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/* The following code example is taken from the book
 * "The C++ Standard Library – A Tutorial and Reference, 2nd Edition"
 * by Nicolai M. Josuttis, Addison-Wesley, 2012
 *
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 */
#include <chrono>
#include <ctime>
#include <iostream>
#include <string>
using namespace std;

string asString (const chrono::system_clock::time_point& tp)
{
    time_t t = chrono::system_clock::to_time_t(tp); // convert to system time
    string ts = ctime(&t);                          // convert to calendar time
    ts.resize(ts.size()-1);                          // skip trailing newline
    return ts;
}

int main()
{
    // define type for durations that represent day(s):
    typedef chrono::duration<int, ratio<3600*24>> Days;

    // process the epoch of this system clock
    chrono::time_point<chrono::system_clock> tp;
    cout << "epoch:      " << asString(tp) << endl;

    // add one day, 23 hours, and 55 minutes
    tp += Days(1) + chrono::hours(23) + chrono::minutes(55);
    cout << "later:      " << asString(tp) << endl;

    // process difference from epoch in minutes and days:
    auto diff = tp - chrono::system_clock::time_point();
    cout << "diff:      "
        << chrono::duration_cast<chrono::minutes>(diff).count()
        << " minute(s)" << endl;
    Days days = chrono::duration_cast<Days>(diff);
    cout << "diff:      " << days.count() << " day(s)" << endl;

    // subtract one year (hoping it is valid and not a leap year)
    tp -= chrono::hours(24*365);
    cout << "-1 year:    " << asString(tp) << endl;

    // subtract 50 years (hoping it is valid and ignoring leap years)
    tp -= chrono::duration<int, ratio<3600*24*365>>(50);
    cout << "-50 years:  " << asString(tp) << endl;

    // subtract 50 years (hoping it is valid and ignoring leap years)
    tp -= chrono::duration<int, ratio<3600*24*365>>(50);
    cout << "-50 years:  " << asString(tp) << endl;
}

```

