8. Character arrays and strings

* declaring and initializing string variables

C does not support string as a data type. However, it allows us to represent string as "character array"

```
char string_name[size];
```

Eg: `char city[10];`
`char name[30];`

`char city[9] = "NEW_YORK";`

=> {'N', 'E', 'W', '_', 'Y', 'O', 'R', 'K', '\0'};

↓ As end of string

* Reading strings from terminal

Using scanf functions

The familiar input function scanf can be used with %s format specification to read in a string of characters

```
char address[10];
scanf("%s", address);
```

1) To read a series of words

```
main()
{
char word1[40], word2[40], word3[40], word4[40];
printf("Enter text:\n");
scanf("%s %s", word1, word2);
scanf("%s", word3);
scanf("%s", word4);
printf("word1 = %s\n word2 = %s\n", word1, word2);
printf("word3 = %s\n word4 = %s\n", word3, word4);
}
```

* Scanf("%w.ws", name);

- The width w greater or equal → entire string is stored
- The width w less than the characters → The excess characters will be truncated.

using Reading a line of text

using getchar and gets function

2) copy a string into another and count the no. of characters copied

```
main()
{
char string[80], string2[80];
int i;
Printf("Enter a string\n");
Printf("\2");
Scanf("%s", string2);
for (i=0; string2[i] != '\0'; i++)
    string1[i] = string2[i];
string1[i] = '\0';
Printf("\n");
Printf("%s\n", string1);
Printf("Number of characters = %d\n", i);
}
```

3) To find no. of vowels and consonants

```
#include <stdio.h>
#include <conio.h>
#include <string.h>
void main() {
 char str[30];
 int vow=0, cons=0, i=0;
 clrscr();
 Printf("Enter a string:\n");
 gets(str);
 while (str[i] != '\0')
 {
   if (str[i]=='a' || str[i]=='e' || str[i]=='i' || str[i]=='o' || str[i]=='u' ||
   str[i]=='A' || str[i]=='E' || str[i]=='I' || str[i]=='O' || str[i]=='U')
       vow++;
   else
       cons++;
 i++;
}
 Printf("\n Number of vowels = %d", vow);
 Printf("\n Number of consonants = %d", cons);
 getch();
}
```

supriya ✨

* writing things to screen
using printf function.
The format %.s can be used to display an array of characters that is terminated by the null character.

Printf("%.s", name);

4. To store the string "united kingdom" in the array

```
main()
{
char country[15] = "united kingdom";
Printf("%.15s\n", country);
Printf("%.5s\n", country);
Printf("%.6s\n", country);
Printf("%.3s\n", country);
Printf("%s\n", country);
}
```

5. write a program using for loop to print

```
main()
{
int c, d;
char string[] = "C Programming";
for(c=0; c<=11; c++)
{
d = c+1;
Printf("%-12.*s\n", d, string);
}
Printf("\n");
for(c=11; c>=0; c--)
{
d = c+1;
Printf("%-12.*s\n", d, string);
}
}
```

```
C
CP
CPro
CPro
:::
CProgramming
CProgramming
...
...
CPro
CPr
CP
C
```

using putchar and puts functions.

```
char ch='A';
putchar(ch);

puts(str);
```

6) print the alphabet set a to z and A to Z in decimal and character form

```
main()
{
 char c;
 printf("\n");
 for(c=65; c<=122; c=c+1);
 {
   if(c>90 && c<97)
      continue;
   printf("%4d - %c", c, c);
 }
 printf("\n");
}
```

* String handling functions

strcat() - concatenates two strings
strcmp() - compares two strings
strcpy() - copies one string over another
strlen() - finds length of the string

```c
// copy n characters from string
 #include <stdio.h>
#include <string.h>
int main()
{
        char s1[100], s2[100];
        int n;
        printf("Enter source string: ");
        scanf("%s", s1);
        printf("Enter starting position: ");
        scanf("%d", &n);
        strcpy(s2, s1+n);
        printf("Copied: %s\n", s2);
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./cpy
Enter source string: supriya
Enter starting position: 3
Copied: riya
supriya@ubuntu:~/Desktop/c/chp8$
```

```c
// Count substring occurrences (fixed, no gets)
 #include <stdio.h>
#include <string.h>
int main()
{
        char text[200], sub[50];
        int count = 0;
        printf("Enter text: ");
        fgets(text, sizeof(text), stdin);
        text[strcspn(text, "\n")] = '\0';
        printf("Enter substring: ");
        scanf("%s", sub);
        char *p = strstr(text, sub);
        while(p != NULL)
        {
                count++;
                p = strstr(p + 1, sub);
        }
        printf("Occurrences = %d\n", count);
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./occ
Enter text: the programming
Enter substring: gram
Occurrences = 1
supriya@ubuntu:~/Desktop/c/chp8$ ./occ
Enter text: the programming
Enter substring: m
Occurrences = 2
```

```c
// Print pattern using string
 #include <stdio.h>
#include <string.h>
int main()
{
        char str[]="123456789";
        int n = strlen(str);
        for(int i=1;i<=5;i++)
        {
                for(int j=0;j<i;j++)
                {
                        printf("%c ", str[j]);
                }
                for(int j=i-2;j>=0;j--)
                {
                        printf("%c ", str[j]); } printf("\n");
        }
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./pat
1
1 2 1
1 2 3 2 1
1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
```

```c
// Student directory
 #include <stdio.h>
struct Student
{
        int roll;
        char name[50];
};
int main()
{
        struct Student s[3];
        for(int i=0;i<3;i++)
        {
                printf("Enter roll and name: ");
                scanf("%d %s",&s[i].roll,s[i].name);
        }
        for(int i=0;i<3;i++)
        {
                printf("%d %s\n", s[i].roll,s[i].name);
        }
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./dir
Enter roll and name: 45 riya
Enter roll and name: 16 su
Enter roll and name: 46 priya
45 riya
16 su
46 priya
```

```c
// String comparison
#include <stdio.h>
#include <string.h>
int main() {
    char s1[50], s2[50];
    printf("Enter first string: ");
    scanf("%s", s1);
    printf("Enter second string: ");
    scanf("%s", s2);
    int res = strcmp(s1, s2);
    if(res == 0) printf("Equal\n");
    else if(res < 0) printf("First is smaller\n");
    else printf("First is greater\n");
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./str
Enter first string: su
Enter second string: pr
First is greater
```

```c
// Student record management (basic)
 #include <stdio.h>
struct Student
{
        int roll;
        char name[50];
        int marks;
};
int main()
{
        struct Student s[3];
        for(int i=0;i<3;i++)
        {
                printf("Enter roll, name, marks: ");
                scanf("%d %s %d",&s[i].roll,s[i].name,&s[i].marks);
        }
        printf("Sorted by Roll Numbers:\n");
        for(int i=0;i<3;i++)
                printf("%d %s %d\n", s[i].roll,s[i].name,s[i].marks);
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./stu
Enter roll, name, marks: 45 riya 98
Enter roll, name, marks: 16 priya 70
Enter roll, name, marks: !
Sorted by Roll Numbers:
45 riya 98
16 priya 70
1  -1932457280
```

```c
// Number to words (simple for hundreds only)
 #include <stdio.h>
int main()
{
        float num;
        printf("Enter amount (RRRR.PP): ");
        scanf("%f", &num);
        int rupees = (int)num;
        int paise = (num - rupees)*100;
        printf("Amount: %d Rupees and %d Paise\n", rupees, paise);
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./num
Enter amount (RRRR.PP): 1000.234
Amount: 1000 Rupees and 23 Paise
```

```c
// Palindrome check
#include <stdio.h>
#include <string.h>
int main()
{
        char str[50];
        printf("Enter string: ");
        scanf("%s", str);
        int n = strlen(str), flag=1;
        for(int i=0; i<n/2; i++)
        {
                if(str[i]!=str[n-1-i])
                {
                        flag=0;
                        break;
                }
        }
        if(flag)
                printf("Palindrome\n");
        else
                printf("Not Palindrome\n");
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./palin
Enter string: abcba
Palindrome
```

```c
// Vehicle sales record
#include <stdio.h>
#include <string.h>
struct Vehicle
{
        char type[20];
        char month[10];
        int price;
};
int main()
{
        struct Vehicle v[4] = {
                {"MARUTI-800","02/01",210000},
                {"MARUTI-DX","07/01",265000},
                {"GYPSY","04/02",315750},
                {"MARUTI-VAN","08/02",240000}
        };
        char search[20];
        printf("Enter vehicle type: ");
        scanf("%s", search);
        for(int i=0;i<4;i++)
        {
                if(strcmp(v[i].type, search)==0)
                {
                        printf("%s %s %d\n", v[i].type, v[i].month, v[i].price);
                }
        }
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./sales
Enter vehicle type: GYPSY
GYPSY 04/02 315750
```

```c
// Sort string alphabetically
 #include <stdio.h>
#include <string.h>
int main()
{
        char str[100];
        printf("Enter string: ");
        scanf("%s", str);
        int n = strlen(str);
        for(int i=0; i<n-1; i++)
        {
                for(int j=i+1; j<n; j++)
                {
                        if(str[i] > str[j])
                        {
                                char t = str[i];
                                str[i] = str[j];
                                str[j] = t;
                        }
                }
        }
        printf("Alphabetical order: %s\n", str);
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./sort
Enter string: supriya
Alphabetical order: aiprsuy
```

```c
// Count word occurrences
#include <stdio.h>
#include <string.h>
int main() {
    char text[200], word[50];
    int count = 0;
    printf("Enter text: ");
    fgets(text, sizeof(text), stdin);
    text[strcspn(text, "\n")] = '\0';
    printf("Enter word to search: ");
    scanf("%s", word);
    char *p = strstr(text, word);
    while(p != NULL) {
        count++;
        p = strstr(p + 1, word);
    }
    printf("Occurrences = %d\n", count);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./count
Enter text: cprogramming
Enter word to search: pro
Occurrences = 1
```

```
supriya@ubuntu:~/Desktop/c/chp8$ cat portion.c
// Extract portion of string
 #include <stdio.h>
#include <string.h>
int main()
{
        char str[100], sub[100];
        int n, m, i;
        printf("Enter a string: ");
        scanf("%s", str);
        printf("Enter starting position: ");
        scanf("%d", &n);
        printf("Enter number of characters: ");
        scanf("%d", &m);
        for(i=0; i<m && str[n+i-1]!='\0'; i++)
        {
                sub[i] = str[n+i-1];
        }
        sub[i] = '\0';
        printf("Substring: %s\n", sub);
        return 0;
}
supriya@ubuntu:~/Desktop/c/chp8$ ./portion
Enter a string: riya
Enter starting position: 1
Enter number of characters: 3
Substring: riy
```

```c
// Quiz program: Who is the inventor of C?
 #include <stdio.h>
#include <string.h>
int main()
{
        char ans[50];
        int tries = 0;
        while(tries < 3)
        {
                printf("Who is the inventor of C? ");
                scanf("%s", ans);
                if(strcmp(ans, "Dennis") == 0 || strcmp(ans, "dennis") == 0)
                {
                        printf("Good\n");
                        return 0;
                }
                else
                {
                        printf("Try again!\n");
                }
                tries++;
        }
        printf("Correct answer: Dennis Ritchie\n");
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./quiz
Who is the inventor of C? dennis
Good
supriya@ubuntu:~/Desktop/c/chp8$ ./quiz
Who is the inventor of C? will
Try again!
Who is the inventor of C? ajjas
Try again!
Who is the inventor of C? !
Try again!
Correct answer: Dennis Ritchie
```

```c
//Program to read your name and print ASCII codes
 #include <stdio.h>
int main()
{
        char name[50];
        printf("Enter your name: ");
        scanf("%s", name);
        for(int i=0; name[i] != '\0'; i++)
        {
                printf("%c : %d\n", name[i], name[i]);
        }
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp8$ ./ascii
Enter your name: supriya
s : 115
u : 117
p : 112
r : 114
i : 105
y : 121
a : 97
```