

Yocto's hidden gem: OTA and seamless updates with `systemd-sysupdate`

Martín Abente Lahaye

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systemd-sysupdate

- **Atomic updates** for different resources (files, directories or partitions).
- Updates from **remote and local sources** (HTTP/HTTPS and directories).
- Parallel installed versions **A/B/C/... style**.
- Relative **small** footprint (~10 MiB or roughly 5% increase).
- Available since **systemd 251**.

- Optional **Built-in** services for updating and rebooting.
- Optional DBus interface for **applications integration**.
- Optional grouping of resources to be enabled together as **features**.
- Leverages other mechanisms already baked-in (boot assessment, **systemd-boot**, etc).

<https://www.freedesktop.org/software/systemd/man/latest/systemd-sysupdate.html>

Yocto integration

Step 0: a Poky image

kas-poky-demo.yml:

```
INIT_MANAGER = "systemd"  
EFI_PROVIDER = "systemd-boot"  
INITRAMFS_IMAGE = "core-image-minimal-initramfs"  
QB_KERNEL_ROOT = ""  
QB_DEFAULT_KERNEL = "none"  
IMAGE_FSTYPES = "wic"  
WKS_FILE = "core-image-demo.wks.in"
```

recipes-core/images/core-image-demo.bb:

```
SUMMARY = "A demo image with UKI support enabled"

LICENSE = "MIT"

UKI_CMDLINE = "rootwait root=PARTLABEL=root console=${KEYBOARD}

inherit core-image uki
```

https://github.com/uapi-group/specifications/blob/main/specs/unified_kernel_image.md

wic/core-image-demo.wks.in:

```
part /boot --ondisk sda --fstype vfat --part-name ESP --p
part / --ondisk sda --fstype=ext4 --source rootfs --part-

bootloader --ptable gpt --timeout=5
```

https://uapi-group.org/specifications/specs/discoverable_partitions_specification/

Step 1: Adding IMAGE_VERSION to os-release

recipes-core/os-release/os-release.bbappend:

```
OS_RELEASE_FIELDS += " \
    IMAGE_VERSION \
"

OS_RELEASE_UNQUOTED_FIELDS += " \
    IMAGE_VERSION \
"
```

<https://www.freedesktop.org/software/systemd/man/latest/os-release.html>

recipes-core/images/core-image-demo.bb:

```
UKI_FILENAME = "uki_${IMAGE_VERSION}.efi"  
UKI_CMDLINE = "rootwait root=PARTLABEL=_${IMAGE_VERSION}"
```

wic/core-image-demo.wks.in:

```
part / --ondisk sda --fstype=ext4 --source rootfs --part-
```

Step 2: enabling and configuring sysupdate

recipes-core/systemd/systemd_%.bbappend

```
EXTRA_OEMESON: append = " \  
    -Dfdisk=enabled \  
    -Dsysupdate=enabled \  
    -Dsysupdated=enabled \  
"
```

recipes-core/systemd/systemd_%.bbappend

```
SRC_URI += " \  
    file://60-rootfs.transfer \  
    file://70-kernel.transfer \  
"  
do_install:append() {  
    install -d ${D}${base_libdir}/sysupdate.d  
    install -m 0644 ${UNPACKDIR}/60-rootfs.transfer ${D}${base_libdir}/sysupdate.d  
    install -m 0644 ${UNPACKDIR}/70-kernel.transfer ${D}${base_libdir}/sysupdate.d  
}  
"
```

<https://www.freedesktop.org/software/systemd/man/latest/sysupdate.d.html>

recipes-core/systemd/systemd/60-rootfs.transfer

[Transfer]

ProtectVersion=%A

Verify=no

[Source]

Type=url-file

Path=http://10.0.2.2:3333/

MatchPattern=rootfs_@v.ext4

[Target]

Type=partition

Path=auto

MatchPattern=_@v

MatchPartitionType=root

InstancesMax=2

recipes-core/systemd/systemd/70-kernel.transfer

[Transfer]

ProtectVersion=%A

Verify=no

[Source]

Type=url-file

Path=http://10.0.2.2:3333/

MatchPattern=uki_@v.efi

[Target]

Type=regular-file

Path=/EFI/Linux

PathRelativeTo=boot

MatchPattern=uki_@v+@l-@d.efi uki_@v+@l.efi uki_@v.efi

Mode=0444

TriesLeft=3

wic/core-image-demo.wks.in:

```
part /boot --ondisk sda --fstype vfat --part-name ESP --p
part / --ondisk sda --fstype=ext4 --source rootfs --part-
part --ondisk sda --source empty --part-name "_empty" --p

bootloader --ptable gpt --timeout=5
```

<https://www.freedesktop.org/software/systemd/man/latest/systemd-repart.html>

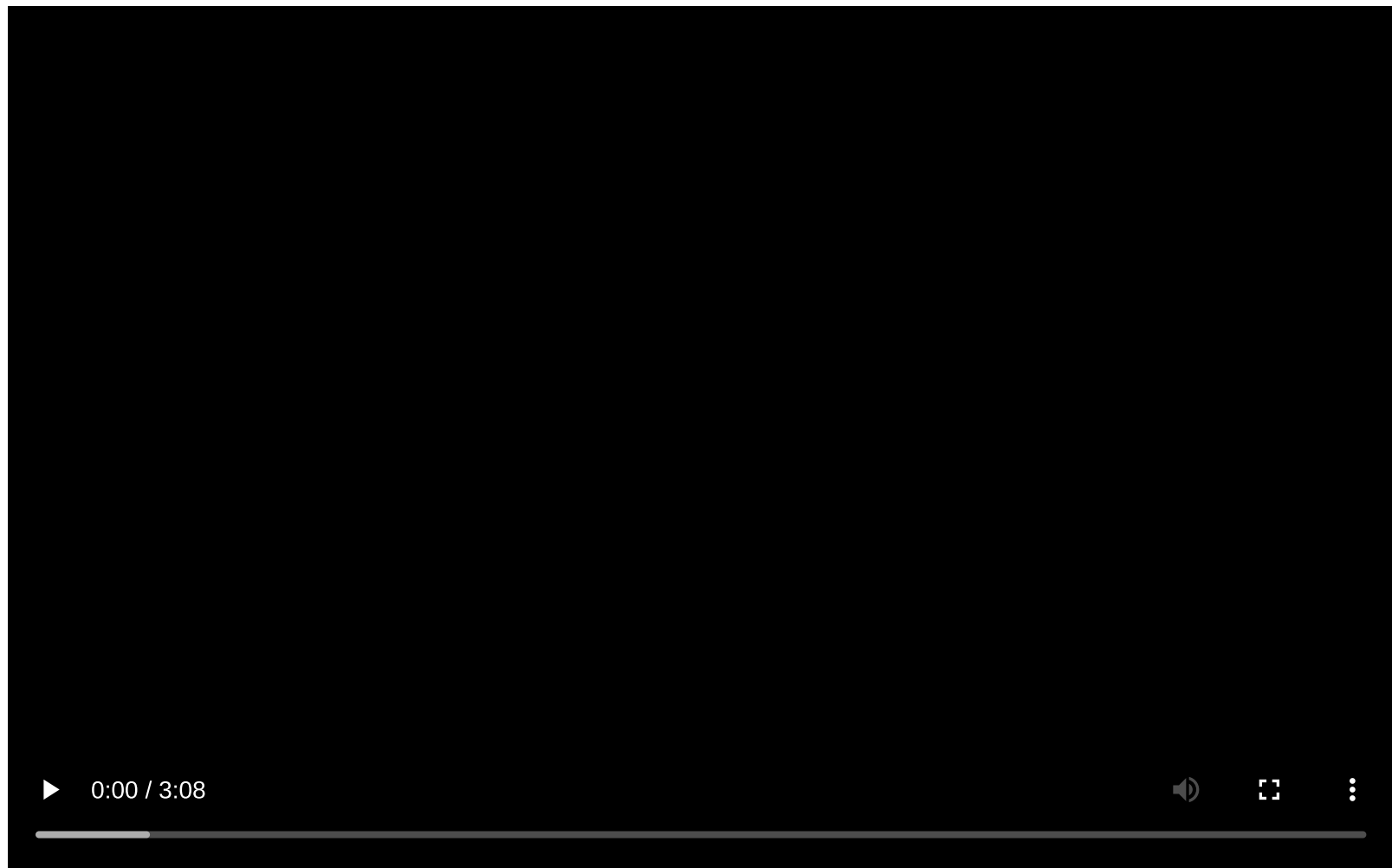
Step 3: serving updates

A simple server:

```
$ ls -l ./server/  
rootfs_0.ext4  
rootfs_1.ext4  
SHA256SUMS  
uki_0.efi  
uki_1.efi
```

```
$ sha256sum * > SHA256SUMS  
$ python3 -m http.server 3333
```

Demo



Limitations

- sysupdate-wise: missing delta updates.
- Yocto-wise: proper integration.
- demo-wise: requires UEFI firmware.

<https://github.com/systemd/systemd/issues/28227>

<https://github.com/systemd/systemd/issues/33351>

Recommended readings

<https://linuxembedded.fr/2024/09/mise-a-jour-dun-systeme-embarque-la-voie-de-systemd>

<https://x86.lol/generic/2024/08/28/systemd-sysupdate.html>

This talk to be blogged soon, including actual demo sources.

Thanks for your attention!

mabente@igalia.com

