Making the Universal Image for PRAGMA Boot by Clonezilla

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http://clonezilla.org/

https://github.com/pragmagrid/pragma_boot

PRAGMA 31

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Outline

- **Quick Introduction to Clonezilla**
- **PRAGMA Boot by Clonezilla**
  - Workflow / Architecture
  - Issue / Why Clonezilla
  - Demo
  - Feature Work
- **Q&A**

About us:
Free Software Lab

- From Taiwan, working for the NPO NCHC (National Center for High-Performance Computing)
- Developers of the free software **DRBL, Clonezilla** and more...
- Maintenance of mirror sites:
  - Linux/packages mirror ： http://free.nchc.org.tw
  - OSM cache server, OSDN mirror in Taiwan, ..

Taiwan image source: wikipedia.org

open source development network

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Better HPC Better Living

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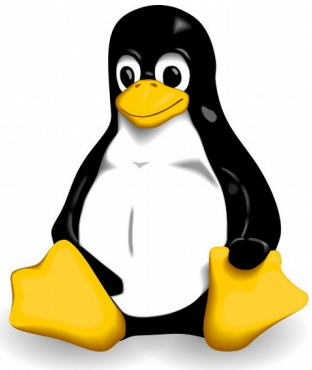
What is Clonezilla?

- A partition and disk imaging/cloning utility similar to True image® or Ghost®
- GPL license
- A bare metal recovery tool for


*1


*2

*3


*4

VMFS

VMware ESX/ESXi

*5

*6

*Logo source: (1) Larry Ewing, Simon Budig and Anja Gerwinski, (2) Apple ,(3) Microsoft, (4) Marshall Kirk McKusick, (5) VMWare (6) Distrowatch.com

Massive system deployment
System imaging and cloning - backup

- System backup/recover/rescue
- PC classroom
- Cluster computing
- Massive bootable usb flash
- More ...

Clonezilla Features

- Free (GPL) Software
- File systems supported:
  - Ext2/3/4, ReiserFS, Reiser4, XFS, JFS, HFS+, BrtFS, F2fs, UFS, Minix, VMFS, F2FS, NILFS2, FAT and NTFS
  - Supports LVM2
  - Support some hardware RAID chips (by kernel)
- Smart copying for supported filesystem. For unsupported file systems sector-to-sector copying is done via dd.
- Boot loader : syslinux, grub 1/2 ; MBR and hidden data (if exist)
- Serial console
- Unattended mode
- One image restoring to multiple local devices
- Multicast supported in Clonezilla Server Edition (SE)
- The image format is transparent, open and flexible

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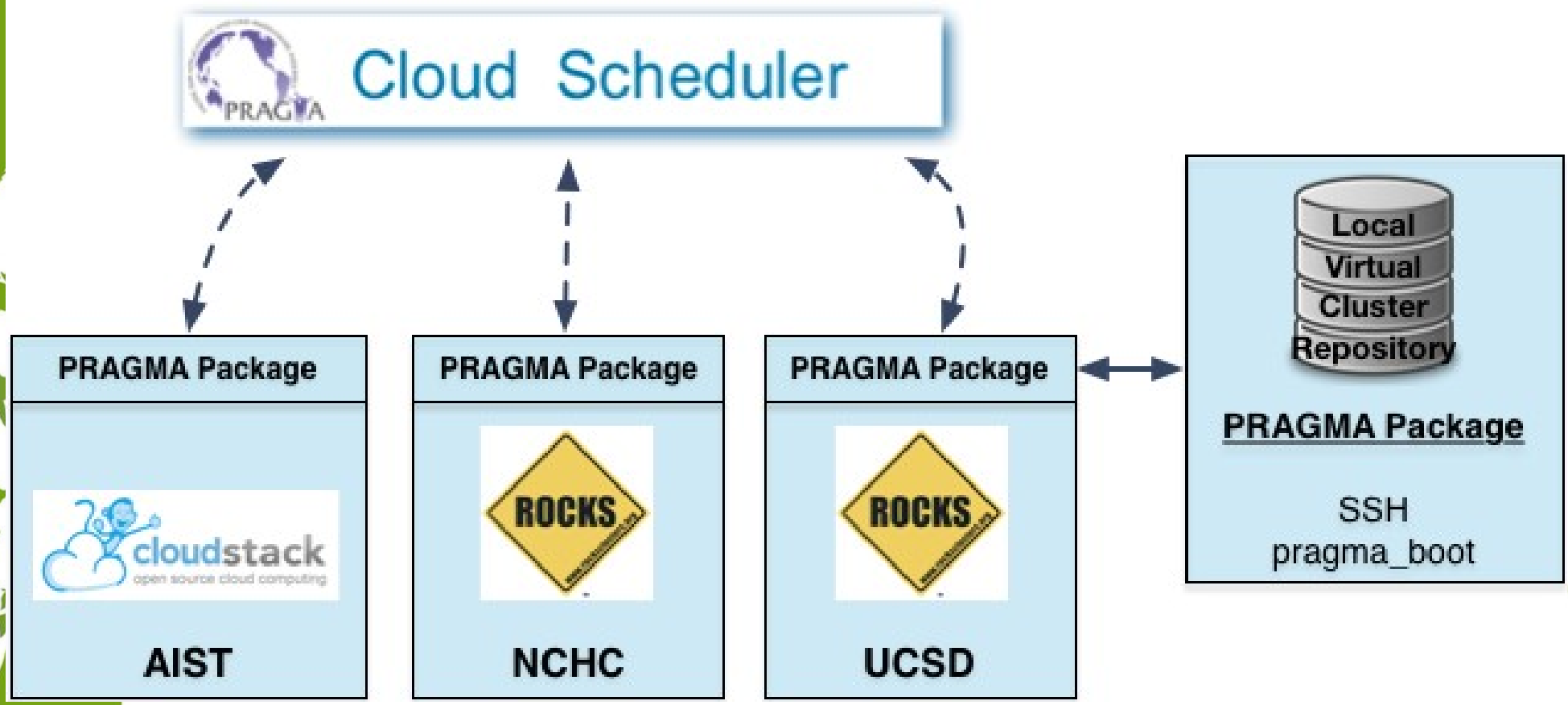
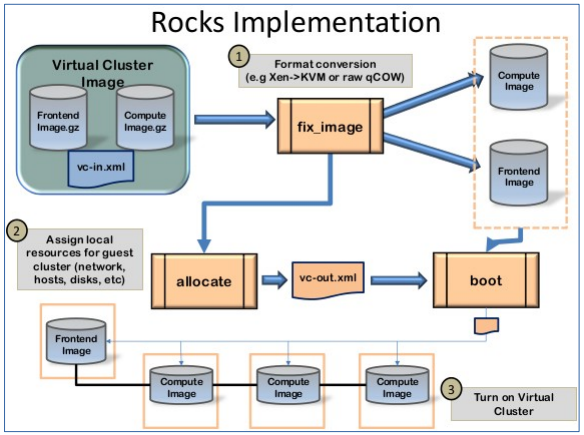
Architecture Overview

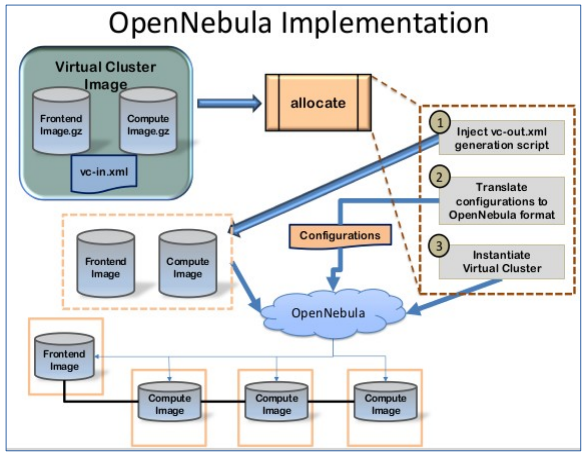


Architecture for the PRAGMA cloud scheduler

About Deployment Issue

- Virtual Cluster (VC) Image Deployment
  - **Virtual disk format** need to be **converted** between different cloud hosting environment
    - Raw, cow, qcow , qcow2, vdi , vmdk, vhdx,...
  - Different cloud hosting uses different VC image deployment method





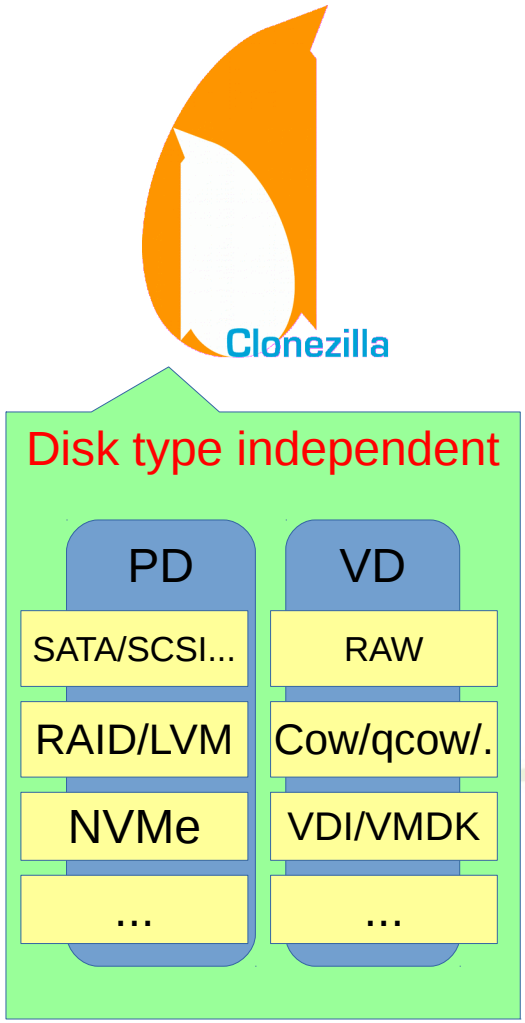
=> To provide a universal image tool would be a good idea for VC deployment

Why using Clonezilla

- Clonezilla supports several types of OS
  - Flexibility for VC image type
- The restored environment is **disk type independent**
  - Don't care about **which type of disk** is used: physical disk (PD) / virtual disk (VD)
  - Don't care about **which format of virtual disk** is used in virtual system

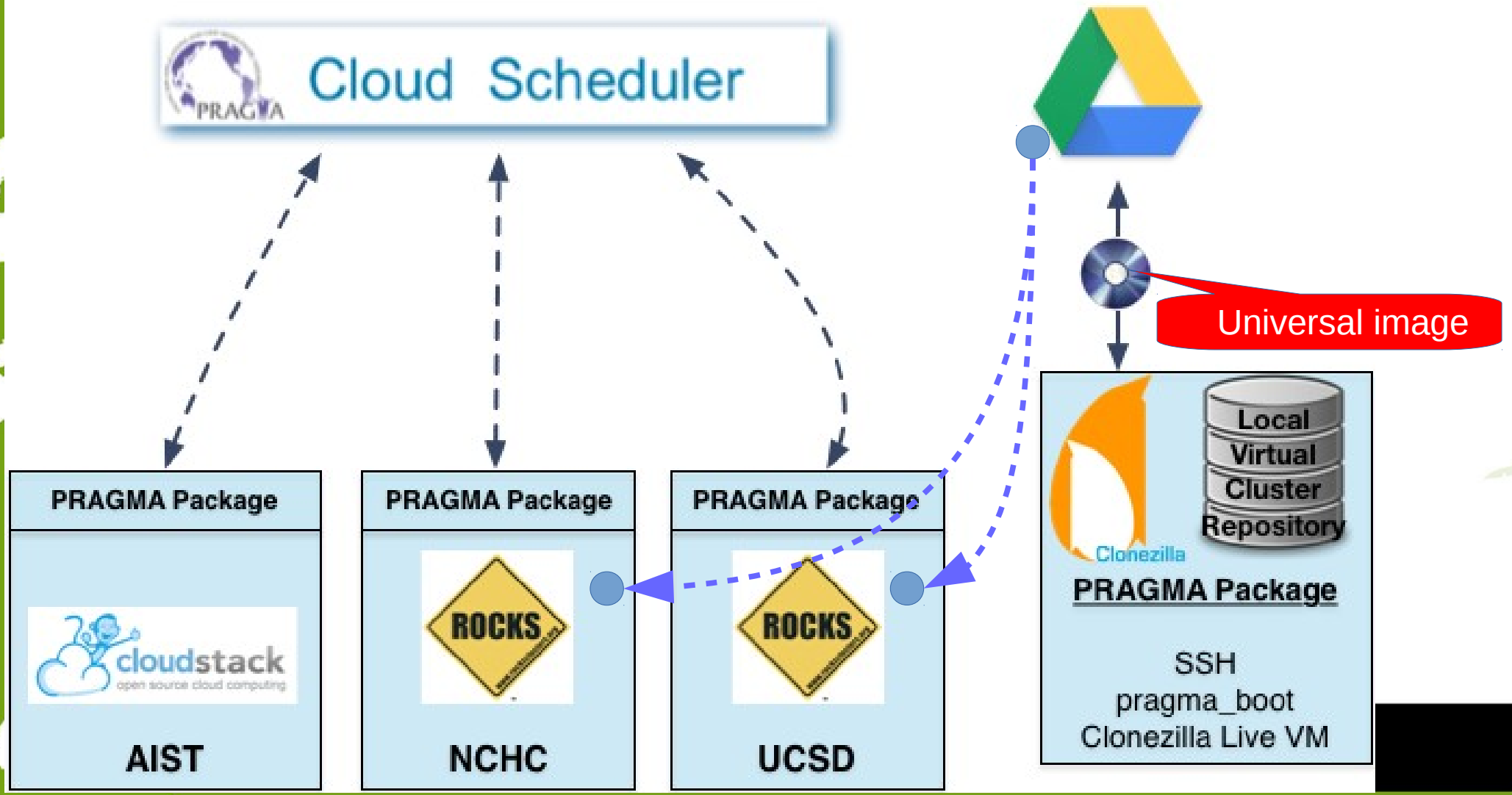
=> ***What role does Clonezilla play?***

- **VC image creator** for image provider
- **VC image deployer** for resource site



Architecture (with Clonezilla)

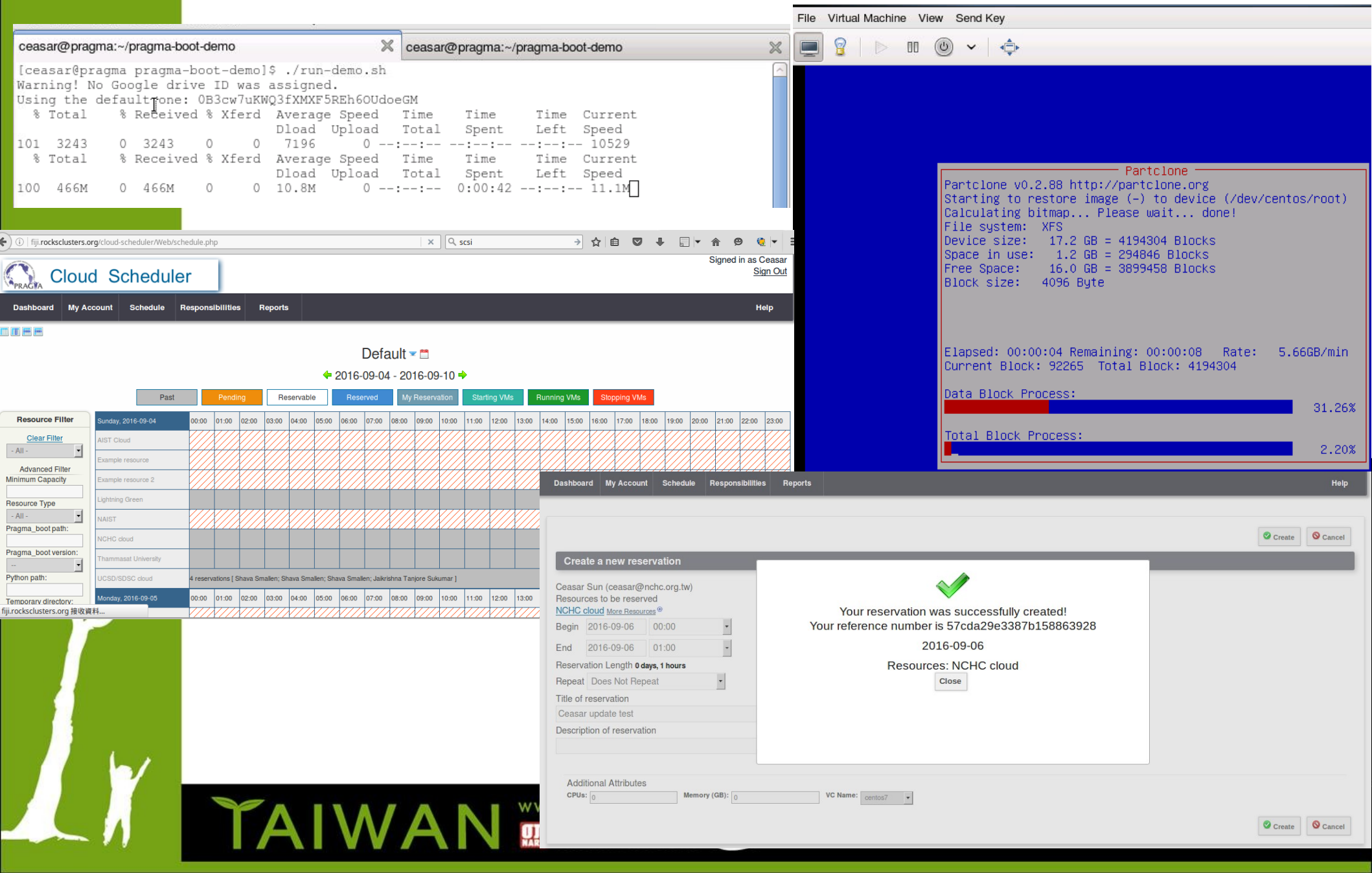
- To create universal VC image for different cloud hosting environments



Demo Scenario

- Goal
  - To deploy CentOS 7 VC image into NCHC resource site
- Step :
  1. Get the VC (CentOS 7) image packed by UCSD
  2. Restore image and convert virtual disk format for PRAGMA boot with Clonezilla
  3. Deploy image to NCHC Rocks VM hosting environment
  4. Book NCHC resource by Cloud Scheduler web UI and check the resource

Screenshot


ceasar@pragma:~/pragma-boot-demo
ceasar@pragma:~/pragma-boot-demo
[ceasar@pragma pragma-boot-demo]$ ./run-demo.sh
Warning! No Google drive ID was assigned.
Using the default one: 0B3cw7uKWQ3fXMXF5REh6OUdoeGM
% Total % Received % Xferd Average Speed Time Time Time Current
Dload Upload Total Spent Left Speed
101 3243 0 3243 0 0 7196 0 --:--:-- --:--:-- --:--:-- 10529
% Total % Received % Xferd Average Speed Time Time Time Current
Dload Upload Total Spent Left Speed
100 466M 0 466M 0 0 10.8M 0 --:--:-- 0:00:42 --:--:-- 11.1M
File Virtual Machine View Send Key
Partclone
Partclone v0.2.88 http://partclone.org
Starting to restore image (-) to device (/dev/centos/root)
Calculating bitmap... Please wait... done!
File system: XFS
Device size: 17.2 GB = 4194304 Blocks
Space in use: 1.2 GB = 294846 Blocks
Free Space: 16.0 GB = 3899458 Blocks
Block size: 4096 Byte
Elapsed: 00:00:04 Remaining: 00:00:08 Rate: 5.66GB/min
Current Block: 92265 Total Block: 4194304
Data Block Process:
31.26%
Total Block Process:
2.20%
fiji.rocksclusters.org/cloud-scheduler/Web/schedule.php
Cloud Scheduler
Signed in as Ceasar
Sign Out
Dashboard
My Account
Schedule
Responsibilities
Reports
Help
Default
2016-09-04 - 2016-09-10
Past
Pending
Reservable
Reserved
My Reservation
Starting VMs
Running VMs
Stopping VMs
Resource Filter
Clear Filter
Advanced Filter
Minimum Capacity
Resource Type
Pragma_boot path:
Pragma_boot version:
Python path:
Temporary directory:
Sunday, 2016-09-04
AIST Cloud
Example resource
Example resource 2
Lightning Green
NAIST
NCHC cloud
Thammasat University
UCSD/SDSC cloud
4 reservations [Shava Smallen; Shava Smallen; Shava Smallen; Jaikrishna Tanjore Sukumar]
Monday, 2016-09-05
Create a new reservation
Ceasar Sun (ceasar@nchc.org.tw)
Resources to be reserved
NCHC cloud More Resources
Begin 2016-09-06 00:00
End 2016-09-06 01:00
Reservation Length 0 days, 1 hours
Repeat Does Not Repeat
Title of reservation
Ceasar update test
Description of reservation
Your reservation was successfully created!
Your reference number is 57cda29e3387b158863928
2016-09-06
Resources: NCHC cloud
Close
Additional Attributes
CPUs:
Memory (GB):
VC Name:
centos7
Create
Cancel
TAIWAN

Conclusion / Feature Work

- Advantage
  - Using universal image to make it easy for image provider and PRAGMA resource site
- What's the next in NCHC and Clonezilla support
  1. Make the deployment as unattended mode for VC image in PRAGMA resource site
  2. Clonezilla supports packaging a pragma_boot enabled image from native OS
  - Build heterogeneous (ex: CloudStack,...) testbed in NCHC by universal VC image for testing and verification
  - ...

Acknowledge

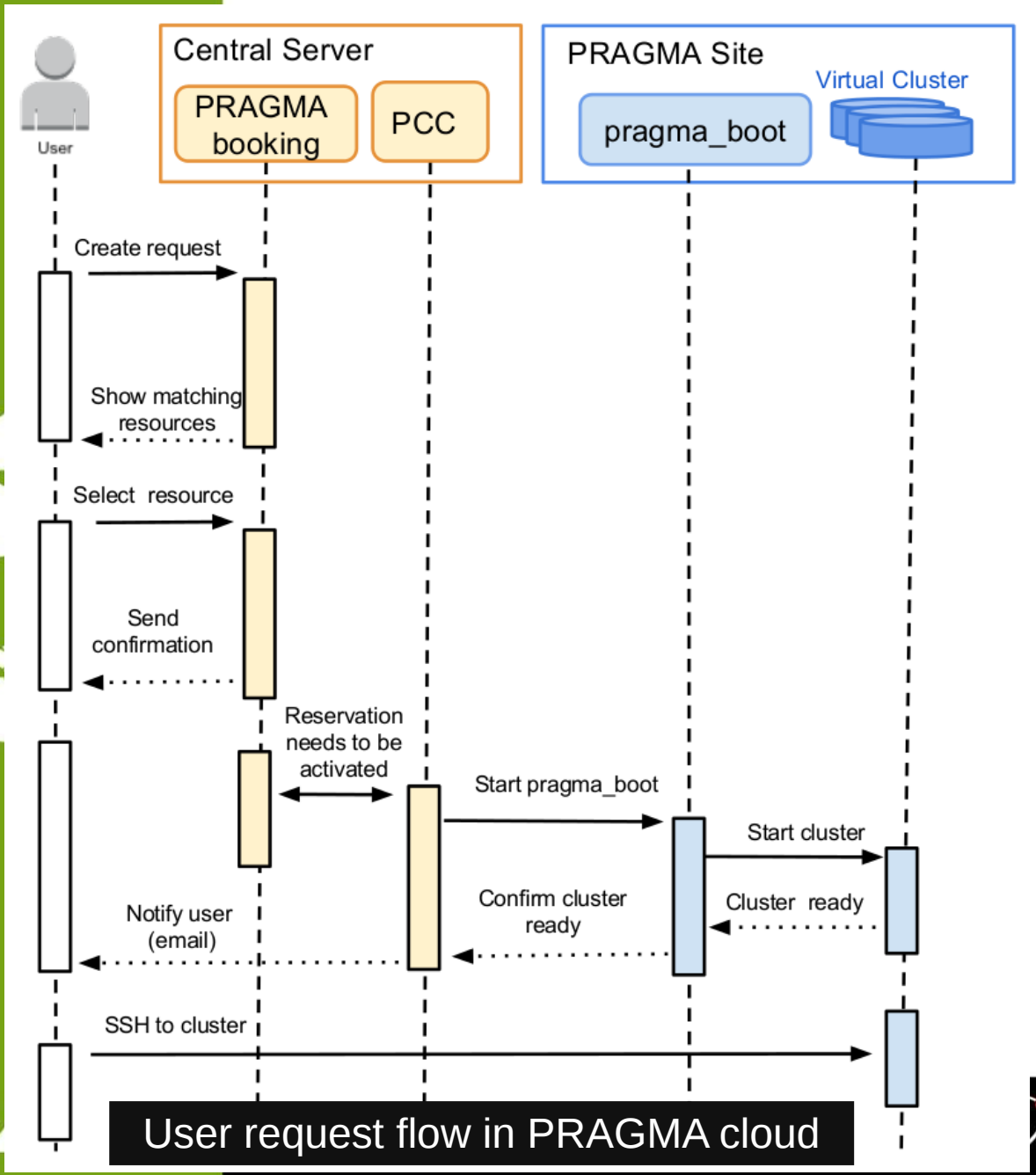
Thanks to UCSD team :

To help to build up NCHC PRAGMA resource site

To test using Cloneizlla into PRAGMA boot environment

Q & A

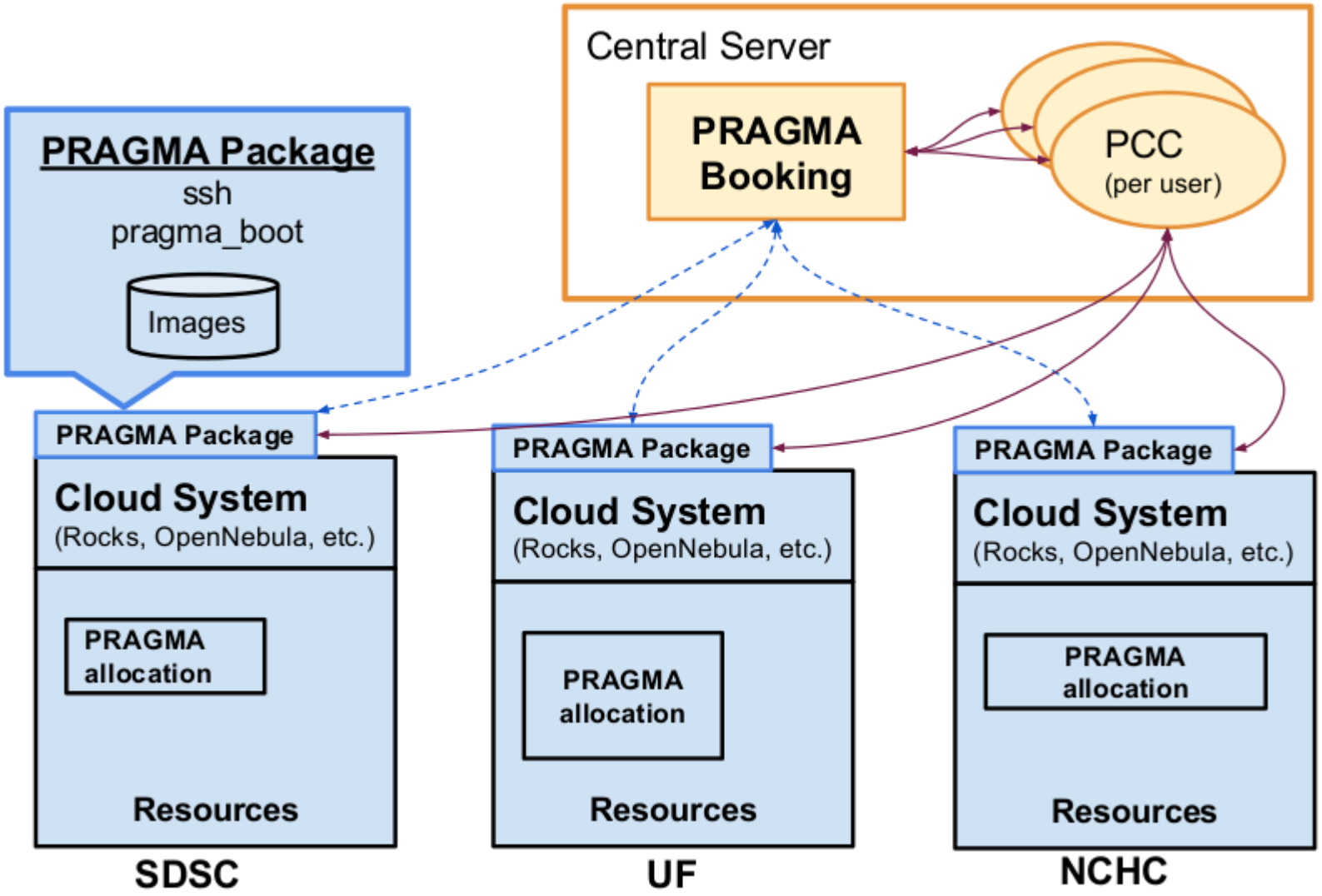
PRAGMA Cloud with pragma boot



User request flow in PRAGMA cloud

- Support virtual cluster environment:
  - SDSC Rocks, Cloudstack , OpenNebula
- Web UI for booking VC resource:
  - http://fiji.rocksclusters.org/cloud-scheduler/

Architecture (original version)



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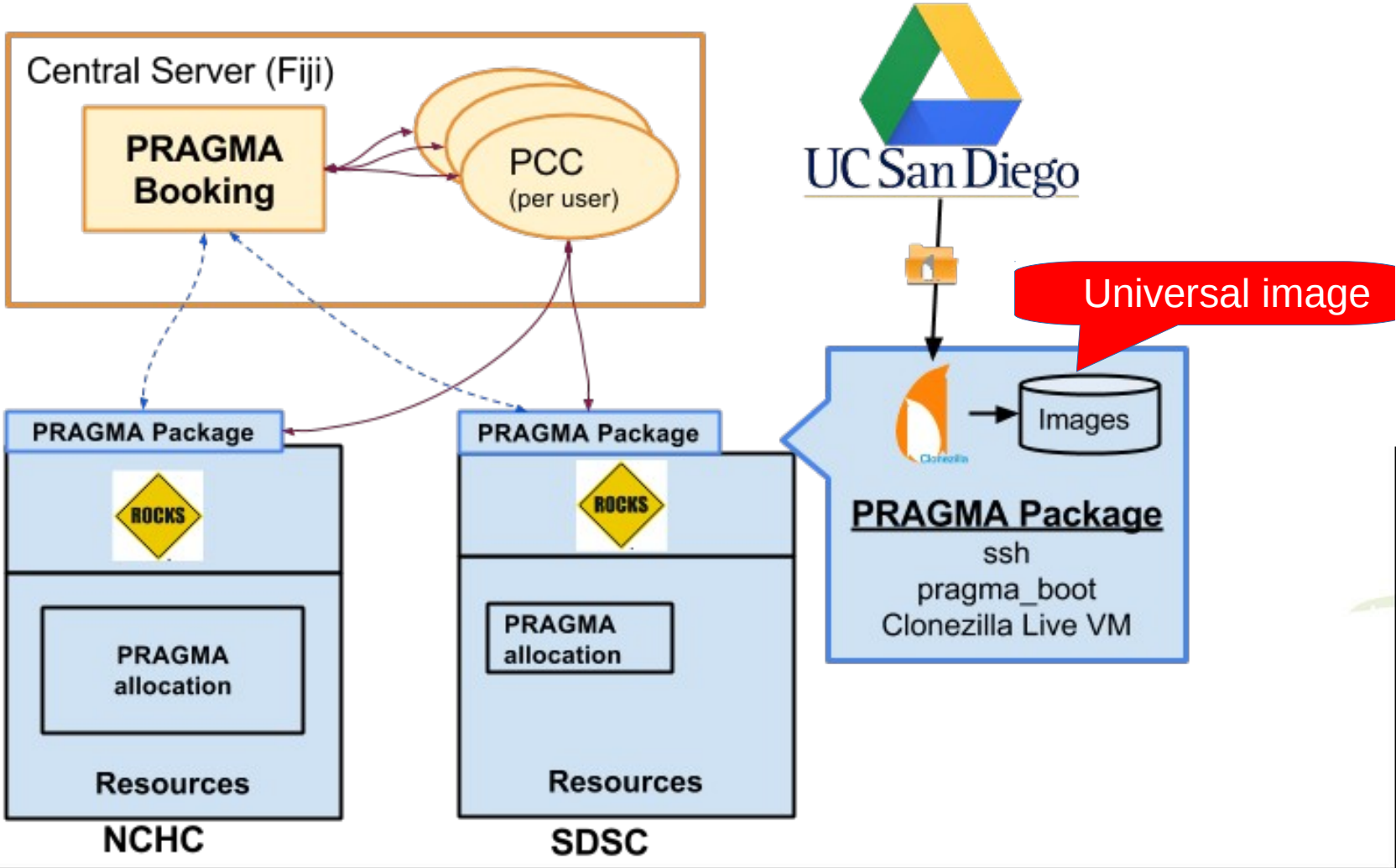
Architecture (with Clonezilla)

- To create universal VC image for different cloud hosting environments



Note

- Start VNC
  - ~/pragma-boot-demo/vncsrv
- Demo script
  - ~/pragma-boot-demo/run-demo.sh
  - $ virt-manager --connect qemu:///session
- Cloud Scheduler
  - http://fiji.rocksclusters.org/cloud-scheduler
- In virtual frontend
  - uname -a
  - df -Th
  - cat /etc/centos-release
  - ip addr