In C programming, the while and do-while loops are used to execute a block of code repeatedly as long as a specified condition is true.

While loop:

- In a while loop, the condition is checked before each iteration.
- If the condition is true, the code block inside the loop is executed.
- If the condition becomes false, the loop is exited, and the program continues with the next statement after the loop.

Basic syntax of a while loop in C:

C

```c
while (condition) {
    // code to be executed
}
```

- The condition is a Boolean expression that determines whether the loop should continue or not.
- If the condition is initially false, the code inside the loop will never be executed.

Example:

C

```c
#include <stdio.h>

int main() {
```

```
    int count = 0;
    while (count < 5) {
        printf("Count: %d\n", count);
        count++;
    }

    return 0;
}
```

Output:

Output

```
Count: 0
Count: 1
Count: 2
Count: 3
Count: 4
```

Practice Problems On While Loop In C:

Problem 1: Sum of Natural Numbers

Write a program that calculates the sum of the first n natural numbers using a while loop. The value of n is provided by the user.

C

```c
#include <stdio.h>

int main() {
    int n, sum = 0, i = 1;

    printf("Enter the value of n: ");
    scanf("%d", &n);

    while (i <= n) {
        sum += i;
        i++;
    }

    printf("Sum of the first %d natural numbers is %d\n", n, sum);

    return 0;
}
```

Explanation:

- The program takes input from the user for the value of n.
- Then, it initializes two variables sum and i to 0 and 1 respectively.
- The while loop continues until i is less than or equal to n.
- In each iteration, i is added to the sum, and i is incremented by 1.
- Finally, the sum is printed.

Output:

Output

```
Enter the value of n: 5
```

```
Sum of the first 5 natural numbers is 15
```

Problem 2: Factorial Calculation

Write a program to calculate the factorial of a given number using a while loop. The value of the number is provided by the user.

C

```c
#include <stdio.h>

int main() {
    int n, fact = 1, i = 1;

    printf("Enter a positive integer: ");
    scanf("%d", &n);

    while (i <= n) {
        fact *= i;
        i++;
    }

    printf("Factorial of %d is %d\n", n, fact);

    return 0;
}
```

Explanation:

- The program takes input from the user for a positive integer n.
- It initializes two variables fact and i to 1.
- The while loop continues until i is less than or equal to n.
- In each iteration, i is multiplied with fact, and i is incremented by 1.
- Finally, the factorial is printed.

Output:

Output

```
Enter a positive integer: 5
Factorial of 5 is 120
```

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