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

- What is cloud-init
- Where does it run?
- Goals that drive development.
- How does it work?
- What can you do with it?
- New features
- Demo
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.
Why is cloud-init?

Ahh. That’s better.

```
   you@your-laptop$ ssh root@cloudhost
   Please login as the user "ubuntu" rather than the user "root".

   Connection to cloudhost closed.
   you@your-laptop$ ssh ubuntu@cloudhost
   Welcome to Ubuntu 14.04.2 LTS (GNU/Linux 3.13.0-49-generic x86_64)

   * Documentation:  https://help.ubuntu.com/

   System information disabled due to load higher than 1.0

   Get cloud support with Ubuntu Advantage Cloud Guest:
       http://www.ubuntu.com/business/services/cloud

   Last login: Thu Apr 30 22:15:40 2015 from 10-5-0-2.openstacklocal
   ubuntu@trust-20150430-220608:~$ ubuntu@trust-20150430-220608:~$ echo 'I <3 Cloud [go cubs]'
   I <3 Cloud [go cubs]
   ubuntu@trust-20150430-220608:~$  
```
Turn This
Into This
Multi-distro Support
Multi-cloud Support

- MAAS
- Google Compute Engine
- ORACLE CLOUD
- DigitalOcean
- Azure
- LXD
- openstack
- Hetzner Online
- KVM
- Joyent
- CloudSigma
- IBM Cloud
- Rackspace
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.

Cloud Image migration.
OSes should have to only ship a single image.
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
  - Instance-id
  - Tags
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
#cloud-config
packages: [pastebinit]
runcmd:
  - echo Hi Mom | tee /run/greeting.log | pastebinit
User-Data Uses

Enable automation and integration.
Specific configuration language for:

<table>
<thead>
<tr>
<th>Action</th>
<th>Configuration Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add Packages and Upgrade</td>
<td>Configure LXD</td>
</tr>
<tr>
<td>Set Hostname</td>
<td>Add Users and Groups</td>
</tr>
<tr>
<td>Add SSH Keys</td>
<td>Partition Disks</td>
</tr>
<tr>
<td>Run Arbitrary Code</td>
<td>Grow the root Partition</td>
</tr>
<tr>
<td>Start Puppet or Chef</td>
<td>Phone Home</td>
</tr>
<tr>
<td>Timezone / Locale</td>
<td>Mirror Selection</td>
</tr>
</tbody>
</table>
Handoff to existing Chef management

```yaml
#cloud-config
chef:
  install_type: "omnibus"  # package|gems
  omnibus_version: "12.3.0"
  node_name: "your-node-name"
  server_url: "https://chef-server.you"
  environment: "production"
  run_list:
    - "recipe[apache2]"
    - "role[frontend]"
```
Handoff to existing Puppet management

#cloud-config
puppet:
  conf:
    agent:
      certname: whiz-bang-front-end.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------- ...

SALTSTACK
Cloud-init 18.4/18.5 features

- ☑ (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

- ☑ (18.5) Hotplug network configuration
  
  - Automatically apply network config based on metadata/udev events
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]

- Deploying puppet across clouds and Linux distributions
  - Live demo
- Standardized Instance-data available from cloud-init
  - https://asciinema.org/a/208031
Thanks, Questions, Contact

Thanks! Questions?

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