Porting fwupd to the BSD distributions

Keep your hardware safe with up-to-date firmware

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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/](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/](https://www.reddit.com/r/BSD/comments/9fmagx/will/fwupd_on_linux_for_firmware_updates_work_on/)
Outdated firmware makes devices vulnerable to the different attacks.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.
fwupd/LVFS architecture

LVFS

internet

only metadata

CDN

gnome-software

fwupdmgr

download

cache

firmware

embargoed metadata

session

custom plugins

systemd

system

udev

UpdateMetadata() GetDevices() sqlite

pending.db

sysfs

ESRT

AppStream XML


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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/](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.
fwupd port for Qubes OS

qubes-fwupdmgr
update

LVFS

wget firmware

fwupd_download_updates

init download

Metadata cache

Firmware

UpdateVM

fwupd-dom0-update

fwupd_dom0-update

Init copying and validation

Firmware

fwupd_receive_updates

fwupd (dom0)

fwupdmgr (dom0)

update device

fwupdmgr (sys-usb)

fwupdmgr (sys-usb)

update device

sys-usb

fwupd_usbvm_validate

fwupdmgr install

copy and validate firmware

fwupdmgr install

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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
Status of the work and main problems

- 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>).

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Status of the work and main problems

- 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.
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.
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 -llibfwupdplugin
-I../libfwupdplugin -I.. -llibfwupd -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-umini-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 -Wl,valid-pch -Wextra -std=c99 -g
-Waggregate-return -Wunused -Warray-bounds -Wcast-align
-Wdeprecation-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.
Feel free to contact us if you believe we can help you in any way. We are always open to cooperate and discuss.