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Subject: [PATCH 7/20] Make alloc\_pid(), free\_pid() and put\_pid() work with struct upid

Posted by [Pavel Emelianov](#) on Fri, 10 Aug 2007 11:48:03 GMT

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Each struct upid element of struct pid has to be initialized properly, i.e. its nr must be allocated from appropriate pidmap and ns set to appropriate namespace.

When allocating a new pid, we need to know the namespace this pid will live in, so the additional argument is added to alloc\_pid().

On the other hand, the rest of the kernel still uses the pid->nr and pid->pid\_chain fields, so these ones are still initialized, but this will be removed soon.

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```
include/linux/pid.h | 2 +-
kernel/fork.c       | 2 +-
kernel/pid.c        | 49 ++++++-----
3 files changed, 36 insertions(+), 17 deletions(-)
```

```
--- ./include/linux/pid.h.ve8 2007-08-06 15:39:05.000000000 +0400
+++ ./include/linux/pid.h 2007-08-06 15:39:05.000000000 +0400
@@ -111,7 +111,7 @@ extern struct pid *FASTCALL(find_pid(int
extern struct pid *find_get_pid(int nr);
extern struct pid *find_ge_pid(int nr);
```

```
-extern struct pid *alloc_pid(void);
+extern struct pid *alloc_pid(struct pid_namespace *ns);
extern void FASTCALL(free_pid(struct pid *pid));
```

```
static inline pid_t pid_nr(struct pid *pid)
--- ./kernel/fork.c.ve8 2007-08-06 15:39:02.000000000 +0400
+++ ./kernel/fork.c 2007-08-06 15:39:05.000000000 +0400
@@ -1029,7 +1029,7 @@ static struct task_struct *copy_process(
    goto bad_fork_cleanup_put_domain;

    if (pid != &init_struct_pid) {
-   pid = alloc_pid();
+   pid = alloc_pid(task_active_pid_ns(p));
    if (!pid)
        goto bad_fork_put_binfmt_module;
    }
```

```

--- ./kernel/pid.c.ve8 2007-08-06 15:39:05.000000000 +0400
+++ ./kernel/pid.c 2007-08-06 15:41:34.000000000 +0400
@@ -29,7 +29,8 @@
#include <linux/pid_namespace.h>
#include <linux/init_task.h>

-#define pid_hashfn(nr) hash_long((unsigned long)nr, pidhash_shift)
+#define pid_hashfn(nr, ns) \
+ hash_long((unsigned long)nr + (unsigned long)ns, pidhash_shift)
static struct hlist_head *pid_hash;
static int pidhash_shift;
struct pid init_struct_pid = INIT_STRUCT_PID;
@@ -188,11 +189,13 @@ fastcall void put_pid(struct pid *pid)
    if (!pid)
        return;

- /* FIXME - this must be the namespace this pid lives in */
- ns = &init_pid_ns;
+ ns = pid->numbers[pid->level].ns;
    if ((atomic_read(&pid->count) == 1) ||
-        atomic_dec_and_test(&pid->count))
+        atomic_dec_and_test(&pid->count)) {
        kmem_cache_free(ns->pid_cachep, pid);
+    if (ns != &init_pid_ns)
+        put_pid_ns(ns);
+ }
}
EXPORT_SYMBOL_GPL(put_pid);

@@ -205,45 +208,61 @@ static void delayed_put_pid(struct rcu_h
fastcall void free_pid(struct pid *pid)
{
    /* We can be called with write_lock_irq(&tasklist_lock) held */
+ int i;
    unsigned long flags;

    spin_lock_irqsave(&pidmap_lock, flags);
    hlist_del_rcu(&pid->pid_chain);
    spin_unlock_irqrestore(&pidmap_lock, flags);

- free_pidmap(&init_pid_ns, pid->nr);
+ for (i = 0; i <= pid->level; i++)
+ free_pidmap(pid->numbers[i].ns, pid->numbers[i].nr);
+
+ call_rcu(&pid->rcu, delayed_put_pid);
}

-struct pid *alloc_pid(void)

```

```

+struct pid *alloc_pid(struct pid_namespace *ns)
{
    struct pid *pid;
    enum pid_type type;
- int nr = -1;
- struct pid_namespace *ns;
+ int i, nr;
+ struct pid_namespace *tmp;

- ns = task_active_pid_ns(current);
  pid = kmem_cache_alloc(ns->pid_cachep, GFP_KERNEL);
  if (!pid)
    goto out;

- nr = alloc_pidmap(ns);
- if (nr < 0)
-   goto out_free;
+ tmp = ns;
+ for (i = ns->level; i >= 0; i--) {
+   nr = alloc_pidmap(tmp);
+   if (nr < 0)
+     goto out_free;
+
+   pid->numbers[i].nr = nr;
+   pid->numbers[i].ns = tmp;
+   tmp = tmp->parent;
+ }
+
+ if (ns != &init_pid_ns)
+   get_pid_ns(ns);

+ pid->level = ns->level;
+ pid->nr = pid->numbers[0].nr;
  atomic_set(&pid->count, 1);
- pid->nr = nr;
  for (type = 0; type < PIDTYPE_MAX; ++type)
    INIT_HLIST_HEAD(&pid->tasks[type]);

  spin_lock_irq(&pidmap_lock);
- hlist_add_head_rcu(&pid->pid_chain, &pid_hash[pid_hashfn(pid->nr)]);
+ hlist_add_head_rcu(&pid->pid_chain, &pid_hash[pid_hashfn(pid->nr, ns)]);
  spin_unlock_irq(&pidmap_lock);

out:
  return pid;

out_free:
+ for (i++; i <= ns->level; i++)

```

```

+ free_pidmap(pid->numbers[i].ns, pid->numbers[i].nr);
+
+ kmem_cache_free(ns->pid_cache, pid);
+ pid = NULL;
+ goto out;
@@ -255,7 +274,7 @@ struct pid * fastcall find_pid(int nr)
+ struct pid *pid;

+ hlist_for_each_entry_rcu(pid, elem,
- &pid_hash[pid_hashfn(nr)], pid_chain) {
+ &pid_hash[pid_hashfn(nr, &init_pid_ns)], pid_chain) {
+ if (pid->nr == nr)
+ return pid;
+ }

```

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