

# The 12 Factors of DevOps

# Introduction

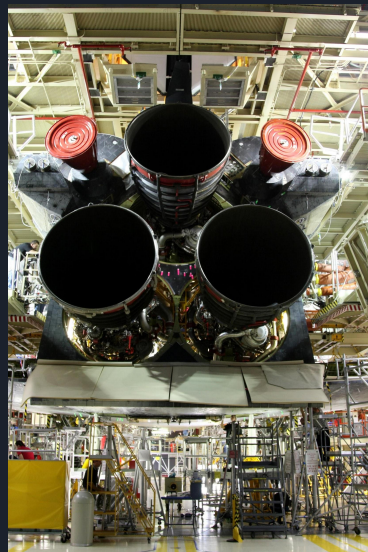


# Principles of DevOps

Cultural or process?



Technical?





**The goal of DevOps is to improve collaboration between Development and Operations so we improve the speed and quality of delivery.**

Launch it ...



... and keep it flying!





# “Goals”, “Principles” and “Factors”

## **CAMS**

John Willis and Damon Edwards

## **The Three Ways**

Gene Kim

<https://12Factor.net/>

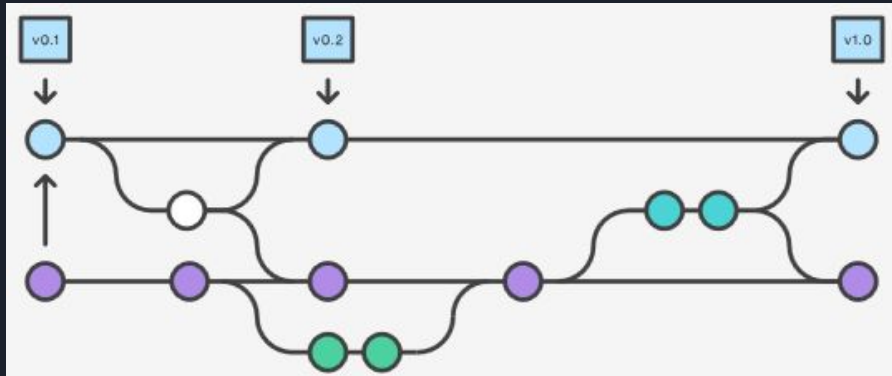
Written by Adam Wiggins

<https://12Factor.net/>

- |                        |                       |
|------------------------|-----------------------|
| 1. Codebase            | 7. Port binding       |
| 2. Dependencies        | 8. Concurrency        |
| 3. Config              | 9. Disposability      |
| 4. Backing services    | 10. Dev / Prod parity |
| 5. Build, release, run | 11. Logs              |
| 6. Processes           | 12. Admin processes   |



# 1. Codebase

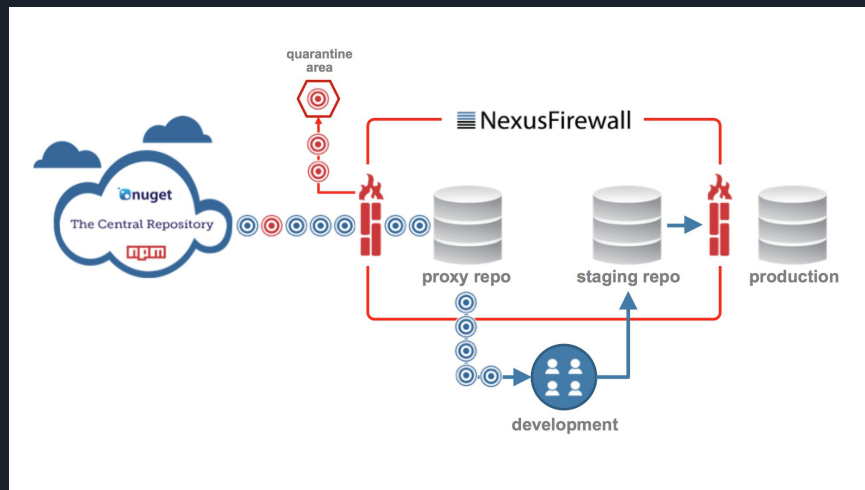


**All aspects of the application, including build, migration and deployment scripts must use version control**

## 2. Dependencies

**All application dependencies should be identified and referenced as part of the build**

**No system leakage!**



### 3. Config

**Keep the config together.  
Use it to express all of the  
values you need for  
resource locations,  
databases, environment  
config, credentials ...**

**No hard coding in the  
application**

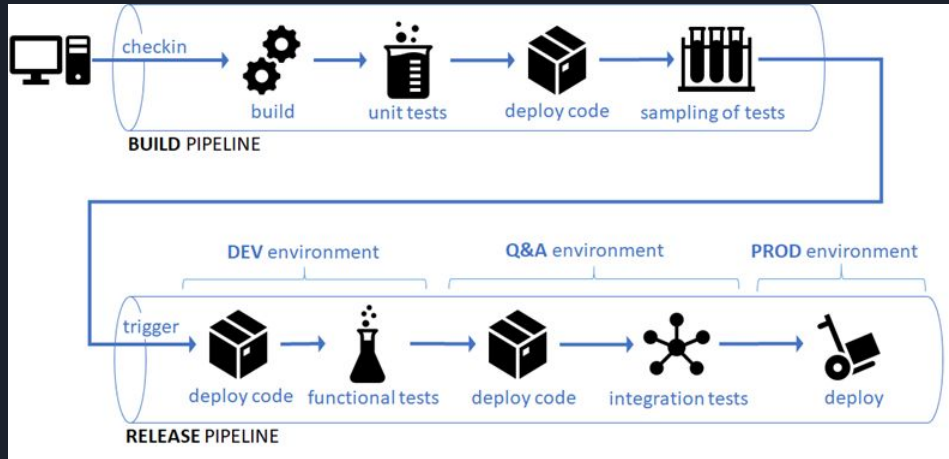
```
5 # Database settings.
6 database:
7
8 # the name of your JDBC driver
9 driverClass: org.h2.Driver
10
11 # the username
12 user: *****
13
14 # the password
15 password: *****
16
17 # the JDBC URL
18 url: jdbc:h2:./target/application
19
20 server:
21   applicationConnectors:
22     - type: http
23       port: 8080
24     - type: https
25       port: 8443
26       keyStorePath: vault.keystore
27       keyStorePassword: *****
28
29   adminConnectors:
30     - type: http
31       port: 8081
32     - type: https
```

## 4. Backing services



**Backing services or “Attached resources” should be swappable, build them independently of the application and use adaptors so you can swap services when needed**

## 5. Build, release and run

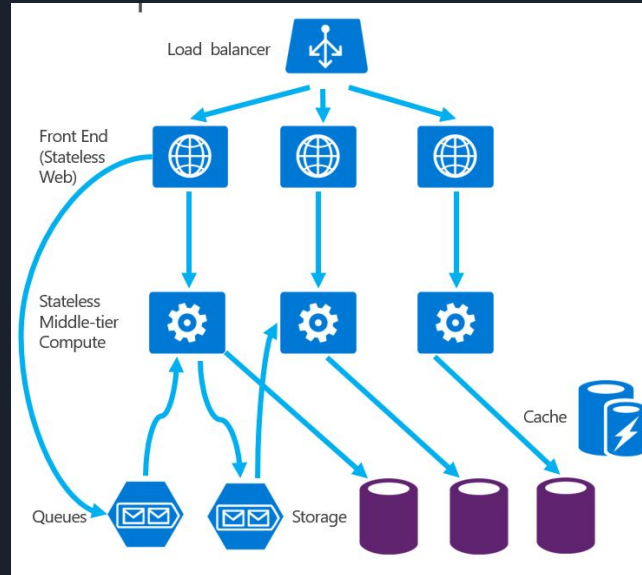


**Keep the  
stages discrete  
from each  
other**

## 6. Processes

**Keep  
applications  
stateless, no  
sticky sessions**

**The “Backing  
Services”  
provide state**



## 7. Port binding

***jetty://***

 **Tornado**

The logo for Thin, featuring the word "Thin" in a serif font, flanked by two decorative, fan-like symbols.

**Don't rely on external applications for ports and protocols**

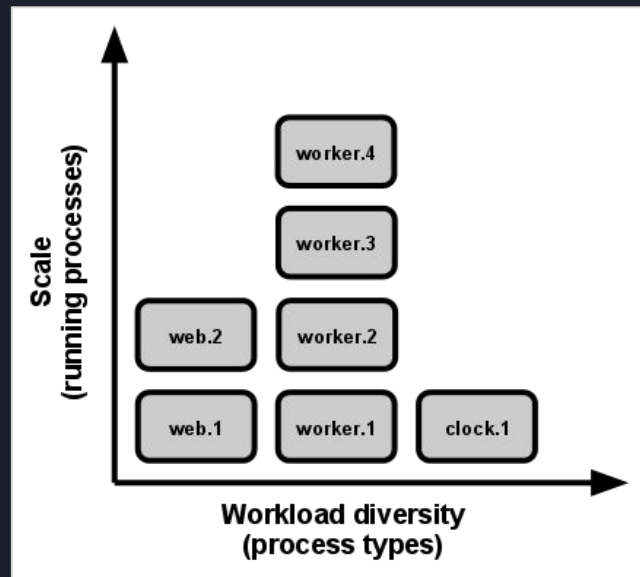
**Use embedded servers to make the application independent from its environment**

**... no dependency leakage**

## 8. Concurrency

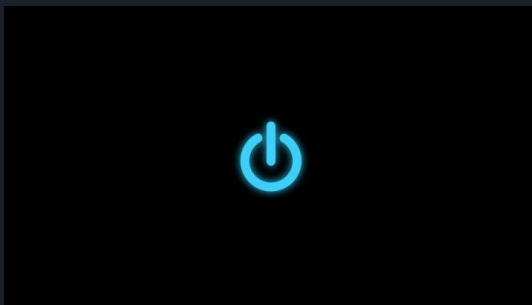
**Share nothing, horizontally partitionable, machine agnostic.**

**Use “Process Managers” to manage applications at volume.**





## 9. Disposability



**Minimise startup times,  
makes a “Process Manager”  
more responsive.**

**Ensure graceful shutdown,  
drain connections, release  
locks, return jobs to queues**

## 10. Dev / Prod parity



**Manage time and  
personnel gaps**



**Use adaptors, don't  
rely on them**



**Keep Dev and Ops  
on the same page!**

## 11. Logs

```
05:52:19 Info AboutLog 170 0 "Changing App Context: {0: 1} -> {0: 4097}"
05:52:19 Info Status 163 0 "INSTALL SPACE REQUIRED: {0: 10169266} KB; SPACE AVAILABLE: {1: 123510776} KB; LOC: {2: C:\}"
05:52:19 Info Step 25 55502 "User advanced from '{0: Connecting}' page to '{1: Summary}' page."
05:52:19 Info Selection 38 55612 "The following lines show the default selections for the Summary page when it first appeared."
05:52:19 Info Selection 99 0 "This is a new installation of 2016 SP1.0."
05:52:19 Info Selection 102 0 "Download Options: {Operation:=Install only (do not download) (Enabled: 1)}, {Background downloader:=Do not use (Enabled: 1)} (Enabled: 1)"
05:52:19 Info Selection 103 0 "Installation Location: {Installation location:=C:\Program Files\SOLIDWORKS Corp (Enabled: 1)}, {Install from:=G:\SOLIDWORKS DOWNLOADS (Enabled: 1)} (Enabled: 1)"
05:52:19 Info Selection 104 0 "Toolbox/Hole Wizard Options: {Toolbox installation location:=C:\SOLIDWORKS Data (Enabled: 1)}, {Toolbox installation method:=New Toolboxes (Enabled: 1)} (Enabled: 1)"
05:52:19 Info Selection 105 0 "Estimated installation size: 9.7 GB"
05:52:23 Info Step 25 55502 "User advanced from '{0: Summary}' page to '{1: Products To Install}' page."
05:52:24 Info Selection 37 55611 "The user clicked the button representing the {0: OK} operation on the {1: Products To Install} page."
05:52:24 Info Selection 36 55610 "The user changed the installation action of {0: PhotoView 360 Network Render Client} to: {1: Install PhotoView 360 Network Render Client 2016 SP1.0}"
05:52:24 Info Selection 36 55610 "The user changed the installation action of {0: SOLIDWORKS Electrical} to: {1: Do not install SOLIDWORKS Electrical 2016 SP1.0}"
05:52:24 Info Selection 36 55610 "The user changed the installation action of {0: API Tools} to: {1: API Tools 2016 SP1.0 (install manually)}"
05:52:24 Info Selection 36 55610 "The user changed the installation action of {0: SOLIDWORKS Workgroup PDM x64 Client Add-in} to: {1: Do not install SOLIDWORKS Workgroup PDM x64 Client Add-in 2016 SP1.0}"
05:52:24 Info Selection 36 55610 "The user changed the installation action of {0: SOLIDWORKS Workgroup PDM Add-in} to: {1: Do not install SOLIDWORKS Workgroup PDM Add-in 2016 SP1.0}"
05:52:24 Info Status 163 0 "INSTALL SPACE REQUIRED: {0: 9411784} KB; SPACE AVAILABLE: {1: 123506652} KB; LOC: {2: C:\}"
05:52:25 Info Status 163 0 "INSTALL SPACE REQUIRED: {0: 9411784} KB; SPACE AVAILABLE: {1: 123506652} KB; LOC: {2: C:\}"
05:52:25 Info Step 25 55502 "User advanced from '{0: Products To Install}' page to '{1: Summary}' page."
05:52:27 Info Step 25 55502 "User advanced from '{0: Summary}' page to '{1: Download Options}' page."
05:52:33 Info Selection 37 55611 "The user clicked the button representing the {0: OK} operation on the {1: Download Options} page."
05:52:33 Info Step 25 55502 "User advanced from '{0: Download Options}' page to '{1: Summary}' page."
05:52:37 Info Step 25 55502 "User advanced from '{0: Summary}' page to '{1: Installation Location}' page."
05:53:48 Warning Message 9 55200 "Dialog Shown: {0: C:\Program Files\SOLIDWORKS 2016 This path does not exist. Do you want to create it now?}. User selected: {1: Yes}"
05:53:48 Info Status 163 0 "INSTALL SPACE REQUIRED: {0: 9411784} KB; SPACE AVAILABLE: {1: 123506652} KB; LOC: {2: C:\}"
05:53:48 Info Step 23 55500 "Page '{0: Installation Location}' is being reshown or refreshed."
05:53:50 Info Selection 37 55611 "The user clicked the button representing the {0: OK} operation on the {1: Installation Location} page."
05:53:50 Info Status 163 0 "INSTALL SPACE REQUIRED: {0: 9411784} KB; SPACE AVAILABLE: {1: 123506652} KB; LOC: {2: C:\}"
05:53:50 Info Status 163 0 "INSTALL SPACE REQUIRED: {0: 9411784} KB; SPACE AVAILABLE: {1: 123506652} KB; LOC: {2: C:\}"
05:53:50 Info Step 25 55502 "User advanced from '{0: Installation Location}' page to '{1: Summary}' page."
05:53:56 Info Step 25 55502 "User advanced from '{0: Summary}' page to '{1: Toolbox Options}' page."
05:54:37 Info Step 23 55500 "Page '{0: Toolbox Options}' is being reshown or refreshed."
05:54:43 Info Selection 37 55611 "The user clicked the button representing the {0: OK} operation on the {1: Toolbox Options} page."
05:54:44 Info Status 163 0 "INSTALL SPACE REQUIRED: {0: 9411784} KB; SPACE AVAILABLE: {1: 123506648} KB; LOC: {2: C:\}"
05:54:44 Info Step 25 55502 "User advanced from '{0: Toolbox Options}' page to '{1: Summary}' page."
05:54:58 Info Selection 37 55611 "The user clicked the button representing the {0: <U-N</U>-ext} operation on the {1: Summary} page."
05:54:58 Info Selection 39 55613 "The following lines show the selections for the Summary page when the user selected to begin a download or installation."
05:54:58 Info Selection 99 0 "This is a new installation of 2016 SP1.0."
05:54:58 Info Selection 102 0 "Download Options: {Operation:=Install only (do not download) (Enabled: 1)}, {Background downloader:=Do not use (Enabled: 1)} (Enabled: 1)"
05:54:58 Info Selection 103 0 "Installation Location: {Installation location:=C:\Program Files\SOLIDWORKS 2016 (Enabled: 1)}, {Install from:=G:\SOLIDWORKS DOWNLOADS (Enabled: 1)} (Enabled: 1)"
05:54:58 Info Selection 104 0 "Toolbox/Hole Wizard Options: {Toolbox installation location:=C:\Program Files\SOLIDWORKS 2016\SOLIDWORKS 2016 DATA (Enabled: 1)} (Enabled: 1)"
05:54:58 Info Selection 105 0 "Estimated installation size: 9.0 GB"
05:54:58 Info Selection 43 55617 "The source folder that will be used is: {0: G:\SOLIDWORKS DOWNLOADS\SOLIDWORKS 2016 x64 SP01}"
05:54:58 Info Selection 44 55617 "The Installation Manager Source Folder that will be used is: {0: G:\SOLIDWORKS DOWNLOADS\SOLIDWORKS 2016 x64 SP01\src}"
05:54:59 Info Step 25 55502 "User advanced from '{0: Summary}' page to '{1: Install Progress}' page."
05:54:59 Info Selection 107 0 "Writing serial numbers to the registry..."
```

Value your logs, at scale  
you need aggregation  
and analytics to  
maintain control

Treat logging as a  
"Backing Service"



## 12. Admin processes

**Ship admin code with the app and incorporate into the application dependencies. Run the admin tools as you would the app - keep it simple.**

**Recognise the need for data migrations, data fixes and any other admin commands needed**





**Thank you all!**

**Questions?**