ARC-CE IPv6 TESTBED

Barbara Krašovec, Jure Kranjc
ARNES

Why ARC-CE over IPv6?

- IPv4 exhaustion

- On Friday 14th, RIPE NCC has announced that the last /8 is being distributed from available pool

Therefore it will soon be impossible to deploy or even enlarge clusters, based on IPv4. Migration to IPv6 will be mandatory.

Testbed

- 2 ARC server nodes: one with SL5, one with SL6
- 1 worker node

  arcce-ipv6.arnes.si

  meja.arnes.si

  wn034.arnes.si

Slovenia	Arctur-1	492	0+20	11+0
	Arnes	1696	1693+0	424+3
	Arnes-IPv6-test	8	0+0	1+6
	Lutetia (CIPKeBiP)	144	0+0 (queue inactive)	0+1721
	SiGNET	2100	2086+0	525+0
	SiGNET B	8	0+0	0+0
	SiGNET C	2100	0+2097	0+521

Installation

- Server installed using IPv6-only
- IPv6-mirrors added
- Service installed from UMD2 repo on SL5 and SL6

No special settings required and no special problems found.

Configuration

- No configuration needed for IPv6
- VOMS for testing purposes [/etc/arc.conf]

```
[vo]
id="ipv6-user"
vo="ipv6-user"
source="vomss://vomsmania.cnaf.infn.it:8443/voms/net.egi.eu"
```

First problem: LRMS

- **Slurm** does not support IPv6 – most of the code that needs to be changed is in src/common/slurm_protocol_socket_implementation.c
- **Torque** built from source or installed from EPEL does not support IPv6. Daemon not working due to “network unavailable” error

Emi-torque-server and client from UMD-2 repo

- pbs_server successfully started
- local job submission works but jobs remain in queue, because..
- pbs_mom does not work

```
pbs_mom;Svr;pbs_mom;LOG_ERROR::
Network is unreachable (101) in
rpp_send_out, Error in sendto
```

Testing

- **4 setups**:
  - Dual Stack for both Client and Server
  - IPv6-only client, Dual Stack Server
  - Dual Stack Client, IPv6-only Server
  - IPv6-only on both Client and Server

ARC server

- ARC server 2.0.0 tested
- Gridftpd works on IPv6
- Grid-manager (a-rex) works “locally” - does not “depend” on network
- ARIS/ldap works on IPv6

```
slapd      5067    root    7u     IPv6
   67894598                      TCP *:gris
(LISTEN)
```

- ```
  gridftpd   5151    root    3u     IPv6
     67894854                      TCP *:gsiftp
  (LISTEN)
  ```
  ```

ARC client

Arc standalone client 12.05 used and arc client from UMD-2 repo.

- Globus-url-copy works
- Submission fails..

1st setup: Dual stack client and server

- Job submission works, ldap works
- Setup used also on Arnes' production cluster with no problems
- All communication between client and server goes over IPv4

```
arcsub -c ARC0:meja.arnes.si test.xrsl
Job submitted with jobid:
gsiftp://meja.arnes.si:2811/jobs/mlLLDmfVjXgnYFU0Xoo
FSKOnABFKDmABFKDmt0HKDmABFKDms0AcPo
```

2nd setup: IPv6-only client, server in dual stack (1)

- LDAP works:

```
arcinfo -c meja.arnes.si
meja.arnes.si(IPv4):443 - Network is unreachable
Execution Target on Computing Service: meja.arnes.si
URL: meja.arnes.si
Interface name: org.nordugrid.gridftpjob
Queue: default
Health state: ok
```

```
ldapsearch -x -h meja.arnes.si -p 2135 -b 'Mds-Vo-name=local, o=Grid'
# meja.arnes.si, local, grid
dn: nordugrid-cluster-name=meja.arnes.si,Mds-Vo-name=local,o=grid
nordugrid-cluster-cache-total: 257342
nordugrid-cluster-issuerca: /C=SI/O=SiGNET/CN=SiGNET CA
nordugrid-cluster-homogeneity: TRUE
nordugrid-cluster-lrms-version: 2.5.7
nordugrid-cluster-middleware: nordugrid-arc-2.0.0
```

2nd setup: IPv6-only client, server in dual stack (2)

- Job submission fails with *"Job submission aborted because no resource returned any information"*
- Strace shows that client only tries using IPv4 and hangs: `[pid 7537] connect(10, {sa_family=AF_INET, sin_port=htons(2811), sin_addr=inet_addr("109.127.252.39")}, 16) = -1 EINPROGRESS (Operation now in progress)`

3rd setup: IPv6-only server, dual stack client

- Same results as in 2nd setup: LDAP works, job submission fails with *"No resource returned any information"* error
- Arc client only tries communicating with server over IPv6

4th setup: IPv6-only server and client

- Ldap works
- Job submission fails

```
arcls gsiftp://meja.arnes.si:2811
ERROR: Failed connecting to server meja.arnes.si:2811
ERROR: Failed to obtain stat from ftp: globus_xio: Unable
to connect to meja.arnes.si:2811/globus_xio:
globus_l_xio_tcp_connect_next failed./globus_xio:
globus_xio_system_socket_register_connect
failed./globus_xio: System error in connect: Network is
unreachable/globus_xio: A system call failed: Network is
unreachable
•ERROR: Failed listing files
```

Solution on the way

- http://bugzilla.nordugrid.org/show_bug.cgi?id=2940

  IPv6 patch ready for testing..

Summary (1)

- Gridftpd works on IPv6
- Arc client always forces to use IPv4 and therefore fails with gsiftp when it should use IPv6
- Globus-url-copy works on IPv6
- The main deal breaker is LRMS!

Summary (2)

	Dual stack	IPv6 only
Torque	Yes (uses IPv4)	No
GridFTP	Yes	Yes
Globus-url-copy	Yes	Yes
Aris/Ldap	Yes	Yes
Arc client job submission	Yes (uses IPv4)	No (forces IPv4 - no resources returned any information)

Questions?