C++ Date and Time

The C++ standard library does not provide a proper date type. C++ inherits the structs and functions for date and time manipulation from C. To access date and time related functions and structures, you would need to include <ctime> header file in your C++ program.

There are four time-related types: **clock_t, time_t, size_t**, and **tm**. The types - clock_t, size_t and time_t are capable of representing the system time and date as some sort of integer.

The structure type **tm** holds the date and time in the form of a C structure having the following elements −

```
struct tm {
  int tm_sec;   // seconds of minutes from 0 to 61
  int tm_min;   // minutes of hour from 0 to 59
  int tm_hour;  // hours of day from 0 to 24
  int tm_mday;  // day of month from 1 to 31
  int tm_mon;   // month of year from 0 to 11
  int tm_year;  // year since 1900
  int tm_wday;  // days since sunday
  int tm_yday;  // days since January 1st
  int tm_isdst; // hours of daylight savings time
}
```

Following are the important functions, which we use while working with date and time in C or C++. All these functions are part of standard C and C++ library and you can check their detail using reference to C++ standard library given below.

Current Date and Time

Suppose you want to retrieve the current system date and time, either as a local time or as a Coordinated Universal Time (UTC). Following is the example to achieve the same −

```
#include <iostream>
#include <ctime>
```

Live Demo

```
using namespace std;

int main() {
   // current date/time based on current system
   time_t now = time(0);

   // convert now to string form
   char* dt = ctime(&now);

   cout << "The local date and time is: " << dt << endl;

   // convert now to tm struct for UTC
   tm *gmtm = gmtime(&now);
   dt = asctime(gmtm);
   cout << "The UTC date and time is:"<< dt << endl;
}
```

When the above code is compiled and executed, it produces the following result –

```
The local date and time is: Sat Jan  8 20:07:41 2011

The UTC date and time is:Sun Jan  9 03:07:41 2011
```

Format Time using struct tm

The **tm** structure is very important while working with date and time in either C or C++. This structure holds the date and time in the form of a C structure as mentioned above. Most of the time related functions makes use of tm structure. Following is an example which makes use of various date and time related functions and tm structure –

While using structure in this chapter, I'm making an assumption that you have basic understanding on C structure and how to access structure members using arrow -> operator.

Live Demo

```
#include <iostream>
#include <ctime>

using namespace std;
```

```
int main() {
   // current date/time based on current system
   time_t now = time(0);

   cout << "Number of sec since January 1,1970 is:: " << now << endl;

   tm *ltm = localtime(&now);

   // print various components of tm structure.
   cout << "Year:" << 1900 + ltm->tm_year<<endl;
   cout << "Month: "<< 1 + ltm->tm_mon<< endl;
   cout << "Day: "<< ltm->tm_mday << endl;
   cout << "Time: "<< 5+ltm->tm_hour << ":";
   cout << 30+ltm->tm_min << ":";
   cout << ltm->tm_sec << endl;
}
```

When the above code is compiled and executed, it produces the following result –

```
Number of sec since January 1,1970 is:: 1588485717
Year:2020
Month: 5
Day: 3
Time: 11:31:57
```