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College of Engineering, Computer Studies
and Architecture

Laboratory Activity No. 2

FLOWCHARTING AND ALGORITHMS

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Laboratory Activity 2

Understanding Input and Output Statements in Turbo C

Objectives:

- To understand and implement basic input and output statements in Turbo C.
- To learn how to use ``printf`` and ``scanf`` functions for displaying and receiving data.

Materials Needed:

- A computer with Turbo C installed.
- A basic understanding of C programming syntax.

Introduction:

In Turbo C, input and output operations are performed using ``scanf`` and ``printf`` functions. The ``printf`` function is used to display information on the screen, while the ``scanf`` function is used to receive input from the user.

Activity Instructions:

1. Basic Output using ``printf``:

Step 1: Open Turbo C and create a new file.

Step 2: Write a simple program to display your name and age using the ``printf`` function.

Step 3: Compile and run the program.

Step 4: Observe the output and verify that your name and age are correctly displayed.

```
#include <stdio.h>

void main() {
    printf("Name: John Doe\n");
    printf("Age: 20\n");
}
```

2. Basic Input using `scanf`:

Step 1: Modify the previous program to allow the user to input their name and age.

Step 2: Use the `scanf` function to take the user's input.

Step 3: Display the user's input back to them using `printf`.

Step 4: Compile and run the program. Enter different values and observe the output.

```
#include <stdio.h>

void main() {
    char name[30];
    int age;

    printf("Enter your name: ");
    scanf("%s", name);

    printf("Enter your age: ");
    scanf("%d", &age);

    printf("Name: %s\n", name);
    printf("Age: %d\n", age);
}
```

3. Advanced Input and Output:

Step 1: Expand the program to include more data types, such as floating-point numbers for height and grade.

Step 2: Use `scanf` to receive the height and grade from the user.

Step 3: Display the collected information in a formatted manner.

Step 4: Compile and run the program. Test it with various inputs.

```
#include <stdio.h>

void main() {
    char name[30];
    int age;
    float height, grade;

    printf("Enter your name: ");
    scanf("%s", name);

    printf("Enter your age: ");
    scanf("%d", &age);

    printf("Enter your height (in meters): ");
    scanf("%f", &height);

    printf("Enter your grade: ");
    scanf("%f", &grade);

    printf("\n--- Student Information ---\n");
    printf("Name: %s\n", name);
```

```
printf("Age: %d\n", age);  
printf("Height: %.2f meters\n", height);  
printf("Grade: %.2f\n", grade);  
}
```

Questions:

1. What is the difference between `printf` and `scanf`?
 - `printf` is used for outputs while `scanf` is used for inputs.
2. Why is it important to use the correct format specifier (e.g., `%d`, `%s`, `%f`) in `printf` and `scanf`?
 - It is important for data type matching, also it ensures data is read and written accurately, and using correct specifier makes the code more readable and easier to maintain. While using incorrect specifier can cause the program to access memory incorrectly, potentially leading to crashes or undefined behavior.
3. What happens if you input a different data type than expected by the format specifier?
 - The program won't run as expected and may display incorrect results or even an error code

Programming Exercises:

1. Create a program that asks for a distance in kilometers and converts it into its metric equivalent.

```
#include <stdio.h>

int main()
{
    float distance_km;

    printf("Input Distance (km): ");
    scanf("%f", &distance_km);

    float meters = distance_km * 1000;
    float cm = meters * 100;
    float mm = cm * 10;

    printf("\nDistance in meters (m): %.2f m\n", meters);
    printf("Distance in centimeters (cm): %.2f cm\n", cm);
    printf("Distance in millimeters (mm): %.2f mm\n", mm);

    printf("\nPress Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

2. Write a program that asks the user to enter the radius of a circle and then computes for its area. Recall that the formula to compute for the area is $AREA = \pi \times R^2$, where R is the radius. The output must be similar to the one below:

The area of the circle with radius 2 cm is 12.56 cm²

```
#include <stdio.h>

int main()
{
    float radius;
    float pi = 3.14159;

    printf("Enter Radius (cm): ");
    scanf("%f", &radius);

    float area = pi * radius * radius;

    printf("\nThe area of the circle with radius %.2f cm is %.2f cm^2\n\n",
radius, area);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

3. Create a program that converts a Fahrenheit measure to a Celsius measure ($C = 5/9 \times (F-32)$).

```
#include <stdio.h>

int main()
{
    float fahrenheit;

    printf("Enter Fahrenheit: ");
    scanf("%f", &fahrenheit);

    float celsius = 5.0 / 9.0 * (fahrenheit - 32);

    printf("%.2f Fahrenheit = %.2f Celcius\n\n", fahrenheit, celsius);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```


4. Write a program that will compute and display the midterm grade of a student. The midterm grade is equal to one-third of the minor A exam and two-thirds of the midterm exam.

```
#include <stdio.h>

int main()
{
    char stud_name[30];
    int minor_a, midterm;

    printf("Enter Student's Name: ");
    fgets(stud_name, sizeof(stud_name), stdin);

    printf("Enter Minor A Exam: ");
    scanf("%d", &minor_a);

    printf("Enter Midterm Exam: ");
    scanf("%d", &midterm);

    float midterm_grd = (1.0 / 3.0 * minor_a) + (2.0 / 3.0 * midterm);

    printf("\nStudent's Name: %s", stud_name);
    printf("Midterm Grade: %.2f\n\n", midterm_grd);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

5. Create a program that will input a number in kilowatt and display its equivalent measure in watts.

```
#include <stdio.h>

int main()
{
    float kilowatt;

    printf("Enter Killowatt/s: ");
    scanf("%f", &kilowatt);

    float watts = kilowatt * 1000.0;

    printf("Equivalent Kilowatt/s in Watt/s: %.2f Watts\n\n", watts);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

6. Create a program that will compute and display the area of a square. Recall that the formula to compute for the area is $AREA = S^2$ where S is the side of the square.

```
#include <stdio.h>

int main()
{
    float side;

    printf("Enter Length of Side (m): ");
    scanf("%f", &side);

    float area = side * side;

    printf("\nArea of a Square with Side %.2f m is %.2f m^2\n\n", side, area);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

7. Make a program that will convert an inputted number in inches (in) and display its equivalent measure in feet (ft).

```
#include <stdio.h>

int main()
{
    float inch;

    printf("Enter Measurement in Inches (in): ");
    scanf("%f", &inch);

    float feet = inch / 12.0;

    printf("Equivalent Measurement (in) to (ft): %.2f ft\n\n", feet);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

8. Create a program that will get as input from the user the base and height of a triangle. Compute and display the area of the rectangle.

```
#include <stdio.h>

int main()
{
    float base, height;

    printf("Enter Length of the Base (m): ");
    scanf("%f", &base);

    printf("Enter the Height (m): ");
    scanf("%f", &height);

    float area = 0.5 * base * height;

    printf("The Area of the Triangle with a Base of %.2f m and a Height of %.2f m is %.2f m^2\n\n", base, height, area);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

9. Write a program that inputs two real numbers then exchanges their values.

```
#include <stdio.h>

// Write a program that inputs two real numbers then exchanges their values.

int main()
{
    float first_number, scnd_number, temp;

    printf("Enter First Number: ");
    scanf("%f", &first_number);

    printf("Enter Second Number: ");
    scanf("%f", &scnd_number);

    temp = first_number;
    first_number = scnd_number;
    scnd_number = temp;

    printf("\nValue After Exchange First Number: %.2f\n", first_number);
    printf("Value After Exchange Second Number: %.2f\n\n", scnd_number);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```

10. . Make a program that will accept a number in square meters (m^2) and display its equivalent measure in hectares (has). Hint: $1000 \text{ m}^2 = 1 \text{ ha}$

```
#include <stdio.h>

int main()
{
    float sqr_m;

    printf("Enter Area (m^2): ");
    scanf("%f", &sqr_m);

    float has = sqr_m / 10000.0;

    printf("%.2f m^2 is equal to %.3f has.\n\n", sqr_m, has);

    printf("Press Enter to exit...");
    getchar();
    getchar();

    return 0;
}
```