freeIPA
identity | policy | audit

Identity Management based on FreeIPA

SLAC 2014

THEY CAN TAKE MY SOUL BUT THEY CAN'T TAKE MY NAME!
VISA CALLED. SOMEONE STOLE YOUR IDENTITY.
I NEED A NEW BATTLE CRY.
HOW ABOUT "OUCH"?
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What is an Identity Management System (IdM)

- An IdM system is a set of services and rules to manage the users of an organization
- It includes information about individuals, computers, groups, roles, authentication and authorization rules that apply to the set of users and devices managed by the system
- If you need to manage more than a handful of machines you do not want to manually configure all these functions on each one, instead you use an IdM system generally hosted on a centralized server

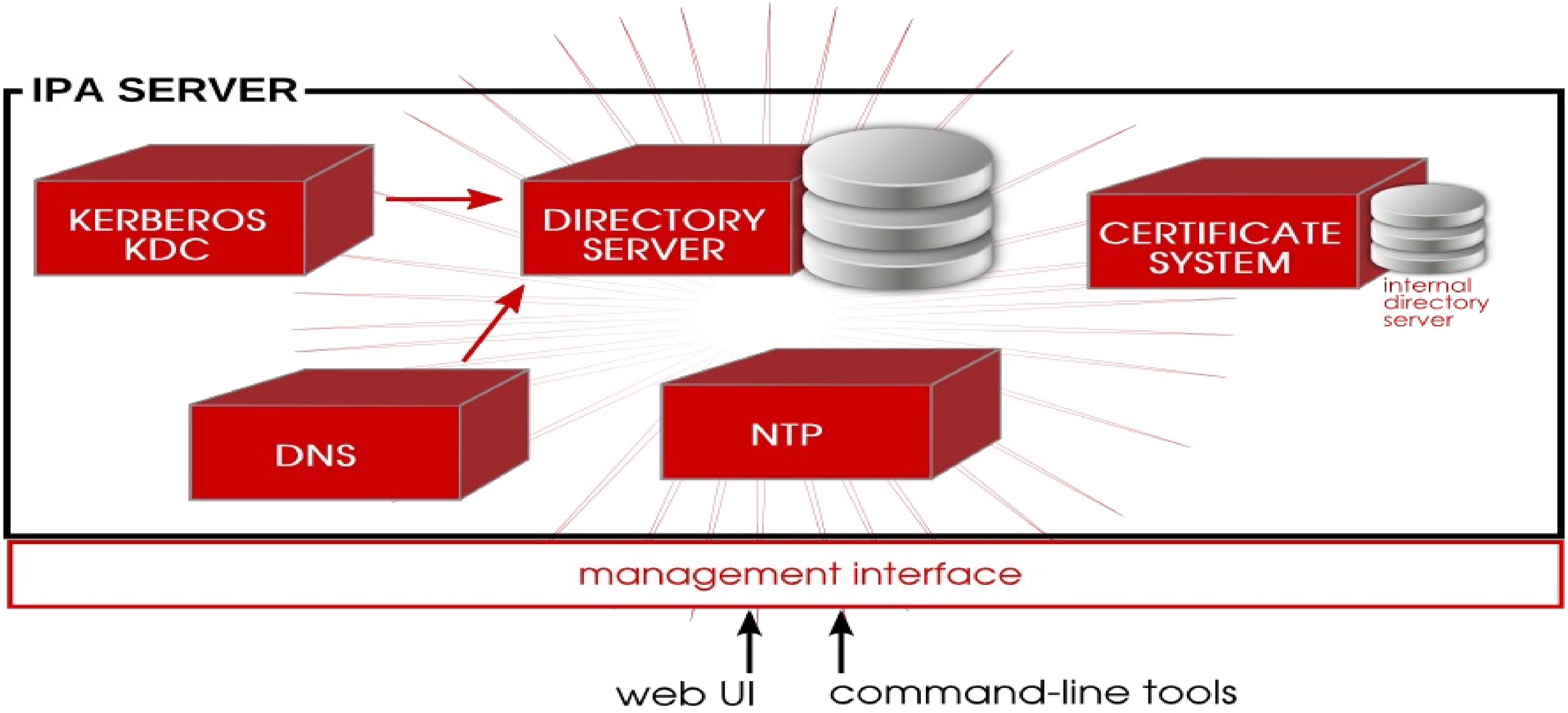
What is FreeIPA

- IPA stands for Identity, Policy, Audit
  - FreeIPA open source project was started in 2007
  - FreeIPA v1 was released in 2008
  - FreeIPA v3.3 was released in April 2014
- It's based on well known open source tools and standards
- FreeIPA (or just IPA) is the upstream project for Red Hats Identity Management solution

Main values

- Identity and authentication is a complex problem – many disjoint technologies exist
- We want to make it more simple to deploy and use
- IPA is a domain controller for Linux/UNIX environment
  - Think Active Directory but for Linux
  - Central server that stores identity information, policies related to identities and performs authentication

FreeIPA - high level architecture



An FreeIPA server is an identity and authentication server. The primary FreeIPA server, essentially a domain controller, uses a Kerberos server and KDC for authentication. An LDAP backend contains all of the domain information, including users, client machines, and domain configuration.

Features

- Centralized authentication via Kerberos or LDAP
- Identity management:
  - users, groups, hosts, host groups, services, netgroups
- Manageability:
  - Simple installation scripts for server and client
  - Rich CLI and web-based user interface
  - Pluggable and extensible framework for UI/CLI
  - Flexible delegation and administrative model
  - Self service portal

Features (Continued)

- X.509 certificate provisioning for hosts and services
- Host-based access control (HBAC)
- Centrally-managed SUDO
- SELinux policy management
- SSH key management
- Group-based password policies
- Can act as NIS server for legacy systems
- Painless password migration
- Integrated DNS server managed by IPA

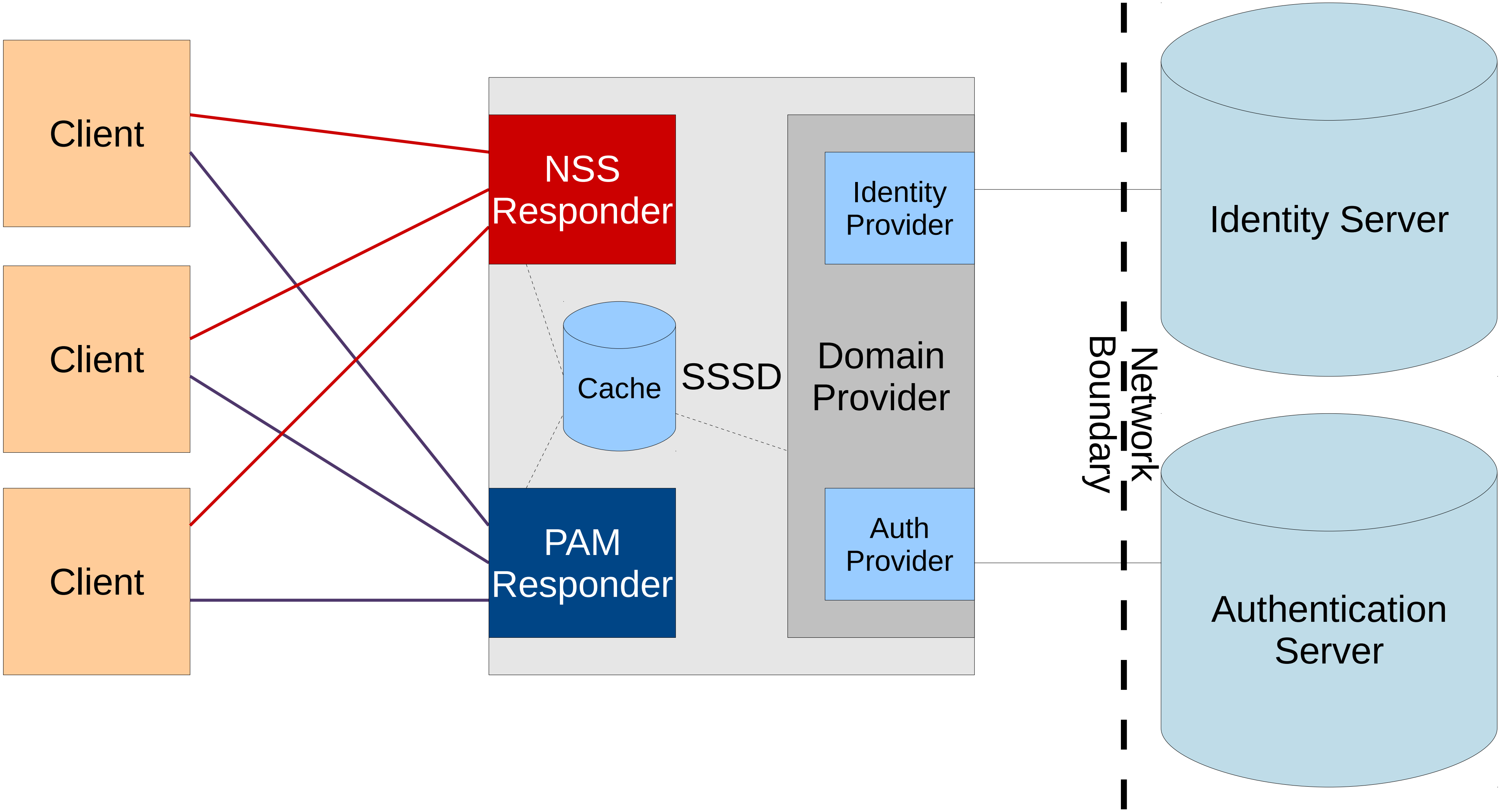
Features (Continued)

- Replication:
  - Supports multi-server deployment based on the multi-master replication
  - User replication with MS Active Directory
  - Password replication based on passsync.msi
- Cross Kerberos-Realm Trust for IdM <=> AD setups
- Compatibility with broad set of clients

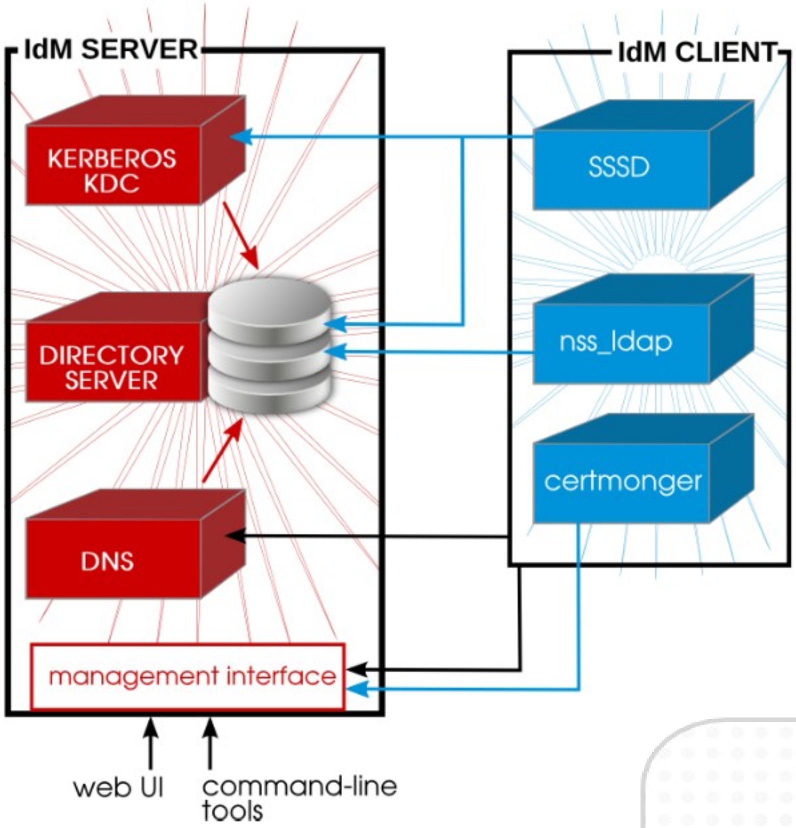
SSSD (System Security Services Daemon)

- Retrieves identity information from a central identity management system
- Performs authentication and password change against a central authority
- Enforces access control
- Integrates with client side components like SUDO, SELinux, SSH
- Replaces older technologies including:
  - NIS, direct PAM/NSS LDAP/Kerberos connections, NSCD, winbind

SSSD Architecture



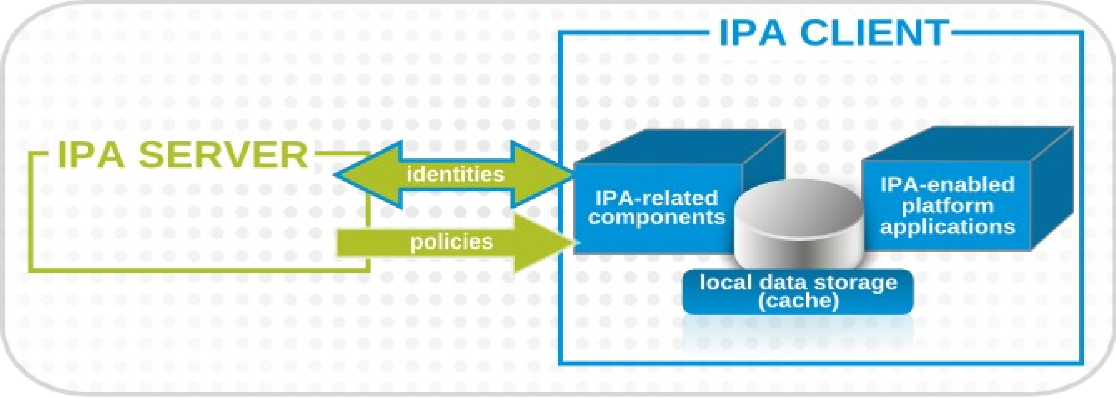
Client – Server Interaction



SSSD provides the user authentication for the machine and enforces host-based access control rules

nss_ldap fetches object using encrypted LDAP connection

Certmonger monitors and renews the certificates on the client, it can request new certificates for the services on the system (NSS and PEM)



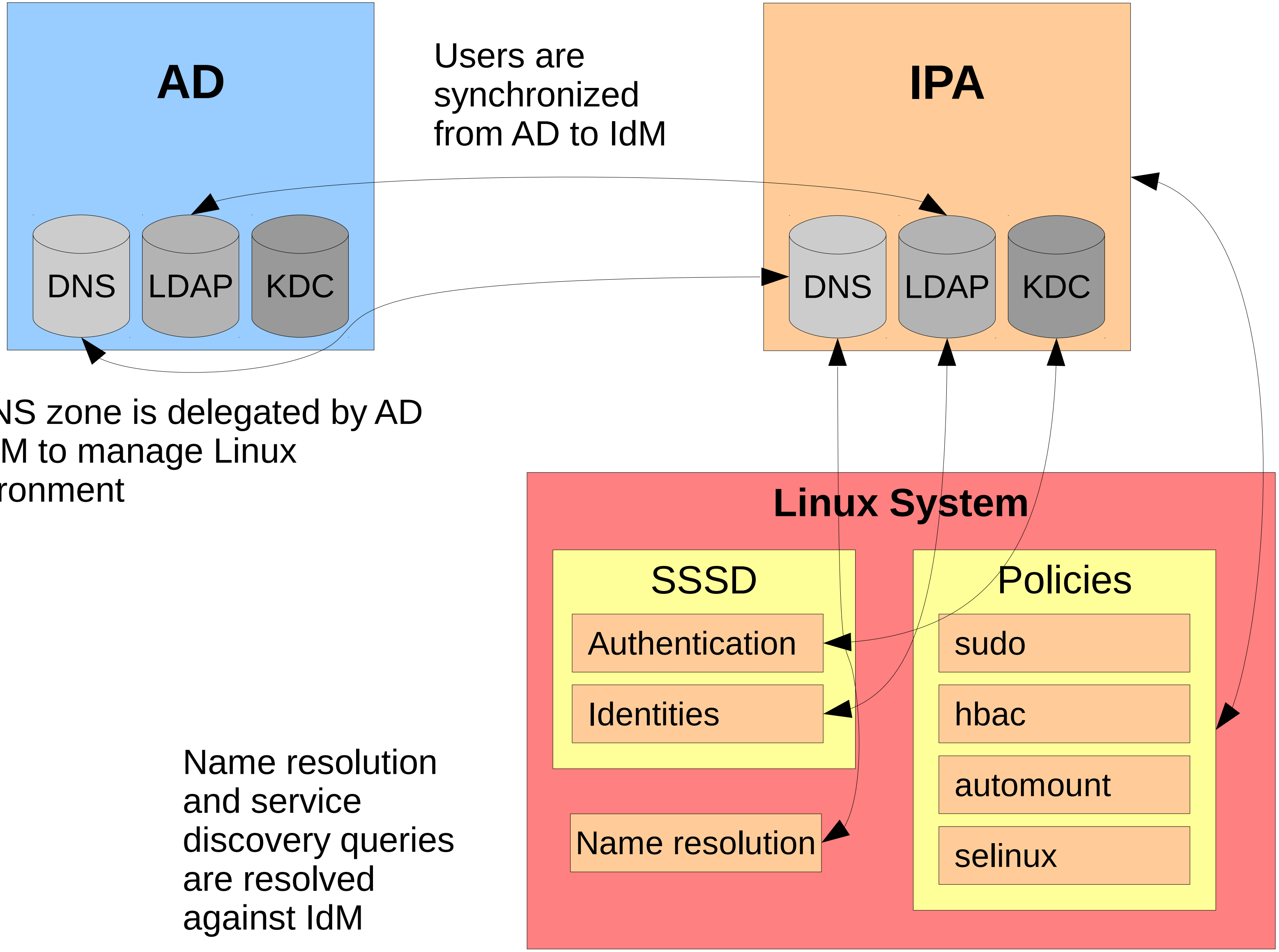
IPA and Active Directory

- IPA and Active Directory both provide identity management solutions on top of the Kerberos infrastructure
- Integration either based on trust or replication
- IPA AD trust feature is designed
  - To give Active Directory users access to IPA resources
  - To allow IPA servers and clients to resolve identities of AD users and groups
- IPA AD trust feature does not require
  - Synchronizing accounts and passwords with AD
  - Installing any software on AD domain controllers

Cross-realm trust: IdM and Active Directory

- IPA exposes its own realm as an Active Directory-compatible forest
- Two Active Directory-compatible forests can trust each other
- As result:
  - Active Directory users can access IPA resources
  - IPA servers and clients can resolve identities of AD users and groups
  - Access to IPA is controlled by IPA rules (HBAC, ...) for Active Directory users and groups
  - All AD user and group management stays at AD side

AD – IPA replication

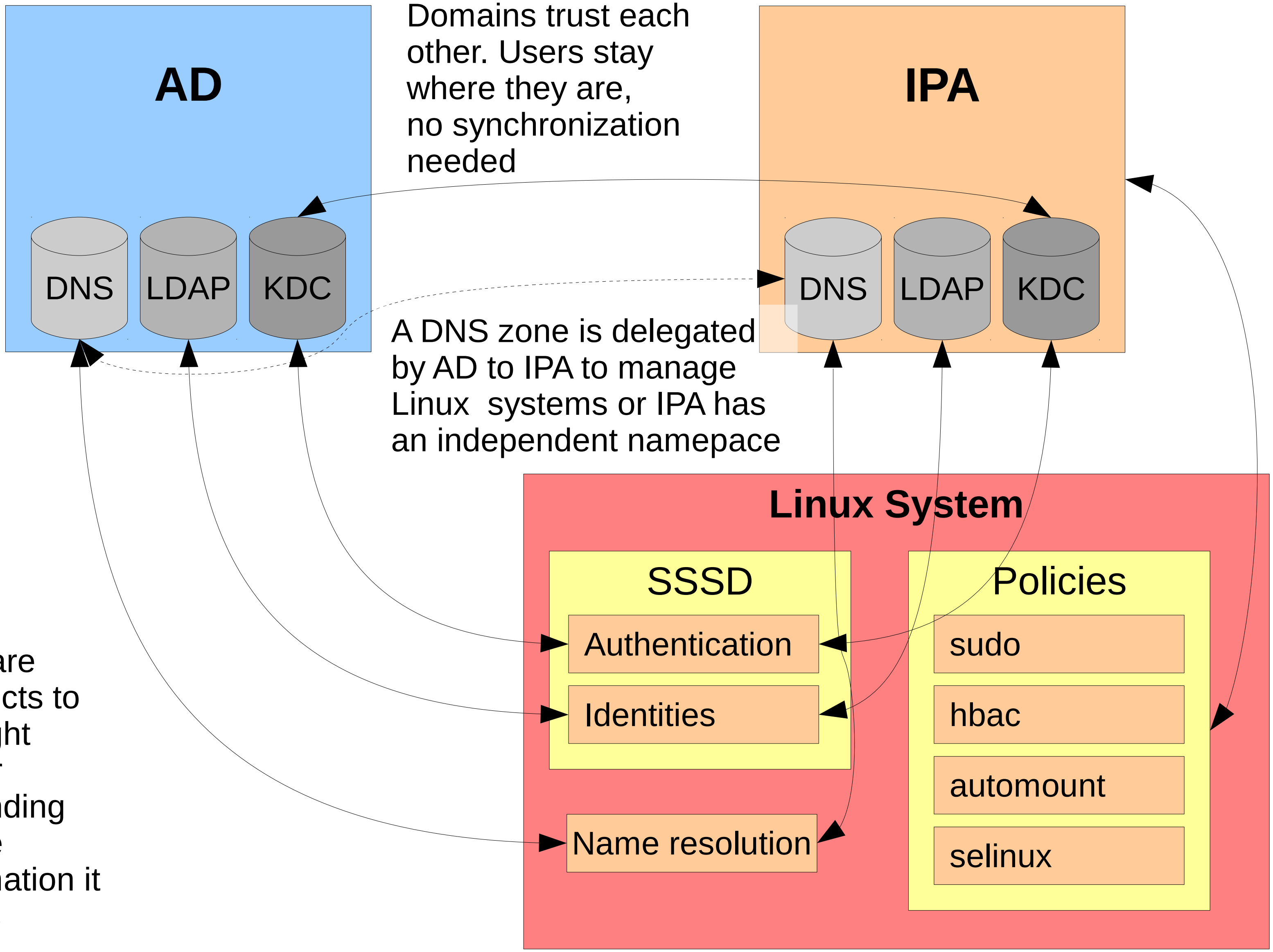


Users are synchronized from AD to IdM

A DNS zone is delegated by AD to IdM to manage Linux environment

Name resolution and service discovery queries are resolved against IdM

AD - IPA Trust



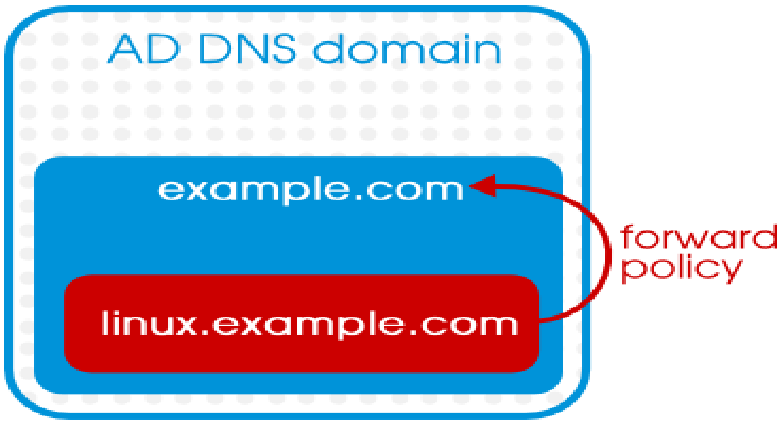
Domains trust each other. Users stay where they are, no synchronization needed

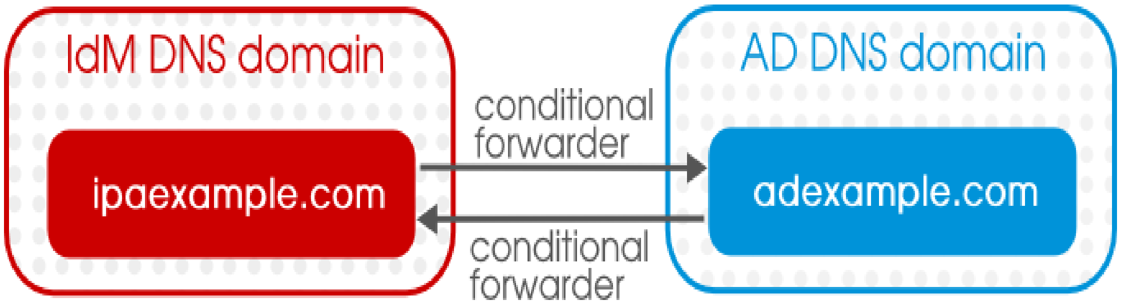
A DNS zone is delegated by AD to IPA to manage Linux systems or IPA has an independent namepace

Client software connects to the right server depending on the information it needs

Cross-realm trust: DNS integration

- DNS is the cornerstone for FreeIPA and Windows to discover services in the local and remote domains
- Two configuration options:
  - Conditional forwarder
  - Delegation (recommended)





New AD trust features in FreeIPA-3.3

- Supports Windows Server 2012 R2
- POSIX attributes stored in AD
- Multiple child domains in AD forest
- Legacy clients support for AD integration
- Multiple FreeIPA trusts servers

Host based access control

Use case: Deny all access for everybody, but allow ssh

```
# ipa hbacrule-del allow_all (also possible during install time)
```

- Creata a new rule idm-users-ssh and assign all hosts

```
# ipa hbacrule-add --hostcat=all idm-users-ssh
```

- Add a group to the rule that should get access

```
# ipa hbacrule-add-user --groups=ipausers idm-users-ssh
```

- Finally add the ssh service to the rule

```
# ipa hbacrule-add-service --hbacsvcs=sshd idm-users-ssh
```

Central sudo Configuration

Use case: Sudo user should be able to read system logs

- First create a command-group and add commands to it

```
# ipa sudocmdgroup-add --desc 'log reading cmd' logfiles
```

```
# ipa sudocmd-add --desc 'read logs' '/usr/bin/less
/var/log/messages'
```

```
# ipa sudocmdgroup-add-member --sudocmds
'/usr/bin/less /var/log/messages' logfiles
```

Central sudo Configuration II

- Now create the main sudo rule

```
# ipa sudorule-add logfiles-cmd
```

- Add the command group or single commands to the rule

```
# ipa sudorule-add-allow-command --sudocmds '/usr/bin/less /var/log/messages' logfiles-cmd

# ipa sudorule-add-allow-command --sudocmdgroups logfiles logfiles-cmd
```

- Add hosts or hostgroups to the rule

```
# ipa sudorule-add-host --hosts tiffy logfiles-cmd

# ipa sudorule-add-host --hostgroups admin-hosts logfiles-cmd
```

- Add user or usergroups to the rule

```
# ipa sudorule-add-user --user sudouser logfiles-cmd
# ipa sudorule-add-user --group sudogroup logfiles-cmd
```

Client sudo Configuration (past)

- Prepare NSS

```
# echo "sudoers: sss" >> /etc/nsswitch.conf
```

- Prepare sssd (/etc/sssd/sssd.conf)

```
[sssd]
[...]
services = nss, pam, ssh, pac, sudo

[domain/idm.coe.muc.redhat.com]
sudo_provider = ldap
ldap_uri = ldap://grobi.idm.coe.muc.redhat.com
ldap_sudo_search_base =
ou=sudoers,dc=idm,dc=coe,dc=muc,dc=redhat,dc=com
ldap_sasl_mech = GSSAPI
ldap_sasl_authid = host/tiffy.idm.coe.muc.redhat.com
ldap_sasl_realm = IDM.COE.MUC.REDHAT.COM
krb5_server = grobi.idm.coe.muc.redhat.com
```

Client sudo Configuration (new)

- Now part of regular client setup
- Configures NSS and SSSD

```
 # git log ef3c9d3
 * ef3c9d3 - (2014-05-09 13:57:04 +0300)  ipa-client-install: Configure sudo to use SSSD as data source
```

SELinux user mapping

Use case: Every user should get a default SELinux identity

# ipa config-show

```
Maximum username length: 32
Home directory base: /home
Default shell: /bin/bash
Default users group: ipausers
Default e-mail domain: idm.coe.muc.redhat.com
Search time limit: 2
Search size limit: 100
User search fields: uid,givenname,sn,telephonenumber,ou,title
Group search fields: cn,description
Enable migration mode: FALSE
Certificate Subject base: O=IDM.COE.MUC.REDHAT.COM
Password Expiration Notification (days): 4
Password plugin features: AllowNThash
SELinux user map order: guest_u:s0$xguest_u:s0$user_u:s0$staff_u:s0-s0:c0.c1023$unconfined_u:s0-s0:c0.c1023
Default SELinux user: unconfined_u:s0-s0:c0.c1023
Default PAC types: MS-PAC
```

SELinux custom user mapping

Use case: Every admin user should have staff_u

```
# ipa selinuxusermap-add --selinuxuser=staff_u:s0-s0:c0.c1023 adminrole

# ipa selinuxusermap-add-user --groups=admins adminrole

# ipa selinuxusermap-mod --hostcat=all adminrole
```

SSH-Key management for users

Use case: Users have a SSH-Key as part of their LDAP object

```
# ipa user-mod tscherf --sshpubkey="ssh-rsa AAA.."
```

```
-----------------------
Modified user "tscherf"
-----------------------
  User login: tscherf
  First name: Thorsten
  Last name: Scherf
  Home directory: /home/tscherf
  Login shell: /bin/sh
  Email address: tscherf@idm.coe.muc.redhat.com
  UID: 1094200001
  GID: 1094200001
  Account disabled: False
  SSH public key: ssh-rsa
AAAAB3NzaC1yc2EAAAABIwAAAQEA9lS/LvA5lv7a5wdKLNvLPoDiPU7W1I41Gn3pjobN9zV1tE7z
PWj2SKHuV2lXn0u993959nGFn173mQpT5Ct5fe0WPGuAmraegtVCAgfwKQXRHA7RiaQPDkeSVX
xAMPrvqPedoeYIt/j9Iy+7JahXYcHW3OUR0N0eGFeolqwg8tX9hr7qRHDQMJrURSnnCT+Pow3P62
Hs3x2fbCR4PdIpeb7Y8woo11TthEjwSHSikD+qKXT6zu+3dXNftq+dGaahjq3lPfPmgAVyKckO8Puh
bb31MzRA3K59LOvyKY5zx8Wg/cpt1rvdvQruFcysU5PFMs6VZYdfwP/Y0KM5jzJvRw==
                    tscherf@vm236.idm.coe.muc.redhat.com
  Password: True
  Member of groups: ipausers
  Kerberos keys available: True
  SSH public key fingerprint: A8:BD:24:95:C9:40:0E:D7:FE:55:F5:CD:72:EA:D4:C2
tscherf@vm236.idm.coe.muc.redhat.com (ssh-rsa)
```

SSH-Key management for users: SSH-Config

- OpenSSH server config is automatically configured to lookup userkey in LDAP via sssd-Proxy

```
 # cat /etc/ssh/sshd_config
 AuthorizedKeysCommand /usr/bin/sss_ssh_authorizedkeys
```

- Login using SSH-Keys instead of Kerberos-Principal

```
 # ssh -o GSSAPIAuthentication=no tiffy
   Mar  8 13:40:13 tiffy sshd[15087]: Accepted publickey for tscherf from 10.32.69.236 port 44882
   Mar  8 13:40:13 tiffy sshd[15087]: pam_unix(sshd:session): session opened for user tscherf
```

- Login using Kerberos-Principal instead of SSH-Keys

```
 # ssh tiffy

 Mar  8 13:38:00 tiffy sshd[15036]: Authorized to tscherf, krb5 principal
tscherf@IDM.COE.MUC.REDHAT.COM (krb5_kuserok)
 Mar  8 13:38:00 tiffy sshd[15036]: Accepted gssapi-with-mic for tscherf from 10.32.69.236 port 49269
ssh2
```

SSH-Key management for hosts

- Host keys are automatically added to LDAP during enrollment

- OpenSSH client config is automatically configured to lookup hostkeys in LDAP via sssd-Proxy

```
# cat /etc/ssh/ssh_config
GlobalKnownHostsFile /var/lib/sss/pubconf/known_hosts
ProxyCommand /usr/bin/sss_ssh_knownhostsproxy -p %p %h
```

```
# ipa host-show grobi.idm.coe.muc.redhat.com
Host name: grobi.idm.coe.muc.redhat.com
[...]
Keytab: True
Fingerprint (MD5): 7b:dc:6c:62:af:16:a8:da:c1:6a:72:ab:94:5e:f8:7e
Fingerprint (SHA1): 35:09:18:41:0a:df:08:61:90:c7:41:fc:e6:72:8c:78:d6:c5:9e:1a
SSH public key fingerprint:
C9:ED:20:48:78:01:A9:23:DA:41:CC:96:1D:1E:4F:BC (ssh-rsa),
F6:14:16:2B:29:DB:ED:84:B1:25:95:FE:64:2E:95:AC (ssh-dss)
```

Enable AD trust service on FreeIPA

```
# ipa-adtrust-install
# wbinfo --online-status
```

```
BUILTIN : online
IDM : online
```

```
# ipa trust-add --type=ad coe.muc.redhat.com
--admin=Administrator --password
```

```
Active directory domain administrator's password:
--------------------------------------------------------------
Added Active Directory trust for realm "coe.muc.redhat.com"
--------------------------------------------------------------
  Realm name: coe.muc.redhat.com
  Domain NetBIOS name: COE
  Domain Security Identifier: S-1-5-21-358654134-3175511377-4185601054
  Trust direction: Two-way trust
  Trust type: Active Directory domain
  Trust status: Established and verified
```

```
# wbinfo --online-status
```

```
BUILTIN : online
IDM : online
COE : online
```

Resources

Project wiki: https://www.freeipa.org

Code:
https://git.fedorahosted.org/cgit/freeipa.git/

SSSD:
https://fedorahosted.org/sssd/

Mailinglists:
freeipa-users@redhat.com
freeipa-devel@redhat.com
freeipa-interest@redhat.com