Basis and Practice in Programming

LAB5

Function

- Why function?
  - Modularization
  - “Divide and conquer!”
- Four types of function
  - With arguments, with return value
  - With argument, without return value
  - Without arguments, with return value
  - Without arguments, without return value

Function

- A function with arguments and return value

```
int Add(int i, int j)
{
    int result = i+j;
    return result;
}
```

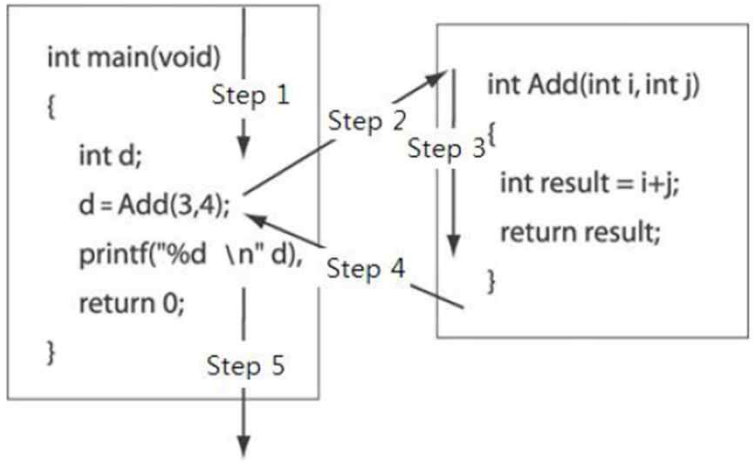
```
ⓐ   ⓑ   ⓒ
int Add (int i, int j)
{
    int result = i+j;
ⓓ   return result;
}
```

ⓐ return type
ⓑ function name
ⓒ arguments
ⓓ return result

Function

- A process of calling function

```
#include <stdio.h>

int Add(int i, int j)
{
    int result = i + j;
    return result;
}
int main(void)
{
    int d;
    d = Add(3 , 4);
    printf("%d ₩n",d);
    return 0;
}
```



Function

- Diverse type of functions

```
void Intro(void)
{
    printf("****** START ****** ₩n");
    printf("Input two integer numbers : ");
}
```

```
int Input(void)
{
    int input;
    scanf("%d", &input);
    return input;
}
```

```
void Result_Print(int val)
{
    printf("Result of Addition: %d ₩n", val);
    printf("****** END ******** ₩n");
}
```

Function

- Declaration of functions
  - Function should be pre-defined before being called

```
Int add(int a, int b)
{
    int result = a + b;
    return result;
}

Int main(void)
{
    add(3, 4);
    return 0;
}
```

```
int add(int a, int b);

Int main(void)
{
    add(3, 4);
    return 0;
}

Int add(int a, int b)
{
    int result = a + b;
    return result;
}
```

Function

- Local variable
  - Declared & used in { }
- Global variable
  - Not declared in functions
  - Accessible in a entire program
- Static variable
  - Can be declared both in internal and external of functions

Function

- Local variable

```
/* LAB 5 example 1 */
#include <stdio.h>

int main(void)
{
    int val = 0;

    if(1)
    {
    int val = 0;
    val += 10;
    printf("The value of local variable in if statement : %d ₩n", val);
    }

    printf("The value of local variable in main function : %d ₩n", val);

    return 0;
}
```

Function

- Global variable

```
/* LAB 5 example 2 */
#include <stdio.h>

int val;

void add(int num);


int main(void)
{
    printf("val : %d ₩n", val);

    add(3);
    printf("val : %d ₩n", val);

    val++;
    printf("val : %d ₩n", val);
    return 0;
}
```

```
void add(int n)
{
    val+=n;
}
```

Function

- Global variable

```
/* LAB 5 example 3 */
#include <stdio.h>

int val=0;

void fct(void);

int main(void)
{
    val = 10;
    printf("val : %d ₩n", val);

    fct();
    printf("val : %d ₩n", val);

 return 0;
}
```

```
void fct(void)
{
    int val = 20;
    val++;
}
```

Function

- Static variable

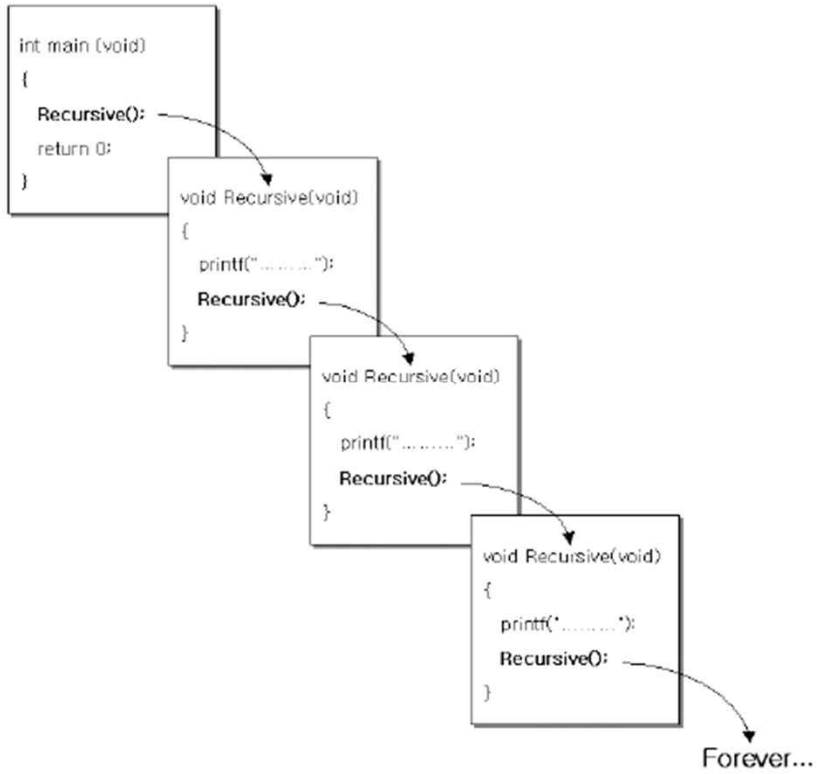
```
/* LAB 5 example 4 */
#include <stdio.h>

Void fct(void);

int main(void)
{
    int i;

    for (i =0; i< 5; i++)
        fct( );

    return 0;
}

void fct(void)
{
    int val = 0;
    val++;
    printf("%d",val);
}
```

```
/* LAB 5 example 5 */
#include <stdio.h>

Void fct(void);

int main(void)
{
    int i;

    for (i =0; i< 5; i++)
        fct( );

    return 0;
}

void fct(void)
{
    static int val = 0;
    val++;
    printf("%d",val);
}
```

Function

- Recursive function call
  - A function which calls itself

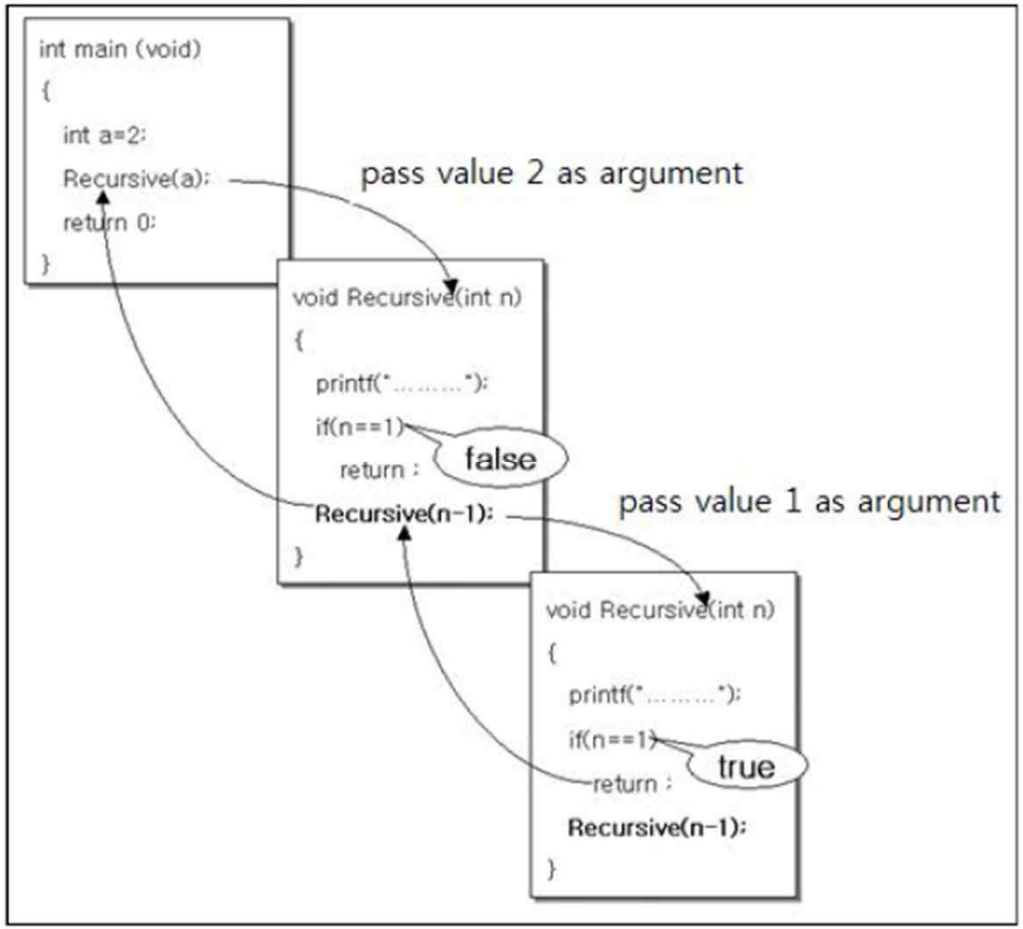
```
#include <stdio.h>

void Recursive(void)
{
   printf("Recursive Call! ₩n");
   Recursive();
}

int main(void)
{
   Recursive();
   return 0;
}
```



Function

- Global variable

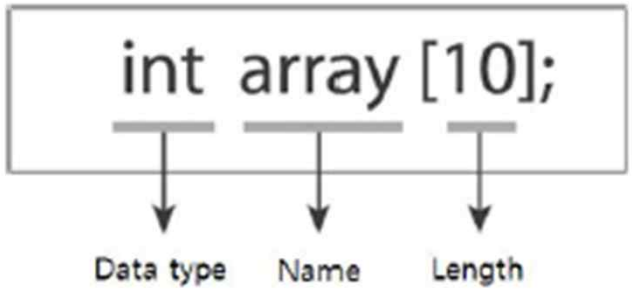
```
/* LAB 5 example 6 */
#include <stdio.h>

void Recursive(int n)
{
      printf("Recursive Call! ₩n");

      if(n==1)
          return;

      Recursive(n-1);
}

int main(void)
{
    int a = 2;
    Recursive(a);

    return 0;
}
```



Array basic

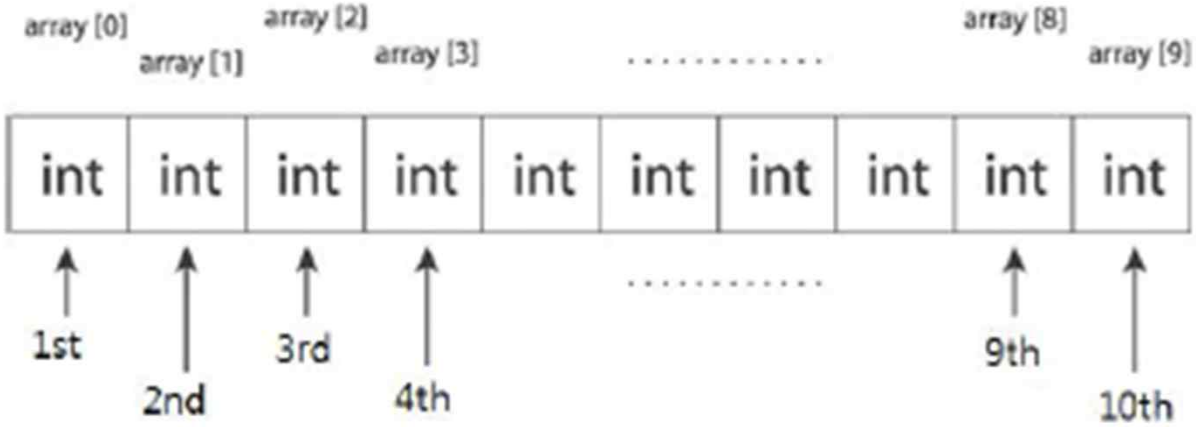
- Declare more than one variable which are the same type

- Three elements in declaration of array
  - Length
  - Data type
  - Name



Array basic

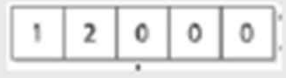
- Access 1-dimension array
  - By index : the position of a element on array
  - Index starts with 0



Array basic

- Initialization with declaration

```
int main(void)
{
  int arr1[5]={1, 2, 3, 4, 5};
  int arr2[ ]={1, 3, 5, 7, 9};
  int arr3[5]={1, 2}
}
```



Array basic

```
/* LAB 5 example 7 */
#include <stdio.h>

int main(void)
{
    double total;
    double val[5];

    val[0] = 1.01;
    val[1] = 2.02;
    val[2] = 3.03;
    val[3] = 4.04;
    val[4] = 5.05;

    total = val[0] + val[1] + val[2] + val[3]+val[4];
    printf("Average : %lf ₩n", total/5);

    return 0;
}
```

```
/* LAB 5 example 8 */
#include <stdio.h>

int main(void)
{
    double total;
    double val[5]={1.01, 2.02, 3.03, 4.04, 5.05};

    total = val[0] + val[1] + val[2] + val[3]+val[4];
    printf("Average : %lf ₩n", total/5);

    return 0;
}
```

Practice

- LAB5 Practice
  - Write a program that calculate 2^n with recursive function call
    - Input number n from user
    - Print the result of 2^n
    - You should solve it with recursive approach
    - Ex) when input value : 8, print 256 (2^8 = 256)