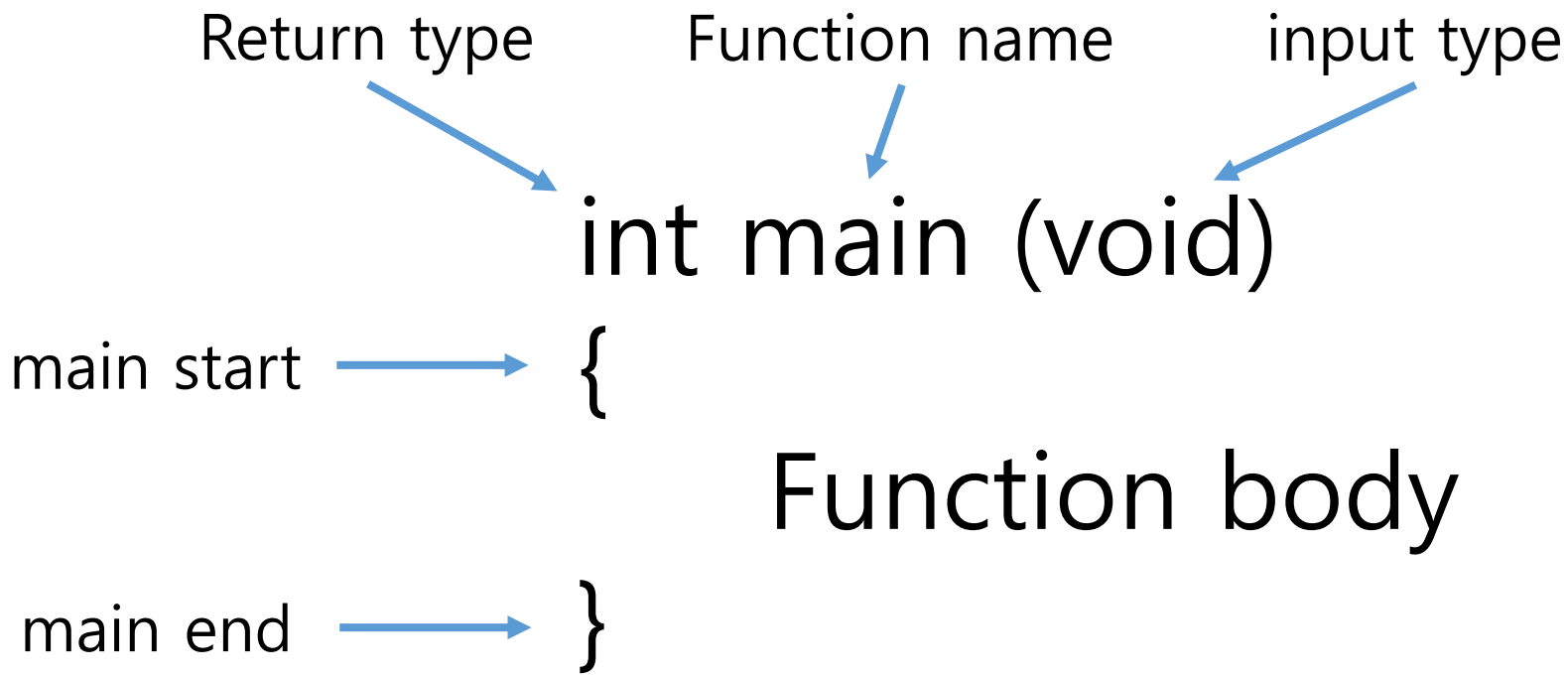
C Programming

Practice 5

Function structure



Function structure

```c
#include <stdio.h>
void prn_message(void); /* function prototype*/
int main(void)
{
    prn_message();          /* function invocation*/
    return 0;
}
/*function definition*/
void prn_message(void)  /* function header*/
                        /* function body*/
{
    printf("Howdy!₩n");
}
```

Call-by-value

```c
#include<stdio.h>

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

int main()
{
    int x = 5, y = 10;
    swap(x, y);
    printf("x = %d, y = %d₩n", x, y);
}
```

Result?

```
x = 5, y = 10
```

Random number - srand()

```c
#include<stdio.h>
#include<stdlib.h> // use for rand() function
#include<time.h> // use for time() function

#define MAX 5

int main(void)
{
    int index = 0;

    srand(time(NULL)); // use a seed value

    printf("Output the 5 random numbers₩n");

    for ( index = 0 ; index < MAX ; index++ )
        printf( "%d ", rand() );   // rand() function creates the random number
    printf( "₩n" );

    return 0;
}
```

```
Output the 5 random numbers
899 26802 14746 30261 24668
```

```
Output the 5 random numbers
958 23666 8621 4649 13722
```

Homework 8 (Lotto)

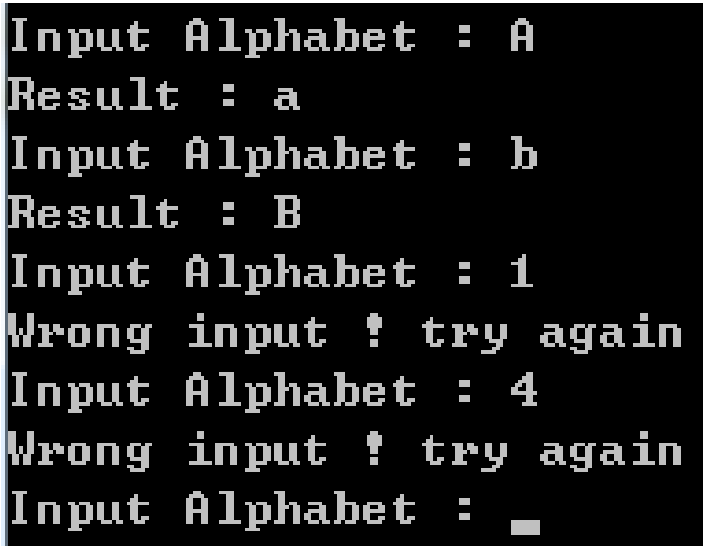
```c
#include<stdio.h>
#include<stdlib.h> // use for rand() function
#include<time.h> // use for time() function

#define MAX 6

int main(void)
{
    int index = 0;

    srand(time(NULL)); // use a seed value

    printf("You can win the first prize at lotto !!₩n");

    for ( index = 0 ; index < MAX ; index++ )
        printf( "%d ", (rand()%45)+1 );   // rand() function creates the random number(1-45)
    printf( "₩n" );

    return 0;
}
```

ASCII Table

10	HEX	문자	10	HEX	문자	10	HEX	문자	10	HEX	문자	10	HEX	문자	10	HEX	문자
0	0x00	NULL	22	0x16	STN	44	0x2C	,	66	0x42	B	88	0x58	X	110	0x6E	n
1	0x01	SOH	23	0x17	ETB	45	0x2D	-	67	0x43	C	89	0x59	Y	111	0x6F	o
2	0x02	STX	24	0x18	CAN	46	0x2E	.	68	0x44	D	90	0x5A	Z	112	0x70	p
3	0x03	ETX	25	0x19	EM	47	0x2F	/	69	0x45	E	91	0x5B	[	113	0x71	q
4	0x04	EOT	26	0x1A	SUB	48	0x30	0	70	0x46	F	92	0x5C	₩	114	0x72	r
5	0x05	ENQ	27	0x1B	ESC	49	0x31	1	71	0x47	G	93	0x5D	]	115	0x73	s
6	0x06	ACK	28	0x1C	FS	50	0x32	2	72	0x48	H	94	0x5E	^	116	0x74	t
7	0x07	BEL	29	0x1D	GS	51	0x33	3	73	0x49	I	95	0x5F	_	117	0x75	u
8	0x08	BS	30	0x1E	RS	52	0x34	4	74	0x4A	J	96	0x60	`	118	0x76	v
9	0x09	HT	31	0x1F	US	53	0x35	5	75	0x4B	K	97	0x61	a	119	0x77	w
10	0x0A	₩n	32	0x20	SP	54	0x36	6	76	0x4C	L	98	0x62	b	120	0x78	x
11	0x0B	VT	33	0x21	!	55	0x37	7	77	0x4D	M	99	0x63	c	121	0x79	y
12	0x0C	FF	34	0x22	"	56	0x38	8	78	0x4E	N	100	0x64	d	122	0x7A	z
13	0x0D	₩r	35	0x23	#	57	0x39	9	79	0x4F	O	101	0x65	e	123	0x7B	{
14	0x0E	SO	36	0x24	$	58	0x3A	:	80	0x50	P	102	0x66	f	124	0x7C	|
15	0x0F	SI	37	0x25	%	59	0x3B	;	81	0x51	Q	103	0x67	g	125	0x7D	}
16	0x10	DLE	38	0x26	&	60	0x3C	<	82	0x52	R	104	0x68	h	126	0x7E	~
17	0x11	DC1	39	0x27	'	61	0x3D	=	83	0x53	S	105	0x69	i	127	0x7F	DEL
18	0x12	DC2	40	0x28	(	62	0x3E	>	84	0x54	T	106	0x6A	j			
19	0x13	DC3	41	0x29	)	63	0x3F	?	85	0x55	U	107	0x6B	k			
20	0x14	DC4	42	0x2A	*	64	0x40	@	86	0x56	V	108	0x6C	l			
21	0x15	NAK	43	0x2B	+	65	0x41	A	87	0x57	W	109	0x6D	m			

Homework 10 – Convert lower case to upper case or upper case to lower case

- Write a program that inputs a character using ASCII table to convert lower case to upper case or upper case to lower case
- Input a character repeatedly using the While statement
- Hint1 : fflush(stdin);
- Hint2 : The difference between A and a is 32

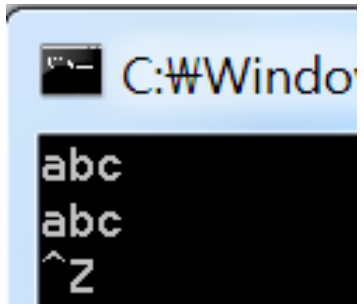


The use of getchar() and putchar()

- getchar() for input and putchar() for output of characters

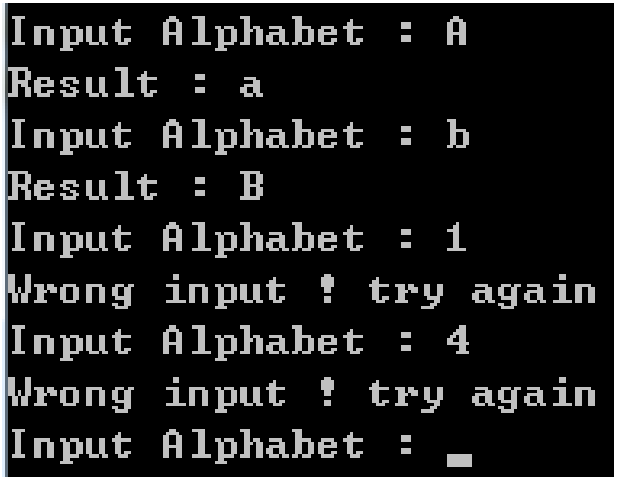
```c
#include <stdio.h>

int main(void)
{
	int ch;

	while((ch = getchar()) != EOF)
	{
	    putchar(ch);
	}

	return 0;
}
```

EOF?



Homework 11 – Convert lower case to upper case or upper case to lower case

- Write a program that inputs a character using ASCII table to convert lower case to upper case or upper case to lower case
- Input a character repeatedly using the While statement
- Hint1 : fflush(stdin);
- Hint2 : The difference between A and a is 32
- **Use the getchar() and putchar()**



To Convert Characters (in ctype.h)

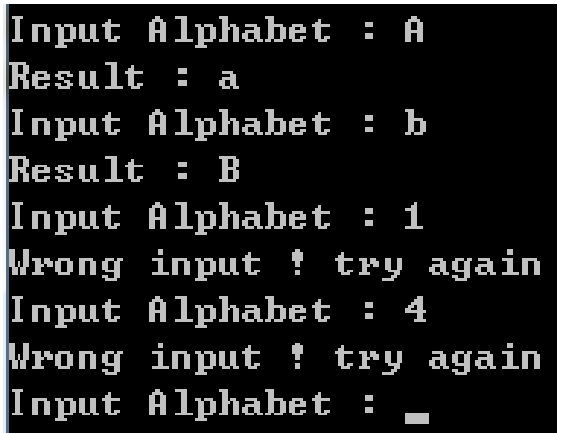
Macro	Nonzero (true) is returned if
isalpha(c)	c is a letter
isupper(c)	c is an uppercase letter
islower(c)	c is a lowercase letter
isdigit(c)	c is a digit
isalnum(c)	c is a letter or digit
isspace(c)	c is a white space character
ispunct(c)	c is a punctuation character
isprint(c)	c is a printable character
isgraph(c)	c is printable, but not a space
iscntrl(c)	c is a control character
isascii(c)	c is an ASCII code

To Convert Characters (in ctype.h)

Function or macro	Effect
toupper(c)	Changes c from lowercase to uppercase
tolower(c)	Changes c from uppercase to lowercase
toascii(c)	Changes c to ASCII code

Homework 12 – Convert lower case to upper case or upper case to lower case

- Write a program that inputs a character using ASCII table to convert lower case to upper case or upper case to lower case
- Input a character repeatedly using the While statement
- Hint1 : fflush(stdin);
- **Use the getchar() and putchar()**
- **Use the ctype.h and functions associated with ctype.h**



The Fundamental Data Types

char	signed char	unsigned char
signed short int (short)	signed int (int)	signed long int (long)
unsigned short int (unsigned short)	unsigned int (unsigned)	unsigned long int (unsigned long)
float	double	long double

The Use of sizeof

```c
#include <stdio.h>
int main(void)
{
    printf("₩n");
    printf("Here are the sizes of some fundamental types:₩n₩n");
    printf("       char:%3d byte ₩n", sizeof(char));
    printf("      short:%3d bytes₩n", sizeof(short));
    printf("        int:%3d bytes₩n", sizeof(int));
    printf("       long:%3d bytes₩n", sizeof(long));
    printf("   unsigned:%3d bytes₩n", sizeof(unsigned));
    printf("      float:%3d bytes₩n", sizeof(float));
    printf("     double:%3d bytes₩n", sizeof(double));
    printf("long double:%3d bytes₩n", sizeof(long double));
    printf("₩n");
    return 0;
}
```

math.h

acos(double)

asin(double)

atan(double)

cos(double)

sin(double)

tan(double)

log10(double)

abs(double)

fabs(double)

fmod(double, double)

pow(double, double)

sqrt(double)

floor(double)

ceil(double)

http://www.tutorialspoint.com/c_standard_library/math_h.htm

Homework 13 - math.h

Write a program to print value of mathematical functions

Use the four mathematical functions :

sqrt(), log10(), abs(), pow(,)

Ex)

```
Input & Number of Nth power
4
2
sqrt()= 2.000000
log10()= 0.602060
abs()= 4.000000
power(,)= 16.000000
```

typedef

```
typedef int color;
color   red, blue, green;
```

```
/* Compute the next day. */
enum day { sun, mon, tue, wed, thu, fri, sat };
typedef enum day day;
day  find_next_day(day d)
{
    day  next_day;
    switch (d) {
    case  sun:
        next_day = mon;  break;
    case  mon:
        next_day = tue;    break;
    case  sat:
        next_day = sun;   break;
    }  /* end of switch */
    return next_day;
}
```

Project 2 – Fibonacci sequence (5 points)

- Write a program to calculate the Fibonacci sequence
- The i-th element of the Fibonacci sequence is defined as follows.

$$\mathrm{F}_i = \mathrm{F}_{i-1} + \mathrm{F}_{i-2}$$

$$\mathrm{F}_0 = 0, \mathrm{F}_1 = 1$$

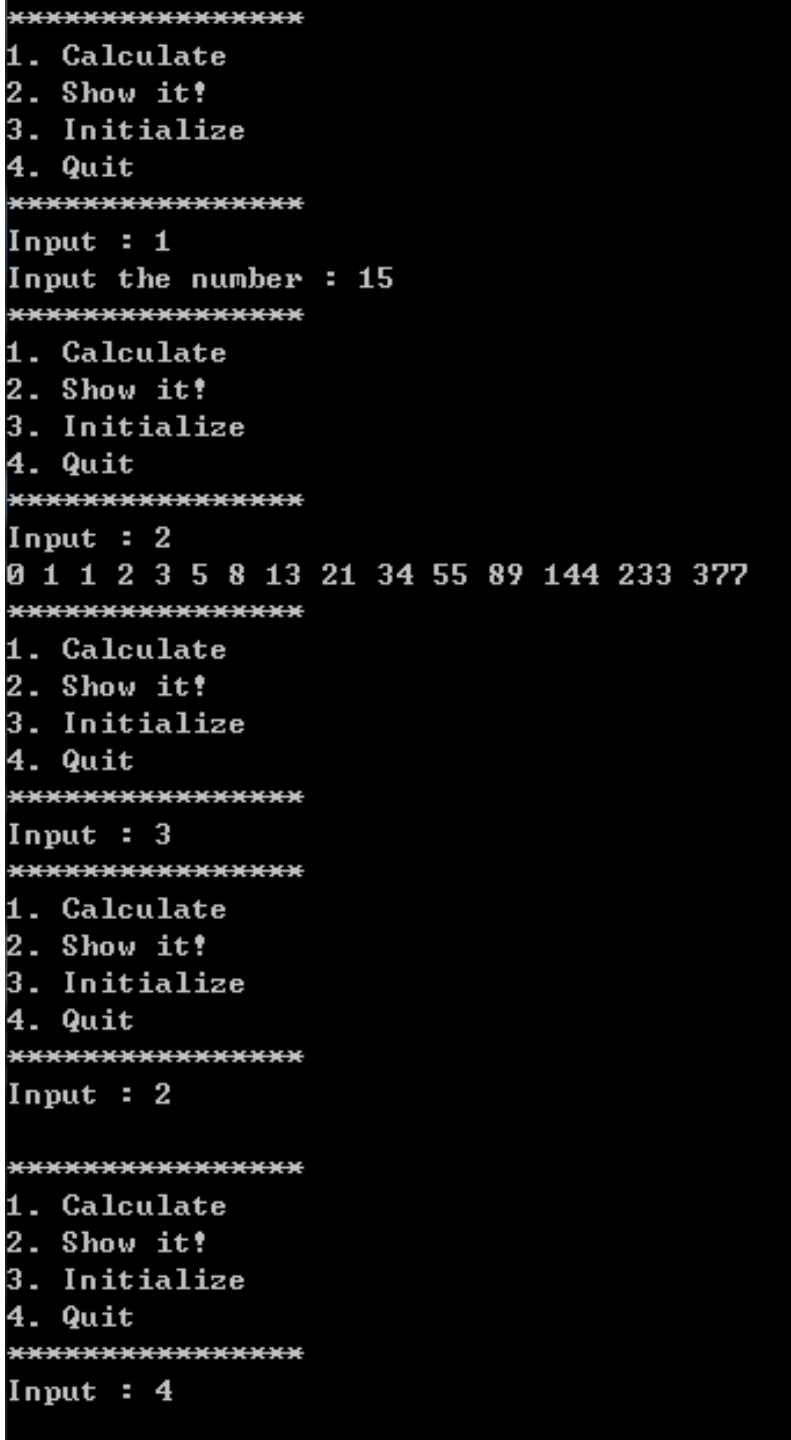
Ex)

0 1 1 2 3 5 8 13

Project 2 – Fibonacci sequence

- Input 1, input another number to calculate the Fibonacci sequence
- Input 2, show the Fibonacci sequence
- Input 3, initialization
- Input 4, terminate the program

Deadline for project: 2015. 10. 28



Homework form

- Homework submission e-mail:

hizorro99@naver.com

- E-mail title: day(Thursday or Friday)_name_#week
  - Ex) Friday_james_week7
  - Ex) 금요일반_장원철_7주차
- File title: student id_name_#.c
  - Ex) 2014123456_james_10.c (or .cpp)
  - Ex) 2014123456_james_11.c (or .cpp)
  - Ex) 2014123456_james_12.c (or .cpp)
  - Ex) 2014123456_james_13.c (or .cpp)