



>EL9323 Project II:

Virtual Eucalyptus

Instructor:

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Members:*

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*Sorted alphabetically

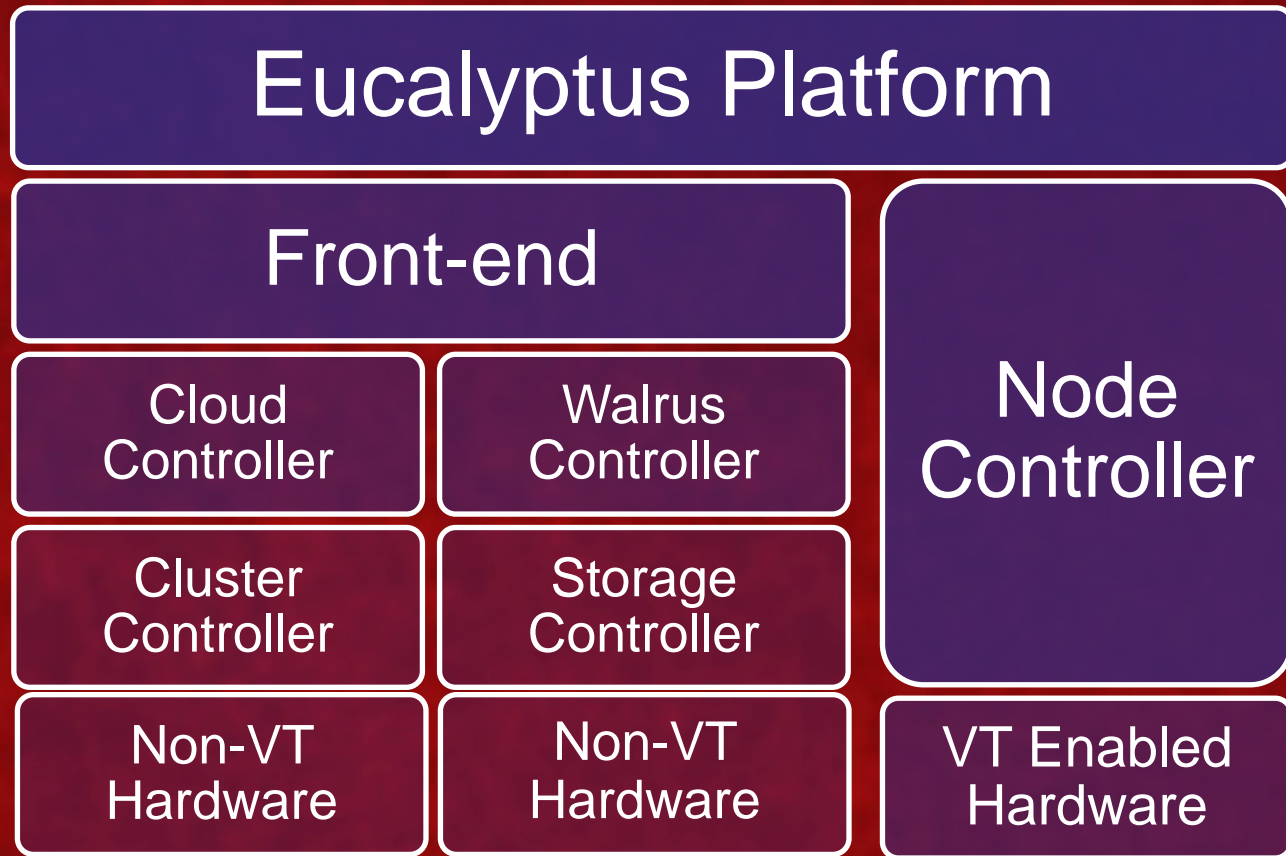
Online Live Group:

<http://cloud.castor.im>

cloudcompute@groups.live.com

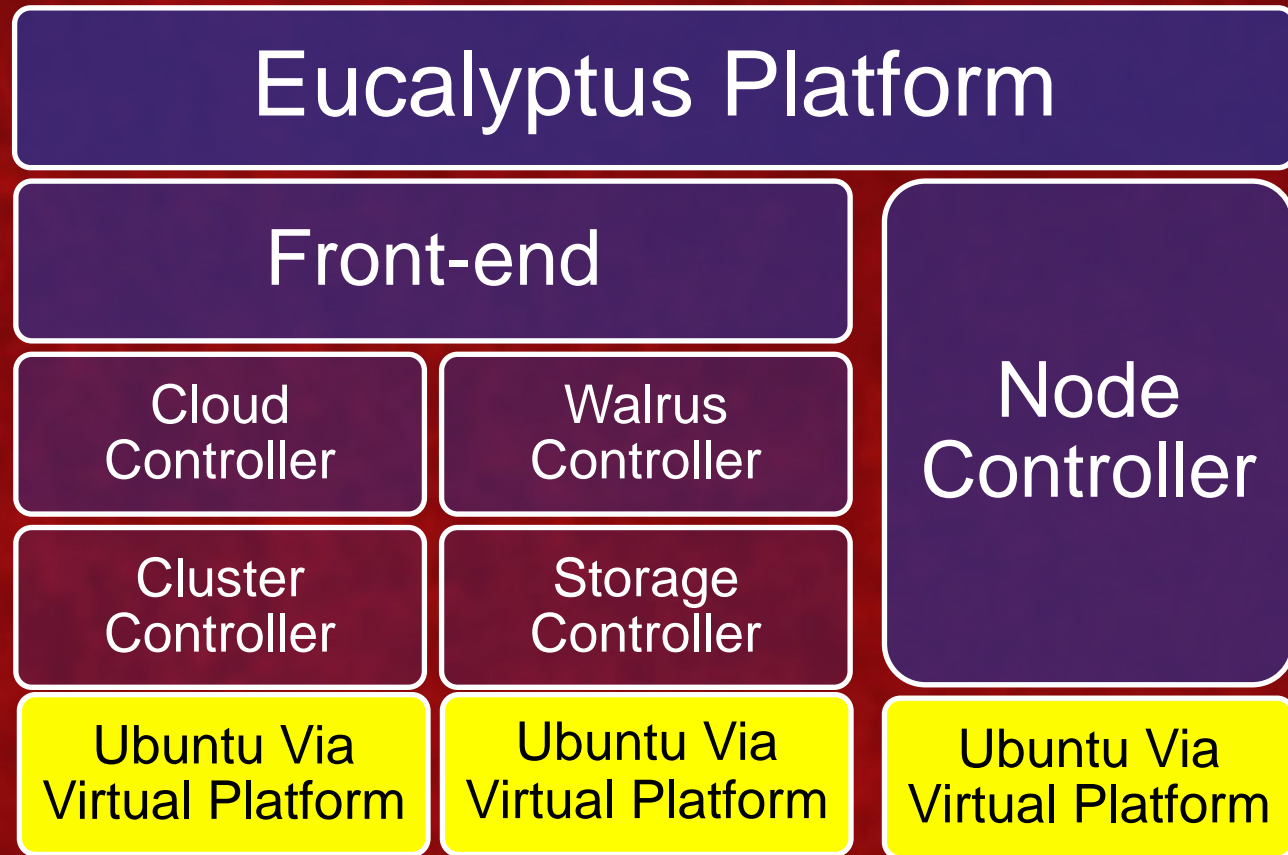
cloudcompute@groups.live.com

Traditional Eucalyptus



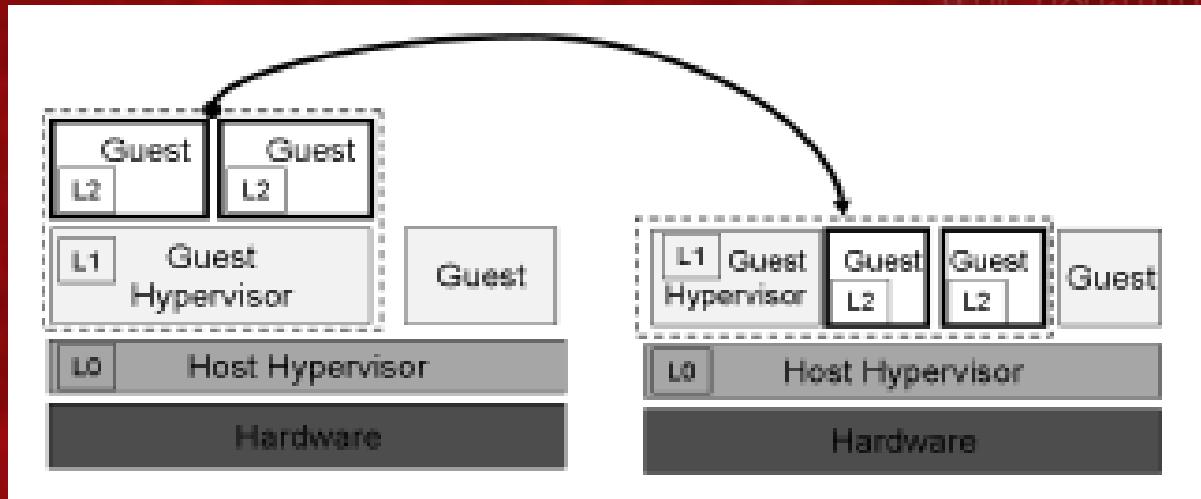
Eucalyptus runs on several physical machines
(At least one should support VT).....

In Our Project



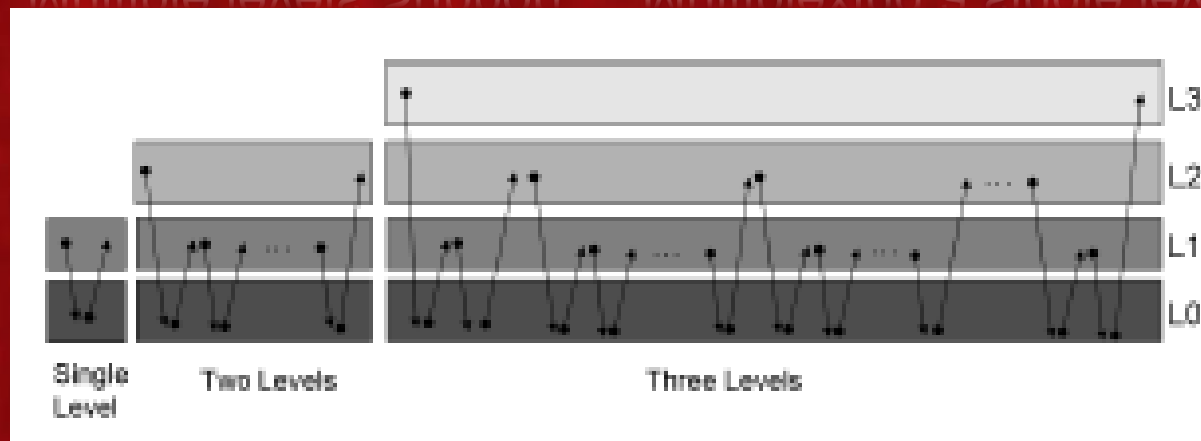
Eucalyptus itself Embedded in Virtual Platform

Node Controller



Multiple levels Support

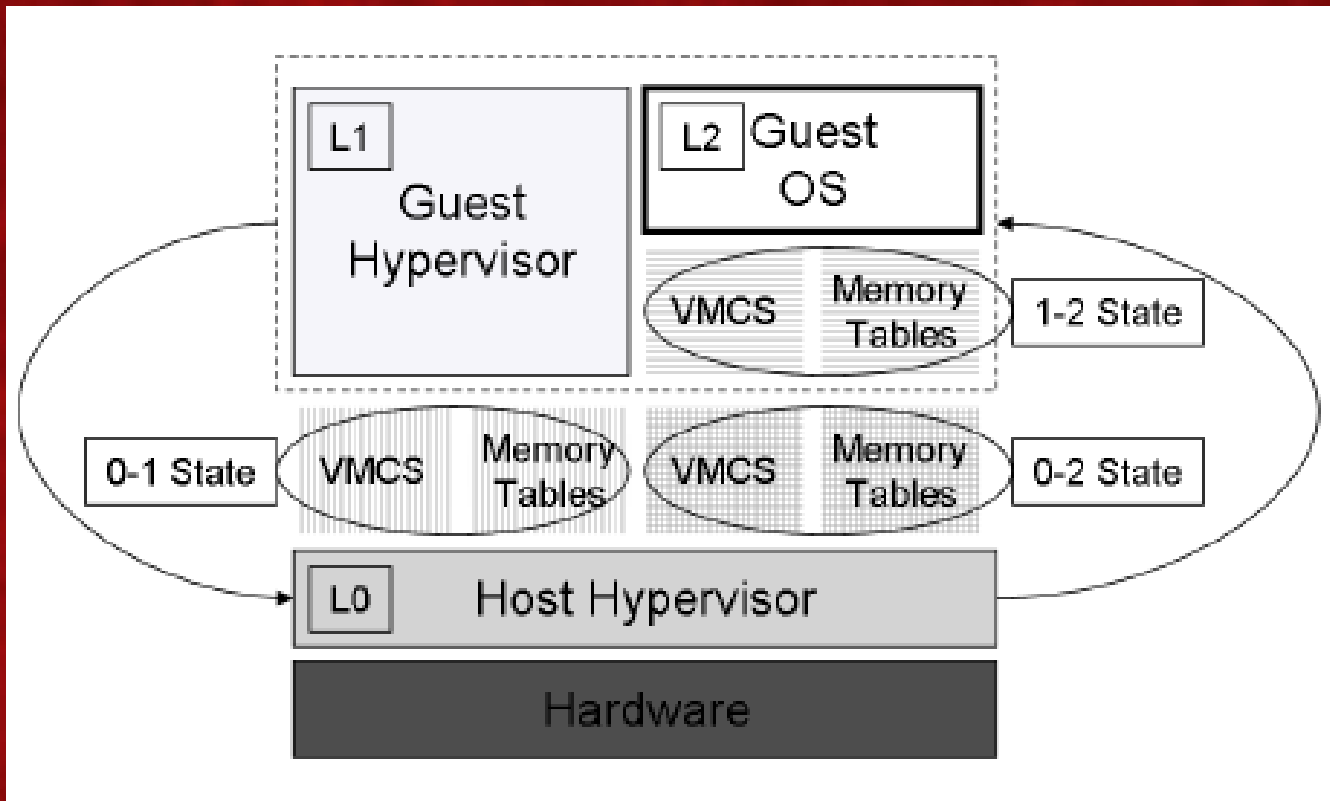
Multiplexing a single level



Nested traps with single-level architectural support for virtualization

A Eucalyptus Project by New York University Students

CPU: Nested VMX Virtualization



Extending VMX for nested virtualization

Steps In Our Project

4 Steps in the Project

Traditional Eucalyptus



Migrate Front-end to Virtual Platform



Migrate Node controller to Virtual Platform



Verify, Testing and Analyze

Environment

Virtual Platform: QEMU(Shell)+KVM

Host OS: Ubuntu Server 10.04.1 (64bit)

Guest OS: Ubuntu Server 10.04.1 (64bit)

Eucalyptus: 1.6.2

Demo Front-end IP: 128.238.82.41 (VM)

Demo Node Controller IP: 128.238.82.42 (VM)

Enable Nested Virtualization

Physical Machine:

Loading AMD KVM Nested Virtualization Kernel:
`modprobe kvm-amd nested=1`

Also we should reconfigure the bridge mode to add a new tap0 environment

```
psharm03@cc-nc03: ~  
psharm03@cc-nc03:~$ sudo dmesg |grep kvm  
[ 30.059946] kvm: Nested Virtualization enabled  
[ 30.059950] kvm: Nested Paging enabled  
psharm03@cc-nc03:~$
```

Virtual Platform:

```
root@vm-node: ~  
root@vm-node:~# dmesg |grep kvm  
[ 0.000000] kvm-clock: Using msrs 12 and 11  
[ 0.000000] kvm-clock: cpu 0, msr 0:1b02901, boot clock  
[ 0.000000] kvm-clock: cpu 0, msr 0:1e15901, primary cpu clock  
[ 0.110041] Switching to clocksource kvm-clock  
[ 6.768425] kvm: Nested Virtualization enabled  
root@vm-node:~#
```


Con't Enable Nested Virtualization

In order to enable nested virtualization, parameter
`sudo qemu-system-x86_64 -hda node.img -boot c -m 512`
`-enable-kvm -net nic,model=e1000 -netdev tap,id=tap0,script=no`
`-net tap,id=tap0,script=no`

In Virtual Node Controller:

```
QEMU
root@vm-node:~# sudo kvm-ok
INFO: Your CPU supports KVM extensions
INFO: /dev/kvm exists
KVM acceleration can be used
root@vm-node:~# _
```

Requirement of the virtual machine

In Virtual Front-End:

Virtual Disk: 10 GB

Memory : 5 GB

MAC address=52:54:00:12:34:56

In Virtual Node Controller:

Virtual Disk: 10 GB

Memory : 5 GB

MAC address=52:54:00:12:34:57

These configurations can support 1 small instance or 1 medium instance.

In Virtual Front-End:

```
sudo qemu-system-x86_64 -hda frontend.img  
-boot c -m 5120 -enable-nesting -net nic  
-net tap,ifname=tap0,script=no
```

In Virtual Node Controller:

```
sudo qemu-system-x86_64 -hda node.img  
-boot c -m 5120 -enable-nesting  
-net nic,macaddr=52:54:00:12:34:57  
-net tap,ifname=tap0,script=no
```

Here, configure the MAC address, no conflicts

Ubuntu Enterprise Cloud, powered by Eucalyptus - Windows Internet Explorer

https://128.238.82.41:8443/#images eucalyptus cloud

Ubuntu Enterprise Cloud, powered by Eucalyptus

ubuntu enterprise cloud Logged in as admin | Logout

Credentials Images Store Users Configuration Services Extras

Id	Name	Kernel	Ramdisk	State	Actions
emi-DFEC1076	image-store-1292738156/image.manifest.xml	eki-F62110F1	eri-0A911159	available	Disable
eki-F62110F1	image-store-1292738156/kernel.manifest.xml			available	Disable
eri-0A911159	image-store-1292738156/ramdisk.manifest.xml			available	Disable

Done Internet | Protected Mode: On 100%

Information of the virtual eucalyptus

```
root@ubuntu: ~  
root@ubuntu:~# euca-describe-availability-zones verbose  
AVAILABILITYZONE    CSPJ-Cluster    128.238.82.41  
AVAILABILITYZONE    |- vm types     free / max    cpu    ram    disk  
AVAILABILITYZONE    |- m1.small     0001 / 0001   1      192    2  
AVAILABILITYZONE    |- c1.medium    0001 / 0001   1      256    5  
AVAILABILITYZONE    |- m1.large     0000 / 0000   2      512   10  
AVAILABILITYZONE    |- m1.xlarge    0000 / 0000   2     1024   20  
AVAILABILITYZONE    |- c1.xlarge    0000 / 0000   4     2048   20  
root@ubuntu:~#
```

```
root@ubuntu: ~  
root@ubuntu:~# euca_conf --list-clusters  
registered clusters:  
    CSPJ-Cluster 128.238.82.41  
root@ubuntu:~# euca_conf --list-scs  
registered storage controllers:  
    CSPJ-Cluster 128.238.82.41  
root@ubuntu:~# euca_conf --list-walruses  
registered walruses:  
    walrus 128.238.82.41  
root@ubuntu:~# euca_conf --list-nodes  
registered nodes:  
    128.238.82.42 CSPJ-Cluster  
root@ubuntu:~# euca-describe-addresses  
ADDRESS 128.238.82.45    available (eucalyptus)  
ADDRESS 128.238.82.46    available (eucalyptus)  
ADDRESS 128.238.82.47    available (eucalyptus)  
ADDRESS 128.238.82.48    nobody  
ADDRESS 128.238.82.49    nobody  
ADDRESS 128.238.82.50    nobody  
root@ubuntu:~#
```


Qemu Console

```
Applications Places System
mguan01@cc-fe03:~$ ifconfig
mguan01@cc-fe03:~$ sudo ifconfig eth0
Link encap:Ethernet HWaddr 52:54:00:12:34:56
inet addr:128.238.82.41 Bcast:128.238.82.255 Mask:255.255.255.0
inet6 addr: fe80::5054:ff:fe12:3456/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:311987 errors:0 dropped:0 overruns:0 frame:0
TX packets:309647 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:119456162 (119.4 MB) TX bytes:136438805 (136.4 MB)
Interrupt:11 Base address:0xe000

mguan01@cc-fe03:~$ sudo ifconfig eth0:metadata
Link encap:Ethernet HWaddr 52:54:00:12:34:56
inet addr:169.254.169.254 Bcast:0.0.0.0 Mask:255.255.255.255
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
Interrupt:11 Base address:0xe000

mguan01@cc-fe03:~$ sudo ifconfig lo
Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
inet6 addr: ::1/128 Scope:Host
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:1614896 errors:0 dropped:0 overruns:0 frame:0
TX packets:1614896 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:608841315 (608.8 MB) TX bytes:608841315 (608.8 MB)

mguan01@cc-fe03:~$
root@ubuntu:~#
```


Virtual Platform vs Physically Machine

Promise:

Disk Space: 10 GB Memory: 5 GB

Virtual Machine	Physical Machine
Support 1 small instance or 1 media instance	Up to 1 xlarge scale instance

Conclusion:

Utilization

Physical Machine > Virtual Machine

Best Regards to

Prof. Catherine Zhang (IBM Researcher)