MOTIVATION

➤ Public clouds are opaque, outside users and cloud researchers have no access to:

➤ capacity/performance/utilization of underlying cloud components:
  hypervisors, physical nodes, switches, datacenter cooling/power equipment, ...

➤ No holistic view, inhibits full understanding

➤ main obstacle behind cloud research and innovation

➤ Goal:

➤ provide rich, consolidated information from all layers of the cloud to initially trusted researchers, eventually to some extent to users

➤ Expose the rich information critical to OCX model to allow users to make intelligent decisions

➤ Exploit rich information from MOC to enable broad cloud computing research community.
MONITORING IN MOC

➤ Power monitoring:
  ➤ Cluster level: Server/switch power monitoring (IPMI - power, fan speeds, temperature, …)
  ➤ Datacenter level: IRCs, chilling towers, water pumps, …
➤ Physical server utilization/capacity (CPU, memory, storage, …)
➤ VM resource usage (OpenStack, hypervisors, VCPU, memory, I/O, network, …)
➤ Switch-layer network monitoring (SNMP - inbound/outbound traffic per port)
➤ Log monitoring (OpenStack services, servers, switches, …)
➤ Hardware performance counters
➤ Application layer data
➤ Sys-calls, lib-calls,
➤ …
CURRENT MOC MONITORING INFRASTRUCTURE

Cloud Management (OpenStack) Layer
- OpenStack Services
  - Nova
  - Keystone
  - Glance
  - Cinder
- Virtual-layer Utilization and Physical to Virtual Mapping
- Server and OpenStack Logs
- Server Power Usage (IPMI)
- Switch Networking data (SNMP)
- Physical Resource Utilization

Data Collection
- Ceilometer
- LogStash
- Sensu

Data Storage
- MongoDB
- Elastic Search
- InfluxDB

Services
- Metering and Billing
- Debugging
- Tenant Cloud Utilization Visualization
- Monitoring data API
- Security data API
- Monitoring & Alerting

Analytics
- User Decision Support
- Cloud Resource Management
- Cloud Introspection Auditing & Security
VIRTUAL LAYER RESOURCE UTILIZATION (THRU CEILOMETER)
POWER MONITORING (THRU IPMI)
NETWORK MONITORING (FROM SWITCHES THRU SNMP)
PHYSICAL LAYER RESOURCE UTILIZATION
MONITORING CHALLENGES

➤ Architecture independent monitoring
  ➤ switches (SNMP), server power/temperature (IPMI)

➤ Data consolidation
  ➤ multiple channels, correlating data, resource mapping

➤ Scalable monitoring infrastructure design

➤ Supporting various use cases
  ➤ batch analysis / online decisions

➤ ...
FUTURE DIRECTIONS

➤ Expand and stabilize the monitoring infrastructure
   ➤ evaluate OpenStack Monasca
   ➤ embedding datacenter-level power monitoring
   ➤ simulation toolboxes for datacenter research
➤ Support MOC operational needs
   ➤ showback and billing
➤ Enabling users/research
   ➤ exposing the data programmatically
   ➤ correlating & visualizing virtual + physical
   ➤ cloud security monitoring service (Alina)
   ➤ support OpenStack Watcher for resource management
   ➤ ...

QUESTIONS?

➤ Checkout monitoring demo for more

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