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| --- | --- | --- | --- |
| **Qualification details** | | | |
| **Training Package Code and Title** | ICT - Information and Communications Technology (Version 8.0) | | |
| **Qualification National Code and Title** | ICT50220 Diploma of information Technology (Release 2) | **State code** | BGJ4 |
| **Assessment Title** | Assessment Project Three (Individual Project) | | |
| **Unit National Code & Title** | ICTPRG535 Build advanced user interfaces | | |
| ICTPRG547 Apply advanced programming skills in another language | | |
| ICTICT517 Match ICT needs with the strategic direction of the organisation | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Date Due** | Week Eighteen | | **Date Received** | |  | |
| **Student Name** |  | | | | | |
| **Student Declaration** | I declare that the evidence submitted is my own work: | | | | | |
| **Assessor Name** | Poorav Sharma 30045900 | | | | | |
| **Assessment Decision** | Satisfactory | | | Not Yet Satisfactory | | |
| **Assessor Signature** |  | | | **Date** | |  |
| **Is student eligible for reassessment (Re-sit)?** | No | Yes | | **Re-assessment Date:** | | Week Twenty |

|  |  |  |  |
| --- | --- | --- | --- |
| **Feedback to student** | | | |
| *Via Blackboard (LMS) – Please check [Grade] section.* | | | |
| **Feedback from student** | | | |
| *Via Blackboard (LMS) – Please use [Comment] section during submission.* | | | |
| **Student signature** |  | **Date** |  |

|  |  |
| --- | --- |
| **Assessment Instructions** | |
| **TO THE ASSESSOR** |  |
| Type of Assessment | Individual Project |
| Duration of the assessment | 6 class sessions (Weeks 13-18) |
| Location of assessment | Classroom |
| Conditions | Assessor to ensure that the noise levels, natural interactions and time variances are maintained as it would be in the Software Development industry.  Learners are required to complete the required tasks in class and submit the required documentation electronically via Blackboard |
| Elements and Criteria | As detailed in the assessment plan  You are required to make sure that all students meet the elements, performance criteria and oral communication items as outlined in the provided solution |
| **TO THE STUDENT** |  |
| Purpose of Assessment | You are required to show you can:  ICTPRG535 Build advanced user interfaces   * Plan and design a UI solution according to organisational requirements, * Apply interactions designs and implement validation requirements against the design plan, * Create and display the UI with graphics according to UI requirements.   ICTPRG547 Apply advanced programming skills in another language   * Code advanced data structures using hashing, sorting and searching algorithms, * Apply third party libraries and communication technologies for data exchange, * Test and evaluate the code to resolve logical and syntactical designs flaws, * Create and document the application according to technical specifications.   ICTICT517 Match ICT needs with the strategic direction of the organisation   * Interpret, analysis and report the strategic organisational plan * Propose and document changes for the implementation of a ICT system * Provide action plan and schedule   The student must demonstrate the ability to complete the tasks outlined in this assessment and is expected to use systematic analytical processes and effect time management to meet the goals/deadlines outlined in the DAP. |

|  |  |
| --- | --- |
| Allowable Materials | Blackboard Topics, SDLC, Weekly readings (PDF), Example programs and Independent Outside of Class Activities |
| Required Resources | Web links and example code can be downloaded from the Blackboard portal.  PC with Notepad++, Visual Studio, GitHub, MSOffice.  Internet Access to GitHub and www.citems.com.au/ |
| Reasonable Adjustment | In some circumstances, adjustments to assessments may be made for you. If you require support for literacy and numeracy issues; support for hearing, sight or mobility issues; change to assessment times/venues; use of special or adaptive technology; considerations relating to age, gender and cultural beliefs; format of assessment materials; or presence of a scribe you need to inform your lecturer. |
| Assessment Submission | All questions and programming activities must be attempted. All written answers must be submitted in this assessment document in the appropriate space.  Use of research tools and peers in formulating answers are acceptable – but work submitted must be your own work.  Final project documentation is to be uploaded to the appropriate area in the Blackboard course created for this unit.  If you are marked as NYS (Not Yet Satisfactory) on your first attempt, you will be provided with another opportunity to re-attempt the assessment. |
| Portfolio Description | A project of web coding tasks and written questions which should be completed in class and finished in the students’ own time on a weekly basis as per the Delivery and Assessment schedule.  Question 1 – Project Specification  Question 2 – Strategic Objectives Evaluation  Question 3 – Design Approval  Question 4 – General Form Programming Criteria  Question 5 – Admin Form Programming Criteria  Question 6 – Testing and Code Optimisation  Question 7 – Implementation Plan  Question 8 – Demonstration, Feedback and Signoff |

# Scenario

You are employed as the Senior Programmer with CITE Managed Services, and you have been assigned the Master File Project for an organisation called Malin Space Science Systems (MSSS). This project will require the planning and development of a multi-form application that will manage the staff details for the MSSS organisation. Ensure your development follows an Agile methodology that is recorded and maintained using your GitHub account. The details and criteria are provided in the following paragraphs.

You should consult with the CITE representative (your Lecturer) if you are unsure about any of the problems or questions in this assessment. Your primary research should focus on the resources on the Blackboard LMS and CITE web site, additional information can be collected from the Internet, ensure all sources are referenced in your submission. You must demonstrate your working applications before uploading to Blackboard, your Lecturer (Assessor) will sign off to ensure all the criteria are satisfied.

## Organisational Background

The staff at Malin are required to use their unique ID to gain access to all the facilities within the Malin organisation. All staff are issued a mobile phone and laptop as part of their employment conditions and induction training; this ensures they can work from any location utilising hot-desks and 5GHz Wi-Fi. The management at Malin’s ICT Security use the mobile phone numbers as the unique staff ID for login to security doors, science buildings, communication and system servers. Therefore, when a staff member arrives at work, they will use their staff mobile number to gain entry into any building. Once they connect their laptop at a hot-desk they will logon to the computer network using the same mobile phone number.

The list of staff names and mobile numbers is stored on a secure cloud server in a Dictionary data structure, which is separate to the encrypted password server that manages the passwords and monitoring systems. Since the original company was founded in London all mobile phones are issued using UK digits, so mobile numbers are 9 digits starting with 07xxx, however the leading zero has been removed. Your application is to be a temporary solution whilst the development team are working on a global system that incorporates a single sign-on and biometric authentication. However, your solution is expected to be included in the global system.

## Application Requirements

Malin Space Science Systems requires a Windows Application which loads data from a .csv file into a read only list box display. The user can then filter the data into a second listbox for further examination. When a record is selected from the second listbox the details are displayed in several related text boxes. The filter must be able to find and display partial results for both the ID number and the staff name. The Create, Update and Delete features must be performed in a second form which has a secure gateway. The Create option must prevent duplicate ID numbers, while the Update and Delete option must have a confirmation message (Status Strip) and roll back. If a record is selected in the first general form and requires amendment the authorised user can open the second admin form which will receive the data from the first general form. Refer to the following basic flowchart for UI actions and information flow. The full programming criteria are listed in Question 4 and 5.

This assessment is a demonstration of a keyboard driven application; therefore all actions must utilise the Alt, Ctrl and CharKey combinations.

## UI Flowchart

**Start**

**End**

**Load data from Excel**

**Open General Form Display data in Listbox 1**

**Open Admin Form**

**Filter Data**

**Display in Listbox 2**

**Display data from Textbox**

**Select and Display one data record**

**Enter ID for Display**

**Perform Edit Operations**

**Save Data and Close Admin Form**

**No Data Found**

## Question 1 Project Specification

Provide a suitable description/explanation for each client requirement and UI actions and then insert your proposed UI design with labels that highlight all the major features for each form. Complete the following Project Specification template to answer this question.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Project Specification | | | | |
| Developer Name | Poorav Sharma | | Date | 14/11/2022 |
| Application Requirements | | | | |
| Requirements | | Description | | |
| List box | | Loads the contents from the .csv & shows filtered Name and ID | | |
| Text Box | | Text box for name and ID to search for specific person and display their contents | | |
| Form guide | | A form guide for the user so that they can navigate and use the form. | | |
|  | |  | | |
|  | |  | | |
|  | |  | | |
| UI Specification General Form | | | | |
| Specification | | Description | | |
| Filter list box | | Filter the list box in live time | | |
| Keyboard shortcut | | Create keyboard shortcut for user to use. | | |
|  | |  | | |
|  | |  | | |
| UI Design Diagram General Form | | | | |
| How will the client application look and what GUI specifications are required? | | | | |
| UI Specification Admin Form | | | | |
| Specification | | Description | | |
| textbox | | Display the selected staff information | | |
| Create | | Create new staff information | | |
| Update | | Update staff information | | |
| Delete | | Delete staff information | | |
| UI Design Diagram Admin Form | | | | |
| How will the client application look and what GUI specifications are required? | | | | |

Question 2 Strategic Objectives Evaluation

Read the Organisational Background and Application Requirements for Malin Space Science Systems and answer the following questions. In this review you will highlight the current system and then formulate proposed changes your solution could have on the MSSS organisation. Complete the following Strategic Objectives Evaluation template to answer this question.

|  |  |  |  |
| --- | --- | --- | --- |
| Strategic Objectives Evaluation | | | |
| Project Name: | Malin\_Staff\_Names | | |
| Developer Name | Poorav Sharma | Date | 14/11/2022 |
| Current System Status | | | |
| List the ICT conditions for staff at MSSS?  The staff at Malin are required to use their unique ID to gain access to all the facilities within the Malin organisation. All staff are issued a mobile phone which acts as the unique staff ID for login to security doors, science buildings, communication, and system servers. | | | |
| What are the current working conditions for staff at MSSS?  All staff are issued a mobile phone and laptop as part of their employment conditions and induction training. This ensures that they can work from any location utilising hot-desks and 5GHz Wi-Fi. | | | |
| List the current security protocols used by staff at MSSS?  When staff member arrives at work, they must use their staff mobile number to enter any building and system servers. | | | |
| What Professional Development is offered for staff at MSSS?  Malin is trying to go global in the future. This means that the staff will have the opportunity to work and train new branches in different countries. | | | |
| Proposed Changes | | | |
| List the effects of the proposed changes for the staff at MSSS?  The proposed changes will allow the staff to change or update their ID and name for what every reason. Staff that has quite Malin will have their ID and name deleted from the system so that they have so access to it anymore. | | | |
| List possible difficulties of the proposed changes for the staff at MSSS?  The main difficulties that will be faced due to the proposed changes for the staff at MSSS is getting used to the new form and how to use it. | | | |
| How might you schedule the implementation of the proposed changes?  Before the proposed changes are implemented the staff will be give an introductory lesson on how the new changes work. Any questions or difficulties they face while being trained with the new program will be answered. After the staff learn to use the program, it will be implemented into the system. | | | |
| How might you gather feedback on the proposed changes?  I can get feedback on the proposed changes from the staff during the training seminar. I will also ask for feedback by asking them to fill out a review form after the program has been implemented in the system for a few weeks. | | | |

## Question 3 Design Approval

Once you have complete questions 1 & 2 arrange for your document to be reviewed by the Lecturer/Assessor for approval, sign off and feedback before completing the development and testing.

* Question 1 Project Specification
* Question 2 Strategic Objectives Evaluation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Design Approval (Lecturer/Assessor use only) | | | | |
| Approver Name | Title | Signature | Date | Approved? |
| Stewart Godwin | Lecturer |  | 14/11/2022 | Approved |
|  |  |  |  |  |
| Lecturer Feedback | | | | |
|  | | | | |

## Question 4 General Form Programming Criteria

Your first programming task is to create the General Form which will load the data and display records. The second task is to create the Admin Form to perform Create, Update and Delete operations. The csv file can be obtained from your lecturer or downloaded from Blackboard.

### Create a Dictionary data structure with a TKey of type integer and a TValue of type string, name the new structure “MasterFile”.

### Create a method that will read the data from the .csv file into the Dictionary data structure when the form loads.

### Create a method to display the Dictionary data into a non-selectable display only listbox (ie read only).

### Create a method to filter the Staff Name data from the Dictionary into a second filtered and selectable listbox. This method must use a textbox input and update as each character is entered. The listbox must reflect the filtered data in real time.

### Create a method to filter the Staff ID data from the Dictionary into the second filtered and selectable list box. This method must use a textbox input and update as each number is entered. The listbox must reflect the filtered data in real time.

### Create a method for the Staff Name textbox which will clear the contents and place the focus into the Staff Name textbox. Utilise a keyboard shortcut.

### Create a method for the Staff ID textbox which will clear the contents and place the focus into the textbox. Utilise a keyboard shortcut.

### Create a method for the filtered and selectable listbox which will populate the two textboxes when a staff record is selected.

### Create a method that will open the Admin Form when the Alt + A keys are pressed. Ensure the General Form sends the currently selected Staff ID and Staff Name to the Admin Form for Update and Delete purposes and is opened as modal. Create modified logic to open the Admin Form to Create a new user when the Staff ID 77 and the Staff Name is empty. Read the appropriate criteria in the Admin Form for further information.

1. Add suitable error trapping and user feedback to ensure a fully functional User Experience. Make all methods private and ensure the Dictionary is static and public.
2. Ensure all code is adequately commented. Map the programming criteria and features to your code/methods by adding comments above the method signatures. Ensure your code is compliant with the CITEMS coding standards (refer http://www.citems.com.au/).

## Question 5 Admin Form Programming Criteria

The Admin Form must be in the same name space and solution folder as the General Form from the previous question.

1. Create the Admin Form with the following settings: Control Box = false and KeyPreview = True, then add two textboxes. The textbox for the Staff ID should be read-only for Update and Delete purposes.
2. Create a method that will receive the Staff ID from the general form and then populate textboxes with the related data.
3. Create a method that will create a new Staff ID and input the staff name from the related text box. The Staff ID must be unique starting with 77xxxxxxx while the staff name may be duplicated. The new staff member must be added to the Dictionary data structure.
4. Create a method that will Update the name of the current Staff ID.
5. Create a method that will Remove the current Staff ID and clear the text boxes.
6. Create a method that will save changes to the csv file, this method should be called before the Admin Form closes.
7. Create a method that will close the Admin Form when the Alt + L keys are pressed.
8. Add suitable error trapping and user feedback to ensure a fully functional User Experience. Make all methods private and ensure the Dictionary is updated.
9. Ensure all code is adequately commented. Map the programming criteria and features to your code/methods by adding comments above the method signatures. Ensure your code is compliant with the CITEMS and MS coding standards (refer http://www.citems.com.au/).

## Addendum

This development utilises keyboard input for all General and Admin Form events, you are permitted to reassign the key combinations from those described in the list of criteria, ensure these are recorded/displayed for the user’s convenience.

## Question 6 Testing and Code Optimisation

### File IO Optimisation

Ensure your code is error free and functions correctly, then test the method code for the major iterative File IO structures in the general and admin forms, ensure you record the performance details. Research alternatives to determine if your code is the best solution for reading and writing CSV files. Modify and optimise your methods as required, comment out older/slower code.

### Data Structure Optimisation

Implement a secondary data structure and run optimisation tests to determine the most efficient operational performance. The Dictionary<T,V> data structure represents a basic hash table , however the alternative is the SortedDictionary<T,V> which is a basic binary search tree implementation. Add a second parallel data structure then run and test the code. Record your results and determine the best performance; comment out the structure with the worst performance.

Your Test and Code Optimisation report must include appropriate evidence that your multi form application functions as expected (references to screen captures) and the code has been optimised. Complete the following Test and Code Optimisation report template to answer this question.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test and Code Optimisation | | | | |
| Developer Name | Poorav Sharma | | **Date** | 14/11/2022 |
| **File IO Testing** | | | | |
| Read CSV | Description | Optimisation | | |
| Test 1 | Load the program and see if the all the data from the csv file is being read into the dictionary and is shown in the list box. |  | | |
| Test 2 | Load the program and see if the all the data from the csv file is being read into the sorted dictionary and is shown the list box. |  | | |
| Write CSV | Description | Optimisation | | |
| Test 1 | Open the admin form and make changes to the dictionary and save it. The updated dictionary should be written into the csv file with the correct format. |  | | |
| Test 2 | Open the admin form and make changes to the sorted dictionary and save it. The updated sorted dictionary should be written into the csv file with the correct format. |  | | |
| **Data Structure Testing** | | | | |
| Dictionary<> | Description/Definition | Performance (Big O) | | |
| Test 1 | Check how many ticks it takes for the csv file to be read into the program. | It took the program 25260 ticks to read the csv file into the dictionary data structure. The performance (Big O) of the program method is a way to estimate how fast the method performs. In this case the Big O notation for the dictionary file is O(n). This means the time taken for the method to finish is linear because it depends on the number of data it is going through. This is due to the use of the “loop” method which goes through all the data in the file. | | |
| Test 2 | Check how many ticks it takes for Program to write in the csv file | If the number of the Big O is smaller, it is better because this means the time takes for the method to carryout its commands is shorter. The Big O for dictionary data structure is smaller than the Big O for sorted dictionary. The performance can be measures using timers to see how long it takes the method to finish it command under a specific data structure. As seen in the picture it took the method 16818 ticks to save the dictionary into a csv file. | | |
| SortedDictionary<> | Description/Definition | Performance (Big O) | | |
| Test 1 | Check how many ticks it takes for the csv file to be read into the program. | The sorted dictionary took longer ticks to complete the same method used for the dictionary. This means that it has a bigger O number. The algorithm used to calculate sorted dictionary structure is O (n log n), this is because sorted dictionary uses a binary-search-tree which is designed to use as may operations as necessary to use as little RAM as possible. This is different to dictionary data structure which implements as a hash-table. Hash-tables are designed to use excess memory to use as few operations as possible, allowing the method under the dictionary data structure to finish its job within less ticks. | | |
| Test 2 | Check how many ticks it takes for Program to write in the csv file | As see evidence from the pictures. The performance of dictionary is faster (smaller Big O) than the performance of the sorted dictionary (smaller Big O). This means it is better to use the dictionary data structure in the program because it is faster. | | |

# Question 7 Implementation Plan

Once all the development and testing has been completed you will need to consider an implementation plan. This plan will need to include a schedule (timeline), the activity/training priority and a comment/Feedback to ensure a trouble-free adoption of your application.

Complete the following Implementation Plan to answer this question.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Implementation Plan | | | | |
| Developer Name | Poorav Sharma | | **Date** | 14/11/2022 |
| Date/Month | Activity/Explanation/Training | Comment/Feedback | | |
| 23/11 | The staff will be informed of the new program. The training conference date will also be announced so that they can prepare themselves for it. | It is important to notify the staff of the upcoming changes that are going to take place in their workplace. | | |
| 26/11 | A training conference will be held to teach the staff how to use the new program that is going to be implemented. Any questions or difficulties they face will be answered by the instructors. Any questions regarding the program after the conference will be answered by the IT help desk. | It is important to help the staff get familiarized with the new program before it is implemented so that there will be fewer issues when it is being used. | | |
| 28/11 | The program will be implemented into the workplace. |  | | |
| 26/12 | The staff will be asked to fill out a feedback survey about their experience using the new program. | The program will be update according to any valid feedback or bugs found in the program. | | |

## Question 8 Demonstration, Feedback and Signoff

Ensure your code is fully commented with your Name, ID, and Date placed above the main code body of each file. Check all the above documentation has been completed and is ready for inspection. Contact your Lecturer (Assessor) and arrange to demonstrate your working applications, use the following Marking Guide and Observation Checklist to ensure you have completed all the assessment criteria.

### Assessor Marking Guide

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Marking Guide and Observation Checklist | | Satisfactory | | Feedback |
| **Questions** | | YES NO | |  |
| Q1 | Project Specification: all fields a have been completed |  |  |  |
|  | UI Specification for General Form: all UI components been identified |  |  |  |
|  | UI Design Diagram General Form: the GUI has details layout and component are identified |  |  |  |
|  | UI Specification for Admin Form: all UI components been identified |  |  |  |
|  | UI Design Diagram Admin Form: the GUI has details layout and component are identified |  |  |  |
| Q2 | Strategic Objectives Evaluation: All fields of the template are filled in. |  |  |  |
|  | The current systems status is completed |  |  |  |
|  | The proposed changes section is completed |  |  |  |
| Q3 | Design Approval has been signed off by Lecturer |  |  |  |
|  | Suitable feedback has been provided |  |  |  |
|  | Anomalies have been corrected |  |  |  |
| Q4 | General Form Programming Criteria |  |  |  |
|  | All methods outlined in the criteria have been completed |  |  |  |
|  | All methods have error trapping |  |  |  |
|  | Criteria mapping and comments are correct |  |  |  |
| Q5 | Admin Form Programming Criteria |  |  |  |
|  | All methods outlined in the criteria have been completed |  |  |  |
|  | All methods have error trapping |  |  |  |
|  | Criteria mapping and comments are correct |  |  |  |
| Q6 | Testing and Code Optimisation: All the fields in the Report have been filled in. |  |  |  |
|  | The IO for reading has been tested and optimised |  |  |  |
|  | The IO for writing has been tested and optimised |  |  |  |
|  | The Dictionary has been reviewed and tested |  |  |  |
|  | The SortedDictionary has been added, reviewed and tested |  |  |  |
| Q7 | Implementation Plan: The plan is complete with timeline, activities and feedback |  |  |  |
| Q8 | Demonstration: The multi form application is complete and all components work correctly. |  |  |  |
| **General Feedback:** | | | | |
|  | **Assessment Decision**  Satisfactory  Not Yet Satisfactory | | | |

**Note:** All documentation must use the supplied templates/forms.

**Submit the zipped solution folder with relevant documents to Blackboard**

End of Assessment Three