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Loop (2)

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do...while statement

```
do {  
    statements;  
} while ( <condition> );
```

- is used to repeat a statement or a block of code several times
- The loop will always be executed at least once, before the test is made to determine whether it should continue

Example

- Calculate the sum of an integer array (ver 3)

Algorithm: (version 3)

sum = 0

do

{

input aNum

add aNum to sum

} while (aNum!=0)

output sum

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

```
int main()
```

```
{
```

```
int aNum, sum = 0;
```

```
do
```

```
{
```

```
scanf("%d", &aNum) ;
```

```
sum += aNum;
```

```
} while (aNum!=0);
```

```
printf("Sum is %d\n", sum);
```

```
return 0;
```

```
}
```

Using do...while to verify input data

```
int n;
```

```
do {
```

```
    printf("Input a positive number: ");
```

```
    //n = -1;
```

```
    fflush(stdin);
```

```
    if (scanf("%d", &n) < 0 )
```

```
        printf("Input data is not a positive  
number\n");
```

```
}while (n>0);
```

```
printf("The number is %d\n", n);
```

Result

- Input a positive number: -2
- Input a positive number: 5
- The number is 5

Infinite loops

- Can create infinite loops by while and for statements
 - The loop is infinite when the loop condition is always true

```
while (1)
```

```
{  
    ...  
}
```

```
for (;;) 
```

```
{  
    ...  
}
```

Break statement

- Use break in an infinitive loop to terminate the loop
- Often use in infinitive loops

```
for (;;)
{
    ...
    if (<condition>) break;
}
```

Example

```
#include <stdio.h>
int main()
{
    int n;
    while (1) {
        printf("Input a positive number: ");
        fflush(stdin);
        scanf("%d", &n);
        if (n<0 ){
            printf("Must be positive. Try again\n");}
        else
            break;
    }
    printf("The number is %d\n", n);
    return 0;
}
```


Result

Input a positive number: -2

Must be positive. Try again

Input a positive number: 5

The number is 5

Continue statement

- When a continue statement is encountered, a loop will stop whatever it is doing and will go straight to the start of the next loop pass.

```
for (...)  
{  
    ...  
    if (< condition >) continue;  
    ...  
}
```

Example

```
#include <stdio.h>

int main()
{
    int n;
    do {
        printf("Input a positive number: ");
        fflush(stdin);
        scanf("%d", &n);
        if (n < 0) {
            printf("Bad number. Try again\n");
            continue;
        }
        printf("The number is %d\n", n);
    }
    while (n<0);
    return 0;
}
```

Result

Input a positive number: -2

Bad number. Try again

The number is 2

Input a positive number: 5

The number is 5

Exercises

- (i) Write a program which prints out the prime factorization of a number (treat 2 as the first prime). For example,
- on input 6, desired output is: 2 3
 - " " 24, " " : 2 2 2 3
 - " " 23, " " : 23
- (ii) Write a program which prints the first prime number greater than a number N on input.
- (iii) Write a program to calculate the number PI using the following formula: $PI/4 = 1 - 1/3 + 1/5 - \dots + (-1)^n 1/(2n+1)$



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for your
attentions!**



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