

Time Duration

The time duration is a measure of how many ticks have passed since a certain time point. The implementation is presented in this lesson.

WE'LL COVER THE FOLLOWING ^

- Time duration

Time duration

Time duration is the difference between the two time-points. Time duration is measured in the number of ticks.

```
template <class Rep, class Period = ratio<1>> class duration;
```



If **Rep** is a floating point number, the time duration supports fractions of ticks. The most important time durations are predefined in the chrono library:

```
typedef duration<signed int, nano> nanoseconds;  
typedef duration<signed int, micro> microseconds;  
typedef duration<signed int, milli> milliseconds;  
typedef duration<signed int> seconds;  
typedef duration<signed int, ratio< 60>> minutes;  
typedef duration<signed int, ratio<3600>> hours;
```



How long can a time duration be? The C++ standard guarantees that the predefined time durations can store +/- 292 years. You can easily define your own time duration like a German school hour: **typedef std::chrono::duration<double, std::ratio<2700>> MyLessonTick**. Time durations in natural numbers have to be explicitly converted to time durations in floating pointer numbers. The value will be truncated:

```
// duration.cpp  
#include<iostream>  
#include <chrono>
```



```

#include <ratio>
using namespace std;
using namespace std::chrono;

template <class Rep, class Period = ratio<1>> class duration;

int main(){
    typedef std::chrono::duration<long long, std::ratio<1>> MySecondTick;
    MySecondTick aSecond(1);

    milliseconds milli(aSecond);
    std::cout << milli.count() << " ms\n";           // 1000 milli

    seconds seconds(aSecond);
    std::cout << seconds.count() << " sec\n";         // 1 sec

    minutes minutes(duration_cast<minutes>(aSecond));
    std::cout << minutes.count() << " min\n";         // 0 min

    typedef std::chrono::duration<double, std::ratio<2700>> MyLessonTick;
    MyLessonTick myLesson(aSecond);
    std::cout << myLesson.count() << " less\n";       // 0.00037037 less

    return 0;
}

```



Durations

i std::ratio

std::ratio supports arithmetic at compile time with rational numbers. A rational number has two template arguments. One is the nominator, the other the denominator. C++11 predefines lots of rational numbers.

```

typedef ratio <1, 1000000000000000000> atto;
typedef ratio <1, 1000000000000000> femto;
typedef ratio <1, 1000000000000> pico;
typedef ratio <1, 1000000000> nano;
typedef ratio <1, 1000000> micro;
typedef ratio <1, 1000> milli;
typedef ratio <1, 100> centi;
typedef ratio <1, 10> deci;
typedef ratio < 10, 1> deca;
typedef ratio < 100, 1> hecto;
typedef ratio < 1000, 1> kilo;
typedef ratio < 1000000, 1> mega;
typedef ratio < 1000000000, 1> giga;
typedef ratio < 1000000000000, 1> tera;
typedef ratio < 1000000000000000, 1> peta;
typedef ratio < 1000000000000000000, 1> exa;

```

```
typedef ratio < 1000000000000000000, 1> exa;
```

C++14 has built-in literals for the most used time durations.

| Type | Suffix | Example |
|---|------------------|-------------------|
| <code>std::chrono::hours</code> | <code>h</code> | <code>5h</code> |
| <code>std::chrono::minutes</code> | <code>min</code> | <code>5min</code> |
| <code>std::chrono::seconds</code> | <code>s</code> | <code>5s</code> |
| <code>std::chrono::millise</code> <code>conds</code> | <code>ms</code> | <code>5ms</code> |
| <code>std::chrono::microse</code> <code>conds</code> | <code>us</code> | <code>5us</code> |
| <code>std::chrono::nanosec</code> <code>onds</code> | <code>ns</code> | <code>5ns</code> |

Built-in literals for time durations