

4. Control Structure

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<https://pirun.ku.ac.th/~fengwks/ram/ge749/lect/lect4.pdf>

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3. Basic of C

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<https://pirun.ku.ac.th/~fengwks/ram/ge749/lect/lect1.pdf>

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Operators

Multiplication and Division

*, /

Adding and Subtracting

+, -

Increment and Decrement

++, --

Relation

<, <=, >, >=, ==, !=

Logical AND and OR

&&, ||

Bit Operation AND and OR

&, |

Operation and Assignment

+=, -=, *=, /=

i += 4 is i = i + 4

Increment (prefix and postfix)

```
i=4; printf("%d\n", i++ );  
printf("%d\n", i);
```

```
i=4; printf("%d\n", ++i );  
printf("%d\n", i);
```

Logical Operator and Bit Operator

```
i=7; j=2;
```

```
printf( "%d\n", i && j );
```

```
printf( "%d\n", i || j );
```

```
printf( "%d\n", i & j );
```

```
printf( "%d\n", i | j );
```



Condition

Condition in C is just 0 or not 0

0 is False

not 0 is True

Comparison

<, <=, >, >=, ==, !=

```
printf ( "%d\n", 1 == 1 )
```

if True -> 1

if False->0



Control Structure

Control Structure is used to control the execution order of statements.

if

while

for

do

break

continue

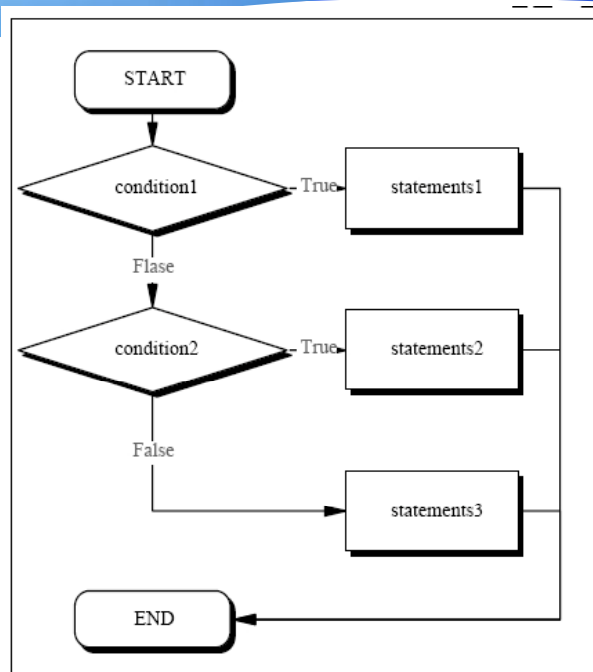
switch

goto



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if 1



if condition is true execute statements

```
if( condition1 )  
    statement1  
else if( condition2 )  
    statement2  
else  
    statement3
```

```
if( condition1 ) {  
    statements1  
} else if( condition2 ) {  
    statements2  
} else {  
    statements3  
}
```

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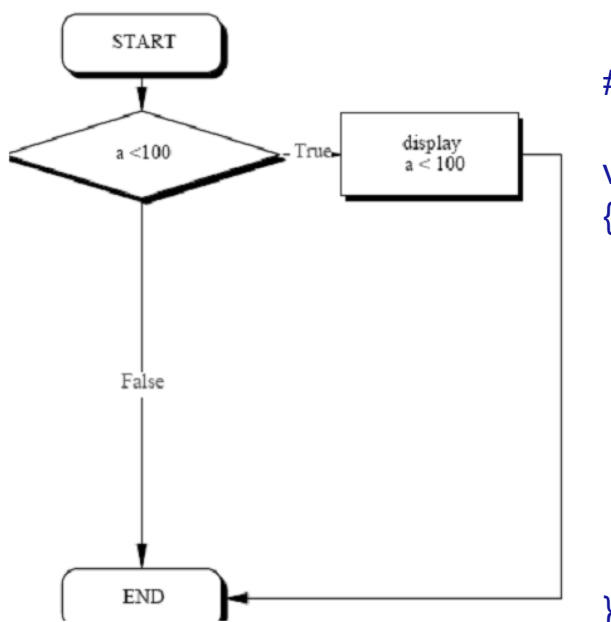
Comparison and Assignment

```
void main( void )
{
    int i=1;
    printf( "%d\n", 1 == 1 );
    printf( "%d\n", i == 1 );
    printf( "%d\n", i == 2 );
    if( i == 1 ){
        printf("i is 1\n");
    } else {
        printf("i is not 1\n");
    }
    printf( "%d\n", i = 0); printf("i= %d\n", i);
    printf( "%d\n", i = 5); printf("i= %d\n", i);
}
```



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if 2



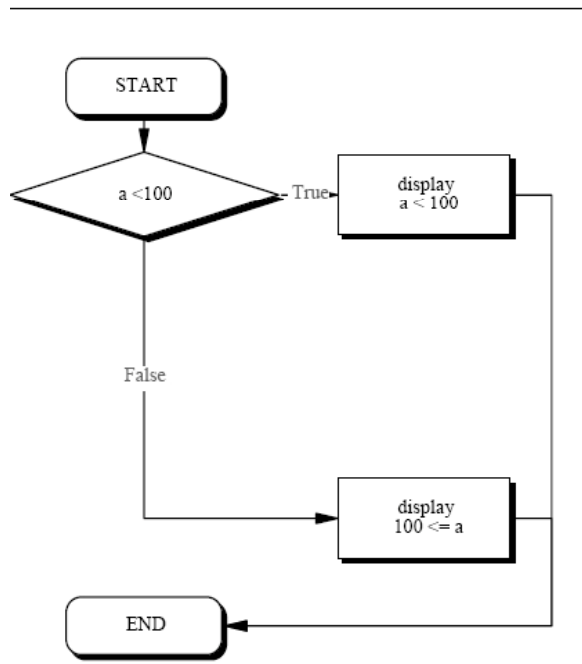
```
#include <stdio.h>
```

```
void main(void)
{
    int a;
    printf("input your number=");
    scanf("%d",&a);

    if (a<50) {
        printf("%d<50 \n",a);
    }
}
```



if 3



```
#include<stdio.h>
void main( void )
{
    int    a;
    scanf("%d",&a);

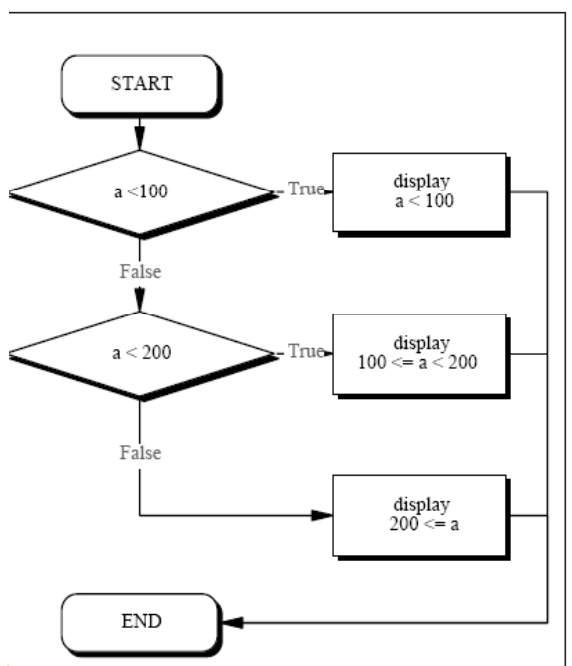
    if( a < 100 ){
        printf("a < 100¥n");
    } else {
        printf("100 <= a ¥n");
    }
}
```

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if 4



```
#include<stdio.h>
void main( void )
{
    int    a;
    scanf("%d",&a);

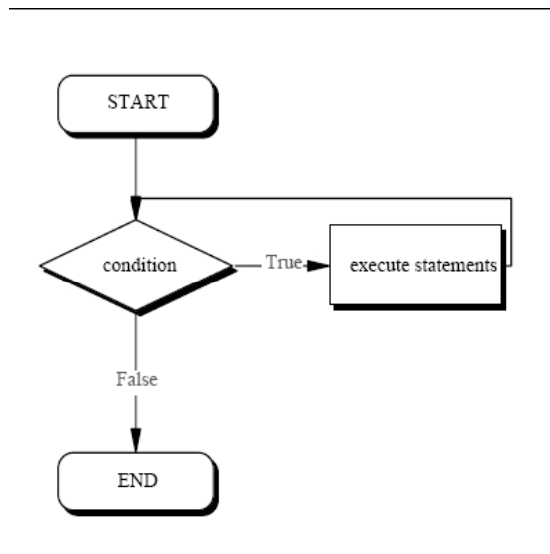
    if( a < 100 ){
        printf("a < 100¥n");
    } else if( a < 200 ) {
        printf("100 <= a < 200¥n");
    } else {
        printf("200 <= a ¥n");
    }
}
```

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while 1



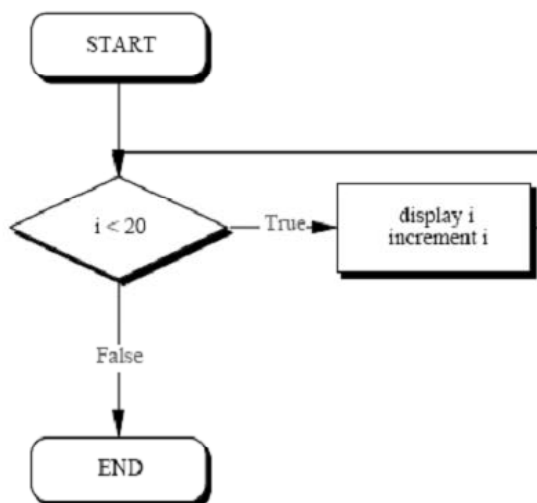
Repeat statement while the condition is true

```
while( condition )  
    statement
```

```
while( condition )  
{  
    statements  
}
```



while 2



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

```
void main(void)
```

```
{  
    int a;
```

```
        a=0;
```

```
        while (a<10)
```

```
        {
```

```
            printf("line no# %d\n",a);
```

```
            a++;
```

```
        }
```

```
        printf("Finish program\n");
```

```
    }
```



while 3

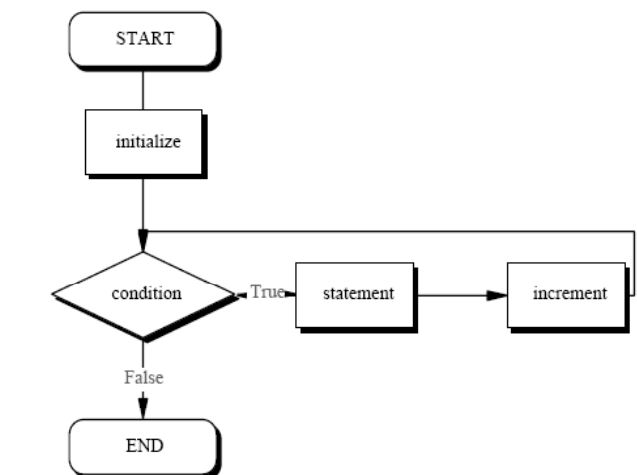
```
#include<stdio.h>
void main( void )
{
    int    fahr, celsius;
    int    lower, upper, step;
    lower = 0;
    upper = 300;
    step = 20;
    fahr = lower;
    while( fahr <= upper ){
        celsius = 5 * ( fahr - 32 ) / 9;
        printf("%d\t%d\n", fahr, celsius );
        fahr = fahr + step;
    }
}
```



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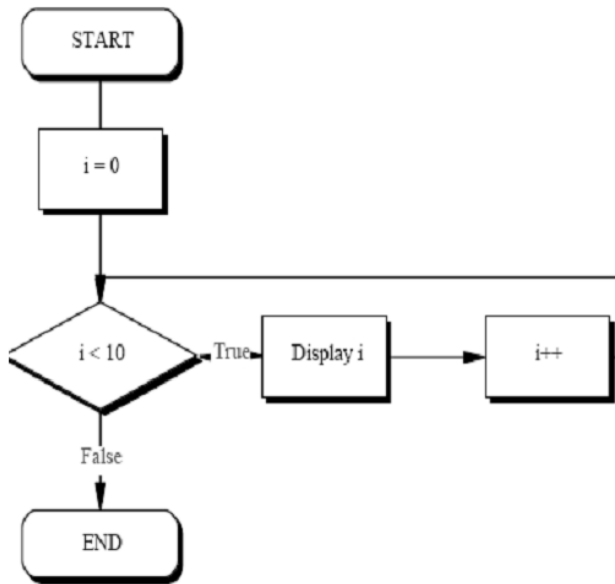
for 1

**for(initialize; condition; increment)
statement**



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for 2



```
#include <stdio.h>

void main(void)
{
    int a;

    for (a=0;a<10;a++)
    {
        printf("line no# %d\n",a);
    }
    printf("Finish program\n");
    printf("Finish program\n");
}
```



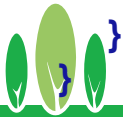
for 3

```
#include<stdio.h>
#define LOWER          0
#define UPPER          300
#define STEP           20
main()
{
    int    fahr, celsius;
    for( fahr = LOWER; fahr <= UPPER; fahr += STEP ){
        celsius = 5* ( fahr - 32 ) / 9;
        printf("%d\t%d\n", fahr, celsius );
    }
}
```



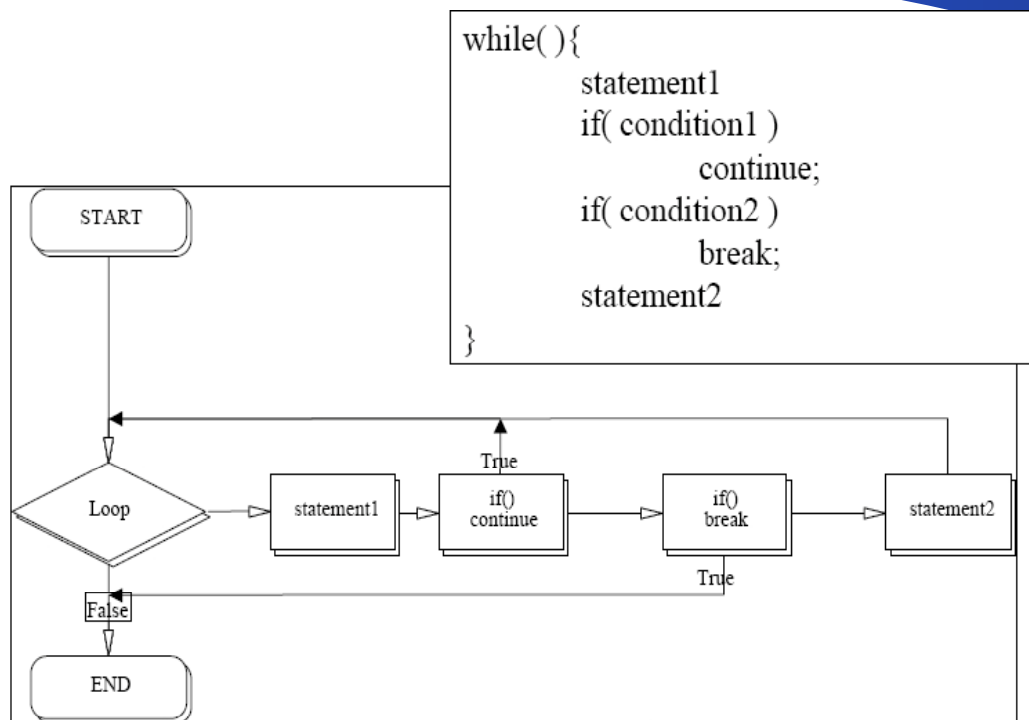
for 4

```
#include<stdio.h>
#define ROUGH
#define LOWER      0
#define UPPER      300
#if defined( ROUGH)
    #define STEP    20
#else
    #define STEP    5
#endif
#define F2C( fahr )    (5*(fahr - 32)/9)
void main( void )
{
    int  fahr, celsius;
    for( fahr = LOWER; fahr <= UPPER; fahr += STEP ){
        celsius = F2C( fahr );
        printf("%d\t%d\n", fahr, celsius );
    }
}
```



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break, continue 1



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break, continue 2

```
main()
{
    int c;
    while( 1 ){
        c = getchar();
        if( c == 'Z' )
            break;
        if( c < 'a' || c > 'z' )
            continue;
        putchar( c );
    }
    printf("exiting loop\n" );
}
```



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exercise - example

Write a program to calculate $1+2+3+\dots+n$

```
#include<stdio.h>
int sigma( int n );
main()
{
    int n;
    while(1){
        scanf("%d", &n);
        if( n <= 0 )
            break;

        printf("sigma from 1 to %d is %d\n", n , sigma( n ) );
    }
}
int sigma( int n )
{
    int total, i;
    total = 0;
    for(i=1;i<=n;i++)
        total += i;
    return total;
}
```



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exercise

1. Write a program to calculate sigma of n1 to n2
 $n1 + (n1+1) + (n1+2) + \dots + (n2-1) + n2$
2. Write a program to calculate factorial of n
 $1 * 2 * 3 * \dots * n$
3. Write a program to calculate average of 5 numbers
4. Write a program to calculate average of 5 numbers
If value equal or lesser than 20 input again until
average more than 20
5. Write a program to solve the equation
 $ax + by + c = 0$
 $dx + ey + f = 0$
6. Write a program
accept only digit character and display
exit if Z is pressed.
`isdigit()`



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Answer1 exercise

```
#include <stdio.h>

void main(void)
{
    int    total=0;
    int    i=1;
    int    n1,n2;

    printf("Input Start number=");scanf("%d",&n1);
    printf(" Input End  number=");scanf("%d",&n2);
    printf("Input Your number1=%d and number2=%d\n",n1,n2 );

    while(n1<=n2){
        printf("i=%d\n",i);
        total+=i;
        i++;
        n1++;
    }
    printf("Your result=%d\n",total );
}
```



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Answer2 exercise

```
#include <stdio.h>

void main(void)
{
    float total=0.0;
    int i=0;
    int n1=0;

    printf("Program fine average of 5 number\n");

    for (i=1;i<=5;i++){
        printf("input number[%d]=",i);scanf("%d",&n1);
        total=total+n1;
    }

    printf("Your average result=%4.2lf\n",total/5. );
```



Answer3 exercise

```
#include <stdio.h>

void main(void)
{
    double total=0.0;
    int i;
    int n1=0;
    double avg=0.0;

    printf("Program fine average of 5 number if average >=20 exit\n");
    i=1;
    while (1){
        printf("input number[%d]=",i);scanf("%d",&n1);
        total=total+n1;
        avg=total/(double)i;
        i++;
        if (i<=5){
            continue;
        }else if ( avg<20.0){
            printf("your avg=%4.4lf < 20.0 input again\n",avg);
            continue;
        }else{
            printf("your avg=%4.2lf >=20.0 complete\n",avg);
            break;
        }
    }
}
```



Reference:

Assoc.Prof.Dr.HONDA Kiyoshi, Lecture Note .RS and GIS Field of study,School of Engineering and Technology ,AIT Thailand.2005



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Question?

**Thank you for your kind
attention**

