
Subject: [PATCH 6/9] Containers (V9): Add procfs interface
Posted by [Paul Menage](#) on Fri, 27 Apr 2007 10:46:13 GMT
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This patch adds:

/proc/containers - general system info

/proc/*/container - per-task container membership info

Signed-off-by: Paul Menage <menage@google.com>

fs/proc/base.c | 7 ++
kernel/container.c | 128 +++
2 files changed, 135 insertions(+)

Index: container-2.6.21-rc7-mm1/fs/proc/base.c

```
=====
--- container-2.6.21-rc7-mm1.orig/fs/proc/base.c
+++ container-2.6.21-rc7-mm1/fs/proc/base.c
@@ -68,6 +68,7 @@
#include <linux/security.h>
#include <linux/ptrace.h>
#include <linux/seccomp.h>
+#include <linux/container.h>
#include <linux/cpuset.h>
#include <linux/audit.h>
#include <linux/poll.h>
@@ -1980,6 +1981,9 @@ static const struct pid_entry tgid_base_
#ifdef CONFIG_CPUSETS
REG("cpuset", S_IRUGO, cpuset),
#endif
+#ifdef CONFIG_CONTAINERS
+ REG("container", S_IRUGO, container),
+#endif
INF("oom_score", S_IRUGO, oom_score),
REG("oom_adj", S_IRUGO|S_IWUSR, oom_adjust),
#ifdef CONFIG_AUDITSYSCALL
@@ -2270,6 +2274,9 @@ static const struct pid_entry tid_base_s
#ifdef CONFIG_CPUSETS
REG("cpuset", S_IRUGO, cpuset),
#endif
+#ifdef CONFIG_CONTAINERS
+ REG("container", S_IRUGO, container),
+#endif
INF("oom_score", S_IRUGO, oom_score),
REG("oom_adj", S_IRUGO|S_IWUSR, oom_adjust),
```

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#ifdef CONFIG_AUDITSYSCALL
Index: container-2.6.21-rc7-mm1/kernel/container.c
=====
--- container-2.6.21-rc7-mm1.orig/kernel/container.c
+++ container-2.6.21-rc7-mm1/kernel/container.c
@@ -247,6 +247,7 @@ static int container_mkdir(struct inode
static int container_rmdir(struct inode *unused_dir, struct dentry *dentry);
static int container_populate_dir(struct container *cont);
static struct inode_operations container_dir_inode_operations;
+struct file_operations proc_containerstats_operations;

static struct backing_dev_info container_backing_dev_info = {
    .ra_pages = 0, /* No readahead */
@@ -1507,6 +1508,7 @@ int __init container_init(void)
{
    int err;
    int i;
+ struct proc_dir_entry *entry;

    for (i = 0; i < CONTAINER_SUBSYS_COUNT; i++) {
        struct container_subsys *ss = subsys[i];
@@ -1518,10 +1520,136 @@ int __init container_init(void)
        if (err < 0)
            goto out;

+ entry = create_proc_entry("containers", 0, NULL);
+ if (entry)
+ entry->proc_fops = &proc_containerstats_operations;
+
out:
    return err;
}

+/*
+ * proc_container_show()
+ * - Print task's container paths into seq_file, one line for each hierarchy
+ * - Used for /proc/<pid>/container.
+ * - No need to task_lock(tsk) on this tsk->container reference, as it
+ *   doesn't really matter if tsk->container changes after we read it,
+ *   and we take container_mutex, keeping attach_task() from changing it
+ *   anyway. No need to check that tsk->container != NULL, thanks to
+ *   the_top_container_hack in container_exit(), which sets an exiting tasks
+ *   container to top_container.
+ */
+
+/* TODO: Use a proper seq_file iterator */
+static int proc_container_show(struct seq_file *m, void *v)
+{

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+ struct pid *pid;
+ struct task_struct *tsk;
+ char *buf;
+ int retval;
+ struct containerfs_root *root;
+
+ retval = -ENOMEM;
+ buf = kmalloc(PAGE_SIZE, GFP_KERNEL);
+ if (!buf)
+ goto out;
+
+ retval = -ESRCH;
+ pid = m->private;
+ tsk = get_pid_task(pid, PIDTYPE_PID);
+ if (!tsk)
+ goto out_free;
+
+ retval = 0;
+
+ mutex_lock(&container_mutex);
+
+ for_each_root(root) {
+ struct container_subsys *ss;
+ struct container *cont;
+ int subsys_id;
+ int count = 0;
+ /* Skip this hierarchy if it has no active subsystems */
+ if (!root->subsys_bits) continue;
+ for_each_subsys(root, ss) {
+ seq_printf(m, "%s%s", count++ ? ", " : "", ss->name);
+ }
+ seq_putc(m, ':');
+ get_first_subsys(&root->top_container, NULL, &subsys_id);
+ cont = task_container(tsk, subsys_id);
+ retval = container_path(cont, buf, PAGE_SIZE);
+ if (retval < 0)
+ goto out_unlock;
+ seq_puts(m, buf);
+ seq_putc(m, '\n');
+ }
+
+out_unlock:
+ mutex_unlock(&container_mutex);
+ put_task_struct(tsk);
+out_free:
+ kfree(buf);
+out:
+ return retval;

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+}
+
+static int container_open(struct inode *inode, struct file *file)
+{
+ struct pid *pid = PROC_I(inode)->pid;
+ return single_open(file, proc_container_show, pid);
+}
+
+struct file_operations proc_container_operations = {
+ .open = container_open,
+ .read = seq_read,
+ .llseek = seq_lseek,
+ .release = single_release,
+};
+
+/* Display information about each subsystem and each hierarchy */
+static int proc_containerstats_show(struct seq_file *m, void *v)
+{
+ int i;
+ struct containerfs_root *root;
+ mutex_lock(&container_mutex);
+ seq_puts(m, "Hierarchies:\n");
+ for_each_root(root) {
+ struct container_subsys *ss;
+ int first = 1;
+ seq_printf(m, "%p: bits=%lx containers=%d (", root,
+ root->subsys_bits, root->number_of_containers);
+ for_each_subsys(root, ss) {
+ seq_printf(m, "%s%s", first ? "" : ", ", ss->name);
+ first = false;
+ }
+ seq_putc(m, ')');
+ if (root->sb) {
+ seq_printf(m, " s_active=%d",
+ atomic_read(&root->sb->s_active));
+ }
+ seq_putc(m, '\n');
+ }
+ seq_puts(m, "Subsystems:\n");
+ for (i = 0; i < CONTAINER_SUBSYS_COUNT; i++) {
+ struct container_subsys *ss = subsys[i];
+ seq_printf(m, "%d: name=%s hierarchy=%p\n",
+ i, ss->name, ss->root);
+ }
+ mutex_unlock(&container_mutex);
+ return 0;
+}
+

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```

+static int containerstats_open(struct inode *inode, struct file *file)
+{
+ return single_open(file, proc_containerstats_show, 0);
+}
+
+struct file_operations proc_containerstats_operations = {
+ .open = containerstats_open,
+ .read = seq_read,
+ .llseek = seq_lseek,
+ .release = single_release,
+};
+/**
+ * container_fork - attach newly forked task to its parents container.
+ * @tsk: pointer to task_struct of forking parent process.

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