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Subject: Re: [Patch 1/3] Miscellaneous container fixes  
Posted by [Paul Menage](#) on Fri, 01 Dec 2006 17:25:54 GMT  
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On 12/1/06, Srivatsa Vaddagiri <vatsa@in.ibm.com> wrote:  
> This patches fixes various bugs I hit in the recently posted container  
> patches.  
>  
> 1. If a subsystem registers with fork/exit hook during bootup (much  
> before rcu is initialized), then the resulting synchronize\_rcu() in  
> container\_register\_subsys() hangs. Avoid this by not calling  
> synchronize\_rcu() if we arent fully booted yet.  
>  
> 2. If cpuset\_create fails() for some reason, then the resulting  
> call to cpuset\_destroy can trip. Avoid this by initializing  
> container->...->cpuset pointer to NULL in cpuset\_create().  
>  
> 3. container\_rmdir->cpuset\_destroy->update\_flag can deadlock on  
> container\_lock(). Avoid this by introducing \_\_update\_flag, which  
> doesnt take container\_lock().

Ah - this may be the lockup that PaulJ hit.

Thanks for these fixes.

Paul

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Subject: Re: [Patch 1/3] Miscellaneous container fixes  
Posted by [Paul Jackson](#) on Fri, 01 Dec 2006 20:31:34 GMT  
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Paul M wrote:  
> Ah - this may be the lockup that PaulJ hit.

Yes - looks like this fixes it. Thanks, Srivatsa.

And with that fix, it becomes obvious how to reproduce this problem:

```
mount -t cpuset cpuset /dev/cpuset # if not already mounted
cd /dev/cpuset
mkdir foo
echo 1 > foo/cpu_exclusive
rmdir foo # hangs ...
```

However ...

Read the comment in kernel/cpuset.c for the routine cpuset\_destroy().

It explains that `update_flag()` is called where it is (turning off the `cpu_exclusive` flag, if it was set), to avoid the calling sequence:

```
cpuset_destroy->update_flag->update_cpu_domains->lock_cpu_hotplug
```

while holding the `callback_mutex`, as that could ABBA deadlock with the CPU hotplug code.

But with this container based rewrite of `cpusets`, it now seems that `cpuset_destroy` -is- called holding the `callback_mutex` (though I don't see any mention of that in the `cpuset_destroy` comment ;), so it would seem that we once again are at risk for this ABBA deadlock.

I also notice that the comment for `container_lock()` in the file `kernel/container.c` only mentions its use in the oom code. That is no longer the only, or even primary, user of this lock routine. The `kernel/cpuset.c` code uses it frequently (without comment ;), and I wouldn't be surprised to see other future controllers calling `container_lock()` as well.

Looks like its time to update those comments, and think about what was written there before, as that might catch a bug or two, such as the one Srivatsa just fixed for us.

Most of those long locking comments in `kernel/cpuset.c` are there for a reason - recording the results of a lesson learned in the school of hard knocks.

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I won't rest till it's the best ...  
Programmer, Linux Scalability  
Paul Jackson <pj@sgi.com> 1.925.600.0401

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Subject: Re: [Patch 1/3] Miscellaneous container fixes  
Posted by [Paul Menage](#) on Tue, 05 Dec 2006 12:04:56 GMT  
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On 12/1/06, Paul Jackson <pj@sgi.com> wrote:

```
> Read the comment in kernel/cpuset.c for the routine cpuset_destroy().  
> It explains that update_flag() is called where it is (turning off  
> the cpu_exclusive flag, if it was set), to avoid the calling sequence:  
>  
> cpuset_destroy->update_flag->update_cpu_domains->lock_cpu_hotplug  
>  
> while holding the callback_mutex, as that could ABBA deadlock with the  
> CPU hotplug code.
```

This particular race is gone in the -mm2 kernel since `cpus_exclusive` no longer drives `sched_domains` - can we assume that this will be reaching mainline some time soon?

>

> But with this container based rewrite of `cpuset`s, it now seems that  
> `cpuset_destroy` -is- called holding the `callback_mutex` (though I don't  
> see any mention of that in the `cpuset_destroy` comment ;), so it would

And in fact I explicitly documented it as only holding `manage_mutex`, not `callback_mutex` in `Documentation/containers.txt`. I think maybe this slipped in during the multi-hierarchy rewrite. :-)

Looking at the various `*_destroy()` functions in the container subsystems in my patch set, I think that it should be OK to call the destructors prior to taking `callback_mutex` for the unlinking of the container from its parents.

>

> I also notice that the comment for `container_lock()` in the file  
> `kernel/container.c` only mentions its use in the oom code. That is  
> no longer the only, or even primary, user of this lock routine.  
> The `kernel/cpuset.c` code uses it frequently (without comment ;),  
> and I wouldn't be surprised to see other future controllers calling  
> `container_lock()` as well.

As was pointed out by Chandra Seetharaman, it would be nice if we could avoid having all the container subsystems relying on `callback_mutex` for their locking needs - particularly since that's likely to be acquired at performance-sensitive times.

The `cpu_acct` and `beancounters` subsystems that I included in my patch set both use their own per-container locks for synchronization, so it's not completely necessary to use the central locks. There's probably a happy medium between "one big lock" and "way too many small locks".

Paul

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