Subject: [PATCH 8/20] Make alloc_pid(), free_pid() and put_pid() work with struct upid
Posted by Pavel Emelianov on Tue, 07 Aug 2007 09:29:50 GMT
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Each struct upid element of struct pid has to be initialized properly,
i.e. its nr mst 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.

Signed-off-by: Pavel Emelyanov <xemul@openvz.org>

```
 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_cachep, 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;
 }
```