
Subject: [PATCH 21/33] memory controller resource counters v7
Posted by [Paul Menage](#) on Mon, 17 Sep 2007 21:03:28 GMT
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(container->cgroup renaming by Paul Menage <menage@google.com>)

Introduce generic structures and routines for resource accounting.

Each resource accounting cgroup is supposed to aggregate it,
cgroup_subsystem_state and its resource-specific members within.

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```
include/linux/res_counter.h | 102 ++++++
init/Kconfig                |  7 +
kernel/Makefile             |  1
kernel/res_counter.c         | 120 ++++++
4 files changed, 230 insertions(+)
```

```
diff -puN /dev/null include/linux/res_counter.h
--- /dev/null
+++ a/include/linux/res_counter.h
@@ -0,0 +1,102 @@
+#ifndef __RES_COUNTER_H__
+#define __RES_COUNTER_H__
+
+
+
+/*
+ * Resource Counters
+ * Contain common data types and routines for resource accounting
+ *
+ * Copyright 2007 OpenVZ SWsoft Inc
+ *
+ * Author: Pavel Emelianov <xemul@openvz.org>
+ *
+ */
+
+#include <linux/cgroup.h>
+
+
+/*
+ * The core object. the cgroup that wishes to account for some
+ * resource may include this counter into its structures and use
+ * the helpers described beyond
+ */
+
```

```

+struct res_counter {
+ /*
+  * the current resource consumption level
+  */
+ unsigned long usage;
+ /*
+  * the limit that usage cannot exceed
+  */
+ unsigned long limit;
+ /*
+  * the number of unsuccessful attempts to consume the resource
+  */
+ unsigned long failcnt;
+ /*
+  * the lock to protect all of the above.
+  * the routines below consider this to be IRQ-safe
+  */
+ spinlock_t lock;
+};
+
+/*
+ * Helpers to interact with userspace
+ * res_counter_read/_write - put/get the specified fields from the
+ * res_counter struct to/from the user
+ *
+ * @counter:   the counter in question
+ * @member:   the field to work with (see RES_xxx below)
+ * @buf:      the buffer to operate on,...
+ * @nbytes:   its size...
+ * @pos:      and the offset.
+ */
+
+ssize_t res_counter_read(struct res_counter *counter, int member,
+ const char __user *buf, size_t nbytes, loff_t *pos);
+ssize_t res_counter_write(struct res_counter *counter, int member,
+ const char __user *buf, size_t nbytes, loff_t *pos);
+
+/*
+ * the field descriptors. one for each member of res_counter
+ */
+
+enum {
+ RES_USAGE,
+ RES_LIMIT,
+ RES_FAILCNT,
+};
+
+/*

```

```

+ * helpers for accounting
+ */
+
+void res_counter_init(struct res_counter *counter);
+
+/*
+ * charge - try to consume more resource.
+ *
+ * @counter: the counter
+ * @val: the amount of the resource. each controller defines its own
+ *       units, e.g. numbers, bytes, Kbytes, etc
+ *
+ * returns 0 on success and <0 if the counter->usage will exceed the
+ * counter->limit _locked call expects the counter->lock to be taken
+ */
+
+int res_counter_charge_locked(struct res_counter *counter, unsigned long val);
+int res_counter_charge(struct res_counter *counter, unsigned long val);
+
+/*
+ * uncharge - tell that some portion of the resource is released
+ *
+ * @counter: the counter
+ * @val: the amount of the resource
+ *
+ * these calls check for usage underflow and show a warning on the console
+ * _locked call expects the counter->lock to be taken
+ */
+
+void res_counter_uncharge_locked(struct res_counter *counter, unsigned long val);
+void res_counter_uncharge(struct res_counter *counter, unsigned long val);
+
+#endif
diff -puN init/Kconfig~memory-controller-resource-counters-v7 init/Kconfig
--- a/init/Kconfig~memory-controller-resource-counters-v7
+++ a/init/Kconfig
@@ -319,6 +319,13 @@ @@ config CPUSETS

```

Say N if unsure.

```

+config RESOURCE_COUNTERS
+ bool "Resource counters"
+ help
+   This option enables controller independent resource accounting
+   infrastructure that works with cgroups
+ depends on CGROUPS
+
+config SYSFS_DEPRECATED

```

```

bool "Create deprecated sysfs files"
default y
diff -puN kernel/Makefile~memory-controller-resource-counters-v7 kernel/Makefile
--- a/kernel/Makefile~memory-controller-resource-counters-v7
+++ a/kernel/Makefile
@@ -59,6 +59,7 @@ obj-$(CONFIG_RELAY) += relay.o
obj-$(CONFIG_SYSCTL) += utsname_sysctl.o
obj-$(CONFIG_TASK_DELAY_ACCT) += delayacct.o
obj-$(CONFIG_TASKSTATS) += taskstats.o tsacct.o
+obj-$(CONFIG_RESOURCE_COUNTERS) += res_counter.o

ifneq ($(CONFIG_SCHED_NO_NO_OMIT_FRAME_POINTER),y)
# According to Alan Modra <alan@linuxcare.com.au>, the -fno-omit-frame-pointer is
diff -puN /dev/null kernel/res_counter.c
--- /dev/null
+++ a/kernel/res_counter.c
@@ -0,0 +1,120 @@
+/*
+ * resource cgroups
+ *
+ * Copyright 2007 OpenVZ SWsoft Inc
+ *
+ * Author: Pavel Emelianov <xemul@openvz.org>
+ */
+
+#include <linux/types.h>
+#include <linux/parser.h>
+#include <linux/fs.h>
+#include <linux/res_counter.h>
+#include <linux/uaccess.h>
+
+void res_counter_init(struct res_counter *counter)
+{
+ spin_lock_init(&counter->lock);
+ counter->limit = (unsigned long)LONG_MAX;
+}
+
+int res_counter_charge_locked(struct res_counter *counter, unsigned long val)
+{
+ if (counter->usage > (counter->limit - val)) {
+ counter->failcnt++;
+ return -ENOMEM;
+ }
+
+ counter->usage += val;
+ return 0;
+}

```

```

+
+int res_counter_charge(struct res_counter *counter, unsigned long val)
+{
+ int ret;
+ unsigned long flags;
+
+ spin_lock_irqsave(&counter->lock, flags);
+ ret = res_counter_charge_locked(counter, val);
+ spin_unlock_irqrestore(&counter->lock, flags);
+ return ret;
+}
+
+void res_counter_uncharge_locked(struct res_counter *counter, unsigned long val)
+{
+ if (WARN_ON(counter->usage < val))
+ val = counter->usage;
+
+ counter->usage -= val;
+}
+
+void res_counter_uncharge(struct res_counter *counter, unsigned long val)
+{
+ unsigned long flags;
+
+ spin_lock_irqsave(&counter->lock, flags);
+ res_counter_uncharge_locked(counter, val);
+ spin_unlock_irqrestore(&counter->lock, flags);
+}
+
+
+static inline unsigned long *res_counter_member(struct res_counter *counter,
+ int member)
+{
+ switch (member) {
+ case RES_USAGE:
+ return &counter->usage;
+ case RES_LIMIT:
+ return &counter->limit;
+ case RES_FAILCNT:
+ return &counter->failcnt;
+ };
+
+ BUG();
+ return NULL;
+}
+
+ssize_t res_counter_read(struct res_counter *counter, int member,
+ const char __user *userbuf, size_t nbytes, loff_t *pos)

```

```
+{  
+ unsigned long *val;  
+ char buf[64], *s;  
+  
+ s = buf;  
+ val = res_counter_member(counter, member);  
+ s += sprintf(s, "%lu\n", *val);  
+ return simple_read_from_buffer((void __user *)userbuf, nbytes,  
+ pos, buf, s - buf);  
+}  
+  
+ssize_t res_counter_write(struct res_counter *counter, int member,  
+ const char __user *userbuf, size_t nbytes, loff_t *pos)  
+{  
+ int ret;  
+ char *buf, *end;  
+ unsigned long tmp, *val;  
+  
+ buf = kmalloc(nbytes + 1, GFP_KERNEL);  
+ ret = -ENOMEM;  
+ if (buf == NULL)  
+ goto out;  
+  
+ buf[nbytes] = '\0';  
+ ret = -EFAULT;  
+ if (copy_from_user(buf, userbuf, nbytes))  
+ goto out_free;  
+  
+ ret = -EINVAL;  
+ tmp = simple_strtoul(buf, &end, 10);  
+ if (*end != '\0')  
+ goto out_free;  
+  
+ val = res_counter_member(counter, member);  
+ *val = tmp;  
+ ret = nbytes;  
+out_free:  
+ kfree(buf);  
+out:  
+ return ret;  
+}
```