Utilizing Cloud Storage for Mainframes

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- Cloud Storage and Cloud Computing are changing how IT operates – outside of the mainframe data center
- Trends and Tides
- Use Cases
- CloudTAPE - How it Works
- Questions
Why Cloud Storage?

- Common Concerns and Questions
  - Unintentional storage of confidential data in the Cloud
  - Privacy concerns – who is allowed to access my data?
  - Multiple storage strategies are complicated to manage
  - Slow to recover data from the cloud
  - Fear of losing data out of enterprise control
  - No easy way to implement a cloud tier
Why Cloud Storage?

- Agility and Scalability drives cloud deployment value more than cost
- Cost is Compelling
  - IT infrastructure is now driven by low margin and capital intensive cloud business models
- Analysts forecast the Global Software Defined Storage market to grow at a CAGR of 35.2% over the period 2015-2019.
Trends and Tides

- Current data from analysts and AWS s3 Storage pricing:

- In 2015, some 72% of enterprises will pursue a hybrid cloud strategy, and the hybrid cloud market as a whole will reach $80 billion by 2018, according to Gartner

<table>
<thead>
<tr>
<th>Type</th>
<th>Standard Storage</th>
<th>Reduced Redundancy Storage</th>
<th>Glacier Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 1 TB / month</td>
<td>$0.0300 per GB</td>
<td>$0.0240 per GB</td>
<td>$0.0100 per GB</td>
</tr>
<tr>
<td>Next 49 TB / month</td>
<td>$0.0295 per GB</td>
<td>$0.0236 per GB</td>
<td>$0.0100 per GB</td>
</tr>
<tr>
<td>Next 450 TB / month</td>
<td>$0.0290 per GB</td>
<td>$0.0232 per GB</td>
<td>$0.0100 per GB</td>
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</table>
Trends and Tides for Mainframe Virtual Tape

- Infrastructure Changes and Operational Trends
  - Better Disaster Recovery
  - Security and Encryption
  - Multi-site Data Center Operations
  - Shared Storage Infrastructure
  - Virtual for the Masses
  - Big Data meets Big Value Data
Traditional Physical Tape
Vaulting and Recall

The traditional process of creating tapes to send offsite to a secure offsite vault or disaster recovery site.
Data Centers and Disaster Recovery without Physical Tape

Production Site

Mainframe

FICON

Luminex MVT

Disaster Recovery Site

Mainframe

FICON

Luminex MVT

Luminex is the leader driving the industry towards tapeless mainframe datacenters

Replication using WAN (No FICON or ESCON channel extension required)
3rd Site Tape Archive

Production Site
- Production Mainframe
- Luminex MVT

Disaster Recovery Site
- Luminex MVT
- DR Mainframe

Third Copy
“Luminex Introduces World’s First Cloud-based Tape Vaulting Solution For Mainframe Environments”

August 8, 2012, at SHARE IBM Mainframe User Group
Encryption and Security

- It is essential to encrypt data PRIOR to it being sent to the cloud storage
  - Processes and key management in your total control
  - Ensure that any breach of the cloud storage data center does not risk your data
  - Ensure that data cannot be mis-used or subject to government request without your involvement
- Integrates with and leverages CGSafe Luminex encryption and key management
Trends and Directions
Security and Encryption

- Increased Customer Focus on Mainframe Data Security
  - Data-At-Rest and Data-in-Flight
- Inline data encryption options with key management
  - Luminex – CGX-based or KMIP appliance
  - EMC – RSA
  - IBM and Oracle for physical tape media only
- Drive-based encryption does not protect against logical access or in-flight during replication
- Security requires encrypting data at its earliest point of creation and decrypting closest to when/where it is used
Mainframe Tape Performance Characteristics

**LOCAL SITE**
- Fast Read/Write Critical
- Frequent Activity

**REMOTE SITE**
- Fast Read during DR event/test Critical
- Infrequent Activity

**LOCAL SITE**
- Write & Read Speed Not Critical
- Infrequent Activity

**REMOTE SITE**
- Write & Read Speed Not Critical
- Infrequent Activity
- ~68% of Tape data is more than 90 days old
### Understand Your Data

**Tape Analysis by Age Report**

<table>
<thead>
<tr>
<th>Category</th>
<th>Capacity (GB)</th>
<th>Current Volumes</th>
<th>% of Total</th>
<th>Cumulative % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5+ Years</td>
<td>611,116.17</td>
<td>39,465.00</td>
<td>41.09%</td>
<td>41.09%</td>
</tr>
<tr>
<td>3+ Years - 5 Years</td>
<td>304,034.82</td>
<td>10,697.00</td>
<td>20.44%</td>
<td>61.53%</td>
</tr>
<tr>
<td>1+Years - 3 Years</td>
<td>437,680.34</td>
<td>41,195.00</td>
<td>29.43%</td>
<td>90.95%</td>
</tr>
<tr>
<td>181 Days - 1 Year</td>
<td>40,843.12</td>
<td>6,671.00</td>
<td>2.75%</td>
<td>93.70%</td>
</tr>
<tr>
<td>91-180 Days</td>
<td>38,887.56</td>
<td>10,059.00</td>
<td>2.61%</td>
<td>96.31%</td>
</tr>
<tr>
<td>61-90 Days</td>
<td>9,564.28</td>
<td>3,242.00</td>
<td>0.64%</td>
<td>96.96%</td>
</tr>
<tr>
<td>31-60 Days</td>
<td>11,030.01</td>
<td>3,815.00</td>
<td>0.74%</td>
<td>97.70%</td>
</tr>
<tr>
<td>0-30 Days</td>
<td>34,238.84</td>
<td>13,431.00</td>
<td>2.30%</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>Summary:</strong></td>
<td><strong>1,487,395.13</strong></td>
<td><strong>128,575.00</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>
Off Site Copy

- Provide remote storage and redundancy without the cost and overhead of a dedicated DR or bunker site

Production Site

Local Copy on Luminex MVT

Off Site Copy in the Cloud
3rd Copy and/or Archive

- Store Data Out-Of-Region
- Compliance / 3rd Copy
- Replace all remote tape vaults
- Primary tape data and Backup may also be stored in Cloud as 3rd copy option
2nd Copy, Archive Data not stored at DR

- Reduce or eliminate requirement for Archive data at DR site
- Primary tape data and Backup may also be stored in Cloud as 3rd copy option

CloudTAPE vaults a copy of all Archive Data to the Cloud

Production Site

Tape data reads / writes to local virtual tape

DR Site

Replicate Backups to the DR Site

Local Copy

Remote Copy for DR

Maximizing Data Protection and Availability
Offsite / Compliance / Deep Archive
Stored Only in Cloud

- Replace tape on shelves or managed in remote vaults
- Prepares for Data Center relocations
- Primary tape data and Backup may also be stored in Cloud as 3rd copy option

CloudTAPE vaults a copy of all Archive Data to the Cloud
How it Works
CloudTAPE Intelligent Storage Management

**Production Site**

**Data Use Case**
- Data that must remain local to Production and DR
  - Fast Reads/Writes
  - Fast Read during DR event/test Critical

- Data that must remain local to Production and, optionally, DR
  - Fast Reads/Writes
  - Frequent Activity

- Data that can be offloaded to the Cloud after X days
  - Write & Read Speed Not Critical
  - Infrequent Activity

**Example Data**
- Backup
- Primary Operational
- Archive (temporary copy)

**DR Site**
- 2nd Copy
- Optional 2nd Copy

**Cloud Storage**
- Optional 3rd Copy
- Only Copy (after X days)

A 2 copies
B 1 / 2 / 3 copies
C 1 or 2 copies
CloudTAPE Replication & Vaulting

- Integrated with proven RepMon mainframe VOLSER-based replication software
- Provides real-time status monitoring and logging of virtual tape data writes and replication to the Cloud at the VOLSER level
- Provides visual and audit capabilities to confirm when tapes are “in the cloud”
- Satisfy legal and audit concerns
- No chain of custody issues
CloudTAPE – How it Works

**Production Site**
- Production Mainframe
- FICON
- Luminex Channel Gateways

**DR Site**
- DR Mainframe
- FICON
- Luminex Channel Gateway

**No Cloud**
100% Local

**sCloud**
100% Local

**pCloud**
0 – 100% Local
Managed Cache
100% Cloud
CloudTAPE Advantages

- **Better Access**
  - Access to a 2\textsuperscript{nd} or 3\textsuperscript{rd} copy of mainframe tape anywhere in the world, at any time

- **Save money**
  - Eliminate the cost associated with physical tape media, shipping and off-site storage for vaulting

- **Simply Secure**
  - Eliminate security issues with physical media

- **Compliance**
  - Geographic Dispersal of Archive Data

- **No changes!**
  - Non-disruptive to existing tape applications and datacenter operations
Why Luminex?

- Luminex is the leader in solving real-world customer issues moving to modern mainframe data centers
- Proven Innovation and Technology Leader
- Proven Customer Advocate
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