Operating Exadata Cloud at Customer

Technical How To

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Safe Harbor Statement

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Agenda

- Introduction
- The best of Oracle technology stays the same with the Cloud at Customer
- Positive change when you go to Oracle's Cloud at Customer
- Starting point for handoff
- Top 10 new ways to operate Exadata through Oracle Cloud at Customer

Introduction

- We are likely running on-premises gear
- We are likely running Exadata Database Machine
- We are moving to cloud (perhaps cautiously)
- We need tactics to succeed at the transition
- This talk is about the tactics of how to succeed at the transition

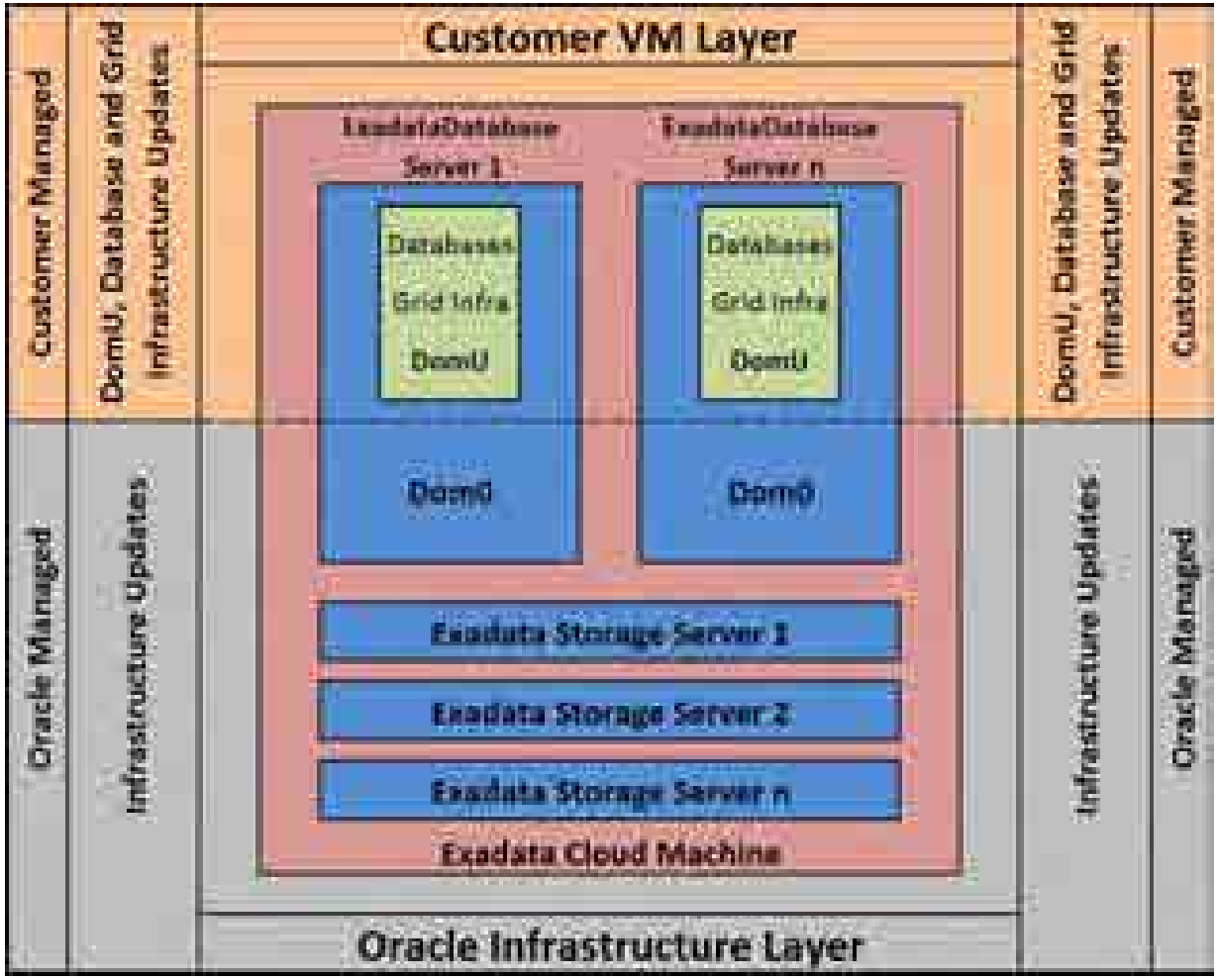
The Best of Oracle Stays the Same

- Business is still business, people are still people, data is still data
- Exadata Cloud at Customer (ExaCC) runs the same hardware and software as on-premises Exadata Database Machine
- Oracle Enterprise Linux, x86 chips, Oracle ASM, Oracle Database, etc.
- SQL, tables, tablespaces, logs, backups, DR, etc.
- AWR, Data Guard, EM, OMC, etc.
- Ask Tom, user community, developer support

Positive Changes with Oracle Cloud

- Mindset shift from products to services for
  - Infrastructure
  - Platforms
  - Databases and applications
- What it means to be an administrator
  - Applying tooling to automate processes
- What it means to be an architect
  - Cloud security, connectivity
  - Deployment and maintenance flexibility and automation

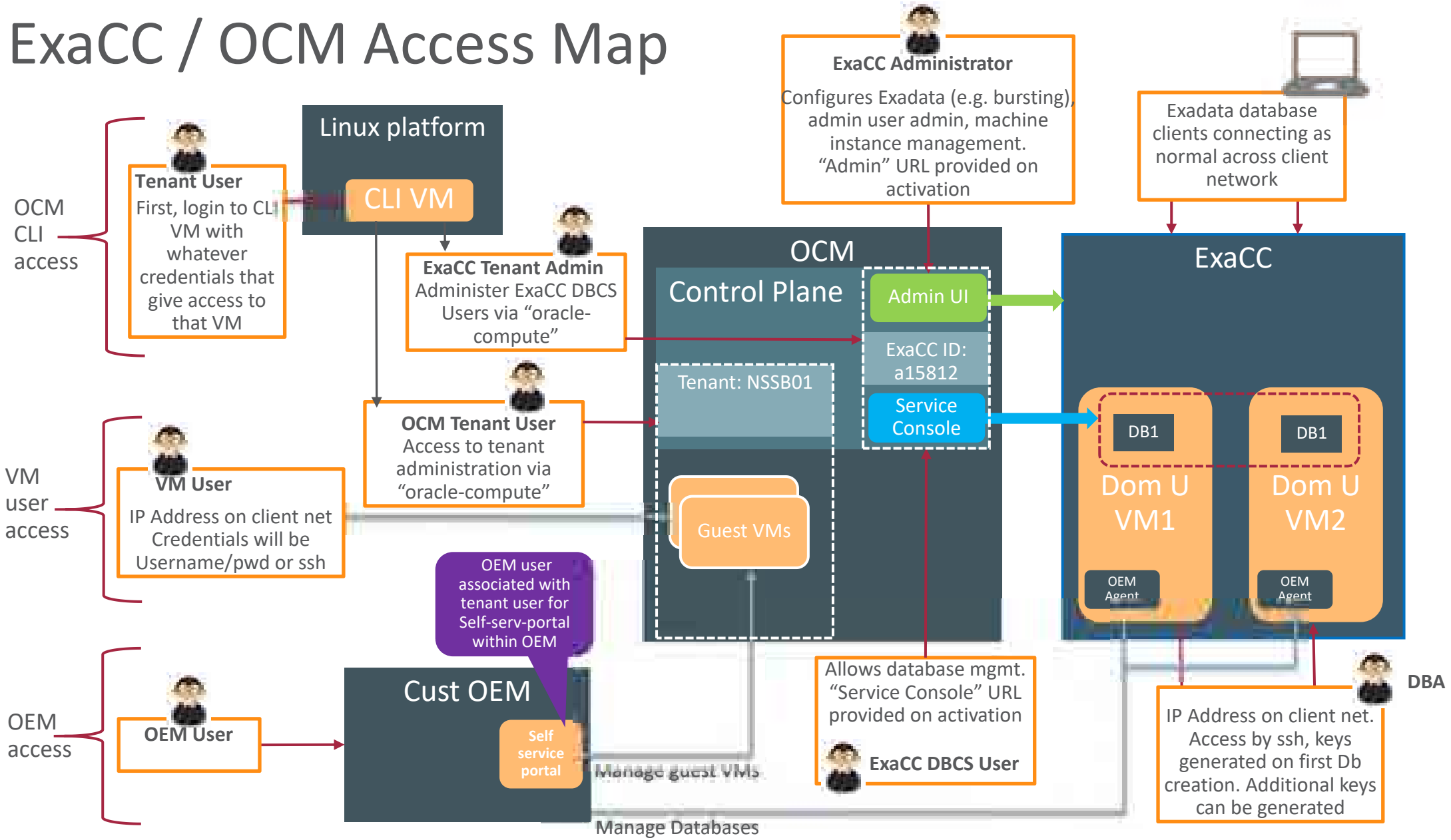
Starting Point for Handoff



- Virtual machine (VM) operating systems running the Exadata compute node software
- Grid Infrastructure on the compute node
- Database software on the compute node

- Ethernet switches
- InfiniBand switches
- Power supplies
- Exadata Storage Servers
- Hypervisor running on the physical servers

ExaCC / OCM Access Map



Quick Review of the Service

- ASM storage configuration
- OCPU subscription and bursting
- Cloud administration
- Compute node access
- Database deployment
- Database migration
- Backup and recovery
- Enterprise Manager

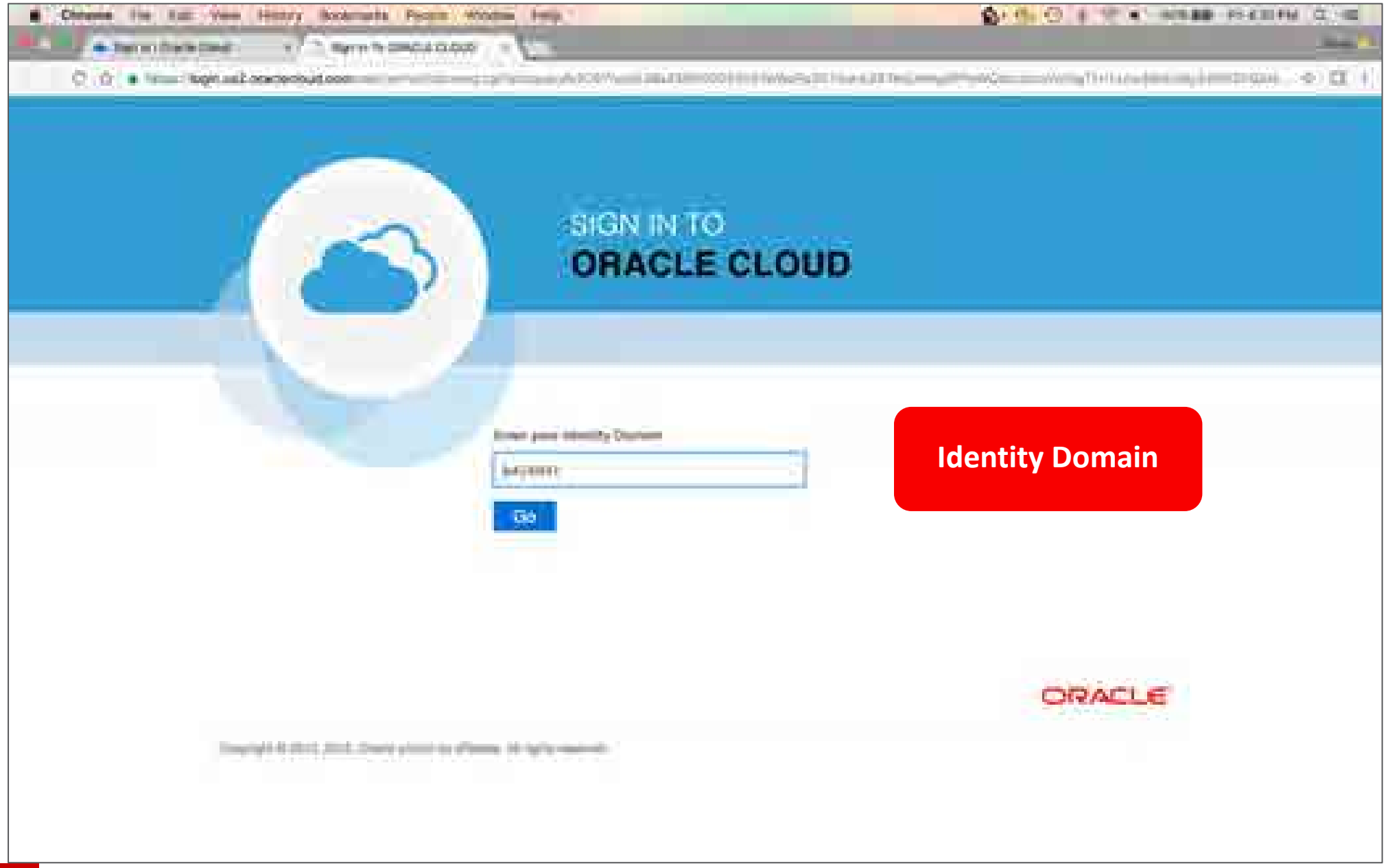
Top 10 New Ways to Operate Exadata in the Cloud

10. Cloud Access Points – Refer to Your Handoff Document

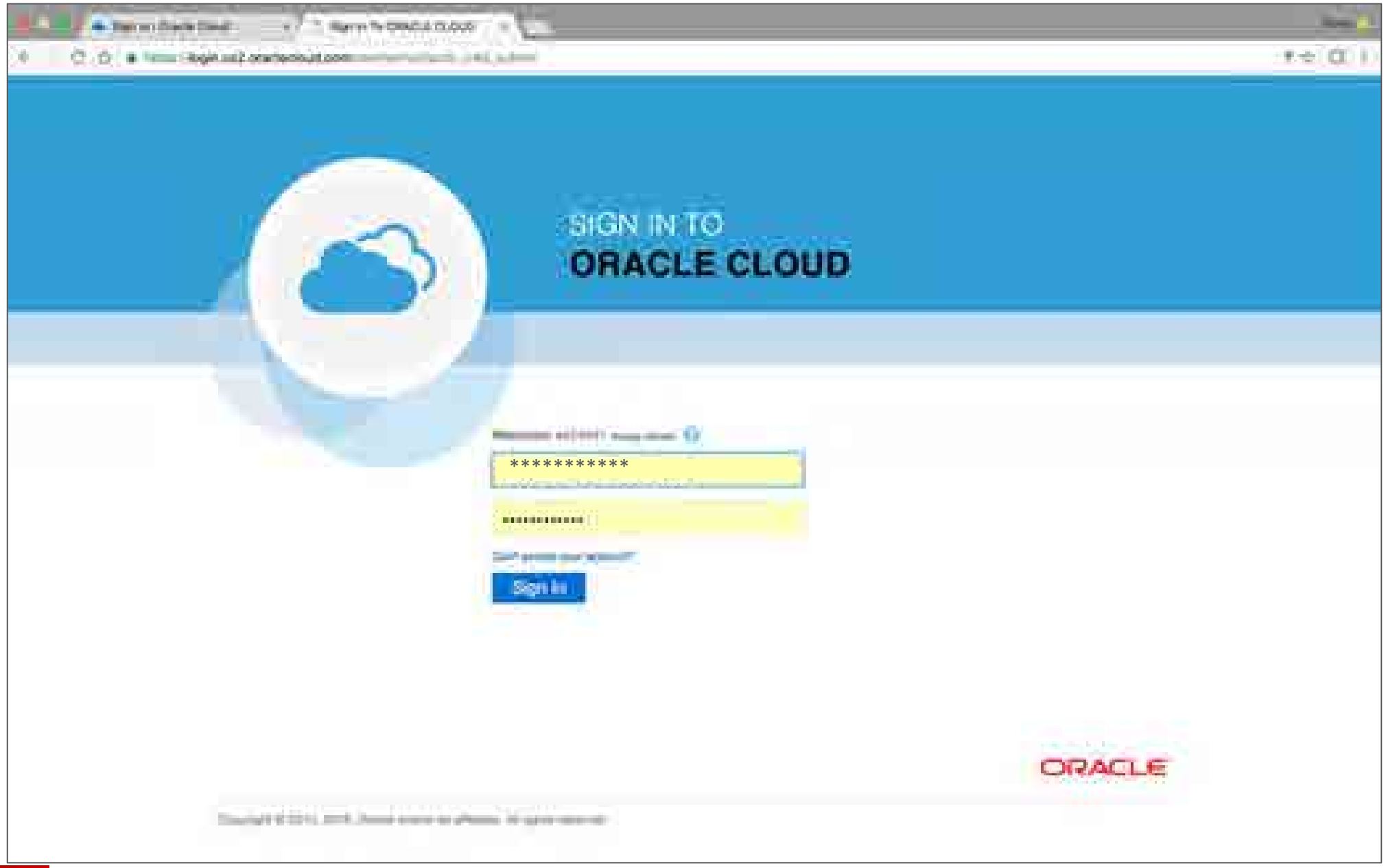
Account	When to Use:
Cloud Administration Account	This will be used by the cloud service administrator. This account was used to create the Cloud Service Instance on each Exadata Cloud at Customer purchased.
Exadata Cloud at Customer Service Administration (My Services)	The Service Console will be used to manage the Exadata Cloud Service and shows you the REST endpoints
Database Cloud Service Administration (Service Console)	The DBaaS console is used to create and manage databases running in your Exadata Cloud Service
Customer Support Identifier (CSI)	When this CSI is used, your problem will be directed to the appropriate team at Oracle based on the options you choose at the time you open the service request.

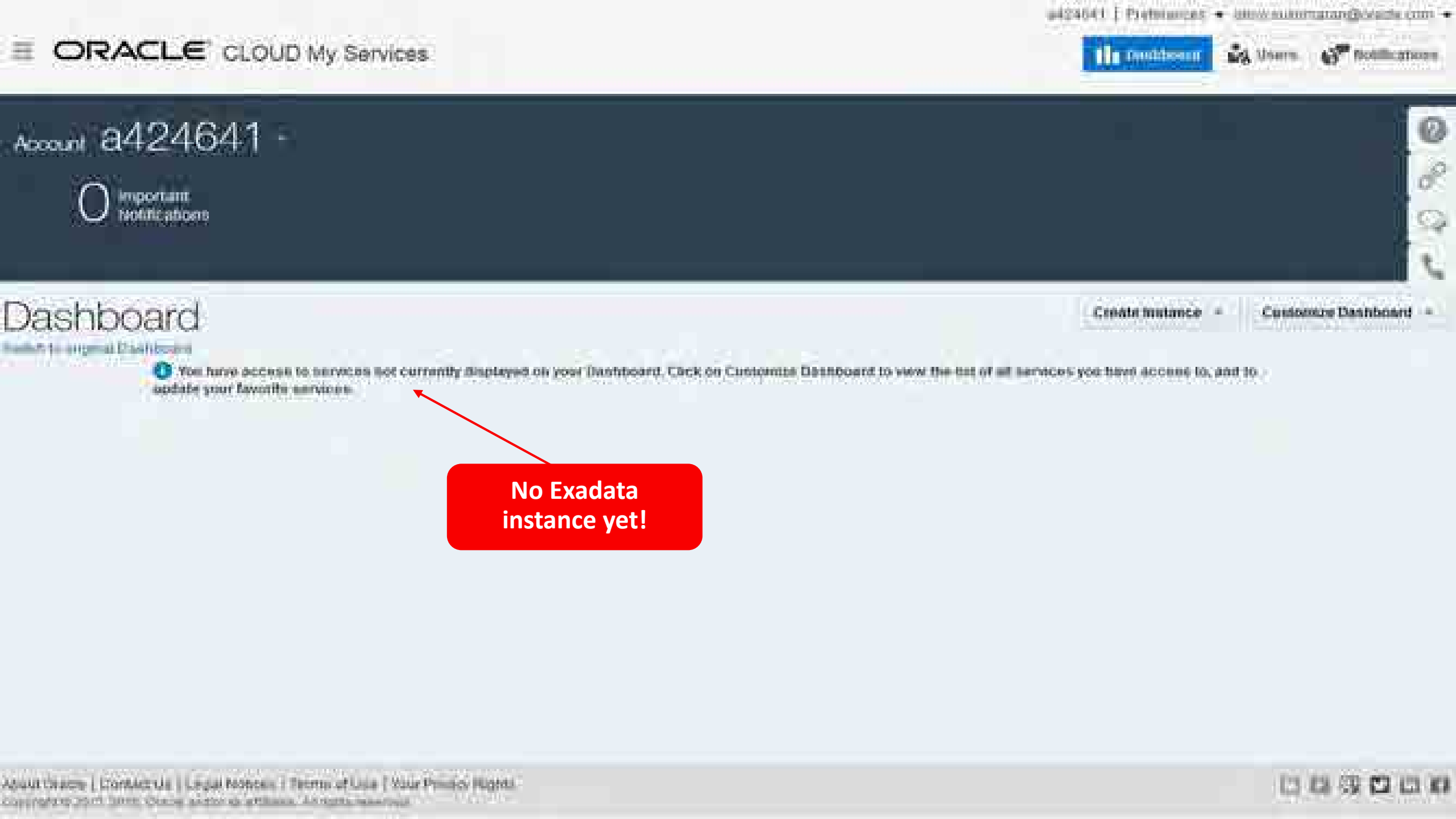
9. Create an Exadata with Software

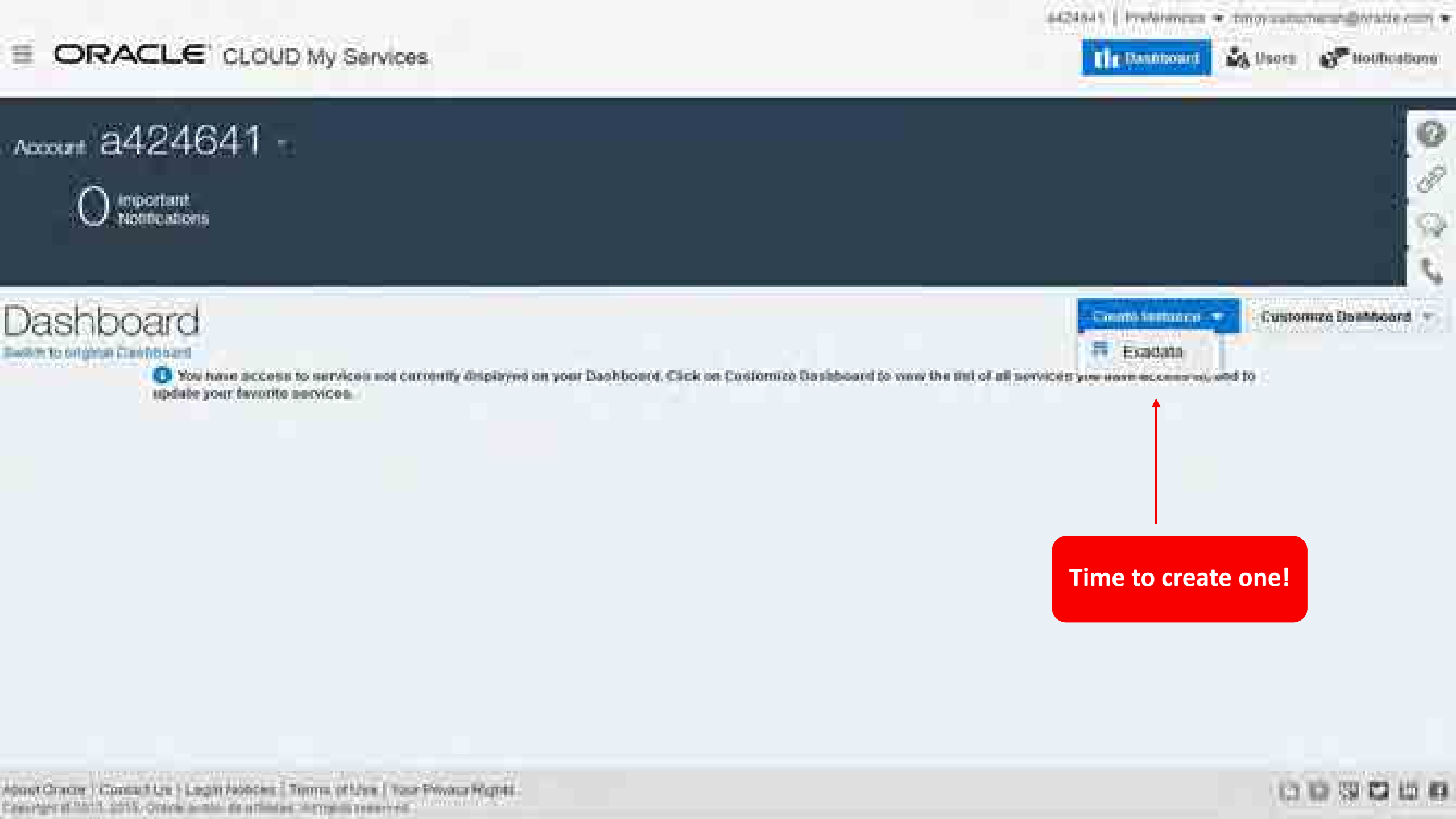
- Web UI
  - One time events, quick way to get started
- REST API
  - Lights out operations, zero user input, full automation
- Mindset change
  - Making hardware softer, not software harder
  - Experiment to find best way to solve a problem
  - Mistakes are not permanent

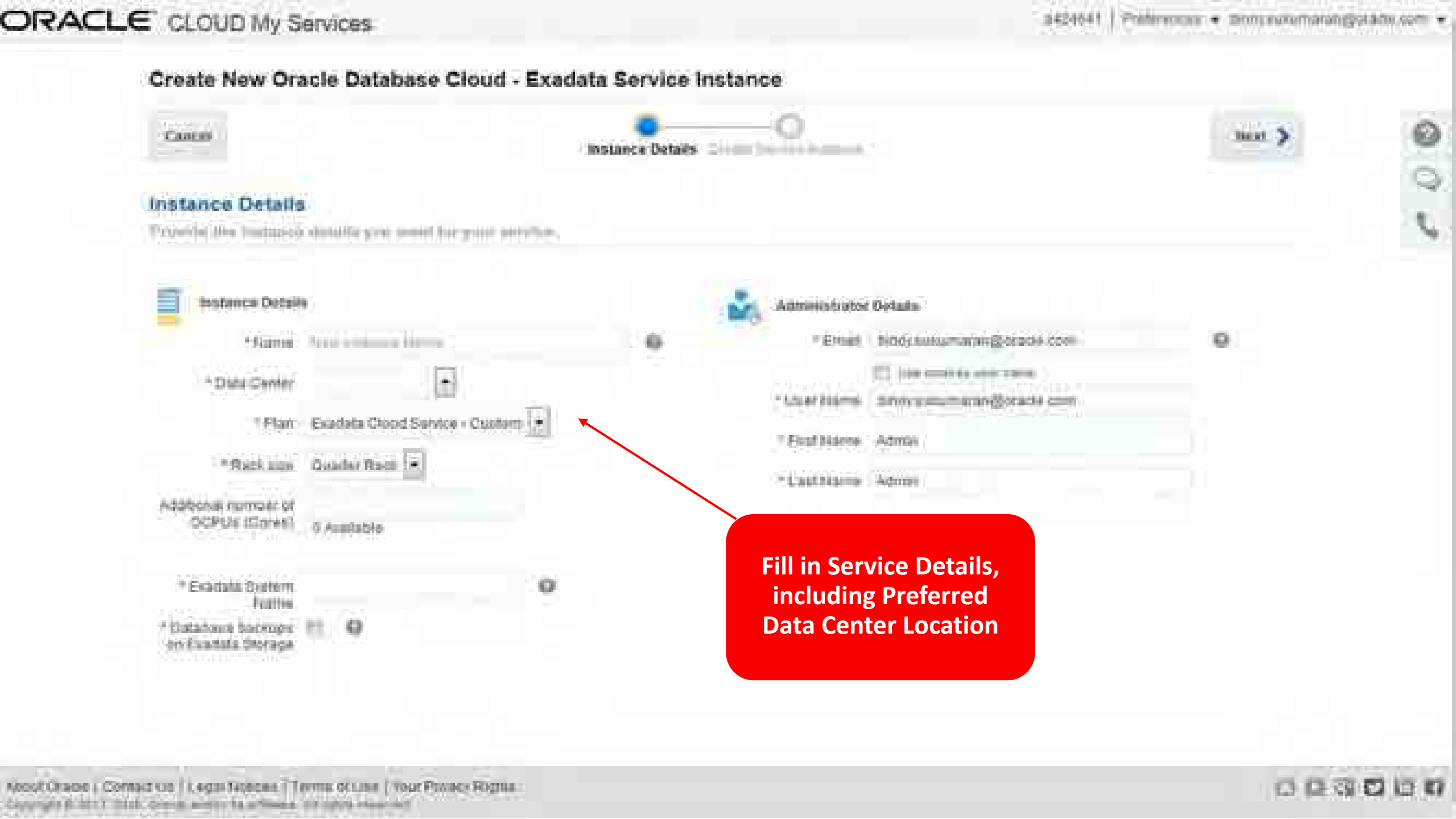


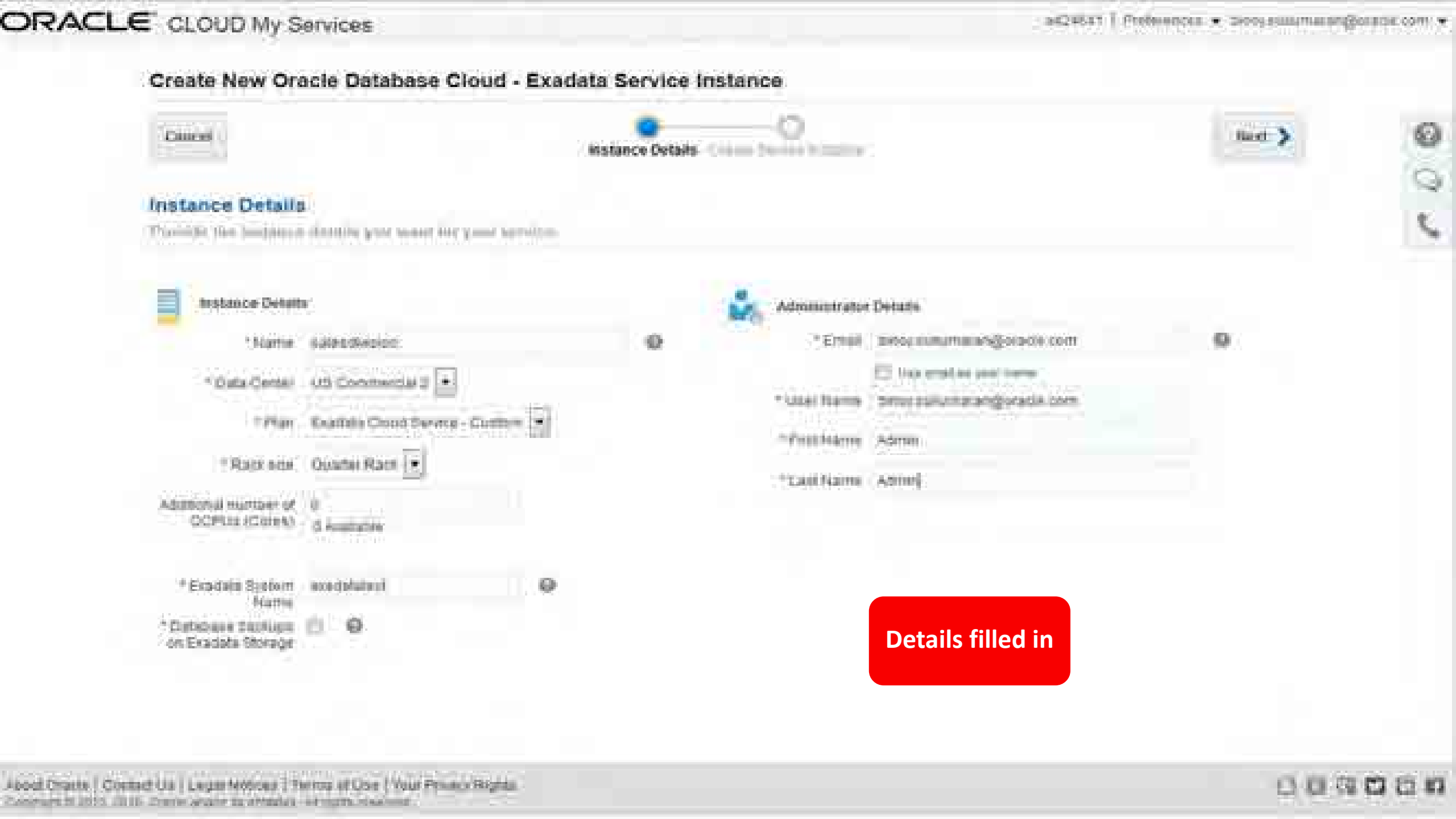
Identity Domain




ORACLE CLOUD My Services
Account a424641
0 Important Notifications
Dashboard
Create Instance
Customize Dashboard
You have access to services not currently displayed on your Dashboard. Click on Customize Dashboard to view the list of all services you have access to, and to update your favorite services.
No Exadata instance yet!


ORACLE CLOUD My Services
Dashboard
Users
Notifications
Account a424641
0 Important Notifications
Dashboard
Switch to original Dashboard
Customize Dashboard
Exadata
You have access to services not currently displayed on your Dashboard. Click on Customize Dashboard to view the list of all services you have access to, and to update your favorite services.
Time to create one!


ORACLE CLOUD My Services
Create New Oracle Database Cloud - Exadata Service Instance
Cancel
Instance Details
Next
Instance Details
Instance Details
Administrator Details
Fill in Service Details, including Preferred Data Center Location


ORACLE CLOUD My Services
Create New Oracle Database Cloud - Exadata Service Instance
Cancel
Instance Details
Next
Instance Details
Instance Details
Administrator Details
Details filled in

ORACLE CLOUD My Services

Create New Oracle Database Cloud - Exadata Service Instance

Cancel

Create Service Instance

Create Service Instance

Confirmation

Instance Details

Name:

Data Center: US002

Plan: Exadata Cloud Service - Custom

Rack size: Quarter Rack

Additional number of OCPUs (Cores):

Exadata System Name:

Database backups on Exadata Storage:

Administrator Details

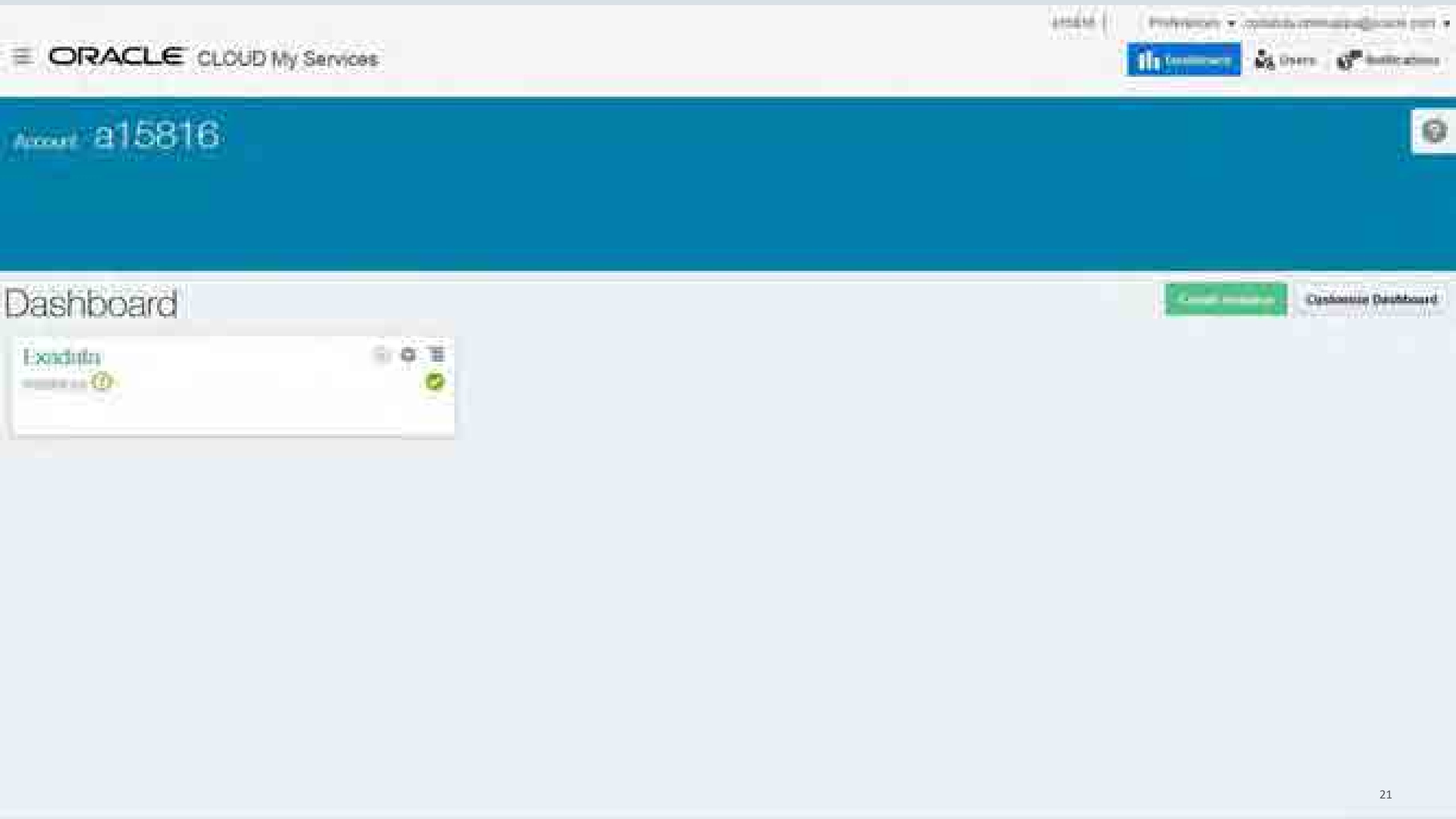
Email:

User Name:

First Name: Admin

Last Name: Admin

Review and Create the Exadata Instance! (a.k.a - RAC Cluster)


ORACLE CLOUD My Services
Account a15816
Dashboard
Customize Dashboard
Exadata

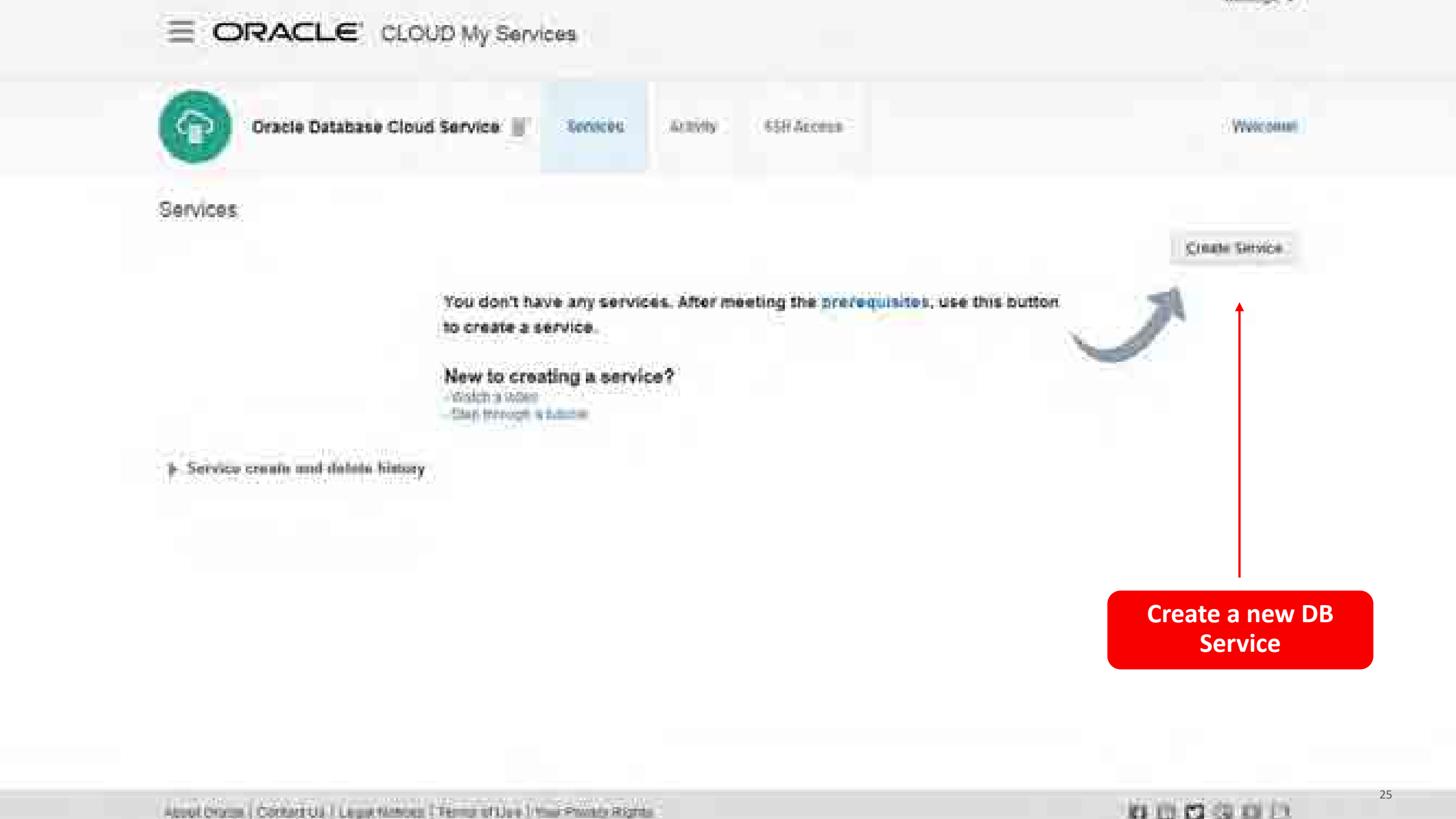
8. Secure Access to DomU with Passwordless SSH

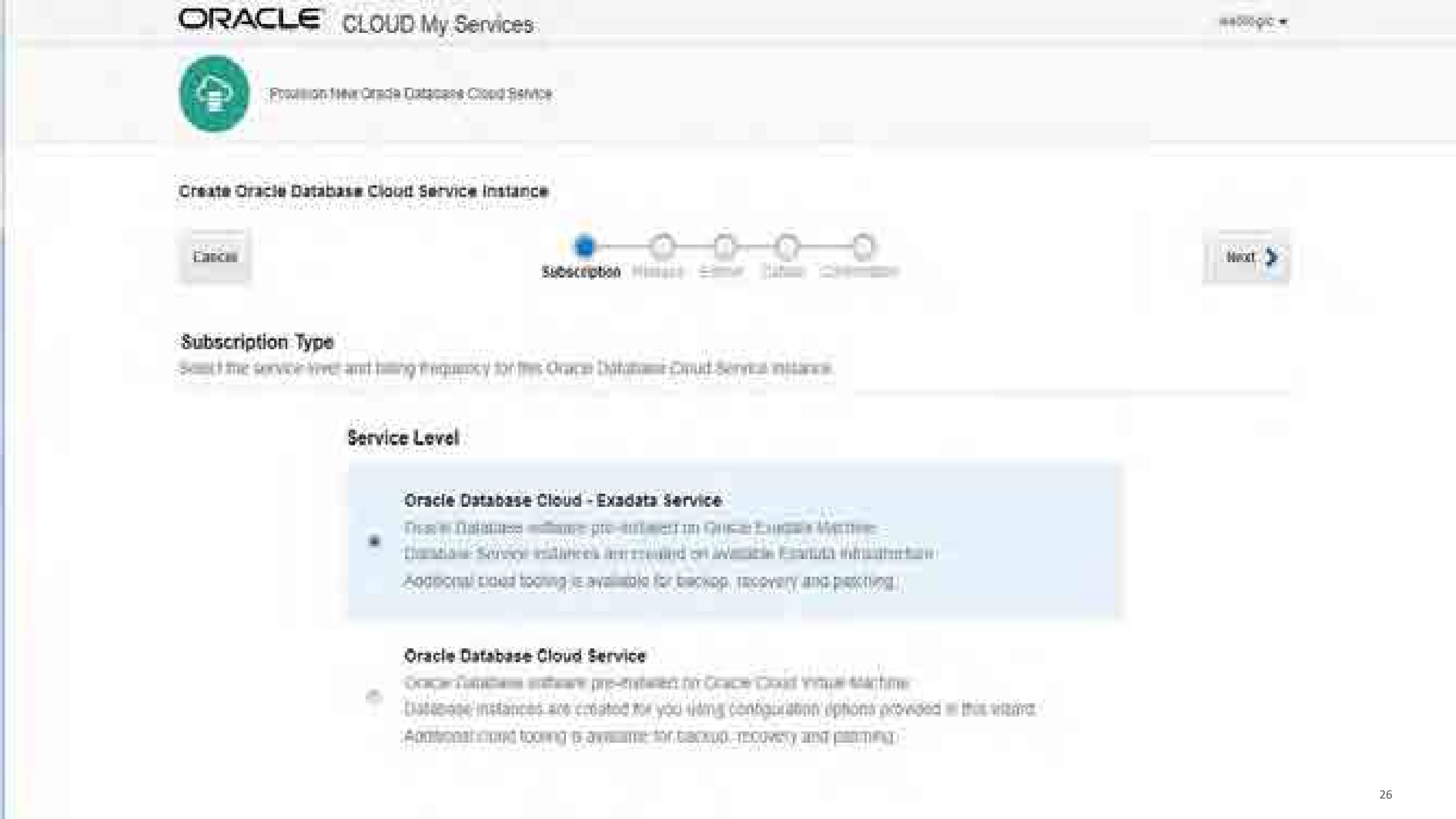
- opc (/home/opc)
  - System administration
  - Access with ssh using preconfigured keys
- oracle (/home/oracle)
  - Database administration
  - Cannot use the sudo
  - Access with ssh using preconfigured keys
- root (/root)
  - Access using sudo –s from opc user
  - You do not have direct access to this account
- grid (/home/grid)
  - ASM and clusterware administration
  - Access using sudo and su
    - sudo -s as the opc user to get root access
    - su - grid to become the grid user.
  - You do not have direct access to this account

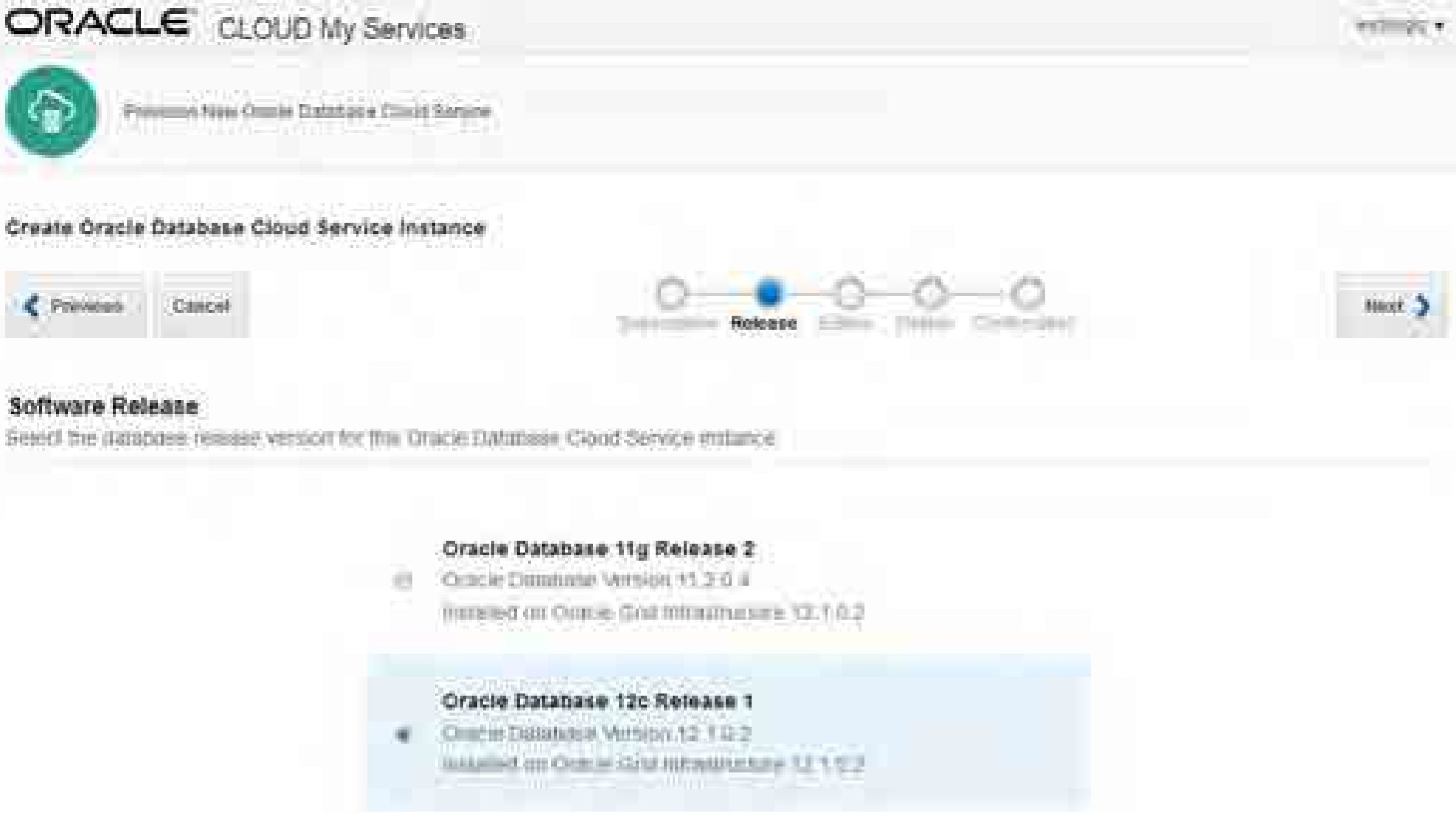
https://docs.oracle.com/cloud-machine/latest/exadatacm/ExaCC/GUID-53778B80-072D-4968-B5F8-81D3216F1D9A.htm#ExaCC-GUID-53778B80-072D-4968-B5F8-81D3216F1D9A

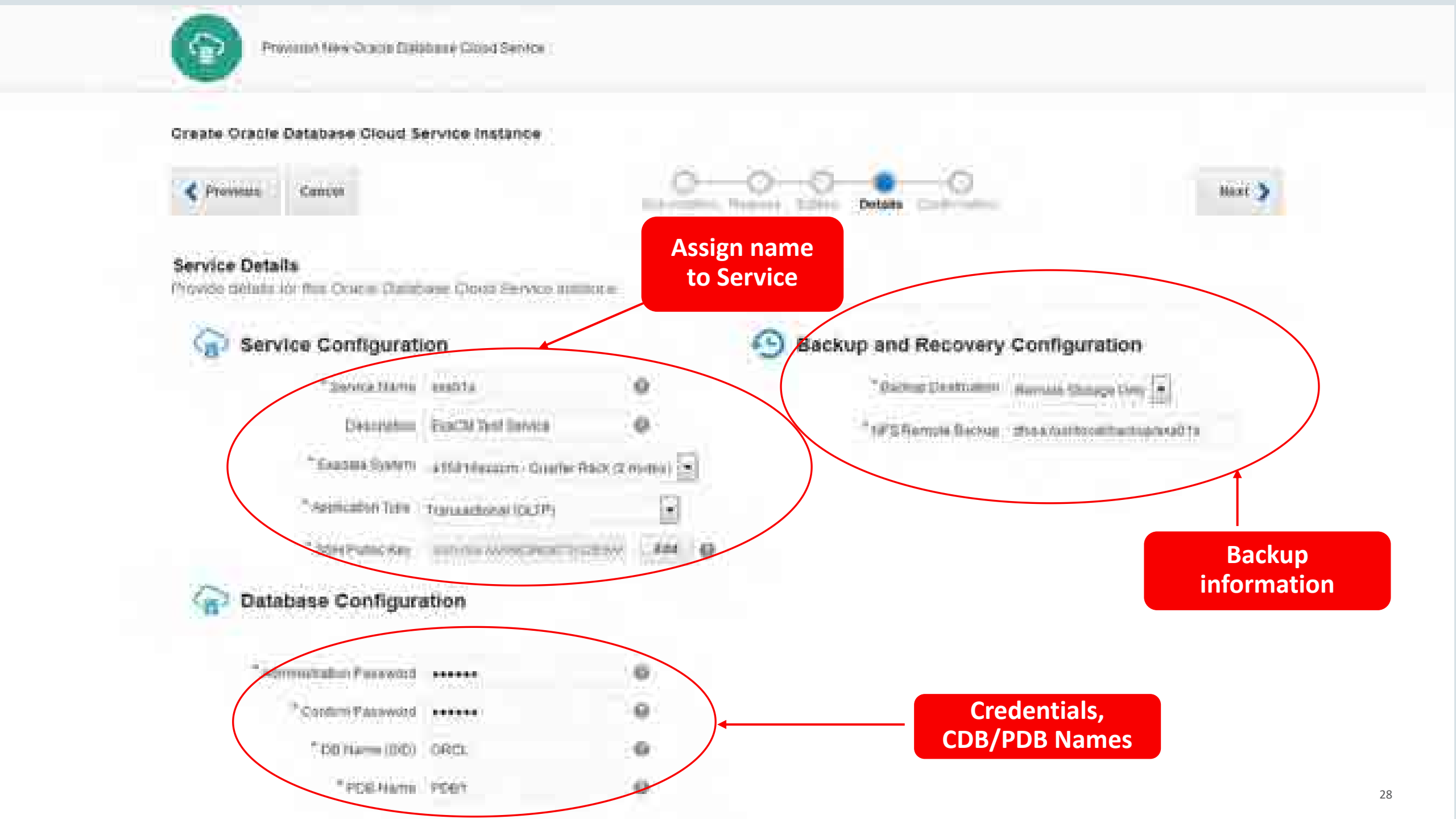
7. Automate Database Creation

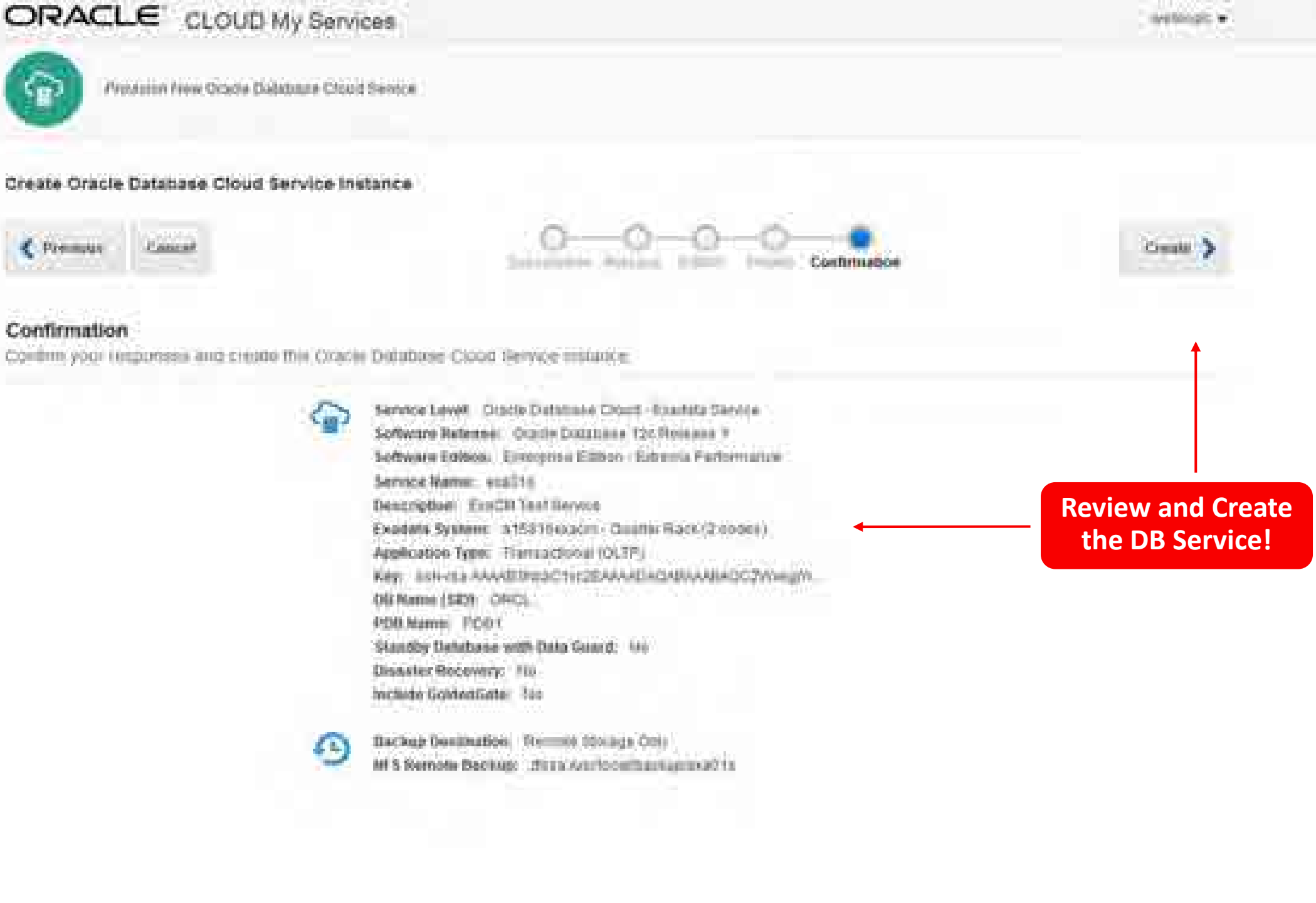
- Web UI
  - One-time actions
  - Great way to learn
- REST API
  - Lights out automation
  - No human interaction
  - Codify execution of your business process
  - Provide databases for the masses

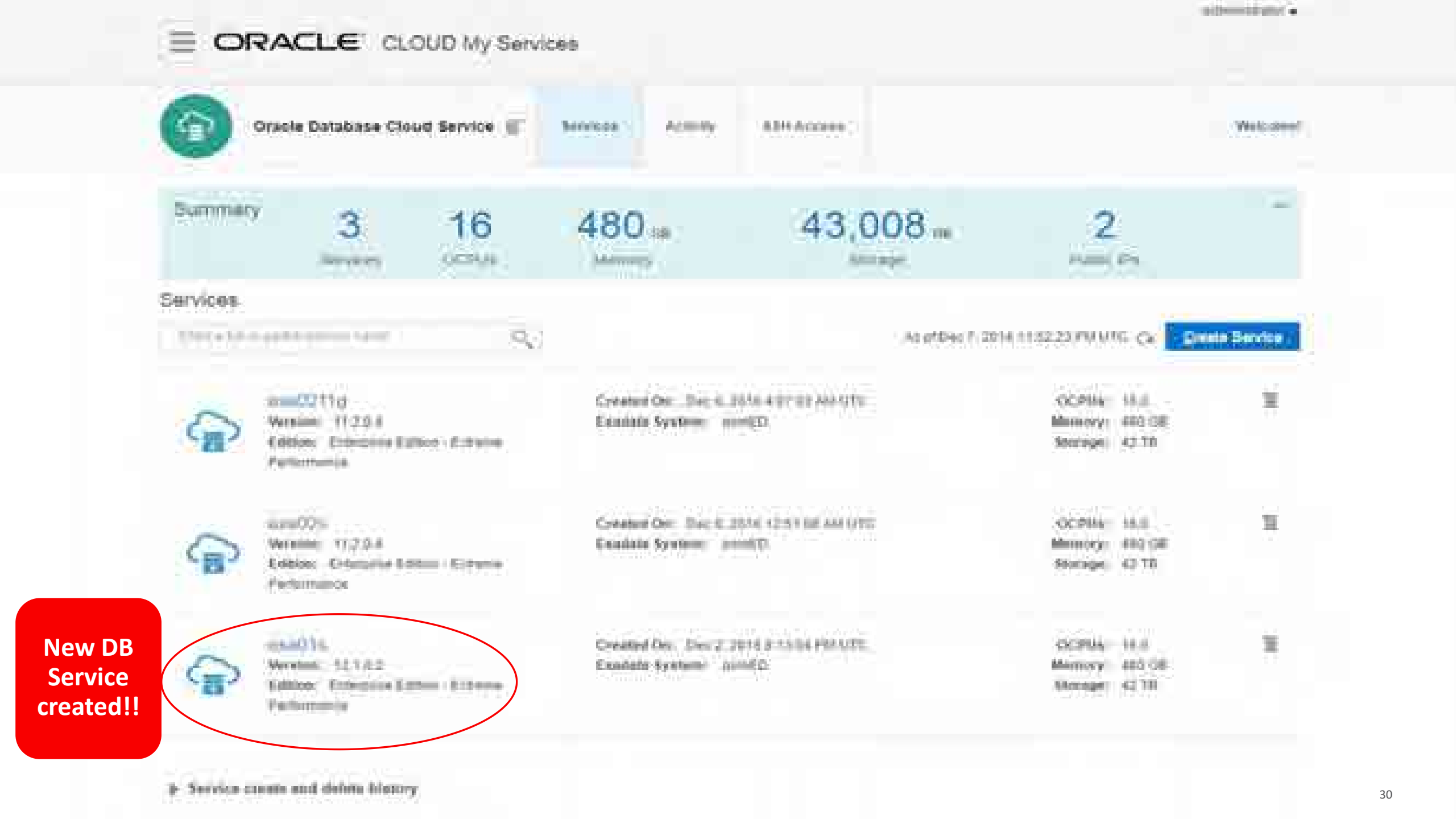

ORACLE CLOUD My Services
Oracle Database Cloud Service
Services
Activity
SSH Access
Welcome
Services
Create Service
You don't have any services. After meeting the prerequisites, use this button to create a service.
New to creating a service?
Service create and delete history
Create a new DB Service


ORACLE CLOUD My Services
Provision New Oracle Database Cloud Service
Create Oracle Database Cloud Service Instance
Cancel
Subscription
Next
Subscription Type
Service Level
Oracle Database Cloud - Exadata Service
Oracle Database Cloud Service


ORACLE CLOUD My Services
Create Oracle Database Cloud Service Instance
Previous
Cancel
Release
Next
Software Release
Oracle Database 11g Release 2
Oracle Database 12c Release 1


Create Oracle Database Cloud Service Instance
Previous
Cancel
Details
Next
Service Details
Assign name to Service
Service Configuration
Backup and Recovery Configuration
Backup information
Database Configuration
Credentials, CDB/PDB Names


ORACLE CLOUD My Services
Provision New Oracle Database Cloud Service
Create Oracle Database Cloud Service Instance
Previous
Cancel
Confirmation
Create
Confirmation
Service Level:
Software Release:
Software Edition:
Service Name:
Description:
Exadata System:
Application Type:
Key:
DB Name (SID):
PDB Name:
Standby Database with Data Guard:
Disaster Recovery:
Include GoldenGate:
Backup Destination:
Review and Create the DB Service!

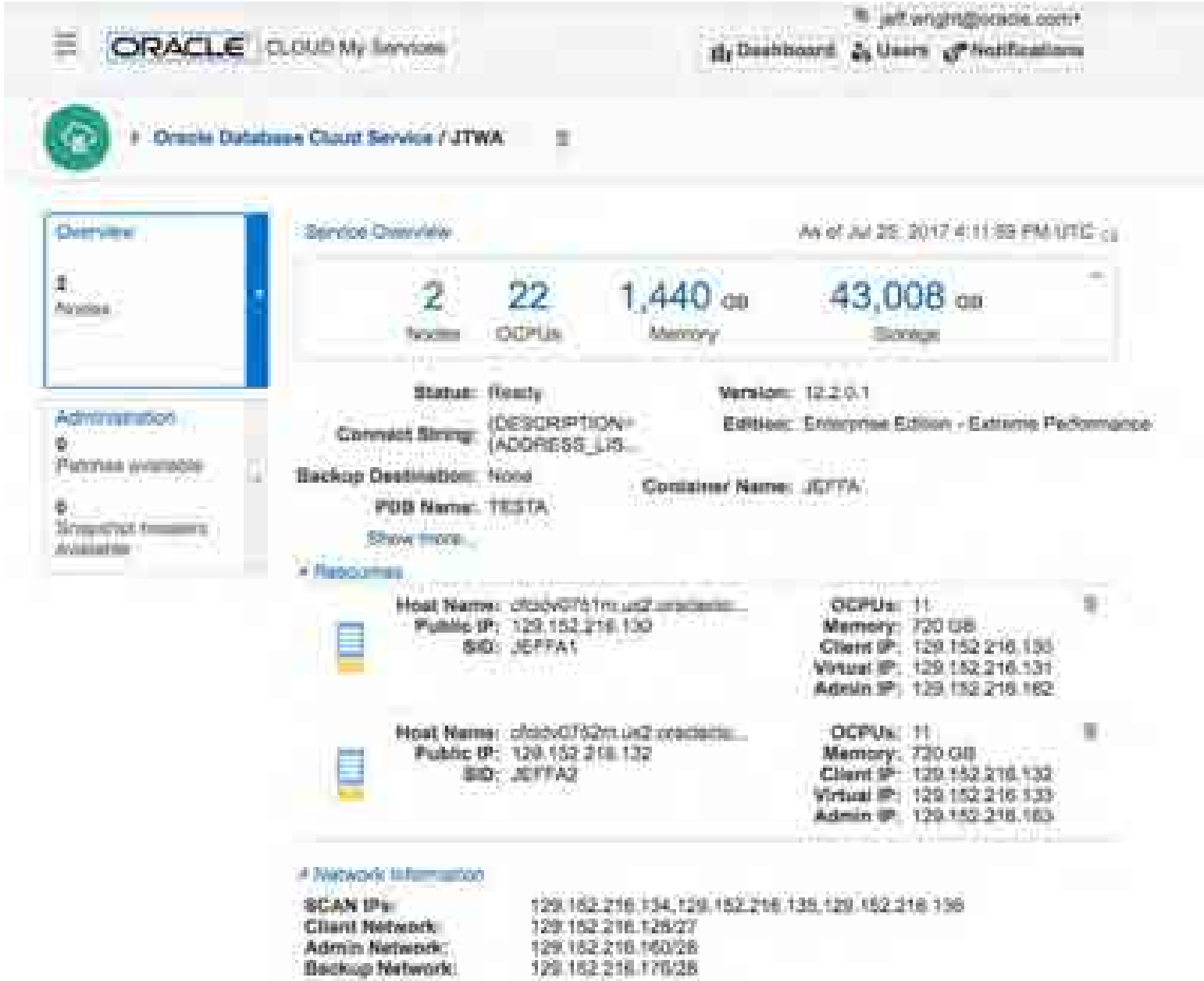

ORACLE CLOUD My Services
Oracle Database Cloud Service
Summary
3
16
480
43,008
2
Services
Create Service
New DB Service created!!

```
{
  "exadataSystemName": "exaspendo",
  "serviceName": "JTWB",
  "level": "PAAS_EXADATA",
  "subscriptionType": "MONTHLY",
  "version": "12.2.0.1",
  "edition": "EE_EP",
  "description": "Created by JTW using the REST interface",
  "clusterName": "exaspendo-006",
  "vmPublicKeyText": "ssh-rsa
AAAAB3NzaC1yc2EAAAABIwAAAQEAt+c1OteRGailSUknJ9VbBoRvvllw4Th56CYJGUWGkcqTjmki1XAYMiAFrQJx3upDRYg9LzSz8SOcbCdg
jlq+BmrVxAHWj+0EIdeQZNrbpfHN8WtK2axqlp7KfyZHtHannkb/YJXdmAa1oHbL9jL07/jmvNbXPbhLa3RHf4cB/z7M5esNoN5s0s2NPv/m
c3By9sbUfO9IvGBGLKUCgwReyl1kk6S9KgevQfwMSGyeVGP4wZBTMoEnQPWnxZJ5Wp49/QSiTa9bjKSQikrcN8si4nJO8bBM9Uk43aAVJBY4
7SDn9X+zGJJHAWvcwPsfbVGOOAWfxRpzMrtbzJwwDixE0w== oracle@cfcldv0751m.us2.oraclecloud.com",
  "parameters": [
    {
      "type": "db",
      "adminPassword": "Welcome#1",
      "sid": "JTWB",
      "pdbName": "JTWBB",
      "backupDestination": "NONE",
      "isRac": "yes"
    }
  ]
}
```

```
curl -v --include --connect-timeout 5 --include --user jeff.wright@oracle.com --header "X-ID-TENANT-
NAME:a462468" --header "Content-Type:application/json" --data @CreateDatabaseJTWB.json
https://dbaas.oraclecloud.com/paas/service/dbcs/api/v1.1/instances/a462468
```

6. Simplified Views of Database Services

- Web UI
  - Quick checks
  - Easy to get started
- REST API
  - Make developers self-sufficient
  - Increase the capacity of developers
  - Lights out automation
  - Reduce human error



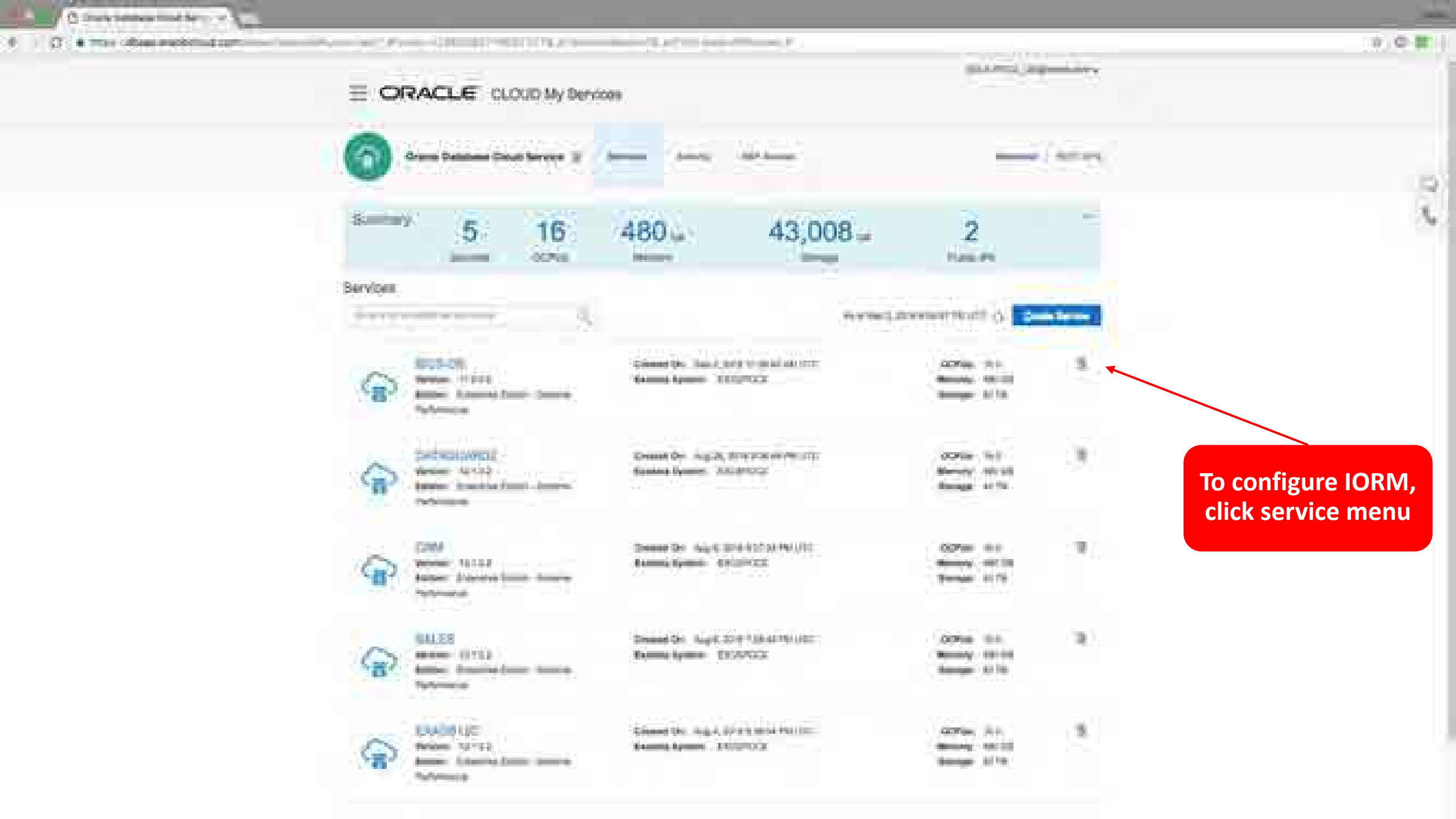
```
curl -s --connect-timeout 2 --user jeff.wright@oracle.com --header "X-ID-TENANT-NAME:a462468"
https://dbaas.oraclecloud.com/paas/service/dbcs/api/v1.1/instances/a462468/JTWA  | ./jq .
{
  "service_name": "JTWA",
  "version": "12.2.0.1",
  "status": "Running",
  "description": "JTWA",
  "identity_domain": "a462468",
  "creation_time": "2017-05-24T16:38:46.619+0000",
  "last_modified_time": "2017-05-24T16:38:46.597+0000",
  "created_by": "jeff.wright@oracle.com",
  "sm_plugin_version": "17.2.3-539",
  "tools_version": "17.2.3-539",
  "service_uri": "https://dbaas.oraclecloud.com:443/paas/service/dbcs/api/v1.1/instances/a462468/JTWA",
  "database_id": "0",
  "num_nodes": 2,
  "level": "PAAS_EXADATA",
  "edition": "EE_EP",
  "use_high_performance_storage": false,
  "subscriptionType": "MONTHLY",
  "creation_job_id": "12093280",
  "num_ip_reservations": 2,
  "backup_destination": "NONE",
  "failover_database": false,
  "rac_database": true,
```

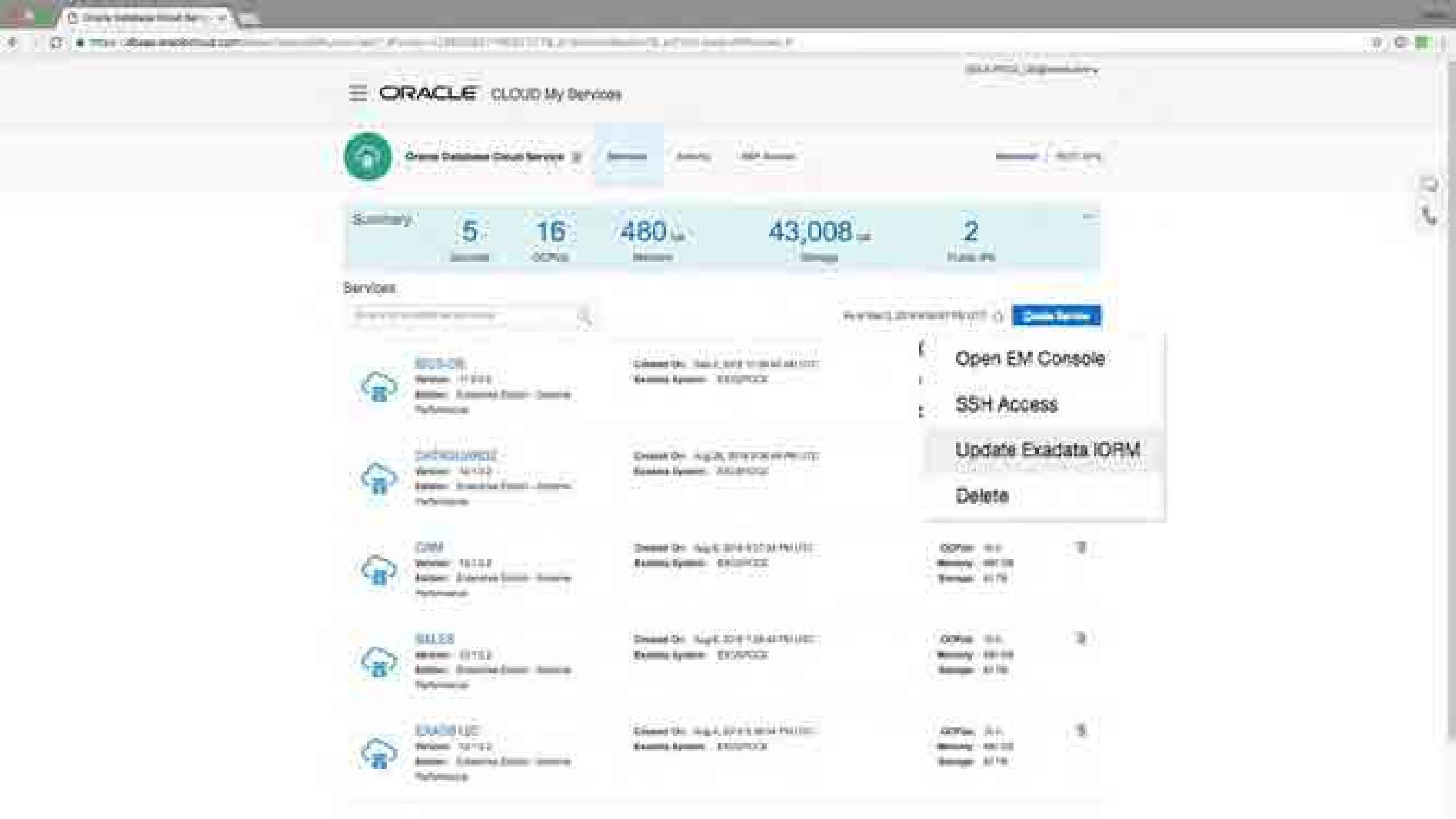
```
"current_version": "12.2.0.1.0",
  "sid": "JEFFA",
  "pdbName": "TESTA",
  "demoPdb": "",
  "listenerPort": 1521,
  "em_url": "https://129.152.216.130:5503/em",
  "connect_descriptor":
"(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(HOST=129.152.216.134)(PORT=1521)(PROTOCOL=TCP))(ADDRESS=(HOST=129.152.2
16.135)(PORT=1521)(PROTOCOL=TCP))(ADDRESS=(HOST=129.152.216.136)(PORT=1521)(PROTOCOL=TCP)))(CONNECT_DATA=(SER
VICE_NAME=TESTA.us2.oraclecloud.com)))",
  "connect_descriptor_with_public_ip":
"(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(HOST=129.152.216.134)(PORT=1521)(PROTOCOL=TCP))(ADDRESS=(HOST=129.152.2
16.135)(PORT=1521)(PROTOCOL=TCP))(ADDRESS=(HOST=129.152.216.136)(PORT=1521)(PROTOCOL=TCP)))(CONNECT_DATA=(SER
VICE_NAME=TESTA.us2.oraclecloud.com)))",
  "glassfish_url": "",
  "charset": "AL32UTF8",
  "ncharset": "AL16UTF16",
  "is_clone": false,
  "clone_supported_version": "17.2.1",
  "total_shared_storage": 0,
  "service_associations": [],
  "subscription_name": "exaspendo",
  "snapshot_service": false,
  "cluster_names": "exaspendo-006",
```

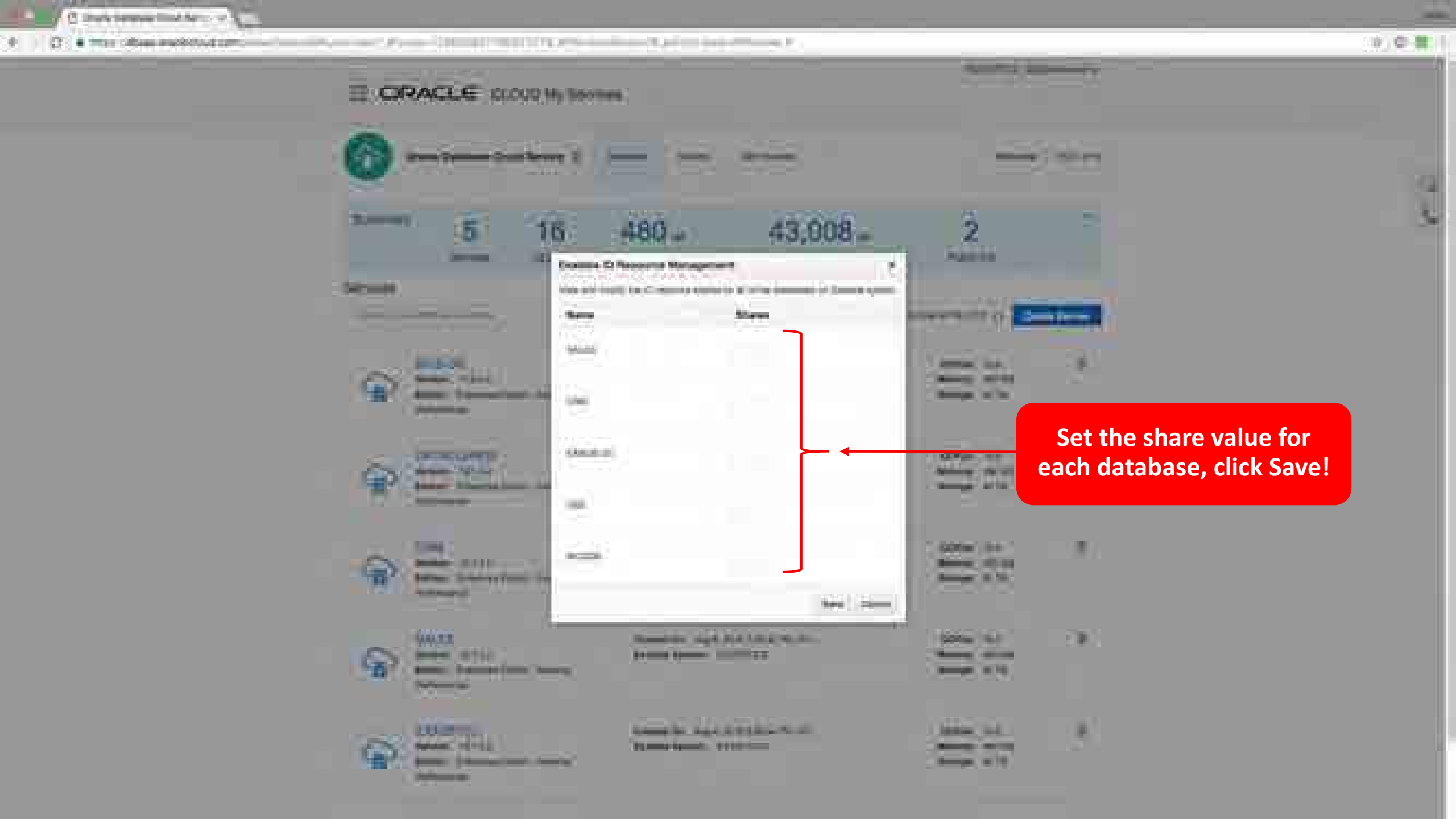
```
"networking_info": {
    "scan_ips": [
      "129.152.216.134",
      "129.152.216.135",
      "129.152.216.136"
    ],
    "admin_network": "129.152.216.160/28",
    "backup_network": "129.152.216.176/28",
    "client_network": "129.152.216.128/27",
    "computes": [
      {
        "hostname": "cfcldv0751m.us2.oraclecloud.com",
        "client_ip": "129.152.216.130",
        "virtual_ip": "129.152.216.131",
        "admin_ip": "129.152.216.162"
      },
      {
        "hostname": "cfcldv0752m.us2.oraclecloud.com",
        "client_ip": "129.152.216.132",
        "virtual_ip": "129.152.216.133",
        "admin_ip": "129.152.216.163"
      }
    ]
  },
  "jaas_instances_using_service": ""
}
```


5. Configure IORM with Cloud Tooling

- Easy web interface for quick and frequent changes
- Adapt and adjust to quickly changing workloads
- Ensure critical business objectives are met
- Safe way to consolidate workloads

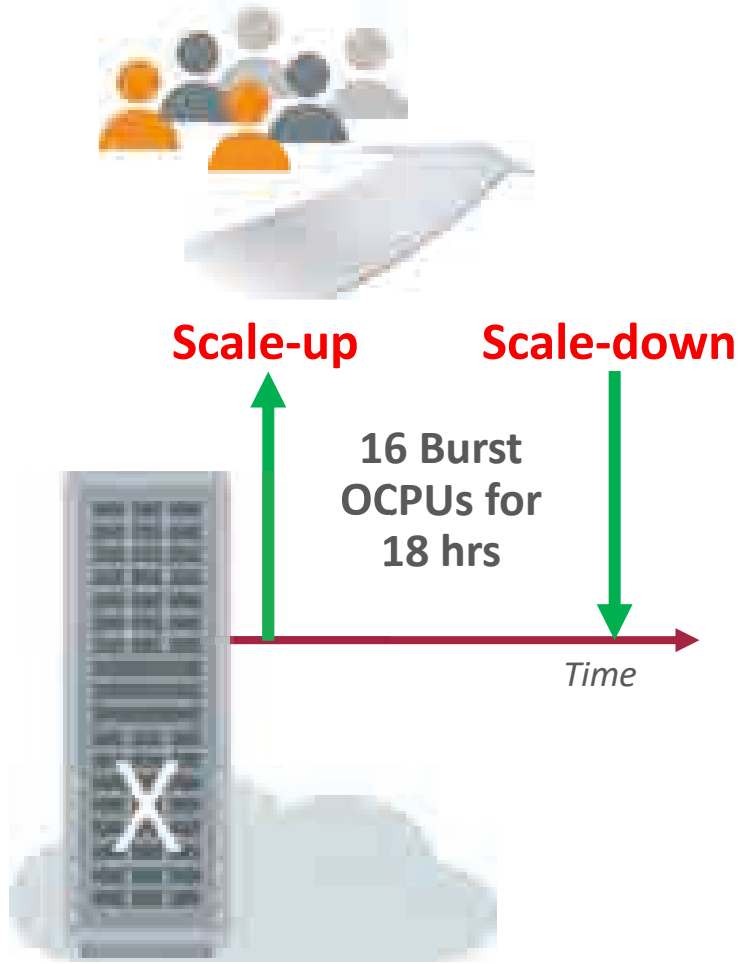

ORACLE CLOUD My Services
Summary
5
16
480
43,008
2
Services
To configure IORM, click service menu

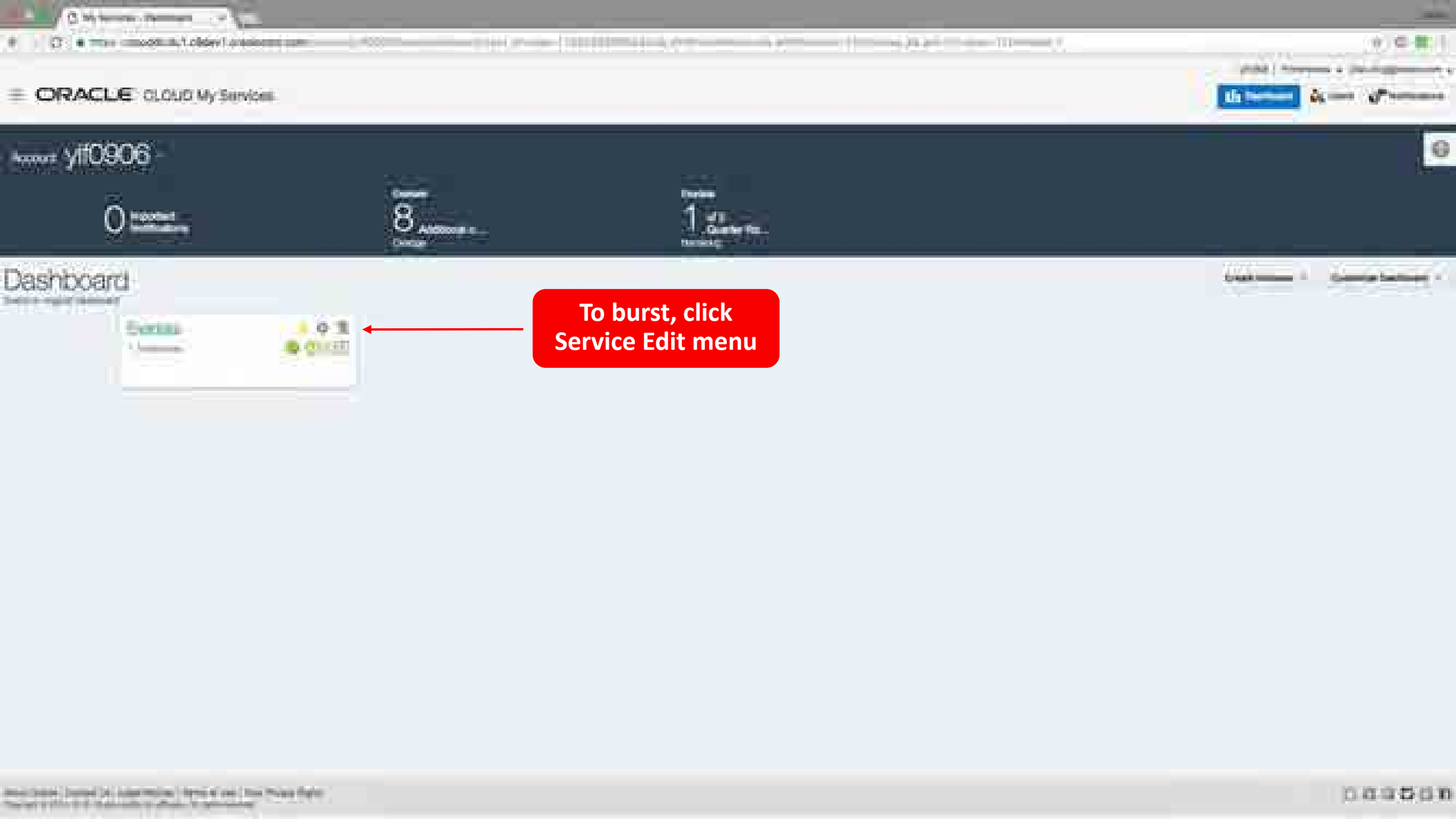

ORACLE CLOUD My Services
Summary
5
16
480
43,008
2
Services
Open EM Console
SSH Access
Update Exadata IORM
Delete

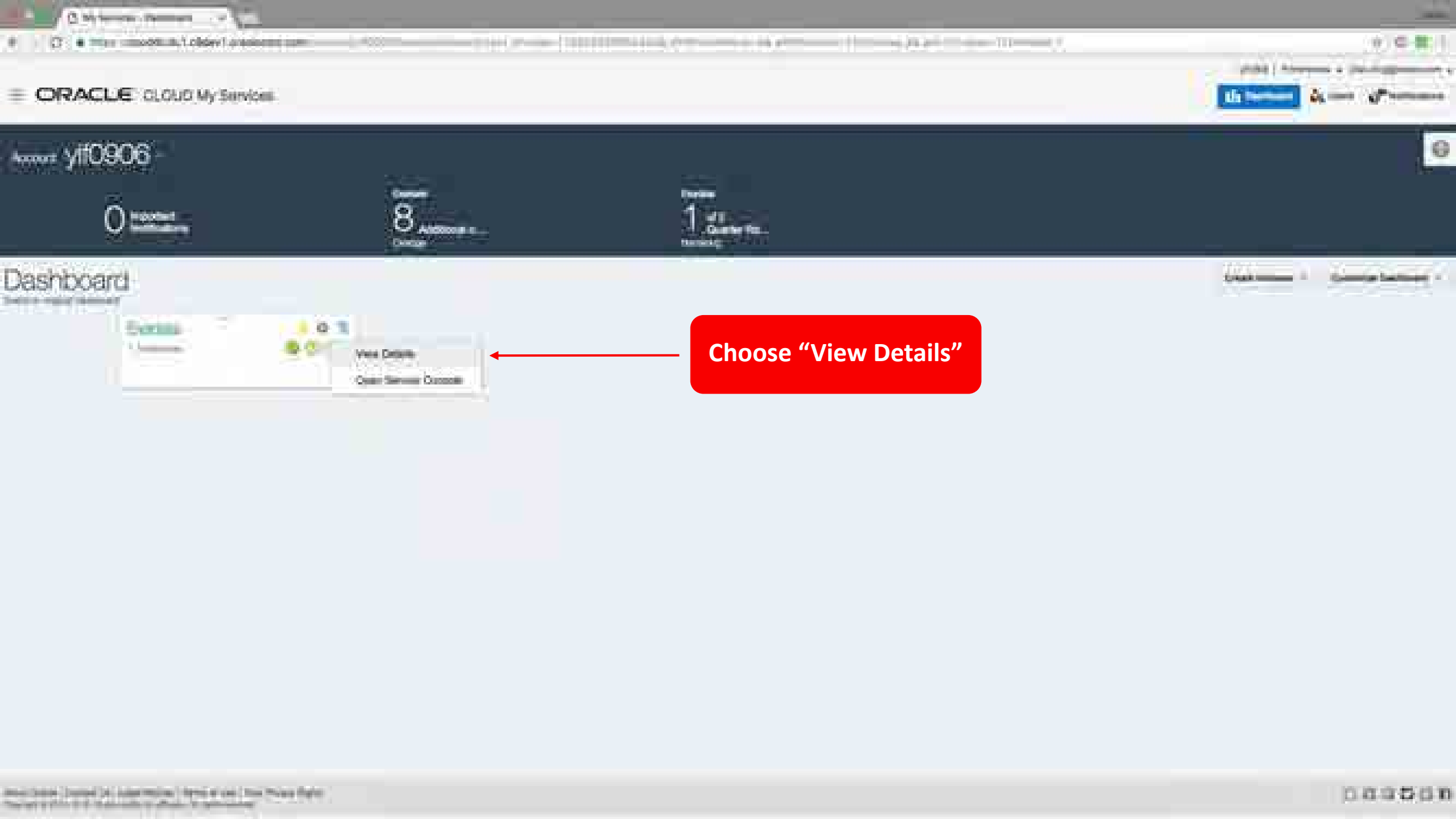

Set the share value for each database, click Save!

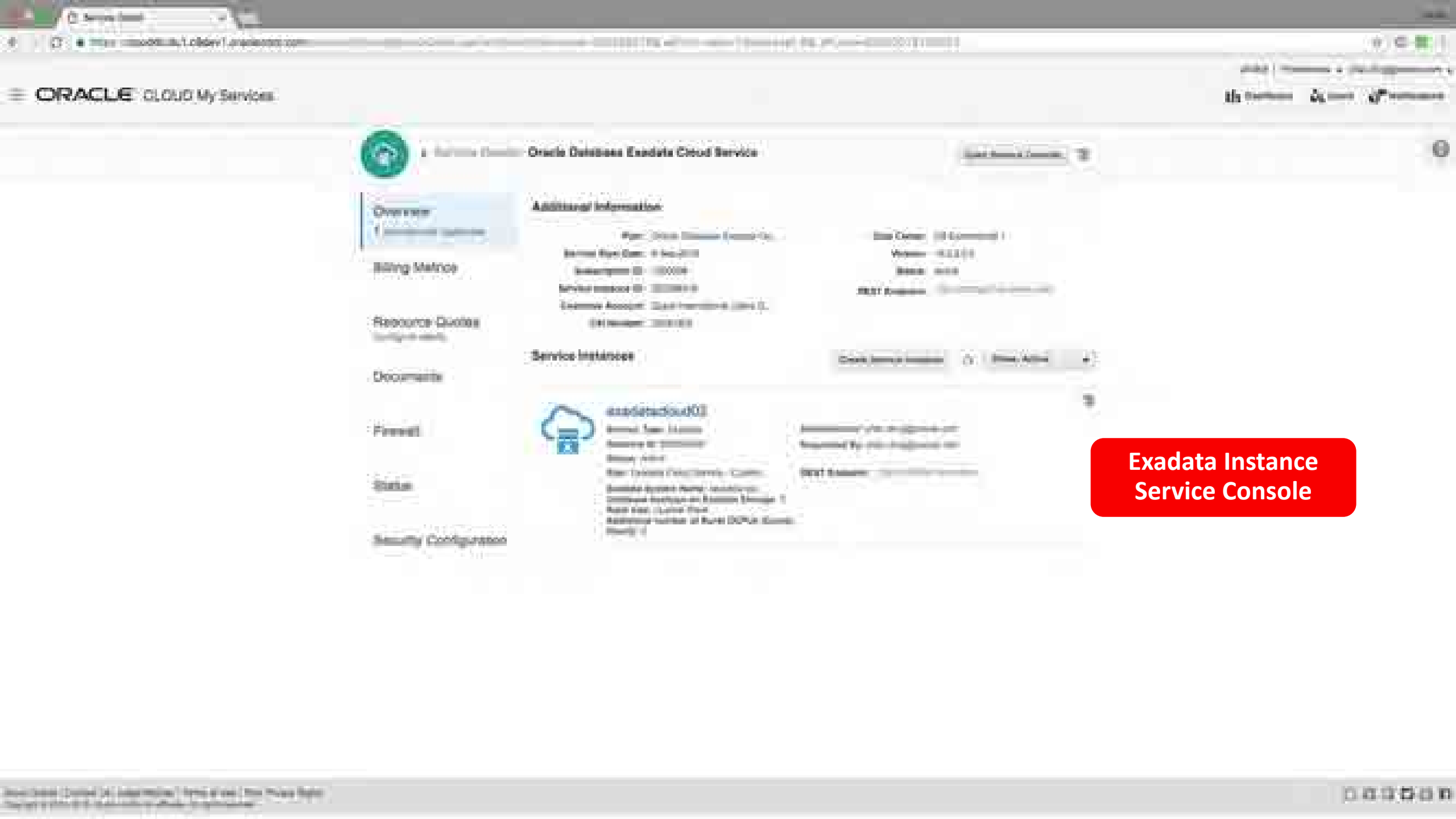
4. Online Scale-up Through Compute Bursting

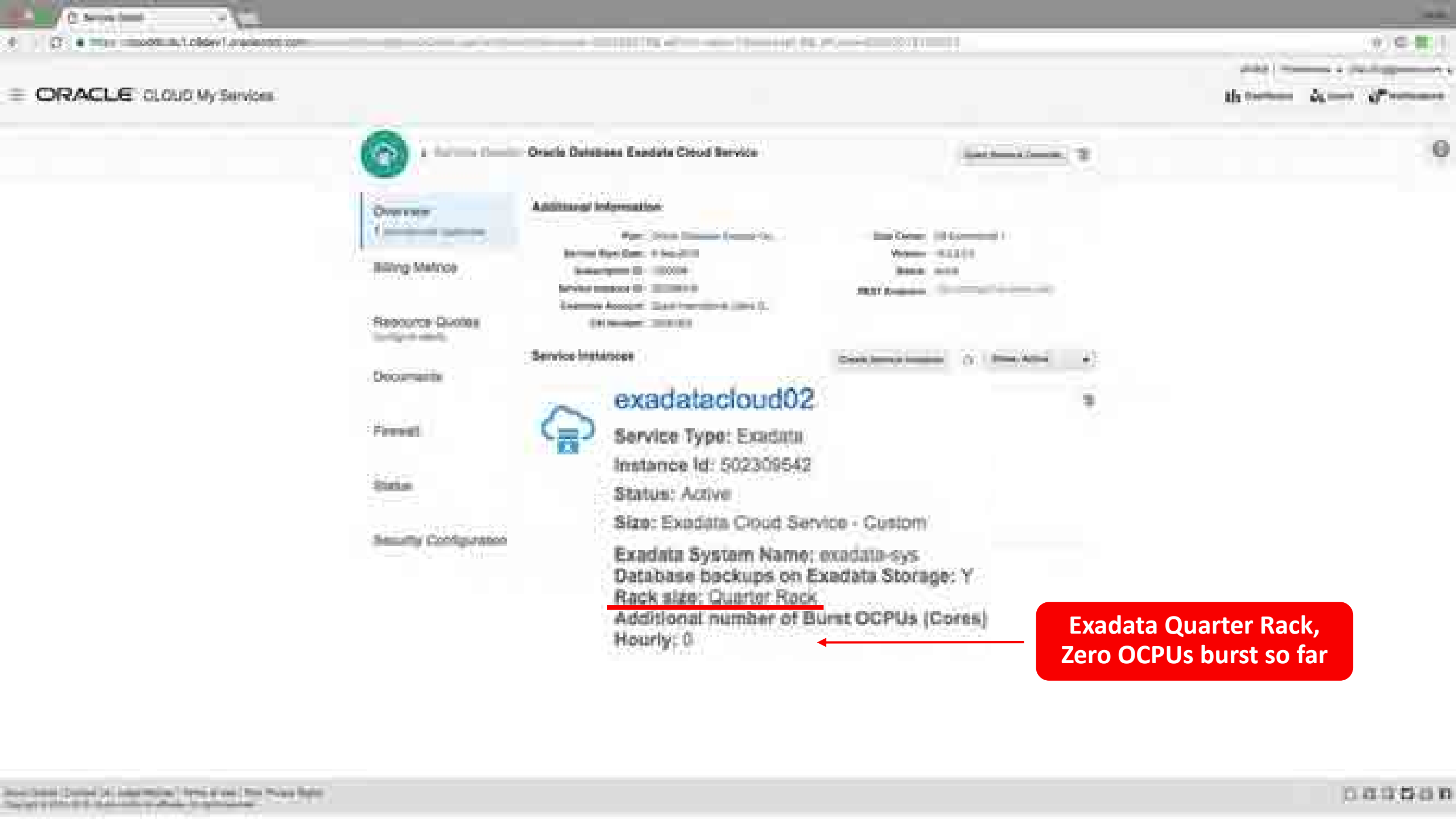
- Grow/shrink compute capacity to meet peak or seasonal demands
- Dynamically add or reduce OCPUs as often as once an hour
- Hourly rates to lower costs – avoids the need to provision for peak
- Burst up to 2x the base number of OCPUs or max capacity (whichever is lower)
- GUI-based self-service

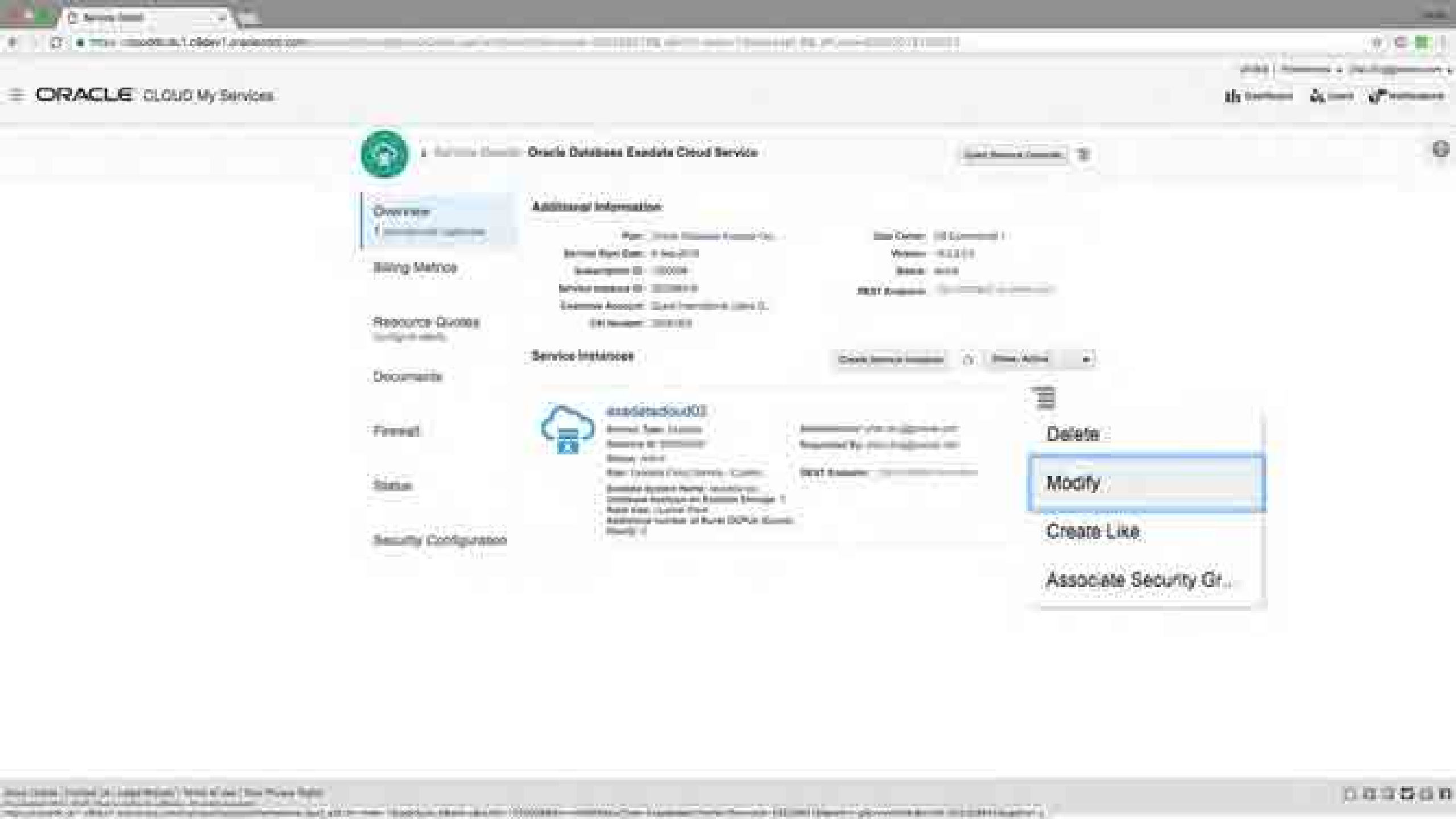


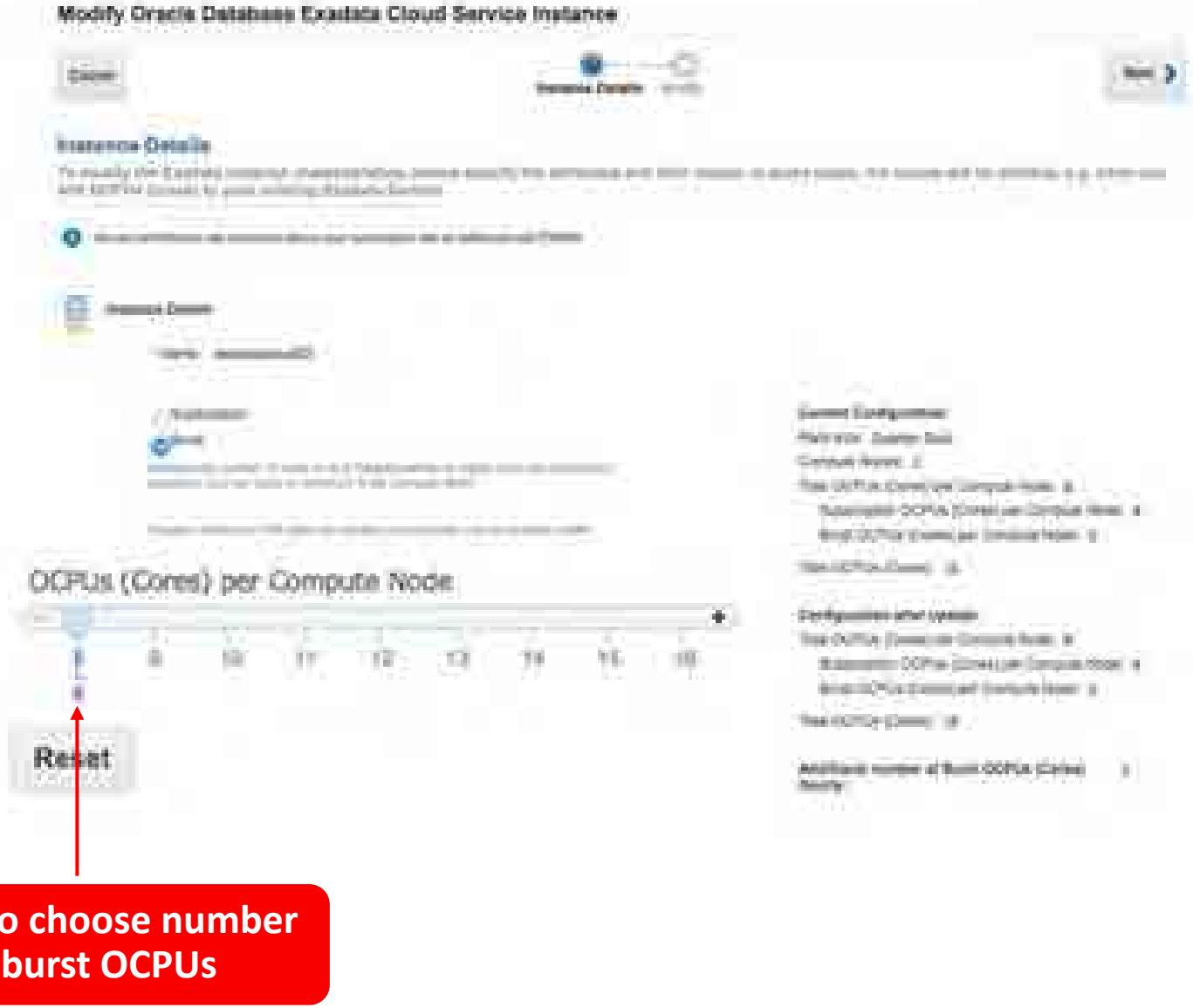

ORACLE CLOUD My Services
Dashboard
To burst, click
Service Edit menu


ORACLE CLOUD My Services
Dashboard
View Details
Choose “View Details”

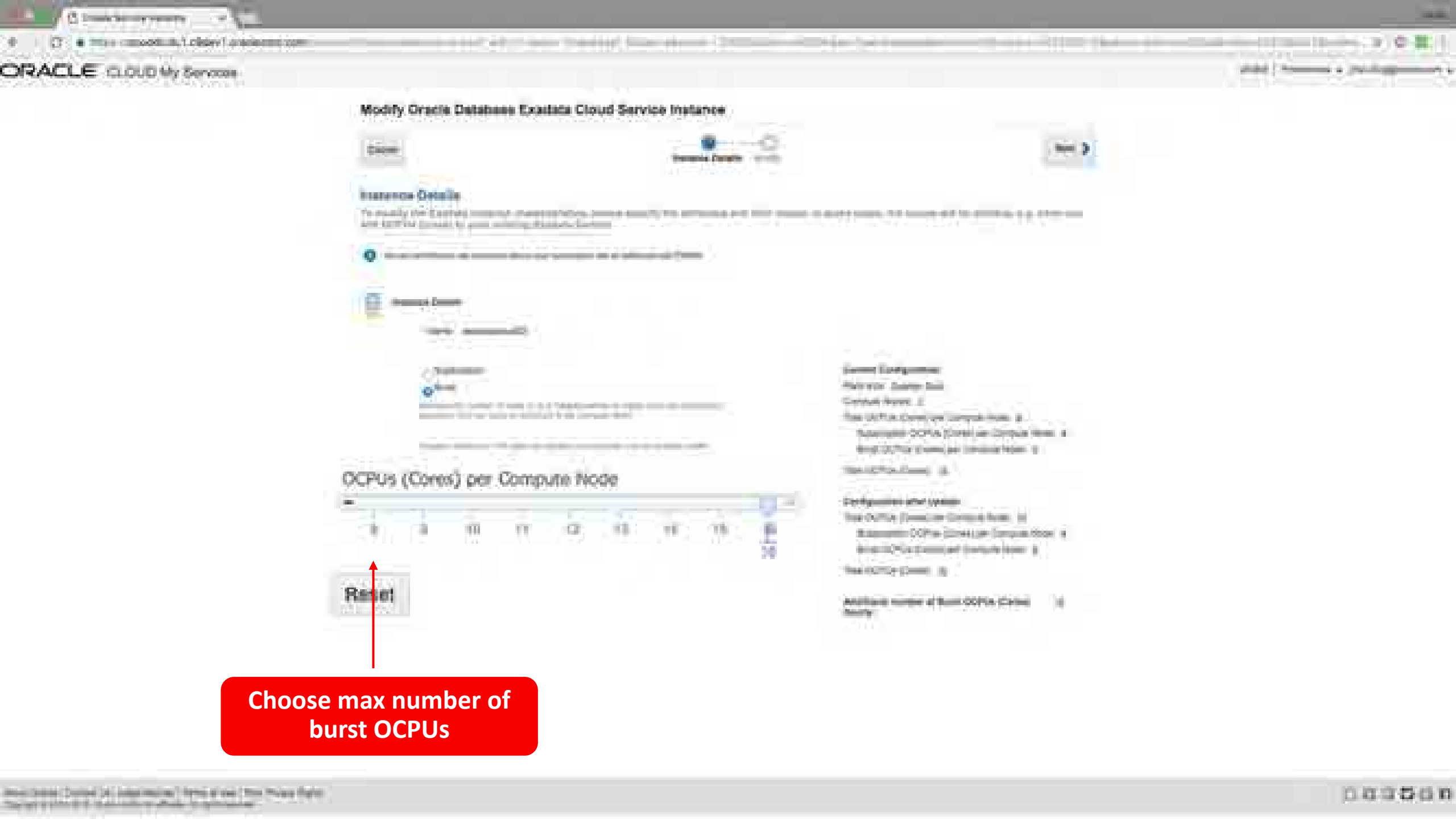

ORACLE CLOUD My Services
Oracle Database Exadata Cloud Service
Overview
Billing Metrics
Resource Quotas
Documents
Firewall
Status
Security Configuration
Additional Information
Service Instances
Exadata Instance Service Console


ORACLE CLOUD My Services
Oracle Database Exadata Cloud Service
Overview
Billing Metrics
Resource Quotas
Documents
Firewall
Status
Security Configuration
Additional Information
Service Instances
exadatacloud02
Service Type: Exadata
Instance Id: 502309542
Status: Active
Size: Exadata Cloud Service - Custom
Exadata System Name: exadata-sys
Database backups on Exadata Storage: Y
Rack size: Quarter Rack
Additional number of Burst OCPUs (Cores)
Hourly: 0
Exadata Quarter Rack,
Zero OCPUs burst so far


ORACLE CLOUD My Services
Oracle Database Exadata Cloud Service
Overview
Billing Metrics
Resource Quotas
Documents
Firewall
Status
Security Configuration
Additional Information
Service Instances
Delete
Modify
Create Like
Associate Security Gr...



Slider to choose number of burst OCPUs


ORACLE CLOUD My Services
Modify Oracle Database Exadata Cloud Service Instance
Cancel
Next
Instance Details
OCPUs (Cores) per Compute Node
Reset
Choose max number of burst OCPUs

ORACLE CLOUD My Services

Modify Oracle Database Exadata Cloud Service Instance

Cancel

Next

Instance Details

Summary of Burst OCPUs

Configuration after Update:

Total OCPUs (Cores) per Compute Node: 16

Subscription OCPUs (Cores) per Compute Node: 8

Burst OCPUs (Cores) per Compute Node: 8

Total OCPUs (Cores): 32

Additional number of Burst OCPUs (Cores) Hourly: 16

ORACLE CLOUD My Services

Modify Oracle Database Exadata Cloud Service Instance

Confirmation

Confirm and Submit!

Confirm the following changes:

Rack size: Quarter Rack

Compute Nodes: 2

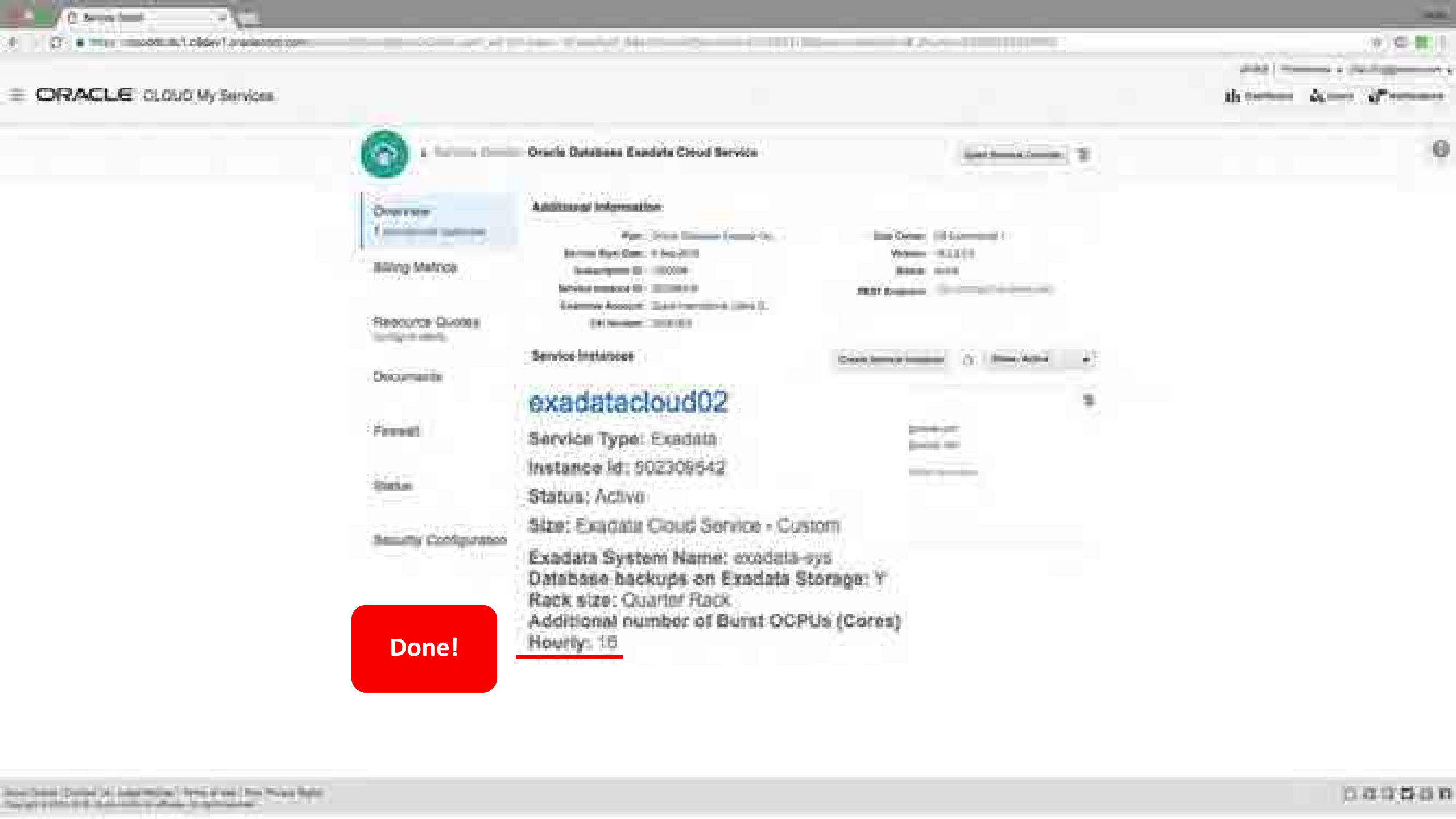
Subscription OCPUs (Cores) per Compute Node: 8

Burst OCPUs (Cores) per Compute Node: 8

Total OCPUs (Cores) per Compute Node: 16

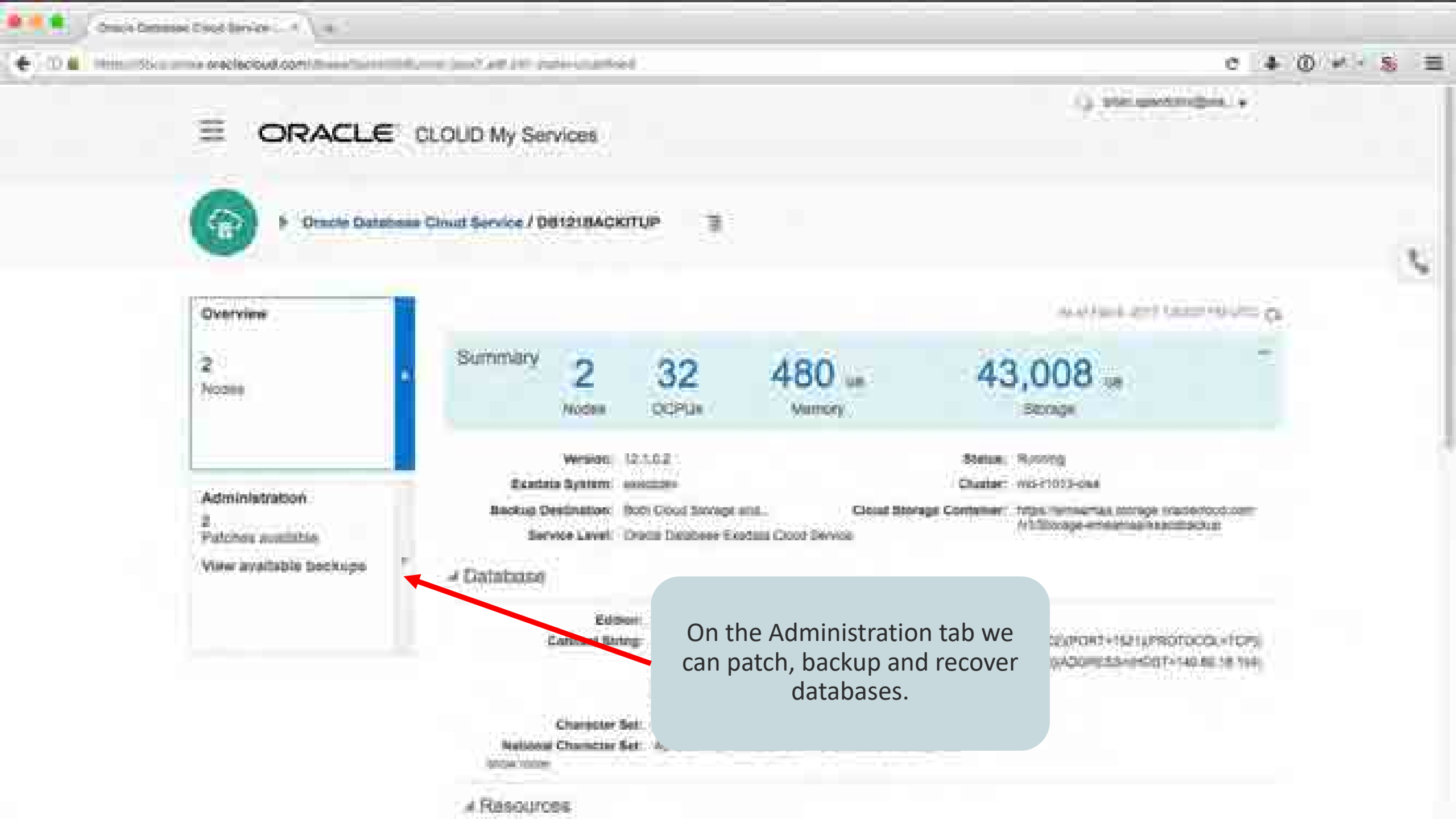
Total OCPUs (Cores): 32

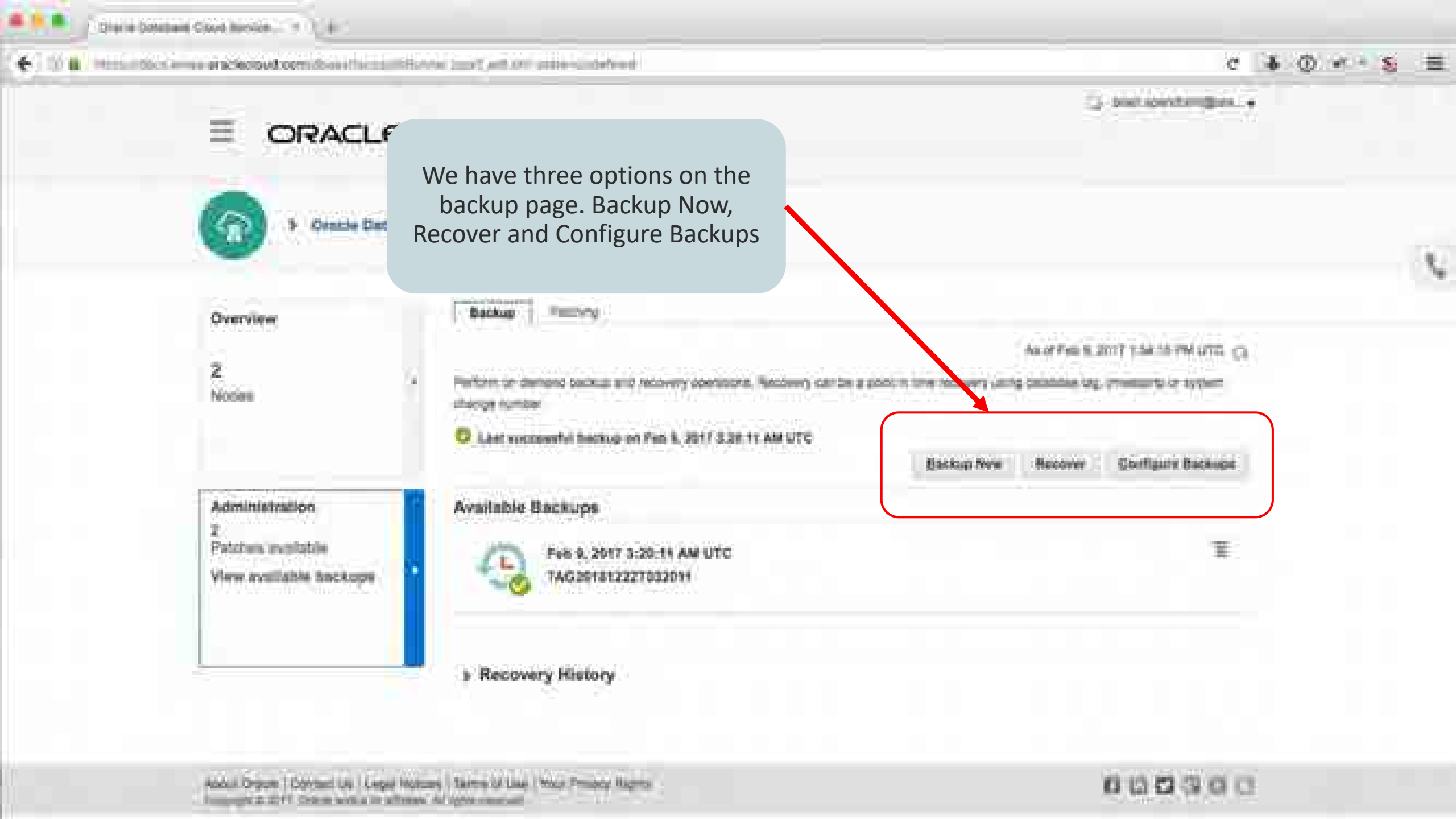
Additional number of Burst OCPUs (Cores) Hourly: 16


ORACLE CLOUD My Services
Oracle Database Exadata Cloud Service
Overview
Billing Metrics
Resource Quotas
Documents
Firewall
Status
Additional Information
Service Instances
exadatacloud02
Service Type: Exadata
Instance Id: 502309542
Status: Active
Size: Exadata Cloud Service - Custom
Exadata System Name: exadata-sys
Database backups on Exadata Storage: Y
Rack size: Quarter Rack
Additional number of Burst OCPUs (Cores)
Hourly: 16
Done!

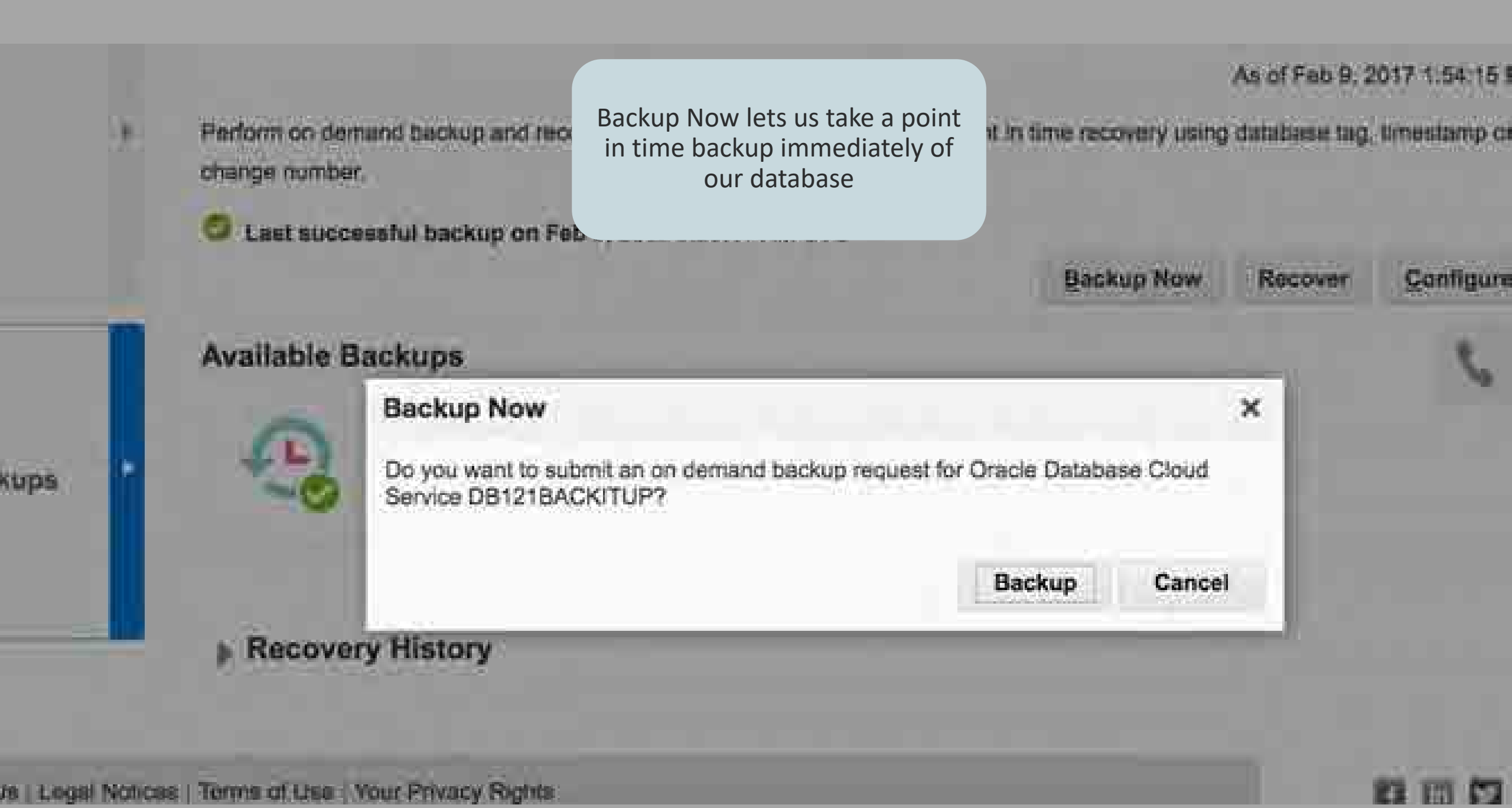
3. Automate Backup, Recovery, and Patching

- Web UI
  - Great for one-off and learning
- REST API
  - Give power to developers
  - Reduce load on DBAs
  - Simple database administration for the masses

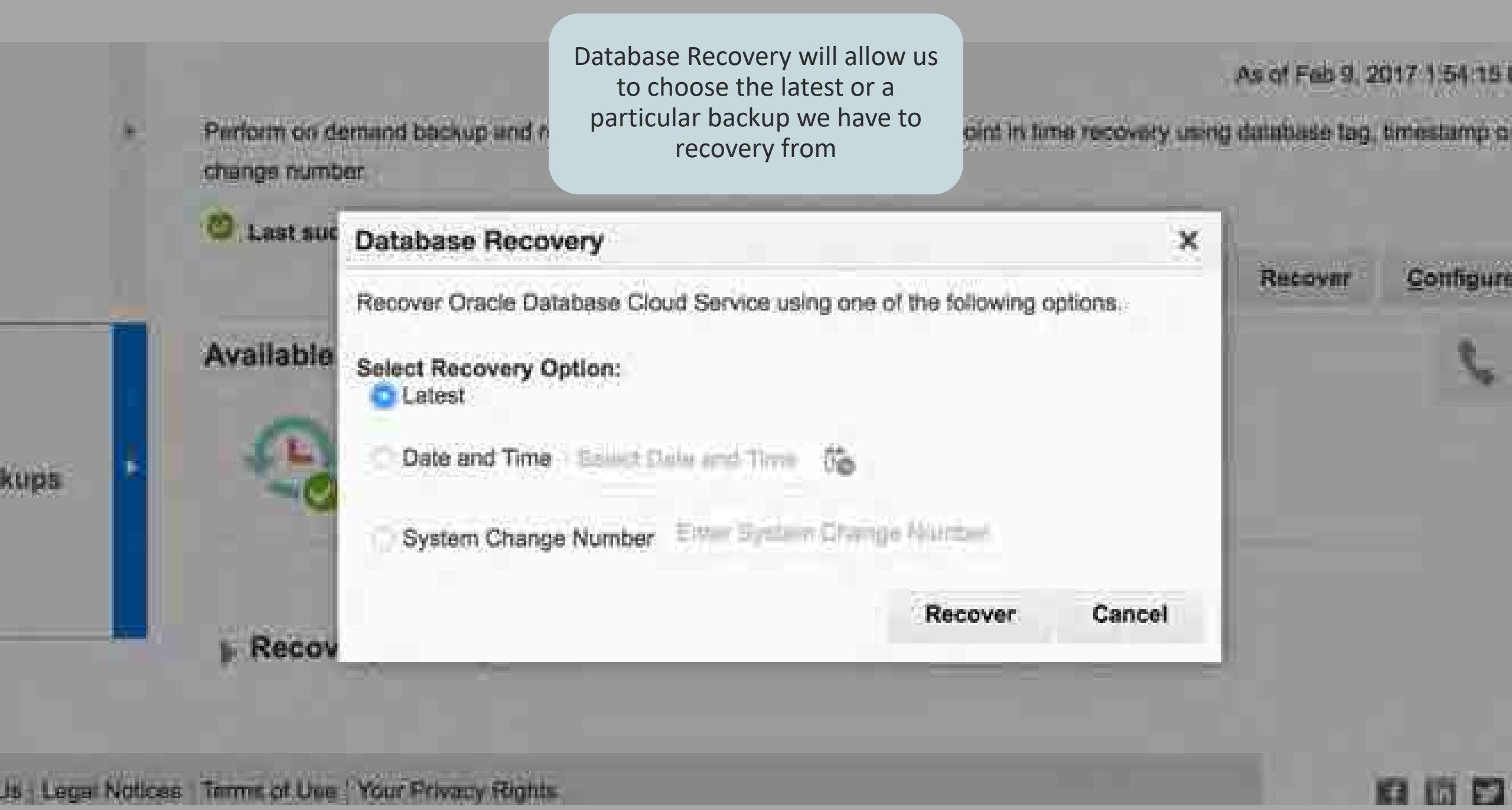

ORACLE CLOUD My Services
Oracle Database Cloud Service / DB121BACKITUP
Overview
2
Nodes
Administration
2
Patches available
View available backups
Summary
2
Nodes
32
OCPUs
480 GB
Memory
43,008 GB
Storage
Version:
Status:
Exadata System:
Cluster:
Backup Destination:
Cloud Storage Container:
Service Level:
Database
Edition:
Character Set:
National Character Set:
Resources
On the Administration tab we can patch, backup and recover databases.


We have three options on the backup page. Backup Now, Recover and Configure Backups
Overview
2
Nodes
Backup
Backup Now
Recover
Configure Backups
Administration
2
Patches available
View available backups
Available Backups
Feb 9, 2017 3:20:11 AM UTC
Recovery History

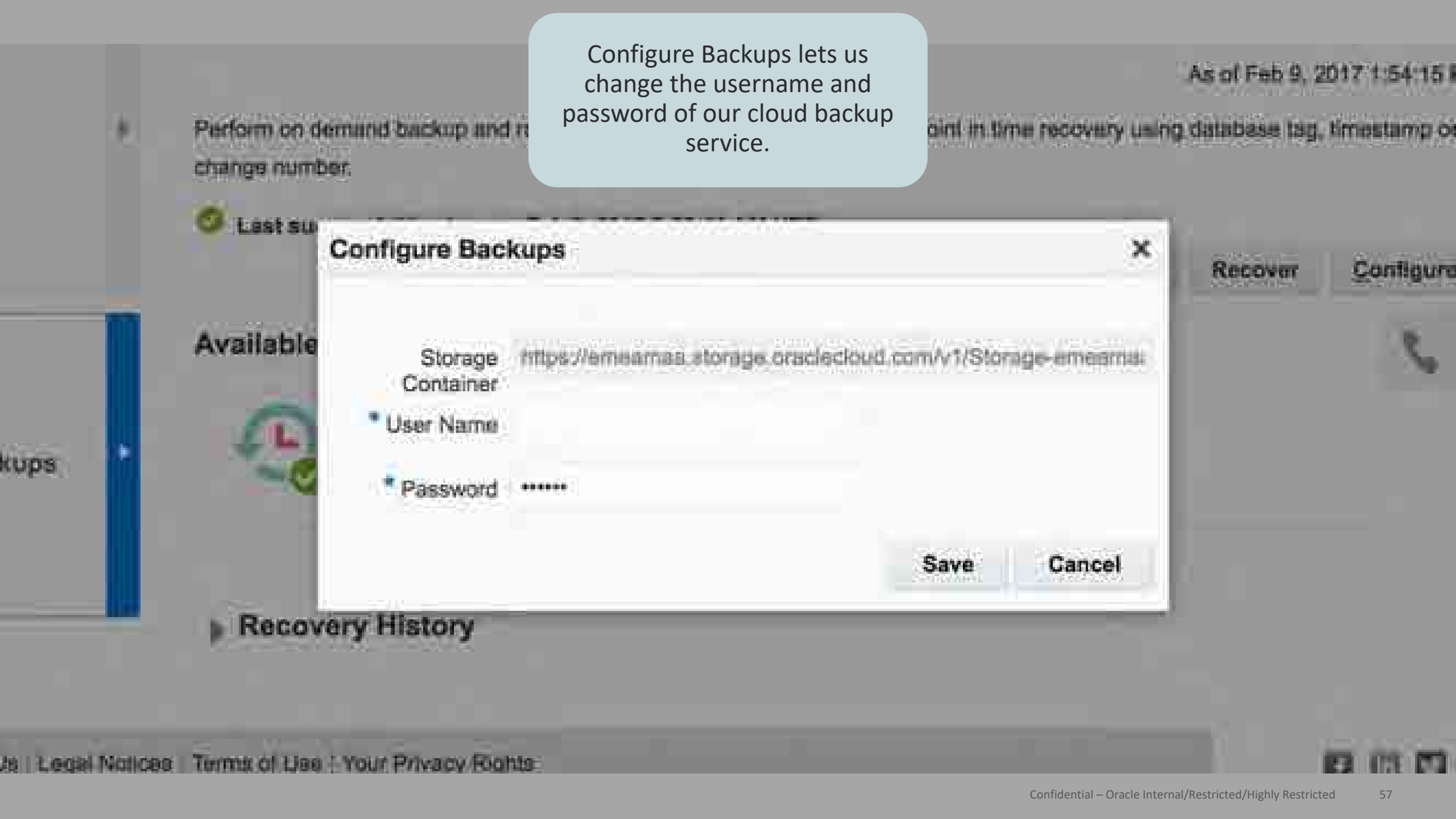
Backup Now lets us take a point in time backup immediately of our database

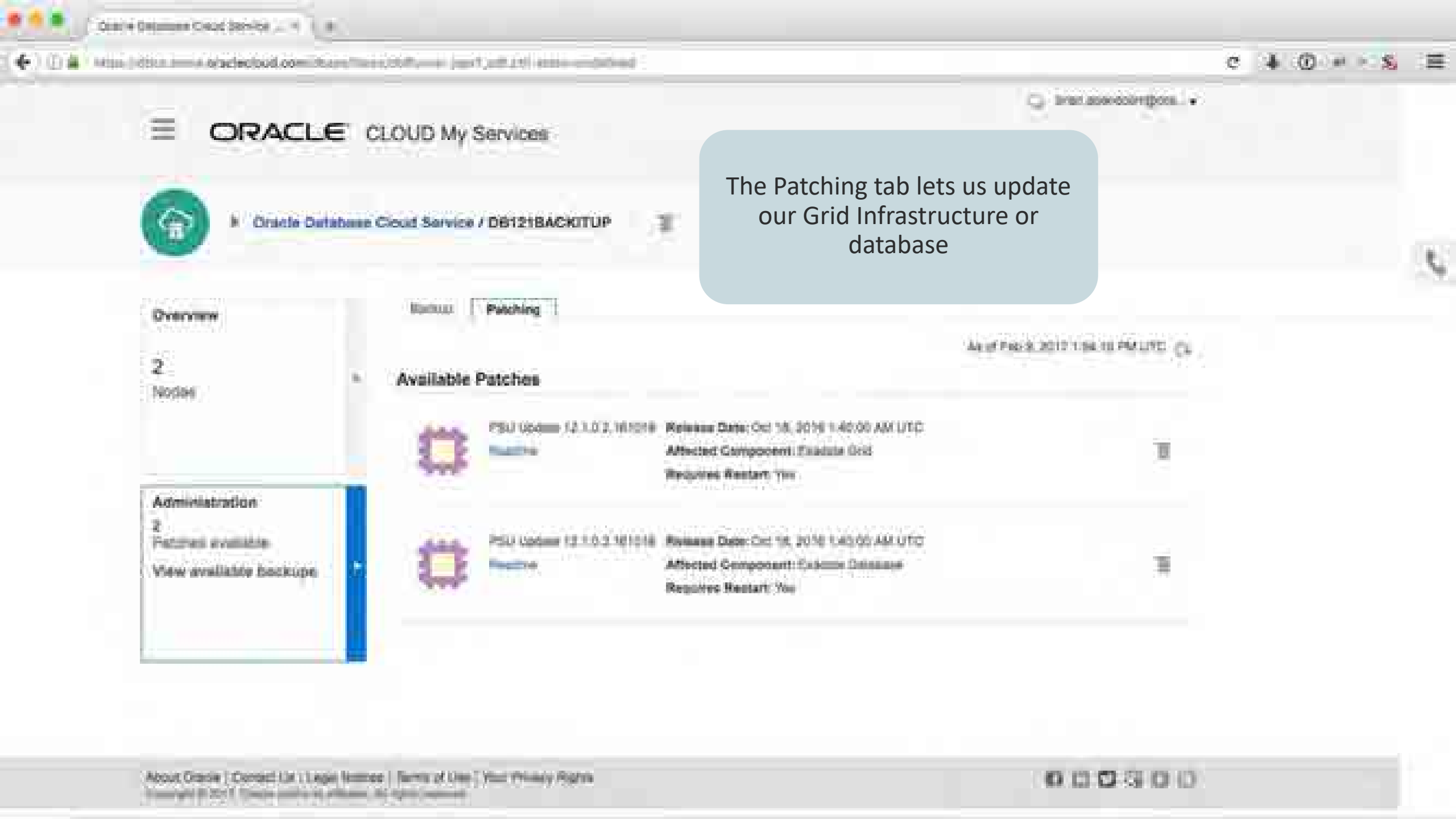


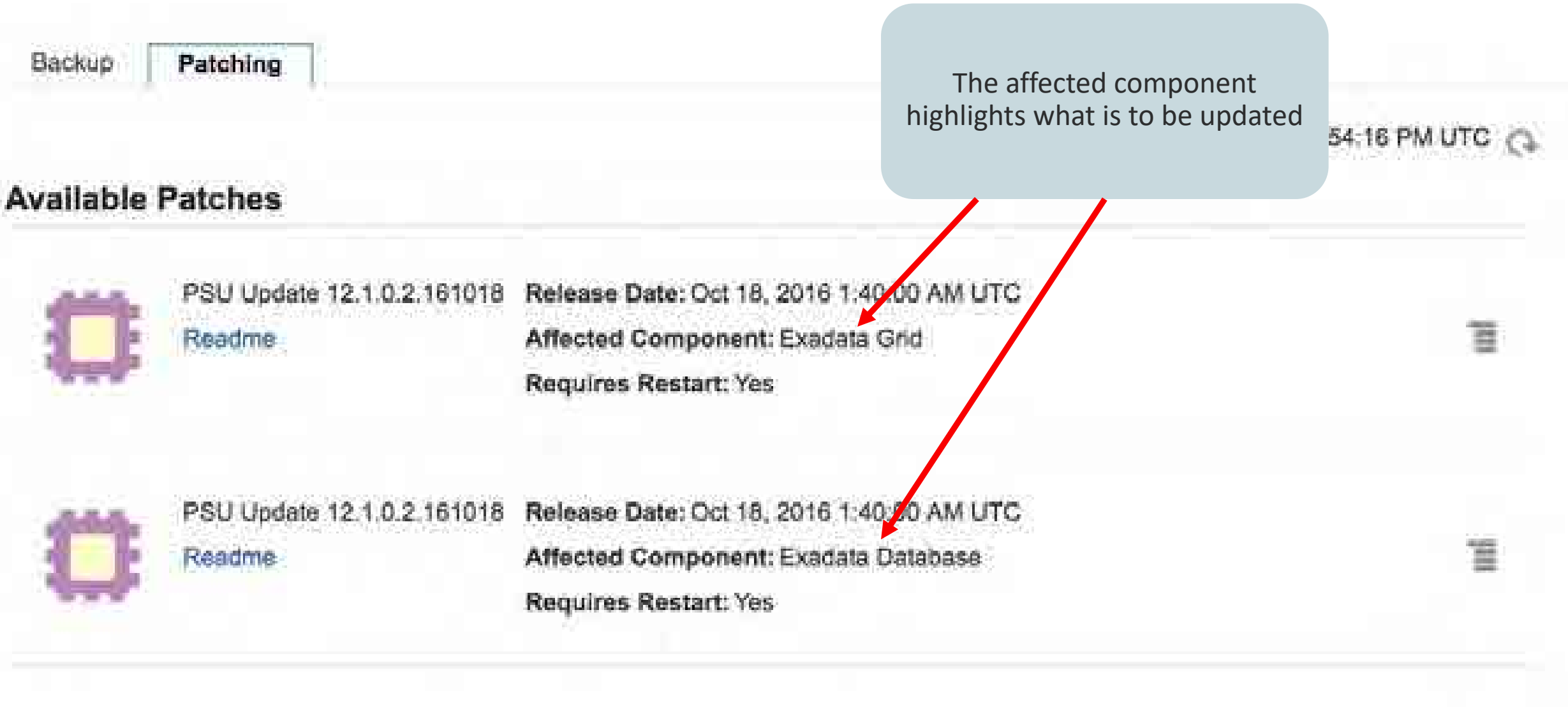
Database Recovery will allow us to choose the latest or a particular backup we have to recovery from



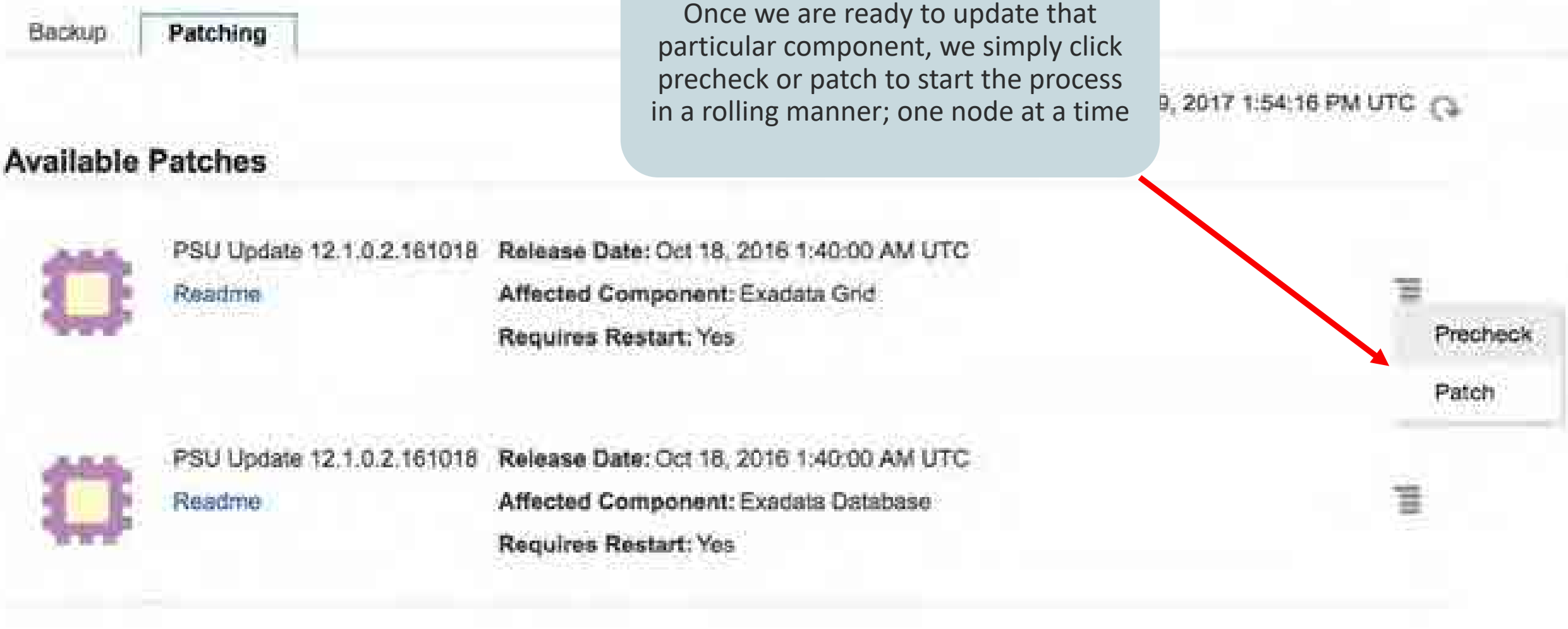
Configure Backups lets us change the username and password of our cloud backup service.




ORACLE CLOUD My Services
Oracle Database Cloud Service / DB121BACKITUP
Overview
2
Nodes
Administration
2
Patches available
View available backups
Backups
Patching
Available Patches
Release Date:
Affected Component:
Requires Restart: Yes
About Oracle | Contact Us | Legal Notices | Terms of Use | Your Privacy Rights
The Patching tab lets us update our Grid Infrastructure or database

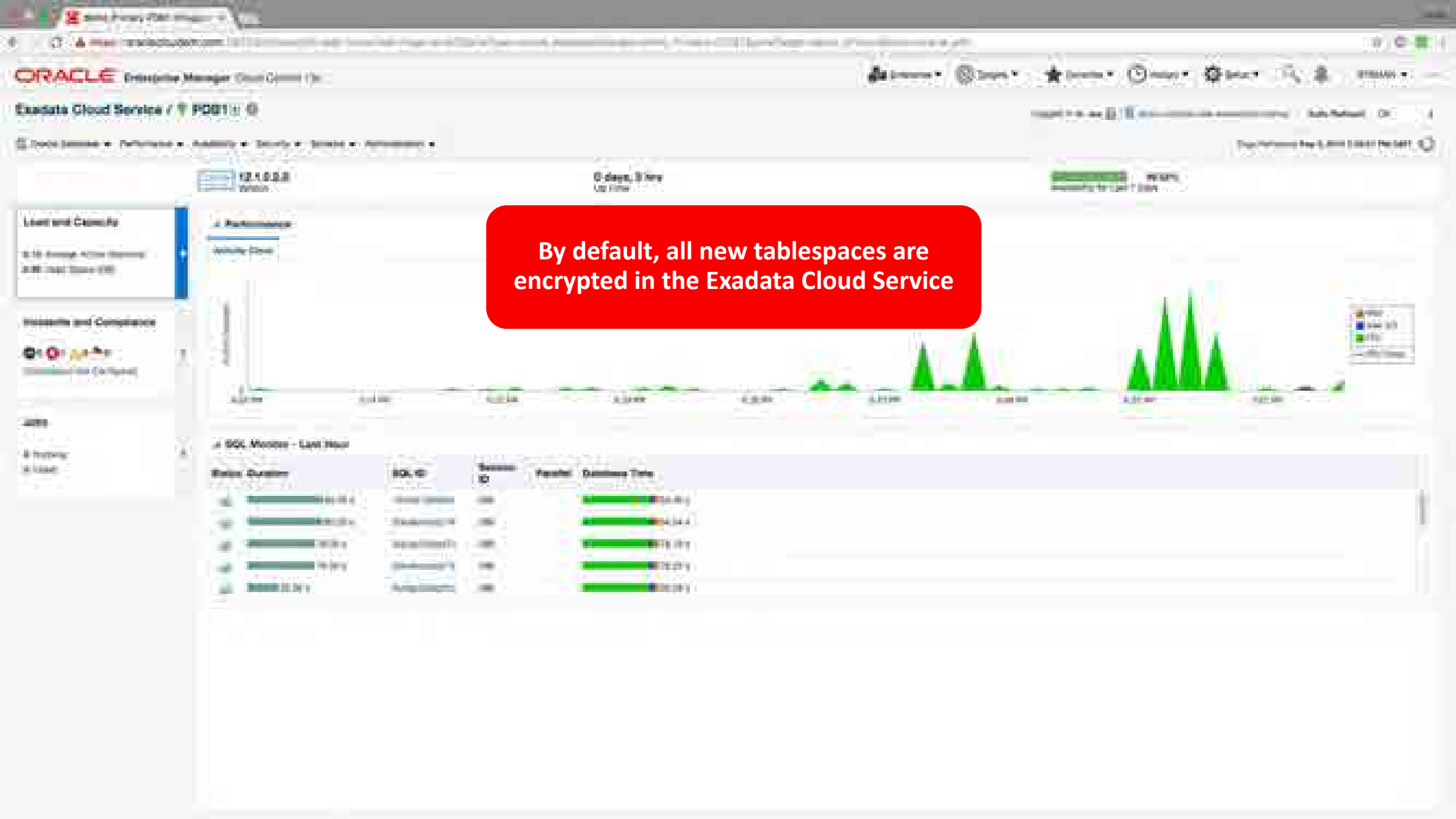

Backup
Patching
The affected component highlights what is to be updated
54:16 PM UTC
Available Patches
PSU Update 12.1.0.2.161018
Readme
Release Date: Oct 18, 2016 1:40:00 AM UTC
Affected Component: Exadata Grid
Requires Restart: Yes
PSU Update 12.1.0.2.161018
Readme
Release Date: Oct 18, 2016 1:40:00 AM UTC
Affected Component: Exadata Database
Requires Restart: Yes

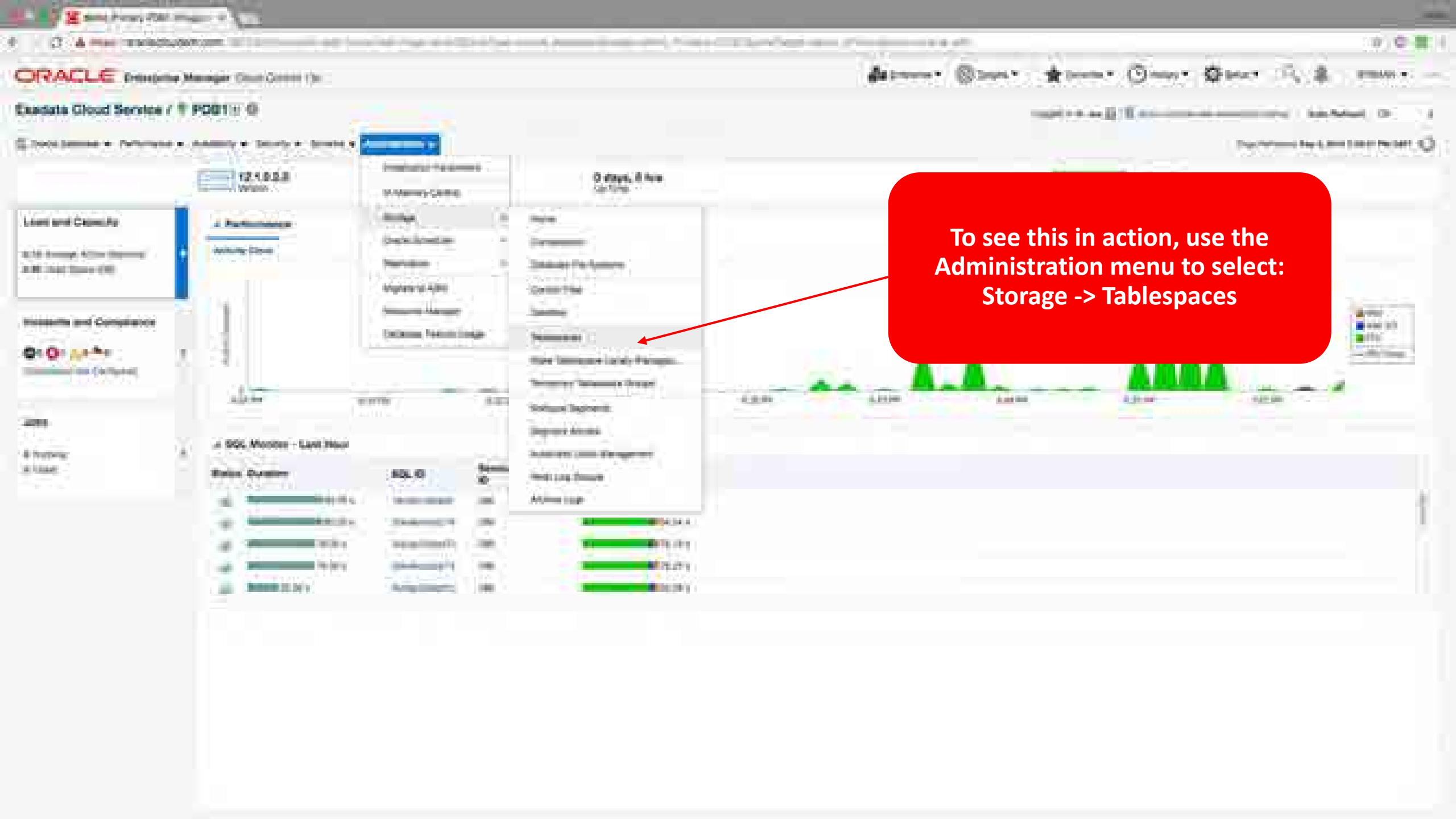
Once we are ready to update that particular component, we simply click precheck or patch to start the process in a rolling manner; one node at a time

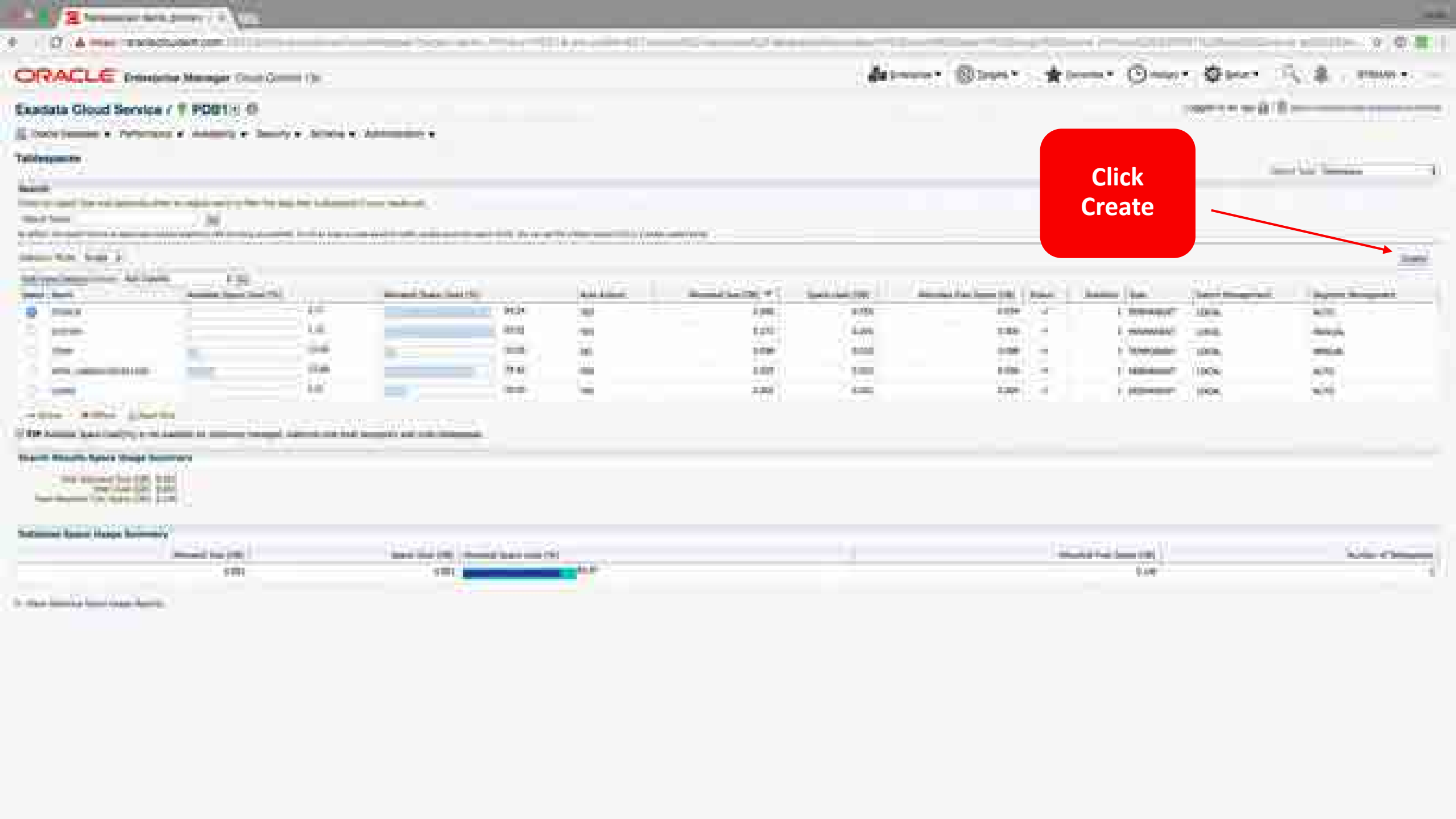


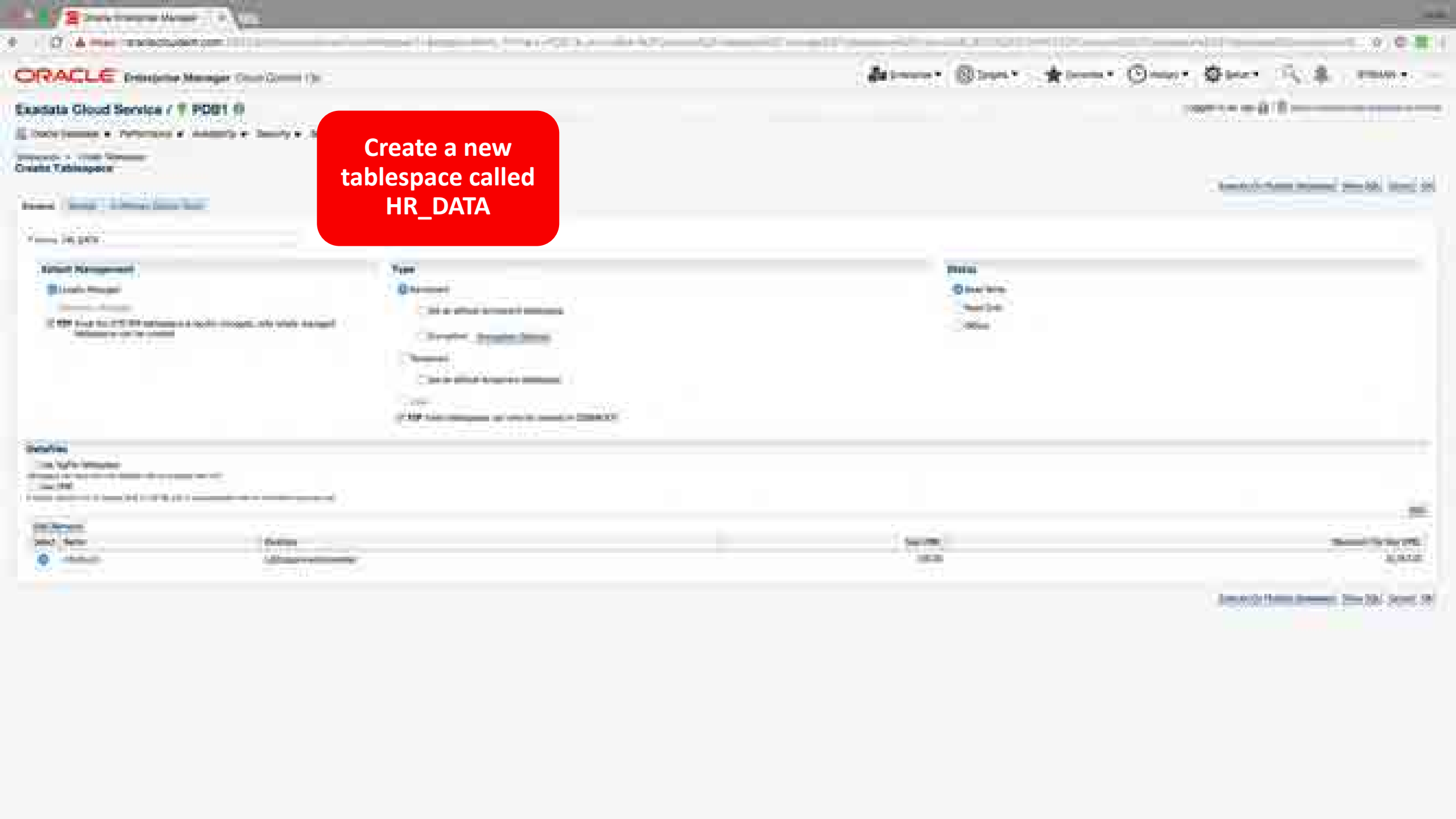
2. Security with Databases Encrypted by Default

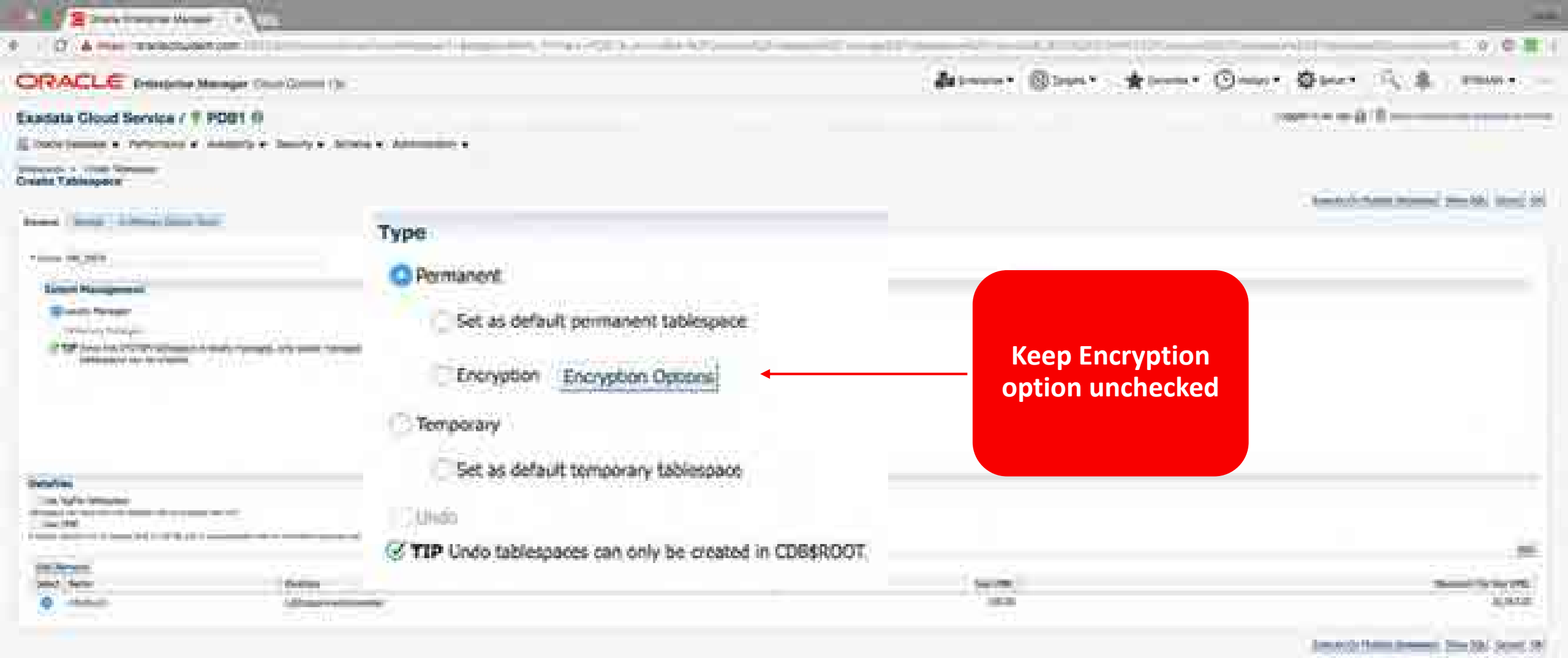
- Oracle Transparent Data Encryption (TDE) included and enabled by default
- Eliminate accidental holes due to developer oversight
- Prevent access to files from providing access to data
- Couple with Oracle Database Vault to prevent DBA access from seeing data

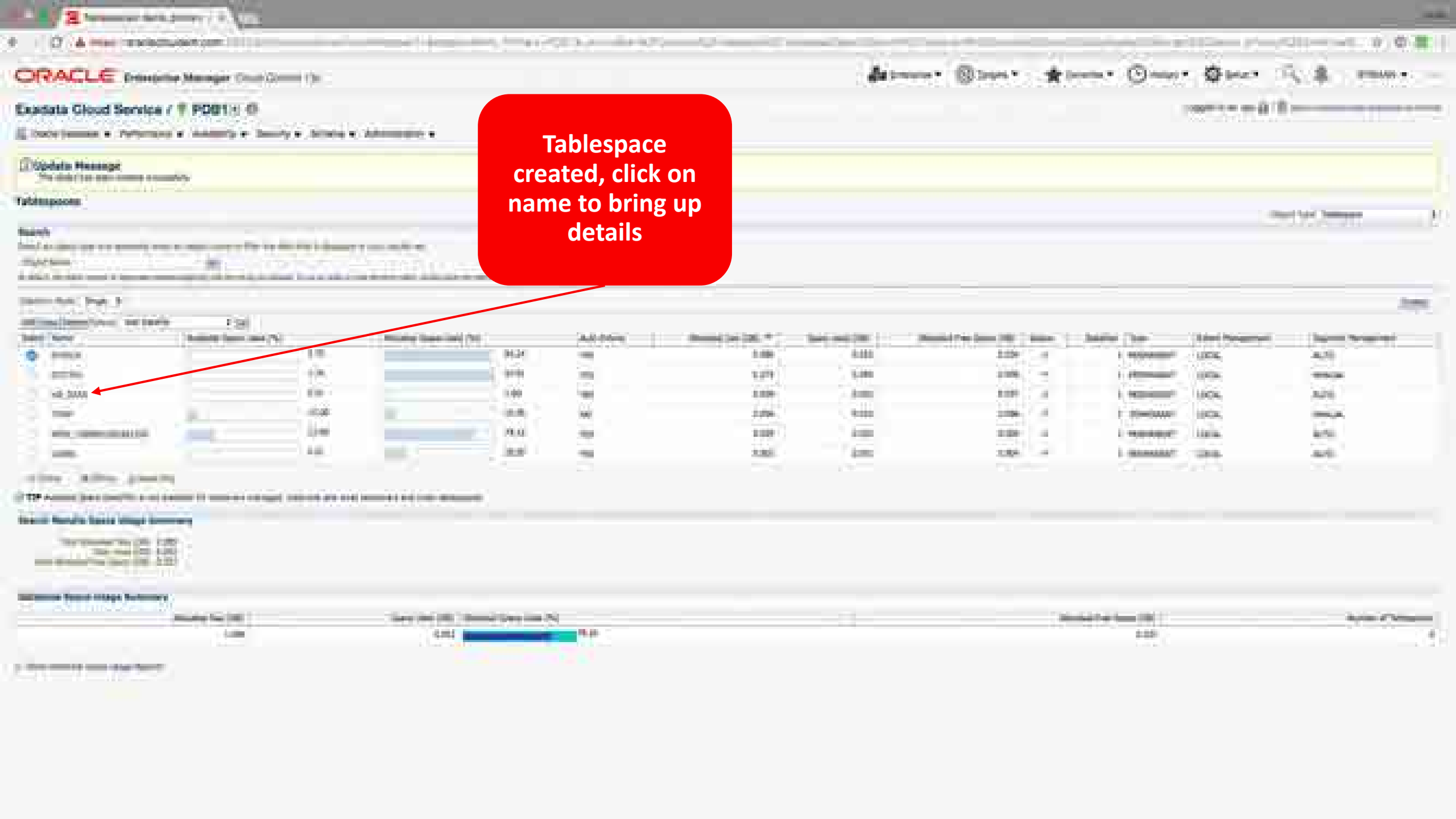

By default, all new tablespaces are encrypted in the Exadata Cloud Service

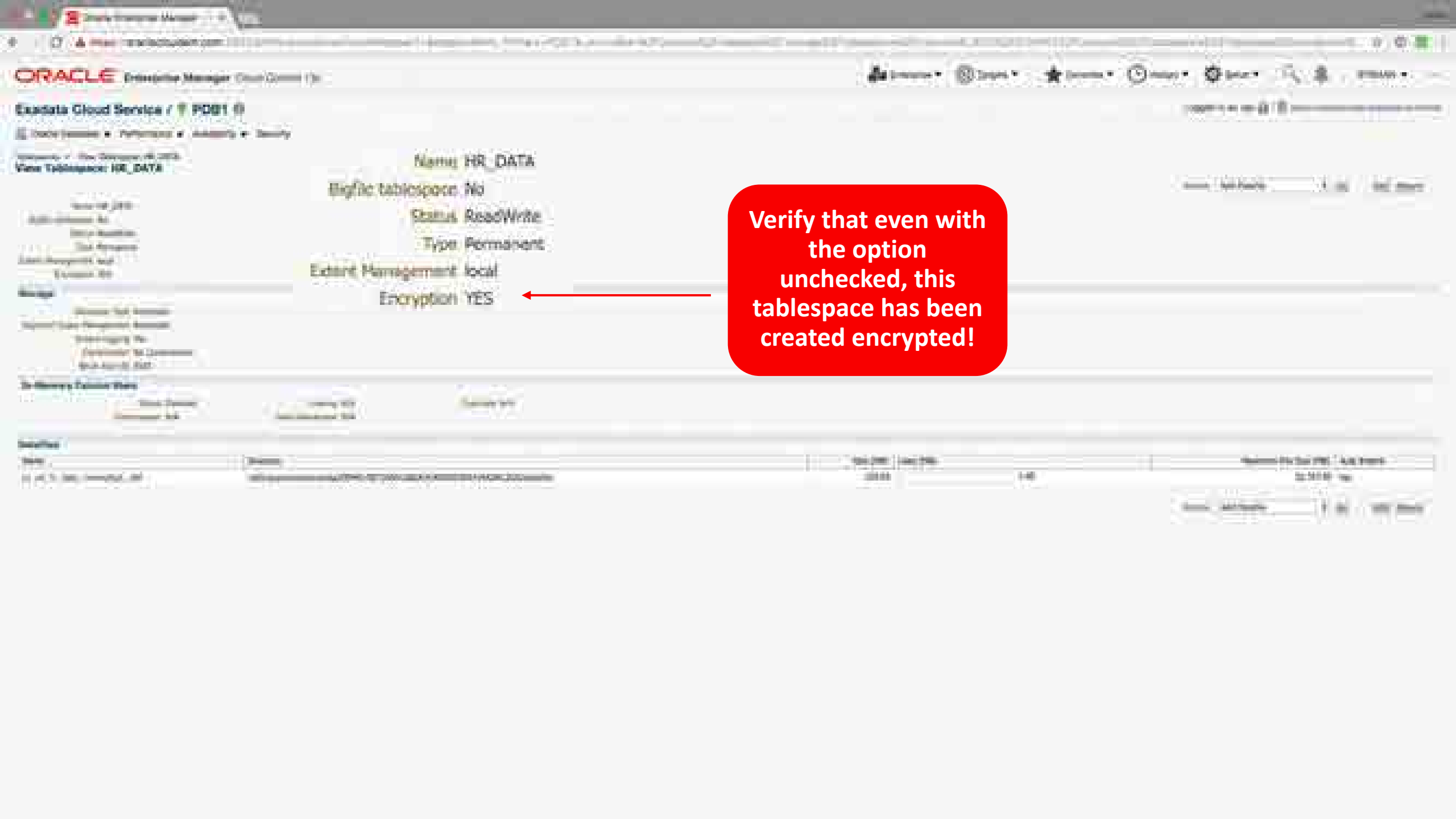

To see this in action, use the Administration menu to select: Storage -> Tablespaces


ORACLE Enterprise Manager
Exadata Cloud Service / PDB1(1)
Click
Create


Create a new tablespace called HR_DATA


Exadata Cloud Service / PDB1
Create Tablespace
Type
Permanent
Set as default permanent tablespace
Encryption
Encryption Options
Temporary
Set as default temporary tablespace
Undo
TIP Undo tablespaces can only be created in CDB$ROOT
Keep Encryption option unchecked


Tablespace created, click on name to bring up details


ORACLE Enterprise Manager
Exadata Cloud Service / PDB1
View Tablespace: HR_DATA
Name HR_DATA
Bigfile tablespace No
Status ReadWrite
Type Permanent
Extent Management local
Encryption YES
Verify that even with the option unchecked, this tablespace has been created encrypted!

1. Enterprise Manager for Hybrid Cloud

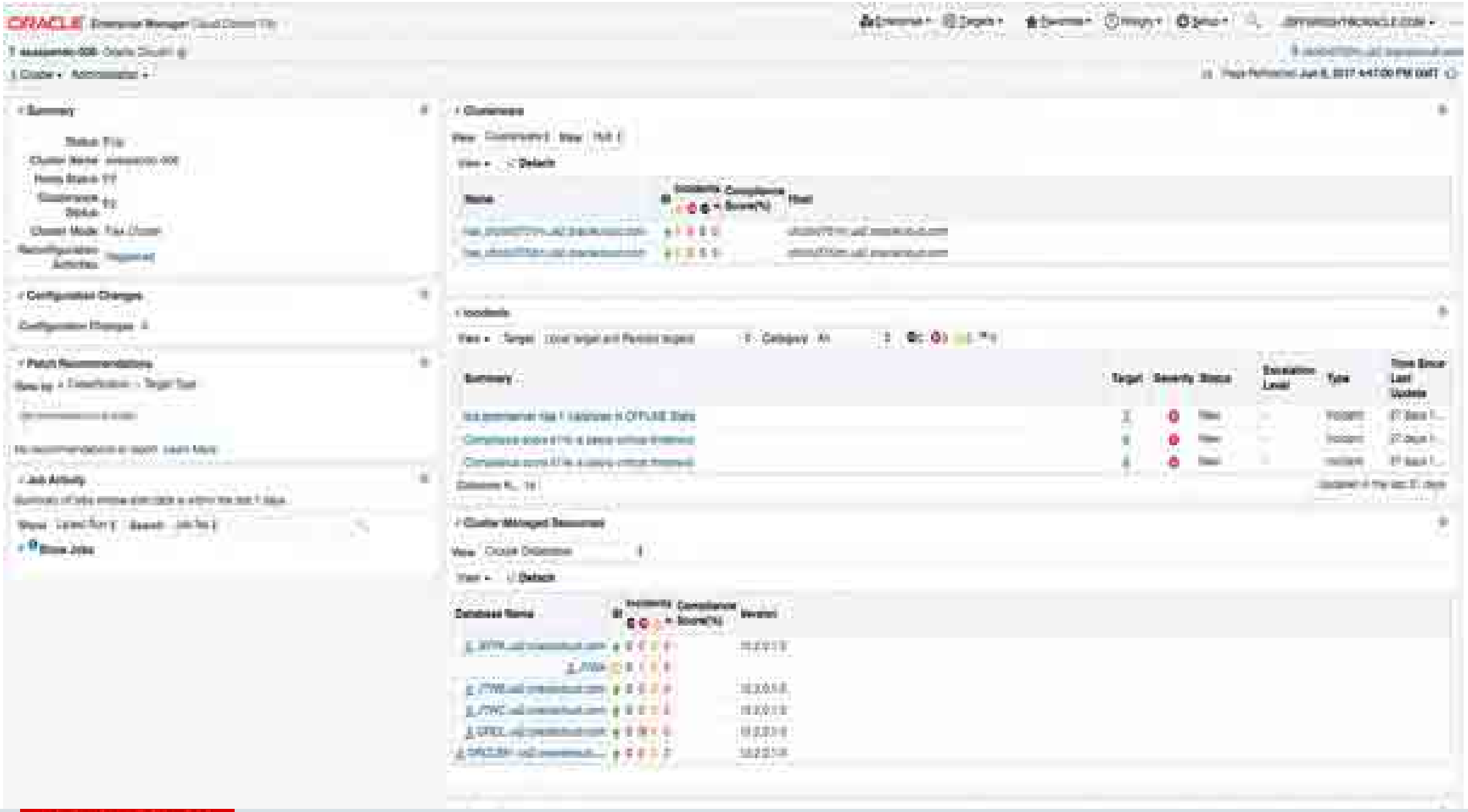
- Single pane of glass for all databases administration
- Uses standard agents on Exadata Cloud at Customer compute nodes
  - Just like any other RAC database
- Augment platform tooling with standard technology you are used to

Installing EM on Exadata Cloud at Customer

- Complete deployment pre-installation tasks
- Create named credentials
  - Use the SSH keys for the OPC and Oracle users you defined when you created the Exadata Cloud at Customer Service Service
- Deploy agents
  - Use the standard host agent, not the Exadata Database Machine agent
- Discover Cluster
- Discover ASM, Database, and Listener

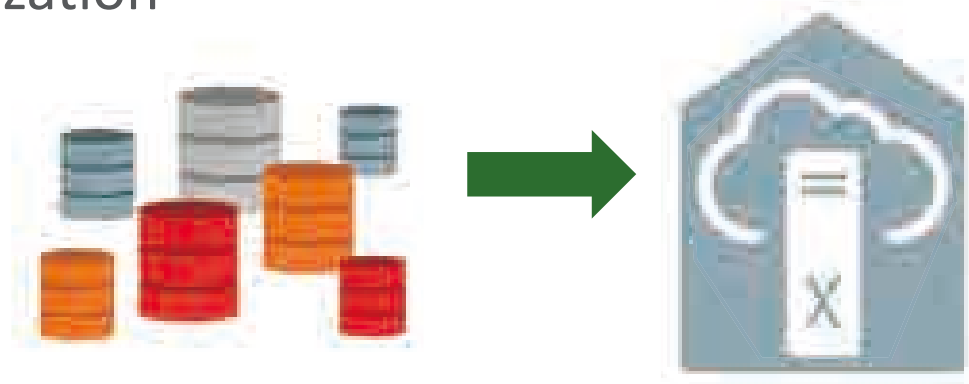
How to use EM with Cloud Tooling

- EM
  - ASM storage space monitoring and management
  - Management of In-Memory processing
  - Scheduling of database jobs
  - Database resource management
  - Database feature usage
  - Schema management
  - Database security management beyond SSH access
  - Database performance monitoring
- Cloud Tooling
  - ASM disk group creation
  - Stopping, starting, or restarting a database node
  - Managing SSH access
  - Database creation and deletion
  - Control and monitor Exadata IORM
  - Database backup and restore
  - Database patching
  - Creating, deleting, and viewing database snapshots



Migrating Databases to Cloud

- 100% Oracle Database compatibility makes migration easy and low risk
- Local network connectivity to Exadata Cloud at Customer provides fast migration
- Logical Migration: allows reorganization and optimization
  - Data Pump, GoldenGate Replication
- Physical Migration: simplest, byte-to-byte copy
  - RMAN backup, Transportable technologies, Data Guard
  - Restore from backup
- MAA Migration Best Practices "Best Practices for Migrating to Exadata Database Machine"



Summary

- Same great Oracle technology, new way to consume it as a service
- New places to log in, new ways to secure data
- Web UI for one-off, REST API for lights out automation
- Codify and automate routine database processes with Oracle Cloud Tooling
- Free developers and database administrators to focus on high value strategic work

Integrated Cloud

Applications & Platform Services


ORACLE