Subject: MT anomaly...
Posted by mirek on Wed, 16 Apr 2008 10:29:09 GMT
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I am now working on some advanced "MT topics" and have encountered this anomaly:

```
#include <Core/Core.h>

using namespace Upp;

#ifdef PLATFORM_POSIX
__thread int threadid;
#else
__declspec(thread) int threadid;
#endif

#define LLOG(x)  LOG((threadid) << " " << x << ", count " << count)

RWMutex          rwlock;
VectorMap<int, String> cache;

String Fn(int x)
{
 return AsString(sin(sqrt((double)x)));
}

void CheckResult(int x, const String& r)
{
 if(r != Fn(x)) {
  DUMP(r);
  DUMP(Fn(x));
  Panic("Failure! " + AsString(threadid));
 }
}

int writes, removes;

void WorkThread(int id)
{
 threadid = id;
 for(int i = 0; i < 200000000; i++) {
  if(i % 10000 == 0)
   INTERLOCKED
    Cout() << id << ": " << i << ", writes: " << writes << ", removes: " << removes << "\n";
  int x = rand() & 0x7fff;
  rwlock.EnterRead();
  int q = cache.Find(x);
```

```
  if(q >= 0) {
   String r = cache[q];
   CheckResult(x, r);
   for(int i = 0; i < 100; i++)
    Fn(x);
   rwlock.LeaveRead();
  }
  else {
   rwlock.LeaveRead();
   rwlock.EnterWrite();
   q = cache.Find(x);
   if(q >= 0)
    CheckResult(x, cache[q]);
   else {
    writes++;
    if(cache.GetCount() >= 0x7000) {
     removes++;
     cache.Remove(0, 100);
    }
    cache.Add(x, Fn(x));
   }
   rwlock.LeaveWrite();
  }
 }
}

CONSOLE_APP_MAIN
{
 Thread t[20];
 for(int i = 0; i < 9; i++)
  t[i].Run(callback1(WorkThread, i + 1));
 WorkThread(0);
 for(int i = 0; i < 9; i++)
  t[i].Wait();
}
```

This is basically a code to test RWMutex doing something reasonable - simulating cache.

This works as expected in Win32, fully utilizing both of my cores, but in Linux I am unable to get more than 60% CPU utilization. Obviously, some weird contention is involved, if only I would know why....

Any ideas?

Mirek

Subject: Re: MT anomaly...
Posted by tvanriper on Sun, 11 May 2008 17:18:24 GMT
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Maybe I'm totally off-base here, and I haven't looked at the code, but are you multi-threading at the kernel or user level?

If you're using the POSIX library calls, you're probably multi-threading through user level threading, which means you probably won't get at multiple cores. You're still multi-threading, but at the user level, you can't get at the other core; that requires a system call of some kind that most user level libraries know nothing about.

If you're using the system calls that Linux offers (kernel level threading), then I don't know why you're seeing this kind of performance; you should be seeing both cores used.

Subject: Re: MT anomaly...
Posted by mirek on Sun, 11 May 2008 17:43:53 GMT
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AFAIK, pthreads work through system threads.

In any case, 60% means I am actually USING another core...

Anyway, month later I think this is just example of contention problem...

Mirek

Subject: Re: MT anomaly...
Posted by mirek on Thu, 15 May 2008 13:09:45 GMT
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BTW, further thinking about the issue, I am going to introduce contention profiling to U++.

Something like

Mutex x;
CPROF(x);

would print approximate number of contention cases (defined as "blocked Enter") at the end of process (just like TIMING / RTIMING does).

The only problem is that this needs more code in Mutex, making it less efficient, hencefore it will only be activated by config flag....

Mirek
