

CT103: Week 14 Lab Session (16/01/2024)

*Note: This assignment will count towards your final grade. Make sure you submit your solution by following the “**Submission Instructions**” at the end of this document. You have **until midnight tonight to submit your solution on Canvas**.*

Late assignment submissions will receive a penalty.

Please make sure you **write comments** explaining what your code does. Start your C program with a **comment stating your; Name, Student ID and Date**.

Write a C program that does the following:

1. A ship is lost somewhere in the sea. The sea is represented as a 12X12 grid, i.e. grid size = 12. Create two global integers “shipX” and “shipY” that represent the x and y co-ordinates of the ship at sea. Initialize these randomly between 0 and 11 (inclusive) within main(). (20 marks)
2. Create a function called ‘**randomSearch**’. This function is of type void. This function should accept the grid size as a parameter passed into the function. This function should randomly generate x, y co-ordinates until the location of the ship is found. Print the number of locations tried and the location of the ship found. Note: Do not use recursion for this function. (30 marks)
3. Create another function called ‘**gridSearch**’. This function is of type void. This function should accept: 1) The grid size and 2) the number of locations tried so far, as parameters passed into the function. This function should sequentially search through the grid until the ship is located. See Figure 1. Print the number of locations tried and the location of the ship found. Note: Use recursion for this function. (40 marks)
4. Test your program once more by changing the grid size to the final digit in your student ID, and resetting the random position of the ship. Use both ‘randomSearch’ and ‘gridSearch’ functions again to search for the ship. If your student ID ends in ‘0’ or ‘1’, use ‘9’ instead. (10 marks)

Your program should output something similar to the following screenshot. You must **upload a single screenshot** showing your program working for each of the requirements in tasks 1 – 4 above. It should look similar to the screenshot in Figure 2.

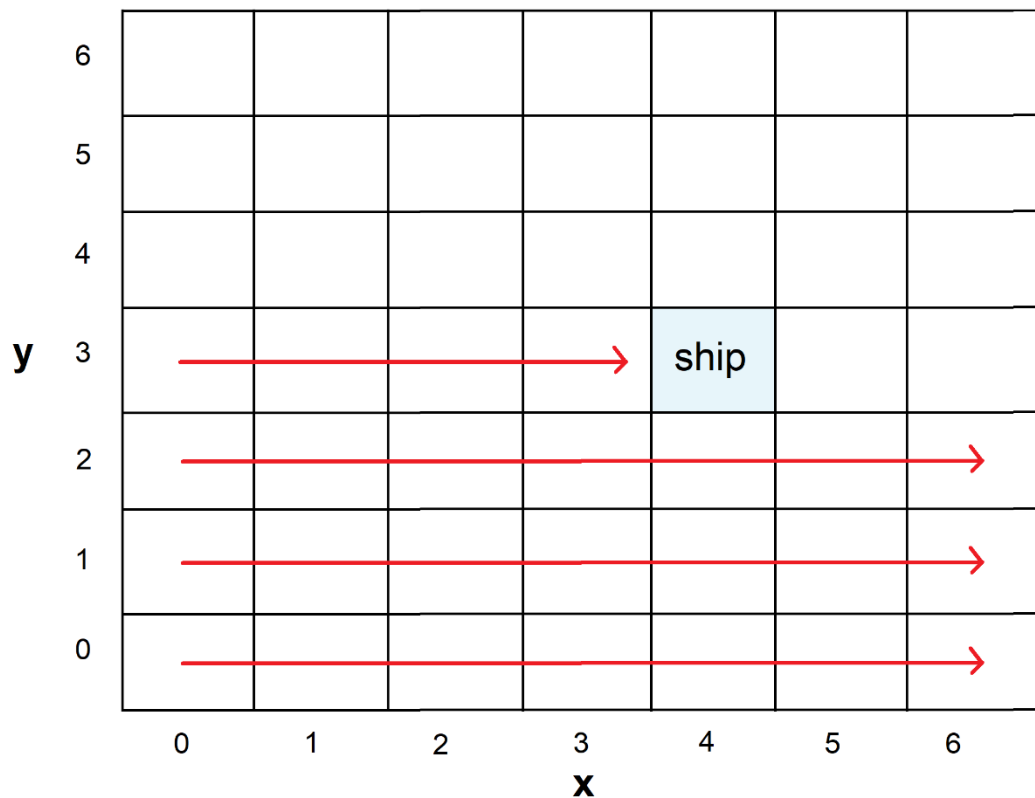


Figure 1: "gridSearch" Illustration

Microsoft Visual Studio Debug Console

```

----- Random Search -----
Ship found after 119 locations!
Ship co-ordinates - x : 6, y : 1.
----- Grid Search -----
Ship found after 16 locations!
Ship co-ordinates - x : 6, y : 1.
===== New Grid =====
----- Random Search -----
Ship found after 4 locations!
Ship co-ordinates - x : 3, y : 3.
----- Grid Search -----
Ship found after 18 locations!
Ship co-ordinates - x : 3, y : 3.

```

Figure 2: Code Output Example

Plagiarism Notice:

A definition of plagiarism is passing off the work of another person as one's own.

You are allowed to ask the lab tutors for help, collaborate with your classmates and review online and print resources for high-level problem solving and background research. You are each expected to complete this assignment individually. This means that every line of code and comment in your submission should be written by you alone. Please see the University of Galway Code of Practice for Dealing with Plagiarism for further information on plagiarism:

<https://www.universityofgalway.ie/media/registrar/policiesmay2023/QA220-Academic-Integrity-Policy-v2.0-Sept-2023.pdf>

Plagiarism is a serious academic offence and may lead to a loss of some or all marks and/or disciplinary proceedings if it is detected in any of your submissions. Students who facilitate others to copy their work are also subject to plagiarism sanctions (including loss of marks), so you should not share your assignment solutions with classmates.

Submission Instructions:

Please do the following to submit your solutions to the assignment.

- Copy and paste your code into a word document labelled 'AssignmentX_YOURNAME_ID.doc', e.g. 'Assignment7_JoeBloggs_123456789.doc'.
- Make sure to **include screenshots of your code working** in the .doc file. Use: 'Windows' + 'Shift' + 'S' on your keyboard. On a Mac, you should use the keys: 'shift' + 'command' + '3' or 'shift' + 'command' + '4'.
- Add both: **your .c program and your .doc files** to a folder called 'AssignmentX_YOURNAME_ID_Submission'.
- Zip the folder up and **submit the .zip file on Canvas** under CT103 Assessments. To zip the folder, right click and press 'Send To' then 'Compressed (zipped) folder'. On Mac, right click the folder and press 'Compress'.
- If for some reason you still cannot access Canvas. Send your .zip folder to the lab instructors by email. They will be available for the duration of the lab.