

Crucible

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crucible is a command line tool for managing bare-metal, installing a live image to disk, and configuring a booted operating system.

The tool is currently written in Python, and exists only as a proof-of-concept.

Proof of Concept

The proof of concept tool is very limited in terms of what OS configuration it offers to the user.

NIC Configuration

Woes of Device Naming

Fawkes uses `biosdevname` to provide some sense of predictable interface names. `biosdevname` works great for simple servers with a single NIC, such as an onboard NIC, `biosdevname` provides the simple `em1` name. For servers with multiple NICs, such as PCIe NICs, these names can still vary wildly because they revolve around the BUS ID. For example, depending on where the PCIe card is inserted and how that motherboard's chipset processes the PCIe busses, the same card inserted in four different servers may have any of the following names (to list a few):

- `p801p1`
- `p785p1`
- `p2p1`
- `p10p1`

This causes problems for triage and development, where a guessing game of sorts has to be played to figure out which NIC is which.

Fawkes NIC Names

Fawkes controls its host's interface names based on the PCI-SIG (Peripheral Component Interconnect Special Interest Group) of a device.

By obtaining the PCI Vendor and Device ID, we can provide customization for classifying NICs for various purposes, each purpose has a defined NIC naming prefix:

- `mgmt`: internal/management network connection
- `sun`: internal/storage network connection
- `hsn`: high-speed connection
- `lan`: external/site-connection

The information belongs to the first 4 bytes of the PCI header, and admin can obtain it using `lspci` or `ethtool`.

If `crucible` is installed on the system, a helper script will be available in `/usr/bin`.

```
/usr/bin/lsnics
```

Example

```
host:~ # lsnics
Name   VID  DID
em1    8086 37D2
em2    8086 37D2
```

```
p801p1 8086 37D2
p801p2 8086 37D2
```

Customizing ifname.yml

To change which network interfaces are used for which purpose, or to add new ones, follow the directions below.

1. Edit the `/etc/crucible/ifname.yml` where Crucible is installed by populating the various categories with the requested information.

```
vim /etc/crucible/ifname.yml
```

2. Re-generate `udev` rules, overwriting the old ones if present.

```
crucible network udev --overwrite
```

Device and Vendor ID Quick Reference

Below is a table of commonly used devices for Fawkes system, this table will continue to expand as Fawkes becomes more prevalent on a larger variety of hardware.

Vendor	Model	Device ID	Vendor ID
Broadcom Inc. and subsidiaries	BCM57414 NetXtreme-E	16D7	14E4
Intel Corporation	Ethernet Connection X722	37d2	8086
Intel Corporation	82576	1526	8086
Mellanox Technologies	ConnectX-4	1013	15b3
Mellanox Technologies	ConnectX-5	1017	15b3
Giga-Byte	Intel Corporation I350	1521	8086
QLogic Corporation	FastLinQ QL41000	8070	1077

Network Interface Setup Reference

This page provides a quick reference for **crucible** and **nmcli**.



The **nmcli** commands are provided as backup options when **crucible** fails.

Hypervisor Nodes (without VxLAN)

Bond setup

crucible

- First hypervisor

```
crucible network interface \  
  --noip \  
  bond0 \  
  --members mgmt0,mgmt1 \  
  --mtu 9000
```

- Remaining hypervisors

```
crucible network interface \  
  --dhcp \  
  bond0 \  
  --members mgmt0,mgmt1 \  
  --mtu 9000
```

nmcli

```
nmcli connection add \  
  con-name bond0 \  
  type bond \  
  ifname bond0 \  
  bond.options  
"mode=802.3ad,miimon=100,lacp_rate=fast,xmit_hash_policy=layer2,ad_select=bandwidth  
" \  
  ethernet.mtu 9000 \  
  ipv4.method disabled \  
  ipv6.method disabled  
nmcli connection add \  
  con-name mgmt0 \  
  type ethernet \  
  ifname mgmt0 \  
  master bond0 \  
  ethernet.mtu 9000  
nmcli connection add \  
  con-name mgmt1 \  
  type ethernet \  
  ifname mgmt1 \  
  master bond0 \  
  ethernet.mtu 9000
```

```
con-name mgmt1 \  
type ethernet \  
ifname mgmt1 \  
master bond0 \  
ethernet.mtu 9000  
nmcli connection up mgmt1  
nmcli connection up mgmt0
```

VLAN setup

crucible

```
crucible network interface \  
--noip bond0.nmn0 \  
--vlan-id 2 \  
--members bond0 \  
--mtu 9000  
crucible network interface \  
--noip bond0.hmn0 \  
--vlan-id 4 \  
--members bond0 \  
--mtu 9000  
crucible network interface \  
--noip bond0.cmn0 \  
--vlan-id 7 \  
--members bond0 \  
--mtu 9000
```

nmcli

```
nmcli connection add \  
con-name bond0.hmn0 \  
type vlan \  
ifname bond0.nmn0 \  
dev bond0 \  
id 2 \  
ipv4.method disabled \  
ethernet.mtu 9000 \  
ipv6.method disabled  
nmcli connection add \  
con-name bond0.hmn0 \  
type vlan \  
ifname bond0.hmn0 \  
dev bond0 \  
id 4 \  
ipv4.method disabled \  
ethernet.mtu 9000 \  
ipv6.method disabled  
nmcli connection add \  
con-name bond0.hmn0 \  
type vlan \  
ifname bond0.cmn0 \  
dev bond0 \  
id 7 \  
ipv4.method disabled \  
ethernet.mtu 9000 \  
ipv6.method disabled
```

```
type vlan \  
ifname bond0.can0 \  
dev bond0 \  
id 4 \  
ipv4.method disabled \  
ethernet.mtu 9000 \  
ipv6.method disabled
```

```
nmcli connection up bond0.nmn0  
nmcli connection up bond0.hmn0  
nmcli connection up bond0.cmn0
```

LAN 0 setup (DHCP)

crucible

```
crucible network interface \  
--dhcp \  
lan0
```

nmcli

```
nmcli connection add \  
con-name lan0 \  
type ethernet \  
ifname lan0 \  
ipv4.method auto \  
ipv6.method disabled
```

LAN 0 setup (with IP)

crucible

```
crucible network interface \  
lan0 \  
10.100.254.5/24 \  
--dns 16.110.135.51,16.110.135.52
```

nmcli

```
nmcli connection add \  
con-name lan0 \  
type ethernet \  
ifname lan0 \  
ipv4.address 10.100.254.5/24 \  
ipv4.dns 16.110.135.51,16.110.135.52 \  
ipv4.method manual \  

```

ipv6.method disabled