# INTRO TO PROMISE THEORY AND CFENGINE

## BUILDING STABLE RELATIONSHIPS - CS444 LINUX ESSENTIALS

# WHO AM I?

- Nick Anderson
- Husband/Dad
- Sysadmin/Infrastructure Engineer
- CFEngine Doer of Things|Factotum @ Northern.tech


Northern.tech
Securing the World's Connected Devices
Mender
CFEngine
Zener

# RELATIONSHIPS

*It's all about who you know. – They*

- How many things can you know?


DUNBAR

# DUNBAR

- Maximum number of stable relationships one can manage
- ~ 150
    - 2–3 intimate relationships
    - 5-7 circle of our very closest friends
    - 12–50 tribe
    - 150–1500 battalion

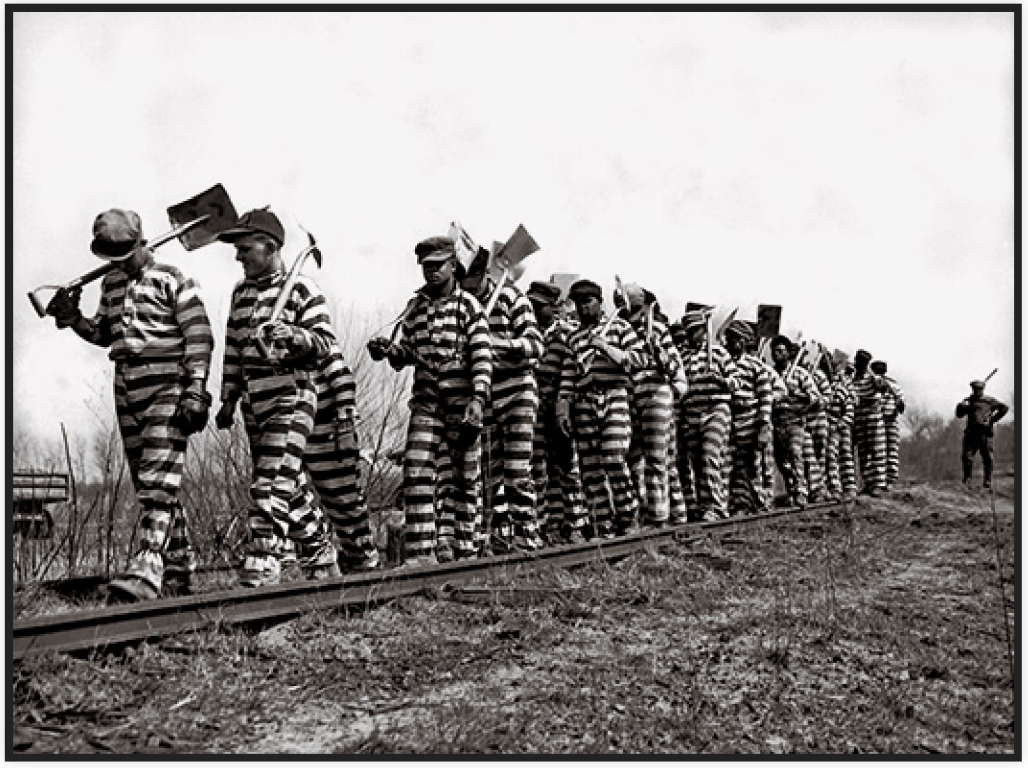
# TRUST

- The foundation of relationships
- Necessary for large systems like societies to function
- Built on repeated interactions over time

# SCALING

- Can technology scale your relationships? https://www.youtube.com/watch?v=07IpED729k8
  - TLDW; Kind of but no not really

# IMPOSITION



# ACTIVITY

Form a circle

# PUBLISHED INTENT

# ACTIVITY

Form a circle

# PROMISE THEORY

- Proposed by Mark Burgess in 2004
- Building reliable systems

# PROMISES

- Document intent
- Agency is required to make a promise
- Evaluated by user
- Allow us to model uncertainty

# APPLICATIONS OF PROMISE THEORY

- Team Cooperation
- Team Leadership
- Economics
  - Brexit

# BENEFITS

- Identify points of failure
- Level set expectations

# CFENGINE

An implementation of promise theory


25


Autonomous
Experienced
Sophisticated
Flexible

# CFENGINE COMPONENTS

# `cf-agent`

`cf-agent` is the command you will use most often. It is used to run policy(code) and ensure your system is in the desired state. If you are running any CFEngine command from the command line, there's a greater than 99% chance that this is it.

# cf-monitord

`cf-monitord` monitors various statistics about the running system. This information is made available in the form of **classes** and **variables**.

You'll almost never use `cf-monitord` directly. However the data provided by `cf-monitord` is available to `cf-agent`.

# `cf-execd`

`cf-execd` is a periodic task scheduler. You can think of it like `cron` on steroids.

By default CFEngine runs and enforces policies every *five minutes*. `cf-execd` is responsible for making that happen.

# `cf-serverd`

`cf-serverd` runs on the CFEngine server, as well as all clients.

- On servers it is responsible for serving files to clients.
- On clients it accepts `cf-runagent` requests

`cf-runagent` allows you to request ad-hoc policy runs. I rarely use it.

# PROMISES

# ANATOMY OF A PROMISE

```
type:
  context::
    "promiser" -> "promisee"
                  ----------|
      attribute1 => "value",  |
      attribute2 => body;     |-- Promise Body
                  ----------|
```

## PROMISE ATTRIBUTES

- Separated by commas
- Vary by **promise type**
- Value is quoted string or unquoted object (function/body/bundle)

# EXAMPLE PROMISE

```
bundle agent main {
  files:
    linux::
      "/tmp/example" -> { "Instructor", "Students" }
        create => "true",
        touch => "true",
        action => warn_only;
}
```

```
warning: Need to touch (update time stamps) for '/tmp/multiple-attr
```

# BUNDLES

- collection of **promises**
- logical grouping
- can have parameters
- **ARE NOT FUNCTIONS**

# A BUNDLE FOR APACHE WEB-SERVER MIGHT

- ensure the `apache2` package is installed
- ensure the content in the config file is correct
- ensure content is present for serving
- ensure proper permissions of files
- ensure the `httpd` process is running
- ensure the `httpd` process is restarted when the configuration changes

# ANATOMY OF A BUNDLE

```
bundle type name
{
    type:
      context::
        "promiser" -> { "promisee" }
          attribute1 => "value",
          attribute2 => value;

    type:
      context::
        "promiser" -> { "promisee" }
          attribute1 => "value",
          attribute2 => value;
}
```

Bundles apply to the binary that executes them. E.g., `agent` bundles apply to `cf-agent` while `server` bundles apply to `cf-serverd`.

Bundles of type `common` apply to any CFEngine binary.

# WHAT COMPONENT(S) USE THIS BUNDLE?

# EXAMPLE 1

```
bundle common globals
{
  vars:

      "tool_path" string => "/srv/tools"
}
```

# EXAMPLE 2

```
bundle server my_access_rules
{
  access:

      "$(globals.tool_path)"
        admit_ips => { "192.168.0.0/24" };
}
```

# EXAMPLE 3

```
bundle agent my_policy
{

  vars:

    "config[PermitRootLogin]" string => "no";
    "config[Port]" string => "22";

  files:

       "/etc/ssh/sshd_config"
         edit_line => set_line_based( "my_policy.config", " ",
}
```

# EXAMPLE 4

```
bundle monitor measure_cf_serverd
{
  vars:

    "pid[cf-serverd]"
      string => readfile( "$(sys.piddir)/cf-serverd.pid", 4k )

    "reg_stat[rss]" string =>"(?:[^\s+]*\s+){23}([^\s]+)(?:.*)

  measurements:

   "/proc/$(pid[cf-serverd])/stat"
     handle => "cf_serverd_vsize",
     stream_type => "file",
     data_type => "int",
```

# DO WE HAVE TIME, AND DO YOU WANT TO TRY YOURSELF?


HOW ANTS BUILD BRIDGES

# QUESTIONS?

# CONNECT WITH ME

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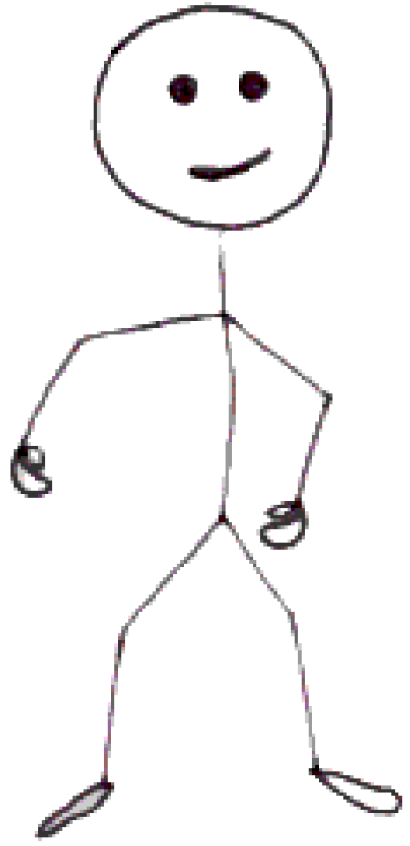
- Twitter: @cmdln_
- Careers at Northern.tech: https://northern.tech/careers
- Company Blog:
- My Blog: http://cmdln.org

# THANKS

This is
my
thank you
dance!



# ADDITIONAL RESOURCES

# ADDITIONAL RESOURCES CONTINUED

## Basic Concepts (part 1)

Basic promise theory concepts (YouTube)

## The rules of delegation (part 2)

How delegation works (YouTube)

## Scaling Cooperation (part 3)

Scaling relationships (YouTube)

## CFEngine Tutorial

A comprehensive self directed tutorial to learn CFEngine 3.

## CFEngine Zero to Hero

A quick intro targeting some of the most important things to know getting started with CFEngine 3.

Created by Nick Anderson