Updates for the PRAGMA Cloud Testbed

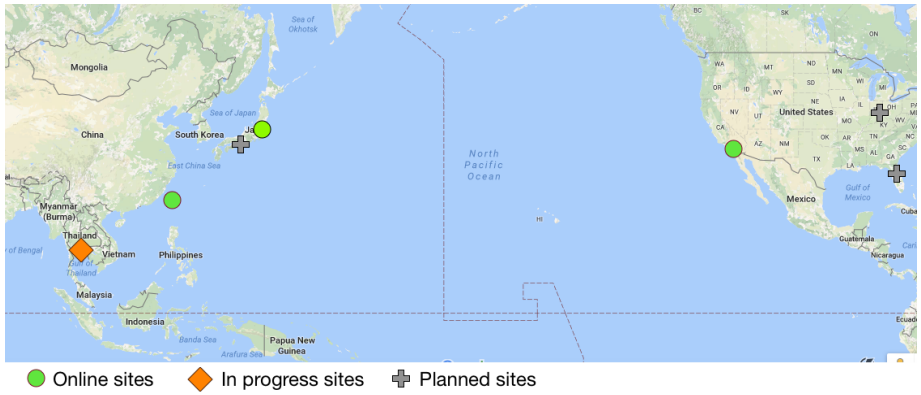
Shava Smallen, Nadya Williams
Jason Haga, Yoshio Tanaka, Philip Papadopoulos

ssmallen@sdsc.edu, nadya@sdsc.edu

September 8, 2016
PRAGMA31

PRAGMA Cloud Testbed

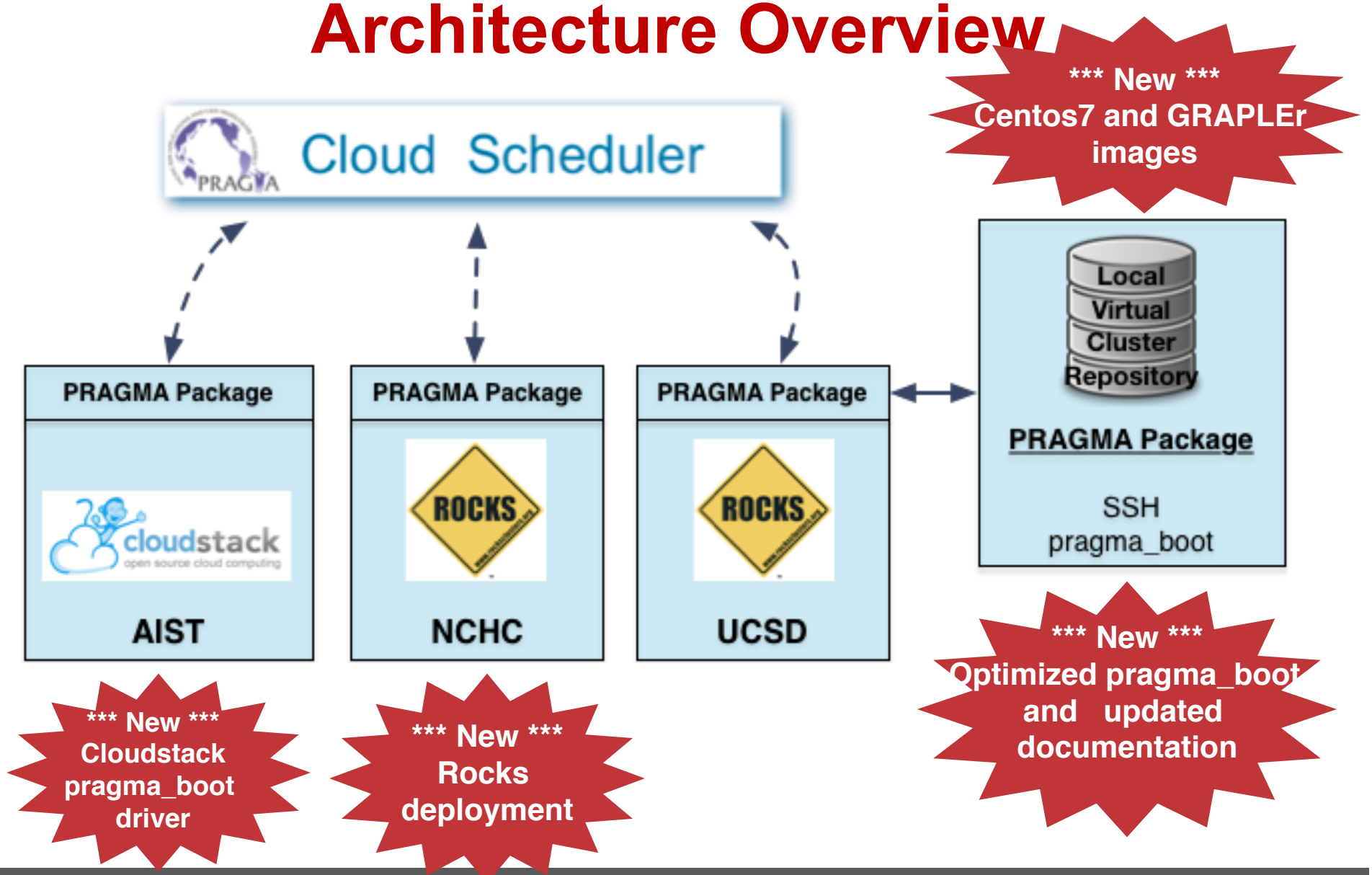
- **Goal**: A persistent Cloud testbed for Biosciences and other PRAGMA working group members to run application experiments.
- Prototype of Lightweight Cloud Scheduler demonstrated in PRAGMA28
- Enhanced in PRAGMA29 to allow for multiple reservations
- New version of pragma_boot, Rocks performance improvements, and NCHC introduced in PRAGMA 30



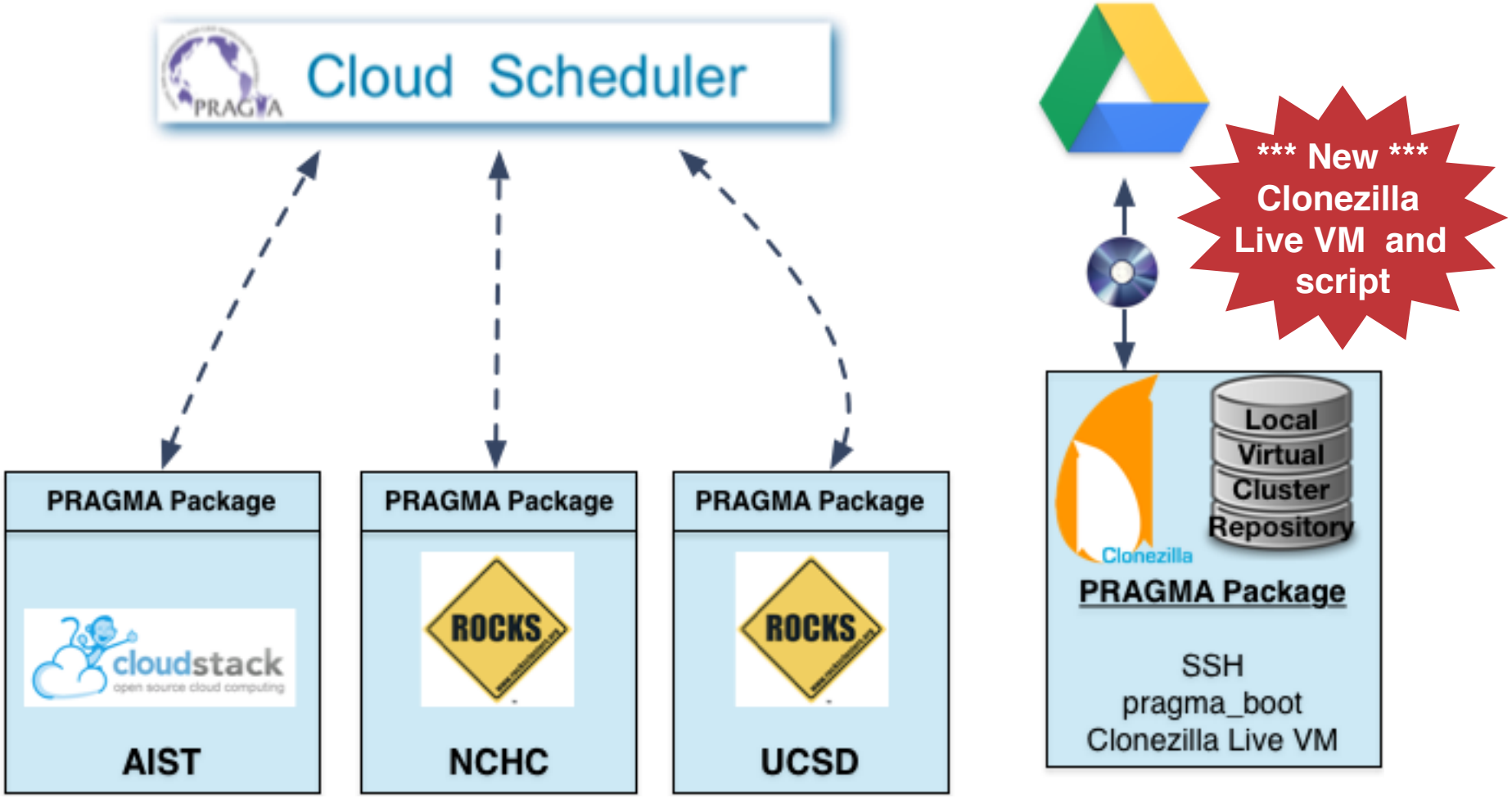
PRAGMA Cloud Scheduler

- **Goal: Low participation overhead and easy to use**
  - Sites only have to install a small package (SSH and pragma_boot) to participate
  - Users have convenient web interface to start up and manage their virtual clusters
- **Currently leverages the following tools:**
  - **Booked**: Open source room reservation software from Twinkle Toes
  - **pragma_boot**: Boots virtual clusters for users across PRAGMA institutions using local VM provisioning system. Currently supports Rocks and Cloudstack.

Architecture Overview

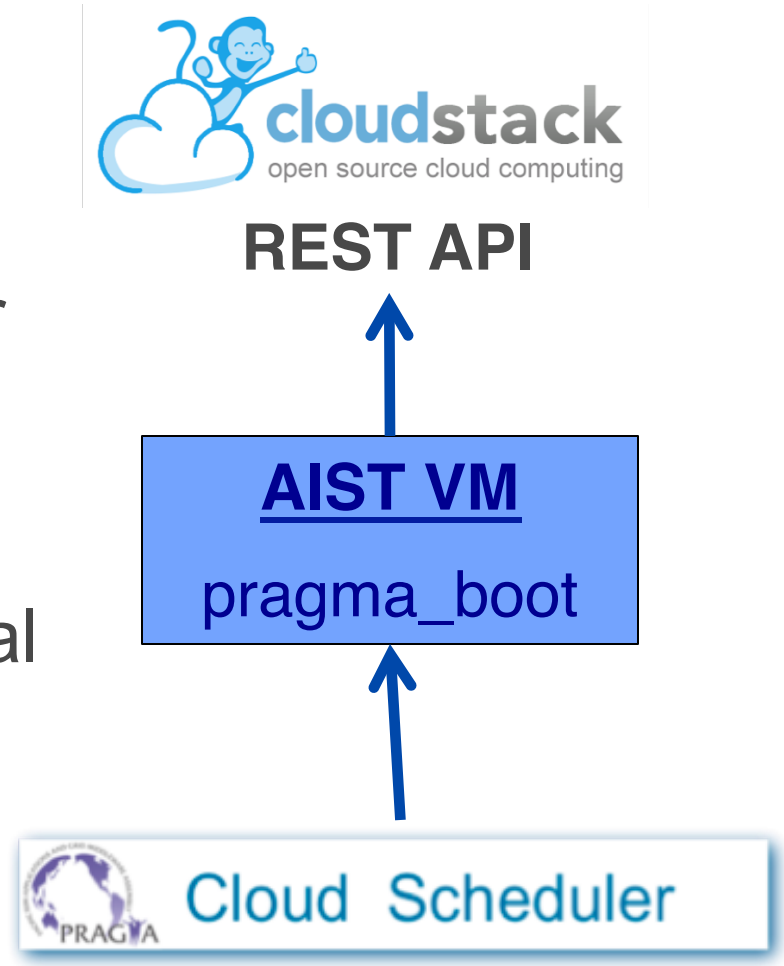


Clonezilla Updates

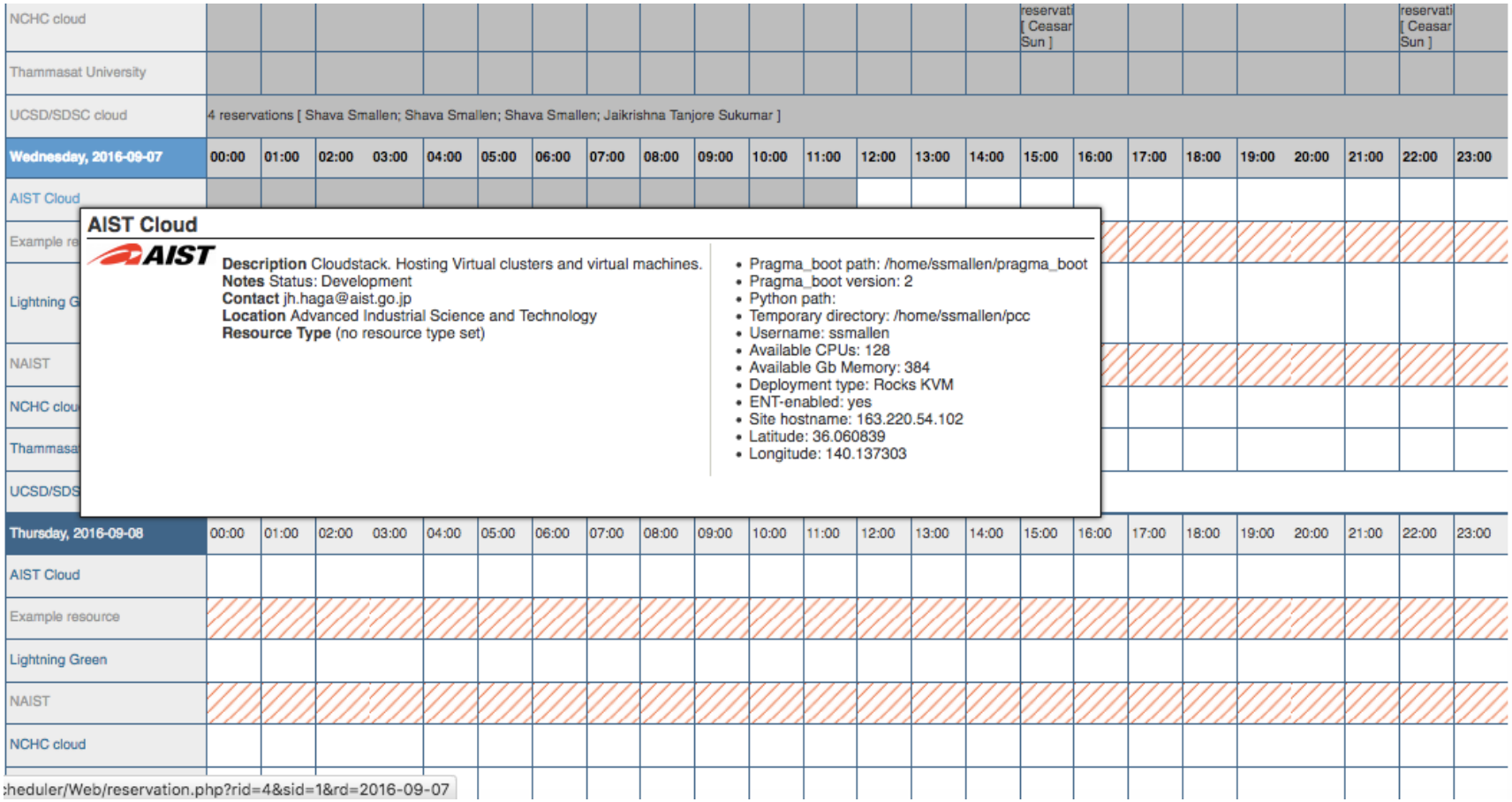


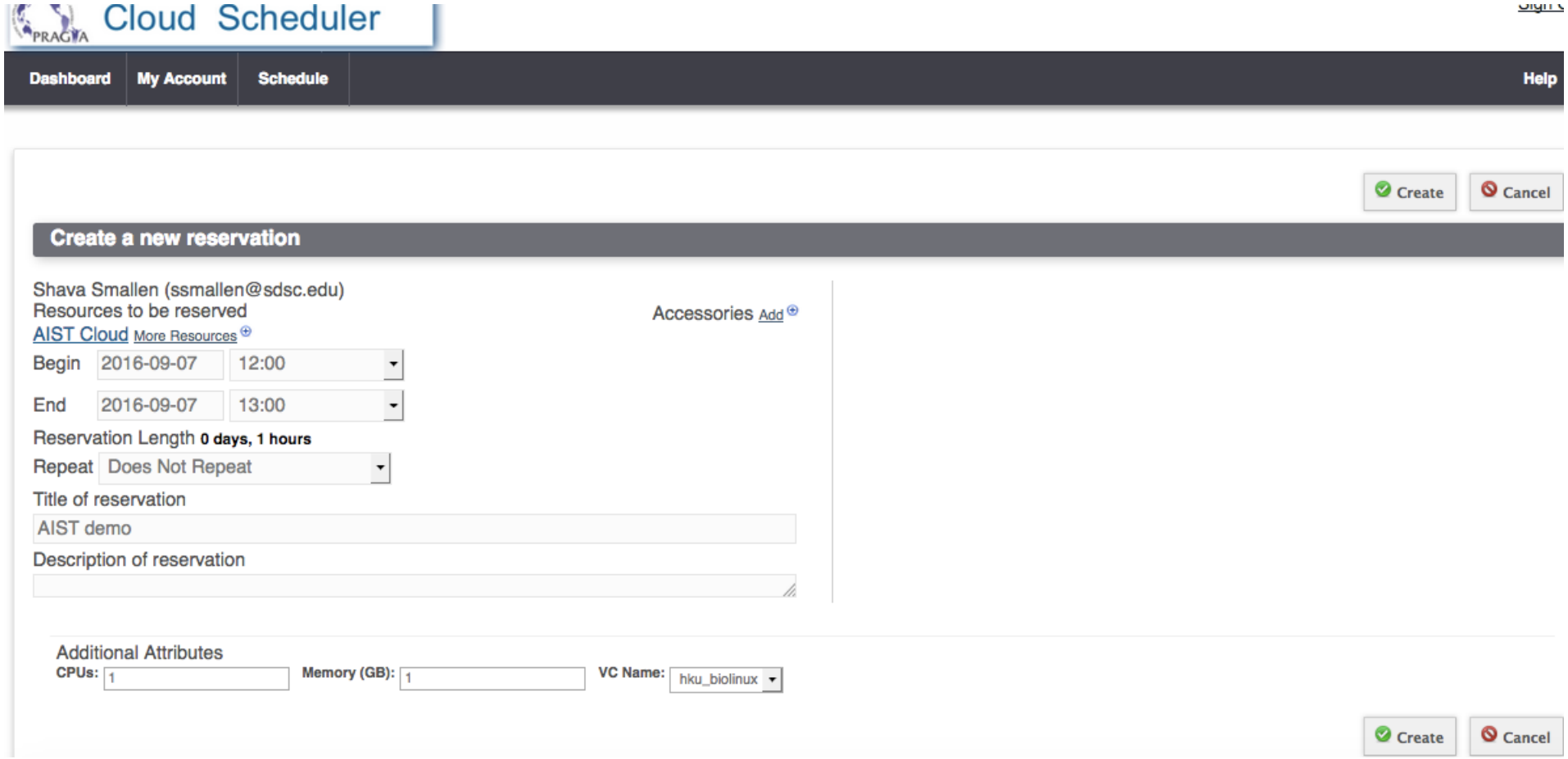
Developing Cloudstack driver

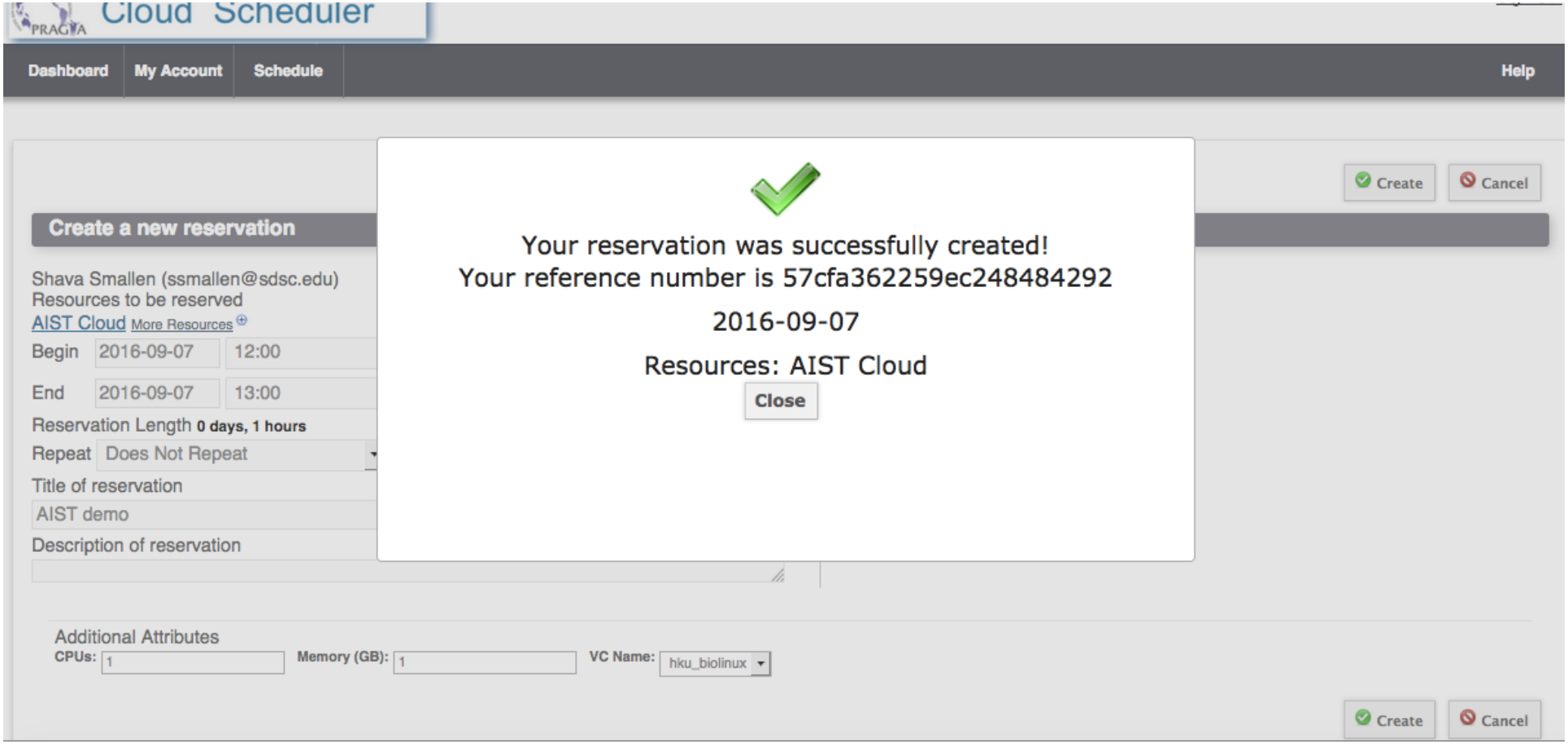
- **allocate** – find free public ip and vlan to use for virtual cluster
- **deploy** – deploy virtual cluster
- **list** – list virtual clusters or details on single virtual cluster
- **shutdown** – shutdown a virtual cluster system
- **clean** – clean a virtual cluster from the system

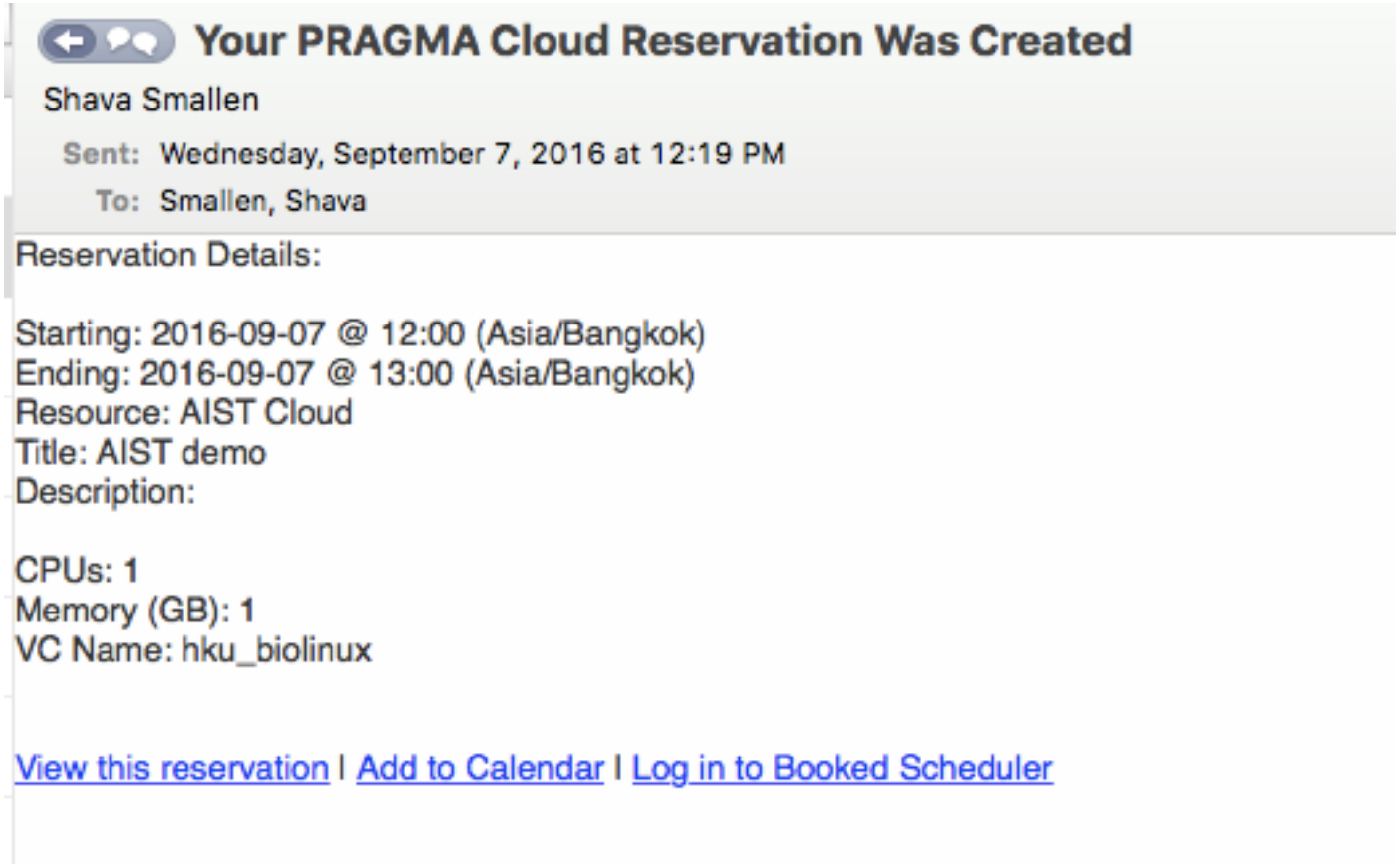


Cloudstack Demo


NCHC cloud
Thammasat University
UCSD/SDSC cloud
4 reservations [Shava Smallen; Shava Smallen; Shava Smallen; Jaikrishna Tanjore Sukumar]
Wednesday, 2016-09-07
00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
AIST Cloud
Example re
Lightning G
NAIST
NCHC clou
Thammasa
UCSD/SDS
AIST Cloud
AIST
Description Cloudstack. Hosting Virtual clusters and virtual machines.
Notes Status: Development
Contact jh.haga@aist.go.jp
Location Advanced Industrial Science and Technology
Resource Type (no resource type set)
Pragma_boot path: /home/ssmallen/pragma_boot
Pragma_boot version: 2
Python path:
Temporary directory: /home/ssmallen/pcc
Username: ssmallen
Available CPUs: 128
Available Gb Memory: 384
Deployment type: Rocks KVM
ENT-enabled: yes
Site hostname: 163.220.54.102
Latitude: 36.060839
Longitude: 140.137303
Thursday, 2016-09-08
00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
AIST Cloud
Example resource
Lightning Green
NAIST
NCHC cloud
heduler/Web/reservation.php?rid=4&sid=1&rd=2016-09-07


Cloud Scheduler
Dashboard
My Account
Schedule
Help
Create
Cancel
Create a new reservation
Shava Smallen (ssmallen@sdsc.edu)
Resources to be reserved
AIST Cloud More Resources
Accessories Add
Begin 2016-09-07 12:00
End 2016-09-07 13:00
Reservation Length 0 days, 1 hours
Repeat Does Not Repeat
Title of reservation
AIST demo
Description of reservation
Additional Attributes
CPUs: 1
Memory (GB): 1
VC Name: hku_biolinux
Create
Cancel


Cloud Scheduler
Dashboard
My Account
Schedule
Help
Create
Cancel
Create a new reservation
Shava Smallen (ssmallen@sdsc.edu)
Resources to be reserved
AIST Cloud More Resources
Begin 2016-09-07 12:00
End 2016-09-07 13:00
Reservation Length 0 days, 1 hours
Repeat Does Not Repeat
Title of reservation
AIST demo
Description of reservation
Your reservation was successfully created!
Your reference number is 57cfa362259ec248484292
2016-09-07
Resources: AIST Cloud
Close
Additional Attributes
CPUs: 1
Memory (GB): 1
VC Name: hku_biolinux
Create
Cancel



Your PRAGMA Cloud Reservation Was Created

Shava Smallen

Sent: Wednesday, September 7, 2016 at 12:19 PM

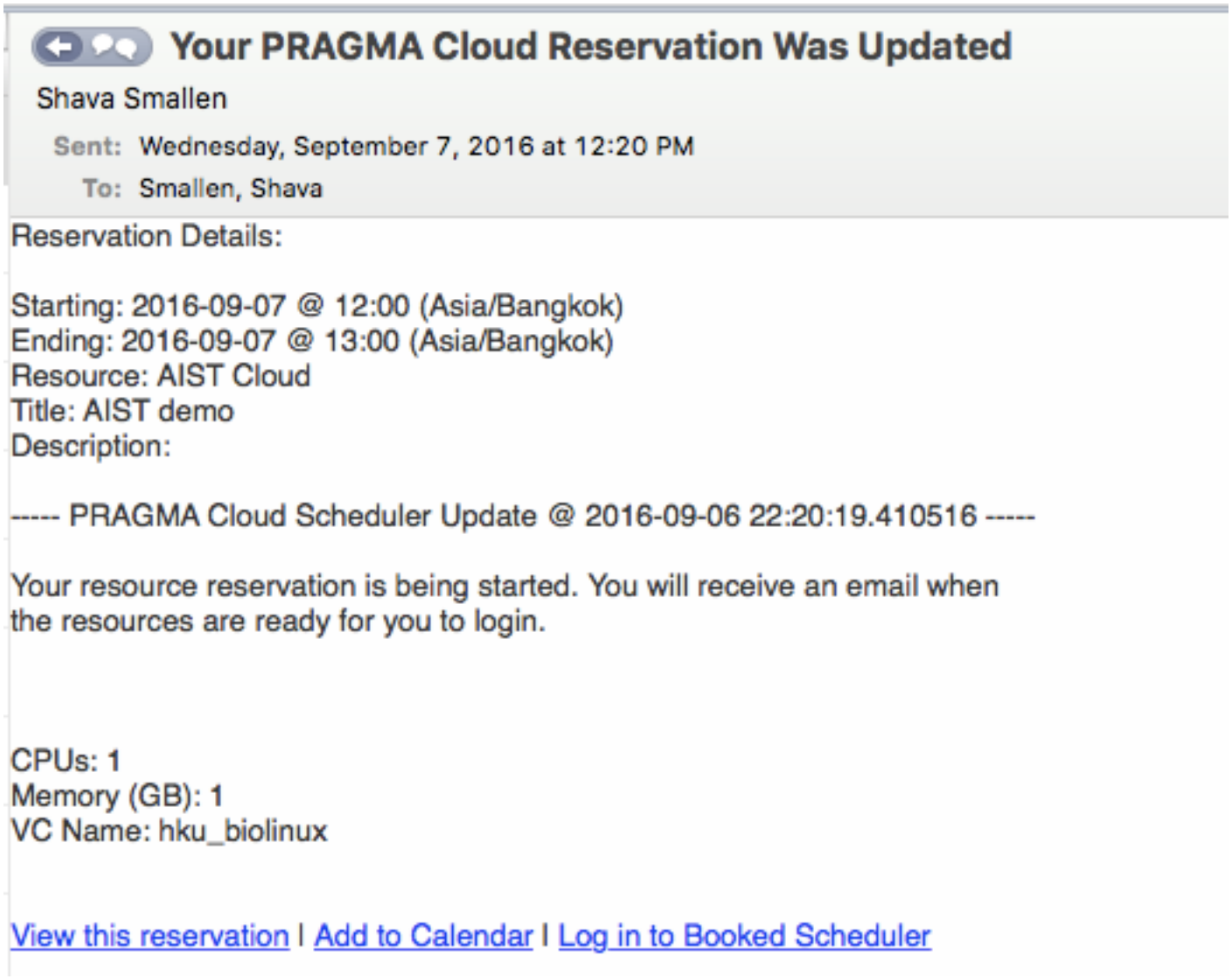
To: Smallen, Shava

Reservation Details:

Starting: 2016-09-07 @ 12:00 (Asia/Bangkok)
Ending: 2016-09-07 @ 13:00 (Asia/Bangkok)
Resource: AIST Cloud
Title: AIST demo
Description:

CPUs: 1
Memory (GB): 1
VC Name: hku_biolinux

View this reservation | Add to Calendar | Log in to Booked Scheduler



Your PRAGMA Cloud Reservation Was Updated

Shava Smallen

Sent: Wednesday, September 7, 2016 at 12:20 PM

To: Smallen, Shava

Reservation Details:

Starting: 2016-09-07 @ 12:00 (Asia/Bangkok)
Ending: 2016-09-07 @ 13:00 (Asia/Bangkok)
Resource: AIST Cloud
Title: AIST demo
Description:

----- PRAGMA Cloud Scheduler Update @ 2016-09-06 22:20:19.410516 -----

Your resource reservation is being started. You will receive an email when the resources are ready for you to login.

CPUs: 1
Memory (GB): 1
VC Name: hku_biolinux

View this reservation | Add to Calendar | Log in to Booked Scheduler

Cloudstack Driver Implementation

- Several REST API calls were needed to implement each pragma_boot call
- Each REST API call requires authentication and signature
- Complex networking configuration (e.g., public IP address and port access)
- Adding custom information to VM requires user data manipulation and 64 bit encoding
- Modify vc-out-parser code on images

TODOs for Cloudstack

- Write new template repository class for pragma_boot
- DNS names for public IP addresses
- Code cleanup
- Verify production environment

Student Hackathon
September 5-6, 2016

- **Task 1** Extension of the existing PRAGMA Cloud Testbed by setting up new computing nodes at the Thammasat University site and proposal to improve the process. (2 teams)
- **Task 2** Applications that add more visibility and analytical ability to PRAGMA Cloud Testbed services (1 team)
- **Task 3** Applications that search, query, discover or generally mine biodiversity data through Lifemapper APIs (1 team)

Team 1

Team 2

Team 3

Team 4

Hackathon Awards

Task 1 Group 1 **Best troubleshooters**

Task 1 Group 2 **Best understanding of their topic and time management** (Demo on September 9)

Task 2 Group 3 **Most creative application and deployment ready for PRAGMA testbed** (Demo on September 9)

Task 3 Group 4 **Best understanding of domain science application needs (biggest hurdle jumpers)**

Goals for PRAGMA 31

- Integrate 6 additional sites: **AIST**, NAIST, **Thammasat / Kasetsart**, IU, UF, CNIC
- Integrate PRAGMA-ENT
- **Integrate more virtual cluster images and get feedback from early users (Jason, others?)**
- Integrate image management with Google drive and Clonezilla (in progress)
- Integrate Cloud Init and boto with pragma_boot for greater portability
- **Package and document software**

More information

- **Thank you!**
  - Yoshio Tanaka
  - Jason Haga
  - Ryousei Takano
  - Hiroki Ohashi
  - Kohei Ichikawa
  - Steven Shiau
  - Weicheng Huang
  - Ceaser Sun
- **Email: pragma-cloud-admin@googlegroups.com**
- **Websites:**
  - **http://fiji.rocksclusters.org/cloud-scheduler**
  - **http://pragma-grid.net/site-setup**