



# Foreman

Provisioning hosts with boot ISO



whoami

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## Team's stack:

- Registration
- Provisioning
- Bootdisk, Discovery
- Libvirt, VMware
- GCE, AWS, Azure
- Ansible, Puppet
- ... and others



# Topics

- [5 min] Intro
- [10 min] Provisioning in Foreman
- [10 min] Boot ISO
- [15 min] Workflows
- [5 min] Something here
- [5 min] Q/A



# Provisioning in Foreman



## Network Provisioning

- Bare-metal
- Virtualization: Libvirt, VMware ...
- PXE, Grub2, BIOS, UEFI
- Secure Boot
- Cloud: Google, AWS, Azure

## Foreman Images

- Foreman Bootdisk
- Foreman Discovery



## Full host image

- Per host (& its OS)
- Syslinux & Grub2
- Bootloader files (from media / repo)
- ~ 160 Mb

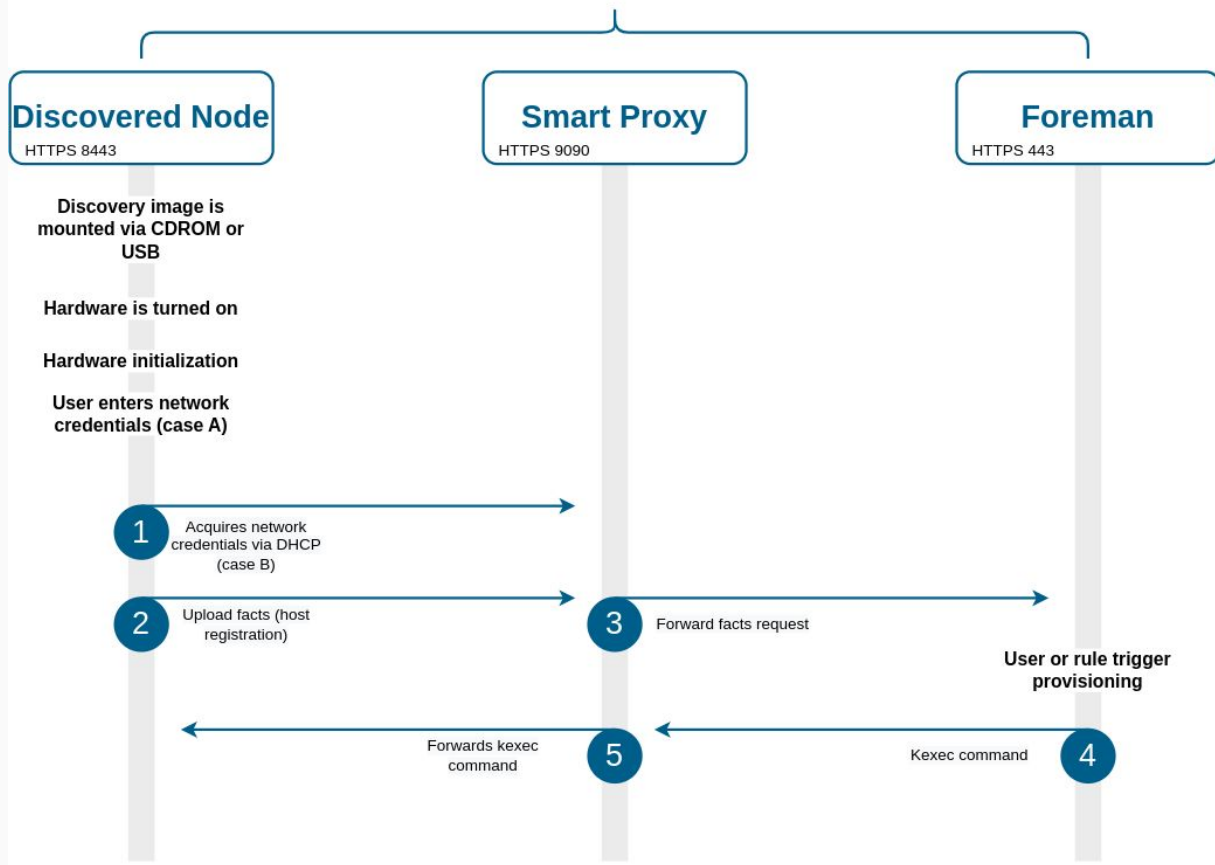
## Subnet Image

- Per subnet
- iPXE & Grub2
- ~ 7MB



# Foreman Discovery

## PXE-less mode





Boot ISO





The boot image, or also known as the "*net install*" media, is used for installation from other source.

That could be CDN, HTTP endpoint, Foreman, etc ...

- Fedora
- CentOS Stream
- RHEL
- Rocky
- Alma



## Boot ISO

- Grub2 + config files
- EFI images
- InitRAM disk & kernel
- Isolinux & config files
- Installer runtime env for Anaconda

## "Full" ISO

*Boot ISO + rpms*

- AppStream
- BaseOS



# Why another?

## Boot ISO

- Provided by the OS maintainers
- Official way how to install the OS\*

\* *One of the many*

## Foreman ISOs challenges

- Maintenance
- Testing is problematic
- Using tech preview features



### ***mkksiso***

*mkksiso is a tool for creating kickstart boot isos.*

*In its simplest form you can add a kickstart to a boot.iso.*

[weldr.io/lorax/mkksiso.html](http://weldr.io/lorax/mkksiso.html)



## Packages

```
dnf install -y lorax
```

```
dnf update -y
```

```
# Reboot if kernel have been updated
```

```
reboot now
```



positional arguments:

`input_iso` ISO to modify

`output_iso` Full pathname of iso to be created

options:

`-a, --add ADD_PATHS` File or directory to add to ISO

`-c, --cmdline CMDLINE` Arguments to add to kernel cmdline

`--ks KICKSTART` Optional kickstart to add to the ISO



*The host system architecture needs to match.*

*Needs to be run as root to create a fully bootable iso.*

*One ISO, one OS\*.*



# Scenarios



1. Minimal, static, and boring.
2. With Foreman
3. Let's make it better
4. *Future ideas*





## #1 Minimalistic and static

*Useful for testing and playing around.*

*Or*

*When you leave the configuration part  
to Puppet or Ansible.*

- Doesn't do much
- No Foreman
- Static
- Any change = iso rebuild



## #2 With Foreman

- Utilize Foreman's templates
- Dynamically generated KS
- Machine must be created first.
- Machine must be in a build mode.
- 404 & 405 errors from Foreman
- 300 seconds timeout (Dracut)



## #3 Let's make it better

*Previous workflow* + new default  
NetBoot template

- We catch all host states
  - Customizable template parameters & content
  - Timeout > 300 seconds
  - Better UX (a little bit)
- %pre in %include
  - Default Boot KS in the ISO
  - 404: URL not found and host not found

# The Future





## #4 Future plans & Ideas

Get the templates from Foreman

new **default NetBoot template**

Default Kickstart template

1. Call Foreman
  - a. Get the NetBoot template
2. Call Foreman
  - a. If host is in build mode, get KS
  - b. %include kickstart
3. Install



## #4 E2E Workflow



Create a host  
OS, Kickstart, host  
group ...



Download  
Customize  
map to OS & host  
publish



Libvirt  
VMware  
BM



# Last notes

1. Debugging
2. KS helpers
3. --add
4. Secure communication



```
mkksiso --cmdline inst.sshd inst.debug
```

`inst.sshd` enables the SSH during the installation

`inst.debug` increases the verbosity of the logging

`/tmp/anaconda.log` and `/tmp/program.log`





```
dnf install pykickstart  
  
ksvalidator --version RHEL9 ./your.ks  
  
ksvalidator --version F41 ./your.ks  
  
  
ksverdiff --from RHEL8 --to RHEL9  
  
ksverdiff --from F40 --to F41
```



## ***mkksiso --add***

*For the installation only, part of the ISO.*

*Can be used for adding repositories.*

*/run/install/repo/\$YOUR\_DIR*

*[weldr.io/lorax/mkksiso.html](http://weldr.io/lorax/mkksiso.html)*



## Grub2

Doesn't work with self-signed certificates. \*

### During installation

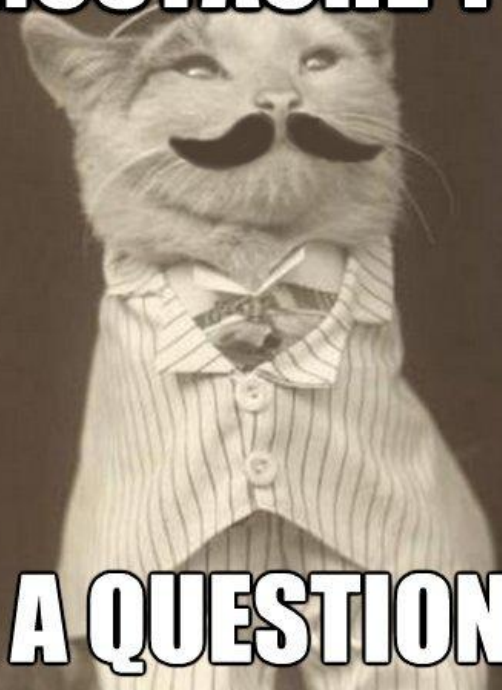
- %pre or %post
- %certificate (Fedora 42)
- From the --add dir
- TOFU - Trust on First Use

## Booted OS

- From the rpm, repository from "--add"
- Just file from the "--add" directory
- Registration
- Ansible, Puppet, ...



**I MUSTACHE YOU**



**A QUESTION**



## **Provisioning, provisioning, provisioning**

Foreman Provisioning Interest Group, FPIG \*

Share your provisioning stories

Any ideas, suggestions or tips for tools are welcomed

*\* Name is subject to change*



# Thank you



- [@stejskalleos](#) (GitHub)
- [@lstejska](#) (Others)
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