CFEngine

The Future of In-Container Configuration Management

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CFEngine AS

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zzamboni

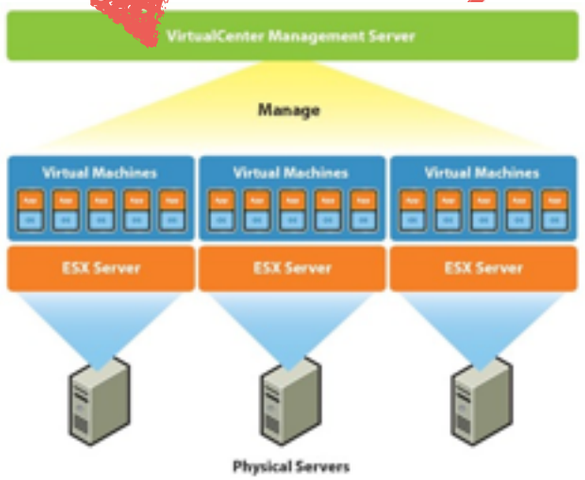
A grossly oversimplified history of computing











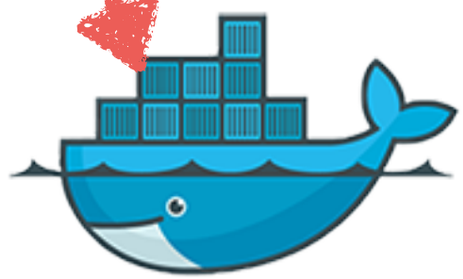


Image credits: http://blog.softlayer.com/tag/mainframe, http://www.bloomberg.com/photo/ibm-makes-1-billion-bet-on-new-mainframe-in-shrinking-business-/222911.html, http://blogs.vmware.com/virtualreality/2008/06/a-look-at-some.html, http://www.michael-noll.com/tutorials/running-hadoop-on-ubuntu-linux-single-node-cluster/

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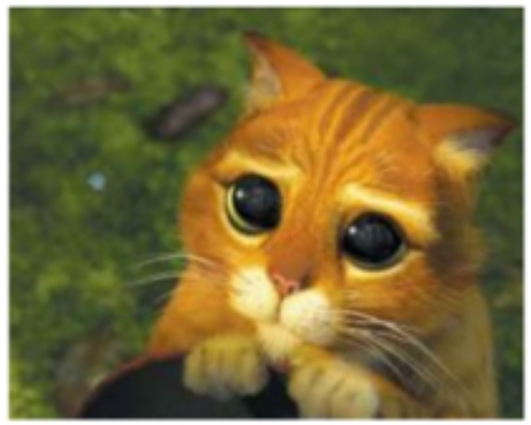
Pets vs cattle

Pets vs cattle

Service Model

cloudscaling



- 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

- Future application architectures should use Cattle but Pets with strong configuration management are viable and still needed

Gavin McCance, CERN 17

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

Pets vs cattle



- Custom-built server (physical or VM)
- Carefully configured (by hand or CM)
- Hard to replicate

amazon web services

- Automatically-built server (VM or container)
- Statically-configured (by hand or CM)
- Easy to replicate

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Pets vs cattle

Traditional domain of configuration management



- Custom-built server (physical or VM)
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amazon web services

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Configuration management in the age of containers?



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Configuration management in the age of containers?

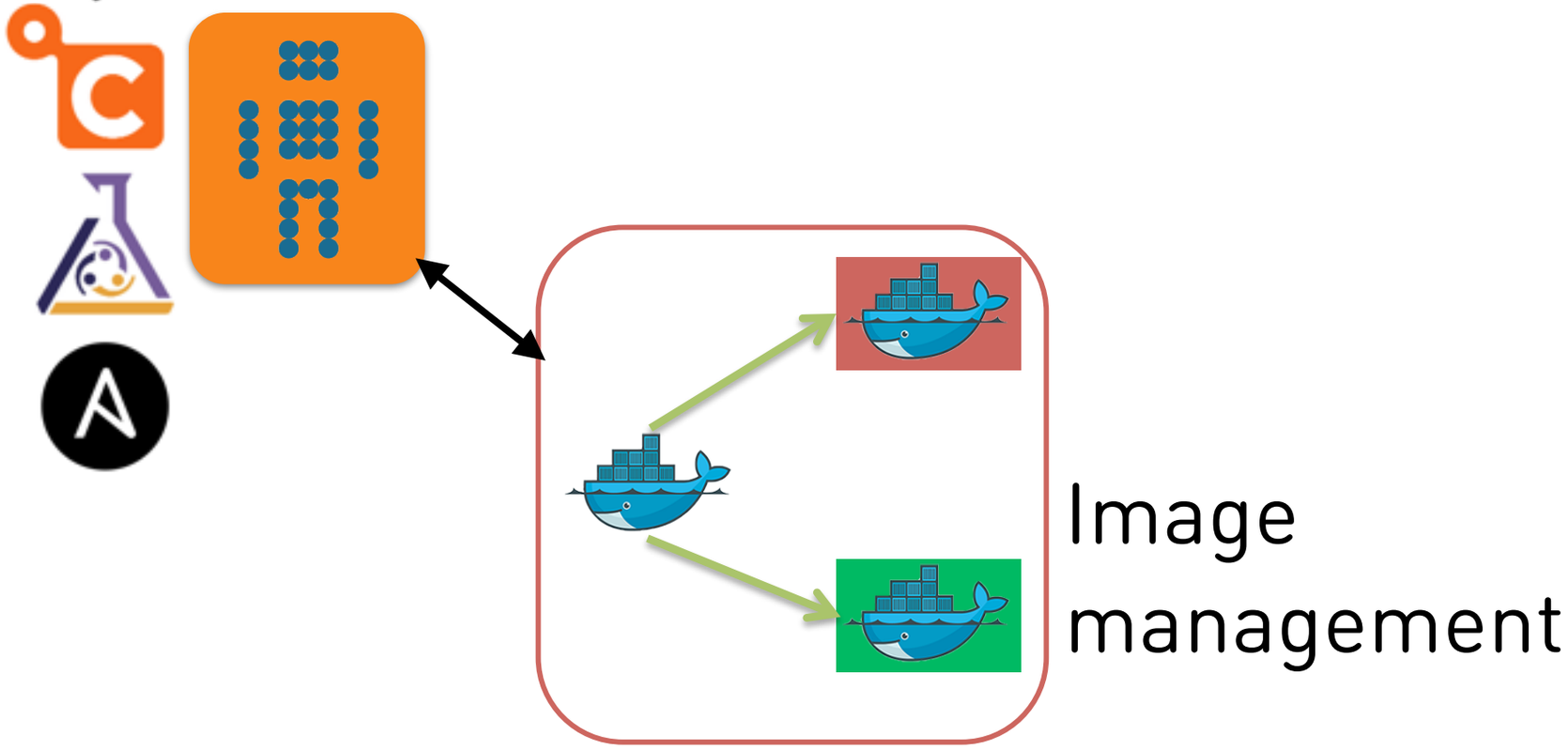

Image management

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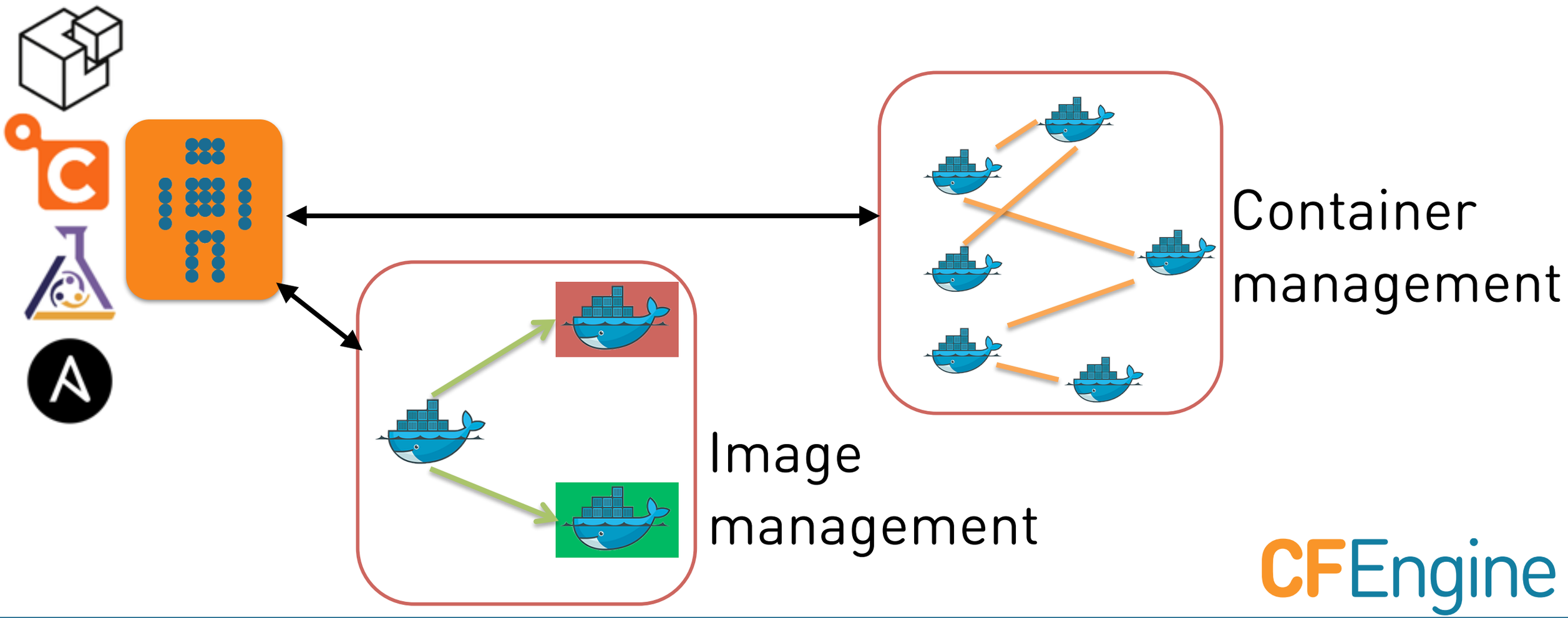
Configuration management in the age of containers?



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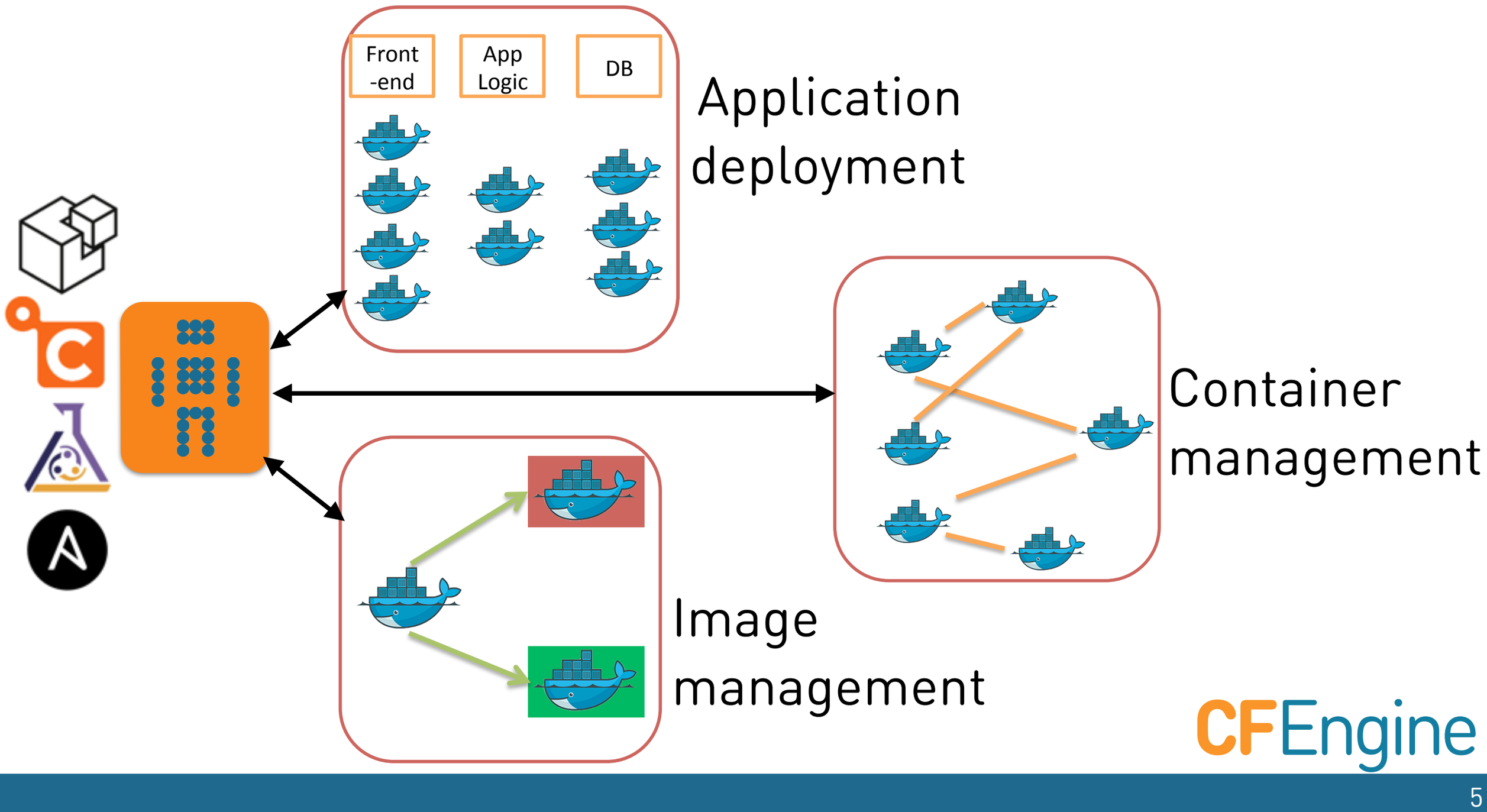
Configuration management in the age of containers?



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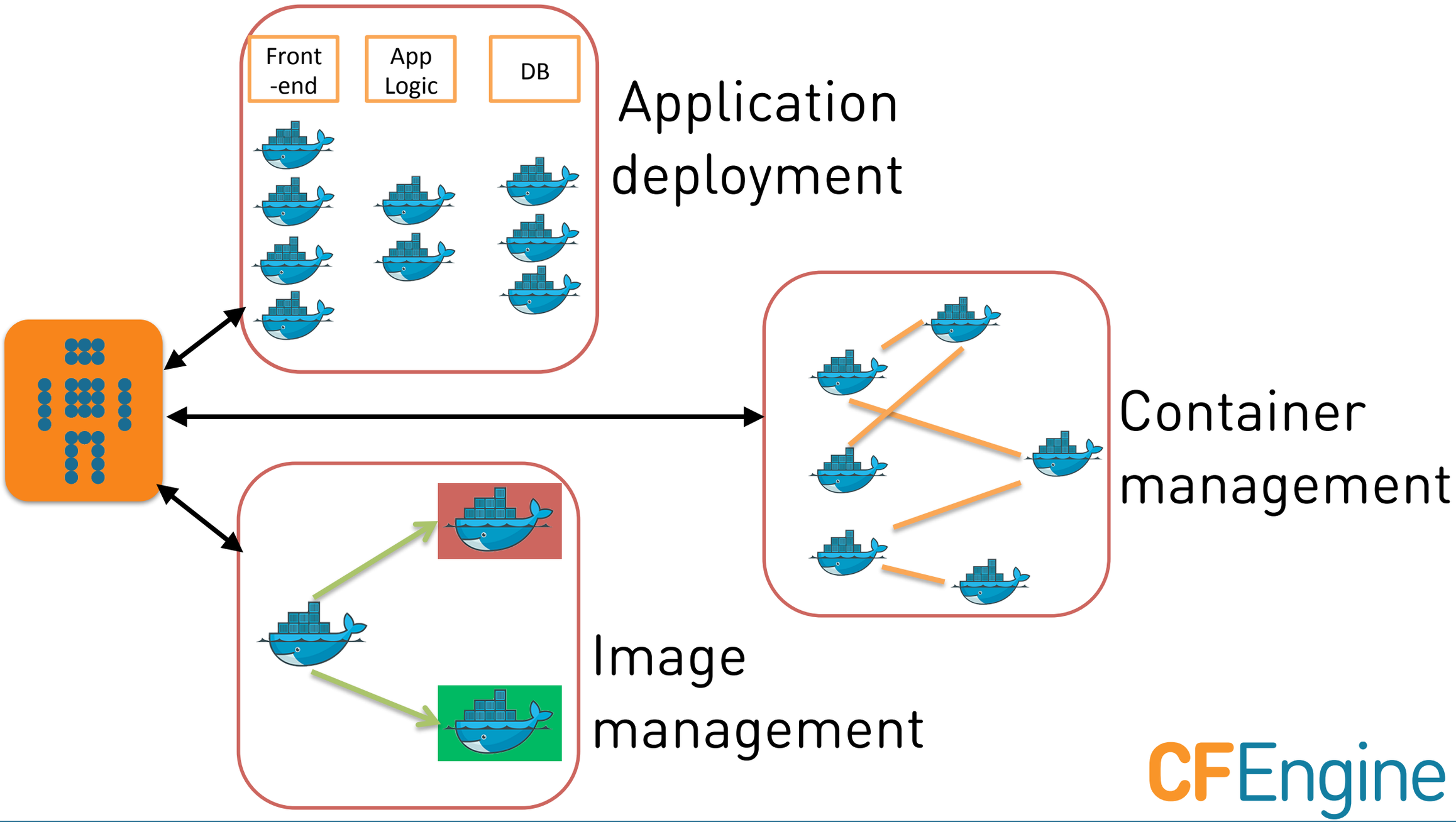
Configuration management in the age of containers!



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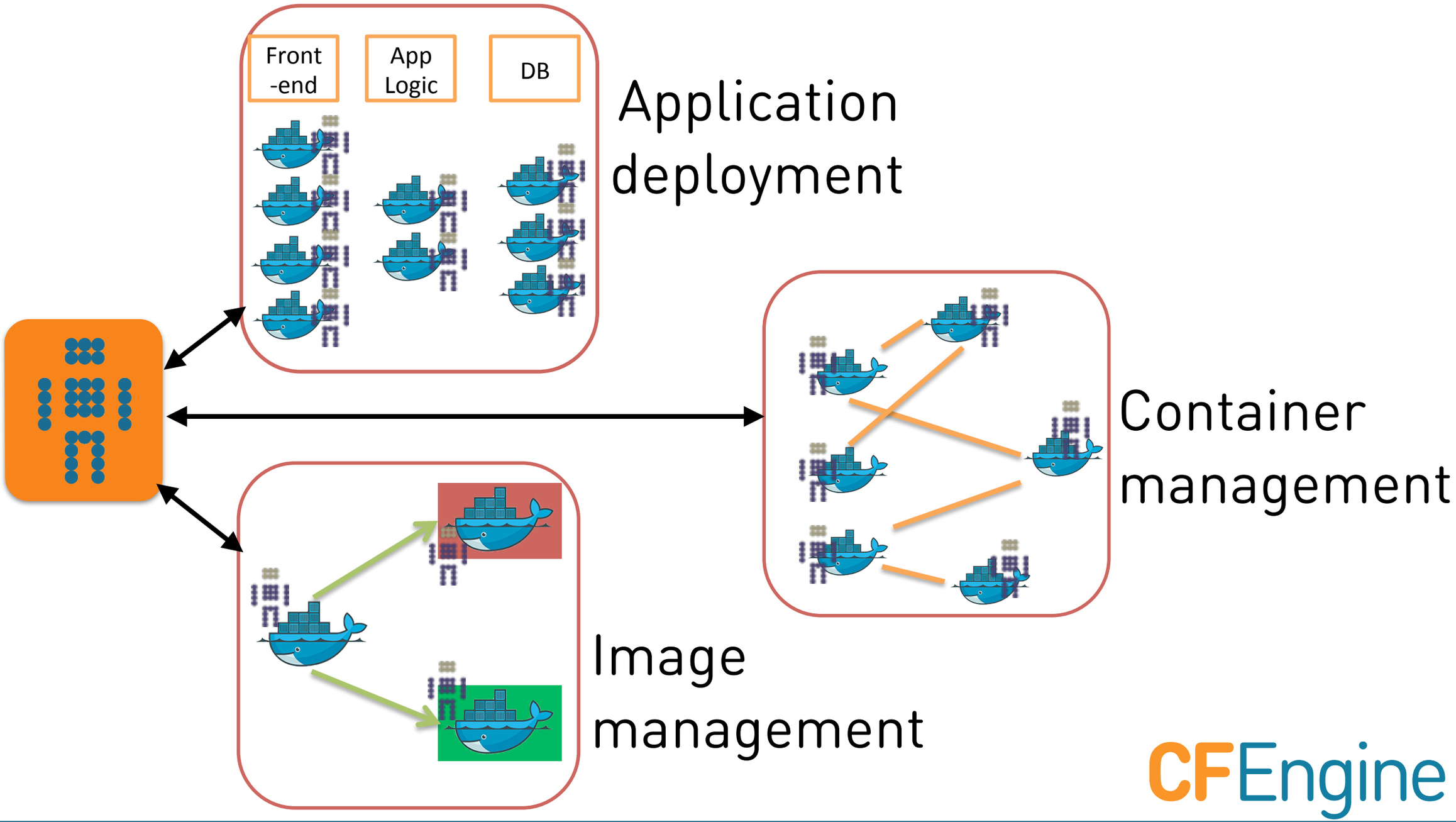
Configuration management in the age of containers!



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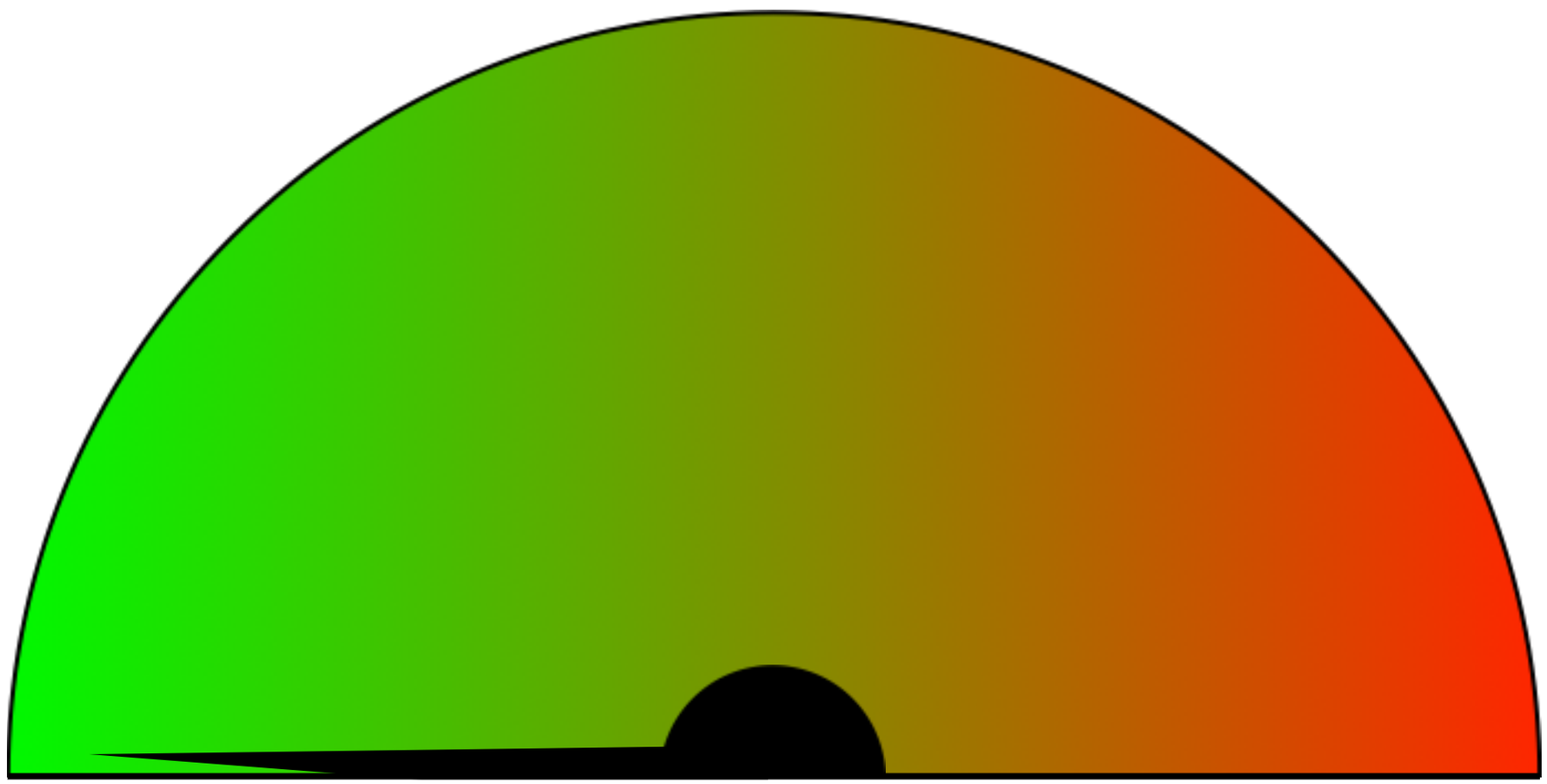
The pet-cattle scale







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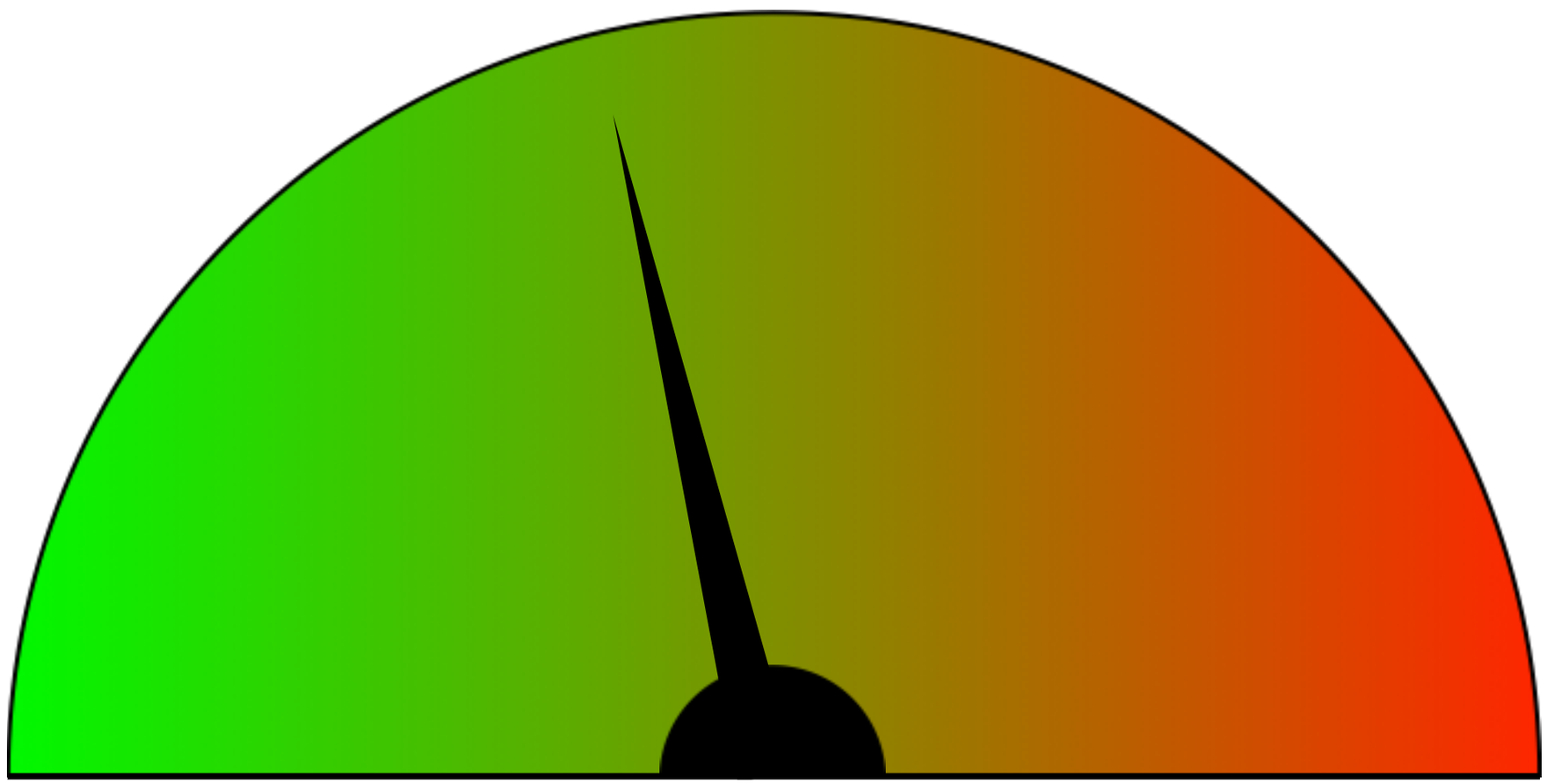



CFEngine

Balancing the scale

```
{
    "cfengine/cfubuntu": {
        "base_image": "ubuntu",
        "install_cfengine": true,
        "packages": [ "openssh-server" ],
        "ports": [ 22 ]
    },
    "cfengine/cfdbserver": {
        "base_image": "cfengine/cfubuntu",
        "packages": [ "mysql-server", "mysql-client" ],
        "ports": [ 3306 ]
    },
    "cfengine/cfwebserver": {
        "base_image": "cfengine/cfubuntu",
        "packages": [ "apache2", "libapache2-mod-php5",
                      "php5-mysql" ],
        "ports": [ 80, 443 ]
    },
    "cfengine/cfwordpress": {
        "base_image": "cfengine/cfwebserver",
        "extralines": [
            "RUN rm -rf /var/www/html",
            "ADD http://wordpress.org/latest.tar.gz /wordpress.tar.gz",
            "RUN tar xvzf /wordpress.tar.gz",
            "RUN mv /wordpress /var/www/html",
            "RUN chown -R www-data:www-data /var/www/"
        ],
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    },
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        "base_image": "cfengine/cfubuntu",
        "packages": [ "haproxy" ],
        "ports": [ 80, 443 ]
    },
}
```

```
{
    "dbserver": {
        "image": "cfengine/cfdbserver",
        "options": "-p 22"
    },

    "webserver": {
        "howmany": 5,
        "image": "cfengine/cfwordpress",
        "links": { "dbserver": "db" },
        "options": "-p 22"
    },

    "haserver": {
        "image": "cfengine/cfhaserver",
        "links": { "webserver": "web" },
        "options": "-p 80 -p 443 -p 22"
    },
}
```

CFEngine

Balancing the scale

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        "base_image": "cfengine/cfubuntu",
        "packages": [ "haproxy" ],
        "ports": [ 80, 443 ]
    },
}
```

```
bundle agent service_catalogue
{
  methods:

    any::
      "docker" usebundle => docker_discovery,
                 comment => "Discover if we are in a docker container";

      "ssh"    usebundle => setup_ssh,
                 comment => "Start ssh and ensure correct keys are in";

    am_policy_hub::
      "setup_docker" usebundle => docker_infrastructure,
                       comment => "Set up docker containers";

    web_server::
      "wordpress"    usebundle => config_wordpress,
                       comment => "Configure wordpress on the local host";

    db_server::
      "mysql"        usebundle => config_mysql,
                       comment => "Configure MySQL for wordpress";

    load_balancer::
      "haproxy"      usebundle => config_haproxy,
                       comment => "Configure haproxy for load balancer";
}
```

CFEngine

In-container/off-container CM

Image size

Runtime size

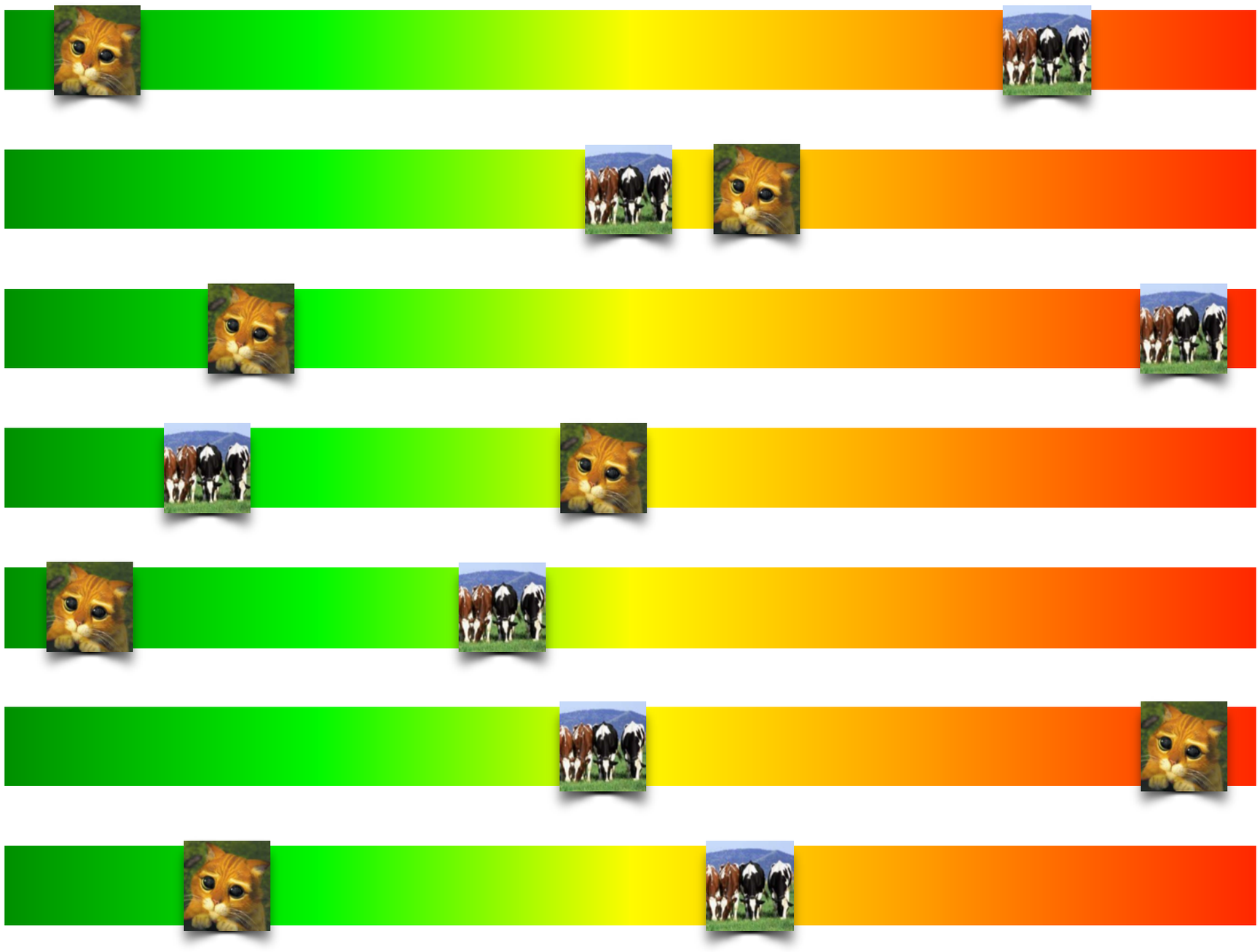
Image/Dockerfile proliferation

Startup time

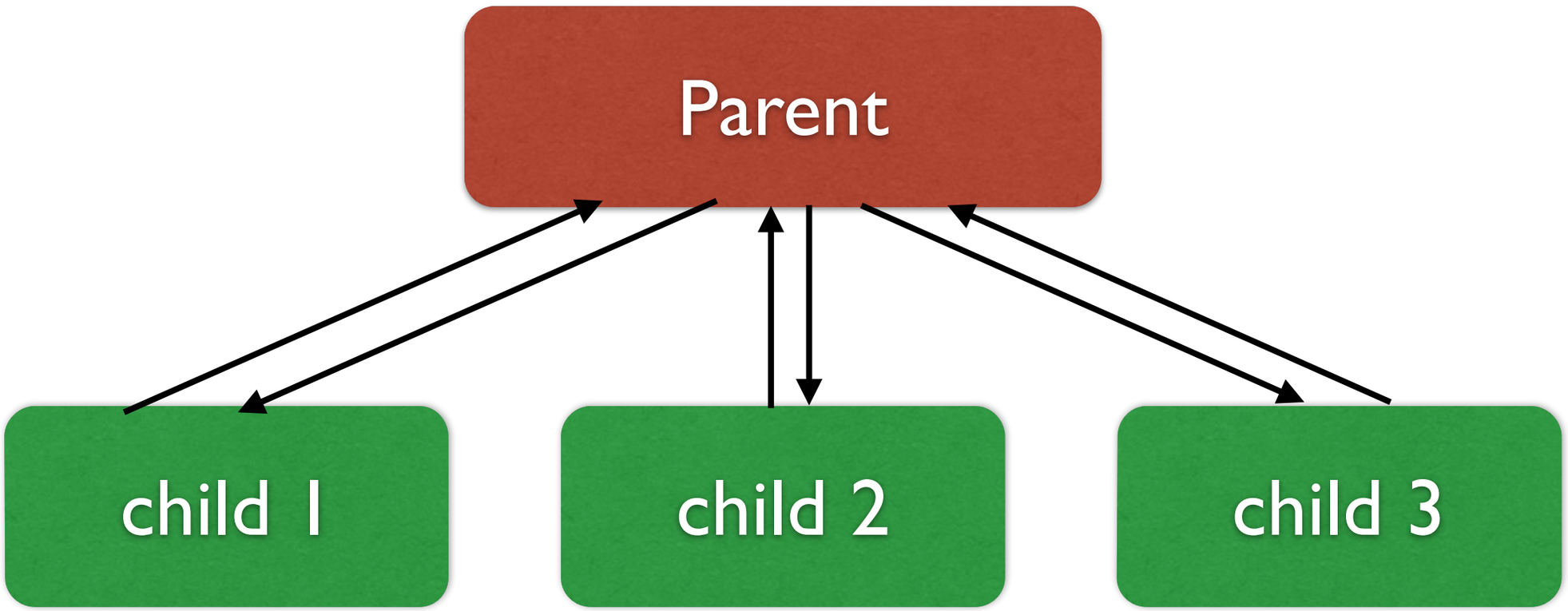
Runtime changes

Immutable infrastructure

Repeatability across infrastructures



Orchestration



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Orchestration

```
bundle agent main
{
  methods:

    parent::

      "plant continuous delivery seeds" comment => "The files where people make changes";
      "pick the flowers"                comment => "Reap the harvest";
      "package for delivery"            comment => "Tie it with a bow";

    bud_containers::

      "feed from the parent" comment => "pick up files and build something";

  services:
    parent::
      "budding children" comment => "Spawn some fledgings";
}
```

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Orchestration

```
bundle agent main
{
  methods:

    parent::

      "plant continuous delivery seeds"
      "pick the flowers"
      "package for delivery"

    bud_containers::

      "feed from the parent" comment =>

  services:
    parent::
      "budding children" comment => "Sp
}
```

```
bundle agent service_budding_children(name,state)
{
  guest_environments:

    parent.!cleanup::

      "$(my.buds)"
            guest_details => stem_cell,
            guest_state   => "create";

    cleanup::

      "$(my.buds)"
            guest_details => stem_cell,
            guest_state   => "delete";
}

##########################################################

body guest_details stem_cell
{
              guest_type => "docker";
        guest_image_name => "cf-stem-cell";
}
```

What do we need from in-container CM?

- Lightweight
- Distributed
- Resilient

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Thank you

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