
Subject: [RFC PATCH 1/5] adds the procs facilities
Posted by [Nadia Derby](#) on Thu, 03 Jul 2008 14:40:14 GMT
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[PATCH 01/05]

This patch adds the procs facility needed to feed some data for the next syscall to be called.

The effect of issuing
echo "LONG<Y> <XX>" > /proc/self/task/<tid>/next_syscall_data
is that <XX> will be stored in a new field of the task structure (next_syscall_data). This field, in turn will be taken as the data to feed next syscall that supports the feature.

<Y> is the number of values provided on the line.
For the sake of simplicity it is now fixed to 1, but this can be extended as needed, in the future.

This is particularly useful when restarting an application, as we need sometimes the syscalls to have a non-default behavior.

Signed-off-by: Nadia Derby <Nadia.Derbey@bull.net>

```
---
fs/exec.c          | 6 +
fs/proc/base.c     | 75 ++++++
include/linux/next_syscall_data.h | 35 ++++++
include/linux/sched.h | 6 +
kernel/Makefile    | 3
kernel/exit.c      | 4 +
kernel/fork.c      | 2
kernel/next_syscall_data.c | 151 ++++++
8 files changed, 281 insertions(+), 1 deletion(-)
```

Index: linux-2.6.26-rc5-mm3/include/linux/sched.h

```
=====
--- linux-2.6.26-rc5-mm3.orig/include/linux/sched.h 2008-06-25 17:10:38.000000000 +0200
+++ linux-2.6.26-rc5-mm3/include/linux/sched.h 2008-06-27 14:18:56.000000000 +0200
@@ -87,6 +87,7 @@ struct sched_param {
 #include <linux/task_io_accounting.h>
 #include <linux/kobject.h>
 #include <linux/latencytop.h>
+#include <linux/next_syscall_data.h>

#include <asm/processor.h>

@@ -1312,6 +1313,11 @@ struct task_struct {
```

```

int latency_record_count;
struct latency_record latency_record[LT_SAVECOUNT];
#endif
+ /*
+ * If non-NULL indicates that next operation will be forced, e.g.
+ * that next object to be created will have a predefined id.
+ */
+ struct next_syscall_data *nsd;
};

/*
Index: linux-2.6.26-rc5-mm3/include/linux/next_syscall_data.h
=====
--- /dev/null 1970-01-01 00:00:00.000000000 +0000
+++ linux-2.6.26-rc5-mm3/include/linux/next_syscall_data.h 2008-07-01 10:25:48.000000000
+0200
@@ -0,0 +1,35 @@
+/*
+ * include/linux/next_syscall_data.h
+ *
+ * Definitions to support fixed data for next syscall to be called. The
+ * following is supported today:
+ * . object creation with a predefined id.
+ *
+ */
+
+#ifndef _LINUX_NEXT_SYSCALL_DATA_H
+#define _LINUX_NEXT_SYSCALL_DATA_H
+
+#define NDATA 1
+
+/*
+ * If this structure is pointed to by a task_struct, next syscall to be called
+ * by the task will have a non-default behavior.
+ * For example, it can be used to pre-set the id of the object to be created
+ * by next syscall.
+ */
+struct next_syscall_data {
+ int ndata;
+ long data[NDATA];
+};
+
+extern ssize_t get_next_syscall_data(struct task_struct *, char *, size_t);
+extern int set_next_syscall_data(struct task_struct *, char *);
+extern int reset_next_syscall_data(struct task_struct *);
+
+static inline void exit_next_syscall_data(struct task_struct *tsk)
+{

```

```

+ reset_next_syscall_data(task);
+}
+
+#endif /* _LINUX_NEXT_SYSCALL_DATA_H */
Index: linux-2.6.26-rc5-mm3/fs/proc/base.c
=====
--- linux-2.6.26-rc5-mm3.orig/fs/proc/base.c 2008-06-25 17:11:04.000000000 +0200
+++ linux-2.6.26-rc5-mm3/fs/proc/base.c 2008-07-01 09:09:30.000000000 +0200
@@ -1158,6 +1158,76 @@ static const struct file_operations proc
};
#endif

+static ssize_t next_syscall_data_read(struct file *file, char __user *buf,
+ size_t count, loff_t *ppos)
+{
+ struct task_struct *task;
+ char *page;
+ ssize_t length;
+
+ task = get_proc_task(file->f_path.dentry->d_inode);
+ if (!task)
+ return -ESRCH;
+
+ if (count >= PAGE_SIZE)
+ count = PAGE_SIZE - 1;
+
+ length = -ENOMEM;
+ page = (char *) __get_free_page(GFP_TEMPORARY);
+ if (!page)
+ goto out;
+
+ length = get_next_syscall_data(task, (char *) page, count);
+ if (length >= 0)
+ length = simple_read_from_buffer(buf, count, ppos,
+ (char *)page, length);
+ free_page((unsigned long) page);
+
+out:
+ put_task_struct(task);
+ return length;
+}
+
+static ssize_t next_syscall_data_write(struct file *file,
+ const char __user *buf,
+ size_t count, loff_t *ppos)
+{
+ struct inode *inode = file->f_path.dentry->d_inode;
+ char *page;

```

```

+ ssize_t length;
+
+ if (pid_task(proc_pid(inode), PIDTYPE_PID) != current)
+ return -EPERM;
+
+ if (count >= PAGE_SIZE)
+ count = PAGE_SIZE - 1;
+
+ if (*ppos != 0) {
+ /* No partial writes. */
+ return -EINVAL;
+ }
+ page = (char *)__get_free_page(GFP_TEMPORARY);
+ if (!page)
+ return -ENOMEM;
+ length = -EFAULT;
+ if (copy_from_user(page, buf, count))
+ goto out_free_page;
+
+ page[count] = '\0';
+
+ length = set_next_syscall_data(current, page);
+ if (!length)
+ length = count;
+
+out_free_page:
+ free_page((unsigned long) page);
+ return length;
+}
+
+static const struct file_operations proc_next_syscall_data_operations = {
+ .read = next_syscall_data_read,
+ .write = next_syscall_data_write,
+};

#ifdef CONFIG_SCHED_DEBUG
/*
@@ -2853,6 +2923,11 @@ static const struct pid_entry tid_base_s
#ifdef CONFIG_TASK_IO_ACCOUNTING
INF("io", S_IRUGO, tid_io_accounting),
#endif
+ /*
+ * NOTE that this file is not added into tgid_base_stuff[] since it
+ * has to be specified on a per-thread basis.
+ */
+ REG("next_syscall_data", S_IRUGO|S_IWUSR, next_syscall_data),
};

```

```
static int proc_tid_base_readdir(struct file * filp,
```

```
Index: linux-2.6.26-rc5-mm3/kernel/Makefile
```

```
-----  
--- linux-2.6.26-rc5-mm3.orig/kernel/Makefile 2008-06-25 17:10:41.000000000 +0200
```

```
+++ linux-2.6.26-rc5-mm3/kernel/Makefile 2008-06-27 09:03:01.000000000 +0200
```

```
@@ -9,7 +9,8 @@ obj-y = sched.o fork.o exec_domain.o  
rcupdate.o extable.o params.o posix-timers.o \  
kthread.o wait.o kfifo.o sys_ni.o posix-cpu-timers.o mutex.o \  
hrtimer.o rwsem.o nsproxy.o srcu.o semaphore.o \  
- notifier.o ksysfs.o pm_qos_params.o sched_clock.o  
+ notifier.o ksysfs.o pm_qos_params.o sched_clock.o \  
+ next_syscall_data.o
```

```
CFLAGS_REMOVE_sched.o = -pg -mno-spe
```

```
Index: linux-2.6.26-rc5-mm3/kernel/next_syscall_data.c
```

```
-----  
--- /dev/null 1970-01-01 00:00:00.000000000 +0000
```

```
+++ linux-2.6.26-rc5-mm3/kernel/next_syscall_data.c 2008-07-01 10:39:43.000000000 +0200
```

```
@@ -0,0 +1,151 @@
```

```
+/*
```

```
+ * linux/kernel/next_syscall_data.c
```

```
+ *
```

```
+ *
```

```
+ * Provide the get_next_syscall_data() / set_next_syscall_data() routines
```

```
+ * (called from fs/proc/base.c).
```

```
+ * They allow to specify some particular data for the next syscall to be
```

```
+ * called.
```

```
+ * E.g. they can be used to specify the id for the next resource to be
```

```
+ * allocated, instead of letting the allocator set it for us.
```

```
+ */
```

```
+
```

```
+#include <linux/sched.h>
```

```
+#include <linux/ctype.h>
```

```
+
```

```
+
```

```
+
```

```
+ssize_t get_next_syscall_data(struct task_struct *task, char *buffer,
```

```
+ size_t size)
```

```
{
```

```
+ struct next_syscall_data *nsd;
```

```
+ char *bufptr = buffer;
```

```
+ ssize_t rc, count = 0;
```

```
+ int i;
```

```
+
```

```
+ nsd = task->nsd;
```

```
+ if (!nsd || !nsd->ndata)
```

```
+ return snprintf(buffer, size, "UNSET\n");
```

```

+
+ count = snprintf(bufptr, size, "LONG%d ", nsd->ndata);
+
+ for (i = 0; i < nsd->ndata - 1; i++) {
+ rc = snprintf(&bufptr[count], size - count, "%ld ",
+ nsd->data[i]);
+ if (rc >= size - count)
+ return -ENOMEM;
+ count += rc;
+ }
+
+ rc = snprintf(&bufptr[count], size - count, "%ld\n", nsd->data[i]);
+ if (rc >= size - count)
+ return -ENOMEM;
+ count += rc;
+
+ return count;
+}
+
+static int fill_next_syscall_data(struct task_struct *task, int ndata,
+ char *buffer)
+{
+ char *token, *buff = buffer;
+ char *end;
+ struct next_syscall_data *nsd = task->nsd;
+ int i;
+
+ if (!nsd) {
+ nsd = kmalloc(sizeof(*nsd), GFP_KERNEL);
+ if (!nsd)
+ return -ENOMEM;
+ task->nsd = nsd;
+ }
+
+ nsd->ndata = ndata;
+
+ i = 0;
+ while ((token = strsep(&buff, " ")) != NULL && i < ndata) {
+ long data;
+
+ if (!*token)
+ goto out_free;
+ data = simple_strtol(token, &end, 0);
+ if (end == token || (*end && !isspace(*end)))
+ goto out_free;
+ nsd->data[i] = data;
+ i++;
+ }

```

```

+
+ if (i != ndata)
+ goto out_free;
+
+ return 0;
+
+out_free:
+ kfree(nsd);
+ return -EINVAL;
+}
+
+/*
+ * Parses a line with the following format:
+ * <x> <id0> ... <idx-1>
+ * Currently, only x=1 is accepted.
+ * Any trailing character on the line is skipped.
+ */
+static int do_set_next_syscall_data(struct task_struct *task, char *nb,
+ char *buffer)
+{
+ int ndata;
+ char *end;
+
+ ndata = simple_strtol(nb, &end, 0);
+ if (*end)
+ return -EINVAL;
+
+ if (ndata > NDATA)
+ return -EINVAL;
+
+ return fill_next_syscall_data(task, ndata, buffer);
+}
+
+int reset_next_syscall_data(struct task_struct *task)
+{
+ struct next_syscall_data *nsd;
+
+ nsd = task->nsd;
+ if (!nsd)
+ return 0;
+
+ task->nsd = NULL;
+ kfree(nsd);
+ return 0;
+}
+
+#define LONG_STR "LONG"
+#define RESET_STR "RESET"

```

```

+
+/*
+ * Parses a line written to /proc/self/task/<my_tid>/next_syscall_data.
+ * this line has the following format:
+ * LONG<x> id      --> a sequence of id(s) is specified
+ *                currently, only x=1 is accepted
+ */
+int set_next_syscall_data(struct task_struct *task, char *buffer)
+{
+ char *token, *out = buffer;
+ size_t sz;
+
+ if (!out)
+ return -EINVAL;
+
+ token = strsep(&out, " ");
+
+ sz = strlen(LONG_STR);
+
+ if (!strncmp(token, LONG_STR, sz))
+ return do_set_next_syscall_data(task, token + sz, out);
+
+ if (!strncmp(token, RESET_STR, strlen(RESET_STR)))
+ return reset_next_syscall_data(task);
+
+ return -EINVAL;
+}

```

Index: linux-2.6.26-rc5-mm3/kernel/fork.c

```

=====
--- linux-2.6.26-rc5-mm3.orig/kernel/fork.c 2008-06-25 17:10:41.000000000 +0200
+++ linux-2.6.26-rc5-mm3/kernel/fork.c 2008-07-01 10:25:46.000000000 +0200
@@ -1077,6 +1077,8 @@ static struct task_struct *copy_process(
    p->blocked_on = NULL; /* not blocked yet */
#endif

+ p->nsd = NULL; /* no next syscall data is the default */
+
+ /* Perform scheduler related setup. Assign this task to a CPU. */
+ sched_fork(p, clone_flags);

```

Index: linux-2.6.26-rc5-mm3/fs/exec.c

```

=====
--- linux-2.6.26-rc5-mm3.orig/fs/exec.c 2008-06-25 17:11:05.000000000 +0200
+++ linux-2.6.26-rc5-mm3/fs/exec.c 2008-06-27 14:53:08.000000000 +0200
@@ -1014,6 +1014,12 @@ int flush_old_exec(struct linux_binprm *
    flush_signal_handlers(current, 0);
    flush_old_files(current->files);

```



```
+ /*
+ * the next syscall data is not inherited across execve()
+ */
+ if (unlikely(current->nsd))
+ reset_next_syscall_data(current);
+
+ return 0;
```

out:

Index: linux-2.6.26-rc5-mm3/kernel/exit.c

```
=====
--- linux-2.6.26-rc5-mm3.orig/kernel/exit.c 2008-06-25 17:10:41.000000000 +0200
+++ linux-2.6.26-rc5-mm3/kernel/exit.c 2008-06-27 14:57:55.000000000 +0200
@@ -1069,6 +1069,10 @@ NORET_TYPE void do_exit(long code)
```

```
    proc_exit_connector(tsk);
    exit_notify(tsk, group_dead);
+
+ if (unlikely(tsk->nsd))
+ exit_next_syscall_data(tsk);
+
#ifdef CONFIG_NUMA
    mpol_put(tsk->mempolicy);
    tsk->mempolicy = NULL;
```

--

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