LTUG
Short introduction of JSC at FZJ

Ulrike Schmidt
Forschungszentrum Jülich GmbH (FZJ)
One of the largest research centres in Europe

Jülich Supercomputing Centre (JSC)
Operates the central supercomputers, servers and campus-wide computer networks

Field: High Performance Computing

Members/Focus:
Stephan Graf – Open Systems
Ulrike Schmidt - Open Systems
Lothar Wollschlager - Open Systems
DATA CENTER

- Data Centers: 1
- Open Systems Servers: 74
  (GPFS-Fileserver: 66, TSM-Server: 8)
- CPU’s (cores): 348
  (GPFS-Fileserver: 284, TSM-Server: 64)
- Operating System Level: RHEL 6.3/6.7 & AIX 6.1.7
- Tape Management System: ACSLS
  (Operating System: Oracle Linux 6.3)
- Amount of Disk: 20 PB (gross), 15 PB (net)
- Administrators for Disk: 5
- Administrators for Tape: 3
JUST – Logical View
(Phase4f: Q3 2015)

10 PB

$WORK $DATA

3 x 600 TB

$HOME

2 x 600 TB

$ARCH

3 CISCO
Nexus 700
512 Ports
(10GigE)

220 GB/sec

JUQUEEN

JURECA

JUROPAs

JUDGE

JUVIS

TSM Server
P7-720
TSM-BA
Clients
(Campus)

8 TSM Server IBM Power 720 (AIX,STLM)
4 Storage Controller DS3512 (TSM DB, STG, LOG)

TSM-BA
TSM-HSM
(HPC,dCache)

Data Migration
Data Archive
Data Backup

Separate buildings

Admin/Priv. Tape Network
SDP2
ACSLS SLC

SL8500
20 x T10000D
4 x T10000B

SL8500
20 x T10000D
4 x T10000B
SOFTWARE

- Tape Management System: ACSLS 8.3.0
- Tape Monitoring System: SDP 2
- SL8500 Monitoring System: SLC 6.25
- Shared Tape Library Manager: TSM-Server 6.3.4.300
- Data Migration Product: TSM-HSM Client 7.1.2.0
- Data Backup Product: TSM Server 6.3.4.300
- Data Archive Product: TSM Server 6.3.4.300
### ORACLE STORAGETEK HARDWARE

- **Tape libraries:** 2 x SL8500
- **Actual capacity:** 99 PB
- **Maximum capacity:** 141 PB (Type D)

<table>
<thead>
<tr>
<th></th>
<th>Capacity</th>
<th>Cartridges</th>
<th>Tape Drives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PB</td>
<td>Total</td>
<td>T2 (8.5 TB)</td>
</tr>
<tr>
<td>SL8500</td>
<td>44</td>
<td>6600</td>
<td>5000</td>
</tr>
<tr>
<td>SL8500</td>
<td>55</td>
<td>10000</td>
<td>6000</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>16600</td>
<td>11000</td>
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</tbody>
</table>
Projects with big scientific data
- Human Brain Project
- AMS Experiment @ ISS
- LOFAR / SKA Telescope

Capacity planning
- 2014: **2.4 PB/Q**
  (400 TB/mon * 2 copies * 3 month → 300 tapes/Q à 8 TB)
- 2013: **2.7 PB/Q**
  (300 TB/mon * 3 copies * 3 month → 540 tapes/Q à 5 TB)
- 2011/2012: **2.25 PB/Q**
  (250 TB/mon * 3 copies * 3 month → 450 tapes/Q à 5 TB)
- 2010: **1 PB/Q**
  (100 TB/mon * 3 copies * 3 month → 1000 tapes/Q à 1 TB)
March 2011: Signed Contract for Library Upgrade
   - Period: 2011-2016
   - Stepping up from 16 PB to 80 PB
   - Replace tape drives and cartridges by new technology

2013 & 2014:
   - Need to increase tape capacity
   - Replace additional 1000 cartridges
<table>
<thead>
<tr>
<th>Year</th>
<th>Library upgrade action</th>
<th>Capacity PB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Contract¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Realized²</td>
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<tr>
<td>2011</td>
<td>add 16 x T10KC drives, replace 3000 tapes</td>
<td>28.6</td>
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<tr>
<td></td>
<td></td>
<td>28.6</td>
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<tr>
<td>2012</td>
<td>replace 2000 tapes</td>
<td>36.6</td>
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<tr>
<td></td>
<td></td>
<td>36.6</td>
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<tr>
<td>2013</td>
<td>replace 2000 tapes</td>
<td>44.6</td>
</tr>
<tr>
<td></td>
<td>additional: replace 1000 tapes</td>
<td>44.6</td>
</tr>
<tr>
<td></td>
<td>replace 2 x T10KA by T10KD</td>
<td>48.6</td>
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<tr>
<td>2014</td>
<td>add/replace T10KC by 32 x T10KD</td>
<td>65.6</td>
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<tr>
<td></td>
<td>replace 1000 tapes</td>
<td>72.6</td>
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<tr>
<td></td>
<td>additional: replace 1000 tapes</td>
<td>84.1</td>
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<tr>
<td></td>
<td></td>
<td>91.6</td>
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<td>2015</td>
<td>replace 1000 tapes</td>
<td>79.6</td>
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<tr>
<td></td>
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<td>99.1</td>
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<td>2016</td>
<td>replace 1000 tapes</td>
<td>86.6</td>
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<tr>
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<td>106.6</td>
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<td>Optional</td>
<td>replace 4600 tapes</td>
<td>132.8</td>
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<tr>
<td></td>
<td></td>
<td>141.1</td>
</tr>
</tbody>
</table>

¹ Assuming 8 TB with T10KD, ² Using 8.5 TB with MaxCap
What do we want from Oracle

- Need information about further product development
- Need roadmap for 5 years and later
- Need early discussions for strategic planning

What do we want from LTUG

- Share knowledge with similar users
- Learn from other installations
- Get information about future product development
- Get roadmap information for about 5 years
Thanks

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