Building cross-domain trust between FreeIPA deployments

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Advancements in Trusted relationships between FreeIPA deployments

Key Updates

Continuous testing using Fedora

- We are able to establish trust between two separate FreeIPA deployments
  - Looks similar to “trust between FreeIPA and Active Directory” from user’s point of view
    - Kerberos authentication works
    - SSSD resolves users and groups
    - ID overrides do work
- We have prepared infrastructure to test the trust
  - Upstream CIs in FreeIPA and SSSD allow test of multiple separate IPA environments
  - Multiple IPA environments can be created locally for developer convenience as well
  - SSSD and FreeIPA development branches automatically built in COPR as packages for Fedora

Demo setup

And some help for those less familiar with podman

Fedora 40+ VM as the main host with sufficient RAM

https://github.com/abbra/freeipa-local-tests/tree/main/ipalab-config/ipa-trust

To access a shell in the container(s), find ip, browser:

```
# podman exec -ti <hostname> bash

# podman exec -ti m1.ipa1demo.test hostname -i

# podman unshare --rootless-netns firefox --new-instance --new-window $url
```

Automation

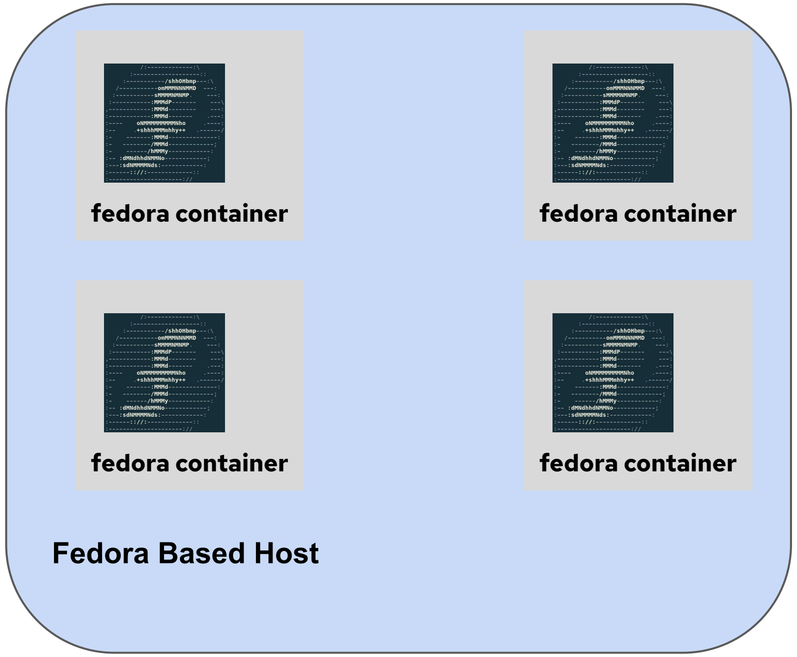
Testing in Fedora using Podman Containers

Environment Setup

- FreeIPA and SSSD upstream development at this point
- Test Environment
  - Fedora-based host running multiple containers or virtual machines
  - Simulates two independent IPA deployments: *IPA1DEMO.TEST* and *IPA2DEMO.TEST*
- Provisioning Tool:
  - ipalab-config to generate podman compose files + podman-compose to produce the test setup
- Deployment Automation:
  - ansible-freeipa to deploy IPA configurations
- Sample Containerfile uses IPA-IPA trust COPR repository

Testing in Fedora using Podman Containers

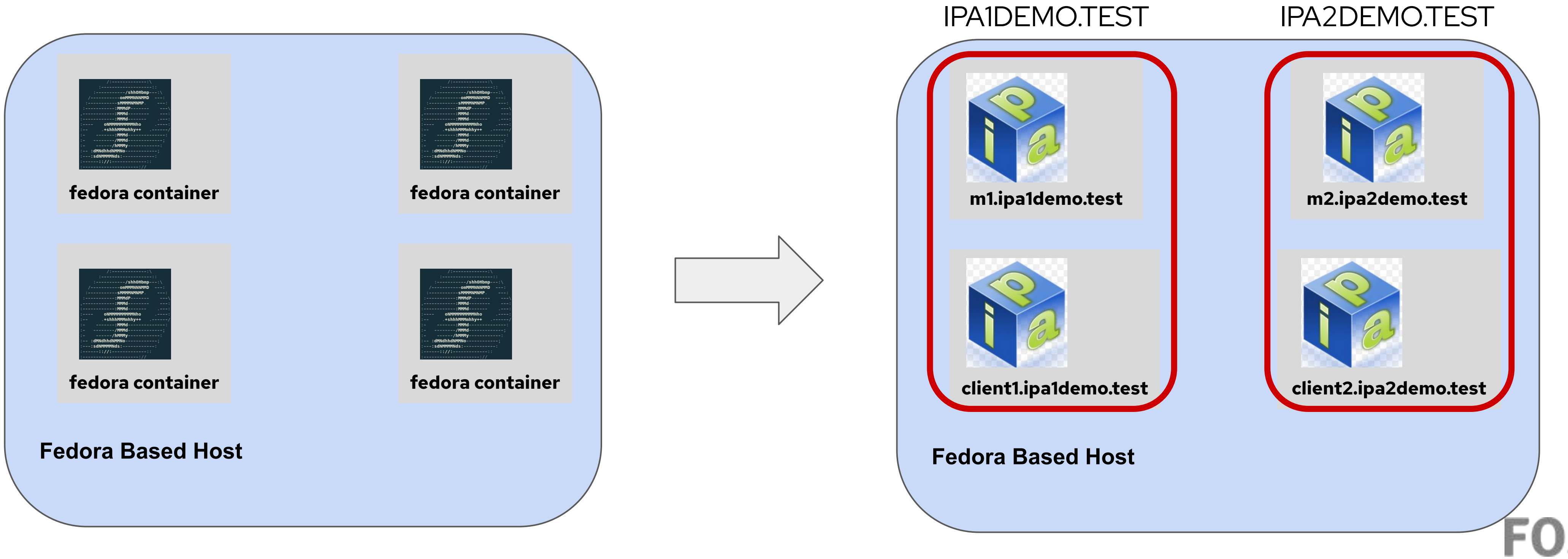
Environment Setup - Provisioning



Testing in Fedora using Podman Containers

Environment Setup – FreeIPA deployment

- Use the Ansible playbooks to automate the deployment of two separate FreeIPA servers and their respective clients, mimicking two independent IPA domains



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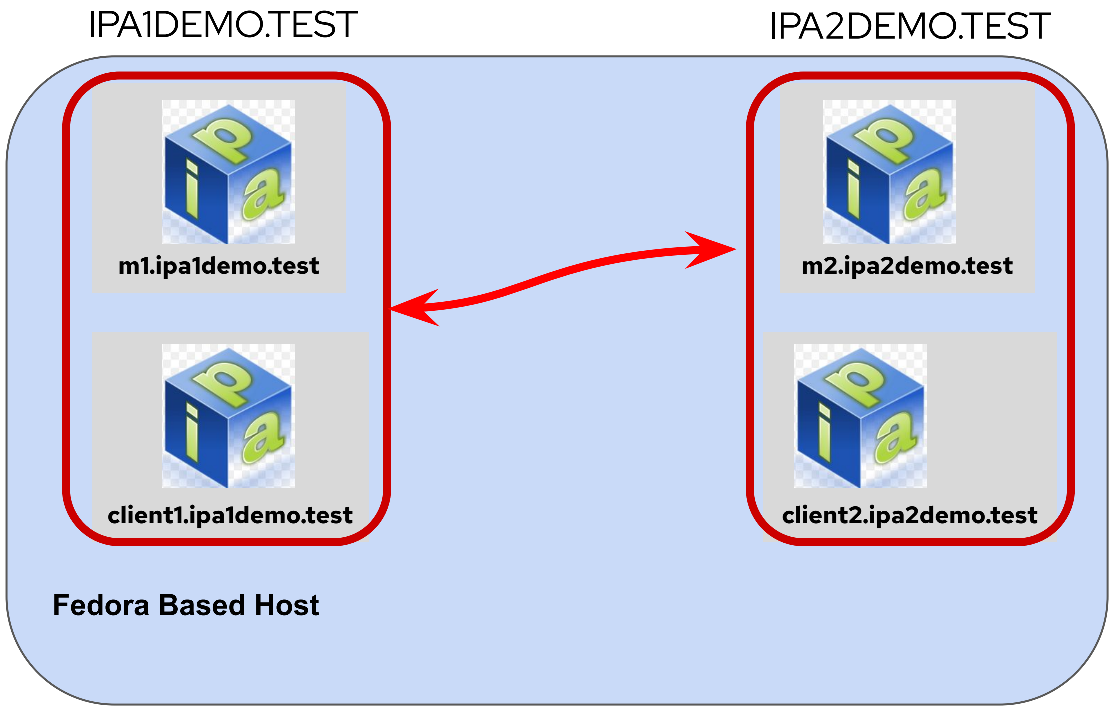
Testing in Fedora using Podman Containers

Establish Trust

- Use the Ansible playbooks to establish trust



Establishing trust between multiple domains

Establish Trust

- The automation process includes several key steps to manage and establish trust between two IdM environments
  - Clean up old data
  - Collect information about the FreeIPA deployments
  - Establish Bidirectional Trust
  - Add ID range for IPA1DEMO.TEST on IPA2DEMO.TEST deployment

- **NB!** The process to establish trust will change. Current approach utilizes the same logic FreeIPA has for trust to Active Directory. In future, a process to establish trust will look similarly but will not rely on existence of Samba DC.

Perform Administrator Operations

Manage Trusted Domain

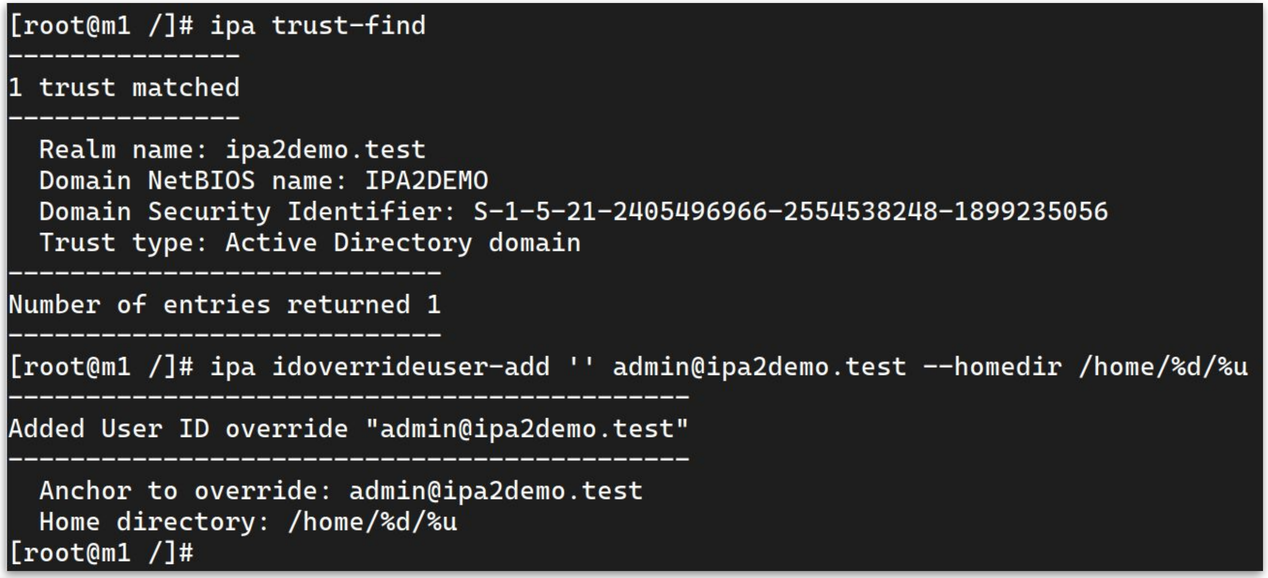
- After Trust Establishment completion:
  - Both IPA environments ready to resolve users and groups from the trusted domains
  - All operations available for trust with Active Directory can also be performed for trust with IPA
- Usual administrative operations:
  - block any access we don’t want to:
    - create HBAC and SUDO rules
  - redefine POSIX attributes for trusted domain users
    - create ID Overrides
  - Allow administrative operations for trusted domain users, including enrolling new machines

Managing Trusted Domains

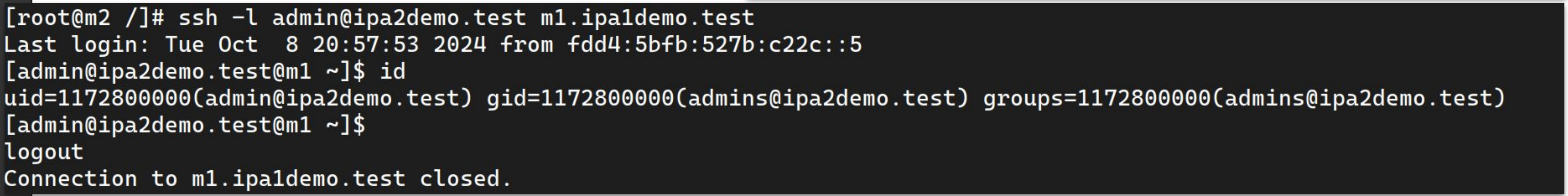
Features to test

- Trusted IPA users and groups can be added as external members of external (non-POSIX) groups
- External groups can be added as members of POSIX groups
- SUDO rules and HBAC rules can be applied via external group membership
- Trusted IPA users and groups can be handled in ID overrides
- Trusted IPA user can be added to ID overrides in 'Default Trust View' to allow login to Web UI
- ID overrides in 'Default Trust View' can be added as members of IPA groups to allow permissions/roles to apply

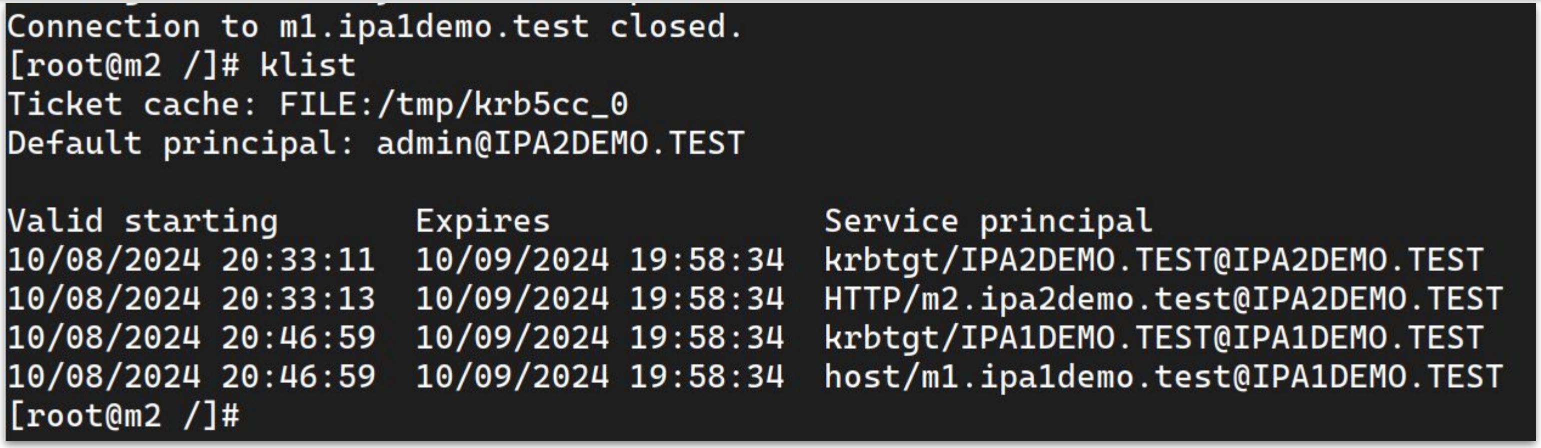
Live Demo



```
[root@m1 /]# ipa trust-find
---------------
1 trust matched
---------------
  Realm name: ipa2demo.test
  Domain NetBIOS name: IPA2DEMO
  Domain Security Identifier: S-1-5-21-2405496966-2554538248-1899235056
  Trust type: Active Directory domain
----------------------------
Number of entries returned 1
----------------------------
[root@m1 /]# ipa idoverrideuser-add '' admin@ipa2demo.test --homedir /home/%d/%u
--------------------------------------------
Added User ID override "admin@ipa2demo.test"
--------------------------------------------
  Anchor to override: admin@ipa2demo.test
  Home directory: /home/%d/%u
[root@m1 /]#
```



```
[root@m2 /]# ssh -l admin@ipa2demo.test m1.ipa1demo.test
Last login: Tue Oct  8 20:57:53 2024 from fdd4:5bfb:527b:c22c::5
[admin@ipa2demo.test@m1 ~]$ id
uid=1172800000(admin@ipa2demo.test) gid=1172800000(admins@ipa2demo.test) groups=1172800000(admins@ipa2demo.test)
[admin@ipa2demo.test@m1 ~]$
logout
Connection to m1.ipa1demo.test closed.
```



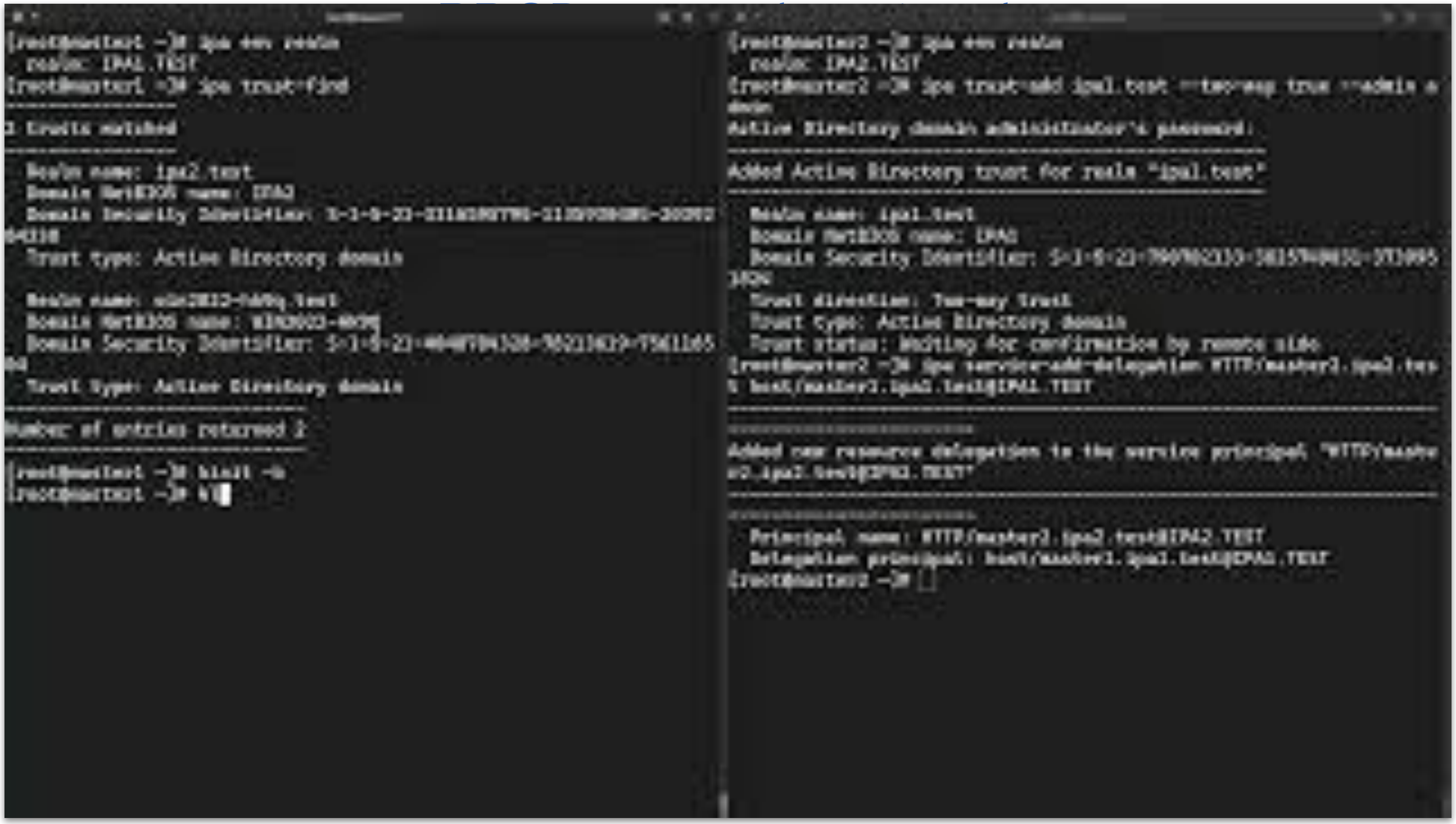
```
Connection to m1.ipa1demo.test closed.
[root@m2 /]# klist
Ticket cache: FILE:/tmp/krb5cc_0
Default principal: admin@IPA2DEMO.TEST

Valid starting       Expires              Service principal
10/08/2024 20:33:11  10/09/2024 19:58:34  krbtgt/IPA2DEMO.TEST@IPA2DEMO.TEST
10/08/2024 20:33:13  10/09/2024 19:58:34  HTTP/m2.ipa2demo.test@IPA2DEMO.TEST
10/08/2024 20:46:59  10/09/2024 19:58:34  krbtgt/IPA1DEMO.TEST@IPA1DEMO.TEST
10/08/2024 20:46:59  10/09/2024 19:58:34  host/m1.ipa1demo.test@IPA1DEMO.TEST
[root@m2 /]#
```

Live Demo

Steps

- Provision a Fedora Base Host
- Build the container image using COPR
- Install provisioning system
- Deploy Servers and Clients
- Establish Bidirectional Trust, then
  - Show POSIX ID range for IPA1DEMO.TEST trust on IPA2DEMO.TEST
  - Show resolution of trusted users on IPA1DEMO
  - Show resolution of trusted users on IPA2DEMO

RBCD cross-domain rules



```
[root@master1 ~]# ipa env realm
  realm: IPA1.TEST
[root@master1 ~]# ipa trust-find
----------------
2 trusts matched
----------------
  Realm name: ipa2.test
  Domain NetBIOS name: IPA2
  Domain Security Identifier: S-1-5-21-[illegible]
[illegible]
  Trust type: Active Directory domain

  Realm name: win2022-[illegible].test
  Domain NetBIOS name: WIN2022-[illegible]
  Domain Security Identifier: S-1-5-21-[illegible]
[illegible]
  Trust type: Active Directory domain
----------------------------
Number of entries returned 2
----------------------------
[root@master1 ~]# kinit -k
[root@master1 ~]# kl
```

```
[root@master2 ~]# ipa env realm
  realm: IPA2.TEST
[root@master2 ~]# ipa trust-add ipa1.test --two-way true --admin a
dmin
Active Directory domain administrator's password:
--------------------------------------------------
Added Active Directory trust for realm "ipa1.test"
--------------------------------------------------
  Realm name: ipa1.test
  Domain NetBIOS name: IPA1
  Domain Security Identifier: S-1-5-21-[illegible]
[illegible]
  Trust direction: Two-way trust
  Trust type: Active Directory domain
  Trust status: Waiting for confirmation by remote side
[root@master2 ~]# ipa service-add-delegation HTTP/master2.ipa2.tes
t host/master1.ipa1.test@IPA1.TEST
-------------------------------------------------------------------
-------------------------------
Added new resource delegation to the service principal "HTTP/maste
r2.ipa2.test@IPA2.TEST"
-------------------------------------------------------------------
-------------------------------
  Principal name: HTTP/master2.ipa2.test@IPA2.TEST
  Delegation principal: host/master1.ipa1.test@IPA1.TEST
[root@master2 ~]#
```

Next steps

Next steps

- ID Overrides template resolving in sssd
  - Set default POSIX shell/home directory for trusted domain users per domain
- Changes in the process to establish trust
  - OAuth2 end-point
- Support for modern authn workflows, e.g. passwordless methods
  - GSSAPI Authentication indicators across the trust boundary
- Federated authorization
  - Web UI login as trusted user with passwordless methods

Questions / Discussion