Text

Description automatically generated

/\*gavin skehan

21440824

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#include <stdio.h> // librays

#include <ctype.h>

#include <math.h>

#include <string.h>

#include <time.h>

#include <stdlib.h>

#define rows 10 // delare grid size

#define columns 10

int shipX, shipY; // delcaring variables and functions

int targetShipX, targetShipY;

void randomSearch(int grid);

int grid = 10;

int numLocations = 0;

void gridSearch(int grid, int numLocations);

int n = 1;

int iD = 4; // new grid size

void main() {

srand(time(NULL)); // random function

int gridSize[rows][columns];

shipX = rand() % 10; // ensures boundaries for the grid

shipY = rand() % 10; // modulus

printf("---------Random Search--------- \n");

randomSearch(grid); // random search function

printf("Ship co-ordinates - x : %d, y : %d \n", shipX, shipY); // shows the co-ordinates of the ship

printf("-----Grid Search------ \n");

gridSearch(grid, 0); // function using recursion

printf("Ship co-ordinates - x : %d, y : %d \n", shipX, shipY);

printf("======New grid========= \n"); // student id grid

printf("---------Random Search--------- \n");

shipX = rand() % iD;

shipY = rand() % iD;

randomSearch(4); // change grid size

printf("Ship co-ordinates - x : %d, y : %d \n", shipX, shipY);

printf("-----Grid Search------ \n");

gridSearch(4, 0);

printf("Ship co-ordinates - x : %d, y : %d \n", shipX, shipY);

return 0;

}

void randomSearch(int grid) { // function

while (shipX != targetShipX || shipY != targetShipY) { // increment searches when co-ordinates are wrong

targetShipX = rand() % 10;

targetShipY = rand() % 10;

numLocations++; // increment

}

if (shipX == targetShipX && shipY == targetShipY) {

printf("Ship found after %d locations! \n", numLocations); // print number of attempts when found

}

}

void gridSearch(int grid, int numLocations) { // recursion method

int targetX = numLocations % grid; // grid = 10

int targetY = numLocations / grid;

if (targetX == shipX && targetY == shipY) {

printf("Ship found after % d locations!\n", numLocations);

}

else {

gridSearch(grid, numLocations + 1); // function delares itself

}

}