Subject: What is the best way to create a Semaphore with timeout?
Posted by Tom1 on Tue, 17 Dec 2019 08:49:12 GMT

Hi,

I need a Semaphore with Wait(int timeout_ms); What is the best way (in terms of efficiency) to implement this timeout functionality?

Using SetTimeCallback() to Release() the Semaphore is not an option in non-GUI environment. Another thread Sleeping for the specified amount of time and then calling Release feels a bit inefficient.

(For the background: I'm building a FIFO using BiVector and wish to get minimal latency and overhead for the operation.)

Best regards,

Tom

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by Tom1 on Tue, 17 Dec 2019 09:49:31 GMT

Hi,

I took a look at Core and found that Semaphore is really just an abstraction of the OS semaphore.

Now the question is: Would it be possible to change Semaphore code in a way that adds support for timeout? Looking at the code reveals that Windows and Linux/Posix could support Wait(timeout) with minimal changes, but I'm not so sure about OSX.

Best regards,

Tom

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by Tom1 on Tue, 17 Dec 2019 10:53:20 GMT

Hi,

I think this is now up to Mirek now... ;)

I have made the needed additions to Semaphore for implementing timeout on Wait.

Here's working code for Windows and Linux:

Mt.h:

```
...
class Semaphore : NoCopy {
#ifdef PLATFORM_WIN32
 HANDLE    handle;
#elif PLATFORM_OSX
 dispatch_semaphore_t   sem;
#else
 sem_t     sem;
#endif

public:
 bool      Wait(int timeout_ms); // Added for timeout - returns true if semaphore was signaled, false
otherwise
 void      Wait();
 void      Release();
#ifdef PLATFORM_WIN32
 void      Release(int n);
#endif

 Semaphore();
 ~Semaphore();
};
...
```

Mt.cpp:

```
...

// For Windows:
bool Semaphore::Wait(int timeout_ms)
{
 return WaitForSingleObject(handle, timeout_ms<0 ? INFINITE : timeout_ms) ==
WAIT_OBJECT_0 ? true : false;
}

...

// For Linux:
bool Semaphore::Wait(int timeout_ms)
{
```

```
 if(timeout_ms<0){
  Wait();
  return true;
 }

 struct timespec until;
 clock_gettime(CLOCK_REALTIME, &until);

 until.tv_sec+=timeout_ms/1000;
 timeout_ms%=1000;
 until.tv_nsec+=timeout_ms*1000000;
 until.tv_sec+=until.tv_nsec/1000000000;
 until.tv_nsec%=1000000000;

 return sem_timedwait(&sem,&until)==-1 ? false : true;
}
...
```

Maybe someone with a Mac could take a look at the OSX code for the same. From what I found on the web, it looks like it could be something like this for OSX:

```
...
bool Semaphore::Wait(int timeout_ms)
{
 if(timeout_ms<0){
  dispatch_semaphore_wait(sem, DISPATCH_TIME_FOREVER);
  return true;
 }
 return dispatch_semaphore_wait(sem, dispatch_time(DISPATCH_TIME_NOW, 1000000 *
timeout_ms)) == 0 ? true : false;
}
...
```

I hope this makes it to the Core.

Best regards,

Tom

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by mirek on Thu, 19 Dec 2019 10:38:17 GMT

Thank you, makes sense, in Core now. I have just removed <0 rule, that is imo not necessarry as we have "infinite" version already.

Now time to add that to ConditionVariable too.

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by Tom1 on Thu, 19 Dec 2019 11:59:38 GMT

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Hi Mirek,

Thanks!

While on the subject, why not add the timeout functionality to ConditionVariable too... Would you like me to figure out the details or are you already working on it?

Best regards,

Tom

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by mirek on Thu, 19 Dec 2019 12:40:23 GMT

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Tom1 wrote on Thu, 19 December 2019 12:59Hi Mirek,

Thanks!

While on the subject, why not add the timeout functionality to ConditionVariable too... Would you like me to figure out the details or are you already working on it?

Best regards,

Tom

Sure, done.

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by Tom1 on Thu, 19 Dec 2019 13:38:21 GMT

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Hi!

That was fast! Thanks Mirek!!

Now to the Fifo implementation. Does this look right from the point of mutex synchronization? I know this 'appears to work when testing' but I'm new with ConditionVariable, so I'm a bit uncertain if my usage of it is correct. I.e. Will multiple receiving threads calling StringFifo::Get() be correctly served so that each and every String will get read exactly once?

```
class StringFifo: public BiVector<String>{
 ConditionVariable cv;
 Mutex mtx;

public:
 StringFifo(){

 }

 void Put(const String &s){
  mtx.Enter();
  AddTail(s);
  cv.Signal();
  mtx.Leave();
 }

 String Get(int timeout_ms=-1){
  mtx.Enter();
  if(GetCount() || (cv.Wait(mtx,timeout_ms) && GetCount())){
   String r=PopHead();
   mtx.Leave();
   return r;
  }
  else{
   mtx.Leave();
   return String::GetVoid();
  }
 }
};
```

Thanks and best regards,

Tom

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by mirek on Thu, 19 Dec 2019 16:05:51 GMT
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Tom1 wrote on Thu, 19 December 2019 14:38Hi!

That was fast! Thanks Mirek!!

Now to the Fifo implementation. Does this look right from the point of mutex synchronization? I know this 'appears to work when testing' but I'm new with ConditionVariable, so I'm a bit uncertain if my usage of it is correct. I.e. Will multiple receiving threads calling StringFifo::Get() be correctly

served so that each and every String will get read exactly once?

```
class StringFifo: public BiVector<String>{
 ConditionVariable cv;
 Mutex mtx;

public:
 StringFifo(){

 }

 void Put(const String &s){
  mtx.Enter();
  AddTail(s);
  cv.Signal();
  mtx.Leave();
 }

 String Get(int timeout_ms=-1){
  mtx.Enter();
  if(GetCount() || (cv.Wait(mtx,timeout_ms) && GetCount())){
   String r=PopHead();
   mtx.Leave();
   return r;
  }
  else{
   mtx.Leave();
   return String::GetVoid();
  }
 }
};
```

Thanks and best regards,

Tom

Sounds good.

Unfortunately, I have removed -1 logic from your code, so that will make it more complicate. I guess I will put it back after all.

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by Tom1 on Thu, 19 Dec 2019 20:44:54 GMT
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Ok, thanks Mirek!

Best regards,

Tom

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by mirek on Wed, 22 Jan 2020 13:44:10 GMT
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Tom1 wrote on Thu, 19 December 2019 21:44Ok, thanks Mirek!

Best regards,

Tom

-1 logic is back...

Subject: Re: What is the best way to create a Semaphore with timeout?
Posted by Tom1 on Wed, 22 Jan 2020 13:48:56 GMT
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Thanks! :)

Best regards,

Tom