

SINDH MADRESSATUL ISLAM UNIVERISTY, KARACHI

DEPARTMENT OF SOFTWARE ENGINEERING

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CSC103 - PROGRAMMING FUNDAMENTALS

ZUBAIR-UDDIN SHAIKH

SECTION SE1A/SE1B/SE1C/CS1D^e

LAB MANUAL 04

BASIC I/O and DATATYPES

BASIC I/O and DATATYPES

1. Data Types in C:

- Examples of data types have been discussed in class. The following table shows the basic data types in C.

Data Type	C Keyword	Bytes	Range	Placeholder (printf)	Placeho lder (scanf)
Character	char	1	(-128 - 127) (0 - 255)	%c	%c
Integer	int	4	-2,147,483,648 to 2,147,483,647	%d	%d
Floating Point	float	4	3.4E-38 to 3.4 E38	%f	%f

Example 01

```
/* Displays the number of bytes used to store each type */  
  
#include <stdio.h>  
  
main()  
{  
    printf("the size of char is %d bytes\n", sizeof(char));  
    printf("the size of int is %d bytes\n", sizeof(int));  
    printf("the size of float is %d bytes\n", sizeof(float));  
    return 0;  
}
```




```
the size of char is 1 bytes  
the size of int is 4 bytes  
the size of float is 4 bytes
```

- As shown by the table above, characters are actually represented in C as integer values. Each character is represented by its ASCII code (e.g A = 65. B=66, etc). The table at the end of this document shows the printable ASCII characters and their corresponding ASCII code.
- Printing a char variable using “%c” will print the character but printing it with “%d” will print the ASCII code. Similarly, printing an integer variable with “%c” will also print the character provided the value is within the range of characters. The following example demonstrates this.

Example 02

```
/* Shows the relationship between char and int types */  
  
#include <stdio.h>  
  
int main()  
{  
    char c='A';  
  
    printf("The character value of c is %c\n", c);  
    printf("The ASCII value of c is %d\n", c);  
    return 0;  
}
```



```
The character value of c is A  
The ASCII value of c is 65
```

2. printf

- We use printf in our programs to display information on the screen. The stuff that you write inside the double quotes will appear on the screen, with some exceptions: a %d will be replaced by an integer, a %c will be replaced by a character, \n will print new line, etc.
- Here are some more examples of printf statements, and the output they will produce:

Example 03

Statement 1: printf ("int: %d, char: %c", 5, '*');

Output: int: 5, char: *

Statement 2: printf("you got %f marks in midterm",77.5);

Output: you got 77.5 in midterm

- One last note about printf: Make sure you use the right format specifier or placeholder [%d for int, %c for char, %f for float] in your printf statements! Weird things will happen if you don't.

3. scanf

- We use scanf to read input from the keyboard. scanf statements look a lot like printf statements:

Example 04

```
char c;
int x;
float y;
float z; // write printf statement and scanf statement for z

printf("Please enter a character: ");
scanf("%c", &c);
printf("You entered: %c", c);

printf("Please enter an integer: ");
scanf("%d", &x);
printf("You entered: %d", x);

printf("Please enter a float: ");
scanf("%f", &y);
printf("You entered: %f", y);
```

4. How am I supposed to declare a variable?

- The tutorial below will help you in understanding this concept. So, open CodeBlocks, write the given program, save it as a .c file, compile it, and run.

Example 05

```
#include<stdio.h>
int main ()
{
    // Declaration
    int a;

    // Initialization
    a = 5;

    // Printing using printf
    printf("Wow! I am becoming a programmer, I have %d courses", a);
    return 0;
}
```

- You see, declaring a variable is very easy. Now we will look at another tutorial.

Example 06

```
#include<stdio.h>

int main ()
{
    // Declaration & Initialization [TOGETHER :S]... yes,
    together
    float side = 5;
    float area;

    printf("Enter Length of side = ");
    scanf("%f",&side);

    area = side * side;
    printf("Area of Square is = %f", area);
    return 0;
}
```

Example 07

```
#include<stdio.h>

int main ()
{
    int a;
    int b;
    int av;

    printf("Enter value of a: ");
    scanf("%d",&a);

    printf("Enter value of b: ");
    scanf("%d",&b);

    av = (a+b)/2;
    printf("Average of a and b is : %d", av);
    return 0;
}
```

ASCII Table

- This table lists the ASCII characters and their decimal, octal and hexadecimal numbers. Characters which appear as names in parentheses (e.g., (nl)) are non-printing characters. A table of the common non-printing characters appears after this table.

Char	Dec	Oct	Hex	Char	Dec	Oct	Hex	Char	Dec	Oct	Hex	Char	Dec	Oct	
Hex															

-															
(nul)	0	0000	0x00	(sp)	32	0040	0x20	@	64	0100	0x40	`	96	0140	0x60
(soh)	1	0001	0x01	!	33	0041	0x21	A	65	0101	0x41	a	97	0141	0x61
(stx)	2	0002	0x02	"	34	0042	0x22	B	66	0102	0x42	b	98	0142	0x62
(etx)	3	0003	0x03	#	35	0043	0x23	C	67	0103	0x43	c	99	0143	0x63
(eot)	4	0004	0x04	\$	36	0044	0x24	D	68	0104	0x44	d	100	0144	0x64
(enq)	5	0005	0x05	%	37	0045	0x25	E	69	0105	0x45	e	101	0145	0x65
(ack)	6	0006	0x06	&	38	0046	0x26	F	70	0106	0x46	f	102	0146	0x66
(bel)	7	0007	0x07	'	39	0047	0x27	G	71	0107	0x47	g	103	0147	0x67
(bs)	8	0010	0x08	(40	0050	0x28	H	72	0110	0x48	h	104	0150	0x68
(ht)	9	0011	0x09)	41	0051	0x29	I	73	0111	0x49	i	105	0151	0x69
(nl)	10	0012	0x0a	*	42	0052	0x2a	J	74	0112	0x4a	j	106	0152	0x6a
(vt)	11	0013	0x0b	+	43	0053	0x2b	K	75	0113	0x4b	k	107	0153	0x6b
(np)	12	0014	0x0c	,	44	0054	0x2c	L	76	0114	0x4c	l	108	0154	0x6c
(cr)	13	0015	0x0d	-	45	0055	0x2d	M	77	0115	0x4d	m	109	0155	0x6d
(so)	14	0016	0x0e	.	46	0056	0x2e	N	78	0116	0x4e	n	110	0156	0x6e
(si)	15	0017	0x0f	/	47	0057	0x2f	O	79	0117	0x4f	o	111	0157	0x6f
(dle)	16	0020	0x10	0	48	0060	0x30	P	80	0120	0x50	p	112	0160	0x70
(dc1)	17	0021	0x11	1	49	0061	0x31	Q	81	0121	0x51	q	113	0161	0x71
(dc2)	18	0022	0x12	2	50	0062	0x32	R	82	0122	0x52	r	114	0162	0x72
(dc3)	19	0023	0x13	3	51	0063	0x33	S	83	0123	0x53	s	115	0163	0x73
(dc4)	20	0024	0x14	4	52	0064	0x34	T	84	0124	0x54	t	116	0164	0x74
(nak)	21	0025	0x15	5	53	0065	0x35	U	85	0125	0x55	u	117	0165	0x75
(syn)	22	0026	0x16	6	54	0066	0x36	V	86	0126	0x56	v	118	0166	0x76
(etb)	23	0027	0x17	7	55	0067	0x37	W	87	0127	0x57	w	119	0167	0x77
(can)	24	0030	0x18	8	56	0070	0x38	X	88	0130	0x58	x	120	0170	0x78
(em)	25	0031	0x19	9	57	0071	0x39	Y	89	0131	0x59	y	121	0171	0x79
(sub)	26	0032	0x1a	:	58	0072	0x3a	Z	90	0132	0x5a	z	122	0172	0x7a
(esc)	27	0033	0x1b	;	59	0073	0x3b	[91	0133	0x5b	{	123	0173	0x7b
(fs)	28	0034	0x1c	<	60	0074	0x3c	\	92	0134	0x5c		124	0174	0x7c
(gs)	29	0035	0x1d	=	61	0075	0x3d]	93	0135	0x5d	}	125	0175	0x7d
(rs)	30	0036	0x1e	>	62	0076	0x3e	^	94	0136	0x5e	~	126	0176	0x7e
(us)	31	0037	0x1f	?	63	0077	0x3f	_	95	0137	0x5f	(del)	127	0177	0x7f

Lab Task 04:

Perform the following exercise and submit source files according to the submission instructions.

1. Take distance in Km and time in hours as input and display speed in m/s.
2. Read three numbers from user and print their sum.
3. Read three numbers from user and Find their average.
4. Write a program that prompts the user for the radius of a sphere and prints its volume. [volume of Sphere= $(4/3) * \pi * \text{radius}^3$]
5. For a student of CS102, take his Quiz #1 marks (out of 5) as input and convert it into percentage marks.

Submission Instructions:

Due Date: Oct 24, 2022

1. For C files, name your C files as questionNumber_yourRollNum_yourSection_LTNumber.c (e.g. Q1_BSE-22F-123_SE1A_LT1.c).
2. Place all files in a folder and name the folder as yourRollNum_yourSection_LTNumber (e.g. BSE-22F-123_SE1A_LT1).
3. Compress the folder by using either Winrar or 7Zip with the same name.
4. Go to tiny.cc/pffall2022smiu and in the “Coordination Document Folder” open the “PF-Activity Submission Form”.
5. Fill out all the details with your correct password and submit the form by the due date.