



# time.h header file in C with Examples

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The **time.h** header file contains definitions of functions to get and manipulate date and time information. It describes three time-related data types.

1. **clock\_t**: clock\_t represents the date as an integer which is a part of the calendar time.
2. **time\_t**: time\_t represents the clock time as an integer which is a part of the calendar time.
3. **struct tm**: struct tm holds the date and time which contains:

## C

```
struct tm {  
    // seconds, range 0 to 59  
    int tm_sec;  
  
    // minutes, range 0 to 59  
    int tm_min;  
  
    // hours, range 0 to 23  
    int tm_hour;  
  
    // day of the month, range 1 to 31  
    int tm_mday;  
  
    // month, range 0 to 11  
    int tm_mon;  
  
    // The number of years since 1900  
    int tm_year;  
  
    // day of the week, range 0 to 6  
    int tm_wday;  
  
    // day in the year, range 0 to 365  
    int tm_yday;
```

```
// daylight saving time
int tm_isdst;
}
```

It also contains **CLOCKS\_PER\_SEC** macro which holds the number of times does the system clock ticks per second.

### Pre-defined Functions in time.h

S.No	Function Name	Explanation
1.	<a href="#"><u>asctime()</u></a>	This function returns the date and time in the format day month date hours:minutes:seconds year. Eg: Sat Jul 27 11:26:03 2019. asctime() function returns a string by taking struct tm variable as a parameter.
2.	<a href="#"><u>clock()</u></a>	This function returns the processor time consumed by a program
3.	<a href="#"><u>ctime()</u></a>	This function returns the date and time in the format day month date hours:minutes:seconds year Eg: Sat Jul 27 11:26:03 2019 time is printed based on the pointer returned by Calendar Time
4.	<a href="#"><u>difftime()</u></a>	This function returns the difference between the times provided.
5.	<a href="#"><u>gmtime()</u></a>	This function prints the UTC (Coordinated Universal Time) Time and date. Format for both gmtime() and asctime() is same
6.	mktime()	This function returns the calendar-time equivalent using struct tm.
7.	<a href="#"><u>time()</u></a>	This function returns the calendar-time equivalent using data-type time_t.

S.No	Function Name	Explanation
8.	<a href="#">strftime()</a>	This function helps to format the string returned by other time functions using different format specifiers

## Examples

### Example 1: Program to print the date and time of the system.

---

#### C

```
#include <stdio.h>
#include <time.h>
int main(void)
{
    struct tm* ptr;
    time_t t;
    t = time(NULL);
    ptr = localtime(&t);
    printf("%s", asctime(ptr));
    return 0;
}
```

## Output





Tue Aug 6 09:00:29 2019

## Example 2: Program to print UTC (Coordinated Universal Time) of the system.

---

C

```
#include <stdio.h>
#include <time.h>
int main(void)
{
    struct tm* ptr;
    time_t t;
    t = time(NULL);
    ptr = gmtime(&t);
    printf("%s", asctime(ptr));
    return 0;
}
```

### Output

Tue Aug 6 09:00:31 2019

## Example 3: Program to calculate the time taken to add two numbers program.

---

C

```
#include <stdio.h>
#include <time.h>
int main(void)
```

```
{
    time_t start, end;
    start = time(NULL);
    int a, b;
    scanf("%d %d", &a, &b);
    printf("Sum of %d and %d is %d\n",
           a, b, a + b);
    end = time(NULL);
    printf("Time taken to print sum is %.2f seconds",
           difftime(end, start));
}
```

## Output

```
Sum of 4196144 and 0 is 4196144
Time taken to print sum is 0.00 seconds
```

**Note:** If user gives input slowly that time also add up for total execution time.

## Example 4: Program to find the clock ticks.

---

### C

```
#include <math.h>
#include <stdio.h>
#include <time.h>

int frequency_of_primes(int n)
{
    // This function checks the number of
    // primes less than the given parameter
    int i, j;
    int freq = n - 1;
    for (i = 2; i <= n; ++i)
        for (j = sqrt(i); j > 1; --j)
            if (i % j == 0) {
                --freq;
                break;
            }
    return freq;
}

int main()
{
```

```

    clock_t t;
    int f;
    t = clock();
    f = frequency_of_primes(9999);
    printf("The number of primes lower"
           " than 10, 000 is: %d\n",
           f);
    t = clock() - t;
    printf("No. of clicks %ld clicks (%f seconds).\n",
           t, ((float)t) / CLOCKS_PER_SEC);
    return 0;
}

```

## Output

The number of primes lower than 10, 000 is: 1229  
 No. of clicks 2837 clicks (0.002837 seconds).

## Example 5: Program to print time as hour: minute returned by asctime() file.

### C

```

#include <stdio.h>
#include <time.h>
int main()
{
    time_t rawtime;
    struct tm* timeinfo;

    // Used to store the time
    // returned by localtime() function
    char buffer[80];

    time(&rawtime);
    timeinfo = localtime(&rawtime);
    strftime(buffer, 80,
              "Time is %I:%M%p.",
              timeinfo);

    // strftime() function stores the
    // current time as Hours : Minutes
    // %I %M and %p-> format specifier
    // of Hours minutes and am/pm respectively*/

    // prints the formatted time
    puts(buffer);
}

```

```
    return 0;  
}
```

## Output

Time is 09:00AM.

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