

PRAGMA25

10.16-18

Beijing, China
National Stadium (Bird's Nest)



Overview of PRAGMA Progress since PRAGMA 24

2013 October 16 - 18



Thank You

Computer Network Information Center

- Director Huang Xiangyang, CNIC, Chinese Academy of Sciences
- Deputy Director Nan Kai, CNIC, CAS
- Dr. Dong Kejun (Kevin), CNIC, CAS
- Many others including Sponsor Dell

For Hosting our 25th PRAGMA Workshop



PRAGMA 6

17 – 19 May 2004





Congratulations

22 – 25 October 2013

Organized by CNIC

PRAGMA24 Workshop

March 20-22, 2013

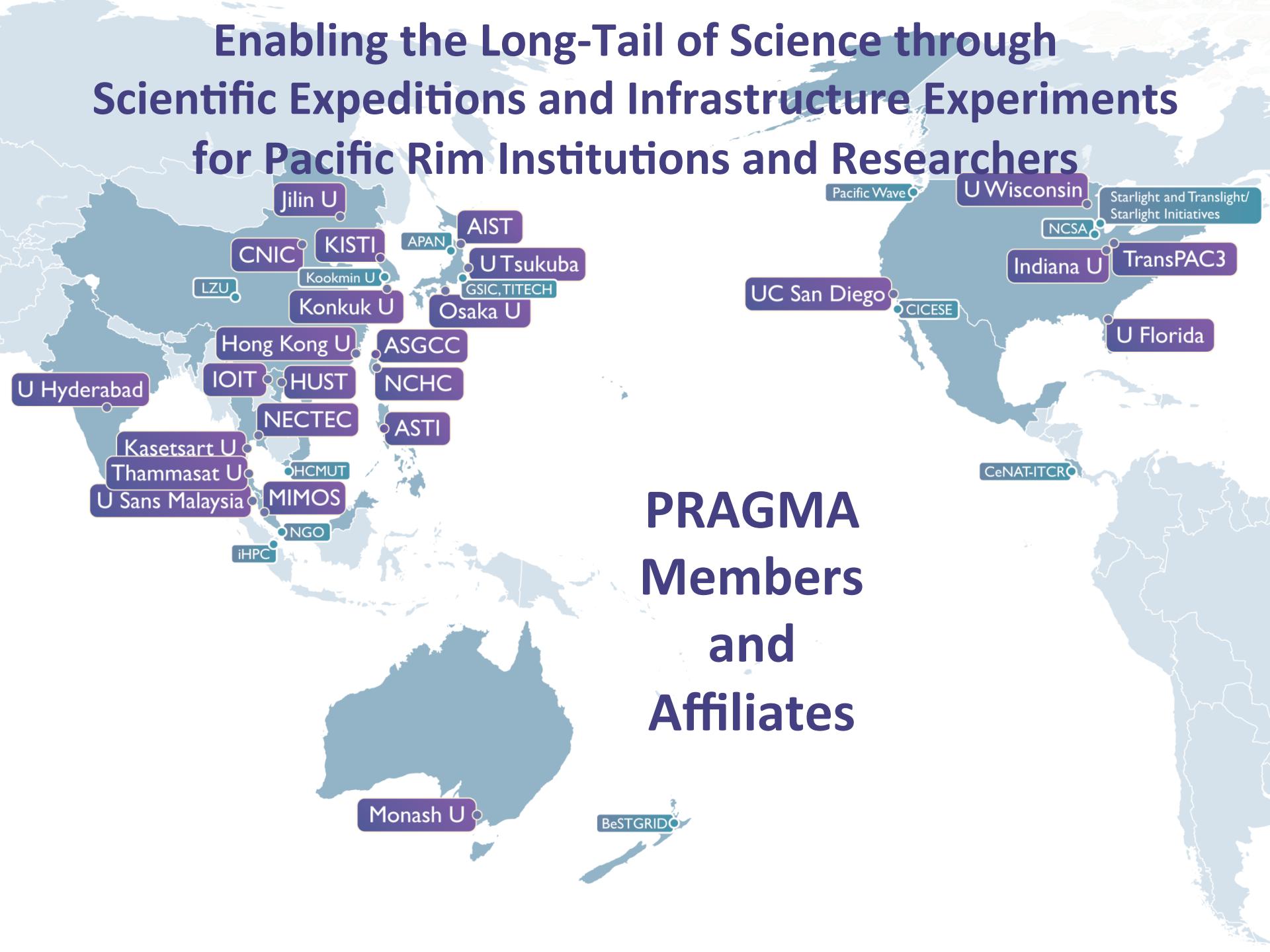
Bangkok, Thailand

FACULTY OF ENGINEERING



Kasetsart University

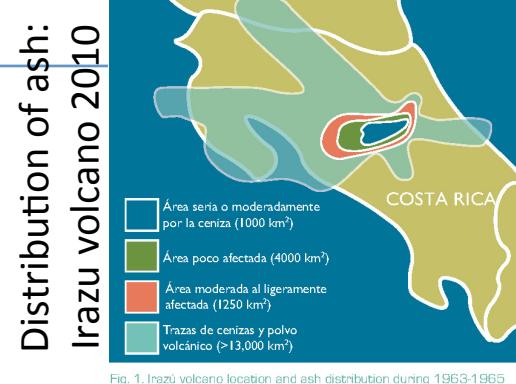
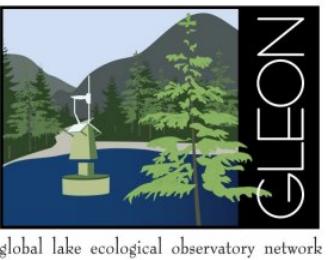
Enabling the Long-Tail of Science through Scientific Expeditions and Infrastructure Experiments for Pacific Rim Institutions and Researchers



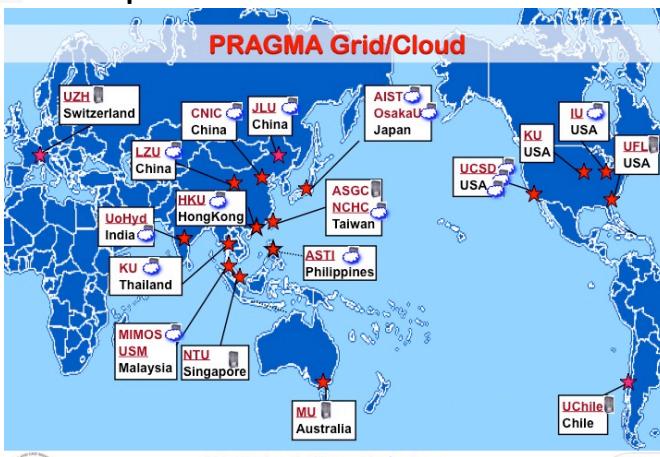
PRAGMA Members and Affiliates

Accomplishments

- Advanced scientific understanding
- Developed, tested, improved, shared approaches and software
- Created PRAGMA cloud
- Built communities
- Trained students
- Evolved with technology and needs: Grid to Cloud
- Encouraged trust and new ideas and partners

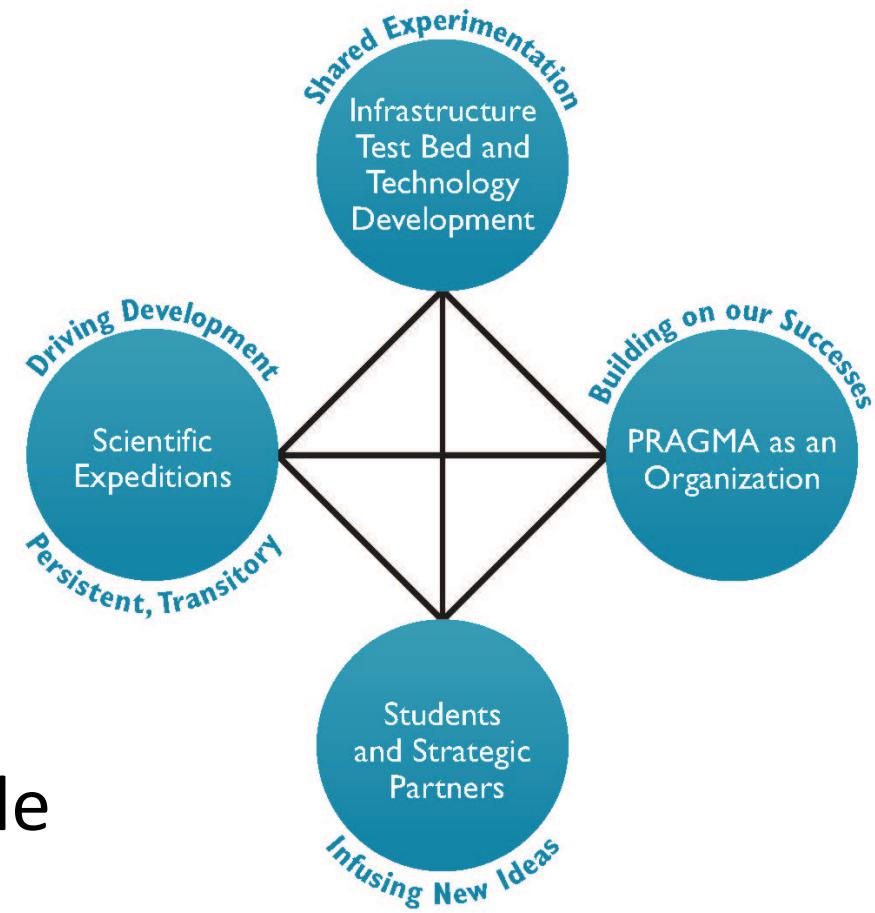


Developed CNIC
Used since
Open-source
PRAGMA 18



PRAGMA's Overarching Activities to Enable Long Tail of (Team) Science

- Foster international scientific expeditions
- Develop and improve a grassroots, international cyberinfrastructure
- Infuse new ideas through students and strategic partners
- Build and enhance the essential people-to-people trust fabric



Interdependence Essential

Grass-roots International CI:

User-defined Trust Envelop

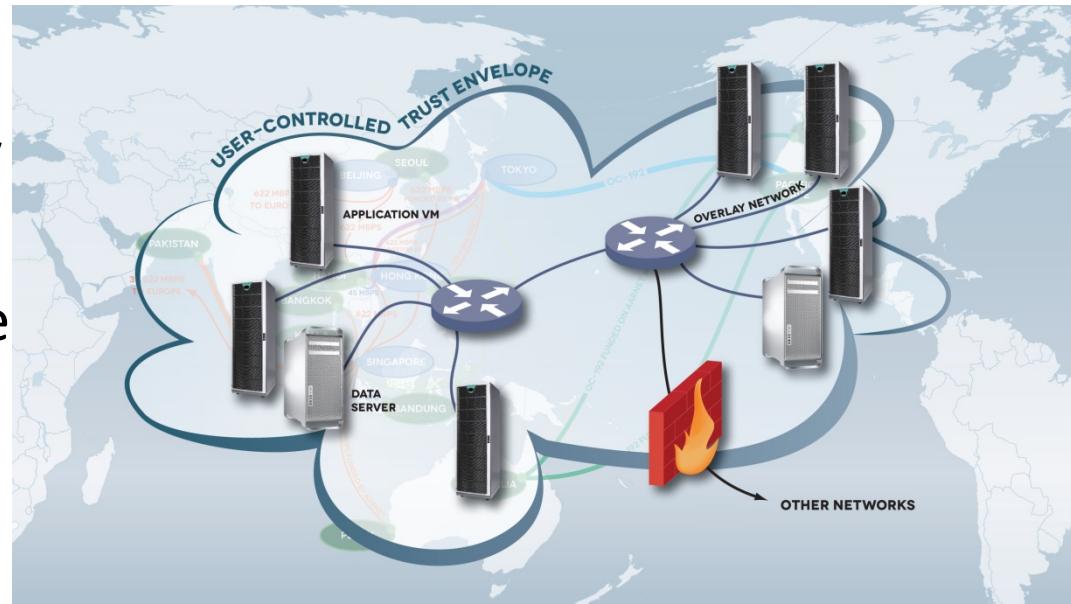
Components

- VM image, virtual cluster porting
- Software defined overlay networks
- Data cloud & provenance
- Observing systems

Importance of Trust Envelop

- Traverse firewalls and *simplify network re-configuration* of application VMs
- Provide an infrastructure that initially limits access to data

Challenge: Integration and a Plan for Trust Envelop



Using the Expeditions to Drive
Development of a
TRUST ENVELOPE

PRAGMA Collaborative Overview 2013 - 2014



- Highlights
 - Demos you will see
- PRAGMA Students
- Community Building
- Working Groups
- Institutions and Sponsors
- Finalized before SC13

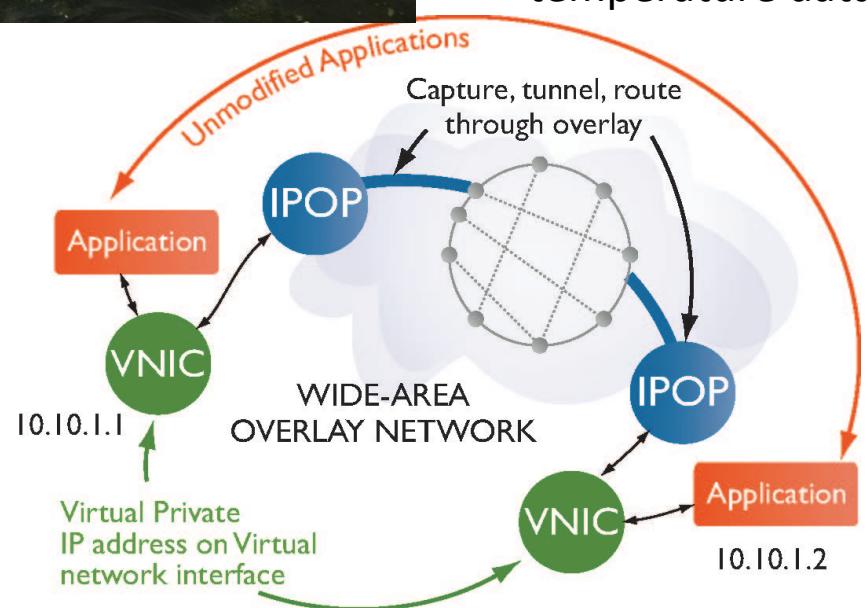
Predicting Water Quality in Lakes

Learning Phytoplankton Rules using SDN

- Indicators of water quality controlled by phytoplankton
- Run multiple simulations to understand rules
- Using VMs to avoid challenges of different architectures
- Using IP-over-P2P (IPOP) to interconnect VMs across multiple institutions



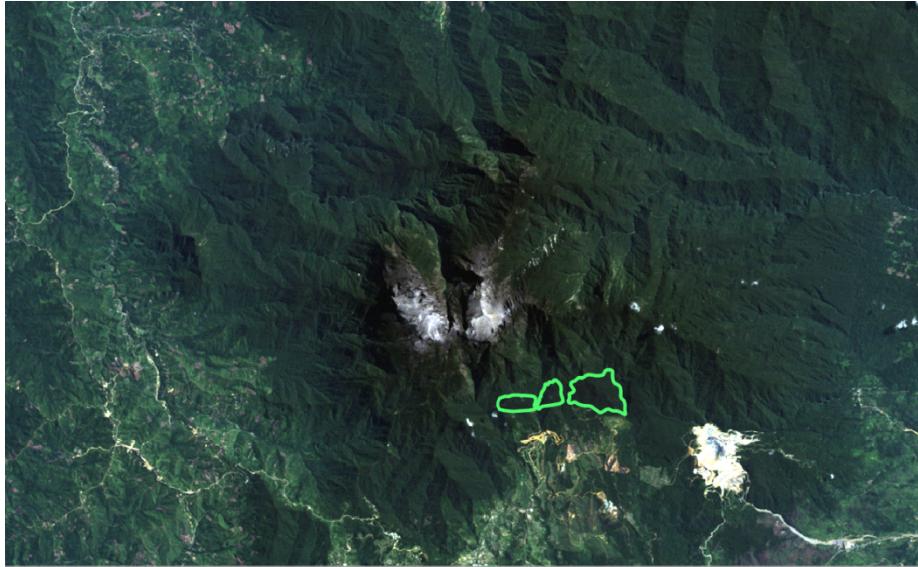
Collecting light, temperature data



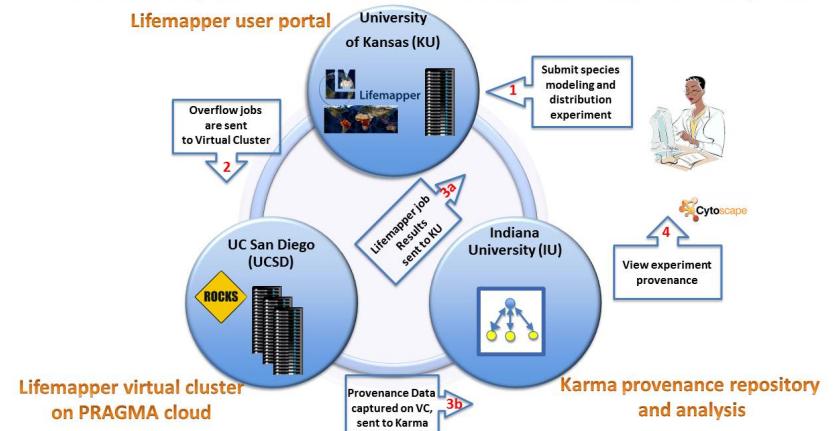
Demo / Poster: Renato Figueiredo (U FL), Paul Hanson (U Wi), Cayelan Carey (VA Tech), Pierre St. Juste, Kyuho Jeong (U FL), Grant Langlois, Luke Winslow (U Wi), Jonathan Doubek (VA Tech)

Biodiversity in Extreme Environments

Distribution Prediction by Sharing CI and Provenance Capture



PRAGMA experiment with Virtual Clusters and metadata capture



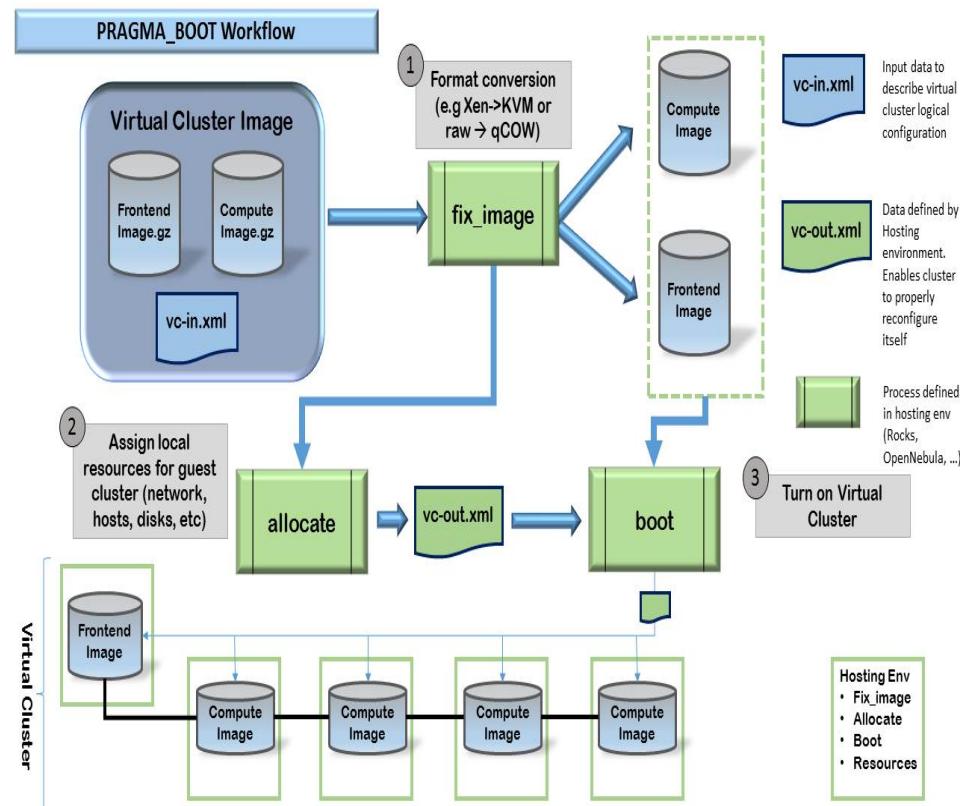
Additional Work of Expedition

- Gained remote sensing data
- Expanded interactions

Demo: Nadya Williams (UCSD),
Aimee Stewart (KU), Quan Zhou (IU)

PRAGMA VC Sharing Automation Phase 4

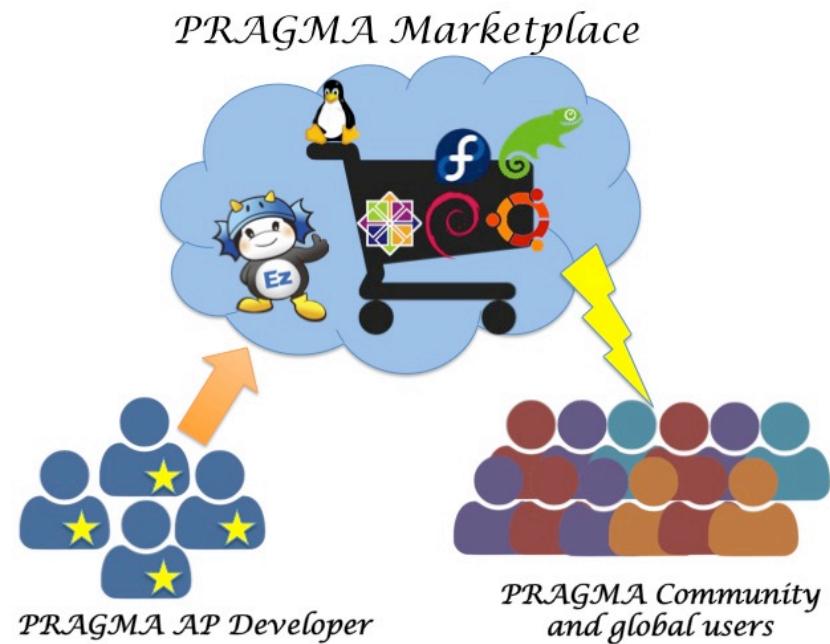
- For specialized applications: “build once, run easily everywhere”
- Share a virtual machine image among multiple hypervisors (Xen and KVM, and Virtual Machine (VM) and hosting middleware (Rocks, Ezilla, OpenNebula, Amazon EC2)
- Developed *pragma_boot* to automate VC translation



Demo: U-chupala, Pongsakorn, Ichikawa Kohei (NAIST); Clementi Luca, Williams Nadya, Papadopoulos Philip (UCSD) Tanaka Yoshio, Ota Akihiko (AIST) Huang Weicheng (NCHC)

Lightweight Cloud Application Marketplace

- Metadata Service to bridge cloud users and available VM images
Provides registration service for vm owners (storage designated by owner)
- Provides tool to convert between VM formats
- <http://140.110.30.2:6242/appliance>

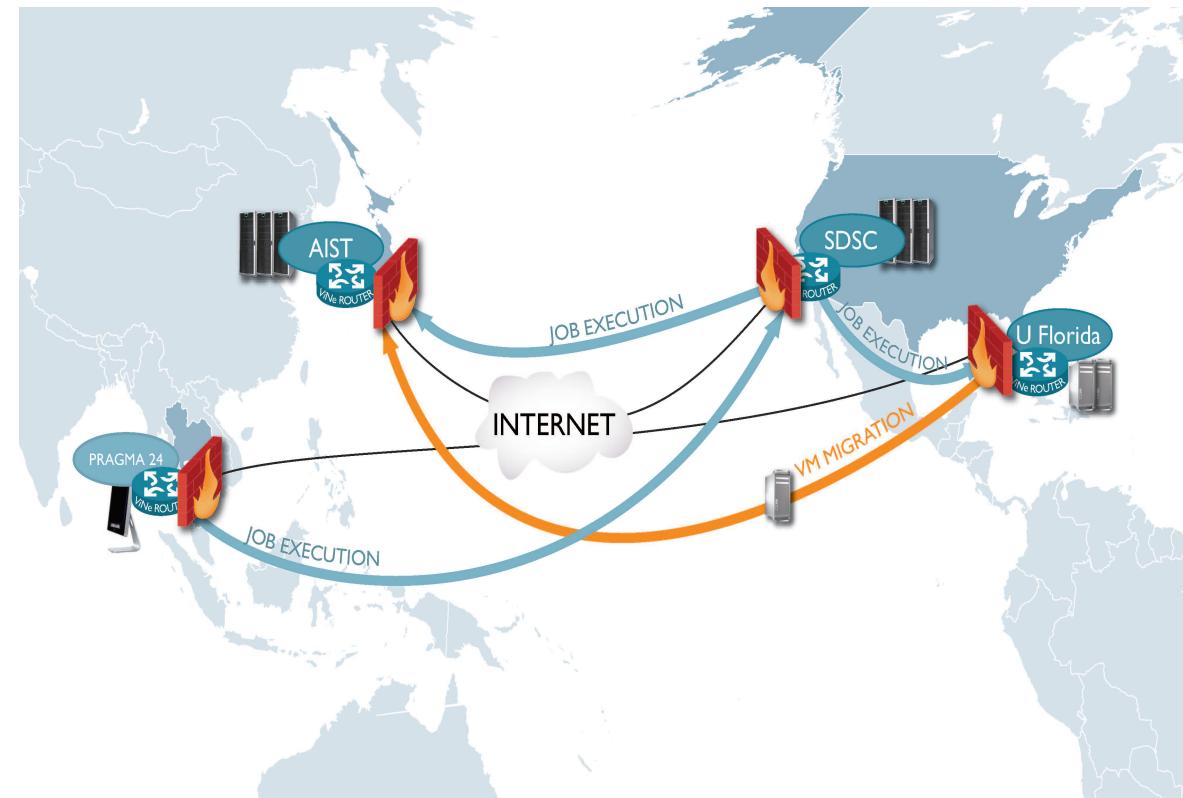


Demo: Chi-Ming Chen, Kuo-Yang Cheng, Weicheng Huang (NCHC);
Yoshio Tanaka (AIST), Luca Clementi, Nadya Williams, Philip Papadopoulos (UCSD)

ViNe: Software Defined IP Overlays

Infrastructure (VR) and Management

- ViNe (U FL): SDN establishes wide-area IP overlays (public, private networks)
- ViNe live migration of VM illustrated at PRAGMA 24
- Future: expand PRAGMA sites; user defined isolated overlays



Demo: Mauricio Tsugawa (U FL);
Nadya Williams, Luca Clementi,
Phil Papadopoulos (UCSD)

OpenFlow Controller and Collaboration

- Developed OpenFlow Controller, and measured performance five sites (NAIST, Osaka, NICT, others)
- Will build in a distributed network monitoring system “OverLoad” developed by Kasetsart U team (based on PRAGMA 24 discussions)

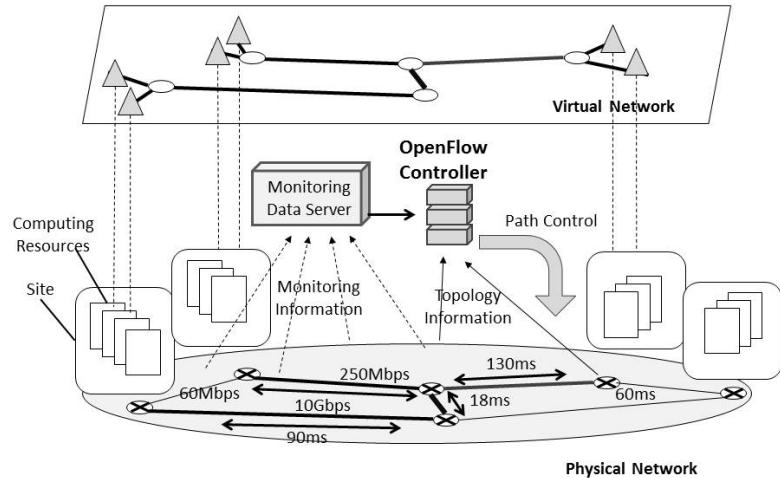


Figure 1: Network performance-aware routing system

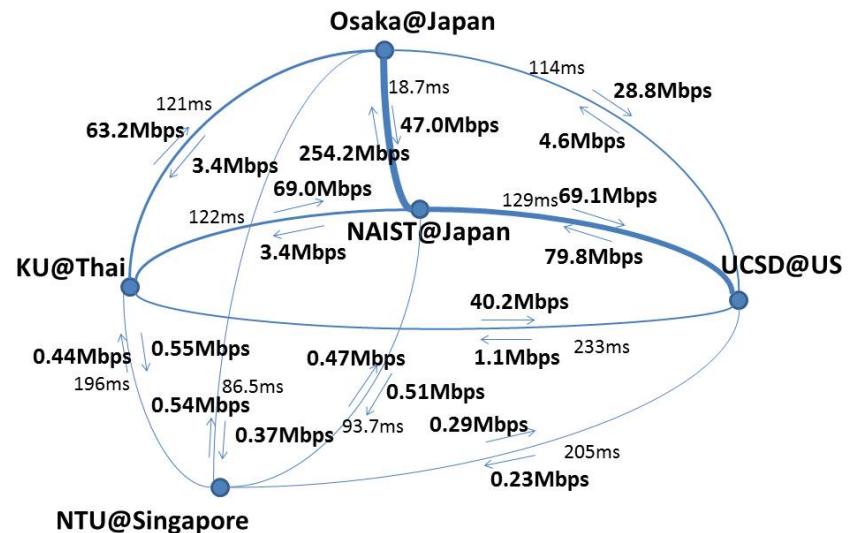
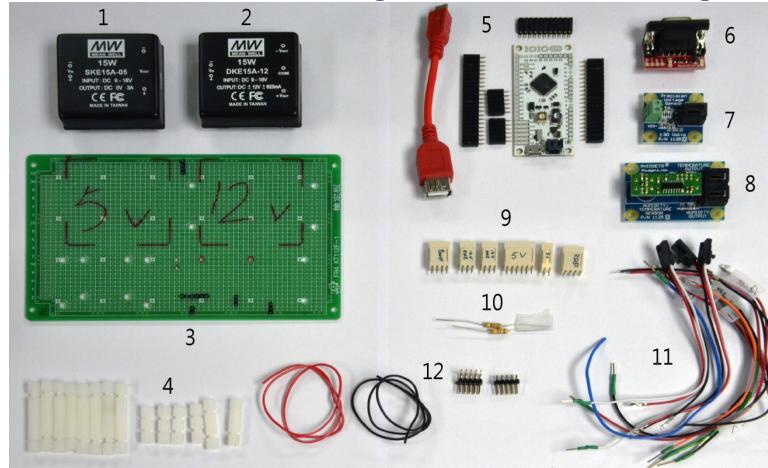


Figure 2: Network performance of the experiment environment

Mobile Technology and Clouds: Development, Deployment, Community Building



1. 5V voltage regulator
2. 12V voltage regulator
3. Perf board
4. Plastic hex-screw pillar
5. IOIO board and pin-socket connector
6. RS232 shifter

7. Voltage sensor
8. Humidity/temperature sensor
9. 2-pin, 3-pin, 4-pin, and 6-pin power connectors
10. Resistors as a voltage divider for decreasing humidity sensor output voltage
11. Sensor signal wire
12. Wire and pin for soldering power and ground connections beneath perf board

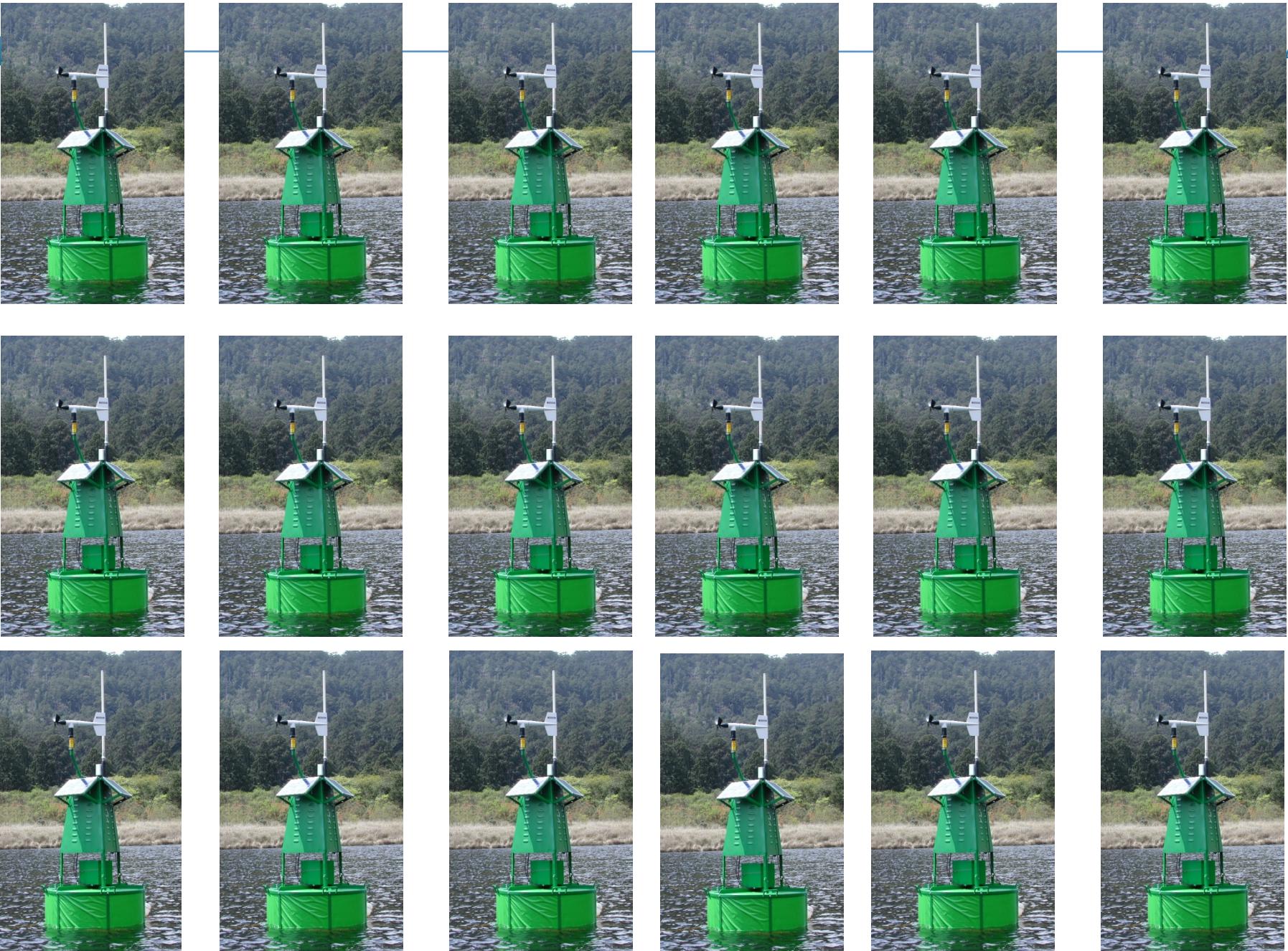


Scalable instrumentation and cyberinfrastructure is critical



We can do this scale now

P



Problematic, but possible with today's cyberinfrastructure



Not currently possible

Scale needed to answer regional/continental questions

Challenge

What is PRAGMA's role in
cloud-mobile technology
development?

San Kei En Project

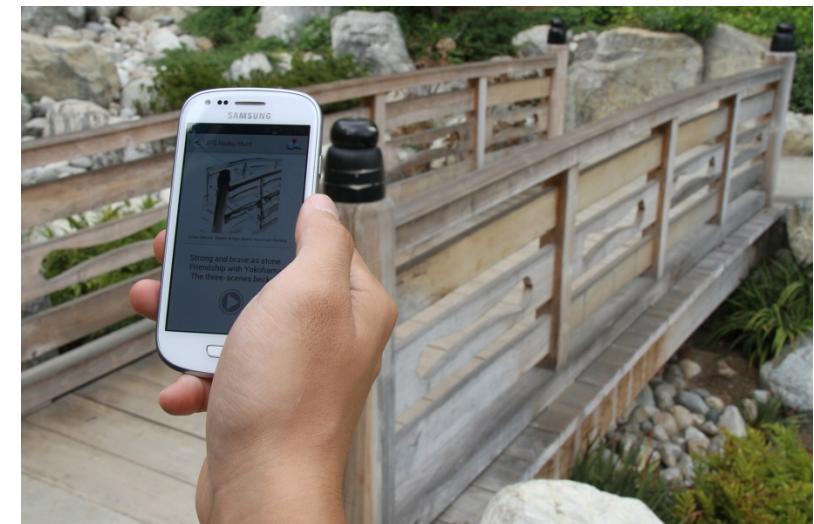
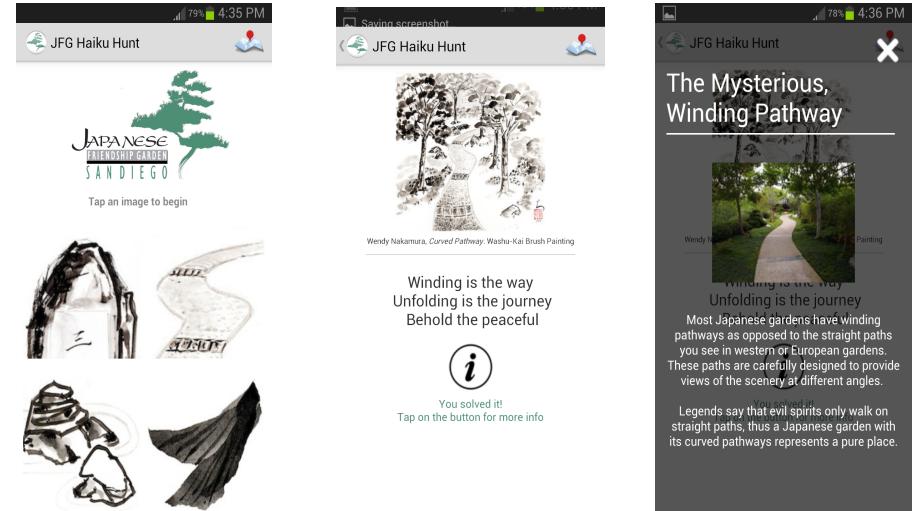
(Japanese Friendship Garden Haiku Hunt)

- Android-based, location-aware mobile application
- First outside use of Place Sticker technology to preserve beauty, maintain connectivity
- Fun! Haiku! Impact!

Demo: UCSD: Jason Haga, Jesus Rios (PRIME 2013); Osaka U: Shinji Shimojo;

BPOC: Vivian Haga, Wesley Hsu (PRIME 2011);
ISID: Kazuhiro Toda;

Ritsumeikan U: Nobuhiko Nishio



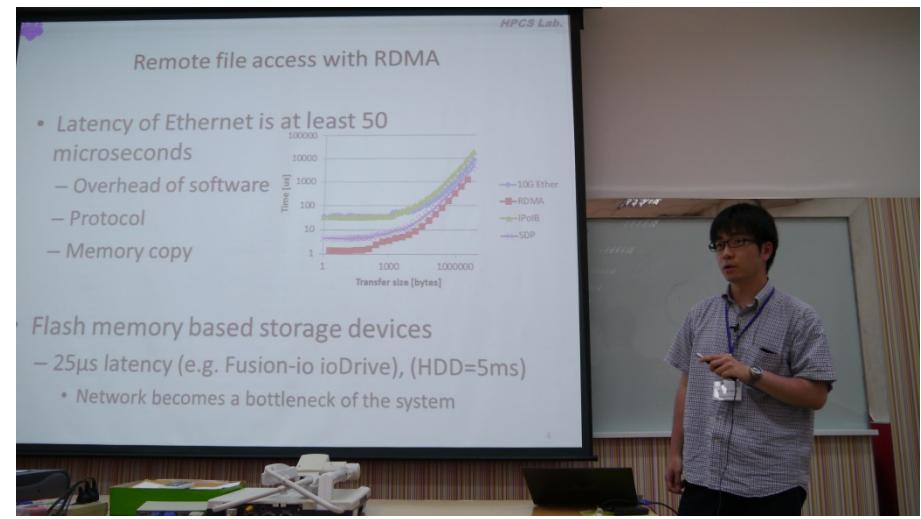
PRAGMA Students: Contributions



PRAGMA Students: Benefits

- Gain professional experience interacting in an international setting
- Create lasting network of international peers through working with peers on joint efforts
- Strengthen research through engagement with mentors/advisors outside students' home institution
- Undertake opportunities for short-term visits by undergraduate / early PhD student

To succeed we need your enthusiastic support!

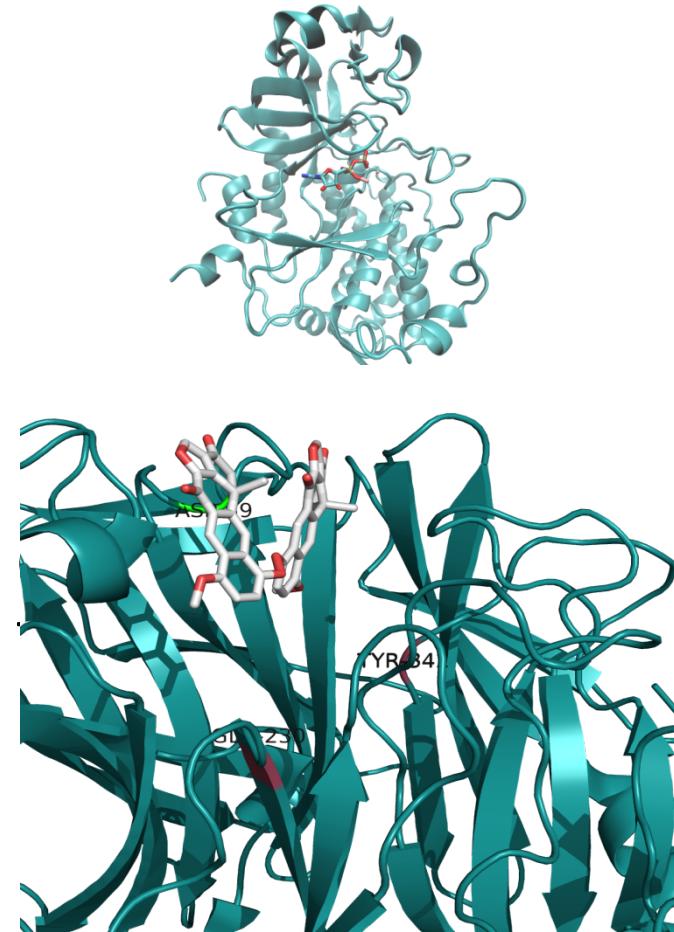


PRIME 2013: Advancing PRAGMA Activities

Projects

- Extend Android SensorPod to new application
- Prototype INCA monitoring to mobile technology
- Develop Haiku Hunt and deploy Place-Sticker technology to out doors
- Implement images for virtual screening
- Use computer technology for drug discovery in infectious and other diseases

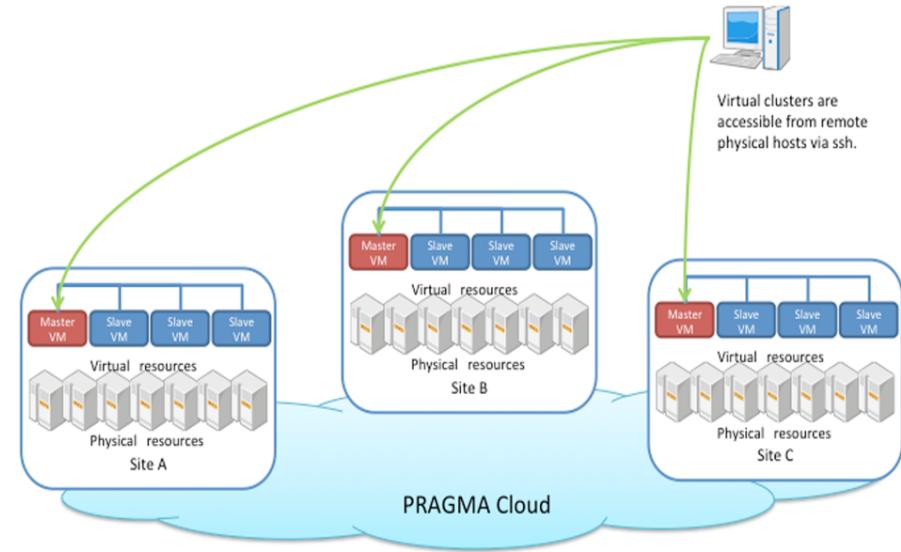
Institutions



**PRAGMA can support these opportunities for our students
Students build connections between PRAGMA members**

Deployment of Virtual Clusters for Molecular Docking Experiments on the PRAGMA Cloud

- Docking experiments are key tool *in silico* drug discover
- Physical grid computing can create inconsistent results - heterogeneity
 - Impacting results
 - Demonstrated by PRIME student (2009)
- Used *pragma_boot*
- Long-term goal: improve virtual dock



Demo: Kohei Ichikawa (NAIST),
Kevin Lam, Karen Rodriguez (PRIME 2013)
Wen-Wai Yim (PRIME 2009), Jason Haga UCSD

Building Communities

- Biodiversity
 - New interactions
- Environmental Observing Communities
 - Training & new deployments
- Mini-PRAGMA Indonesia
 - New activities
 - New workshops!



Cyber Learning Working Group

Objectives

- ❖ Providing cyber education & research environments in computational science
- ❖ Utilizing Computing resources & services in PRAGMA community
- ❖ Promoting developing & utilizing activities through global collaborations

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- ❖ Development of Education open platform and education/research S/W
- ❖ Establishment of international research communities and connections to higher education
- ❖ Construction of collaboration channels amongst PRAGMA WG

Collaborations

Other WGs
(Resource/Tele-Science
Bio/Geo)

PRAGMA Community

Activities

Education/Research,
S/W development

Cyber
Learning
WG

Web based Portal Service

Workshop/Seminar/Contest

Source: Kum Won Cho

Sharing Computing Resource
(middleware/SaaS/Cloud Computing)

Working Groups, Expeditions, Students

PRAGMA Cloud
VM/VC Experiments
Overlay Networks
Data Provenance

Interface to Integrate
Earth Observing

Sensor Networks
Remote Control
Network Applications

Avian Flu Grid
Infectious Disease

Resources

GEO

Telescience

Biosciences

Cyber-Learning

**PRAGMA
Students**

Scientific Understanding
Community Tools

Biodiversity
Expedition

Data
Discovery
Visualization

Overlay
Networks

Earth
Observing &
Sensors

Sustainability of PRAGMA

- Growing Future Leaders
 - Succession planning
- Products
 - What is it we do? Students, Software, People network (access)
- Future Funding Model
 - Provide stability for coordination
- What is PRAGMA – or how to articulate it
 - Global Organization
 - Cradle of international idea – bring an idea and grow it
 - Fluid network of trust

From PRAGMA 24
22 March 2013

Subcommittees of Steering Committee

Sustainability of PRAGMA

Chair: Jim Williams

- Review the issue of sustainability
- Review/revise components on
 - Grow Leaders
 - Create funding models
 - Develop clearly defined products
- Discuss and recommend strategies and implementable approaches that would help PRAGMA continue to be successful

PRAGMA Students

Co-Chairs: Beth Plale, Karpjoo Jeong

- Develop strategies and implementable approaches to
 - Align long-term nature of grad student research with short-term PRAGMA projects
 - Support (financially) graduate student participation on PRAGMA
 - Provide the networking, leadership, and research opportunities for students in PRAGMA

Steering Committee Topics

SC Members Present

- Wing Keung Kwan (HKU)
- Fang-Pang Lin (NCHC)
- Kai Nan (CNIC)
- Phil Papadopoulos (UCSD)
- Shinji Shimojo (Osaka U)
- Yoshio Tanaka (AIST)
- Whey-Fone Tsai (NCHC)
- Putchong Uthayopas (KU)
- Xiaohui Wei (JLU)
- Jim Williams (ex officio)
- Baoping Yan (CNIC)

Topics

- Sustainability of PRAGMA
 - Jim Williams Chair , Shinji Shimojo, Osaka U; Jose Fortes, U Florida; Philip Papadopoulos, UCSD; Yoshio Tanaka, AIST; Whey-Fone Tsai, NCHC
- PRAGMA Students
 - Beth Plale, Indiana U, co-chair; Karpjoo Jeong, Konkuk U, co-chair; Putchong Uthayopas, Kasetsart U; Susumu Date, Osaka U; Paul Hanson, U Wisconsin; Meilan Jiang, Konkuk U; Gabriele Zhou, Indiana U; Yuan Luo, Indiana U

This is Your Workshop

- Working Groups: 4 (~4.5 hours)
- Demos: 6 (2 hours) – from working groups
- Posters: 23 (1.25 hours)
- Opportunities to start collaborations / use the collective resources

Engage!

Our NEW PRAGMA Website

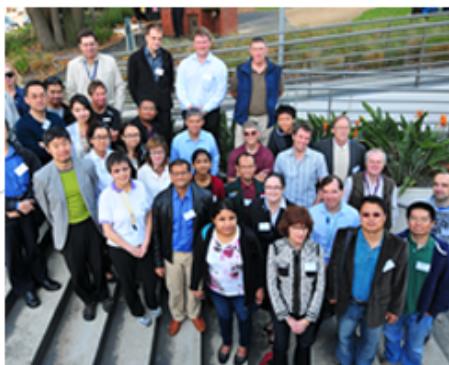


PRAGMA

ABOUT SCIENTIFIC EXPEDITIONS TECHNOLOGY DEVELOPMENT MEMBERS & PARTNERS STUDENTS NEWS & EVENTS RESOURCES

PACIFIC RIM APPLICATIONS AND GRID MIDDLEWARE ASSEMBLY

ENABLING THE LONG TAIL OF SCIENCE THROUGH SCIENTIFIC EXPEDITIONS & INFRASTRUCTURE EXPERIMENTATION FOR PACIFIC RIM INSTITUTIONS & RESEARCHERS



Welcome

PRAGMA is a community of practice comprising individuals and institutions from around the Pacific Rim that actively collaborate with, and enable, small- to medium-sized groups to solve their problems with information technology. Key to PRAGMA's success is the active involvement of participants in scientific expeditions, technology development, student engagement, and outreach to [new communities](#).

Attending our workshops is an ideal way to become familiar with what PRAGMA does, and how we interact as a community of trust. We invite you, your students and colleagues to explore this site, visit our partner sites, and attend future workshops (which do not carry a [registration](#) fee). We look forward to seeing you there!



06JUN13: Pacific Rim Collaboration Expands Interactive Exhibits

14JUN12: PRAGMA Celebrates 10th Anniversary s

23NOV12: Redeployable Cyberinfrastructure for Environmental Observing Systemss



09JUL13: Registration Now Open for PRAGMA 25! October 16-18, 2013

Central Reference Site



NSF Award

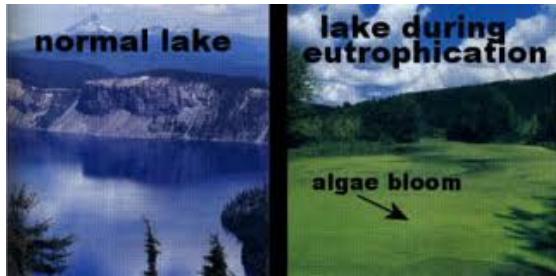


PRAGMA has been funded

Scientific Expeditions

PRAGMA forges collaborative, multidisciplinary teams to address scientific questions of high societal impact. These questions define and drive PRAGMA's technology development efforts. There are three current expeditions:

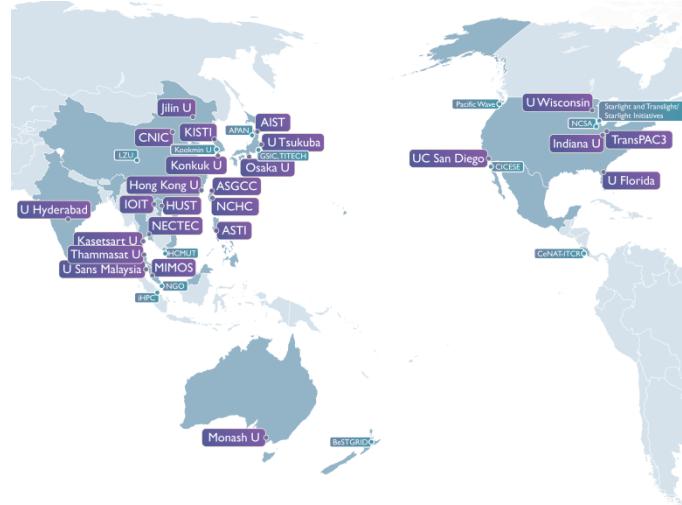
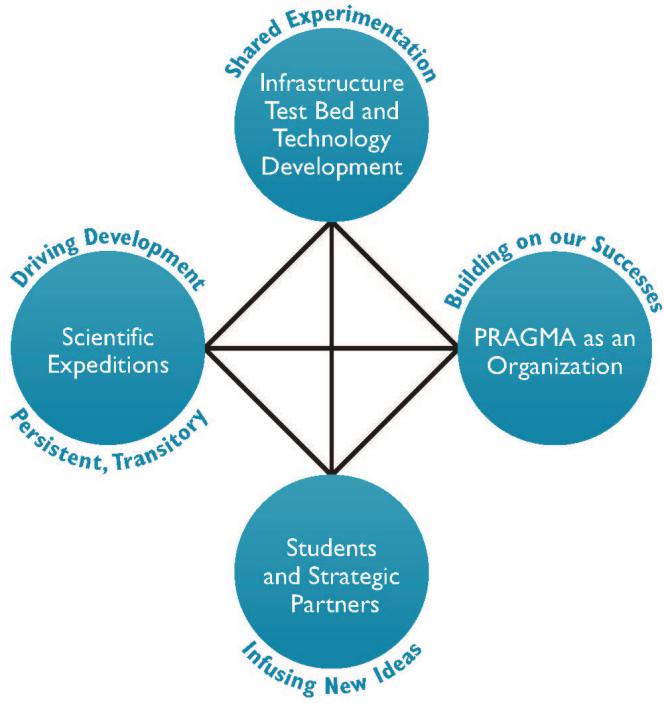
- Understanding adaption in extreme environments;
- Predicting impact of eutrophication on lake ecosystem services; and
- Addressing infectious disease through computer aided [drug discovery](#)



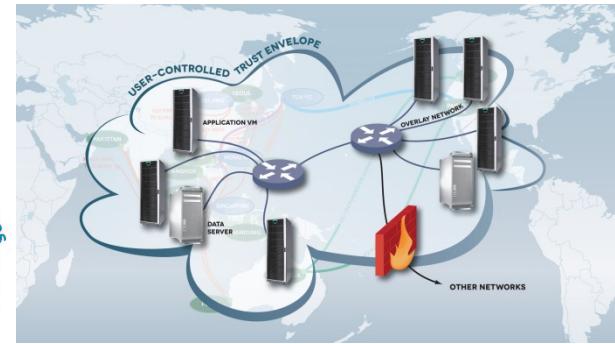
Virtual Scientific Expeditions



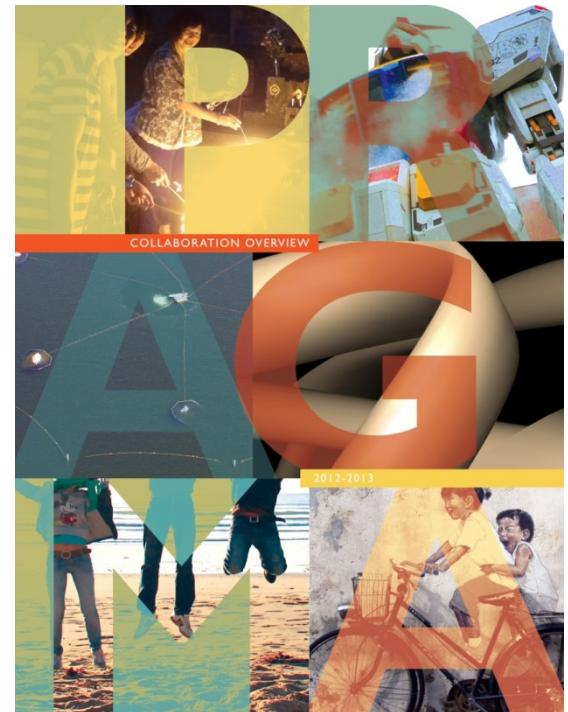
PRAGMA Students



PRAGMA Member Sites



Trust Envelop



PRAGMA Community

Leverage with other projects

- GEO Grid
- iDigBio
- DataONE
- AP BON
- Other project Ito