
Subject: containers development plans (July 20 version)

Posted by [serge](#) on Fri, 20 Jul 2007 17:36:15 GMT

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(If you missed earlier parts of this thread, you can catch earlier parts of this thread starting at <https://lists.linux-foundation.org/pipermail/containers/2007-July/005860.html>)

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Srivatsa Vaddagiri is independently gathering additional information on specific task container subsystems. That will eventually be incorporated into the final version of this roadmap.

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1. namespaces
kernel resource namespaces to support resource isolation and virtualization for virtual servers and application checkpoint/restart.
2. task containers framework
the task containers (or, as Paul Jackson suggests, resource containers) framework by Paul Menage which especially provides a framework for subsystems which perform resource accounting and limits.
3. checkpoint/restart

===== Section 2 =====
=Detailed development plans
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A (still under construction) list of features we expect to be worked on next year looks like this:

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- pid namespace
 - push merged patchset upstream
 - kthread cleanup
 - especially nfs
 - autofs
 - af_unix credentials (stores pid_t?)

- net namespace
- ro bind mounts

2. continuation with new namespaces

- devpts, console, and ttydrivers
- user
- time
- namespace management tools
- namespace entering (using one of:)
 - bind_ns()
 - ns container subsystem
 - (vs refuse this functionality)

- multiple /sys mounts
 - break /sys into smaller chunks?
 - shadow dirs vs namespaces

- multiple proc mounts
 - likely need to extend on the work done for pid namespaces
 - i.e. other /proc files will need some care

virtualization of statistics for 'top', etc

3. any additional work needed for virtual servers?

- i.e. in-kernel keyring usage for cross-username namespace permissions, etc
- nfs and rpc updates needed?
- general security fixes
 - per-container capabilities?
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 - e.g. root in container should not have access to /dev/sda by default)
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4. task containers functionality

- base features
 - virtualized containerfs mounts
 - to support vserver mgmnt of sub-containers
 - locking cleanup
 - control file API simplification
 - control file prefixing with subsystem name

userpace RBCE to provide controls for

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- groups

- pgrp

- executable

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- memory c/r
 - (there are a few designs and prototypes)
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 - hybrid
- overall restart strategy
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- pid namespace
 - clone_with_pid()

===== Section 3 =====

=Use cases

===== Section 3 =====

1, Namespaces:

The most commonly listed uses for namespaces are virtual servers and checkpoint restart. Other uses are debugging (running tests in not-quite-virtual-servers) and resource isolation, such as the use of mounts namespaces to simulate multi-level directories for LSPP.

2. Task Containers:

(Vatsa to fill in)

3. Checkpoint/restart

load balancing:
applications can be migrated from high-load systems to ones with a lower load. Long-running applications can be checkpointed (or migrated) to start a short-running high-load job, then

restarted.

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A long-running application - or whole virtual server - can be migrated or checkpointed so that the system can be rebooted, and the application can continue to run

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===== Section 4 =====

In the list of stakeholders, I try to guess based on past comments and contributions what *general* area they are most likely to contribute in. I may try to narrow those down later, but am just trying to get something out the door right now before my next computer breaks.

Stakeholders:

- Eric Biederman
 - everything
- google
 - task containers
- ibm (serge, dave, cedric, daniel)
 - namespaces
- checkpoint/restart
- bull (benjamin, pierre)
 - namespaces
- checkpoint/restart
 - ibm (balbir, vatsa)
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 - (i must have lost an email - what are they interested in working on?)
- XtreemOS
 - checkpoint/restart
- Fujitsu/VA Linux Japan

resource control

Is anyone else still missing from the list?

thanks,
-serge

Subject: Re: containers development plans (July 20 version)
Posted by [Rohit Seth](#) on Fri, 20 Jul 2007 21:29:38 GMT
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Thanks Serge for collecting these requirements. Have we decided on container mini summit? Couple of points that I want to add in task container functionality section (not sure if these are already covered by items below):

- 1- Per container dirty page (write throttling) limit.
- 2- Per container memory reclaim
- 3- network rate limiting (outbound) based on container
- 4- User level APIS to identify the resource limits that is allowed to a job, for example, how much physical memory a process can use. This should seamlessly integrated with non-container environment as well (may be with ulimit).
- 5- Similary, per container stats, like pages on active list, cpus usage etc. could also be very helpful.

Thanks,
-rohit

On the taskOn Fri, 2007-07-20 at 12:36 -0500, Serge E. Hallyn wrote:
> (If you missed earlier parts of this thread, you can catch earlier parts of
> this thread starting at
> <https://lists.linux-foundation.org/pipermail/containers/2007-July/005860.html>)
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> thanks,
> -serge

Subject: Re: containers development plans (July 20 version)
Posted by [Paul Menage](#) on Sat, 21 Jul 2007 00:02:32 GMT
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On 7/20/07, Serge E. Hallyn <serge@hallyn.com> wrote:

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This last point was actually in the set of patches that I sent to akpm today - probably it was too small an item to be worth including in this list.

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If the checkpoint/restart code is expected to evolve into a workable live migration system, we'd be interested in that too.

Paul

Subject: Re: containers development plans (July 20 version)
Posted by [ebiederm](#) on Sat, 21 Jul 2007 01:00:45 GMT
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"Paul Menage" <menage@google.com> writes:

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At least the support for live migration should be there.

Eric

Subject: Re: containers development plans (July 20 version)
Posted by [Cedric Le Goater](#) on Mon, 23 Jul 2007 14:00:47 GMT
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Serge E. Hallyn wrote:

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btw, that's also a req for resource management.

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- > overall restart strategy
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- > (i must have lost an email - what are they
- > interested in working on?)

they have been following net namespace closely. Their lab also did an interesting paper comparing containers (openvz) and virtual machine (Xen)

- > XtremOS
- > checkpoint/restart
- > Fujitsu/VA Linux Japan
- > resource control
- >
- > Is anyone else still missing from the list?

I would add the BLCR opensource project maintained by Paul H. Hargrove (in cc:). BLCR is widely used in the HPC market but I would say it lacks kernel support in order to be perfect :)

thanks,

C.

Containers mailing list
Containers@lists.linux-foundation.org
<https://lists.linux-foundation.org/mailman/listinfo/containers>

Subject: Re: containers development plans (July 20 version)

Posted by [serue](#) on Mon, 23 Jul 2007 14:24:18 GMT

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Quoting Eric W. Biederman (ebiederm@xmission.com):

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> > If the checkpoint/restart code is expected to evolve into a workable
> > live migration system, we'd be interested in that too.
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> At least the support for live migration should be there.

Yeah, sorry, I kind of take it for granted that when i say 'c/r' i would want live migration, but i shouldn't. Will spell that out.

thanks,
-serge

Containers mailing list
Containers@lists.linux-foundation.org
<https://lists.linux-foundation.org/mailman/listinfo/containers>

Subject: Re: containers development plans (July 20 version)
Posted by [serue](#) on Mon, 23 Jul 2007 14:27:45 GMT
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Quoting Rohit Seth (rohitseth@google.com):
> Thanks Serge for collecting these requirements. Have we decided on
> container mini summit?

I think we've decided to have one, but someone needs to implement the details. Someone (Kirill?) mentioned having a "private" mini-summit for conference attendees, followed by a call-in conference. So we would need a meeting room and time at LCE, followed by a meeting room with a phone. I suppose someone's hotel room would work as well...

Personally I'd prefer to have just one mini-summit, with a live call-in phone number, so noone feels like there's shady back-room goings on. But on the other hand productivity of the mini-summit could be squashed by poor phone line quality or phone etiquette...

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