Porting fwupd to the BSD distributions

Keep your hardware safe with up-to-date firmware

FOSDEM 2021

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- Project genesis and BSD community concerns
- Overall information about fwupd
- fwupd tool architecture
- Firmware and metadata verification
- fwupd port for Qubes OS
- Status of our work
- Main problems
- Q&A

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- open-source contributor:
  - qubes-fwupd
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- scope of interests:
  - firmware upgrade tools
  - virtualization
  - embedded Linux

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- Our clients were asking if there is an easy way to upgrade firmware in BSD distributions

- The community were asking if there is possibility to port fwupd to BSD distributions

- fwupd port is funded by NLNet foundation - https://nlnet.nl/project/fwdup-BSD/

- "Why should we trust the firmware provider?"

- "Do I need daemon running all the time to check for updates?"

- "I can ask OEM to send me firmware binary via email!"

Reddit thread: https://www.reddit.com/r/BSD/comments/9fmagx/will_fwupd_on_linux_for_firmware_updates_work_on/

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- Outdated firmware makes devices vulnerable to the different attacks

- fwupd project can query supported hardware for the current firmware versions and also deploy new firmware versions to devices

- LVFS is a secure web service that provides information about available firmware updates. It can be used by the OEM's to upload firmware archives downloaded by the users

- Our mission is to port fwupd to BSD distributions to make the firmware update process easier for the BSD community
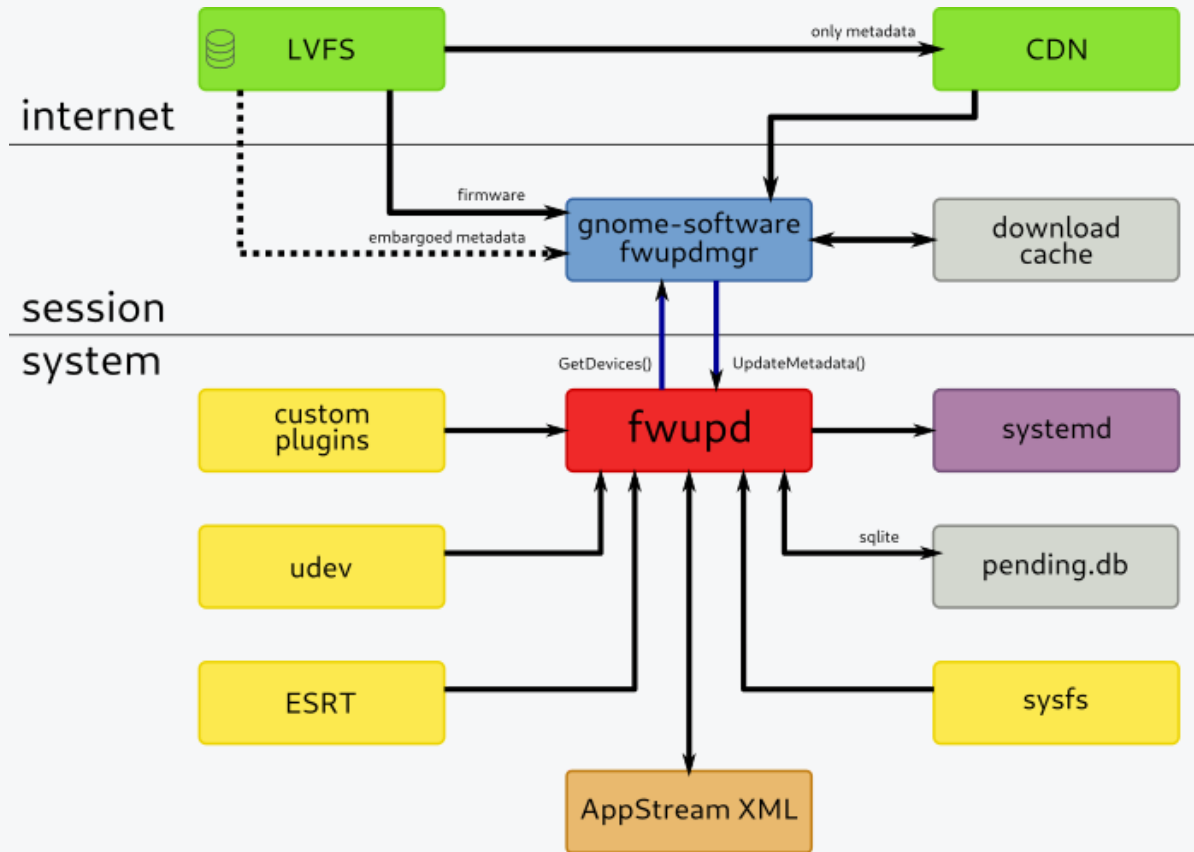
Image source: https://lvfs.readthedocs.io/en/latest/intro.html

- The LVFS is a secure web service that is used by OEM's to provide firmware updates

- The LVFS provides metadata that contains information about possible updates

- The firmware updates are packed into cabinet archives. The archive contains the firmware blob, information about the update, and jcat file, which is used to verify the firmware updates

- A manufacturer is signing the firmware and this sign is verified during the update

- Since version 1.4.0, fwupd uses libjcat (https://github.com/hughsie/libjcat/) to verify the metadata and firmware updates

- libjcat allows reading and writing gzip-compressed JSON catalog files which can be used to store GPG, PKCS-7, and SHA-256 checksums for each file.

- Firmware and metadata have jcat files that provide information about checksums, GPG, and PKCS-7 signatures

- fwupdmgr uses this information to validate files that LVFS provides to the user

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qubes-fwupdmgr update

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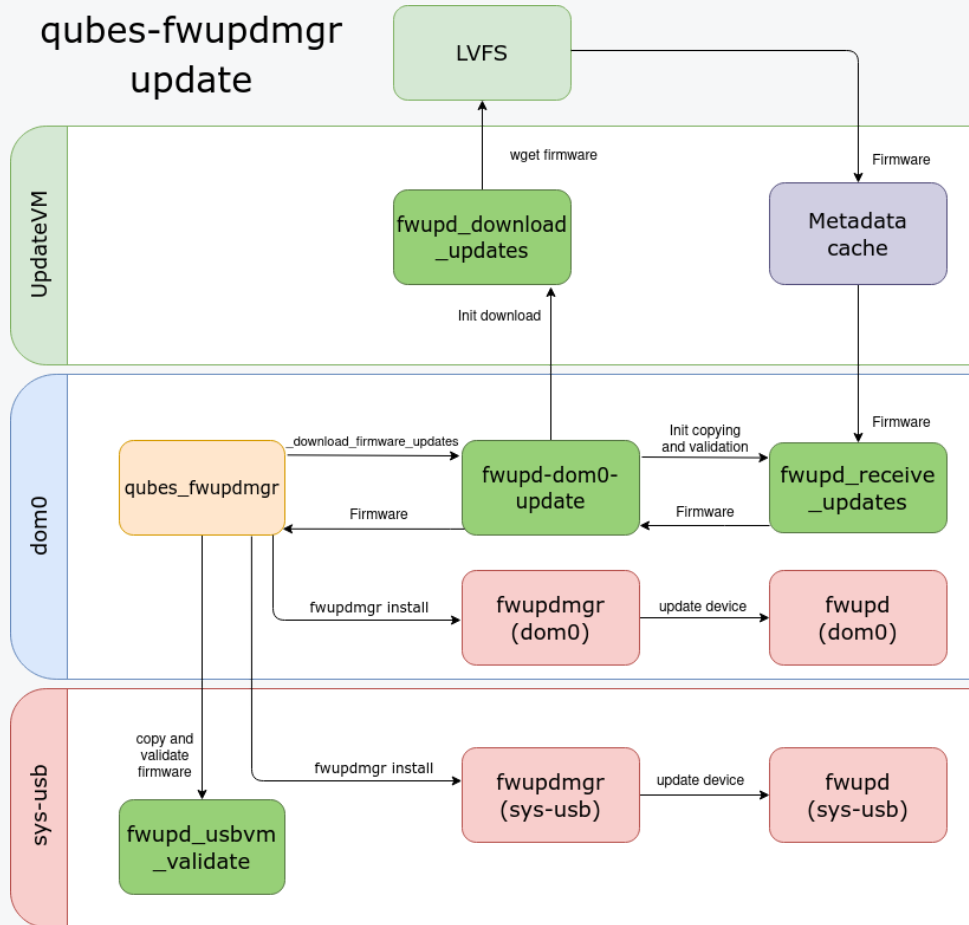
- We would like to provide the fwupd functionalities for four BSD distributions:

  - FreeBSD
  - DragonflyBSD
  - NetBSD
  - OpenBSD

- First of all, we would like to provide firmware updates for USB devices

- After that, we would like to provide UEFI capsule updates

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- Our first goal is compiling the fwupd under the FreeBSD

- Most of the fwupd dependencies are already available in the FreeBSD package manager

- libgusb is a hard requirement of the fwupd. Port of this library has been started by Ting-Wei Lan (https://github.com/hughsie/libgusb/pull/10). It is based on libusb-1.0. FreeBSD provides its implementation of libusb. Some functions that are used by libgusb, are missing https://bugs.freebsd.org/bugzilla/show_bug.cgi?id=224454

- During the meson configuration, the find_library method of the compiler object cannot find the specific libraries

- To make it work correctly, it needs to be replaced with hard dependency

- FreeBSD uses devd (device state change daemon) instead of udev (device manager for the Linux kernel)

- There is no systemd in the BSD distributions

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- There is no EFI System Resource Table (ESRT) support in the FreeBSD kernel

- UEFI capsule update is based on the ESRT

- The ESRT provides a read-only catalog of system components for which the system accepts firmware upgrades via UEFI's "Capsule Update" feature

- This module allows userland utilities to evaluate what firmware updates can be applied to this system

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- For now, compilation fails due to Linux header dependencies

```
[2/272] Compiling C object libfwupdplugin/libfwupdplugin.so.1.0.0.p/fu-efivar.c.o
FAILED: libfwupdplugin/libfwupdplugin.so.1.0.0.p/fu-efivar.c.o

cc -Ilibfwupdplugin/libfwupdplugin.so.1.0.0.p -Ilibfwupdplugin
-I../libfwupdplugin -I. -I.. -Ilibfwupd -I../libfwupd -Isubprojects/libxmlb/src
-I../subprojects/libxmlb/src -Isubprojects/libjcat/libjcat
-I../subprojects/libjcat/libjcat -Isubprojects/libjcat
[...]
-I/usr/local/include/json-glib-1.0 -I/usr/local/include/p11-kit-1
-I/usr/local/include/gio-unix-2.0 -I/usr/local/include/gudev-1.0
-I/usr/local/include/libgcab-1.0 -Xclang -fcolor-diagnostics
-pipe -D_FILE_OFFSET_BITS=64 -Wall -Winvalid-pch -Wextra -std=c99 -g
-Waggregate-return -Wunused -Warray-bounds -Wcast-align
-Wdeclaration-after-statement -Wempty-body -Wformat=2 -Wformat-nonliteral
-Wformat-security -Wignored-qualifiers -Wimplicit-function-declaration
[...]
-Wwrite-strings -fstack-protector-strong -D_DEFAULT_SOURCE
-DFWUPD_DISABLE_DEPRECATED -D_BSD_SOURCE -D_XOPEN_SOURCE=700
-D_GNU_SOURCE -fPIC -pthread -MD -MQ
libfwupdplugin/libfwupdplugin.so.1.0.0.p/fu-efivar.c.o
-MF libfwupdplugin/libfwupdplugin.so.1.0.0.p/fu-efivar.c.o.d
-o libfwupdplugin/libfwupdplugin.so.1.0.0.p/fu-efivar.c.o -c
../libfwupdplugin/fu-efivar.c

../libfwupdplugin/fu-efivar.c:14:10: fatal error: 'linux/fs.h' file not found
#include <linux/fs.h>
         ^~~~~~~~~~~~
1 error generated.
```

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Feel free to contact us if you believe we can help you in any way. We are always open to cooperate and discuss.

Q&A