

# Boot Loader Spec + sd-boot

All Systems Go! 2019

September 2019

# Boot Loader Specification?

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[https://systemd.io/BOOT\\_LOADER\\_SPECIFICATION.html](https://systemd.io/BOOT_LOADER_SPECIFICATION.html)

sd-boot?

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[https://www.freedesktop.org/software/systemd/man/  
systemd-boot.html](https://www.freedesktop.org/software/systemd/man/systemd-boot.html)

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*Used to be: gummiboot*

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Located below \$BOOT

Option A: \$BOOT = Partition of type 0xEA on MBR

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- Option B: \$B00T = Same as EFI System Partition (ESP)

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Option B: \$BOOT = Same as EFI System Partition (ESP)

File system: vfat recommended (but not required)

In case of option A, systemd mounts this automatically to `/boot`

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In case of option B, systemd mounts this automatically to `/efi`



Two types of drop-ins:

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Type #1: `$BOOT/loader/entries/*.conf`

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Type #2: `$BOOT/EFI/Linux/*.efi`

Unified EFI binaries: kernel, initrd, metadata all linked into one PE binary

Type #1: Generic, flexible (use your text editor!)

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Type #2: Simple, sign-as-one, specific to UEFI, one-file updates

## Example for Type #1

```
title      Fedora 30 (Workstation Edition)
version    5.0.17-300.fc30.x86_64
machine-id 42bafdfed44f4575bc0826ded44cd661
options    root=UUID=6c6f8b82-6446-455c-b71e-e7ce108e1d12 ro rhgb quiet audit=0
linux      /42bafdfed44f4575bc0826ded44cd661/5.0.17-300.fc30.x86_64/linux
initrd     /42bafdfed44f4575bc0826ded44cd661/5.0.17-300.fc30.x86_64/initrd
```

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One boot loader, many cooperating players

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Implemented by:

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Implemented by:

`sd-boot` + `systemd's kexec reboot`

sd-boot

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Enumerates Type #1 and Type #2 entries

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Plus EFI Shell, Boot into Firmware Menu, ditto

Just runs EFI executables

Installed via `bootctl install`

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Updated via `bootctl update`

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Show status via `bootctl status`



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[https://systemd.io/BOOT\\_LOADER\\_INTERFACE.html](https://systemd.io/BOOT_LOADER_INTERFACE.html)

# Automatic Boot Assessment

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`$BOOT/loader/entries/foobar+3.conf`

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Based on file renames

`$BOOT/loader/entries/foobar+3.conf`

On failure: `$BOOT/loader/entries/foobar+2-1.conf`

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On failure: `$BOOT/loader/entries/foobar+1-2.conf`

On failure: `$BOOT/loader/entries/foobar+0-3.conf`



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On failure: `$BOOT/loader/entries/foobar+0-3.conf` — BAD!

On success: `$BOOT/loader/entries/foobar.conf`

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On failure: `$BOOT/loader/entries/foobar+1-2.conf`

On failure: `$BOOT/loader/entries/foobar+0-3.conf` — BAD!

On success: `$BOOT/loader/entries/foobar.conf`

Userspace assessment logic: part of systemd

Bonus:

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`systemctl kexec`

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```
systemctl kexec
```

```
systemctl reboot --boot-loader-entry=...
```

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```
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```
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```

```
systemctl reboot --boot-loader-menu=...
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Bonus:

`systemctl kexec`

`systemctl reboot --boot-loader-entry=...`

`systemctl reboot --boot-loader-menu=...`

`systemd-analyze`

Packaged on Fedora and most other distributions



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That's all, folks!