

A Study Experience

Interica data protection and data preservation project in the Cloud

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- There is trepidation of Exploration and Production seismic project data being ushered into the Cloud
- Interica has embarked on studies using its PARS software to achieve seismic project data protection and preservation service-based offerings in the cloud
- The talk shares an unencumbered view of the safety and perils of Cloud Computing in the Oil and Gas industry
- "Trials and Tribulations of ascending the Interica's Software Solutions into the Cloud"

Data Growth



- 1 Gigabyte = 1,000,000,000 1 Terabyte = 1,000,000,000,000 1 Petabyte = 1,000,000,000,000,000
- 1 Exabyte = 1,000,000,000,000,000
- 1 Zettabyte = 1,000,000,000,000,000,000



2014 - 4.4 Zettabytes

2020 – 44 Zettabytes

Interpretation Data Facts & Figures



Site size	Number of projects	Total size	Cost of data
Large	12,000 (surveys=1500)	960 TB	US\$ 9 billion
Medium	7,000 (surveys=1000)	560 TB	US\$ 6 billion
Small	1,000 (Surveys=150)	80 TB	US\$ 0.9 billion

Projects can range from 1GB to 5 TB Average 80GB

Seismic Data Acquisition (20km x 20km) is 800km



Land approximately \$25K per km 800km = \$4 million + \$1 million processing + \$1 million Interpretation cost = \$6 million



- Over 100 file systems
- Tens of Petabytes of total storage
- Over 30 principal applications
- Online projects not modified for up to 15 years
- Between 10,000 and 30,000 projects
- Tens of millions files
- Oldest Live Project Not modified for over a decade!!

Large Company- Archiving & Restores





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The opportunity in Cloud Computing



- The massive amount of ever growing E&P data and the cost to acquire, storage, manage, distribute, deliver, archive the E&P <u>forever</u>.
- Oil & Gas companies are finding it challenging to ensure efficient
 E&P data management and effective data security
- Cloud Computing offers operational efficiency and higher resource utilization
- Data security in the cloud, if done right can be much more than traditional DC



Every company is their own data center



- One terabyte of new project data a day
- Growing numbers of servers, disks, tapes
- Tapes need to be stored securely
- 10% of projects restored data needs to be kept accessible

Archiving to the cloud



- Removes the need for own data center
- Software becomes a service
- 3rd parties responsible for supporting archives, software, security. Potential for cost reductions.

- What's the catch?
 - Speed How to push enough data per day to the cloud?
 - Security How safe is your data from prying eyes?
 - Politics Where is your data; is it allowed out of country? Where's "the cloud" exactly?





Interica PARS/PRM/IDS Present Architecture





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The NIST Cloud Computing Definition

- Widely regarded and accepted as the de-facto standard of Cloud Computing
- 3 key considerations
 - Service Models
 - Deployment Models
 - Key Characteristics of Cloud Computing

The NIST Definition of Cloud Computing

Recommendations of the National Institute of Standards and Technology

Peter Mell Timothy Grance

National Institute of Standards and Technology

U.S. Department of Commerce

Special Publication 800-145



Cloud Computing Service Models



- Infrastructure-as-a-Service (laaS)
 - Compute, Storage, Networks & other fundamental resources
- Platform-as-a-Service (PaaS)
 - Custom or acquired applications to be developed with ready-to-run programming tools and software, and configurable deployment capabilities
- Software-as-a-Service (SaaS)
 - Software and applications' services used by consumers, Internet accessible via a browser, thin/mobile client with some form of usability charges

Software-as-a-Service most appropriate for Interica PARS-IDS

Cloud Computing Deployment Models



Data Compliance, Governance, Security & Sovereignty

- Private Clouds
 - Owned, managed and operated by a single organization.
 - May be on-premise or exclusive 3rd party premises
- Community Clouds
 - Exclusive use by a specific group of community for a unique cause or service offering
 - If CDAL UK or PPDM decides to do Cloud Computing, this would likely be the best deployment model
- Public Clouds
 - Open for General Public Use
 - Usually exist in a Cloud Service Provider's premises
- Hybrid Clouds
 - Combo of 2 or more Public, Private or Hybrid

Cloud Computing Essential Characteristics

- On-demand Self-Service
 - Automated resource provisioning
- Broad network access
 - Accessibility anywhere from any device
- Resource Pooling
 - Aggregation of resources for provisioning using a multi-tenant model
- Rapid Elasticity
 - Ability to scale-up or scale-down rapidly appropriated to any quantity of resource at any time
- Measured Service
 - Resource usage monitoring, utilization metering with relevant transparency



Interica is transforming our traditional SW inline with these cloud characteristic



- INEVITABLE: Cloud Computing is forcing E&P software developers like Interica to think differently about application architecture, just like how it is to E&P users
- CONCERN: Deploying an application not architected for Cloud Computing would not be able to harness the benefits of the Cloud Infrastructure, resulting in increase of operational costs

AIM:

- Phase 1: Archiving-as-a-Service Decided not to name it as AaaS ③
- Phase 2: PARS-as-a-Service & IDS Cloud
- Phase 3: Interica E&P Project Archiving-as-a-Service

The Decision: Migrate or Transform?



Migrate – PARS & IDS to "work as-is"



Install PARS & IDS in VM instances both local & remote at E&P

sites; Remote Access via VPN

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The Decision: Migrate or Transform?



- Migrate Minimal changes to Interica PARS and IDS architecture
- PARS Present Limitations
 - The way PARS application connectors R5000, Petrel, Kingdom, EPOS, DUG etc – communicate with the PARS Nodes and servers – via TCP/UDP ports
 - Inter-process and inter-application communication between Oracle DB incur round-trip latency

Short-term

- Require reliable VPN network
- Inefficiency use of web-based application architecture. Not Firewall friendly
- Could involve administration and procedural changes that results in higher operational costs

Study 1: Data centre-based service



- EPITS/Australia Data Centre
 - Based in Perth Location known
 - IGb/s data connection. Theoretical 8TB/day archiving
 - Runs PARS remotely. VPN tunnels used to securely expose data/applications to PARS
 - Archives can be encrypted, but PARS has to have keys.
 - Provides political security (answers where is my data).
 - Needs data to be encrypted by customer for true security the next stage for us.
 - What happens if EPITS/Interica shut/are bought out? Who owns your data?
 - Data is one location or with one vendor is a risk,
 - Data is more than one location costs more...

The Decision: Migrate or Transform?



Transform: Re-architecting PARS to PARS-as-a-Service





Study 2: Cloud-based service



- "as-a-Service" or Community Clouds
 - Based in "the cloud". Location potentially not known (though data can be restricted to regions).
 - Up to 1 Gb/s connection. Varies by region.
 - Where to run PARS/PRM?
 - How to access data/applications on customer's site?
 - The many questions arising from this study led Interica to:
 - Identify a need to encrypt data on customer's site
 - Have software to access applications/data installed locally
 - Have only the customer own encryption keys

The Decision: Migrate or Transform?

Challenges:

- In SW development, higher learning curve
- Greater SW development investment
- Potential disruption to existing customers in the short term

Benefits

- Cultural and organizational changes to become more AGILE and adoption of DEVOPS
- Greater operational efficiencies better resource utilization; smaller investment in operational resources; Greater economies of scale





The Decision: Migrate or Transform?



- Transform: Re-architecting IDS to become IDS Cloud
- Challenges:
 - IDS has a traditional tape-specific (or VTL) backend
 - IDS has tight control of its tape pool block caching technology, which is high performance and highly efficiency in tape utilization
- Action:
 - Interica in the midst of re-writing IDS to use JBOSS Web Service Core stepping stone to IDS Cloud
 - Replacing IDS tape-specific backend with Cloud Storage APIs



Transform: Re-architect IDS to become IDS Cloud



Figure 4 – IDS Cloud

Interica E&P Cloud Archiving Solution



Bringing together PARS-as-a-Service & IDS Cloud



Figure 5 – Integrated Interica cloud storage solution

The Future of Interica E&P Project Archiving 😳 INTERICA

- As Interica transform to Cloud Computing-based E&P Data Management services, we discovered
 - The Cloud isn't as scary as we thought
 - Interica PRM/PARS/IDS are in a better position for Cloud Computing with this study exercise
 - Interica E&P Project Archiving as-a-Service must work with best-in-breed partners like NetApp to achieve Cloud Computing



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The Future of Interica E&P Project Archiving

- Interica has to partner with best-of-breed partners to make PARS-as-a-Service & IDS Cloud Archiving
- Considerations for technology advantage
 - Multi-tenancy + Resource Pooling + Operational Efficiency
 - Self-service + Automation
 - Cloud resources delivery between private & community clouds
 - Secure E&P Data Platform
 - Speed-to-market



INTERICA

Innovate. Access. Discover.



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SW Development Lifecycle & DevOps

- Future SW development using DevOps → Greater Business Agility
 - Shorter SW development and SW services roll-out into production
 - Continuous applications functionality improvement into GA releases
 - Need to have greater visibility to application performance & latency, application interdependency and communication breakdowns
 - Rapid application performance diagnosis and prognosis





Cloud Computing for E&P



Discovery of Cloud Computing for E&P (if you plan it well)

Benefits

- Stronger E&P Data Management implementation
- Great data compliance, data governance platform because the delivery and the operational aspects are AUDITABLE. Reveals accountability and ownership
- AUTOMATION actually reduces human errors, closes the data leakages gaps, and enhances level of security

MULTI-TENANCY

- Compartmentalize functional and operational groups better management and security
- Reduces surface of security risks and attacks
- Usage measurement and cost control
- LIMIT E&P EXPOSURE only to TRUSTED CLOUD eg. Private Cloud or Community Cloud

Contact



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