

---

Subject: [PATCH] cryo: Improve socket support: add UDP and IPv6 - V2

Posted by [Benjamin Thery](#) on Tue, 17 Jun 2008 11:24:14 GMT

[View Forum Message](#) <> [Reply to Message](#)

---

I played a bit with inet sockets and cryo. With few modifications I managed to "checkpoint-restart" programs that use UDP sockets to listen and send data.

This patch improves socket checkpointing in cryo:

- \* Save/restore socket family: we can checkpoint IPv6 sockets now.

- \* Save/restore socket type: we can checkpoint UDP sockets too.

Changelog:

-----

- \* V2:

- Add helper issockbound() to improve readability of getsockinfo()

- Cleaned up a bunch of unneeded casts in getsockinfo()

- Move socket binding code from restore\_sock() to bind\_sock()

- \* V1:

- Initial version

Simple test programs for UDP sockets available upon request :)

Regards,

Benjamin

Signed-off-by: Benjamin Thery <[benjamin.thery@bull.net](mailto:benjamin.thery@bull.net)>

---

cr.c | 93 ++-----

1 file changed, 73 insertions(+), 20 deletions(-)

Index: cryodev/cr.c

=====

--- cryodev.orig/cr.c

+++ cryodev/cr.c

@@ -67,11 +67,15 @@ int pagesize = 0;

```
typedef struct isockinfo_t {
    int fdnum;
-   int type; /* socket type: UDP, TCP */
+   int type; /* socket type: SOCK_STREAM, SOCK_DGRAM */
+   int family; /* socket family: AF_INET, AF_INET6 */
    int mode; /* bind, listen, connect */
    int opt; /* various sockopt */
    int backlog; /* for listen(2) */
-   struct sockaddr_in locaddr; /* for bind(2) */
+   union {
+       struct sockaddr_in saddr4;
```

```

+ struct sockaddr_in6 saddr6;
+ } locaddr; /* for bind(2) */
+ char tcpstate[TPI_LEN];
+ } isockinfo_t;

@@ -177,9 +181,25 @@ int getmaps(pid_t pid, memseg_t **p)
+ return nseg;
+ }

+static int issockbound(struct sockaddr *sa)
+{
+ if (sa->sa_family == AF_INET) {
+ struct sockaddr_in *sin = (struct sockaddr_in *) sa;
+ if (sin->sin_addr.s_addr != INADDR_ANY ||
+ sin->sin_port != 0)
+ return 1;
+ } else if (sa->sa_family == AF_INET6) {
+ struct sockaddr_in6 *sin6 = (struct sockaddr_in6 *) sa;
+ if (memcmp(&sin6->sin6_addr, &in6addr_any, 16) != 0 ||
+ sin6->sin6_port != 0)
+ return 1;
+ }
+ return 0;
+}
+
+ int getsockinfo(pid_t pid, pinfo_t *pi, int num)
+ {
+ struct sockaddr name;
+ struct sockaddr_storage name;
+ int namelen = (int)sizeof(name), ret = 0;
+ int tpi_len = TPI_LEN;
+ int flag, flaglen;
@@ -188,35 +208,46 @@ int getsockinfo(pid_t pid, pinfo_t *pi,
+ /* get socketname and see if it is an unix or an inet socket */
+ memset(&name, 0, sizeof(name));
+ PT_GETSOCKNAME(pid, num, &name, &namelen);
+ t_d(name.sa_family);
+ t_d(name.ss_family);

- if (name.sa_family != (sa_family_t)AF_INET) return ret;
+ if (name.ss_family != (sa_family_t)AF_INET &&
+ name.ss_family != (sa_family_t)AF_INET6)
+ return ret;

+ if (! (pi->si = (isockinfo_t *)realloc(pi->si, sizeof(isockinfo_t) * (pi->ns+1)))) return -1;
+ psi = &pi->si[pi->ns];
+ memset((void *)psi, 0, sizeof(*psi));
+ memset(psi, 0, sizeof(*psi));

```

```

    //pi->si[pi->ns].fdnum = num;
    psi->fdnum = num;
+ psi->family = name.ss_family;

    psi->mode = ISOCK_UNKNOWN;
- memcpy((void *)&psi->locaddr, (void *)&name, sizeof(name));
- if (psi->locaddr.sin_addr.s_addr != 0 || psi->locaddr.sin_port != 0) psi->mode |= ISOCK_BIND;
-
+ memcpy(&psi->locaddr, &name, namelen);
+
+ if (issockbound((struct sockaddr *)&psi->locaddr))
+   psi->mode |= ISOCK_BIND;
+
+ flag = 0;
+ flaglen = sizeof(flag);
+ PT_GETSOCKOPT(pid, num, SOL_SOCKET, SO_TYPE, &flag, &flaglen);
+ if (flag)
+   psi->type = flag;
+
+   flag = 0;
- flaglen = (int)sizeof(flag);
+ flaglen = sizeof(flag);
  PT_GETSOCKOPT(pid, num, SOL_SOCKET, SO_REUSEADDR, &flag, &flaglen);
  if (flag) psi->opt |= ISOCK_REUSEADDR;

  flag = 0;
- flaglen = (int)sizeof(flag);
+ flaglen = sizeof(flag);
  PT_GETSOCKOPT(pid, num, SOL_SOCKET, SO_ACCEPTCONN, &flag, &flaglen);
  if (flag) {
    psi->mode |= ISOCK_LISTEN;
    //t_d(PT_GETSOCKOPT(pid, num, SOL_TCP, TPI_INFO, &tpi_info, &tpi_info_len));
  }

- namelen = (int)sizeof(name);
+ namelen = sizeof(name);
  if (PT_GETPEERNAME(pid, num, &name, &namelen) == 0) {
    t_d(psi->mode |= ISOCK_CONNECT);
    t_d(PT_GETSOCKOPT(pid, num, SOL_TCP, TPI_TCP_STATE, pi->si[pi->ns].tcpstate,
&tpi_len));
@@ -859,6 +890,31 @@ error:
    return -1;
  }

+static void bind_sock(pid_t pid, isockinfo_t *isockinfo)
+{
+ int len;

```

```

+ struct sockaddr *sa;
+ struct sockaddr_in sin;
+ struct sockaddr_in6 sin6;
+
+ if (isockinfo->family == AF_INET) {
+ len = sizeof(sin);
+ memcpy(&sin, &isockinfo->locaddr.saddr4, len);
+ if (isockinfo->mode & ISOCK_CONNECT)
+ sin.sin6_port = htons(0);
+ sa = (struct sockaddr *) &sin;
+ } else if (isockinfo->family == AF_INET6) {
+ len = sizeof(sin6);
+ memcpy(&sin6, &isockinfo->locaddr.saddr6, len);
+ if (isockinfo->mode & ISOCK_CONNECT)
+ sin.sin_port = htons(0);
+ sa = (struct sockaddr *) &sin6;
+ } else
+ ERROR("Unsupported socket family: %d\n",
+ isockinfo->family);
+ t_d(PT_BIND(pid, isockinfo->fdnum, sa, len));
+}
+
int restore_sock(int fd, pid_t pid)
{
char item[64];
@@ -873,21 +929,18 @@ int restore_sock(int fd, pid_t pid)
else ITEM_SET(isockinfo, isockinfo_t);
else break; // unknown item

- t_d(sock = PT_SOCKET(pid, AF_INET, SOCK_STREAM, 0));
+ t_d(sock = PT_SOCKET(pid, isockinfo->family, isockinfo->type, 0));
if (sock < 0) {
ERROR("PT_SOCKET(%d, %d, %d, %d) errno=%d: %s",
- pid, AF_INET, SOCK_STREAM, 0, sock, strerror(-sock));
+ pid, isockinfo->family, isockinfo->type, 0,
+ sock, strerror(-sock));
}
t_d(PT_DUP2(pid, sock, isockinfo->fdnum));
if (sock != isockinfo->fdnum) t_d(PT_CLOSE(pid, sock));

- if (isockinfo->mode & ISOCK_BIND) {
- struct sockaddr_in sin;
+ if (isockinfo->mode & ISOCK_BIND)
+ bind_sock(pid, isockinfo);

- memcpy((void *)&sin, (void *)&isockinfo->locaddr, sizeof(sin));
- if (isockinfo->mode & ISOCK_CONNECT) sin.sin_port = htons(0);
- t_d(PT_BIND(pid, isockinfo->fdnum, &sin, sizeof(sin)));

```

```
- }  
  if (isockinfo->mode & ISOCK_LISTEN) {  
    t_d(PT_LISTEN(pid, isockinfo->fdnum, 64)); //FIXME: get backlog from TPI_INFO  
  }
```

--

---

Containers mailing list  
Containers@lists.linux-foundation.org  
<https://lists.linux-foundation.org/mailman/listinfo/containers>

---