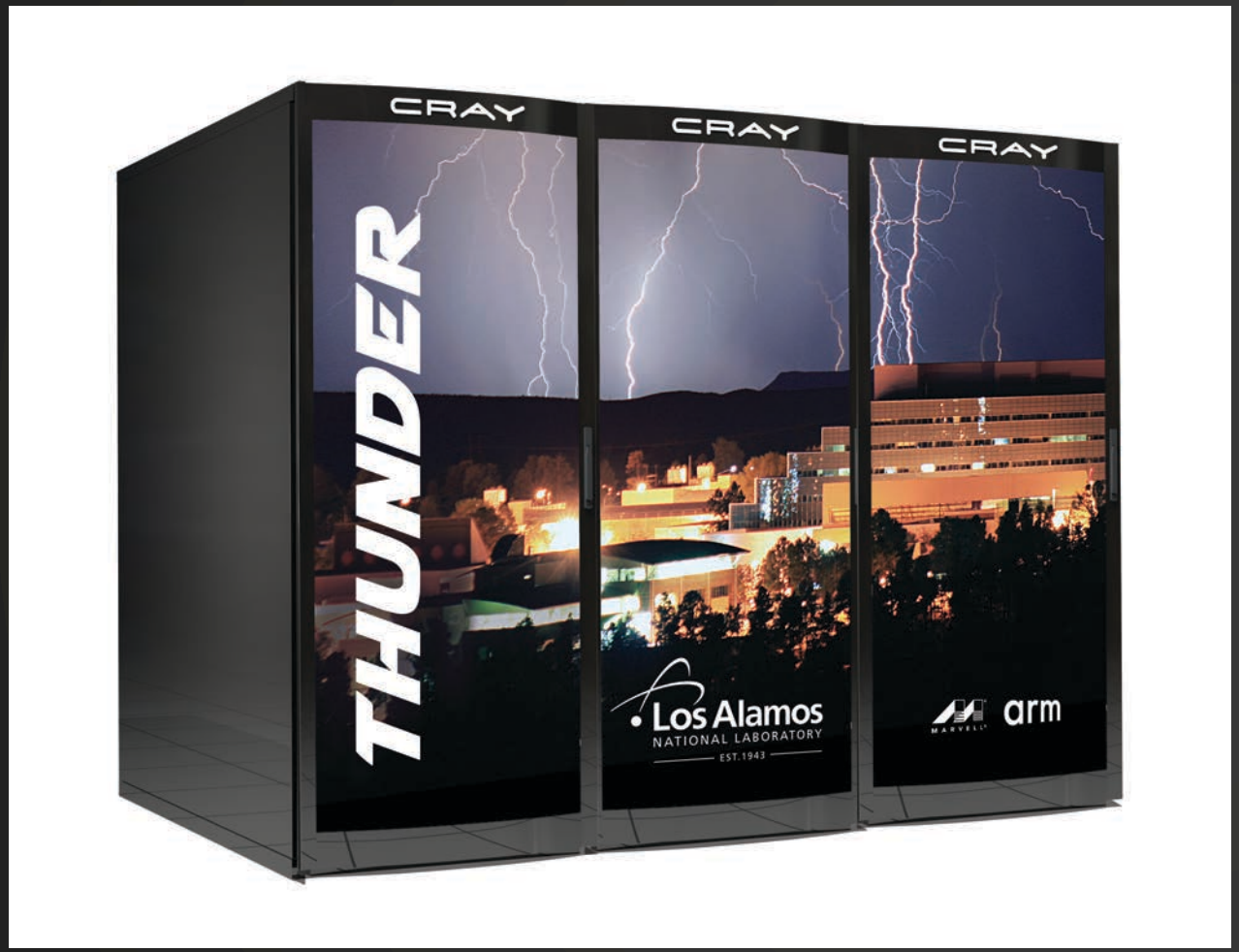
Los Alamos

NATIONAL LABORATORY

EST. 1943

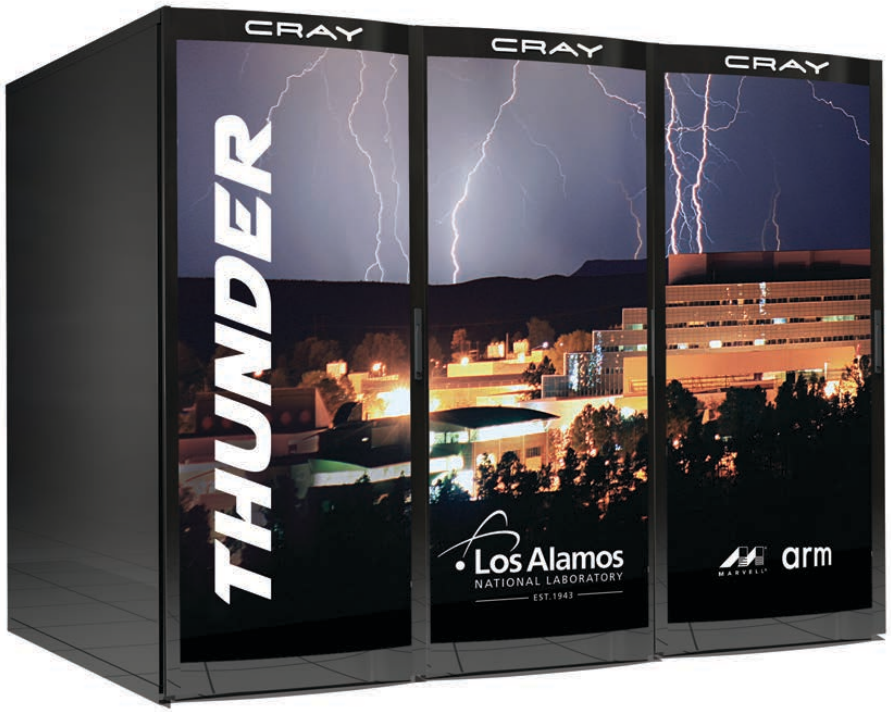


Los Alamos
NATIONAL LABORATORY
EST.1943

Delivering science and technology
to protect our nation
and promote world stability

HPC Cluster Provisioning

Presented by CSCNSI



The Steps

- Step 0: Base install of master
- Step 1: Install OpenHPC components
- Step 2: Initial Warewulf setup
- Step 3: Building the BOS
- Step 4: Assembling the VNFS
- Step 5: Discovering your nodes (requires physical access)

Goals

- Rebuild your cluster from scratch
- Use Warewulf to
  - Provision nodes
  - Manage node images
  - Manage node configuration
- Auto-discover the rest of your nodes using Warewulf's discovery tool

Step 0: Base install of master

- We need to start by working with a clean slate
- Re-install the master node with a clean install
- Re-perform the following setup steps:
  1. Setup hostname
  2. Re-add individual users accounts
  3. Disable selinux
  4. Disable firewalld
  5. Configure your yum repos
  6. Install tmux, vim & ntp

Step 1: Install OpenHPC components

- OpenHPC (https://openhpc.community) is an open source project that provides builds of HPC tools and guides for HPC installation
- We will be using OpenHPC to provide some of our HPC tools
  - Verify the OpenHPC yum repo is configured (we're using a local mirror)
  - Install some OpenHPC packages that we'll need

Step 2: Initial Warewulf Setup

- Setup basic definitions for our Warewulf cluster
- Run some required first-use initialization commands for Warewulf
- Configure NFS to export special directories
  - /home
  - /opt/ohpc/pub
- Setup necessary network services

Step 3: Building the BOS

- BOS = “Base Operating System”
  - The BOS is where we work node images before we assemble them for use
- To build a usable BOS we need to:
  1. Build the initial minimal chroot directory
  2. Add extra software we need to the BOS
  3. Add our NFS client-side mount specifications to the BOS
  4. Enable services inside the BOS image (i.e. services our nodes will start)
  5. Import configuration files into Warewulf’s configuration system

Step 4: Assembling Bootstrap/VNFS (and adding the first 3 nodes)

- We need to build the BOS into something we can use
  - Like the `cpio` step in the netboot guide
- We also need a “bootstrap”
  - Like the `bootstrap.sh` script in the netboot guide
- We already know MAC address info for three compute nodes
  - We’ll add them by hand
  - We’ll show that we can boot them
- This is a good time to inspect the various configurations that Warewulf generates to see that it’s similar to what we did in netboot
  - Except Warewulf is using iPXE, which is structured a little differently

Step 5: Discovering your nodes (requires physical access)

- Rather than dig the MAC addresses out of each server we can auto-add nodes that we don't know that send us a DHCPDISCOVER
- Warewulf provides the `wwnodescan` tool to do this
- We will need to temporarily unplug our BMCs to do this
  - …otherwise Warewulf will think our BMCs are nodes too
- *Don't forget to plug in the BMCs again when you're done*
- It's tempting to just power on all of the nodes quickly, but you risk missing a node and not knowing which one did not register correctly
  - …or just registering all of the nodes out of order.
- So, it's going to take 2-3 minutes/node
  - …a bit tedious, but a lot easier than hand collecting this info.

Next time…

- At this point we have a functional cluster
  - But, it doesn't do much
    - And, we don't have all of our BMCs configured.
- Next time we will setup a handful of HPC utilities that will help us make the system more usable and complete.

Questions?