IVS – profiling

Testovací tým

24. 04. 2018

Protokol

10 vzorků

```
Flat profile:

Each sample counts as 0.01 seconds.
 no time accumulated

  %   cumulative   self              self     total
 time   seconds   seconds    calls  Ts/call  Ts/call  name
  0.00      0.00     0.00       20     0.00     0.00  MathLib::Sum(double, double)
  0.00      0.00     0.00       12     0.00     0.00  MathLib::Mul(double, double)
  0.00      0.00     0.00       10     0.00     0.00  double __gnu_cxx::__stoa<double,
double, char>(double (*)(char const*, char**), char const*, char const*, unsigned
long*)
  0.00      0.00     0.00       10     0.00     0.00
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*)
  0.00      0.00     0.00        2     0.00     0.00  MathLib::Dif(double, double)
  0.00      0.00     0.00        2     0.00     0.00  MathLib::Div(double, double)
  0.00      0.00     0.00        1     0.00     0.00
_GLOBAL__sub_I__ZN7MathLib3SumEdd
  0.00      0.00     0.00        1     0.00     0.00  _GLOBAL__sub_I_main
  0.00      0.00     0.00        1     0.00     0.00
__static_initialization_and_destruction_0(int, int)
  0.00      0.00     0.00        1     0.00     0.00
__static_initialization_and_destruction_0(int, int)
  0.00      0.00     0.00        1     0.00     0.00  MathLib::Pow(double, int)
  0.00      0.00     0.00        1     0.00     0.00  MathLib::NthRoot(double, double)
  0.00      0.00     0.00        1     0.00     0.00  __gnu_cxx::__promote_2<double,
int, __gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int)

_
                     Call graph


granularity: each sample hit covers 2 byte(s) no time propagated

index % time    self  children    called     name
                0.00    0.00      20/20          main [6]
[8]      0.0    0.00    0.00      20         MathLib::Sum(double, double) [8]
-----------------------------------------------
                0.00    0.00      12/12          main [6]
[9]      0.0    0.00    0.00      12         MathLib::Mul(double, double) [9]
-----------------------------------------------
                0.00    0.00      10/10
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*) [11]
[10]     0.0    0.00    0.00      10         double __gnu_cxx::__stoa<double, double,
char>(double (*)(char const*, char**), char const*, char const*, unsigned long*) [10]
-----------------------------------------------
                0.00    0.00      10/10          main [6]
[11]     0.0    0.00    0.00      10
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*) [11]
                0.00    0.00      10/10          double __gnu_cxx::__stoa<double,
double, char>(double (*)(char const*, char**), char const*, char const*, unsigned
long*) [10]
-----------------------------------------------
                0.00    0.00       2/2           main [6]
```

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[12]     0.0    0.00    0.00       2         MathLib::Dif(double, double) [12]
-----------------------------------------------
                0.00    0.00       2/2           main [6]
[13]     0.0    0.00    0.00       2         MathLib::Div(double, double) [13]
-----------------------------------------------
                0.00    0.00       1/1           __libc_csu_init [28]
[14]     0.0    0.00    0.00       1         _GLOBAL__sub_I__ZN7MathLib3SumEdd [14]
                0.00    0.00       1/1
__static_initialization_and_destruction_0(int, int) [16]
-----------------------------------------------
                0.00    0.00       1/1           __libc_csu_init [28]
[15]     0.0    0.00    0.00       1         _GLOBAL__sub_I_main [15]
                0.00    0.00       1/1
__static_initialization_and_destruction_0(int, int) [17]
-----------------------------------------------
                0.00    0.00       1/1           _GLOBAL__sub_I__ZN7MathLib3SumEdd
[14]
[16]     0.0    0.00    0.00       1
__static_initialization_and_destruction_0(int, int) [16]
-----------------------------------------------
                0.00    0.00       1/1           _GLOBAL__sub_I_main [15]
[17]     0.0    0.00    0.00       1
__static_initialization_and_destruction_0(int, int) [17]
-----------------------------------------------
                0.00    0.00       1/1           main [6]
[18]     0.0    0.00    0.00       1         MathLib::Pow(double, int) [18]
                0.00    0.00       1/1           __gnu_cxx::__promote_2<double, int,
__gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int) [20]
-----------------------------------------------
                0.00    0.00       1/1           main [6]
[19]     0.0    0.00    0.00       1         MathLib::NthRoot(double, double) [19]
-----------------------------------------------
                0.00    0.00       1/1           MathLib::Pow(double, int) [18]
[20]     0.0    0.00    0.00       1         __gnu_cxx::__promote_2<double, int,
__gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int) [20]
-----------------------------------------------

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Index by function name

  [14] _GLOBAL__sub_I__ZN7MathLib3SumEdd [13] MathLib::Div(double, double) [10] double
__gnu_cxx::__stoa<double, double, char>(double (*)(char const*, char**), char const*,
char const*, unsigned long*)
  [15] _GLOBAL__sub_I_main     [9] MathLib::Mul(double, double) [11]
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*)
  [16] __static_initialization_and_destruction_0(int, int) [18] MathLib::Pow(double,
int) [20] __gnu_cxx::__promote_2<double, int, __gnu_cxx::__promote<double,
std::__is_integer<double>::__value>::__type, __gnu_cxx::__promote<int,
std::__is_integer<int>::__value>::__type>::__type std::pow<double, int>(double, int)
  [17] __static_initialization_and_destruction_0(int, int) [8] MathLib::Sum(double,
double)
  [12] MathLib::Dif(double, double) [19] MathLib::NthRoot(double, double)
```

100 vzorků

```
Flat profile:

Each sample counts as 0.01 seconds.
 no time accumulated

  %   cumulative   self              self     total
 time   seconds   seconds    calls  Ts/call  Ts/call  name
  0.00      0.00     0.00      200     0.00     0.00  MathLib::Sum(double, double)
  0.00      0.00     0.00      102     0.00     0.00  MathLib::Mul(double, double)
  0.00      0.00     0.00      100     0.00     0.00  double __gnu_cxx::__stoa<double,
double, char>(double (*)(char const*, char**), char const*, char const*, unsigned
long*)
  0.00      0.00     0.00      100     0.00     0.00
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*)
  0.00      0.00     0.00        2     0.00     0.00  MathLib::Dif(double, double)
  0.00      0.00     0.00        2     0.00     0.00  MathLib::Div(double, double)
  0.00      0.00     0.00        1     0.00     0.00
_GLOBAL__sub_I__ZN7MathLib3SumEdd
  0.00      0.00     0.00        1     0.00     0.00  _GLOBAL__sub_I_main
  0.00      0.00     0.00        1     0.00     0.00
__static_initialization_and_destruction_0(int, int)
  0.00      0.00     0.00        1     0.00     0.00
__static_initialization_and_destruction_0(int, int)
  0.00      0.00     0.00        1     0.00     0.00  MathLib::Pow(double, int)
  0.00      0.00     0.00        1     0.00     0.00  MathLib::NthRoot(double, double)
  0.00      0.00     0.00        1     0.00     0.00  __gnu_cxx::__promote_2<double,
int, __gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int)

_
                     Call graph


granularity: each sample hit covers 2 byte(s) no time propagated

index % time    self  children    called     name
                0.00    0.00     200/200         main [6]
[8]      0.0    0.00    0.00     200         MathLib::Sum(double, double) [8]
-----------------------------------------------
                0.00    0.00     102/102         main [6]
[9]      0.0    0.00    0.00     102         MathLib::Mul(double, double) [9]
-----------------------------------------------
                0.00    0.00     100/100
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*) [11]
[10]     0.0    0.00    0.00     100         double __gnu_cxx::__stoa<double, double,
char>(double (*)(char const*, char**), char const*, char const*, unsigned long*) [10]
-----------------------------------------------
                0.00    0.00     100/100         main [6]
[11]     0.0    0.00    0.00     100
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*) [11]
                0.00    0.00     100/100         double __gnu_cxx::__stoa<double,
double, char>(double (*)(char const*, char**), char const*, char const*, unsigned
long*) [10]
-----------------------------------------------
                0.00    0.00       2/2           main [6]
[12]     0.0    0.00    0.00       2         MathLib::Dif(double, double) [12]
-----------------------------------------------
                0.00    0.00       2/2           main [6]
```

```
[13]     0.0    0.00    0.00       2         MathLib::Div(double, double) [13]
-----------------------------------------------
                0.00    0.00       1/1           __libc_csu_init [28]
[14]     0.0    0.00    0.00       1         _GLOBAL__sub_I__ZN7MathLib3SumEdd [14]
                0.00    0.00       1/1
__static_initialization_and_destruction_0(int, int) [16]
-----------------------------------------------
                0.00    0.00       1/1           __libc_csu_init [28]
[15]     0.0    0.00    0.00       1         _GLOBAL__sub_I_main [15]
                0.00    0.00       1/1
__static_initialization_and_destruction_0(int, int) [17]
-----------------------------------------------
                0.00    0.00       1/1           _GLOBAL__sub_I__ZN7MathLib3SumEdd
[14]
[16]     0.0    0.00    0.00       1
__static_initialization_and_destruction_0(int, int) [16]
-----------------------------------------------
                0.00    0.00       1/1           _GLOBAL__sub_I_main [15]
[17]     0.0    0.00    0.00       1
__static_initialization_and_destruction_0(int, int) [17]
-----------------------------------------------
                0.00    0.00       1/1           main [6]
[18]     0.0    0.00    0.00       1         MathLib::Pow(double, int) [18]
                0.00    0.00       1/1           __gnu_cxx::__promote_2<double, int,
__gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int) [20]
-----------------------------------------------
                0.00    0.00       1/1           main [6]
[19]     0.0    0.00    0.00       1         MathLib::NthRoot(double, double) [19]
-----------------------------------------------
                0.00    0.00       1/1           MathLib::Pow(double, int) [18]
[20]     0.0    0.00    0.00       1         __gnu_cxx::__promote_2<double, int,
__gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int) [20]
-----------------------------------------------

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Index by function name

  [14] _GLOBAL__sub_I__ZN7MathLib3SumEdd [13] MathLib::Div(double, double) [10] double
__gnu_cxx::__stoa<double, double, char>(double (*)(char const*, char**), char const*,
char const*, unsigned long*)
  [15] _GLOBAL__sub_I_main     [9] MathLib::Mul(double, double) [11]
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*)
  [16] __static_initialization_and_destruction_0(int, int) [18] MathLib::Pow(double,
int) [20] __gnu_cxx::__promote_2<double, int, __gnu_cxx::__promote<double,
std::__is_integer<double>::__value>::__type, __gnu_cxx::__promote<int,
std::__is_integer<int>::__value>::__type>::__type std::pow<double, int>(double, int)
  [17] __static_initialization_and_destruction_0(int, int) [8] MathLib::Sum(double,
double)
  [12] MathLib::Dif(double, double) [19] MathLib::NthRoot(double, double)
```

1000 vzorků

```
Flat profile:

Each sample counts as 0.01 seconds.
 no time accumulated

  %   cumulative   self              self     total
 time   seconds   seconds    calls  Ts/call  Ts/call  name
  0.00      0.00     0.00     2000     0.00     0.00  MathLib::Sum(double, double)
  0.00      0.00     0.00     1002     0.00     0.00  MathLib::Mul(double, double)
  0.00      0.00     0.00     1000     0.00     0.00  double __gnu_cxx::__stoa<double,
double, char>(double (*)(char const*, char**), char const*, char const*, unsigned
long*)
  0.00      0.00     0.00     1000     0.00     0.00
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*)
  0.00      0.00     0.00        2     0.00     0.00  MathLib::Dif(double, double)
  0.00      0.00     0.00        2     0.00     0.00  MathLib::Div(double, double)
  0.00      0.00     0.00        1     0.00     0.00
_GLOBAL__sub_I__ZN7MathLib3SumEdd
  0.00      0.00     0.00        1     0.00     0.00  _GLOBAL__sub_I_main
  0.00      0.00     0.00        1     0.00     0.00
__static_initialization_and_destruction_0(int, int)
  0.00      0.00     0.00        1     0.00     0.00
__static_initialization_and_destruction_0(int, int)
  0.00      0.00     0.00        1     0.00     0.00  MathLib::Pow(double, int)
  0.00      0.00     0.00        1     0.00     0.00  MathLib::NthRoot(double, double)
  0.00      0.00     0.00        1     0.00     0.00  __gnu_cxx::__promote_2<double,
int, __gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int)
_
                     Call graph


granularity: each sample hit covers 2 byte(s) no time propagated

index % time    self  children    called     name
                0.00    0.00    2000/2000        main [6]
[8]      0.0    0.00    0.00    2000         MathLib::Sum(double, double) [8]
-----------------------------------------------
                0.00    0.00    1002/1002        main [6]
[9]      0.0    0.00    0.00    1002         MathLib::Mul(double, double) [9]
-----------------------------------------------
                0.00    0.00    1000/1000
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*) [11]
[10]     0.0    0.00    0.00    1000         double __gnu_cxx::__stoa<double, double,
char>(double (*)(char const*, char**), char const*, char const*, unsigned long*) [10]
-----------------------------------------------
                0.00    0.00    1000/1000        main [6]
[11]     0.0    0.00    0.00    1000
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*) [11]
                0.00    0.00    1000/1000        double __gnu_cxx::__stoa<double,
double, char>(double (*)(char const*, char**), char const*, char const*, unsigned
long*) [10]
-----------------------------------------------
                0.00    0.00       2/2           main [6]
[12]     0.0    0.00    0.00       2         MathLib::Dif(double, double) [12]
-----------------------------------------------
                0.00    0.00       2/2           main [6]
```

```
[13]     0.0    0.00    0.00       2         MathLib::Div(double, double) [13]
-----------------------------------------------
                0.00    0.00       1/1           __libc_csu_init [28]
[14]     0.0    0.00    0.00       1         _GLOBAL__sub_I__ZN7MathLib3SumEdd [14]
                0.00    0.00       1/1
__static_initialization_and_destruction_0(int, int) [16]
-----------------------------------------------
                0.00    0.00       1/1           __libc_csu_init [28]
[15]     0.0    0.00    0.00       1         _GLOBAL__sub_I_main [15]
                0.00    0.00       1/1
__static_initialization_and_destruction_0(int, int) [17]
-----------------------------------------------
                0.00    0.00       1/1           _GLOBAL__sub_I__ZN7MathLib3SumEdd
[14]
[16]     0.0    0.00    0.00       1
__static_initialization_and_destruction_0(int, int) [16]
-----------------------------------------------
                0.00    0.00       1/1           _GLOBAL__sub_I_main [15]
[17]     0.0    0.00    0.00       1
__static_initialization_and_destruction_0(int, int) [17]
-----------------------------------------------
                0.00    0.00       1/1           main [6]
[18]     0.0    0.00    0.00       1         MathLib::Pow(double, int) [18]
                0.00    0.00       1/1           __gnu_cxx::__promote_2<double, int,
__gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int) [20]
-----------------------------------------------
                0.00    0.00       1/1           main [6]
[19]     0.0    0.00    0.00       1         MathLib::NthRoot(double, double) [19]
-----------------------------------------------
                0.00    0.00       1/1           MathLib::Pow(double, int) [18]
[20]     0.0    0.00    0.00       1         __gnu_cxx::__promote_2<double, int,
__gnu_cxx::__promote<double, std::__is_integer<double>::__value>::__type,
__gnu_cxx::__promote<int, std::__is_integer<int>::__value>::__type>::__type
std::pow<double, int>(double, int) [20]
-----------------------------------------------

_
Index by function name

  [14] _GLOBAL__sub_I__ZN7MathLib3SumEdd [13] MathLib::Div(double, double) [10] double
__gnu_cxx::__stoa<double, double, char>(double (*)(char const*, char**), char const*,
char const*, unsigned long*)
  [15] _GLOBAL__sub_I_main     [9] MathLib::Mul(double, double) [11]
std::__cxx11::stod(std::__cxx11::basic_string<char, std::char_traits<char>,
std::allocator<char> > const&, unsigned long*)
  [16] __static_initialization_and_destruction_0(int, int) [18] MathLib::Pow(double,
int) [20] __gnu_cxx::__promote_2<double, int, __gnu_cxx::__promote<double,
std::__is_integer<double>::__value>::__type, __gnu_cxx::__promote<int,
std::__is_integer<int>::__value>::__type>::__type std::pow<double, int>(double, int)
  [17] __static_initialization_and_destruction_0(int, int) [8] MathLib::Sum(double,
double)
  [12] MathLib::Dif(double, double) [19] MathLib::NthRoot(double, double)
```

Vyhodnocení

Z výše uvedeného protokolu je patrné, že nejvíce času program stráví ve funkcích načítacího cyklu, tj. `MathLib::Sum(double, double)`, `MathLib::Mul(double, double)` a dále funkce pro převod textu na desetinné číslo. Tyto funkce je možno vypustit za předpokladu, že na vstupu programu budou pouze desetinná čísla.

Výraznou optimalizací by bylo použití klíčového slova inline na funkce v matematické knihovně, které by razantně redukovalo instrukcí pro volání funkcí.