

Function

Nguyễn Dũng
Faculty of Information Technology

Definition

```
return_type function_name([parameters])
{
    //Body function
}
```

Examples

```
unsigned int gcd(unsigned int a,
                 unsigned int b)
{
    while (a!=b)
    {
        if (a>b)
            a-=b;
        else
            b-=a;
    }
    return a;
}
```

```
void display()
{
    printf("Hello");
}
```

```
void swap(int &a,int &b)
{
    int temp = a;
    a = b;
    b = temp;
}
```

How to...

- **Step 1:** Parameterized problem
 - To write prototype of function
- **Step 2:** Implement with method that you choose
 - To write body function

Example

- Calculate the average value of a and b.
- Solve:
 - Input: a, b
 - Output: average of a and b
 - Method:
$$\text{average}(a,b) = (a + b)/2$$
- Write function

```
float average(float a, float b)
{
    return (a + b) / 2;
}
```

Parameters of Function

- Parameters to pass to the function which can be:
 - By value: The function gets the a copy of the value of parameters but cannot modify the actual parameters
 - By reference: The function gets the address of the parameter and can modify them.

```
void swap(int a,int b)
{
    int temp = a;
    a = b;
    b = temp;
}
```

```
a = 5, b = 6
Swap
a = 5, b = 6
```

```
void swap(int &a,int &b)
{
    int temp = a;
    a = b;
    b = temp;
}
```

```
a = 5, b = 6
Swap
a = 6, b = 5
```

Call funtion

```
float a, b, c;
void display() {
    printf("Average value of two digit\n");
    printf("Enter a:");scanf("%f",&a);
    printf("Enter b:");scanf("%f",&b);
}
float average(float a, float b){
    return (a + b)/2;
}
void main()
{
    display();
    c = average(a,b);
    printf("Average of %f and %f is: %f",a,b,c);
    getch();
}
```

Prototype of function

- When you write a function below of main function, you must declare the function prototype of it.

```
float a, b, c;  
float average(float, float);  
void main()  
{  
    a = 5; b = 6;  
    c = average(a,b);  
    printf("Average of %f and %f is: %f",a,b,c);  
    getch();  
}  
float average(float a, float b){  
    return (a + b)/2;  
}
```

Recursion

- Recursion is a method which calls to itself.
- Example:
 - Find the sum: $S_n = 1 + 2 + \dots + n$
 - Solve:

$$S = \begin{cases} 1 & \text{if } n = 1 \\ S_{n-1} + n & \text{if } n > 1 \end{cases}$$

- Implement:

```
int sum(int n)
{
    if (n == 1) return 1;
    else return n + sum(n-1);
}
```


To be continued...