

CT018-3-1-ICP

Introduction to C programming

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1.0 Introduction

This assignment assesses a basic understanding of programming concepts using flowcharts, pseudocode, and the programming language C. The deliverable for the project was to build a car service management system. Basic features required in the program were a menu system, ability to select services, type of service (urgent or routine), to print and on-screen invoice and save the invoice in text files.

C is a procedural programming language, which was mainly developed as a system programming language. It allows low-level access to memory, has a simple set of keywords, and follows “clean code” practices. This makes C the perfect language for system and compiler development. C is available in many different platforms, ranging from Windows to Linux. Many programming languages have even inherited syntax from C itself; some of them are Java, PHP, JavaScript etc.

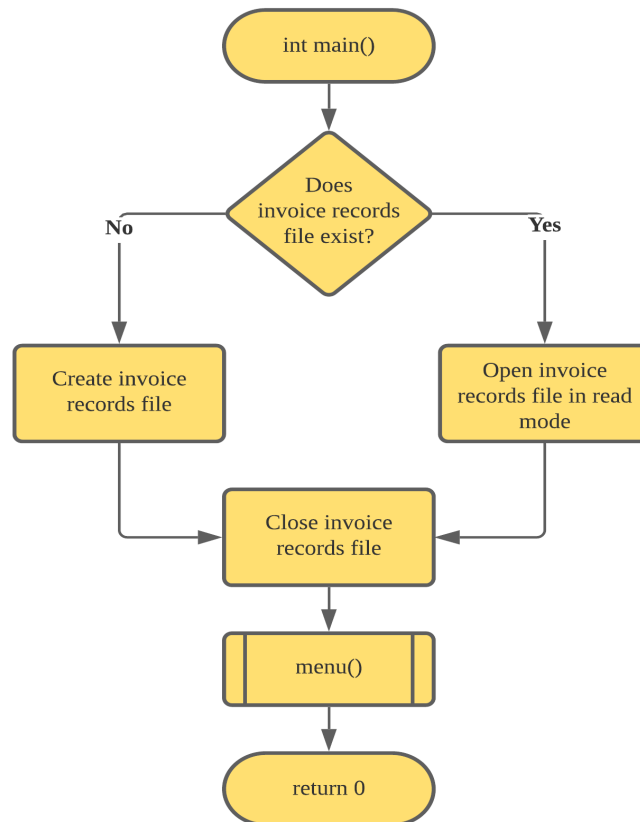
2.0 Assumptions

Some assumptions were made while making this program. They were:

- i) The system is being used by the employees of the company/shop
- ii) All transactions are saved in a central record file
- iii) The user can exit an ongoing transaction before an invoice has been printed
- iv) Invoice number continues, even after closing the program
- v) Once a service has been selected, it is required to choose either “urgent” or “normal.”

3.0 Design of The Program

3.1 Main function/File Initialization



Flowchart 1: File Initialization

The primary function is the heart/core of every C program. It is a necessary function that is called on first every time the program is executed. In this function, the invoice records file is initialized, and the `menu()` process is called, which starts the whole program.

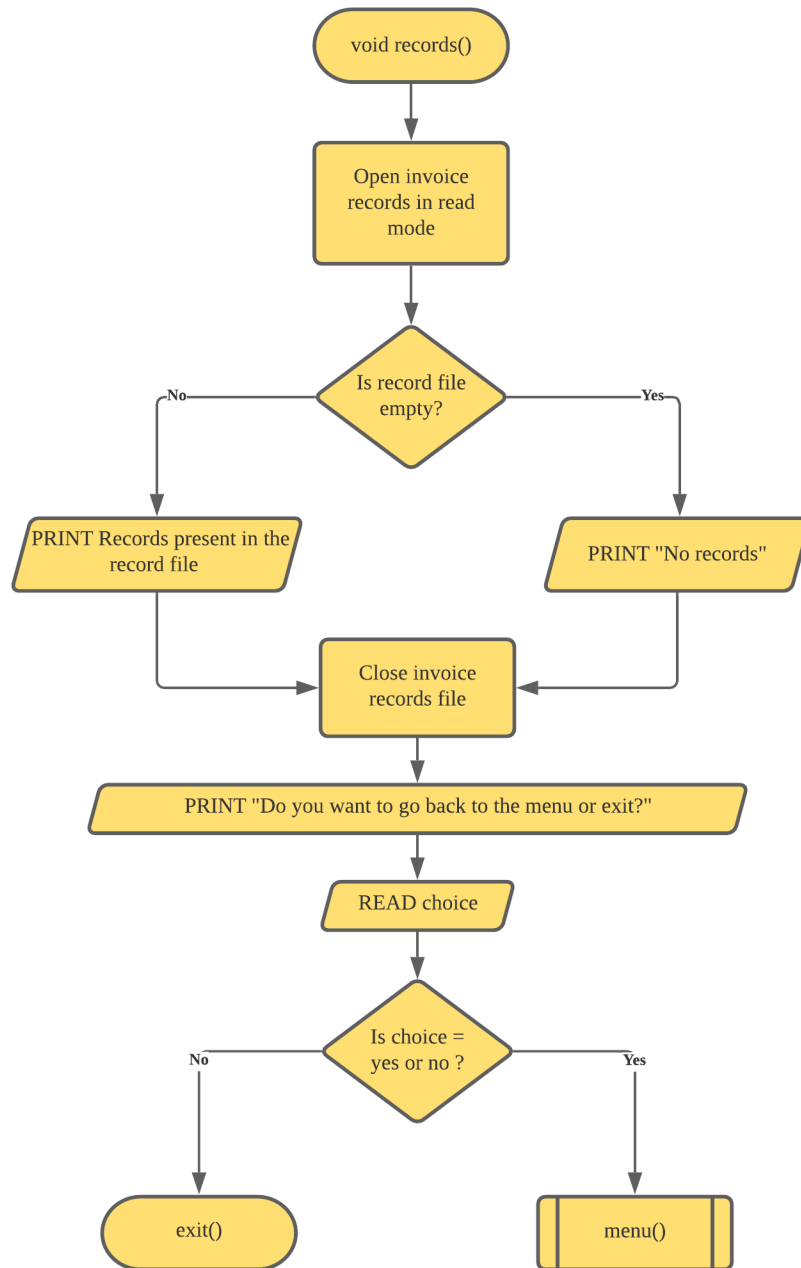
Function `main()` Pseudocode:

```
FUNCTION main()
    OPEN invoRec.txt

    IF invoRec.txt does not exist THEN
        CREATE invoRec.txt
    ENDIF

    CLOSE invoRec.txt
    CALL menu()
ENDFUNCTION
```

3.2 View Records:



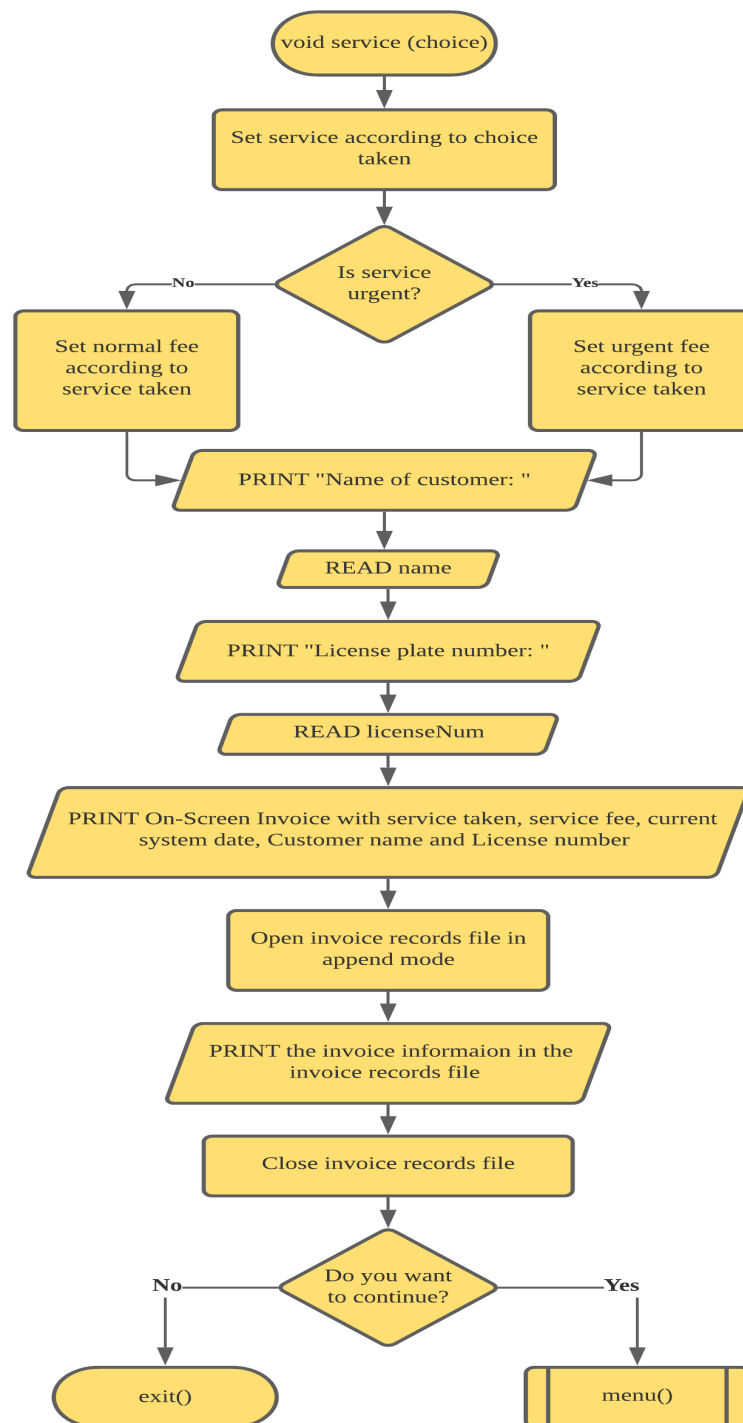
Flowchart 2: View Records

One of the additional features of this program is the ability to check all the invoice records. This function is responsible for that. The task of this function is to read through the invoice records text file and print its content on the screen.

Function records() Pseudocode:

```
FUNCTION records()  
    PRINT "RECORDS: "  
    OPEN invoRec.txt  
  
    IF invoRec.txt is empty THEN  
        PRINT "NO RECORDS"  
    ELSE  
        PRINT records present in invoRec.txt  
    ENDIF  
  
    CLOSE invoRec.txt  
  
    PRINT "Do you want to continue or exit the program? Enter '1' to go back to Menu or '2' to exit: "  
    READ condition  
  
    IF condition == 1 THEN  
        CALL menu()  
    ELSE  
        IF condition == 2 THEN  
            exit()  
        ELSE  
            PRINT "Invalid entry given, the program will now exit."  
            exit()  
        ENDIF  
    ENDIF  
ENDFUNCTION
```

3.3 Car Management Service:



Flowchart 3: Car Management Service

The service(int serv) function is the management system of the program. This is the part of the program which prints the On-Screen invoice and is responsible for storing the invoice data.

Function service() Pseudocode:

```
FUNCTION service(int serv)
    OPEN invoRec.txt
    count = number of records in invoRec.txt

    IF count == 0 THEN
        invNum = 1
    ELSE
        invNum = count + 1
    ENDIF

    CLOSE invoRec.txt

    SET servName according to the serv number taken
    PRINT "Is the service urgent? Enter '1' for yes and '2' for no [-1 to return to Services]: "
    READ condition

    DOWHILE condition != -1
        IF condition == 1 THEN
            servType = "urgent"
            SET urgent fee according to the service taken
        ELSE
            IF condition == 2 THEN
                servType = "normal"
                SET normal fee according to the service taken
            ELSE
                PRINT "Invalid entry! Try again."
                PRINT "Is the service urgent? Enter '1' for yes and '2' for no [-1 to return to Services]: "
                READ condition
            ENDIF
        ENDIF
    ENDDO

    PRINT "What is the name of the customer: "
    READ name
    PRINT "License Plate number: "
    READ liNum

    date = System.date

    PRINT "On-Screen Invoice"
    PRINT "Invoice Number: ", invNum
    PRINT "Customer Name: ", name
    PRINT "Car License number: ", liNum
    PRINT "Service Taken: ", servName
    PRINT "Type of Service: ", servType
    PRINT "Service Fee: ", fee
    PRINT "Service Date: ", date
```



```

OPEN invoRec.txt
APPEND On-Screen Invoice information in invoRec.txt
CLOSE invoRec.txt

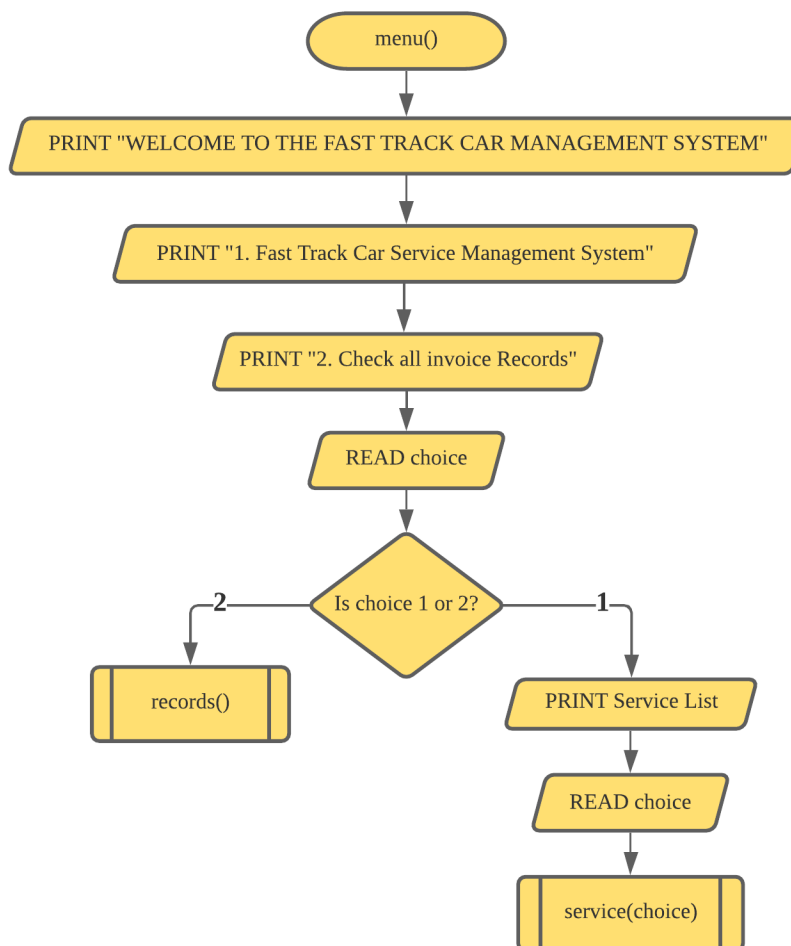
invFName = "invoice" + invNum + ".txt"
OPEN invFName
WRITE On-Screen Invoice information
CLOSE invFName

PRINT "Do you want to continue? Enter '1' to continue or '2' to exit the program: "
READ condition

IF condition == 1 THEN
    CALL menu()
ELSE
    IF condition == 2 THEN
        PRINT "The program will now exit"
        exit()
    ELSE
        PRINT "Invalid entry, the program will exit regardless!"
        exit()
    ENDIF
ENDIF
ENDFUNCTION

```

3.4 Menu:



Flowchart 4: Menu

This function is relatively self-explanatory. It is the menu() function which shows the menu of the program. The function prints the welcome screen with the choice to select either “Show Records” or “Car management system”. If the records section is taken, it calls the records() function; else it prints the services provided by the company and calls the service() function.

Function menu() Pseudocode:

```
FUNCTION menu()
    PRINT "WELCOME TO THE FAST TRACK CAR MANAGEMENT SYSTEM."
    PRINT "1. Fast Track Car Service Management System"
    PRINT "2. Check all Invoice records"
    PRINT "Select by entering '1' or '2': "
    READ choice

    IF choice == 1 THEN
        PRINT "Fast Track Car Service Management System"
        PRINT "Services provided by the workshop:"
        PRINT "Services available with urgent, normal fees and time taken"
        PRINT "What service do you need? Please type the service number: "
        READ choice

        IF choice < 1 or choice > 8 THEN
            PRINT "Invalid service number entered!! The program will now exit."
        ELSE
            service(choice)
        ENDIF
    ELSE
        IF choice == 2 THEN
            records()
        ELSE
            PRINT "Invalid entry, the program will now close!"
            exit()
        ENDIF
    ENDIF
ENDFUNCTION
```

4.0 Functionality

According to the structure of the program, there are four functions:

Service_Menu()

Array_rate()

Queue()

Pay invoice()

5.0 Source Code

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

> void service_Menu() ...
> void array_rate(int *x, int *y){ ...
> void queue(int *token) ...
> void pay_Invoice(char *c_Name, int *c_Id, int *car_Reg_Num, int *service_Time, int *work_Type) ...
> int main(){ ...
```

```
    if (service_Type == 1)
    {
        work_Type = 1;
    }
    else
    {
        work_Type = 2;
    }
    queue(&work_Type);

    if (!(service_Num > 8 || service_Num < 1) && !(service_Type > 2 || service_Type < 1 ))
    {
        array_rate(&service_Num, &service_Type);
        pay_Invoice(c_Name, &c_Id, &car_Reg_Num, &service_Type, &work_Type);
    }

    FILE *f;
    f=fopen("outfile.txt","w");
    if (f==NULL)
    {
        printf("Could not create");
    }
    fprintf(f, "\n \t Customer Name: %s", c_Name);
    fprintf(f, "\n \t Customer Id: %d", &c_Id);
    fprintf(f, "\n \t Car registration number: %d", &car_Reg_Num);

    fclose(f);

    return 0;
}
```

```

void service_Menu()
{
    printf("\n|-----|");
    printf("\n| No.|\t\tService type \t \t | time Needed | Service Fee      |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n|   | \t \t \t\t\t | (minutes) | Normal | Urgent |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 1- | Repair Punctured car tyre / piece | \t 10\t | RM5   | RM6   |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 2- | Car tyre change / piece              | \t 15\t | RM150 | RM160 |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 3- | Mineral oil change                  | \t 20\t | RM80  | RM90  |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 4- | Synthetic oil change                 | \t 20\t | RM130 | RM140 |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 5- | Battery change                      | \t 5 \t | RM200 | RM210 |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 6- | Headlight bulb change / Piece       | \t 5 \t | RM6   | RM8   |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 7- | Taillight bulb change / Piece       | \t 5 \t | RM6   | RM8   |");
    printf("\n|-----+-----+-----+-----|");
    printf("\n| 8- | Car wash                           | \t 10\t | RM10  | RM12  |");
    printf("\n|-----|\\n");
}

```

```
void array_rate(int *x, int *y){
    int temp;
    int array_Sort[8][3] = {{10,5,6}, {15,150,160}, {20,80,90},
                             {20,130,140}, {5,200,210}, {5,6,8},
                             {5,6,8}, {10,10,12}};

    temp = array_Sort[*x-1][0];
    *y = array_Sort[*x-1][*y];
    *x = temp;
    return ;
}
```

```
void queue(int *token)
{
    int A[5]={0,0,0,0,0};
    int i;
    if (*token = 2)
    {
        for(i=0;i<5;i++)
        {
            if(A[i] = 0)
            {
                A[i] = 1;
            }
            else
            {
                i++;
            }
        }
    }

    if (* token = 1)
    {
        for(i=5;i>0;i--)
        {
            if(A[i] = 0)
            {
                A[i] = 1;
            }
            else
            {
                i++;
            }
        }
    }
}
```

```

void pay_Invoice(char *c_Name, int *c_Id, int *car_Reg_Num, int *service_Time, int *work_Type)
{
    time_t rawtime;
    struct tm *info;
    char buffer[80];
    time( &rawtime );
    info = localtime( &rawtime );
    strftime(buffer,80,"%x", info);

    printf("\n|-----|");
    printf("\n| + + + + + | + + + + + |");
    printf("\n| ----- | Payment Invoice | ----- |");
    printf("\n| + + + + + | + + + + + |");
    printf("\n|-----|");
    printf("\n| Date : %s \t", buffer);
    strftime(buffer,80,"%I:%M%p", info);
    printf("Time : %s\t | \n", buffer);
    printf("\n \t Customer Name: %s", c_Name);
    printf("\n \t Customer Id: %d", *c_Id);
    printf("\n \t Car registration number: %d", *car_Reg_Num);
    if (*work_Type == 1)
    {
        printf("\n\n \t Service Name: Normal");
    }
    else
    {
        printf("\n\n \t Service Type: Urgent");
    }

    printf("\n\n \t Pay: RM %d", *service_Time);
    printf("\n\n\t\t\t\t\t-----Thank You.-----");
    printf("\n|-----|");
}

```

```

int main(){

    char c_Name[20];
    int c_Id, car_Reg_Num;
    printf("\n|-----|");
    printf("\n\t\t\t\tWelcome\nplease enter your details");
    printf("\n\nEnter Customer's name:\t");
    scanf("%s",&c_Name);
    printf("\n\nEnter Customer's local ID:\t");
    scanf("%d",&c_Id);
    printf("\n\nEnter Car Registratioin Number:\t");
    scanf("%d",&car_Reg_Num);
    printf("\n|-----|\n");

    service_Menu();

    int service_Num, service_Type, work_Type;
    printf("\n|-----|\n");
    printf("\nEnter the <Number> to avail the service type: \t");
    scanf("%d", &service_Num);
    printf("\n<1> for Normal Service \n<2> for urgent Service\t");
    printf("\nEnter the number:\t");
    scanf("%d", &service_Type);
    printf("\n|-----|");

    if (service_Type == 1)
    {
        work_Type = 1;
    }
    else
    {
        work_Type = 2;
    }
    queue(&work_Type);
}

```


6.0 References

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