Cloud Challenges
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Some of the high level ones

- End to end data integrity
- Vendor lock in
- Performance
• No standards for end-to-end protection
  – Standards needed from creation to deletion
    • There are some standards for parts of the path for disk and tape
• Vendor guarantees cannot be validated
  – What backs the vendor guarantee?
    • Money? Does that matter?
• System architects do not accept at face value what storage hardware vendors tell them
  – Why should anyone accept what cloud vendors tell them
    • Ronald Reagan said it best, “Trust but verify”
Vendor lock in

• How much will it cost you to get your data and move it to another vendor
  – Most vendors once they have your data will charge you an arm and a leg to get the data back quickly
  • Think Glacier

• Vendors want to control your data
  – I have a saying
    • Those who control the archive own “fill in the blank”
      – Big data solution
      – Control your own IP
      – Control your destiny
Performance

• Raise your hands
  – How many people have Less than OC-12 (Optical Carrier 622 Mbit/sec), OC-192 (9952 Mbit/sec), greater than

• Fun fact
  – OC-192 bandwidth is equal:
    • Less than the bandwidth of 8 enterprise 2.5 inch 15K disk drives
    • Less than the bandwidth of 3 enterprise SSDs
  – So how much I/O do you want and do you need to be successful?
## Reliability 9s

<table>
<thead>
<tr>
<th>9s Data Reliability %</th>
<th>1 PiB</th>
<th>50 PiB</th>
<th>100 PiB</th>
<th>500 PiB</th>
<th>1 EiB</th>
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<td>2 99%</td>
<td>11,258,999,068,426</td>
<td>562,949,953,421,312</td>
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<td>112,588</td>
<td>562,938</td>
<td>1,152,896</td>
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</tbody>
</table>

### Data Loss in Bytes
Final Thoughts

• Clouds are a challenge for the data owners not the vendors

• The vendors have your data, make no contractual promises about returning it the way they got it, get paid every month, make it expense and/or difficult to get your data back, are relatively slow compared to local storage
  – Pretty good deal is it not

• Each of us have the responsibility to make sure that what we do or what others do with our data makes long term sense