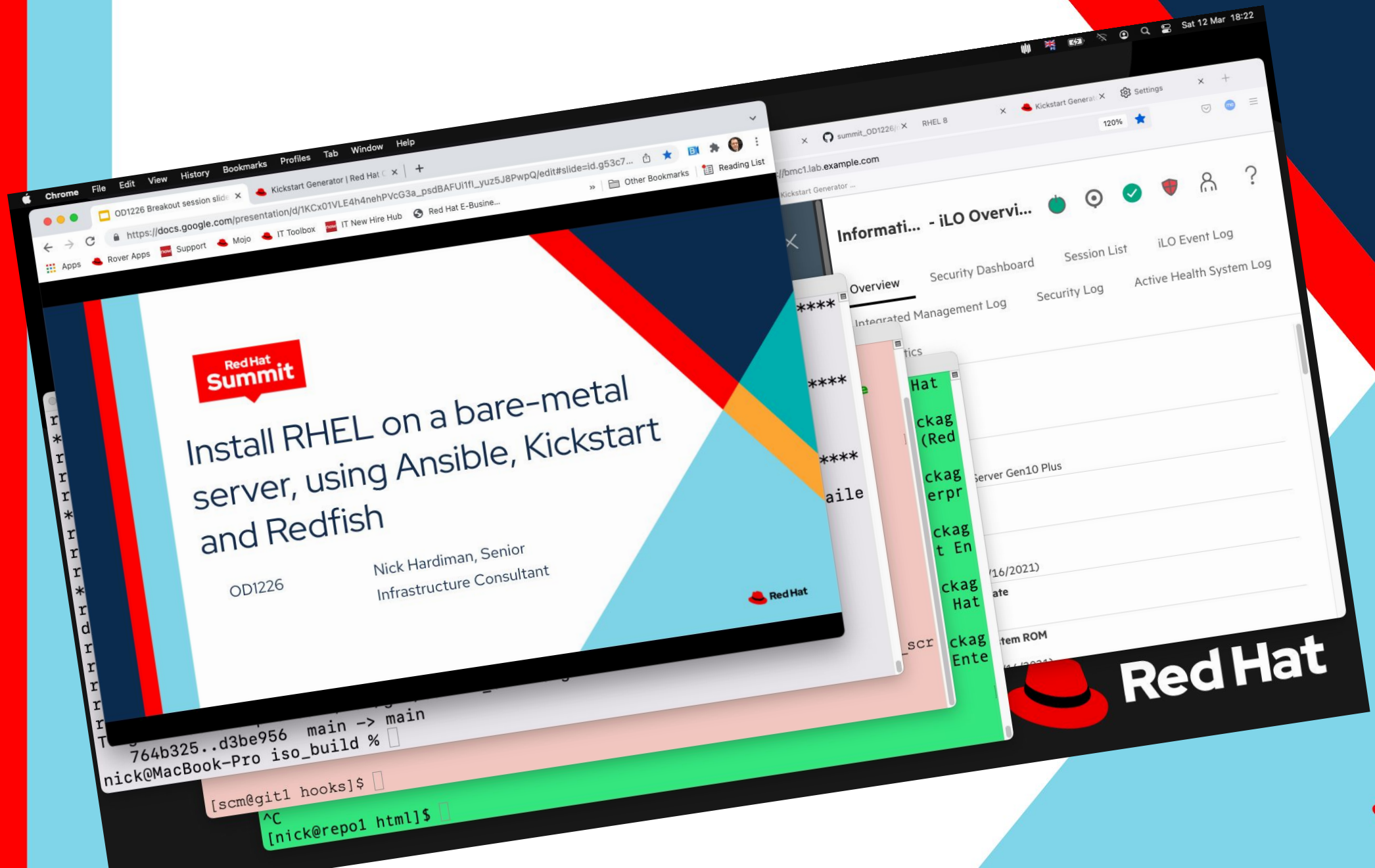
Install RHEL on a bare-metal server, using Ansible, Kickstart and Redfish

OD1226

Nick Hardiman, Senior
Infrastructure Consultant

Red Hat

Screen Tour



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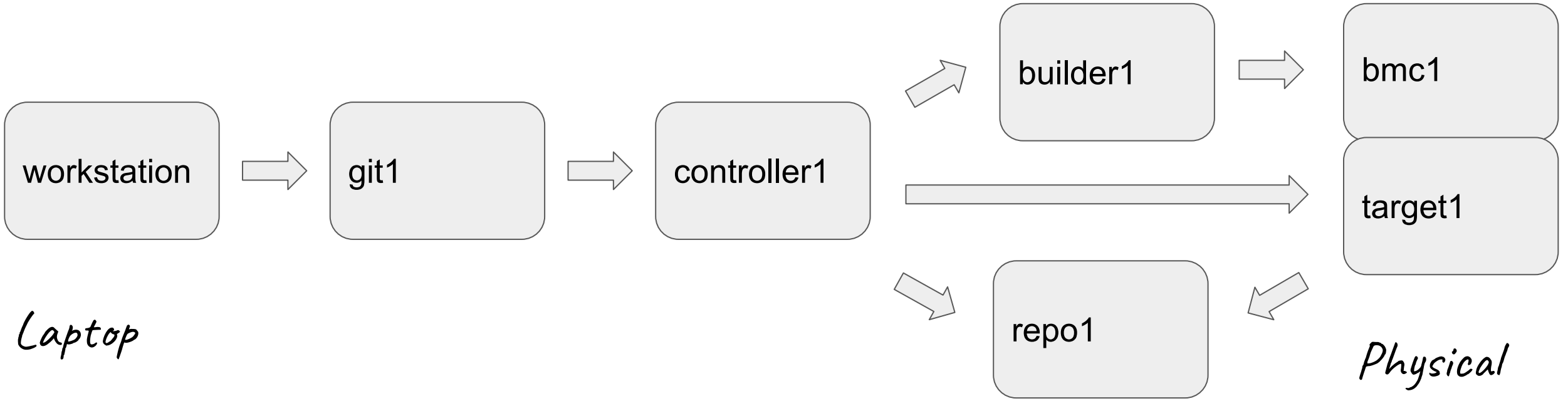
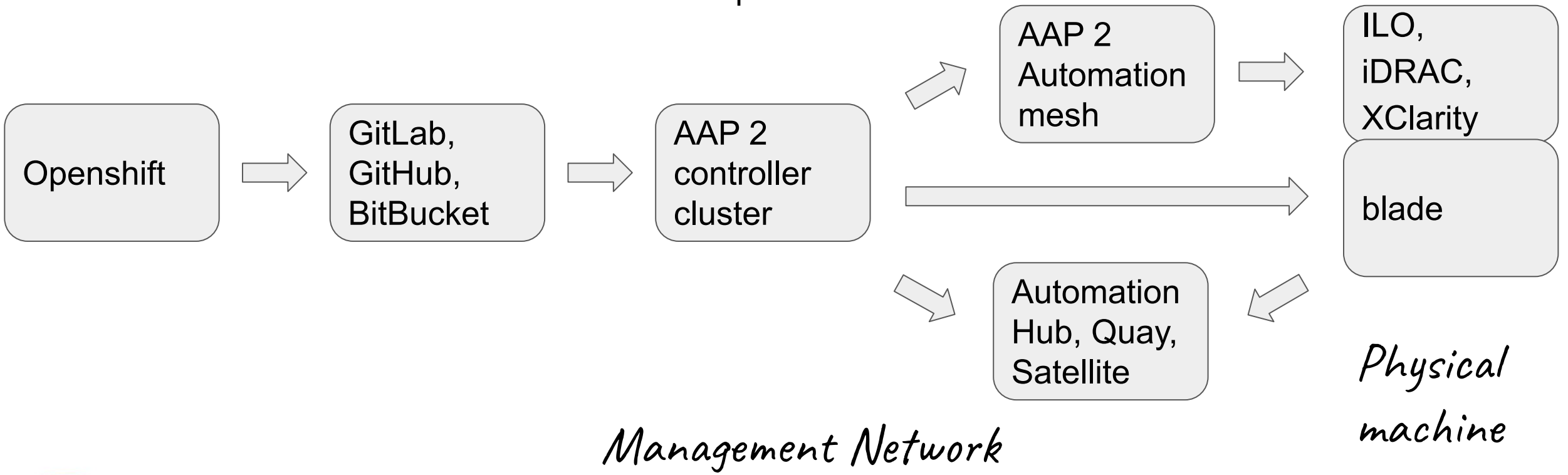
Demo Lab


workstation
git1
controller1
builder1
bmc1
target1
repo1
Laptop
Virtual machines
Physical machine

Demo Lab – Why So Complicated?

Because Production networks are complicated.



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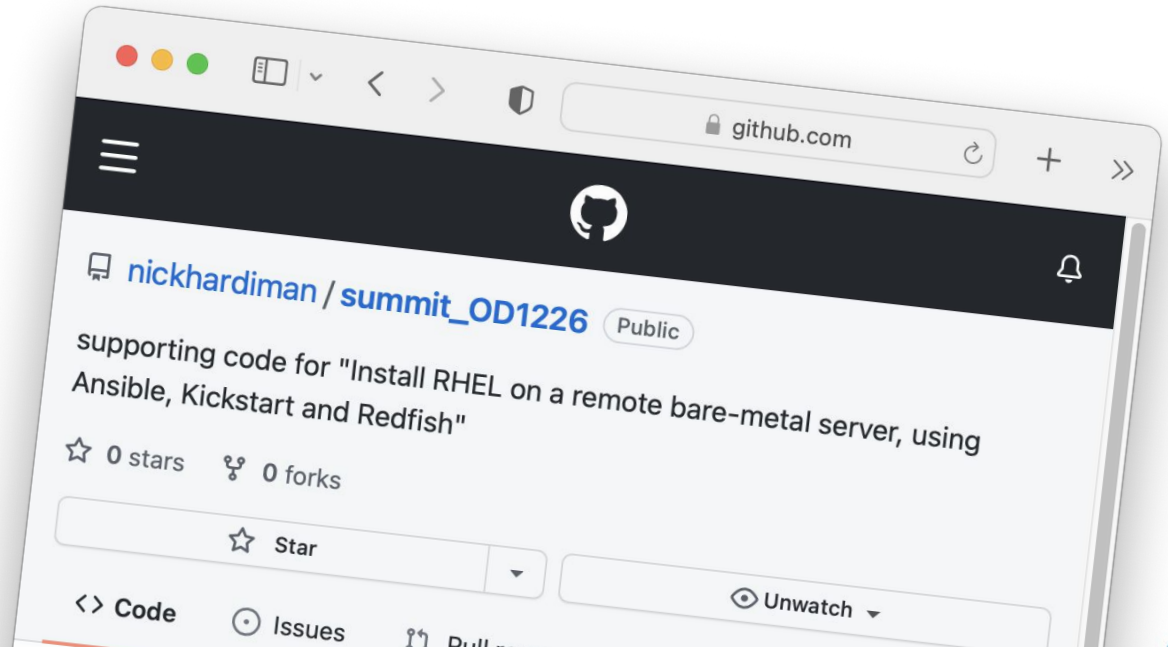
Redfish Bash Scripts

https://github.com/nickhardiman/summit_OD1226/tree/main/shell_scripts



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Shell Scripts for development

These do what the Playbooks do.

power_on.sh
eject.sh
mount.sh
mount_check.sh
one_time_boot.sh
one_time_boot_check.sh
restart.sh

Power On Demo

```
nick@MacBook-Pro shell_scripts % ./power_on.sh
```

Power On - Redfish URL

power_on.sh

```
https://bmc1/redfish/v1/Systems/1/Actions/ComputerSystem.Reset
```

(Service Root)/(Collection of Resources)/(Resource)/(Service Action)

manufacturer_check.sh

```
https://bmc1/redfish/v1/Systems/1?$select=Manufacturer
```

(Service Root)/(Collection of Resources)/(Resource)?(OData)

Power On - HTTP Headers

Request HTTP Headers

```
POST /redfish/v1/Systems/1/Actions/ComputerSystem.Reset HTTP/1.1
Host: bmc1
Authorization: Basic bmljazpyZWRoYXR0ZXI=
User-Agent: curl/7.64.1
…
```

<-- Base64 encoding

Reply HTTP headers

```
HTTP/1.1 200 OK
Cache-Control: no-cache
Content-type: application/json; charset=utf-8
…
```

Power On - JSON Payload

HTTP request

```
{ "ResetType": "On" }
```

HTTP reply (prettified by *jq*)


```
{
  "error": {
    "code": "iLO.0.10.ExtendedInfo",
    "message": "See @Message.ExtendedInfo for more information.",
    "@Message.ExtendedInfo": [
      {
        "MessageId": "Base.1.4.Success"
      }
    ]
  }
}
```

Shell Scripts for Orchestration

https://github.com/nickhardiman/summit_OD1226/tree/main/shell_scripts

post-update <-- Git Hook

os_install.sh

phone_home.sh

app_install.sh

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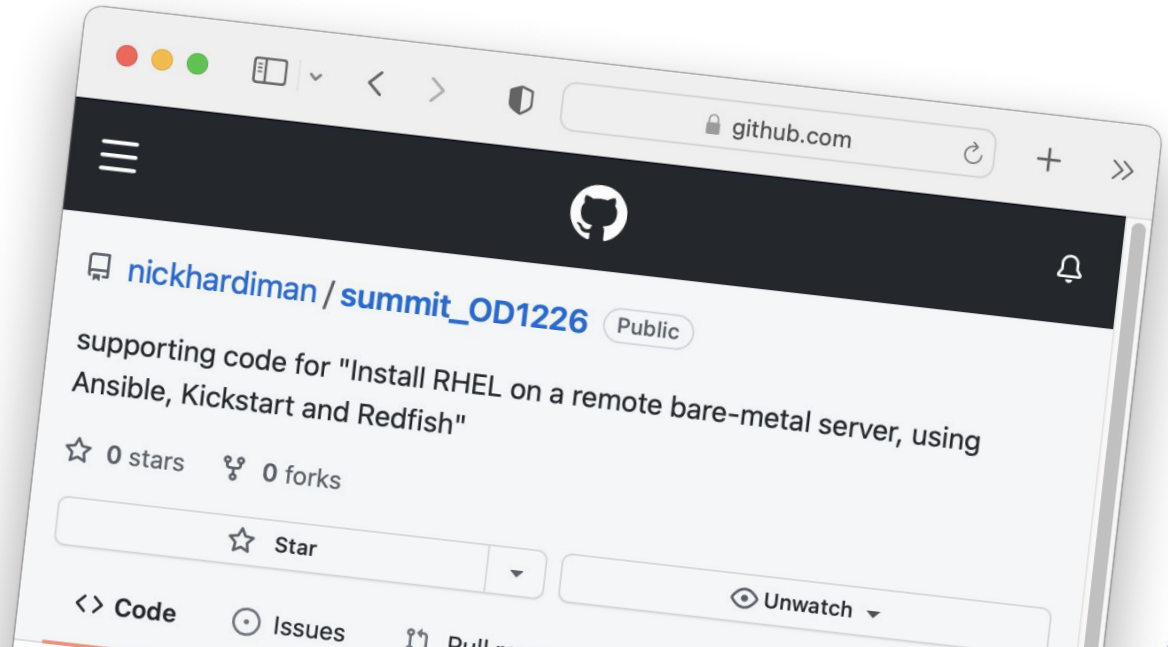
Redfish Ansible Playbooks

https://github.com/nickhardiman/summit_OD1226/tree/main/ansible_playbooks



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Ansible Playbook Demo

Submit a form, wait 10 minutes, done.

RHEL 7

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Ansible Playbooks

https://github.com/nickhardiman/summit_OD1226/blob/main/shell_scripts

Iso_build
machine_check
iso_install
target1_configure

<-- These two talk Redfish.

What's happening?

1. Playbook creates a bootable customized Kickstart ISO file
2. Playbook checks server hardware.
3. Playbook tells the BMC to boot from ISO.
4. Anaconda installs the OS.
5. Playbook installs a web server.

KISS Principle

Air-gapped install

Everything is local (git, ISO files, RPM repos, etc.)

No *.redhat.com (cloud., console, sso, etc.)

No RHSM registration and subscription

No Ansible roles

Kickstart Unattended Install

https://github.com/nickhardiman/summit_OD1226/blob/main/kickstart_files/kickstart-rhel7-1.ks

Kernel command line option `inst.ks=ks.cfg`

Build your kickstart file at
https://access.redhat.com/labs/kickstartconfig/

Check with `ksvalidator`, `ksverdiff`

Anaconda source code
https://github.com/rhinstaller/anaconda

ISO File

Download Two ISO files from Red Hat CDN

- **Boot ISO**
  for customizing (Contains firmware, OS and installer apps, 800MiB)
- **DVD ISO**
  for making RPM repos (Contains boot ISO plus RPMs, 10GiB)

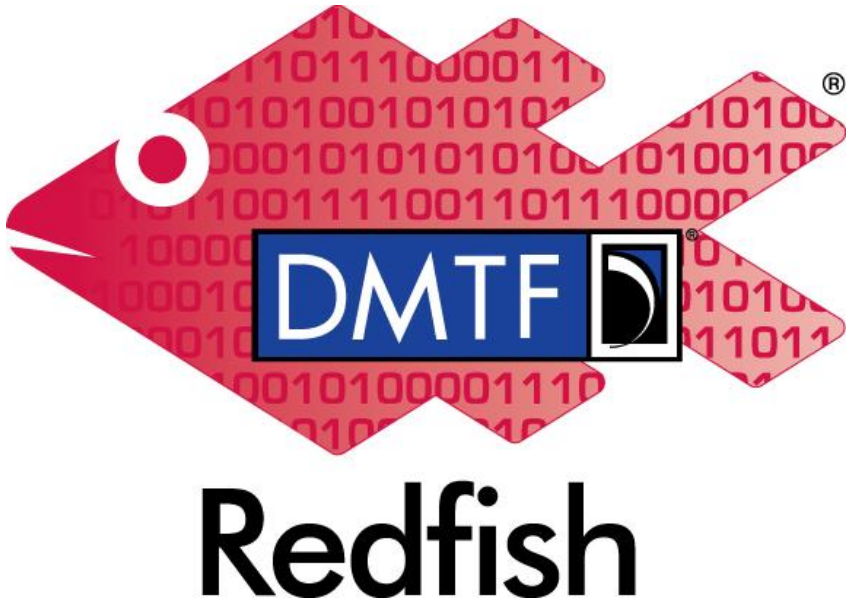
Download: https://access.redhat.com/downloads/
Custom ISO instructions: https://access.redhat.com/solutions/60959
Local repo instructions: https://access.redhat.com/solutions/1355683

DMTF standards organization

https://www.dmtf.org/standards

PMCI, SPDM, Redfish, SMBIOS, CIM

DMTF Redfish Standard



- DSP0268 and DSP2046 PDFs https://www.dmtf.org/standards/redfish
- user forum https://redfishforum.com/
- Python https://github.com/DMTF/Redfish-Tacklebox

Use the Redfish Web API

REST guidelines

Clients
curl, Postman, Swagger

Servers
Every BMC (Dell iDRAC, HPE ILO, Lenovo XClarity Controller, etc.)

The OASIS OData v4 Protocol

request

```
https://192.168.1.245/redfish/v1/Systems/1?$select=Manufacturer
```

reply

```
{
  "@odata.context": "/redfish/v1/$metadata#ComputerSystem.ComputerSystem",
  "@odata.etag": "W/\"DCC7F4A2\"",
  "@odata.id": "/redfish/v1/Systems/1",
  "@odata.type": "#ComputerSystem.v1_10_0.ComputerSystem",
  "Manufacturer": "HPE"
}
```

https://www.odata.org/getting-started/basic-tutorial/

Redfish Gotchas

Consistent across vendors:

- HTTP request methods (GET, PATCH, POST, etc.)
- URL paths

Not so much:

- JSON payloads
- HTTP response codes (200, 201, 401)

https://treblle.com/blog/the-10-rest-commandments

https://www.ics.uci.edu/~fielding/pubs/dissertation/fielding_dissertation_2up.pdf

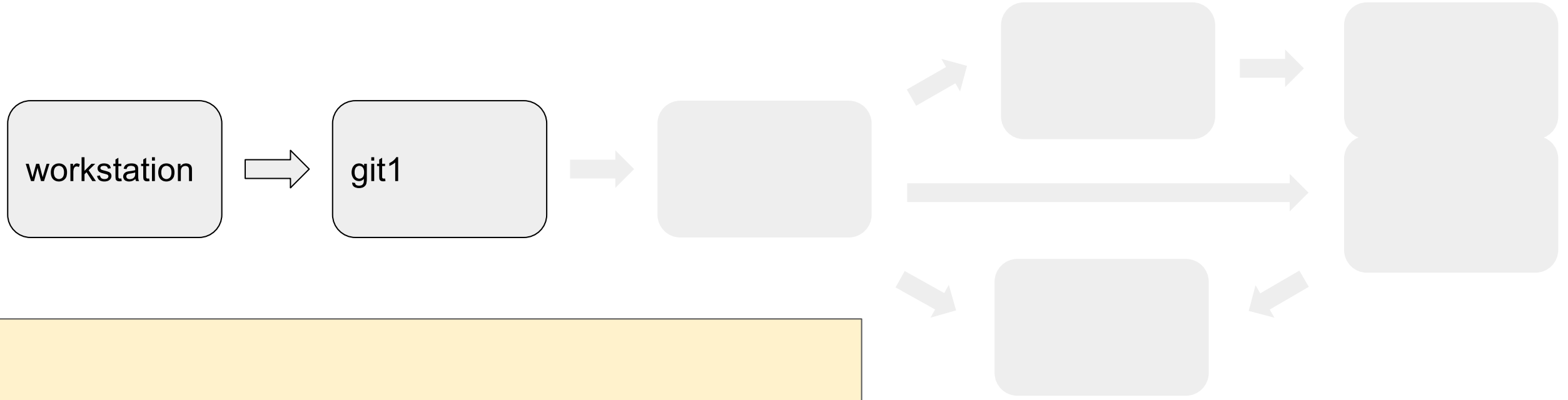
Time for Another Demo?

RHEL 8

Automation Workflow Recap

Step 1/9 form.yml

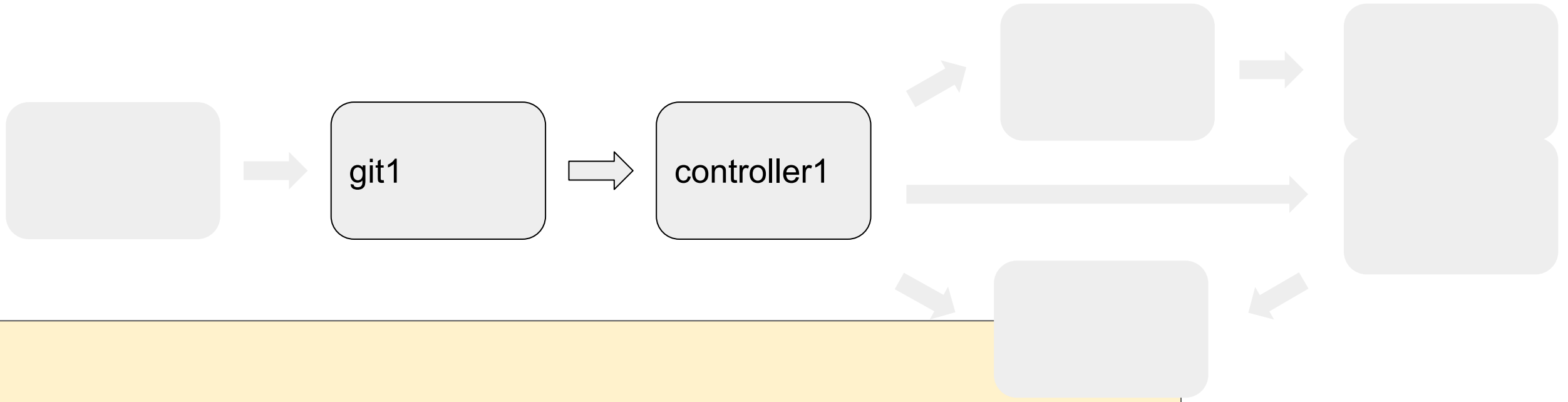
What to install where




```
iso:  rhel-server-7.9-x86_64-boot.iso
kickstart:  kickstart-rhel7-1.ks
new_iso: my_rhel7.iso
machine: target1.lab.example.com
```

Step 2/9 post-update git hook

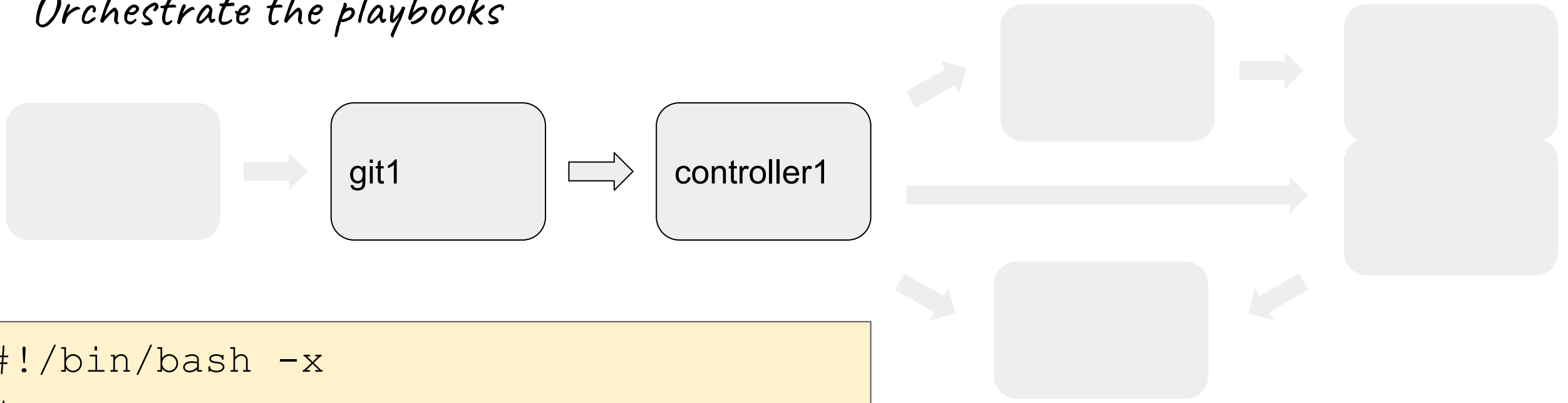
Kick off an install




```
/usr/bin/ssh \
nick@controller1.lab.example.com \
/home/nick/summit_OD1226/shell_scripts/os_install.sh
```

Step 3/9 os_install.sh

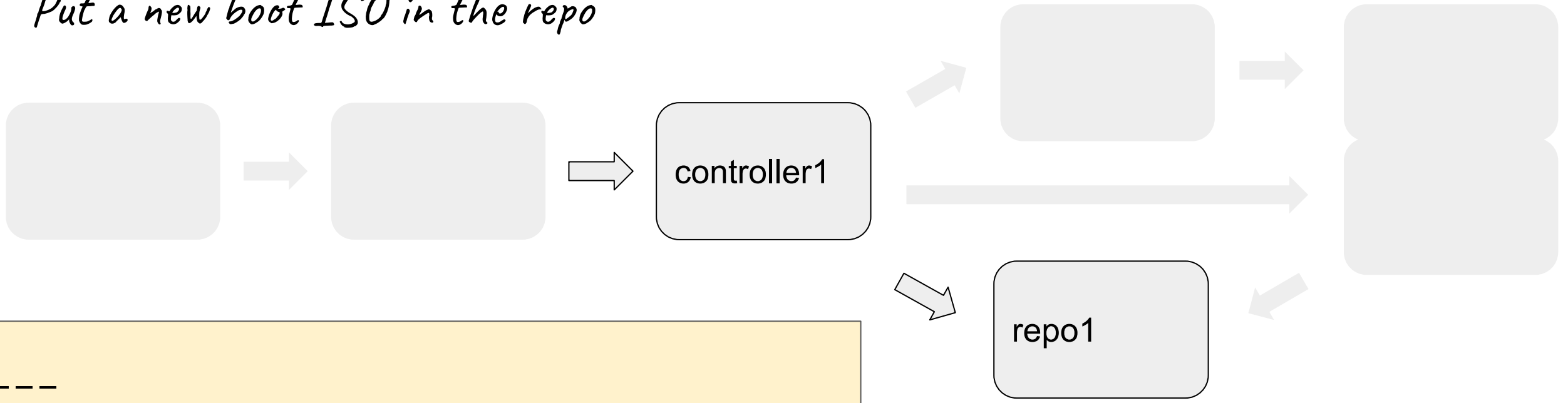
Orchestrate the playbooks




```
#!/bin/bash -x
#
# update the git repo
# check the machine
# build a customized boot ISO
# install ...
```

Step 4/9 iso_build playbook *(1 of 4)*

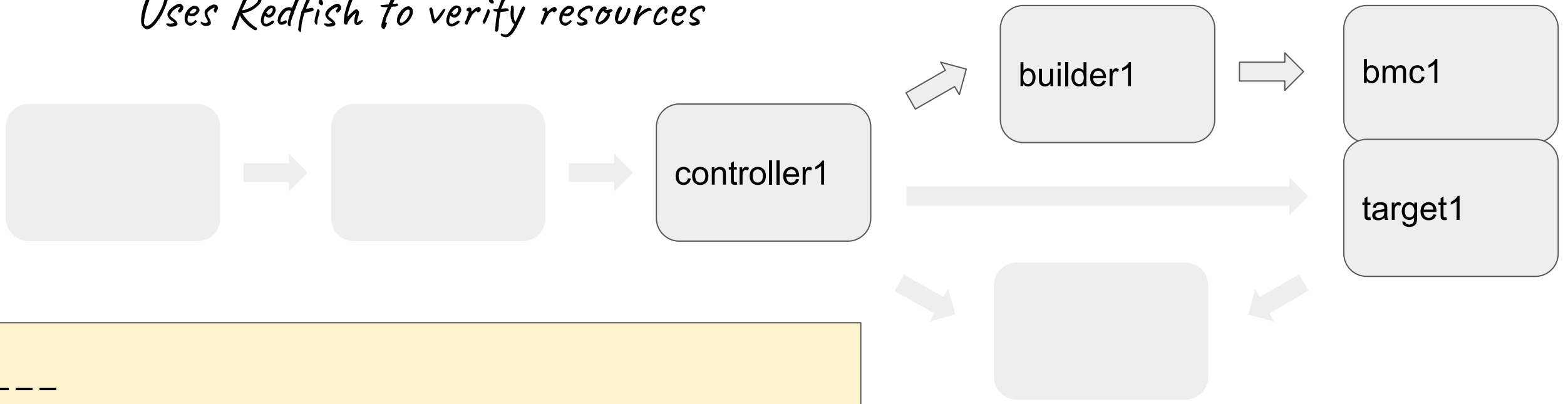
Put a new boot ISO in the repo




```
---
- name: build a customized boot ISO
  hosts: repositories
  become: yes
  vars_files: ...
```

Step 5/9 machine_check playbook (2 of 4)

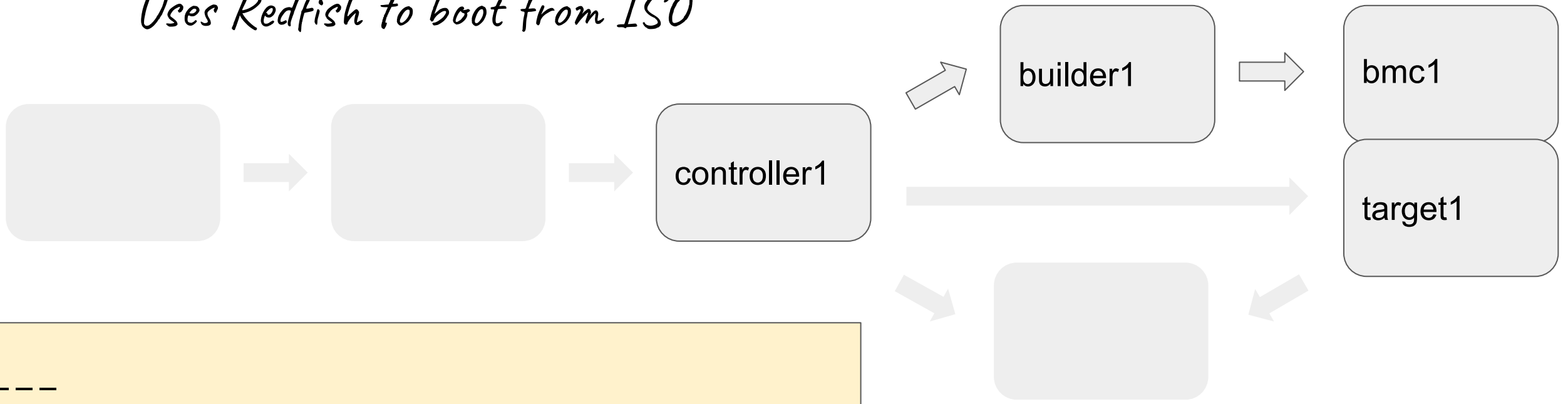
Uses Redfish to verify resources




```
---
- name: check server resources
  hosts: builder1.lab.example.com
  become: no
  gather_facts:  ...
```

Step 6/9 iso_install playbook (3 of 4)

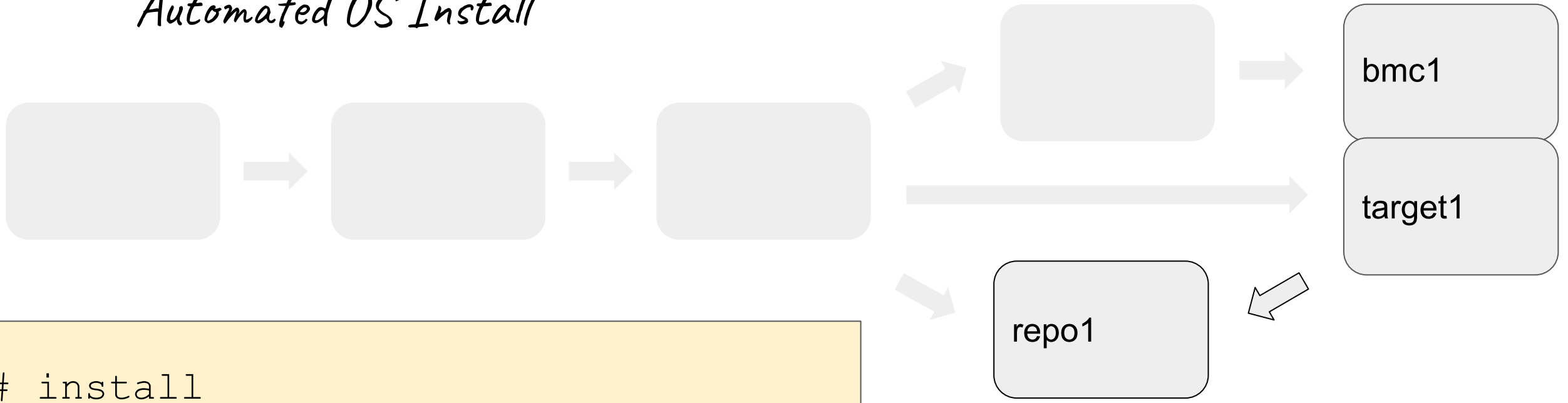
Uses Redfish to boot from ISO




```
---
- name: install the OS
  hosts: builder1.lab.example.com
  become: no
  gather_facts:  ...
```

Step 7/9 kickstart-rhel8-1.ks

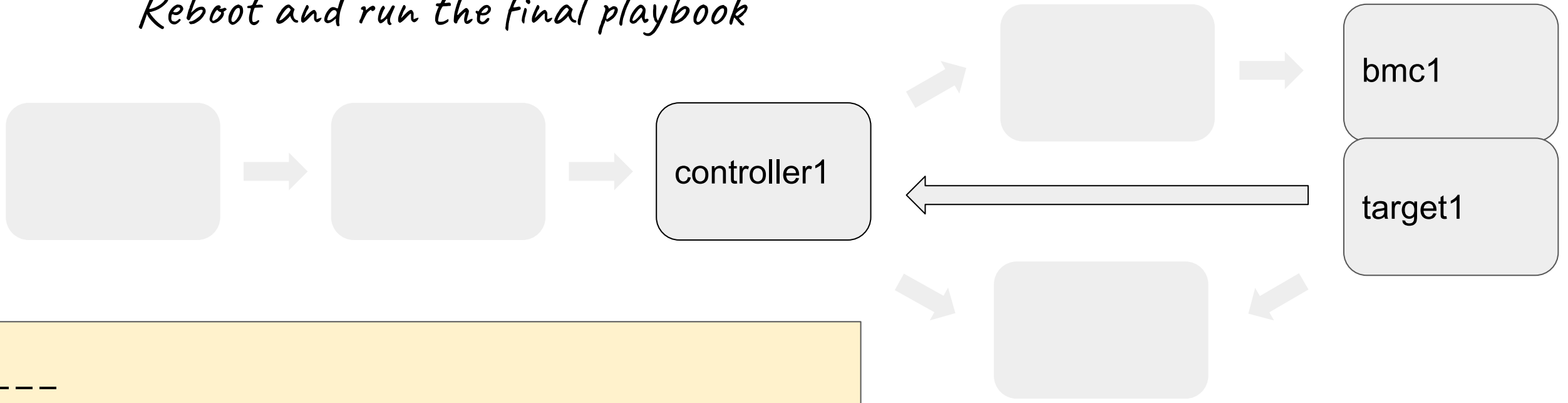
Automated OS Install




```
# install
# don't use graphical install
text
# Run the Setup Agent on first boot
firstboot --enable ...
```

Step 8/9 phone_home.sh

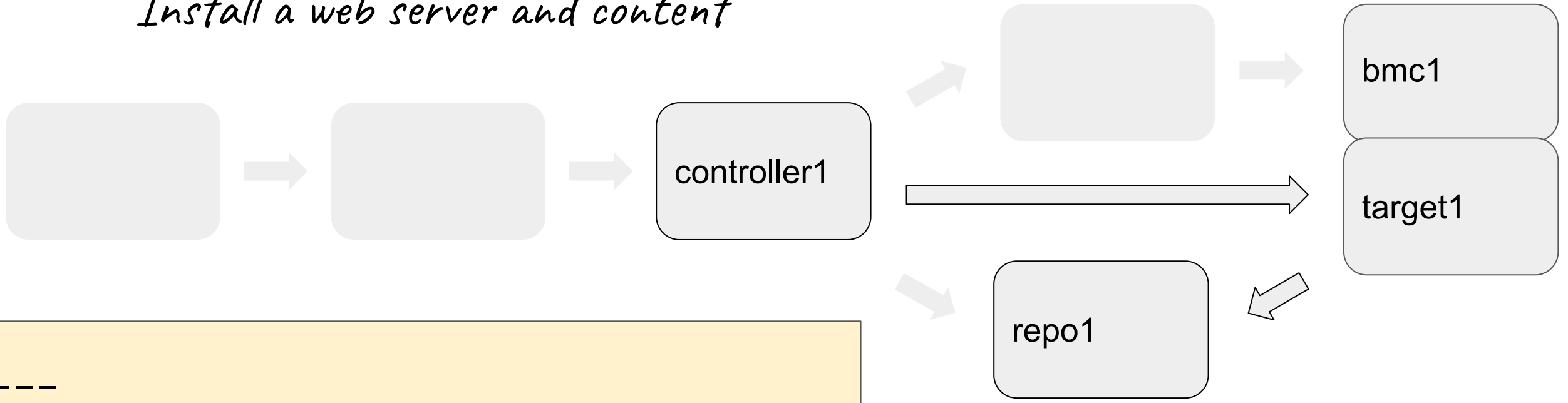
Reboot and run the final playbook




```
---
- name: configure applications
  hosts: machines_to_build
  become: yes
  tasks: ...
```

Step 9/9 target1_configure playbook *(4 of 4)*

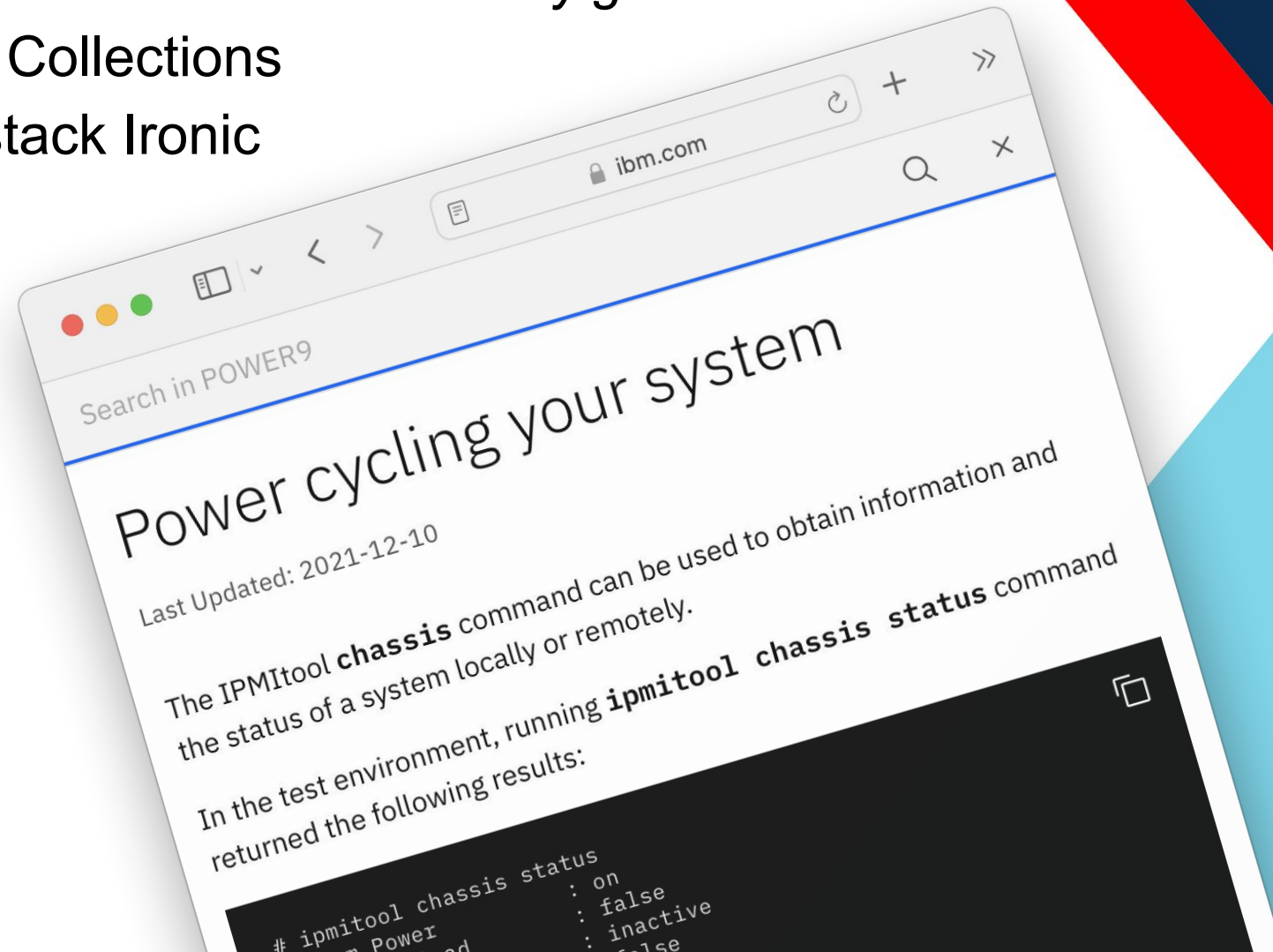
Install a web server and content




```
---
- name: configure applications
  hosts: machines_to_build
  become: yes
  tasks: ...
```

More Redfish Toys

Ansible Collection Modules *community.general.*redfish**
Vendor Ansible Collections
Red Hat Openstack Ironic
Python Sushy
Vendor Tools



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