What's So Special about the Oracle Database Appliance?
Lonneke Dikmans & Frank Hoppe
November 2014 • v1.6
About us - Lonneke Dikmans

Vennster -> eProseed
Established 2007 – SOA/BPM solutions
Consulting, architecture, SOA & BPM Projects
Co-Author of the book “SOA Made Simple”
Fusion Middleware enthusiast, esp. SOA Suite & BPM Suite

O-box Products
Founded by Veriton (UK) & Vennster (NL) in 2013
A pure product company
Fusion Middleware appliances based on ODA: SOA first…
About us - Frank Hoppe

Opitz

O-box Products

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Fusion Middleware appliances based on ODA: SOA first...
Opitz is a partner of O-box
### What’s So Special about ODA?

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Agenda

- Introduction to ODA
- ODA Architecture & Provisioning
- Database: Project Experiences
- Middleware: Project Experiences
- Appliance? Cloud? Exa?
INTRODUCTION TO ODA
What is the Oracle Database Appliance?

1 or 2 storage arrays

2 x 12 cores (2.7GHz) 256GB

20 HDD

4 SSD

2 x dual 10GbE ext + 1 x dual 10GbE int + Management Port
Introduction to ODA

Aims*

- Simplify and speed up Oracle database deployment
- Ease patching & help customers stay on recent versions
- (more recently) Provide ‘in a box’ solution for customers and ISVs

* I don’t work for Oracle – this is my opinion only!
ODA Evolution

1998
Oracle
‘Raw Iron’

2000

2001
Dell/Oracle
database
appliance
(8i single
instance)

2006
RAC-in-a-BOX
Veriton &
Julian Dyke
(9i RAC)

2009
Oracle
Exadata

2010

2011 (Sep)
Oracle
ODA v1

2013 (Feb)
ODA 2.5
Virtualized
Platform

2013 (Apr)
ODA X3-2
hardware

2013 (Dec)
ODA X4-2
hardware

2014

O-box was born!
Introduction to ODA

Characteristics

- Appliance designed by experienced engineers
- Includes sensible optimisations, e.g. huge pages, ASM SAME
- Flexible licensing
- One point of support
  - Fewer decisions to make than traditional systems
  - Quicker to deploy and import your data
ODA ARCHITECTURE & PROVISIONING
The Biggest ODA Decision...

Physical or Virtual?
- Physical (aka Bare Metal/BM) is traditional database-only mode
- Most ODA customers are running in physical mode today (historical?)
- Can't easily change after deployment (need backup/restore)

Trend
- ...towards virtual

Non-database workload too?
- ⇒ You need to use virtual
Bare Metal: for running databases only

Database
- Choice of 11.2.0.4.2 or 11.2.0.3.10 (as at ODA 2.10)
- ...trend to supporting several Oracle versions

Appliance Manager
- UI when you first provision ODA
- oakcli tool
Databases in a VM - are they mad? Not quite...

- Database VM (ODA Base) has direct access to storage
  - via processor VT-d extensions presenting SAS cards to VM
- ODA Base is HVM but with PVHVM network drivers

On the other hand...

- 48 Xeon cores is a lot of compute horsepower for 24-48 disks
Virtualized Platform: databases

**Database**
- Each node has a “ODA Base” DomU
- Looks a lot like ODA BM - most admin done from ODA Base

**Nodes**
- Run a special OVS image

**Appliance Manager**
- GUI when you first provision it
- oakcli tool
Virtualized Platform: databases plus applications

Middleware & Applications
- Run in their own VMs (DomU’s)
- Shared repo so can fail-over
- Supports OVM3 templates

Appliance Manager
- Provides VM management (templates, lifecycle)
- CPU pools for isolation & license management
Virtualized Platform: Oracle WebLogic/OTD

ODA WebLogic
- UI to set up WLS domain
- WebLogic 10.3.6, 12.1.1 or 12.1.2
- Traffic Director 11.1.1.7

⇒ Ready to run Java apps
- HA out of the box
- Can set up 1 or more domains & clusters at initial provisioning
Unboxing

See X4-2 Setup Poster:
http://docs.oracle.com/cd/E22693_01/doc.21/e41668.pdf
Overview of Database Provisioning

1. Download Oracle software

2. Configure network & copy over software

3. Run Oracle Appliance Manager

4. Database (EE, RON or RAC) set up

DB only: stop here!
## ODA Provisioning

<table>
<thead>
<tr>
<th>Physical</th>
<th>Virtual</th>
<th>Virtual with WebLogic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-image with Virtual image</td>
<td>Re-image with Virtual image</td>
<td></td>
</tr>
<tr>
<td>Run oakcli firstnet</td>
<td>Run oakcli firstnet</td>
<td>Run oakcli firstnet</td>
</tr>
<tr>
<td>Install End User Bundle</td>
<td>Install ODA Base</td>
<td>Install ODA Base</td>
</tr>
<tr>
<td>Run OAM</td>
<td>Run OAM</td>
<td>Run OAM</td>
</tr>
<tr>
<td>Install WLS &amp; OTD templates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run ODA WebLogic Config Utility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer your data</td>
<td>Transfer your data</td>
<td>Transfer your data &amp; deploy your applications</td>
</tr>
</tbody>
</table>
Overview of WebLogic Provisioning

1. Download Oracle software
2. Copy over software, unzip templates
3. Run Oracle WebLogic Server Configuration
4. WebLogic & Traffic Director

VMs are provisioned...

DB only: stop here!

Good to Go!
ODA Networking

1 or 2 ‘public’ networks

Networking is 10GbE copper

Since ODA 2.8:
- VLANs
- fibre option (X4-2)

Management (ILOMs)
DATABASE: PROJECT EXPERIENCES
Customer’s ODA Journey

- Insurance provider
- 1700 employees, 3M customers
- Main app covers Product/CRM/Finance
- Used by ~1000 agents / 600 active
- Highly Available
- RAC Database (~2TB) + Data Guard
- Oracle Fusion Middleware (WebLogic, IDM & Reports)
Customer’s ODA Journey

Goals
- Replace EoL servers & FC SAN
- Migrate from Database 10.2 to 11.2 to stay supported
- Improve performance (batch primarily)

Three POC success criteria defined
- Time and ease of setup
- Performance 30% better minimum
- No concerns regarding performance and load

Approach
- Compared ODA to ‘2 servers & NAS’
- Database was driver; WebLogic etc could be additional benefit
- Oracle loaned ODA for 1 month for POC
Proof of Concept Conclusions

Quick to set up & deploy
- It just worked out of the box

Application load testing good
- No surprises

Batch load testing very good
- 4x faster than (EoL) hardware
Observations & Outcome

Experience

- Fiddly initial set-up (VP), ILOM, imaging etc (confirmed by O-box partners)
- Character set constraint so used DBCA with own template
- Performance more than good enough

Live in <3 months (included 10.2 to 11.2 migration)
Experiences since Go-Live

- Getting node evictions on ODA 2.7 ~ every 24 days
  - RAC Pack got involved 😊
  - How big do you think the Dom0 crash dumps are..?!
  - Two potential kernel bugs (16458268, 16372098) identified, already fixed in ODA 2.8 (2.6.39-400 series kernel). ODA VP only?
  - Problem disappeared after patching 😊
- 1 HDD failure last month (from 2 x two array ODAs = 100 disks)
- Huge Pages sizing (50% of main/ODA Base mem may be too low for systems with lots instances but small numbers of sessions)
ODA (aka OAK) version (e.g. 2.10) is incremented by patching

- Patching
  - Infra, Grid Infra and Database (don’t have to do all at once)
  - Currently no Oracle automated patching for Java / WebLogic on ODA

- Patches are approximately quarterly (following CPUs)
- Separate patches for both BM & VP (released together)
- Policy is you need to stay not more than 2 patches behind latest
- One-off patches are allowed but add complexity
**Sizing & Isolation**

- ODA comes with a set of pre-sized templates
  - Very Very Small: 2 cores, 2GB SGA, 1GB PGA, up to 24 db ...
  - ...Extra Extra Extra Large: 48 cores, 96GB SGA, 48GB PGA, single db
- Doc considers db IOPS & throughput for 1 or 2 arrays
  - e.g. Ex Ex Ex Large 2 array: 6600 IOPS, 5500 MB/s, 96GB redo/h
- Resource Manager used for instance caging

"Oracle strongly recommends that you use the Oracle Database Appliance templates, because they implement best practices and are configured specifically for ODA"
Backup & DR

For database
- Standard approach is to use RMAN to either local RECO DG (then off site) or to external storage e.g. ZFS/NAS
- With ZFS options snapshots & clones but moving away from ‘ODA Philosophy’
- (Active) Data Guard for DR (& Reporting)

For middleware / applications
- Nothing out-of-the-box yet: OS utilities, rsync, ACFS snapshots...
‘ODA Philosophy’

It just works!

- Don’t bother questioning every design decision: focus on your own databases (sizing, purging, optimisation rather than e.g. whether SSD is best used for REDO)

Patch regularly

- Quarterly or 6 monthly & educate users to expect this

It’s an APPLIANCE: Don’t Pimp Your ODA!

- It runs EE & storage is primarily self contained - don’t stray too far from design
MIDDLEWARE: PROJECT EXPERIENCES
O-box Products: Middleware Appliances

First product:

Components:
- Oracle SOA Suite
- Oracle Traffic Director
- Oracle WebLogic Suite
- Oracle Database
Building HA Oracle SOA Suite..?
O-box Products’ ODA Journey

Goals
- Faster time to market of SOA Projects
- Easy patching
- In compliance with EDG
- SOA-in-a-box

Success criteria
- Time & ease of setup (no manual intervention)
- Highly available
- Secure

Approach
- Worked closely with Oracle product management
- Take care to keep it supportable by Oracle
- Core expertise of both Vennster and Veriton combined
- Add value by adding control (not just ‘running a few scripts’)
Portal Wire-frames | e.g. Certificates

Security certificates

for Public Domain:
- by O-box
- Certificate Authority

for DMZ network:
- by O-box
- Certificate Authority

for Internal Network:
- by O-box
- Certificate Authority

for Management Network:
- by O-box
- Certificate Authority

Certificate data for O-box certificate

Organizational Unit (OU)
Enter department name...

Organization (O)
University of Dorset

Location (L)
Enter company location

State (S)
Enter state/province

Country (C)
Enter county name

Print configuration Finish
The O-box “2 stick install”

- O-box configuration
- O-box software
- My O-box portal
- Oracle E-delivery
- Oracle media packs
- Approx. 2 hours later
- Ready to go!
Rapid Deployment of Multiple SOA Environments

Oracle Traffic Director
O-box Manager
Oracle Appliance Manager
Oracle WebLogic Suite
Oracle Database

Example environments

ODA X4-2
**O-box Experience | Putting an application on ODA**

**Database**

- Some Fusion Middleware products can be database heavy, e.g. BPEL, but the mid-tier is processing oriented
  - ⇒ good mix for ODA
- ODA GI & database provisioning *just works* 🌟
- Easy to choose between EE, RON or RAC
- WLS ODA template can have GridLink (i.e. FCF, RCLB) example pre-configured to an ODA db
O-box Experience | Putting an application on ODA

WebLogic
- WebLogic domain build is very good
- Multiple domains & multiple clusters only recently supported (WLS ODA 2.9.0+)
- Can only run configuration once (or else clean and restart)

Traffic Director - Load Balancer
- Now available on ODA (as well as Exalogic)
- Stable product - LB features comparable to HW
O-box Experience | *Putting an application on ODA*

- Some constraints, e.g. size of the Oracle Home (3GB) & no API to add disk space
- Lean/limited RPMs (we added RPMs from Oracle Linux ISO)
- We had to tune memory & CPU allocation

**WLS ODA Designed for Java EE application deployment, not tuned for Fusion Middleware platform like SOA**
Further thoughts

EM Agent
- Easy to install in ODA Base (DB) or WebLogic VMs, but not Dom0

Virtualization on ODA
- Hardware core partitioning allowed for licensing
- Certified and supported
- It's not vSphere
- Primarily hypervisor, not full management suite (no OVMM)
APPLIANCE? CLOUD? EXA...?
Cloud*** versus Appliance versus DIY

Cloud
Appliance
DIY

Control
Patching
Support
Security

Privacy**
Cost*

*Cost depends on the size of your organization
** in case of a public cloud
***Public or private cloud

O-box

OPITZ CONSULTING
## ODA versus Exadata

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<th>Exadata (1/8 rack)</th>
<th>Exadata (full rack)</th>
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<tr>
<td></td>
<td>2 database servers</td>
<td>8 database servers</td>
</tr>
<tr>
<td></td>
<td>48 cores</td>
<td>192 cores</td>
</tr>
<tr>
<td></td>
<td>512 GB RAM</td>
<td>1024 GB RAM</td>
</tr>
<tr>
<td></td>
<td>No storage servers</td>
<td>3 storage servers</td>
</tr>
<tr>
<td></td>
<td>24 disks (or 48 disks)</td>
<td>18 disks</td>
</tr>
<tr>
<td></td>
<td>4096 GB RAM</td>
<td>14 storage servers</td>
</tr>
<tr>
<td></td>
<td>10 GbE interconnect</td>
<td>InfiniBand interconnect &amp; RDMA</td>
</tr>
<tr>
<td></td>
<td>Database + optionally apps</td>
<td>Database only</td>
</tr>
<tr>
<td></td>
<td>($60K US (+ $40K for extra storage array))</td>
<td>(use Exalogic for apps)</td>
</tr>
<tr>
<td></td>
<td>$220K US</td>
<td>$1,1M US</td>
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X4-2 models as of June 14
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Is ODA Suitable for You?

Size
- Your biggest prod database needs << 48 RAC/24 EE cores
- Your IOPS reqs aren’t extreme
- You have a relatively small number of DBs, esp if RAC
- You don’t need more than 3 or 4* at one site

License
- You have/need DB Enterprise Edition

Consolidation
- You want to consolidate DB & perhaps middle tier to one hardware platform

Appliance
- You want simplified patching & are happy to patch at least every ~6 months

* This is not a limitation just my opinion
Any questions?

Thank you for listening!

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(search for tag “oda”)
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