Leveraging the Cloud for your GIS

VCGI Webinar

December 4, 2012

GCS Research: Introduction

Alex Philp, Ph. D.
President, GCS Research
Missoula, Montana
406.532.3254 - aphilp@gcs-research.com

John Waterman, PMP, GISP
Vice President of Geospatial Solutions, GCS Research
East Burke, Vermont
802.473.4009 - jwaterman@gcs-research.com

- Our focus:
  - GIS Solutions
  - Research & Development
  - Strategic Consulting
- Our customers: local, state, tribal, federal government, and private sector.

Microsoft Partner
Gold Independent Software Vendor (ISV)

esri Partner Network Gold

GCS research™

What are people looking for in the cloud?

- **Cost Savings**
  - Use vs. license model
- New Agile Features
- Optimization for Higher Quality

GCS research™

Cloud Computing Definition

- Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.
  - The National Institute of Standards and Technology (NIST)

GCS research™

Essential Characteristics

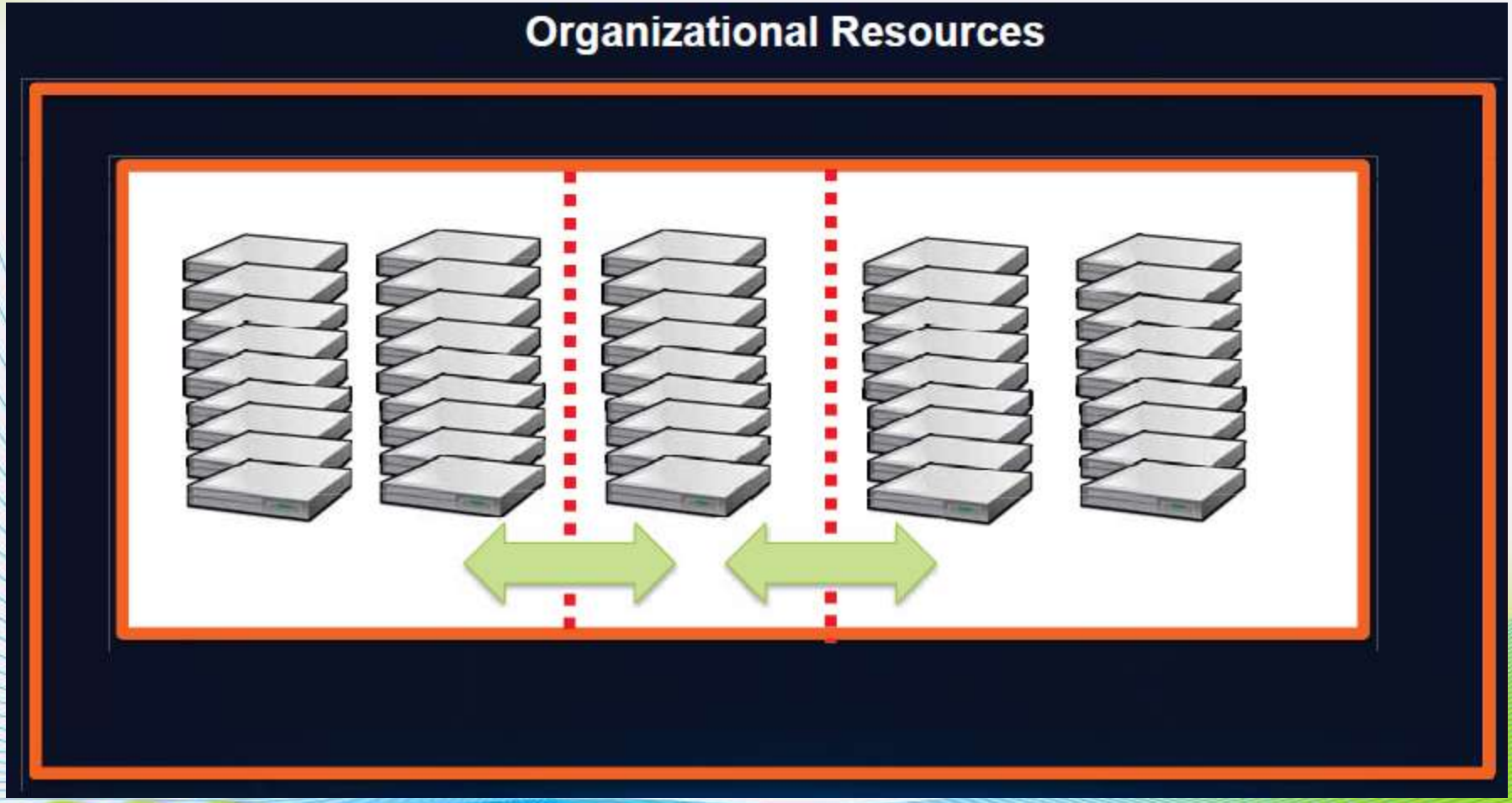
- On-demand self-service
  - Provision computing capabilities without human interaction
- Broad network access
- Resource pooling
  - Between Servers and Geographically
- Rapid elasticity
  - Capabilities dynamically provisioned/released to scale up/down
- Measured service
  - Usage metering
  - Reported to providers/consumers

GCS research™

Cloud Resource Pooling: Dynamic Resource Allocation

GCS research™

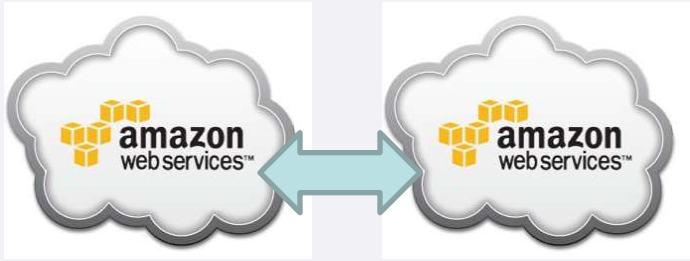
Cloud Resource Pooling: Dynamic Resource Allocation



GCS research™

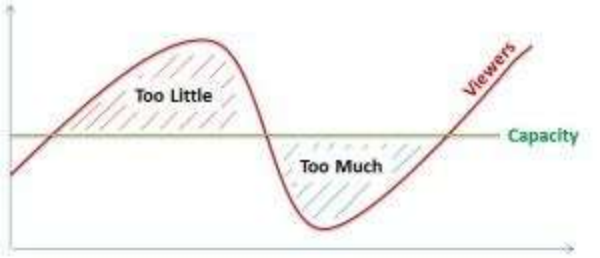
Resource Pooling: Geographical

- Fail over to cloud zones
- Mission Critical Operations
  - **Deploy into several cloud providers for ultimate protection**
- Only pay for what you use



GCS research™

Cloud Rapid Elasticity



- Auto Scaling Service
- How it works?
  - Configure through administrator app
  - Set metric alarm and scaling policy
  - Set min and max number of instances
- i.e. on instance failure, automatically launch new instance to replace failed instance.

GCS research™

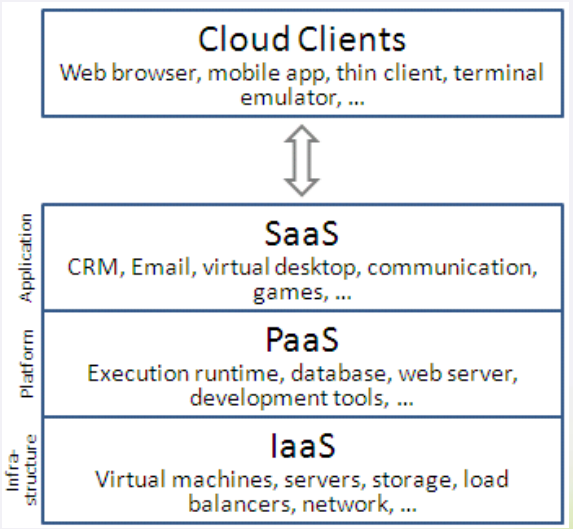
Cloud on-demand self-service

- Administrative consoles; no need to interact with other humans.

GCS research™

Three Core Cloud Service Models

- Software as a Service (SaaS)
  - ArcGIS Online
  - Consumer does not control cloud infrastructure
- Platform as a Service (PaaS)
  - Deploy apps into the cloud
  - ArcGIS Web mapping APIs, i.e. JavaScript, Flex, and Silverlight
  - ArcGIS Online Web Services
- Infrastructure as a Service (IaaS)
  - Full provisioning capabilities: processing, storage, networks, etc.
  - ArcGIS in Amazon EC2



GCS research™

Montana Site Selector - IaaS

Montana Site Selector is a powerful GIS-enabled tool developed specifically for businesses looking to open, expand or relocate in Montana.

Hosted in the Microsoft Azure Cloud

Many other service models

- **Cloud Service Models simply mean what type of services can be provided to customers**
- Storage as a Service (STaaS), Security as a Service (SECaaS), Data as a Service (DaaS), GISasS (GISasS)
- Modeling as a Service (MaaS)
  - IDEAS by The SI Organization

Modeling as a Service (MaaS)

I.D.E.A.S.™ - Intelligent Data Exploration and Analytics System

an Analytic Services and Delivery Platform available to a variety of users

I.D.E.A.S. makes Remote Sensing and Geospatial Information Systems data readily discoverable, accessible, visualized and useable

Finding the Right Geospatial Data and Models

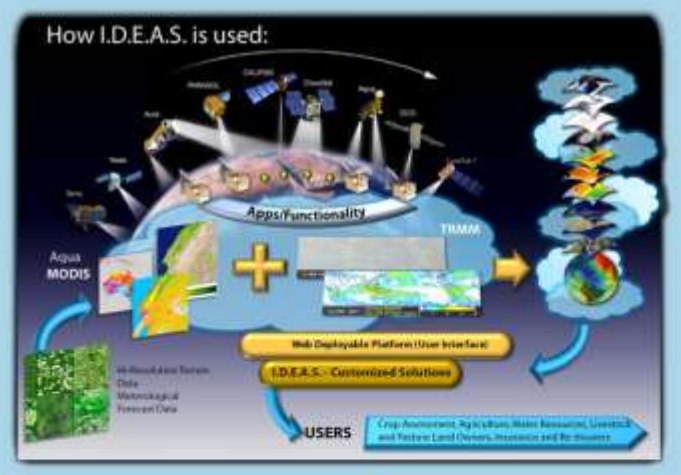
I.D.E.A.S. is a concept that will simplify the discovery, processing and analysis of earth observation data and models. By providing a single interface into federated, disparate data repositories, I.D.E.A.S. will allow users on-demand access to a vast array of satellite and aerial imagery and maps to create value-added visualization products, to utilize data for modeling, and to generate decision-support tools.

Visualization and Analysis Power

I.D.E.A.S. will integrate a web storefront, smart engine and high performance computing backbone to rapidly deploy data, models and analytic capabilities. The web storefront will be a one-stop shopping experience to query, discover, access and execute data and models. The smart engine will leverage innovative methods, such as learned workflows based on a user's problem and solution, to provide near real-time Modeling as a Service (MaaS) functionality for product generation, model calibration, user feedback, and collaboration. The high-performance cloud computing backbone will provide the processing power to generate analytic and visualization products.

Tailored Services for a Variety of Users

I.D.E.A.S. will benefit a wide spectrum of users who want to use image, geospatial, weather, and other remotely sensed data from public sources like NASA and commercial sources for applied science and commercial applications that benefit society. Users will have the ability to upload models, discover other users' models, and download newly-developed products, and solutions. Additionally, I.D.E.A.S. will provide the means for users to develop, exploit, and utilize products and collaborate on solutions in a community of users with similar domain interests.



I.D.E.A.S. is being developed and implemented by the SI through corporate partnerships and licensed technologies

the SI · GCS research · esri · GLOBAL MARKETING INSIGHTS, INC. · Ideas and Machines, Inc. · IBM

The SI Organization, Inc. is a leading provider of full life cycle, mission-focused systems engineering and integration services to the U.S. Intelligence Community, Department of Defense and other agencies. Its scalable systems engineering platform for modeling, simulation and analysis helps customers baseline requirements, optimize resources and manage risk. This systems engineering platform is now available for the commercial sector in cost-effective, modularized components. The company has 40 years of experience successfully delivering complex, system-of-systems technology solutions. The SI employs approximately 2,000 people, with major locations in Chantilly, VA; Laurel, MD; and Valley Forge, PA.

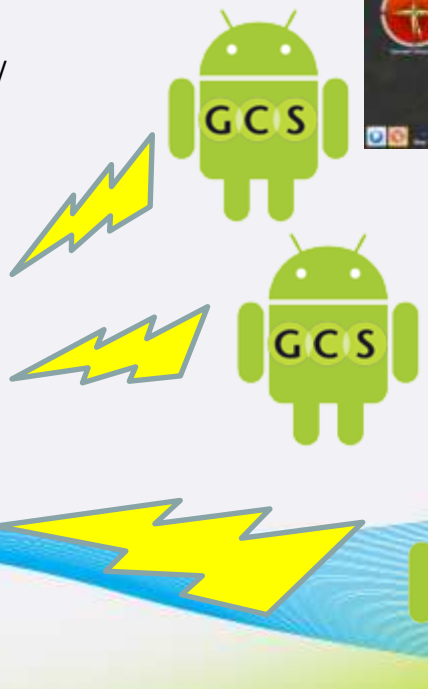
for more information, contact: charles.samuels@thesiorg.com or shawana@globalinsights.com

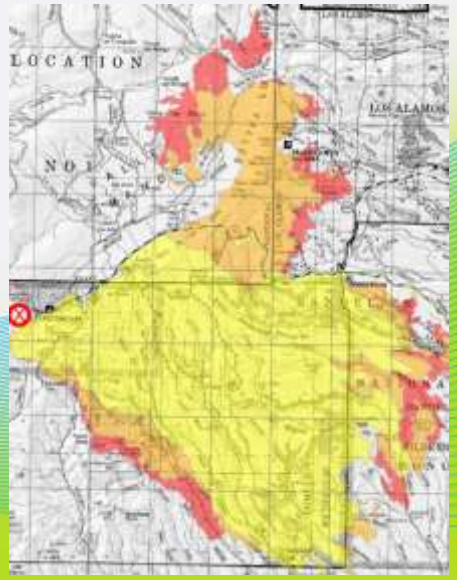
the SI

Cloud and Supercomputing

- Rapidly deliver geoprocessing and complex analysis results
- Predict fire direction/perimeter
- Real-time coordination

http://globe.gcs-holdings.net/landview/





Cloud Pricing?

Model: Only pay for what you use

- **Use vs. license model**

- Amazon EC2 Public cloud
- http://aws.amazon.com/ec2/pricing/

- Amazon EC2 Gov Cloud
- http://aws.amazon.com/govcloud-us/#pricing

GCS research™

Security in the Cloud

- Traditional vs. Cloud Model
- Traditional security does not work with location based devices
- Pressure to accommodate mobile devices
- Security and privacy: top concerns moving to cloud
  - Data storage and transfer protection
  - Personnel
  - Physical threats
  - Vulnerability management and remediation
- Many of these concerns are mitigated in the cloud

GCS research™

Security on the Cloud

- Cloud Advantages
  - Disinterested third party's managing data; no local knowledge
  - Pervasive automation; fewer humans; less mistakes
  - Compliance certifications; security audits; less work for your organization; You are compliant "by inclusion"
  - No need to learn/maintain/purchase security technologies
- Pay Attention
  - Your still responsible for App security and Data security
  - GIS often require larger data transfers

GCS research™

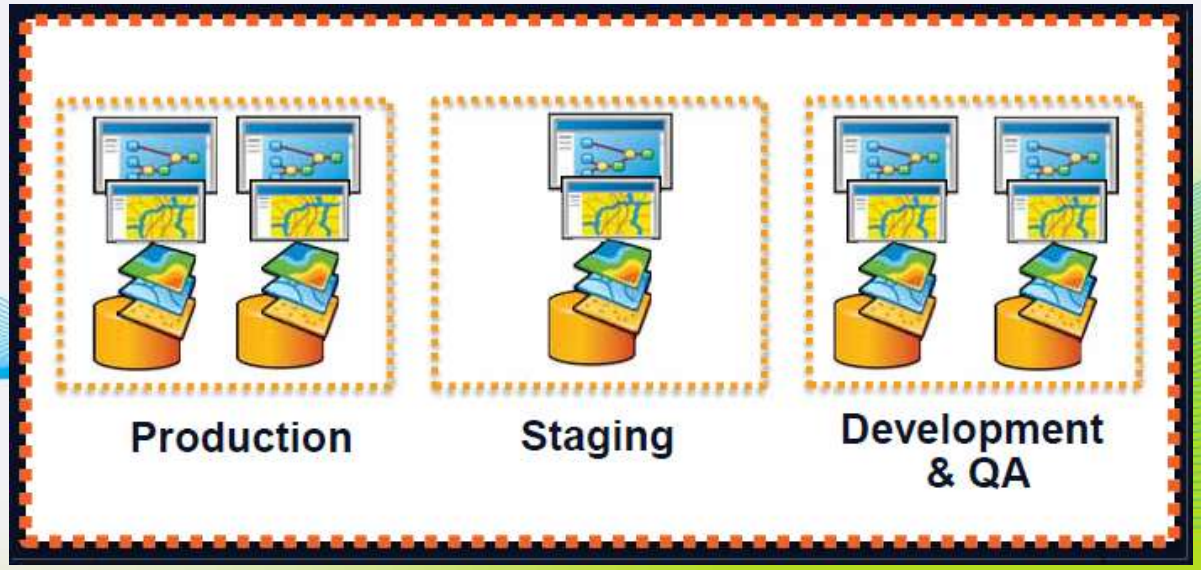
Security in the Cloud

- Tremendous growth in Private Cloud offerings being driven by the Federal Government.
- The Federal Risk and Authorization Management Program (FedRAMP)
  - standardized approach to security assessment, authorization, and continuous monitoring for cloud products and services.
- Compliance standards
- Security standards (ISO 27001)
- Federal certifications

GCS research™

Virtualization in the Cloud

- Quick Back-up and Recovery
- Environments for: testing, development, experimenting, etc.
- Data Visualizations and Management
- Migration efforts
- How does this change your GIS workflow?



GCS research™

Cloud Storage

- Storage in the cloud is **infinite**
- How does this change your GIS workflow?

GCS research™

Common GIS Cloud Deployment

- On premise system for daily use and editing
  - i.e. Enterprise Geodatabase
- Cloud is used for publishing
  - i.e. ArcGIS Online or Amazon EC2
- Overnight replication over HTTPS or secure ftp

GCS research™

Cloud for Redundancy: Save Money

- Outsource all failover to the cloud
- Only pay for what you use
  - (which could be never)
- Never pay for infrastructure and resources which is rarely, if ever, used.

GCS research™

Cloud Information Officer: new job role

- Requires new skills
- Customized specialized builds
- Automated deployments
- Orchestration tools
- Provides Optimizations
  - Scale
  - Capacity
  - Distribution
  - Geolocation
- You must determine how much you need?
- Sysadmins become developers
- Infrastructure as code -> provisioning servers with scripting.

GCS research™

Amazon Web Services

- Pioneers with IaaS
- Created an IT consumer market; made it easy
  - Pay as you use model
  - Get started in 5 minutes using a credit card
- Only Esri Certified Public Cloud

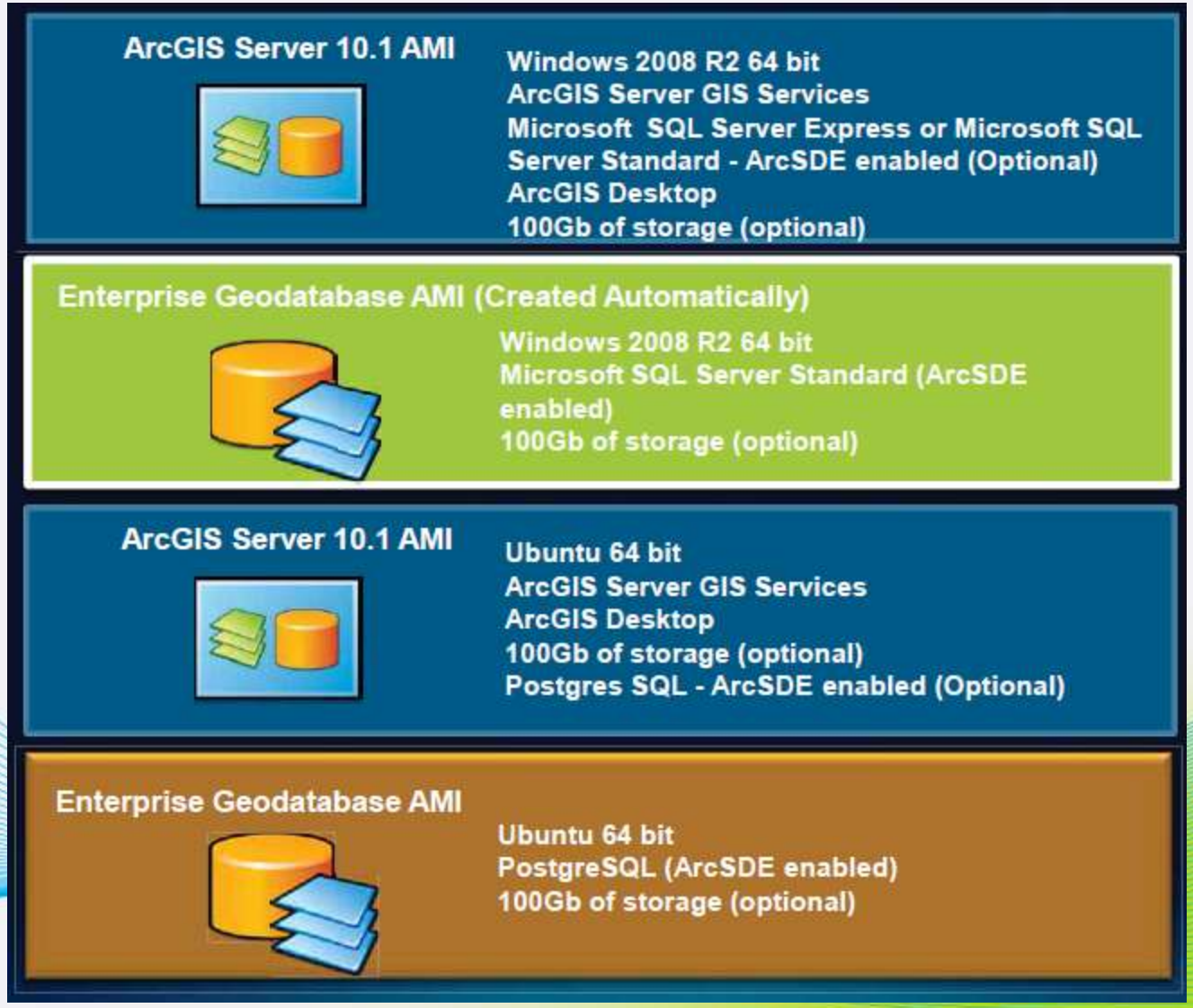
GCS research™

Amazon Machine Images (AMIs)

- A virtual image that works in the Amazon Cloud
  - Provides OS + ArcGIS Server + Data
  - Esri provided AIMs 10.0 and 10.1

GCS research™

Amazon Machine Images (AMIs)



GCS research™

Amazon: Custom ArcGIS Server AMI

GCS research™

ArcGIS Amazon Resources

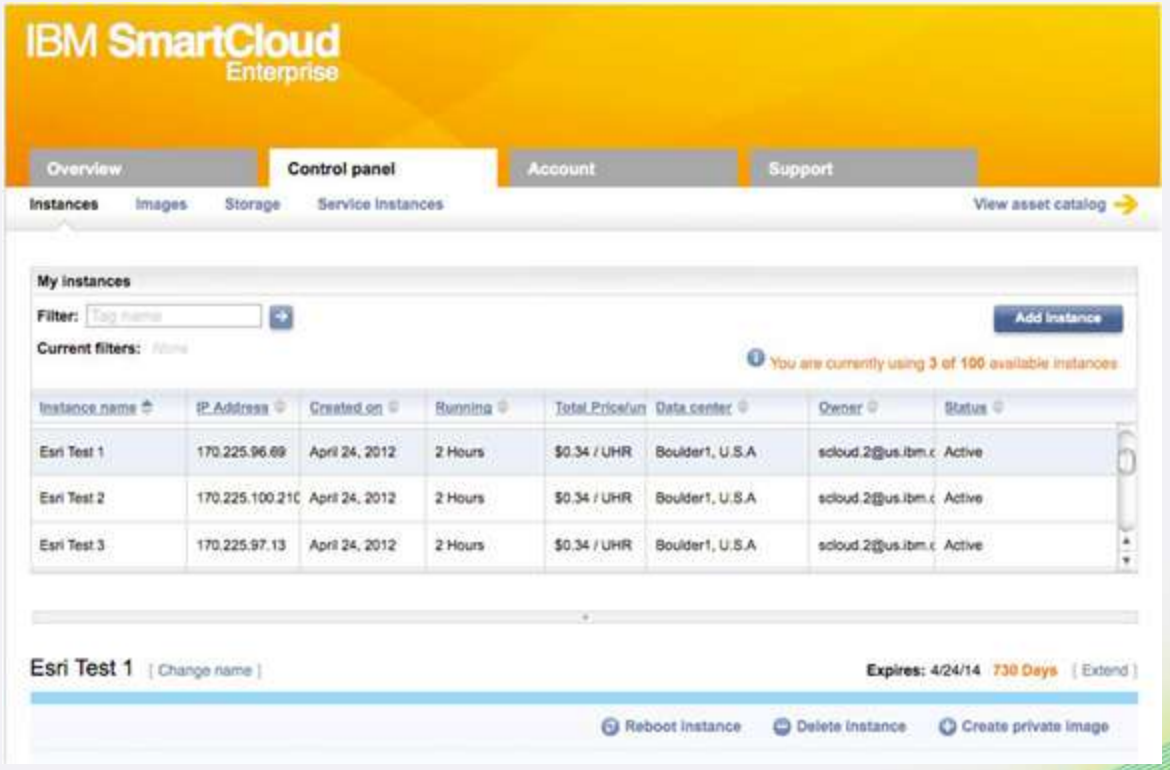
- ArcGIS Online Help

http://resources.arcgis.com/en/help/main/10.1/00rq/00rq00000002000000.htm

GCS research™

Other Clouds

- VCE
- VMWare
- IBM
- Microsoft
- Terremark



http://www.ibm.com/developerworks/cloud/library/cl-geospatialanalytics/

GCS research™

Getting to the Cloud: Questions

- How to scope, forecast costs, and size systems based on projected usage/performance requirements?
  - Define operational requirements:
    - # of concurrent Users/Storage/Bandwidth
    - Length of time system expected to be online
    - Support desired (24/7; 9 to 5)
  - Requirements for MTBF and MTTR?
    - Mean time between failures (MTBF)
    - Mean time to repair (MTTR)
  - Data and Application requirements
- Recommendation: deploy a pilot project

GCS research™

Questions?

Alex Philp, Ph. D.
President, GCS Research
Missoula, Montana
406.532.3254 - aphilp@gcs-research.com

John Waterman, PMP, GISP
Vice President of Geospatial Solutions, GCS Research
East Burke, Vermont
802.473.4009 - jwaterman@gcs-research.com

Microsoft Partner
Gold Independent Software Vendor (ISV)

esri Partner Network
Gold

GCS research™

www.gcs-research.com