Introduction to Ansible

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Are your servers Pets or Cattle?
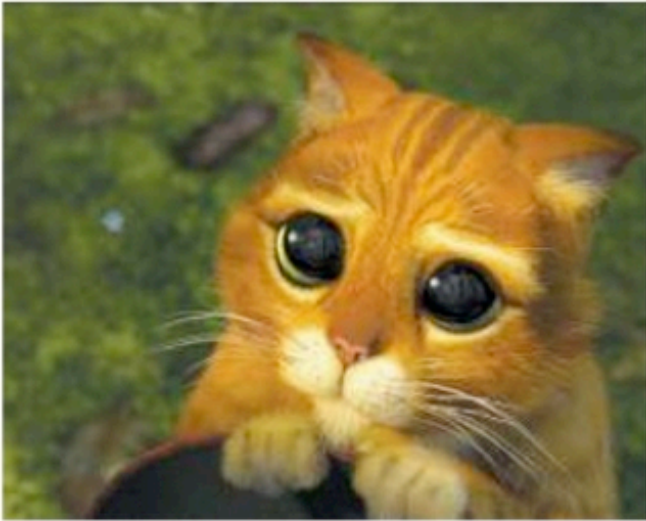
- Pets are given names like pussinboots.cern.ch
- They are unique, lovingly hand raised and cared for
- When they get ill, you nurse them back to health

- Cattle are given numbers like vm0042.cern.ch
- They are almost identical to other cattle
- When they get ill, you get another one

Source:
http://www.slideshare.net/gmccance/cern-data-centre-evolution

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What is Ansible?

- A *configuration management* tool

- Applies changes to your system to bring it to a desired state

- Similar applications include puppet, chef, salt, juju, cfengine

Why choose Ansible?

- Target system requires only sshd and python

  – No daemons or agents to install

- Security

  – Relies on ssh

- Easy to get started, compared to the others!

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Ansible running with cowsay

```
 _____
< TASK: [install /etc/hosts] >
 -------------------------------
        \   ^__^
         \  (oo)_____
            (__)\       )\/\
                ||----w |
                ||     ||
```

ok: [pc1.example.com]

Modules

- Ansible "modules" are small pieces of code which perform one function

  – e.g. copy a file, start or stop a daemon

- Most are "idempotent": means that they only do something when a change is required

- Many modules supplied as standard
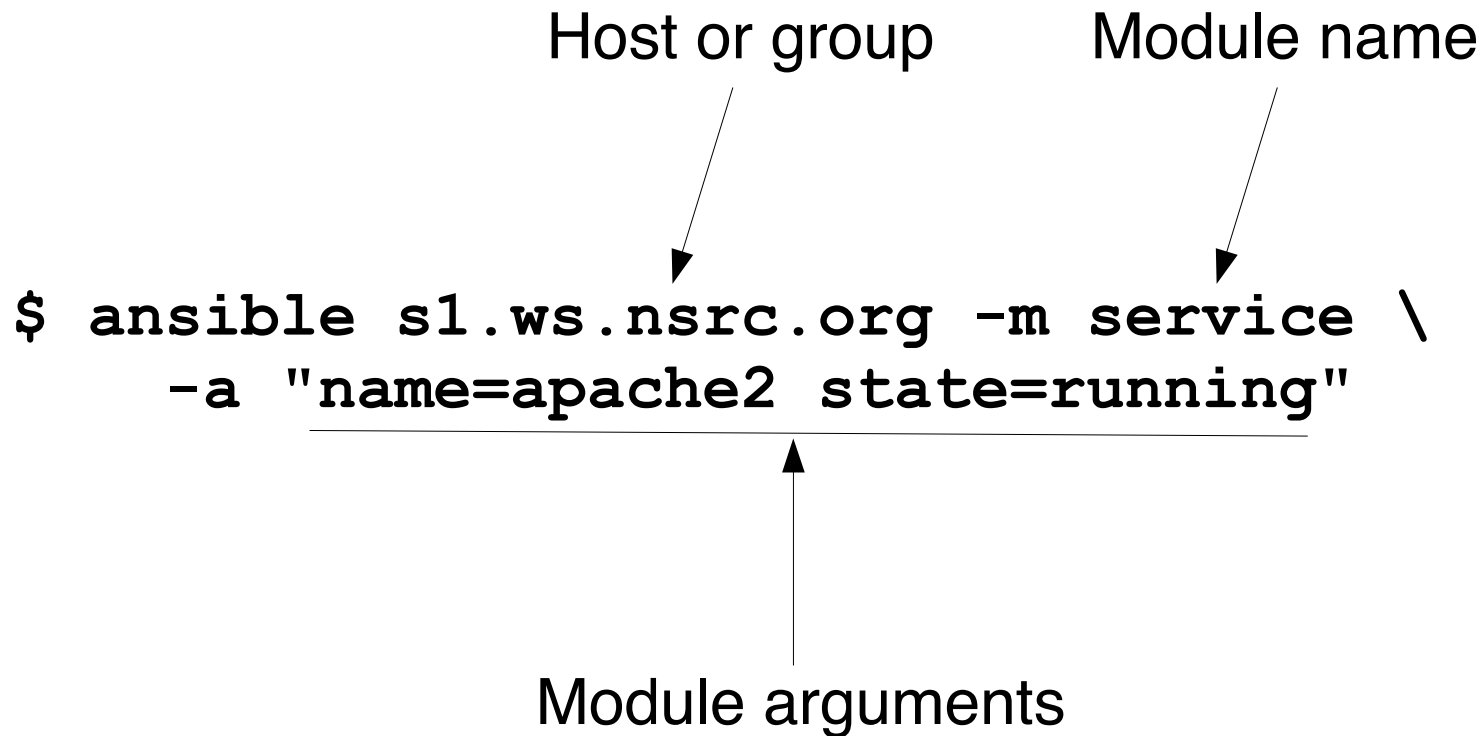
  – http://docs.ansible.com/modules.html

Invoking modules from shell

Host or group   Module name

```
$ ansible s1.ws.nsrc.org -m service \
    -a "name=apache2 state=running"
```

Module arguments

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Configuring Ansible behaviour

- *Tasks* are modules called with specific arguments

- *Handlers* are triggered when something changes

  - e.g. restart daemon when a config file is changed

- *Roles* are re-usable bundles of tasks, handlers and templates

- All defined using YAML

Diversion: YAML

- A way of storing structured data as text
- Conceptually similar to JSON
  - String and numeric values
  - Lists: ordered sequences
  - Hashes: unordered groups of key-value pairs
- String values don't normally need quotes
- Lists and hashes can be nested
- Indentation used to define nesting

YAML list (ordered sequence)

- Single line form

  `[birth, taxes, death]`

- Multi-line form

  ```
  - birth
  - taxes
  - death
  ```

  Space after dash required

YAML hash (key-value pairs)

- ## Single line form

```
{item: shirt, colour: red, size: 42}
```

Space after colon required

- ## Multi-line form

```
item: shirt
colour: red
size: 42
description: |
  this is a very long multi-line
  text field which is all one value
```

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Nesting: list of hashes

- Compact

```
- {item: shirt, colour: red, size: 42}
- {item: shirt, colour: blue, size: 44}
```

- Multi-line

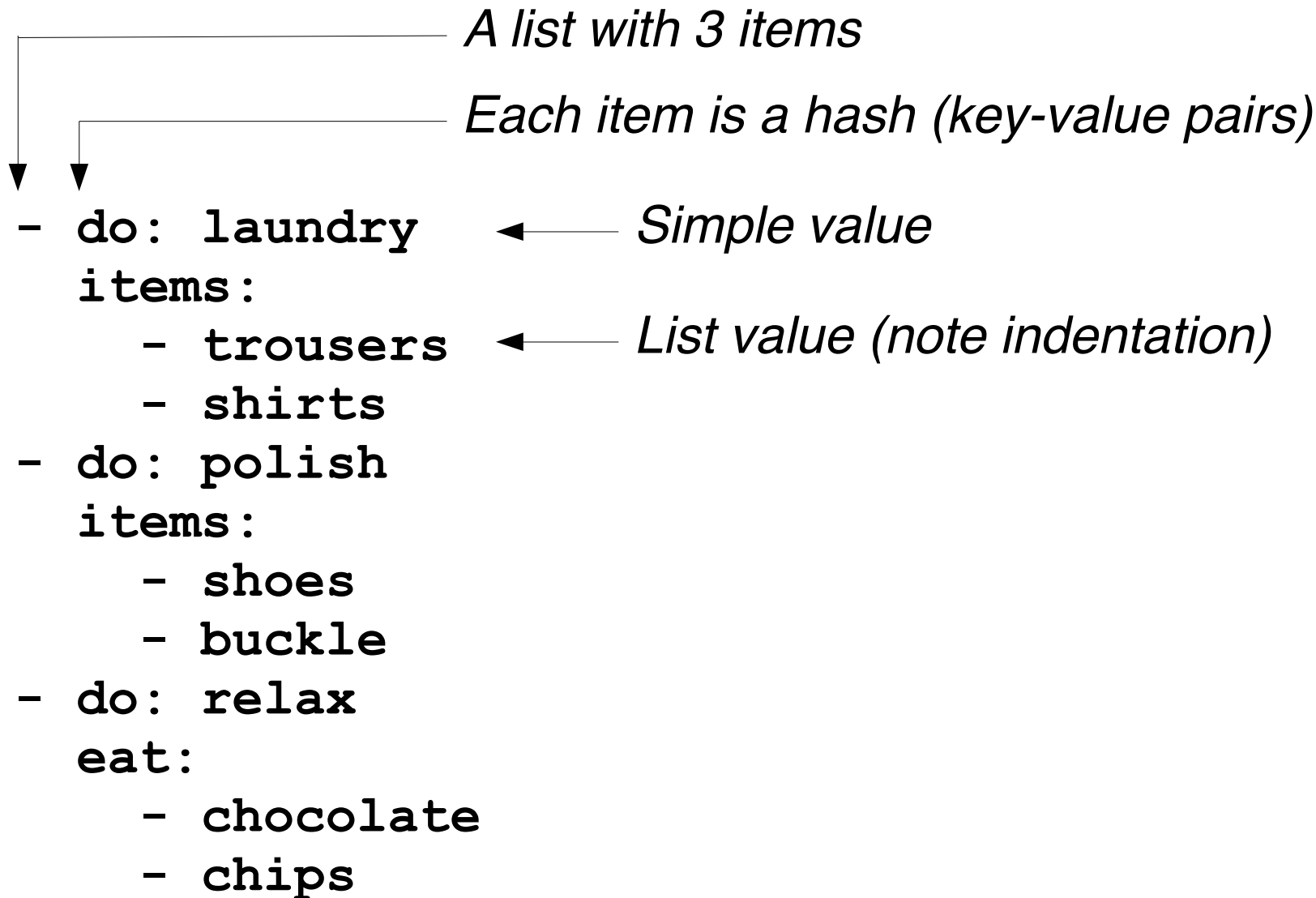*Note alignment*

```
- item: shirt
  colour: red
  size: 42
- item: shirt
  colour: blue
  size: 44
```

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More complex YAML example

A list with 3 items

Each item is a hash (key-value pairs)

```
- do: laundry          Simple value
  items:
     - trousers         List value (note indentation)
     - shirts
- do: polish
  items:
     - shoes
     - buckle
- do: relax
  eat:
     - chocolate
     - chips
```

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Ansible playbook

Top level: a list of "plays"

Each play has "hosts" plus "tasks" and/or "roles"

```
- hosts:
    - pc1.example.com
    - pc3.example.com
  tasks:
    - name: install Apache
      action: apt pkg=apache2 state=present
    - name: ensure Apache is running
      action: service name=apache2 state=running
- hosts: dns_servers
  roles:
    - dns_server
    - ntp
```

Roles

- A bundle of related tasks/handlers/templates

```
roles/<rolename>/tasks/main.yml
roles/<rolename>/handlers/main.yml
roles/<rolename>/defaults/main.yml
roles/<rolename>/files/...
roles/<rolename>/templates/...

### Recommended way to make re-usable configs

### Not all these files need to be present
```

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Tags

- Each role or individual task can be labelled with one or more "tags"

- When you run a playbook, you can tell it only to run tasks with a particular tag: `-t <tag>`

- Lets you selectively run parts of playbooks

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Inventory

- Lists all hosts which Ansible may manage
- Simple "INI" format, not YAML
- Can define groups of hosts
- Default is `/etc/ansible/hosts`
  - We will instead use `./hosts.local`
  - Can override using `-i <filename>`

Inventory (hosts) example

```
[dns_servers]        ◄──────   Name of group
pc1.example.com      ◄──────   Hosts in this group
pc2.example.com

[misc]
pc3.example.com
pc4.example.com

# Note: the same host can be listed under
# multiple groups.
# Group "all" is created automatically.
```

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Inventory variables

- You can set variables on hosts or groups of hosts

- Variables can make tasks behave differently when applied to different hosts

- Variables can be inserted into templates

- Some variables control how Ansible connects

Setting host vars

- Directly in the inventory (hosts) file

```
[core_servers]
pc1.example.com ansible_connection=local
pc2.example.com
```

- In file **host_vars/pc2.example.com**

```
ansible_ssh_host: 10.10.0.241
ansible_ssh_user: root
flurble:
  - foo
  - bar
# This is in YAML and is preferred
```

Setting group vars

- **group_vars/dns_servers**

```
# More YAML
flurble:
  - baz
  - qux
```

- **group_vars/all**

```
# More YAML, applies to every host
# Note: host vars take priority over group vars
```

"Facts"

- Facts are variables containing information collected automatically about the target host

- Things like what OS is installed, what interfaces it has, what disk drives it has

- Can be used to adapt roles automatically to the target system

- Gathered every time Ansible connects to a host (unless playbook has "gather_facts: no")

Showing facts

Invoke the "setup" module

```
$ ansible s1.ws.nsrc.org -m setup | less
s1.ws.nsrc.org | success >> {
    "ansible_facts": {
        "ansible_distribution": "Ubuntu",
        "ansible_distribution_version": "12.04",
        "ansible_domain": "ws.nsrc.org",
        "ansible_eth0": {
            "ipv4": {
                "address": "10.10.0.241",
                "netmask": "255.255.255.0",
                "network": "10.10.0.0"
            },  … etc
```

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jinja2 template examples

- Insert a variable into text

```
INTERFACES="{{ dhcp_interface }}"
```

- Looping over lists

```
search ws.nsrc.org
{% for host in use_dns_servers %}
nameserver {{ host }}
{% endfor %}
```

Many other cool features

- Conditionals

```
- action: apt pkg=apache2 state=present
  when: ansible_os_family=='Debian'
```

- Loops

```
- action: apt pkg={{item}} state=present
  with_items:
    - openssh-server
    - acpid
    - rsync
    - telnet
```

Getting up-to-date Ansible

- Your package manager's version may be old
- For Ubuntu LTS: use the PPA

```
apt-get install python-software-properties
add-apt-repository ppa:rquillo/ansible
apt-get update
apt-get install ansible
```

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More info and documentation

- http://docs.ansible.com/
- http://docs.ansible.com/faq.html
- http://jinja.pocoo.org/docs/templates/