Enterprise desktop at home with FreeIPA and GNOME

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Enterprise?
* almost

local office network is not managed by a company’s IT department
* almost

company services’ hosting is cloudy
there is no one cloud to rule them all
almost

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- A corporate identity for services sign-on

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- Private data to protect and share

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I work on FreeIPA, https://www.freeipa.org

Management of identities and policies:

- stored centrally
- applied locally

And it is available in:

- Fedora
- Red Hat Enterprise Linux / CentOS
- GNU/Linux Debian and Ubuntu
- https://account.gnome.org/ runs FreeIPA since October 2014
How enterprisey are we?
Let’s score by a password
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A typical workflow for every laptop reboot

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2. Jump onto virtual private network (enter a password or more)
3. Obtain initial Kerberos credentials (enter a password)
4. Use corporate applications (enter a password?)
Can we do better than this?

how far are we from

- Sign into a corporate environment
- Use corporate applications
Let’s try to login!

Demo of interactive logon
What was that?

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- **Credentials were entered only once**
Kerberos proxy

Available on the client side with Microsoft Active Directory and MIT Kerberos 1.13

- protocol is called MS-KKDCP
- transparent for Kerberos library users

Kerberos proxy is implemented by FreeIPA 4.2, OpenConnect Server 7.05, and as a standalone server

- Requires HTTPS connection, set up by default in FreeIPA 4.2, very easy to use (one line change on the client)
- Allows to obtain tickets from anywhere
- SSSD 1.12+
- GNOME project has enabled KDC proxy support in https://account.gnome.org to allow use of Kerberos credentials for SSH accounts for GNOME developers
VPN and Kerberos

OpenConnect client supports GSSAPI negotiation

- Fedora 22+ works out of the box

OpenVPN does not support GSSAPI negotiation

- to do since 2005

Could we enforce stronger authentication at a VPN edge?

- yes, we are be able to do so with Kerberos 1.14
  - no practical implementation in FreelPA yet
Two-factor authentication

FreeIPA 4.x supports 2FA natively

- Yubikey, FreeOTP client for Android and iOS, any HOTP/TOTP compatible software and hardware
- Two-factor authentication is enforced on Kerberos level
- Performs pre-authentication before issuing a ticket
- Authentication Indicators are in Kerberos 1.14
- Pre-authentication modules can say how tickets were issued
FreeOTP client for Android and iOS
Demo of interactive logon with 2FA

Let’s create a token for a user and logon with 2FA via Yubikey
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- Renew the ticket granting ticket (TGT)
- Choose which Kerberos principal is in use
Authenticate with GSSAPI

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- No single sign-on with GSSAPI from GNOME applications using WebkitGtk to authenticate
Can we do better than this?
What was that?

Tomáš Popela (Red Hat) and David Woodhouse (Intel) worked to fix libsoup and WebkitGtk

This laptop is running an experimental build of them

We logged into my FreeIPA server’s Web UI

Hopefully, the code will be in the next GNOME release
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- Single sign-on is the primary feature
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- No need to store passwords locally (secure kiosks?)
Visualize

 GNOME Online Accounts could show Kerberos ticket properties

▶ Ticket time validity, flags (forward, renewal)
▶ Authentication indicators
▶ Existing service tickets in the credentials cache and allow to remove them selectively
▶ Allow automatic ticket renewal if KDC permits it
And choose between different Kerberos principals

- MIT Kerberos supports kernel keyring (1.12+) and directory-based (1.11+) storage of credentials
- Multiple Kerberos principals can be stored and used at the same time
- Only a single principal can be defined as “primary” for each Kerberos realm in the collection of credentials
Kerberos ticket renewal

- SSSD supports automatic Kerberos ticket renewal for single factor cases
  - Renewing 2FA tickets requires UI interaction triggered by expiry time
  - Automatic ticket renewal requires permission from KDC, visible as a ticket flag
- GNOME Online Accounts could integrate with SSSD in prompting for credentials (multiple factors) in 2FA case needed information could be provided via SSSD InfoPipe/AuthPipe
Better Kerberos in browsers

- Firefox Kerberos setup isn’t nice
  - needs about:config manipulation
  - DNS domains associated with Kerberos realm could be discovered via DNS SRV records, prompted for confirmation once

- FreeIPA used to provide an extension to automate Firefox setup
  - Extension was generated locally for each FreeIPA deployment to provide configuration details
  - not anymore: Firefox removed ability to provide non-publicly available extensions since version 43
Better Kerberos in browsers

- Chromium/Chrome
  - Have bugs for processing of WWW-Authenticate: Negotiate when Kerberos credentials are not available
  - On Linux only allows to configure Kerberos use through command line, poor user experience

- A fixed libsoup/WebkitGtk allows to always use GSSAPI if server advertises WWW-Authenticate: Negotiate over HTTPS
  - no need to configure anything in Epiphany
  - could be further confined with a user confirmation similar to how passwords are managed on first use
Better Kerberos in browsers

- GSSAPI flow is synchronous, needs better UI interaction to avoid hogging down other tabs
  - still major issue for many browsers
Any practical use of it?
What was that?

*Ipsilon* is an Identity provider that supports GSSAPI, SAML, OpenID, and other methods of authentication

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▶ I set up Ipsilon to authenticate against my FreeIPA server
▶ I set up Owncloud instance and created a simple application to do login via Ipsilon SAML
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- Successfully logged-in users get created in *Owncloud* if they belong to a certain group in *FreelPA*
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Oops, I “invented” Owncloud Enterprise Edition?
Better support for SAML in GNOME Online Accounts

GNOME Online Accounts doesn’t support SAML for arbitrary provider

- One cannot setup own Owncloud account in GNOME without entering passwords
- Have to use separate Owncloud end-point for non-SAML logon
Certificates

FreeIPA 4.2 supports issuing x.509 certificates to users

FreeIPA 4.2 adds per-user vault to store keys and credentials wrapped into an encrypted blob

- authentication to password vaults is GSSAPI-based
- multiple clients can use unique public/private key pairs to derive their access to user’s vault
- SSSD 1.13 allows to authenticate with certificates
- Certificates can come from any OpenSC and coolkey compatible devices
How enterprisey our home could become?
What benefits do we get by becoming *enterprisey* with FreeIPA and GNOME?

1. Control your own infrastructure
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3. Profit?
Questions?