



Qualification national code and title	ICT40120 Certificate IV in Information Technology (Programming)
Unit/s national code/s and title/s	ICTPRG433 Test Software ICTPRG440 Apply introductory programming skills in different languages

Assessment 1 – Sort and Search Application

Assessment type (☑):

- ☐ Questioning (Oral/Written)
- ☐ Practical Demonstration
- ☐ 3rd Party Report
- ☒ Other – Portfolio

Assessment Resources:

Blackboard Shell – Learning Materials

Software:

To be provided by TAFE on campus but installation expected at home on a personal windows device.

- Visual Studio 2019/2022 Community Edition

Assessment Instructions:

Portfolio – Sort and Search Application

This assessment requires you to develop an application that meets the given requirements. You will be demonstrating a variety of basic programming techniques including variable assignment, selection and iteration constructs and working with arrays. This assessment covers elements 1.1-2.2 of ICTPRG433.

Due Date: End of week 7

Complete all the assessment tasks below.

1. Observation by your lecturer of you doing the assessment in class is considered part of the assessment process. You are permitted to work on the assessment at home as well.
2. Submit your documentation into the Blackboard assessments area.
3. All skills must be demonstrated to achieve a satisfactory result.
4. All work submitted must be your own individual effort or the work of the team members in your group. Individual contributions must be declared.

Assessment Instrument:



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Brief

Create a console application that emulates a lottery of numbers. Your program must allow the user to select their own numbers from a predefined range of values. Once all values have been selected the program will then generate a series of random numbers and compare the users' values with those. The number of values that match with those the user picked from the randomly generated numbers will be displayed for the user to see how many they got correct.

Requirements

The application must:

1. Take user input to store values they select into an array structure.
2. Write a custom Linear and Binary Search and use the Binary Search to find the matching values in the array.
3. Only allow values within a predefined range.
4. Handle any input validation gracefully, while informing user if incorrect.
5. Where necessary display outputs to user for prompt and feedback.
6. Allow for customisation of the application by ensuring the following values are variables:
 - a. The **total** number of values that the user must enter / are generated randomly.
 - b. The **range** of numbers that are accepted for input / to be selected from randomly.

Problem Breakdown

To help break down the application and problem into smaller chunks here are some tasks to complete as a guide. There is a further breakdown attached in the appendices.

Task 1 – Create a program that allows users to enter values and store these into an array.

Task 2 – Take a screenshot of you debugging your program at a breakpoint showing the values have been entered into the data structure correctly.

Task 3 – Create a random number generator that fills a second array with random numbers. Make sure they are within the range the user can input.

Task 4 – Demonstrate understanding of two methods of searching on an array using a Linear and binary search algorithm.

Task 5 – Write the rest of the application by using the search function and check each of the user entered values against the random ones. Let the user know the outcome. Give different outcomes for different results.

Task 6 – Test and debug your program to ensure it meets **ALL** requirements.

Deliverables

1. Zipped application including all solution files and folders.
2. Screenshots showing breakpoint use and debugging of values inside the array.

Appendix – Support Notes



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Lottery Program

This document will support the portfolio assessment by providing helpful hints and tips to complete the tasks. The program brief is an application that runs a lottery program. Users can choose from a series of numbers between a particular range. The program then creates its own version of numbers and compares those user values against the program's random numbers. Any matches that the program then finds are then displayed to the user.

1. Task 1 – Taking user input and storing values

- User input can be gathered by using:

```
Console.ReadLine()
```

- This method returns a string value so store it as a variable like this:

```
string userInput = Console.ReadLine();
```

- Convert a string into another type by calling the types “parse” or “tryparse” methods. Check the signature of these methods to better understand the inputs and outputs.
- Create an array using full syntax since we don't have the values yet. *(Note: size can be dynamic by using a variable instead making it easier to change later).*
- Loops can be used to encapsulate this code so we can enter multiple values into the array easily. Remember a for loops syntax:

```
For(int I = 0; I < myarray.Length; I++)  
{  
  
}
```

2. Task 2 – Debugging

Create a screenshot of your application in debugging/breakpoint mode and show the values for the array that the user entered using the above task.

- Enter break mode by using the bar on the left of visual studio.



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The screenshot shows a code editor with the following code:

```
18 FillArrayRandomly();
19 PrintArray(randoms);
20 Console.ReadLine();
21
22
23 void FillArrayRandomly()
24 {
```

A hover tooltip for the variable `randoms` is displayed, showing its type as `int[7]` and its values:

Index	Value
[0]	12
[1]	21
[2]	25
[3]	29
[4]	17
[5]	37
[6]	22

- Screen capture the arrays data by hovering over the variable in the IDE.

Task 3 – Random Number Generator

- Create a random number generator object and number using this code:

```
Random rnd = new Random();
```

```
Int randomNumber = rnd.next(lowestValue, highestValue);
```

- Create a loop to enter values into an array randomly.

Task 4 – Demonstrate two methods of searching an array

For this task **you need to create two search methods** of finding a value in an array. Make sure you create this code as a function that is reusable.

- Remember function declarations include return type, name and any parameters in brackets:

```
Void print(string theMessage)
```

```
{
```

```
}
```

- Use the supporting power point on sorting and searching for help on how to perform binary searches.
- Remember to return a result if the value is not found!

5. Task 5 – Complete the program

Tie the following four tasks together and complete the program by using the input, random generation and searching to finalise the lottery application. Tidy up user outputs, validate user inputs and check the additional tasks if you want an extra challenge.



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6. Task 6 – Test and Debug your application

Using debugging tools and running your application in debug mode, validate that the application runs as expected and does what the initial brief asked.