Large deployment of GNOME from the administrator’s perspective

Mini Debconf Paris 2012

25 november 2012

Introduction

- Debian is awesome to use in a 1000+ machines environment
  - Automated deployment tools: FAI, debian-installer
  - Customization: custom APT repositories
  - Administration tools, and our famous reliability!
- Workstations are a good use case, with GNOME as the desktop
  - The easy way: leave users with self-administration permissions
    → But it doesn’t scale very well in terms of support
  - Our way: standard workstations with no specific permissions
- In order to ship the best systems for users:
  - How does GNOME actually work on the inside?
  - Where are important places to look for a configuration / a problem?
  - What can I tweak on my systems?

OUTLINE

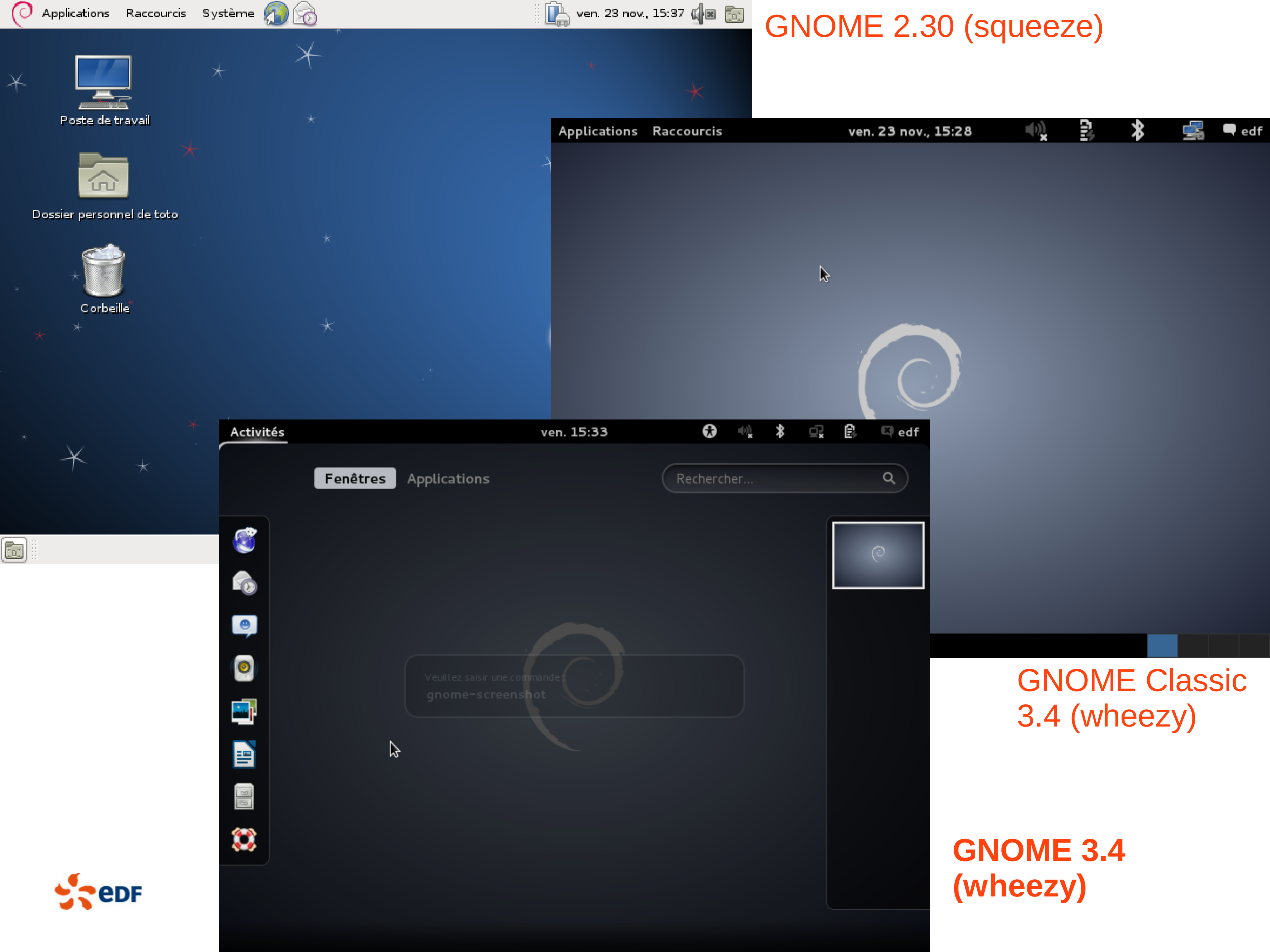
1. **The base plumbing for the desktop**
   DBus, PolicyKit, ConsoleKit

2. **User settings**
   GConf and GSettings

3. **Login and password management**
   The display manager & the keyring

4. **Networking with GNOME**
   Configuring and delegating the network with Network-Manager
   The virtual filesystem layer

5. **Miscellanea**
   Other plumbing
   Using the plumbing in custom scripts
   Deploying the configuration on workstations

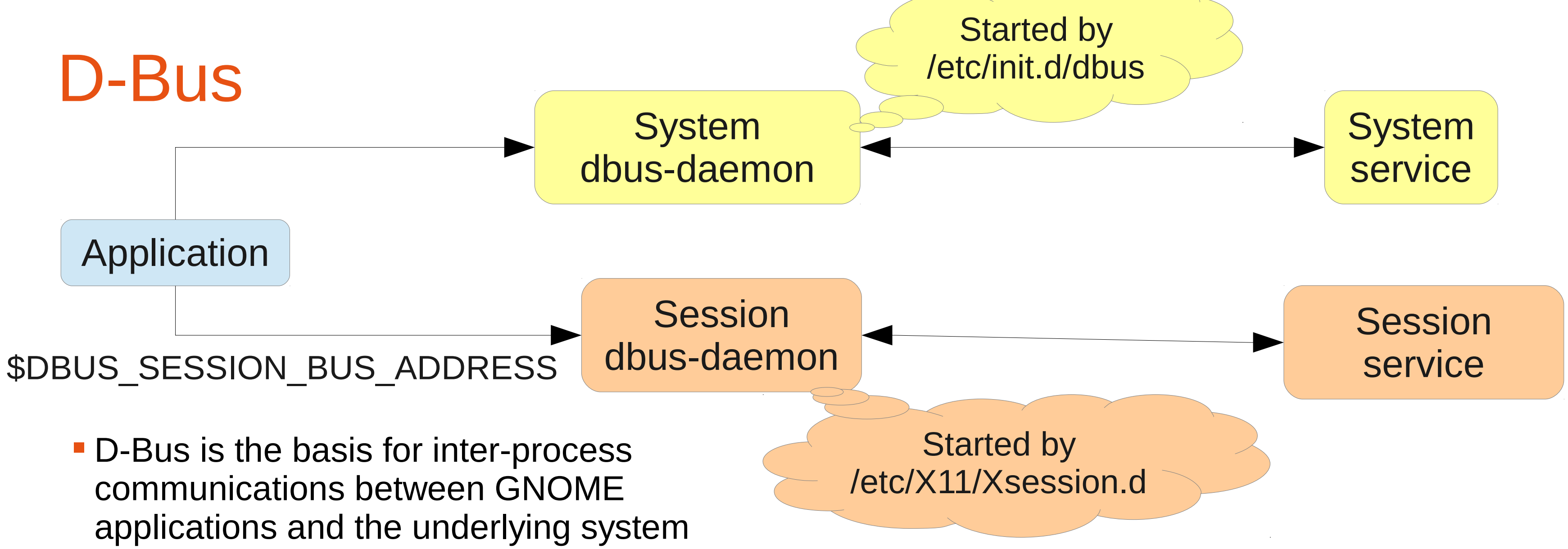


GNOME 2.30 (squeeze)

GNOME Classic 3.4 (wheezy)

GNOME 3.4 (wheezy)

D-Bus



Started by /etc/init.d/dbus

System dbus-daemon

System service

Application

$DBUS_SESSION_BUS_ADDRESS

Session dbus-daemon

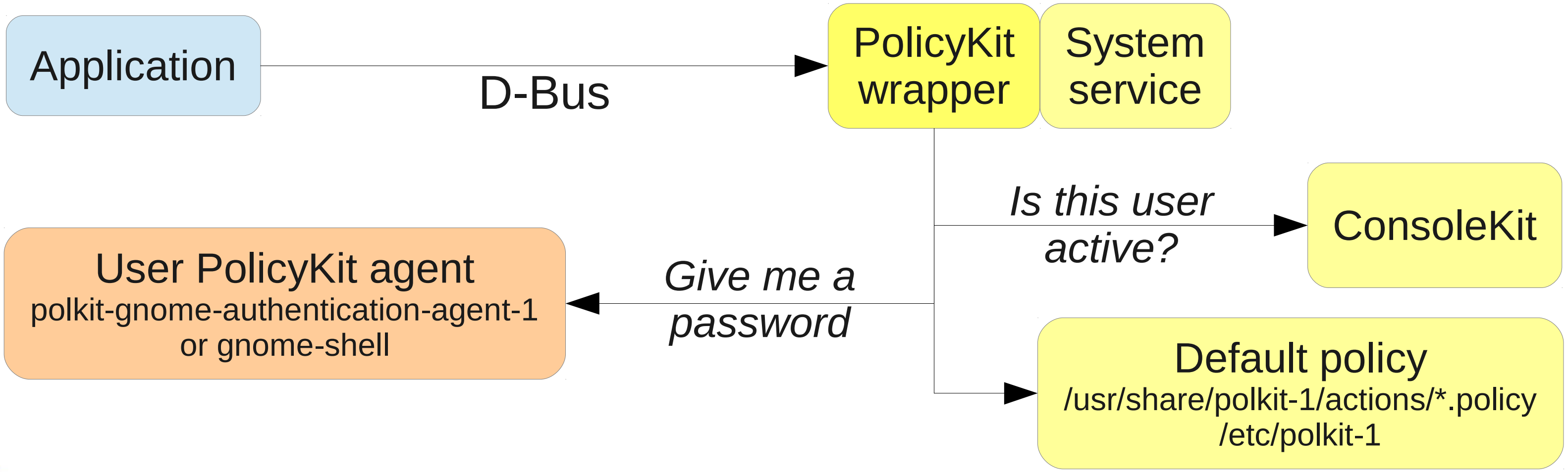
Session service

Started by /etc/X11/Xsession.d

- D-Bus is the basis for inter-process communications between GNOME applications and the underlying system
  - Based on a typed messaging system over Unix sockets
  - Implements an asynchronous RPC mechanism
  - The system bus is started at boot and never restarted
  - The session bus is started before the session manager by X11 scripts
- Services can either
  - Start by themselves and *register* a name, e.g. org.freedesktop.NetworkManager
  - Be auto-spawned by the DBus daemon
    → /usr/share/dbus-1/services/*.service and /usr/share/dbus-1/system-services/*.service
- Basic permissions management in /etc/dbus-1/*.conf
  - Most relevant daemons use PolicyKit instead

ConsoleKit and PolicyKit

- ConsoleKit **keeps track of users** logged on. Try the command: ck-list-sessions
  - Can be queried to know which user is physically logged on (active = TRUE)
  - In jessie, will be replaced by a similar systemd service
  - Default action: udev-acl (see /lib/udev/rules.d/70-acl.rules)
    → Sets permissions dynamically on a number of devices like /dev/snd/*
    → Most specific groups (audio, video, netdev…) are obsolete.
- PolicyKit adds complex **permissions management** to D-Bus
  - Can wrap any D-Bus call, invisible from the application



Tuning the default policy

- Ship a file in /etc/polkit-1/localauthority/30-site.d/*my-config*.pkla
  - [Allow users to shutdown the system even when someone else is logged on]

    ```
    Identity=*
    Action=org.freedesktop.consolekit.system.stop-multiple-users
    ResultAny=no
    ResultInactive=no
    ResultActive=yes
    ```

    ResultActive is for the user actually using the machine

  - [Let some users change the CPU frequency by hand]

    ```
    Identity=unix-group:benchmarks
    Action=org.gnome.CPUFreqSelector
    ResultAny=no
    ResultInactive=no
    ResultActive=yes
    ```

    Group selection

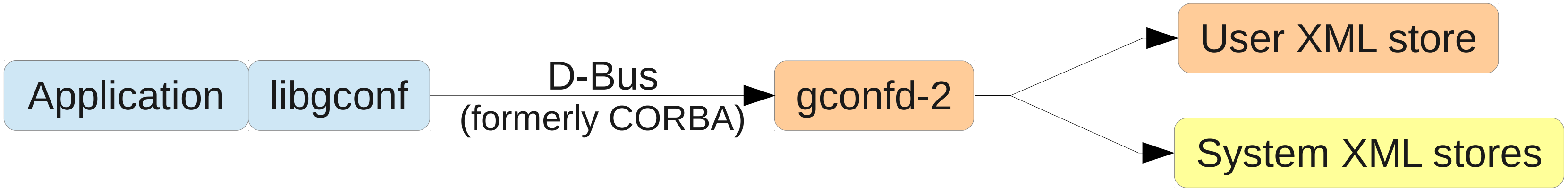
  - [Let a user install any package from the repository using software-center]

    ```
    Identity=unix-user:joss
    Action=org.debian.apt.install-packages
    ResultAny=no
    ResultInactive=no
    ResultActive=auth_self
    ```

    Ask the user’s own password

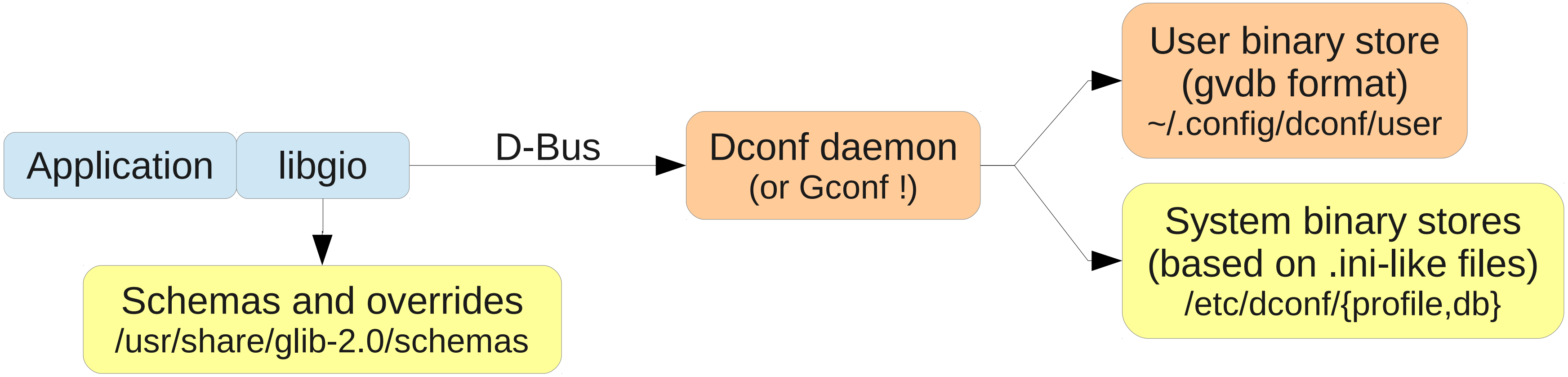
  - In jessie, you will be able to set more complex rules using JavaScript

User settings in GNOME 2.x: GConf

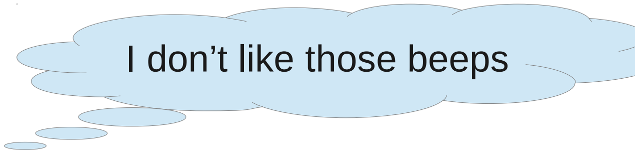


- Still used by a few applications, but not the core of GNOME in wheezy
- Stack of stores implementing defaults, user settings, mandatory (readonly) settings
- Debian-specific paths:
  /usr/share/gconf/schemas → schemas (+ upstream defaults)
  /usr/share/gconf/{defaults,mandatory} → overrides and mandatory settings
  /var/lib/gconf/* → default stores (where schemas/defaults are applied)
  /etc/gconf/2/path → the stores list
- Changing a user setting: gconftool --type *type* --set *key value*
- Changing a system setting:
  gconftool --direct --config-source xml:readwrite:/etc/gconf/gconf.xml.defaults --type *type* --set *key value*
- Changing a setting in a Debian package:
  debian/*package*.gconf-defaults or *package*.gconf-mandatory
  /path/to/key value
  dh_gconf --priority 90
- Which settings are available?
  gconf-editor or gconftool -R /

User settings in GNOME 3.x: GSettings



- Schemas, defaults and overrides are managed by the client
- The daemon uses binary databases for speed
- Changing a user setting:
  - gsettings set org.gnome.desktop.sound event-sounds false
- Listing all settings:
  - gsettings list-recursively org.gnome.nautilus
- There is also the (buggy) dconf-editor



Tuning GSettings in a package

- Ship an override file in debian/*package*.gsettings-override

  ```
  dh_installgsettings --priority=90
  ```

  -
    ```
    # Custom background
    [org.gnome.desktop.background]
    picture-options='zoom'
    picture-uri='file:///my/nice/picture.svg'
    ```

    You can also use XML files for evolving backgrounds

  -
    ```
    # Squeeze-like icons on the desktop
    [org.gnome.desktop.background]
    show-desktop-icons=true
    ```

  -
    ```
    # I haz a theme
    [org.gnome.desktop.interface]
    gtk-theme='FabulousTheme'
    icon-theme='WonderfulIcons'
    [org.gnome.desktop.wm.preferences]
    theme='CoolBorders'
    ```

    The GTK theme needs to have the same name for GTK+ 2.0 and 3.0

  -
    ```
    # Default applications and extensions in the shell
    [org.gnome.shell]
    favorite-apps=['evolution.desktop', 'libreoffice-impress.desktop', …..]
    enabled-extensions=['apps-menu@gnome-shell-extensions.gcampax.github.com']
    ```

D-Conf: default and mandatory system settings

- Configure a system database: /etc/dconf/profile

```
user-db:user
system-db:local
```

- Default settings then go in /etc/dconf/db/local.d/00_my_defaults

  -
    ```
    # Those users are too dumb, don’t let them do anything
    [org/gnome/desktop/lockdown]
    disable-applications-handlers=true
    disable-log-out=true
    disable-print-setup=true
    …
    ```

Separator for defaults is /
(instead of . for schemas)

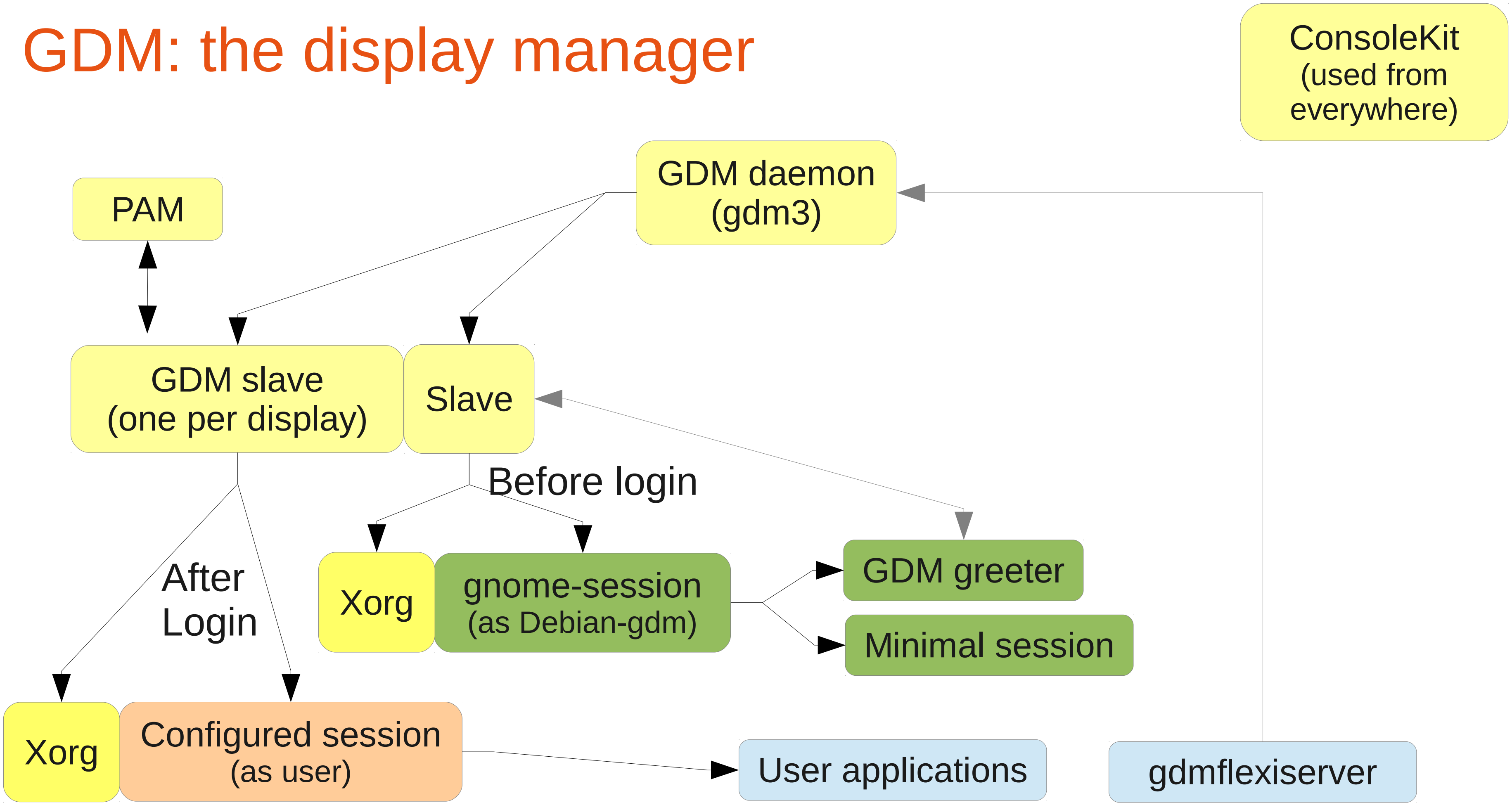
- Make those defaults mandatory with **locks**: /etc/dconf/db/local.d/locks/my_locks

```
/org/gnome/desktop/lockdown/disable-applications-handlers
/org/gnome/desktop/lockdown/disable-log-out
/org/gnome/desktop/lockdown/disable-print-setup
…
```

- To **update the database**:

```
dconf update
```

GDM: the display manager


ConsoleKit (used from everywhere)
GDM daemon (gdm3)
PAM
GDM slave (one per display)
Slave
Before login
After Login
Xorg
gnome-session (as Debian-gdm)
GDM greeter
Minimal session
Xorg
Configured session (as user)
User applications
gdmflexiserver

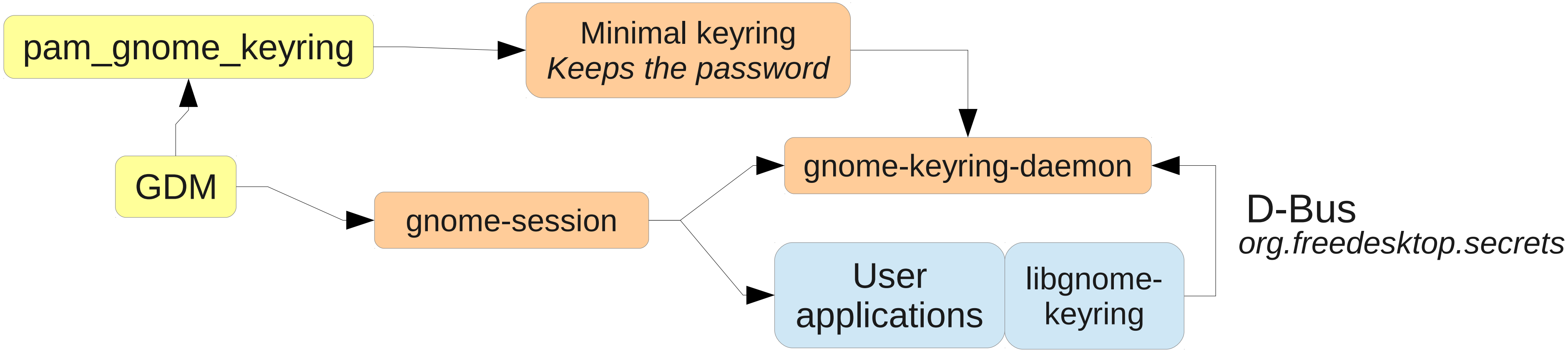
- All communication goes through D-Bus
- Tight integration with ConsoleKit (manages user/VT/display relations)
- Displays are started and closed dynamically
- Minimal login session launched to manage login (with full a11y support)

Configuring GDM

- Daemon configuration: /etc/gdm3/daemon.conf (Debian-specific)
    - Enabling autologin, debugging, VT configuration…
    - XDMCP ⚠
- The real configuration for the minimal session (Debian-specific)
    - GNOME 2.30: /etc/gdm3/greeter.gconf-defaults
      In a package: /usr/share/gdm/greeter-config/90_my_config
      + invoke-rc.d gdm3 reload
    - GNOME 3.x: /etc/gdm3/greeter.gsettings (GSettings format)
      In a package: /usr/share/gdm/dconf/90-my-settings (DConf format)
      + invoke-rc.d gdm3 reload
- User defaults (language, session, user icon):
    - In GNOME 2.30: ~/.dmrc and ~/.face
    - In GNOME 3.x: AccountsService → /var/lib/accountsservice

Storing secrets: the GNOME keyring

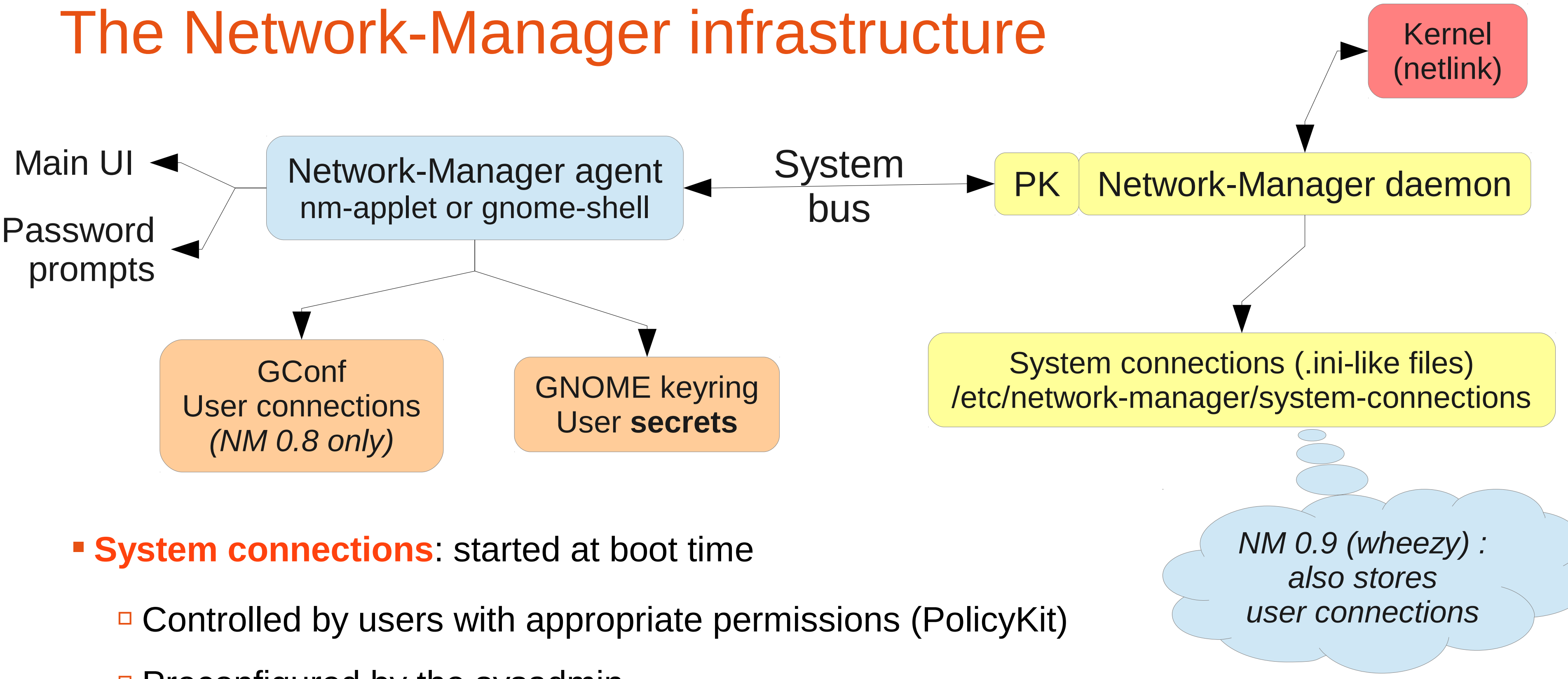
- Keeps user secrets in AES-encrypted files
  - Several *keyrings*, each with its own password
  - Also acts as GnuPG and SSH agent
  - Special case: the **login keyring** uses the login password



- User interface: **seahorse**
  - Access user keys and passwords
- pam_gnome_keyring also acts when **changing the password**
  - Infrastructure constraint: password change is on the same machine

Passwords are kept in sync

The Network-Manager infrastructure



Kernel (netlink)

Main UI

Password prompts

Network-Manager agent
nm-applet or gnome-shell

System bus

PK

Network-Manager daemon

GConf
User connections
(NM 0.8 only)

GNOME keyring
User **secrets**

System connections (.ini-like files)
/etc/network-manager/system-connections

NM 0.9 (wheezy) :
also stores
user connections

- **System connections**: started at boot time
  - Controlled by users with appropriate permissions (PolicyKit)
  - Preconfigured by the sysadmin
- **User connections**: started at login time / on-the-fly
  - Secrets stored securely in the keyring
  - Fast user switching: drops the connection (either wanted or buggy behavior).
    → NM 0.9 now defaults to system connections but supports user connections
- System connections with user secrets: 802.1x

Configuring system connections

- Let’s say your DHCP server returns incorrect information, Windows-only
- But you need working DHCP + IPv6 in the outside world

- In /etc/network-manager/system-connections/eth0-external
  - [connection]

```
id=eth0-external
uuid=deadbeef-1234-1234-1234-deadbeef1234
type=802-3-ethernet
autoconnect=false

[ipv4]
method=auto

[802-3-ethernet]
duplex=full
mac-address=13:37:15:de:ad:11

[ipv6]
method=auto
```

Identifies the device

- In /etc/network-manager/system-connections/eth0-internal
  - [connection]

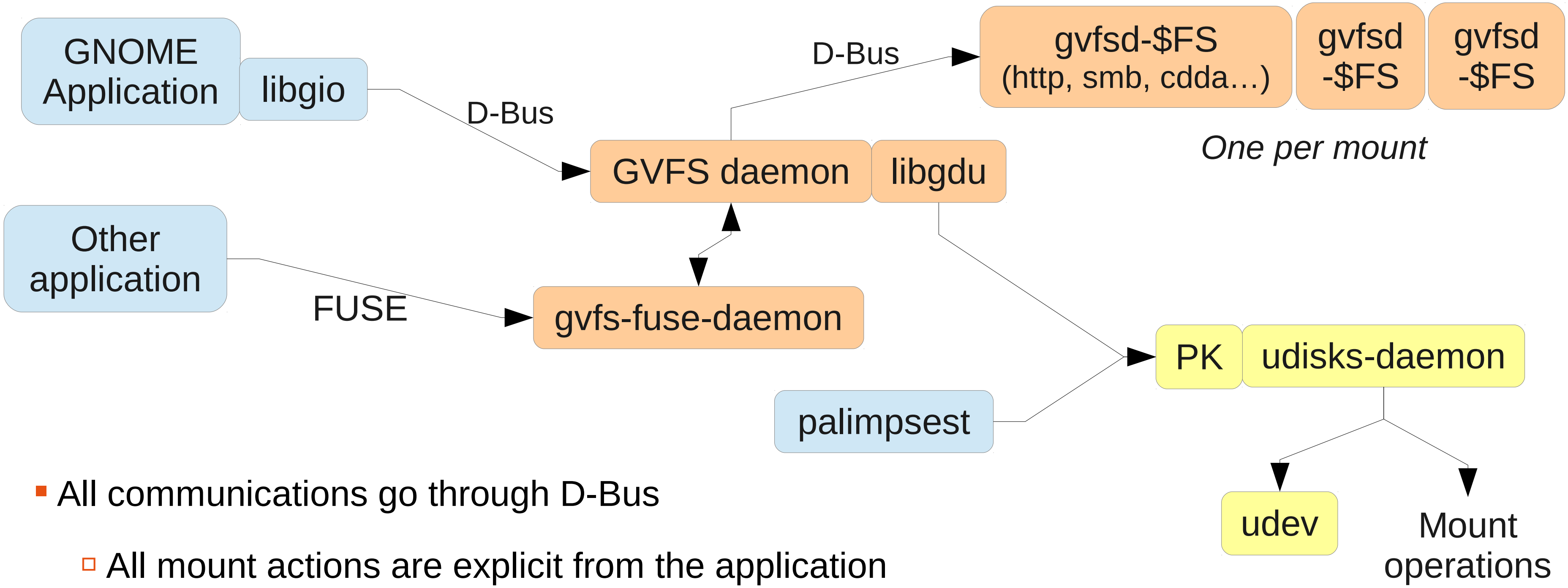
```
id=eth0-internal
uuid=deadbeef-1234-1234-1234-deadbeef1234
type=802-3-ethernet

[ipv4]
method=auto
dns=10.0.0.42
dns-search=unix-servers.nolcorp.com
ignore-auto-dns=true

[802-3-ethernet]
duplex=full
mac-address=13:37:15:de:ad:11

[ipv6]
method=ignore
```

Required on 0.9

- Other use cases
  - Pre-configuring Wi-Fi with a shared key the user doesn’t see (not very secure though)
  - 802.1x with a per-machine certificate the user doesn’t see
  - Pre-configured 802.1x with per-user credentials

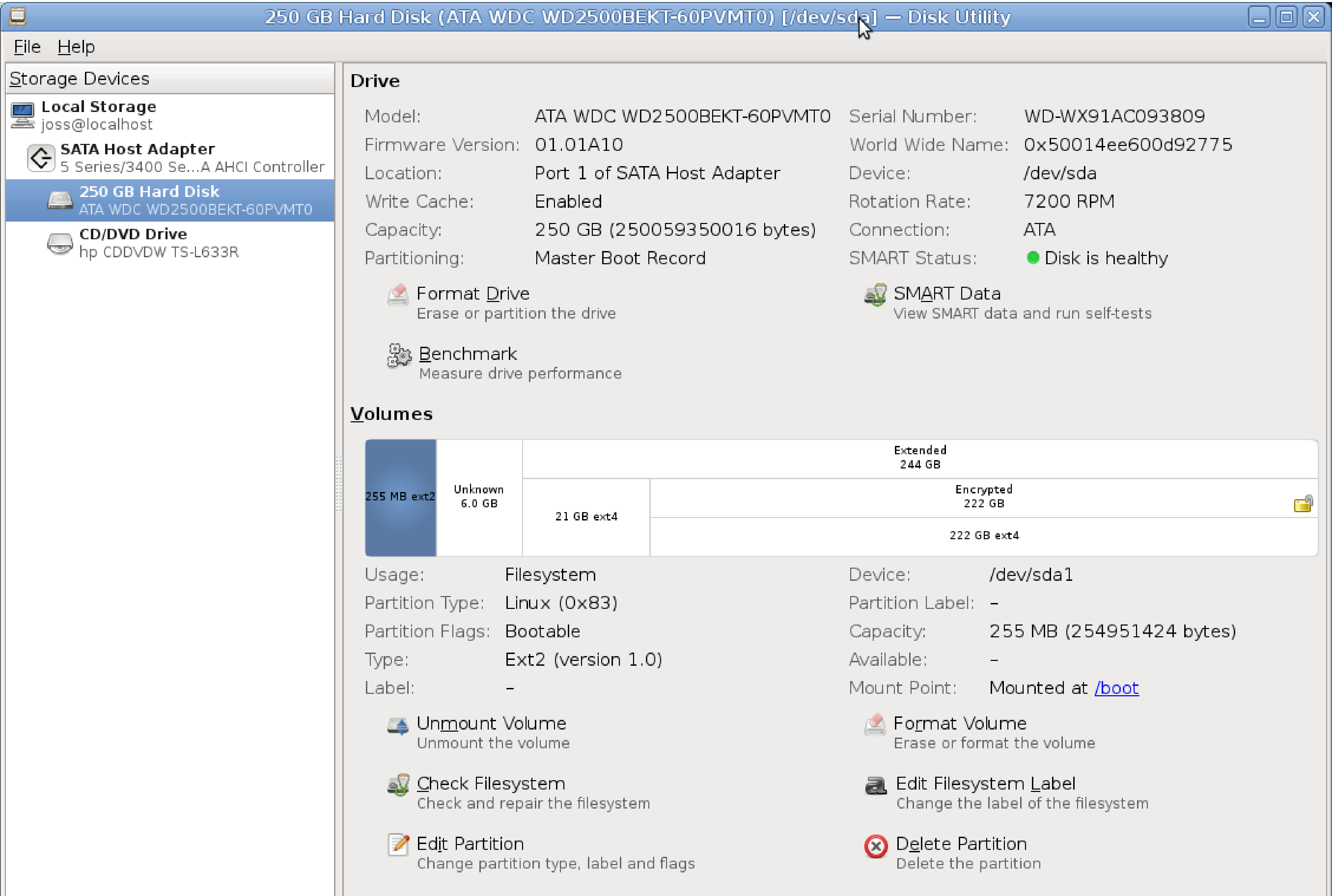
→All still with access to other networks for users with **PolicyKit permissions**

Networked and local filesystems: the VFS layers



- All communications go through D-Bus
  - All mount actions are explicit from the application
    → Done by gnome-settings-daemon, nautilus or gnome-shell
- Command-line:
  - See all mounted filesystems: gvfs-mount -l
  - Mount a CIFS mount: gvfs-mount smb://server/share/path
- Gvfs-fuse: nautilus redirects applications not supporting GIO to ~/.gvfs
  - Needs *fuse* group membership

The palimpsest interface (GNOME disk utility)



250 GB Hard Disk (ATA WDC WD2500BEKT-60PVMT0) [/dev/sda] — Disk Utility

Storage Devices

Local Storage
joss@localhost

SATA Host Adapter
5 Series/3400 Se...A AHCI Controller

250 GB Hard Disk
ATA WDC WD2500BEKT-60PVMT0

CD/DVD Drive
hp CDDVDW TS-L633R

Drive

Model: ATA WDC WD2500BEKT-60PVMT0
Firmware Version: 01.01A10
Location: Port 1 of SATA Host Adapter
Write Cache: Enabled
Capacity: 250 GB (250059350016 bytes)
Partitioning: Master Boot Record

Serial Number: WD-WX91AC093809
World Wide Name: 0x50014ee600d92775
Device: /dev/sda
Rotation Rate: 7200 RPM
Connection: ATA
SMART Status: ● Disk is healthy

Volumes

Usage: Filesystem
Partition Type: Linux (0x83)
Partition Flags: Bootable
Type: Ext2 (version 1.0)
Label: –

Device: /dev/sda1
Partition Label: –
Capacity: 255 MB (254951424 bytes)
Available: –
Mount Point: Mounted at /boot

Other useful things to know & configure

- Available applications (menus and MIME associations):
  /usr/share/applications and ~/.local/share/applications
- Adding new sub-menus:
  /etc/xdg/menus/applications-merged/my-menu.menu
- CUPS PolicyKit interface: **cups-pk-helper**
  - *Squeeze:* system-config-printer{,-applet}
    Wheezy: directly in g-control-center & g-settings-daemon
  - Query / configure printers, notifications for print operations
- Power management interface: **upower**
  - g-power-manager (*squeeze*) / g-settings-daemon (*wheezy*) defines the policy
- Sound server / mixer: **PulseAudio** *(wheezy only)*
  - All mixing now done through it
  - Can be configured to mute sound when switching users

GNOME is easily scriptable

- **In Python**:

  from gi.repository import Gtk, GnomeKeyring, …

  - Formerly in squeeze: autogenerated Python modules

    The conversion script does most of the job

- In JavaScript:

  #! /usr/bin/seed
  Gtk = imports.gi.Gtk;

- Some real-world-examples:

  - A daemon / applet to bypass an IE-only enterprise proxy

    Notification area / libnotify: display status
    Autostart with the session
    Store the password in the keyring

  - A script to create CIFS shortcuts accessible from “Places” menu

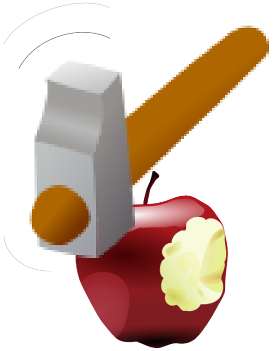
    Store the password for GVFS
    ~/.gtk-bookmarks → “Places” and the shortcuts for GtkFileChooser

  - A script to wrap a RDP / Citrix client

    Extract the same password as for CIFS

An infrastructure for GNOME machines

- **The infrastructure is more work than the desktop**
- Most of the time: a Debian mirror and a custom APT **repository**
  → rsync / debmirror and reprepro / mini-dinstall / …
- A custom installation CD: FAI or d-i
- Authentication: OpenLDAP or Fedora directory server
- Printing is tricky
  - CUPS can hold thousands of printers but the UI becomes unusable
  - J. Blache's solution: filtering printers by location with LDAP
    → **Welcome to the wonderful world of copyright assignment.**
- Network file systems: don't forget about **NTP**!
- Administrating a large bunch of machines: forget about simplistic solutions
  - 2 good tools in Debian: **Puppet** and **BCFG2**
  - Can be linked to inventory: GLPI + FusionInventory
- Root password management anyone?
- You encrypt partitions? Don't forget about key escrow



Thank you.