

DBoD exercises

- **Requesting an instance**
- **Using the DBoD portal**
- **Logging into the MySQL/PostgreSQL instance**
- **Managing your instances**
- **Backups, Clones**
- **Upgrades**

How to connect remotely from outside of CERN

Let's give DBeaver a try

<https://dbeaver.io/>





Database Services by IT-DA-DB

Oracle Database

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CERN Resources Portal

Manage your CERN Resources, lifecycle, settings, etc.

Home | List Services | Pending Actions | Select Account | Help | Support

Oracle

Oracle database accounts.

Create a new Oracle account

Naming convention for the login field:

- If you are creating an account for a **project**, please create a login name like '<projectname>_MyProject_admin' or 'MyProject_user'.
- For **personal accounts** (e.g. an account you would use to test or try small things, or to learn) please use your name (underscore) in the login name. For example, for a personal account, you could use your name 'John.Doe'.

[Click here to show the full list of limitations for the login field.](#)

Login:

Database:

Account type:

Description:
A short description for your account (max 40 characters).

Oracle

Oracle database accounts.

My Accounts

Search by login or database

Account
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>
anowicki on <input type="text"/>

anowicki on

Login: **anowicki**

Database:

Description:

Owner actions...
Unlock account, increase quota.

DADs...

Change Password

Change Description

Change Owner
Requires new owner's approval.

Which services at CERN rely on Oracle databases?

ChatGPT generated answer

Some key services at CERN that use Oracle databases include:

1. **Physics Data Management**: This service manages data from particle physics experiments, particularly from the Large Hadron Collider (LHC). Oracle databases help organize and facilitate access to large volumes of data.

Online and offline computing – e.g. ATONR, ATR

2. **Accelerator Operations**: This service manages operational parameters, monitoring, and optimizing accelerator performance. Oracle databases are used to store and analyze historical data for performance optimization.

ACCCON databases

3. **IT and Administrative Systems**: CERN uses Oracle databases for many internal administrative services, such as financial management, human resources, and procurement systems. These databases support the organization's daily administrative functions and ensure smooth, reliable operations.

e.g. EDH, LMS, INFOR, PAYROLL

4. **Data Archiving and Analysis**: This service allows scientists and engineers access to historical data for analysis over the long term. This service ensures that data from past experiments and operational activities remain accessible and organized for future use.

5. **Asset and Inventory Management**: This service manages equipment, components, and materials across the organization. Oracle databases help track and manage all equipment, components, and materials.

...many many more

6. **Project Management and Collaboration Tools**: CERN's project management platforms, often integrated with Oracle, help scientists and engineers plan, track, and collaborate on complex, large-scale projects across the organization.

Oracle e-groups

Databases	E-Group
cerndb1	
cerndbu	
devdb19	<u>oracle-general-purpose-users</u>
devdb19u	
intdb19	
csdb_test	
csdbrac	<u>oracle-it-databases-users</u>
csdbtest	
aisbid	
aisbip	
aisbit	
aisdb_dev	
aisdb_preprod	
aisdb_prod	
aisdbt	
baan6d	
baan6p	
baan6t	
desfound	
edh_service_prod	<u>oracle-administrative-</u>
fidelio_service_prod	<u>databases-users</u>
inforln_service_dev	

<https://resources.web.cern.ch/resources/Manage/Oracle/Subscribe.aspx>

Oracle – create a new account

Go to <https://resources.web.cern.ch/>

List Services → Oracle → New account

Follow the naming convention, use numbers only

Login: csc_oracle<NN>

Database: devdb19

Account type: Development

Description: CERN School of Computing

Create a new Oracle account

Naming convention for the login field:

- If you are creating an account for a **project**, please create a login 'MyProject_admin' or 'MyProject_user'.
- For **personal accounts** (e.g. an account you would use to test or develop) use a number (underscore) in the login name. For example, for a personal account: 'MyProject_admin_1'.

[Click here to show the full list of limitations for the login field.](#)

Login:

Database:

Account type:

Description:

*A short description for your account
(max 40 characters).*

Create Resource

Oracle tooling

CERN SESSION MANAGER (Logout from database only) (Logout from Session Manager)

Database connection Blocking locks Job Failures **My Sessions** All Sessions Database Sessions Session details SQLs

My Sessions | ANOWICKI@

Search Display rows per page 15

My Sessions

SID ↑=	<input type="checkbox"/>	Username	OS User	Status	State	DB Time [S]	CPU Time [S]	Cursors	L Reads [MB]	P Reads [MB]	Last Activity [S]	Machine	OS PID	Program	Action	Module	Logon Time	Inst ID	Service
2855	<input checked="" type="checkbox"/>	ANOWICKI	oracle	INACTIVE	IDLE	1	1	3	274	0	0	.cern.ch	28711	sqlplus@ (TNS V1-V3)	-	SQL*Plus	2023-11-10 10:43:09	1	SYS\$USERS

row(s) 1 - 1 of 1

<https://cern.ch/session-manager>

Oracle tooling

Oracle Enterprise Monitoring
used by the Oracle Database team

↑ AISDBP_AIS1_RAC55.WORLD_1 ⓘ Logged in as dbsnmp | itrac5520.cern.ch

Cluster Database Performance Availability Security Schema Administration

Database (GMT+01:00) Hide Activity Summary Reports Top Activity Lite Off

Activity Summary (Average Active Sessions) ⓘ Maximum CPU Cores Background Activity

ASH Analytics SQL Monitoring Workload Blocking Sessions

Applied Filters ⓘ None View Option ⓘ

Average Active Sessions ⓘ Maximum CPU Cores Total Activity Background Activity Sample Resolution ⓘ Medium

ASH Dimension Wait Class

SQL ID ▼ by Wait Class

Tune SQL Create SQL Tuning Set Columns

SQL ID	Activity (Average Active Sessions)	SQL
7ajqxhg4k4j6q	0.93	N/A
akm14kvbn81sy	0.83	6010
ga21w9ndzxnjf	0.81	288
8xcb5bvvd4h1w	0.71	344
94h6ncxu2421b	0.68	378
fyk2f1w21sr8d	0.60	406
4j153wvryzw8y	0.58	850

User Session ▼ by Wait Class Columns

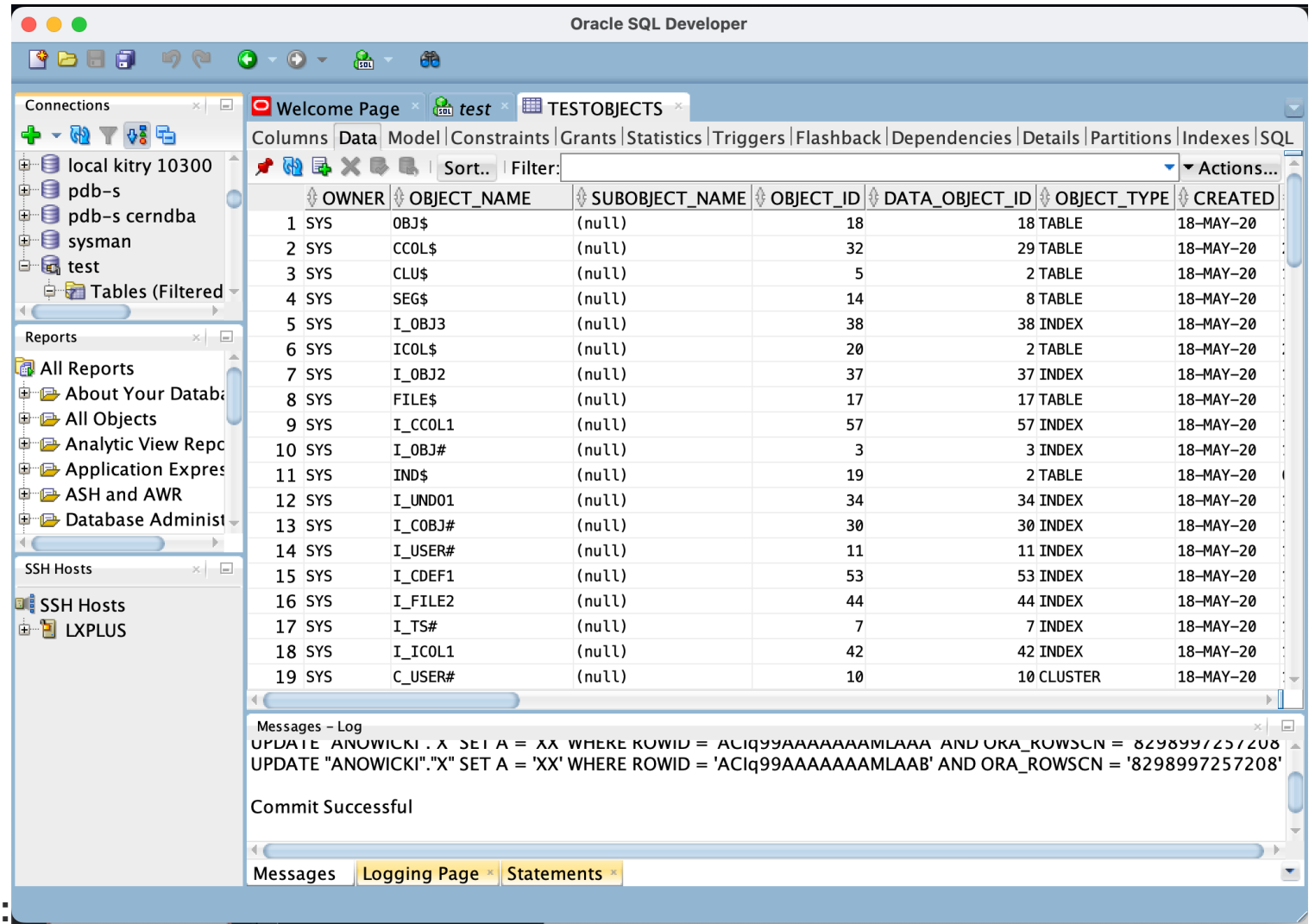
User Session	Activity (Average Active Sessions)	Us
1:793,9047	1.06	FO
1:4,44822	0.91	AP
1:4114,22158	0.89	FO
1:5966,58982	0.89	AP
1:5036,13300	0.87	LM
1:2363,16198	0.70	SY
1:1202,57288	0.62	FO
1:3861,14980	0.60	IM

How to connect to your Oracle account?

Oracle Client – SQL Developer

Available in DFS, more info:

[KB0001276](https://www.oracle.com/database/sqldeveloper/technologies/download/)



Directly from Oracle (you need an account):

<https://www.oracle.com/database/sqldeveloper/technologies/download/>

Oracle Client

Oracle instantclient RPM Packages for CERN Alma and RedHat 8 and 9 – [KB0006697](#)

It's also deployed to EOS – [KB0001167](#)

It's also available in CMF for Windows Desktop

Directly from Oracle (you need an account):

<https://www.oracle.com/database/technologies/instant-client/downloads.html>

Oracle Client

There are other options:

Python Library – python-oracledb (don't use cxOracle)

SQLPlus – command line

How to know where to connect?

tnsnames.ora

devdb19=

(

DESCRIPTION=

(ADDRESS= (PROTOCOL=TCP) (HOST=devdb19-s.cern.ch) (PORT=10121))

(LOAD_BALANCE=on)

(CONNECT_DATA=

(SERVER=DEDICATED)

(SERVICE_NAME=devdb19_s.cern.ch)

)

)

tnsnames.ora

We distribute the file in multiple ways – EOS, AFS, DFS, https, rpm file

[KB0001211](#)

It's available inside CERN network via https:

<https://service-oracle-tnsnames.web.cern.ch/service-oracle-tnsnames/tnsnames.ora>

Oracle – remote connection

For security, access to databases is limited to within CERN's network

You need to do tunneling

Live demo: How to configure SQL Developer?

SQL Developer

1. Download SQL Developer: <https://www.oracle.com/database/sqldeveloper/technologies/download/>
2. Download tnsnames.ora: <https://service-oracle-tnsnames.web.cern.ch/service-oracle-tnsnames/tnsnames.ora>
3. Configure the path to tnsnames.ora
4. Configure the connection
oracle.net.socksProxyHost
oracle.net.socksProxyPort
oracle.net.socksRemoteDNS
5. Remember to run the ssh tunnel:
ssh -D 9999 <nicellogin>@lxplus.cern.ch

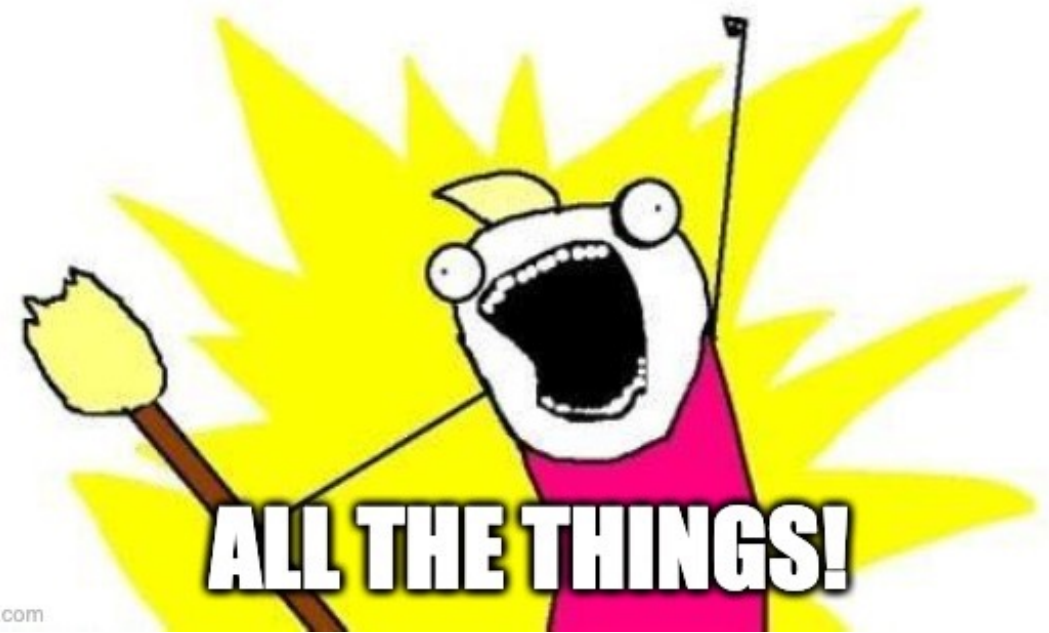
More info about Oracle

What do we do?

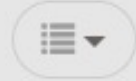
We automate things that are done often:

- Patching of database software
- Hardware migrations between servers
- New installations
- Accounts provisioning (and deletion)

AUTOMATE



✓ upgrade-grid-infrastructure-on-cluster



This job takes as input a CLUSTER NAME as then calles the job upgrade-grid-infrastructure-on-hosts with the correct hosts of the cluster.

Options:

CLUSTER_NAME:

[REDACTED]

VERSION:

crs1920

TRANSPARENT:

YES

Succeeded 🚩 0.26:03 at 8/10 3pm >

#105664

username

794f0e81

[Run Again](#) ↻

Log Output »

Node

Start time

Duration

> [REDACTED].cern.ch

18 Steps not run

Check that we running on the good

0.26:02

> #! Install CRS golden image	OK	3:25:12 pm	0.04:27
✓ Grid Infrastructure/helpers/upgrade-grid-infrastructure- on-hosts > #! root.sh - after golden image install	OK	3:33:50 pm	0.00:03
<pre> 15:33:52 Running /CRS/dbs01/crs1920/root.sh on host 15:33:52 /CRS/dbs01/crs1920/root.sh 15:33:52 Check /CRS/dbs01/crs1920/install/root_ cern.ch_2023-08-10_15-33-52- 623679026.log for the output of root script </pre>			
> #! Pre-patching info	OK	3:33:55 pm	0.00:03

<https://github.com/rundeck/rundeck>

In contrast to the DBoD service

The Oracle team is performing the upgrades

- **Users are informed ahead of time. LHC schedule is taken into consideration (if needed)**

HA solution all the way – each component is multiplexed

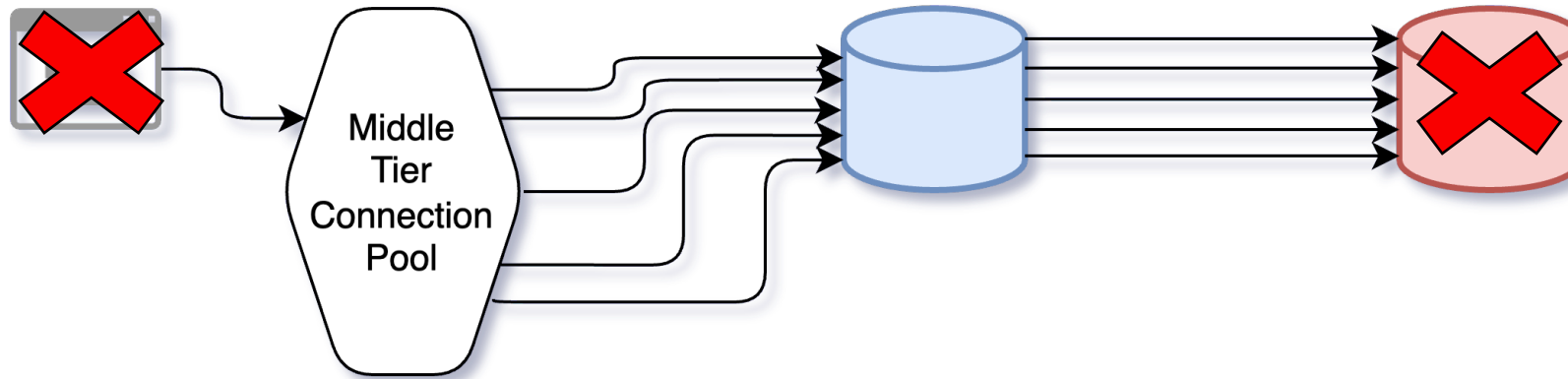
Less autonomy for users, but it's highly scalable

Oracle is suitable for mission critical workloads

Some nice features from Oracle

Database Links

What if you shutdown one of the db's involved?



Database Links

DB Link Viewer

Dear Oracle User,

Welcome: ANOWICKI Logout

Admin View | Monitored Databases

Link Database:

Link Owner:

FIM Link Owner:

Link Status:

We have detected that you own some oracle accounts containing database links that are invalid or have connectivity issues. Those links are listed below, grouped by database and issue type. Please take action and resolve the problems to suppress further alerts. At the same time please verify if the listed links are still being used and remove them if no longer needed. More details about your links can be found in the "DB Link Viewer" tool (see: <https://cern.ch/dblink-viewer> - My Links Tab). More information about the tool can be found here: https://cern.service-now.com/service-portal?id=kb_article&n=KB0002806.

Link that has an invalid TNS or the target account missing.
Action to take: database link should be deleted.

Link Name	Database	Oracle Account	Issue
			Invalid TNS
			Invalid TNS
			Account Missing
			Invalid TNS
			Invalid TNS
			Invalid TNS

Link DB Name	Link Owner
A	L
A	A
A	A
A	C
A	C
A	T
A	L
A	C
A	L
A	K

Target account is locked or has expired password.
Action to take: target account owner should be contacted to unlock the account or change the password; in case of a password change all related links should be recreated with the new password.

Link Name	Database	Oracle Account	Issue
			Account Password Expired
			Account Password Expired
			Account Locked
			Account Locked

Target database or host is not accessible.
Action to take: verify if the link is using correct TNS; if necessary recreate it with a correct TNS; DBA should be contacted to check the target database if you believe that the current TNS is valid.

id or account is missing on target database
account is locked or has expired password
checked: target database not accessible
not been updated for three or more days
d

not be using an outdated password
descriptor is not a TNS alias
points to the same database

Comments

...d password. ✖

...sing on database

...se.

...1 database



Data Migrations

Oracle provides a Data Pump tool which speeds up copying of data by using server-side processes and internal optimisations

Data Migrations – Data Pump automation

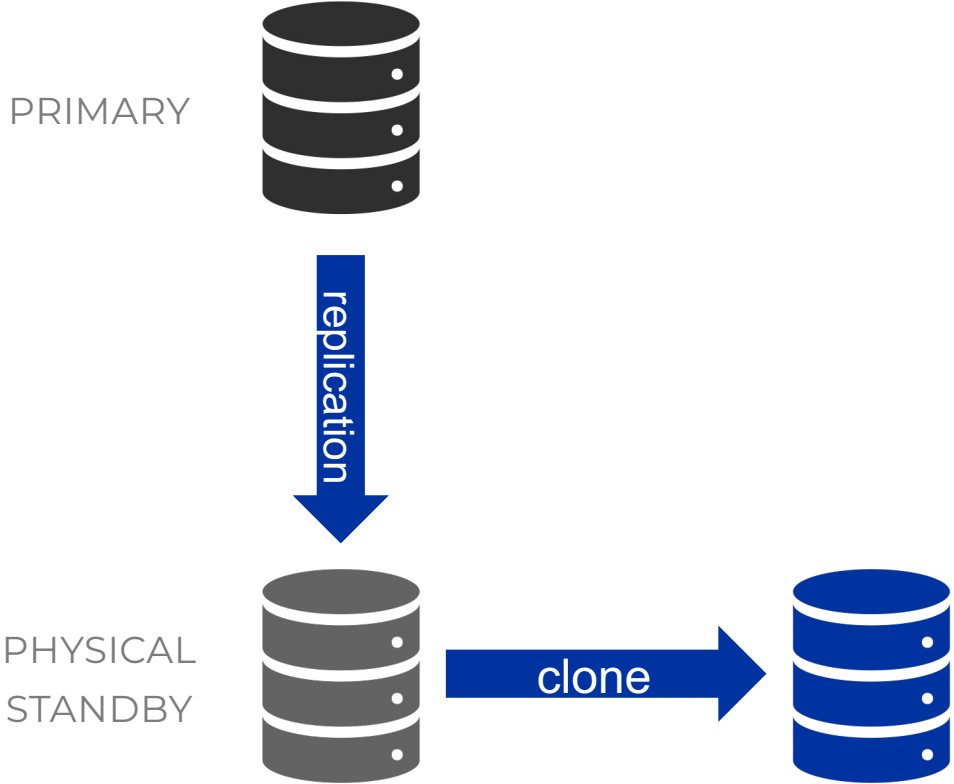
```
SQL> exec cerndb_dpuser.cp_schema('DST_DB_NAME');
```

```
SQL> exec cerndb_dpuser.cp_schema('DST_DB_NAME',  
    include=>'TABLE: like ''TEST%''',  
    exclude=>'TABLE/CONSTRAINT;STATISTICS');
```

The infrastructure is complicated...
this is where mistakes happen

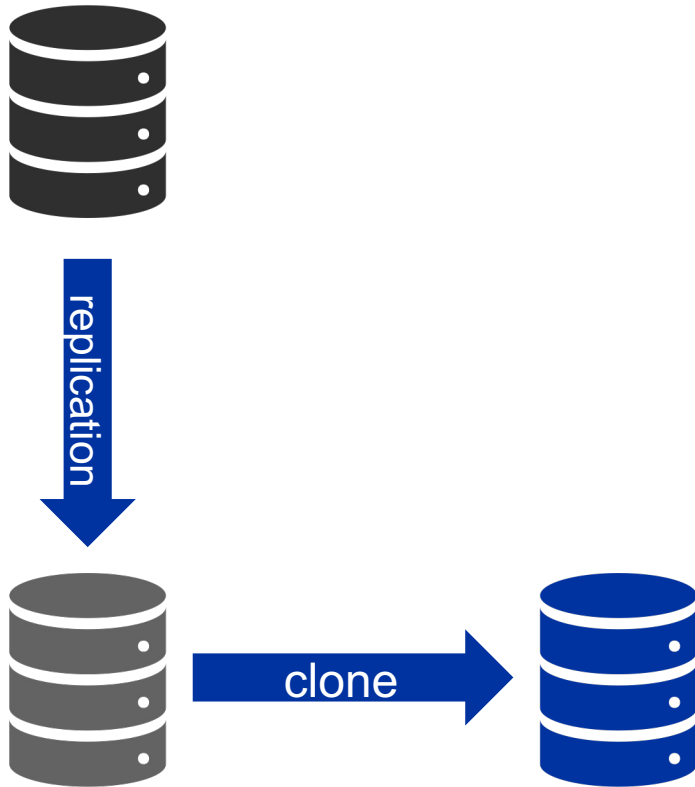
Database Clones

Using replicas as a base for clones



Database Clones

Key points



- 4 minutes to create a clone of a 10TB database
- Thin Clones (Copy On Write)
using the dNFS snapshots

Storage API

Usage: sapi delete_s

```
bash# sapi delete_s
```

Operation successful

STEM <flags>

name subsystemX



Storage API

Usage: `sapi delete_snapshots SNAPSHOT_NAME VOLUME_NAME SUBSYSTEM <flags>`

```
bash# sapi delete_snapshots dbnas:/very_long_path snapshot_name subsystemX
```

Storage API

Usage: sapi delete_snapshots **SNAPSHOT_NAME** **VOLUME_NAME** **SUBSYSTEM** <flags>

bash# sapi delete_snapshots **dbnas:/very_long_path** **snapshot_name** **subsystemX**



Questions?

The final exercise

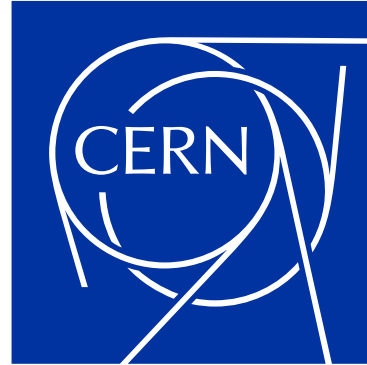
```
ssh lxplus
```

```
$ sqlplus <your_requested_account>@devdb19
```

The password will be: change_me7

```
SQL> select * from anowicki2.final_exercise;
```

Thank you !



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