

A Comparison of PaaS clouds with a Detailed Reference to Security and Geoprocessing Services

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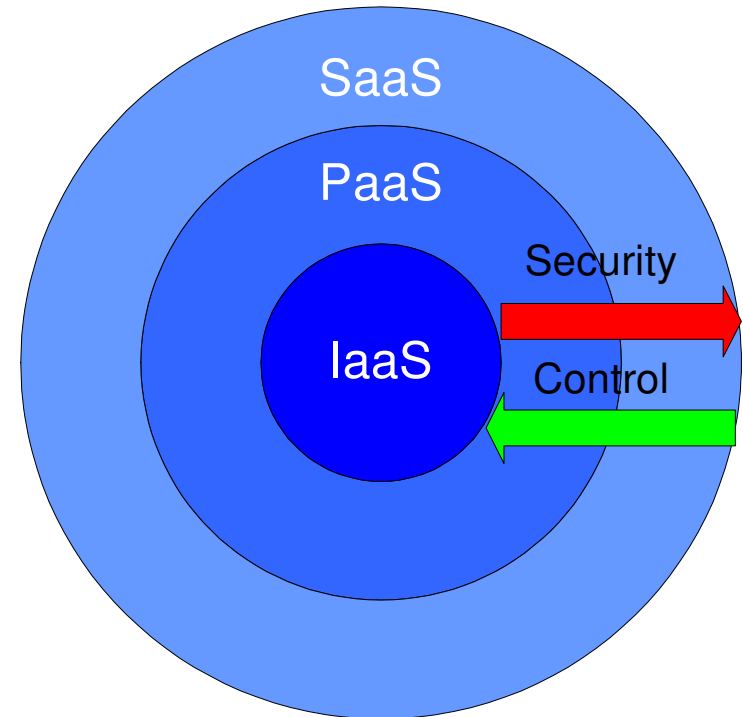
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What is Cloud Computing?

A cloud is a utility based computing model that provides a service, and allows virtualised resources to be easily and efficiently scaled on demand.

Cloud Service Models and Security

- Service Models
 - Software as a Service (SaaS)
 - Platform as a Service (PaaS)
 - Infrastructure as a Service (IaaS)
- Security/Control trade-off as we move further up the service model



Security Goals in PaaS clouds

- We look at three security goals



PaaS Cloud Comparison

- Compare three PaaS cloud providers

- Google App Engine (GAE)



- Microsoft Windows Azure (MWA)



- GroundOS (GOS)



- Platform as a Service (PaaS)

PaaS Cloud Comparison



	Google App Engine	Windows Azure	GroundOS
Availability	No SLA No mention of guaranteed uptime	Provided by SLA	Problem of user
Integrity	Encryption Authentication	Encryption Authentication	Problem of user Encryption

PaaS Cloud Comparison



	Google App Engine	Windows Azure	GroundOS
Confidentiality	Privacy policy Encryption Authentication	Privacy policy Encryption Authentication	Problem of user Encryption
Authentication	Single sign-on Username & password	Username & password	Username & password
SLA	No	Yes	No

PaaS Cloud Experiments

- Write to file system
 - Malicious files on host machine
- Ping request
 - Denial of Service/Smurf attacks
- Spawn thread
 - Distributed Denial of Service attacks
- System call
 - Access host machine

PaaS Cloud Experiments - Results



Write to file system	Denied	Denied
Ping request	Denied	Denied
Spawn thread	Denied	Granted
System call	Denied	Denied

Paas Cloud Experiments - Results

- Reason for results.

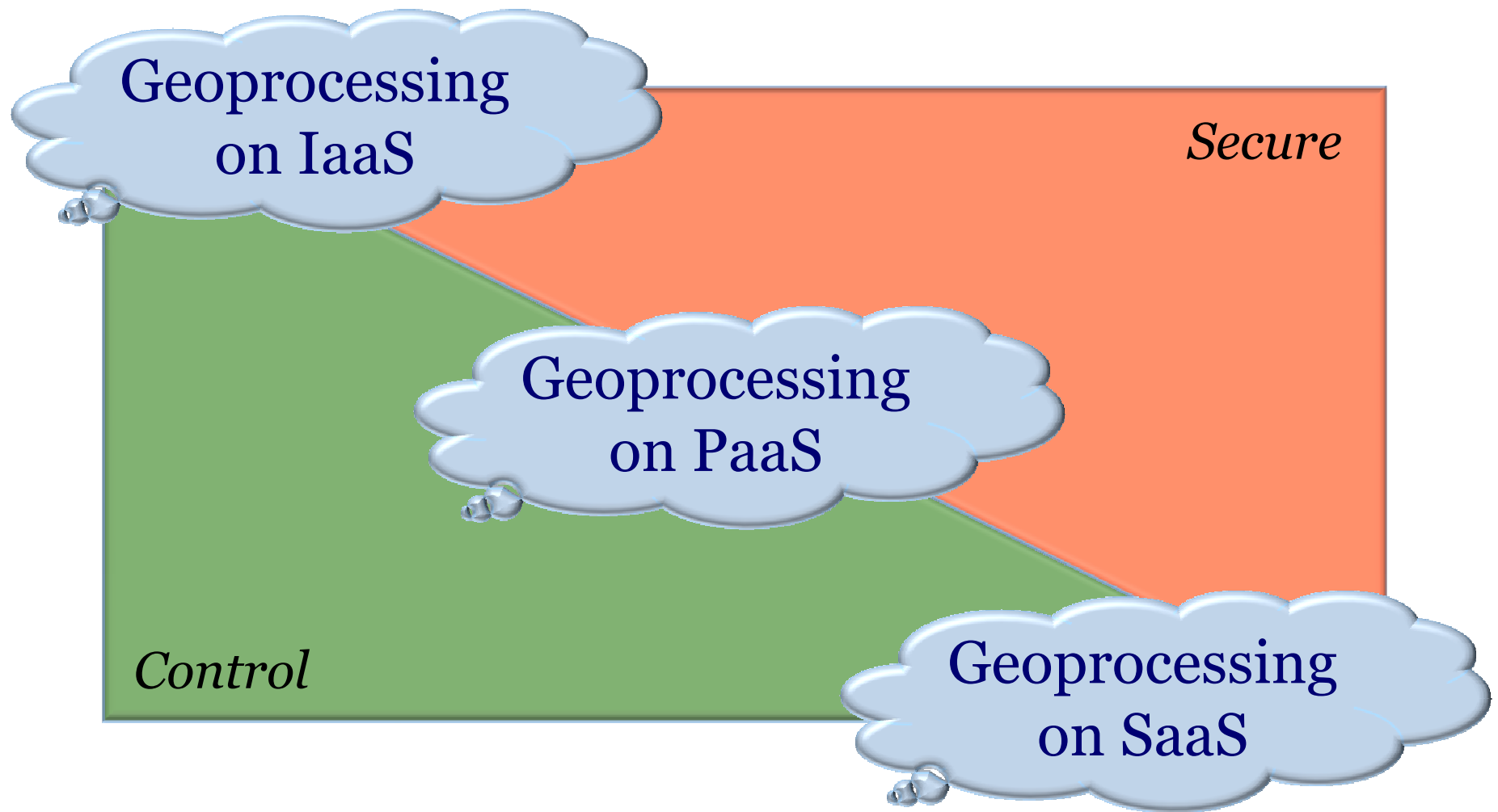


	Google App Engine	Windows Azure
Write to file system	No support for I/O	Permission error raised
Ping request	Customised Python API	I/O error raised
Spawn thread	Limited to one thread (main)	Two worker roles
System call	No API support	Permission error raised

Geoprocessing Service on a Cloud

- Infrastructure (IaaS)
 - Develop, deploy, monitor more than one WPS
 - Most control, least secure
- Platform (PaaS)
 - Develop and deploy WPS
- Software (SaaS)
 - Deploy existing WPSs
 - Least control, most secure

Geoprocessing Service on a Cloud



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Geoprocessing Service on a PaaS Cloud

- Benefits
 - Processing scalability
 - Resources for high processing demands
 - Climate modeling
 - Coordinate transformations
 - Web Processing Service (WPS)
 - User scalability
 - Peaks in user requests
 - Web Processing Service (WPS)
 - Web Feature Service (WFS)

Geoprocessing Service on a PaaS Cloud

- Challenges
 - GeoDRM for protection of geographic data
 - Temporary ‘files’ in cloud database tables
 - Existing geoprocessing service has to be ‘ported’ to cloud platform
 - Supported programming language
 - Remove security risks
 - Ping requests, system calls, thread limitations
 - Built-in platform cloud features
 - Vendor lock-in

Conclusions

- Benefits of clouds outweigh disadvantages
- Geoprocessing services
 - Cloud benefit: processing scalability
 - IaaS, PaaS and SaaS clouds
 - PaaS: best if you want to develop your own service, but not worry about cloud deployment
- Security in clouds is vital
 - Understand & manage security risks

A look into the future

- Here to stay
- Huge benefits
- Manage security risks
- Cloud standards to avoid vendor lock-in!

Questions?

Thank you