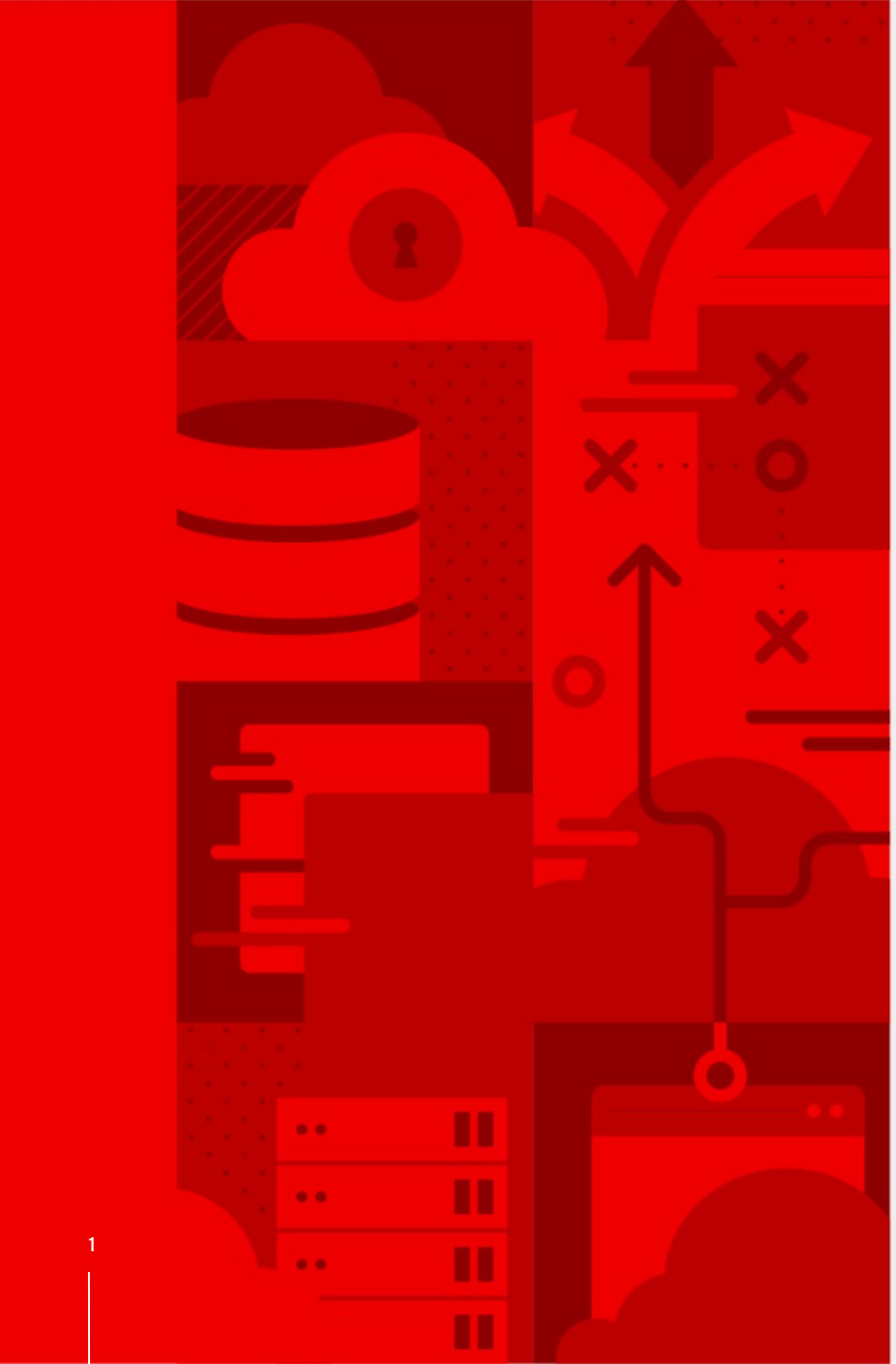


Building the LVFS

Forcing Hardware Vendors to care about Linux since 2015

Richard Hughes
Principal Engineer

Red Hat

The Problem: Users were not updating firmware

What hardware is installed?

Users don't typically know exactly what hardware they are using.

What updates are available

Users do not visit OEM websites to manually look for firmware updates.

Where do I get them from?

Many OEMs have insecure download links without any file checksums or signatures.

How to apply the update

Vendor tools often required Microsoft Windows, or unsupported Linux versions.

LVFS and fwupd work together

LVFS : Trusted Metadata Source

The hardware vendor uploads firmware to the LVFS where it is verified and signed. Users then download a shared metadata catalogue from a central server.

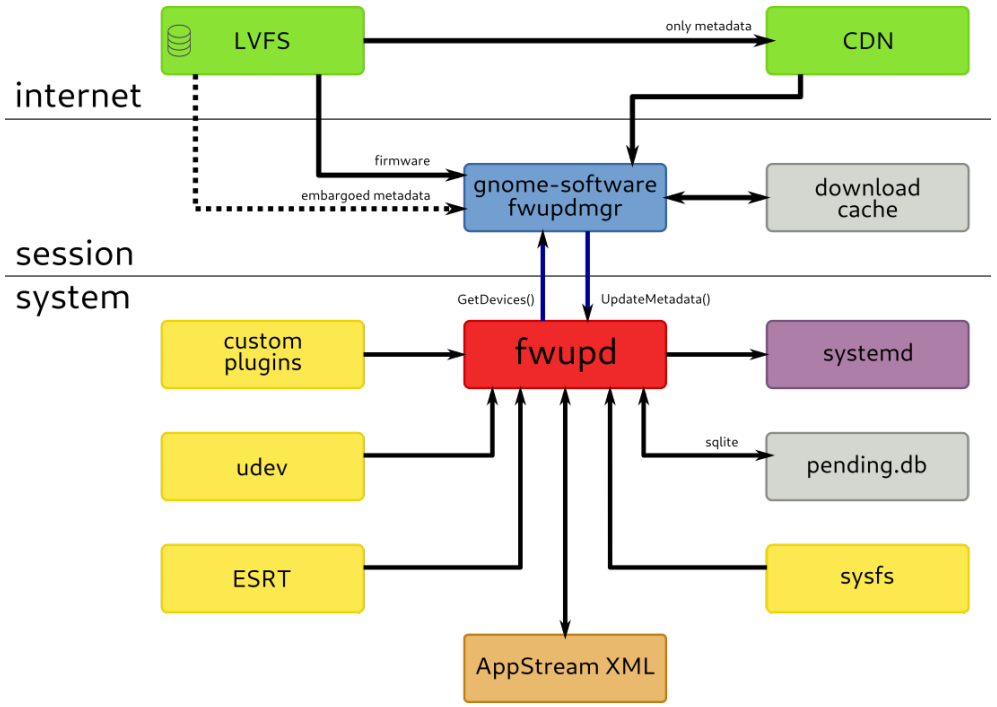
fwupd : Mechanism

The open source fwupd project deploys the update onto the Linux client machine. Over 32 update protocols are now supported and more are planned.

LVFS : Anonymous Reporting

After updating firmware, fwupd optionally sends success or failure information back to the LVFS to ensure updates are being deployed without problems

Architecture of fwupd



D-Bus is used to interact with fwupd

- Desktop neutral interface with binding for every language
- Optionally downloads metadata from the LVFS
- Enumerate hardware & deploy firmware.

Updates not applied without an agent

- Full integration with GNOME and KDE, and CLI interface

Scalable architecture designed to continue to grow

- Written in a *lowest common denominator* language: **C**
- Well tested dependancies of **GLib** and **GObject**

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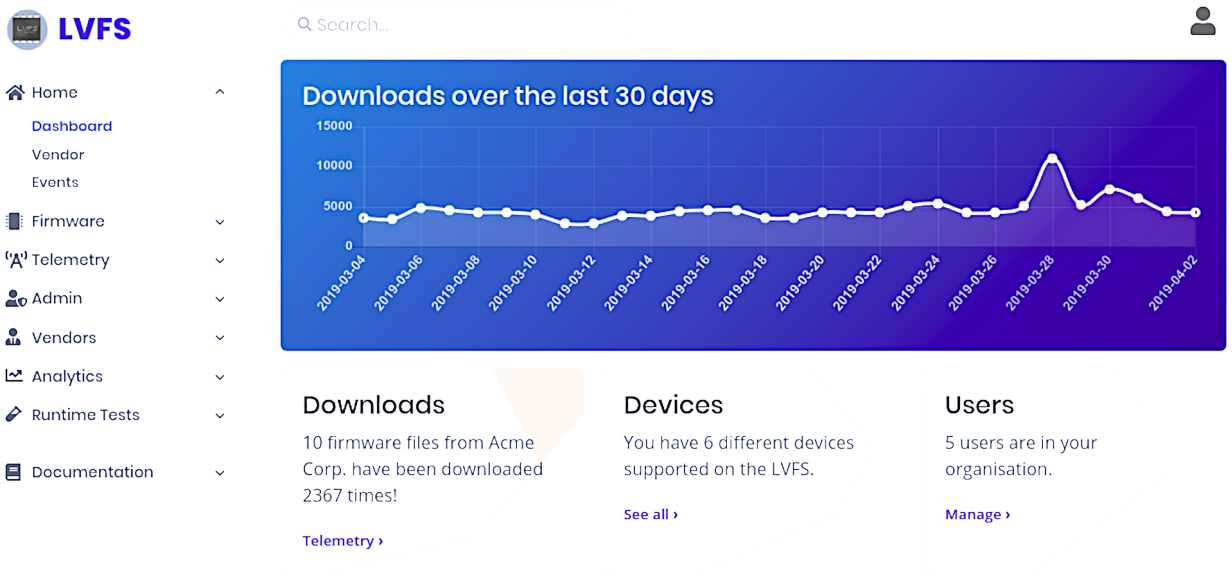
Architecture of LVFS



A simple web service that had to be "just good enough"

- No astronaut architects here

Privacy-centric by design

- Puts privacy first by matching hardware client side
- Metadata scale out to users via a "dumb" CDN

Mostly centralized firmware distribution

- Can easily be mirrored on a private network
- For demoting failing firmware
- *Really* for statistics

Scalable architecture

- Written in a high level language: **Python**
- Well tested dependancies of **Flask** and **SQLAlchemy**

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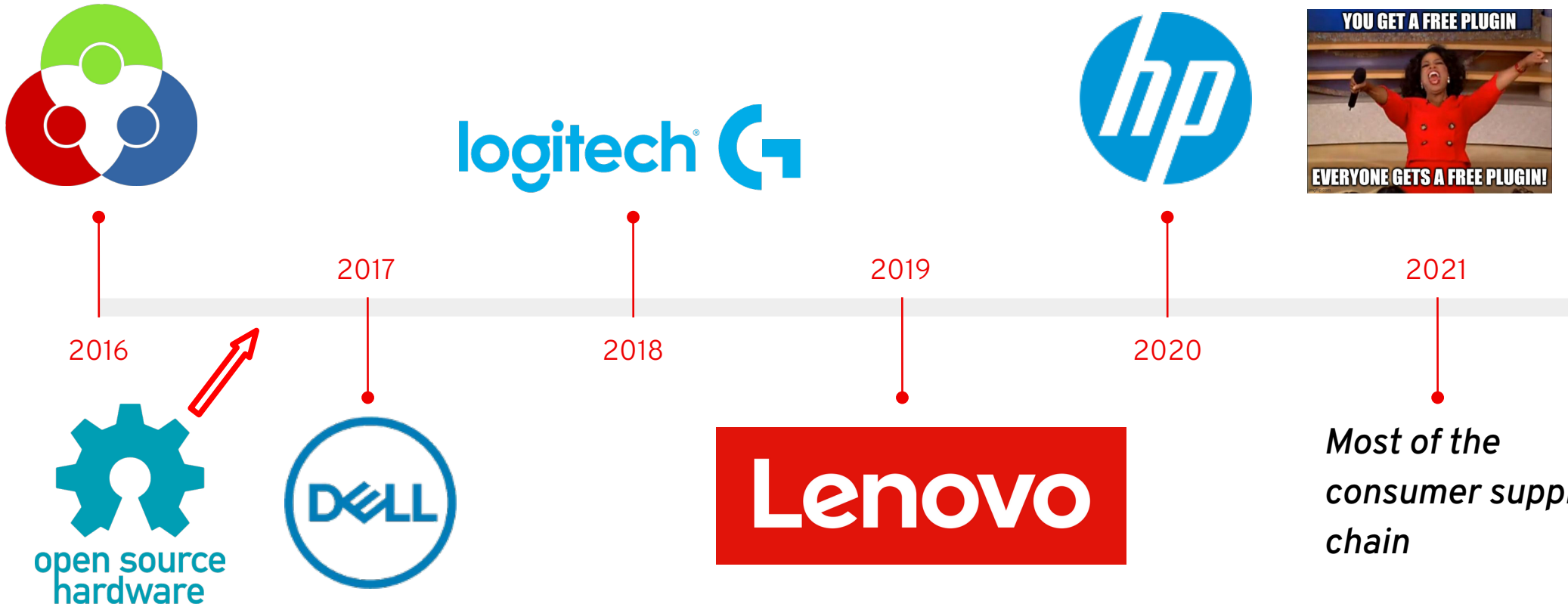
Red Hat Initiation Energy

Hi Richard,

Yes, we may be interested in the service, I think we should transition
to your @redhat email.

On Thu, Nov 26, 2015 at 9:31 PM, Richard Hughes <richard@hughsie.com> wrote:
> My name is Richard Hughes and I'm a developer at Red Hat. We have
> developed an open specification and mechanism for updating firmware on
> USB devices – we've launched this in Fedora 24 and will be rolling it out
> in RHEL 8 in the coming months, but it's of course available for all
> the other Linux distributions. fwupd allows vendors to either use the
> existing DFU mechanism, or define a custom "plugin" that can be used
> to install the update. The plugin can also be used as a way to
> query the current firmware version, and the LVFS site allows vendors
> to easily submit firmware files for mirroring and signing.

90 OEMs, ODMs & IHVs **all work together**



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Firmware update cadence used for purchasing

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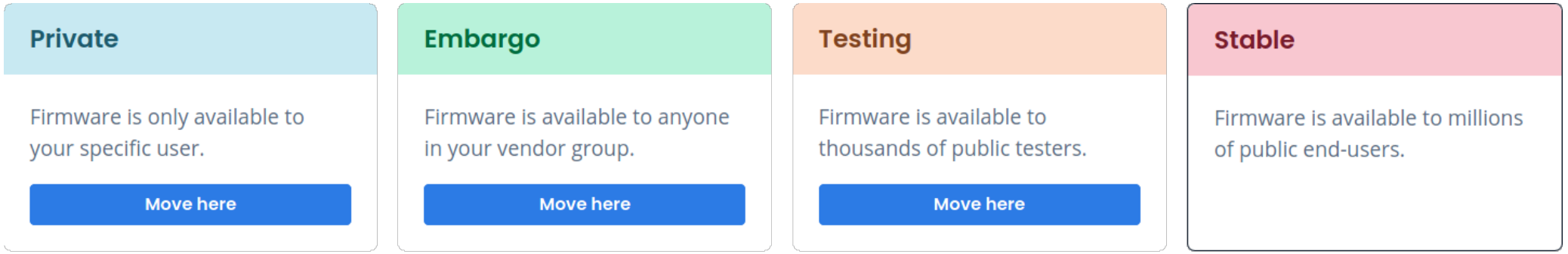
There is no cost to use the LVFS or to contribute to fwupd

The Linux Vendor Firmware Service is managed by the Linux Foundation and core development work is provided by **neutral** Red Hat.

Independent consulting companies provide technical help and training.

Private End-to-End Testing



History

Timestamp	User	Target
2016-12-28 10:34:11	richard@hughsie.com	stable
2016-12-28 10:34:07	richard@hughsie.com	testing
2016-12-28 10:34:03	richard@hughsie.com	embargo-hughski
2016-12-28 10:34:00	richard@hughsie.com	private

OEMs just want the easy life

OEMs are free to choose whatever criteria they like for hardware suppliers, and they are choosing these rules for various business reasons.

Lenovo

All suppliers for Lenovo ThinkPad, ThinkStation and ThinkCentre have to have working fwupd plugins and be able to upload to the LVFS. Failure to meet either criteria causes the “preferred vendor” status to be lost.

Dell

All approved ODMs and ISVs being used by Dell must have firmware that can be updated using fwupd and have updates available on the LVFS.

Google

Firmware must be updatable using fwupd to get the “Works with Chrome” compliance sticker. Google are shipping parts of fwupd in every Chromebook now sold.

How to build an ecosystem

Be installed by default

Being installed by default, so it “was there already”

The shared LVFS remote was “enabled by default”

Plugins meant the IHVs could “own” a tiny part of the code base and not feel totally out of control

Build and they will come

Building functionality in the hope it would be used

We did a lot of the work ourselves initially

Design for forward and backwards compatibility

Designed to not be cloned

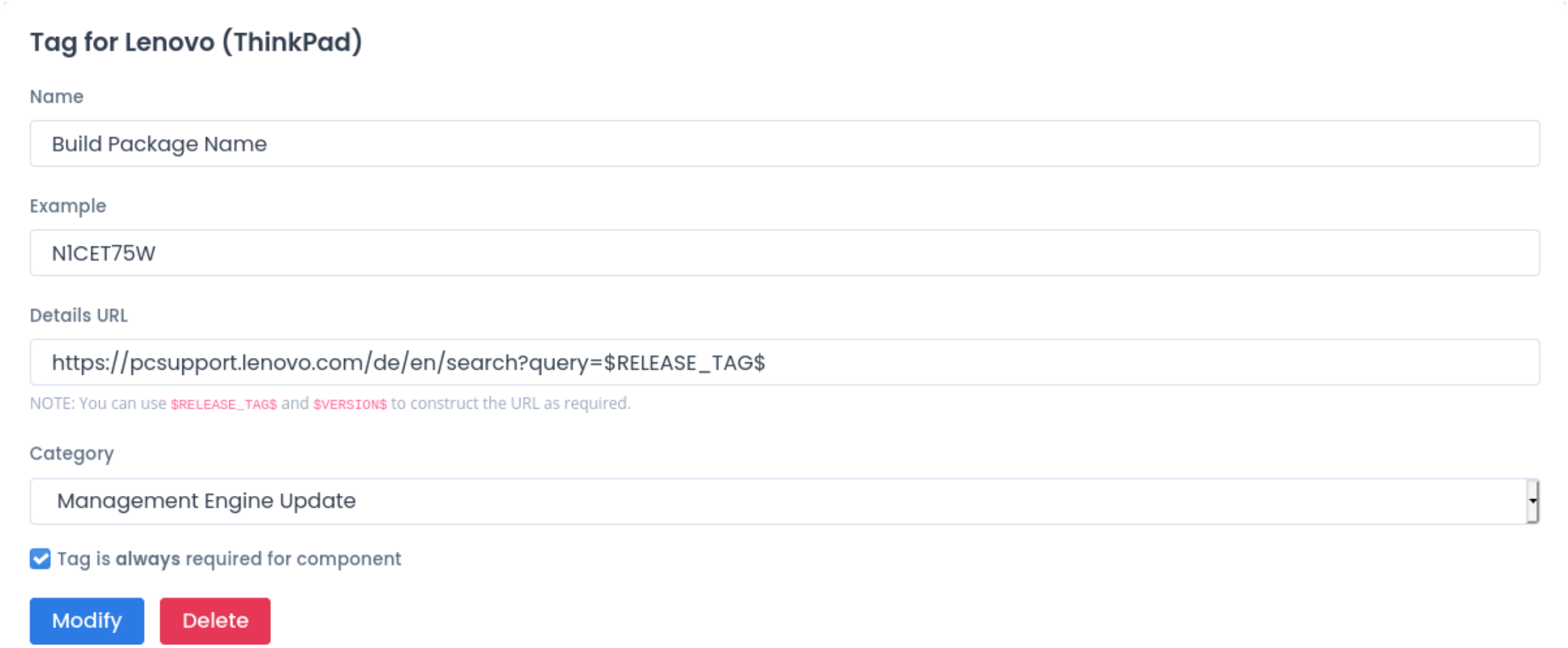
No **Intel** LVFS

No **HPE** LVFS

No **PixArt** LVFS

You can spin up your instance if you want, it’s just a ton of work and almost impossible to actually use.

Allowing the OEM to do it “thier way”



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IBVs, ODMs and OEMs have existing contracts

Independent BIOS Vendor

The OBV typically uploads firmware to the LVFS to run tests and to verify that the image works with fwupd. IBVs and ISVs are normally not shown on the LVFS.

Original Device Manufacturer

The ODM can either just upload updates on behalf of the OEM, or the ODM can manage the entire QA process including pushing to testing and stable.

Original Equipment Manufacturer

The OEM is the “user visible” brand the user is familiar with, and is typically the only vendor visible on the LVFS. OEMs can test firmware uploaded by their ODMs.

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Keeping two world in sync

Eclypsium

Vendor is sharing metadata with the LVFS.

Show devices

- Lenovo ThinkPad T560/P50s System Update (0.1.29 != 1.31)
- Lenovo ThinkPad X1 Carbon 5th System Update (0.1.48)
- Lenovo ThinkPad X1 Carbon 5th Embedded Controller Update (0.1.20)
- Lenovo ThinkPad X1 Yoga 2nd System Update (0.1.38)
- Lenovo ThinkPad X1 Yoga 2rd Embedded Controller Update (0.1.17)
- Lenovo ThinkPad T470 / ThinkPad 25 System Update (0.1.64)
- Lenovo ThinkPad P71 System Update (0.1.31)
- Lenovo ThinkPad P51 System Update (0.1.52)
- Lenovo ThinkPad T570/P51s System Update (0.1.42)

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The LVFS grows every year, as new vendors join and as more firmware is uploaded

Companies and agencies are free to mirror the LVFS for privacy or scalability reasons and so we don't actually know the real number of downloads.

Every day over 12 million Linux users automatically download firmware update metadata from the LVFS.

27.7M

Firmware files supplied to end users

Since the LVFS started the official server has supplied millions of firmware updates for over 200 different devices.

2.1M

Success reports from end users

Over 99% of firmware was deployed correctly, with 1% of "known failures" identified using a built-in rule engine.

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What the vendors are saying...

> LVFS is strategically important for Dell to be able to provide secure firmware updates in a standards-compliant way.

Mario Limonciello
Sr. Principal Software Engineer, Dell

> Standardizing on LVFS has helped Lenovo seamlessly distribute our firmware updates to our customers

Rob Herman
Executive Director, Lenovo

Red Hat

Thanks for listening!

Contact me:

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@hughsient

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