CLOUD SECURITY

SECURITY ASPECTS IN GEOSPATIAL CLOUD

Guided by – Prof. S. K. Ghosh
Presented by - Soumadip Biswas

PART 1

A brief

Concept of cloud

Issues in cloud   Security Issues

A BRIEF

- *The Evolution*
  - *Super computing*
  - *Cluster computing*
  - *Utility computing*
  - *Grid computing*

  - *Service Oriented Architecture: SOA*
    - *Service*
    - *Service-orientation*

CONCEPT : SOA

- *The storing and accessing of applications and computer data often through a Web browser rather than running installed software on your personal computer or office server*

- *Internet-based computing whereby information, IT resources, and software applications are provided to computers and mobile devices on-demand*

- *Using the Internet to access web-based applications, web services*

THE BIG PICTURE : CLOUD

- *Security*
- *Scalability*
- *Availability*
- *Performance*
- *Cost-effective*
- *Resilient computing*
- *Release resources when no longer needed*
- *Pay for what you use*
- *Leverage others' core competencies*
- *Turn fixed cost into variable cost*

COMPONENTS

* *Basic Concept*

* *Characteristics*

  * *On-demand self service*
  * *Broad network access*
  * *Resource pooling – location independence*
  * *Rapid elasticity*
  * *Measured service*

* *Cloud Service Models*

* *Cloud Deployment Models*

SERVICE MODELS

- *Software as a Service (SaaS)*
- *Platform as a Service (PaaS)*
- *Infrastructure as a Service (IaaS)*

- *A Cousin model*
  - *Data as a Service (DaaS)*

DEPLOYMENT MODELS

* *Public Cloud*
  * *Enterprise owned or leased*

* *Private Cloud*
  * *Shared infrastructure for specific community*

* *Community Cloud*
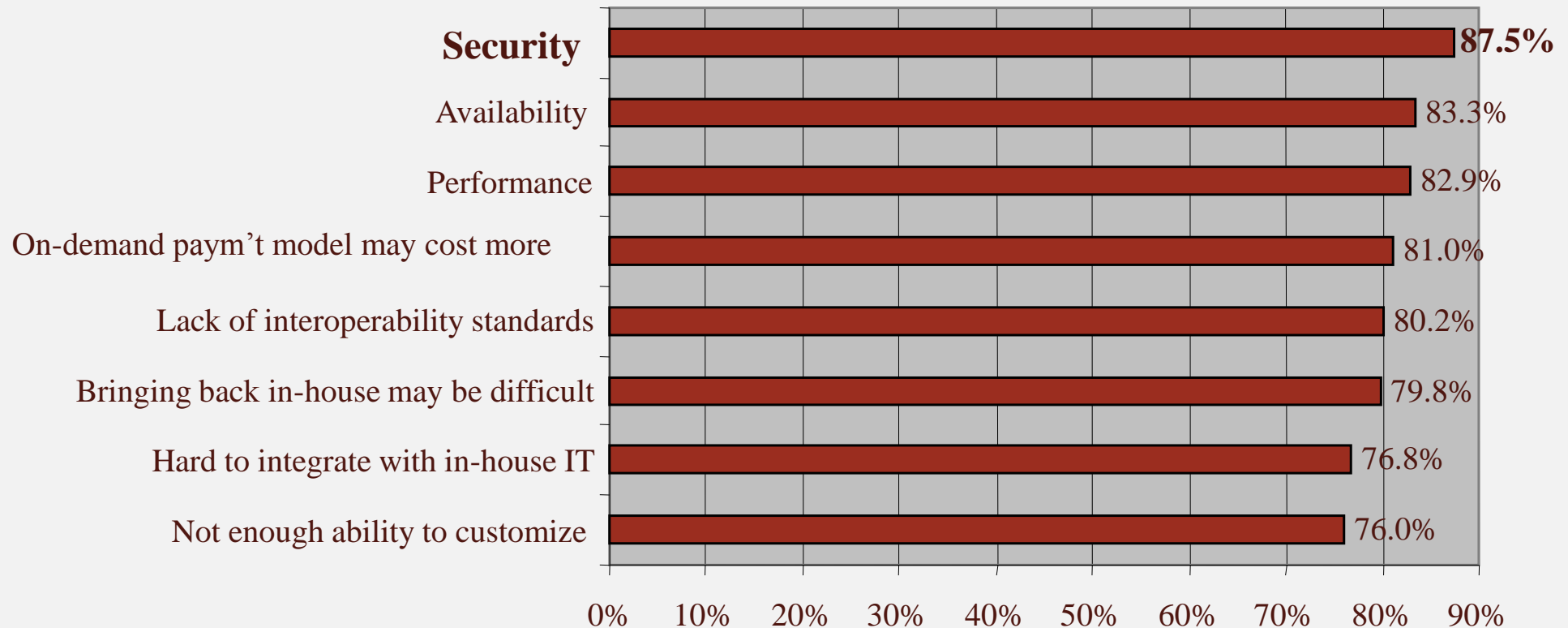 * *Sold to the public, mega-scale infrastructure*

* *Hybrid Cloud*
  * *Composition of two or more clouds*

CLOUD ATTACK INCIDENTS

* *Google Docs found the flaw in March 2009 that inadvertently shares users docs.*

* *Salesforce.com employee fell victim to a phishing attack and leaked customer list in October 2009*

* *Epic.com logged a complaint against Google for its privacy practices in March 2009.*

* *Steven Warshak stops govt. repeated searches of his e-mail using SCA in July 2007.*

* *Outage of big bucket deployment in amazons in Feb 2008 where for a period of several hours there was Denial of Service attack.*

A SURVEY

Issue	Percentage
Security	**87.5%**
Availability	83.3%
Performance	82.9%
On-demand paym't model may cost more	81.0%
Lack of interoperability standards	80.2%
Bringing back in-house may be difficult	79.8%
Hard to integrate with in-house IT	76.8%
Not enough ability to customize	76.0%

A rating of many different issues in cloud computing,

Ref: Cloud Computing 2010, An IDC Update, IDC Executive Telebriefing, 29 September 2009

ISSUES

- *Privacy issues*
  - *Lack of user control*
  - *Unauthorized secondary usage*
- *Trust issues*
  - *Weak Trust Relationship*
  - *Lack Of Customer Trust*
- *Security issues*
- *Legal issues*
  - *Legal framework*
  - *Transferring of data*
  - *Outsourcing Issue*

SECURITY ISSUES

- *Authentication and identity management*
- *Access*
- *Availability and backup*
- *Control over Data lifecycle*
- *Lack of standardization*
- *Multi-tenancy*
- *Audit*

SECURITY ASPECTS

 * *Server access security*

 * *Internet access security*

 * *Database access security*

 * *Data privacy security*

 * *Program access security*

SECURITY RELEVANT CLOUD COMPONENTS

- *Cloud Provisioning Services*
- *Cloud Data Storage Services*
- *Cloud Processing Infrastructure*
- *Cloud Support Services*
- *Cloud Network and Perimeter Security*

- *Elastic Elements: Storage, Processing, and Virtual Networks*

GENERAL SECURITY ADVANTAGES

- *Shifting public data to a external cloud reduces the exposure of the internal sensitive data*

- *Cloud homogeneity makes security auditing/testing simpler*

- *Clouds enable automated security management*

- *Redundancy / Disaster Recovery*

PART 2

Get domain specific   Geospatial Cloud

Issues in Geospatial cloud

Examples

DOMAIN : GIS

- *Geographical Information System*
  - *Captures, stores, analyzes, manages, and presents data with reference to geographic location data*

- *Uses*
  - *Earth surface based scientific investigations*
  - *Resource, asset management*
  - *Infrastructure assessment and development*
  - *Reference , location planning*
  - *Statistical analysis, criminology*
  - *Warfare assessments   ...LOT MORE*

GIS SERVICES

- *Web feature service*
    - *Retrieves heterogeneous data*
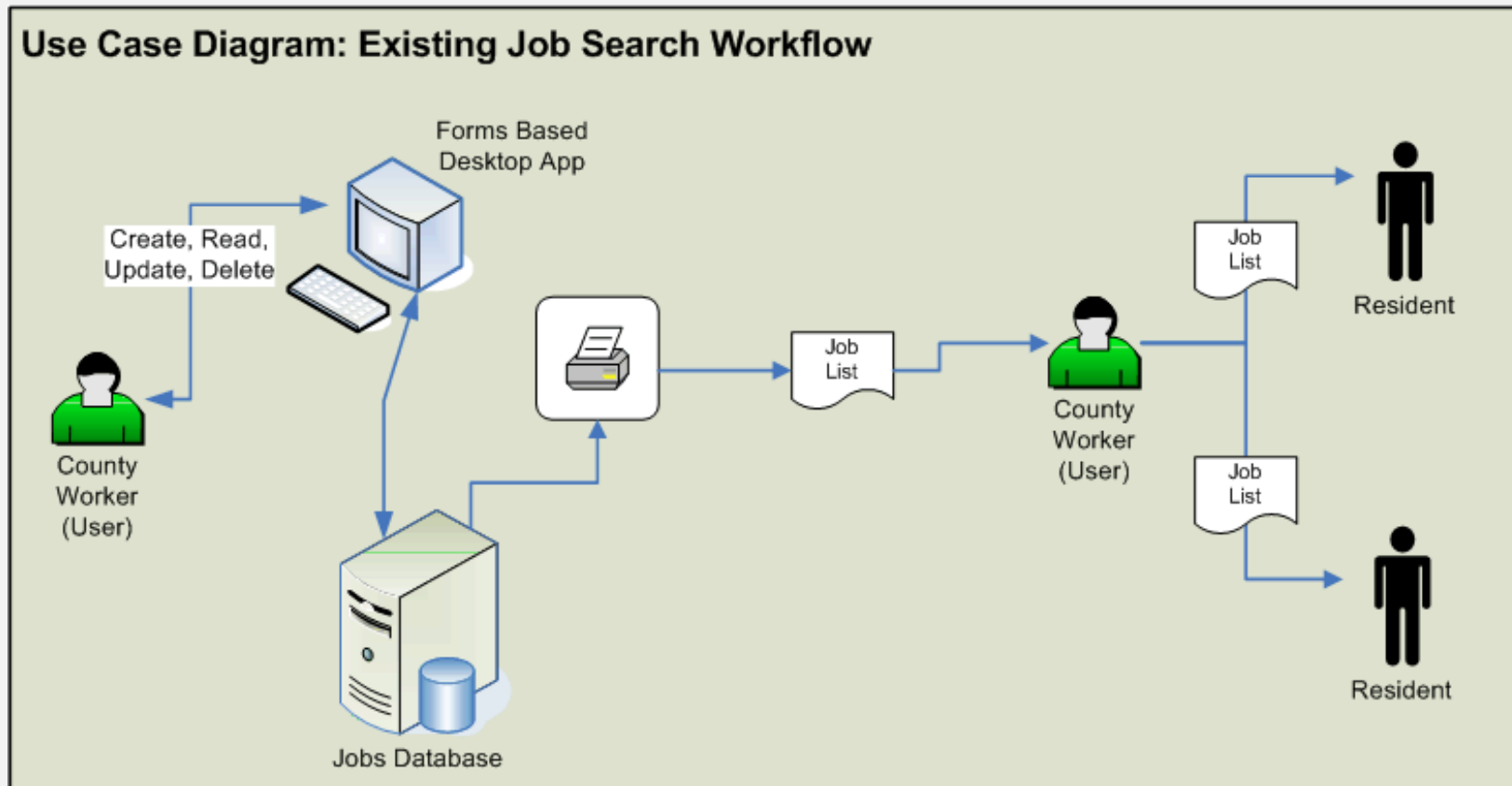- *Web mapping service*
    - *Creates maps with customization*
- *Web processing service*
    - *Processes user requests*
- *Web Coverage Service*
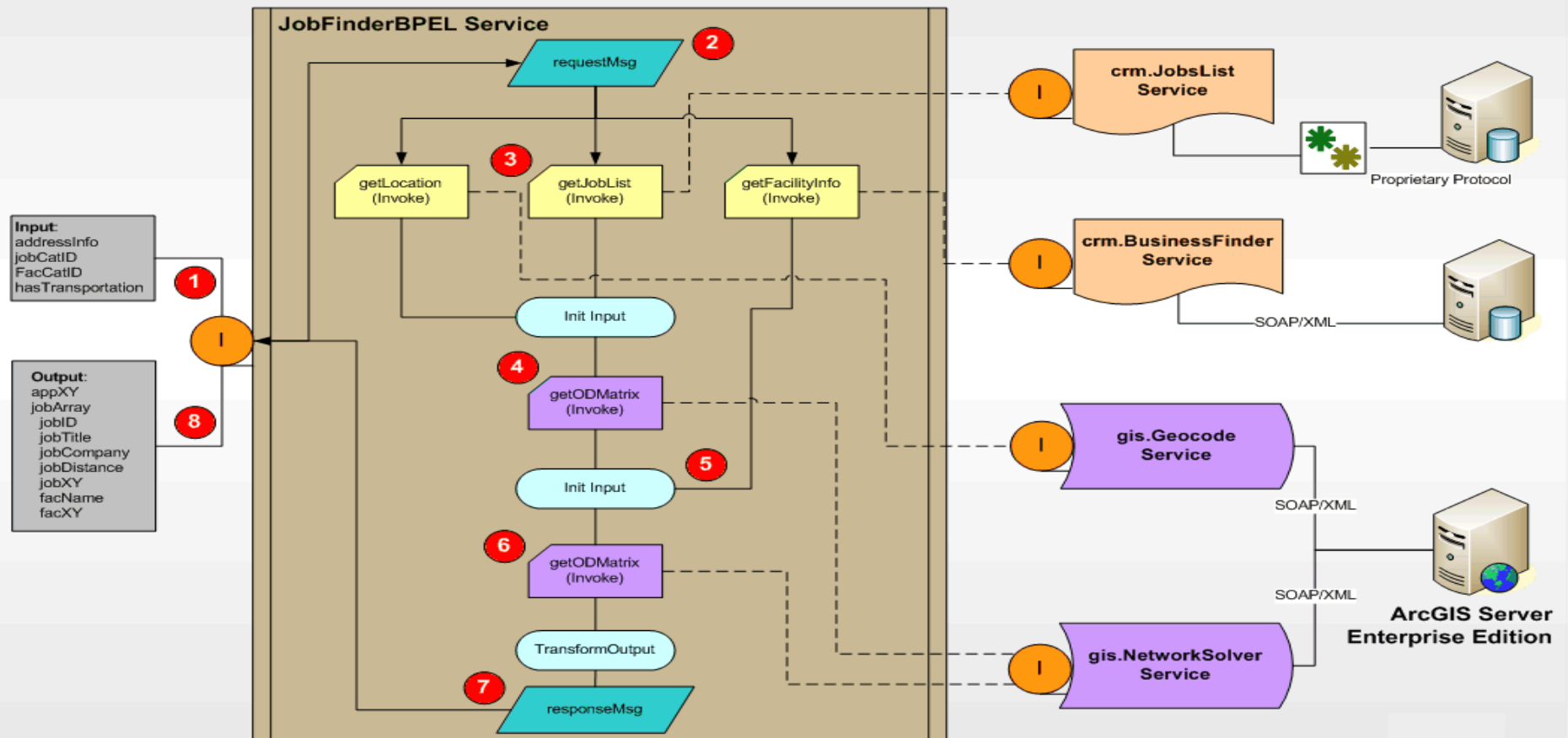   - *Describes objects in spatial data and provides coverage*

A SCENARIO

Ref: Geospatial Service-Oriented Architecture (SOA) An ESRI White Paper, page 65

A SOA APPROACH: CLOUDY

Ref: Geospatial Service-Oriented Architecture (SOA) An ESRI White Paper, page 73

LETS COMBINE THEM

- *GIS in Cloud*

- *Many different services offered by GIS*

- *Cloud can be a great option to integrate with GIS*

- *Enhance the Storage Capacity and Security of Spatial Data, Provide Strong Support of Mass Data Storage for GIS*

- *Enhance the Efficient Processing Capabilities of Spatial Analysis and Facilitate Decision-Making Support by Combining Cloud Computing and Spatial Analysis*

- *Have a Great Impact on Software Development and Product Models of GIS*

DATA AS A SERVICE (DAAS)

* *Multi-tenancy, system configuration to be a pooled and shared resource by many institutions and governments enhancing the ability to discover and share data*

* *Ability to access this storage intensive (raster) data quickly and given the low cost the ability to store more time dependant/historical data*

* *Pay as you go for data access may provide promise for a business model that in the long-term could support the financing of the NSDI*

SECURITY ISSUES

- **Access control**
  - Use RBAC
- **Security and Confidentiality of Spatial data**
 - Protect sensitive data

- **Other Issues**
  - SLA violation
  - Supervision issue
  - Regulation establishing

EXAMPLE : GEOIQ

* *Geographical information system*
* *Organize and Share GIS Projects*
* *Create and Edit Spatial and Non-Spatial Data*
* *Import and Interoperability*
* *Styling*
* *GIS Attributes Information*
* *Export Spatial Data*
* *Publish and Share*
* *WMS and TMS Server*
* *Publish GIS Projects on Google Maps*
* *GIS Support for Mobile Devices*

BASIC WORKING
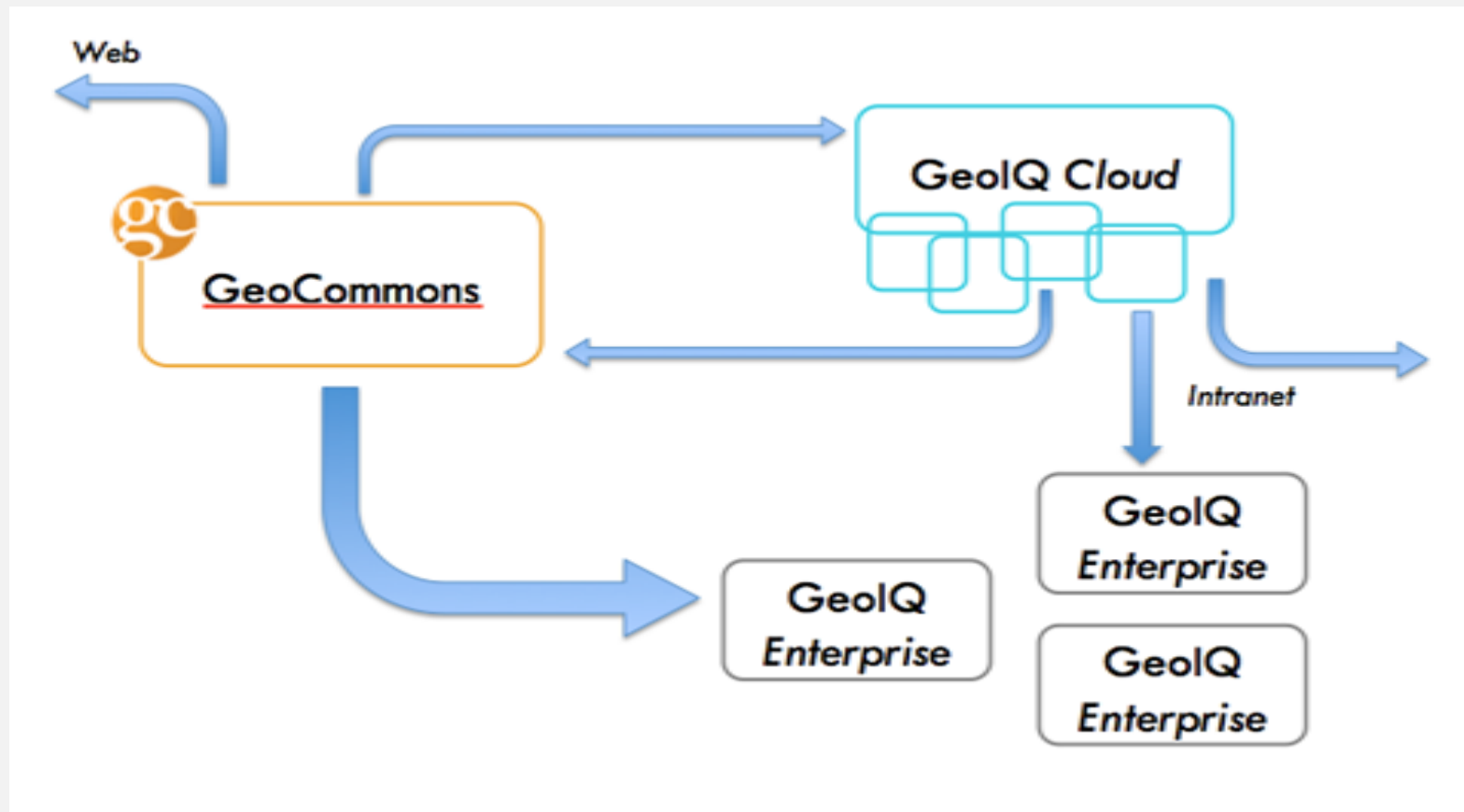
Ref: www.geoiq.com

SOME MORE EXAMPLES

- *IBM cloud offering*

- *RMSC and ESRI Collaborate on GIS Cloud*
  - *RMSC is providing all the compute horsepower and ESRI is providing their ArcGIS software package*

- *Microsoft Azure is working*

- *Google Maps*

- *NSDI takes initiative*

A NEWS

- *NGAC GeoCloud Game March 23, 2010*
  - *Geospatial Cloud Computing Workshop designed to increase awareness and understanding of cloud computing issues*
  - *Features a war-game*
    - *Deigned for members of the NGAC, FGDC Executive Committee, and geospatial professionals within the Govt.*
    - *common language around the challenges involved in migrating to cloud computing technology and the risks and rewards associated with this migration.*
- *Result at a glance*
  - *Reveals the importance of having this GeoCloud as*
    - *Collaboration and sharing*
    - *Experience varying fidelity of spatial data and their interdependencies*
    - *Complex organizational issues – role-playing*
    - *Guiding policies – facilitate process between and among govt. agencies*
  - *Much work needs to be done on DaaS and Pay-as-you-go Model*

CONCLUSION AND REMARKS

* *We have seen that cloud have many of its own kind of challenges and advantages as well*
* *Geospatial Cloud, would be a real deal when implemented*
* *Lack of the examples about cloud techniques applying in GIS, thus it's a really novice*
* *All new works needs to be done, much care is required*

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