AIST Managed Cloud Environment

—a PI's Perspective

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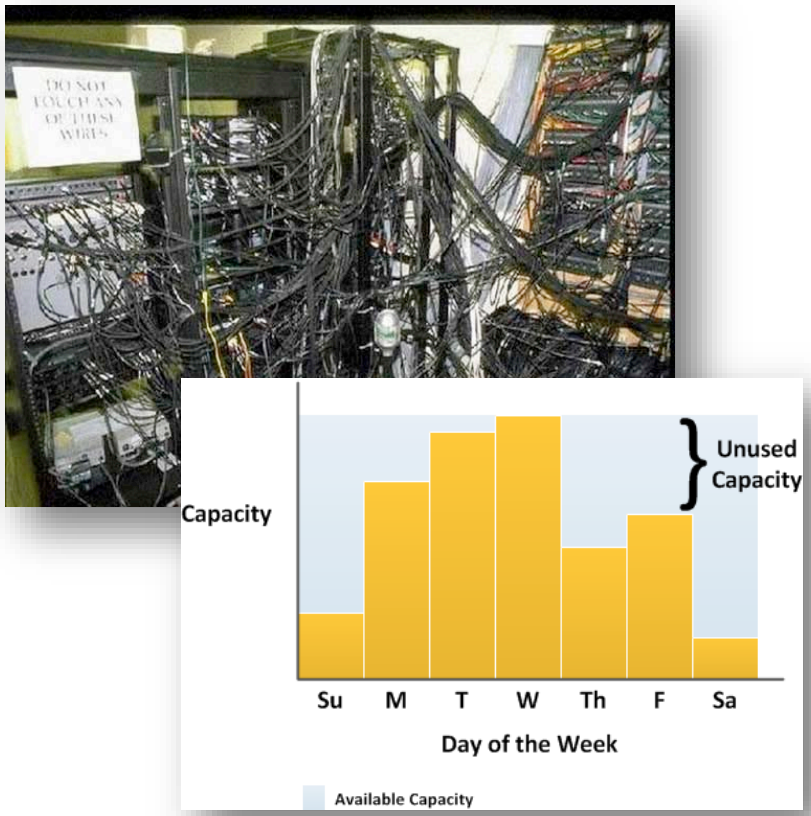
Benefits

- How the cloud offerings of AIST would specifically help support your research?
- How it can help AIST projects *get more computing resources beyond what they typically would get if they go with the traditional hardware procurement* route.

On-premise hardware procurements



Managed cloud approach

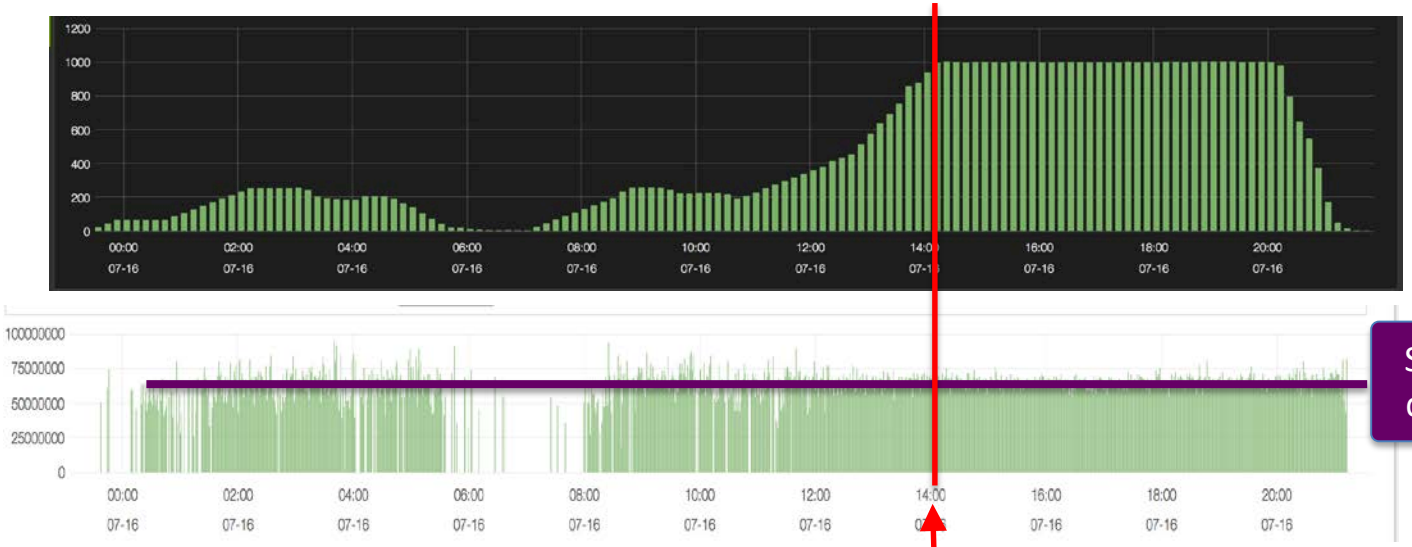
- Capital-expenditure Free
  - *"Pay as you go"*
- Agility and elasticity
  - Reacting to changing requirements.
- Virtualization
  - Management, deployability, reproducibility
- Scalable performance
  - High data volume and high data throughout
- Cloud data center efficiencies
- Resource management, including billing
- IT security compliance
  - Security updates, compliance, monitoring,

Example: OCO-2 Science Data System Adapted to AWS

- Science requirements change. Can science data systems react quickly enough to accommodate science demands?
- OCO-2 L2 Full Physics processing operational in AWS
  - Auto scaling of compute resources
  - Demonstrated capability of high data throughput rates and elastic compute/storage

compute nodes over time

Per node transfer rate over time



Scalable internal data throughput

@ 32,000 processors

Initial Lessons Learned

- What is the "user experience" in terms of any potential complexity?
- *"Trimming the fat"*
- Cost models
  - Costs differences among compute instance types and storage types
  - Cost differences between regions
  - Egress!
- Geographical locality
  - Where is compute and storage?
  - Moving data and processing.
- *Benchmark, benchmark, benchmark, ..*
  - "*Cost per unit*" yields non-obvious results

prefered minimun job duration (m) :	50

	test runs					prefered job size		on-demand (US-West-1)		spot (US-West-1)		on-demand (US-West-2)		spot (US-West-2)	
instance	soundings per job	concurrent processors	# test runs	mean runtime (s)	mean runtime per sounding per processor (m)	# soundings	# soundings (evenly distributed processors)	mean costs per job	$ per sounding	mean costs per job	$ per sounding	mean costs per job	$ per sounding	mean costs per job	$ per sounding
m2.4xlarge	32	8	42	1382	5.8	69	7	$0.4223	0.01320	$0.0250	0.00078	$0.4138	0.01293	$0.0384	0.00120
cc2.8xlarge	32	32	14365	615	10.3	156	16					$0.3417	0.01068	$0.0462	0.00144
m3.2xlarge															
c3.8xlarge	32	32	126	461	7.7	208	22	$0.2448	0.00765	$0.2151	0.00672	$0.2151	0.00672	$0.3073	0.00960
r3.8xlarge	32	32	131	489	8.2	196	22	$0.4238	0.01324	$0.0543	0.00170	$0.3803	0.01189	$0.3803	0.01189