Razvoj softvera - Čas 11

Primeri sa predavanja iz predmeta *Razvoj softvera* na Matematičkom fakultetu Univerziteta u Beogradu u školskoj 2023/24. godini.

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01 - preciz.cpp

```
#include <iostream>
#include "timer.h"

using namespace std;

template<typename T>
T suma( T b, T e )
{
   T s = 0;
   for(; b<=e; b++)
      s += b;
   return s;
}

int main()
{
   // ne sme vise od 10000000, ili float propada!
   const long double limit = 10000000;
   Timer t;
   cout << "Suma od 1 - " << limit << " = " << suma<float>(1,limit) << endl;
   cout << "[" << t.DurationInSeconds() << "]" << endl;

   t.Restart();
   cout << "Suma od 1 - " << limit << " = " << suma<double>(1,limit) << endl;
   cout << "[" << t.DurationInSeconds() << "]" << endl;

   t.Restart();
   cout << "Suma od 1 - " << limit << " = " << suma<long double>(1,limit) << endl;
   cout << "[" << t.DurationInSeconds() << "]" << endl;
}
```

02 - swap.cpp

```
#include <iostream>
#include "timer.h"

using namespace std;

const unsigned outerSize = 1000000;
const unsigned innerSize = 1000;
```

```
int niz[innerSize];

void swap1( int& x, int& y )
{
   int t=x;
   x=y;
   y=t;
}

void test1()
{
   for( unsigned j=0; j<outerSize; j++)
      for( unsigned long i=1; i<innerSize; i++ )
         swap1(niz[i-1],niz[i]);
}

void test1p()
{
   // da bi se prevodilac naterao da prevede swap1 kao ne-inline
   auto* fn = &swap1;
   for( unsigned j=0; j<outerSize; j++)
      for( unsigned long i=1; i<innerSize; i++ )
         fn(niz[i-1],niz[i]);
}

inline void swap2( int& x, int& y )
{
   int t=x;
   x=y;
   y=t;
}

void test2()
{
   for( unsigned j=0; j<outerSize; j++)
      for( unsigned long i=1; i<innerSize; i++ )
         swap2(niz[i-1],niz[i]);
}

int main()
{
   Timer t;
   cout << "Test1..."<< endl;
   test1();
   cout << "[" << t.DurationInSeconds() << "s]" << endl;

   t.Restart();
   cout << "Test1p..."<< endl;
   test1p();
   cout << "[" << t.DurationInSeconds() << "s]" << endl;

   t.Restart();
   cout << "Test2..."<< endl;
```

```
    test2();
    cout << "[" << t.DurationInSeconds() << "s]" << endl;
}
```

03 - brojanje bitova.cpp

```
#include <iostream>
#include "timer.h"

using namespace std;

short brojBitova1(int x) {
    short n=0;
    for( unsigned i=0; i<32; i++ ){
        if( x&1 ) n++;
        x >>= 1;
    }
    return n;
}

short brojBitova1a(int x) {
    short n=0;
    for( unsigned i=0; i<32; i++ ){
        n += x&1;
        x >>= 1;
    }
    return n;
}

const short tablica[] = {0,1,1,2,1,2,2,3,1,2,2,3,2,3,3,4};
short brojBitova2(int x) {
    return tablica[(x) & 0xF]
        + tablica[(x >> 4) & 0xF]
        + tablica[(x >> 8) & 0xF]
        + tablica[(x >> 12) & 0xF]
        + tablica[(x >> 16) & 0xF]
        + tablica[(x >> 20) & 0xF]
        + tablica[(x >> 24) & 0xF]
        + tablica[(x >> 28)];
}

int main()
{
    Timer t;
    cout << "Test1..."<< endl;
    short n = 0;
    for( int i=0; i<10000000; i++)
        n += brojBitova1(i);
    cout << "[" << t.DurationInSeconds() << "s]    " << n << endl;

    t.Restart();
    cout << "Test1a..."<< endl;
```

```
   n = 0;
   for( int i=0; i<10000000; i++)
      n += brojBitova1a(i);
   cout << "[" << t.DurationInSeconds() << "s]    " << n << endl;

   t.Restart();
   cout << "Test2..."<< endl;
   n = 0;
   for( int i=0; i<10000000; i++)
      n += brojBitova2(i);
   cout << "[" << t.DurationInSeconds() << "s]    " << n << endl;
}
```

04 - matrice.cpp

```
#include <iostream>
#include <chrono>

#include "timer.h"

using namespace std;

int constexpr len=20000;
//int constexpr len=10000;
int niz[len][len];

void init()
{
   cout << "Init...";
   for( int i=0; i<len; i++ ){
      if( i%200 == 0 ) cout.put('.').flush();
      for( int j=0; j<len; j++ )
         niz[i][j] = 1;
   }
   cout << endl;
}

void f1()
{
   int sum = 0;
   for( int i=0; i<len; i++ ){
      if( i%200 == 0 ) cout.put('.').flush();
      for( int j=0; j<len; j++ )
         sum += niz[i][j];
   }
   cout << endl;
   cout << "suma = " << sum << endl;
}

void f2()
{
   int sum = 0;
```

```
   for( int i=0; i<len; i++ ){
      if( i%200 == 0 ) cout.put('.').flush();
      for( int j=0; j<len; j++ )
         sum += niz[j][i];
   }
   cout << endl;
   cout << "suma = " << sum << endl;
}

void test( void f() )
{
   Timer t;
   f();
   cout << "[" << t.DurationInSeconds() << "s]" << endl;
}

int main()
{
   init();
   test( f2 );
   test( f2 );
   test( f1 );
   test( f1 );
   return 0;
}
```

timer.h

```
#include <chrono>

class Timer
{
public:
   Timer() {
      Restart();
   }

   void Restart() {
      _startTime = std::chrono::system_clock::now();
   }

   float DurationInSeconds() {
      std::chrono::system_clock::time_point t1 = std::chrono::system_clock::now();
      return std::chrono::duration_cast<std::chrono::milliseconds>( t1 -
_startTime ).count() / 1000.0;
   }

private:
   std::chrono::system_clock::time_point _startTime;
};
```