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Subject: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [Stanislav Kinsbursky](#) on Mon, 08 Oct 2012 10:55:45 GMT

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Today, there is a problem in connecting of local SUNRPC transports. These transports uses UNIX sockets and connection itself is done by rpciod workqueue.

But all local transports are connecting in rpciod context. I.e. UNIX sockets lookup is done in context of process file system root.

This works nice until we will try to mount NFS from process with other root - for example in container. This container can have it's own (nested) root and rcpbind process, listening on it's own unix sockets. But NFS mount attempt in this container will register new service (Lockd for example) in global rpcbind - not containers's one.

This patch solves the problem by switching rpciod kernel thread's file system root to the right one (stored on transport) while connecting of local transports.

Signed-off-by: Stanislav Kinsbursky <[skinsbursky@parallels.com](mailto:skinsbursky@parallels.com)>

---

```
net/sunrpc/xprtsock.c | 52 +-----  
1 files changed, 50 insertions(+), 2 deletions(-)
```

```
diff --git a/net/sunrpc/xprtsock.c b/net/sunrpc/xprtsock.c
```

```
index aaaadfb..ecbcd1 100644
```

```
--- a/net/sunrpc/xprtsock.c
```

```
+++ b/net/sunrpc/xprtsock.c
```

```
@@ -37,6 +37,7 @@
```

```
#include <linux/sunrpc/svcsock.h>
```

```
#include <linux/sunrpc/xprtsock.h>
```

```
#include <linux/file.h>
```

```
+#include <linux/fs_struct.h>
```

```
#ifdef CONFIG_SUNRPC_BACKCHANNEL
```

```
#include <linux/sunrpc/bc_xprt.h>
```

```
#endif
```

```
@@ -255,6 +256,11 @@ struct sock_xprt {
```

```
void (*old_state_change)(struct sock *);
```

```
void (*old_write_space)(struct sock *);
```

```
void (*old_error_report)(struct sock *);
```

```
+
```

```
+ /*
```

```
+ * Saved transport creator root. Required for local transports only.
```

```
+ */
```

```
+ struct path root;
```

```
};
```

```
/*
```

```

@@ -1876,6 +1882,30 @@ static int xs_local_finish_connecting(struct rpc_xprt *xprt,
    return kernel_connect(sock, xs_addr(xprt), xprt->addrlen, 0);
}

+/*
+ * __xs_local_swap_root - swap current root to transport's root helper.
+ * @new_root - path to set to current fs->root.
+ * @old_root - optional pointer to save current root to
+ *
+ * This routine is required to connecting unix sockets to absolute path in
+ * proper root environment.
+ * Note: no path_get() will be called. I.e. caller have to hold reference to
+ * new_root.
+ */
+static void __xs_local_swap_root(struct path *new_root, struct path *old_root)
+{
+ struct fs_struct *fs = current->fs;
+
+ spin_lock(&fs->lock);
+ write_seqcount_begin(&fs->seq);
+ if (old_root)
+ *old_root = fs->root;
+ fs->root = *new_root;
+ write_seqcount_end(&fs->seq);
+ spin_unlock(&fs->lock);
+}
+
+/**
+ * xs_local_setup_socket - create AF_LOCAL socket, connect to a local endpoint
+ * @xprt: RPC transport to connect
@@ -1891,6 +1921,7 @@ static void xs_local_setup_socket(struct work_struct *work)
    struct rpc_xprt *xprt = &transport->xprt;
    struct socket *sock;
    int status = -EIO;
+ struct path root;

    current->flags |= PF_FSTRANS;

@@ -1907,7 +1938,10 @@ static void xs_local_setup_socket(struct work_struct *work)
    dprintk("RPC: worker connecting xprt %p via AF_LOCAL to %s\n",
        xprt, xprt->address_strings[RPC_DISPLAY_ADDR]);

+ __xs_local_swap_root(&transport->root, &root);
+ status = xs_local_finish_connecting(xprt, sock);
+ __xs_local_swap_root(&root, NULL);
+
+ switch (status) {

```

```

case 0:
    dprintk("RPC:    xprt %p connected to %s\n",
@@ -2256,6 +2290,18 @@ static void xs_connect(struct rpc_task *task)
    }
}

+static void xs_local_destroy(struct rpc_xprt *xprt)
+{
+ struct sock_xprt *transport = container_of(xprt, struct sock_xprt, xprt);
+ struct path root = transport->root;
+
+ dprintk("RPC:    xs_local_destroy xprt %p\n", xprt);
+
+ xs_destroy(xprt);
+
+ path_put(&root);
+}
+
/**
 * xs_local_print_stats - display AF_LOCAL socket-specific stats
 * @xprt: rpc_xprt struct containing statistics
@@ -2475,7 +2521,7 @@ static struct rpc_xprt_ops xs_local_ops = {
 .send_request = xs_local_send_request,
 .set_retrans_timeout = xprt_set_retrans_timeout_def,
 .close = xs_close,
- .destroy = xs_destroy,
+ .destroy = xs_local_destroy,
 .print_stats = xs_local_print_stats,
 };

@@ -2654,8 +2700,10 @@ static struct rpc_xprt *xs_setup_local(struct xprt_create *args)
    dprintk("RPC:    set up xprt to %s via AF_LOCAL\n",
        xprt->address_strings[RPC_DISPLAY_ADDR]);

- if (try_module_get(THIS_MODULE))
+ if (try_module_get(THIS_MODULE)) {
+ get_fs_root(current->fs, &transport->root);
    return xprt;
+ }
    ret = ERR_PTR(-EINVAL);
out_err:
    xprt_free(xprt);

```

---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports  
Posted by [bfields](#) on Tue, 09 Oct 2012 19:35:06 GMT

Cc'ing Eric since I seem to recall he suggested doing it this way?

Seems OK to me, but maybe that swap\_root should be in common code? (Or maybe we could use set\_fs\_root()?)

I'm assuming it's up to Trond to take this.--b.

On Mon, Oct 08, 2012 at 02:56:32PM +0400, Stanislav Kinsbursky wrote:

```
> Today, there is a problem in connecting of local SUNRPC transports. These
> transports uses UNIX sockets and connection itself is done by rpciod
> workqueue.
> But all local transports are connecting in rpciod context. I.e. UNIX sockets
> lookup is done in context of process file system root.
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> for example in container. This container can have it's own (nested) root and
> rcpbind process, listening on it's own unix sockets. But NFS mount attempt in
> this container will register new service (Lockd for example) in global rpcbind
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> Signed-off-by: Stanislav Kinsbursky <skinsbursky@parallels.com>
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> @@ -37,6 +37,7 @@
> #include <linux/sunrpc/svcsock.h>
> #include <linux/sunrpc/xprtsock.h>
> #include <linux/file.h>
> +#include <linux/fs_struct.h>
> #ifdef CONFIG_SUNRPC_BACKCHANNEL
> #include <linux/sunrpc/bc_xprt.h>
> #endif
> @@ -255,6 +256,11 @@ struct sock_xprt {
> void (*old_state_change)(struct sock *);
> void (*old_write_space)(struct sock *);
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> +{
> + struct fs_struct *fs = current->fs;
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> + spin_lock(&fs->lock);
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> + if (old_root)
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> struct rpc_xprt *xprt = &transport->xprt;
> struct socket *sock;
> int status = -EIO;
> + struct path root;
>
> current->flags |= PF_FSTRANS;
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> @@ -1907,7 +1938,10 @@ static void xs_local_setup_socket(struct work_struct *work)
> dprintk("RPC: worker connecting xprt %p via AF_LOCAL to %s\n",
> xprt, xprt->address_strings[RPC_DISPLAY_ADDR]);
>
> + __xs_local_swap_root(&transport->root, &root);

```

```

> status = xs_local_finish_connecting(xprt, sock);
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> + struct path root = transport->root;
> +
> + dprintk("RPC:    xs_local_destroy xprt %p\n", xprt);
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> ret = ERR_PTR(-EINVAL);
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```

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [Myklebust, Trond](#) on Tue, 09 Oct 2012 19:49:46 GMT

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---

On Tue, 2012-10-09 at 15:35 -0400, J. Bruce Fields wrote:

> Cc'ing Eric since I seem to recall he suggested doing it this way?

>

> Seems OK to me, but maybe that swap\_root should be in common code? (Or

> maybe we could use set\_fs\_root(?)

>

> I'm assuming it's up to Trond to take this.--b.

I'm reluctant to do that at this time since the original proposal was precisely that of export set\_fs\_root() and using it around the AF\_LOCAL socket bind. That proposal was NACKed by Al Viro.

If Al is OK with the idea of us creating a private version of set\_fs\_root, then I'd like to see an official Acked-by: that we can append to this commit.

Cheers

Trond

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>> +
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>> + write_seqcount_begin(&fs->seq);
>> + if (old_root)
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>> + fs->root = *new_root;
>> + write_seqcount_end(&fs->seq);
>> + spin_unlock(&fs->lock);
>> +}
>> +
>> +
>> + /**

```



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>> .print_stats = xs_local_print_stats,
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```

```
> >
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> > dprintk("RPC:    set up xprt to %s via AF_LOCAL\n",
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> >
> > - if (try_module_get(THIS_MODULE))
> > + if (try_module_get(THIS_MODULE)) {
> > + get_fs_root(current->fs, &transport->root);
> > return xprt;
> > + }
> > ret = ERR_PTR(-EINVAL);
> > out_err:
> > xprt_free(xprt);
> >
```

--

Trond Myklebust  
Linux NFS client maintainer

NetApp  
Trond.Myklebust@netapp.com  
www.netapp.com

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---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [ebiederm](#) on Tue, 09 Oct 2012 20:20:48 GMT

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---

"Myklebust, Trond" <Trond.Myklebust@netapp.com> writes:

> On Tue, 2012-10-09 at 15:35 -0400, J. Bruce Fields wrote:  
>> Cc'ing Eric since I seem to recall he suggested doing it this way?

Yes. On second look setting fs->root won't work. We need to change fs. The problem is that by default all kernel threads share fs so changing fs->root will have non-local consequences.

I very much believe we want if at all possible to perform a local modification.

Changing fs isn't all that different from what devtmpfs is doing.

>> Seems OK to me, but maybe that swap\_root should be in common code? (Or  
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>

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> precisely that of export set\_fs\_root() and using it around the AF\_LOCAL  
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> append to this commit.

Eric

---

---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [bfields](#) on Tue, 09 Oct 2012 22:31:39 GMT

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---

On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:

> "Myklebust, Trond" <Trond.Myklebust@netapp.com> writes:

>

> > On Tue, 2012-10-09 at 15:35 -0400, J. Bruce Fields wrote:

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>

> Yes. On second look setting fs->root won't work. We need to change fs.

> The problem is that by default all kernel threads share fs so changing

> fs->root will have non-local consequences.

Oh, huh. And we can't "unshare" it somehow?

Or, previously you suggested:

- introduce sockaddr\_fd that can be applied to AF\_UNIX sockets, and teach unix\_bind and unix\_connect how to deal with a second type of sockaddr, AT\_FD:

```
struct sockaddr_fd { short fd_family; short pad; int fd; }
```

- introduce sockaddr\_unix\_at that takes a directory file descriptor as well as a unix path, and teach unix\_bind and unix\_connect to deal with a second sockaddr type, AF\_UNIX\_AT:

```
struct sockaddr_unix_at { short family; short pad; int dfd; char path[102]; }
```

Any other options?

> I very much believe we want if at all possible to perform a local  
> modification.

>

> Changing fs isn't all that different from what devtmpfs is doing.

Sorry, I don't know much about devtmpfs, are you suggesting it as a

model? What exactly should we look at?

--b.

---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [ebiederm](#) on Tue, 09 Oct 2012 22:47:42 GMT

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---

"J. Bruce Fields" <[bfields@fieldses.org](mailto:bfields@fieldses.org)> writes:

> On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:

>> "Myklebust, Trond" <[Trond.Myklebust@netapp.com](mailto:Trond.Myklebust@netapp.com)> writes:

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>> The problem is that by default all kernel threads share fs so changing

>> fs->root will have non-local consequences.

>

> Oh, huh. And we can't "unshare" it somehow?

I don't fully understand how nfs uses kernel threads and work queues.

My general understanding is work queues reuse their kernel threads

between different users. So it is mostly a don't pollute your

environment thing. If there was a dedicated kernel thread for each

environment this would be trivial.

What I was suggesting here is changing task->fs instead of

task->fs.root. That should just require task\_lock().

> Or, previously you suggested:

>

> - introduce sockaddr\_fd that can be applied to AF\_UNIX sockets,

> and teach unix\_bind and unix\_connect how to deal with a second

> type of sockaddr, AT\_FD:

> struct sockaddr\_fd { short fd\_family; short pad; int fd; }

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> - introduce sockaddr\_unix\_at that takes a directory file

> descriptor as well as a unix path, and teach unix\_bind and

> unix\_connect to deal with a second sockaddr type, AF\_UNIX\_AT:

> struct sockaddr\_unix\_at { short family; short pad; int dfd; char path[102]; }

>

> Any other options?

I am still half hoping we don't have to change the userspace API/ABI.

There is sanity checking on that path that no one seems interested in to solve this problem.

This is a weird issue as we are dealing with both the vfs and the networking stack. Fundamentally we need to change task->fs.root or we need to capitalize on the openat functionality in the kernel, so that we don't create mountains of special cases to support this.

I think swapping task->fs instead of task->fs.root is effectively the same complexity.

>> I very much believe we want if at all possible to perform a local  
>> modification.

>>

>> Changing fs isn't all that different from what devtmpfs is doing.

>

> Sorry, I don't know much about devtmpfs, are you suggesting it as a  
> model? What exactly should we look at?

Roughly all I meant was that devtmpfsd is a kernel thread that runs with an unshared fs struct. Although I admit devtmpfsd is for all practical purposes a userspace daemon that just happens to run in kernel space.

Eric

---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [bfields](#) on Wed, 10 Oct 2012 01:23:36 GMT

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On Tue, Oct 09, 2012 at 03:47:42PM -0700, Eric W. Biederman wrote:

> "J. Bruce Fields" <[bfields@fieldses.org](mailto:bfields@fieldses.org)> writes:

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> > On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:

> >> "Myklebust, Trond" <[Trond.Myklebust@netapp.com](mailto:Trond.Myklebust@netapp.com)> writes:

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> > Oh, huh. And we can't "unshare" it somehow?

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> I don't fully understand how nfs uses kernel threads and work queues.

> My general understanding is work queues reuse their kernel threads  
> between different users. So it is mostly a don't pollute your  
> environment thing. If there was a dedicated kernel thread for each  
> environment this would be trivial.  
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> What I was suggesting here is changing task->fs instead of  
> task->fs.root. That should just require task\_lock().

Oh, OK, got it--if that works, great.

> > Sorry, I don't know much about devtmpfs, are you suggesting it as a  
> > model? What exactly should we look at?  
>  
> Roughly all I meant was that devtmpfsd is a kernel thread that runs  
> with an unshared fs struct. Although I admit devtmpfsd is for all  
> practical purposes a userspace daemon that just happens to run in kernel  
> space.

Thanks for the explanation.

--b.

---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [ebiederm](#) on Wed, 10 Oct 2012 02:00:35 GMT

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

> "J. Bruce Fields" <bfields@fieldses.org> writes:  
>  
>> On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:  
>>> "Myklebust, Trond" <Trond.Myklebust@netapp.com> writes:  
>>>>  
>>>> > On Tue, 2012-10-09 at 15:35 -0400, J. Bruce Fields wrote:  
>>>> >> Cc'ing Eric since I seem to recall he suggested doing it this way?  
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>  
>> Or, previously you suggested:  
>>  
>> - introduce sockaddr\_fd that can be applied to AF\_UNIX sockets,  
>> and teach unix\_bind and unix\_connect how to deal with a second  
>> type of sockaddr, AT\_FD:  
>> struct sockaddr\_fd { short fd\_family; short pad; int fd; }  
>>  
>> - introduce sockaddr\_unix\_at that takes a directory file  
>> descriptor as well as a unix path, and teach unix\_bind and  
>> unix\_connect to deal with a second sockaddr type, AF\_UNIX\_AT:  
>> struct sockaddr\_unix\_at { short family; short pad; int dfd; char path[102]; }  
>>  
>> Any other options?  
>  
> I am still half hoping we don't have to change the userspace API/ABI.  
> There is sanity checking on that path that no one seems interested in to  
> solve this problem.

There is a good option if we are up to userspace ABI extensions.

Implement open(2) on unix domain sockets. Where open(2) would essentially equal connect(2) on unix domain sockets.

With an open(2) implementation we could use file\_open\_path and the implementation should be pretty straight forward and maintainable. So implementing open(2) looks like a good alternative implementation route.

Eric

---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [Stanislav Kinsbursky](#) on Wed, 10 Oct 2012 05:03:41 GMT

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10.10.2012 02:47, Eric W. Biederman

> "J. Bruce Fields" <bfields@fieldses.org> writes:

>

>> On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:

>>> "Myklebust, Trond" <Trond.Myklebust@netapp.com> writes:

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> My general understanding is work queues reuse their kernel threads  
> between different users. So it is mostly a don't pollute your  
> environment thing. If there was a dedicated kernel thread for each  
> environment this would be trivial.

One kernel thread per environment is exactly what we are trying to avoid if possible.

And the reason why we don't want to do this is that it's really looks like overkill.

> What I was suggesting here is changing task->fs instead of  
> task->fs.root. That should just require task\_lock().  
>  
>> Or, previously you suggested:  
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>> - introduce sockaddr\_fd that can be applied to AF\_UNIX sockets,  
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>> Any other options?  
> I am still half hoping we don't have to change the userspace API/ABI.  
> There is sanity checking on that path that no one seems interested in to  
> solve this problem.  
>  
> This is a weird issue as we are dealing with both the vfs and the  
> networking stack. Fundamentally we need to change task->fs.root or  
> we need to capitalize on the openat functionality in the kernel, so  
> that we don't create mountains of special cases to support this.  
>  
> I think swapping task->fs instead of task->fs.root is effecitely the  
> same complexity.

Thanks for the idea. And for mentioning, that kernel threads shares fs struct. I missed it.

>



>>> I very much believe we want if at all possible to perform a local  
>>> modification.  
>>>  
>>> Changing fs isn't all that different from what devtmpfs is doing.  
>> Sorry, I don't know much about devtmpfs, are you suggesting it as a  
>> model? What exactly should we look at?  
> Roughly all I meant was that devtmpfsd is a kernel thread that runs  
> with an unshared fs struct. Although I admit devtmpfsd is for all  
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>  
> Eric  
>  
> --  
> To unsubscribe from this list: send the line "unsubscribe linux-nfs" in  
> the body of a message to majordomo@vger.kernel.org  
> More majordomo info at <http://vger.kernel.org/majordomo-info.html>

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Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [Stanislav Kinsbursky](#) on Wed, 10 Oct 2012 05:09:24 GMT

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10.10.2012 06:00, Eric W. Biederman

> ebiederm@xmission.com (Eric W. Biederman) writes:

>

>> "J. Bruce Fields" <bfields@fieldses.org> writes:

>>

>>> On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:

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>>>>>

>>>>> On Tue, 2012-10-09 at 15:35 -0400, J. Bruce Fields wrote:

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>> My general understanding is work queues reuse their kernel threads

>> between different users. So it is mostly a don't pollute your

>> environment thing. If there was a dedicated kernel thread for each

>> environment this would be trivial.

>>

>> What I was suggesting here is changing task->fs instead of

>> task->fs.root. That should just require task\_lock().

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> There is a good option if we are up to userspace ABI extensions.
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> Implement open(2) on unix domain sockets. Where open(2) would
> essentially equal connect(2) on unix domain sockets.
>
> With an open(2) implementation we could use file_open_path and the
> implementation should be pretty straight forward and maintainable.
> So implementing open(2) looks like a good alternative implementation
> route.
```

This requires patching of vfs layer as well. I don't want to say, that the idea is not good. But it requires much more time to implement and test. And this patch addresses the problem, which exist already and would be great to fix it as soon as possible.

So, probably, implementing open for unix sockets is the next and more generic step.

Thanks.

> Eric

>

> --

> To unsubscribe from this list: send the line "unsubscribe linux-nfs" in

> the body of a message to majordomo@vger.kernel.org

> More majordomo info at <http://vger.kernel.org/majordomo-info.html>

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Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [Stanislav Kinsbursky](#) on Wed, 10 Oct 2012 10:32:28 GMT

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10.10.2012 05:23, J. Bruce Fields

> On Tue, Oct 09, 2012 at 03:47:42PM -0700, Eric W. Biederman wrote:

>> "J. Bruce Fields" <bfields@fieldses.org> writes:  
>>  
>>> On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:  
>>>> "Myklebust, Trond" <Trond.Myklebust@netapp.com> writes:  
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>

The main problem with swapping fs struct is actually the same as in root swapping. I.e. routines for copy fs\_struct are not exported. It could be done on place, but I don't think, that Al Viro would support such implementation.  
Trond?

>>> Sorry, I don't know much about devtmpfs, are you suggesting it as a  
>>> model? What exactly should we look at?  
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>> with an unshared fs struct. Although I admit devtmpfsd is for all  
>> practical purposes a userspace daemon that just happens to run in kernel  
>> space.  
>  
> Thanks for the explanation.  
>  
> --b.  
>

--  
Best regards,

---

Subject: Re: [PATCH v3] SUNRPC: set desired file system root before connecting local transports

Posted by [bfields](#) on Fri, 26 Oct 2012 17:52:54 GMT

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On Wed, Oct 10, 2012 at 02:32:28PM +0400, Stanislav Kinsbursky wrote:

> 10.10.2012 05:23, J. Bruce Fields

> > On Tue, Oct 09, 2012 at 03:47:42PM -0700, Eric W. Biederman wrote:

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> > > > On Tue, Oct 09, 2012 at 01:20:48PM -0700, Eric W. Biederman wrote:

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> root swapping. I.e. routines for copy fs\_struct are not exported.

> It could be done on place, but I don't think, that Al Viro would

> support such implementation.

> Trond?

It seems like we got stalled here.... Could you go ahead and try a patch, and see what people think?

--b.

---