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Subject: Re: [PATCH] introduce task cgroup v2  
Posted by [Peter Zijlstra](#) on Mon, 16 Jun 2008 06:39:54 GMT  
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On Sat, 2008-06-07 at 20:00 +0900, KOSAKI Motohiro wrote:

> ChangeLog

> =====

> v1 -> v2

- > o implement can\_attach() and attach() method.
- > o remove can\_fork member from cgroup\_subsys.
- > instead, copy\_process() call task\_cgroup\_can\_fork() directly.
- > o fixed dead lock bug.
- > o add Documentation/contoroller/task.txt

>

>

> benefit

> =====

> 1. prevent fork bomb.

>

> We already have "/proc/sys/kernel/threads-max".

> but it isn't perfect solution.

> because threads-max prevent any process creation.

> then, System-administrator can't login and restore trouble.

>

> task limit cgroup is better solution.

> it can prevent fork by network service daemon, but allow fork by interactive process.

>

>

> 2. help implement batch processing

>

> in general, batch processing environment need support #task limit.

> this patch help implement it.

>

>

> usage

> =====

>

> # mount -t cgroup -o task none /dev/cgroup

> # mkdir /dev/cgroup/foo

> # cd /dev/cgroup/foo

> # ls

> notify\_on\_release task.max\_tasks task.nr\_tasks tasks

> # echo 100 > task.max\_tasks

> # echo \$\$ > tasks

> # fork\_bomb 1000 & <- try create 1000 process

> # pgrep fork\_bomb | wc -l

> 98

fwiw I think the name sucks!

cgroups are about grouping tasks, so what's a task cgroup?

```
> Signed-off-by: KOSAKI Motohiro <kosaki.motohiro@jp.fujitsu.com>
> CC: Li Zefan <lizf@cn.fujitsu.com>
> CC: Paul Menage <menage@google.com>
>
> ---
> Documentation/controllers/task.txt | 18 +++
> include/linux/cgroup_subsys.h      | 4
> include/linux/cgroup_task.h        | 33 +++++
> init/Kconfig                        | 10 +
> kernel/Makefile                     | 1
> kernel/cgroup_task.c                | 213 +++++++++++++++++++++++++++++++++++++
> kernel/fork.c                       | 4
> 7 files changed, 283 insertions(+)
>
> Index: b/init/Kconfig
> =====
> --- a/init/Kconfig
> +++ b/init/Kconfig
> @@ -289,6 +289,16 @@ config CGROUP_DEBUG
>
> Say N if unsure
>
> +config CGROUP_TASK
> + bool "Simple number of task accounting cgroup subsystem"
> + depends on CGROUPS && EXPERIMENTAL
> + default n
> + help
> + Provides a simple number of task accounting cgroup subsystem for
> + prevent fork bomb.
> +
> + Say N if unsure
> +
> config CGROUP_NS
> bool "Namespace cgroup subsystem"
> depends on CGROUPS
> Index: b/kernel/Makefile
> =====
> --- a/kernel/Makefile
> +++ b/kernel/Makefile
> @@ -46,6 +46,7 @@ obj-$(CONFIG_KEXEC) += kexec.o
> obj-$(CONFIG_COMPAT) += compat.o
> obj-$(CONFIG_CGROUPS) += cgroup.o
> obj-$(CONFIG_CGROUP_DEBUG) += cgroup_debug.o
```

```

> +obj-$(CONFIG_CGROUP_TASK) += cgroup_task.o
> obj-$(CONFIG_CPUSETS) += cpuset.o
> obj-$(CONFIG_CGROUP_NS) += ns_cgroup.o
> obj-$(CONFIG_UTS_NS) += utsname.o
> Index: b/kernel/cgroup_task.c
> =====
> --- /dev/null
> +++ b/kernel/cgroup_task.c
> @@ -0,0 +1,213 @@
> +/* cgroup_task.c - #task control group
> + *
> + * Copyright (C) 2008 KOSAKI Motohiro <kosaki.motohiro@jp.fujitsu.com>
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> + * but WITHOUT ANY WARRANTY; without even the implied warranty of
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> + */
> +
> +#include <linux/cgroup.h>
> +#include <linux/err.h>
> +#include <linux/cgroup_task.h>
> +
> +struct task_cgroup {
> + struct cgroup_subsys_state css;
> + /*
> + * the counter to account for number of thread.
> + */
> + int max_tasks;
> + int nr_tasks;
> +
> + spinlock_t lock;
> +};
> +
> +struct cgroup_subsys task_cgroup_subsys __read_mostly;
> +
> +static inline struct task_cgroup *task_cgroup_from_task(struct task_struct *p)
> +{
> + return container_of(task_subsys_state(p, task_cgroup_subsys_id),
> + struct task_cgroup, css);
> +}
> +
> +static struct task_cgroup *task_cgroup_from_cgrp(struct cgroup *cgrp)

```

```

> +{
> + return container_of(cgroup_subsys_state(cgrp,
> +   task_cgroup_subsys_id), struct task_cgroup,
> +   css);
> +}
> +
> +static int task_cgroup_max_tasks_write(struct cgroup *cgrp,
> +   struct cftype *cftype,
> +   s64 new_max_tasks)
> +{
> + struct task_cgroup *taskcg;
> + int ret = -EBUSY;
> +
> + if ((new_max_tasks > INT_MAX) ||
> +   (new_max_tasks < -1))
> +   return -EINVAL;
> +
> + taskcg = task_cgroup_from_cgrp(cgrp);
> +
> + spin_lock(&taskcg->lock);
> + if (taskcg->nr_tasks <= new_max_tasks) {
> +   taskcg->max_tasks = new_max_tasks;
> +   ret = 0;
> + }
> + spin_unlock(&taskcg->lock);
> +
> + return ret;
> +}
> +
> +static s64 task_cgroup_max_tasks_read(struct cgroup *cgrp, struct cftype *cft)
> +{
> + s64 max_tasks;
> + struct task_cgroup *taskcg = task_cgroup_from_cgrp(cgrp);
> +
> + spin_lock(&taskcg->lock);
> + max_tasks = taskcg->max_tasks;
> + spin_unlock(&taskcg->lock);
> +
> + return max_tasks;
> +}
> +
> +static s64 task_cgroup_nr_tasks_read(struct cgroup *cgrp, struct cftype *cft)
> +{
> + s64 nr_tasks;
> + struct task_cgroup *taskcg = task_cgroup_from_cgrp(cgrp);
> +
> + spin_lock(&taskcg->lock);
> + nr_tasks = taskcg->nr_tasks;

```

```

> + spin_unlock(&taskcg->lock);
> +
> + return nr_tasks;
> +}
> +
> +static struct cftype task_cgroup_files[] = {
> + {
> + .name = "max_tasks",
> + .write_s64 = task_cgroup_max_tasks_write,
> + .read_s64 = task_cgroup_max_tasks_read,
> + },
> + {
> + .name = "nr_tasks",
> + .read_s64 = task_cgroup_nr_tasks_read,
> + },
> +};
> +
> +static struct cgroup_subsys_state *task_cgroup_create(struct cgroup_subsys *ss,
> +      struct cgroup *cgrp)
> +{
> + struct task_cgroup *taskcg;
> +
> + taskcg = kzalloc(sizeof(struct task_cgroup), GFP_KERNEL);
> + if (!taskcg)
> + return ERR_PTR(-ENOMEM);
> +
> + taskcg->max_tasks = -1; /* infinite */
> + spin_lock_init(&taskcg->lock);
> +
> + return &taskcg->css;
> +}
> +
> +static void task_cgroup_destroy(struct cgroup_subsys *ss, struct cgroup *cgrp)
> +{
> + kfree(cgrp->subsys[task_cgroup_subsys_id]);
> +}
> +
> +
> +static int task_cgroup_can_attach(struct cgroup_subsys *ss,
> +      struct cgroup *cgrp, struct task_struct *tsk)
> +{
> + struct task_cgroup *taskcg = task_cgroup_from_cgrp(cgrp);
> + int ret = 0;
> +
> + spin_lock(&taskcg->lock);
> + if (taskcg->nr_tasks == taskcg->max_tasks)
> + ret = -EBUSY;
> + spin_unlock(&taskcg->lock);

```

```

> +
> + return ret;
> +}
> +
> +static void task_cgroup_attach(struct cgroup_subsys *ss, struct cgroup *cgrp,
> +      struct cgroup *old_cgrp, struct task_struct *tsk)
> +{
> + struct task_cgroup *old_taskcg = task_cgroup_from_cgrp(old_cgrp);
> + struct task_cgroup *new_taskcg = task_cgroup_from_cgrp(cgrp);
> +
> + spin_lock(&old_taskcg->lock);
> + old_taskcg->nr_tasks--;
> + spin_unlock(&old_taskcg->lock);
> +
> + spin_lock(&new_taskcg->lock);
> + new_taskcg->nr_tasks++;
> + spin_unlock(&new_taskcg->lock);
> +}
> +
> +
> +static int task_cgroup_populate(struct cgroup_subsys *ss,
> +      struct cgroup *cgrp)
> +{
> + return cgroup_add_files(cgrp, ss, task_cgroup_files,
> +      ARRAY_SIZE(task_cgroup_files));
> +}
> +
> +int task_cgroup_can_fork(struct task_struct *task)
> +{
> + struct task_cgroup *taskcg;
> + int max_tasks;
> + int ret = 0;
> +
> + if (task_cgroup_subsys.disabled)
> + return 0;
> +
> + taskcg = task_cgroup_from_task(task);
> +
> + spin_lock(&taskcg->lock);
> + max_tasks = taskcg->max_tasks;
> +
> + if ((max_tasks >= 0) &&
> +      (taskcg->nr_tasks >= max_tasks))
> + ret = -EAGAIN;
> + else
> + taskcg->nr_tasks++;
> + spin_unlock(&taskcg->lock);
> +

```

```

> + return ret;
> +}
> +
> +static void task_cgroup_exit(struct cgroup_subsys *ss, struct task_struct *task)
> +{
> + struct task_cgroup *taskcg;
> +
> + if (task_cgroup_subsys.disabled)
> + return;
> +
> + taskcg = task_cgroup_from_task(task);
> +
> + spin_lock(&taskcg->lock);
> + taskcg->nr_tasks--;
> + spin_unlock(&taskcg->lock);
> +}
> +
> +
> +struct cgroup_subsys task_cgroup_subsys = {
> + .name = "task",
> + .subsys_id = task_cgroup_subsys_id,
> + .create = task_cgroup_create,
> + .destroy = task_cgroup_destroy,
> + .can_attach = task_cgroup_can_attach,
> + .attach = task_cgroup_attach,
> + .populate = task_cgroup_populate,
> + .exit = task_cgroup_exit,
> + .early_init = 0,
> +};
> +
> Index: b/kernel/fork.c
> =====
> --- a/kernel/fork.c
> +++ b/kernel/fork.c
> @@ -54,6 +54,7 @@
> #include <linux/tty.h>
> #include <linux/proc_fs.h>
> #include <linux/blkdev.h>
> +#include <linux/cgroup_task.h>
>
> #include <asm/pgtable.h>
> #include <asm/pgalloc.h>
> @@ -920,6 +921,8 @@ static struct task_struct *copy_process(
>     p->user != current->nsproxy->user_ns->root_user)
>     goto bad_fork_free;
> }
> + if (task_cgroup_can_fork(p))
> + goto bad_fork_free;

```

```

>
> atomic_inc(&p->user->__count);
> atomic_inc(&p->user->processes);
> @@ -994,6 +997,7 @@ static struct task_struct *copy_process(
> p->io_context = NULL;
> p->audit_context = NULL;
> cgroup_fork(p);
> +
> #ifdef CONFIG_NUMA
> p->mempolicy = mpol_dup(p->mempolicy);
> if (IS_ERR(p->mempolicy)) {
> Index: b/include/linux/cgroup_subsys.h
> =====
> --- a/include/linux/cgroup_subsys.h
> +++ b/include/linux/cgroup_subsys.h
> @@ -48,3 +48,7 @@ SUBSYS(devices)
> #endif
>
> /* */
> +
> +#ifdef CONFIG_CGROUP_TASK
> +SUBSYS(task_cgroup)
> +#endif
> Index: b/include/linux/cgroup_task.h
> =====
> --- /dev/null
> +++ b/include/linux/cgroup_task.h
> @@ -0,0 +1,33 @@
> +/* cgroup_task.h - #task control group
> + *
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> + * but WITHOUT ANY WARRANTY; without even the implied warranty of
> + * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
> + * GNU General Public License for more details.
> + */
> +
> +#ifndef _LINUX_CGROUP_TASK_H
> +#define _LINUX_CGROUP_TASK_H
> +
> +#ifdef CONFIG_CGROUP_TASK
> +int task_cgroup_can_fork(struct task_struct *task);

```



```
> +
> +#else /*CONFIG_CGROUP_TASK*/
> +
> +static inline int task_cgroup_can_fork(struct task_struct *task)
> +{
> + return 0;
> +}
> +
> +#endif
> +
> +
> +#endif
> +
> Index: b/Documentation/controllers/task.txt
> =====
> --- /dev/null
> +++ b/Documentation/controllers/task.txt
> @@ -0,0 +1,18 @@
> +Task limit Controller
> +
> +1. Description
> +
> +Implement a cgroup to track number of tasks (process and thread).
> +this feature is useful for prevent fork bomb attack.
> +
> +
> +2. User Interface
> +
> +restrict number of tasks to 100.
> +
> + # echo 100 > /cgroups/foo/task.max_tasks
> +
> +
> +display current number of tasks.
> +
> + # cat > /cgroups/foo/task.nr_tasks
> +
> +
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