Hardware Configuration & Management

How do we remotely deploy configurations at scale?

The joys of hardware configuration

- Sitting in the data center with a keyboard and monitor
- Burning a CD/USB drive
- Installing the OS
- Configuring which drives to install on
- Configuring the OS once its installed + software, networking, etc

- How well does this scale if you need to provision 1,000s of servers?
  - Hint: Not well

- So what options do we have?

BMC/IPMI

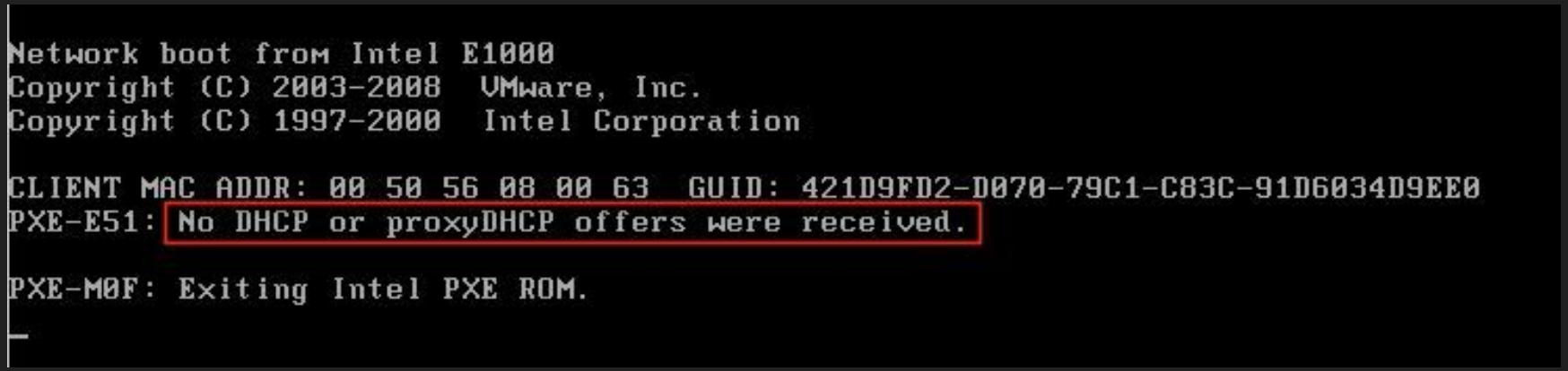
- BMC - Baseboard Management Controller
- IPMI - Intelligent Platform Management Interface
- BMC is the heart of IPMI allowing for monitoring the physical state of hardware systems, as well as remote control to power states and some configuration
- IPMI is a specification that leverages BMC that allows an administrator to manage multiple servers from a single location by means of a user-friendly interface
- Allows for system event logging, BIOS changes, remote power on/off, and even remote console access
- Goes by several names depending on the vendor, i.e Dell iDRAC, HP iLO, etc

BMC/IPMI

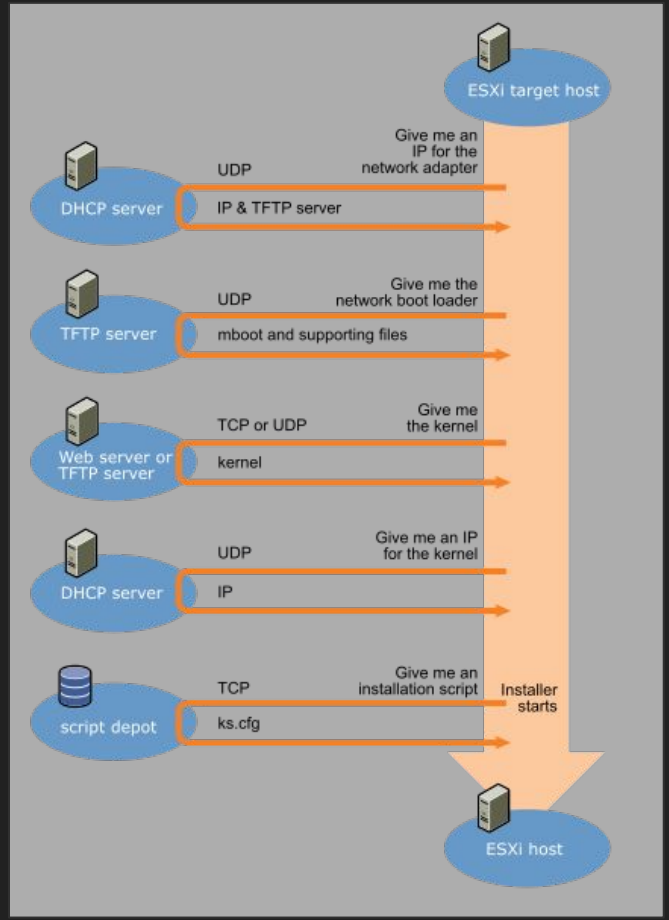
(Demo)

PXE Boot

- PXE Boot! - Pre-Boot Execution Environment
- Used to ‘Network Boot’ operating systems
- Leverages DHCP under the hood to get configuration options
- Can be used just to replace putting the CD in the drive - or can be a fully fledged configuration tool with kickstart scripts



How does PXE Boot work?



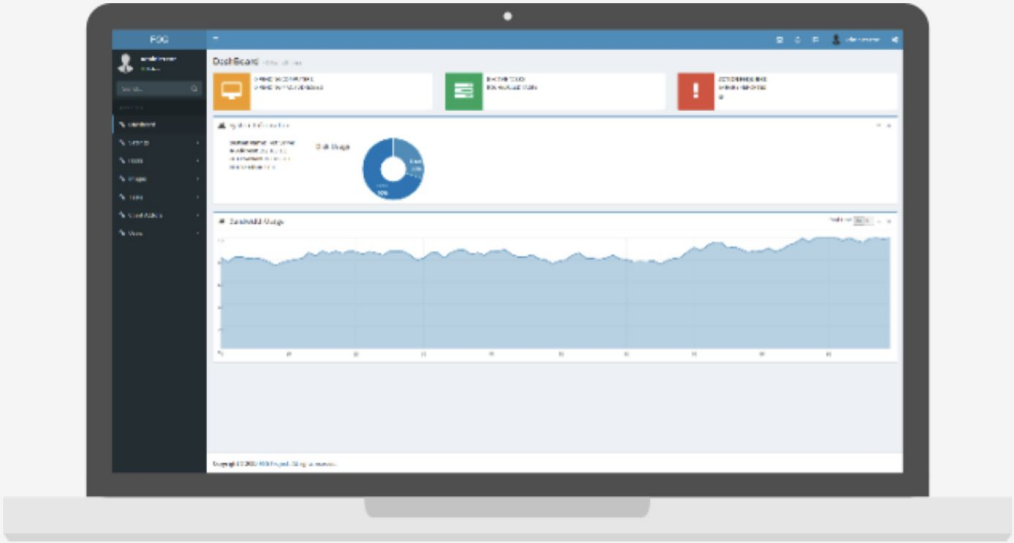
How does PXE Boot work?

(Demo)

FOG

FOG Project

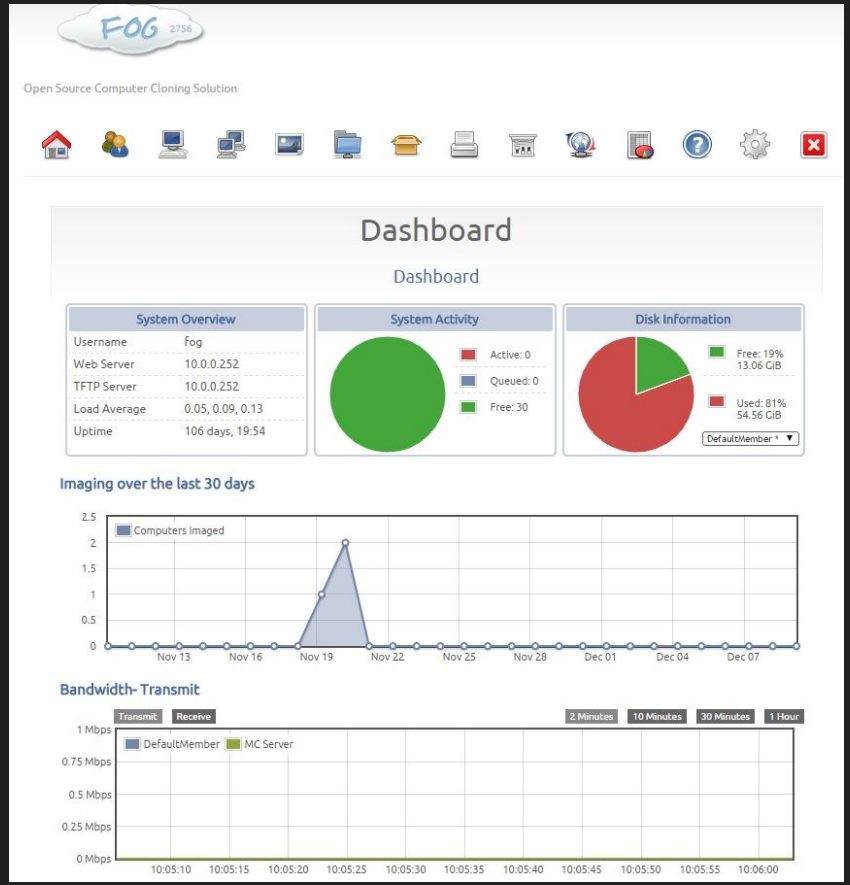
A free open-source network computer cloning and management solution



User interface shown will be available in a future release

FOG

- FOG - Originally called Free Open-source Ghost
- Leverages PXE under the hood to provide imaging/cloning of servers
- Provides TFTP, DHCP, and PXE services in one easy installation
- Web interface to make configuration management easier
- Great for when you have a bunch of identical servers to provision with minor config changes (i.e. esxi hosts)



WDS/SCCM

- Windows Deployment Services / System Center Configuration Manager
- Microsoft created and supported products with SCCM leveraging WDS which leverages PXE
- Used to network boot / install windows operating systems leveraging PXE
- Also used for configuration management, remote control, patch management, network protection, antivirus installation, and more

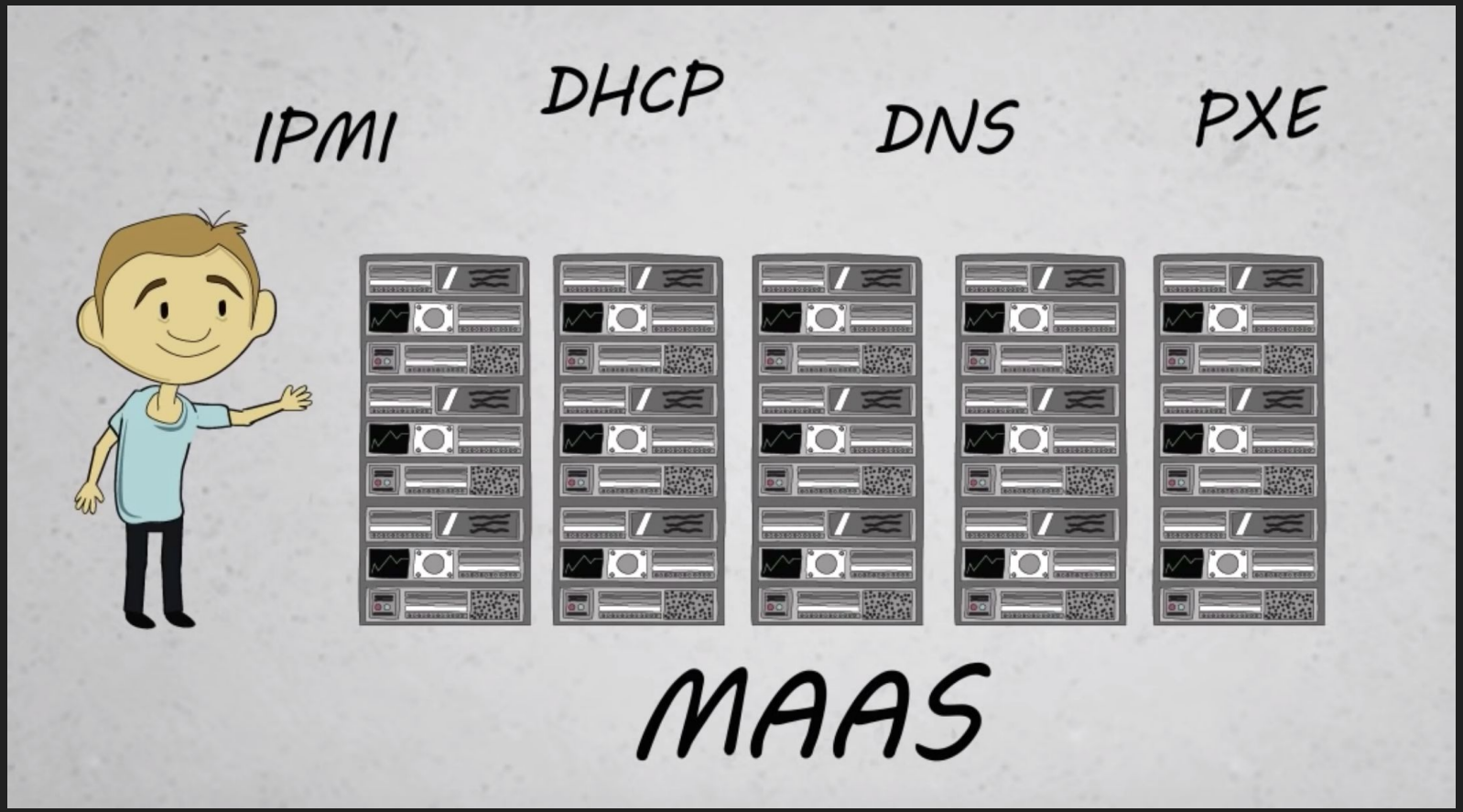
- Limited to managing Windows environments (surprise surprise) but can be extremely powerful for managing desktops or windows servers


MAAS

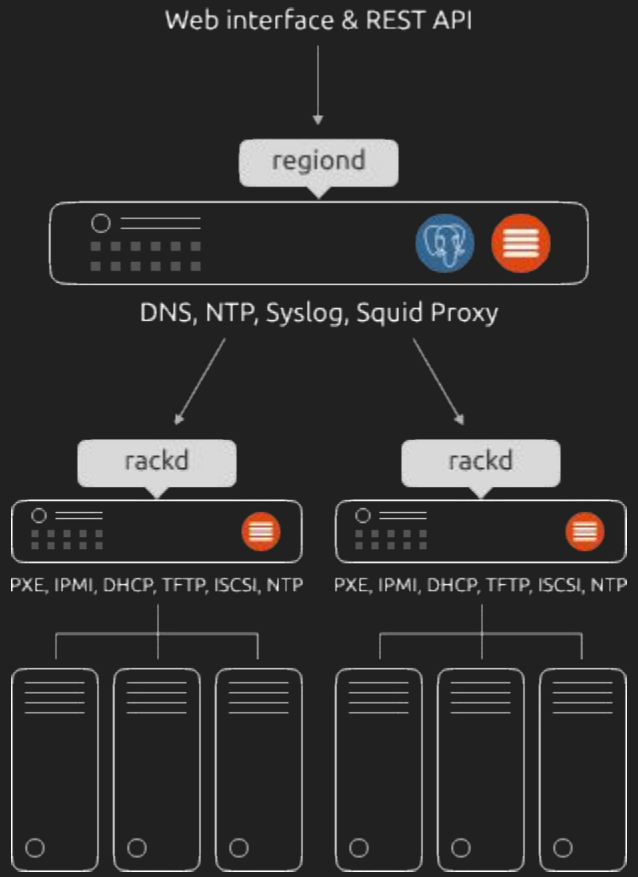
MAAS - Metal as a Service

- MaaS - also open-source - created by Canonical (the maintainers of Ubuntu)
- Leverages BMC + PXE and custom agents to do a ton of automated work
- Inventory - can automatically detect all attached devices and their serial/model numbers
- Storage Configuration - can set up RAID, ZFS, LVM, etc
- Diagnostics - can automatically perform hardware diagnostics and report to a centralized dashboard
- OS Installation - provides touchless deployments of operating systems and can assign static IPs on boot
- Once the OS is installed it can run its own init scripts to install software or it can hand off to Chef, Puppet, Ansible, etc to do the rest. (More on this later when we talk about IaC)

MAAS - how it works



MAAS - how it works



Questions?

References

- https://fogproject.org/
- https://www.syslinux.org/old/pxe.php
- https://docs.microsoft.com/en-us/windows/win32/wds/windows-deployment-services-portal
- https://www.microsoft.com/en-us/cloud-platform/system-center-configuration-manager
- https://maas.io/