Ansible & Amazon EC2

Orchestrating NetBSD into the Cloud

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  ... and what is this Amazon EC2 cloud, anyways?!
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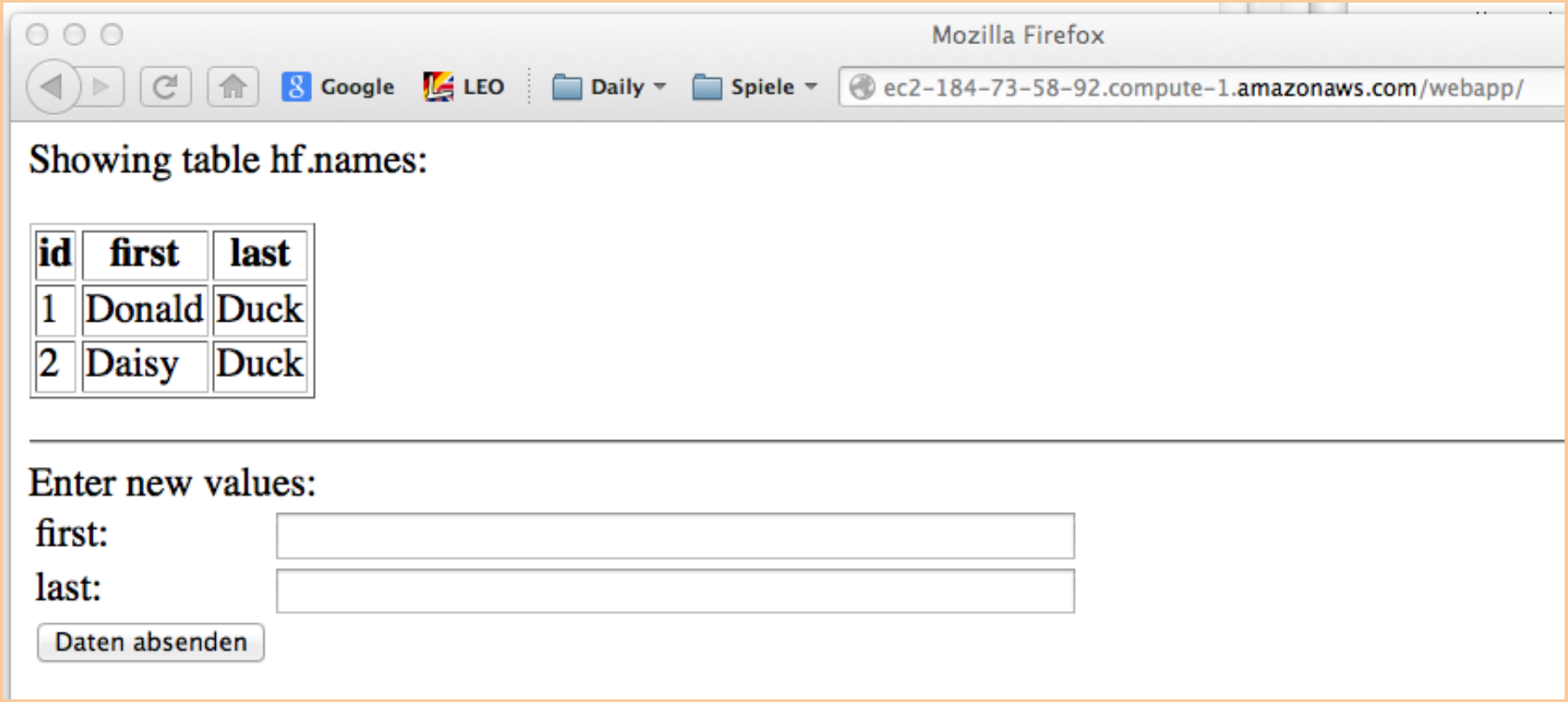
Goal


Mozilla Firefox
Google
LEO
Daily
Spiele
ec2-184-73-58-92.compute-1.amazonaws.com/webapp/
Showing table hf.names:
id
first
last
1
Donald
Duck
2
Daisy
Duck
Enter new values:
first:
last:
Daten absenden

Introducing Ansible

Introducing Ansible

- See also: Puppet, chef
- Describe system state - "playbooks"
- Adjust reality -> "orchestration"
- No daemons left & right
- SSH based
- Copies modules to remote machine and runs them with parameters
- Infrastructure: python, SSH, text files
- Key modules support NetBSD: pkgin, service, ec2

Source: http://ansible.cc/

Milestone 1: Ansible with DB+Web on local machine

NetBSD preparation for Ansible

Steps:

1. Setup hardware / VM
2. Do basic NetBSD installation: base, etc
3. From sysinst, install pkgin (yai!)
4. Install ansible binary package
5. Allow root-login via network (yuck!)

Playbook: Basic NetBSD setup

Run:

```
% ansible-playbook \
  -k -i hosts-HF \
  config-netbsd-basic.yml
```

Log: view

Hosts: view

Playbook: view

```
% ansible-playbook -k -i hosts-HF config-netbsd-basic.yml
SSH password:

PLAY [netbsd] *********************

GATHERING FACTS *********************
ok: [10.0.0.181]

TASK: [Install tcsh] *********************
changed: [10.0.0.181]

TASK: [Add user feyrer] *********************
changed: [10.0.0.181]

TASK: [Create ~feyrer/.ssh directory] *********************
changed: [10.0.0.181]

TASK: [Enable ssh login with ssh-key] *********************
changed: [10.0.0.181]

TASK: [Install sudo] *********************
changed: [10.0.0.181]

TASK: [Enable PW-less sudo-access for everyone in group 'wheel'] **
changed: [10.0.0.181]

TASK: [Disable ssh logins as root] *********************
changed: [10.0.0.181]

NOTIFIED: [restart sshd] *********************
changed: [10.0.0.181]

PLAY RECAP *********************
10.0.0.181                 : ok=9    changed=8    unreachable=0
```

Playbook: MySQL database server

Run:

```
% ansible-playbook \
  -i hosts-HF \
  config-netbsd-dbserver.yml
```

Log: view

Playbook: view

```
% ansible-playbook    -i hosts-HF config-netbsd-dbserver.yml

PLAY [dbservers] ********************

GATHERING FACTS ********************
ok: [10.0.0.181]

TASK: [Install mysql] ********************
changed: [10.0.0.181]

TASK: [Install MySQL rc.d script] ********************
changed: [10.0.0.181]

TASK: [Start MySQL service] ********************
changed: [10.0.0.181]

TASK: [Install python-mysqldb (for mysql_user module)] *****
changed: [10.0.0.181]

TASK: [Setup DB] ********************
changed: [10.0.0.181]

TASK: [Add db-user] ********************
changed: [10.0.0.181]

TASK: [Copy over DB template] ********************
changed: [10.0.0.181]

TASK: [Import DB data] ********************
changed: [10.0.0.181]

PLAY RECAP ********************
10.0.0.181                     : ok=9    changed=8    unreac
```

Playbook: Apache/PHP server

Run:

```
% ansible-playbook \
  -i hosts-HF \
  config-netbsd-webserver.yml
```

Log: view

Playbook: view

Webapp: view

```
TASK: [Enable PHP modules in PHP config file] ****
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.
changed: [10.0.0.181] => (item={'re': '^extension.

TASK: [Fix Apache access control] ****************
changed: [10.0.0.181]

TASK: [Create directory for webapp] **************
changed: [10.0.0.181]

TASK: [Deploy example webapp] ********************
changed: [10.0.0.181]

TASK: [Create webapp symlink for easy access] ****
changed: [10.0.0.181]

NOTIFIED: [restart apache] **********************
changed: [10.0.0.181]

PLAY RECAP **********************
10.0.0.181                 : ok=15   changed=14
```

Milestone 2: Basic setup for EC2

Going into the cloud

We have:

- 1 local VM with both DB- and web-server

We want:

- VMs in Amazon EC2 cloud
- 1+ DB-server
- 1+ webservers

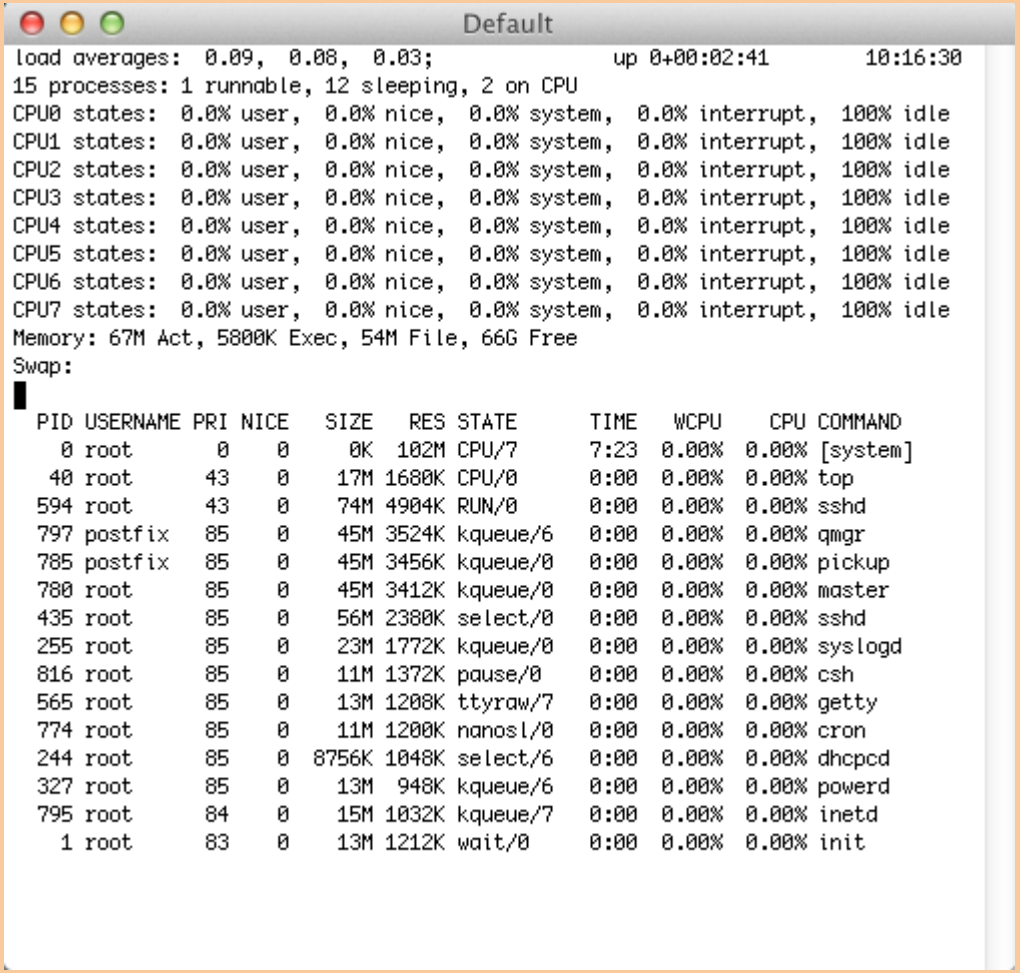
NetBSD in Amazon's EC2 cloud

- NetBSD is fully supported in Amazon's Xen-based EC2 cloud
- Steps:
  - Get Amazon AWS account
  - Select Amazon Machine Image (AMI) -> NetBSD
  - Select hardware (CPU/cores, RAM)
  - Create SSH keys
  - Define firewall rules = security groups
  - Start instance
  - Login via SSH

Demo: AWS Web Console

NetBSD in Amazon's EC2 cloud

top(1) pr0n:



The euca2ools package

Environment variables:

```
setenv EC2_ACCESS_KEY  "AKxxxxxxxxxxxxxxxxxx"
setenv EC2_SECRET_KEY  "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
setenv EC2_CERT                .../cert-XXX.pem
setenv EC2_PRIVATE_KEY         .../pk-XXX.pem
setenv EC2_URL                 http://ec2.amazonaws.com
setenv S3_URL                  http://s3.amazonaws.com
```

Regions & availability zones:

```
euca-describe-regions
euca-describe-availability-zones
euca-describe-availability-zones --region eu-west-1
```

Change default region:

```
setenv EC2_URL             http://ec2.eu-west-1.amazonaws.com
```

AMIs:

```
euca-describe-images --all
```

The euca2ools package, cont'd

SSH Keypairs:

```
euca-add-keypair          -f key-eucaHF.pem eucaHF
euca-describe-keypairs
euca-delete-keypair       eucaHF
```

Instances:

```
euca-run-instances -k eucaHF ami-7fc3c30b
euca-describe-instances
euca-describe-instances i-96a773dc
ssh -i key-eucaHF.pem ec2-54-328-43-220.compute.amazonaws.com -l root
euca-terminate-instances i-96a773dc
```

Links: Eucalyptus homepage

Wiki entry: NetBSD Wiki

Blog entry: hubertf's NetBSD blog

Ansible's ec2 modules & friends

- ec2: launch instance, wait until up
- ec2_facts: determine instance facts
- ec2_vol: create and attach S3 storage

Also:

- ec2.py, ec2.ini

EC2 preparations for Ansible

1. Setup security (firewall) group:

```
% euca-add-group -d 'Web servers' ec2-webservers
% euca-authorize -P tcp -p 80-80 -s 0.0.0.0/0 ec2-webservers
% euca-authorize -P tcp -p 22-22 -s 0.0.0.0/0 ec2-webservers
% euca-authorize -P icmp -s 0.0.0.0/0 ec2-webservers
%
% euca-describe-groups
GROUP   sg-a854b3c3     749335780469    ec2-webservers  Web servers
PERMISSION      749335780469    ec2-webservers  ALLOWS  tcp     22
PERMISSION      749335780469    ec2-webservers  ALLOWS  tcp     80
PERMISSION      749335780469    ec2-webservers  ALLOWS  icmp    -1
```

2. Load SSH key into agent:

```
% eval `ssh-agent`
Agent pid 9304
% ssh-add -l
The agent has no identities.
% ssh-add .../key-ec2HF.pem
Identity added: ../../euca2ools/key-ec2HF.pem (../../euca2ools/key-ec2HF.pem)
% ssh-add -l
2048 d5:25:19:3d:59:40:35:32:03:f7:c5:83:de:19:b6:d0 ../../euca2ools/key-ec2HF.pem (
```

Playbook: Prepare EC2 instance

Run:

```
% ansible-playbook \
  -i hosts-HF \
  config-ec2-prepare1vm.yml
```

Log: view

Hosts: view

Playbook: view

```
% ansible-playbook -i hosts-HF config-ec2-prepare1vm.yml

PLAY [localhost] ********************

TASK: [Launch new EC2 instance] *********************
changed: [127.0.0.1]

TASK: [Give the system 30 seconds to boot up] ********************
changed: [127.0.0.1]

TASK: [Get rid of SSH "Are you sure you want to continue connectin
changed: [127.0.0.1]

TASK: [Fix /usr/bootstrap.sh to run pkgin with -y] ***************
changed: [127.0.0.1] => (item={'cmd': 'install /usr/bootstrap.sh /
changed: [127.0.0.1] => (item={'cmd': 'chmod +w /usr/bootstrap.sh'
changed: [127.0.0.1] => (item={'cmd': 'sed "s,bin/pkgin update,bin
changed: [127.0.0.1] => (item={'cmd': 'chmod -w /usr/bootstrap.sh'

TASK: [Install pkgin via /usr/bootstrap.sh] **********************
changed: [127.0.0.1] => (item={'cmd': u'env PATH=/usr/sbin:${PATH}

TASK: [Copy over Ansible binary package] *********************
changed: [127.0.0.1]

TASK: [Install Ansible dependencies] *********************
changed: [127.0.0.1]

TASK: [Install Ansible package (manually)] *********************
changed: [127.0.0.1]

TASK: [Setup lame /usr/bin/python symlink] *********************
changed: [127.0.0.1]

PLAY RECAP **********************
127.0.0.1                  : ok=9    changed=9    unreachable=
```

Playbook: Talking to EC2 instances

Run:

```
% env ANSIBLE_HOSTS=./ec2.py \
  ansible-playbook \
  config-ec2-basic.yml
```

Log: view

Playbook: view

```
% env ANSIBLE_HOSTS=./ec2.py ansible-playbook co

PLAY [security_group_ec2-webservers] ***********

GATHERING FACTS ********************
ok: [ec2-50-16-129-62.compute-1.amazonaws.com]
ok: [ec2-54-235-232-227.compute-1.amazonaws.com]
ok: [ec2-23-20-42-71.compute-1.amazonaws.com]
ok: [ec2-23-20-87-176.compute-1.amazonaws.com]
ok: [ec2-54-242-254-237.compute-1.amazonaws.com]
ok: [ec2-54-234-59-5.compute-1.amazonaws.com]

TASK: [ping] ********************
ok: [ec2-54-235-232-227.compute-1.amazonaws.com]
ok: [ec2-50-16-129-62.compute-1.amazonaws.com]
ok: [ec2-23-20-87-176.compute-1.amazonaws.com]
ok: [ec2-23-20-42-71.compute-1.amazonaws.com]
ok: [ec2-54-234-59-5.compute-1.amazonaws.com]
ok: [ec2-54-242-254-237.compute-1.amazonaws.com]

PLAY RECAP ********************
ec2-23-20-42-71.compute-1.amazonaws.com : ok=2
ec2-23-20-87-176.compute-1.amazonaws.com : ok=2
ec2-50-16-129-62.compute-1.amazonaws.com : ok=2
ec2-54-234-59-5.compute-1.amazonaws.com : ok=2
ec2-54-235-232-227.compute-1.amazonaws.com : ok=2
ec2-54-242-254-237.compute-1.amazonaws.com : ok=2
```

Milestone 3: One EC2 instance with both DB+Web

Playbook: Prepare EC2 instance

Run:

```
% ansible-playbook \
  -i hosts-HF \
  config-ec2-prepare1vm.yml
```

Log: view

Hosts: view

Playbook: view

```
% ansible-playbook -i hosts-HF config-ec2-prepare1vm.yml

PLAY [localhost] ********************

TASK: [Launch new EC2 instance] *********************
changed: [127.0.0.1]

TASK: [Give the system 30 seconds to boot up] *********************
changed: [127.0.0.1]

TASK: [Get rid of SSH "Are you sure you want to continue connecting
changed: [127.0.0.1]

TASK: [Fix /usr/bootstrap.sh to run pkgin with -y] *****************
changed: [127.0.0.1] => (item={'cmd': 'install /usr/bootstrap.sh /us
changed: [127.0.0.1] => (item={'cmd': 'chmod +w /usr/bootstrap.sh'})
changed: [127.0.0.1] => (item={'cmd': 'sed "s,bin/pkgin update,bin/p
changed: [127.0.0.1] => (item={'cmd': 'chmod -w /usr/bootstrap.sh'})

TASK: [Install pkgin via /usr/bootstrap.sh] *********************
changed: [127.0.0.1] => (item={'cmd': u'env PATH=/usr/sbin:${PATH} /

TASK: [Copy over Ansible binary package] *********************
changed: [127.0.0.1]

TASK: [Install Ansible dependencies] *********************
changed: [127.0.0.1]

TASK: [Install Ansible package (manually)] *********************
changed: [127.0.0.1]

TASK: [Setup lame /usr/bin/python symlink] *********************
changed: [127.0.0.1]

PLAY RECAP ********************
127.0.0.1                  : ok=9    changed=9    unreachable=0
```

Playbook: Basic setup of EC2 VM

Run:

```
% env \
  ANSIBLE_HOSTS=./ec2.py \
  ansible-playbook \
  config-ec2-basic.yml
```

Log: view

Playbook: view

```
% env ANSIBLE_HOSTS=./ec2.py ansible-playbook config-ec2-b

PLAY [security_group_ec2-webservers] ********************

TASK: [ping] ********************
ok: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Install tcsh] ********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Add user feyrer] ********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Create ~feyrer/.ssh directory] ********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Enable ssh login with ssh-key] ********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Install sudo] ********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Enable PW-less sudo-access for everyone in group 'w
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Disable ssh logins as root] ********************
ok: [ec2-107-22-69-112.compute-1.amazonaws.com]

PLAY RECAP ********************
ec2-107-22-69-112.compute-1.amazonaws.com : ok=8    change
```

Playbook: Setup database server

Run:

```
% env \
  ANSIBLE_HOSTS=./ec2.py \
  ansible-playbook \
  config-ec2-dbserver.yml
```

Log: view

Playbook: view

```
% env ANSIBLE_HOSTS=./ec2.py ansible-playbook config-ec2-db

PLAY [security_group_ec2-webservers] ********************

TASK: [Install mysql] *********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Install MySQL rc.d script] *********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Start MySQL service] *********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Install python-mysqldb (for mysql_user module)] ****
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Setup DB] *********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Add db-user] *********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Copy over DB template] *********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

TASK: [Import DB data] *********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.com]

PLAY RECAP *********************
ec2-107-22-69-112.compute-1.amazonaws.com : ok=8    changed
```

Playbook: Setup web server

Run:

```
% env \
  ANSIBLE_HOSTS=./ec2.py \
  ansible-playbook  \
  config-ec2-webserver.yml
```

Log: view

Playbook: view

```
TASK: [Enable PHP modules in PHP config file] ****
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co
changed: [ec2-107-22-69-112.compute-1.amazonaws.co

TASK: [Create directory for webapp] **************
changed: [ec2-107-22-69-112.compute-1.amazonaws.co

TASK: [Deploy example webapp] ********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.co

TASK: [Create webapp symlink for easy access] ****
changed: [ec2-107-22-69-112.compute-1.amazonaws.co

NOTIFIED: [restart apache] ***********************
changed: [ec2-107-22-69-112.compute-1.amazonaws.co

PLAY RECAP ********************
ec2-107-22-69-112.compute-1.amazonaws.com : ok=14
```

Milestone 4: Ansible and EC2 with separate DB + Web

Playbook: Prepare VMs for Web+DB

Run:

```
% ansible-playbook \
  -i hosts-HF \
  config-ec2-prepare-db+web-vm.yml
```

Log: view

Hosts: view

Playbook for both VMs: view

Playbook for 1 VM: view

```
TASK: [ec2-dbservers | Launch new EC2 instance] **
changed: [127.0.0.1]

TASK: [ec2-dbservers | Give the system 30 seconds
changed: [127.0.0.1]

TASK: [ec2-dbservers | Get rid of SSH "Are you sur
changed: [127.0.0.1]

TASK: [ec2-dbservers | Fix /usr/bootstrap.sh to ru
changed: [127.0.0.1] => (item={'cmd': 'install /us
changed: [127.0.0.1] => (item={'cmd': 'chmod +w /u
changed: [127.0.0.1] => (item={'cmd': 'sed "s,bin/
changed: [127.0.0.1] => (item={'cmd': 'chmod -w /u

TASK: [ec2-dbservers | Install pkgin via /usr/boot
changed: [127.0.0.1] => (item={'cmd': u'env PATH=/

TASK: [ec2-dbservers | Copy over Ansible binary pa
changed: [127.0.0.1]

TASK: [ec2-dbservers | Install Ansible dependencie
changed: [127.0.0.1]

TASK: [ec2-dbservers | Install Ansible package (ma
changed: [127.0.0.1]

TASK: [ec2-dbservers | Setup lame /usr/bin/python
changed: [127.0.0.1]

PLAY RECAP ********************
127.0.0.1                  : ok=18   changed=1
```

Playbook: Basic setup of EC2 VMs

Run:

```
% env \
  ANSIBLE_HOSTS=./ec2.py \
  ansible-playbook \
  config-ec2-basic.yml
```

Log: view

Playbook: view

```
% env ANSIBLE_HOSTS=./ec2.py ansible-playbook config-ec2-basic.yml

PLAY [security_group_ec2-webservers;security_group_ec2-dbservers] ***

TASK: [ping] **********************
ok: [ec2-54-235-44-118.compute-1.amazonaws.com]
ok: [ec2-54-234-139-151.compute-1.amazonaws.com]

TASK: [Install tcsh] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]

TASK: [Add user feyrer] **********************
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Create ~feyrer/.ssh directory] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]

TASK: [Enable ssh login with ssh-key] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]

TASK: [Install sudo] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]

TASK: [Enable PW-less sudo-access for everyone in group 'wheel'] ****
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Disable ssh logins as root] **********************
ok: [ec2-54-235-44-118.compute-1.amazonaws.com]
ok: [ec2-54-234-139-151.compute-1.amazonaws.com]

PLAY RECAP **********************
ec2-54-234-139-151.compute-1.amazonaws.com : ok=8    changed=6    unr
ec2-54-235-44-118.compute-1.amazonaws.com : ok=8    changed=6    unre
```

Playbook: Setup database server VM

Run:

```
% env \
  ANSIBLE_HOSTS=./ec2.py \
  ansible-playbook \
  config-ec2-dbserver.yml
```

Log: view

Playbook: view

```
% env ANSIBLE_HOSTS=./ec2.py ansible-playbook config-ec2-d

PLAY [security_group_ec2-dbservers] ********************

TASK: [Install mysql] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Install MySQL rc.d script] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Start MySQL service] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Install python-mysqldb (for mysql_user module)] ***
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Setup DB] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Add db-user] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Copy over DB template] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Import DB data] **********************
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

PLAY RECAP **********************
ec2-54-235-44-118.compute-1.amazonaws.com : ok=8    change
```

Playbook: Setup web server VM

Run:

```
% env \
  ANSIBLE_HOSTS=./ec2.py \
  ansible-playbook  \
  config-ec2-webserver.yml
```

Log: view

Playbook: view

```
TASK: [Enable PHP modules in PHP config file] ***
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.
changed: [ec2-54-234-139-151.compute-1.amazonaws.

TASK: [Create directory for webapp] *************
changed: [ec2-54-234-139-151.compute-1.amazonaws.

TASK: [Deploy example webapp] *******************
changed: [ec2-54-234-139-151.compute-1.amazonaws.

TASK: [Create webapp symlink for easy access] ***
changed: [ec2-54-234-139-151.compute-1.amazonaws.

NOTIFIED: [restart apache] **********************
changed: [ec2-54-234-139-151.compute-1.amazonaws.

PLAY RECAP ********************
ec2-54-234-139-151.compute-1.amazonaws.com : ok=1
```

Playbook: Connect Web-VM & DB-VM

Run:

```
% env \
  ANSIBLE
  ansible
  config-
```

Log: vie

Playboo

Script: v

```
% env ANSIBLE_HOSTS=./ec2.py ansible-playbook config-ec2-conne

PLAY [security_group_ec2-webservers;security_group_ec2-dbserve

TASK: [Collect EC2 host information] **********************
ok: [ec2-54-234-139-151.compute-1.amazonaws.com]
ok: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Prepare connection-script in /tmp/do-connect-vms.sh] **
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

TASK: [Run connection-script] *********************
changed: [ec2-54-234-139-151.compute-1.amazonaws.com]
changed: [ec2-54-235-44-118.compute-1.amazonaws.com]

PLAY RECAP ********************
ec2-54-234-139-151.compute-1.amazonaws.com : ok=3    changed=2
ec2-54-235-44-118.compute-1.amazonaws.com : ok=3    changed=2
```

Lessons learned

1. NetBSD goes well into the Cloud
2. ... with some Amazon glitches at times
3. Ansible is useful with NetBSD & EC2
4. ... and is somewhat in motion
5. Using Ansible with or without Amazon EC2 looks useful:
   - reliable
   - repeatable
   - human readable
   - extensible
   - free, with commercial support

Future work

Steps:

1. Move to >1 DB/webserver - loadbalancing
   (And while there, go from "push" to "pull"?)
2. Document!

Summary

- Introducing Ansible
- NetBSD preparation for Ansible
- Milestone 1: Ansible with DB+Web on one local VM
- Milestone 2: Basic Ansible setup for Amazon EC2
  ... and what is this Amazon EC2 cloud, anyways?!
- Milestone 3: One EC2 instance with both DB+Web
- Milestone 4: Ansible+EC2 with different instances for DB+Web
- Lessons learned
- Future work

Thanks!

Questions?

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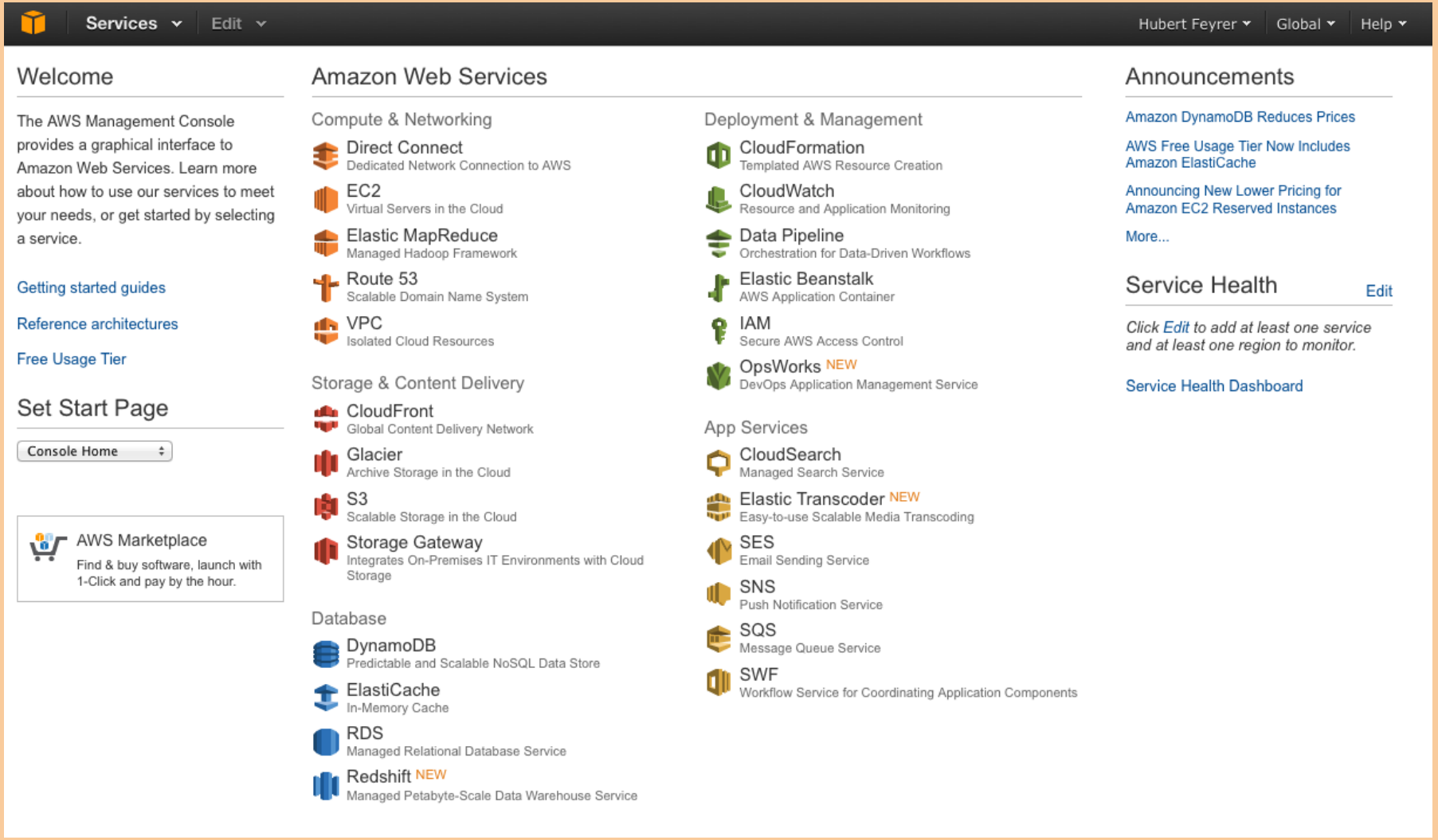
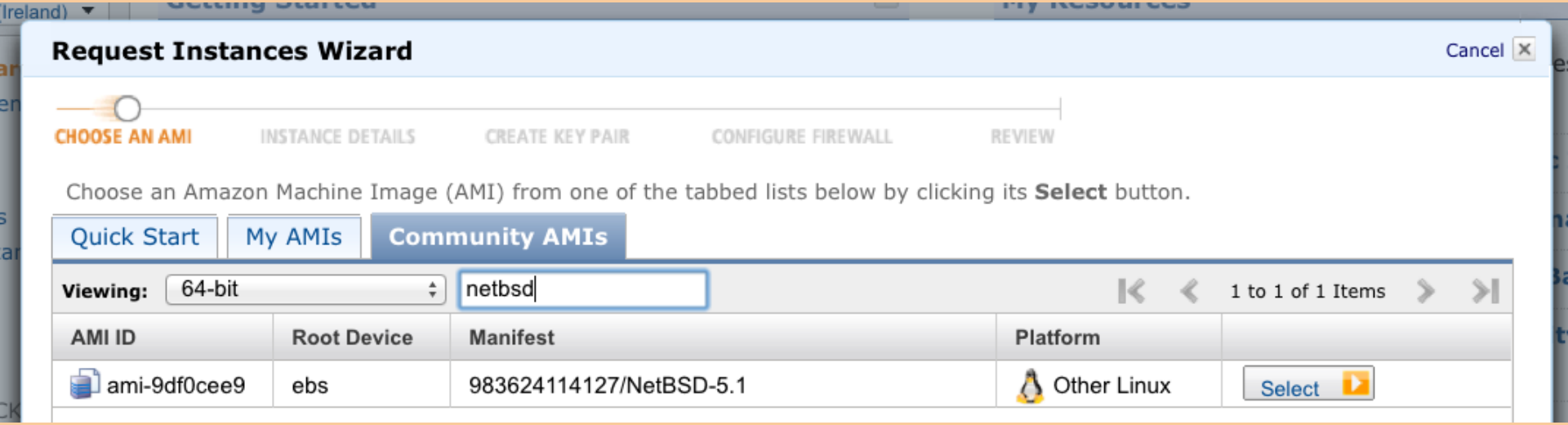
Backup

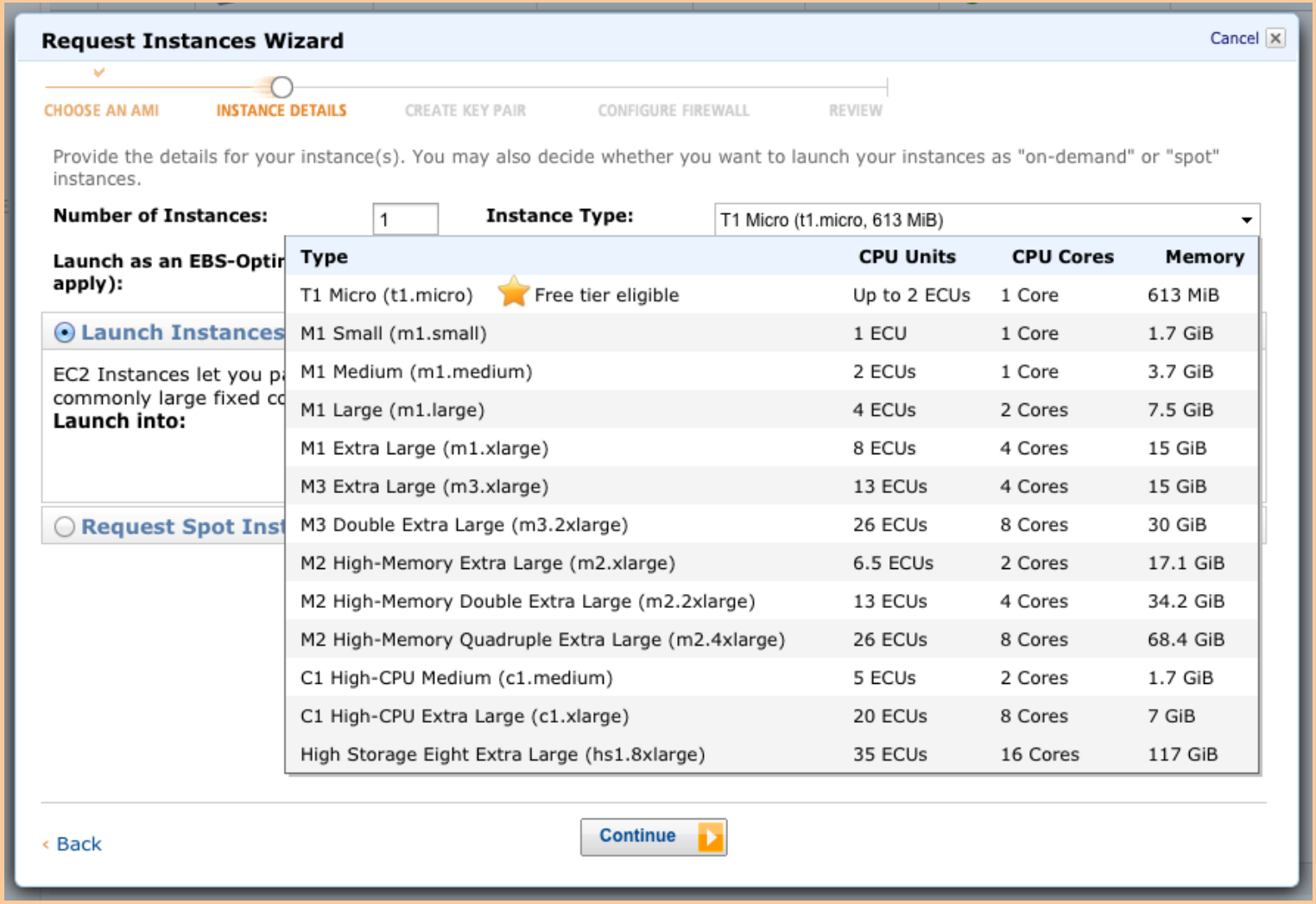
AWS - Overview



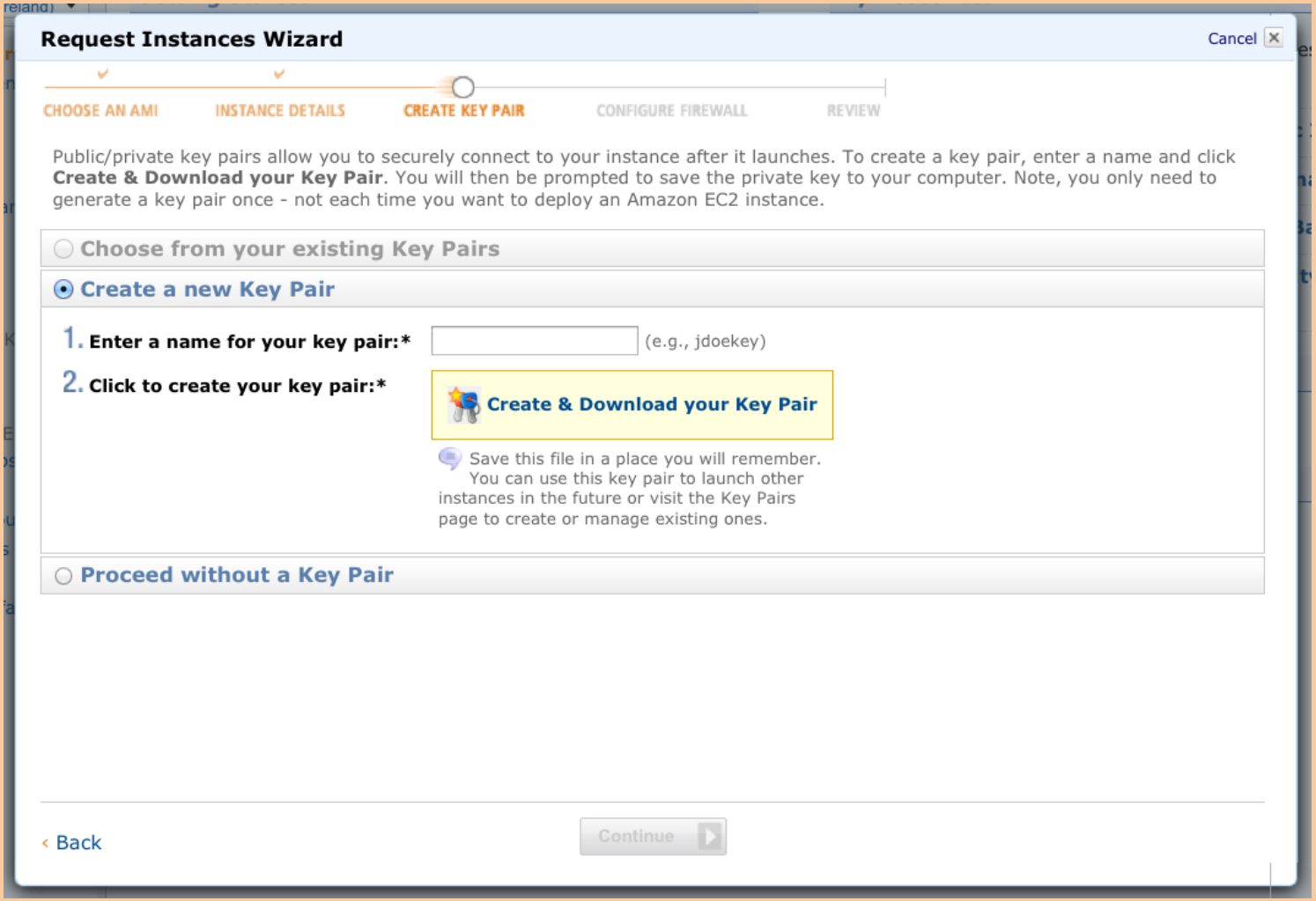
AWS - Community AMI for NetBSD



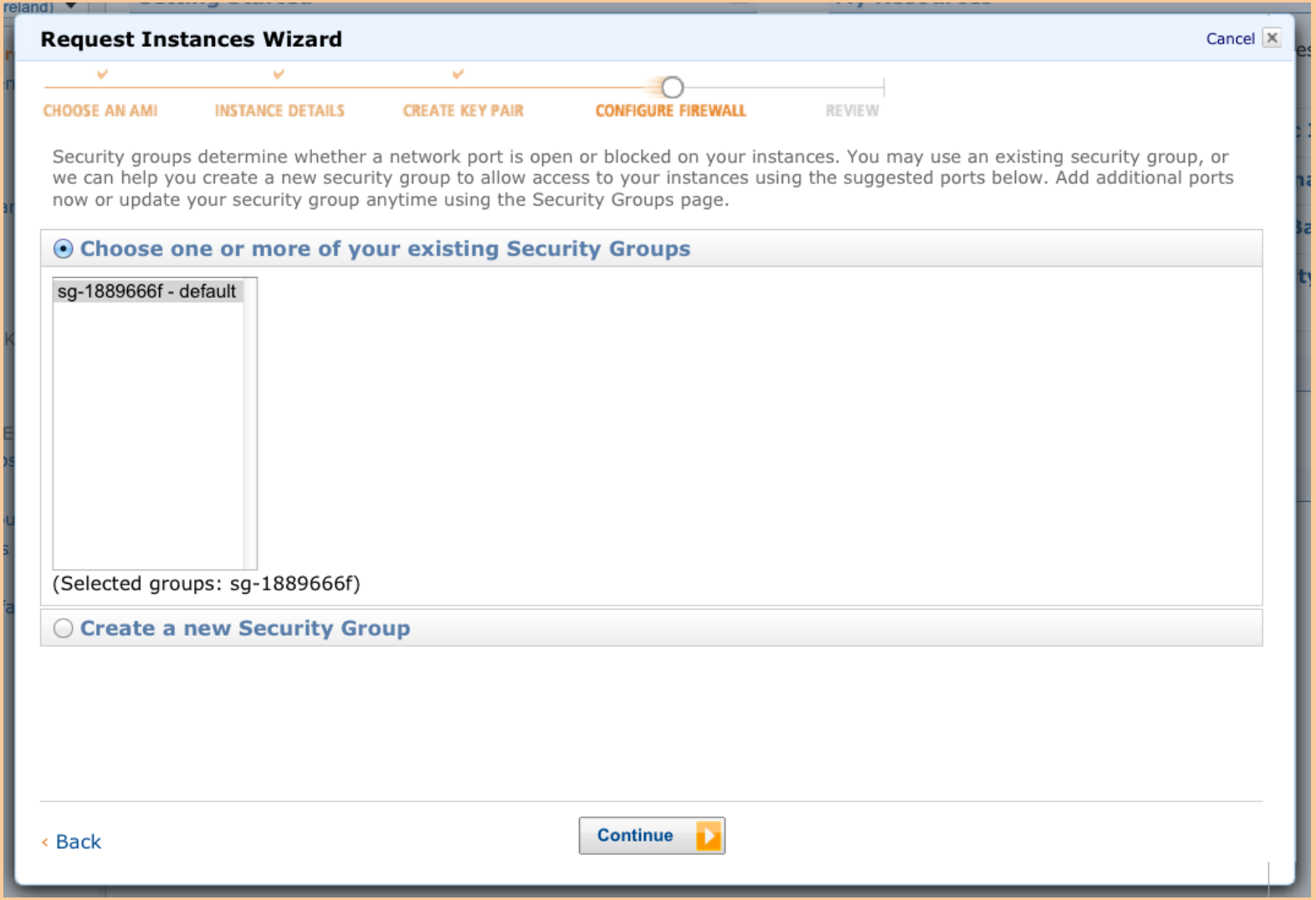
AWS - Select CPU & Memory



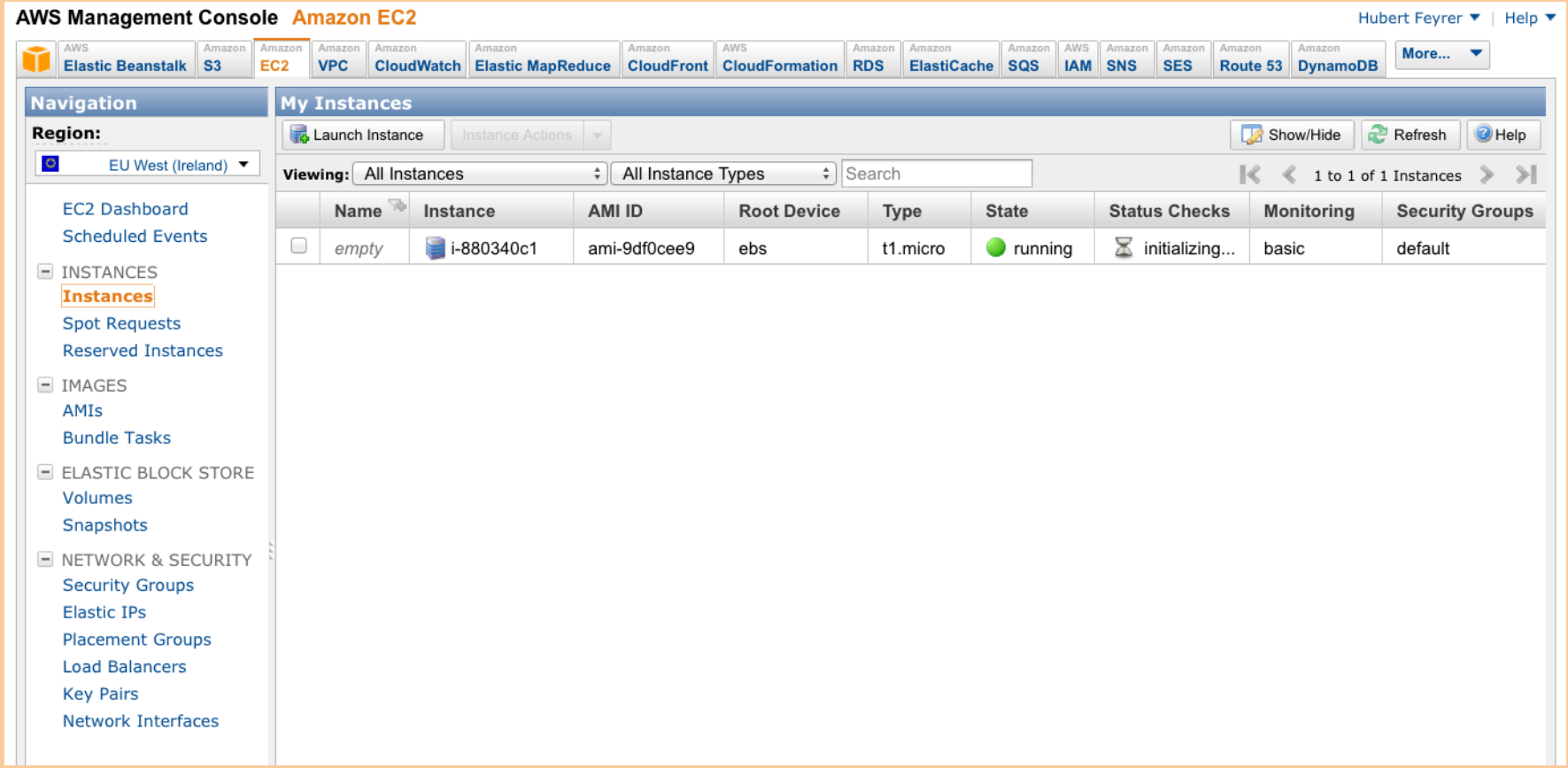
AWS - Create SSH key



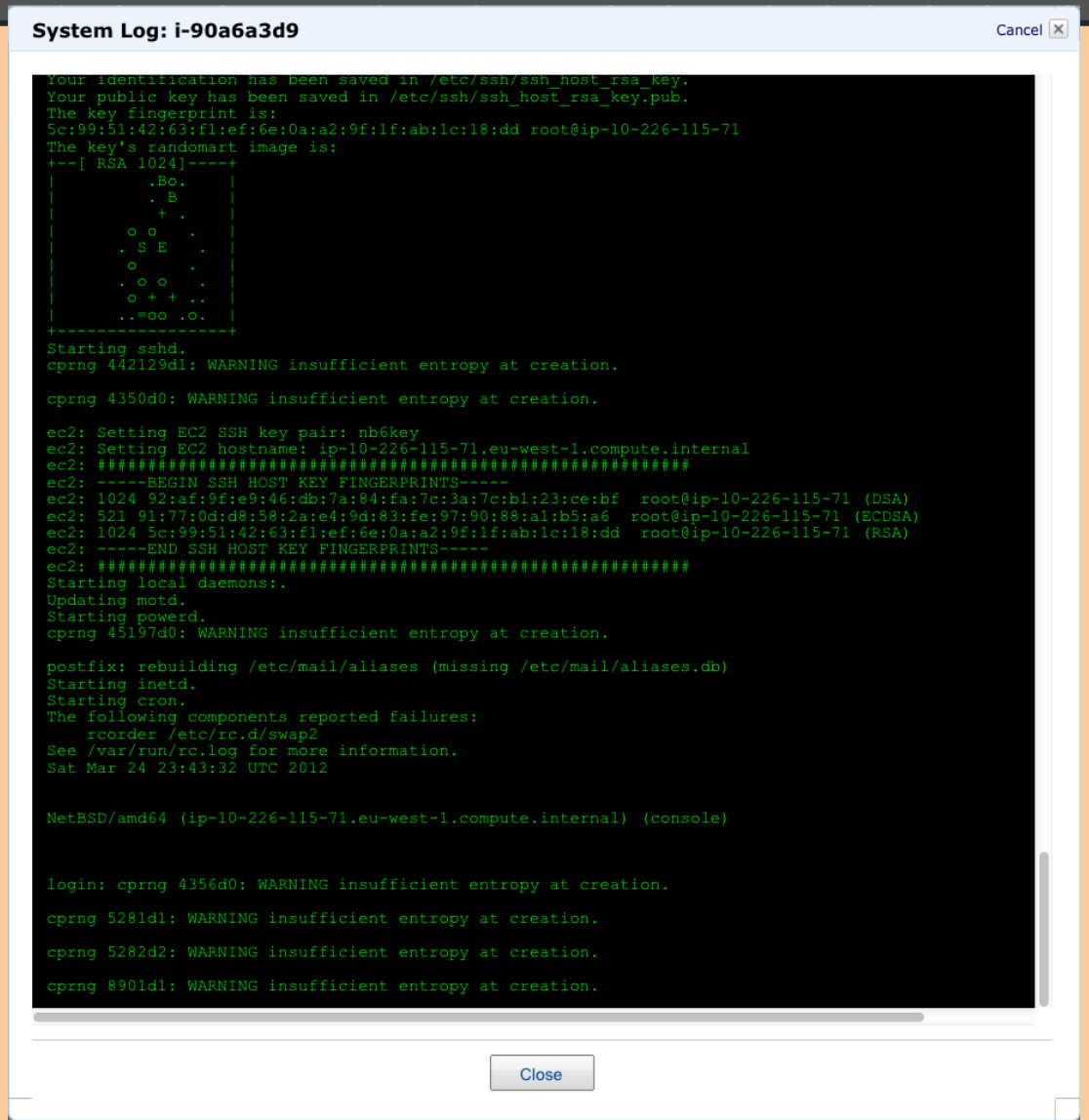
AWS - Firewall rules



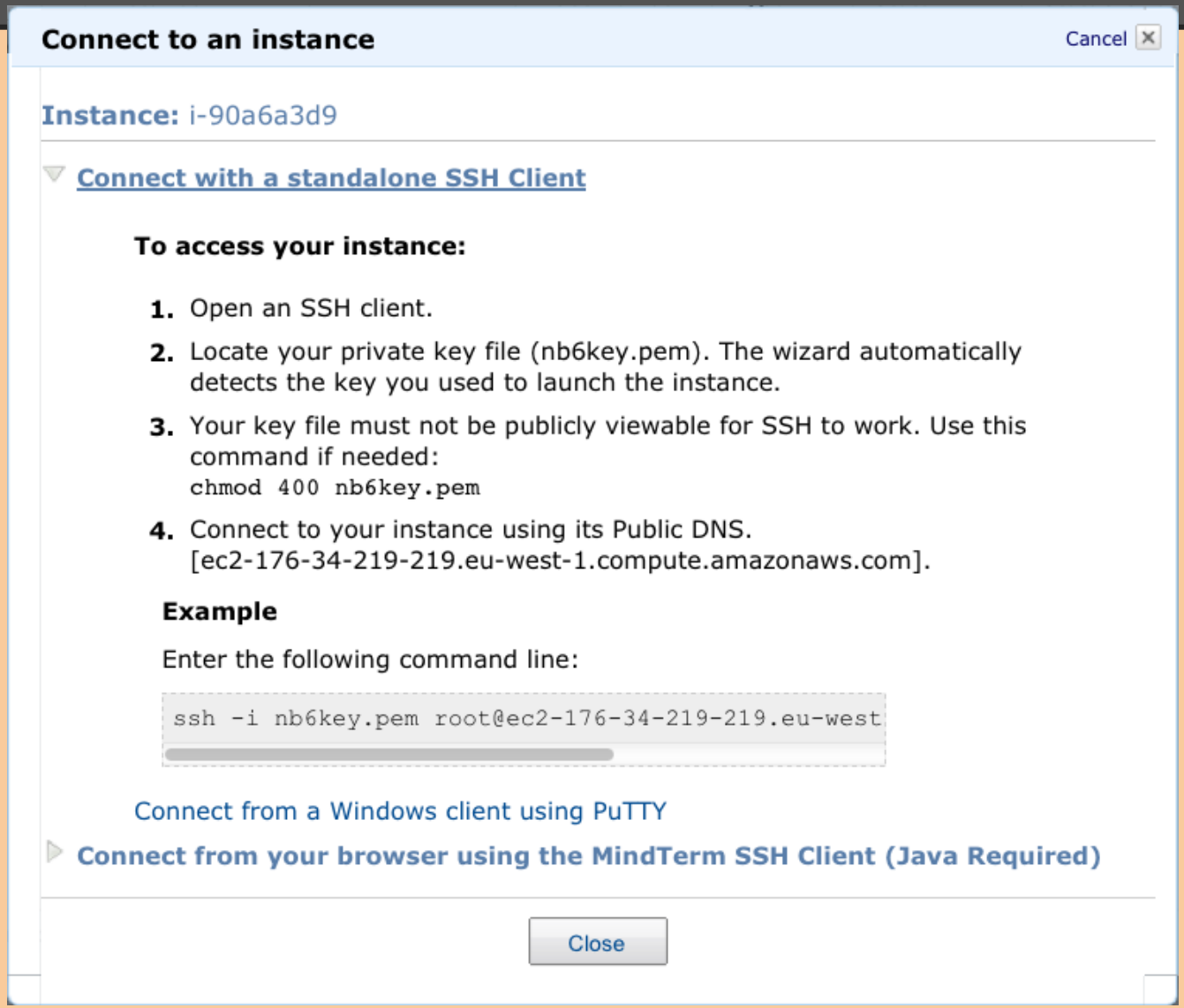
AWS - Instance running



AWS - Xen console



AWS - SSH login - help



AWS - SSH login