

September 2013

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## Databases «On the Fly»

Unravel the Cloud Potential in Oracle Enterprise Manager 12c

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## About me

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- Rune Lilleng (36) – Oslo, Norway
- Database manager at The directorate for Labour and welfare →NAV
- Worked with Oracle products since 2000
  - Data warehouse
  - DBA
  - Exadata (2009)
  - Enterprise Manager (10,11,12)

# Index

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- About NAV
- History
- Future (MOD)
- Cloud implementation
- Experiences
- Future
- Q & A

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# About NAV

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## Objective

- The Norwegian Labour and Welfare service (NAV) plays a broad participatory role in the world of work and society, and contributes to the financial security of the individual.
- This depends on close interaction with the user, working life, and local authorities, and a sharper focus on people with special needs in relation to the labour market and others in a challenging life situation.

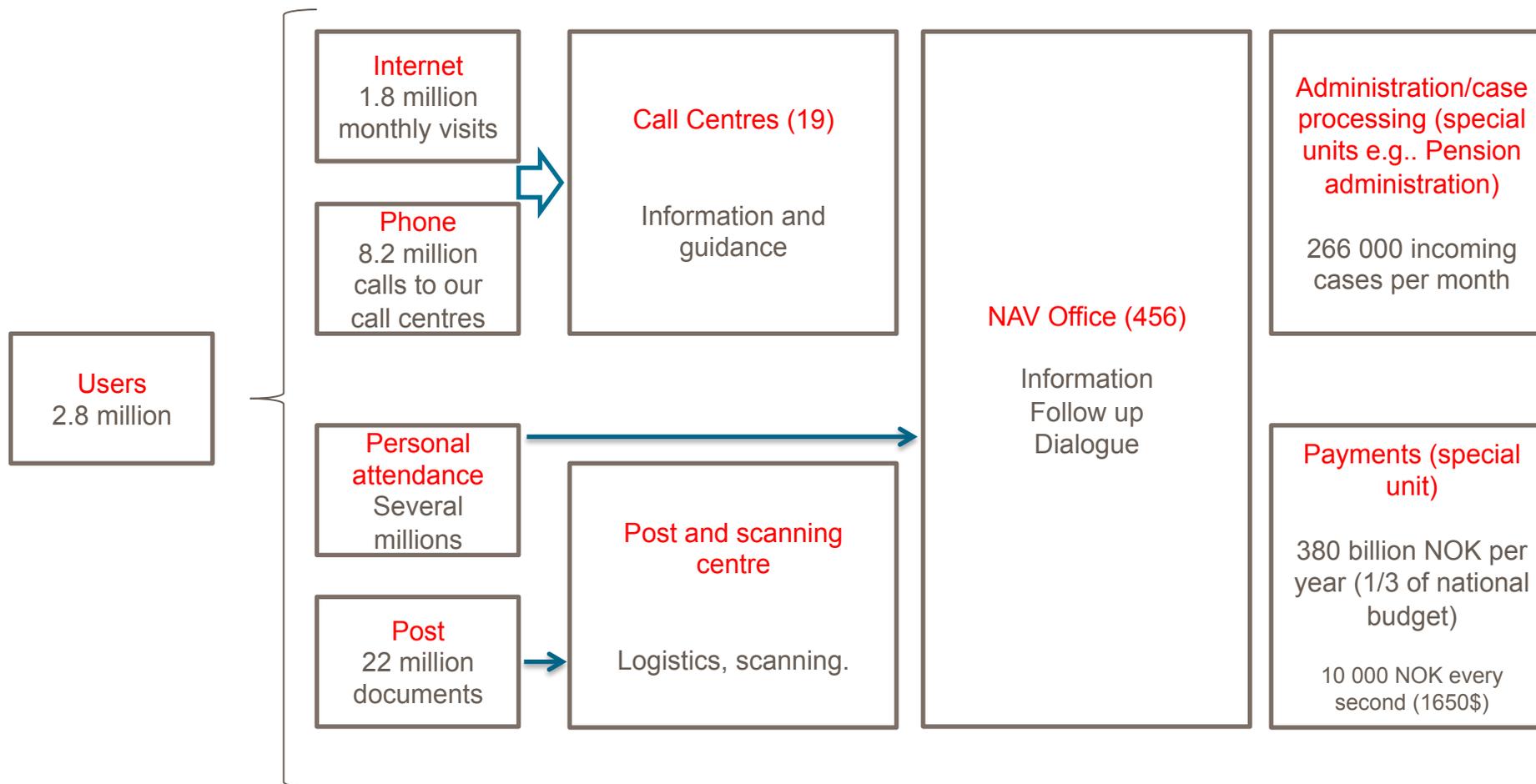
## 2006 Reform

- The Norwegian Labour and Welfare Administration (NAV) was established on 1 July 2006 (Labour and welfare act of 2006).
- It merged the previous National Insurance Service and employment services “aetat”. (20 000 employees).
- The primary goal of this reform was to expedite case work so that more resources could focus on our users and their specific needs (work first).

## Services

- Unemployment
- Sickness benefits
- Family related benefits
- Pensions
- Financial assistance (social)
- Employment schemes
- Occupational injury
- Health services

# About NAV



# History: Multiple platforms

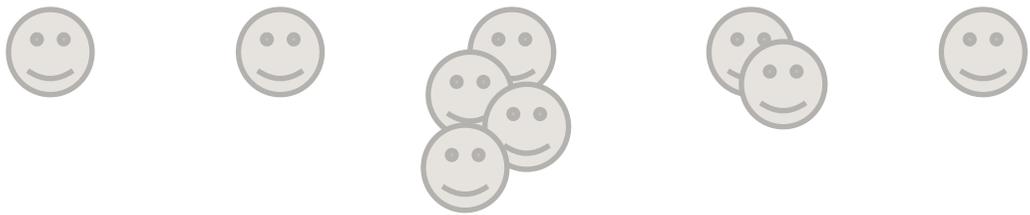
**IT**  
The act of 2006 only focused on organizational changes, and very little was done to consolidate/change the IT platforms from the two former agencies.



5 data centers, spread all over Oslo

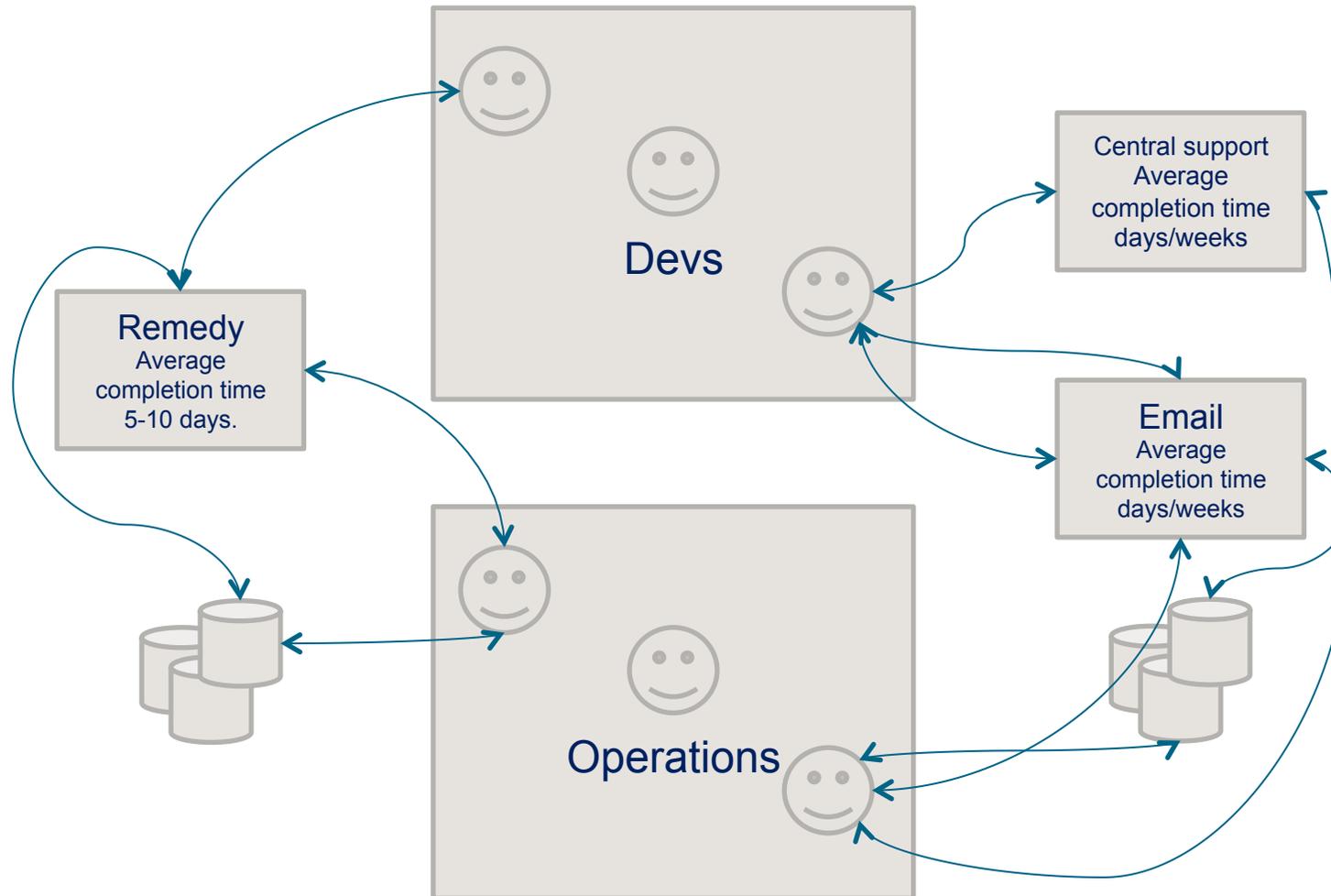
HP-UX      Solaris      Linux      z/OS      Windows

Different platforms



OS support was fragmented. Not professionalized, patching, security etc..

# History: database provisioning



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## History: lack of consistency

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RDBMS installations were none uniform. Each DBA had different preferences. Lots of variations (and confusion).

Patching (security and fixes) were at best random. Too many platforms and different installations made this very difficult.

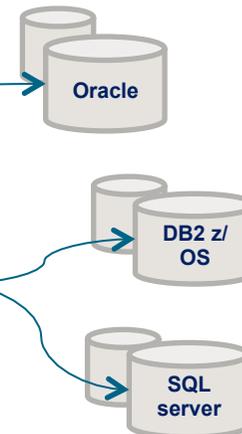
Costly to run on many, and to some extent, old platforms. Various degrees of OS support, lack of personell.

# History: ageing systems

One of our most central systems saw it's first light in 1976 («Infotrygd»). Yes, it's still running 😊



Portfolio of over 300 running applications. 12 core systems. Cobol, Forms, Java apps, .net



**Unable to implement needed changes due to complexity and high costs.**

# MOD program (IT modernization)

As a prequel to the MOD program it was clear that we needed to consolidate and make certain strategic choices, before we could even start to talk about establishing a private cloud solution and developing new applications.

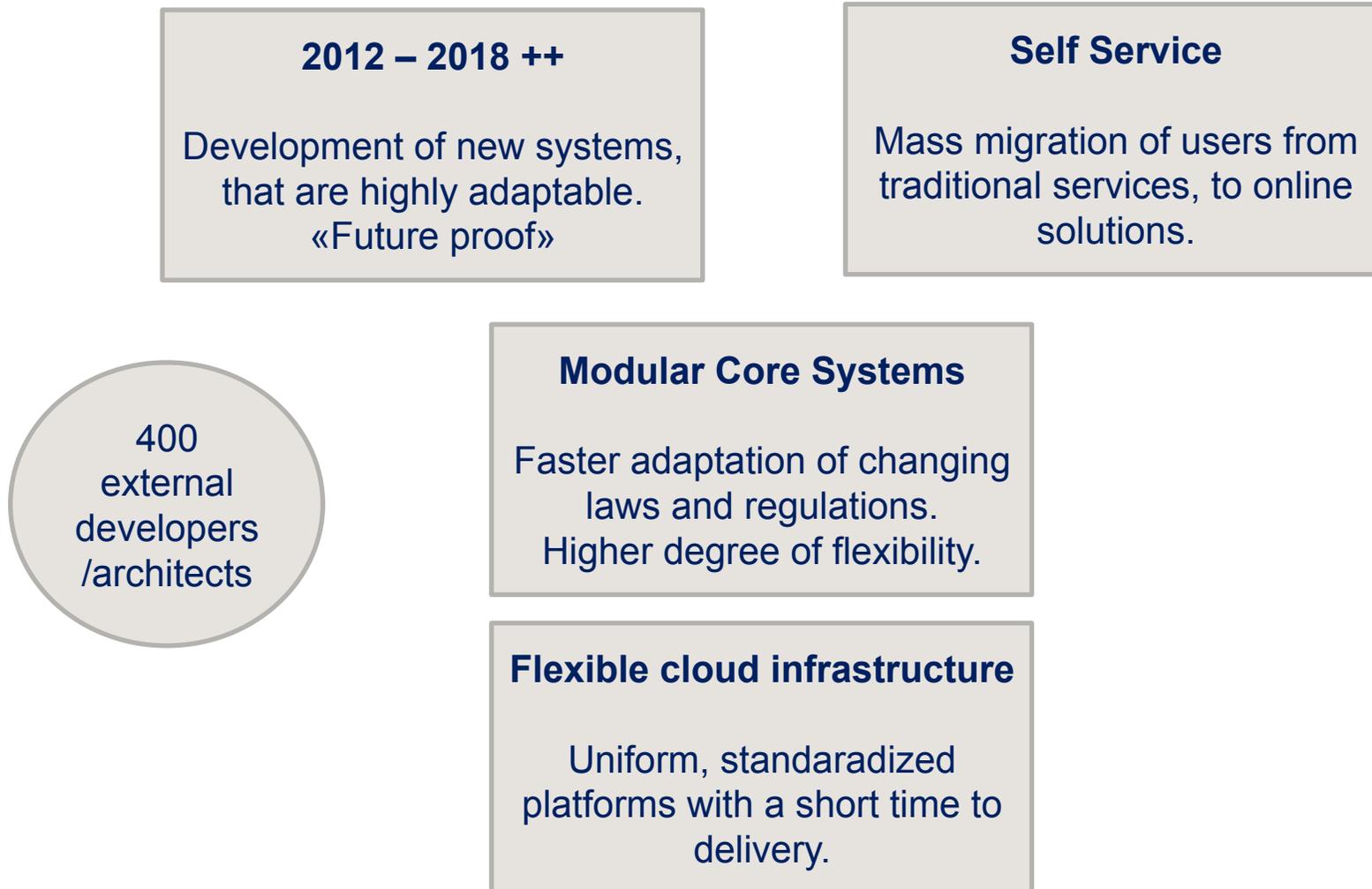
Number of data centres were reduced from 5 to 2. Network infrastructure was renewed, consolidated and simplified.

Strategic operating system of choice became Linux. All running apps and databases have been migrated to Linux (except old legacy systems running on mainframe)

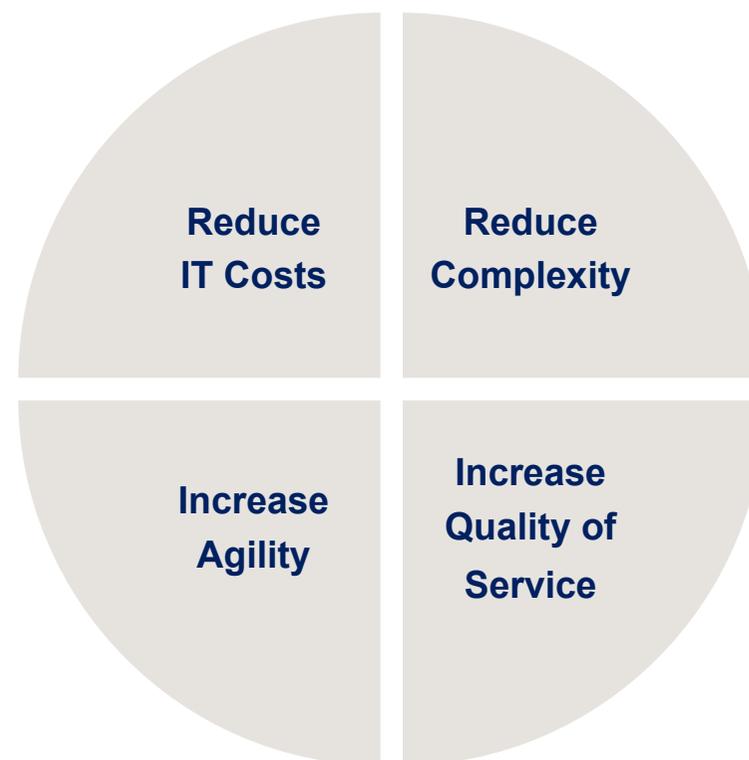
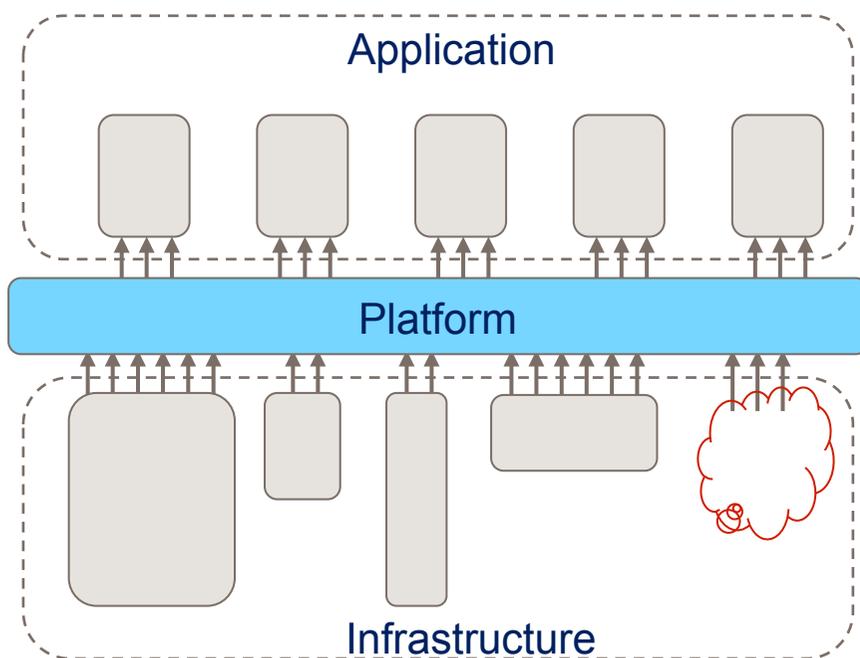
Strategic database platform of choice became Oracle. On-going job migrating databases from DB2 to Oracle.

Jboss, and to some extent WAS selected as strategic j2ee platforms.

# MOD: NAV 2.0



# Why cloud?



In order to meet the demands from MOD, establishing a private cloud, quickly emerged as the only viable option.

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# Implementation

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**Funding was approved late Q1 2012**

**Mission: establish a private database cloud within 01.October.2012**

- 1. Testing**
- 2. Establish infrastructure**
- 3. Config privs and defining pre-req. in EM12c**
- 4. Create Self-Service-Portal**
- 5. Config Chargeback (Showback)**
- 6. Production!!**

## **Implementation: testing**

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- **Simple EM12c installation on in-house server**
- **Configure minimum in EM12c with existing db-servers**
- **Created a Self-Service-Portal**
- **Internals ordered some databases via portal**
- **Testing took us 8 weeks to complete (april/may)**

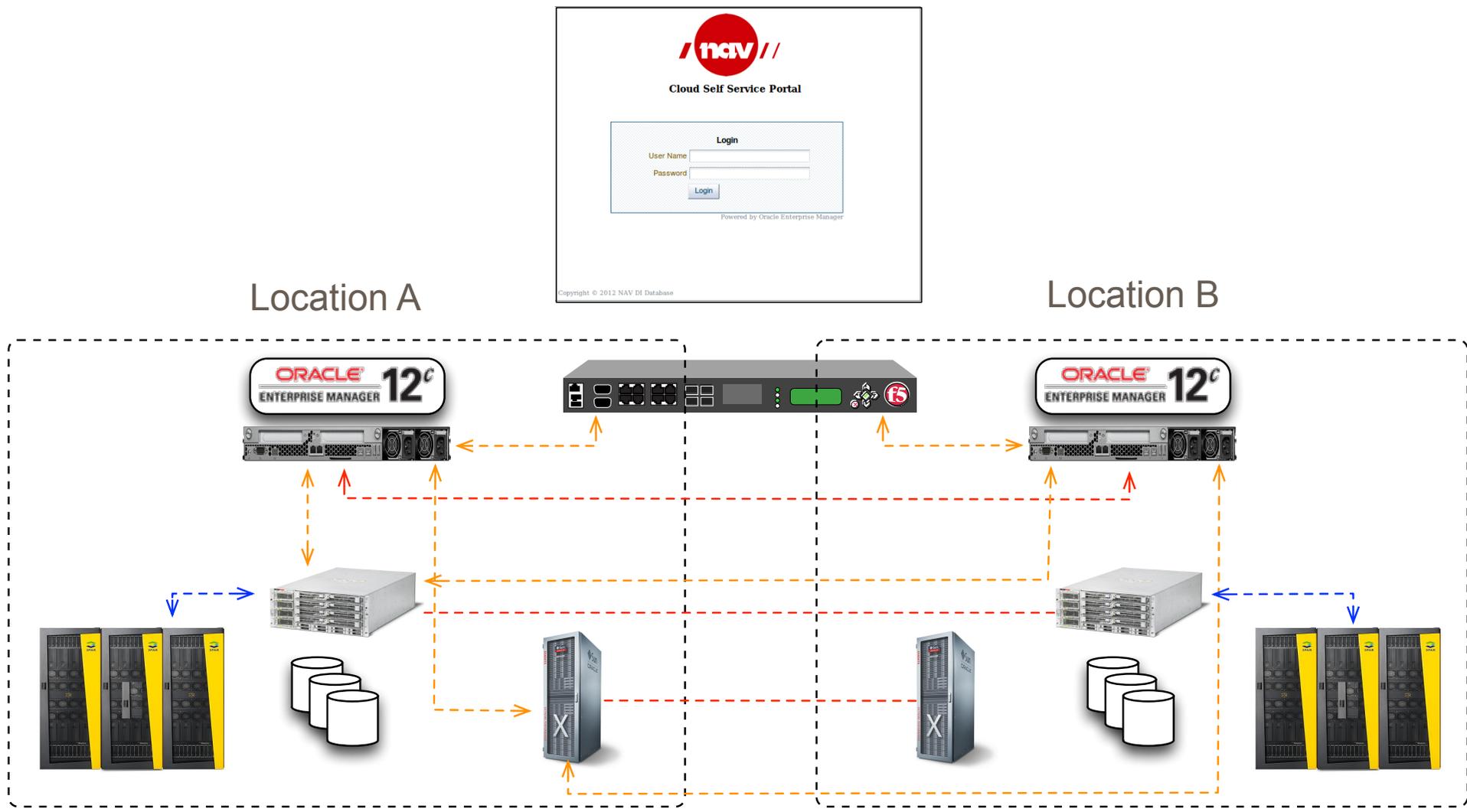
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## Implementation: establish infrastructure

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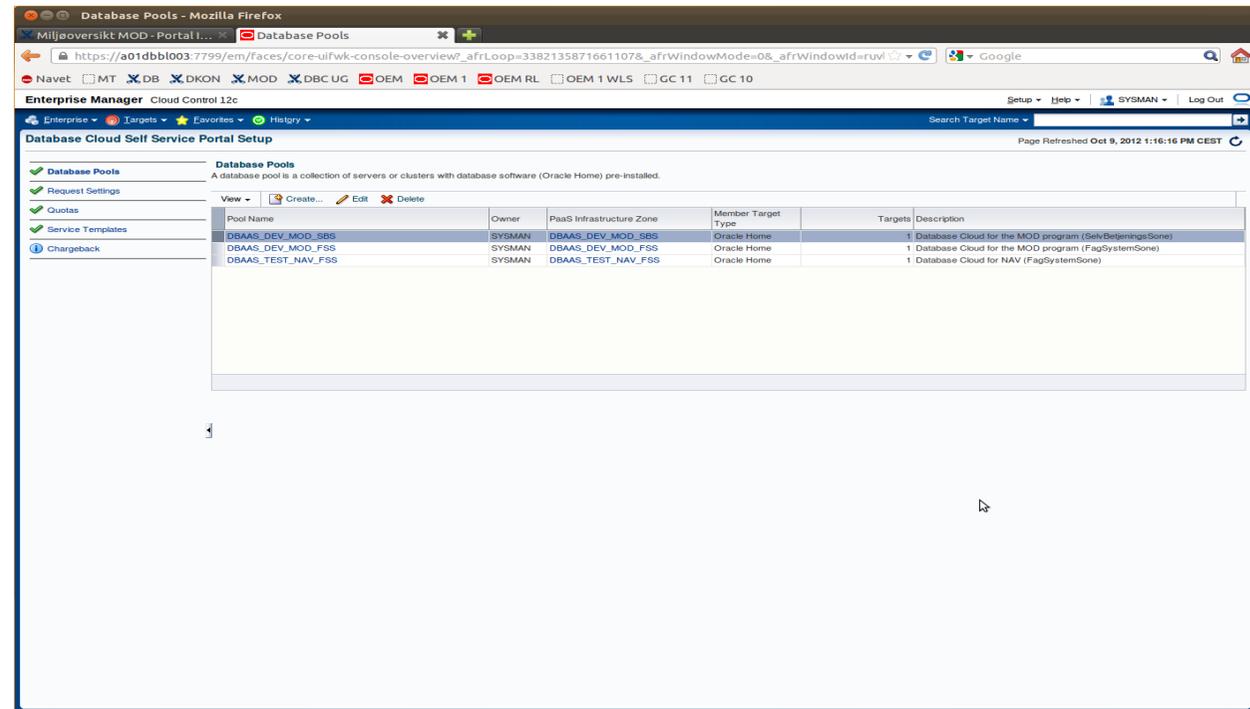
- **Decide on HW infrastructure/server platform**
  - Most of our existing infrastructure was near end of life, or SW was running on platforms no longer within our strategic choices.
  - Cloud runs on Sun Server X2-8 (8) w/HP 3PAR storage, Oracle Exadata (4 x 1/2 racks) all running Oracle Linux
- **EM12c High Availability level 3**
  - OMS in active/active configuration. Repository database is using RAC + data guard.
- **Install OMS and load balancer (big-ip)**
- **Configure Software Library and open ports to MOS**

# Implementation: EM infrastructure



# Implementation: configuration

- **Config privilege delegation for db-servers**
- **User admin**
  - Cloud Admins
  - End User Role and End users
- **Create Database Zone/Pools**
  - Pools from 12.1.0.2
- **Configure Request and Quotas settings**
- **Create service templates.**
  - Deployment Procedure

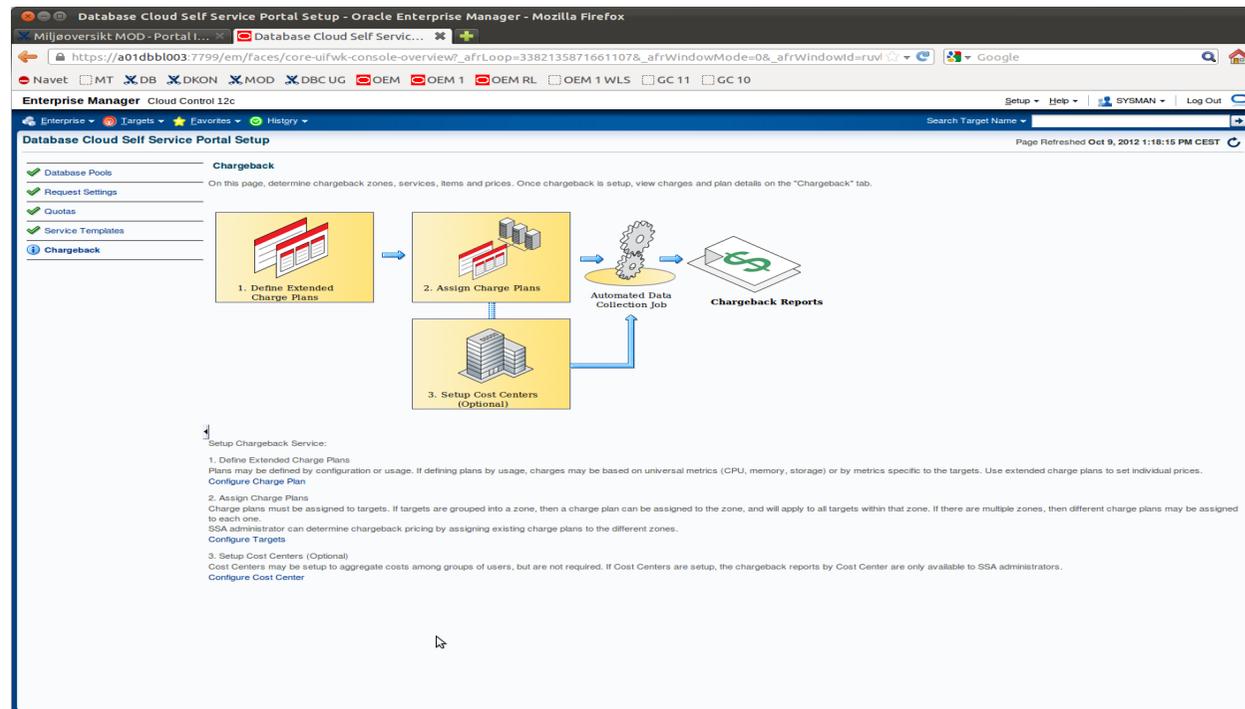


# Implementation: configure portal



# Implementation: Define charge plans

- Defining a Chargeplan
- Defining Cost centres
- Assign Charge plan and cost centre to Targets (DB Pools)



The screenshot displays the Oracle Enterprise Manager interface for Database Cloud Self Service Portal Setup. The main content area is titled "Chargeback" and includes a diagram illustrating the workflow:

1. Define Extended Charge Plans
2. Assign Charge Plans
3. Setup Cost Centers (Optional)

The diagram shows these steps leading to an "Automated Data Collection Job" and finally "Chargeback Reports". Below the diagram, there is a section titled "Setup Chargeback Service:" with the following instructions:

- 1. Define Extended Charge Plans**  
Plans may be defined by configuration or usage. If defining plans by usage, charges may be based on universal metrics (CPU, memory, storage) or by metrics specific to the targets. Use extended charge plans to set individual prices.  
**Configure Charge Plan**
- 2. Assign Charge Plans**  
Charge plans must be assigned to targets. If targets are grouped into a zone, then a charge plan can be assigned to the zone, and will apply to all targets within that zone. If there are multiple zones, then different charge plans may be assigned to each one.  
SSA administrator can determine chargeback pricing by assigning existing charge plans to the different zones.  
**Configure Targets**
- 3. Setup Cost Centers (Optional)**  
Cost Centers may be setup to aggregate costs among groups of users, but are not required. If Cost Centers are setup, the chargeback reports by Cost Center are only available to SSA administrators.  
**Configure Cost Center**

Delivered to production 01.10.2012

## Experiences: how to?

### **Meet with dev team leaders in advance**

To decide whom to give  
access to the cloud  
interface

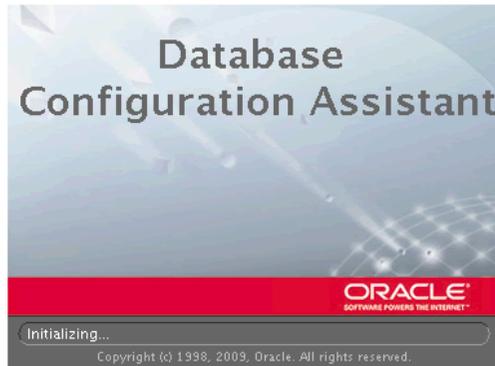
Tell 400+ devs  
that they have to  
create and  
manage their  
own databases?

### **Close all old provisioning queues from day one!**

### **Write an online «how to»**

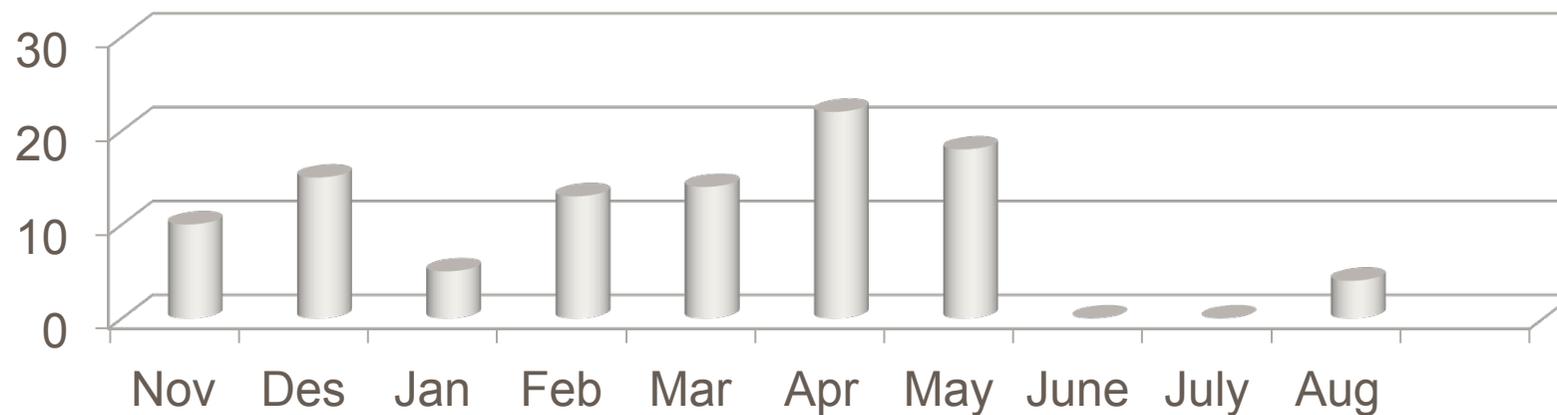
Redirect all requests to  
this wiki

# Experiences: development/trends



Select Service Template	
Search	Service Template Name <input type="text"/>
Service Template Name	Description
Large Test Database Default	Oracle RDBMS 11.2.0.3 Single Instance 6000 MB SGA, 2192 MB PGA, 8 CPU,
Medium Test Database Default	Oracle RDBMS 11.2.0.3 Single Instance 3000 MB SGA, 1096 MB PGA, 4 CPU,
Small Development Database Default	Oracle RDBMS 11.2.0.3 Single Instance 1500 MB SGA, 500 MB PGA, 1 CPU, I
Small Test Database Default	Oracle RDBMS 11.2.0.3 Single Instance 1500 MB SGA, 548 MB PGA, 2 CPU, I

No. of instances



# Experiences: provisioning time (past)

Old order form.  
Average time before first response 1-3 days.

Minimum of required information (80%). Leading to Ping-Pong conversations about what they really need.  
2-5 days.

Resolving cost issues:  
0 – 14 days

Total average from «frist contact» to delivery  
6.8 days

Customer	Contact	External Contact
NAV-ID*+	L110896	
Customer*	Rune Lilleng	
Phone*	21070962/40609909	
Mobile Phone	406 09 909	
Site	2900	
Department	2970	
Department Name	NAV IKT DRIFT	
Trygde-ID	RLA2970	

Template+	
Notes	<p>Hello,</p> <p>I would like a new database for project A.</p> <p>Cheers, Rune</p>
Summary*	Hello,

Assigned Group*+	IKT DP Database	Short
Assignee+	Bente Kaldestad	
Status*	Ny	
Status Reason		
Resolution		

Classification	Work Detail	Relationships	Date/System	Partner
<b>Operational Categorization</b>		<b>Resolution Categorization</b>		
Incident Type*	Request	Incident Type		
Tier 1*+	Bestilling	Tier 1+		
Tier 2*+	Ny	Tier 2+		
Tier 3+		Tier 3+		
<b>Product Categorization</b>		<b>Resolution Product Categorization</b>		
Tier 1*+	Plattform	Tier 1+		
Tier 2*+	Database	Tier 2+		
Tier 3+	-	Tier 3+		
Product Name+	Oracle Database	Product Name		
Model/Version		Model/Version		
Manufacturer	Oracle	Manufacturer		
<b>Classification</b>				
Impact*	2-Betydelig			
Urgency*	2-Høy			
Priority*	Høy			
Reported Source	Telefon			
Environment*	Produksjon			
Target Date				
CI Name+				
Serial Number+				

# Experiences: provisioning time

Enterprise Manager Cloud Control 12c Setup ▾ Help ▾ | SYSMAN ▾ | Log Out

Enterprise ▾ Targets ▾ Favorites ▾ History ▾ Search Target Name

**Provisioning** [Switch to Classic View](#)

**Procedure Activity: DBAAS-CREATE-#1405** View Data Real Time: Manual Refresh

Elapsed Time: 2 minutes, 0 seconds Procedure Actions ▾

**Procedure Steps**

View ▾

Select	Type	Status	Name
<input type="checkbox"/>	Computational	✓	Initialize Deployment Procedure.
<input type="checkbox"/>	Computational	✓	Compute the Pool Associated with the Selected Deployment Procedure.
<input type="checkbox"/>	Computational	✓	Validates the Relevant Quotas
<input type="checkbox"/>	Computational	✓	Obtain the Target Node List using the Placement Algorithm.
<input type="checkbox"/>	Procedure Step		▶ Creates and configures the Database Instance
	Computational		Post Processing Steps

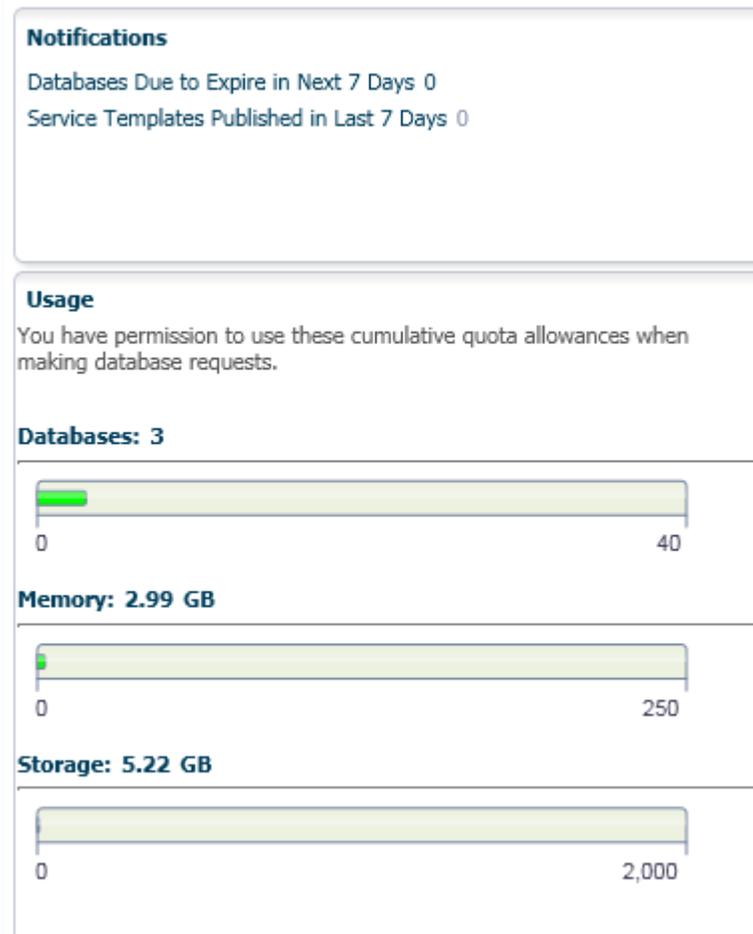
18 minutes

## Experiences: configuration basket

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- **Limited number of options**
  - Small (1.5GB SGA, 2 cores, UTF8, text, jvm, xml) (80%)
  - Medium (3 GB SGA, 4 cores) (15%)
  - Large (6 GB SGA, 8 cores) (5%)
  - Network zone (internal / external)
  
- **Since 01.10.2012 we've had 8 requests to perform modifications to created databases**
  - 5 were increase cpu for simple load testing
  - 3 were denied
  
- **Clear constraints on resource consumption**
  - Implemented into EM12c (automatic quota validation).
  - Users are encouraged to set an expiration date on environments.

# Experiences: costs



- **Absolute limits**
  - Initial investment gives them a fixed amount of resources (cpu/storage/memory).
  
- **Funding for additional resources is now targeted at the actual divisions/groups consuming them.**
  - Rather than bloating Operations' budget every year 😊

# Experiences: cloud chargeback

Database Cloud Self Service Portal Page Refreshed Sep 18, 2013 10:21:48 AM CEST

Manage  My Servers  My Databases  My Middleware  My Tests  My Preferences

Home **Chargeback**

\* Start Date  \* End Date

**Charge Trend**

**Details**

View

**Charge Plans**

Select Zone

Charge Plan  Date Range

Metric	Type	Rate (Credits)	Per Unit	Per Time Period
CPU Usage	Default CPU Architecture	6.5	CPU	daily
Memory Allocation	Generic	0.25	GB	daily
Storage Allocation	Generic	0.009	GB	daily

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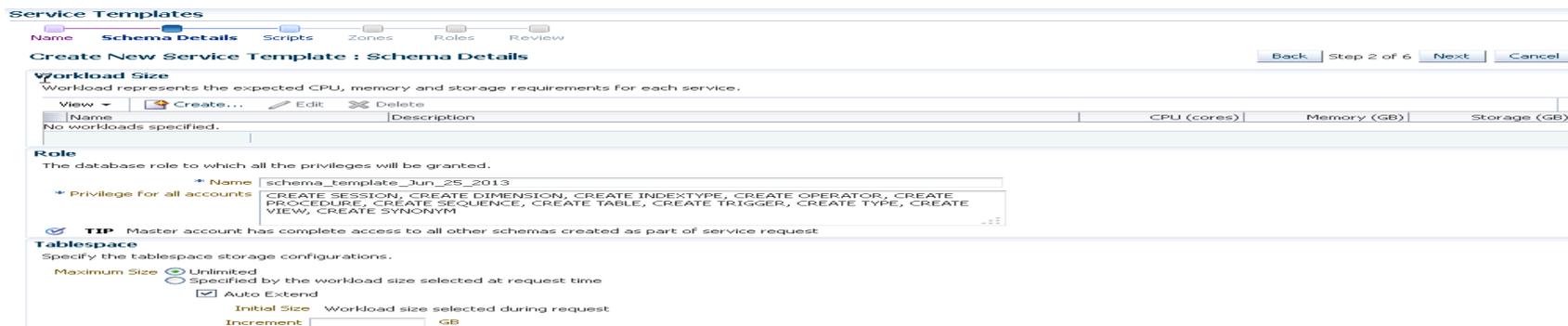
## Experiences: standardization

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- **Old implementations varied greatly**
  - Different character sets
  - Different database options installed
    - Potential licencing nightmare
  - Too many Oracle installations per server (not all according to OFA)
  - Various degrees of patching (if any).
  - Lack of documentation
  
- **Uniform installation**
  - All databases are created equally!
    - It's no longer in the hands of a specific DBA.
  - Simplified documentation
  - Consolidation and uniform installations makes patching radically less challenging and time consuming.

# In pilot : Schema as a service

- **Schema as a service**
  - Available since release 2
  - Even higher degree of consolidation density
  
- **More options**
  - Reference schemas (metadata and actual schema content)
    - Very valuable, once the devs move into a stage where they require actual data.
    - Saves our DBAs from all those tedious export/import jobs.
  - Empty schemas



**Service Templates**

Name **Schema Details** Scripts Zones Roles Review

Create New Service Template : Schema Details Back Step 2 of 6 Next Cancel

**Workload Size**  
 Worldload represents the expected CPU, memory and storage requirements for each service.

View

Name	Description	CPU (cores)	Memory (GB)	Storage (GB)
No workloads specified.				

**Role**  
 The database role to which all the privileges will be granted.

\* Name: schema\_template\_Jun\_25\_2013

\* Privilege for all accounts: CREATE SESSION, CREATE DIMENSION, CREATE INDEXTYPE, CREATE OPERATOR, CREATE PROCEDURE, CREATE SEQUENCE, CREATE TABLE, CREATE TRIGGER, CREATE TYPE, CREATE VIEW, CREATE SYNONYM

**TIP** Master account has complete access to all other schemas created as part of service request

**Tablespace**  
 Specify the tablespace storage configurations.

Maximum Size:  Unlimited  Specified by the workload size selected at request time

Auto Extend

Initial Size:  Workload size selected during request

Increment:  GB

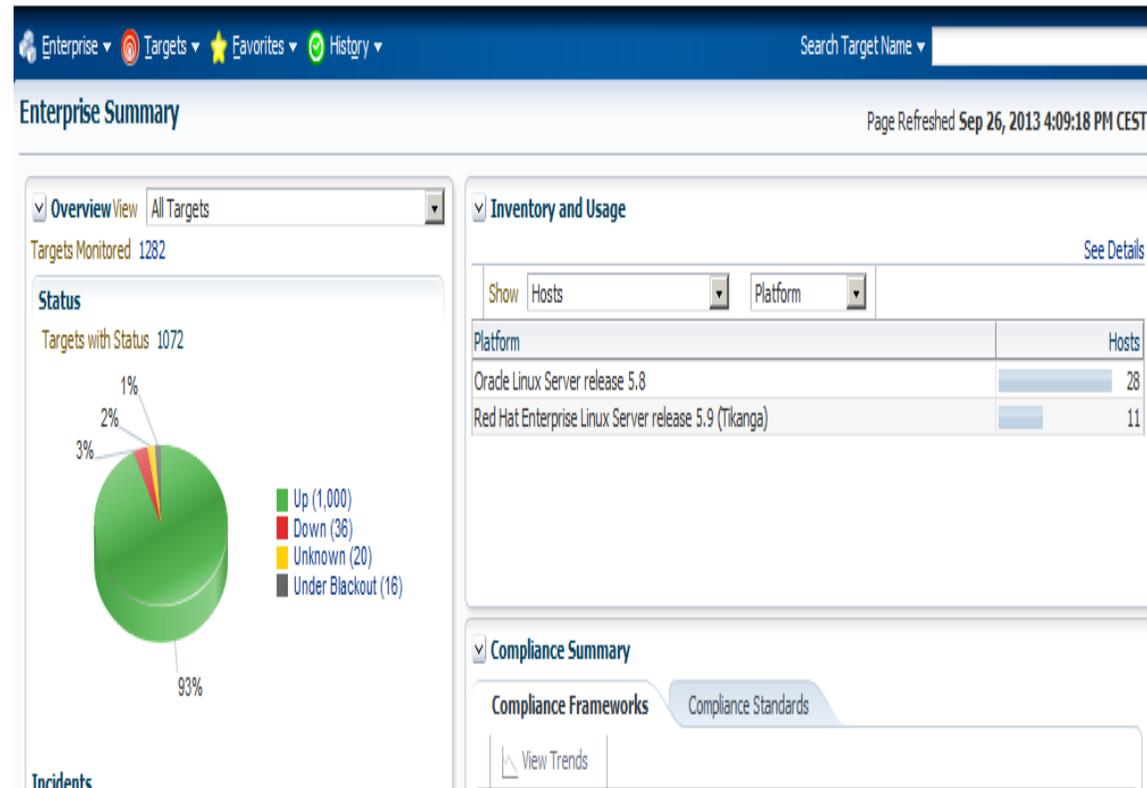
## Change of focus

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- Time previously spent on provisioning and data movement is now put to better use
  - Running backup and restore tests
  - Assist dev teams with performance tuning
  - Applying patches and performing upgrades
  - Early on involvement in new projects

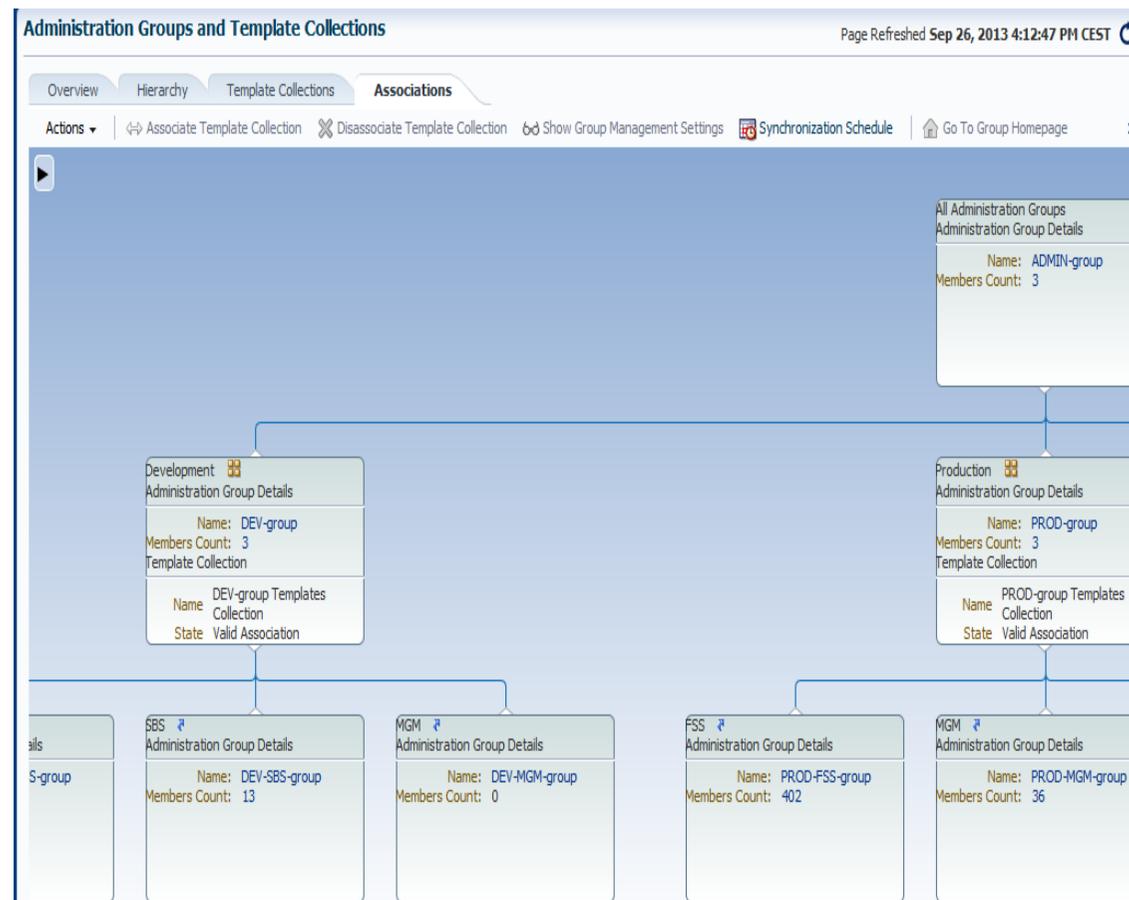
# Monitoring & notifications

- EM is used to monitor all components
  - Servers
  - Exadata
  - Databases
  - Storage
  - Listeners
  - Applications
  - Jobs
- Integrated with central support systems (Remedy, HP insight manager)



# Monitoring & notifications

- Vast improvements and ease of use from previous EM versions
  - Administration groups
  - Monitoring templates
  - Template collections
- Central setup, automatic configuration for new components
  - Add required config and a target enrols itself into correct group.



# Engineered systems

- Central administration
- Performance monitoring
- Components check

**Navigation**

- DB Machine dm04.adeo.no
- Compute Nodes
- Exadata Grid dm04.adeo.no
- IB Network dm04.adeo.no

Up (1,000)

**DB Machine dm04.adeo.no**

Database Machine

Incidents 0 76 2 0 Exadata Cells 6 1

**Database Machine Schematic**

Legend

- Up
- Down
- Blackout
- Exadata Cell
- Compute Node
- Infiniband Switch
- Ethernet Switch
- Keyboard-Video-Mouse
- Unallocated

Component	Status	Temperature
dm04sw-ib3	Up	32°C
dm04sw-ib2	Up	29°C
dm04db04	Up	17°C
dm04db03	Up	16°C
dm04db02	Up	16°C
dm04db01	Up	18°C
dm04cel07	Up	22°C
dm04cel06	Up	23°C
dm04cel05	Up	23°C
dm04cel04	Up	23°C
dm04cel03	Up	23°C
dm04cel02	Up	24°C
dm04cel01	Up	24°C

# Administration

- Database administration
- ASM
- Applications
- Jobs
  - Backups
  - Scripts

Monitoring Templates					
Pending Apply Operations 0					
<a href="#">Apply</a> <a href="#">View</a> <a href="#">Edit</a> <a href="#">Create Like</a> <a href="#">Delete</a> <a href="#">Compare Settings</a> <a href="#">Export</a> <a href="#">Create</a> <a href="#">Set Default Templates</a> <a href="#">Import</a>					
Select	Name	Target Type	Pending Apply Operations	Owner	Last Modified By
<input checked="" type="radio"/>	PAD Prod	Database Instance	0	SYSMAN	SYSMAN
<input type="radio"/>	Oracle Application Server Test	Oracle Application Server	0	SYSMAN	SYSMAN
<input type="radio"/>	Oracle Application Server Prod	Oracle Application Server	0	SYSMAN	SYSMAN
<input type="radio"/>	Oracle Application Server Dev	Oracle Application Server	0	SYSMAN	SYSMAN
<input type="radio"/>	Listener Test	Listener	0	SYSMAN	SYSMAN
<input type="radio"/>	Listener Prod	Listener	0	SYSMAN	SYSMAN
<input type="radio"/>	Listener Dev	Listener	0	SYSMAN	SYSMAN
<input type="radio"/>	Host Test	Host	0	SYSMAN	SYSMAN
<input type="radio"/>	Host Prod	Host	0	SYSMAN	SYSMAN
<input type="radio"/>	Host Dev	Host	0	SYSMAN	SYSMAN
<input type="radio"/>	Forms Test	Forms	0	SYSMAN	SYSMAN
<input type="radio"/>	Forms Prod	Forms	0	SYSMAN	SYSMAN
<input type="radio"/>	Forms Dev	Forms	0	SYSMAN	SYSMAN
<input type="radio"/>	Database Test	Database Instance	0	SYSMAN	SYSMAN
<input type="radio"/>	Database Prod	Database Instance	0	SYSMAN	SYSMAN
<input type="radio"/>	Database Dev	Database Instance	0	SYSMAN	SYSMAN
<input type="radio"/>	ASM Test	Automatic Storage Management	0	SYSMAN	SYSMAN
<input type="radio"/>	ASM Prod	Automatic Storage Management	0	SYSMAN	SYSMAN

## Future

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- What we have done for the developers we will also do for ourselves 😊
  - November 2013 all production databases will be cloud generated.
- Work further with the charge plan, adding more variables (electricity, housing).
- Integrate BI Publisher (for added reporting options)
- Upgrade to release 3

# Q & A

