Using Policyfiles

YoloVer as a Workflow

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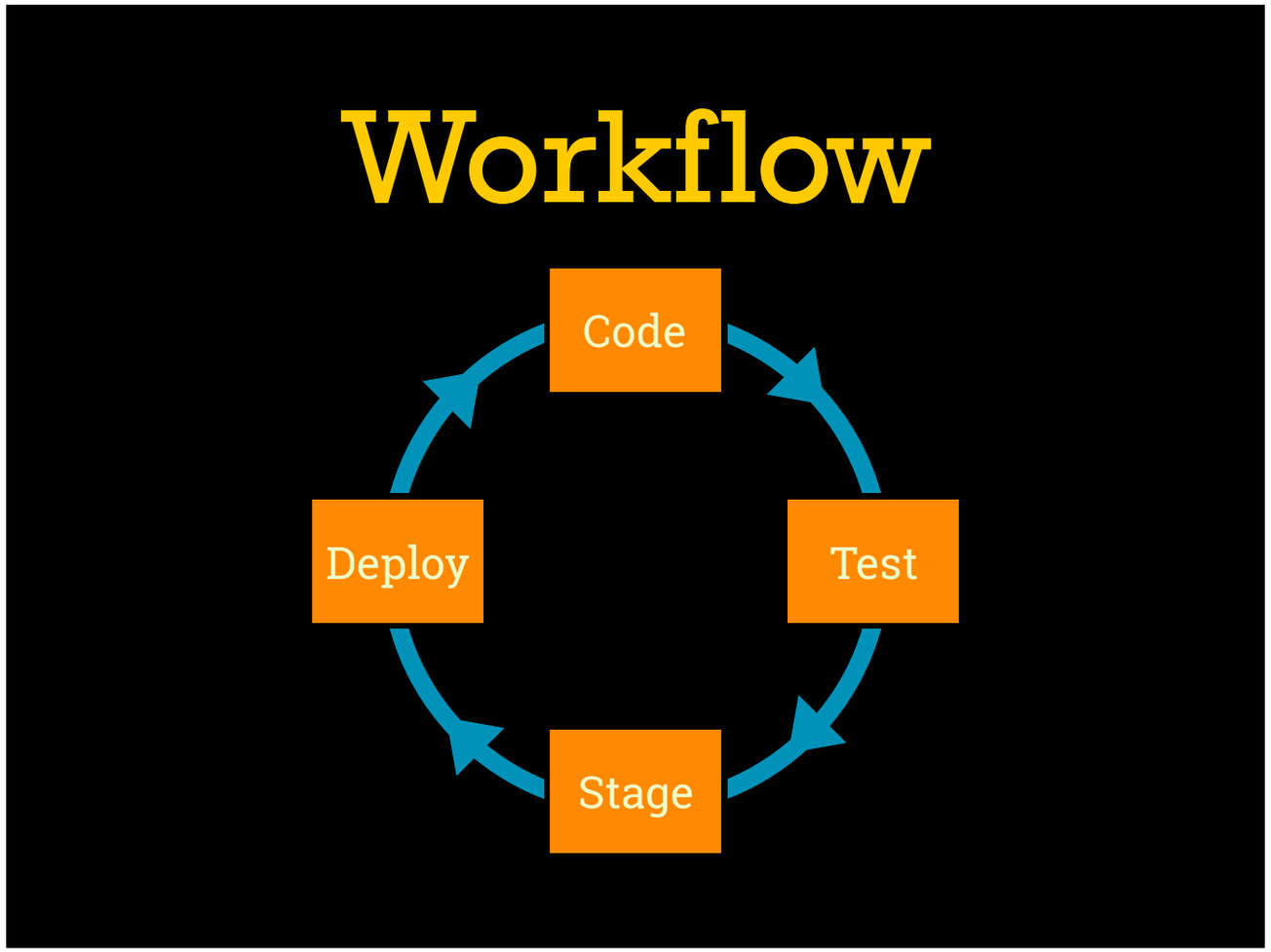
For those of little patience, let's begin with a quick overview of how policies work.



Any Chef workflow is going to have to hit four major points: writing the code, testing the code locally, managing some kind of staging or pre-production environment, and rolling things out to production.

New Words

- chef Command – Part of ChefDK, like knife
- Policy – Exact set of cookbooks to run
- Policyfile – Source code for a policy
- Policy Name – Replaces role, web/db/etc
- Policy Group – Replaces environment, SN1/2/etc
- Compiled Policy – Snapshot of a policy

A few words you might not have seen before. The /usr/bin/chef command is a new command line tool that comes with ChefDK, kind of like knife but handles higher-level operations including working with policies. Policyfile, or Policyfile.rb, is a Ruby code file containing the description of a policy. Each node is attached to a single policy name and a single policy group, the policy name is like the role of the node and the group is like its environment. A compiled policy, or Policyfile.lock, is a snapshot of a completely resolved policy like Gemfile.lock or Berksfile.lock.

Smile for the Camera


```
{
  "revision_id": "288ed244f8db8bff3caf58147e840bbe079f76e0",
  "name": "demo_policy",
  "run_list": ["recipe[demo::default]"],
  "cookbook_locks": {
    "demo": {
      "version": "1.0.0",
      "identifier": "f04cc40faf628253fe7d9566d66a1733fb1afbe9",
      "dotted_decimal_identifier": "67630690.23226298.2550585",
      "source": "cookbooks/demo",
      "cache_key": null,
      "scm_info": null,
      "source_options": {"path": "cookbooks/demo"}
    }
  }
}
```


A compiled policy on-disk is a JSON document with all the information from the Ruby source code as well as the specific cookbook versions that are going to be used with the policy and where they come from.

… And Push It Over There

- `chef install`
- Compile and download

- `chef push`
- Upload to Chef Server

The two main commands to get started with policies are "chef install" and "chef push". install works like "berks install", compiling the policy to a single snapshot and downloading all needed cookbooks to ~/.chefdk. push replaces commands like "berks upload" and "knife cookbook upload" to send the compiled policy and all the cookbooks it is using up to the Chef Server.

Policyfile.rb

With that short version out of the way, let's look at a long version of what goes in a Policyfile and how to use them.

[Overview of what goes in a Policyfile. Folder layout for multiple policies. Git integration.]

Policyfile.rb

```
name "kafka"

default_source :community

run_list "base", "kafka::server"
```

The three main directives: `name`, `default_source`, and `run_list`. The name, as you might imagine, sets the name of the policy. The `default_source` directive adds to the list of default sources used to find cookbooks without an explicit source. The `run_list` directive sets the primary run list for the policy, or put more directly, what nodes assigned to this policy will execute.

Run Lola Run

```
run_list "foo", "bar"

run_list ["foo", "bar"]

run_list %w{foo bar}

run_list "foo::other", "recipe[bar]"
```

`run_list` accepts either multiple arguments or an array of recipe names. You can use the `recipe[name]` syntax but you cannot use roles in a policy's run list so this is generally redundant.

Marathon Man

```
named_run_list :deploy, "app::deploy"

$ chef-client -n deploy

# Doesn't work anymore
$ chef-client -o "recipe[app::deploy]"
```

In addition to setting the primary run list, we can also set addition named run lists via `named_run_list`. These take the place of traditional override run lists (`chef-client -o`) while still allowing the policy to know about the potential override so that its cookbooks are included in the compiled snapshot.

[Introduce named run lists, like override run lists of yore. We can't use override run lists themselves because we need to use only the cookbooks the policy knows about.]

Alice's Restaurant

```
cookbook "monit"

cookbook "monit", "1.0.0"
cookbook "monit", "~> 1.0"

cookbook "monit", path: "../chef-monit"
cookbook "monit", github: "poise/monit"
cookbook "monit", git: "https://…"
```

While the default_source lines specify the fallbacks for where to find cookbooks, it can also be overridden on a per-cookbook basis. This can also include version overrides like in an environment. Sources supported include path for things in the same repo or git/github to pull directly from a git branch or tag.

The Usual Suspects

```
default_source :community

default_source :supermarket, "http://…"

default_source :chef_server, "http://…"

default_source :chef_repo, "../"
```

The most common default source is to use https://supermarket.chef.io/, but we can also pull in from a private Supermarket, an organization on a Chef Server, or monorepo-style folder of cookbooks.

Lone Star

```
default_source :… do |s|
  s.preferred_source_for "monit", "…"
end
```

If you have a cookbook that is present in multiple default sources, you will have to resolve which source is preferred. This ensures there is never confusion about where a cookbook is coming from.

M*A*S*H

```
default["myapp"]["root"] = "/app"

override["monit"]["port"] = 8080
```

Policies can also include node attributes, like a role or environment. Unlike those, these are set using the syntax from cookbook attributes files, which makes setting complex nested values a little less verbose.

Deliverance

- `$ chef install [path/to/policy.rb]`
- Compiles policy, solves all version constraints
- Searches all sources when applicable
- Creates Policyfile.lock and downloads to cache

That covers the basic syntax and data for what goes in a Policyfile, now let's look at the main commands. As mentioned before, the first command you'll usually encounter is `chef install`. It takes an optional path to the file to process, but otherwise uses `./Policyfile.rb`. If the `Policyfile.lock` file doesn't exist, this command will run a version solver to generate a set of cookbooks that matches requirements from the policy and the various `depends` values in the cookbooks being used. This compiled policy snapshot is then written to disk for next time, and all the cookbooks used in it are downloaded to the local cache in a manner similar to Berkshelf or Bundler.

Groundhog Day

- `$ chef update [path/to/policy.rb]`
- Recompiles an existing policy
- Similar to "`rm Policyfile.lock && chef install`"
- But don't do that, use "`chef update`"
- Will grow single-cookbook updates later

`chef update` is currently just a slight modification to the install command in that it forces a policy recompile even if there is an existing lockfile. At some point in the future support will be added for more fine-grained updates, but for now just use it when you want to re-solve a policy to pick up new or changed cookbooks.

Raising Arizona

- `$ chef push $group [path/to/policy.rb]`
- Uploads a policy to a Chef Server
- Uploads are to a policy group (S1, S2, etc)
- Includes any cookbooks needed for the policy

And finally we have `chef push`, which acts like `berks upload` in that it reads in a solved policy (lockfile) and uploads it to a Chef Server. Unlike `berks upload` this isn't a global operation, we push a compiled policy to a specific policy group. Policy groups aren't really first class objects per se, more just a kind of tag that creates segments within a single policy. Usually this is used to implement a separation between staging and production, or whatever other organizational segments you might have. The push command will also make sure any cookbooks needed for the policy get uploaded along with it.

A Place in the Sun

```
$ chef install ./Policyfile.rb

$ chef install policies/app.rb
```

By default all policy commands will look for a file named "Policyfile.rb" in the current directory. This makes sense for policies driven by a top-level role cookbook, but in a flatter, central-repository-driven we will usually want a folder with each policy as its own file. Each command will accept an optional argument to specify a path to the policy source. In a repo-centric structure we would generally put these under policies/ to match cookbooks/ and roles/.

The Remains of the Day

```
$ nano Policyfile.rb
$ chef install
$ chef push s1
$ chef push s2

# Edit some cookbooks …
$ chef update
$ chef push s1
$ chef push s2
```

To pull everything together, a simple example of working with a policy. First we create the policy code and compile it (we'll just assume we got it right on the first try). Then we deploy the the policy out to stage 1, do something to verify that we are happy with the stage, and then roll it out to stage 2. Later on we have edited some cookbooks and want to pushed them out so we run chef update to recompile the policy, and then use chef push to update each group in sequence like before.

Bleeding Edge

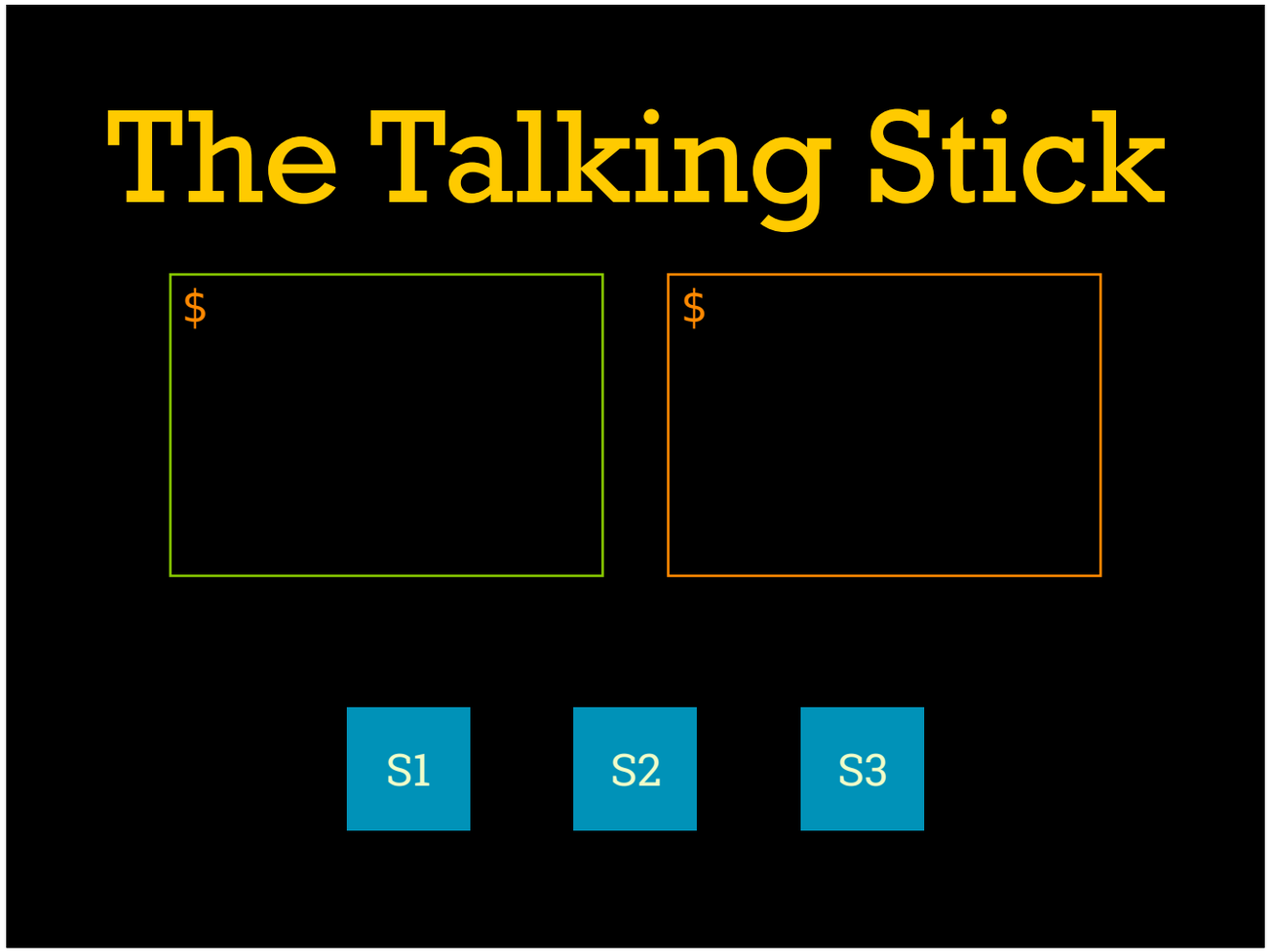
Unfortunately it isn't all roses and unicorns. The Policyfile system is evolving rapidly but there are some issues to know about.

[Talk about the downsides of the flow. Single pipeline, machine ownership, etc.]

The Talking Stick

- There is only one pipeline
- Multiple releases must be mutex-d

The first issue is fact that all users in a policy-based system share a release pipeline for each specific policy.



So by way of an example, let's look at a case with two people trying to push an update to a cluster with three stages.

The Talking Stick

```
$ chef update
Policy compiled
$ chef push s1
```

```
$
```

S1 S2 S3

First the green user makes some changes, re-compiles their policy, and pushes the compiled policy to stage one.

The Talking Stick

```
$ chef update
Policy compiled
$ chef push s1
$ chef push s2
```

```
$
```

S1 S2 S3

They do whatever verifications are needed (not pictured), and then proceed to push the compiled policy to stage two. Then let's say they get bored and go out to lunch.

The Talking Stick

```
$ chef update
Policy compiled
$ chef push s1
$ chef push s2
```

```
$ chef update
Policy compiled
$ chef push s1
$ chef push s2
$ chef push s3
```

S1 S2 S3

The orange user gets back from lunch early, compiles their own modified policy, and rolls it out to all three stages (again, there would be some verification/burn in between stages but that isn't the point).

The Talking Stick

```
$ chef update
Policy compiled
$ chef push s1
$ chef push s2
$ chef push s3
```

```
$ chef update
Policy compiled
$ chef push s1
$ chef push s2
$ chef push s3
```

S1 S2 S3

Then the green user gets back and finishes their deploy. In the end we have an inconsistent cluster. Stages one and two are running the orange policy but stage three has the green policy.

The Talking Stick

- For now: make sure no one else is deploying
- Future: Deploy UI may help lock clusters
- Situational awareness is required

So in short, be aware of when a deploy is happening. If you are deploying on a cluster that you own, this is somewhat easier. If deploying on client clusters, double check with their team(s).

Graft vs. Host

- Base cookbooks maintained by core team
- App cookbooks from the cluster owner
- Refine ownership and distribution
- Here be dragons, tread lightly

A place this single pipeline issue comes into sharp focus is when dealing with a node that runs cookbooks managed by multiple teams. This may require more careful handling of who owns which pieces of the system, what the owner is responsible for, and how teams notify each other of changes.

Environment Attributes

- default/override in the policy act like role attrs
- No specific support for group-level values

The next major stumbling block is usually around environment-level attributes. Policy attributes map nicely to a replacement for role attributes, but as policy groups aren't a first-class object themselves there is no direct replacement for environment attributes. Fortunately there are a few patterns that can help.

Nesting

```
# Policyfile.rb
default["SN1"]["app"]["dbhost"] = "…"
default["SN2"]["app"]["dbhost"] = "…"

# recipes/default.rb
node[node.policy_group]["app"]["dbhost"]
```

The simplest is to use the group name as a top-level key in the attribute name for things you know will vary by group. You can access the name of the current node's policy group via `node.policy_group`. This is only workable in situations where you control how the attribute data is used though.

Hoisting

```
# Policyfile.rb
default["SN1"]["app"]["dbhost"] = "…"
default["SN2"]["app"]["dbhost"] = "…"

# attributes/default.rb
default.update(default[node.policy_group])
```

For situations where you need to use cookbooks not explicitly designed for this, you can use a hoisting pattern to copy the attribute data out of the group-specific subtree and overlay it on the rest of the attributes. This is often the most robust solution, but the code to implement can be tricky. A simple version is shown here, but stay tuned for a reusable cookbook that implements a more robust version.

Data Bag

```
# attributes/default.rb
item = DataBagItem.load("env",
                        node.policy_group)
default.update(item.raw_data)
```

And finally you can skip policy attributes altogether and store environment-level values in a data bag item. This can help with situations where you want attribute data to live outside of the life cycle of the policy itself.

Base Role

```
# base.rb
default_source :community
run_list "base"
default["key"] = "value"

# Policyfile.rb
instance_eval(IO.read("base.rb"))
name "web"
run_list << "web"
```

You can't use roles in the run lists of a Policyfile. The biggest case this impacts is having a "base" role applied to all nodes. You can support most of this use case using a shared base Policyfile that is included in all the others. This allows following same snapshot-based workflow while still having some shared data.

Partial Updates

- `chef update` can only regenerate a policy
- Planned for the future
- Use `chef diff` for safety

A downside compared to a Berkshelf-based workflow is that single cookbooks can't be upgraded without fully re-compiling the policy. Support is planned for the future, but for now take care to diff your compiled policy before pushing to ensure you aren't releasing something unexpected.

Danger Zone

- LANA, LANAAAAAAAAAA
- New, fresh, well-tested
- Growing quickly

ChefDK in general and the Policyfile tools in specific are evolving rapidly. Not everything out there has support for the new workflows but it will probably be added soon. If you run into an unsupported corner of the ecosystem, you can always ask me.

Trouble Spots

- Single pipeline
- Group-level attributes
- Shared base configuration
- Partial updates
- Young tooling

So to summarize, some of the major things to look out for are pipeline stomping, data management, and possibly wonky integrations.

Order's Up

With our new tools firmly in hand, let's zoom out to a big-picture look at workflows.

[Release process or lack thereof. Benefits and downsides of a semver process. Talk about yolover snapshots.]

Release Process

- Update cookbook version
- Make a git tag
- Maybe push to (internal?) Supermarket
- Push to Chef Server organization
- Update Chef environments in order
- Repeat for each changed cookbook

A quick version of a traditional Chef cookbook release process. First we updated the cookbook version in metadata.rb, and make sure to follow SemVer. Then we make a git tag, maybe use Stove to push to a Supermarket site, and `berks upload` to push it to a Chef Server. Then we edit the Chef environment for each stage to roll the new version out, making sure chef-client completes successfully on each stage. Importantly this process is cookbook-centric, so we release each cookbook independently.

SemVer FTW!

- Allows flexible environment restrictions (~> 1.0)
- Loose coupling and last-minute solver
- Better control for other teams
- More semantic info for UI/tools
- Warm and fuzzy feelings

Usually a release process like this is coupled with SemVer so that we can use that semantic information to structure how new releases flow out to different environments and users. It allows using the pessimistic range operator in environments and dependencies, leaving the version solver in Chef Server and Berkshelf to work out the details. Plus the internet told me SemVer is awesome so clearly I want it!

More Like LameVer

- Mental overhead to establish "compatible"
- Ensure all dependencies are released in order
- Must have linearized x.y.z versions
- No concurrent git branches or pre-releases

But it isn't all positive. Tracking which changes are compatible with which other changes presents some cognitive load during development. Additionally when running a release process you often need to release multiple cookbooks in the right order. On top of that, Chef's version solver is very limited and only supports three component `x.y.z` version numbers, no extra tags like `-pre` or `-rc1`. This makes it difficult to handle releases when different environments are targeting different git branches of the same cookbook.

That's a lot of work.

YoloVer

- Policyfile(s) linked directly to git
- Use a cookbooks/ folder if desired
- `chef install/update` to take a new snapshot
- `chef push` to deploy to stages

So we want a lighter weight solution. Enter YoloVer: a workflow based around snapshots of a whole run list instead of multiple discrete projects with their own release processes. As you might imagine, this workflow is based around policies and Policyfiles. Using all the tools we just learned, we can manage cookbook deployments with a granularity of whole-repository snapshots. This means we don't need the overhead of a per-cookbook release system but still retain control over rollouts.

Example Repo

```
$ ls .
cookbooks/ policies/

$ ls cookbooks
bb-kafka/ bb-graphite/ bb-collectd/

$ ls policies/
db.rb frontend.rb
```

So let's look at an example git repository for a hypothetical monitoring team. We have a folder of local cookbooks specific to the team, and a folder of policies for each type of server we are going to maintain.

policies/db.rb

```
name "db"

default_source :community
default_source :chef_repo, ".."
cookbook "clojure", github: "…/clojure"

run_list "clojure", "git", "bb-kafka"
```

For the "db" policy we have all the things we saw before. We set the name, as always. Then we set two default sources. Remember these have to be non-overlapping, but it means everything in the cookbooks/ folder will be picked up automatically when needed. We also set one cookbook as coming from a specific git repository. When we take the snapshot, we'll capture whatever is in the master branch of that repository and use it until we recompile. Finally we set our run list, using cookbooks from all three sources.

Mise en Place

Having a production workflow is all well and good, but development starts on a workstation somewhere and generally we want to try things locally first.

[Local development with the policyfile-zero provisioner and Test Kitchen. replace env cookbook pattern]

Kitchen

- Test Kitchen with policyfile_zero
- Testing policies, not cookbooks
- Use ChefDK or install chef-dk

.kitchen.yml

```
driver:
  name: vagrant

platforms:
- name: ubuntu-14.04
- name: centos-7

suites:
- name: default
- name: other
```

Let's start with a basic Test Kitchen config. The is named .kitchen.yml and it goes in the base of the repository (remember, this isn't for testing single cookbooks, we'll cover that later). The overall structure of Test Kitchen is a driver configuration which determines how we'll create VMs, a list of platforms to test on, and then a list of test suites.

Test Matrix

	ubuntu-14.04	centos-7
default	default-ubuntu-1404	default-centos-7
other	other-ubuntu-1404	other-centos-7

One of the core concepts of Test Kitchen is the instance matrix. An instance is the combination of a platform and a suite, using the names of each to form the name of the instance.

policyfile_zero

```
provisioner:
  name: policyfile_zero
  policyfile: policies/web.rb
```

Named Run Lists

```
suites:
- name: default
- name: other
  provisioner_config:
    named_run_list: other
```

Double check this works

Multiple Policies

```
suites:
- name: default
- name: db
  provisioner_config:
    policyfile: policies/db.rb
```

Kitchen Basics

```
$ kitchen converge

$ kitchen converge other

$ kitchen converge default.*

$ kitchen destroy
```

Example

```
driver:
  name: vagrant

provisioner:
  name: policyfile_zero
  policyfile: policies/db.rb

platforms:
- name: centos-7

suites:
- name: default
```

Putting it all together we get this Test Kitchen config. We haven't set up any actual tests yet, but this will let us run the policy in a VM and see if it converges cleanly.

Remodeling

Switching to Policyfiles usually means rewriting some amount of roles, environments, and the cookbook equivalents of each to the Policyfile structure. Let's examine each of those.

Role

```
# roles/app.rb
name "app"
run_list [
  "recipe[base]",
  "recipe[app]"
]

default_attributes(
  "app" => {"port" => 8080},
)
```

A pretty simple role for deploying some kind of application. We're pulling in some kind of base recipe, an application recipe, and set a node attribute for the application's port.

Role Cookbook

```ruby
# metadata.rb
name "role-app"
depends "base"
depends "app"

# attributes/default.rb
default["app"]["port"] = 8080

# recipes/default.rb
include_recipe "base"
include_recipe "app"
```

Or to look at it in the form of a role cookbook. The same effective role just in cookbook metadata, attributes, and recipes. You can see the same role data, the recipes are pulled in via include_recipe and the application port is set in the attributes file.

Role Policy

```
# policies/app.rb
name "app"
default_source :community
run_list "base", "app"

default["app"]["port"] = 8080
```

Converting this to a Policyfile is fairly straightforward. We have the same run list as with the other forms, and notably the attributes are exactly the same as in the role cookbook making the conversion even easier.

Environment

```
# environments/prod.rb
name "prod"
cookbook_versions({
  "postgresql" => "3.4.20",
})

default_attributes({
  "postgresql" => {
    "dir" => "/data",
  },
})
```

Moving on to an environment; here we have a version constraint to lock the postgresql cookbook and an attribute to set Postgres' data directory.

Env Cookbook

```
# metadata.rb
name "env-prod"
depends "role-app"
depends "postgresql", "3.4.20"

# attributes/default.rb
default["postgresql"]["dir"] = "/data"

# recipes/app.rb
include_recipe "role-app"
```

Converting this to a cookbook is a bit less clear. This is following my specific version of the environment cookbook pattern, but yours may look slightly different. We pull in all our role cookbooks, in addition to the version constraint on the postgresql cookbook. Our environment attributes become cookbook attributes, and each role maps to a single recipe.

Env Policy

```
# policies/app.rb
name "app"
default_source :community
run_list "base", "app"

cookbook "postgresql", "3.4.20"
default["app"]["port"] = 8080
default["postgresql"]["dir"] = "/data"

# Upload to prod group
$ chef push prod policies/app.rb
```

Converting to a Policyfile is similarly dicey. Environments map to policy groups, but this means that it can be difficult to include cross-policy constraints. This is the most direct conversion, starting from the role policy but adding the cookbook constraint and attribute. This works as a kind-of one off but will only apply to the one "role" and we would have to update the policy as we move things through the pipeline if we want different versions of postgresql in different policy groups.

Env Policy

```
# policies/_prod.rb
cookbook "postgresql", "3.4.20"
default["postgresql"]["dir"] = "/data"

# policies/app.rb
path = File.expand_path("../_prod.rb",
                        __FILE__)
instance_eval(IO.read(path))
name "app"
# …
```

A more useful translation is often to use a snippet of Policyfile code that can be shared between the multiple policies. This handles some of the possible use cases, but remember to mesh this on top of the single release pipeline structure.

Wrapper Cookbook

```
# metadata.rb
name "company-postgresql"
depends "postgresql", "3.4.20"

# recipes/default.rb
include_recipe "postgresql"

# recipes/server.rb
include_recipe "postgresql::server"
```

Another option for long-term version restrictions on community cookbooks is to put a stubby wrapper in the policy repo's cookbooks.

END OF CURRENTLY WRITTEN SLIDES

Chef Push

Discuss the chef push command and how to use it.

Discuss the chef push command and how to use it.

What baseline are we starting from?

A: Name-level familiarity but teaching from scratch.

Household Staff

Jenkins, CI, maybe ChefSpec and InSpec?

Jenkins, CI, maybe ChefSpec and InSpec?

Testing Tools

- ChefSpec – Unit testing
- Test Kitchen – Integration testing
- InSpec – Integration/acceptance testing

There are four major branches of testing (unit, integration, acceptance, and smoke) but only unit and integration tests generally happen in the context of local testing. With Chef that means ChefSpec and Test Kitchen. We'll see more of InSpec later when we start writing integration tests, but for now just know it is related to Test Kitchen.

Unit Testing

- Test a single unit of logic (recipe, resource)
- Mock/stub at unit boundaries
- Ensure isolation between tests
- Move fast and break things

Before we go over the details of how to use those tools, let's look at the theory behind the types of testing. Unit tests mean testing a single unit of code. With things like web applications a unit is usually a single class or method, but for Chef our units are more often a single recipe or a custom resource. The goal of unit testing is get high-speed tests above almost anything else. This means we focus on mocking out anything outside of the unit especially anything slow or with side effects.

Unit Testing

- Edge cases
- Complex inputs
- Regression checks

This makes unit tests a great choice for testing edge cases, complex inputs, and regression checks. Because unit tests are generally much faster than integration tests, we can have far more of them without our tests taking a frustrating amount of time.

Integration Testing

- Test the integration of multiple units
- Check side effects
- Slower, but closer to real life

Integration tests are the other side of the coin. We throw all the units in a big pile and light it on fire to see what happens. This means tests take a lot longer since we let them do the whole side-effects thing, and rely on higher-level isolation for repeatability.

Integration Testing

- Real world use cases
- Performance tests (sometimes)

So this means generally we use integration tests to look at bigger slices of real-world use cases. Sometimes they can also be used for performance analysis, but beware of how much the test environment impacts the numbers, you probably can't compare directly to production.

ChefSpec

- RSpec 4lyfe
- Really runs Chef
- Provider stubs, `step_into` specific providers
- Stub helpers for data_bags, search, commands

ChefSpec is the primary unit testing tool for Chef. It is a set of RSpec helpers and extensions for running a Chef converge without actually modifying the system. By default all providers are stubbed to be a no-op, but you can re-enable specific ones for testing.

Test Kitchen

- Create a fresh virtual machine
- Install and run Chef
- Run verification tests via InSpec
- Uses Policyfile via policyfile_zero plugin

Test Kitchen is a suite of tools to create a blank VM using any of a number of drivers (Vagrant, AWS, OpenStack, Docker), install Chef and copy our cookbook(s) to the VM, run a normal Chef converge, and then run some tests to confirm the cookbook did what we think it was supposed to.

RSpec

Before we dive into the specifics of ChefSpec, let's talk about writing RSpec tests in general. ChefSpec builds on top of RSpec so you need to walk before you can run (or converge, ::cymbal crash::).

RSpec

```
describe "a thing" do
  it "is a thing" do
    expect(1).to eq 1
  end
end
```

The simplest possible RSpec test. We have one example group, created using "describe" and labeled "a thing". Inside that is one example ("it") labeled "is a thing". Group and example labels can be anything, and we'll cover them in more detail in a moment, but overall the standard is to make the RSpec code read like prose. Inside the example we have one expectation ("expect()"), in this case just comparing 1==1.

Describe

```
describe MyClass do
  # ...
end

describe "label" do
  # ...
end
```

Context

```
describe "a thing" do
  context "with A" do
    # …
  end
  context "with B" do
    # …
  end
end
```

It

```
it "works" do
  expect(val).to …
end

it { expect(val).to … }
```

All Together

```
describe "addition" do
  context "with 1" do
    it { expect(1+1).to eq 2 }
  end
  context "with 2" do
    it { expect(2+2).to eq 4 }
  end
end
```

Point out that I have no "it" labels here

Running

- Put that in spec/thing_spec.rb
- $ chef exec rspec

Expectations

```
expect(value).to matcher
```

eq Matcher

Point out function-y nature just this once.

```
expect(value).to eq(other)

expect(1).to eq 1

expect("a").to eq "a"
```

to_not Mode

Quick diversion, not a matcher but a matcher mode

```
expect(1).to_not eq 2

expect("a").to_not eq "b"
```

be Matcher

```
expect(1).to be > 0

expect(-1).to be < 0

expect(0).to be == 0
```

Same as eq matcher

Boolean Matchers

```
expect(nil).to be_nil

expect(true).to be true
expect(false).to be false

expect(1).to be_truthy
expect(nil).to be_falsey
```

String Matchers

```
expect("abc").to include "a"

expect("abc").to match /a.c/

expect("abc").to start_with "a"

expect("abc").to end_with "c"
```

Class Matchers

```
expect("a").to be_a String

expect(1).to be_an Integer
```

Error Matchers

Point out the block here

```
expect { myfunc() }.to raise_error

…to raise_error ArgumentError

…to raise_error /message/
```

Subject

```
describe "a thing" do
  subject { 1 }
  it do
    expect(subject).to eq 1
  end
end
```

Is Expected

```
describe "a thing" do
  subject { 1 }
  it do
    is_expected.to eq 1
  end
end
```

Should (Okay)

```
describe "a thing" do
  subject { 1 }
  it do
    should eq 1
  end
end
```

Should (Not Okay)

```
describe "a thing" do
  subject { 1 }
  it do
    subject.should eq 1
  end
end
```

Let

```
describe "a thing" do
  let(:myval) { 1 }
  it do
    expect(1+myval).to eq 2
  end
end
```

Complex Let

```
describe "a thing" do
  subject { val + 1 }
  context "with 1" do
    let(:val) { 1 }
    it { is_expected.to eq 2 }
  end
  context "with 2" do
    let(:val) { 2 }
    it { is_expected.to eq 3 }
  end
end
```

Before

```
describe "a thing" do
  before do
    puts "BEFORE!"
  end
  it { … }
end
```

Before Timing

```
before(:each) { … }

before(:all) { … }
```

Other Hooks

```
before { … }

after { … }

around {|ex| …; ex.run; … }
```

Mention timing works on all of them

Spec Helper

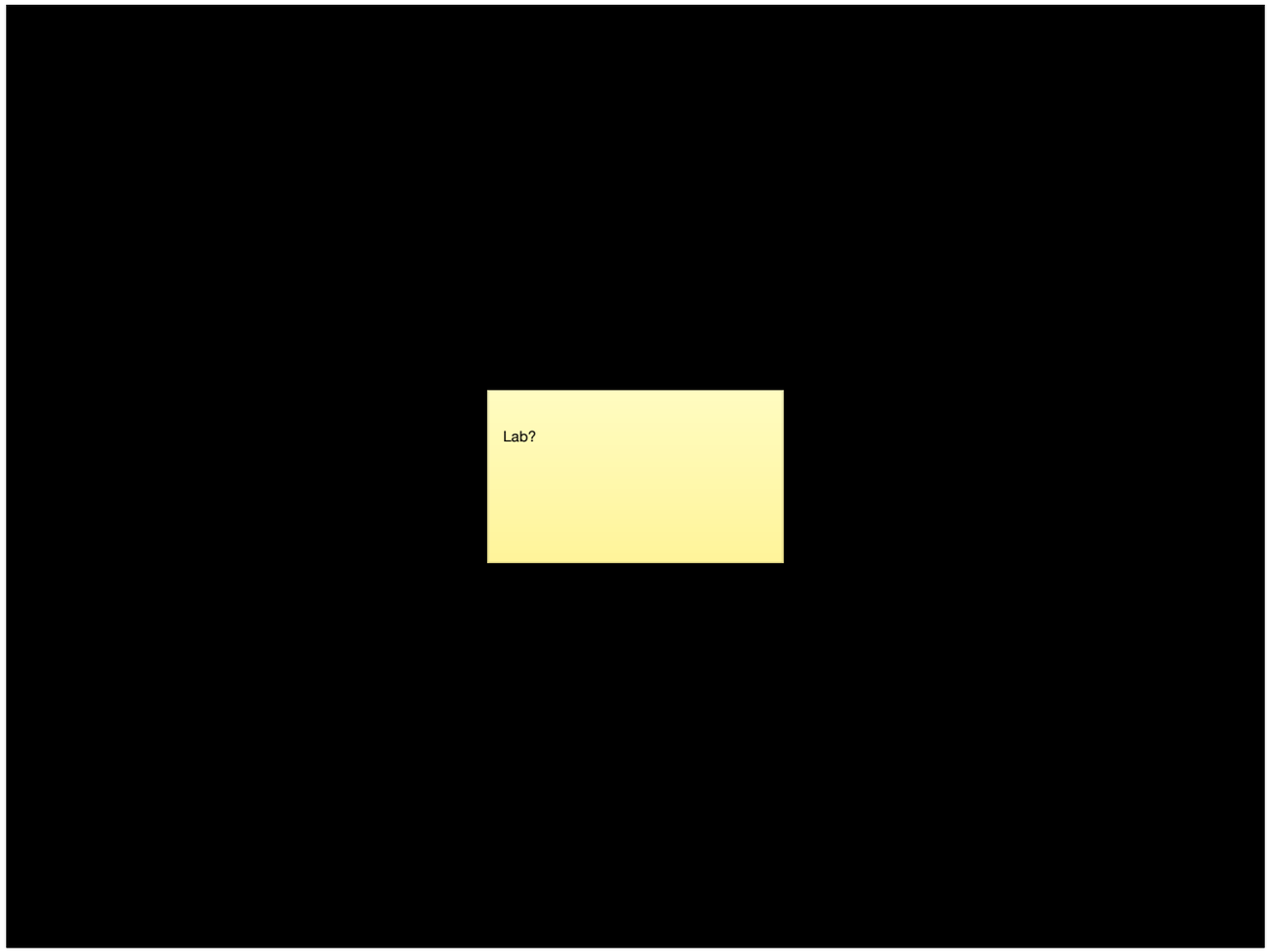
```
# spec/spec_helper.rb
require "…"

RSpec.configure do |config|
  # …
end
```

Spec Helper

```
# spec/thing_spec.rb
require "spec_helper"

describe …
```


Lab?

Mocks

- Helpers for faking out methods
- Avoid "dangerous" call (IO.write, shell_out)
- Call without depending on internals (unit isolation)

Mocks

```
allow(IO).to receive(:read)

expect(IO).to receive(:read)
```

Argument Matchers

```
… receive(:read).with("/foo")

… receive(:read).with(match /foo.*/)
```

Return Value

```
… receive(:read).and_return("lorem")

… receive(:read) {|path| "lorem" }
```

Doubles

```
double()

double(method: "1")

double("label", method: "1")
```

Doubles

```
double(x: 1).x == 1

fake = double
expect(fake).to receive(:x) { 1 }
```

Default mode is allow

Example

```
describe MyLib do
  let(:node) do
    double(name: "test.example",
           chef_environment: "prod")
  end
  subject { MyLib.myfunc(node) }
  it { is_expected.to eq … }
end
```

Example

```
describe "myfunc" do
  subject { myfunc("foo", "abc") }
  it do
    expect(IO).to receive(:write) \
                  .with("/foo", "abc")
    subject
  end
end
```

Explain expect mock before subject

Example

```
describe "myotherfunc" do
  subject { myotherfunc("bar") }
  before do
    allow(IO).to receive(:read) \
    .with("/bar").and_return("abc")
  end
  it { is_expected.to eq "abc" }
end
```

ChefSpec

ChefSpec

```
# spec/spec_helper.rb
require "chefspec"
require "chefspec/policyfile"

# Policyfile.rb
name "cookbookname"
run_list name
default_source :community
cookbook name, path: "."
```

Runner

```
subject do
  ChefSpec::SoloRunner.converge("name")
end
```

Basics

```
describe "myrecipe" do
  subject do
    ChefSpec::SoloRunner.converge("myrecipe")
  end

  it { is_expected.to … }
end
```

Matchers

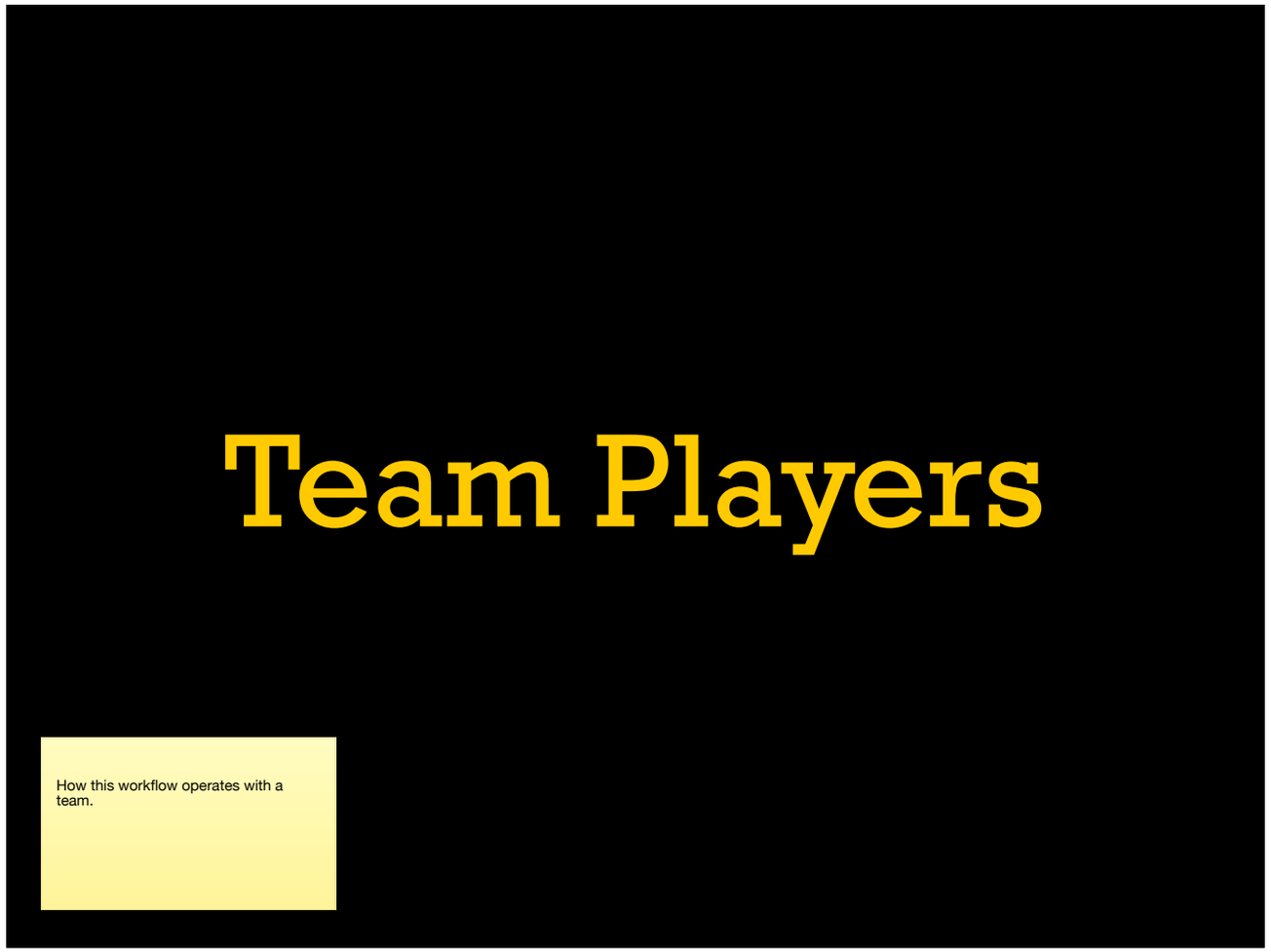
```
…to ACTION_RESOURCE(NAME)

…to install_package("nginx")
…to create_user("myapp")
```

With

```
.with(prop: val, prop: val)
```

```
install_package("nginx").with(version: "1.2")
create_user("myapp").with(group: "nogroup")
```



How this workflow operates with a team.

not really workflow related, you might want to run the clean commands in cron

clean-policy-revisions Delete unused policy revisions on the server[19:29:13]

clean-policy-cookbooks Delete unused policyfile cookbooks on the server

server-side maintenance stuffs