Using APEX To Manage database environments

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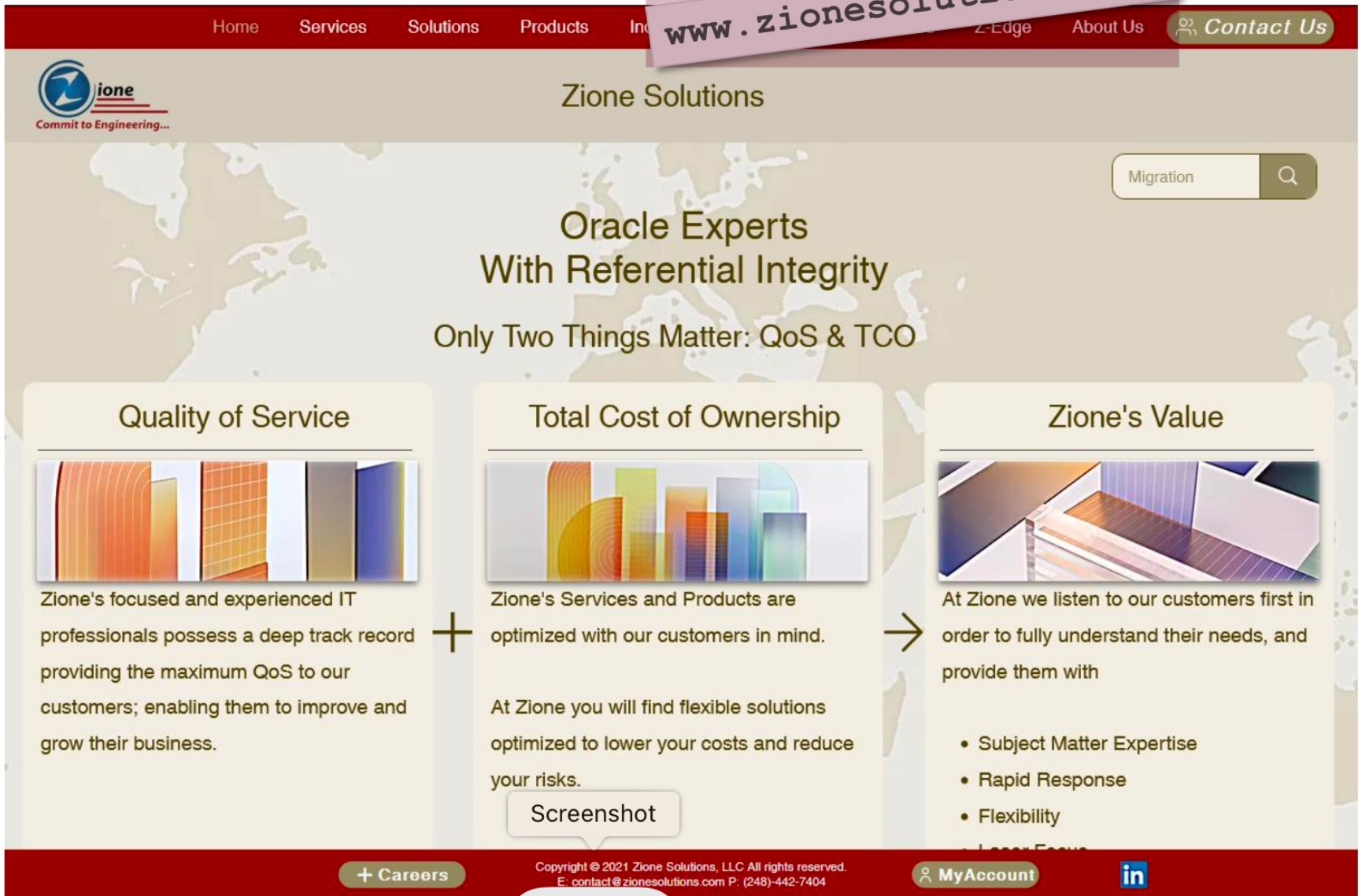
- Michigan Oracle User Summit
  - www.mous.us

ORACLE ACE

You Should Also Get To Know Zione Solutions' Website

www.zionesolutions.com



My Passions and Fun things

Fishing

Backpack - Hiking

Safe Harbor

- We were all **beginners** once
- Please excuse any **novice oversights** and issues
- We hope **it helps you**
- Other people will have **different opinions**

Project Philosophies to Follow

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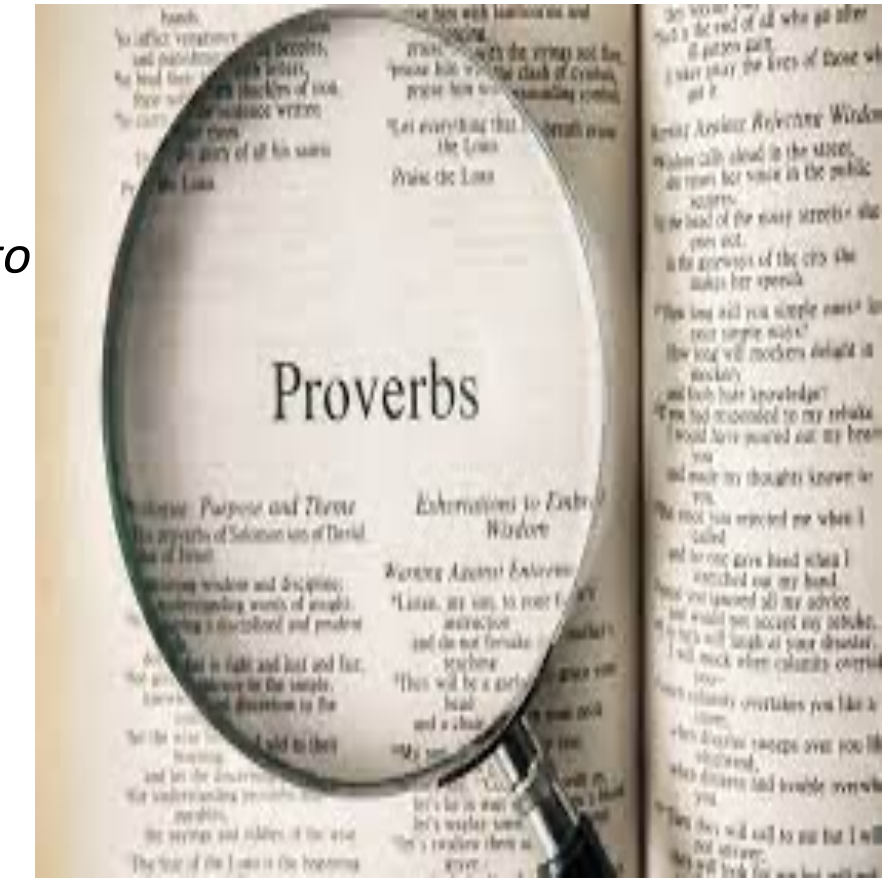
Commit to Engineering...

Philosophies – Associated with This Project

”Don’t Worry too much about how you are going to get it all done.

- *Get started and learn as you go, and it will all come to*
- *Action creates momentum*
- *Momentum energizes you to keep going”*

“



Philosophies – Associated with This Project

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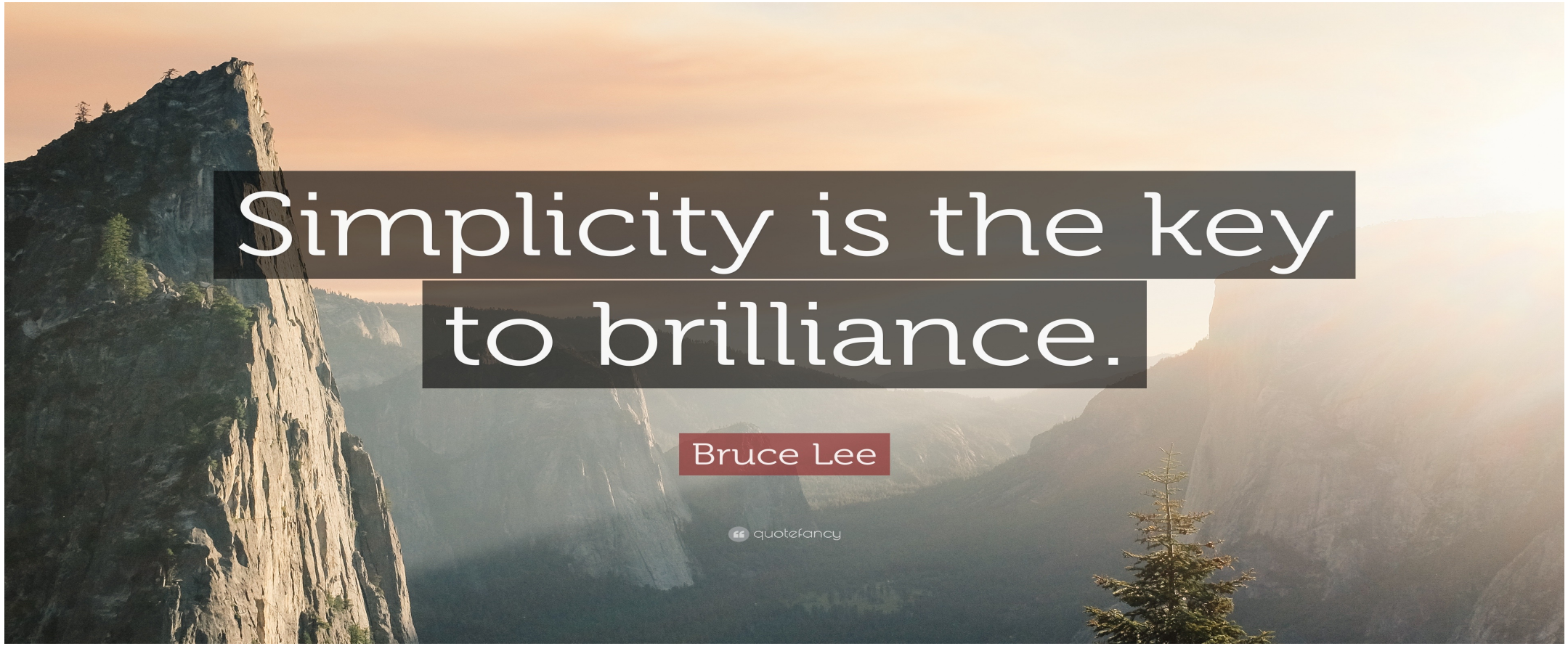


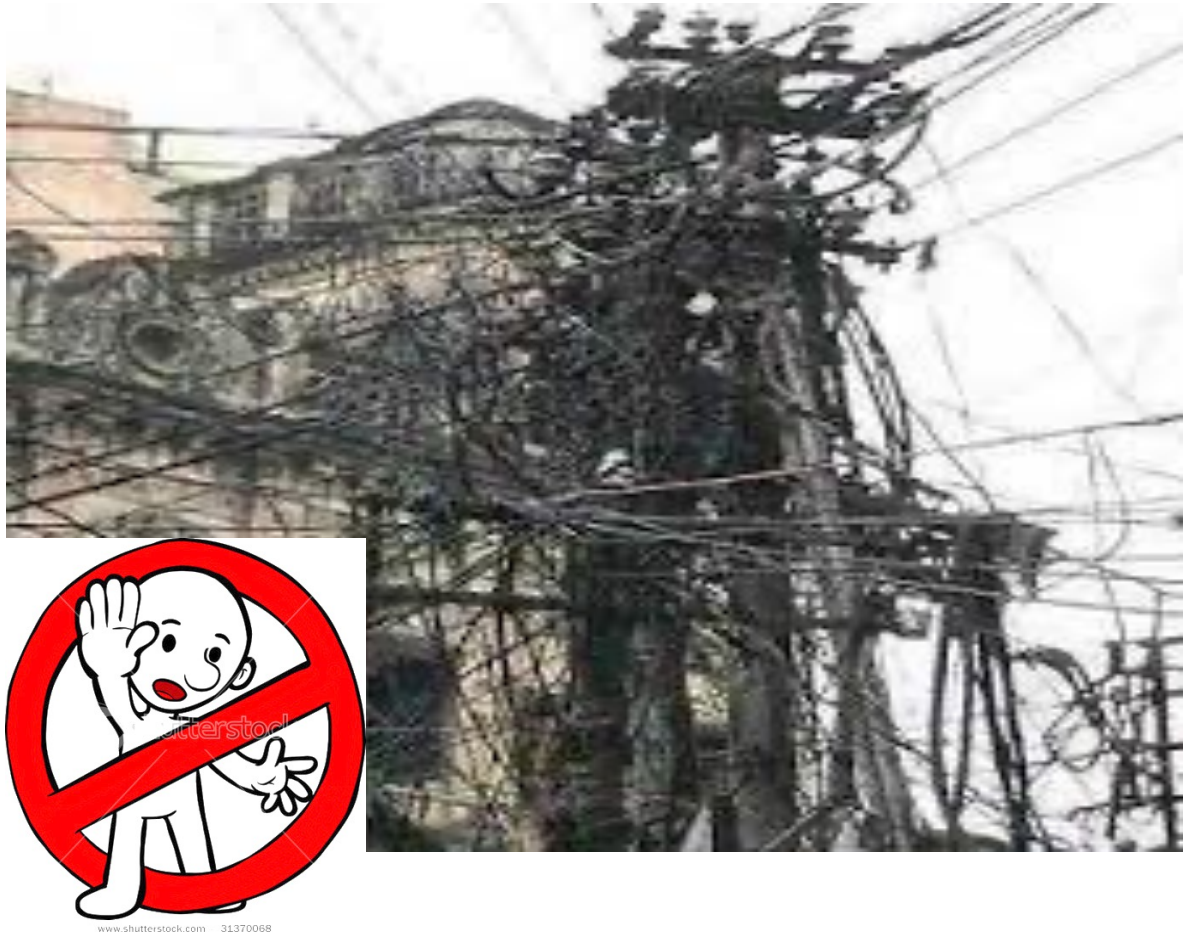
Philosophies – Associated with This Project

KICKME

Philosophies – Associated with This Project

Keeping **I**t **C**omplicated **K**eeps

Me **E**mployed



Today's Discussion

This presentation WILL demonstrate **advantages, disadvantages and benefits** of using Oracle APEX to manage large database and application systems.

This session will discuss the **tips, tricks and solutions** that provided the ability to overcome the challenges of new technology and manage a large environment.

The information provided from this presentation will help administrators **navigate** the difficult world of managing a large database environment with a tool like APEX.

Todays Agenda

- APEX Basics
- Problem Statement
- Reporting Requirements
- Data collection
- Phase 1 – basic reports (POC)
- Phase 1 - Demo
- Future Enhancements
- Summary / Conclusion
- Resources

APEX Basics

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APEX Basics

Oracle APEX Everywhere

- No cost fully-supported feature
  - All supported DB editions and versions
- No limits on developers, end users, apps
- Available in all Database Cloud Services
- Run on-premises, Oracle Cloud, other clouds

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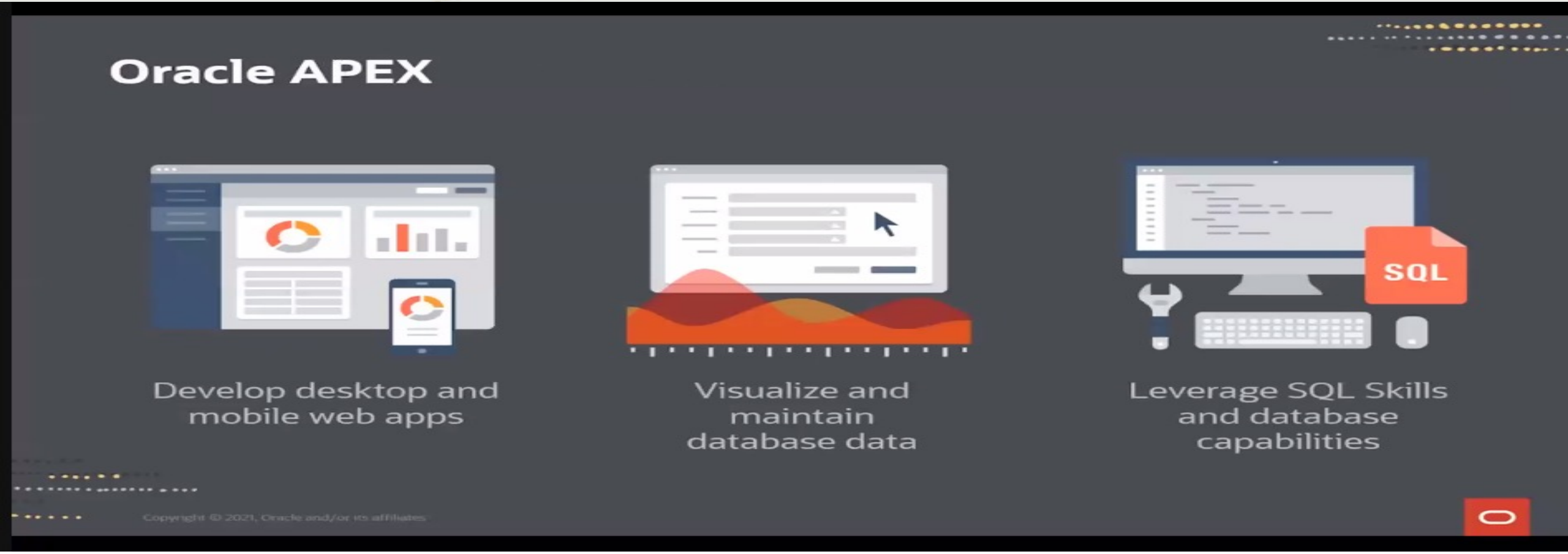
APEX Basics


Oracle APEX
Develop desktop and mobile web apps
Visualize and maintain database data
SQL
Leverage SQL Skills and database capabilities
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APEX Core Components

- Reports (Interactive & Classic)
- Forms (Form and Interactive Grid)
- Item Types
- Charts (Bar, Pie, and Line)
- Calendars
- Dynamic Actions
- Processes

APEX basics

What's in it for the DBA?

- Easy for ad-hoc reporting and updates
- Simplifies manual routines
- Easier to manage than lot of other apps
- Simple architecture
- Gives your data a nice look
- Advice - Start small
- Advice - Start with the core components

Questions

QUESTIONS

HAVE YOU HAD TO ANSWER THESE QUESTIONS ABOUT YOUR DATABASE SYSTEMS ????

How many 19c databases do you have ???

How many Non-supported databases do you have ?

How many PDB's do you currently have ?

How much total storage you using ?

How many total CPU's are you using ?

Performance Questions

How about what Day of Week / Hour do you see:

- Highest Logical I/O ?
- Highest Physcal I/O ?
- Highest CPU ?

Do you have a calendar with your Long-term Backups and patching schedules ?

What Day of Week or Hour is your systems busiest Day ?

Where do you get your DB information ?

Spreadsheets ??

Where do you get your DB information ?

Database and OS Scripts ?

Where do you get your DB information ?

OEM and OEM Reports ?

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Where do you get your DB information ?

Combination of all 3 ?

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Problem Statement

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Problem Statement

- Large database and application footprint
  - Many databases > 100, machines - 300
- Many spreadsheets showing environments at different times owned by many people
- Multiple people needing same overall information
  - Managers, DBA's, Application Owners, Development
- Requirement to generate different type of reports and graphs using the same data

Reporting Requirements

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Reporting Requirements

- Machine Information
  - CPU allocated
  - Memory allocated
  - OS version
  - Total DB storage
  - IP address
  - Lifecycle – (dev, test, prod, etc)
  - OVM name

Reporting Requirements

- Database Information
  - SGA Size
  - Database Name (Instance)
  - PDB Name (Containers)
  - DB Version
  - Machine Name
  - Lifecycle – (dev, test, prod, etc)
  - Tablespace Information
  - Application Information

Reporting Requirements

- Backup and Patching Information
  - Database name
  - Machine Name
  - Day
  - DB Version
  - Backup Type (Full, Incremental, LTR)
  - Backup Duration
  - Lifecycle – (dev, test, prod, etc.)
  - Patching type (Linux / database)

Reporting Requirements

- Performance information
  - Database name
  - Container Name
  - Date / Time of snapshot
  - Physical I/O
  - Logical I/O
  - CPU Time
  - Elapsed Time
  - SQL ID

Data Collection

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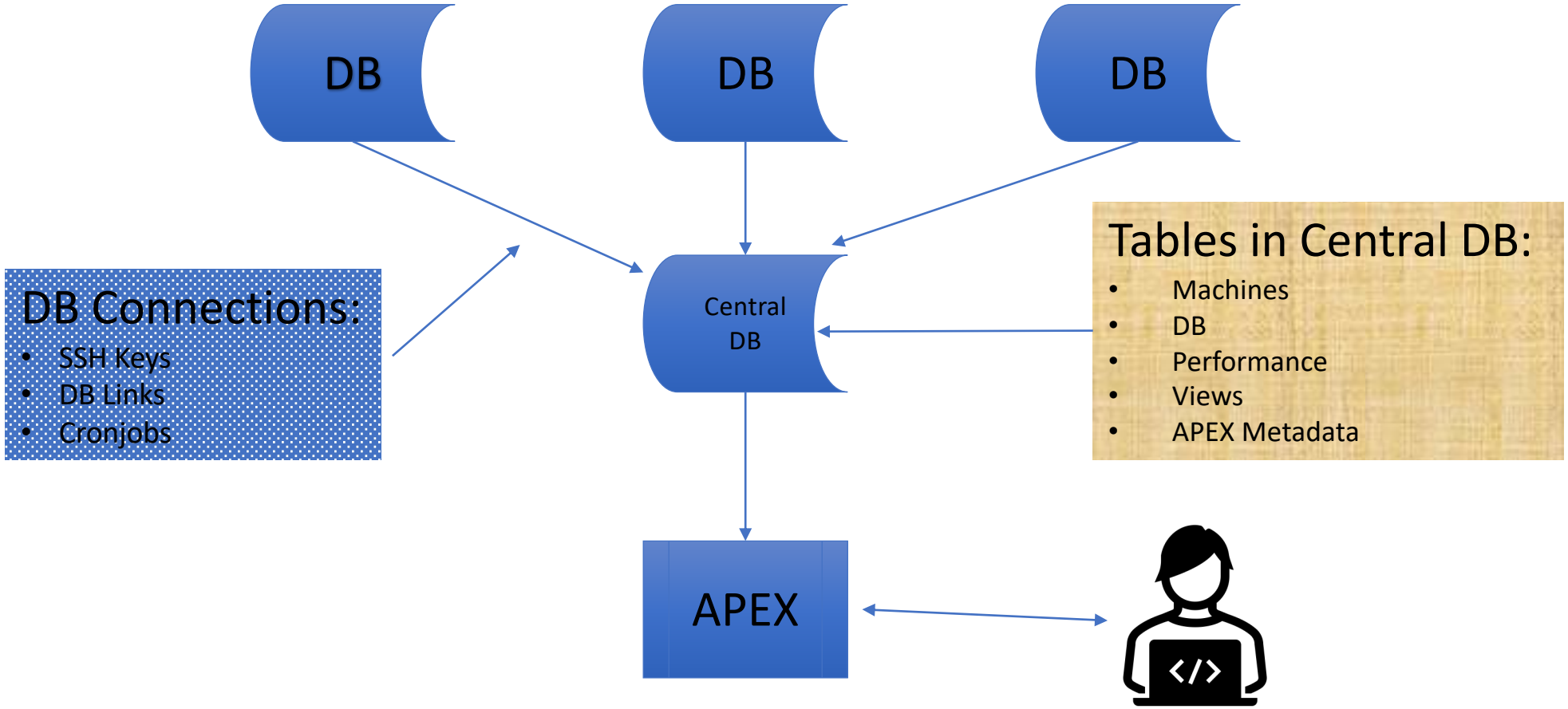
Data Collection – How are we going to get the data?

- Spreadsheets - Initial Data of Machines and Databases
- Database links
  - Tablespace Info
  - Performance Info (i.e. ASH)
  - SGA, Version, Containers
  - Backup time information
- Shell Script to gather backup information (Located in Cronjobs)
- Python scripts to gather OS information
- OEM Metadata

Data Collection – What is required to get the data

- Central Database
- Database Links
- Ssh keys
- Python scripts
- Shell Scripts
- Cronjobs running on monitored machines

Application Warehouse Layout



Phase 1 - steps

- Created tables to hold tablespace and performance information
- Created SSH keys to all the database machines
- Created “Passwordless” database links from Central DB to Databases. (i.e. Hash values and table with Links)

- *** Huge thanks to Jon at Method5 for infrastructure ideas
- *** Huge thanks to Craig at Orapub for the performance scripts

Phase 1 - steps (cont)

- Created Shell and python scripts to :
  - scrape cronjobs (Backups)
  - gather tablespace info.
  - machine Info.
  - performance information.
- Enable cronjobs to gather information using Shell and Python Scripts
- Generate reports based on information (After 1 week of data).

Phase 2 Steps

- Reports Built as part of a Phase 2:
  - Tablespace information by Machine/Database
  - Space Used, Allocated and Free by Machine
  - Tablespace Growth Prediction
  - Performance by Machine / Database
  - Physical and Logical I/O , CPU reports by Date and Hour

- 2 – 3 weeks of development time

Phase 1 Demo

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Phase 1 steps – (POC)

- Install APEX Software into Central DB
- Create APEX Worksheet, Users
- Create initial application – importing spreadsheet into master table
  - (Source of truth – Combined Spreadsheets)
- Total time < 1 hour for the first 3 steps

Phase 1 Steps – (POC)

- Create tables based on Initial master table:
  - Machines
  - Databases
  - Backups

- Create views based on newly created tables:
  - Machine / Database views
  - Machine / Database / Backup Views

Phase 1 Steps

- Phase 1 - Build Reports and charts based on Existing data (Master data tables and views)

- Total Time to build Phase 1 (POC) – (With Reports) – 3 Days

Phase 1 steps

- Reports Built as part of a POC to prove the value:
  - Machine Report (With Drill Down)
  - Database Report (With PDB's)
  - Backup Reports (Full/Incr. and LTR)
  - RAM and DB Utilization

- DEMO – Phase 1 reports

Phase 1 Demo

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Development steps – Phase 1 - Oracle DB Machines and List

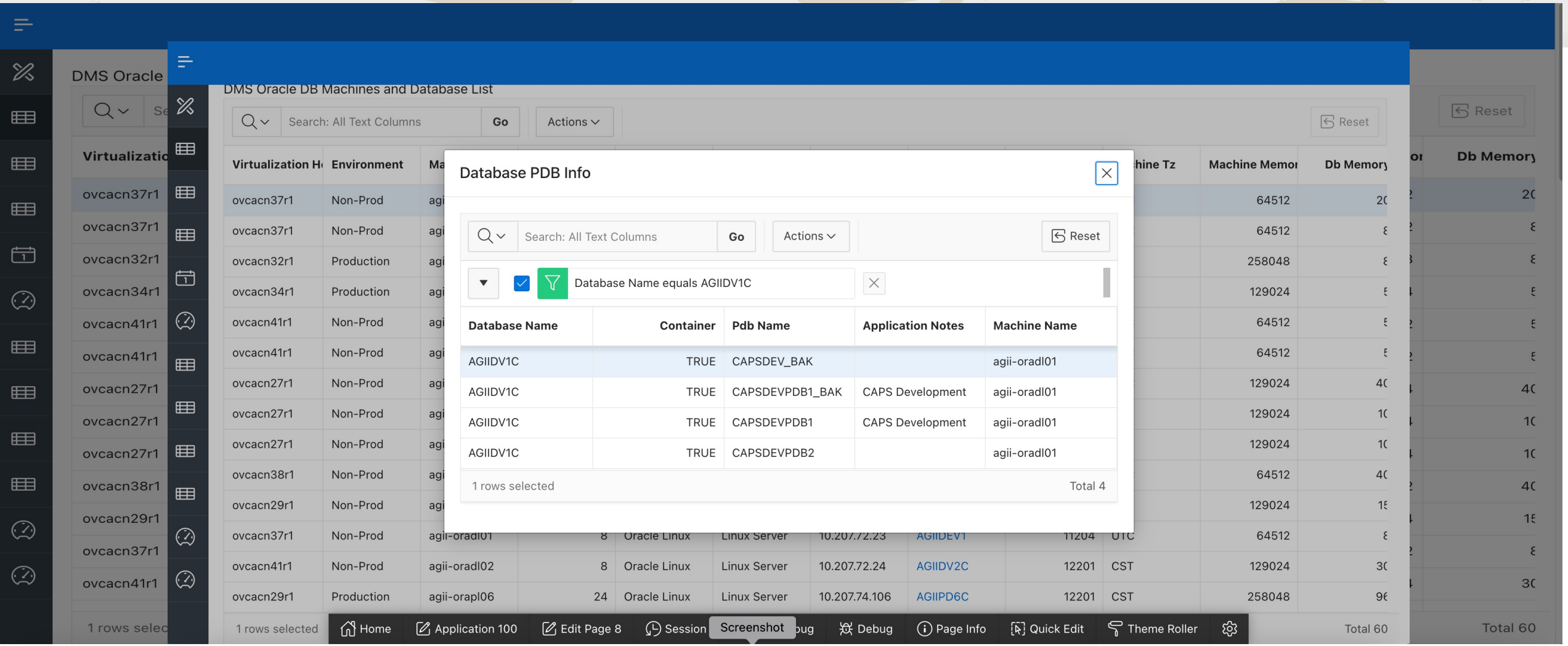
DMS Oracle DB Machines and Database List

Search: All Text Columns | Go | Actions | Reset

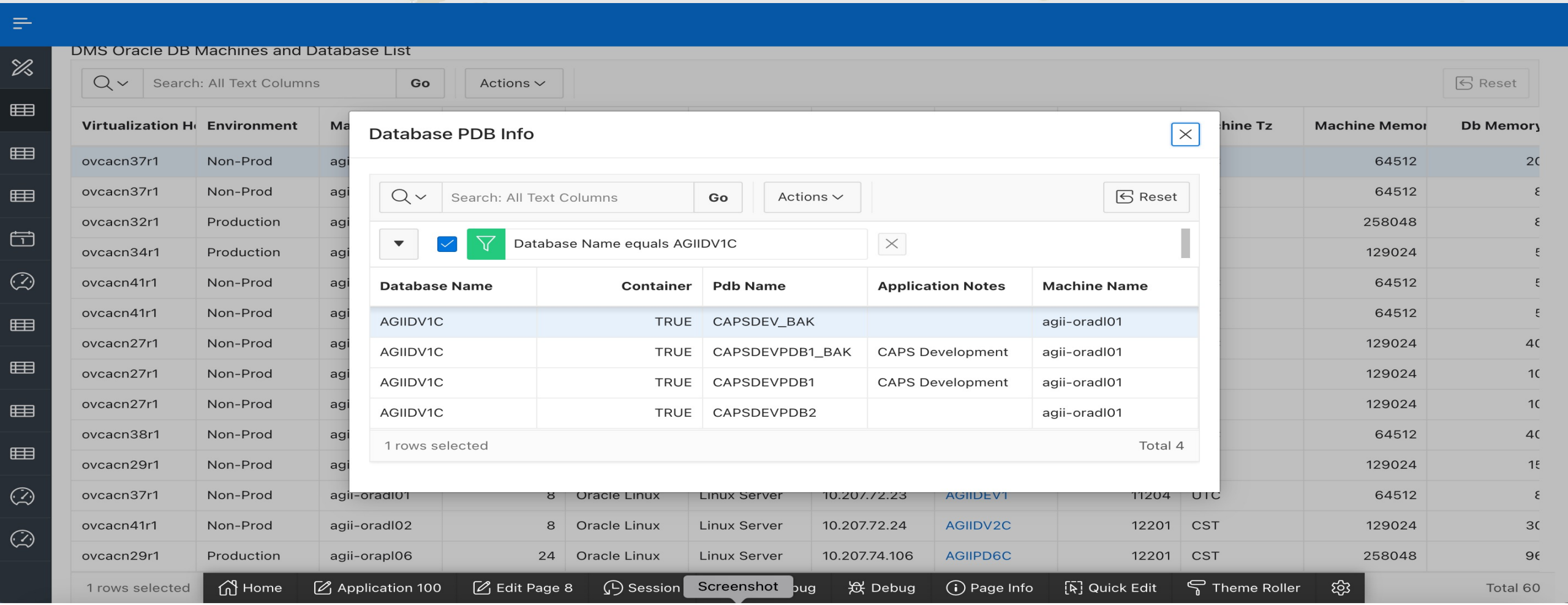
Virtualization H	Environment	Machine Name.	Cpu Core Count	Operating Syste	Class	Ip Address	Db Name	Db Version	Machine Tz	Machine Memor	Db Memory
ovcacn37r1	Non-Prod	[redacted]	8	Oracle Linux	Linux Server	[redacted]	AGIIDV1C	12201	UTC	64512	20
ovcacn37r1	Non-Prod		8	Oracle Linux	Linux Server	[redacted]	IRISDEVC	12201	UTC	64512	8
ovcacn32r1	Production		16	Oracle Linux	Linux Server	[redacted]	AGIIPD4C	12201	CST	258048	8
ovcacn34r1	Production		16	Oracle Linux	Linux Server	[redacted]	CALVINPD	11204	CST	129024	5
ovcacn41r1	Non-Prod		8	Oracle Linux	Linux Server	[redacted]	ONLINET	11204	UTC	64512	5
ovcacn41r1	Non-Prod		8	Oracle Linux	Linux Server	[redacted]	PPRMT	11204	UTC	64512	5
ovcacn27r1	Non-Prod		8	Oracle Linux	Linux Server	[redacted]	AGIIQ22C	12201	UTC	129024	40
ovcacn27r1	Non-Prod		16	Oracle Linux	Linux Server	[redacted]	EBTQA	11204	CST	129024	10
ovcacn27r1	Non-Prod		16	Oracle Linux	Linux Server	[redacted]	PRJ	11204	CST	129024	10
ovcacn38r1	Non-Prod		8	Oracle Linux	Linux Server	[redacted]	AGIITN1C	12201	UTC	64512	40
ovcacn29r1	Non-Prod		16	Oracle Linux	Linux Server	[redacted]	EBTBRUA2	12201	CST	129024	15
ovcacn37r1	Non-Prod		8	Oracle Linux	Linux Server	[redacted]	AGIIDEV1	11204	UTC	64512	8
ovcacn41r1	Non-Prod		8	Oracle Linux	Linux Server	[redacted]	AGIIDV2C	12201	CST	129024	30

Home | Application 100 | Edit Page 2 | Session | Screenshot | Debug | Page Info | Quick Edit | Theme Roller | Total 60

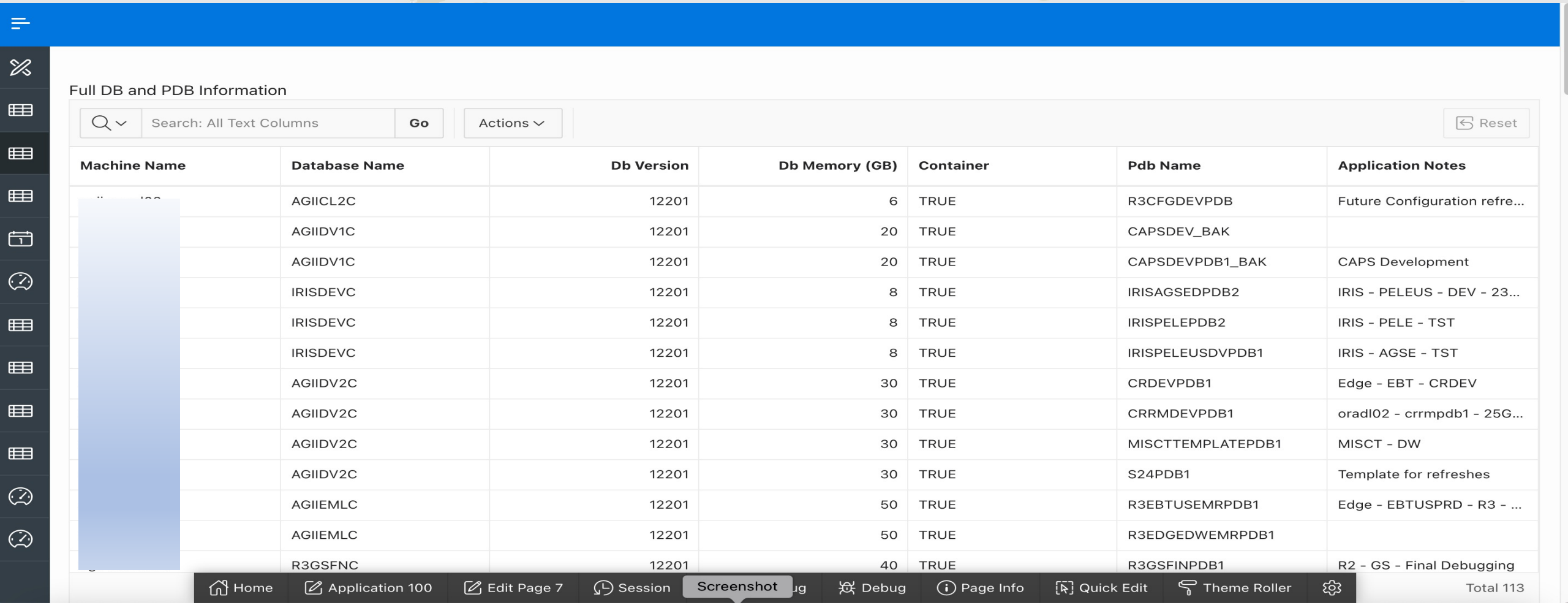
Development steps – Phase 1 – Drop Down Capability



Development steps – Phase 1 – Drop Down Capability



Development steps – Phase 1 – Database Information



Full DB and PDB Information

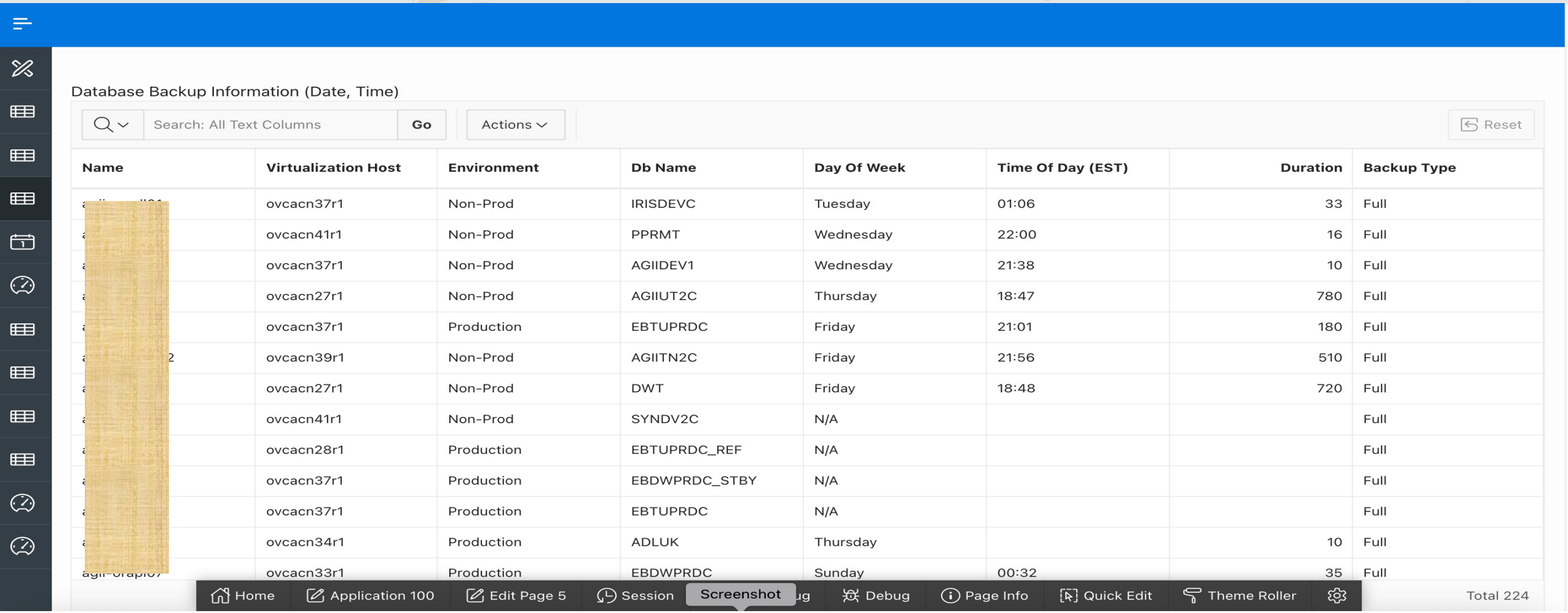
Search: All Text Columns | Go | Actions | Reset

Machine Name	Database Name	Db Version	Db Memory (GB)	Container	Pdb Name	Application Notes
	AGIICL2C	12201	6	TRUE	R3CFGDEVPDB	Future Configuration refre...
	AGIIDV1C	12201	20	TRUE	CAPSDEV_BAK	
	AGIIDV1C	12201	20	TRUE	CAPSDEVPDB1_BAK	CAPS Development
	IRISDEVC	12201	8	TRUE	IRISAGSEDPDB2	IRIS - PELEUS - DEV - 23...
	IRISDEVC	12201	8	TRUE	IRISPELEPDB2	IRIS - PELE - TST
	IRISDEVC	12201	8	TRUE	IRISPELEUSDVPDB1	IRIS - AGSE - TST
	AGIIDV2C	12201	30	TRUE	CRDEVPDB1	Edge - EBT - CRDEV
	AGIIDV2C	12201	30	TRUE	CRRMDEVPDB1	oradl02 - crrmpdb1 - 25G...
	AGIIDV2C	12201	30	TRUE	MISCTTEMPLATEPDB1	MISCT - DW
	AGIIDV2C	12201	30	TRUE	S24PDB1	Template for refreshes
	AGIIEMLC	12201	50	TRUE	R3EBTUSEMRPDB1	Edge - EBTUSPRD - R3 - ...
	AGIIEMLC	12201	50	TRUE	R3EDGEDWEMRPDB1	
	R3GSFNC	12201	40	TRUE	R3GSFINPDB1	R2 - GS - Final Debugging

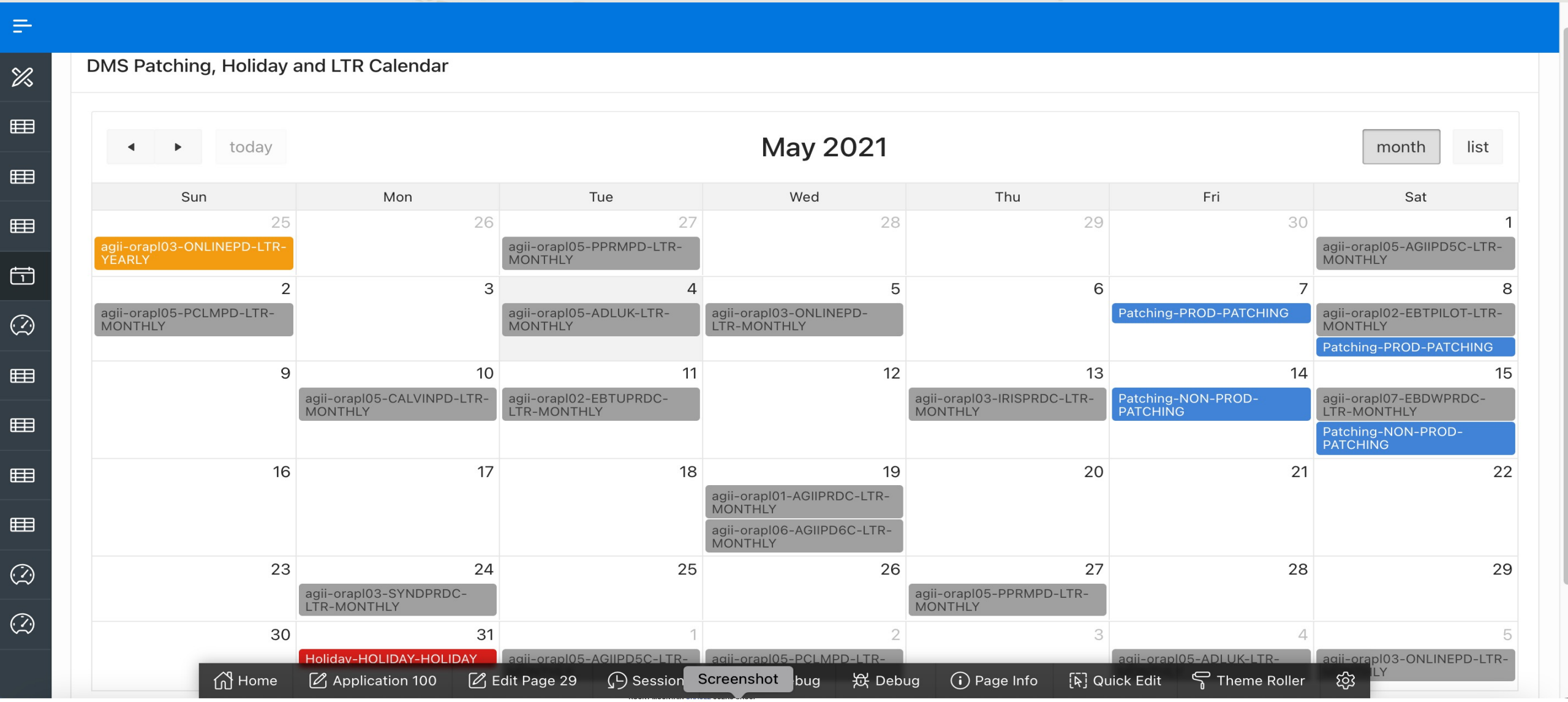
Home | Application 100 | Edit Page 7 | Session | Screenshot | Debug | Page Info | Quick Edit | Theme Roller

Total 113

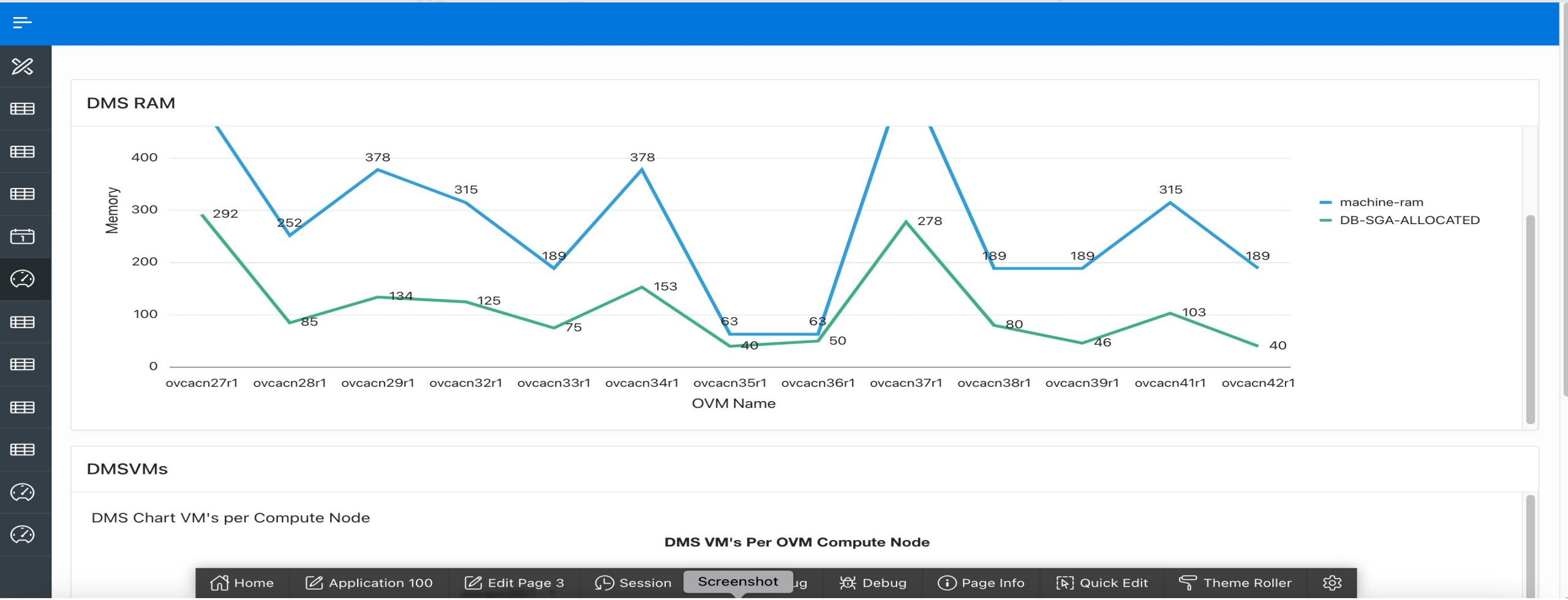
Development steps – Phase 1 – Full and Incremental Backups



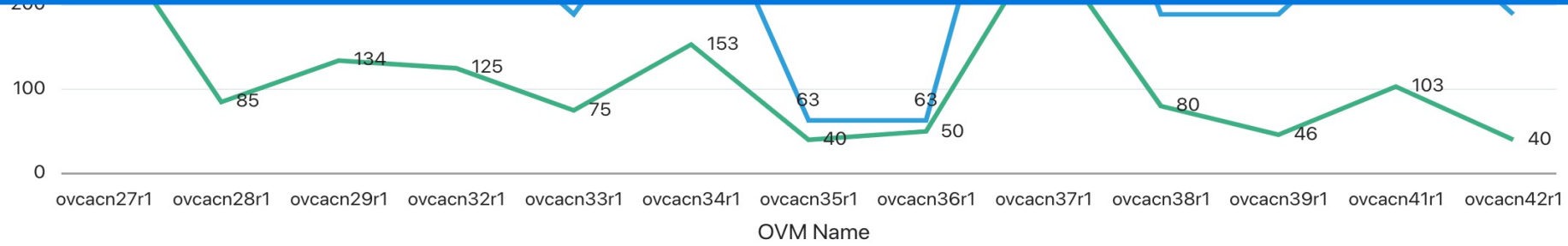
Development steps – Phase 1 – Long Term backups and Patching



Development steps – Phase 1 – RAM Allocation Per VM

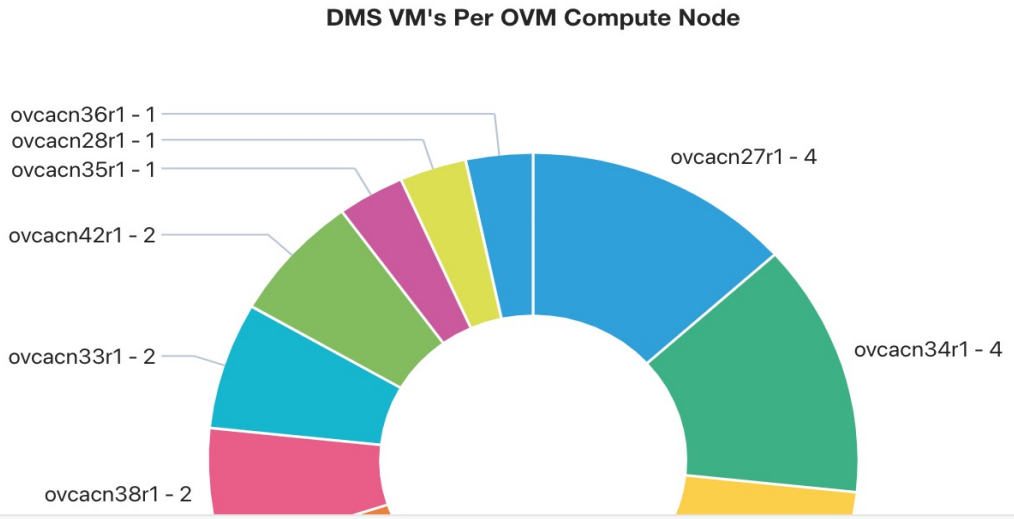


Development steps – Phase 1 – Pie graph – DB Allocation Per VM



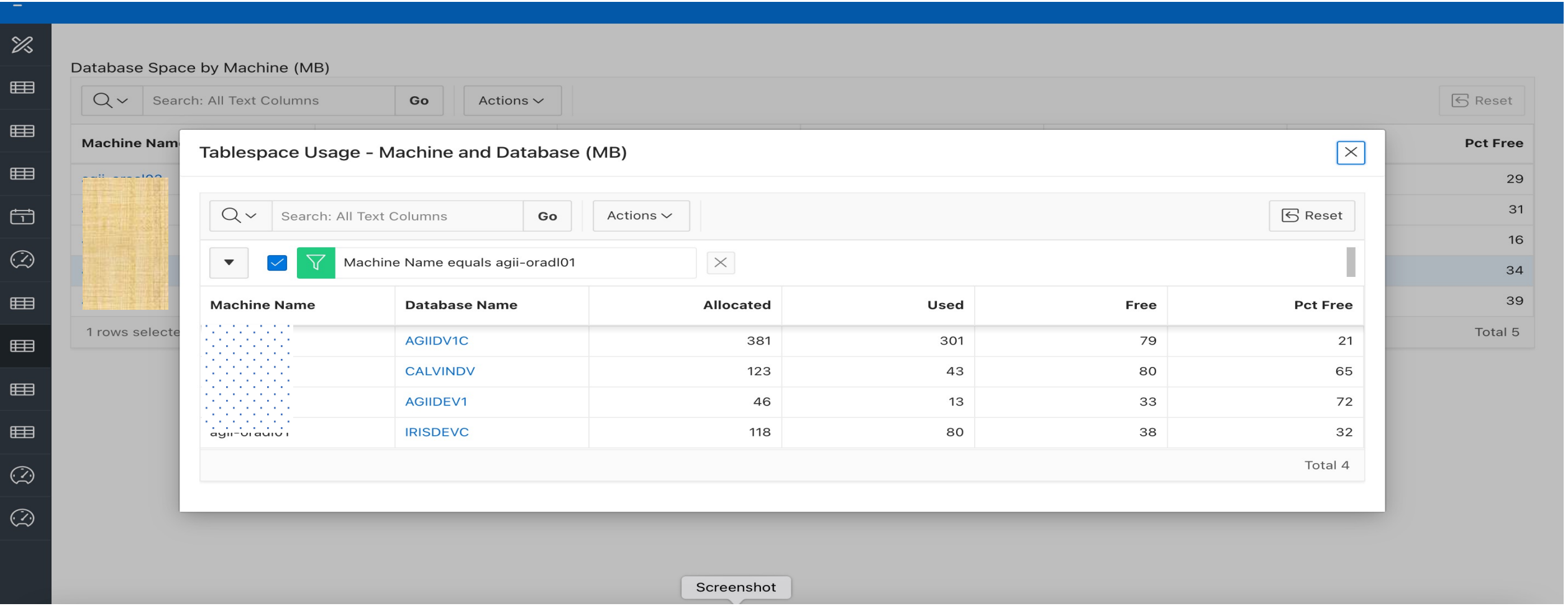
DMSVMs

DMS Chart VM's per Compute Node



Screenshot

Development steps – Phase 1 – Machine Space Report – DB Drill Down



Phase 2 - Demo

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Phase 1 – Machine Space Report

Database Space by Machine (MB)

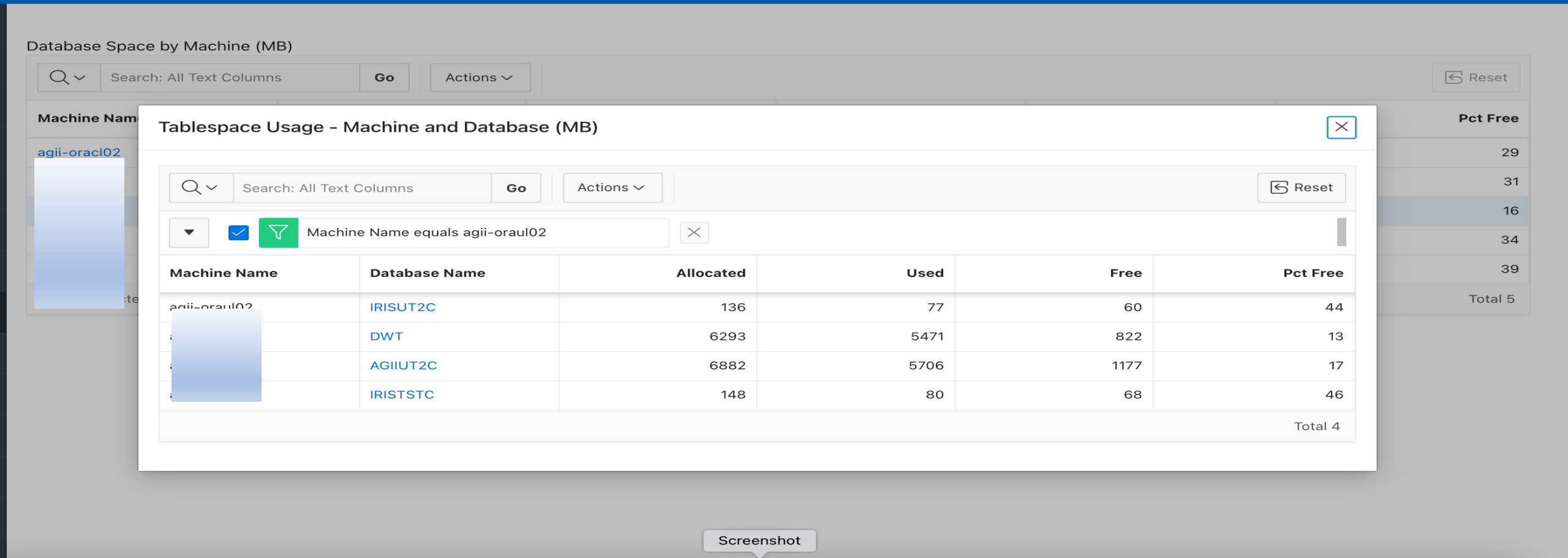
Search: All Text Columns | Go | Actions | Reset

Machine Name	Environment	Allocated	Used	Free	Pct Free
[redacted]	Non-Prod	409	291	118	29
[redacted]	Non-Prod	11719	8069	3650	31
[redacted]	Non-Prod	13460	11333	2127	16
[redacted]	Non-Prod	668	438	230	34
[redacted]	Production	236	143	93	39

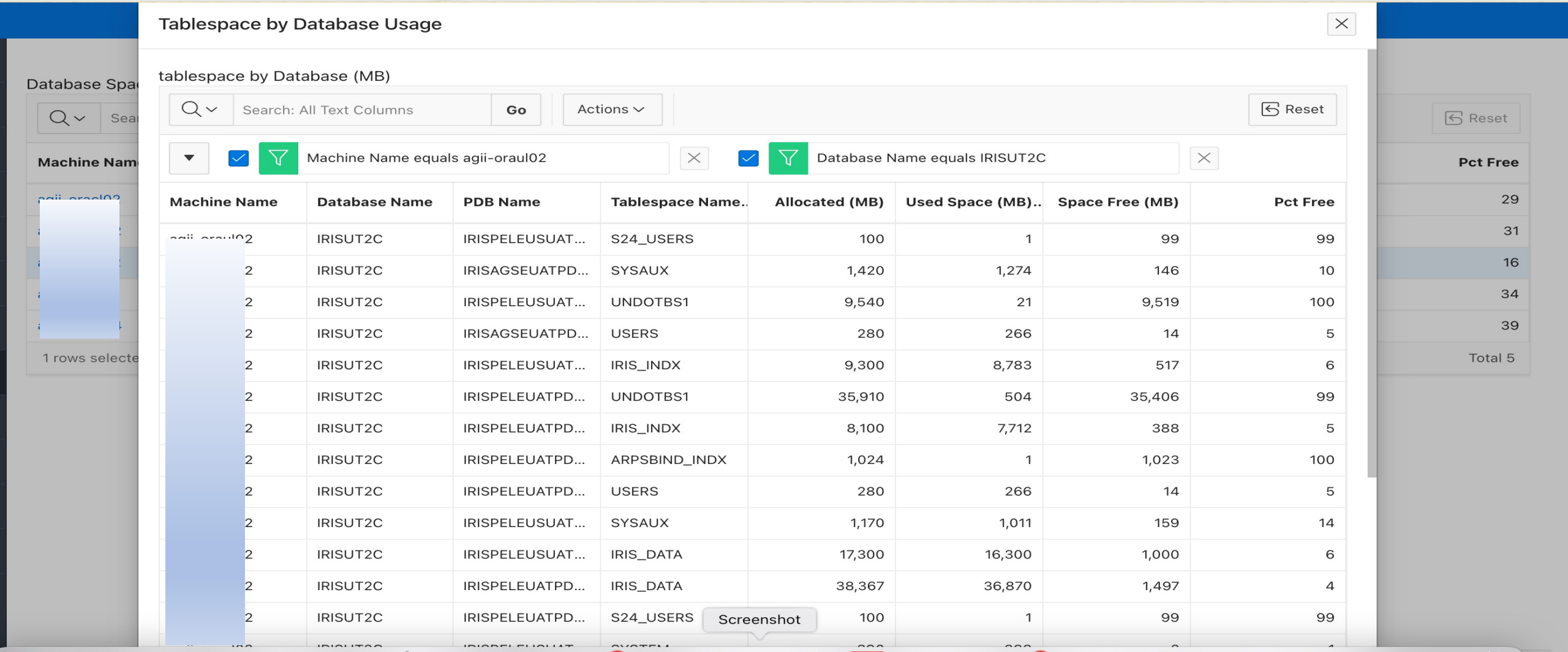
Total 5

Screenshot

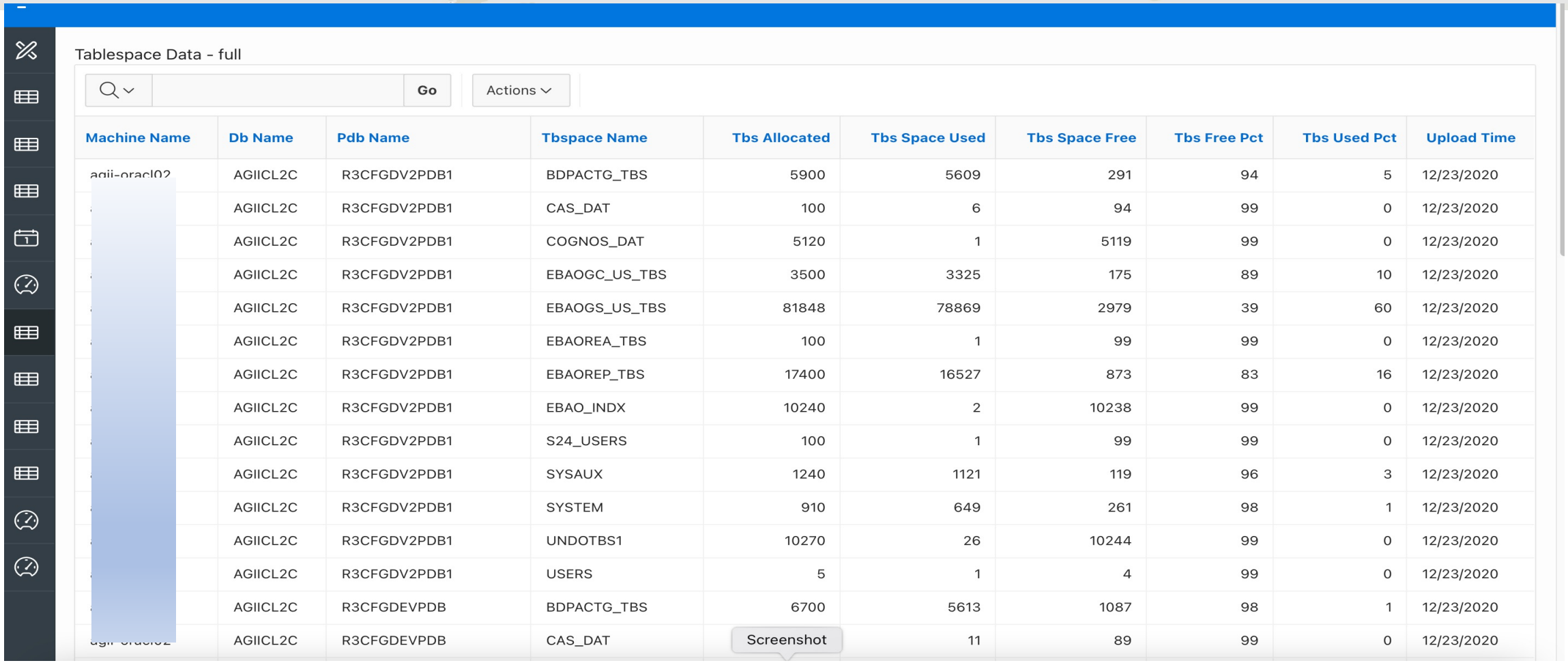
Phase 1 – Machine Space Report – Drill Down based on Machine



Phase 1 – Machine Space Report – Drill Down based on DB



Phase 2 – Tablespace Information by Machine



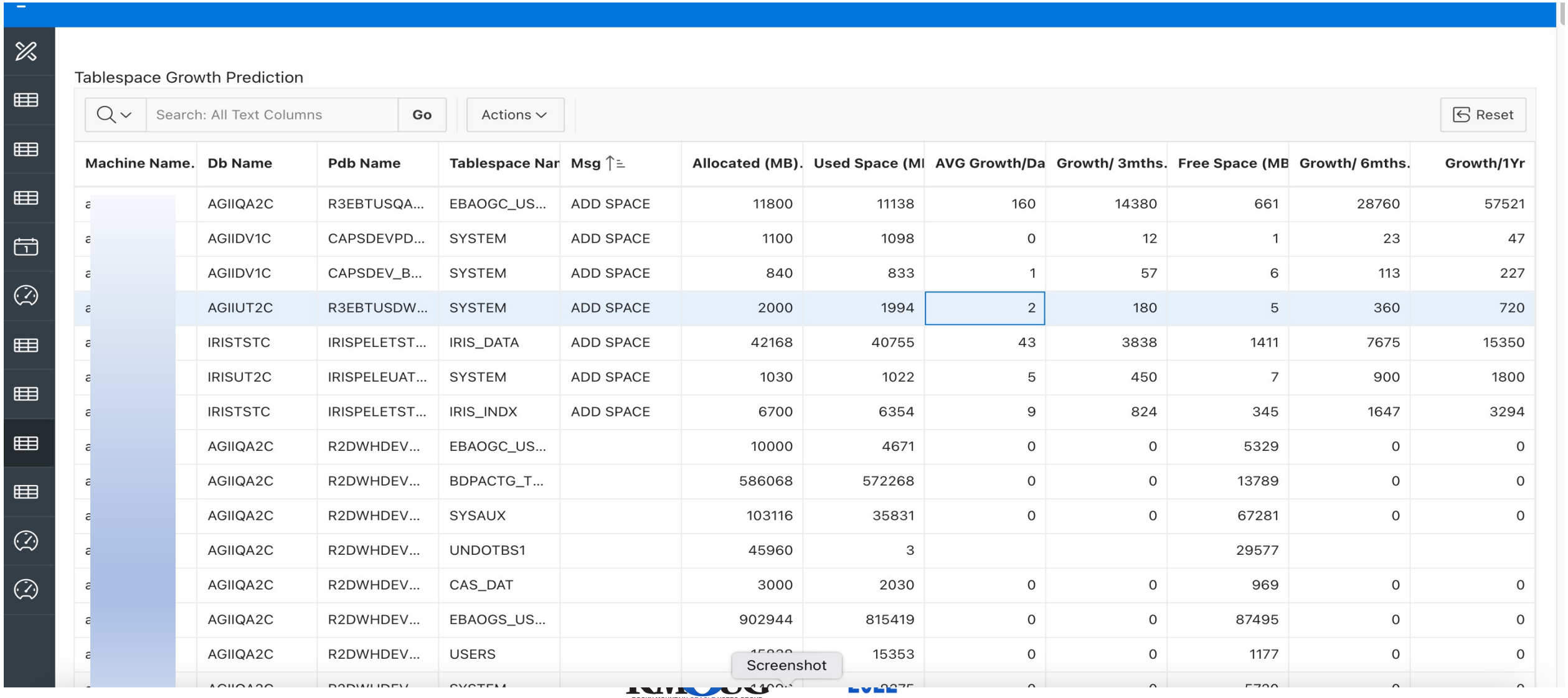
Tablespace Data - full

Go | Actions

Machine Name	Db Name	Pdb Name	Tbspace Name	Tbs Allocated	Tbs Space Used	Tbs Space Free	Tbs Free Pct	Tbs Used Pct	Upload Time
agii-oracl02	AGIICL2C	R3CFGDV2PDB1	BDPACTG_TBS	5900	5609	291	94	5	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	CAS_DAT	100	6	94	99	0	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	COGNOS_DAT	5120	1	5119	99	0	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	EBAOGC_US_TBS	3500	3325	175	89	10	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	EBAOGS_US_TBS	81848	78869	2979	39	60	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	EBAOREA_TBS	100	1	99	99	0	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	EBAOREP_TBS	17400	16527	873	83	16	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	EBAO_INDX	10240	2	10238	99	0	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	S24_USERS	100	1	99	99	0	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	SYSAUX	1240	1121	119	96	3	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	SYSTEM	910	649	261	98	1	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	UNDOTBS1	10270	26	10244	99	0	12/23/2020
	AGIICL2C	R3CFGDV2PDB1	USERS	5	1	4	99	0	12/23/2020
	AGIICL2C	R3CFGDEVPDB	BDPACTG_TBS	6700	5613	1087	98	1	12/23/2020
	AGIICL2C	R3CFGDEVPDB	CAS_DAT	11	89	99	0	12/23/2020	

Screenshot

Phase 2 – Tablespace growth prediction



Tablespace Growth Prediction

Search: All Text Columns | Go | Actions | Reset

Machine Name.	Db Name	Pdb Name	Tablespace Nar	Msg	Allocated (MB).	Used Space (MI	AVG Growth/Da	Growth/ 3mths.	Free Space (MB	Growth/ 6mths.	Growth/1Yr
a	AGIIQA2C	R3EBTUSQA...	EBAOGC_US...	ADD SPACE	11800	11138	160	14380	661	28760	57521
a	AGIIDV1C	CAPSDEVPD...	SYSTEM	ADD SPACE	1100	1098	0	12	1	23	47
a	AGIIDV1C	CAPSDEV_B...	SYSTEM	ADD SPACE	840	833	1	57	6	113	227
a	AGIIUT2C	R3EBTUSDW...	SYSTEM	ADD SPACE	2000	1994	2	180	5	360	720
a	IRISTSTC	IRISPELETST...	IRIS_DATA	ADD SPACE	42168	40755	43	3838	1411	7675	15350
a	IRISUT2C	IRISPELEUAT...	SYSTEM	ADD SPACE	1030	1022	5	450	7	900	1800
a	IRISTSTC	IRISPELETST...	IRIS_INDX	ADD SPACE	6700	6354	9	824	345	1647	3294
a	AGIIQA2C	R2DWHDEV...	EBAOGC_US...		10000	4671	0	0	5329	0	0
a	AGIIQA2C	R2DWHDEV...	BDPACTG_T...		586068	572268	0	0	13789	0	0
a	AGIIQA2C	R2DWHDEV...	SYSAUX		103116	35831	0	0	67281	0	0
a	AGIIQA2C	R2DWHDEV...	UNDOTBS1		45960	3			29577		
a	AGIIQA2C	R2DWHDEV...	CAS_DAT		3000	2030	0	0	969	0	0
a	AGIIQA2C	R2DWHDEV...	EBAOGS_US...		902944	815419	0	0	87495	0	0
a	AGIIQA2C	R2DWHDEV...	USERS			15353	0	0	1177	0	0

Screenshot

Phase 2 – Database Performance by Machine / DB

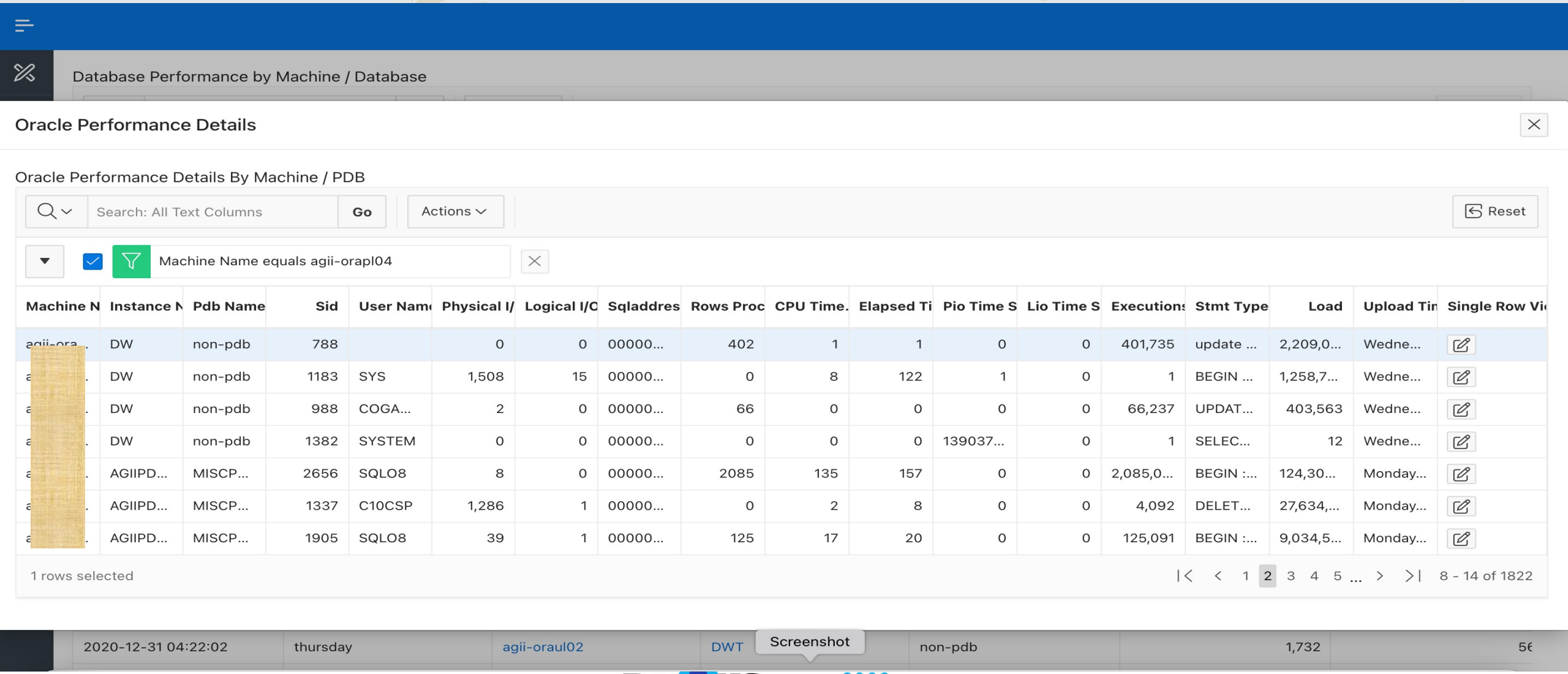
Database Performance by Machine / Database

Search: All Text Columns | Go | Actions | Reset

Utime	Dow	Machine Name	Db Name	Pdb Name	Etime Min	Cpu Mir
2020-12-30 21:34:31	wednesday		DW	non-pdb	1	
2020-12-30 21:34:31	wednesday		DW	non-pdb	122	8
2020-12-30 22:11:34	wednesday		AGIIPD5C	EBTPROD	4	2
2020-12-30 22:20:54	wednesday		IRISDEVC	IRISPELEUSDPDB2	0	0
2020-12-30 22:20:55	wednesday		DWT	non-pdb	0	0
2020-12-30 22:21:04	wednesday		IRISUT2C	IRISAGSEUATPDB1	0	0
2020-12-30 22:21:09	wednesday		AGIIUT2C	R3EBTUSDWUATPDB2	29	16
2020-12-30 22:30:05	wednesday		AGIIQA2C	R3EBTUSQA2PDB4	0	0
2020-12-30 22:30:10	wednesday		AGIIQA2C	R3EBTUSQA1PDB4	0	0
2020-12-30 22:30:11	wednesday		CALVINDV	non-pdb	0	0
2020-12-31 00:30:18	thursday		DWT	non-pdb	1,706	55
2020-12-31 00:30:19	thursday		IRISTSTC	IRISPELETSTPDB2	0	0
2020-12-31 02:30:11	thursday		CALVINDV	non-pdb	0	0
2020-12-31 02:30:16	thursday		IRISTSTC	IRISPELEUSTSTPDB2	0	0
2020-12-31 04:22:02	thursday	agii-oradu02	DWT	non-pdb	1,732	56

Screenshot

Phase 2 – Performance details by Machine / PDB



Phase 2 – Performance details– Drill Down by Machine

Database Performance by Machine / Database

Oracle Performance Details

Oracle Performance Details By Machine / PDB

Search: All Text Columns | Go | Actions | Reset

Machine Name equals agii-orapl04

Machine N	Instance N	Pdb Name	Sid	User Nam	Physical I/	Logical I/C	Sqladdres	Rows Proc	CPU Time.	Elapsed Ti	Pio Time S	Lio Time S	Executions	Stmt Type	Load	Upload Tin	Single Row Vi
agii-ora..	DW	non-pdb	788		0	0	00000...	402	1	1	0	0	401,735	update ...	2,209,0...	Wedne...	
a..	DW	non-pdb	1183	SYS	1,508	15	00000...	0	8	122	1	0	1	BEGIN ...	1,258,7...	Wedne...	
a..	DW	non-pdb	988	COGA...	2	0	00000...	66	0	0	0	0	66,237	UPDAT...	403,563	Wedne...	
a..	DW	non-pdb	1382	SYSTEM	0	0	00000...	0	0	0	139037...	0	1	SELEC...	12	Wedne...	
a..	AGIIPD...	MISCP...	2656	SQLO8	8	0	00000...	2085	135	157	0	0	2,085,0...	BEGIN :...	124,30...	Monday...	
a..	AGIIPD...	MISCP...	1337	C10CSP	1,286	1	00000...	0	2	8	0	0	4,092	DELET...	27,634,...	Monday...	
a..	AGIIPD...	MISCP...	1905	SQLO8	39	1	00000...	125	17	20	0	0	125,091	BEGIN :...	9,034,5...	Monday...	

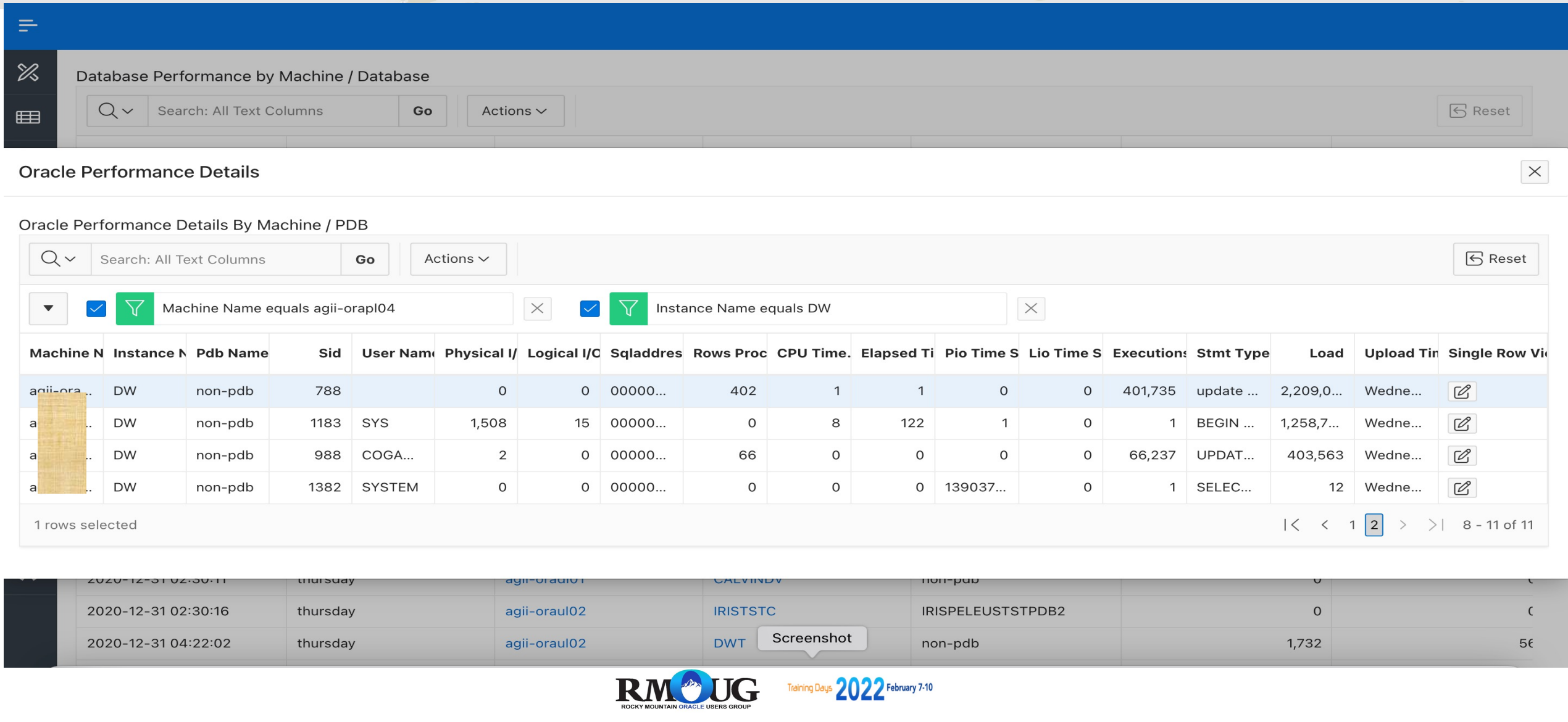
1 rows selected

|< < 1 2 3 4 5 ... > >| 8 - 14 of 1822

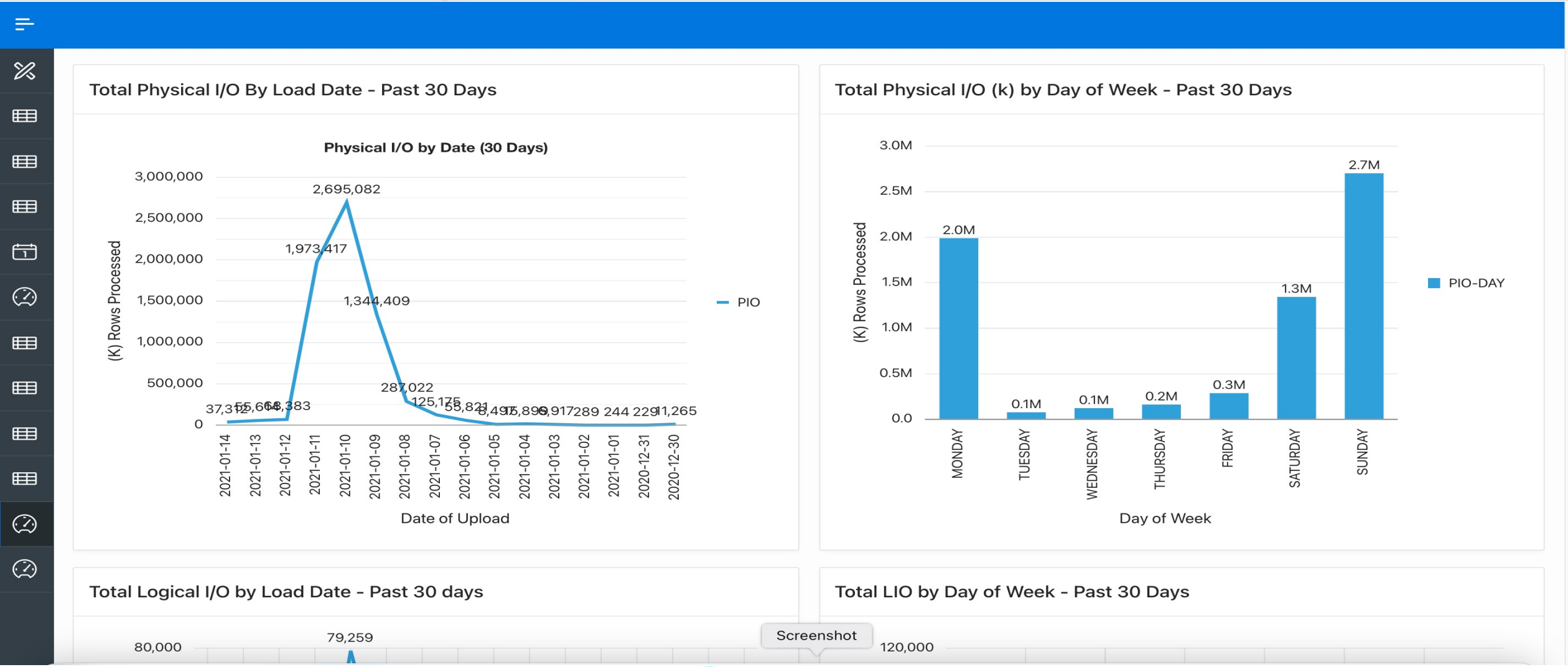
2020-12-31 04:22:02	thursday	agii-oraul02	DWT		non-pdb	1,732

Screenshot

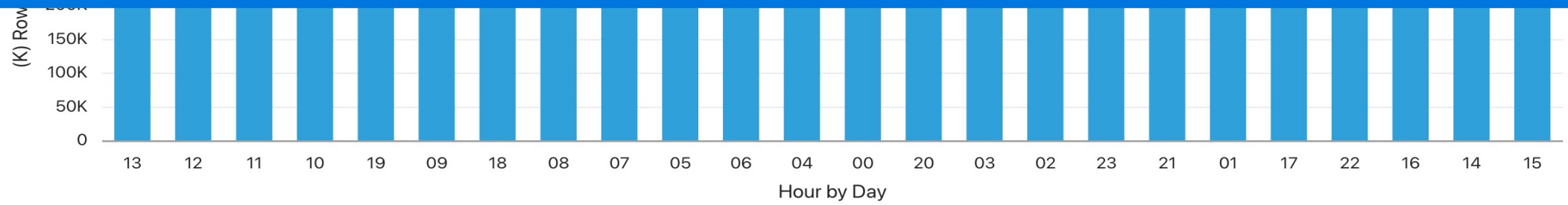
Phase 2 – Performance details– Drill Down by Machine / DB

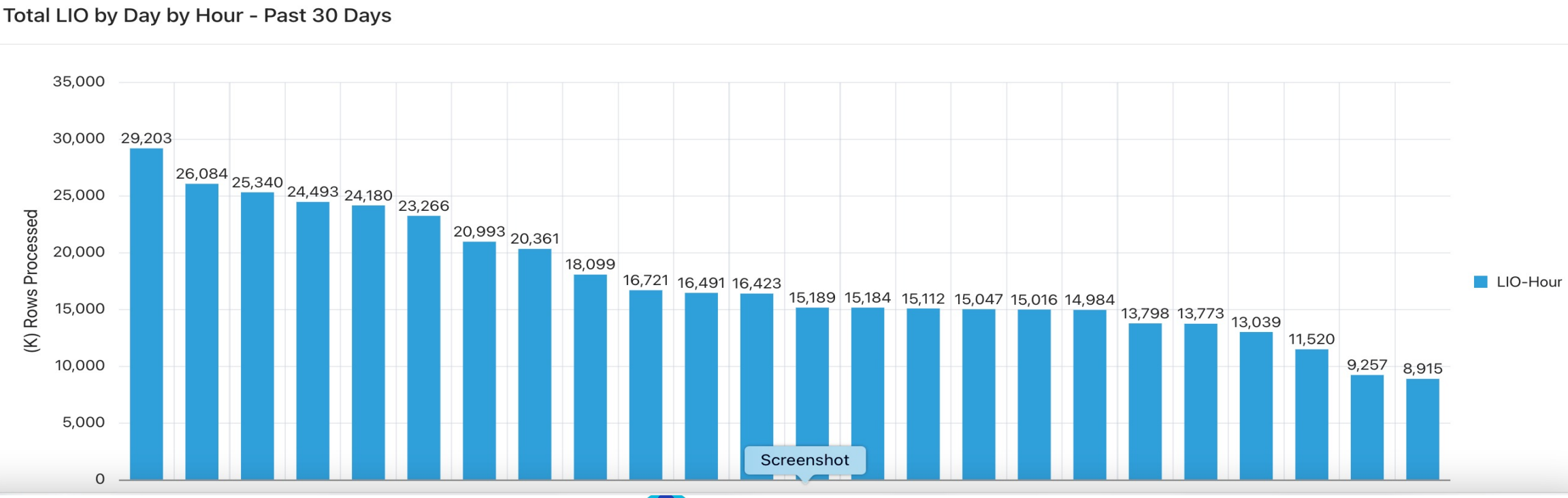


Phase 2 – Performance Physical and Logical I/O and CPU used – Past 30



Phase 2 – Performance Physical I/O, Logical I/O and CPU used – By Hour - Past 30 Days





Future Enhancments

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Reports – Phase 2

- Future additions as part of a Phase 2:
  - Add Machine learning output data to reports
    - i.e. save data in table when anomaly appears and data during that time
  - Add better data collection scripts (i.e. Using Jobs)
  - Gather and report on gv$_Sysmetric data - Completed
  - Gather ASH / AWR data and report (Enterprise Only)
  - Gather and report on ticket data
  - Report on ticket data based on Machine and database name
  - Move to Github - Completed

- Estimate - 3 – *4* weeks of development time

Summary / Conclusion

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Conclusion / Summary

- APEX is Low-Code and Simple to Use
- Part of **FREE** offering from Oracle Cloud
- Easy to start building application and build in phases
- Reduces complexities with Middle-tier management and other Infrastructure items

Conclusion / Summary

- SQL and REST Friendly
- Flexible
- Can be run on all platforms and apps (I.e. Mobile, Web, etc.).
- Perfect proof of concept tool – fastest time-to-value

Resources

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References and Acknowledgements

A huge thanks to the following blogs and websites:

- https://orapub.com/ – Used many Scripts from Orapub
- https://method5.github.io/ - Method5 – great tool and Ideas for accessing other databases
- apex.oracle.com
- apex.oracle.com/en/learn
- https://www.oracle.com/tools/technologies/handsonlab-apex.html
- blogs, events, webinars, AskTom Office Visits
- ”Apex for Beginners” Presentation – Boutique Consulting
- “APEX for the DBA” – Presentation by BICON

For more information about this Session, please contact:

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