

Project Report – Fundamentals of Computing

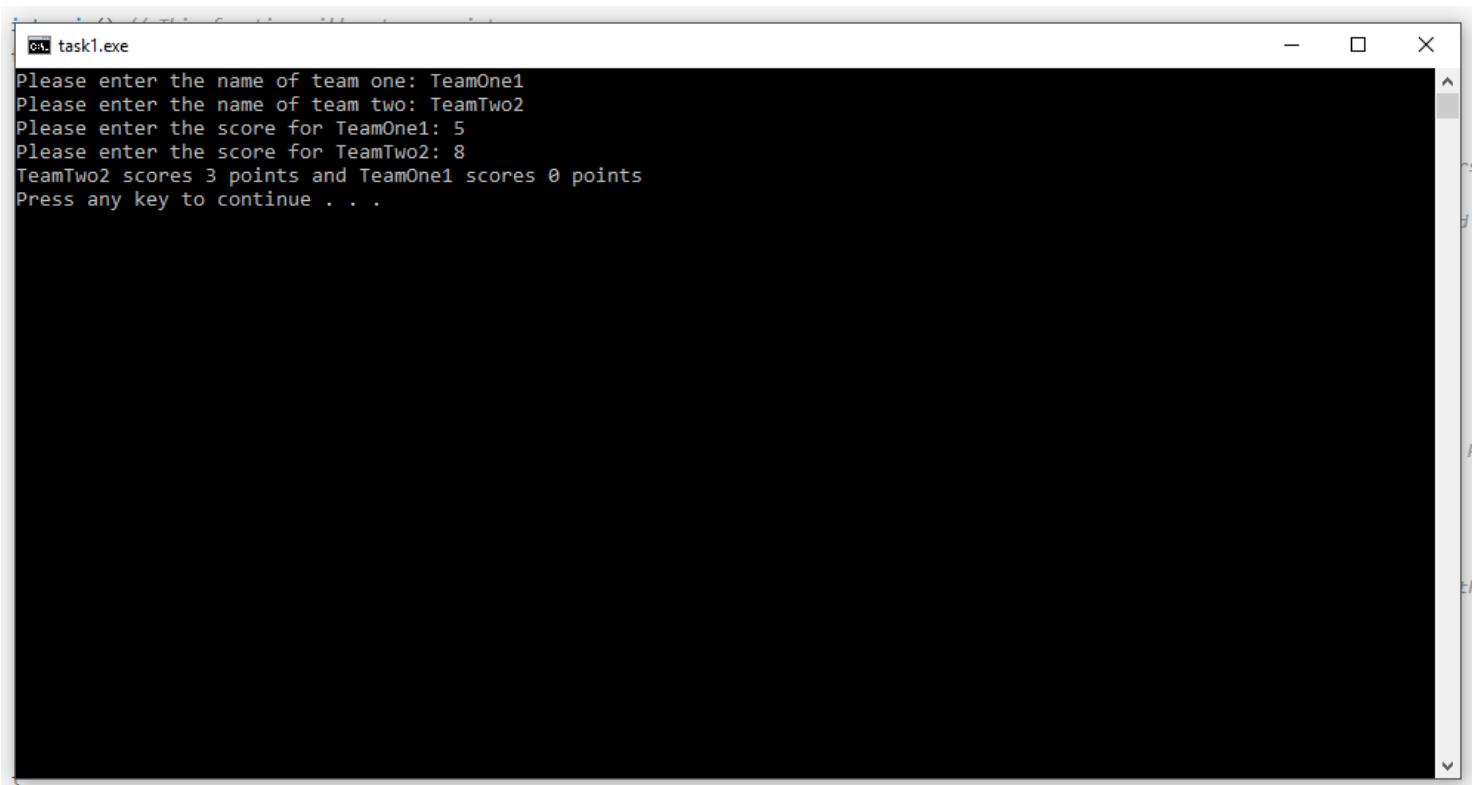
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Task 1

This program takes the names of two teams and the scores for each team. It then compares the scores and prints a different message depending on which team scored more or if it was a draw.

```
#include <stdio.h>
int main() // This function will return an integer
{
    char nameTeam1[20]; //Declares variable "nameTeam1" which has 20
    characters
    char nameTeam2[20]; //Declares variable "nameTeam2" which also has 20
    characters
    int team1Score, team2Score; //Declares two integer variables
    "team1Score" and "team2Score"
    printf("Please enter the name of team one: "); //Prints a statement for
    the user, requesting them to enter the desired name of the first team
    scanf("%s", nameTeam1); //This line takes the input from the user and
    assigns it to the variable "nameTeam1"
    printf("Please enter the name of team two: "); //Repeats the same
    process for "nameTeam2" to request and assign the name of the second team
    scanf("%s", nameTeam2);
    printf("Please enter the score for %s: ", nameTeam1); //Requests the
    score for the first named team
    scanf("%d", & team1Score); //Assigns the user input to variable
    "team1Score"
    printf("Please enter the score for %s: ", nameTeam2); //Repeats the
    process for "team2Score"
    scanf("%d", & team2Score);
    if (team1Score > team2Score) //If statement which checks if the integer
    value for "team1Score" is higher than "team2Score"
    {
        printf("%s scores 3 points and %s scores 0 points \n", nameTeam1,
        nameTeam2 ); //If the statement is true print that they score 3 points and
        the second team scores 0
    }
    else //If the statement is not true, carries on to the next if statement
    if (team1Score < team2Score) //Compares the two vales to see if the
    second team's score value is higher than the team's
    {
        printf("%s scores 3 points and %s scores 0 points \n",
        nameTeam2, nameTeam1 ); //Print that the second team get 3 points and the
        first team gets 0
    }
    else //If neither statements are met then both teams must have the
    same score
    {
        printf("Both %s and %s score 1 point \n", nameTeam1,
        nameTeam2); //Since it must be a draw, both teams recieve 1 point
    }
    return 0; //The function returns integer 0
}
```



```
task1.exe
Please enter the name of team one: TeamOne1
Please enter the name of team two: TeamTwo2
Please enter the score for TeamOne1: 5
Please enter the score for TeamTwo2: 8
TeamTwo2 scores 3 points and TeamOne1 scores 0 points
Press any key to continue . . .
```

Task 2

This program takes student's names and test scores and assigns a grade based on the mark. The code checks the value of "mark" against the grade boundaries to decide which grade to display. It also increments each counter for grades to keep a list of how many of each grade has been achieved by the students. It then asks if more student information will be inputted and loops.

```
#include <stdio.h>
int main() //Starts a function that will return an integer
{
    char name[20], response, grade; //Initialises 3 string variables
    int mark, Fcount=0, Dcount=0, Ccount=0, Bcount=0, Acount=0;
    //Initialises the marks integer variable
    do { //Starts a do while loop
        printf("Enter a student name: "); //Asks the user to input the
        student name
        scanf("%s", name); //reads the input from the user and assigns the
        pointer to the variable "name" as a string
        printf("Enter the student's mark: "); //Asks the user to input the
        student's mark
        scanf("%d", &mark); //reads the input from the user and assigns the
        pointer to the variable "mark" as an integer
        printf("%s", name); //Outputs the name of the student from the
        variable "name"
        printf(" receives the grade: "); //Outputs a string to form a
        sentence containing the student's name and grade
        if (mark < 40){ //Checks if the value of "mark" is less than 40
            printf("F"); //If so, the outputted grade is an F
            Fcount = Fcount+1;
        } //closes the if loop
        else if (mark <= 49){ //If the previous statement isn't true, checks
        to see if "mark" is less than or equal to 49
            printf("D"); //If so, the outputted grade is a D
            Dcount = Dcount+1;
        } //closes the if loop
        else if (mark <= 59){ //If the previous statement also isn't
        true, checks to see if "mark" is less than or equal to 59
            printf("C"); //If so, the outputted grade is a C
            Ccount = Ccount+1;
        } //closes the if loop
        else if (mark <= 69){ //If the previous statement also isn't
        true, checks to see if "mark" is less than or equal to 69
            printf("B"); //If so, the outputted grade is a B
            Bcount = Bcount+1;
        } //closes the if loop
        else { //If all the previous statements are false then the
        grade must be higher than 69 so another if statement is not necessary
            printf("A"); //If so, the outputted grade must be an A
            Acount = Acount+1;
        } //closes the if loop
        getchar(); //reads a single character from stdin
        printf("\n\nNumber of students with F: %d \nNumber of students with
        D: %d \nNumber of students with C: %d \nNumber of students with B: %d
        \nNumber of students with A: %d ", Fcount, Dcount, Ccount, Bcount, Acount);
        printf("\n\nDo you want to add another student? Type Y for yes and N
        for No\n");
        scanf("%c", &response);
    } while (response == 'Y');
    return 0;
}
```

```
task2.exe
Enter a student name: Ben
Enter the student's mark: 78
Ben recieves the grade: A

Number of students with F: 0
Number of students with D: 0
Number of students with C: 0
Number of students with B: 0
Number of students with A: 1

Do you want to add another student? Type Y for yes and N for No
Y
Enter a student name: Ned
Enter the student's mark: 66
Ned recieves the grade: B

Number of students with F: 0
Number of students with D: 0
Number of students with C: 0
Number of students with B: 1
Number of students with A: 1

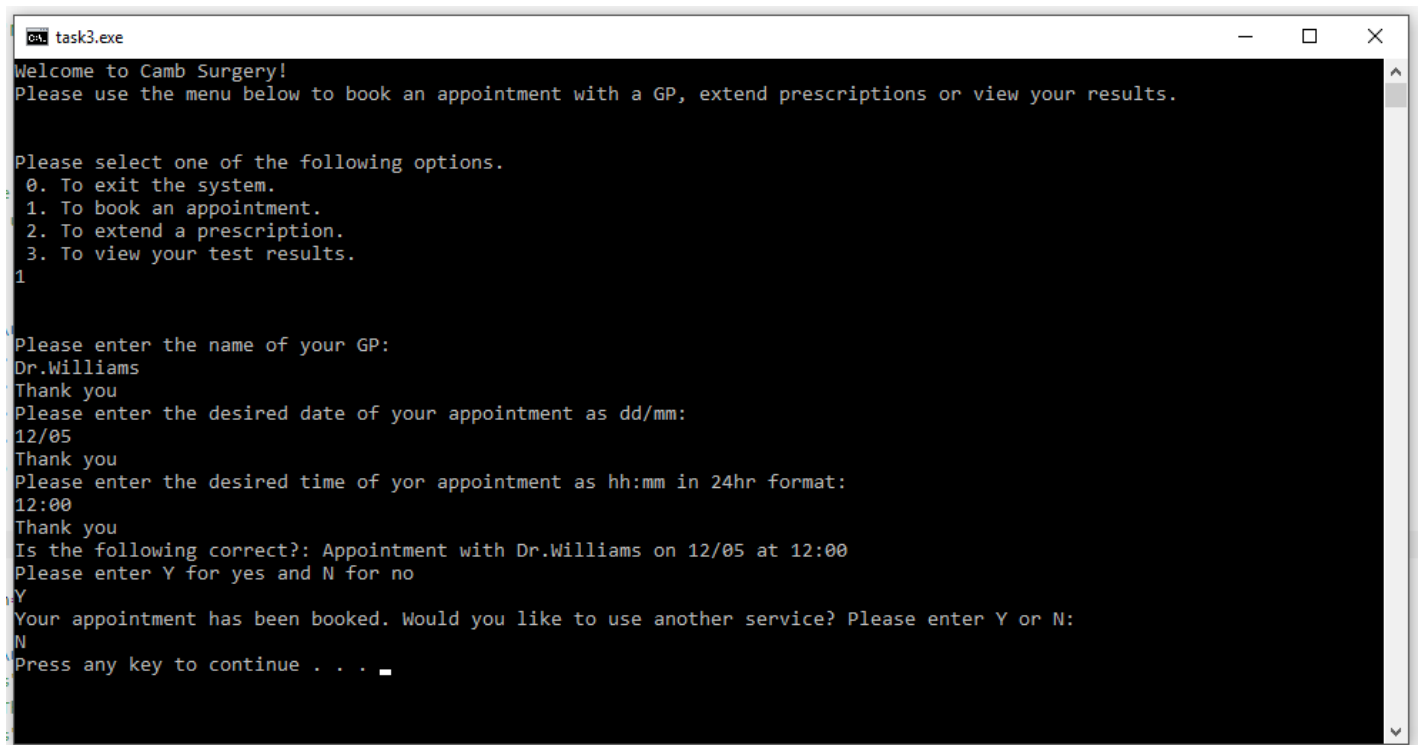
Do you want to add another student? Type Y for yes and N for No
Y
Enter a student name: Ted
Enter the student's mark: 22
Ted recieves the grade: F

Number of students with F: 1
Number of students with D: 0
Number of students with C: 0
Number of students with B: 1
Number of students with A: 1

Do you want to add another student? Type Y for yes and N for No
N
Press any key to continue . . .
```

Task 3

This program displays a menu for 4 options, exit, booking an appointment, extending a prescription and viewing test results. When selected, the 0th option exits the program with a break command. the 1st option requests the GP's name, date of appointment and time then repeats it to the user for confirmation. They can then choose to re-input this information or accept it and move on. The program then prompts the user if they'd like to use another service where they can choose to pick from the menu again or close the program with another break. The second option asks for a prescription ID and the length of time they'd like to extend it by in days. It again repeats this information to the user and asks for confirmation before asking to continue with another service. The 3rd option requires the user to input a test ID, asks for confirmation, then "prints" the hypothetical test results and asks if the user would like to use another service again.



```
task3.exe
Welcome to Camb Surgery!
Please use the menu below to book an appointment with a GP, extend prescriptions or view your results.

Please select one of the following options.
0. To exit the system.
1. To book an appointment.
2. To extend a prescription.
3. To view your test results.
1

Please enter the name of your GP:
Dr.Williams
Thank you
Please enter the desired date of your appointment as dd/mm:
12/05
Thank you
Please enter the desired time of yor appointment as hh:mm in 24hr format:
12:00
Thank you
Is the following correct?: Appointment with Dr.Williams on 12/05 at 12:00
Please enter Y for yes and N for no
Y
Your appointment has been booked. Would you like to use another service? Please enter Y or N:
N
Press any key to continue . . . _
```

```

#include <stdio.h>

int main()
{
    char cont='Y';
    char patientName[20];
    char dob[10];
    char doctorName[20];
    char appointmentDate[20];
    char time[5];
    char response='N';
    int option;
    char prescID;
    int prescETX;
    char testID;

    printf("Welcome to Camb Surgery!\n");
    printf("Please use the menu below to book an appointment with a GP,
extend prescriptions or view your results.\n");

    //Opening welcome which is only used once so is outside of the for loop

    for(;;) { //starts an infinite loop

        printf("\n\nPlease select one of the following options.\n");
        printf(" 0. To exit the system.\n");
        printf(" 1. To book an appointment.\n");
        printf(" 2. To extend a prescription.\n");
        printf(" 3. To view your test results.\n");
        scanf("%d", &option);

        //prints out the menu

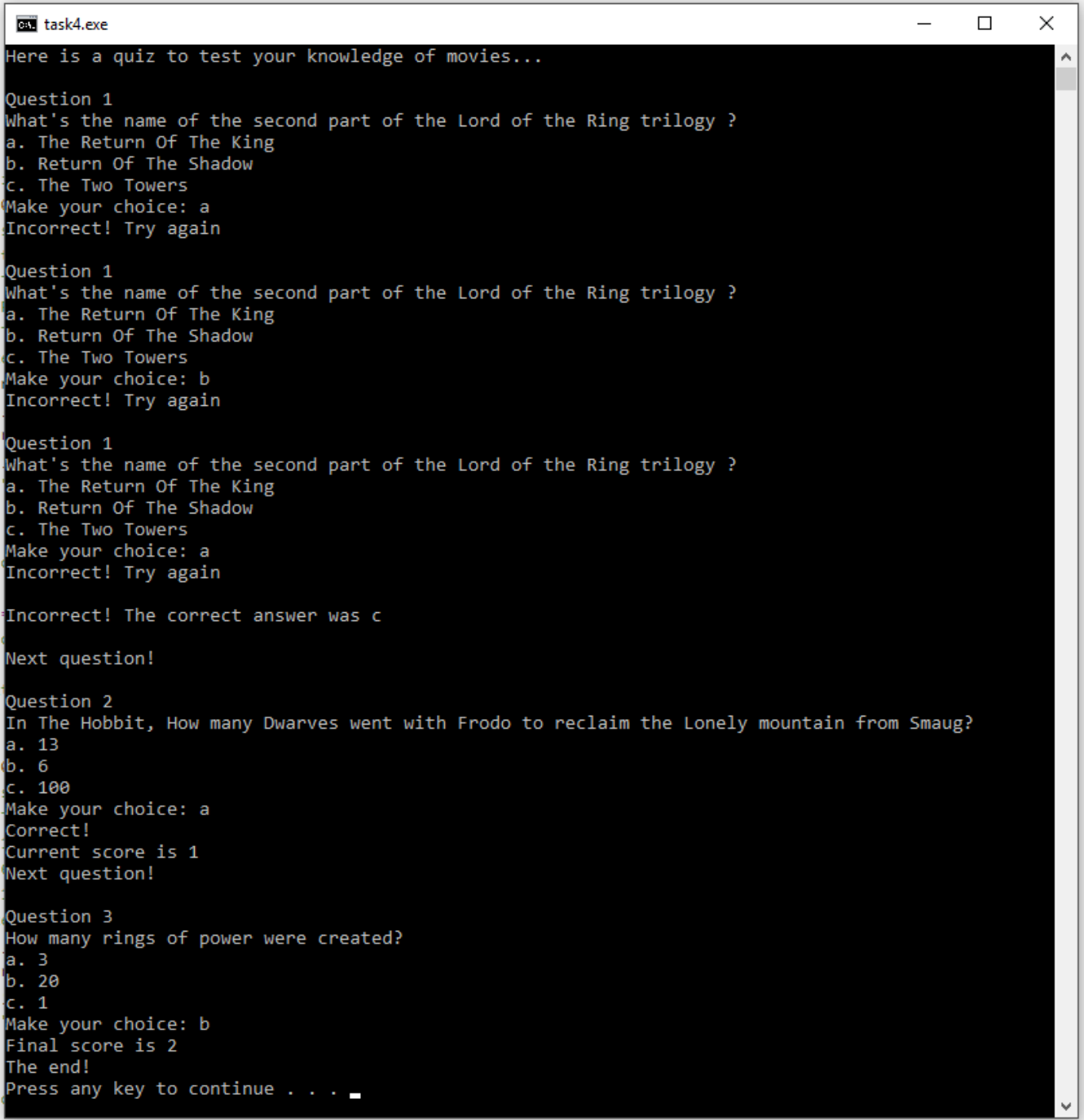
        if (option== 0){
            break;
        }
        else if (option== 1) {
            do{ //starts a do while loop
                printf("\n\nPlease enter the name of your GP: \n" );
                scanf("%s", &doctorName);
                printf("Thank you\nPlease enter the desired date of your
appointment as dd/mm: \n");
                scanf("%s", &appointmentDate);
                printf("Thank you\nPlease enter the desired time of your
appointment as hh:mm in 24hr format: \n" );
                scanf("%s", &time);
                printf("Thank you\nIs the following correct?: Appointment with "
);
                printf("%s", doctorName);
                printf(" on %s", appointmentDate);
                printf(" at %s\n", time);
                printf("Please enter Y for yes and N for no\n" );
                scanf("%c", &response);
            }while (response== 'N'); //loops while the response is N
            printf("Your appointment has been booked. Would you like to use
another service? Please enter Y or N: \n");
            scanf("%c", &cont);
            if (cont== 'N'){ //exits the for loop if answer is N
                break;
            }
        }
    }
}

```

```
    }
    else if (option== 2) {
        do{ //starts a do while loop
            fflush(stdin); //empties the buffer. To be used before you read a
string.
            printf("\n\nPlease enter the prescription identifier of the
prescription you would like to extend: \n");
            scanf(" %c", &prescID);
            printf("\nHow many days would you like to extend this
prescription for?\n");
            scanf("%d", &prescETX);
            printf("\nTo confirm, you would like to extend prescription ID:
%s for a total of %d days? Please enter Y or yes and N for no\n", prescID,
prescETX);
            scanf(" %c", &response);
            }while (response== 'N'); //loops while the response is N
            printf("Your prescription has been extended. Would you like to
use another service? Please enter Y or N: \n");
            scanf(" %c", &cont);
            if (cont== 'N'){ //exits the for loop if answer is N
                break;
            }
        }
    }
    else if (option== 3){
        do{ //starts a do while loop
            printf("\n\nPlease enter your test result identifier: \n");
            scanf("%c", &testID);
            printf("\nYou have requested the results for test: %s. Is this
correct? Please enter Y or yes and N for no\n", testID);
            scanf("%c", &response);
            }while (response== 'N'); //loops while the response is N
            printf("\n The results of your test are now printing. Would you
like to use another service? Please enter Y or N: \n");
            scanf("%c", &cont);
            if (cont== 'N'){ //exits the for loop if answer is N
                break;
            }
        }
    }
}
return 0; //ends the program
}
```


Task 4

This program is a quiz that gives the user 3 questions to answer, picking from 3 possible answers and giving 3 chances to get it correct before moving on. The variable "chances" is set before each question and iterates every time the question is answered. If it reaches 3, the correct answer is revealed and the question is skipped. If the correct answer is entered, the "score" variable is incremented and the next question is displayed. After all 3 questions, the end score is revealed.



```
task4.exe
Here is a quiz to test your knowledge of movies...

Question 1
What's the name of the second part of the Lord of the Ring trilogy ?
a. The Return Of The King
b. Return Of The Shadow
c. The Two Towers
Make your choice: a
Incorrect! Try again

Question 1
What's the name of the second part of the Lord of the Ring trilogy ?
a. The Return Of The King
b. Return Of The Shadow
c. The Two Towers
Make your choice: b
Incorrect! Try again

Question 1
What's the name of the second part of the Lord of the Ring trilogy ?
a. The Return Of The King
b. Return Of The Shadow
c. The Two Towers
Make your choice: a
Incorrect! Try again

Incorrect! The correct answer was c

Next question!

Question 2
In The Hobbit, How many Dwarves went with Frodo to reclaim the Lonely mountain from Smaug?
a. 13
b. 6
c. 100
Make your choice: a
Correct!
Current score is 1
Next question!

Question 3
How many rings of power were created?
a. 3
b. 20
c. 1
Make your choice: b
Final score is 2
The end!
Press any key to continue . . .
```

```
#include <stdio.h>

int main()
{
    char answer;
    int chances;
    int score=0;

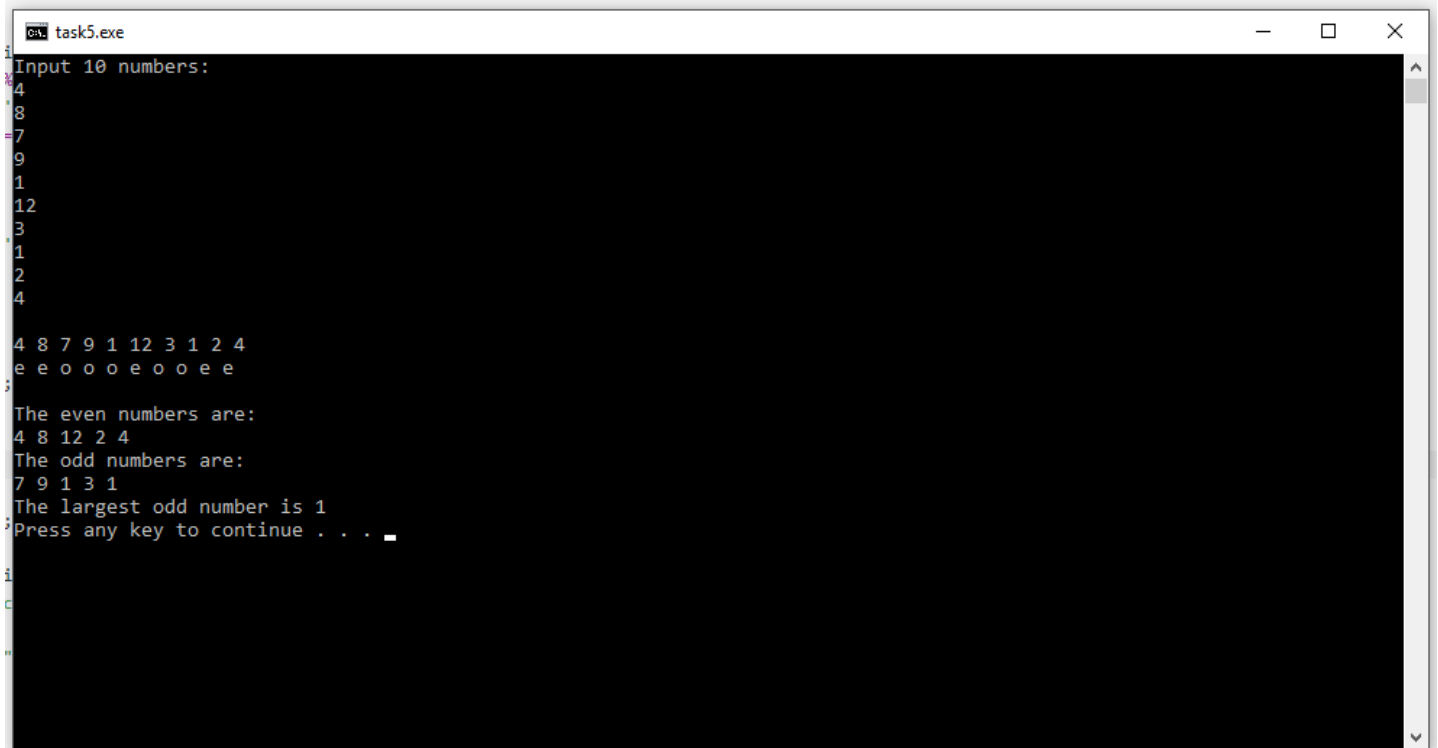
    printf("Here is a quiz to test your knowledge of movies...\n\n");
    for (chances=0; chances < 3; ++chances){ //starts a for loop which only
lets the user try 3 times
        printf("Question 1\n");
        printf("What's the name of the second part of the Lord of the Ring
trilogy ?\n");
        printf("a. The Return Of The King\n");
        printf("b. Return Of The Shadow\n");
        printf("c. The Two Towers\n");
        printf("Make your choice: ");
        fflush(stdin);
        scanf(" %c", &answer);
        if (answer == 'c'){ //increments the score and breaks the for loop
when recieving correct answer
            ++score;
            printf("Correct!\nCurrent score is %d \n", score);
            break;
        }
        printf("Incorrect! Try again\n\n");
    }
    if (chances == 3){ //gives the user the answer if they failed the 3
chances
        printf("Incorrect! The correct answer was c \n");
    }
    printf("\nNext question!\n\n");

    for (chances=0; chances < 3; ++chances){ //starts a for loop which only
lets the user try 3 times
        printf("Question 2\n");
        printf("In The Hobbit, How many Dwarves went with Frodo to reclaim
the Lonely mountain from Smaug?\n");
        printf("a. 13\n");
        printf("b. 6\n");
        printf("c. 100\n");
        printf("Make your choice: ");
        scanf(" %c", &answer);
        if (answer == 'a'){ //increments the score and breaks the for loop
when recieving correct answer
            ++score;
            printf("Correct!\nCurrent score is %d", score);
            break;
        }
        printf("Incorrect! Try again\n\n");
    }
    if (chances == 3){ //gives the user the answer if they failed the 3
chances
        printf("Incorrect! The correct answer was a \n");
    }
    printf("\nNext question!\n\n");
```

```
    for (chances=0; chances < 3; ++chances){ //starts a for loop which only
lets the user try 3 times
        printf("Question 3\n");
        printf("How many rings of power were created?\n");
        printf("a. 3\n");
        printf("b. 20\n");
        printf("c. 1\n");
        printf("Make your choice: ");
        scanf(" %c", &answer); //increments the score and breaks the for loop
when recieving correct answer
        if (answer == 'b'){
            ++score;
            break;
        }
        printf("Incorrect! Try again\n\n");
    }
    if (chances == 3){ //gives the user the answer if they failed the 3
chances
        printf("Incorrect! The correct answer was b \n");
    }
    printf("Final score is %d", score); //prints the total score and ends
the program
    printf("\nThe end!\n");
}
```

Task 5

This program finds the largest odd number out of 10 inputted numbers. First, it checks each number in the array to see if it's odd or even. It prints the numbers and an 'o' or 'e' to show if they are odd or even. It then sorts them into two separate arrays, one for even numbers and one for odd numbers and displays both arrays. Lastly, it compares every value in the odd array to find the largest value and assigns that to the 'big' value which is then printed. If there were no odd numbers, then the value of 'big' will be the same as what it was when it was initialised, zero, so it prints that there were no odd numbers.



```
task5.exe
Input 10 numbers:
4
8
7
9
1
12
3
1
2
4
4 8 7 9 1 12 3 1 2 4
e e o o o e o o e e
The even numbers are:
4 8 12 2 4
The odd numbers are:
7 9 1 3 1
The largest odd number is 1
Press any key to continue . . .
```

```
#include <stdio.h>

int main()
{
    int arr[10], i, j, x=0, y=0, even[10], odd[10], big=0;
    char oe[10];

    printf("Input 10 numbers:\n");

    for (i = 0; i < 10; i++){ //loops to input 10 numbers into the array
        scanf("%d", &arr[i]);
    }

    for (i = 0; i < 10; i++){ //checks if each value in the array is
        divisible by 2, therefore even, and puts it into the even array
        if(arr[i] % 2 == 0){
            oe[i] = 'e';
            even[y] = arr[i];
            y++;
        }
        else{ //every other value goes into the odd array
            oe[i] = 'o';
```

```
        odd[x] = arr[i];
        x++;
    }
}
printf("\n");

for (i = 0; i < 10; i++){ //displays all the numbers
    printf("%d ", arr[i]);
}
printf("\n");

for (i = 0; i < 10; i++){ //displays wether each is odd or even with
'o' or 'e'
    printf("%c ", oe[i]);
}
printf("\n\n");

printf("The even numbers are: \n"); //prints all the numbers from even
array
for (i = 0; i < y; i++){
    printf("%d ", even[i]);
}
printf("\n");

printf("The odd numbers are: \n"); //prints all the numbers from odd
array
for (i = 0; i < x; i++){
    printf("%d ", odd[i]);
}
printf("\n");

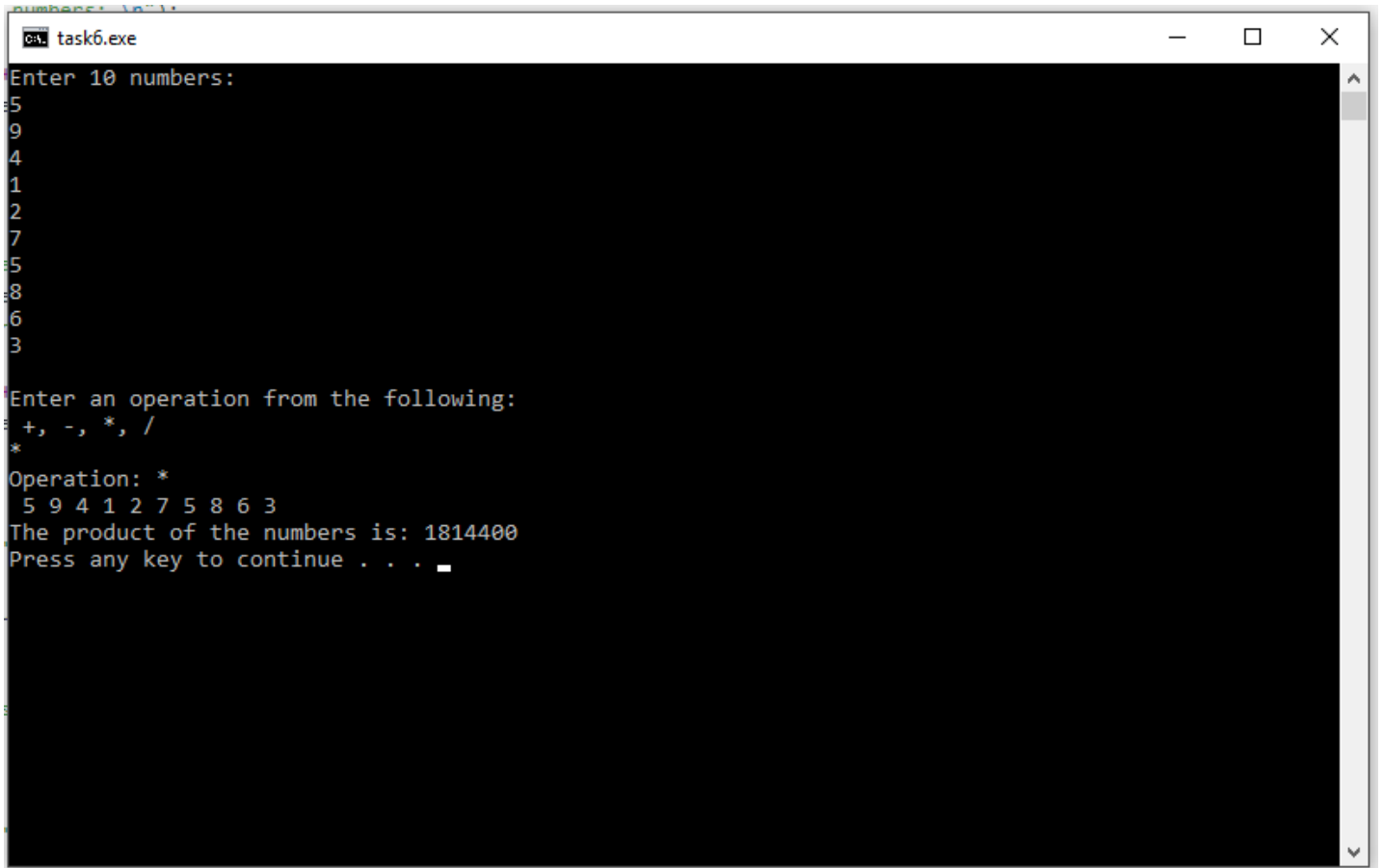
for (i = 0; i < x; i++){ //compares each odd number to find the
biggest
    if(odd[i]>odd[i+1])
        big = odd[i];
    }

    if (big==0){ //if big = 0 then no odd numbers
        printf("There were no odd numbers");
    }else{
        printf("The largest odd number is %d", big); //prints biggest odd
number
    }

    return 0;
}
```

Task 6

This program takes 10 values then performs an operation on them chosen by the user. First, the 10 values are inputted by the user and stored in an array. The user then enters one of the 4 operators shown in the console and the operation is completed on the values in the array. Depending on the operation, each number from the array is added, subtracted, multiplied or divided from each other to produce the end value which is then printed.



```
task6.exe
Enter 10 numbers:
5
9
4
1
2
7
5
8
6
3

Enter an operation from the following:
+, -, *, /
*

Operation: *
5 9 4 1 2 7 5 8 6 3
The product of the numbers is: 1814400
Press any key to continue . . .
```

```
#include <stdio.h>

int main()
{
    int arr[10], x, sum=0, mult=0, div=0, sub=0;
    char operation;

    printf("Enter 10 numbers: \n");

    for(x=0; x<10; x++){ //loops to input 10 numbers into the array
        scanf(" %d", &arr[x]);
    }

    do{ //starts a do while loop

        printf("\nEnter an operation from the following: \n +, -, *, /
\n");
        scanf(" %c", &operation);
```

```
    printf("Operation: %c \n", operation); //user inputs operation into
'operation' char

    for(x=0; x<10; x++){ //prints the array
        printf(" %d", arr[x]);
    }

    if(operation == '+'){ //if add is chosen, sum of all the numbers in
array
        for(x=0; x<10; x++){
            sum=arr[x]+sum;
        }

        printf("\nThe sum of the numbers is: %d", sum); //prints
answer and break
        break;
    }

    if(operation == '-'){ //subtracts each number in the array
        sub=arr[0];
        for(x=1; x<10; x++){
            sub=sub-arr[x];
        }

        printf("\nThe numbers subtracted from eachother equal to:
%d", sub); //prints answer and breaks
        break;
    }

    if(operation == '*'){ //multiplies each number in the array
        mult=arr[0];
        for(x=1; x<10; x++){
            mult=arr[x]*mult;
        }
        printf("\nThe product of the numbers is: %d", mult);
//prints answer and breaks
        break;
    }

    if(operation == '/'){ //divides each number in the array
        div=arr[0];
        for(x=1; x<10; x++){
            div=div/arr[x];
        }
        printf("\nEach number divided by the next is equal to: %d",
div); //prints answer and breaks
        break;
    }

}while(operation != ('+'| '-'| '*'| '/')); //if anything else is entered, loop
exits

return 0;
}
```

Task 7

This program prints the smallest possible number from a set of inputted numbers. First, the number of values is inputted so we know how many times to iterate in a later section. Next, the numbers are entered and go into an array. Each value in this array is now checked to see if it's positive. If so, it goes into a separate array for positive numbers. This array is then fed into the "smallest" function that checks one value against another and returns the smallest. This is repeated for the whole positive array then the smallest positive number is printed.

```
#include <stdio.h>

int smallest(int num1, int num2)
{
    if(num1 > num2){
        return num2;
    }else
        return num1;
} //function takes two integers, compares the two and returns the smallest value

int main()
{
    int arr[10], pos[10], i, x, j=0, small;

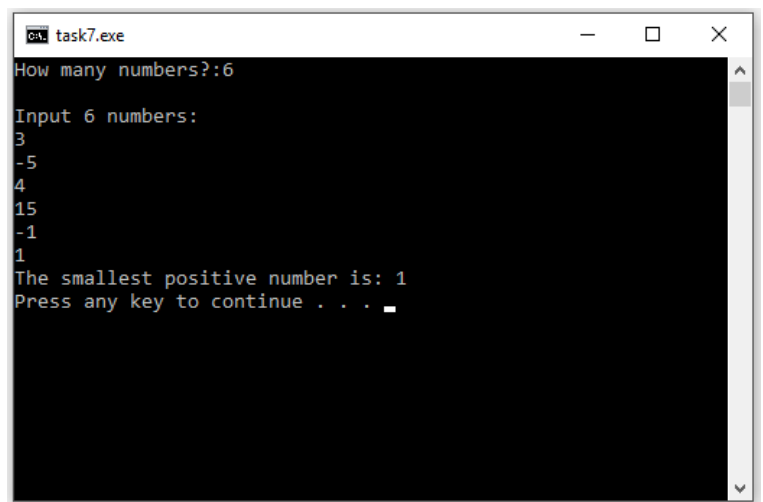
    printf("How many numbers?:");
    scanf(" %d", &x); //number of times to loop the for
    printf("\nInput %d numbers:\n", x); //recieves and stores numbers in an array
    for (i = 0; i < x; i++){
        scanf(" %d", &arr[i]);
    }

    for (i = 0; i < x; i++){ //takes the array and moves positive values into another array
        if(arr[i]>0){
            pos[j] = arr[i];
            j++;
        }
    }

    small = pos[0];
    for (i = 1; i < j; i++){
        small = smallest(small, pos[i]); //calls the function with each value of positive array and saves to 'small'
    }

    printf("The smallest positive number is: %d", small); //prints the 'small' int value

    return 0;
}
```



```
task7.exe
How many numbers?:6
Input 6 numbers:
3
-5
4
15
-1
1
The smallest positive number is: 1
Press any key to continue . . .
```


Task 8

This program serves as a system to store, process and display student's marks. First, the main function starts an infinite loop in which it calls the "printMenu" function to display the menu and options. The 1st option runs the function "students" which asks for the user to input the number of students in the class and their names and marks respectively by putting them into two arrays, "name" and "mark". The 2nd option calls the function "printStudents" which prints out the student's names and marks from these arrays. The 3rd option calls the "highMark" function which checks each value in the mark array and finds the largest number. It then takes that number and copies the location of the largest value in the mark array and uses it to find the name of that student. It then prints both the name and mark of the student. The 4th option calls the function "highMark" which takes all the student's marks and creates an average for the class by adding each number together then dividing by the total number of students. It then prints this value. The 5th and final option exits the program with a break.

```
#include <stdio.h>
#include <string.h>

int x, i, option, stID, highest, avg=0;
int mark[30];
char name[30][10];

void printMenu()
{ //function that prints the menu
    printf("\nPlease select one of the following options.\n");
    printf(" 1. Input students' names and marks\n");
    printf(" 2. Display all the students' names and marks\n");
    printf(" 3. Display the highest mark in the class\n");
    printf(" 4. Display average class mark\n");
    printf(" 5. Exit\n");
}

void students()
{ //function that takes the student's names and marks and puts them into arrays
    printf("How many students are in the class? (max 30): ");
    scanf("%d", &x);

    printf("\nInput %d student's names:\n", x);
    for (i = 0; i < x; i++){
        fflush(stdin);
        scanf("%s", name[i]);
    }

    printf("\nPlease enter the marks for each student\n");
    for (i = 0; i < x; i++){
        printf("%s: ", name[i]);
        scanf(" %d", &mark[i]);
        printf("\n");
    }
}

void printStudents()
{ //function that prints all the info from student arrays
    for (i = 0; i < x; i++){
        printf("%s: ", name[i]);
        printf("%d\n", mark[i]);
    }
}
```

```
}

void highMark()
{ //function that finds the highest mark and student name
    highest = mark[0];
    for (i = 1; i < x; i++){ //loops for all students
        if (mark[i] > highest){ //iterates over every mark
            highest = mark[i];
            stID = i; //copies array ID to find the correct student name
        }
    }
    printf("The student with the highest mark is %s with a mark of:
%d\n", name[stID], highest); //prints mark and name
}

void averageMark()
{ //fucnition that averages all the marks and prints the values
    for (i = 0; i < x; i++){
        avg += mark[i]; //loops adding each value together
    }
    avg /= x; //divides from amount of values in array
    printf("The average mark of the class is: %d\n", avg); //prints
average
}

int main ()
{
    for(;;){ //starts an infinte loop

        printMenu(); //calls the menu function then recieves option input
        scanf("%d", &option);

        if (option==1){

            students(); //calls function

        }else if (option==2){

            printStudents(); //calls function

        }else if (option==3){

            highMark(); //calls function

        }else if (option==4){

            averageMark(); //calls function

        }else if (option==5){
            break; //breaks from infinite loop
        }
    }
    return 0;
}
```

```
task8v2.exe
Please select one of the following options.
1. Input students' names and marks
2. Display all the students' names and marks
3. Display the highest mark in the class
4. Display average class mark
5. Exit
1
How many students are in the class? (max 30): 6

Input 6 student's names:
Todd
Adam
Olivia
Aiden
Steve
Chloe

Please enter the marks for each student
Todd: 56

Adam: 77

Olivia: 89

Aiden: 45

Steve: 67

Chloe: 72

Please select one of the following options.
1. Input students' names and marks
2. Display all the students' names and marks
3. Display the highest mark in the class
4. Display average class mark
5. Exit
2
Todd: 56
Adam: 77
Olivia: 89
Aiden: 45
Steve: 67
Chloe: 72

Please select one of the following options.
1. Input students' names and marks
2. Display all the students' names and marks
3. Display the highest mark in the class
4. Display average class mark
5. Exit
3
The student with the highest mark is Olivia with a mark of: 89

Please select one of the following options.
1. Input students' names and marks
2. Display all the students' names and marks
3. Display the highest mark in the class
4. Display average class mark
5. Exit
4
The average mark of the class is: 67

Please select one of the following options.
1. Input students' names and marks
2. Display all the students' names and marks
3. Display the highest mark in the class
4. Display average class mark
5. Exit
5
Press any key to continue . . .
```