(4) = (yellowBlue)

Dim curTheme As Theme
curTheme = themes(nextTheme)

Me.BackgroundImage = curTheme.background
inactiveColor = curTheme.buttonInactiveColor
activeColor = curTheme.buttonActiveColor

'Frees memory
ReDim themes(0)

End Sub

Function nextTheme() As Short

'Reads number from file that determines
'the previous theme used
Dim StreamReader As StreamReader

StreamReader = _
New StreamReader((Application.StartupPath.ToLower _ 
    .Replace("\bin\debug", "") _ 
    + "\theme.txt"))

Dim themeNumber As Short
themeNumber = CShort(StreamReader.ReadLine)
StreamReader.Close()

'Obtains the value of the next theme
themeNumber += 1

'Rounds back to 0 if the number exceeds
'the total number of themes
If themeNumber > themes.length - 1 Then
    themeNumber = 0
End If

'Writes the new number into the file
Dim StreamWriter = _
New StreamWriter((Application.StartupPath.ToLower _ 
    .Replace("\bin\debug", "") _ 
    .Replace("\bin\release", "") _ 
    + "\theme.txt"))
```

```
    StreamWriter.WriteLine(themeNumber)
    StreamWriter.Close()

    Return themeNumber

End Function

Private Sub Main_Load _
(ByVal sender As System.Object, ByVal e As System.EventArgs) _
Handles MyBase.Load

    Me.Size = New Size(1040, 640)

    'Sets the theme
    themeInit()

    'Initializes controls
    controlsInit()

    'Sets current page to login
    curPage = "Login"
    changePage()

End Sub

Private Sub Admin_Resize _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles Me.Resize

    header_panel.Size = New Size(Me.Size.Width, 40)
    name_button.Location = New Point((Me.Size.Width.ToString) - _
        (name_button.Size.Width + 15), _
        name_button.Location.Y)

    If logout_panel.Visible Then
        logout_panel.Visible = False
    End If

    If nav_panel.Visible Then
        nav_panel.Visible = False
    End If

    If logs_dataGrid.Visible Then
        logs_dataGrid.Width = Me.Width - 17
        logs_dataGrid.Height = Me.Height - 125
    End If

    If add_panel.Visible Then
        centerControl(add_panel)
    End If

    If search_text.Visible Then
        search_text.Location =
            New Point(((ClientSize.Width - search_text.Width) \ 2), -
            (logs_dataGrid.Location.Y - search_text.Height))
    End If

End Sub
```

```
If save_button.Visible Then
    save_button.Location = _
        New Point(search_text.Location.X + search_text.Width, _
            search_text.Location.Y)
End If

If settings_panel.Visible Then
    centerControl(settings_panel)
End If

If resetPassword_panel.Visible Then
    centerControl(resetPassword_panel)
End If

If changeAdmin_panel.Visible Then
    centerControl(changeAdmin_panel)
End If

If login_panel.Visible Then
    centerControl(login_panel)
End If

If confirmAction_panel.Visible Then
    centerControl(confirmAction_panel)
End If

If stats_panel.Visible Then
    centerControl(stats_panel)
End If

If dialog_panel.Visible Then
    centerControl(dialog_panel)
End If

If newUser_panel.Visible Then
    centerControl(newUser_panel)
End If

End Sub

'Button changes color on MouseHover'
Private Sub button_MouseHovers _
(ByVal sender As Object, ByVal e As System.EventArgs)

'Casts sender object to type 'label'
Dim btn As Label = DirectCast(sender, Label)

If Not (btn.Text = curPage And _
        btn.Name.ToString <> ("nav_button")) Then

    button(btn.Name).ForeColor = activeColor
End If

End Sub

'Button changes color on MouseLeave'
```

```
Private Sub button_MouseLeave _  
(ByVal sender As Object, ByVal e As System.EventArgs)  
  
    Dim btn As Label = DirectCast(sender, Label)  
    If Not (btn.Text = curPage And  
            btn.Name.ToString <> ("nav_button")) Then  
  
        button(btn.Name).ForeColor = inactiveColor  
  
    End If  
  
End Sub  
  
Private Sub logs_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles logs_button.Click  
  
    If curPage <> "Logs" Then  
        curPage = "Logs"  
        changePage()  
    End If  
  
End Sub  
  
Private Sub home_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles home_button.Click  
  
    If curPage <> "Home" Then  
        curPage = "Home"  
        changePage()  
    End If  
  
End Sub  
  
Private Sub settings_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles settings_button.Click  
  
    If curPage <> "Settings" Then  
        curPage = "Settings"  
        changePage()  
    End If  
  
End Sub  
  
Private Sub add_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs)  
  
    logs_dataGrid.Visible = False  
    add_panel.Visible = True  
  
    add_panel.BringToFront()  
    centerControl(add_panel)  
  
    Dim dataSet As New DataSet  
    Dim adapter As New _
```

```
        OleDb.OleDbDataAdapter _  
        ("SELECT DISTINCT Type from Logs ORDER BY Type ASC ", conn)  
  
    adapter.Fill(dataSet)  
  
    type_combo.Items.Clear()  
  
    Dim count As Integer  
  
    For count = 0 To dataSet.Tables(0).Rows.Count - 1  
  
        type_combo.Items.Add _  
            (dataSet.Tables(0).Rows(count).Item(0).ToString)  
  
    Next  
  
    type_combo.Items.Add("New Category...")  
  
End Sub  
  
Private Sub search_text_TextChanged _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles search_text.TextChanged  
  
    Dim adapter As OleDb.OleDbDataAdapter  
    dataSet = New DataSet  
  
    adminSearchCommand = ("SELECT refID, " & _  
                            "Title, " & _  
                            "Description, " & _  
                            "Type, " & _  
                            "Cost, " & _  
                            "isComplete, " & _  
                            "Date, " & _  
                            Users.Name FROM Logs " & _  
                            "INNER JOIN Users ON Logs.user_id=Users.user_id " & _  
                            "WHERE (refID=''' & search_text.Text & ''' OR " & _  
                                "Title Like '%" & search_text.Text & "%' OR " & _  
                                "Type Like '%" & search_text.Text & "%' OR " & _  
                                "Description LIKE '%" & search_text.Text & "%' OR " & _  
                                "Name LIKE '%" & search_text.Text & "%' OR " & _  
                                "Date LIKE '%" & search_text.Text & "%') " & _  
                            "ORDER BY " & _  
                            "isComplete DESC, " & _  
                            "Date DESC, " & _  
                            "type ASC, " & _  
                            "title ASC;" )  
  
    userSearchCommand = ("SELECT refID, " & _  
                            "Title, " & _  
                            "Description, " & _  
                            "Type, " & _  
                            "Cost, " & _  
                            "isComplete, " & _  
                            "Date FROM Logs " & _  
                            "WHERE user_id =''' & userID & '''AND " & _
```

```
"(refID=''" & search_text.Text & "'' & _  
    "OR Title Like '%' & search_text.Text & "%' '' & _  
    "OR Type Like '%' & search_text.Text & "%' '' & _  
    "OR description LIKE '%' & search_text.Text & "%' '' & _  
    "OR date LIKE '%' & search_text.Text & "%' ) " & _  
"ORDER BY " & _  
    "isComplete DESC, " & _  
    "Date DESC, " & _  
    "type ASC, " & _  
    "title ASC;"  
  
If search_text.Text <> "" Then  
    'Filters data by the search text  
    If isAdmin Then  
  
        adapter =  
            New OleDb.OleDbDataAdapter(adminSearchCommand, conn)  
  
    Else  
  
        adapter =  
            New OleDb.OleDbDataAdapter(userSearchCommand, conn)  
  
    End If  
Else  
  
    'Unfiltered data is displayed when search text is blank  
    If isAdmin Then  
        adapter = New OleDb.OleDbDataAdapter(adminCommand, conn)  
    Else  
        adapter = New OleDb.OleDbDataAdapter(userCommand, conn)  
    End If  
End If  
  
adapter.Fill(dataSet)  
logs_dataGrid.DataSource = Nothing  
logs_dataGrid.DataSource = dataSet.Tables(0)  
  
logsInit()  
  
End Sub  
  
'Gets the last reference ID  
Function getRefID() As String  
  
Dim refAdapter As OleDb.OleDbDataAdapter  
Dim refID As New DataSet  
  
refAdapter =  
    New OleDb.OleDbDataAdapter("SELECT refID FROM Logs", conn)  
refAdapter.Fill(refID)  
  
Return  
    (refID.Tables(0).Rows(refID.Tables(0).Rows.Count - 1).Item(0))  
  
End Function
```

```

Sub saveChanges()
    logs_dataGrid.EndEdit()

    'Updates cells
    If editedCells.Length > 0 Then
        Dim columnName As String
        Dim columnNumber As Short
        Dim rowNumber As Integer

        Dim refID As String
        Dim isComplete As Boolean
        Dim cost As Double
        Dim editedValue As String

        Dim updAdapter As New OleDb.OleDbCommand
        updAdapter.Connection = conn

        Dim count As Integer
        For count = 0 To editedCells.Length - 1
            columnNumber = editedCells(count).ColumnIndex
            rowNumber = editedCells(count).RowIndex
            refID = logs_dataGrid.Rows(rowNumber).Cells(0).Value
            columnName =
                dataSet.Tables(0).Columns(columnNumber).ColumnName

            'Using variables of appropriate type depending on the
            'column that needs to updated

            If columnNumber = 4 Then 'For numeric
                cost = logs_dataGrid. _
                    Rows(rowNumber). _
                    Cells(columnNumber).Value

                updAdapter.CommandText = _
                    ("UPDATE Logs SET [" & columnName & "] = " & cost & " " & _
                     "WHERE refID = '" & refID & "'")
            ElseIf columnNumber = 5 Then 'For boolean

                isComplete = logs_dataGrid. _
                    Rows(rowNumber). _
                    Cells(columnNumber).Value
                updAdapter.CommandText =
                    ("UPDATE Logs SET [" & columnName & "] = " & isComplete & " " & _
                     "WHERE refID = '" & refID & "'")
            Else 'For string

                editedValue = logs_dataGrid. _
                    Rows(rowNumber). _
                    Cells(columnNumber).Value
                updAdapter.CommandText = _
                    ("UPDATE Logs SET [" & columnName & "] = '" & editedValue & "' " & _
                     "WHERE refID = '" & refID & "'")
            End If
        Next
    End If
End Sub

```

```
        updAdapter.ExecuteNonQuery()

    Next

End If

'Adds new logs
If newRows.Count > 0 Then
    Dim insrtAdapter As New OleDb.OleDbCommand
    insrtAdapter.Connection = conn

    'Iterates through newRows adding each one into database
    Dim entry As New DictionaryEntry
    For Each entry In newRows

        Dim row As Windows.Forms.DataGridViewRow
        row = entry.Value

        'Sets default values if user left the field blank
        If row.Cells(1).Value.ToString = _
            DBNull.Value.ToString Then
            row.Cells(1).Value = "Untitled"
        End If
        If row.Cells(2).Value.ToString = _
            DBNull.Value.ToString Then
            row.Cells(2).Value = "Not Included"
        End If
        If row.Cells(3).Value.ToString = _
            DBNull.Value.ToString Then
            row.Cells(3).Value = "General"
        End If
        If row.Cells(4).Value.ToString = _
            DBNull.Value.ToString Then
            row.Cells(4).Value = 0
        End If
        If row.Cells(5).Value.ToString = _
            DBNull.Value.ToString Then
            row.Cells(5).Value = False
        End If

    'Inserts new log into database
    insrtAdapter.CommandText = ("INSERT INTO Logs " & _
        "([refID], " & _
        "[title], " & _
        "[description], " & _
        "[type], " & _
        "[Cost], " & _
        "[isComplete], " & _
        "[Date], " & _
        "[user_id]) " & _
        "VALUES ('" & getRefID() + 1 & "', " & _
        "'" & row.Cells(1).Value & "', " & _
        "'" & row.Cells(2).Value & "', " & _
        "'" & row.Cells(3).Value & "', " & _
        "'" & row.Cells(4).Value & "'")"

End If
```

```
    """ & row.Cells(5).Value & ", " &
    """ & Now.Date.ToShortDateString & ", " & _
    """ & userID & ");")  
  
    insrtAdapter.ExecuteNonQuery()  
  
    Next  
  
End If  
  
End Sub  
  
Private Sub save_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles save_button.Click  
  
    'Verify whether user intends to save changes  
    If confirmAction("Do you want to save changes?") Then  
        saveChanges()  
    End If  
  
    hasEdited = False  
    changePage()  
    ReDim editedCells(0)  
    newRows.Clear()  
  
End Sub  
  
Private Sub logs_dataGrid_CellContentClick _  
(ByVal sender As Object, ByVal e As  
System.Windows.Forms.DataGridViewCellEventArgs) _  
Handles logs_dataGrid.CellContentClick  
  
    If e.ColumnIndex = 5 Then  
        logs_dataGrid_CellEndEdit(logs_dataGrid, e)  
    End If  
  
End Sub  
  
'Keeps track of the edits the user has made  
Private Sub logs_dataGrid_CellEndEdit _  
(ByVal sender As Object, ByVal e As  
System.Windows.Forms.DataGridViewCellEventArgs) _  
Handles logs_dataGrid.CellEndEdit  
  
    hasEdited = True  
  
    'If edited cell was in a new row  
    If newRows.Contains(e.RowIndex) Then  
        Dim row As Windows.Forms.DataGridViewRow  
        row = newRows(e.RowIndex)  
        newRows.Remove(e.RowIndex)  
        newRows.Add(e.RowIndex, row)  
  
        'If edited cell was from an existing row  
    Else  
        Dim editedCell As New Cell
```

```
    editedCell.Column = e.ColumnIndex
    editedCell.Row = e.RowIndex

    editedCells(editedCells.Length - 1) = editedCell
    ReDim Preserve editedCells(editedCells.Length)
End If

End Sub

Private Sub logs_data_UserAddedRow _
(ByVal sender As Object, ByVal e As
System.Windows.Forms.DataGridViewRowEventArgs) _
Handles logs_dataGrid.UserAddedRow

hasEdited = True

'Keeps track of the new rows added
newRows.Add(e.Row.Index - 1, logs_dataGrid.Rows(e.Row.Index - 1))

'Fills in the data for 'date' and the 'userAdded' columns
logs_dataGrid.Rows(e.Row.Index - 1).Cells(6).Value = _
Now.Date.ToShortDateString
If userID = 0 Then
    logs_dataGrid.Rows(e.Row.Index - 1).Cells(7).Value = fullName
End If

End Sub

Private Sub resetPassword_button_Click _
(ByVal sender As System.Object, ByVal e As System.EventArgs) _
Handles resetPassword_button.Click

resetPassword_panel.Location = settings_panel.Location
settings_panel.Visible = False
resetPassword_panel.Visible = True

End Sub

Private Sub back_button_Click _
(ByVal sender As System.Object, ByVal e As System.EventArgs) _
Handles backResetPassword_button.Click

settings_panel.Location = resetPassword_panel.Location
resetPassword_panel.Visible = False
settings_panel.Visible = True

End Sub

Private Sub backChangeAdmin_button_Click _
(ByVal sender As System.Object, ByVal e As System.EventArgs) _
Handles backChangeAdmin_button.Click

settings_panel.Location = changeAdmin_panel.Location
changeAdmin_panel.Visible = False
settings_panel.Visible = True

End Sub
```

```
Private Sub changeadmin_button_Click _  
(ByVal sender As Object, ByVal e As System.EventArgs) _  
Handles changeadmin_button.Click  
  
    changeAdmin_panel.Location = settings_panel.Location  
    settings_panel.Visible = False  
    changeAdmin_panel.Visible = True  
  
    Dim allUsers As New DataSet  
    Dim adapter As New OleDb.OleDbDataAdapter _  
        ("SELECT name FROM Users " & _  
         "WHERE user_id <> '0' " & _  
         "ORDER BY name ASC ;", conn)  
  
    adapter.Fill(allUsers)  
  
    newAdmin_combo.Items.Clear()  
    newAdmin_combo.Text = "Choose New Admin"  
  
    Dim count As Integer  
  
    For count = 0 To allUsers.Tables(0).Rows.Count - 1  
  
        newAdmin_combo.Items.Add(allUsers.Tables(0).Rows(count).Item(0).ToString)  
  
    Next  
  
End Sub  
  
Sub changeAdmin()  
  
    Dim updAdapter As New OleDb.OleDbCommand  
    updAdapter.Connection = conn  
  
    Dim newAdminUserID As String  
    Dim newAdminName As String  
  
    Dim user As New DataSet  
    Dim adapter As New OleDb.OleDbDataAdapter _  
        ("SELECT user_id FROM Users " & _  
         "WHERE name = '" & newAdmin_combo.Text & "' ;", conn)  
    adapter.Fill(user)  
  
    If newAdmin_combo.Text <> "Choose New Admin" Then  
        newAdminName = newAdmin_combo.Text  
        newAdminUserID = user.Tables(0).Rows(0).Item(0)  
  
        'UserIDs are swapped with the admin and the chosen user  
        'so that the new user is recognized as admin  
        updAdapter.CommandText = _  
            ("UPDATE Users SET [user_id] = 'temp' " & _  
             "WHERE user_id = '0' ")  
        updAdapter.ExecuteNonQuery()  
  
        updAdapter.CommandText = _
```

```
        ("UPDATE Users SET [user_id] = '0' " &
         "WHERE name = '' & newAdminName & '')")
    updAdapter.ExecuteNonQuery()

    updAdapter.CommandText =
    ("UPDATE Users SET [user_id] = '' & newAdminUserID & '' & "
     "WHERE user_id = 'temp' ")
    updAdapter.ExecuteNonQuery()

    userID = newAdminUserID

    curPage = "Settings"
    changePage()
End If

End Sub

Private Sub doneChangeAdmin_button_Click _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles doneChangeAdmin_button.Click

    changeAdmin_panel.Visible = False

    'Verify whether user intends to change admin
    If confirmAction("Do you want to change the admin?") Then
        changeAdmin()
        changePage()
    Else
        'Returns to the 'change admin' page
        changePage()
        Dim obj As New Object
        changeadmin_button_Click(obj, New System.EventArgs)
    End If

End Sub

Private Sub doneResetPassword_button_Click _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles doneResetPassword_button.Click

    If oldPassword_text.Text = password And _
       newPassword_text.Text = reenterPassword_text.Text Then

        If confirmAction("Do you want to change the password?") Then
            Dim updAdapter As New OleDb.OleDbCommand
            updAdapter.Connection = conn

            updAdapter.CommandText =
                ("UPDATE Users SET " &
                 "[password] = '' & newPassword_text.Text & '' & "
                 "WHERE user_id = '' & userID & '')")
            updAdapter.ExecuteNonQuery()

            changePage()
        End If

    ElseIf oldPassword_text.Text <> password Then

```

```

        dialog("Incorrect Password")
    Else
        dialog("Passwords do not match")
    End If

End Sub

'Closes the form
Private Sub close_button_Click _
(ByVal sender As System.Object, ByVal e As System.EventArgs) _
Handles close_button.Click

    Me.Close()

End Sub

Private Sub login_button_Click _
(ByVal sender As System.Object, ByVal e As System.EventArgs) _
Handles login_button.Click

    If loginUserName_text.Text = "" Or loginPassword_text.Text = ""
Then
    dialog("Fill all the fields")
    Exit Sub
End If

Dim user As DataSet
Dim loginAdapter =
New OleDb.OleDbDataAdapter _
("SELECT user_id, username, password, name FROM Users " & _
"WHERE username= '" & loginUserName_text.Text & "' AND " & _
"password = '" & loginPassword_text.Text & "' ;", _
conn)

user = New DataSet
loginAdapter.Fill(user)

'Check if username password combination exists
If user.Tables(0).Rows.Count > 0 Then

    userID = user.Tables(0).Rows(0).Item(0)
    userName = user.Tables(0).Rows(0).Item(1)
    password = user.Tables(0).Rows(0).Item(2)
    fullName = user.Tables(0).Rows(0).Item(3)

    If userID = 0 Then
        isAdmin = True
    Else
        isAdmin = False
    End If

'Extracts first name from full name
Dim firstName As String
firstName = fullName.Remove(fullName.IndexOf(" "), _
(fullName.Length) - fullName.IndexOf(" ")))

```

```
name_button.Text = firstName  
displayedFullName_label.Text = fullName  
displayedUserName_label.Text = userName  
  
'Opens connection to database  
conn.Open()  
  
curPage = "Home"  
changePage()  
Else  
    dialog("Incorrect username password combination")  
    loginPassword_text.Text = ""  
End If  
  
End Sub  
  
'Logs out  
Private Sub logout_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles logout_button.Click  
  
loginPassword_text.Text = ""  
logout_panel.Visible = False  
nav_panel.Visible = False  
  
'Closes connection to database  
conn.Close()  
  
curPage = "Login"  
changePage()  
  
End Sub  
  
Private Sub confirmAction_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles confirmAction_button.Click  
  
confirm = True  
  
End Sub  
  
Private Sub denyAction_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles denyAction_button.Click  
  
deny = True  
  
End Sub  
  
Private Sub nav_button_Click _  
(ByVal sender As System.Object, ByVal e As System.EventArgs) _  
Handles nav_button.Click  
  
If nav_panel.Visible Then  
    nav_panel.Visible = False
```

```
Else
    nav_panel.Visible = True
End If

End Sub

Private Sub name_button_Click _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles name_button.Click

    If logout_panel.Visible Then
        logout_panel.Visible = False
    Else
        logout_panel.Location = New Point _
            ((Me.Size.Width) - (110), _
             name_button.Location.Y + 40)
        logout_panel.Visible = True
    End If

End Sub

Private Sub ok_button_Click _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles ok_button.Click

    confirm = True

End Sub

Private Sub newUser_button_Click _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles newUser_button.Click

    newUser_panel.Location = settings_panel.Location
    settings_panel.Visible = False
    newUser_panel.Visible = True

End Sub

Private Sub backNewUser_button_Click _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles backNewUser_button.Click

    settings_panel.Location = newUser_panel.Location
    settings_panel.Visible = True
    newUser_panel.Visible = False

End Sub

'Validates new user
Function validateNewUser() As Boolean

    'Checks if any field is left blank
    If newUserFirstName_text.Text = "" Or _
        newUserLastName_text.Text = "" Or _
        newUserUsername_text.Text = "" Or _
        newUserPassword_text.Text = "" Then
```

```
dialog("Fill all the required fields")
    Return False
End If

'Checks if username already exists
Dim userNameAdapter As OleDb.OleDbDataAdapter
Dim UserName As New DataSet

userNameAdapter = New OleDb.OleDbDataAdapter _ 
    ("SELECT username FROM Users WHERE username=''" & newUsername_text.Text & "'", conn) -
userNameAdapter.Fill(userName)

If userName.Tables(0).Rows.Count > 1 Then
    dialog("Username already exists")
    Return False
End If

Return True

End Function

'Gets the last User ID
Function getUserId() As String

Dim userAdapter As OleDb.OleDbDataAdapter
Dim userID As New DataSet

userAdapter = New OleDb.OleDbDataAdapter _ 
    ("SELECT userID FROM Users", conn)
userAdapter.Fill(userID)

Return _
(userID.Tables(0).Rows(userID.Tables(0).Rows.Count - 1).Item(0))

End Function

'Inserts new user into the database
Private Sub doneNewUser_button_Click _ 
    (ByVal sender As System.Object, ByVal e As System.EventArgs) _
    Handles doneNewUser_button.Click

If validateNewUser() Then
    Dim fullName As String
    fullName = (newUserFirstName_text.Text + " " +
        newUserLastName_text.Text)

    Dim insrtAdapter As New OleDb.OleDbCommand
    insrtAdapter.CommandText = ("INSERT INTO Users " & _
        "[userID], " & -
        "[name], " & -
        "[username], " & -
        "[password]) " & -
        "VALUES ('" & getUserId() + 1 & "", " & -
        "" & fullName & ", " & -
        "" & newUsername_text.Text & "", " & _
```

```
        """) & newUserPassword_text.Text & "');")
    insrtAdapter.ExecuteNonQuery()
End If
End Sub

'Opens a PDF containing the user manual
Private Sub help_button_Click _
(ByVal sender As Object, ByVal e As System.EventArgs) _
Handles help_button.Click

System.Diagnostics.Process.Start _
(((Application.StartupPath.ToLower _
    .Replace("\bin\debug", "") _
    + "\User Manual.pdf"))

End Sub

End Class
```

DBINIT.VB**Module dbInit**

```
Public conn As New OleDb.OleDbConnection _
    ("Provider=Microsoft.ACE.OLEDB.12.0;" & _
    "Data Source=Z:" & _
    "\Maintanance System" & _
    "\Application" & _
    "\Database.accdb;")
```

End Module

Database

Users

Field Name	Data Type	Description
user_id	Text	Unique identifier for each user
username	Text	Self assigned ID used to login
password	Text	A confidential string of characters used to authorize login
name	Text	Full name of the user

Logs

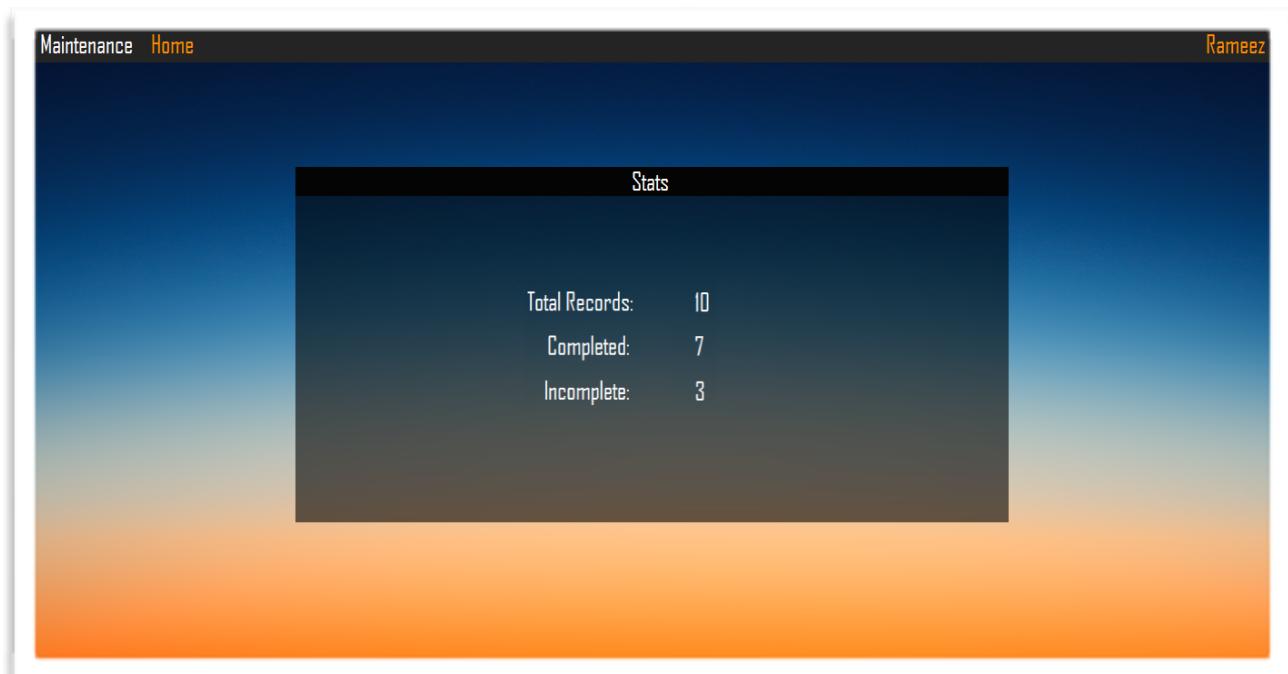
Field Name	Data Type	Description
refID	Text	Unique ID given to each maintenance log
title	Text	A name that briefly describes the maintenance logs
description	Memo	Details pertaining to the log
isComplete	Yes/No	Boolean value stating whether the issue has been taken care of
type	Text	Category of the log
user_id	Text	UserID of the user who added the log
Date	Text	Date the log was added
Cost	Number	Total expenditure

Screens

Login



Home



Logs

Maintenance Logs

Save

Rameez

Title	Description	Type	Cost	Completed	Date	User Added
UPS	UPS in the IT Lab has a defective battery	IT		<input type="checkbox"/>	2/23/2015	Anaoha Rarammadathil
Water cooler	Water cooler only dispenses warm water	General		<input type="checkbox"/>	2/1/2015	Andrew Trow
Bunsen Burner	Bunsen Burner in the chemistry lab is blocked with soot	Lab		<input type="checkbox"/>	1/9/2015	Vedanth Ashok
Bus Broke Down	Bus broke down due to engine failure	Transoort		<input checked="" type="checkbox"/>	2/29/2015	Anaoha Rarammadathil
Tyre Puncture	Tires of the school transoort are in need of repair	Transoort		<input checked="" type="checkbox"/>	2/27/2015	Rameez Rafeeo
Pipe Leak	Bathroom pipes in the boys hostel are leaking	Bathroom		<input checked="" type="checkbox"/>	2/25/2015	Vedanth Ashok
Projector	Remote used to operate projector does not have batteries	IT		<input checked="" type="checkbox"/>	2/4/2015	Shankar Ramaswamy
Network	Network server in the IT lab is down	IT		<input checked="" type="checkbox"/>	1/9/2015	Rameez Rafeeo
Chair	Shortage of chairs in room 14	Class		<input checked="" type="checkbox"/>	1/5/2015	Andrew Trow
Fans	One fan in room 24 does not work	Class		<input checked="" type="checkbox"/>	1/11/2015	John Pnadalath
*				<input type="checkbox"/>		

Settings

Maintenance Settings

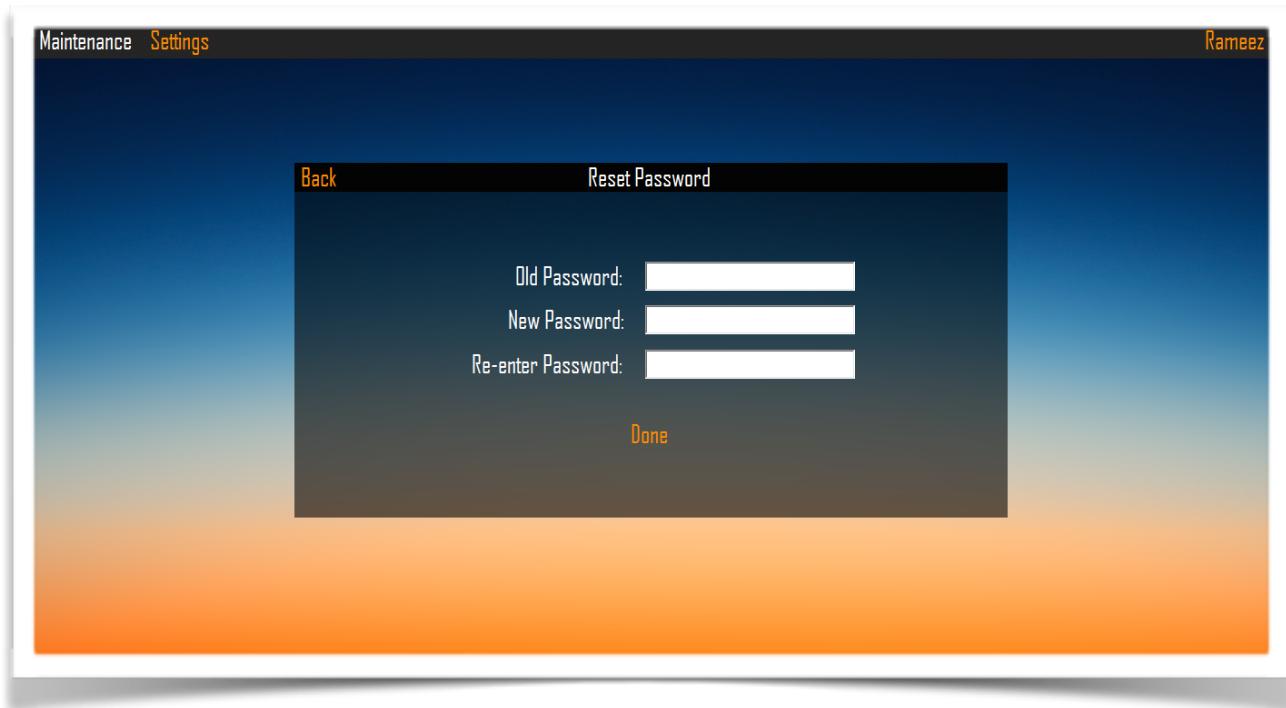
Rameez

Settings

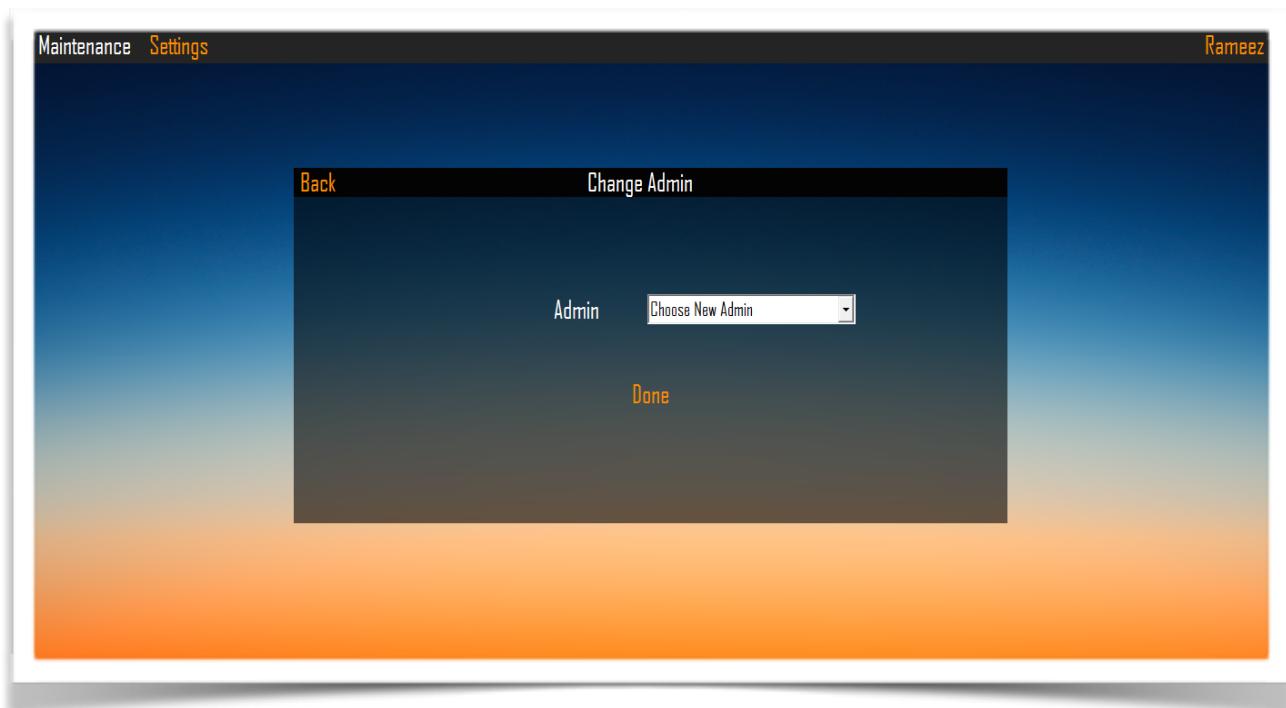
Name:	Rameez Rafeeq
UserName:	shadowrameez
Password:	Reset Password

New User Change Admin Help

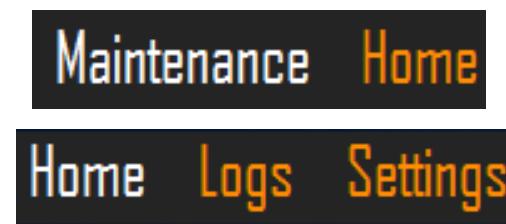
Reset Password



Change Admin



New User

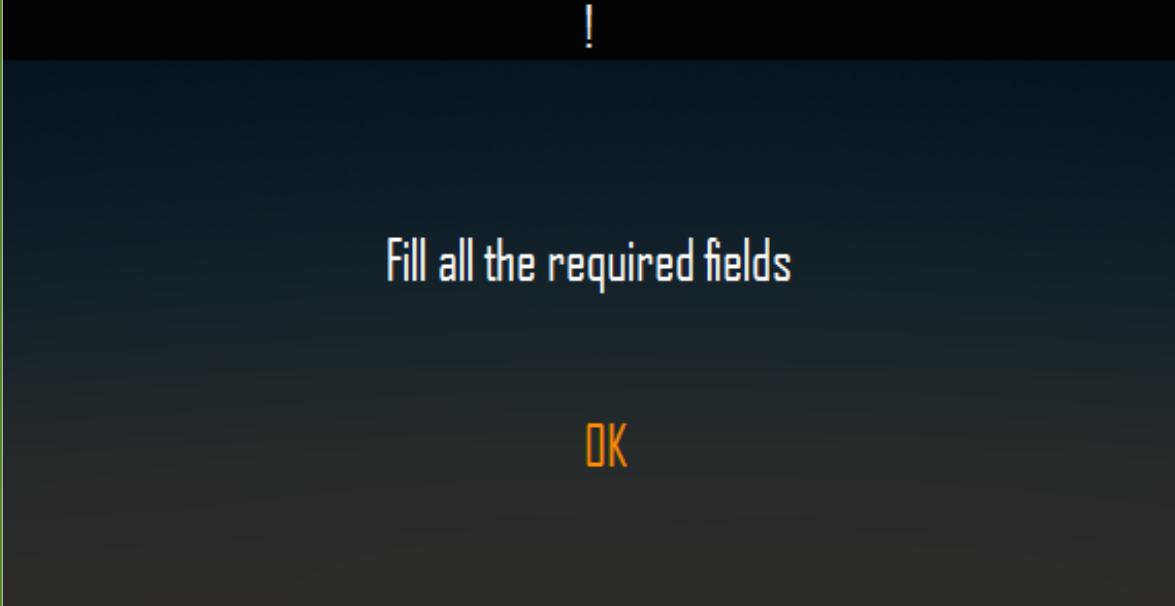
Navigation

Testing

Aim

To check if all parts of the software work as it were intended to. Due to clean input and output design of this software, black box testing is ideal.

Login

No	Test	Test Data	Expected Output	Pass
1	Check if blank username or password is accepted	Blank text	A dialog should appear asking the user to fill in the necessary details	Yes
Output		 Fill all the required fields OK		
2	Check if invalid username and password combination is accepted	Invalid username and password	A dialog should appear telling the user that an incorrect username or password has been entered.	Yes

No	Test	Test Data	Expected Output	Pass
Output			! Incorrect username password combination OK	
3	Check if valid username and password combination is accepted.	Valid username and password	The page is changed from 'Login' to 'Home'.	Yes
Output	Maintenance Home			Rameez

Home

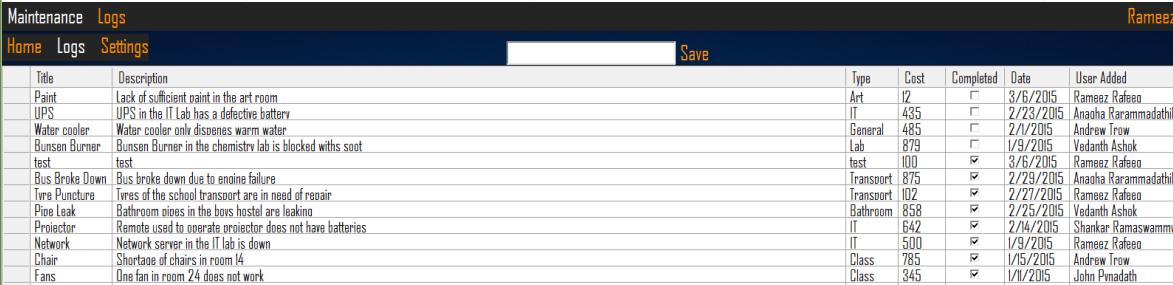
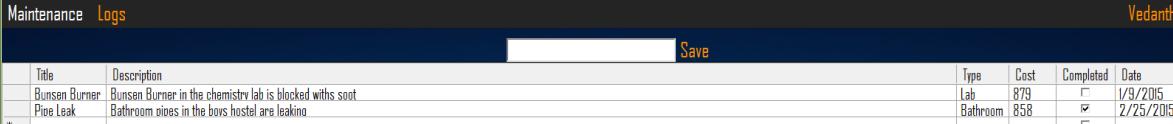
No	Test	Test Data	Expected Output	Pass
1	Check if the user's name is displayed on the top right corner	Name of the user logged in	The button <code>name_button</code> should contain the user's name.	Yes

No	Test	Test Data	Expected Output	Pass
				Rameez
Output				
2	Check if an overview of the logs contained in the database show.	None	A panel should be visible showing the total logs, the number of completed logs and the incomplete logs.	Yes

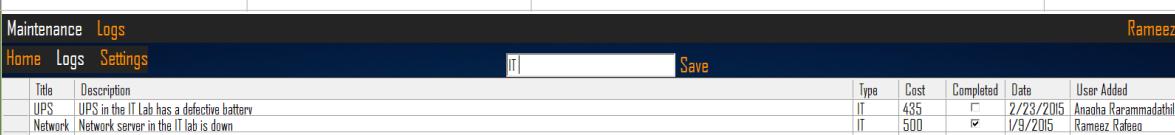
Overview

Total Records:	12
Completed:	8
Incomplete:	4

Logs

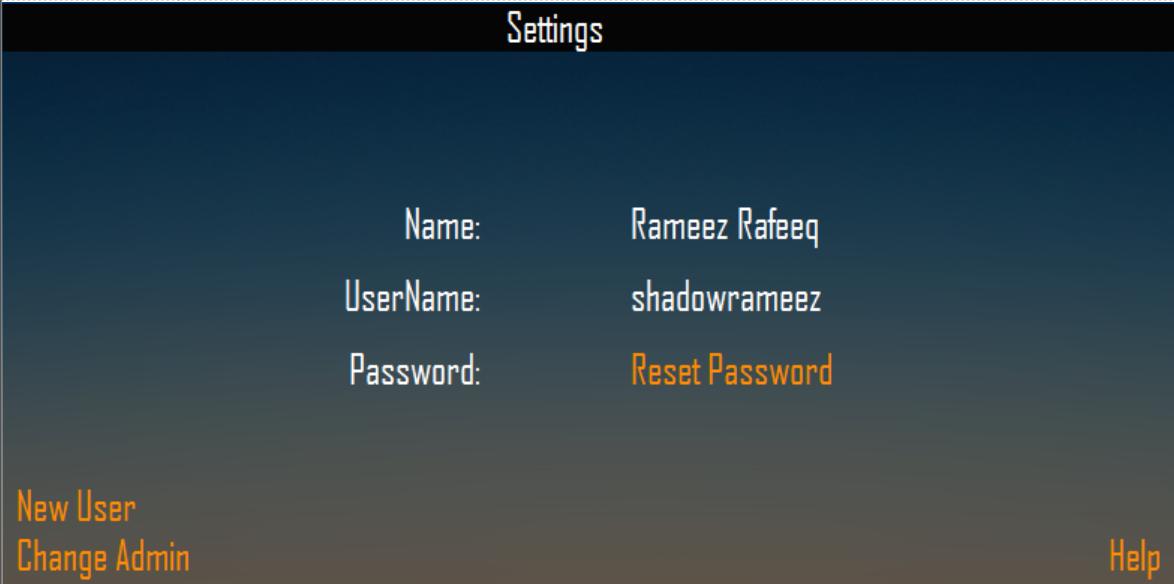
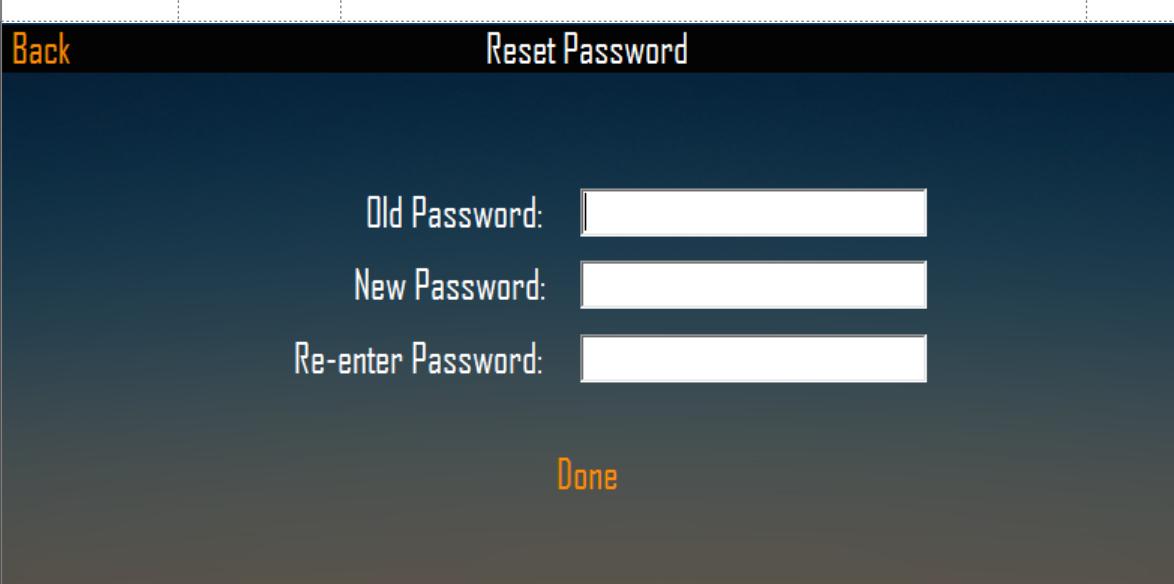
No	Test	Test Data	Expected Output	Pass
1	Check if the user can view the logs	None	DataGrid that is populated with logs should be visible.	Yes
				Rameez
Output				
2	Check if logs only pertaining to the user who is currently logged in is visible	Valid User Login	DataGrid should only show the logs that were previously added by the user	Yes
				Vedanth
Output				
3	Check if all logs are visible when the admin is logged in	Valid Admin Login	DataGrid should be populated with all the logs from the database regardless of the user who added it.	Yes

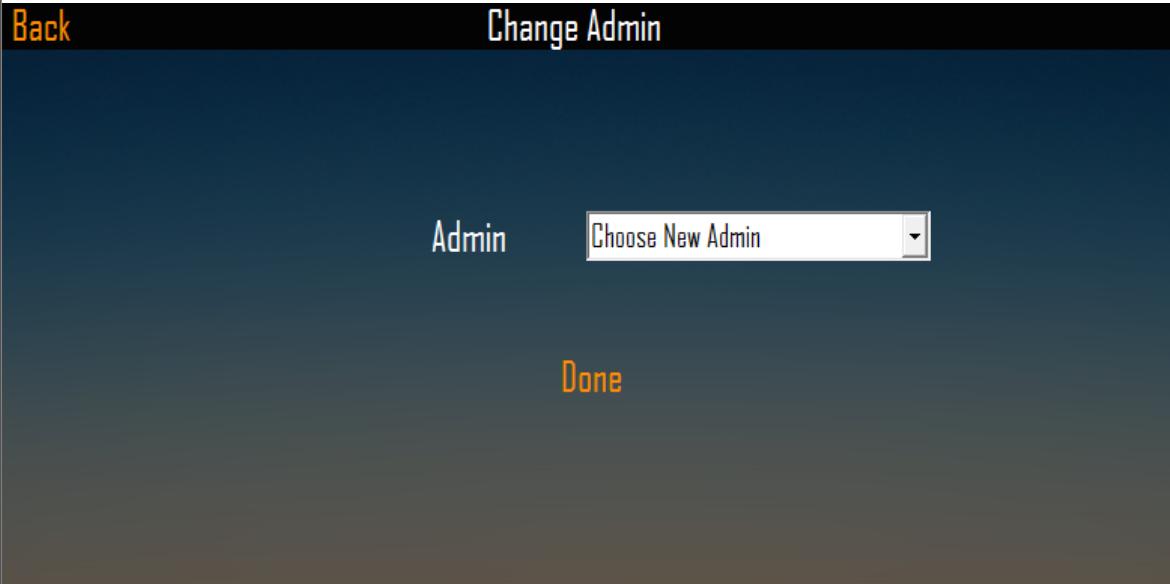
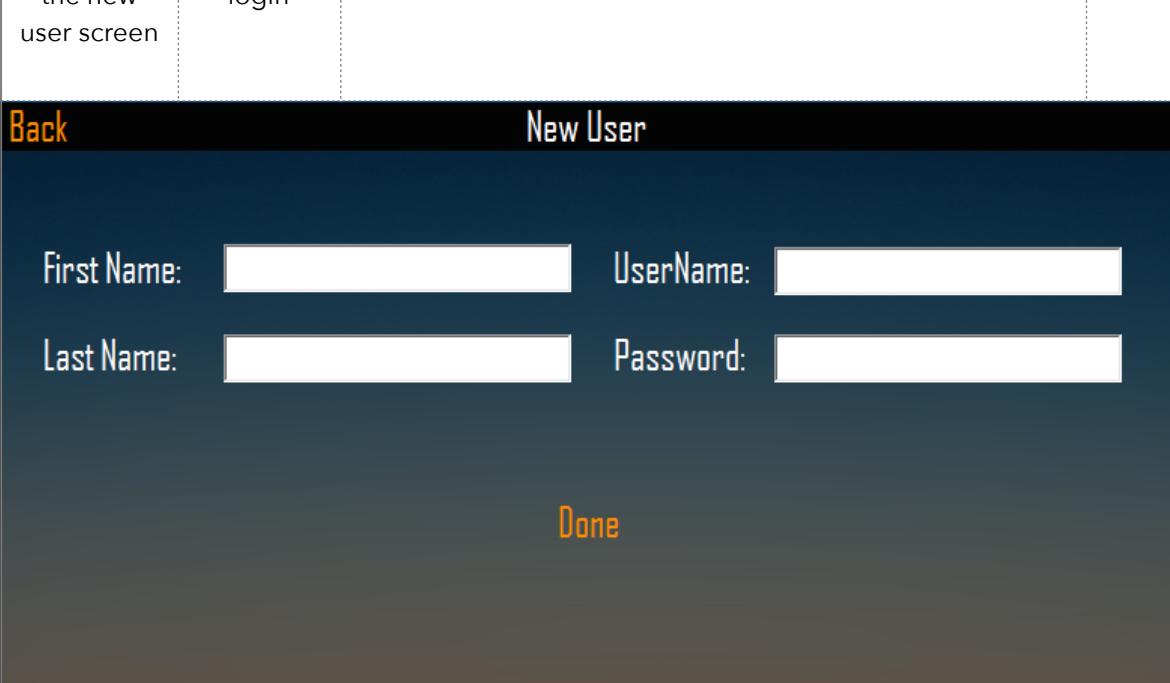
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Output																																																																																															
5	Check if user is able to edit the existing records	None	The user is able to edit details of an existing row of the DataGridView.	Yes																																																																																											
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No	Test	Test Data	Expected Output	Pass
6	Check if confirmation dialogue is shown	None	Once the user has made changes on the DataGridView, a dialog is shown asking the user whether he wishes to save changes when the user is clicks on the save_button or when he changes the page without clicking on the save_button .	Yes
				
7	Check if the user can search through data	None	When the user types into the search text, the DataGridView should refresh showing the filtered data.	Yes
				
8	Check if the user is able to sort the data	None	When clicked on one of the column headers of the DataGridView, the user should be able to sort data by that column.	Yes

No	Test	Test Data		Expected Output	Pass
Output	Type	Cost	Completed		
	Art	12	<input type="checkbox"/>		
	Transoort	102	<input checked="" type="checkbox"/>		
	test	123	<input type="checkbox"/>		
	Class	345	<input checked="" type="checkbox"/>		
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	Transoort	875	<input checked="" type="checkbox"/>		
	Lab	879	<input type="checkbox"/>		
	test edit	999	<input type="checkbox"/>		

Settings

No	Test	Test Data	Expected Output	Pass
1	Check if user details are displayed.	The full name and username of a user	A panel should be visible containing labels which display the current user's full name and username.	Yes
			 <p>Settings</p> <p>Name: Rameez Rafeeq User Name: shadowrameez Password: Reset Password</p> <p>New User Change Admin Help</p>	
2	Check if the user is able access the change password screen	None	When clicked on Reset Password, the user should be presented with a prompts to change password.	Yes
			 <p>Back Reset Password</p> <p>Old Password: <input type="text"/></p> <p>New Password: <input type="text"/></p> <p>Re-enter Password: <input type="text"/></p> <p>Done</p>	

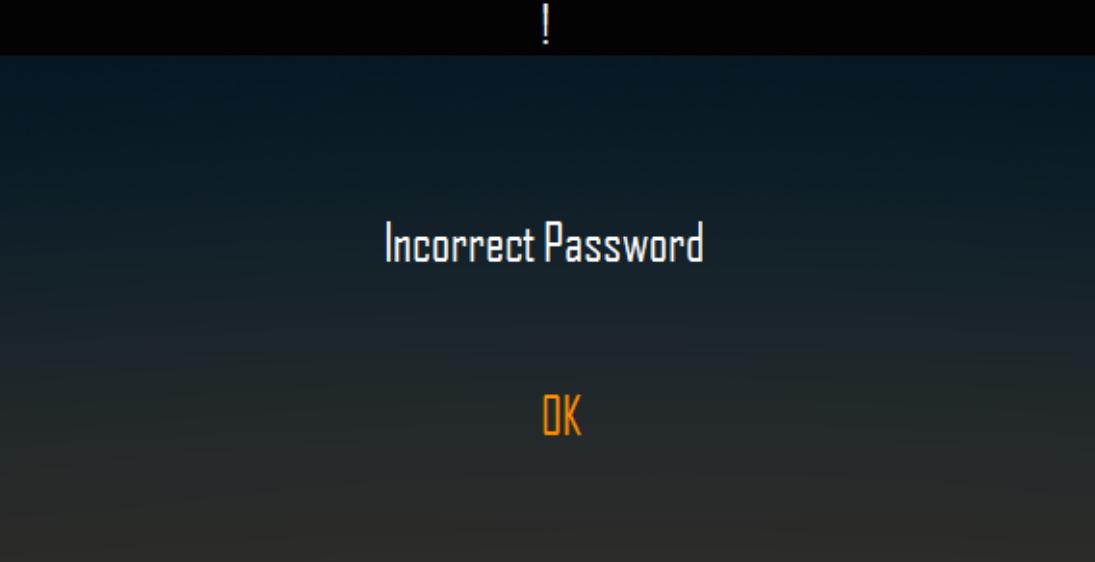
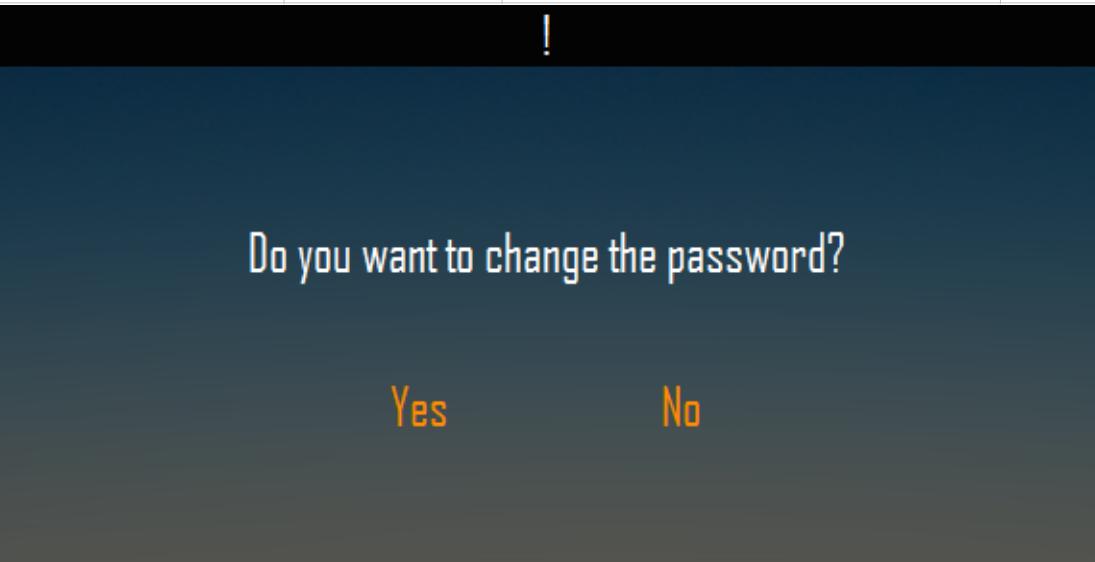
No	Test	Test Data	Expected Output	Pass
3	Check if the admin is able access the change admin screen	Valid Admin Login	When clicked on Change Admin, the user should be presented with a prompts to change the admin to another user.	Yes
				
Output				
4	Check if the admin is able access the new user screen	Valid admin login	When clicked on New User, the user should be presented with a prompts to change the admin to another user.	Yes
				
Output				

No	Test	Test Data	Expected Output	Pass
5	Check if the User Manual can be accessed	None	User Manual should open up in the default PDF viewer	Yes

iMaintenance

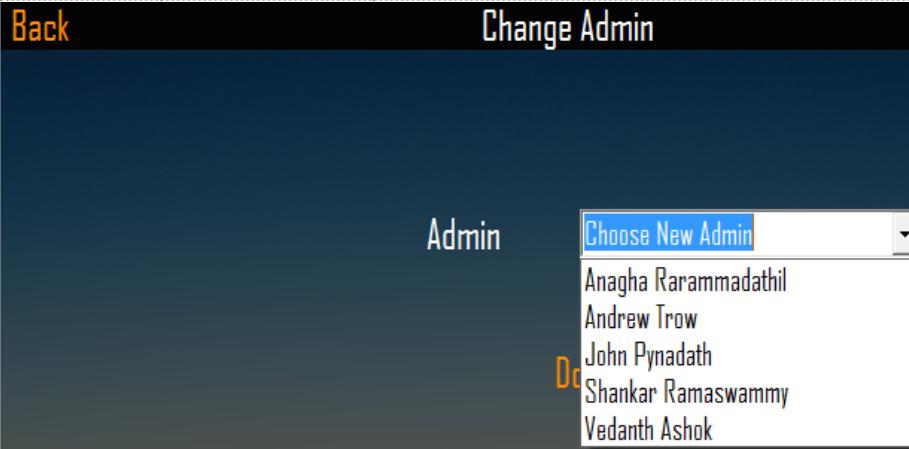
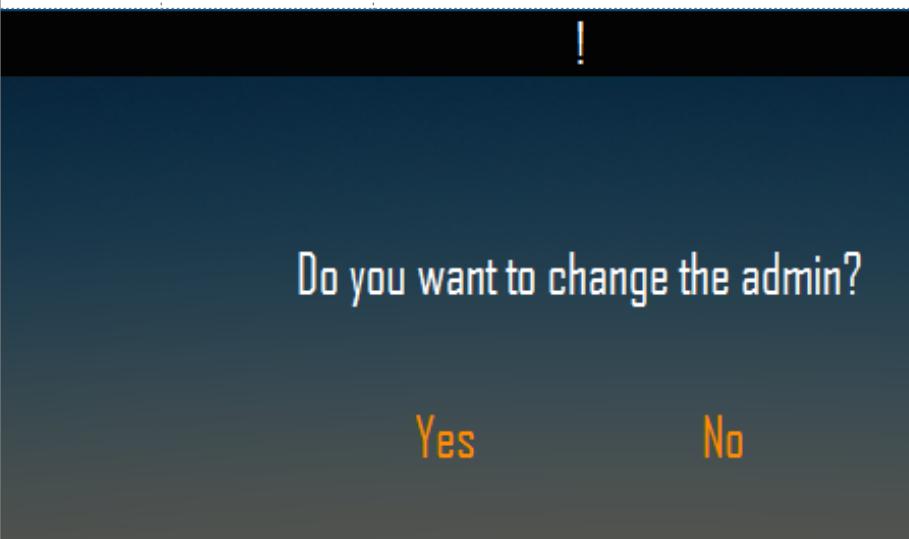
User Documentation

Change Password

No	Test	Test Data	Expected Output	Pass
1	Check if incorrect current password is entered	Incorrect password	A dialog should pop up saying incorrect password has been entered	Yes
				
2	Check if valid current password is entered	Valid password	If the current password matches with username of the user logged in and if the entered new passwords match, the password is changed of the user should be updated in the database	Yes
				
3	Check if the new passwords that don't match are accepted	Mismatched strings of characters	A dialog should pop up saying that the passwords do not match	Yes

No	Test	Test Data	Expected Output	Pass
Output			!	
4	Check if the new passwords that match are accepted	Matching strings of characters	If the current password matches with username of the user logged in and if the entered new passwords match, the password is changed of the user should be updated in the database	Yes
Output			!	
			Do you want to change the password?	
			Yes No	

Change Admin

No	Test	Test Data	Expected Output	Pass
1	Check if the comboBox correctly populated	List of users in the database The current admin	The comboBox should contain the names of all the users registered except the admin.	Yes
				
2	Check if the admin is able to change admins	Valid Admin Login	After the admin has selected a user who is to be the next admin and click on Done, the current admin loses his privileges while the selected user gains admin privileges.	Yes
				

New User

No	Test	Test Data	Expected Output	Pass
1	Check if all details are entered	Valid Admin Login New user details	A dialog should pop up asking to fill in all the required fields	Yes
Output		 Fill all the required fields		
2	Check if existing username is accepted	Valid Admin Login An existing username	A dialog should pop up saying the username already exists	Yes
Output		 Username already exists		

Implementation

User Testing

The completed software was shown to Mr. Shankar, the client. Functionality and usage were explained to him including the benefits and limits of this software.

Interview

Interview (16/12/2014)

Trevor: Good morning

Mr Shankar: Morning, Trevor

Trevor: I would like to finalize the development of the program I have been working on.

Mr Shankar: Alright, So can I look at the software now?

Trevor: Yes, But before that, please consider going through the user manual. It will be really helpful in understanding and operating the interface.

Mr Shankar: I'd rather just go through the software and learn by experience. I will go through the manual later if I have any trouble.

Trevor: All right then

(Mr Shankar explores the software)

Mr Shankar: Great work. I really like the minimalistic interface, it's very clean.

Trevor: Thank you. Now that you have gone through software, would I be right to conclude that all the initial requirement are satisfied?

Mr Shankar: Yes, I do believe all requirements have been met.

Trevor: Are there any improvements you would like to suggest?

Mr Shankar: I think a way to print out the logs displayed on screen would be a nice addition. Other than that, I am quite satisfied with it. The features implemented are perfect.

Trevor: Thank you. Since you are very much satisfied with the software, do you mind if giving me an official letter of approval?

Mr Shankar: Of course. Is it alright if I give it to you sometime next week?

Trevor: That wouldn't be a problem. Thank you.

Mr Shankar: You are welcome.

System Changeover

Parallel implementation: This method of implementation would be the most apt. Considering how the maintenance logs play an important role in the school's finance, it is better to take the safe route. For the first few weeks, logs will be maintained both on the software and handwritten on the ledger. Once it has been confirmed that the software is devoid of bugs, a complete changeover can take place.

Appropriateness of Structure and Exploitation of Available Resources

Hardware Used

- Display
1280x720, 16:9
- Keyboard
QWERTY Keyboard
- Mouse
Two button mouse with scroll wheel
- 1 GB RAM
- 1GHz Intel Core 2 Duo
- Windows 7

Software Used

Operating System: Windows 7

IDE: Visual Studio 2005

Programming Language: VisualBasic.Net 2005

Database Software: 2010

Problem Log

5 October 2014: During the development phase, I had originally intended on creating a new variation of the Data Grid View that had a variety of features, design flexibility and was much more aesthetically consistent with the design than the built-in Data Grid View. While implementing this, I realized the school computer which lacked a discreet graphic processing unit was unable to repaint the control on resize. Due to this, I had to settle for using the built-in Data Grid View. This was a waste of 3 days.

12 November 2014: While annotating the code, I noticed a couple of cases where the code was redundant and also not optimal. I took me 2 days to fix this.

Evaluation

Success in Meeting the Original Objectives

All requirements put forward by the client has been incorporated into the software. Evidence of this can be found in the test plan.

Requirement Specification

- Login
- Home
 - Overview of logs
- Logs
 - View logs
 - View all logs (Admin only)
 - Sort logs
 - Filter logs
 - Add new logs
 - Edit existing logs
- Settings
 - Help
 - Change password
 - Change admin (Admin only)
 - Create a new user (Admin only)

Evaluation of User's Response To The System

The client was very satisfied with the final software and all of the requirements have been met. The user had thoroughly gone through the system checking inputs and outputs and reported no fault. A review letter with acceptance from Mr. Shankar was sent a week after implementation. The letter itself is attached in the next page.

The client also gave a couple of suggestion for future versions of the software such as the ability to print and the ability to backup and archive.

Desirable Extensions

- Ability print the logs on screen.
- Built in feature to archive data older than a set period of time.
- Optimizing the program for multi-core processors using threads.
- Provision to make changes to the user data.