THE LINUX FOUNDATION
OPEN SOURCE SUMMIT
EUROPE

**Cloud-init:
The cross-cloud
magic sauce.**

Scott Moser / Chad Smith
smoser   / blackboxsw @
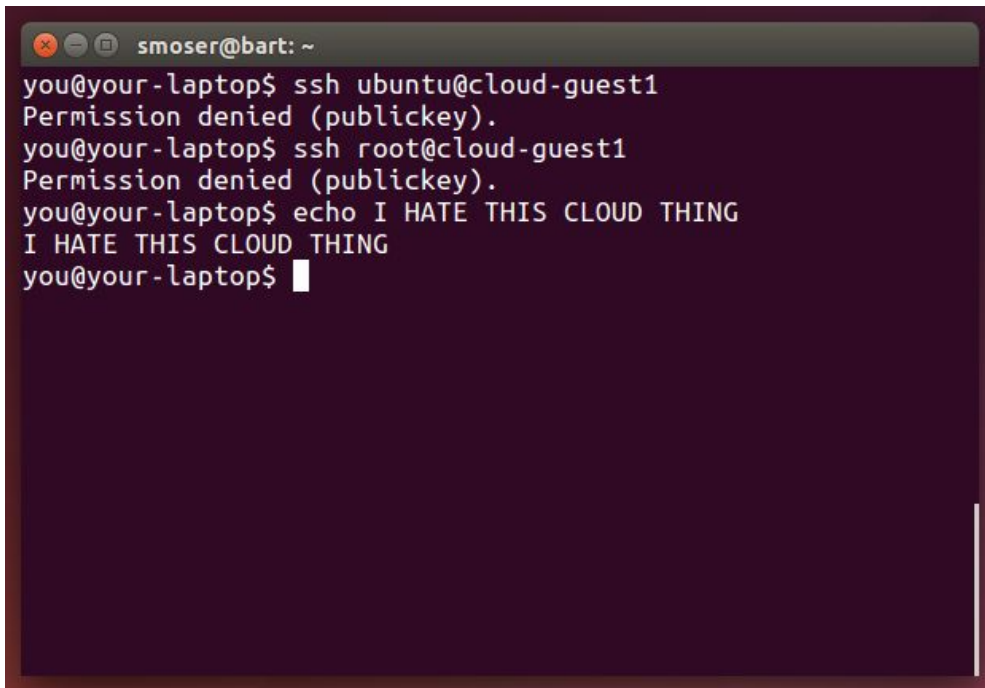FreeNode #cloud-init
OSS Europe '18: Edinburgh

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What is cloud-init?

Cloud Init is cross platform cloud instance initialization software.

That didn't help. Maybe tell me what problem it solves?

Why is cloud-init?

Basic instance initialization.

```
smoser@bart: ~
you@your-laptop$ ssh ubuntu@cloud-guest1
Permission denied (publickey).
you@your-laptop$ ssh root@cloud-guest1
Permission denied (publickey).
you@your-laptop$ echo I HATE THIS CLOUD THING
I HATE THIS CLOUD THING
you@your-laptop$
```

Why is cloud-init?

Ahh. That's better.

Turn This

Into This

Cloud Instance Makeup

Inputs to a cloud instance.
- Disk Image
- Meta-data
- User-data
- Vendor-data

Each cloud platform provides in different format in a different manner (disk, network, serial device …)

Cloud-init commonizes.

Disk Image

Just a container for blocks.
How do you get one?
- Use Existing.
- Make your own.
- Download.

https://download.opensuse.org/repositories/Cloud:/Images:/
https://cdimage.debian.org/cdimage/openstack/
https://cloud-images.ubuntu.com/
https://alt.fedoraproject.org/cloud/

Meta-data

- Information provided by the cloud platform
- Examples:
    - Hostname
    - Authorization information (ssh public keys)
    - Network information

Network Configuration

Initially network was simple: dhcp on eth0

Now clouds have multiple nics, multiple IPs, ipv4 and ipv6, bonds, bridges, vlan.

Each cloud describes network differently.
Cloud-init renders to OS specific network config:
- /etc/network/interfaces
- Netplan
- Sysconfig
- Arch, FreeBSD

User-data

Simple

```
#!/bin/sh
echo Hi Mom
```

Fancier

```
#cloud-config
packages: [pastebinit]
runcmd:
 - echo Hi Mom | tee /run/greeting.log |  pastebinit
```

Vendor Data

User-Data Uses

Enable automation and integration.

Specific configuration language for:

Add Packages and Upgrade	Configure LXD
Set Hostname	Add Users and Groups
Add SSH Keys	Partition Disks
Run Arbitrary Code	Grow the root Partition
Start Puppet or Chef	Phone Home
Timezone / Locale	Mirror Selection

Cloud Init Goals

Never need to make a custom image or reboot.
- Execute code at defined points in boot:
  - asap, network-up, "final"

Support custom image via image capture workflow.
- Execute code on boot **once** (ever), per-**instance**, or per-**boot.**
- Boot your instance, modify things, snapshot, re-use.

OSes should have to only ship a single image.

Multi-distro Support

amazon web services™ | EC2

Google Compute Engine

DigitalOcean

Azure

LXD

ORACLE CLOUD

Multi-cloud Support

openstack

HETZNER ONLINE

KVM

Joyent

CloudSigma

IBM Cloud

rackspace
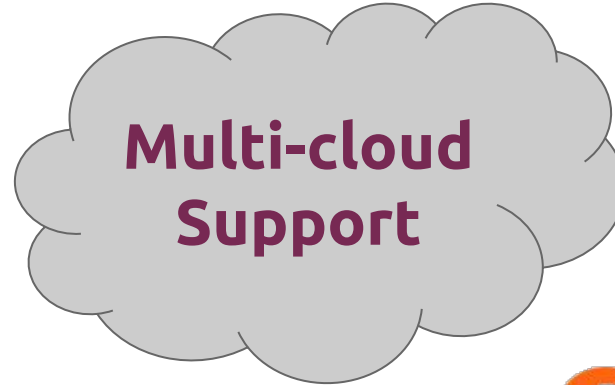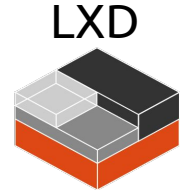
Cloud-init 18.4/18.5 features

- (18.5) Hotplug network configuration

  - Automatically apply network config based on metadata/udev events

- (18.4) Standardized instance metadata on all clouds and distros **/run/cloud-init/instance-data.json**

- (18.4) Extended command line tooling

  - **cloud-id/cloud-init query:** emit specific instance-data attributes. Report canonical cloud name and region

  - **cloud-init analyze :** detailed analysis of boot-time operations

  - **cloud-init status:** block until cloud-init successfully completes

Handoff to existing Chef management

```
#cloud-config
chef:
    install_type: "omnibus"
    omnibus_version: "12.3.0"
    node_name: "your-node-name"
    server_url: "https://chef-server.you"
    run_list:
        - "recipe[apache2]"
        - "role[frontend]"
```

Handoff to existing Puppet management

```
#cloud-config
puppet:
  conf:
    agent:
      certname:  puppet-agent-{{region}}.mydomain
      server: puppetmaster.mydomain
    ca_cert: |
      -----BEGIN CERTIFICATE----- ...
```

Handoff to existing SaltStack management

```
#cloud-config
salt_minion:
    conf:
        master: salt.example.com
    grains:
        role:
            - web
    public_key: |
        ------BEGIN PUBLIC KEY------- ...
    private_key: |
        ------BEGIN PRIVATE KEY------ ...
```

Templates allow for one #cloud-config

```
## template: jinja
#cloud-config
{% set HN='oss-' ~ v1.platform ~ '-' ~ v1.region ~ '-' ~ range(9) |
random %}
puppet:
  conf:
    agent:
      server: puppetserver.blackboxsw.com
      certname: {{ HN }}
hostname: {{ HN }}
…
{% if v1.region == 'us-east-2' and v1.cloud_name == 'aws' -%}
echo 'Installing custom proxies ...'
{%- endif %}
```

Cloud-init at work [demo]

- Standardized Instance-data available from cloud-init
  - https://asciinema.org/a/206773

- Deploying puppet across clouds and Linux distributions
  - Live demo + asciinema

Thanks, Questions, Contact

Thanks!
Questions?

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    smoser, blackboxsw

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