

Deploying enterprise services 60 times a day using Python

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The City of Oslo

More than 50000 employees - twice as many as Statoil

57 departments

20 developers

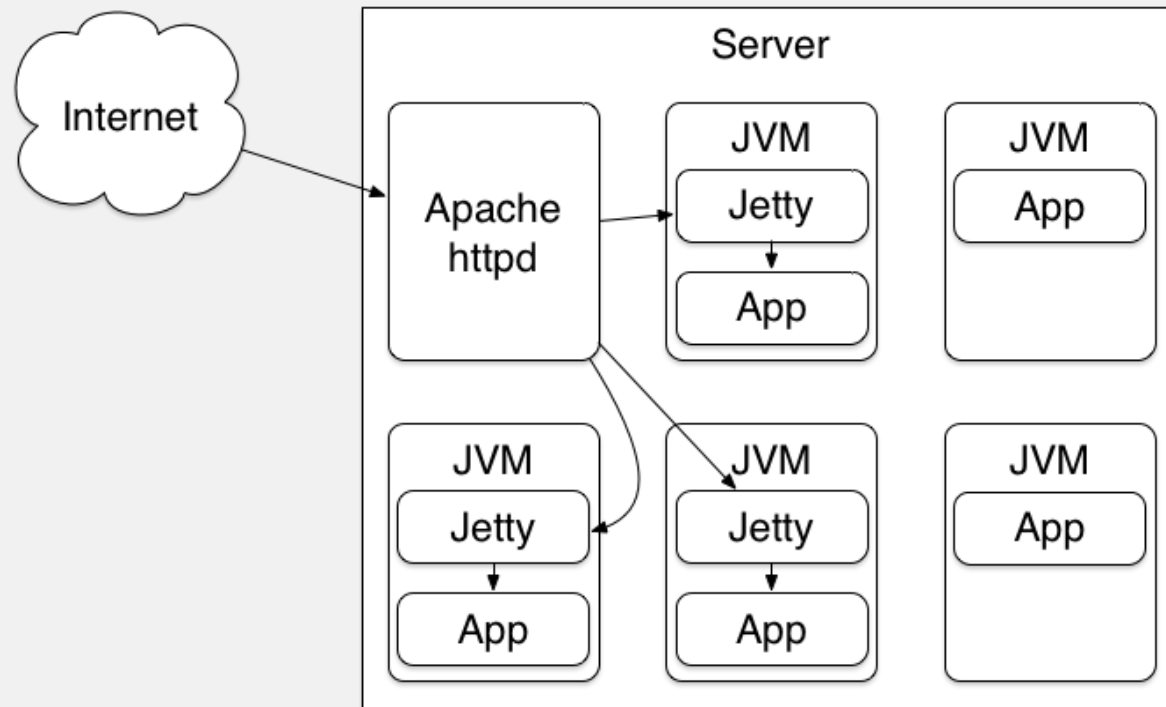
120 applications

36 servers

2.5M messages / day

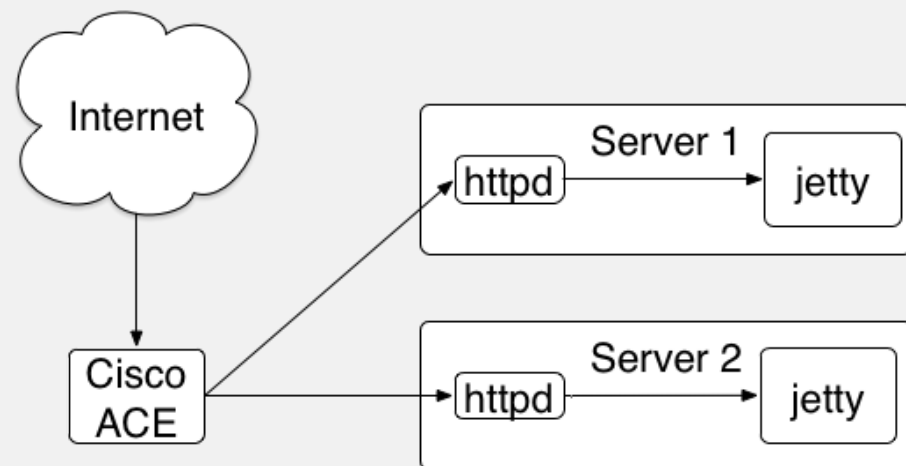
60 deploys / day

Server

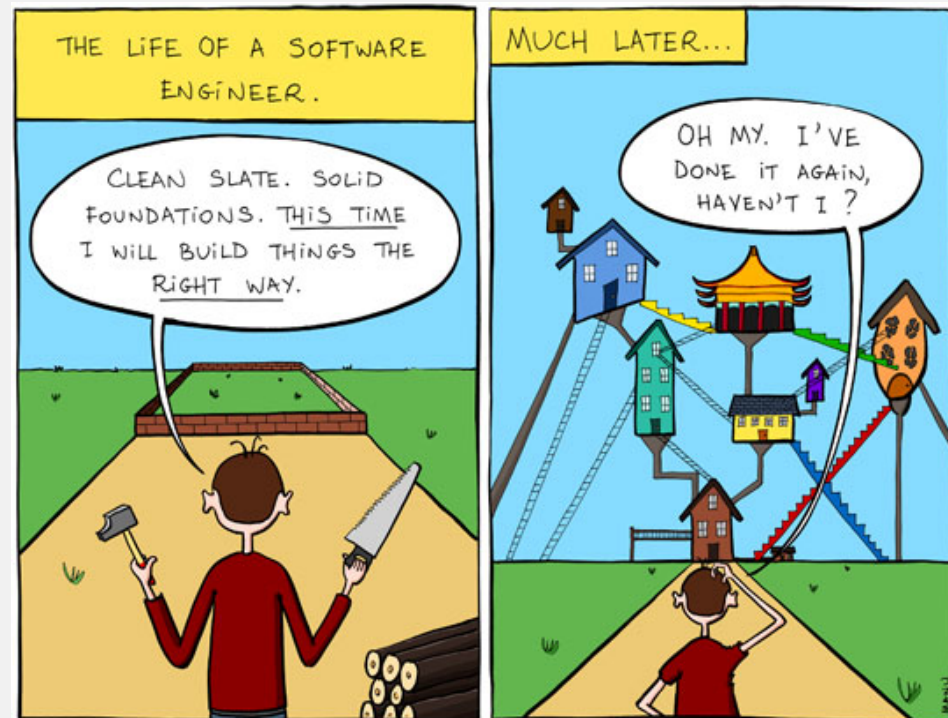


Redundancy

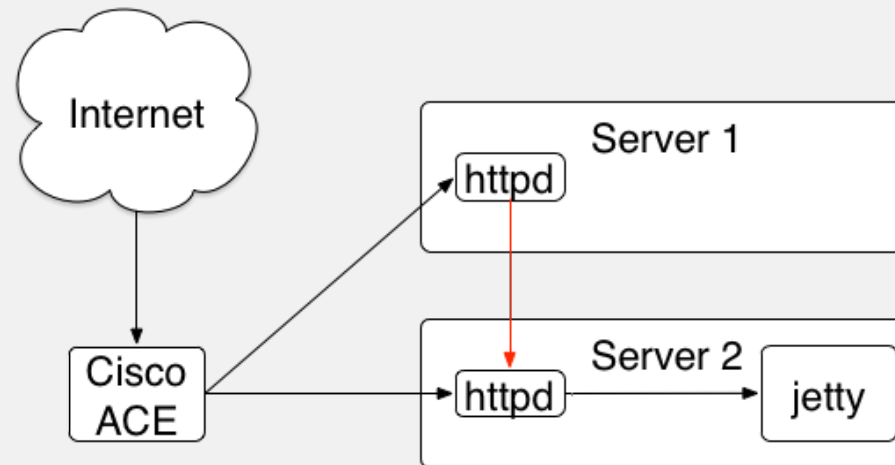
40-80 applications



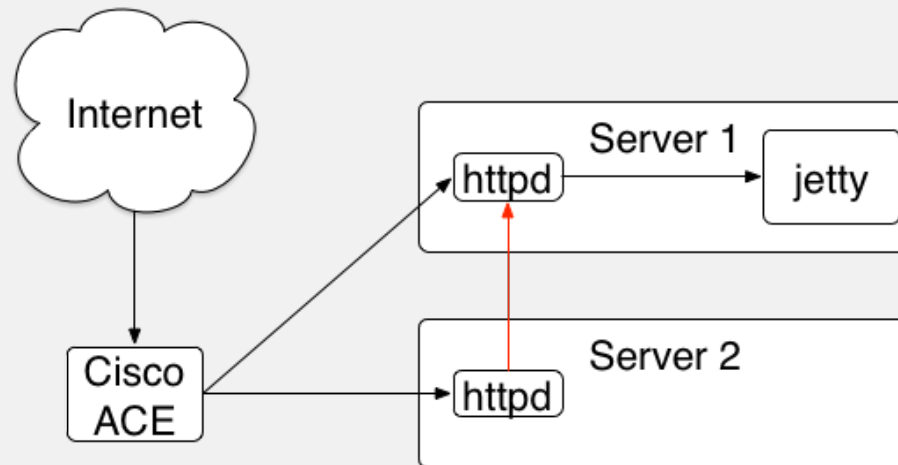
from maven to Ruby



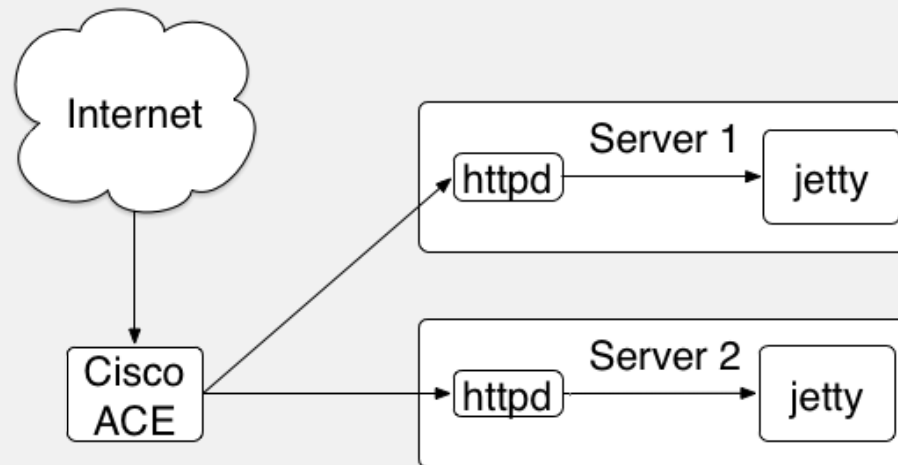
Deployment without downtime



Deployment without downtime

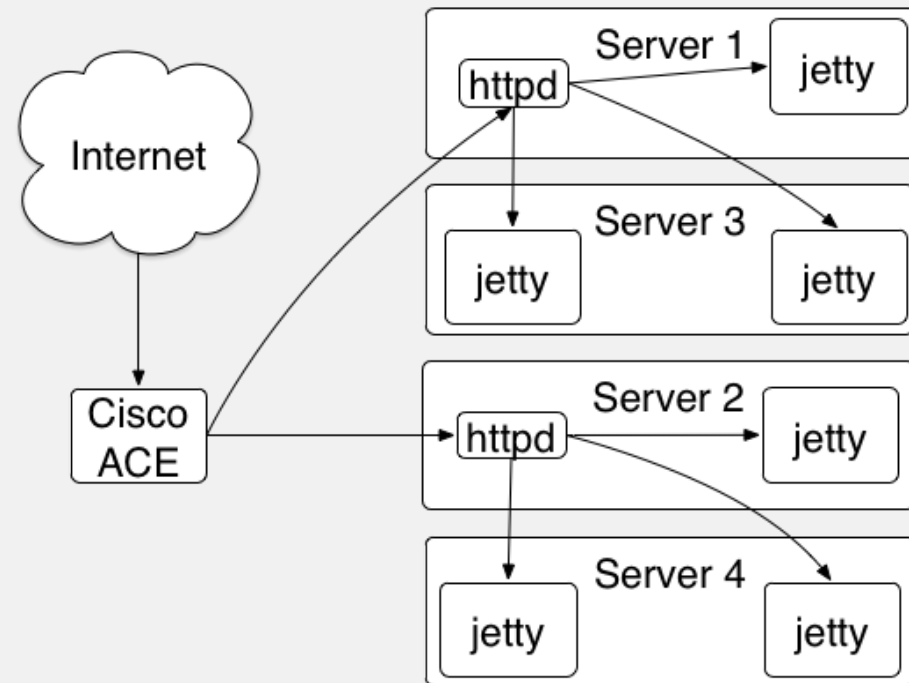


Deployment without downtime

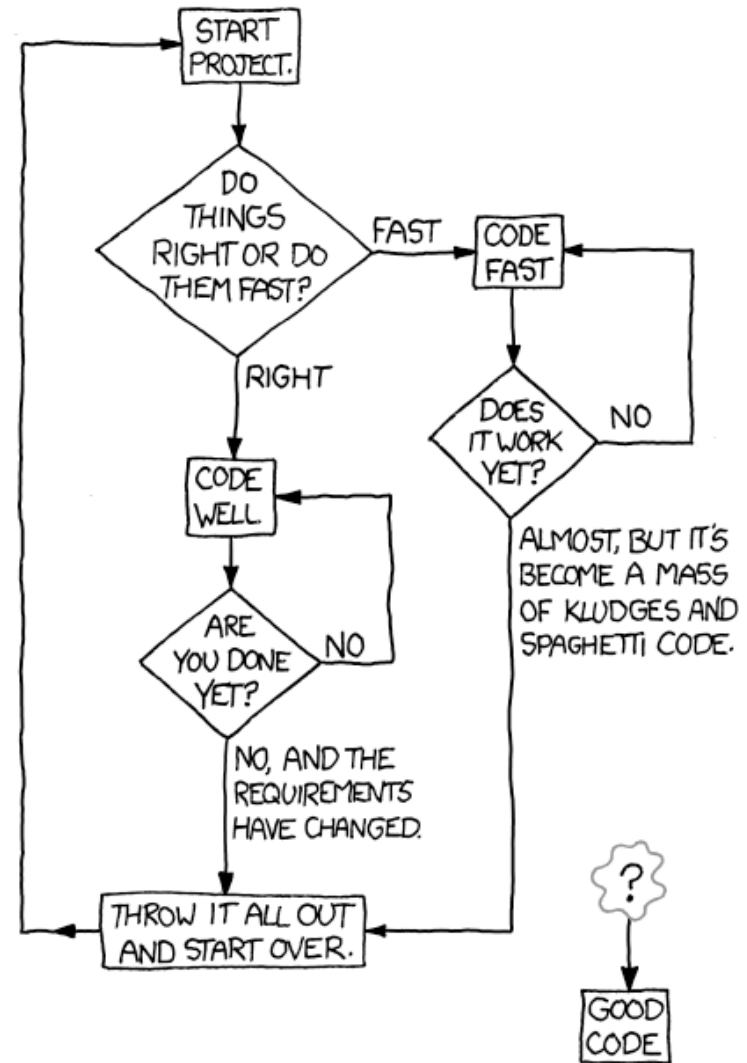


Scaling out

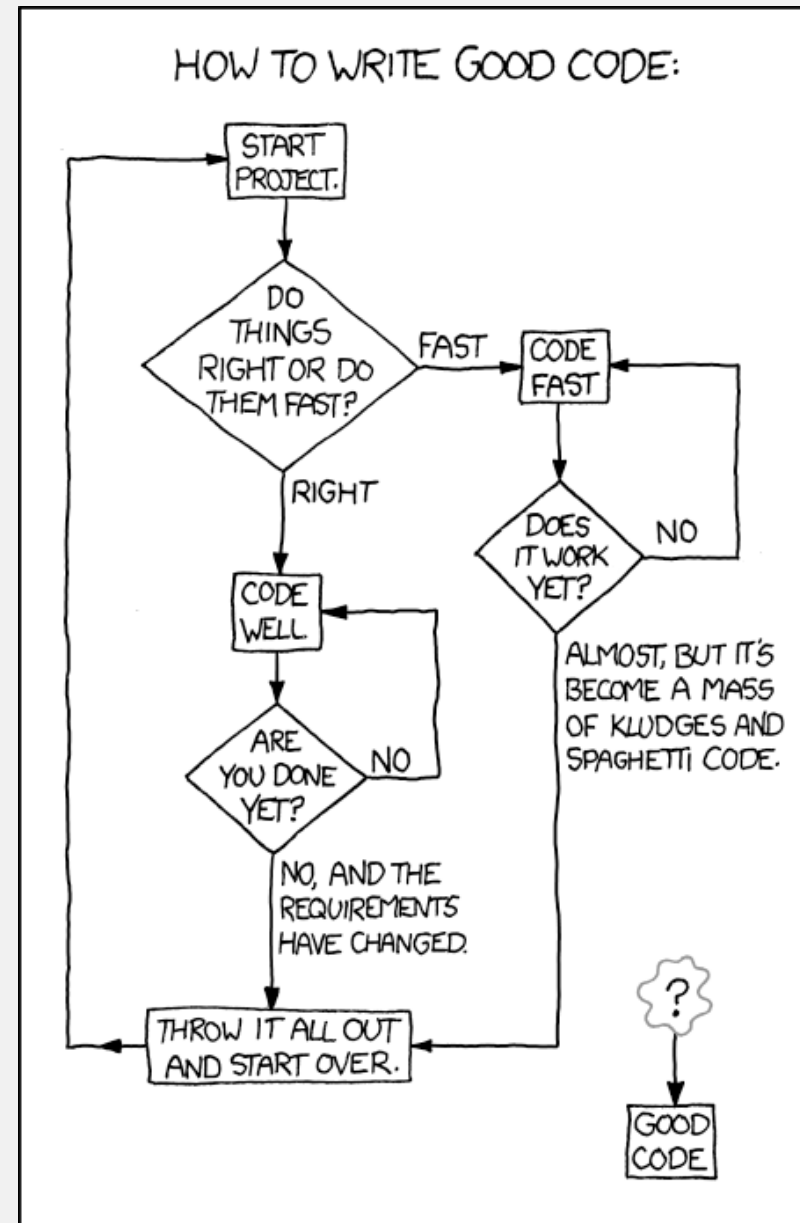
80-120 applications



HOW TO WRITE GOOD CODE:



throw it all out
and start over



**Use correct level of
abstraction**

**Separate side effects from
control flow**

```
from fabric import api

@api.task
def command():
    api.local("echo greetings local shell")

@api.parallel
def remote_command():
    with api.settings(warn_only=True):
        return api.run("service httpd status")

@api.parallel
def other_remote():
    with api.hide('running', 'stdout'):
        api.sudo('service httpd reload')

def on(servers, task, *args):
    with api.settings(hosts=servers):
        api.execute(task, *args)
```

```
def setup_from_artifactory(deployment, artifact):
    with api.prefix('export http_proxy='):
        on(deployment.servers, api.run, 'wget -N {}'.format(artifact.url))
    api.run('unzip -o {} -d {}'.format(artifact.assembly_zipname, artifact.dirname))
    on(deployment.servers, api.run,
        'ln -nfs {} {}-app'.format(artifact.dirname, app.remote_user))
    on(deployment.servers, api.run, 'chmod a+x {}-app/bin/*.sh'.format(app.remote_user))
    on(deployment.servers, api.run, 'delete_old_versions {}'.format(app.remote_user))
    on(deployment.servers, api.run,
        'echo jmx.port={} > config/itas.properties'.format(app.jmx_port))
    on(deployment.servers, api.run,
        'echo jvm.xmx={} >> config/itas.properties'.format(app.xmx))
    on(deployment.app_servers, api.run, 'rm config/disabled')
    for proxy, server in zip(deployment.proxies, deployment.app_servers):
        remote_deployment_without_downtime(proxy, server, deployment)
    on(deployment.disabled_servers, api.run, 'touch config/disabled')
    on(deployment.disabled_servers, api.run, 'itas stop')
```



```
def setup_from_artifactory(deployment, artifact):  
    on(deployment.servers, download, artifact)  
  
    on(deployment.servers, install, artifact, deployment)  
  
    on(deployment.app_servers, enable)  
    for proxy, server in zip(deployment.proxies, deployment.app_servers):  
        remote_deployment_without_downtime(proxy, server, deployment)  
    on(deployment.disabled_servers, disable)
```

```
def setup_from_artifactory(deployment, artifact):  
    on(deployment.servers, download, artifact)  
    on(deployment.servers, install, artifact, deployment)  
    on(deployment.app_servers, enable)  
    for proxy, server in zip(deployment.proxies, deployment.app_servers):  
        remote_deployment_without_downtime(proxy, server, deployment)  
    on(deployment.disabled_servers, disable)
```

```
@api.parallel
def install(artifact, app):
    with api.hide('stdout', 'running'):
        api.run('ln -nfs {} {}-app'.format(artifact.dirname, app.remote_user))
        api.run('chmod a+x {}-app/bin/*.sh'.format(app.remote_user))
        api.run('delete_old_versions {}'.format(app.remote_user))
        api.run('echo jmx.port={} > config/itas.properties'.format(app.jmx_port))
        api.run('echo jvm.xmx={} >> config/itas.properties'.format(app.xmx))
```

```
@api.parallel
def enable():
    with api.settings(warn_only=True), api.hide('stderr', 'warnings', 'stdout', 'running'):
        api.run('rm config/disabled')
```

```
@api.parallel
def disable():
    with api.hide('running', 'stdout'):
        api.run('touch config/disabled')
        api.run('itas stop')
```

```
class TestInstall(object):
    # ... setup-code
    @mock.patch('pyshare.deploy.api.run')
    def test_should_remove_old_symlink_and_create_new(self, run):
        deploy.install(self.artifact, self.deployment)
        run.assert_any_call('ln -nfs jmsadmin-assembly-10.41.0-standalone jmsadmin-app')

    @mock.patch('pyshare.deploy.api.run')
    def test_should_make_scripts_runnable(self, run):
        deploy.install(self.artifact, self.deployment)
        run.assert_any_call('chmod a+x jmsadmin-app/bin/*.sh')

    @mock.patch('pyshare.deploy.api.run')
    def test_should_delete_old_versions(self, run):
        deploy.install(self.artifact, self.deployment)
        run.assert_any_call('delete_old_versions jmsadmin')

    @mock.patch('pyshare.deploy.api.run')
    def test_should_create_new_properties_files(self, mock):
        deploy.install(self.artifact, self.deployment)
        mock.assert_any_call('echo jmx.port=30 > config/itas.properties')
        mock.assert_any_call('echo jvm.xmx=128m >> config/itas.properties')
```

Minimize branching

**DO repeat yourself
(sometimes)**

```
def setup(deployment, artifact, local=False):
    if local:
        on(deployment.proxies + deployment.app_servers, upload, artifact, deployment)
    else:
        on(deployment.servers, download, artifact)

    on(deployment.servers, install, artifact, deployment)
    on(deployment.app_servers, enable)

    if local:
        on(deployment.proxies + deployment.app_servers,
            deploy_downtime, artifact, deployment)
        if deployment.has_http():
            on(deployment.proxies, httpd_graceful)
    else:
        for proxy, server in zip(deployment.proxies, deployment.app_servers):
            remote_deployment_without_downtime(proxy, server, deployment)
    on(deployment.disabled_servers, disable)
```

```
def setup_from_artifactory(deployment, artifact):
    on(deployment.servers, download, artifact)
    on(deployment.servers, install, artifact, deployment)
    on(deployment.app_servers, enable)
    for proxy, server in zip(deployment.proxies, deployment.app_servers):
        remote_deployment_without_downtime(proxy, server, deployment)
    on(deployment.disabled_servers, disable)

def setup_from_local(deployment, artifact):
    on(deployment.proxies + deployment.app_servers, upload, artifact, deployment)
    on(deployment.servers, install, artifact, deployment)
    on(deployment.app_servers, enable)
    on(deployment.proxies + deployment.app_servers, deploy_downtime, artifact, deployment)
    if deployment.has_http():
        on(deployment.proxies, httpd_graceful)
    on(deployment.disabled_servers, disable)
```

**Testing infrastructure
scripts is important**

mock & py.test

isolate dangerous operations

separate state from control flow

Usability is important



DevOps Borat
@DEVOPS_BORAT



Following

To make error is human. To propagate error to all server in automatic way is [#devops](#).

```
3. oio@europa: ~ (bash)
europa ~ $ i deploy
prod      sikkerprod  sikkertest  systest    test
europa ~ $ i deploy
```

```
3. oio@europa: ~ (bash)
snoktransformer
ssod-grensesnitt
super-pom-interaktivetjenester
super-pom-interaktivetjenester-10.13.0
super-pom-interaktivetjenester-10.14.0
sussaksmottak
svarut-integrasjon
telenormobil
template
tet-integrasjon
transform
ude-integrasjon
uniqueref
validering
vavoljetank-integrasjon
virksomhetsregister
visualcost-integrasjon
web
whistleblower
whistleblower-ekstern
whistleblower-intern
xmldiff
xmlvalidering
xsltservice
europa ~ $ i deploy prod
```

```
3. oio@europa: ~ (bash)
snoktransformer
ssod-grensesnitt
super-pom-interaktivetjenester
super-pom-interaktivetjenester-10.13.0
super-pom-interaktivetjenester-10.14.0
sussaksmottak
svarut-integrasjon
telenormobil
template
tet-integrasjon
transform
ude-integrasjon
uniqueref
validering
vavoljetank-integrasjon
virksomhetsregister
visualcost-integrasjon
web
whistleblower
whistleblower-ekstern
whistleblower-intern
xmldiff
xmlvalidering
xslt-service
europa ~ $ i deploy prod jmsadmin
```

```
3. oio@europa: ~ (bash)
visualcost-integrasjon
web
whistleblower
whistleblower-ekstern
whistleblower-intern
xmldiff
xmlvalidering
xsltservice
europa ~ $ i deploy prod jmsadmin-10
jmsadmin-10.10.0  jmsadmin-10.22.0  jmsadmin-10.37.0  jmsadmin-10.52.0
jmsadmin-10.11.0  jmsadmin-10.23.0  jmsadmin-10.38.0  jmsadmin-10.53.0
jmsadmin-10.12.0  jmsadmin-10.24.0  jmsadmin-10.39.0  jmsadmin-10.54.0
jmsadmin-10.12.1  jmsadmin-10.25.0  jmsadmin-10.40.0  jmsadmin-10.55.0
jmsadmin-10.12.2  jmsadmin-10.26.0  jmsadmin-10.41.0  jmsadmin-10.56.0
jmsadmin-10.12.3  jmsadmin-10.27.0  jmsadmin-10.42.0  jmsadmin-10.57.0
jmsadmin-10.13.0  jmsadmin-10.28.0  jmsadmin-10.43.0  jmsadmin-10.58.0
jmsadmin-10.14.0  jmsadmin-10.29.0  jmsadmin-10.44.0  jmsadmin-10.59.0
jmsadmin-10.15.0  jmsadmin-10.30.0  jmsadmin-10.45.0  jmsadmin-10.60.0
jmsadmin-10.16.0  jmsadmin-10.31.0  jmsadmin-10.46.0  jmsadmin-10.61.0
jmsadmin-10.17.0  jmsadmin-10.32.0  jmsadmin-10.47.0  jmsadmin-10.62.0
jmsadmin-10.18.0  jmsadmin-10.33.0  jmsadmin-10.48.0  jmsadmin-10.7.0
jmsadmin-10.19.0  jmsadmin-10.34.0  jmsadmin-10.49.0  jmsadmin-10.8.0
jmsadmin-10.20.0  jmsadmin-10.35.0  jmsadmin-10.50.0  jmsadmin-10.8.1
jmsadmin-10.21.0  jmsadmin-10.36.0  jmsadmin-10.51.0  jmsadmin-10.9.0
europa ~ $ i deploy prod jmsadmin-10.60.0
```

```
3. oio@europa: ~ (bash)
whistleblower-intern
xmldiff
xmlvalidering
xsltservice
europa ~ $ i deploy prod jmsadmin-10
jmsadmin-10.10.0 jmsadmin-10.22.0 jmsadmin-10.37.0 jmsadmin-10.52.0
jmsadmin-10.11.0 jmsadmin-10.23.0 jmsadmin-10.38.0 jmsadmin-10.53.0
jmsadmin-10.12.0 jmsadmin-10.24.0 jmsadmin-10.39.0 jmsadmin-10.54.0
jmsadmin-10.12.1 jmsadmin-10.25.0 jmsadmin-10.40.0 jmsadmin-10.55.0
jmsadmin-10.12.2 jmsadmin-10.26.0 jmsadmin-10.41.0 jmsadmin-10.56.0
jmsadmin-10.12.3 jmsadmin-10.27.0 jmsadmin-10.42.0 jmsadmin-10.57.0
jmsadmin-10.13.0 jmsadmin-10.28.0 jmsadmin-10.43.0 jmsadmin-10.58.0
jmsadmin-10.14.0 jmsadmin-10.29.0 jmsadmin-10.44.0 jmsadmin-10.59.0
jmsadmin-10.15.0 jmsadmin-10.30.0 jmsadmin-10.45.0 jmsadmin-10.60.0
jmsadmin-10.16.0 jmsadmin-10.31.0 jmsadmin-10.46.0 jmsadmin-10.61.0
jmsadmin-10.17.0 jmsadmin-10.32.0 jmsadmin-10.47.0 jmsadmin-10.62.0
jmsadmin-10.18.0 jmsadmin-10.33.0 jmsadmin-10.48.0 jmsadmin-10.7.0
jmsadmin-10.19.0 jmsadmin-10.34.0 jmsadmin-10.49.0 jmsadmin-10.8.0
jmsadmin-10.20.0 jmsadmin-10.35.0 jmsadmin-10.50.0 jmsadmin-10.8.1
jmsadmin-10.21.0 jmsadmin-10.36.0 jmsadmin-10.51.0 jmsadmin-10.9.0
europa ~ $ i deploy prod jmsadmin-10.60.0
Updating a8098bf..645076e
Fast-forward
Fetched new changes from origin/master, exiting.
europa ~ $
```

```
3. oio@europa: ~ (bash)
xmldiff
xmlvalidering
xsltservice
europa ~ $ i deploy prod jmsadmin-10
jmsadmin-10.10.0 jmsadmin-10.22.0 jmsadmin-10.37.0 jmsadmin-10.52.0
jmsadmin-10.11.0 jmsadmin-10.23.0 jmsadmin-10.38.0 jmsadmin-10.53.0
jmsadmin-10.12.0 jmsadmin-10.24.0 jmsadmin-10.39.0 jmsadmin-10.54.0
jmsadmin-10.12.1 jmsadmin-10.25.0 jmsadmin-10.40.0 jmsadmin-10.55.0
jmsadmin-10.12.2 jmsadmin-10.26.0 jmsadmin-10.41.0 jmsadmin-10.56.0
jmsadmin-10.12.3 jmsadmin-10.27.0 jmsadmin-10.42.0 jmsadmin-10.57.0
jmsadmin-10.13.0 jmsadmin-10.28.0 jmsadmin-10.43.0 jmsadmin-10.58.0
jmsadmin-10.14.0 jmsadmin-10.29.0 jmsadmin-10.44.0 jmsadmin-10.59.0
jmsadmin-10.15.0 jmsadmin-10.30.0 jmsadmin-10.45.0 jmsadmin-10.60.0
jmsadmin-10.16.0 jmsadmin-10.31.0 jmsadmin-10.46.0 jmsadmin-10.61.0
jmsadmin-10.17.0 jmsadmin-10.32.0 jmsadmin-10.47.0 jmsadmin-10.62.0
jmsadmin-10.18.0 jmsadmin-10.33.0 jmsadmin-10.48.0 jmsadmin-10.7.0
jmsadmin-10.19.0 jmsadmin-10.34.0 jmsadmin-10.49.0 jmsadmin-10.8.0
jmsadmin-10.20.0 jmsadmin-10.35.0 jmsadmin-10.50.0 jmsadmin-10.8.1
jmsadmin-10.21.0 jmsadmin-10.36.0 jmsadmin-10.51.0 jmsadmin-10.9.0
europa ~ $ i deploy prod jmsadmin-10.60.0
Updating a8098bf..645076e
Fast-forward
Fetched new changes from origin/master, exiting.
europa ~ $ i deploy prod jmsadmin-10.60.0 ssod-grensesnitt telenormobil sussaksm
ottak tet-integrasjon ude-integrasjon
```


You can deploy 60 applications and go to lunch

**You can deploy 60 applications and go to lunch
(not to prod)**

800 lines of code

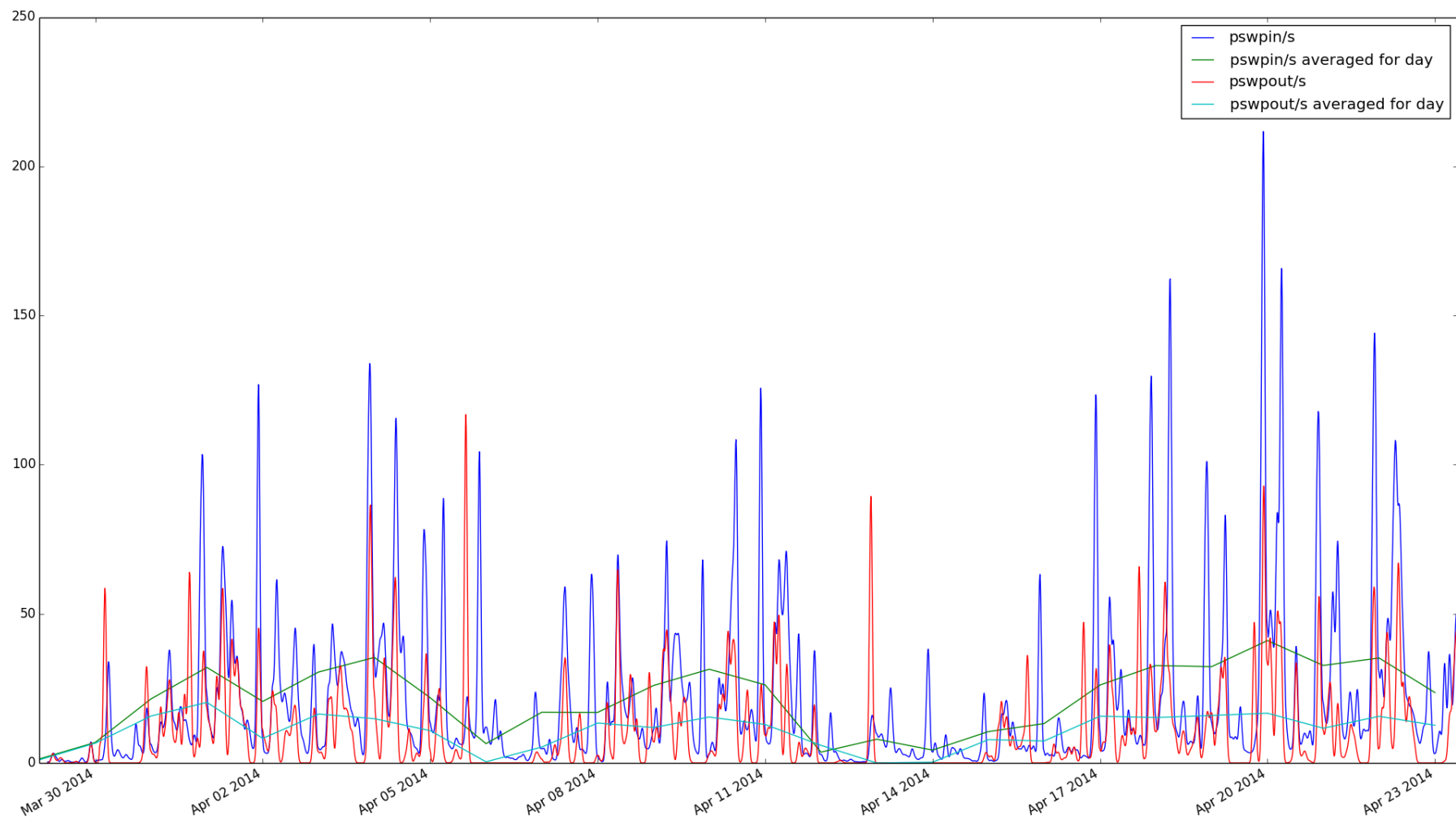
80% test coverage

16 contributors

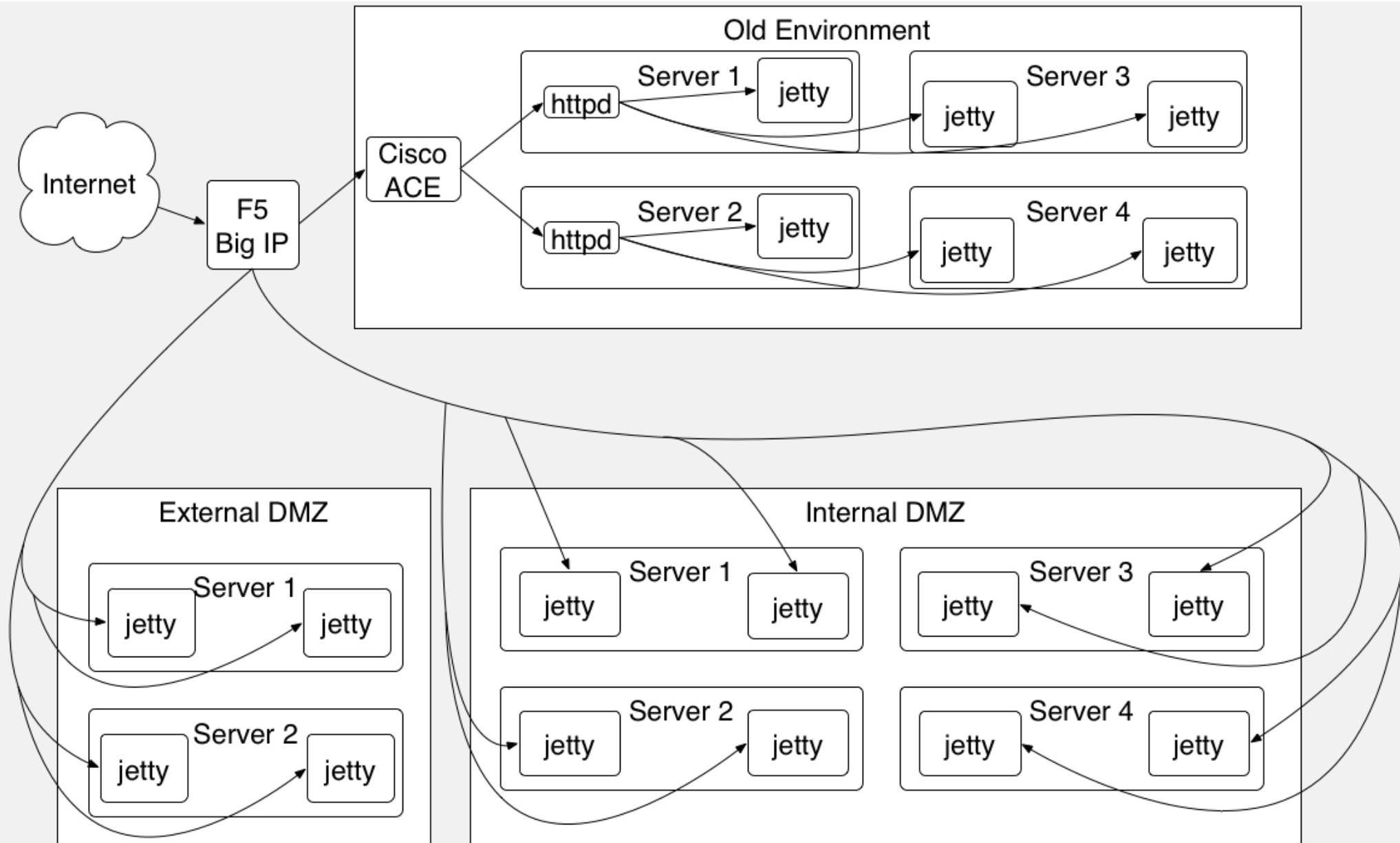
JIRA, Confluence and Hipchat

Sends email, obviously

Other use of Python



```
ProcessInfo(pid='21808', user='543', ran='matrikeloppslag', kB_swap=87840),  
ProcessInfo(pid='24982', user='22823', ran='sas-integrasjon', kB_swap=90268),  
ProcessInfo(pid='21548', user='snokpadm', ran='snokpadm', kB_swap=99424),  
ProcessInfo(pid='17496', user='511', ran='gk-fileksport-batch', kB_swap=103088),  
ProcessInfo(pid='5930', user='19618', ran='bym-inntauing', kB_swap=106304),  
ProcessInfo(pid='8291', user='585', ran='agresso-kodeplan', kB_swap=110180),  
ProcessInfo(pid='8065', user='smtpmail', ran='smtpmail', kB_swap=110232),  
ProcessInfo(pid='4508', user='584', ran='meldingslager', kB_swap=111768),  
ProcessInfo(pid='15902', user='565', ran='snokrouting', kB_swap=114760),  
ProcessInfo(pid='31224', user='517', ran='extcalendars', kB_swap=130992),  
ProcessInfo(pid='9678', user='567', ran='agressoadm', kB_swap=133500),  
ProcessInfo(pid='21583', user='gk', ran='gk', kB_swap=156260),  
ProcessInfo(pid='24100', user='scanning', ran='scanning', kB_swap=174356),  
ProcessInfo(pid='10560', user='epay', ran='epay', kB_swap=176616),  
ProcessInfo(pid='4366', user='agrlvask', ran='agrlvask', kB_swap=190520)]
```



Scripts are programs too

abstraction level

state and control flow

remove branching

repeat yourself

testing

usability

Questions?

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