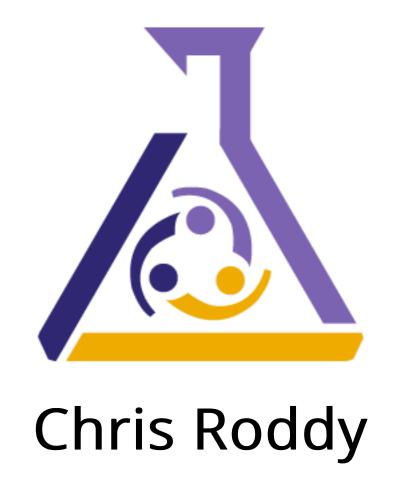
# Managing Puppet Code

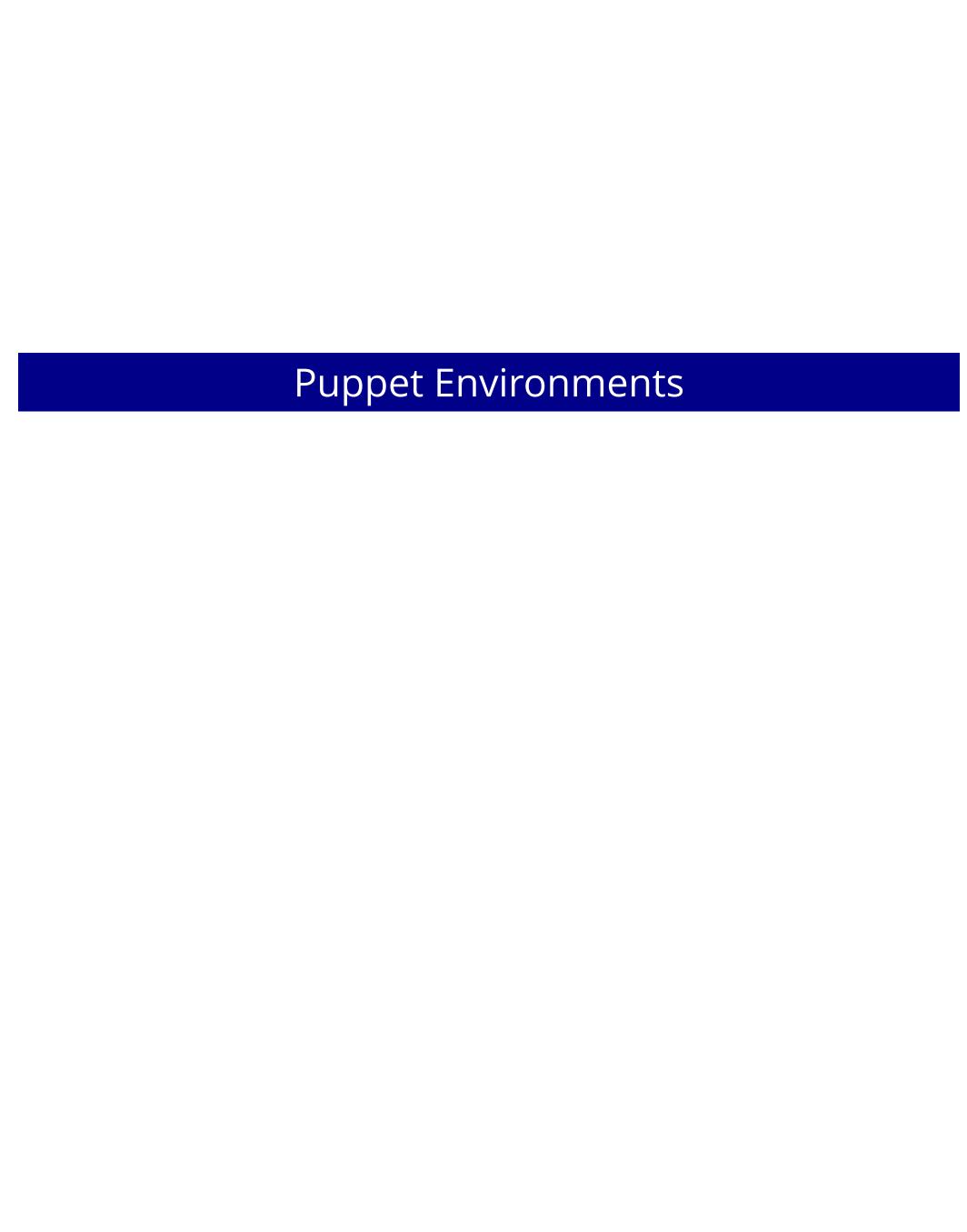
With R10k and Directory Environments



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# Managing Puppet Code

- Evolution of Puppet environments
- Monolithic repositories
- R10k workflow
- Master configuration
- Q&A



### What is an Environment?

Puppet environment:
An isolated collection of Puppet nodes, which a master can serve with completely different site manifests and modulepaths

## Config-File Environments

Each environment configured explicitly in puppet.conf:

```
[main]
  certname = puppet.example.com
  modulepath = /etc/puppet/modules
  manifest = /etc/puppet/manifests/site.pp
  server = puppet.example.com

[agent]
  pluginsync = true
  environment = production

[master]
  reports = tagmail

[dev]
  modulepath = /etc/puppet/environments/dev/modules
  manifest = /etc/puppet/environments/dev/site.pp

[test]
  modulepath = /etc/puppet/environments/test/modules
  manifest = /etc/puppet/environments/test/site.pp

[preprod]
  modulepath = /etc/puppet/environments/preprod/modules
  manifest = /etc/puppet/environments/preprod/modules
  manifest = /etc/puppet/environments/preprod/site.pp
```

# **Dynamic Environments**

Environments configured generically using variables:

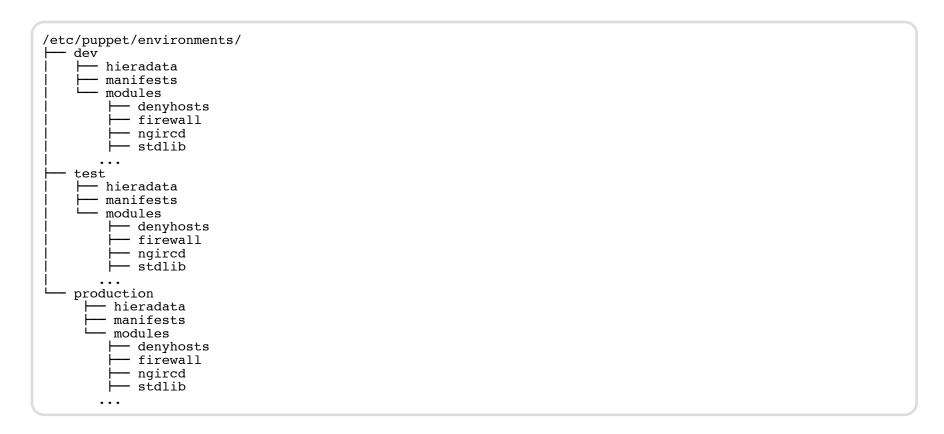
```
[main]
  certname = puppet.example.com
  modulepath = /etc/puppet/environments/$environment/modules
  manifest = /etc/puppet/environments/$environment/manifests/site.pp
  server = puppet.example.com

[agent]
  pluginsync = true
  environment = production

[master]
  reports = tagmail
```

### **Environment Contents**

Environments all tend to look the same...



### **Directory Environments**

Set basemodulepath and environmentpath in puppet.conf:

```
[main]
  certname = puppet.example.com
  basemodulepath = /etc/puppet/modules
  environmentpath = /etc/puppet/environments
  server = puppet.example.com

[agent]
  pluginsync = true
  environment = production

[master]
  reports = tagmail
```

Set modulepath and manifest in environment.conf:

```
modulepath = modules:$basemodulepath
```

All manifests in manifests will be loaded (by default).

### Per-Environment Hiera data

\$environment is interpolated in hiera.yaml.

```
:backends:
    - yaml

:hierarchy:
    - nodes/%{clientcert}
    - datacenters/%{datacenter}
    - platforms/%{operatingsystem}-%{operatingsystemrelease}
    - platforms/%{operatingsystem}
    - common

:yaml:
    :datadir: /etc/puppet/environments/%{environment}/hieradata
```

### **Future of Environments**

- Enabling directory environments disables config-file environments
- Config-file environments are deprecated
- Directory environments will be the only option in Puppet 4



# Puppet Super Overmind Monolith

All of /etc/puppet as a repository:

```
/etc/puppet/
    environments
        dev
           - hieradata
            manifests
            - modules
        production
         ├── hieradata
├── manifests
            - modules
 - manifests
- modules
  - hiera.yaml
  - puppet.conf
    ├─ ca
├─ certificate_requests
      - certs
      - private
       - private_keys
       - public_keys
```

...private\_keys???

# **Environment Repository**

Each branch as the contents of a single environment:

```
/etc/puppet/environments/production

— hieradata

— manifests

— site.pp

— modules

— concat

— denyhosts

— firewall

— git

— inifile

— ngircd

— profiles

— roles

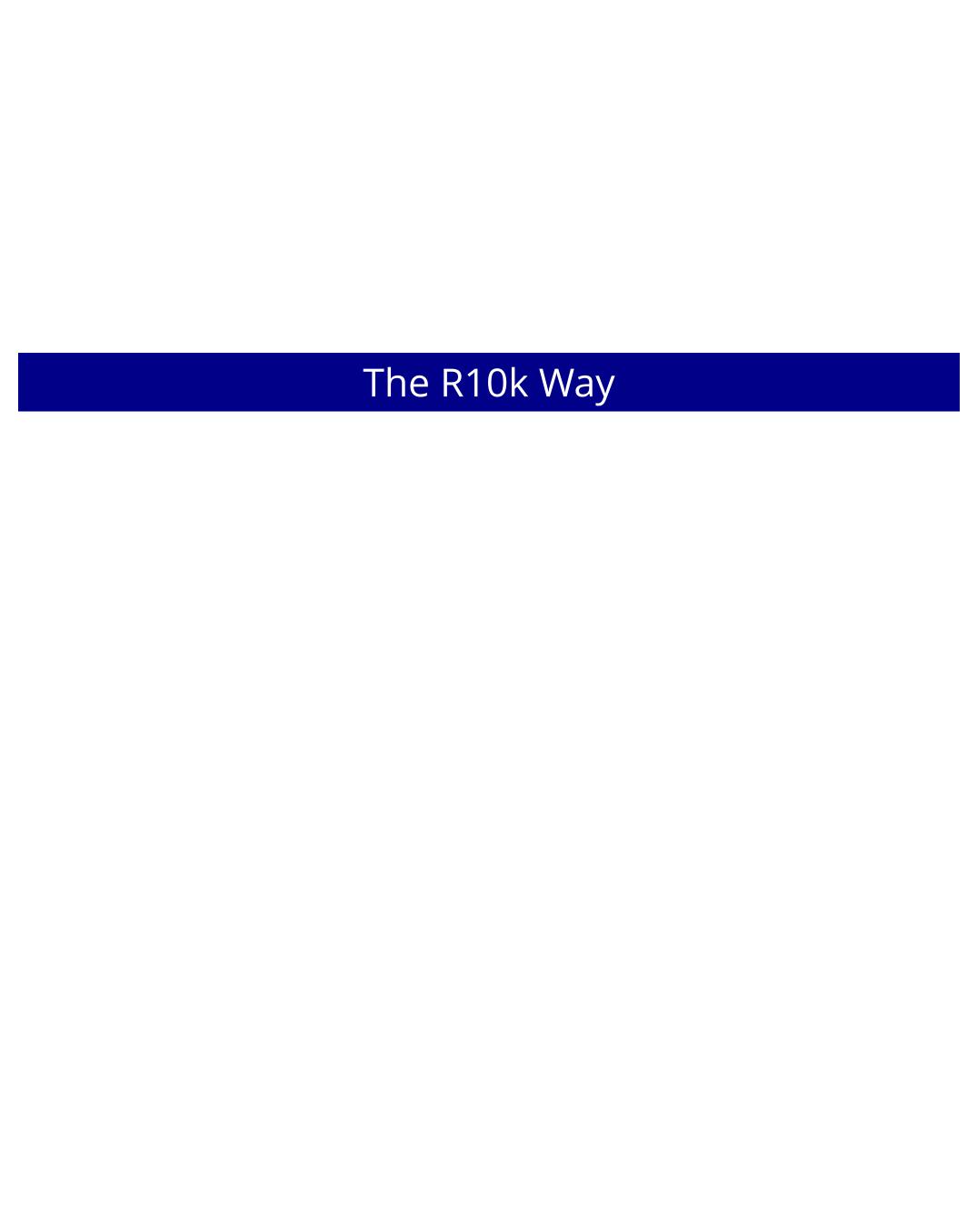
— stdlib

— thttpd

...
```

# Problems with Monolithic Repos

- History of local modules is intermixed and difficult to follow
- Importing Forge modules results in huge, useless changesets
- Rolling a single module forward or back is very difficult



## What is R10k?

R10k is a tool for deploying Puppet environments from version control.

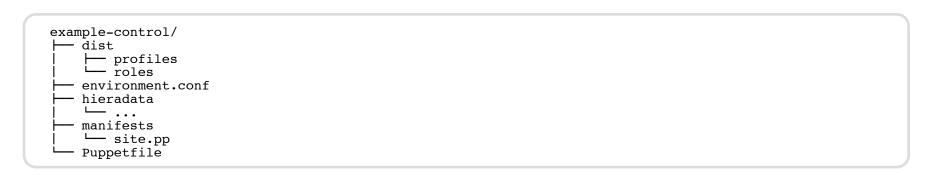
### What is R10k?

R10k is a tool for deploying Puppet environments from version control.

- Directory environments
- Private modules from Git
- Public modules from the Forge and Github
- Environment metadata in a special "control" repository

# **Control Repository**

The control repository holds environment metadata, arranged for a single Puppet environment:



# Puppetfile

The Puppetfile lists the desired modules and their versions.

### Branches Become Environments

R10k will create an environment for each branch of the control repository.

croddy@devbox \$ git branch
 dev
 preprod
\* production

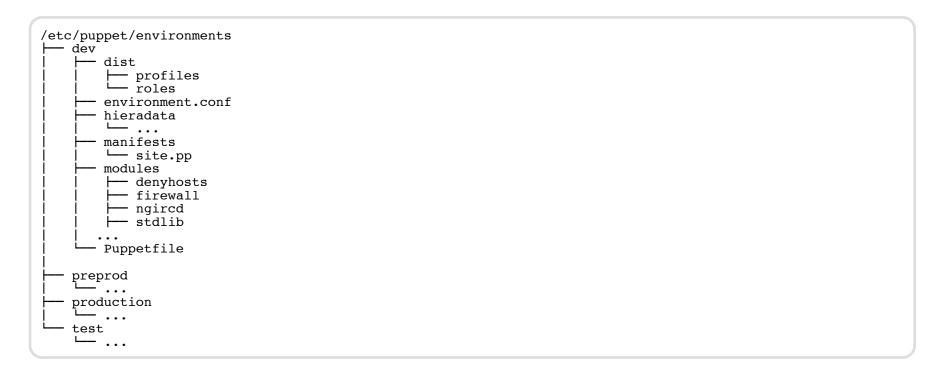
test

### **Branches Become Environments**

R10k will create an environment for each branch of the control repository.

```
croddy@devbox $ git branch
  dev
  preprod
* production
  test
```

After r10k deploy environment -p...



### What is an Environment?

Puppet environment:
An isolated collection of Puppet code, configuration, and supporting materials, which a master can serve at different points in the development life cycle

### Feature Branch Environments

```
croddy@devbox $ git branch
  dev
  preprod
  production
  test
  croddy_JIRA_567
* croddy_JIRA_1234
  jmorrison_JIRA_890
```

### After r10k deploy environment -p...

# The 'production' Environment

The production Puppet environment is not the environment that contains your production nodes.

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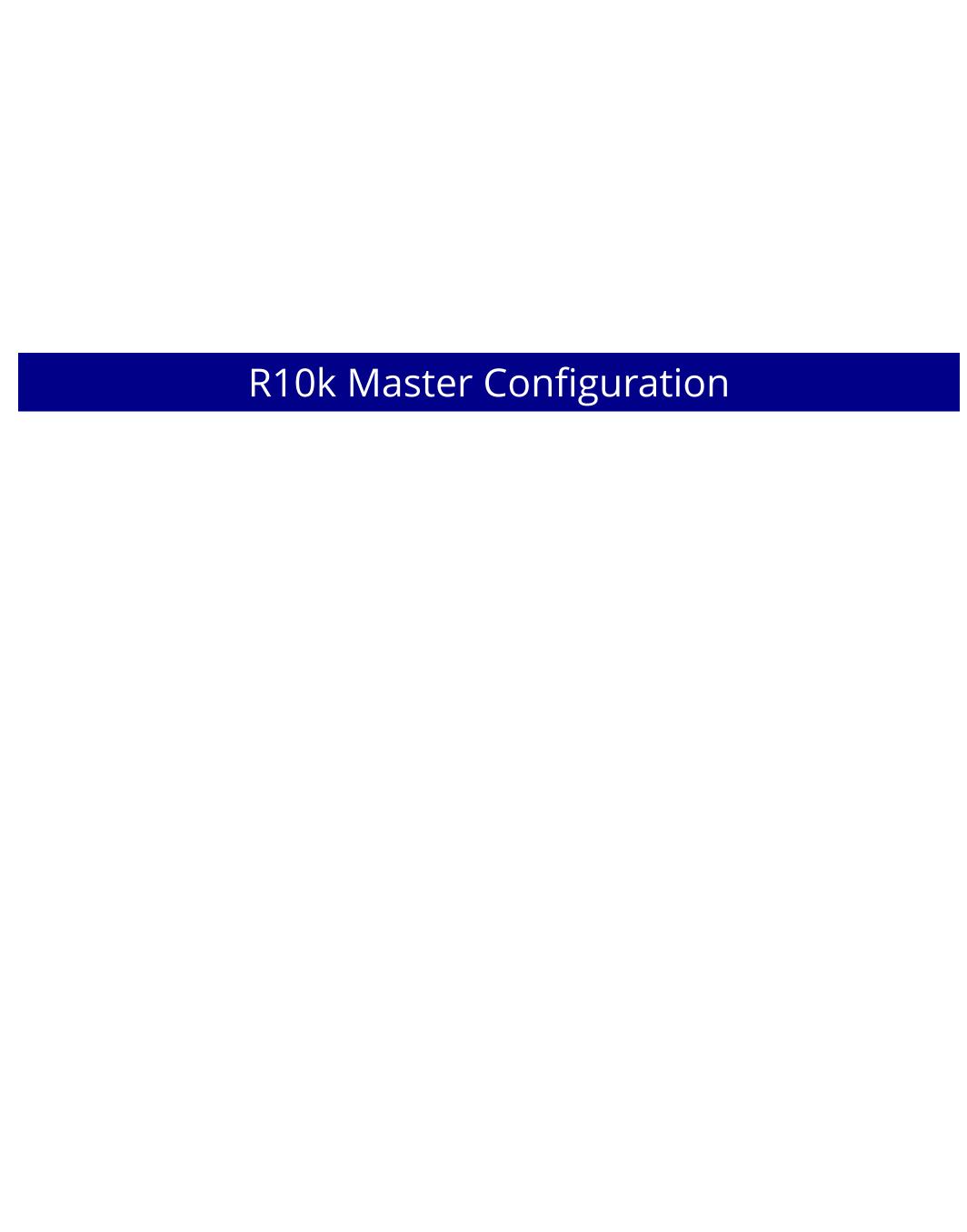
The production Puppet environment contains production-grade Puppet code that can manage nodes from any of your server environments.

# Development Life Cycle

- Make a new branch based on production
- Update Puppetfile with new module versions
- Update Hiera data, Roles, and Profiles
- Test feature environment where appropriate
- Merge it up to QA, preprod, etc.

# Development Life Cycle

- Unambigious collections of modules with easy merges
- Tests the same code in early environments as in production
- Site manifest, Roles, Profiles, modules, and Hiera data in a single Git hash



# R10k Puppet Master Configuration

- Configure master for directory environments
- Initialize a control repository
- Install r10k gem and its dependencies
- Configure in r10k.yaml
- Set up a way to run R10k automatically

# **Directory Environments**

Set basemodulepath and environmentpath in puppet.conf:

```
[main]
  certname = puppet.example.com
  basemodulepath = /etc/puppet/modules
  environmentpath = /etc/puppet/environments
  server = puppet.example.com

[agent]
  pluginsync = true
  environment = production

[master]
  reports = tagmail
```

(Legacy dynamic environments work, too)

# **Control Repository**

- Initialize an empty Git repo
- Add a Puppetfile
- Copy in Hiera data, site manifest, and static modules
- Push it to a repo the master can access

### R10k Gem

### Install the rlok gem...

# Configure R10k

R10k needs to know how to find the control repository.

```
#/etc/r10k.yaml
---
:cachedir: /var/cache/r10k
:sources:
  puppet:
    puppet:
    basedir: /etc/puppet/environments
    remote: git@github.com:cmroddy/example-control.git
```

The user running R10k will usually need SSH keys.

### Ready to Deploy

R10k fetches the control repo and creates environments for each branch.

```
$ r10k deploy environment -pv
[R10K::Task::Deployment::DeployEnvironments - INFO] Loading environments from all sources
[R10K::Task::Environment::Deploy - NOTICE] Deploying environment test
[R10K::Task::Puppetfile::Sync - INFO] Loading modules from Puppetfile into queue
[R10K::Task::Module::Sync - INFO] Deploying thttpd into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying gircd into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying denyhosts into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying vcsrepo into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying vcsrepo into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying inifile into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying firewall into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying concat into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying make into /etc/puppet/environments/test/modules
[R10K::Task::Module::Sync - INFO] Deploying modules from Puppetfile into queue
[R10K::Task::Module::Sync - INFO] Deploying modules from Puppetfile into queue
[R10K::Task::Module::Sync - INFO] Deploying denyhosts into /etc/puppet/environments/production/modules
[R10K::Task::Module::Sync - INFO] Deploying denyhosts into /etc/puppet/environments/production/modules
[R10K::Task::Module::Sync - INFO] Deploying vcsrepo into /etc/puppet/environments/production/modules
[R10K::Task::Module::Sync - INFO] Deploying stdlib into /etc/puppet/environments/production/modules
[R10K::Task::Module::Sync - INFO] Deploying inifile into
```

# **Automatic Deployment**

- Cron job
- Git hook
- Mcollective
- Jenkins
- Master's prerun\_command

### zack/r10k

### http://forge.puppetlabs.com/zack/r10k

- Manages the Gem and its dependencies
- Manages r10k.yaml
- Includes an Mcollective agent and a web hook
- More famous than R10k itself (on Google)

### Gotchas

- master is an illegal environment name, so you must rename the branch
- R10k does not install dependencies, you must specify them
- hiera.yaml can't be consulted on a per-environment basis (HI-46)
- Agent-set environments require a special configuration in PE 3.7
- R10k has Subversion support, so your Git coup d'état might fail

