
Subject: [PATCH v9 6/9] tcp buffer limitation: per-cgroup limit
Posted by [Glauber Costa](#) on Mon, 12 Dec 2011 07:47:06 GMT
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This patch uses the "tcp.limit_in_bytes" field of the kmem_cgroup to effectively control the amount of kernel memory pinned by a cgroup.

This value is ignored in the root cgroup, and in all others, caps the value specified by the admin in the net namespaces' view of tcp_sysctl_mem.

If namespaces are being used, the admin is allowed to set a value bigger than cgroup's maximum, the same way it is allowed to set pretty much unlimited values in a real box.

Signed-off-by: Glauber Costa <glommer@parallels.com>
Reviewed-by: Hiroyouki Kamezawa <kamezawa.hiroyu@jp.fujitsu.com>
CC: David S. Miller <davem@davemloft.net>
CC: Eric W. Biederman <ebiederm@xmission.com>

```
Documentation/cgroups/memory.txt | 1 +
include/net/tcp_memcontrol.h | 2 +
net/ipv4/sysctl_net_ipv4.c | 14 +++++
net/ipv4/tcp_memcontrol.c | 137 ++++++-----
4 files changed, 152 insertions(+), 2 deletions(-)
```

```
diff --git a/Documentation/cgroups/memory.txt b/Documentation/cgroups/memory.txt
index 687dea5..1c9779a 100644
```

```
--- a/Documentation/cgroups/memory.txt
+++ b/Documentation/cgroups/memory.txt
@@ -78,6 +78,7 @@ Brief summary of control files.
```

```
memory.independent_kmem_limit # select whether or not kernel memory limits are
independent of user limits
+ memory.kmem.tcp.limit_in_bytes # set/show hard limit for tcp buf memory
```

1. History

```
diff --git a/include/net/tcp_memcontrol.h b/include/net/tcp_memcontrol.h
index 5f5e158..3512082 100644
```

```
--- a/include/net/tcp_memcontrol.h
+++ b/include/net/tcp_memcontrol.h
@@ -14,4 +14,6 @@ struct tcp_memcontrol {
struct cg_proto *tcp_proto_cgroup(struct mem_cgroup *memcg);
int tcp_init_cgroup(struct cgroup *cgrp, struct cgroup_subsys *ss);
void tcp_destroy_cgroup(struct cgroup *cgrp, struct cgroup_subsys *ss);
+unsigned long long tcp_max_memory(const struct mem_cgroup *memcg);
+void tcp_prot_mem(struct mem_cgroup *memcg, long val, int idx);
```

```

#endif /* _TCP_MEMCG_H */
diff --git a/net/ipv4/sysctl_net_ipv4.c b/net/ipv4/sysctl_net_ipv4.c
index bbd67ab..fe9bf91 100644
--- a/net/ipv4/sysctl_net_ipv4.c
+++ b/net/ipv4/sysctl_net_ipv4.c
@@ -24,6 +24,7 @@
#include <net/cipso_ipv4.h>
#include <net/inet_frag.h>
#include <net/ping.h>
+#include <net/tcp_memcontrol.h>

static int zero;
static int tcp_retr1_max = 255;
@@ -182,6 +183,9 @@ static int ipv4_tcp_mem(ctl_table *ctl, int write,
int ret;
unsigned long vec[3];
struct net *net = current->nsproxy->net_ns;
+#ifdef CONFIG_CGROUP_MEM_RES_CTLR_KMEM
+ struct mem_cgroup *memcg;
+#endif

ctl_table tmp = {
.data = &vec,
@@ -198,6 +202,16 @@ static int ipv4_tcp_mem(ctl_table *ctl, int write,
if (ret)
return ret;

+#ifdef CONFIG_CGROUP_MEM_RES_CTLR_KMEM
+ rcu_read_lock();
+ memcg = mem_cgroup_from_task(current);
+
+ tcp_prot_mem(memcg, vec[0], 0);
+ tcp_prot_mem(memcg, vec[1], 1);
+ tcp_prot_mem(memcg, vec[2], 2);
+ rcu_read_unlock();
+#endif
+
net->ipv4.sysctl_tcp_mem[0] = vec[0];
net->ipv4.sysctl_tcp_mem[1] = vec[1];
net->ipv4.sysctl_tcp_mem[2] = vec[2];
diff --git a/net/ipv4/tcp_memcontrol.c b/net/ipv4/tcp_memcontrol.c
index bfb0c2b..e353390 100644
--- a/net/ipv4/tcp_memcontrol.c
+++ b/net/ipv4/tcp_memcontrol.c
@@ -6,6 +6,19 @@
#include <linux/memcontrol.h>
#include <linux/module.h>

```

```

+static u64 tcp_cgroup_read(struct cgroup *cont, struct cftype *cft);
+static int tcp_cgroup_write(struct cgroup *cont, struct cftype *cft,
+    const char *buffer);
+
+static struct cftype tcp_files[] = {
+ {
+ .name = "kmem.tcp.limit_in_bytes",
+ .write_string = tcp_cgroup_write,
+ .read_u64 = tcp_cgroup_read,
+ .private = RES_LIMIT,
+ },
+};
+
static inline struct tcp_memcontrol *tcp_from_cgproto(struct cg_proto *cg_proto)
{
return container_of(cg_proto, struct tcp_memcontrol, cg_proto);
@@ -34,7 +47,7 @@ int tcp_init_cgroup(struct cgroup *cgrp, struct cgroup_subsys *ss)

cg_proto = tcp_prot.proto_cgroup(memcg);
if (!cg_proto)
- return 0;
+ goto create_files;

tcp = tcp_from_cgproto(cg_proto);

@@ -57,7 +70,9 @@ int tcp_init_cgroup(struct cgroup *cgrp, struct cgroup_subsys *ss)
cg_proto->sockets_allocated = &tcp->tcp_sockets_allocated;
cg_proto->memcg = memcg;

- return 0;
+create_files:
+ return cgroup_add_files(cgrp, ss, tcp_files,
+    ARRAY_SIZE(tcp_files));
}
EXPORT_SYMBOL(tcp_init_cgroup);

@@ -66,6 +81,7 @@ void tcp_destroy_cgroup(struct cgroup *cgrp, struct cgroup_subsys *ss)
struct mem_cgroup *memcg = mem_cgroup_from_cont(cgrp);
struct cg_proto *cg_proto;
struct tcp_memcontrol *tcp;
+ u64 val;

cg_proto = tcp_prot.proto_cgroup(memcg);
if (!cg_proto)
@@ -73,5 +89,122 @@ void tcp_destroy_cgroup(struct cgroup *cgrp, struct cgroup_subsys *ss)

tcp = tcp_from_cgproto(cg_proto);
percpu_counter_destroy(&tcp->tcp_sockets_allocated);

```

```

+
+ val = res_counter_read_u64(&tcp->tcp_memory_allocated, RES_USAGE);
+
+ if (val != RESOURCE_MAX)
+ jump_label_dec(&memcg_socket_limit_enabled);
+ }
EXPORT_SYMBOL(tcp_destroy_cgroup);
+
+static int tcp_update_limit(struct mem_cgroup *memcg, u64 val)
+{
+ struct net *net = current->nsproxy->net_ns;
+ struct tcp_memcontrol *tcp;
+ struct cg_proto *cg_proto;
+ u64 old_lim;
+ int i;
+ int ret;
+
+
+ cg_proto = tcp_prot.proto_cgroup(memcg);
+ if (!cg_proto)
+ return -EINVAL;
+
+
+ if (val > RESOURCE_MAX)
+ val = RESOURCE_MAX;
+
+
+ tcp = tcp_from_cgproto(cg_proto);
+
+
+ old_lim = res_counter_read_u64(&tcp->tcp_memory_allocated, RES_LIMIT);
+ ret = res_counter_set_limit(&tcp->tcp_memory_allocated, val);
+ if (ret)
+ return ret;
+
+
+ for (i = 0; i < 3; i++)
+ tcp->tcp_prot_mem[i] = min_t(long, val >> PAGE_SHIFT,
+ net->ipv4.sysctl_tcp_mem[i]);
+
+
+ if (val == RESOURCE_MAX && old_lim != RESOURCE_MAX)
+ jump_label_dec(&memcg_socket_limit_enabled);
+ else if (old_lim == RESOURCE_MAX && val != RESOURCE_MAX)
+ jump_label_inc(&memcg_socket_limit_enabled);
+
+
+ return 0;
+}
+
+static int tcp_cgroup_write(struct cgroup *cont, struct cftype *cft,
+ const char *buffer)
+{
+ struct mem_cgroup *memcg = mem_cgroup_from_cont(cont);
+ unsigned long long val;

```

```

+ int ret = 0;
+
+ switch (cft->private) {
+ case RES_LIMIT:
+ /* see memcontrol.c */
+ ret = res_counter_memparse_write_strategy(buffer, &val);
+ if (ret)
+ break;
+ ret = tcp_update_limit(memcg, val);
+ break;
+ default:
+ ret = -EINVAL;
+ break;
+ }
+ return ret;
+}
+
+static u64 tcp_read_stat(struct mem_cgroup *memcg, int type, u64 default_val)
+{
+ struct tcp_memcontrol *tcp;
+ struct cg_proto *cg_proto;
+
+ cg_proto = tcp_prot.proto_cgroup(memcg);
+ if (!cg_proto)
+ return default_val;
+
+ tcp = tcp_from_cgproto(cg_proto);
+ return res_counter_read_u64(&tcp->tcp_memory_allocated, type);
+}
+
+static u64 tcp_cgroup_read(struct cgroup *cont, struct cftype *cft)
+{
+ struct mem_cgroup *memcg = mem_cgroup_from_cont(cont);
+ u64 val;
+
+ switch (cft->private) {
+ case RES_LIMIT:
+ val = tcp_read_stat(memcg, RES_LIMIT, RESOURCE_MAX);
+ break;
+ default:
+ BUG();
+ }
+ return val;
+}
+
+unsigned long long tcp_max_memory(const struct mem_cgroup *memcg)
+{
+ struct tcp_memcontrol *tcp;

```

```
+ struct cg_proto *cg_proto;
+
+ cg_proto = tcp_prot.proto_cgroup((struct mem_cgroup *)memcg);
+ if (!cg_proto)
+ return 0;
+
+ tcp = tcp_from_cgproto(cg_proto);
+ return res_counter_read_u64(&tcp->tcp_memory_allocated, RES_LIMIT);
+}
+
+void tcp_prot_mem(struct mem_cgroup *memcg, long val, int idx)
+{
+ struct tcp_memcontrol *tcp;
+ struct cg_proto *cg_proto;
+
+ cg_proto = tcp_prot.proto_cgroup(memcg);
+ if (!cg_proto)
+ return;
+
+ tcp = tcp_from_cgproto(cg_proto);
+
+ tcp->tcp_prot_mem[idx] = val;
+}
--
1.7.6.4
```
