# Integrating Linux systems with Active Directory

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# Agenda

- Problem statement
- Aspects of integration
- Integration options
- Recommendations

# Problem Statement

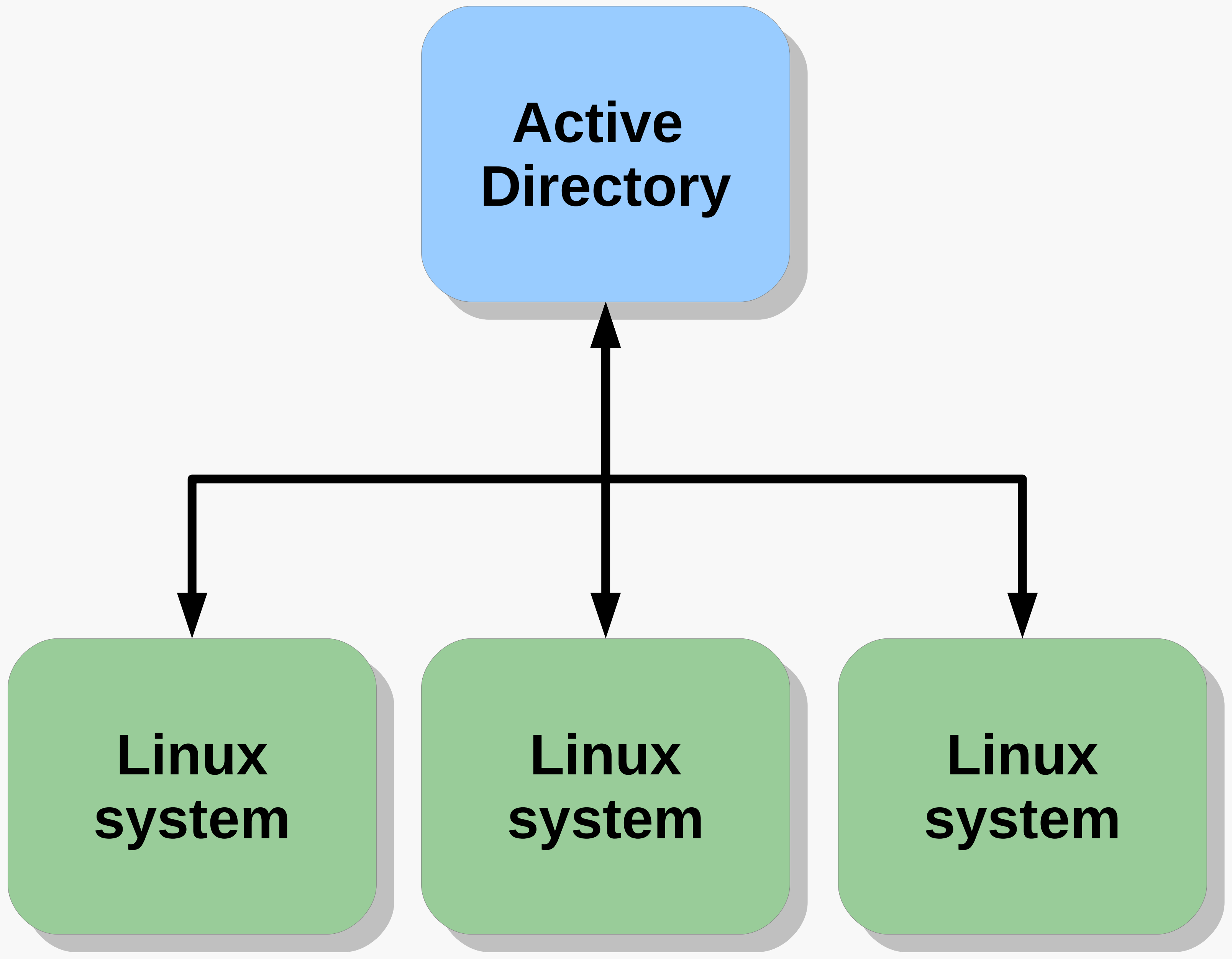
- For most companies AD is the central hub of the user identity management inside the enterprise
- All systems that AD users can access (including Linux) need (in some way, i.e. directly or indirectly) to have access to AD to perform authentication and identity lookups
- In some cases the AD is the only allowed central authentication server due to compliance requirements
- In some cases DNS is tightly controlled by the Windows side of the enterprise and non Windows systems need to adapt to this

# Aspects of Integration

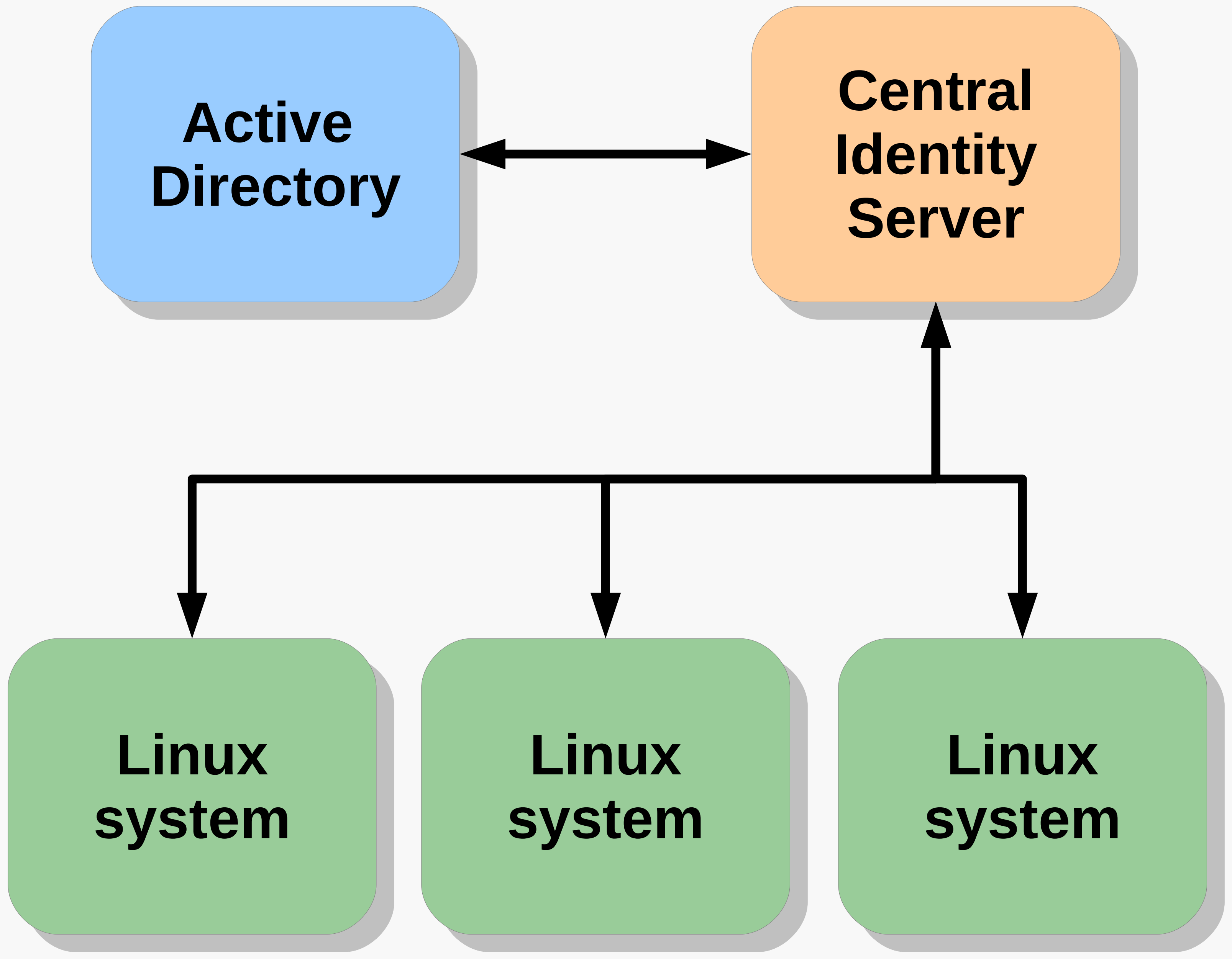
- Authentication
  - User logs into a Linux system, how is he authenticated?
- Identity lookup
  - How system knows about the right accounts?
  - How AD accounts are mapped to POSIX?
- Name resolution and service discovery
  - How system knows where is its authentication and identity server?
- Policy management
  - How other identity related policies are managed on the system?

# Integration Options

### Direct Integration



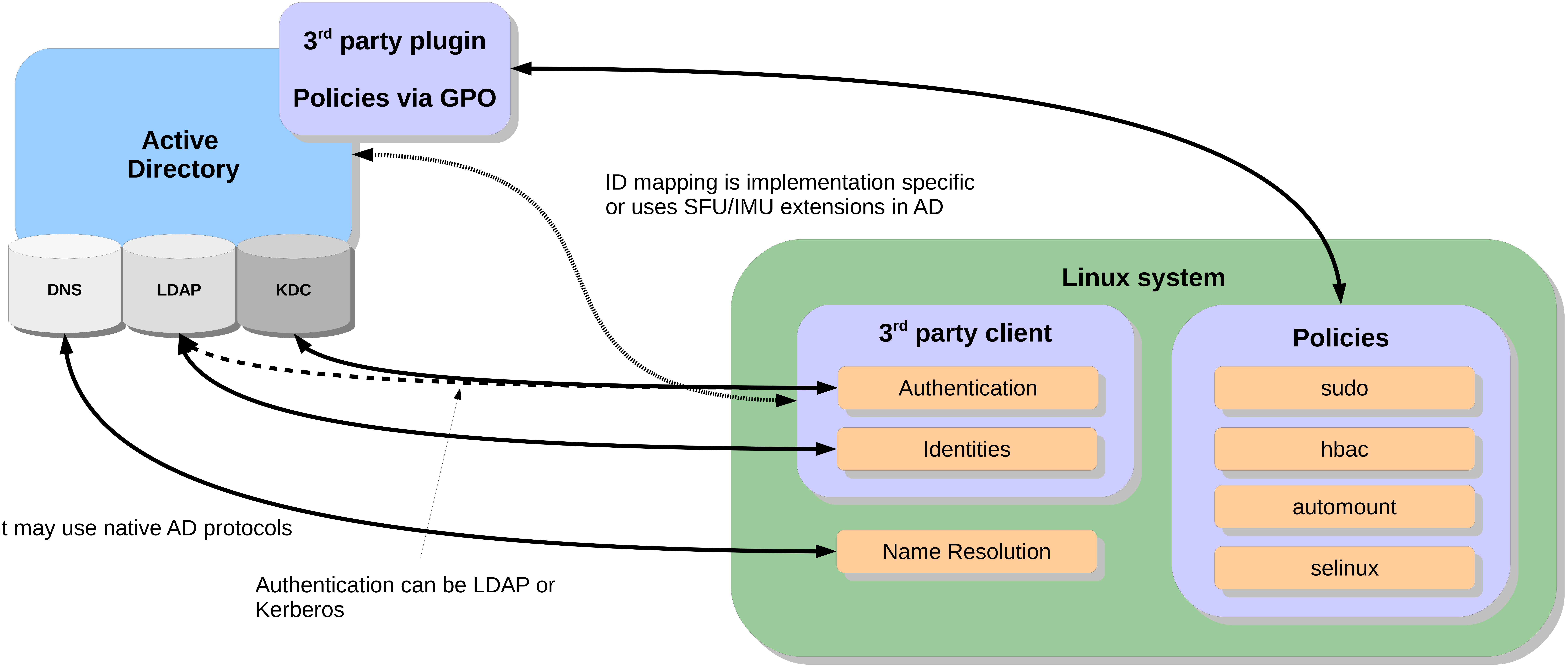
### Indirect Integration



# Direct Integration Options

- 3rd party
- Legacy (pam_krb5, pam_ldap, nss_ldap, nslcd)
- Traditional – winbind
- Contemporary – SSSD (with realmd)

# Third Party Direct Integration



ID mapping is implementation specific or uses SFU/IMU extensions in AD

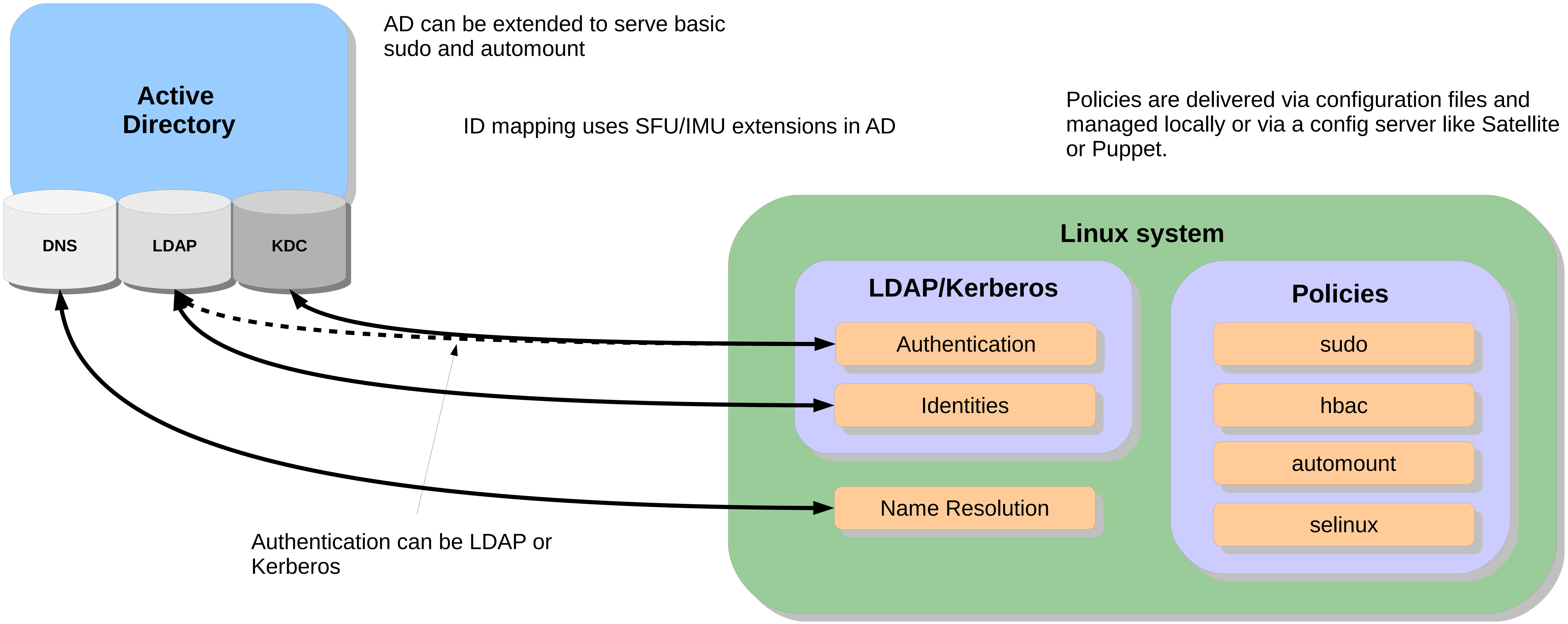
Client may use native AD protocols

Authentication can be LDAP or Kerberos

# Pros and Cons of the 3rd Party Option

- Pros
  - Everything is managed in one place including policies
- Cons
  - Requires third party vendor
  - Extra cost per system (adds up)
  - Limits UNIX/Linux environment independence
  - Requires software on AD side

# Legacy Integration Option



AD can be extended to serve basic sudo and automount

ID mapping uses SFU/IMU extensions in AD

Policies are delivered via configuration files and managed locally or via a config server like Satellite or Puppet.

Authentication can be LDAP or Kerberos

# Pros and Cons of the Legacy Option

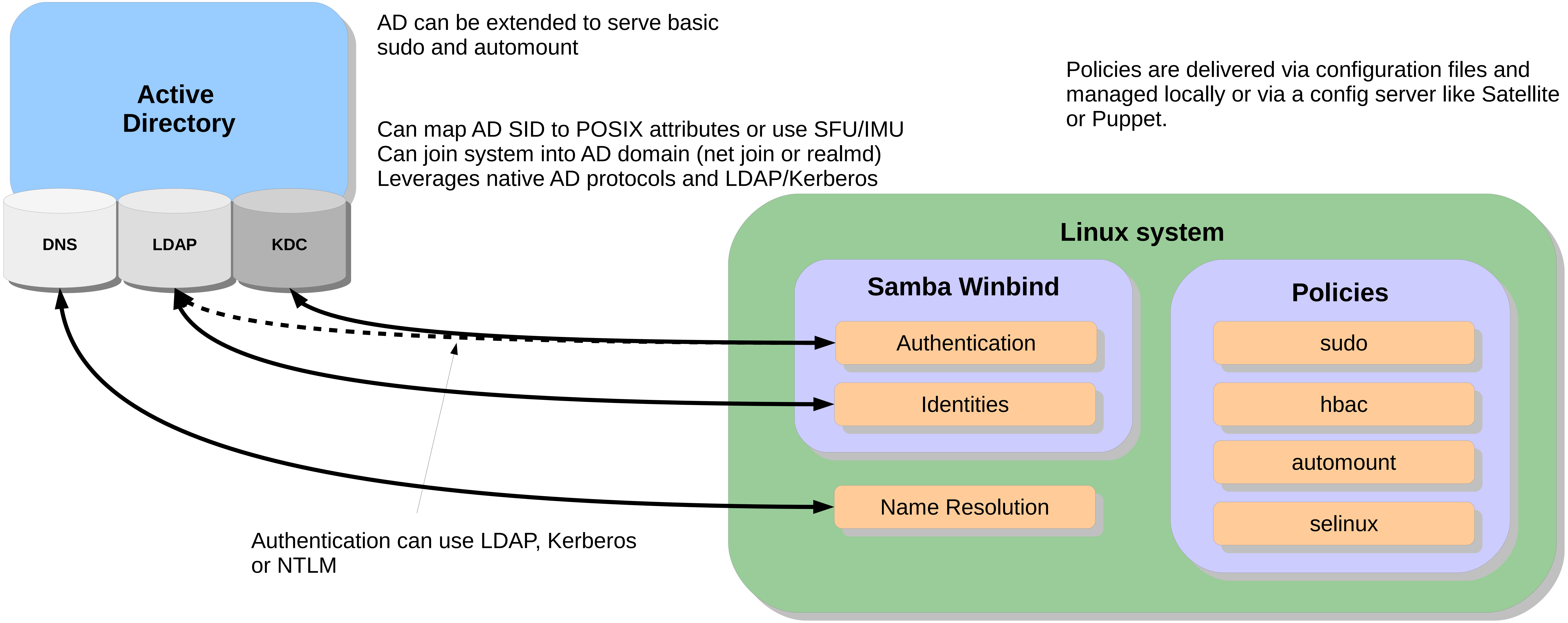
- Pros:
  - Free
  - No third party vendor is needed
  - Intuitive
- Cons:
  - Requires SFU/IMU AD extension
  - Policies are not centrally managed
  - Hard to configure securely

# Traditional Integration Option

AD can be extended to serve basic sudo and automount

Policies are delivered via configuration files and managed locally or via a config server like Satellite or Puppet.

Can map AD SID to POSIX attributes or use SFU/IMU
Can join system into AD domain (net join or realmd)
Leverages native AD protocols and LDAP/Kerberos



Authentication can use LDAP, Kerberos or NTLM

# Pros and Cons of the Traditional Option

- Pros:
  - Well known
  - Does not require third party
  - Does not require SFU/IMU
  - Supports trusted domains
- Cons:
  - Can connect only to AD and very MSFT focused
  - Has some perceived stability issues
  - Policies are not centrally managed

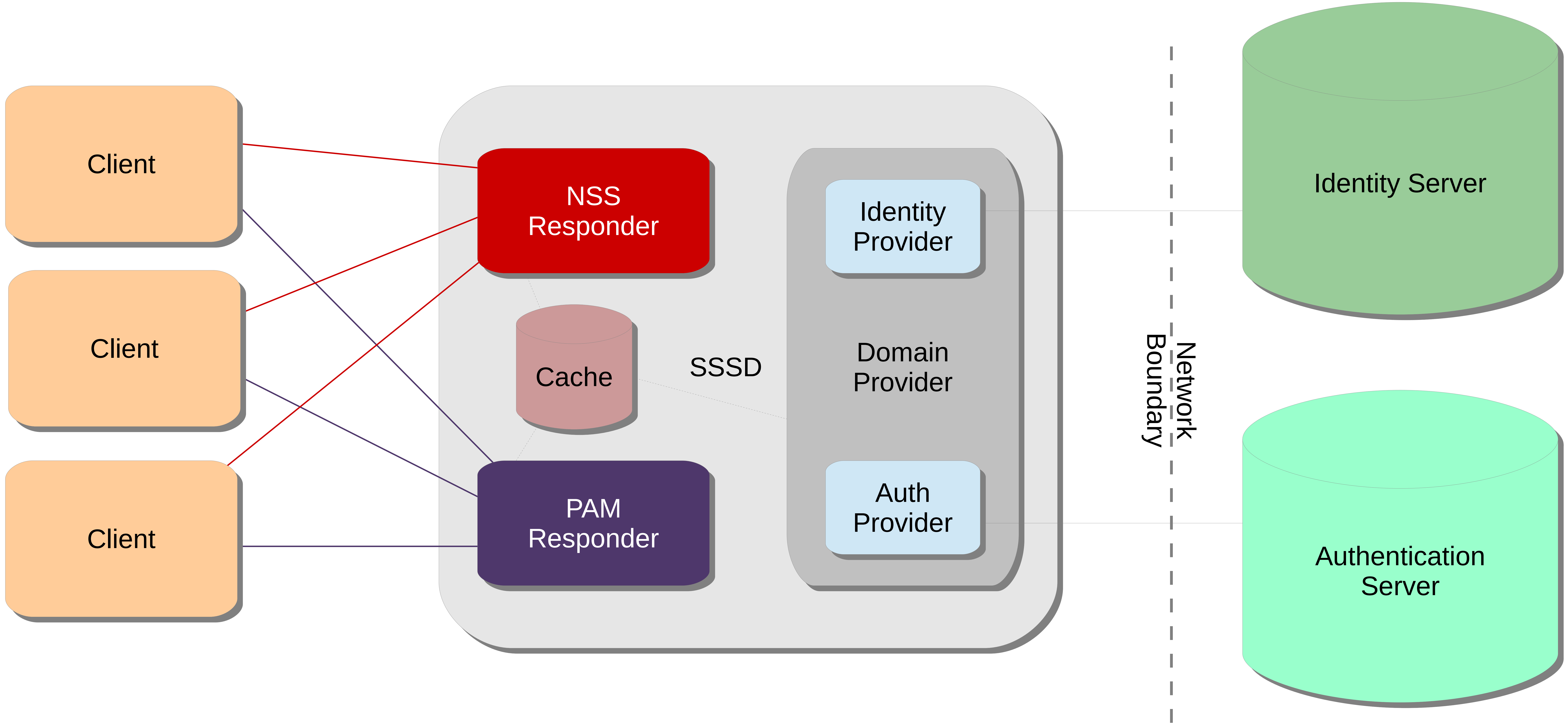
# Introducing SSSD

- SSSD is a service used to retrieve information from a central identity management system.
- SSSD connects a Linux system to a central identity store:
  - Active Directory
  - FreeIPA
  - Any other directory server
- Provides authentication and access control
- Top technology in the evolution chain of the client side IdM components

# SSSD Features

- Multiple parallel sources of identity and authentication – domains
- All information is cached locally for offline use
  - Remote data center use case
  - Laptop or branch office system use case
- Advanced features for
  - FreeIPA integration
  - AD integration

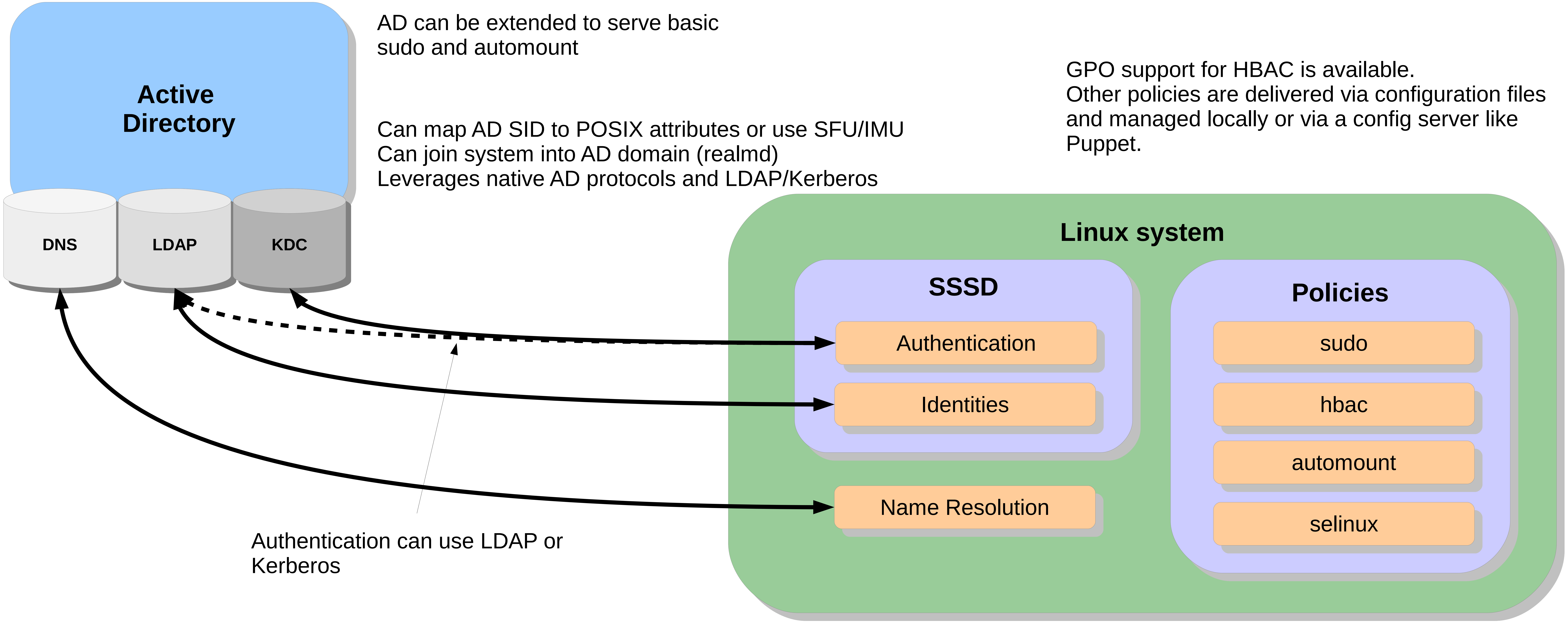
# Identity Source Integration with SSSD



# Why SSSD is our choice?

- Supports everything that previous UNIX solutions support and more
- Brings architecture to the next level
- Supports multiple sources – domains
- Supports IdM specific features
- Supports trusts between AD and IdM
- Has a feature parity with windbind in core areas

# Contemporary Integration Option



AD can be extended to serve basic
sudo and automount

Can map AD SID to POSIX attributes or use SFU/IMU
Can join system into AD domain (realmd)
Leverages native AD protocols and LDAP/Kerberos

GPO support for HBAC is available.
Other policies are delivered via configuration files and managed locally or via a config server like Puppet.

Authentication can use LDAP or Kerberos

# Pros and Cons of the Contemporary Option

- Pros:
  - Does not require SFU/IMU but can use them
  - Can be used with different identity sources
  - Support transitive trusts in AD domains and trusts with FreeIPA
  - Supports CIFS client and Samba FS integration
  - GPO for Windows based HBAC
- Cons:
  - No NTLM support, no support for AD forest trusts (yet)

# Option Comparison

| Feature | LDAP/KRB | Winbind | SSSD |
|---|---|---|---|
| Authenticate using Kerberos or LDAP | Yes | Yes | Yes |
| Identities are looked up in AD | Yes | Yes | Yes |
| Requires SFU/IMU | Yes | No | No |
| ID mapping | None | Multiple ways | Most popular way |
| System is joined into AD | Manual | Has join utility | Realmd |
| Supports trusts for AD domains | No | Yes | Yes |
| Supports heterogeneous domains and advanced features | No | No | Yes |
| Support file sharing | No | Yes | Yes |
| HBAC GPO | No | No | Yes |
| NTLM support | No | Yes | 1.14 (spring 2016) |

# Bottom Line of the Direct Integration

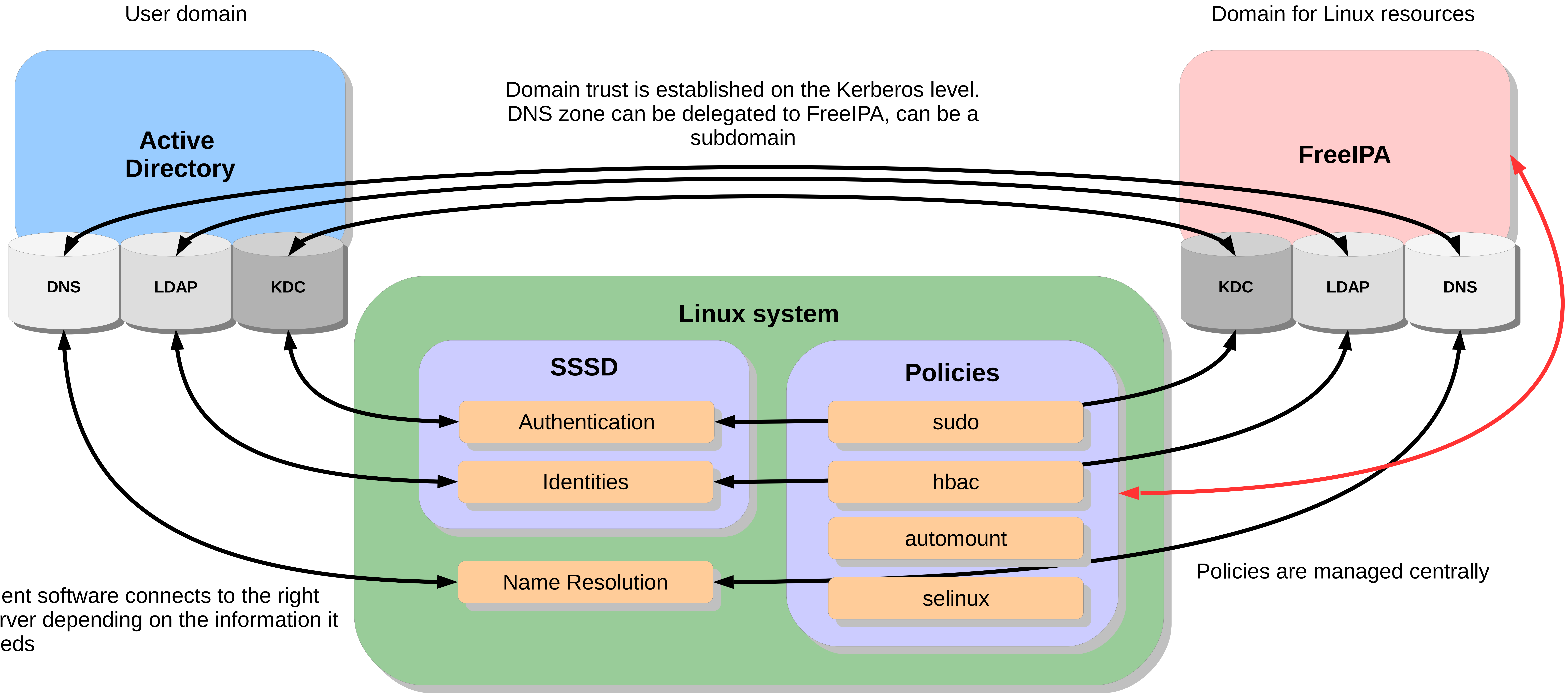
- SSSD is the way to go
- Winbind is the fallback option:
  - if you rely on NTLM (please do not, it is very insecure)
  - If you have multiple forests and need users from different forests to access the Linux system

# Limitations of the Direct Integration Options

- Policy management is mostly left out
- Per system CALs add to cost
- Linux/UNIX administrators do not have control over the environment

***All these limitations prevent growth of the Linux environment inside your organization!***

# FreeIPA Based Integration Option (Trust)



Domain trust is established on the Kerberos level. DNS zone can be delegated to FreeIPA, can be a subdomain

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

Policies are managed centrally

# Pros and Cons of the FreeIPA Trust

- Pros:
  - Reduces cost – no CALs or 3rd party
  - Policies are centrally managed
  - Gives control to Linux admins
  - Enabled independent growth of the Linux environment
  - No synchronization required
  - Authentication happens in AD
- Requirement:
  - Proper DNS setup

# Terminology

- FreeIPA – open source project and technology
- IdM – Identity Management in Red Hat Enterprise Linux or CentOS
- IdM is a stable version of the FreeIPA project

# Direct vs. Indirect

| Use Case | Direct Integration | Trust-based Integration |
|---|---|---|
| Number of Linux Clients | • Small, less than 30 | • Large, 30 or more |
| Policy Management | • Requires separate solution | • Included with FreeIPA |
| Cost | • Grows with # of clients(CALs) | • Fixed at one connection<br>• Free in Fedora/RHEL/CentOS |
| Best Investment Profile | • Short-term | • Long-term |

If you think environment is big enough for a content management system it is big enough for FreeIPA!

# Summary

- Consider direct integration for a small deployment
- Consider SSSD as a main solution for direct integration
- Use winbind as a fallback alternative
- Consider IdM/FreeIPA trust based solution for a bigger or growing environment
- Use Fedora to discover, CentOS to prepare and RHEL to deploy your central identity management solution

# Resources

- FreeIPA
  - Project wiki: www.freeipa.org
  - Project trac: https://fedorahosted.org/freeipa/
  - Code: http://git.fedorahosted.org/git/?p=freeipa.git
  - Mailing lists:
    - freeipa-users@redhat.com
    - freeipa-devel@redhat.com
    - freeipa-interest@redhat.com
- SSSD: https://fedorahosted.org/sssd/
  - Mailing lists:
    - sssd-devel@lists.fedorahosted.org
    - sssd-users@lists.fedorahosted.org
- Certmonger: https://fedorahosted.org/certmonger/

# Questions?

# THANK YOU!