Small Python Tools for Software Release Engineering

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Self Introduction

- 學C++起家
- 偶爾慣C
- 結果工作都用Java
- 常常偷懶只寫shell script
- Python??

講一朵開發雲的故事

Release Engineering

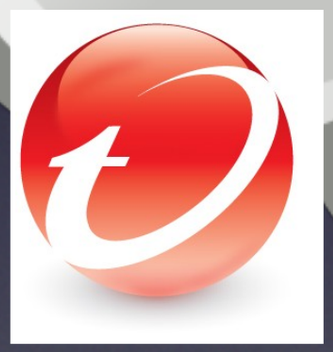
- “a sub-discipline in software engineering concerned with the compilation, assembly, and delivery of source code into finished products or other software components.”
  -- Wikipedia
- 對我來說
  - 把code寫好放到production上跑

Version Control

寫code

出build

測試



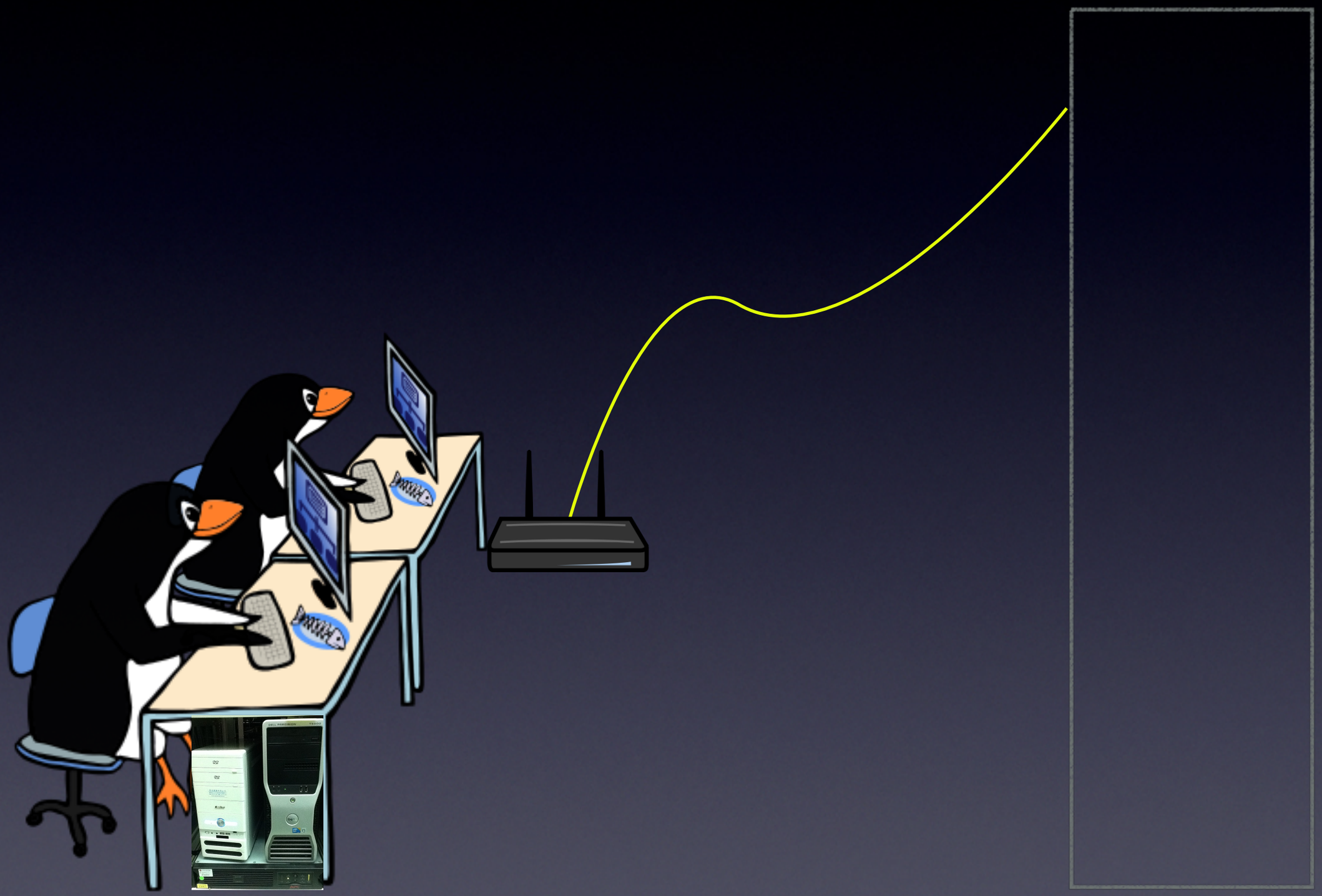
米國

慢。。。。

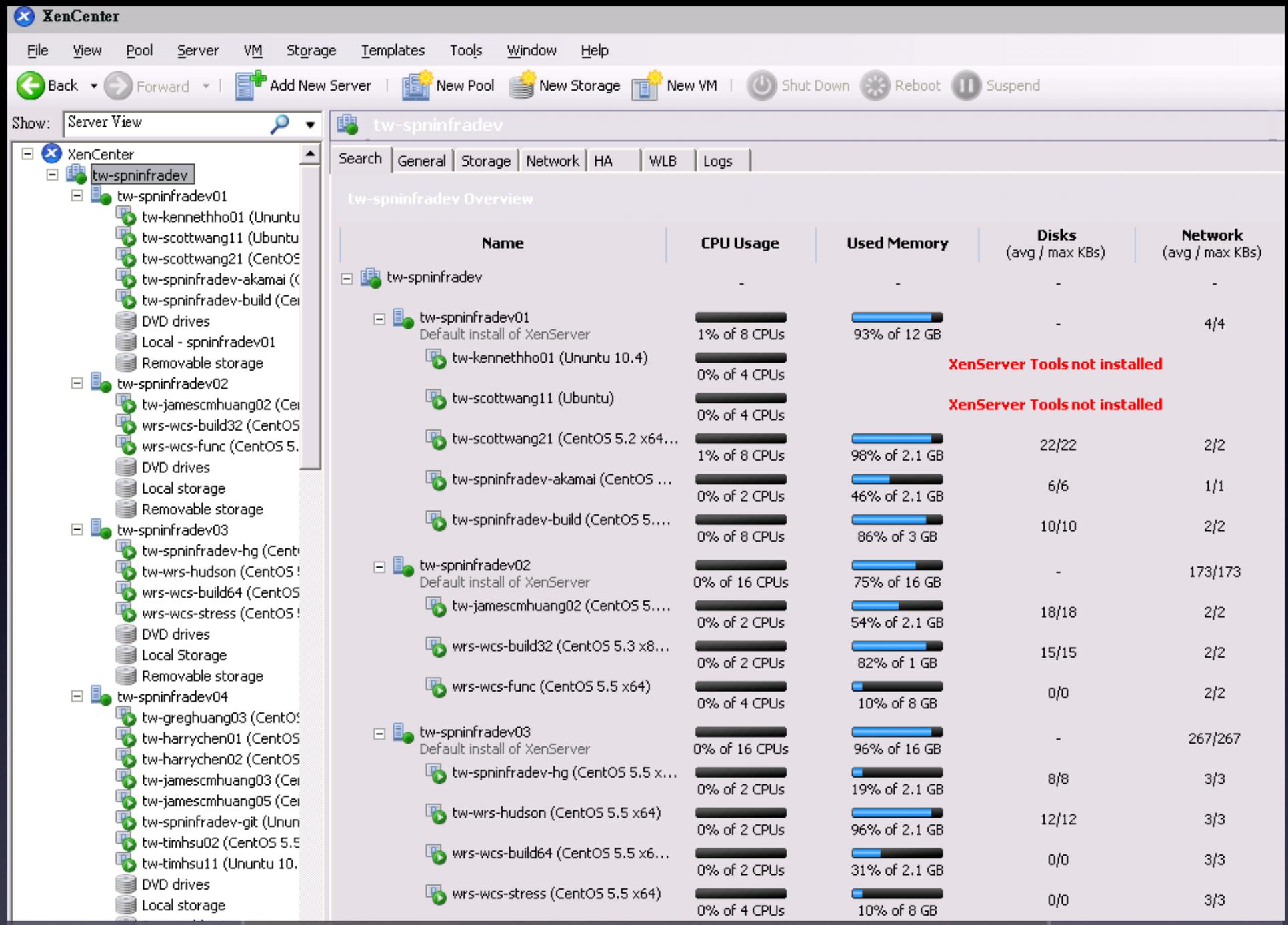
台灣

$$$$$

http://aws.amazon.com/



Local LAB
installed with XenServer


XenCenter
File View Pool Server VM Storage Templates Tools Window Help
Back Forward Add New Server New Pool New Storage New VM Shut Down Reboot Suspend
Show: Server View
XenCenter
tw-spninfradev
tw-spninfradev01
tw-kennethho01 (Ununtu
tw-scottwang11 (Ubuntu
tw-scottwang21 (CentOS
tw-spninfradev-akamai ((
tw-spninfradev-build (Cer
DVD drives
Local - spninfradev01
Removable storage
tw-spninfradev02
tw-jamescmhuang02 (Cer
wrs-wcs-build32 (CentOS
wrs-wcs-func (CentOS 5.
DVD drives
Local storage
Removable storage
tw-spninfradev03
tw-spninfradev-hg (Cent
tw-wrs-hudson (CentOS !
wrs-wcs-build64 (CentOS
wrs-wcs-stress (CentOS !
DVD drives
Local Storage
Removable storage
tw-spninfradev04
tw-greghuang03 (CentOS
tw-harrychen01 (CentOS
tw-harrychen02 (CentOS
tw-jamescmhuang03 (Cer
tw-jamescmhuang05 (Cer
tw-spninfradev-git (Ununt
tw-timhsu02 (CentOS 5.5
tw-timhsu11 (Ununtu 10.
DVD drives
Local storage
tw-spninfradev
Search General Storage Network HA WLB Logs
tw-spninfradev Overview
Name
CPU Usage
Used Memory
Disks (avg / max KBs)
Network (avg / max KBs)
tw-spninfradev - - - -
tw-spninfradev01 Default install of XenServer 1% of 8 CPUs 93% of 12 GB - 4/4
tw-kennethho01 (Ununtu 10.4) 0% of 4 CPUs XenServer Tools not installed
tw-scottwang11 (Ubuntu) 0% of 4 CPUs XenServer Tools not installed
tw-scottwang21 (CentOS 5.2 x64... 1% of 8 CPUs 98% of 2.1 GB 22/22 2/2
tw-spninfradev-akamai (CentOS ... 0% of 2 CPUs 46% of 2.1 GB 6/6 1/1
tw-spninfradev-build (CentOS 5.... 0% of 8 CPUs 86% of 3 GB 10/10 2/2
tw-spninfradev02 Default install of XenServer 0% of 16 CPUs 75% of 16 GB - 173/173
tw-jamescmhuang02 (CentOS 5.... 0% of 2 CPUs 54% of 2.1 GB 18/18 2/2
wrs-wcs-build32 (CentOS 5.3 x8... 0% of 2 CPUs 82% of 1 GB 15/15 2/2
wrs-wcs-func (CentOS 5.5 x64) 0% of 4 CPUs 10% of 8 GB 0/0 2/2
tw-spninfradev03 Default install of XenServer 0% of 16 CPUs 96% of 16 GB - 267/267
tw-spninfradev-hg (CentOS 5.5 x... 0% of 2 CPUs 19% of 2.1 GB 8/8 3/3
tw-wrs-hudson (CentOS 5.5 x64) 0% of 2 CPUs 96% of 2.1 GB 12/12 3/3
wrs-wcs-build64 (CentOS 5.5 x6... 0% of 2 CPUs 31% of 2.1 GB 0/0 3/3
wrs-wcs-stress (CentOS 5.5 x64) 0% of 4 CPUs 10% of 8 GB 0/0 3/3

XenCenter

開VM

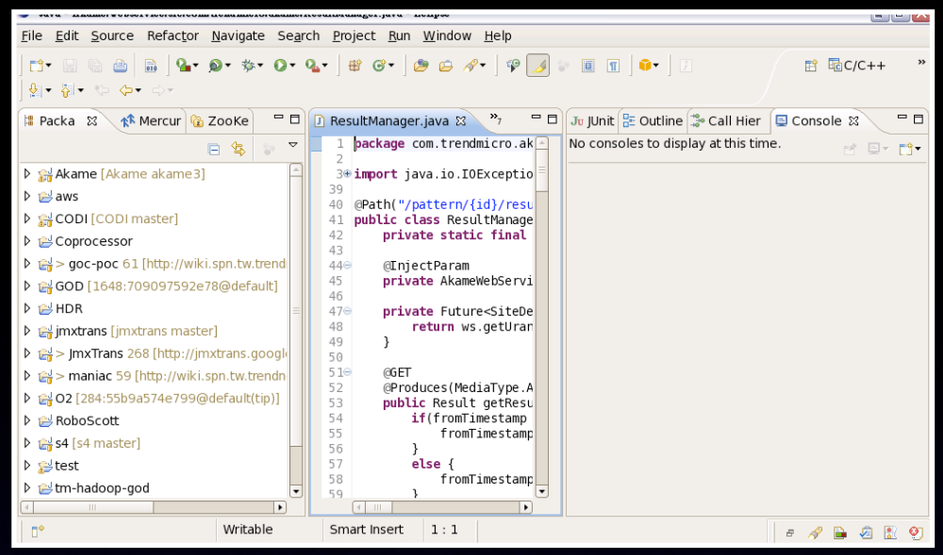
砍VM

關VM

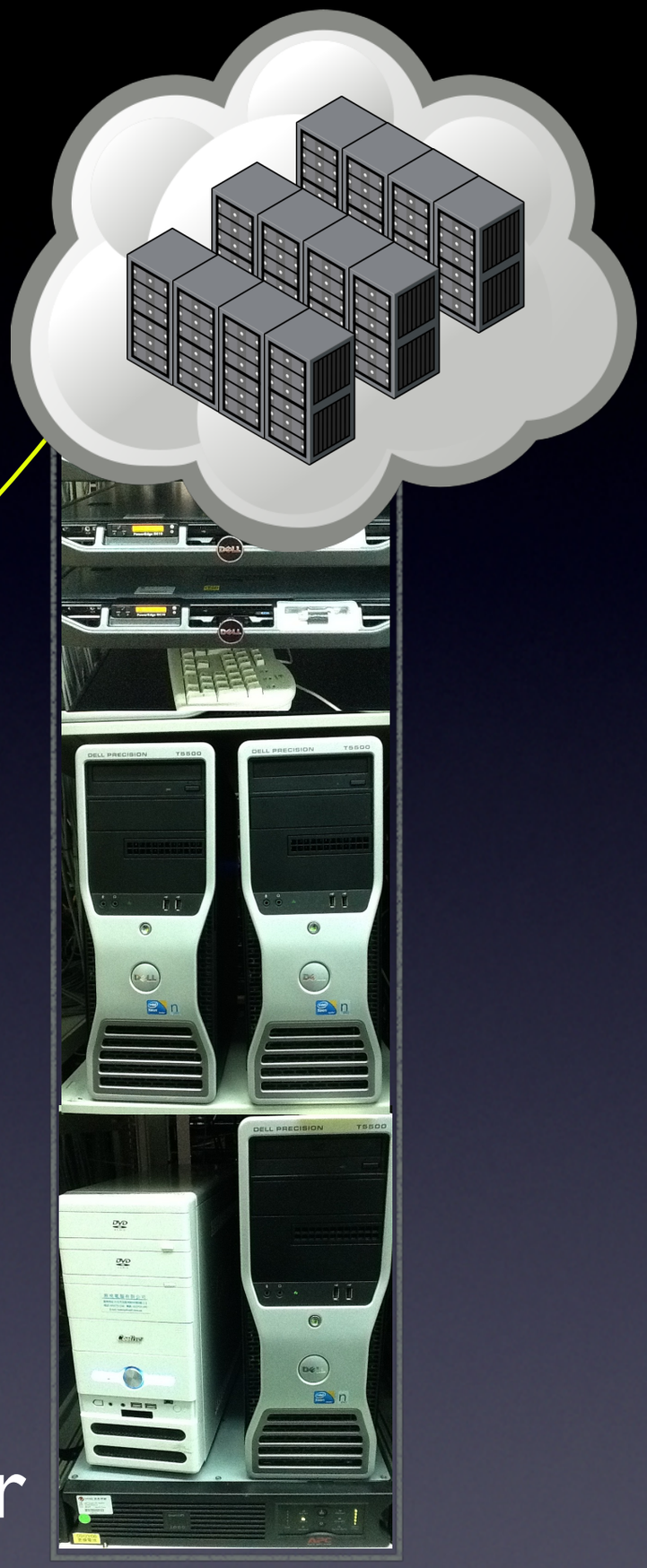
搬VM

複製VM

XenCenter



Yum
Repo



mercurial

--- +++ git

Local LAB
installed with XenServer


Admin
R&D
順利交接

路遙知馬力
日久見人辛

Admin becomes the bottleneck!

外商
小Leader

外商
菜比八

包RPM試試

東西做好了

注意
dependency

尒

找個乾淨機器裝看看

Production VM嗎?

對

找誰要?

Admin

好


Admin
R&D
開會...

我包的RPM
你測一下

等了一天終
於搞定

對

要再開一台VM?


Admin
R&D
教召...


I WANT MY
F**KING VM!!!
我要我的錢

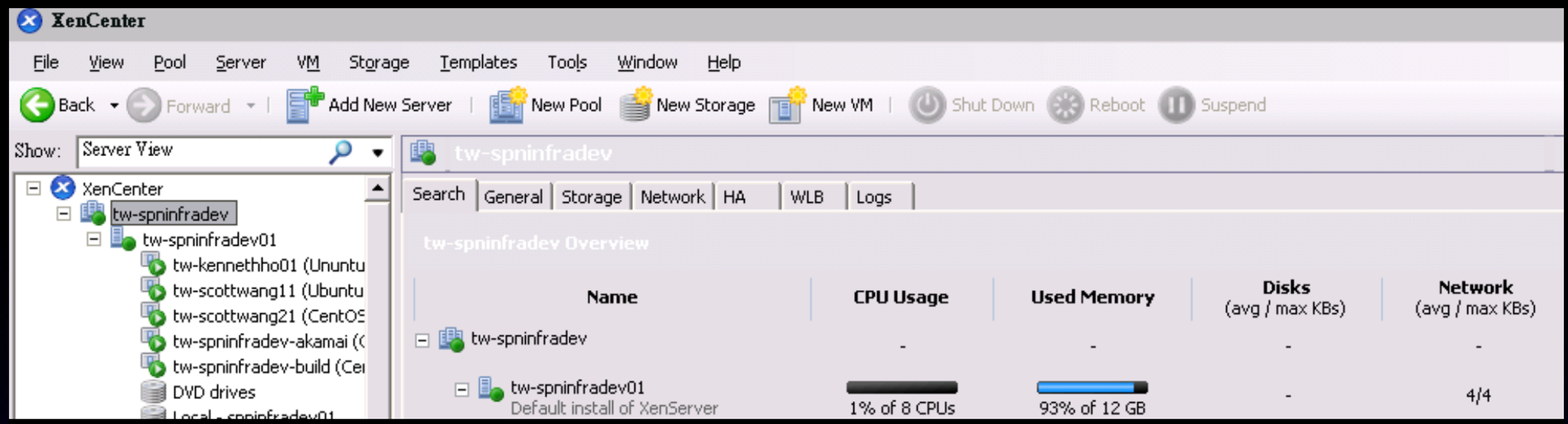
什麼不是雲端運算?

“Cloud Computing” Definition by NIST

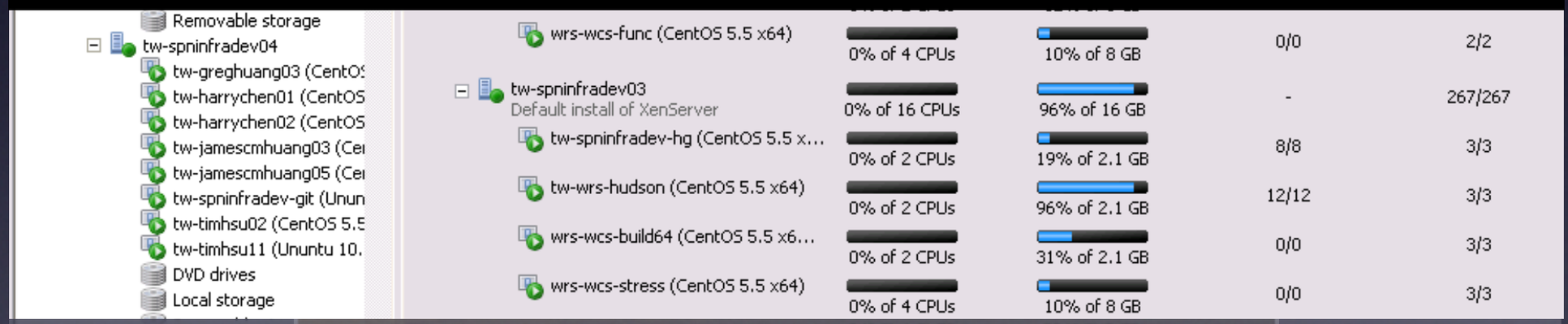
- On-demand self-service
- A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service’s provider.

“Cloud Computing” Definition by NIST

- Rapid elasticity
  - Capabilities can be rapidly and elastically provisioned, in some cases automatically, to scale rapidly outward and inward commensurate with demand.



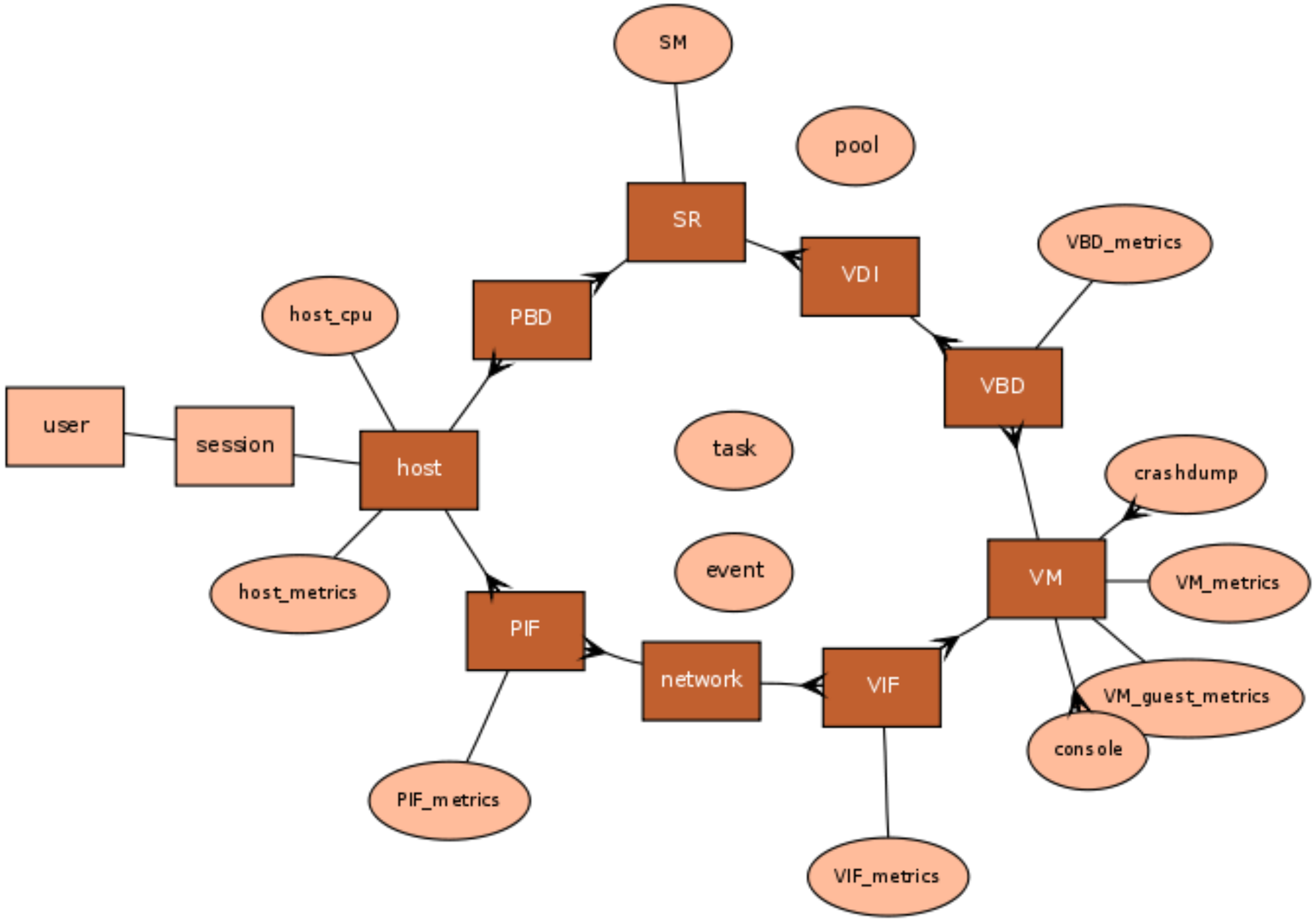
「真男人 / 女人不需要桌面環境！！」



How to automate this?

Xen Management API

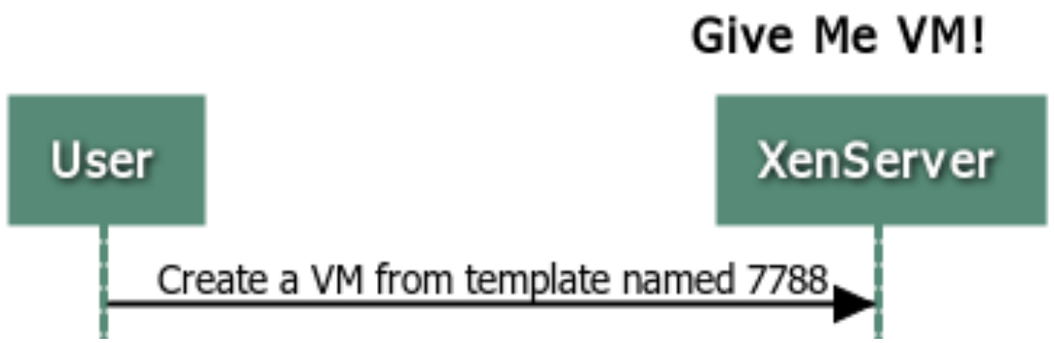
- Java and Python binding
- Using Java binding
  - 要compile，麻煩
- Using Python binding
  - Trial and error in the interpreter first (勝)

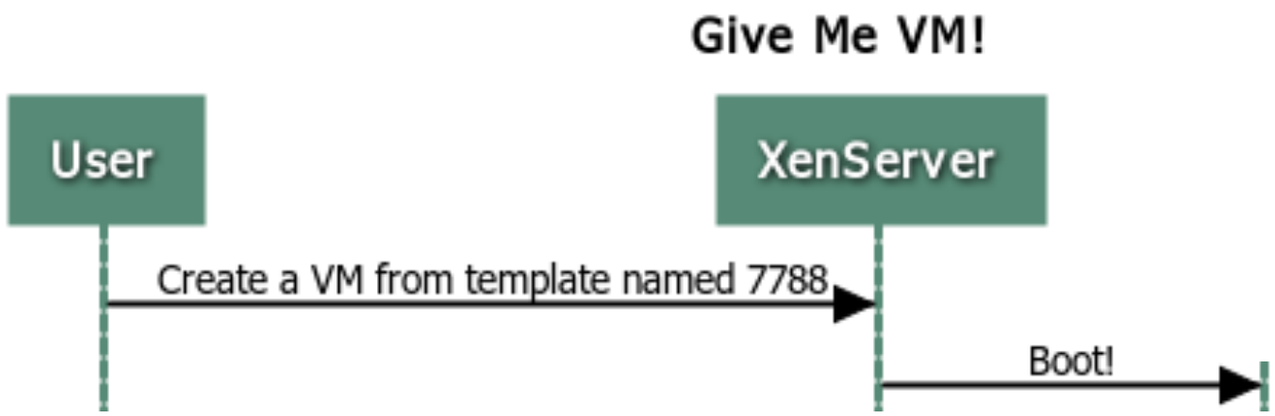


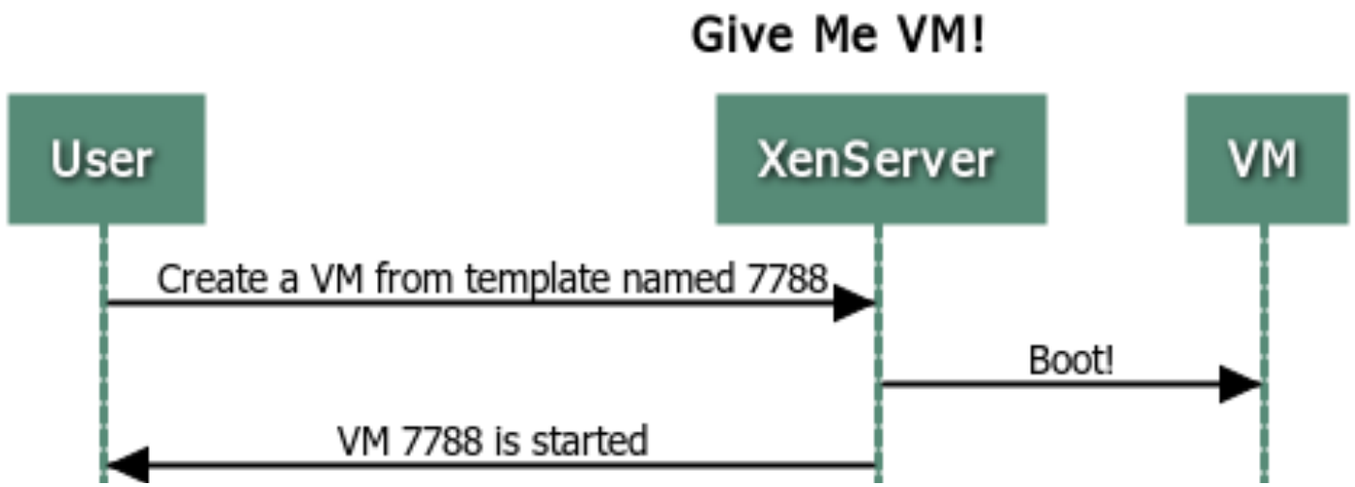
http://docs.vmd.citrix.com/XenServer/6.0.0/1.0/en_gb/api/

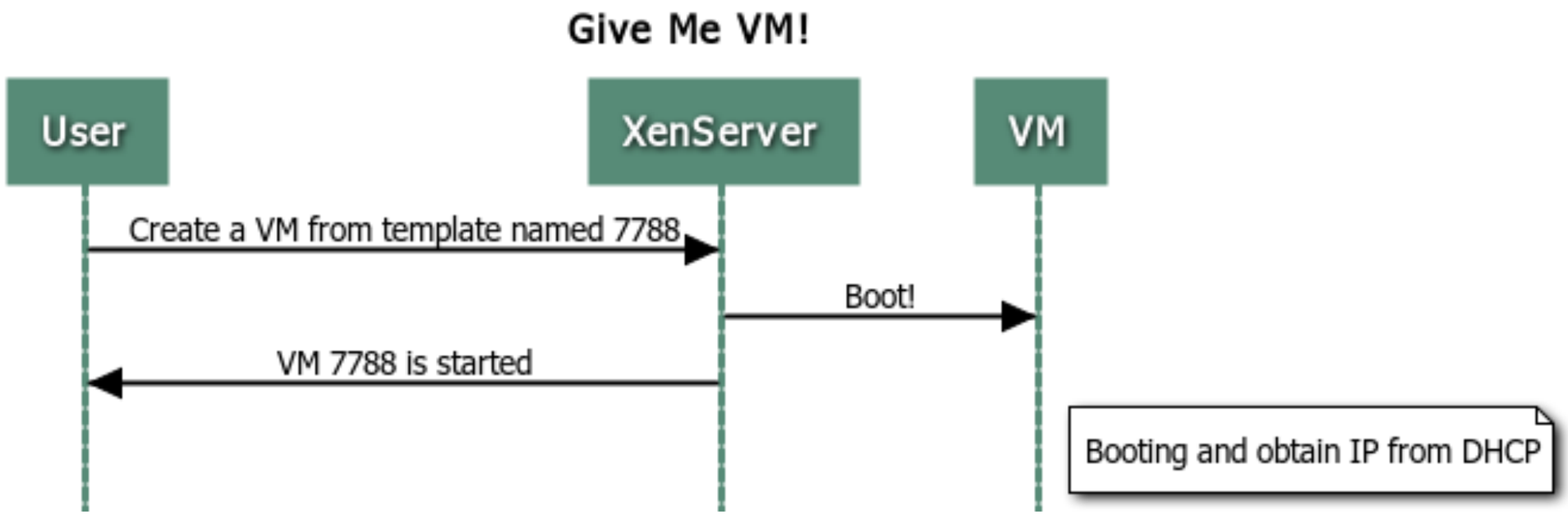
Give Me VM!

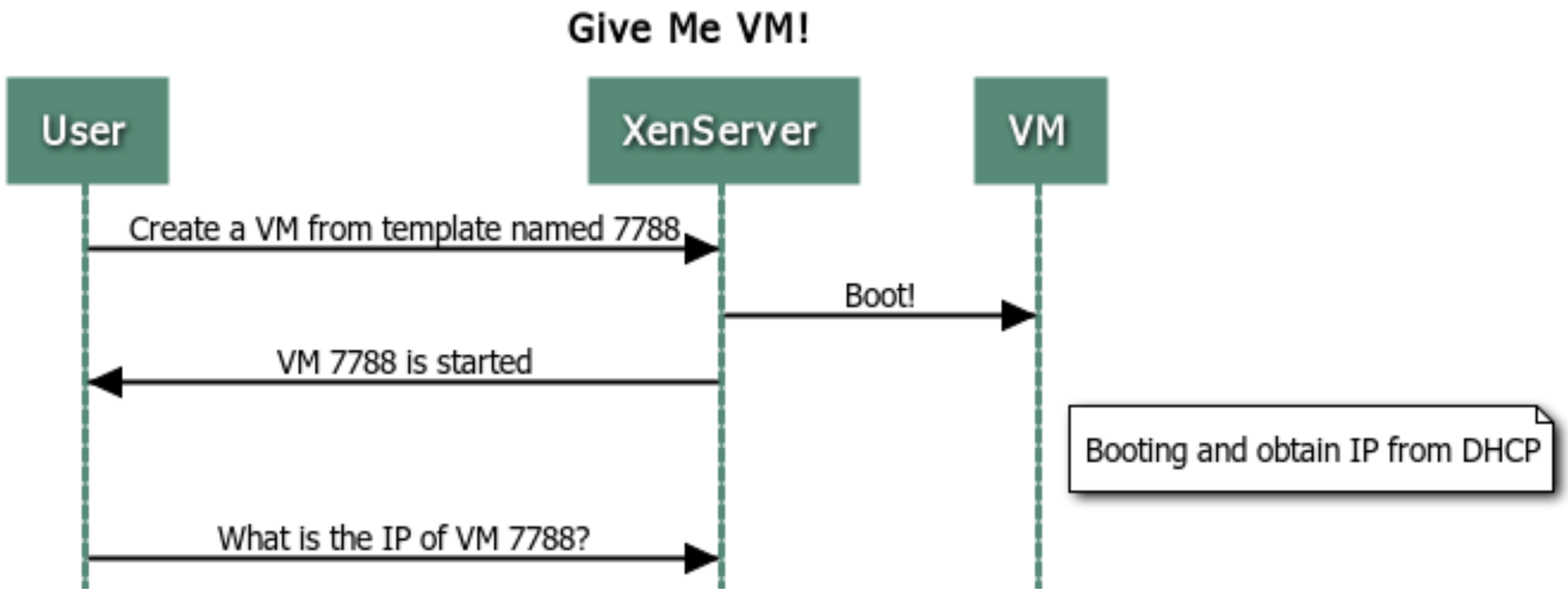
- Objective
  - Create a temporary VM for testing by self service
  - Login into it automatically
  - Destroy it when the testing is finished

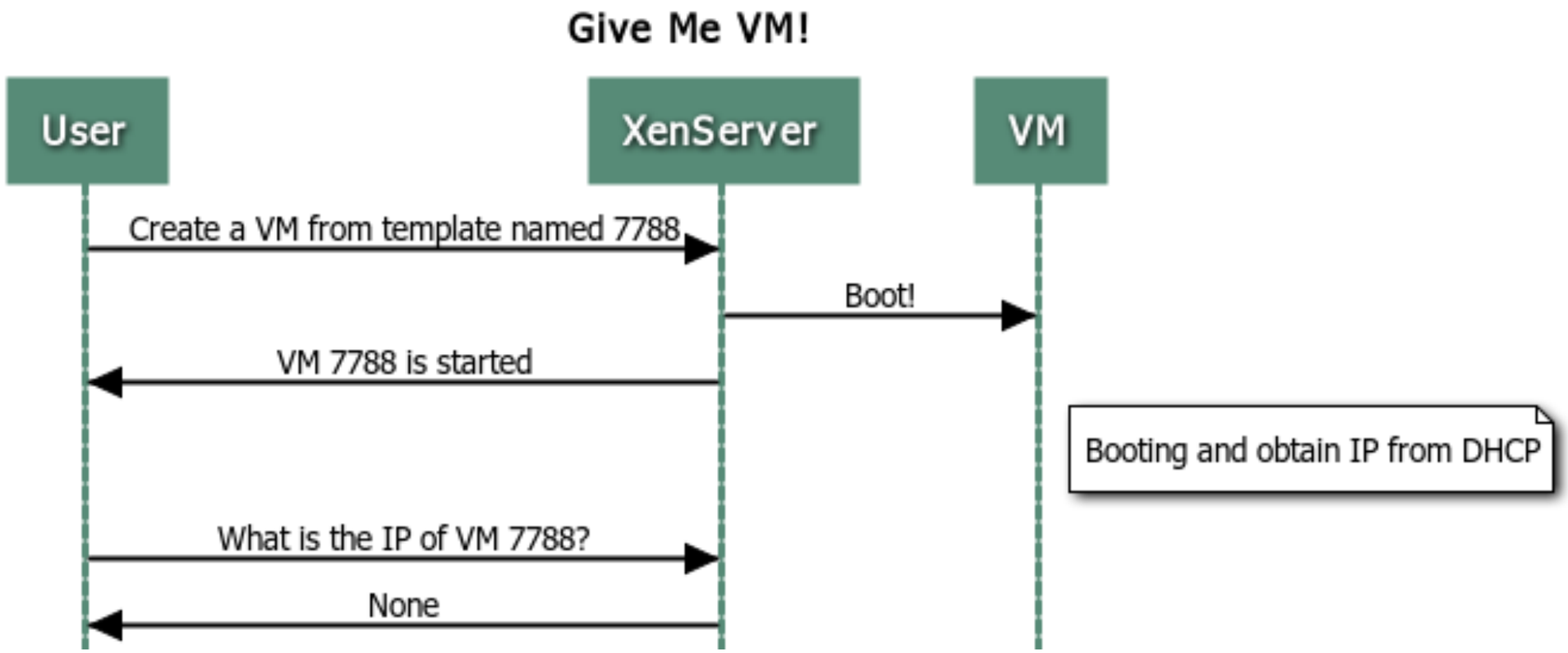


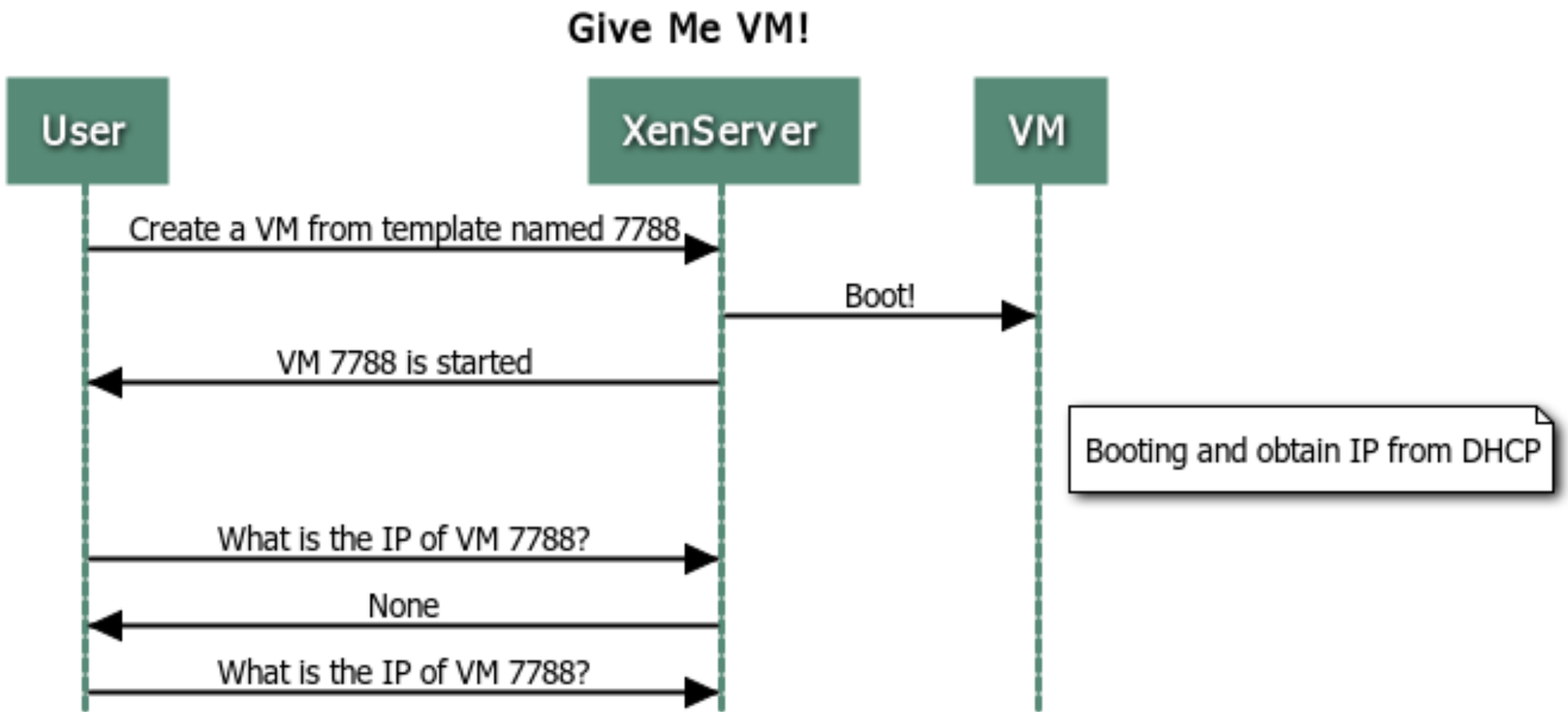


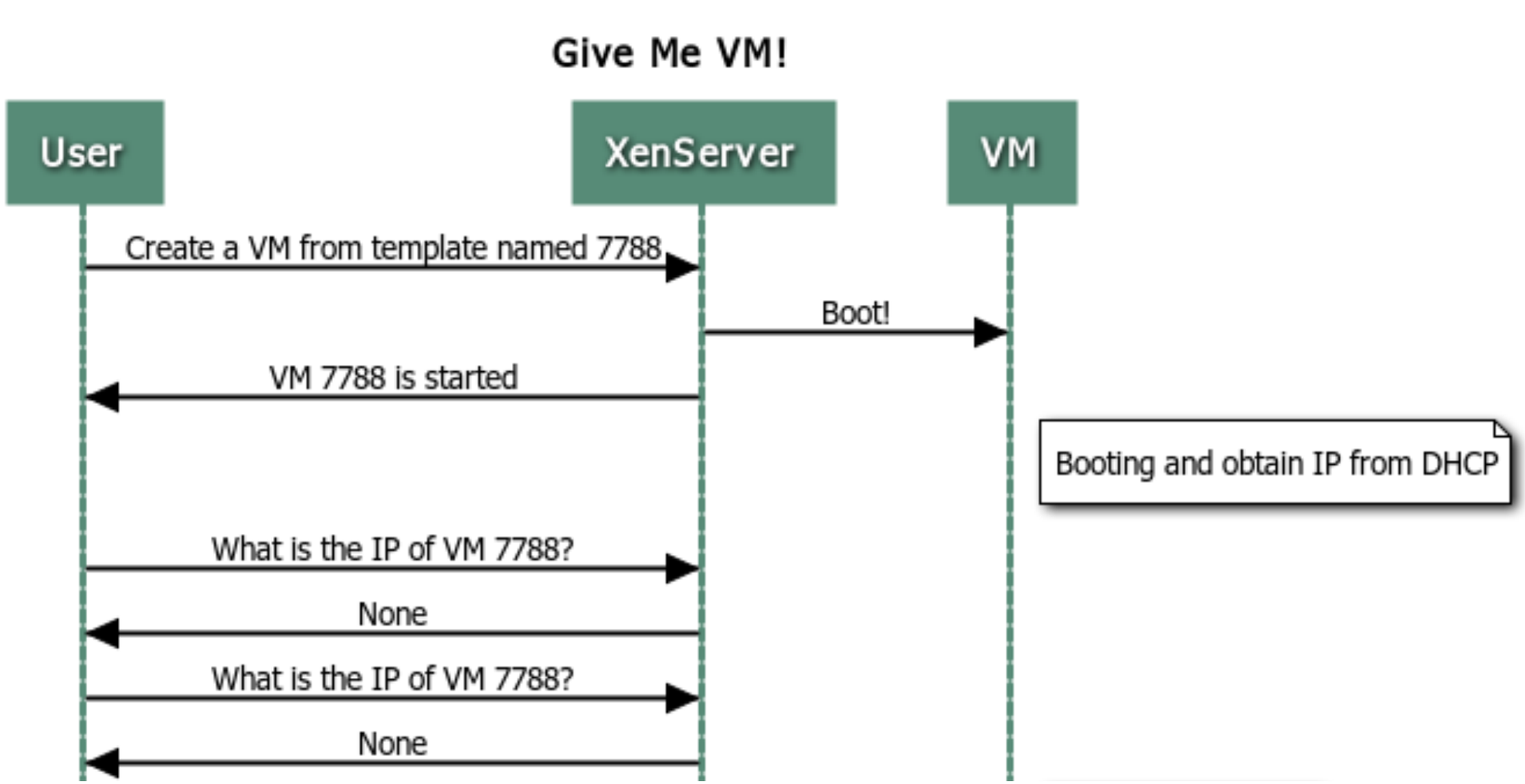


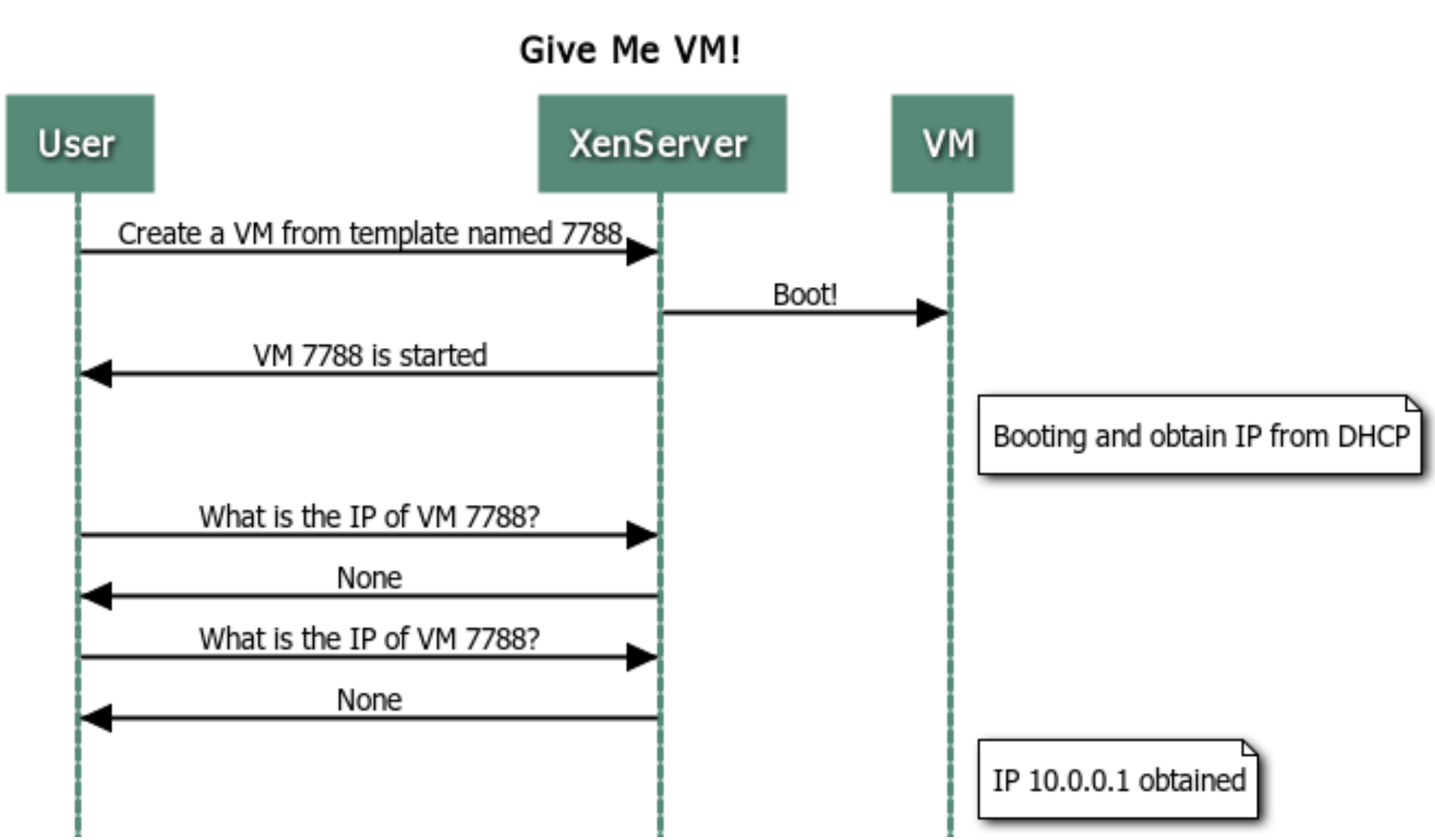


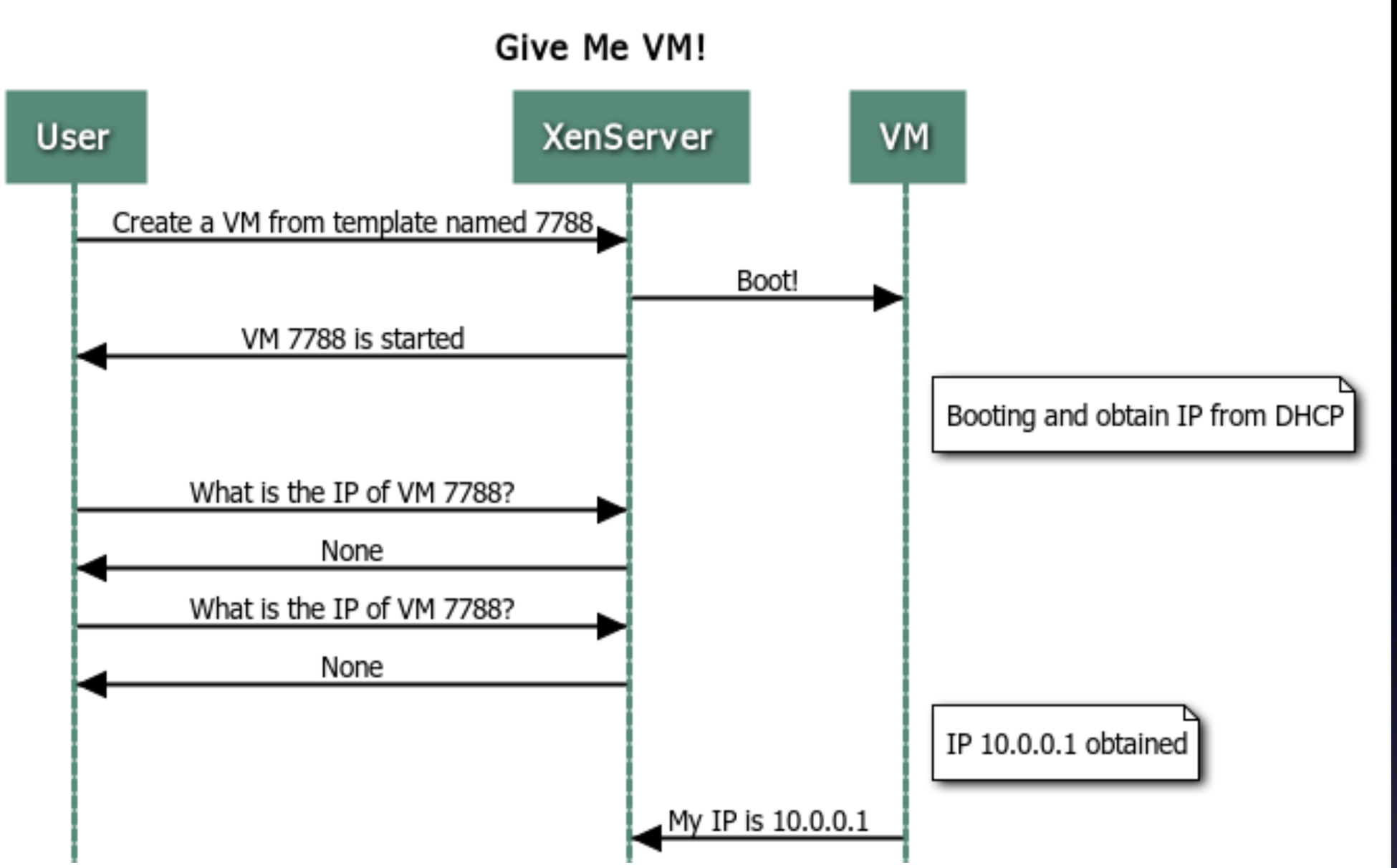


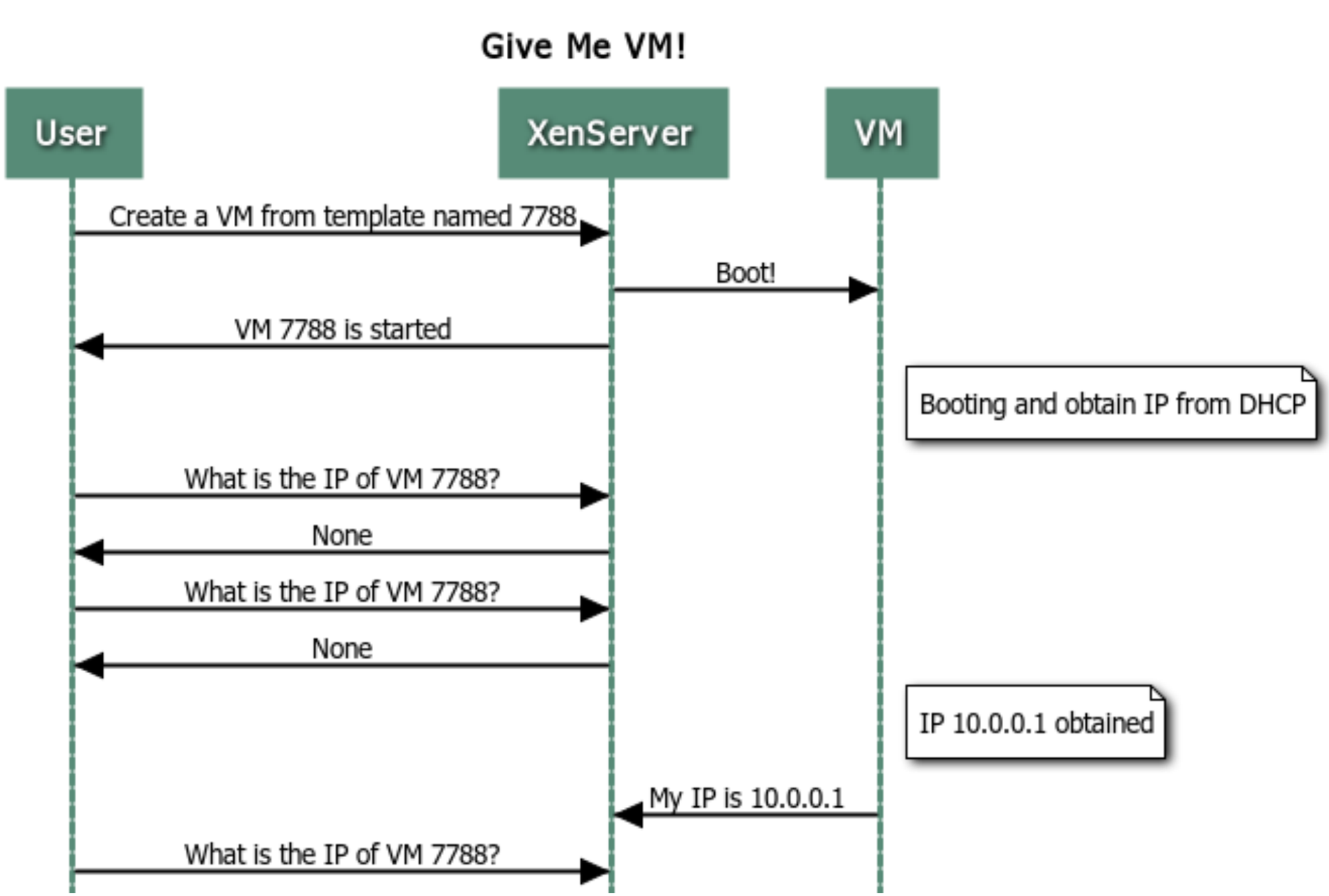


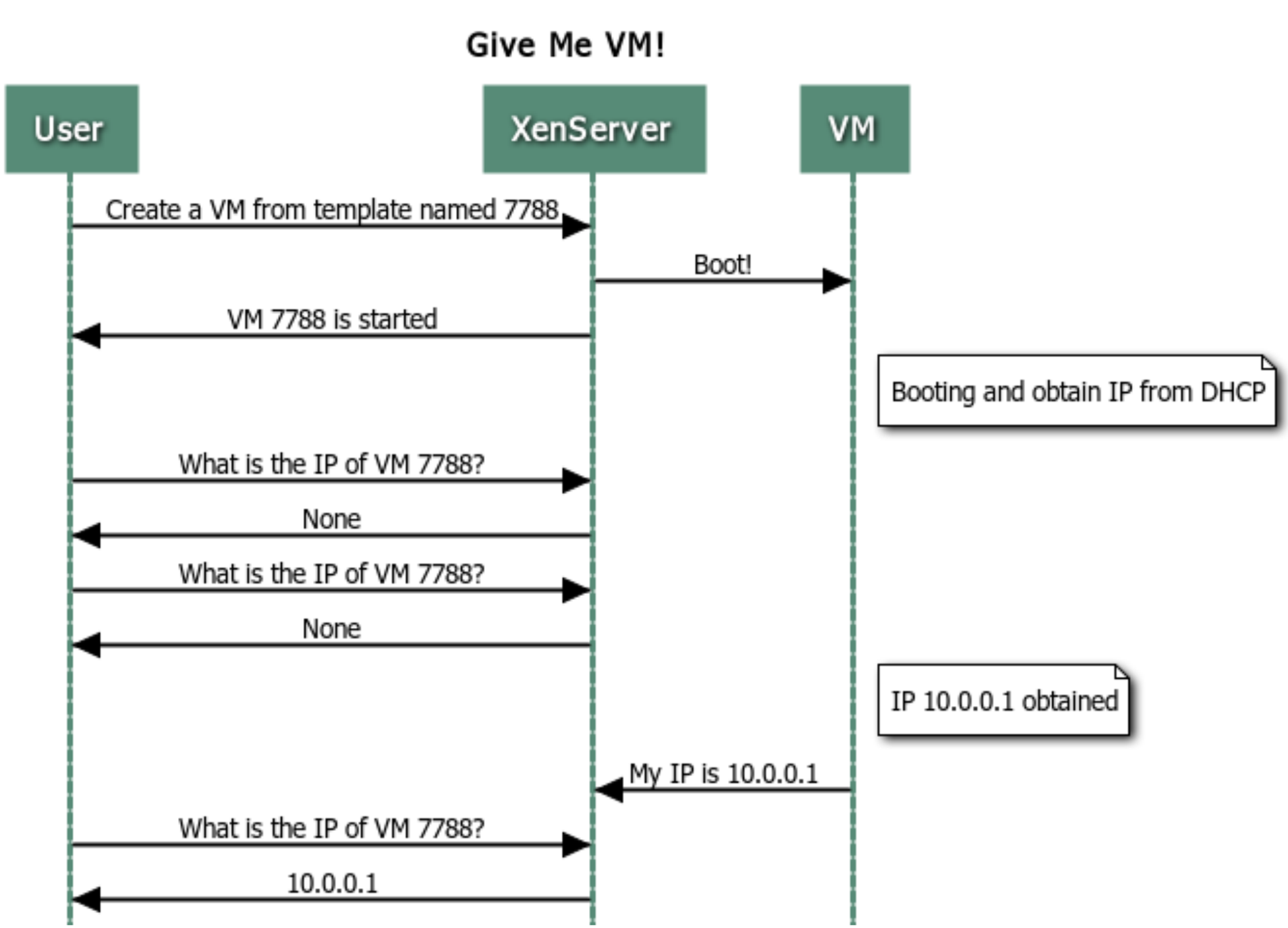


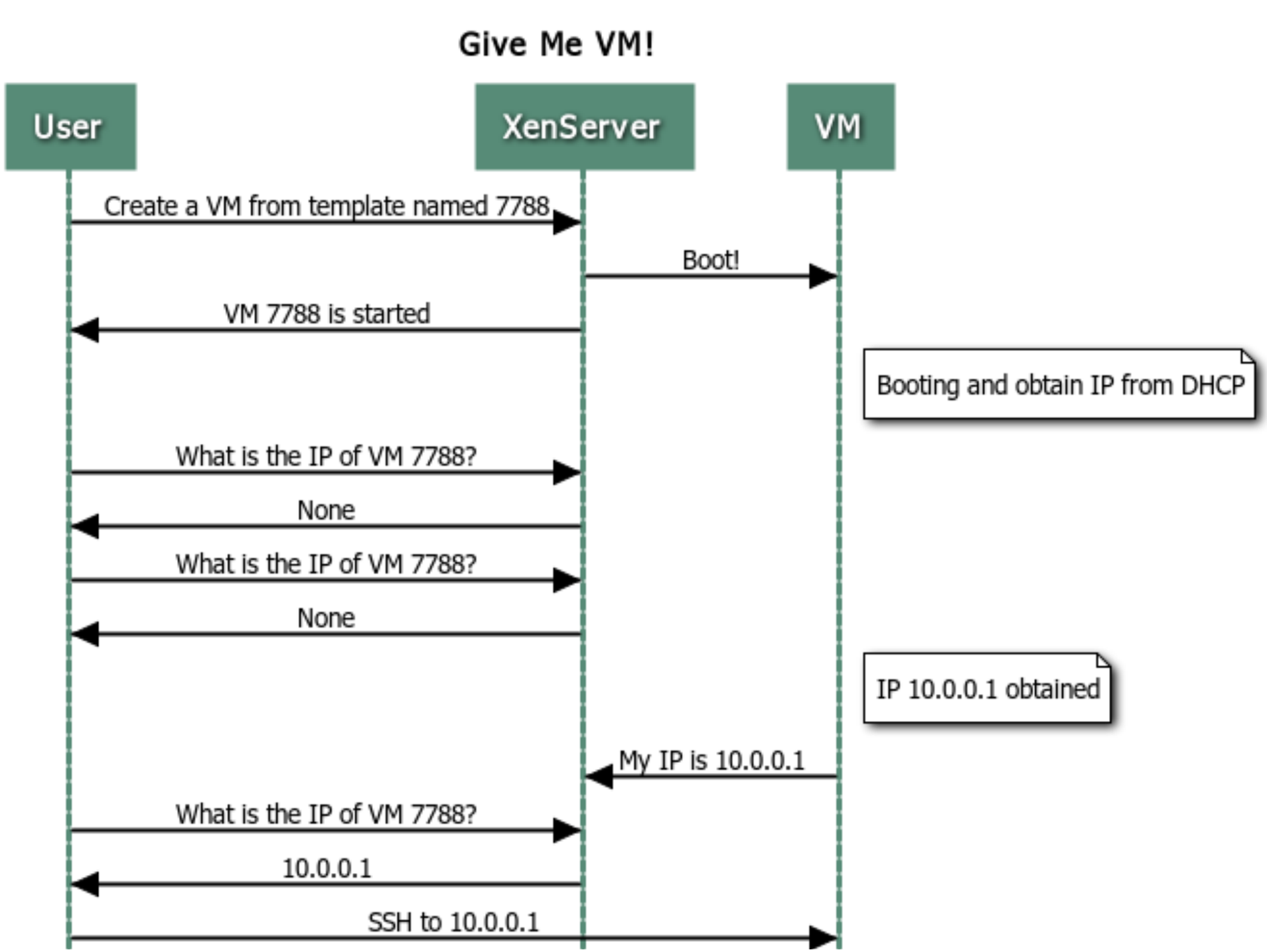


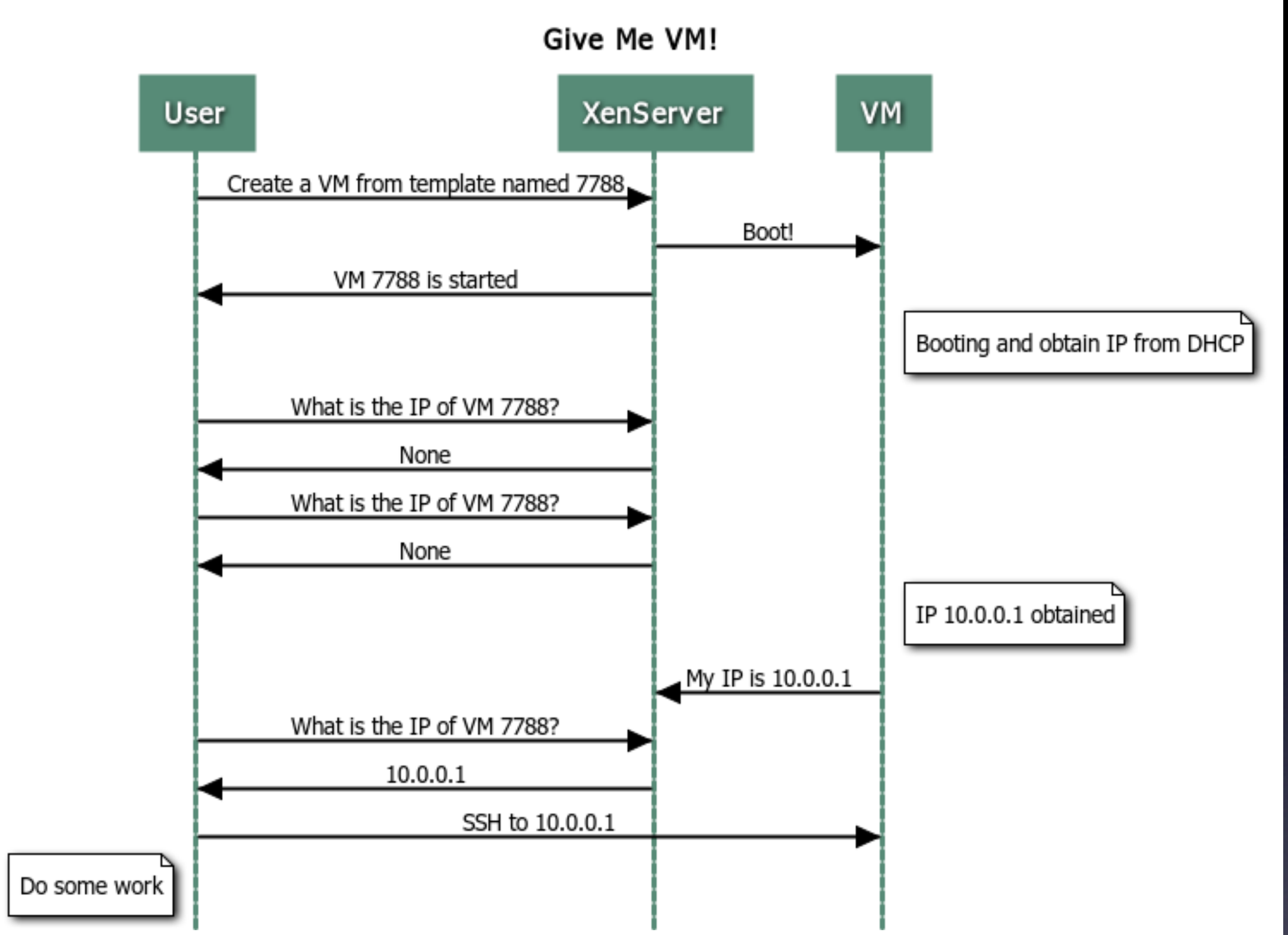


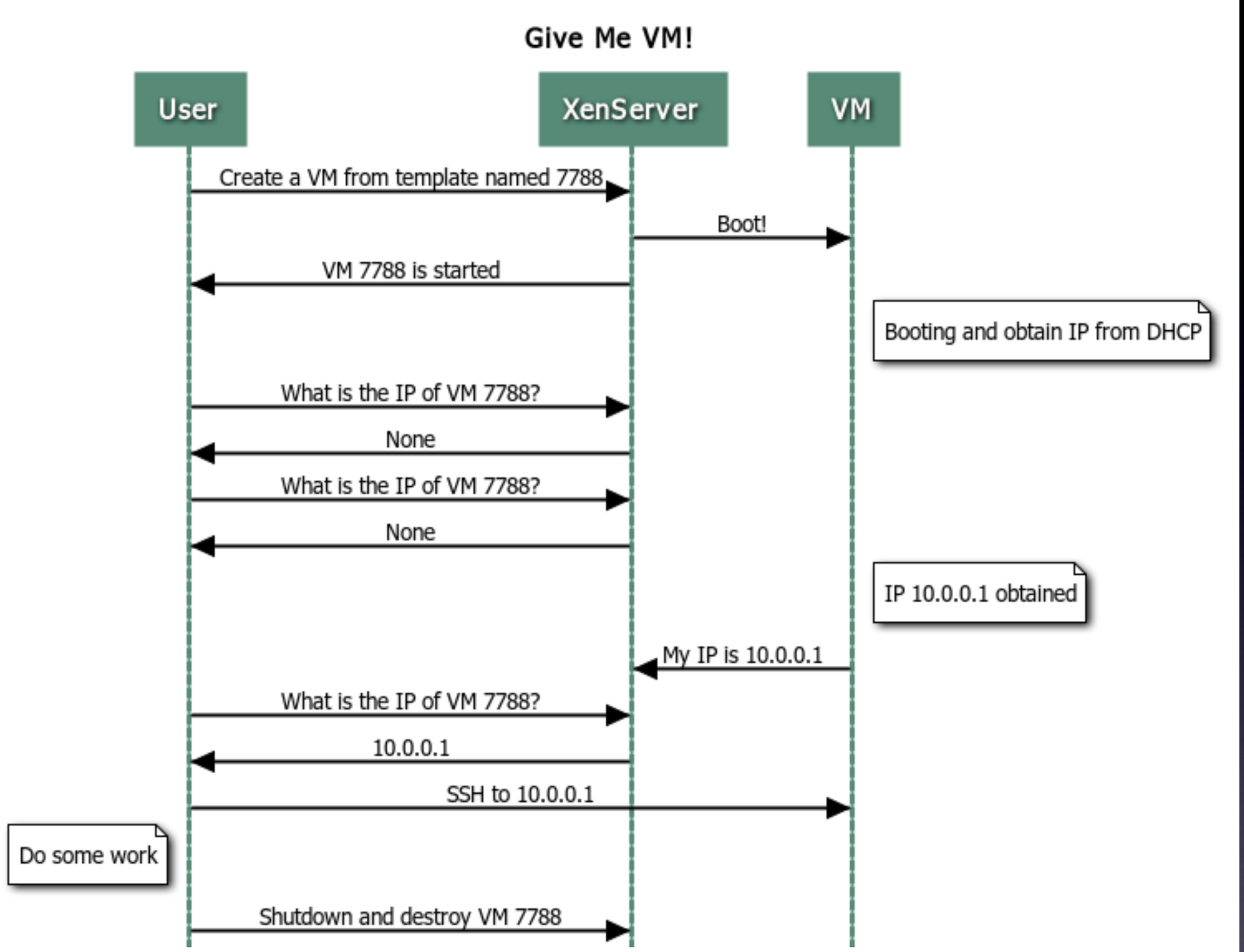


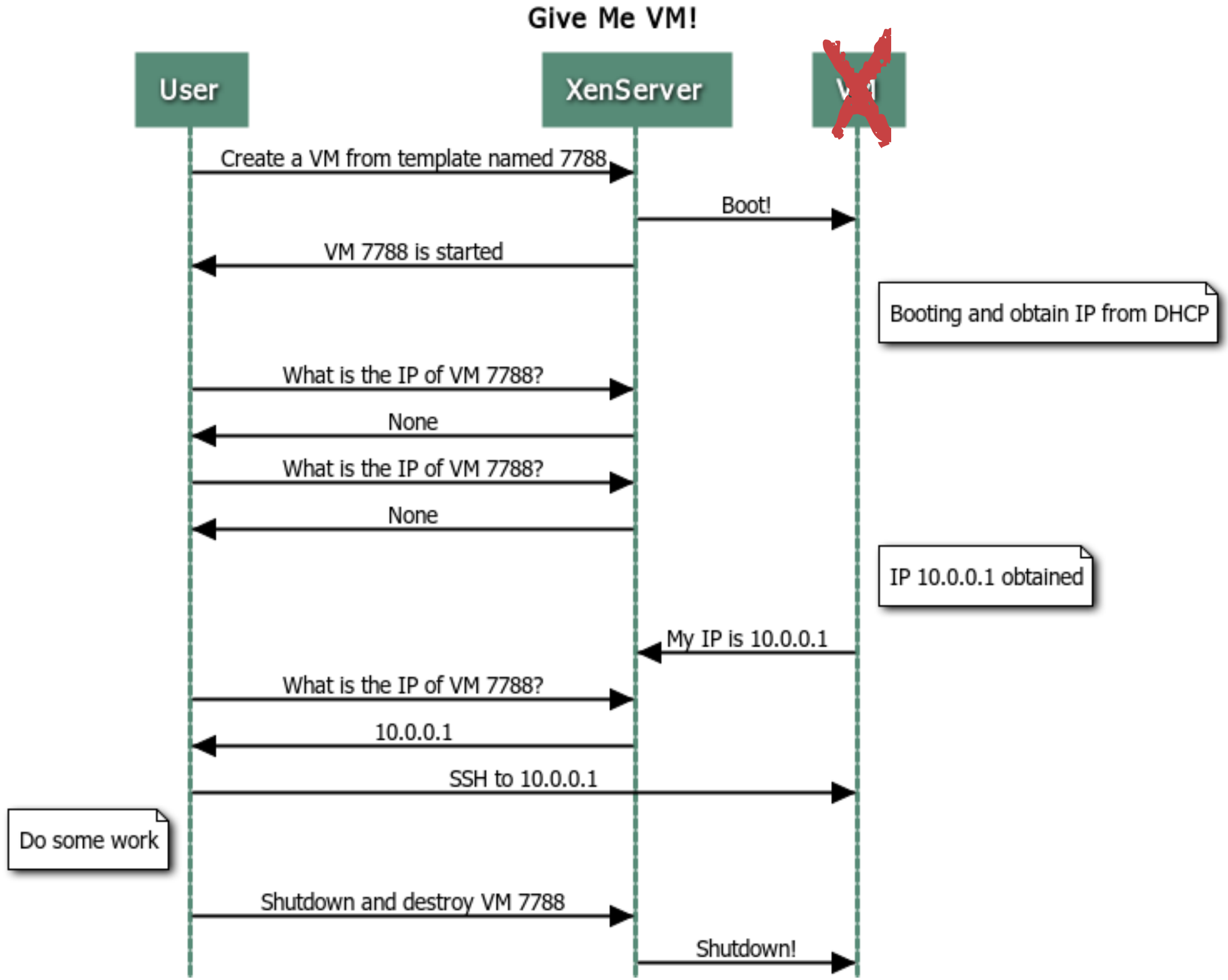












準備作業

- Install a Para-Virtualized VM
- Install Xen Tools in the VM
  - Will report IP via XenBus to XenServer
- Convert the VM to a template

Xen Kernel Required
Less overhead for timers, interrupts, I/O traffic and context switches

Recommended
Paravirtualized network & I/O drivers

Included in stock kernels for Oracle Enterprise and Red Hat Linux

Dom0
Control Domain
VM Management
Hardware detection
Device support

Virtual Machine (domU)
Paravirtualized Linux (PV mode)

Virtual Machine (domU)
Paravirtualized Linux (PV mode)

Virtual Machine
Unmodified Linux (HVM mode)

Requires x86 processor virtualization be enabled

Linux Kernel
Native Drivers
Backend Drivers
QEMU

Linux Kernel
Virtual Driver
Physical Driver

Linux Kernel
Virtual Driver
Physical Driver

Linux Kernel
Physical Driver

Report IP

Virtual I/O Path

Direct I/O Path

Xen Hypervisor

X86 Hardware

https://community.emc.com/servlet/JiveServlet/showImage/38-3466-30315/Xen.png

動作分解

- 第一動
- import XenAPI
  - XenAPI.py can be downloaded from XenServer SDKs
  - Actually a XML-RPC wrapper inside

第二動

- Create XenAPI session
  - session = XenAPI.Session("http://master")
  - session.xenapi.login_with_password("user name", "password")

第三動

- Create a VM from a template
  - template = session.xenapi.VM.get_by_name_label(vm_label)[0]
  - name = "spot-" + str(time.time()).replace(".","")
  - new = session.xenapi.VM.clone(template, name)

第四動

- Provision and start VM
  - session.xenapi.VM.provision(new)
  - session.xenapi.VM.start(new, False, False)

Waiting for IP

```
retry_count = 0
while retry_count < MAX_RETRIES:
  try:
    retry_count = retry_count + 1
    metric = session.xenapi.VM_guest_metrics.
                get_record(session.xenapi.VM.get_record
                (new)['guest_metrics'])
    ip = metric['networks']['0/ip']
    break
  except:
    print "Waiting for IP information..."
    time.sleep(5)
```

Waiting for SSHd

```
retry_count = 0
while retry_count < MAX_RETRIES:
  try:
    retry_count = retry_count + 1
    sock = socket.socket(socket.AF_INET,
              socket.SOCK_STREAM);
    sock.connect((ip, 22))
    sock.close()
    break
  except:
    print "Waiting for sshd to come up..."
    time.sleep(5)
```

Time to Login!

Returns after logout

```
os.system("ssh -i spot_key -o UserKnownHostsFile=/
dev/null -o StrictHostKeyChecking=no root@" + ip)
```

Garbage Collection

```
session.xenapi.VM.hard_shutdown(new)
for vbd in session.xenapi.VM.get_record(new)['VBDs']:
  if session.xenapi.VBD.get_record(vbd)['type'] == 'Disk':
    vdi = session.xenapi.VBD.get_record(vbd)['VDI']
    session.xenapi.VBD.destroy(vbd)
    session.xenapi.VDI.destroy(vdi)
 else:
    session.xenapi.VBD.destroy(vbd)
session.xenapi.VM.destroy(new)
```

山不轉，路轉

Evolution! by @jeffhung

```
IMAGE_TYPES = [

    { 'key': 'spn-centos53', 'name': 'CentOS 5.3 (Production VM)', 'label': 'SPN-
Production-VM-CentOS-5.3-spot' },

    { 'key': 'spn-centos62', 'name': 'CentOS 6.2 (Production VM)', 'label': 'SPN-
Production-VM-CentOS-6.2-spot' },

    { 'key': 'lucid',        'name': 'Ubuntu 10.04 (Lucid)',       'label': 'Ubuntu-10.04-
spot' },

    { 'key': 'myspn',        'name': 'MySPN Dev VM (CentOS 6.2)',  'label': 'tw-
MySPN-devvm' },

]
```

Supports Non-interactive Mode

```
parser = optparse.OptionParser(description="Give me a temporary VM that volatile when I'm done.")

parser.add_option('-l', dest='list', action='store_true',
                  help='list available VM image types')
parser.add_option('-t', dest='type', help='VM image type')
parser.add_option('-f', dest='file', action='append',
                  help='Preload file to VM instance in / folder')
parser.add_option('-i', dest='init',
                  help='Script for initialize VM instance, default to init.sh if file exist')
parser.add_option('-I', dest='interactive', action='store_true',
                  help='Run interactively, default enabled if -i not specified')
```

Automatically Running Scripts

```
print 'Preloading file to newly created VM instance: ', file
os.system("scp -i spot_key -o UserKnownHostsFile=/dev/null -o StrictHostKeyChecking=no " + file + " root@" + ip + ":/")

os.system("ssh -i spot_key -o UserKnownHostsFile=/dev/null -o StrictHostKeyChecking=no root@" + ip + " “ + file)
```

Automatic Daily Regression Test

- CI System triggers daily build job
- Daily build artifacts will be sent to Yum repository
- Trigger regression test job
- Automatically creates a new VM
- Execute the test scripts
- Destroy the VM

Live Demo

不打假球

References

- XenServer SDKs
  - http://community.citrix.com/display/xs/Download+SDKs
- XenAPI Documentation
  - http://docs.vmd.citrix.com/XenServer/6.0.0/1.0/en_gb/api/
  - http://downloads.xen.org/Wiki/XenAPI/xenapi-1.0.6.pdf

Thank You!

Questions?

```
# ./give_me_vm.py
Available Image Types:
  1) spn-centos53 : CentOS 5.3 (Production VM)
  2) spn-centos62 : CentOS 6.2 (Production VM)
  3) lucid        : Ubuntu 10.04 (Lucid)
  4) myspn        : MySPN Dev VM (CentOS 6.2)
Please choose one of the above: 3
Using image type: Ubuntu-10.04-spot
Will preload file to VM instance: init.sh
Creating VM spot-13382604631 4 from Ubuntu-10.04-spot...
Done!
Provisioning VM...
Done!
Starting VM...
Done!
Waiting for IP information...
Waiting for IP information...
IP obtained: 10.1.112.84
Preloading file to newly created VM instance:  init.sh
Warning: Permanently added '10.1.112.84' (RSA) to the list of known hosts.
init.sh                                       100%  443     0.4KB/s   00:00
Done!
```

```
Running init.sh...
Warning: Permanently added '10.1.112.84' (RSA) to the list of known hosts.
Running init.sh
hello!
Done!
Opening SSH connection...
Warning: Permanently added '10.1.112.84' (RSA) to the list of known hosts.
Linux localhost 2.6.32-33-server #70-Ubuntu SMP Thu Jul 7 22:28:30 UTC
2011 x86_64 GNU/Linux
Ubuntu 10.04.3 LTS

Welcome to the Ubuntu Server!
 * Documentation:  http://www.ubuntu.com/server/doc
  System information as of Tue May 29 11:02:21 CST 2012

  System load:  0.55              Processes:           86
  Usage of /:   11.0% of 7.23GB   Users logged in:     0
  Memory usage: 9%                IP address for eth0: 10.1.112.84
  Swap usage:   0%

  Graph this data and manage this system at https://landscape.canonical.com/

15 packages can be updated.
9 updates are security updates.

Last login: Fri Feb 24 18:19:24 2012 from 10.1.112.190
root@localhost:~#
```