

A background image showing a close-up of hands in business attire writing on documents and spreadsheets on a table.

Pivotal Cloud Foundry – Manifests , Environment Variables and AutoScaling

Objectives of PCF

- Purpose:
 - To learn pivotal cloud foundry Manifest yml , environment variables and auto scaling.
- Product:
 - Manifests
 - Environment Variables
 - Auto Scaling
- Process:
 - Understand manifest, environment variables and auto scaling.

Table of Contents

- Manifests
- Environment Variables
- Auto Scaling

MANIFEST

Cloud Foundry Manifest File



- Describes the application deployment options
 - Automates subsequent deployments
 - Same options as **cf push** command
 - Plus options only available in the manifest
- Default name : **manifest.yml**
 - **YAML*** format
 - Human friendly data serialization standard
 - Supported by many programming languages
 - Less verbose than XML, similar to JSON
 - <http://www.yaml.org>

Create using
your favorite
text editor

** YAML Ain't Markup Language*

Using a Manifest with Push



- `cf push` automatically detects manifest
 - In current directory or parent directories
 - Expects file named `manifest.yml`
 - Override with `-f` option
 - `cf push -f dev-manifest.yml`
 - Or ignore with `--no-manifest` option.
- No manifest found?
 - `cf push` will default all deployment options
 - Not the best choices
 - **Different** to previous version of `cf` (which prompted)

YAML Format



- 3 dashes
 - Indicates start of document
- Indent with spaces, not tabs!
 - Determines hierarchy
 - Each indent 2 spaces
 - "-" defines "group"
- Syntax: property : value pairs
- #starts a one line comment

```
---
applications:
- name: nodetestdh01
  memory: 64M
  instances: 2
  host: crn      # comment
  domain: cfapps.io
  path: .
  # comment

- name: nextapp      # group 2
  memory: 256M
  ...
```

- See <http://www.yaml.org/spec/1.2/spec.html>

manifest.yml Example



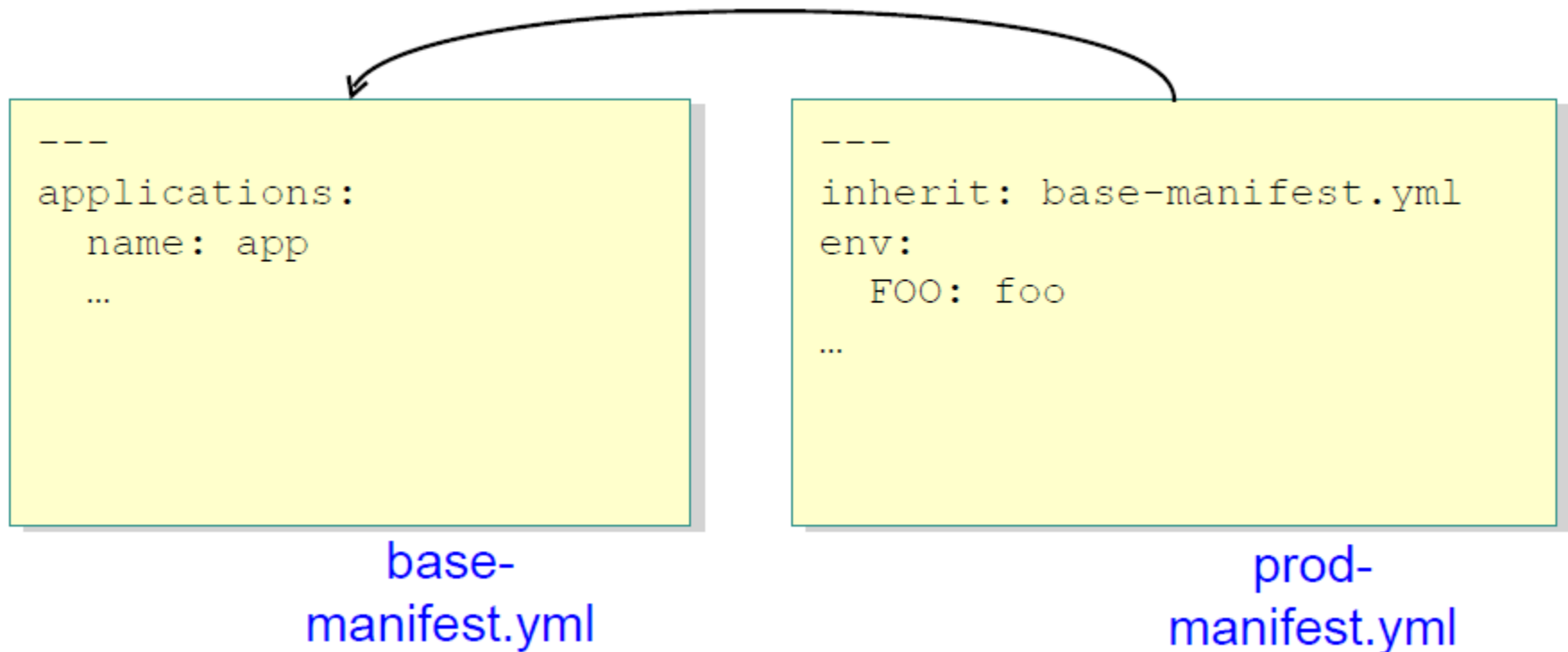
```
---
applications:
- name: cf-node-demo
  command: node app.js
  memory: 128M
  instances: 1
  host: demo-${random-word}
  domain: cfapps.io
  path: .
```

- **Applications:** can describe one or more applications
- **Name:** of the app - used in commands
- **Command:** command to run (optional)
- **Memory:** ceiling / **instances** to run
- **Host:** your choice, must be unique (within domain)
 - Tip: \${random-word}
- **Path:** to executable

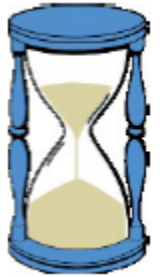
Manifest inheritance



- You may wish to have multiple manifest for an App
 - Different manifests for each space
- One manifest can "inherit" from another



Specifying Timeouts

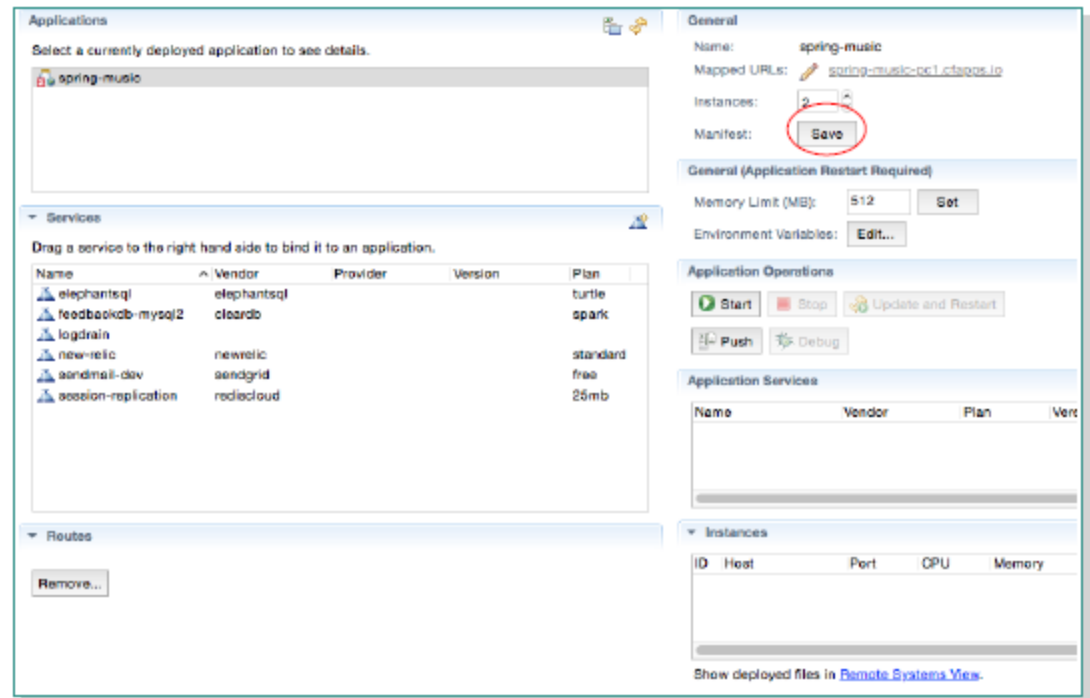
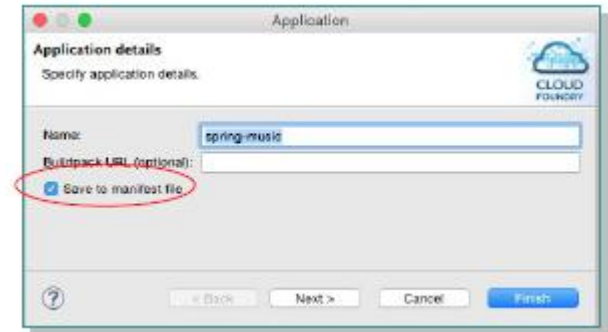


- Can use the manifest to specify timeouts for push, staging or startup
 - When you know your application is too large for the defaults

```
---
applications:
- name: nodetestdh01
  memory: 64M
  instances: 2
  host: crn
  domain: cfapps.io
  path: .
  timeout: 120 # 120 secs
  env:
    # Set to 20 and 10 mins
    CF_STAGING_TIMEOUT: 20
    CF_STARTUP_TIMEOUT: 10
```

Manifest and STS - I

- STS users can create a manifest
 - Checkbox during push
 - Or push an application has been pushed
 - Applications tab of Server properties



Manifest and STS - II

- Manifest created using same info as original push
 - Note{} in syntax (valid but optional)
- **WARNING:**
 - STS does not use manifest when pushing
 - Even if it has generated one

```
---
applications:
- name: dlbsmvc
  memory: 512M
  host: dlb-spring-mvc-demo
  domain: cfapps.io
  env: {
  }
  services: {
  }
```

Note on Spaces



- A space cannot be specified in a manifest file
 - Set first: `cf target -s development`
- To determine the current space
 - Just run: `cf target`

Manifest vs CLI



- A manifest reduces the amount of typing when deploying via CLI
 - Purpose is to makes deployment easily repeatable

- Options specified via CLI override options specified via manifest
 - **Example:** `cf push my-app -i 8 -m 1024M`
 - Deploys 8 instances with 1024M limit each, regardless of manifest settings

ENVIRONMENT VARIABLES

Environment Variables

- Key / value pairs
 - Used for anything you like
 - Specify via manifest

```
---
env:    # global, all apps
  spring_profiles_active: dev
  another_variable: foo
applications:
  ...
```

```
---
applications:
- name: myapp
  memory: 256M
  instances: 1
  host: crn
  domain: cfapps.io
  env:    # this app only
    spring_profiles_active: dev
    another_variable: foo
```

- Or via command line
- `cf set-env <app-name> <env-var-name> [<value>]`
- Requires re-staging (i.e. `cf restage` or `cf push`) to take effect
- Or use App Manager or Eclipse plug-in

Environment Variables - Precedent

- Environment variables via manifest take precedent over CLI
 - Opposite from the push options defined earlier!
- Example
 - `cf set-env app Foo fromCLI`
 - `cf push`
 - Result? 'fromManifest'!
- Use `cf push app --no-manifest` to bypass manifest values

```
---  
env:  
  FOO: fromManifest  
applications:  
  name: app
```

Environment Variables - Persistence

- Environment variables retain their values
 - Whether application is running or not
- To view use `cf env <app>`
- Use `cf unset-env <app> <var>` to remove
- If changed while app is running
 - Use `cf restage <app>` to make change take effect

Environment Variables - Accessing

- CF environment variables are available to applications
 - Appear like any other environment variable
- Access via...
 - Java: `System.getenv("some_variable");`
 - Ruby: `ENV['some_variable']`
 - Node.js: `process.env.some_variable`

Environment Variables – VCAP_APPLICATION

- Information on memory, instances
 - JSON formatted object (described later):

```
{ "instance_id": "451f045fd16427bb99c895a2649b7b2a",  
  "instance_index": 0,  
  "host": "0.0.0.0",  
  "port": 61857,  
  "started_at": "2013-08-12 00:05:29 +0000",  
  "started_at_timestamp": 1376265929,  
  "start": "2013-08-12 00:05:29 +0000",  
  "state_timestamp": 1376265929,  
  "limits": { "mem": 512, "disk": 1024, "fds": 16384 },  
  ...  
}
```

Environment Variables – VCAP_SERVICES

- Information on all bound services
 - JSON formatted object (described later):

```
{ "elephantsql": [  
  { "name": "elephantsql-c6c60",  
    "label": "elephantsql-n/a",  
    "tags": [ "postgres", "postgresql", "relational" ],  
    "plan": "turtle",  
    "credentials": {  
      "uri": "postgres://PHxTPn@babar.elephantsql.com:5432/selmbd"  
    }  
  },  
],  
  "sendgrid": [  
    { "name": "mysendgrid",  
      "credentials": {  
        "username": "QvsXMbJ3rK",  
        "password": "HCHMOYluTv"  
      }  
    }  
  ]  
}
```

Integration with Spring

- **spring_profiles_active**

- "Activates" a profile in a Java/Spring application.

```
---  
env:  
  spring_profiles_active: dev  
  another_variable: foo  
applications:  
  ...
```

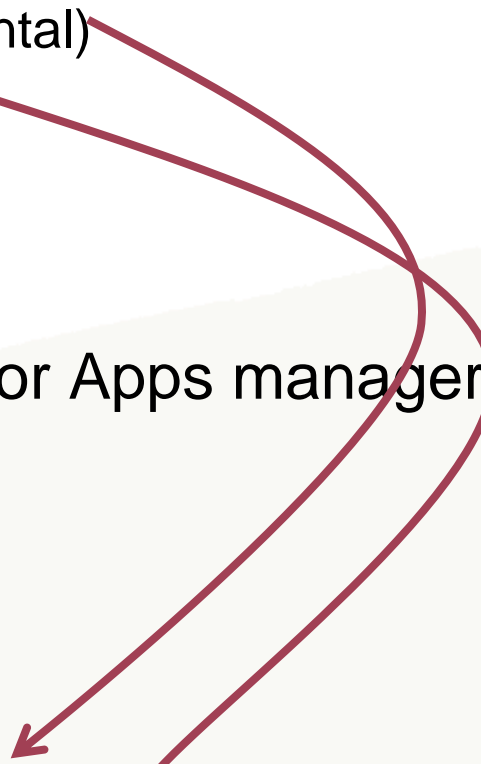
Environment Variables Management

- Not all environment variables can be changed
 - Those set by CF runtime cannot
 - Such as **VCAP_SERVICES** (set by service binding)
 - See URL below for list of variables set by runtime
- To view environment variables:
 - **cf env [app-name]**
 - Displays user defined and system defined variables
 - Some variables only available to running instances

<http://docs.pivotal.io/pivotalcf/devguide/deploy-apps/environment-variable.html>

SCALING

Scaling

- Allows updating application to adjust to changes in load
 - Update instances (horizontal)
 - Update memory (vertical)
 - Done from CLI, Eclipse or Apps manager
 - From CLI
 - **cf scale <app-name>**
 - Reports current scaling
 - **cf scale <app-name> -i 4 -m 512M -k 1G**
 - make 4 instances, each with 512 Meg memory, 1 Gig disk space.
- 

Applications and Resource Limits



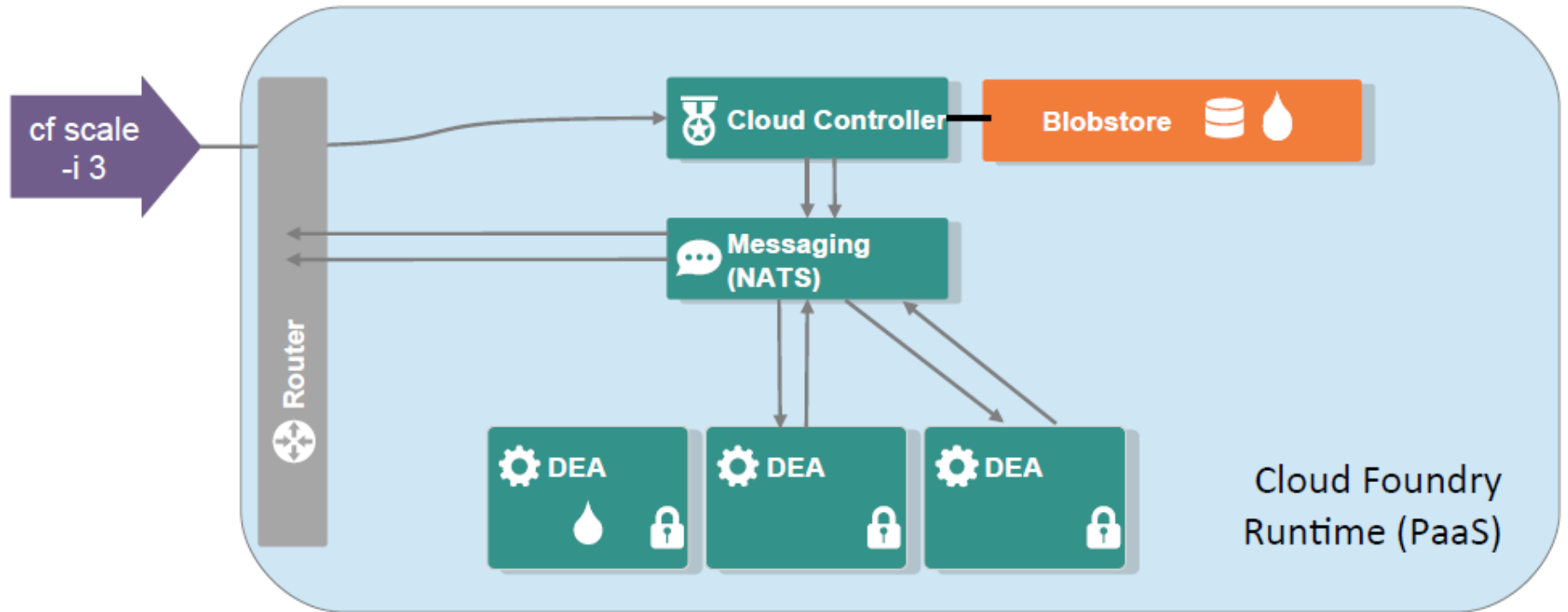
- When an application is pushed/scaled
 - Disk and memory limits are specified
- Application may not exceed its limits
 - Will fail instead
 - If limits exceeded at start-up: **flapping**
 - Repeating sequence of fail, restart, until timed out
- Quotas limit disk and memory usage by all applications in a space and/or an organization
 - Attempt to push/scale-up refused

How is CPU Allocated?

- Memory and local-disk limits can be set, what about CPU?
- "Fair-share" CPU allocation based on memory allocation
 - Each DEA has 256 "shares" of CPU
 - Regardless of memory or cores
 - Allocation = $256 * \text{container-memory-limit} / \text{total-DEA-memory}$
- Example
 - 1G application: `cf push myapp -m 1G`
 - Container size = instance size = 1G
 - DEA size = 32G (set by OPs)
 - CPS shares = 8 ($256 * 1 / 32 = 8$)

Scaling an Application

- Cloud Controller starts new instances or stops surplus instances
 - Load-balancing router shares load across all instances



What is I re-push?

- Subsequent **cf push** commands override the number of instances
 - Based on 1) CLI and 2) manifest
 - IF CLI/manifest do not specify instances, previous values stand
 - Application restarted
- Recommendation:
 - Use manifest to store 'default' scaling settings
 - OR omit scaling setting from the manifest.

File System Implementation

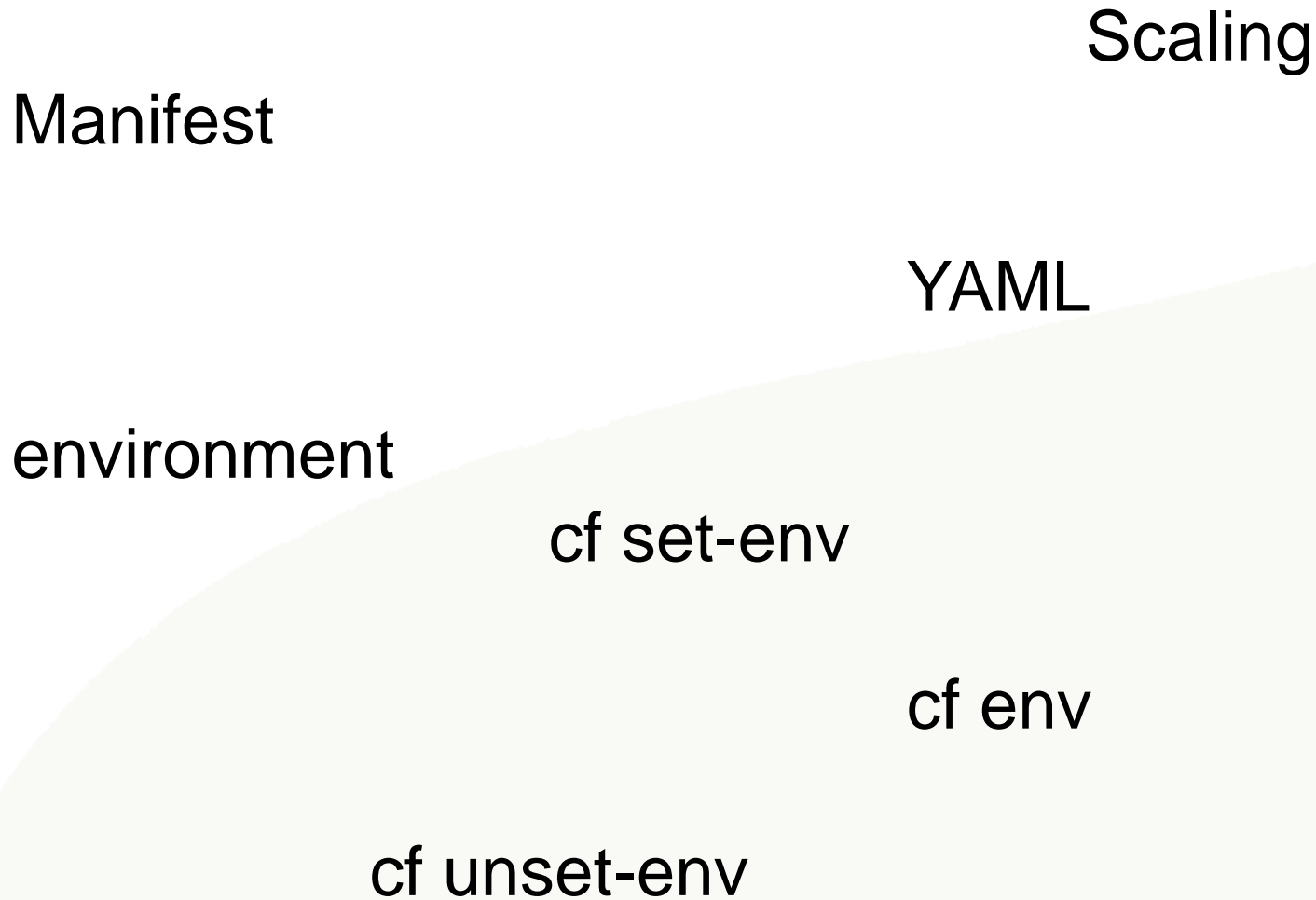


- Application instances (droplets) run in isolated Windows containers
 - Own resources, non-shared- such as files
 - For *safety and security*
- When an application is scaled up
 - New container, new isolated file-system
- When application ends (Stopped, failed or scaled down)
 - Local file-storage is destroyed with container
- **Implication**
 - *Do not rely on files: transient and not shareable*

Summary

- Use of Environment variables
- All about application manifests
- How scaling happens

Recap



People matter, results count.



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