Type Conversion and Type casting in C

- Type conversion occurs when the expression has data of mixed data types.
- example of such expression include converting an integer value in to a float value, or assigning the value of the expression to a variable with different data type.
- In type conversion, the data type is promoted from lower to higher because converting higher to lower involves loss of precision and value.
- For type conversion, C following some **General rules**explained below

1. Integer types are lower than floating point types
2. Signed types are lower than unsigned types
3. Short whole number types are lower than longer types
4. **double>float>long>int>short>char**

- While Programming consider the following points

1. An arithmetic operation between an integer and integer always yields an integer result.
2. An operation between a float and float always yields a float result
3. An operation between an integer and float always yields a float result. In this operation the integer is first promoted to a float and then the operation is performed. the net result is a float.
   int/int=int
   float/int=float
   int/float=float
   float/float=float
4. If the expression contains one operand as double data type and another operand as some other lower data type then the other operand is also converted to double and the result will be double.
   double operator (float(or)long(or)int(or)short)=>double
5. If the expression contains long and unsigned integer data types, the unsigned integer is converted to unsigned long and the result will be unsigned long.
6. Character and short data are promoted to integer
7. Unsigned char and unsigned short are converted to unsigned integer.

Forced Conversion:

- Forced conversion occurs when we are converting the value of the larger data type to the value of the smaller data type or smaller data type to the larger data type.
- For example,consider the following assignment statement

```
int a;
float b;
a=5.5;
b=100;
```

In the first statement a=5.5 ;a is declared as int so the float value 5.5 cannot be stored in a.In such a case float is demoted to an int and then its value is stored. hence 5 is stored

in a.
In the second statement b=100;since b is a float variable 100 is promoted to 100.000000 and then stored in b.

- In general, the value of the expression is promoted or demoted depending on the type of variable on left hand side of =.

consider the following statement
float x,y,z;
int result;
result=x*y*z/100+32/8-3*1.5;
In the above statement some operands are ints where as others are floats. During evaluation of the expression the ints would be promoted to floats and the result of the expression would be a float. But when this float value is assigned to result,it is again demoted to an int and then stored in result.

- Forced conversion may decrease the precision.
- **Type casting** is the prefered method of forced conversion

Type Casting (or) Explicit Type conversion:

- Explicit type conversions can be forced in any expression , with a unary operator called a cast.
- Syntax is
  (type-name) expression;
- Example

int n;
float x;
x=(float)n;
The above statement will convert the value of n to a float value before assigning to x.but n is not altered

- Type casting does not change the actual value of the variable but the resultant value may be put in temporary storage.
- The cast operator has the same high precedence as other unary operators.
- The Typecasting should not be used in some places.such as
  1. Type cast should not be used to override a const or volatile declaration.overriding these type modifiers can cause the program to fail to run correctly.
  2. Type cast should not be used to turn a pointer to one type of structrure or data type in to another.
- Example of type casting using pointers

```
#include<stdio.h>
main()
{
   void *temp; //void pointer
   char c='a',*ch="hello";
   int i=10;
   temp=&c;
   printf("char=%c\n",*(char *)temp);
```

```
    temp=ch;
    printf("string=%s\n",(char *)temp);
    temp=&i;
    printf("i=%d\n",*(int *)temp);
    return 0;
}
```

output

```
char=a
string=hello
i=10
```

here temp is a void pointer.temp is used to typecast to anyother pointer

Source:

http://datastructuresprogramming.blogspot.in/2010/02/type-conversion-and-type-casting-in-c.html