|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Qualification details** | | | | | | | | | | | | | | | | |
| **Training Package Code and Title:** | | ICT - Information and Communications Technology (Release 8.1) | | | | | | | | | | | | | | |
| **Qualification National Code and Title:** | | ICT40120 Certificate IV in Information Technology  (Release 4) | | | | | | | | | | **State code:** | | | | BFF9 |
| **Assessment Title** | | Assessment Task Two (Team Project) | | | | | | | | | | | | | | |
| **Unit National Code & Title** | | ICTPRG440 Apply introductory programming skills in different languages | | | | | | | | | | | | | | |
| ICTPRG437 Build a user interface | | | | | | | | | | | | | | |
| ICTICT449 Use version control systems in development environments | | | | | | | | | | | | | | |
| **Due Dates** | | Sprint One: Week 9 | | | | | | **Date Received** | | | | | | |  | |
| Sprint Two: Week 12 | | | | | | **Date Received** | | | | | | |  | |
| Handover: Week 14 | | | | | | **Date Received** | | | | | | |  | |
| **Student Name** | | ***Brandon Morales Cordoba*** | | | | | | | | | **Student ID** | | | | | ***30085204*** |
| **Student Declaration** | | I declare that the evidence submitted is my own work:  ………………………………………….. | | | | | | | | | | | | | | |
| **Assessor Name** | |  | | | | | | | | | | | | | | |
| **Assessment Decision** | |  | Satisfactory | | | |  | | Not Yet Satisfactory | | | | | | | |
| **Assessor Signature** | |  | | | | | | | **Date** | | | | |  | | |
| **Is student eligible for reassessment (Re-sit)?** | |  | | No |  | Yes | | | **Reassessment 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** | *Brandon Morales Cordoba* | | | | | | | | | **Date** | | | *22/04/2024* | | | |

|  |  |
| --- | --- |
| **Assessment Instructions** | |
| **TO THE ASSESSOR** | |
| Type of Assessment | Team Project |
| Duration of Assessment | 8 Class Sessions (Week 7 - 14) |
| 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 checklist and marking guide. |
| Instructions | This project uses an agile methodology consisting of Sprint One, Sprint Two with a final submission of a Handover. Assessors need to ensure that students are in teams of two. They are required to select a Scrum Master for each sprint to lead the team and submit the documents required for each sprint (in Sprint One Question - 1, 2, 3…7 – Sprint Two - Question 4, 5, 6…14). Assessor must observe the students fulfilling their team responsibilities either as a Scrum Master or a team member using the Observation Checklist. In Sprint Two the roles will be reversed, and the Scrum Master will become the team member and vice-versa.  Students will need to demonstrate their workflow and code versioning by providing access to their GitHub account  In order to verify the authenticity of the student’s assessment, you may ask the student to again produce an answer to an existing question. |
| **TO THE STUDENT** | |
| Purpose of Assessment | You are required to show you can:  ICTPRG440 Apply introductory programming skills in different languages   * Demonstrate your skills and knowledge by creating a GUI based application * Code using data structures and standard algorithms for searching and sorting data. * Debug, document and test completed application using IDE and associated features.   ICTPRG437 Build a user interface   * Demonstrate your knowledge by researching prototyping tools and application development languages. * Investigating organizational guideline, policies and procedures.   ICTICT449 Use version control systems in development environments   * Install and configure a version control system * Create and upload code to version control system   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.  You are required to meet the elements, performance criteria and oral communication items as outlined in the provided checklist. |
| Allowable Materials | Blackboard (Topic by topic) will include the following: Weekly Readings, Class notes, and Weekly Activities. |
| Required Resources | Computer with:   * Web links and example code can be downloaded from the Blackboard * MS Visual Studio, * MSOffice * Internet Access to MSDN, 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 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. |
| Project contents | This team project consists of the following tasks:  Sprint One   * Question 1 – Complete the Project Specification, * Question 2 – Create a GUI design, * Question 3 – Manage Version Control System * Question 4 – Sign off and approval, * Question 5 – Algorithm and Pseudo Code, * Question 6 – Develop the Sprint One application, * Question 7 – Presentation of Sprint One application and documentation.   Sprint Two   * Question 8 – Compete the Updated Project Specification, * Question 9 – Updated GUI design, * Question 10 – Manage Version Control System, * Question 11 – Sign off and approval, * Question 12 – Algorithm and Pseudo Code, * Question 13 – Develop the Sprint Two application, * Question 14 – Presentation of Sprint Two application and documentation   Handover   * Question 15 – Version Control Comparison * Question 16 – Test Report * Question 17 – Recommendations Report * Question 18 – Review and Handover |

# Scenario

You have accepted the role of a Mid-Level Programmer for CITE Managed Services working as part of a small team to design, code and test a series of algorithms. Your task is to demonstrate your teamwork skills and programming knowledge by producing a program that will process astronomical data which is streamed from a local observatory. The continuous data represents the interaction of neutrinos with earth matter which are amplified and stored in an array data structure for analysis. The demonstration of the final application will utilise simulated data. Ref: https://en.wikipedia.org/wiki/Neutrino\_astronomy

## Software Development Methodology

This team project will use an agile methodology to complete the development of the Astronomical Processing application. For detailed information about the agile software development methodology read the PDF documents in the Software Development section on Blackboard.

It is critical that all team members are familiar with every aspect of the development. There are three major milestones, the first two will be the assessment point which focuses on the Scrum Master (Sprint One or Sprint Two). The other team member will not submit and is not required to present the Sprint application or answer interview questions. The third milestone is for the whole team and represents the final assessment point for the project (Handover). The Weekly Schedule (shown below) outlines each of these milestones and the final group handover. As the development progresses the team will collect information, create mini-reports and develop the Astronomical Processing application.

## Rapid Application Team

Before you can start Sprint One you will be assigned membership into a team of two students. Your Lecturer will have the final decision on teams and team membership; and decide which student(s) will be allocated to each team.

The following information must be completed before the team begins work and starts the Project. Begin by having a meeting and decide on a team name, then select the Scrum Master for Sprint One, the Scrum Master must rotate for each of the two sprints. Your lecturer may select the Scrum Master or adjudicate in cases of conflict.

Team Name: Sudaka dev

Sprint One

Scrum Master: Brayam Mazuera

Team Member: Brandon Morales

You should consult with the CITEMS 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 website, additional information can be collected from the Internet, ensure all sources are fully referenced. You should write your answers in the sections of the standard template provided in this document.

## Weekly Schedule

|  |  |  |  |
| --- | --- | --- | --- |
|  | | TASK | DESCRIPTION |
| Week 7  AM session | Sprint One | Question One – Four.  Analysis and Design Documentation | Complete the Project Specification documentation for the analysis and design stage.  Review the documentation and submit for Approval and Sign Off. |
| PM Session | Sprint One | Question Five – Six.  Commence Application Development | The first Scrum Master will lead the development of the application using the approved Program Specifications document. |
| Week 8  AM session | Sprint One | Question Six.  Continue Application Development | The Team will continue the development of the application using the approved Program Specifications document. |
| PM Session | Sprint One | Question Six.  Complete Application Development | The Team will complete the development of the application and test the error trapping and user functionality. |
| Week 9  AM session | Sprint One | Question Seven.  **Finalise Sprint One** | The first Scrum Master will present the application with Sprint One Program Criteria. The lecturer/assessor can ask questions. |
| PM Session | Sprint One | **Assessment Point for first scrum master and team member** | The first Scrum Master will present the application with Sprint One Program Criteria. The lecturer/assessor can ask questions. |
| Week 10  AM session | Sprint Two |  |  |
| PM Session | Sprint Two |  |  |
| Week 11  AM session | Sprint Two |  |  |
| PM Session | Sprint Two |  |  |
| Week 12  AM session | Sprint Two |  |  |
| PM session | Sprint Two |  |  |
| Week 13  AM session | Handover |  |  |
| PM Session | Handover |  |  |
| Week 14  AM session | Handover |  |  |
| PM Session | Handover |  |  |

# Sprint One

At the local observatory the number of neutrino interactions per hour is saved as an integer value. The client wants to record and process these hourly values by storing them in an array of size 24. They require a forms-based GUI application which displays the data in a list box and uses text boxes and buttons for processing. Use the following client requirements to design a prototype of the user interface.

### Client Requirements

* All data is stored as integers in an array.
* The client can use a text box input to search the array.
* There are buttons that can sort and search the data.
* There is an input field (text box) so data can be edited.
* The name of the application should be Astronomical Processing.

### Program Functionality

* The array is of type integer.
* The array has 24 elements to reflect the number of hours per day.
* The sort method must be coded using the Bubble Sort algorithm.
* The search method must be coded using the Binary Search algorithm.
* A single text box is provided for the search input.
* The program must generate an error message if the text box is empty.
* The program must generate an error message if the search is not successful.
* The program must generate a message if the search is successful.
* The program must be able to edit data values.
* The array is filled with random integers to simulate the data stream (numbers between 10 and 90).

### Project Management and Source Control

During this project you will require a source control facility to save, edit and review the documents and programming code. If your do not have a GitHub\* account then you will need to create one and share the project folder with your team and provide access to your lecturer if requested. There are several types of accounts; you should decide which type suits your requirements. GitHub also includes a Project Board option that can be used to manage the workflows (Sprints). This type of source control will be used in other SMTAFE courses.

Main Site: https://github.com/

Help Files: https://docs.github.com/en

It is the Scrum Master’s responsibility to manage the GitHub Project for each week. Complete the Sprint One information and assign team member(s) with tasks for each week; save a screen capture of your GitHub Project with associated notes. This information will be presented in Question Three.

\*NOTE: GitHub is the recommended sources control, check with your lecturer if you wish to use an alternative.

### Application and GUI Prototype Design

The team should meet and discuss the Sprint One Client Requirements and Program Functionality, using this information design a user interface that would be suitable for this application. The team should design, write and review the algorithm and pseudo code for the two major processing functions required by the Client (Binary Search and Bubble Sort). This meeting and the associated discussions must be fully documented and added to the source control for assessment. Ensure all documentation conforms to CITEMS organizational guidelines.

## Question One

### Instructions

Use the Sprint One Project Specifications template below to complete Question One, include suitable information for each of the sections. List all the Project Tasks and assign a Priority (Very Important = 1 to Least Important = 5). Next, list all the functional and non-functional requirements based on the client requirements and program functionality.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sprint One Project Specifications | | | | |
| Project Details | | | | |
| Release | | 1.0 | | |
| Date | | 18/03/2024 | | |
| Team Name | | Sudaka Dev | | |
| Scrum Master | | Brayam Mazuera | | |
| Team Member | | Brandon Morales | | |
| Project Tasks(requiments priprity - orghanizer ) | | | | |
| Task # | Description | | Priority(1 low –5 high ) | Notes |
| 1 | Pseudo-code | | 5 | General idea of how the project would develop |
| 2 | Flowchart | | 5 |  |
| 3 | MockUp | | 5 | Windows form in Figma |
| 4 | Layout desiung (GUI) | | 4 |  |
| 5 | Algorithm Array | | 4 | Using the constructor “HourlyData” who takes two parameters (hours and interactions) |
| 6 | Algorithm BinarySearch | | 4 | This code implements Binary Search to find an element in a sorted array. |
| 7 | Algorithm BubbleSort | | 4 | Bubble sort swaps adjacent elements in array based on Interactions property. |
| 8 | Botton Sort | | 3 | Backend to implementing Algorithm BubbleSort also |
| 9 | Botton Seach | | 3 | backend to implementing Algorithm BinarySearch |
| 10 | Botton Edit | | 3 | backend to implement array data editing |
| 11 | Botton Refresh | | 3 | Clean all data array to regenerated |
| 12 | Error Handing | | 4 |  |
|  |  | |  |  |
| Functional Requirements () | | | | |
| **Functional Requirements for Astronomical Processing Application** **1. Data Storage and Input:**   * The application shall store astronomical data as a one-dimensional integer array with a size of 24, representing the 24 hours in a day. * The application shall provide a text box for the user to input search queries.   **2. Data Initialization:**   * The application shall initialize the data array with random integer values between 10 and 90 upon startup, simulating an astronomical data stream.   **3. Data Load Time:**   * The application should initialize the data array with random values within Y seconds upon startup. This specifies a performance target for data loading.   **4. Search Functionality:**   * The application shall implement a binary search algorithm to efficiently search the data array for a specific integer value. * The application shall validate the search input. An error message shall be displayed if the user leaves the search text box empty. * Upon successful search, the application shall display a message indicating the value was found and its corresponding index in the data array. * If the search value is not found, the application shall display an error message indicating the search was unsuccessful.   **3. Sorting Functionality:**   * The application shall implement a bubble sort algorithm to sort the data array in ascending order.   **4. Data Editing:**   * The application shall provide a separate text box for the user to input a new data value. * The application shall allow the user to edit existing values in the data array by specifying the index and the new value.   **6. Search Time:**   * The application should perform a search within X seconds for a successful or unsuccessful result. This defines an expected speed for the search functionality.   **7. Error Handling:**   * The application shall handle potential errors such as invalid user input (non-numeric values) and out-of-bounds index selections during data editing. | | | | |
| Non-Functional Requirements | | | | |
| 1. **GUI:** The user interface shall provide clear labels for the search text box, edit text box, and buttons for searching, sorting, and editing data. 2. **Exceptions:** When user type a no-number character, the GUI has the functionality of showing the entry error with a different colour pop that will show warning. | | | | |

## Question Two

### Instructions

Fill in all sections of the GUI Design Specifications template. List all the UI components (buttons, text box, list box, etc) and describe what action or event are associated with each. Insert a detailed image/picture/screen capture of the GUI design, ensure all the features are identified and labelled.

|  |  |
| --- | --- |
| GUI Design Specifications | |
| GUI Development Tool | Figma |
| Application Development IDE | Figma |
| UI Components | |
| **MainForm** (Title bar): This is the main window of the application. It doesn't seem to have any specific action or event associated with it in the image.  **InputNumber** (Text field): This component allows the user to input a number. It’s not possible to tell from the image what happens after the user enters a number.  **Sort** (Button): This button likely triggers a sorting function when clicked. The image shows the number of times the button was clicked for each hour.  **Search** (Button): This button likely triggers a search function when clicked. Like the Sort button, the image shows the number of times it was clicked throughout the day.  **Edit** (Button): This button likely triggers an editing function when clicked. The image shows the number of times it was clicked throughout the day.  **Refresh** (Button): This button likely resets the application or a specific function to its default state when clicked. The image shows the number of times it was clicked throughout the day.  **Display error** (warning pop layout): The graphical interface allows real-time checking of the input data. If a non-number is entered, the system shows an error message. This message changes the colour of the incorrect field, alerting the user to the problem. | |
| GUI Layout | |
| HOME PAGE    Error handing | |
| Type to find the internation number | |
| Sort all data array generated | |
| Search the data | |
| Edit the internation number | |
| Refresh all data generated | |

## Question Three

### Instructions

CITE uses GitHub as the primary Version Control System (VCS), the Scrum Master should create a GitHub account (you can use your existing account). Ensure your development computer has Visual Studio installed with all the appropriate features to create and develop a C# .Net application. Open Visual Studio and create a new project; ensure the GitHub settings have been updated to reflect your GitHub account. Create a new repository for the project and check you have a local and remote (Cloud) instance of the repository.

Complete the following Manage Version Control System template to answer this question.

Consult with your lecturer if you wish to use an alternative source control service. Any alternative source control must support a local desktop installation.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Manage Version Control System | | | | | | |
| VCS Name | | git | | | | |
| Version Details | | Version 3.3.12 | Date | 15/04/2024 | | |
| Supported Platforms | | GitHub | | | | |
| Repository/Project Information | | | | | Yes | No |
| Has the cloud VCS account been created and named correctly? | | | | |  |  |
| Has the basic project solution been created? | | | | |  |  |
| Has the cloud VCS repository been created | | | | |  |  |
| Does the cloud VCS repository have a readme file? | | | | |  |  |
| Has the local source repository been created? | | | | |  |  |
| Are the two VCS resources linked? | | | | |  |  |
| Account Details Checklist | | | | | | |
| Repository Name: | AT2-AstroApp | | | | | |
| URL | https://github.com/Brumertz/AT2-AstroApp | | | | | |
| Local Source Control Screen Shot |  | | | | | |
| Cloud Screen Shot |  | | | | | |

## Question Four

### Sprint One Approval

The Scrum Master will arrange for the completed Sprint One Project Specification document to be reviewed by the Lecturer/Assessor for approval, sign off and feedback before the team starts Question Five and Six.

Your submission for approval of the Sprint One Project Specification will include:

* Question One
  + Project Details,
  + Project Tasks,
  + Requirements (Functional and non-functional),
* Question Two
  + Design Specifications (detailed diagram of the GUI design),
  + GUI Layout,
* Question Three
  + Manage Version Control System details (screen shots from source control)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Approval (Lecturer/Assessor use only) | | | | |
| Approver Name | Title | Signature | Date | Approved? |
|  |  |  |  |  |
|  |  |  |  |  |
| Lecturer Feedback | | | | |
| * Implementing a different colour for error handing (error type user) | | | | |
| Meeting, discussion, and related notes | | | | |
| * Missing GUI guides. * Adding all changes in the version 2. | | | | |

## Question Five

### Instructions

Fill in the two sections for the algorithm and pseudo code for the Binary Search and Bubble Sort. Refer to the Blackboard resources to ensure your answer reflects the differences between an Algorithm and Pseudo Code.

|  |  |  |
| --- | --- | --- |
| Algorithm and Pseudo Code | | |
| Binary Search | | |
| Put the Algorithm for the Binary Search here;  Algorithm: BinarySearch(array, searchValue) Input: An array of HourlyData objects and a search value Output: The index of the search value in the array if found, otherwise -1   1. Set left as 0 and right as the length of the array minus 1. 2. While left is less than or equal to right: a. Calculate mid as left plus (right minus left) divided by 2. b. If array[mid].Interactions is equal to searchValue, return mid (value found). c. If array[mid].Interactions is less than searchValue, update left to mid + 1 (search the right half). d. Otherwise, update right to mid - 1 (search the left half). 3. If the search value is not found after the while loop, return -1 (value not found). | Put the Pseudo Code for the Binary Search here; BinarySearch(array, searchValue)  Begin  Left = 0  Right = length of array - 1  While Left <= right do  Mid = left + (right - left) /2  If array[mid].Interactions == SearchValue then  Return mid // Value found  If array[mid].Interactions < SearchValue then  Left = mid + 1 // Search The right half  Else  Right = mid - 1 // Search the left half  End If  End While  Return -1 // Value not found  End | |
| Bubble Sort | | |
| Put the Algorithm for the Bubble Sort here; Algorithm: BubbleSort(array) Input: An array of HourlyData objects Output: The array sorted in ascending order based on the Interactions attribute   1. Set n as the length of the array. 2. Iterate i from 0 to n - 1: a. Iterate j from 0 to n - i - 1: i. If array[j].Interactions is greater than array[j + 1].Interactions, then: - Swap the elements at positions j and j + 1. 3. Repeat steps 2 until the array is fully sorted. 4. The array is now sorted in ascending order based on the Interactions attribute. | | Put the Pseudo Code for the Bubble Sort here; BubbleSort(array)  Begin  n = length of array  Increase = 0 to n - 1 do  For j = 0 to n - i - 1 do  If array[j].Interactions > array[j + 1].Interactions then  // Swap elements  Temp = array[j]  Array[j] = array[j + 1]  Array[j + 1] = temp  End If  End For  End For  End |

## Question Six

### Programming and Application Development

Once the team has received approval from the Lecturer/Assessor review and amended the Sprint One Project Specification document based on the feedback. The Scrum Master should update the Version Control so the team can begin to create/edit/debug and test a Windows Prototype Application that will satisfy the Client Requirements and Program Functionality.

As the team progresses and completes tasks the Scrum Master will update the relevant Project Board. Avoid deleting items, simply add new items into the next column, this will provide historical evidence of the teams’ progress.

The Windows Prototype Application must comply with CITEMS organisational requirements for coding standards, comments, and documentation. For example, add suitable comments to all your code. Add a header comment at the top of the code as shown below, with Name(s), Date, Version, and a program description.

**// Your Name, Team Name, Sprint Number**

**// Date:**

**// Version:**

**// Name of the program**

**// Brief explanation of the program and list,**

**// Inputs, Processes, Outputs**

## Question Seven

### Presentation of Sprint One

The Scrum Master should update the Project Board and ensure the programming code has the correct naming conventions and internal comments as per the CITEMS Policies and Standards. Notify your Lecturer to arrange a suitable time to present the final Sprint One documents and demonstrate the working Astronomical Processing application. This presentation will be assessing the Sprint One Scrum Master using simulated data in the array. The following Submission Requirements should be used to ensure all aspects of the assessment are covered.

## Submission Requirements

Your submission for Sprint One will include:

* + Completed Project Specifications template,
  + Completed GUI Specification and notes,
  + Completed Manage Version Control System (project boards, file structure, etc),
  + Completed Feedback with Lecturer/Assessor approval,
  + Completed Algorithm and Pseudo Code,
  + Completed Solution Folder for the Astronomical Processing application.

The Sprint One Scrum Master will demonstrate the program which must satisfy the following:

The program must load random data into the array using a button click.

The client must be able to click a button to bubble sort the data.

The client must be able to enter search data and click a button to activate a binary search.

All data is displayed in a List Box.

Data can be edited.

All error messages are demonstrated.

Code comments are relevant.

Demonstrate your workflow and code versioning within GitHub.

Answer questions on all aspects of the Sprint One development and documents.

End of Sprint One