SSH To Job: How it Works (and Sometimes Doesn't)

EU HTCondor Workshop 2022

Jaime Frey

Debugging Can Be Hard

› Remote debugging is harder
   • Or at least time-consuming
› Foreign environment
› Long round-trip time

Solution: SSH To Job

› A terminal session where your job is running

› In the same environment as the job

- Same environment variables, etc
- In the same container instance, if any

```
[jfrey@submit-1 test]$ condor_ssh_to_job 1138.0
Welcome to slot1_24@e2565.chtc.wisc.edu!
Your condor job is running with pid(s) 799083.
[jfrey@e2565 ~]$
```

Make It Simple to Use

› Want to use ssh programs

› Don't want to require admin to configure ssh/sshd

- Different user account on Execution Point
- Firewalls
- Host and user credentials

› HTCondor can make a network connection with strong authentication

- Used to run the job

SSH To Job Workflow

› Ask schedd for capability to EP

› Connect to starter on EP and present capability

› Generate and exchange ssh credentials with starter

- Ssh_to_job writes private user key and known_hosts file
- Starter writes server key and authorized_users file

› Launch ssh and sshd and hand them the existing network connection

- They communicate and establish ssh session

Complications

› Sshd can inherit socket from parent

› Ssh client insists on initiating new network connection

› ProxyCommand option
- Tells ssh to run arbitrary command that establishes connection

› We provide proxy command
- Connects to ssh_to_job process
- Receives FD of socket connection to starter/sshd
- Proxies data

More Complications

› Sshd reads /etc/passwd for executing user account info

  • User account may be absent

  • User's login shell may be /bin/nologin

› We wrote a small shared library

  • Defines alternate getpwnam() that returns a valid struct passwd with usable login shell

› We use LD_PRELOAD to intercept sshd's getpwnam() calls

It Works Most of the Time

› Some failures of ssh_to_job will require admin attention

Sshd Is Missing

› Common when running job in a container

› Add sshd to container image

AP Firewall and CCB

› When EP is using CCB, network connection goes from EP to AP

› User processes can't use HTCondor's shared port by default

- Ssh_to_job will bind to dynamic TCP port, which firewall may block

› Create directory /var/lock/condor/daemon_sock

- Enable write permissions for HTCondor users

Clever Firewalls

› Firewall with Deep Packet Inspection
  • May be configured to block ssh on all ports
› Talk to your network admin

Job Wrapper Script

› Wrapper script places job in a container

  • Ssh session can end up in separate, identical container

› See earlier talk about avoiding wrapper scripts

› Have HTCondor launch the job container

  • EP will launch the sshd in the same container instance

Thank You!