8051 DATA TYPES

There are various type of data types in C :

- unsigned char
- signed char
- unsigned int
- signed int
- sbit (single bit)
- bit and sfr

Data Types	Size in bits	Data Range/Usage
unsigned char	8 bit	0 to 225
signed char	8 bit	-128 to +127
unsigned int	16 bit	0 to 65535
signed int	16 bit	-32768 to +32767
sbit	1 bit	SFR bit addressable only
bit	1 bit	RAM bit addressable only
sfr	8 bit	RAM addresses 80 – FFH only

unsigned char:

The character data type is the most common choice. 8051 is an 8-bit microcontroller and unsigned char is also an 8-bit data type in the range of 0 – 255 (00 – FFH). C compilers use the signed char as the default data types if we do not put the keyword unsigned char.

Example:

```
#include <reg51.h> // Header file of 8051

void main(void)

{

        unsigned char i;

        for (i=0;i<=255;i++)

        P1=i;

}
```

Signed char :

The signed char is an 8-bit data type. signed char use the MSB D7 to represent – or +. signed char give us values from –128 to +127.

We always use unsigned char in program until and unless we don't need to represent signed numbers for example Temperature.

Example :

```
//Singed numbers

#include <reg51.h> // Header file of 8051

void main(void)

{
        char anynum[ ]={+1,-1,+2,-2,+3,-3,+4,-4};

        unsigned char z;

        for (z=0;z<=8;z++)

        P1=anynum[z];
}
```

Unsigned int :

- The unsigned int is a 16-bit data type.
- Takes a value in the range of 0 to 65535 (0000 – FFFFH)
- Define 16-bit variables such as memory addresses
- Set counter values of more than 256
- Since registers and memory accesses are in 8-bit chunks, the misuse of int variables will result in a larger hex file.

Example :

```
#include <reg51.h>

sbit MY_BIT=P1^0;

void main(void)

{       unsigned int z;

        for (z=0;z<=50000;z++)

        {       MY_BIT=0;

                MY_BIT=1;
        }
}
```

Signed int:

- Signed int is a 16-bit data type.
- use the MSB D15 to represent – or +.
- We have 15 bits for the magnitude of the number from –32768 to +32767.

Example :

```
#include <reg51.h> // Header file of 8051

void main(void)

{

        char mynum[ ]={+1,-1,+2,-2,+3,-3,+4,-4};

        signed int z;

        for (z=0;z<=8;z++)

        P1=mynum[z];

}
```

Bit and SFR :

The bit data type allows access to single bits of bit-addressable memory spaces 20 –2FH

To access the byte-size SFR registers, we use the sfr data type.

Example:

```
// sbit and sfr data type

#include<reg51.h> //Header file for 8051

sbit test=P1^0;

sfr PORT=0x80;

void main(void)

{
        unsigned char i;

        for (i=0;i<=255;i++)

        {
                PORT=i;

                test=~test;
        }
}
```