
Subject: [PATCH 2/7] Basic kernel memory functionality for the Memory Controller
Posted by [Glauber Costa](#) on Tue, 21 Feb 2012 11:34:34 GMT
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This patch lays down the foundation for the kernel memory component of the Memory Controller.

As of today, I am only laying down the following files:

- * memory.independent_kmem_limit
- * memory.kmem.limit_in_bytes
- * memory.kmem.soft_limit_in_bytes
- * memory.kmem.usage_in_bytes

I am omitting the Documentation files in this version, at least in the first cycle. But they should not differ much from what I posted previously. The patch itself is not much different than the previous versions I posted.

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mm/memcontrol.c | 98 ++++++-----
1 files changed, 97 insertions(+), 1 deletions(-)

```
diff --git a/mm/memcontrol.c b/mm/memcontrol.c
index b15a693..26fda11 100644
--- a/mm/memcontrol.c
+++ b/mm/memcontrol.c
@@ -235,6 +235,10 @@ struct mem_cgroup {
    */
    struct res_counter memsw;
    /*
+ * the counter to account for kmem usage.
+ */
+ struct res_counter kmem;
+ /*
 * Per cgroup active and inactive list, similar to the
 * per zone LRU lists.
 */
@@ -280,6 +284,11 @@ struct mem_cgroup {
    */
```

```

    unsigned long move_charge_at_immigrate;
    /*
+ * Should kernel memory limits be stabilished independently
+ * from user memory ?
+ */
+ int kmem_independent_accounting;
+ /*
+ * percpu counter.
+ */
    struct mem_cgroup_stat_cpu *stat;
@@ -356,6 +365,7 @@ enum mem_type {
    _MEM = 0,
    _MEMSWAP,
    _OOM_TYPE,
+ _KMEM,
};

#define MEMFILE_PRIVATE(x, val) (((x) << 16) | (val))
@@ -3844,6 +3854,11 @@ static u64 mem_cgroup_read(struct cgroup *cont, struct cftype *cft)
    else
        val = res_counter_read_u64(&memcg->memsw, name);
    break;
+ #ifdef CONFIG_CGROUP_MEM_RES_CTLR_KMEM
+ case _KMEM:
+     val = res_counter_read_u64(&memcg->kmem, name);
+     break;
+ #endif
    default:
        BUG();
        break;
@@ -3876,7 +3891,13 @@ static int mem_cgroup_write(struct cgroup *cont, struct cftype *cft,
    break;
    if (type == _MEM)
        ret = mem_cgroup_resize_limit(memcg, val);
- else
+ else if (type == _KMEM) {
+     if (!memcg->kmem_independent_accounting) {
+         ret = -EINVAL;
+         break;
+     }
+     ret = res_counter_set_limit(&memcg->kmem, val);
+ } else
    ret = mem_cgroup_resize_memsw_limit(memcg, val);
    break;
    case RES_SOFT_LIMIT:
@@ -3890,6 +3911,16 @@ static int mem_cgroup_write(struct cgroup *cont, struct cftype *cft,
    /*
    if (type == _MEM)

```

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    ret = res_counter_set_soft_limit(&memcg->res, val);
#ifdef CONFIG_CGROUP_MEM_RES_CTLR_KMEM
+ else if (type == _KMEM) {
+   if (!memcg->kmem_independent_accounting) {
+     ret = -EINVAL;
+     break;
+   }
+   ret = res_counter_set_soft_limit(&memcg->kmem, val);
+   break;
+ }
#endif
    else
        ret = -EINVAL;
    break;
@@ -4573,8 +4604,69 @@ static int mem_control_numa_stat_open(struct inode *unused, struct
file *file)
#endif /* CONFIG_NUMA */

#ifdef CONFIG_CGROUP_MEM_RES_CTLR_KMEM
+static u64 kmem_limit_independent_read(struct cgroup *cgroup, struct cftype *cft)
+{
+   return mem_cgroup_from_cont(cgroup)->kmem_independent_accounting;
+}
+
+static int kmem_limit_independent_write(struct cgroup *cgroup, struct cftype *cft,
+   u64 val)
+{
+   struct mem_cgroup *memcg = mem_cgroup_from_cont(cgroup);
+   struct mem_cgroup *parent = parent_mem_cgroup(memcg);
+
+   + val = !!val;
+   /*
+    * This follows the same hierarchy restrictions than
+    * mem_cgroup_hierarchy_write().
+    *
+    * TODO: We also shouldn't allow cgroups
+    * with tasks in it to change this value. Otherwise it is impossible
+    * to track the kernel memory that is already in memcg->res.
+    */
+   if (!parent || !parent->use_hierarchy || mem_cgroup_is_root(parent)) {
+     if (list_empty(&cgroup->children))
+       memcg->kmem_independent_accounting = val;
+     else
+       return -EBUSY;
+   } else
+     return -EINVAL;
+
+   return 0;

```

```

+}
+static struct cftype kmem_cgroup_files[] = {
+ {
+ .name = "independent_kmem_limit",
+ .read_u64 = kmem_limit_independent_read,
+ .write_u64 = kmem_limit_independent_write,
+ },
+ {
+ .name = "kmem.usage_in_bytes",
+ .private = MEMFILE_PRIVATE(_KMEM, RES_USAGE),
+ .read_u64 = mem_cgroup_read,
+ },
+ {
+ .name = "kmem.limit_in_bytes",
+ .private = MEMFILE_PRIVATE(_KMEM, RES_LIMIT),
+ .read_u64 = mem_cgroup_read,
+ .write_string = mem_cgroup_write,
+ },
+ {
+ .name = "kmem.soft_limit_in_bytes",
+ .private = MEMFILE_PRIVATE(_KMEM, RES_SOFT_LIMIT),
+ .write_string = mem_cgroup_write,
+ .read_u64 = mem_cgroup_read,
+ },
+};
+
+
+static int register_kmem_files(struct cgroup *cont, struct cgroup_subsys *ss)
+{
+ int ret;
+ ret = cgroup_add_files(cont, ss, kmem_cgroup_files,
+     ARRAY_SIZE(kmem_cgroup_files));
+ if (ret)
+     return ret;
+ /*
+  * Part of this would be better living in a separate allocation
+  * function, leaving us with just the cgroup tree population work.
+  @@ -4926,6 +5018,9 @@ mem_cgroup_create(struct cgroup_subsys *ss, struct cgroup *cont)
+  if (parent && parent->use_hierarchy) {
+     res_counter_init(&memcg->res, &parent->res);
+     res_counter_init(&memcg->memsw, &parent->memsw);
+  + res_counter_init(&memcg->kmem, &parent->kmem);
+  + memcg->kmem_independent_accounting =
+  +     parent->kmem_independent_accounting;
+  /*
+   * We increment refcnt of the parent to ensure that we can
+   * safely access it on res_counter_charge/uncharge.
+  @@ -4936,6 +5031,7 @@ mem_cgroup_create(struct cgroup_subsys *ss, struct cgroup *cont)

```

```
} else {  
    res_counter_init(&memcg->res, NULL);  
    res_counter_init(&memcg->memsw, NULL);  
+ res_counter_init(&memcg->kmem, NULL);  
}  
memcg->last_scanned_node = MAX_NUMNODES;  
INIT_LIST_HEAD(&memcg->oom_notify);  
--
```

1.7.7.6
