# Database
# Competence Centre

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- **Oracle VM at CERN**
  - Deployment status update
  - Intel Single Root I/O Virtualization (SR-IOV)
- **Enterprise Manager**
  - Enterprise Manager 12 beta testing overview
- **Replication Technologies update**
  - 11g deployment plans
  - Validations with production data
- **Outreach**

# OracleVM
## at CERN

- **3** pools of OracleVM Servers running **53** VMs fully hardware virtualized

- Oracle clusters **(RACs) of 11g** installed in virtual machines

- CERN CC integration Quattor, Lemon, SLS LANDB, syscontrol

- **OracleVM Manager** with **redundant configuration**, **OVM repository on our production DB**

- **5** Pools of OracleVM Servers running **102** VMs using **HW, HW+PVdriver, PV**

- OVM 2.2: 2 Pool Production, 1 dev, 2 test

- **HighAvailability** stress test **successful**, auto recovery of the VM after multiple server power cut

- OVM manager on 2 virtual machines with DNS load balancer!

- **EM12 Cloud** test beta program

- **OVM 3.0** Test in SafeHost with Intel 10GB Ethernet card

# Intel SR-IOV + Oracle OVM 3.0

- ## What is Intel Single Root I/O Virtualization (SR-IOV)?

  SR-IOV is a PCI device virtualization technology that allows a single PCI device to appear as multiple PCI devices on the physical PCI bus
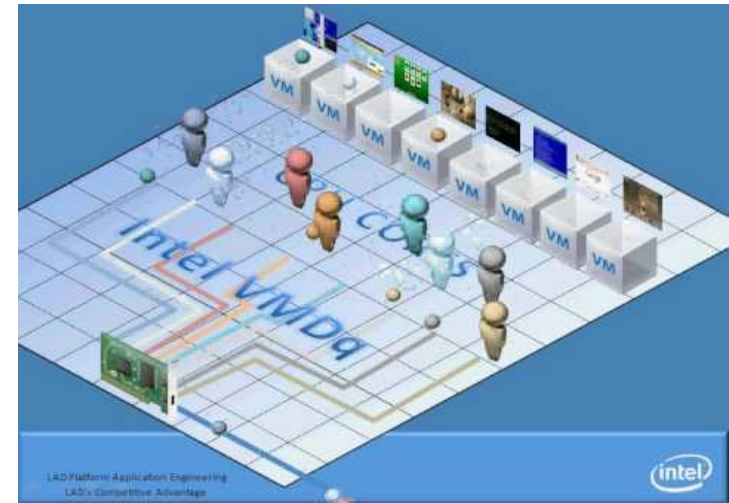


- **The aim of the test, is to measure the benefit of using SR-IOV with CERN database workloads on ORACLE VM 3.0**
  - Assigning one or more virtual functions to a virtual machine allows the virtual machine to directly exploit the hardware without any mediation by the hypervisor.
  - This means less CPU usage, reduced latency and increased bandwidth!

# Intel SR-IOV + Oracle OVM: status

- New Intel SR-IOV 10GB Ethernet Cards installed on new Dell machines

- Oracle VM 3.0 server installed last week @SafeHost

- Deep analysis on 8 different virtual OS and solution of NFS I/O problem

- SR-IOV on OVM 3.0 test completed for December

# Oracle Enterprise Manager 12 Beta @CERN

# EM 12 new features interesting for CERN

- Manageable upgrade
- SSH Keys and LDAP based authentication
- Admin Groups
- AWR/ASH/Emergency ADDM
- Active Reports
- EM Cloud Management instead of OVM Manager
- Consolidation planner
- Bare metal provisioning

- **Testing in 5 tracks:**
  - Install
  - Upgrade (two system upgrade)
  - Database Management and framework
  - Application Replay
  - Cloud Management

# Application Replay - product overview

- **What is AR?**
  - realistic testing of any part of the application stack from application server down to disk
  - capture a workload on the production system from network traffic
  - replay it on a test system with the exact timing, concurrency, and transaction characteristics of the original workload
  - Based on **Oracle Real User Experience Insight (RUEI)**

- **What is RUEI?**
  - end-to-end monitoring based on network protocol analysis
  - offers wide variety of online applications performance reporting
  - deployment requires network appliance or special configuration on switches (copy port)
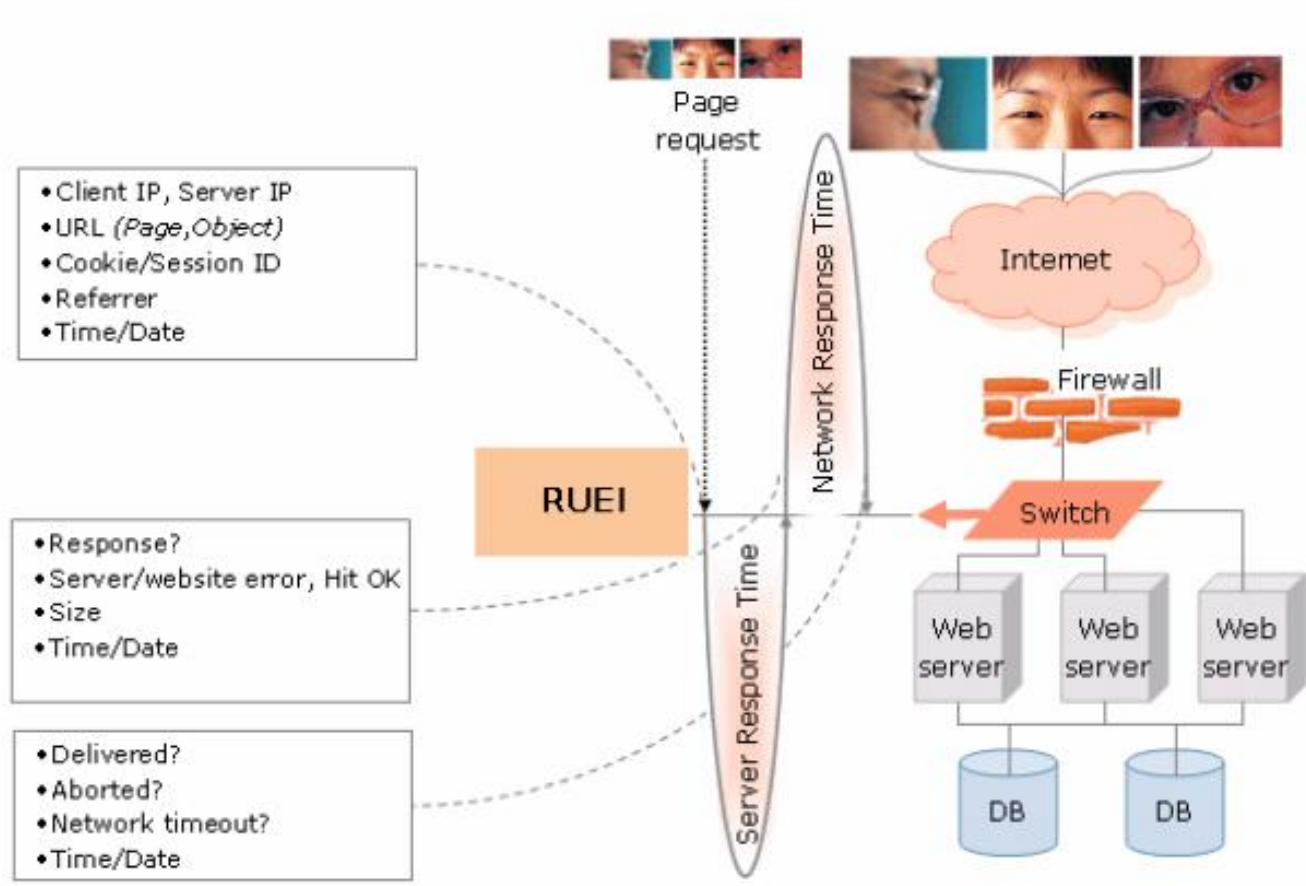
# Oracle EM12 Cloud Management
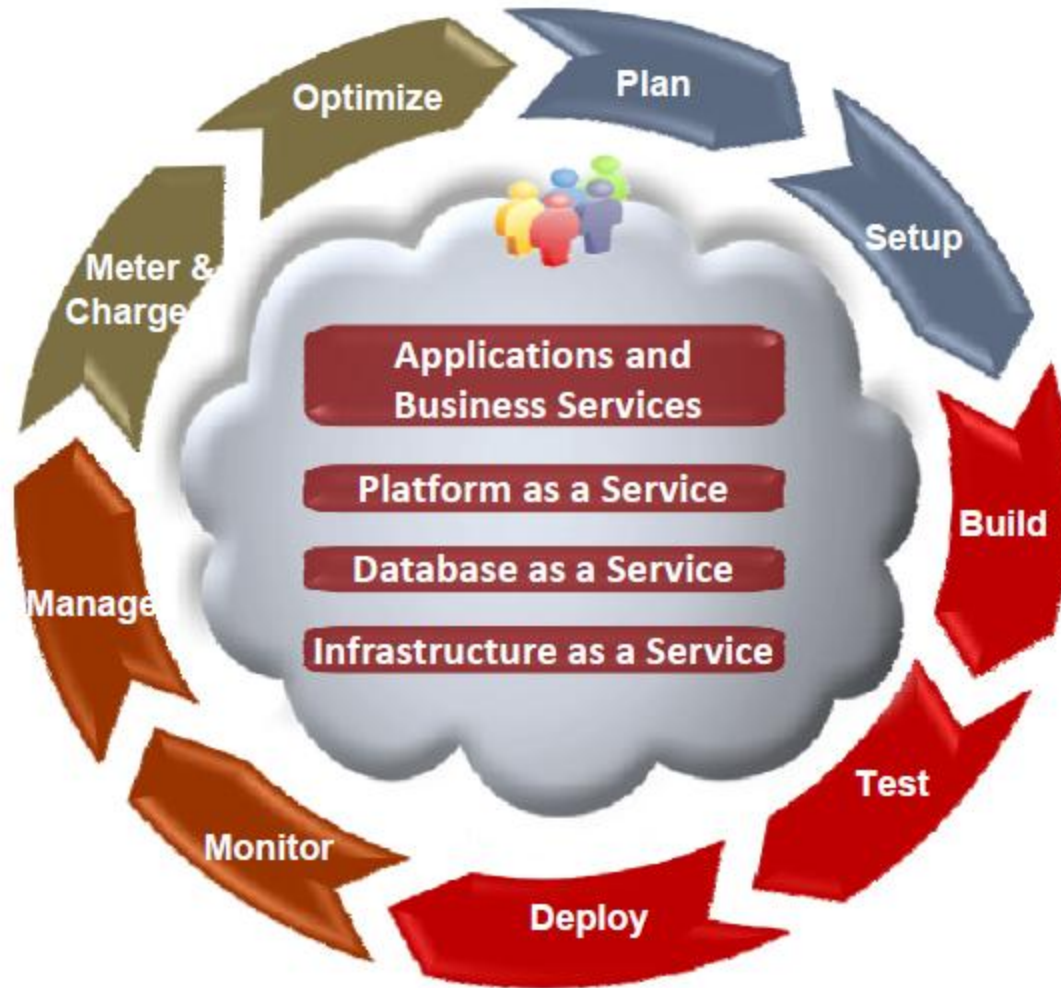
- Really good product with great GUI

- Lots of functionalities appreciated by CERN

- Modularity and 2-system upgrade are important

- Looking forward to get the 1$^{st}$ patchset and go to production

- Great collaboration with Oracle teams

- Andrew Bulloch:

  *"CERN has a very good reputation inside Oracle development for delivering high quality work and feedback and I'm sure in the EM Beta test their reputation will only be further enhanced with your efforts so a hearty thanks from us…"*

# Replication technologies update

# Replication plans for 2012

- **Streams replacement with ADG**
  - CMS (online – offline)
  - ALICE (online – offline)

- **No changes (Streams11g) for**
  - ATLAS
    - online - offline (ADG foreseen in 2013)
    - offline - T1s
  - LHCb
    - online – offline
    - offline – T1s
  - COMPASS (online – offline)

# Validation of 11g replication

- Streams
  - Downstream capture (ATLAS, LHCb)
    - 11g to 11g (default configuration)
    - 11g to 10g (intermediate state during upgrade)
    - Cascading downstream capture (in combination with Dataguard)
  - Long term replication test (over 3 months) with production data
  - Validation of various patches
- CMS active standby
  - Tested with CMS critical data sets (Conditions) and client applications
  - Good replication performance (avg. 38MB/s, max 82 MB/s)
  - Good stability
- Feedback provided to Oracle development teams

- Goal
  - Validation of technologies with CERN's data
  - Direct performance comparison
- Tested technologies
  - Streams 11g
  - GoldenGate 11g
  - Active DataGuard 11g
- Workload from production
  - LHCB LHC file catalog
- On same hardware and software configuration

# Replication testing - feedback

- **Results sent to Oracle development teams**
- **Further optimizations suggested by development teams**
  - Streams: GoldenGate XStream optimization
  - ADG: patching + tuning
- **Tests repeated after implementation of the improvements**
- **Much more better performance observed!**

**CERN openlab**

Monitor ▾ | Maps ▾ | DBs ▾ | Streams ▾ | **Standbys** ▾ | Plots ▾ | Errors ▾ | Availability ▾ | History ▾ | Reports ▾

All ▾ | All-Prod ▾ | ALICE ▾ | ATLAS ▾ | CMS ▾ | COMPASS ▾ | LHCb ▾ | OTHERS ▾ | TEST ▾ | TEST11G2 ▾ | TEST_ATLAS ▾

### DATAGUARDS SETUP

| # | Redo log stream | Standby State | Type | Data latency | File transport lag | Apply rate | Recovery status |
|---|---|---|---|---|---|---|---|
| 1 | ADCR.CERN.CH=>ADCR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 22 sec | 0 sec | 8.7 MB/s | 1 MRP(s) up |
| 2 | ALIONR.CERN.CH=>ALIONR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 18 sec | 0 sec | 791.9 kB/s | 1 MRP(s) up |
| 3 | ATLR.CERN.CH=>ATLR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 26 sec | 1 sec | 821.6 kB/s | 1 MRP(s) up |
| 4 | ATONR.CERN.CH=>ATONR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 29 sec | 1 sec | 617.3 kB/s | 1 MRP(s) up |
| 5 | CMSONR.CERN.CH=>CMSONR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 32 sec | 1 sec | 653.9 kB/s | 1 MRP(s) up |
| 6 | CMSR.CERN.CH=>CMSR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 25 sec | 0 sec | 982.0 kB/s | 1 MRP(s) up |
| 7 | CMSTEST.CERN.CH=>CMSTEST_STDBY.CERN.CH | READ ONLY | / MAXIMUM PERFORMANCE | 8 day(s) 22 hr 14 min 52 sec | 8 day(s) 4 hr 54 min 15 sec | -- | DOWN |
| 8 | LCGR.CERN.CH=>LCGR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 17 min 56 sec | 2 min 33 sec | 53.9 MB/s | 1 MRP(s) up |
| 9 | LHCBONR.CERN.CH=>LHCBONR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 26 sec | 2 sec | 206.0 kB/s | 1 MRP(s) up |
| 10 | LHCBR.CERN.CH=>LHCBR_STDBY.CERN.CH | MOUNTED | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 19 sec | 5 sec | 256.9 kB/s | 1 MRP(s) up |
| 11 | TEST11G.CERN.CH=>TEST11G_STDBY.CERN.CH | READ ONLY WITH APPLY | PHYSICAL STANDBY / MAXIMUM PERFORMANCE | 3 hr 6 min 22 sec | 3 hr 6 min 22 sec | 0 B/s | 1 MRP(s) up |

**07-10-11 14:43:09** auto refresh ☑

Links: 3D OEM, 3D TWIKI     Contact : Pdb.Service

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Monitor ▾ | Maps ▾ | **DBs** ▾ | Streams ▾ | Standbys ▾ | Plots ▾ | Errors ▾ | Availability ▾ | History ▾ | Reports ▾

**Info** ▾ | Overview ▾ | Stats ▾

## ATLR_STDBY.CERN.CH

### Instances

| Id | Name | CPU Usage | CPU Load | Stream Pool Size | Stream Pool Free | Stream Pool Utilization | Redo Size | Redo Generated/s | Bytes Read/s | Bytes Written/s | PGA size | Logons /s | Current logons |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | atlr1 | 1% | 0.41 | 592.0 MB | 592.0 MB | 0 % | 0 B | 0 B | 2.0 MB | 2.5 MB | 432.5 MB | 1 | 37 |
| 2 | atlr2 | 1% | 0.42 | 592.0 MB | 592.0 MB | 0 % | 0 B | 0 B | 43.1 MB | 1.2 MB | 558.0 MB | 1 | 41 |

### Standby stats

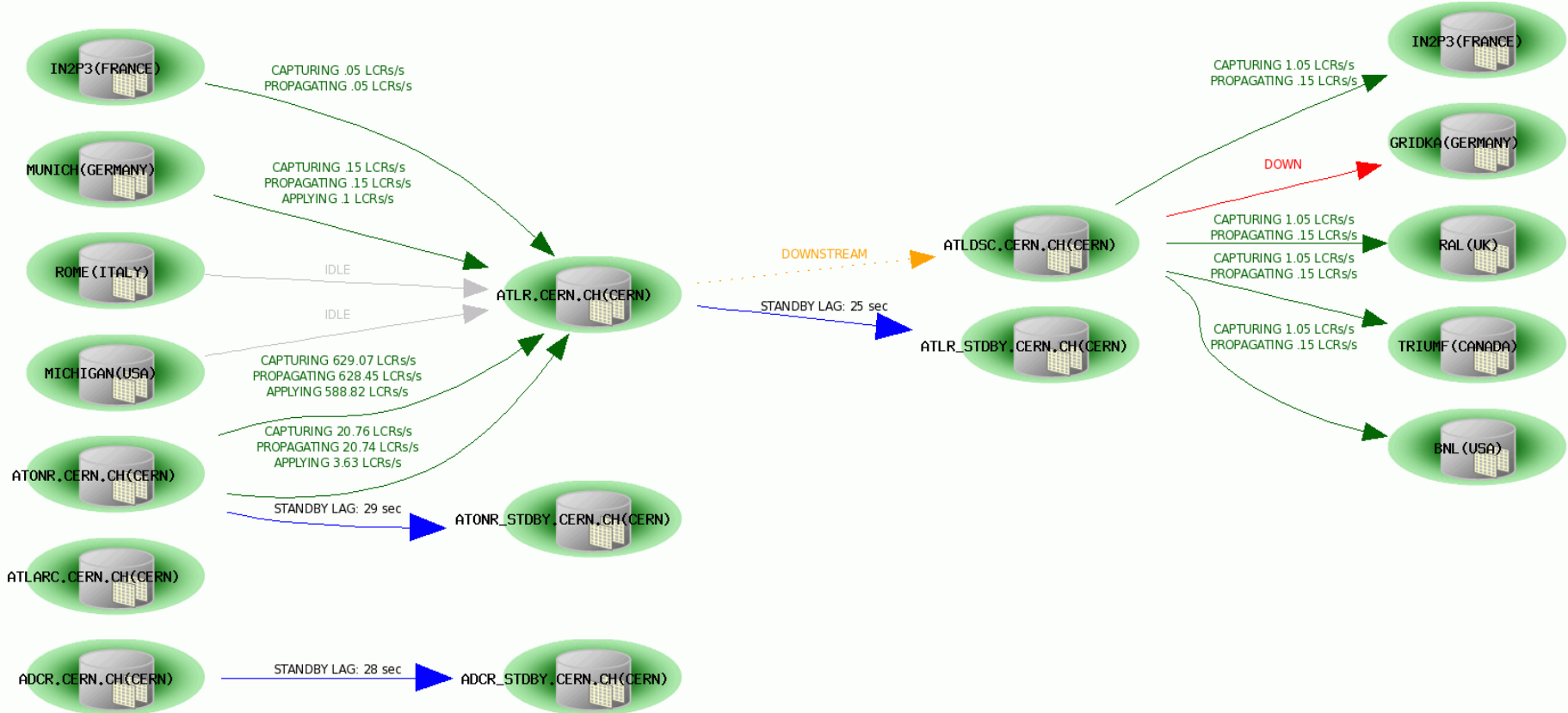| Primary database | Recovery Status |
|---|---|
| ATLR.CERN.CH | Up (1 processes) |

| Apply Lag | Transport Lag | Applied redo volume | Current redo apply speed | Redo apply active speed | Redo apply average speed |
|---|---|---|---|---|---|
| 30 sec | 3 sec | 4168.3 GB | 1.2 MB/s | 12.6 MB/s | 1.7 MB/s |

**07-10-11 14:45:41** auto refresh ☑

# Standby monitoring

# Outreach

# Presentations

- "Overview of Database Technologies" **Eric Grancher**, Computing and Astroparticle Physics  2nd ASPERA Workshop, Barcelona 30-31 May 2011

- **"**CERN IT-DB Deployment, Status, Outlook**" Luca Canali,** ESA-GAIA DB Workshop, ISDC, March 2011

- *"Oracle at CERN"* **Eric Grancher***,* CERN openlab summer students programme 2011, CERN, August 2011

- "AWR and ASH in 3-D: Performance Analysis Tools No DBA Has Seen Before" **Anton Topurov***, Debaditya Chatterjee, John Beresniewicz*, Oracle Open World 2011, San Franciscio  2-6 September 2011

- "Successful Oracle Database 10.2 to 11.2 Migration with Oracle Real Application Testing" **Katarzyna Dziedziniewicz-Wojcik***, Prabhaker Gongloor,* **Eric Grancher**, Oracle Open World 2011, San Franciscio 2-6 September 2011