



ODTUG Kscope25

dallas - ft worth june 15 - 19

Welcome



Rafał Grzegorczyk
Senior APEX Developer



Oracle ACE
Pro

Oracle's SQLcl CI/CD bombshell: It will forever change your APEX & Database deployments

Monday, June 16th 09:00 am - 09:50 am @ Austin 6

pretius

ORACLE

Partner

Liquibase



Oracle SQLcl “Project”

— —

Is Oracle's latest SQLcl feature
the only CI/CD Tool
for APEX
and Oracle Database
YOU will ever need?

— —

Providing what you **need**, not what you **want**

300+
People

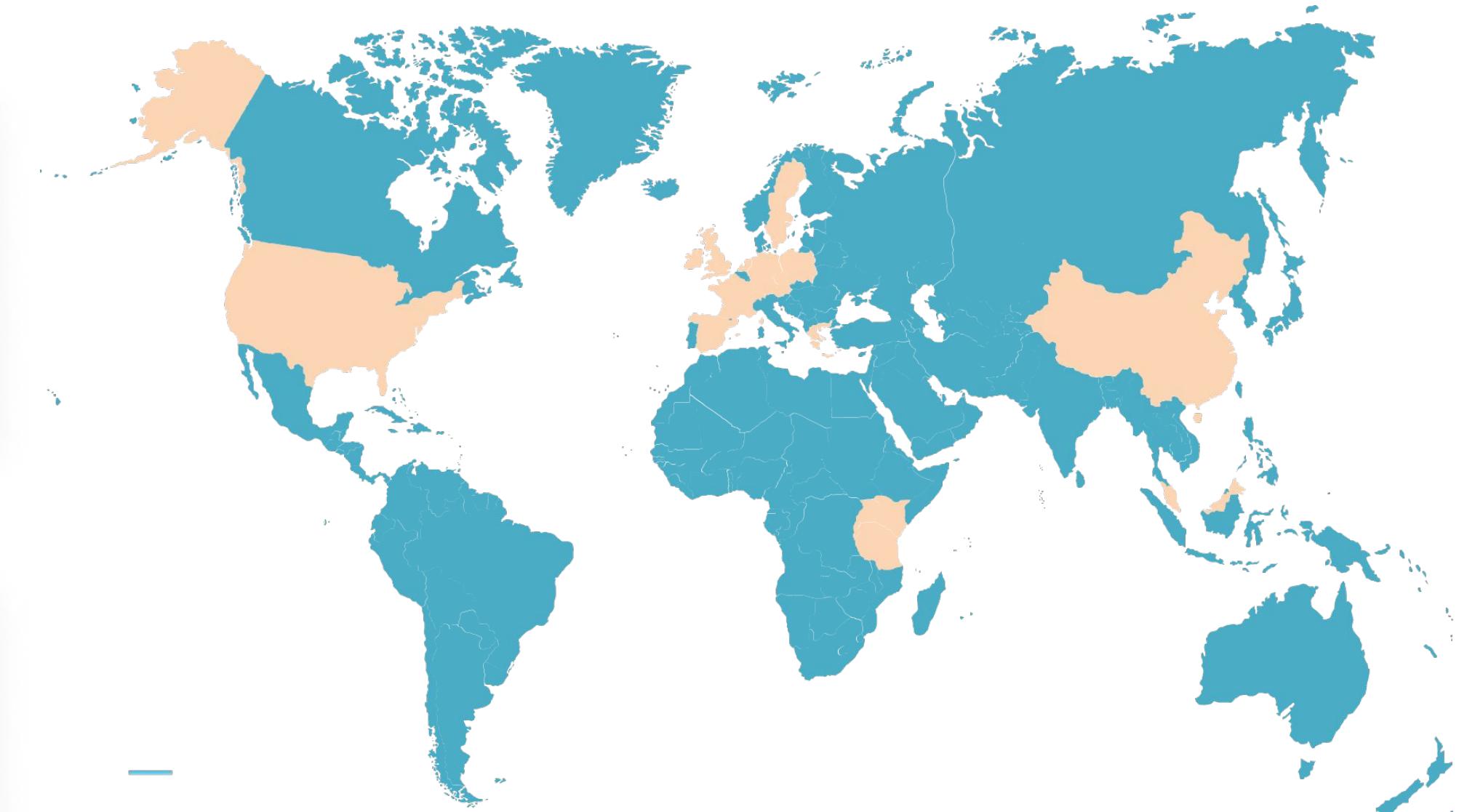
60+
APEX Devs

5
Oracle ACEs

70+
Customers

4
Continents

2
Warsaw, PL
London, UK



About me

- 1 Kielce, Poland - 200 km south from Warsaw
 - 2 Oracle APEX and PL/SQL Developer
 - 3 Worldwide speaker since 2021
 - 4 Oracle ACE Pro
- Find me at:

rgrzegorczyk@pretius.com

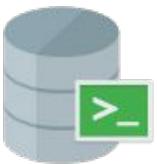
rgrzegorczyk 

<https://rafal.hashnode.dev/>



What is Oracle SQLcl?

Oracle SQLcl



- Oracle SQL Developer Command Line (SQLcl)
- Free command line interface for Oracle Database
- Allows to execute SQL and PL/SQL
- Provides in-line editing, statement completion
- Supports SQL*Plus scripts, allows to access Cloud Storage
- Data Pump, Codescan..... and much more

Database / Oracle / SQL Developer Command Line /

User's Guide

Title and Copyright Information

Preface

1 Changes in Release 25.1 for Oracle SQLcl User's Guide

▶ 2 Using Oracle SQLcl

▶ 3 Using Liquibase

▶ 4 Database Application CI/CD

5 Using Cloud Storage

6 Using Data Pump

7 Using the Cloud Premigration Advisor Tool

8 Using the PGQL Plug-in

▶ 9 SQLcl Command Reference

A List of Unsupported SQL*Plus Commands and Features

B SQL Performance Troubleshooting

C Third-Party License Information

“Project” command

“Project” command

- “Project” is an CI/CD extension in SQLcl
- Introduced in 2nd half of 2024
- Contains several sub-commands to help developers manage database & APEX changes
- It uses Liquibase & GIT in a simple & developer-friendly way

Title and Copyright Information

Preface

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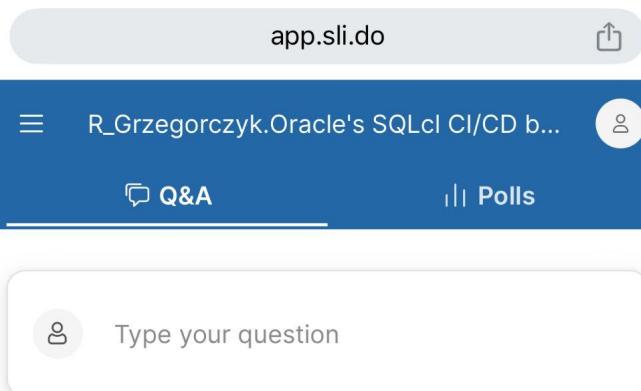
Questions & Answers

app.sli.do

R_Gregorczyk.Oracle's SQLcl CI/CD b...

Q&A Polls

Type your question



Join at slido.com

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R_Gregorczyk.Oracle's SQLcl CI/CD b...

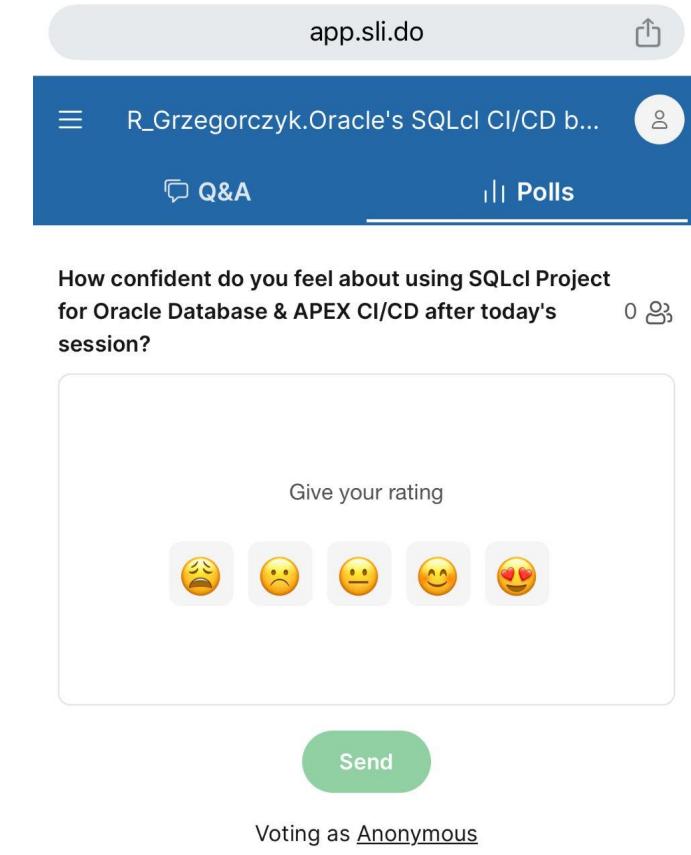
Q&A Polls

How confident do you feel about using SQLcl Project for Oracle Database & APEX CI/CD after today's session? 0

Give your rating

Send

Voting as Anonymous

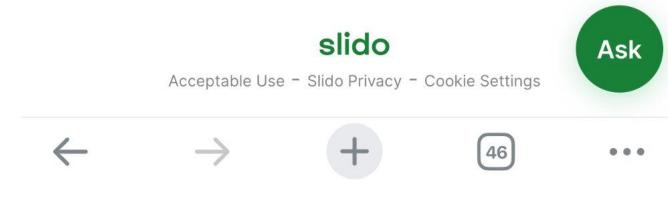


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Ask

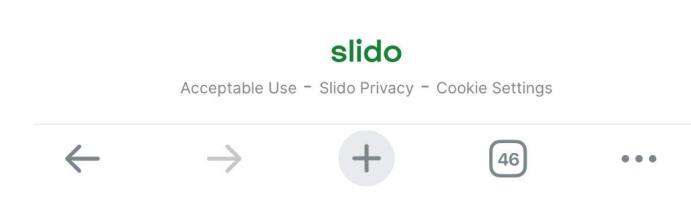
← → + 46 ...



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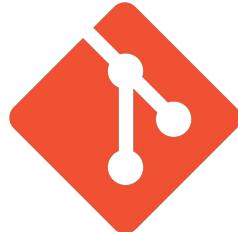
← → + 46 ...



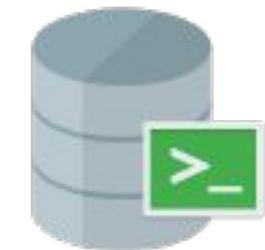
Demo

Tools & Environment

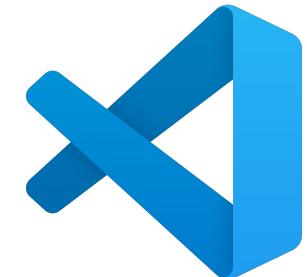
GIT + Fork (GUI Client)

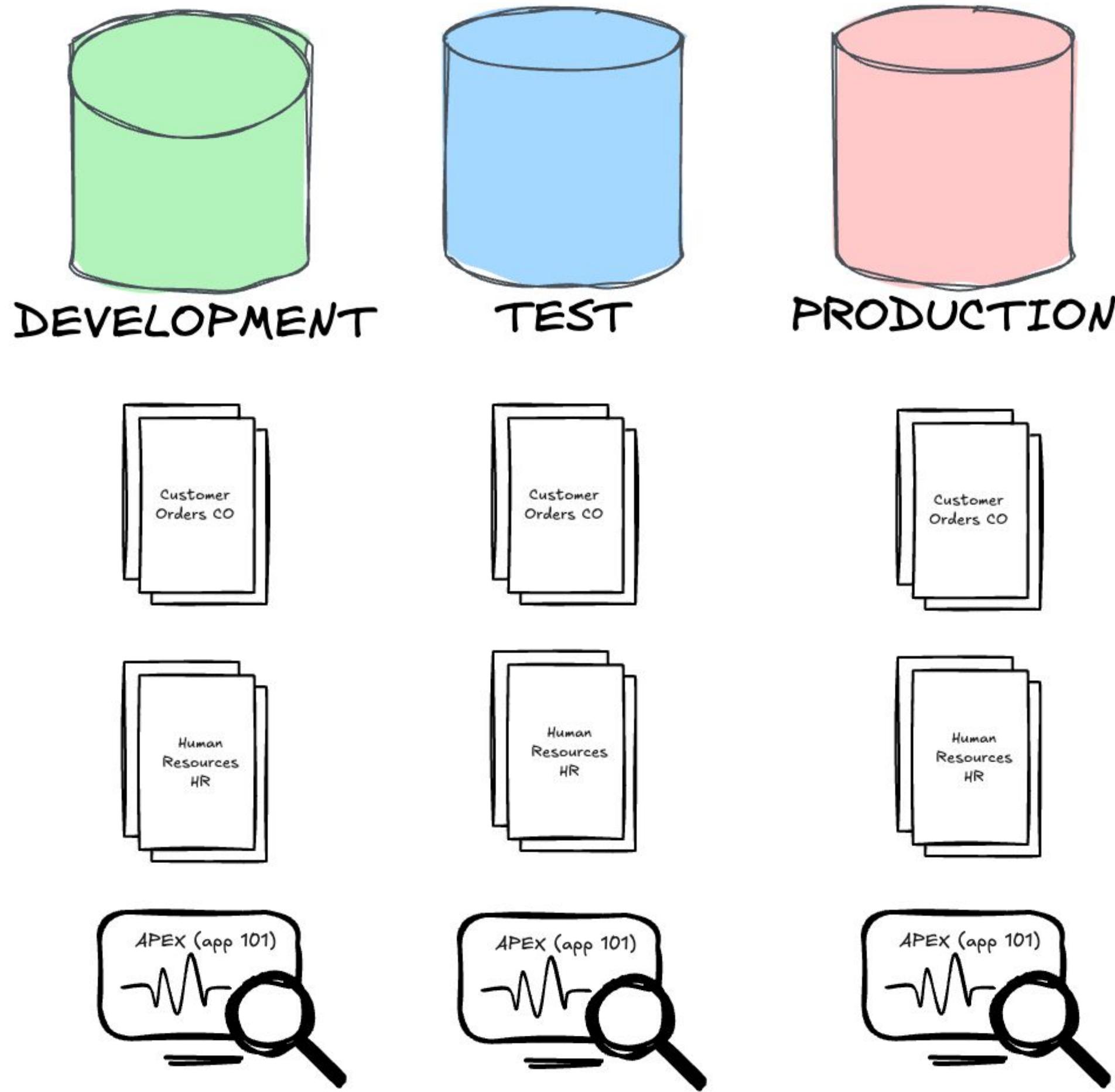


Oracle SQLcl 25.1.1.0



Visual Studio Code





Configured database connections

The screenshot shows the 'Connections' section of the Oracle SQL Developer Extension for VSCode. On the left, there's a sidebar with 'SQL DEVELOPER' and 'SQL SNIPPETS'. The 'CONNECTIONS' section lists several databases under three main categories: 'BOMBSHELL', 'DEVELOPMENT', and 'PRODUCTION'. Under 'DEVELOPMENT', 'PRODUCTION', and 'TEST', there are sub-folders for 'admin', 'co', and 'hr'. The 'DEVELOPMENT' category is currently selected, indicated by a blue border around its folder icon.

- > Customers
- < Priv
- < BOMBSHELL
- < DEVELOPMENT (●)
 - > dev_admin
 - > dev_co
 - > dev_hr
- < PRODUCTION (●)
 - > prod_admin
 - > prod_co
 - > prod_hr
- < TEST (●)
 - > test_admin
 - > test_co
 - > test_hr

This screenshot shows the extension page for 'Oracle SQL Developer Extension for VSCode' on the Microsoft Store. The title is 'Oracle SQL Developer Extension for VSCode' by Oracle Corporation. It has 395,286 installs and a 4.5-star rating from 99 reviews. A large green play button icon is prominently displayed. Below the title, it says 'End-to-end development tools for your SQL and PL/SQL applications.' There are buttons for 'Disable' (with a dropdown arrow), 'Uninstall' (with a dropdown arrow), and 'Auto Update' (with a gear icon). At the bottom, there are tabs for 'DETAILS', 'FEATURES', and 'CHANGELOG'. To the right, there's an 'Installation' section with details: Identifier: oracle.sql-developer, Version: 25.1.1, Last Updated: 2025-05-05, Updated: 10:20:21, and Size: 482.32MB.

Extension: Oracle SQL Developer Extension for VSCode

Oracle SQL Developer Extension for VSCode

Oracle Corporation [oracle.com](#) | 395,286 | ★★★★☆ (99)

End-to-end development tools for your SQL and PL/SQL applications.

Disable | Uninstall | Auto Update

DETAILS FEATURES CHANGELOG

Oracle SQL Developer Extension for VS Code

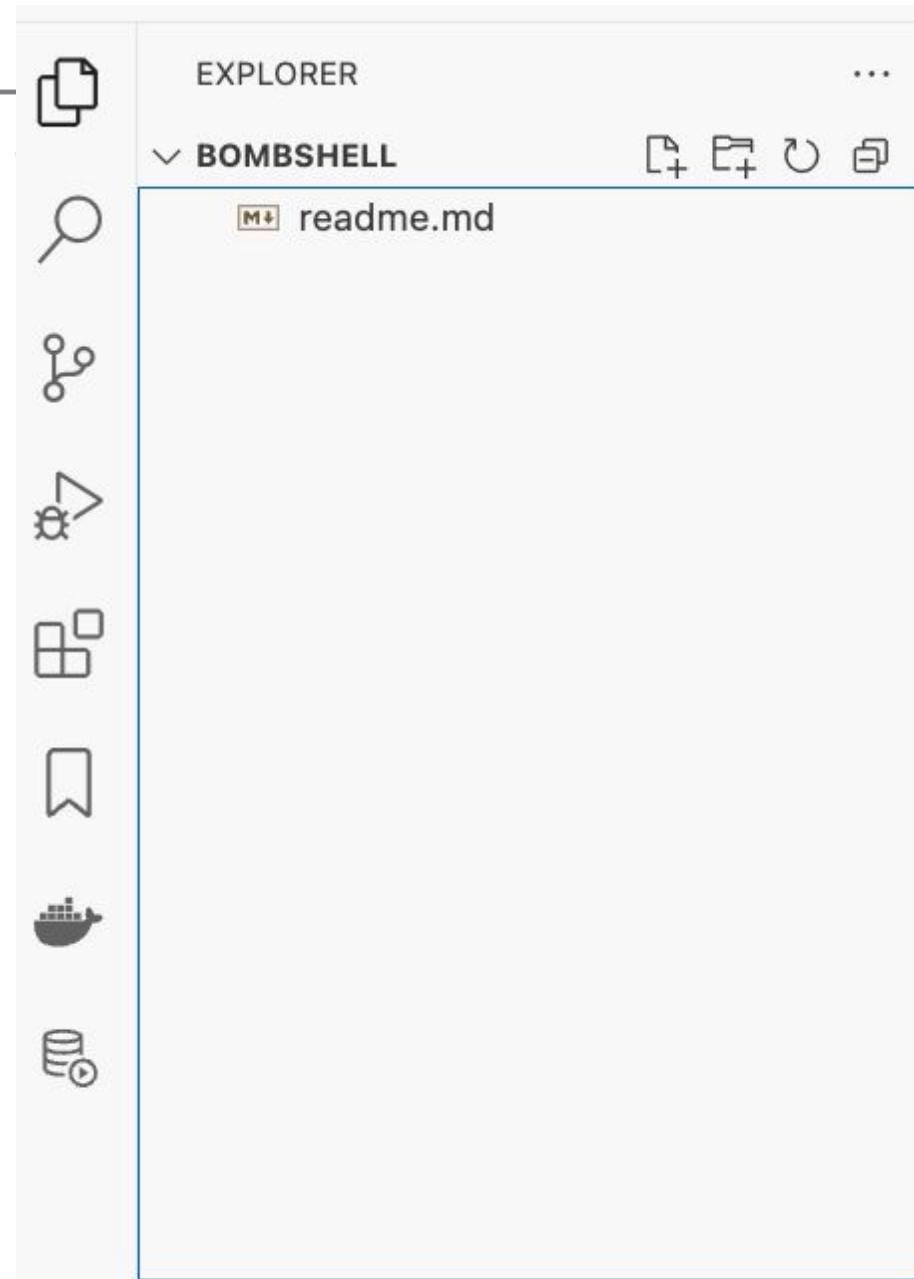
About the Oracle SQL Developer extension for VS Code

The de-facto query, development, and administration tool for Oracle Database professionals, is now available as an extension in the world's most popular IDE

Installation

Identifier	oracle.sql-developer
Version	25.1.1
Last Updated	2025-05-05, 10:20:21
Size	482.32MB

Empty folder "Bombshell":



The screenshot shows the GitHub Desktop application. A new repository named 'bombshell' is initialized. The repository view shows three branches: 'main', 'dev' (which is checked out), and 'test'. A commit for 'Initialize repository' by Grzegorczyk Rafal is listed, along with a file tree containing 'readme.md'. A large blue fork icon is prominently displayed.

- GIT repository in "bombshell" folder
- 3 branches - dev, test and main(for production)
- All branches are equal at this moment



1.Kick-off new project

Initialize a new project:

```
> sql -name dev_admin  
> project init -name bombshell -schemas HR, CO
```

Questions & Answers

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Parameters:

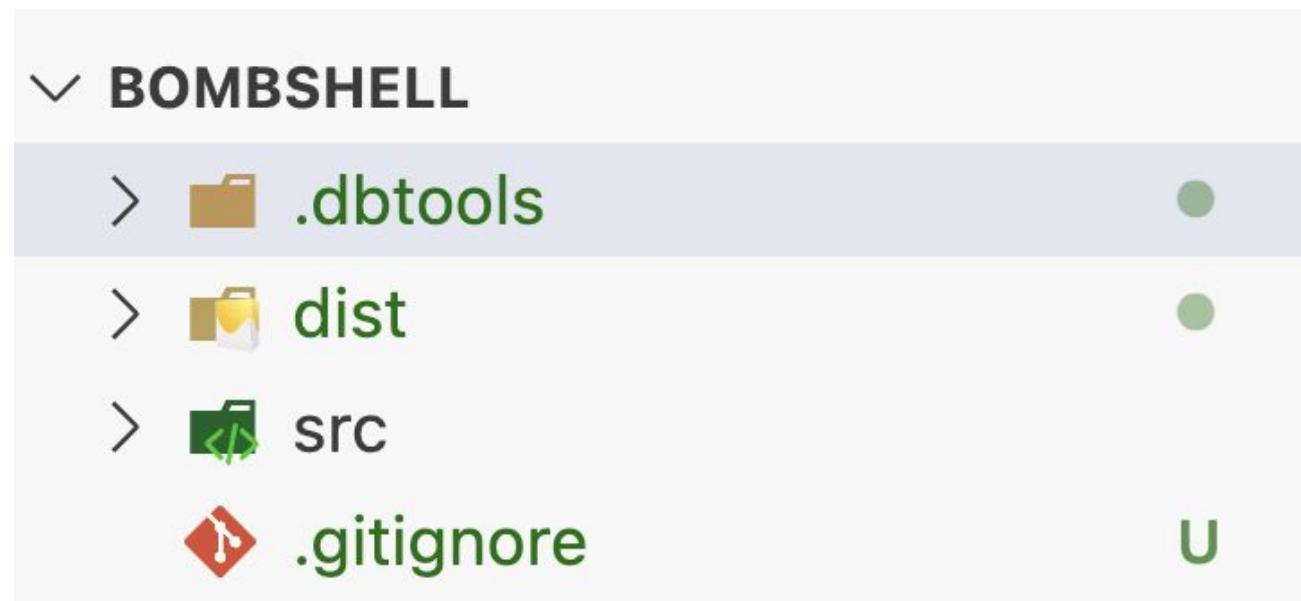
- “name” - project name
- “schemas” - comma separated schemas to be tracked in project

The screenshot shows a code editor interface with the following details:

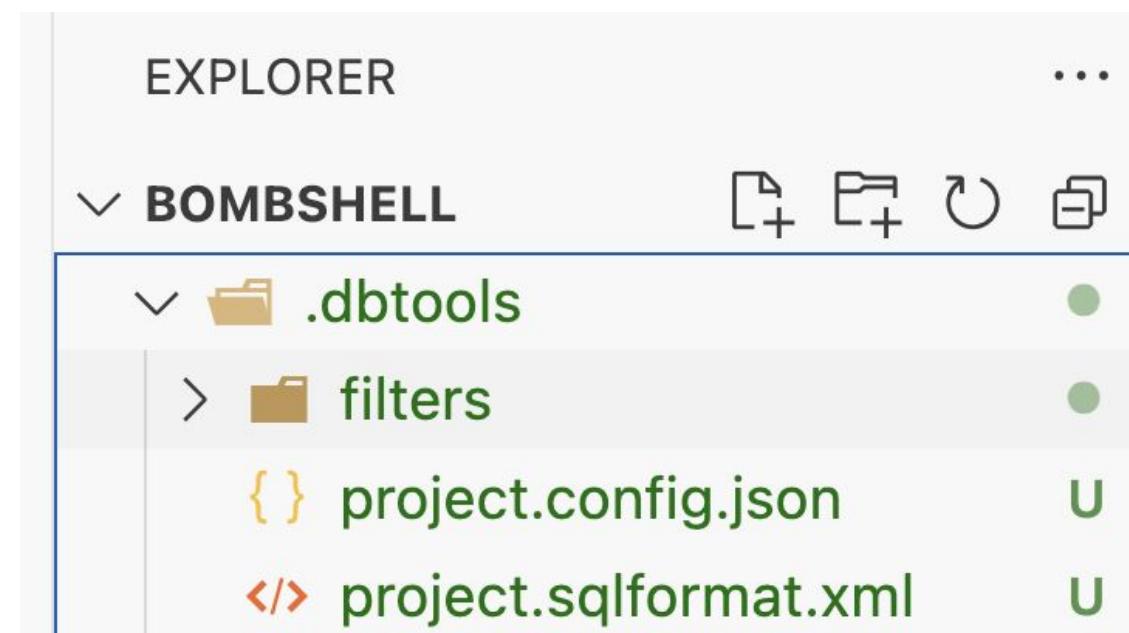
- Explorer Bar:** On the left, it shows a tree view with a folder icon, the text "EXPLORER", and a dropdown menu. Below it, under "BOMBSHELL", there is a file icon with "readme.md".
- Terminal Tab:** The "TERMINAL" tab is active, displaying the following output:

```
o → bombshell git:(dev) ✘ sql -name dev_admin
SQLcl: Release 25.1 Production on Wed May 14 15:40:34 2025
Copyright (c) 1982, 2025, Oracle. All rights reserved.
```
- Search Bar:** At the top center, it says "bombshell".
- Icons:** There are several icons in the sidebar: a file icon, a magnifying glass, a person icon with a "1" (notifications), a gear, a bookmark, a ship, a database, a user icon with a "1", and a settings gear.
- Status Bar:** At the bottom, it shows "dev*" with a dropdown arrow, "0 0 0", "Git Graph", and "bomshell".

Several files and folders were created:



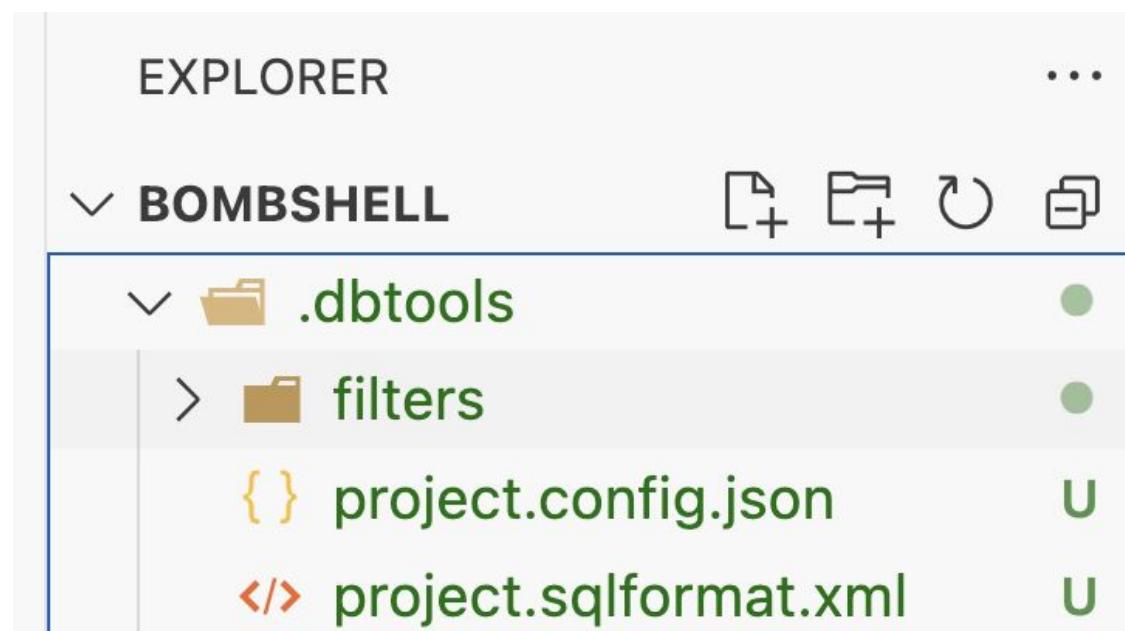
.dbtools - project configuration files



The screenshot shows the content of the 'project.config.json' file. The JSON object defines a project named 'bombshell' using 'sqlcl'. It specifies a connection name 'dev_admin' and version '25.1.1.0'. The project includes schemas 'HR' and 'CO', and an export section with a format that enables transformations. The 'setTransform' section includes options for 'collationClause', 'constraints', 'constraintsAsAlter', and 'emitSchema'.

```
{
  "project": "bombshell",
  "sqlcl": {
    "connectionName": "dev_admin",
    "version": "25.1.1.0"
  },
  "schemas": [ "HR", "CO" ],
  "lastReleaseVersion": "",
  "export": {
    "format": {
      "enable": true
    },
    "setTransform": {
      "collationClause": "NEVER",
      "constraints": true,
      "constraintsAsAlter": true,
      "emitSchema": true
    }
  }
}
```

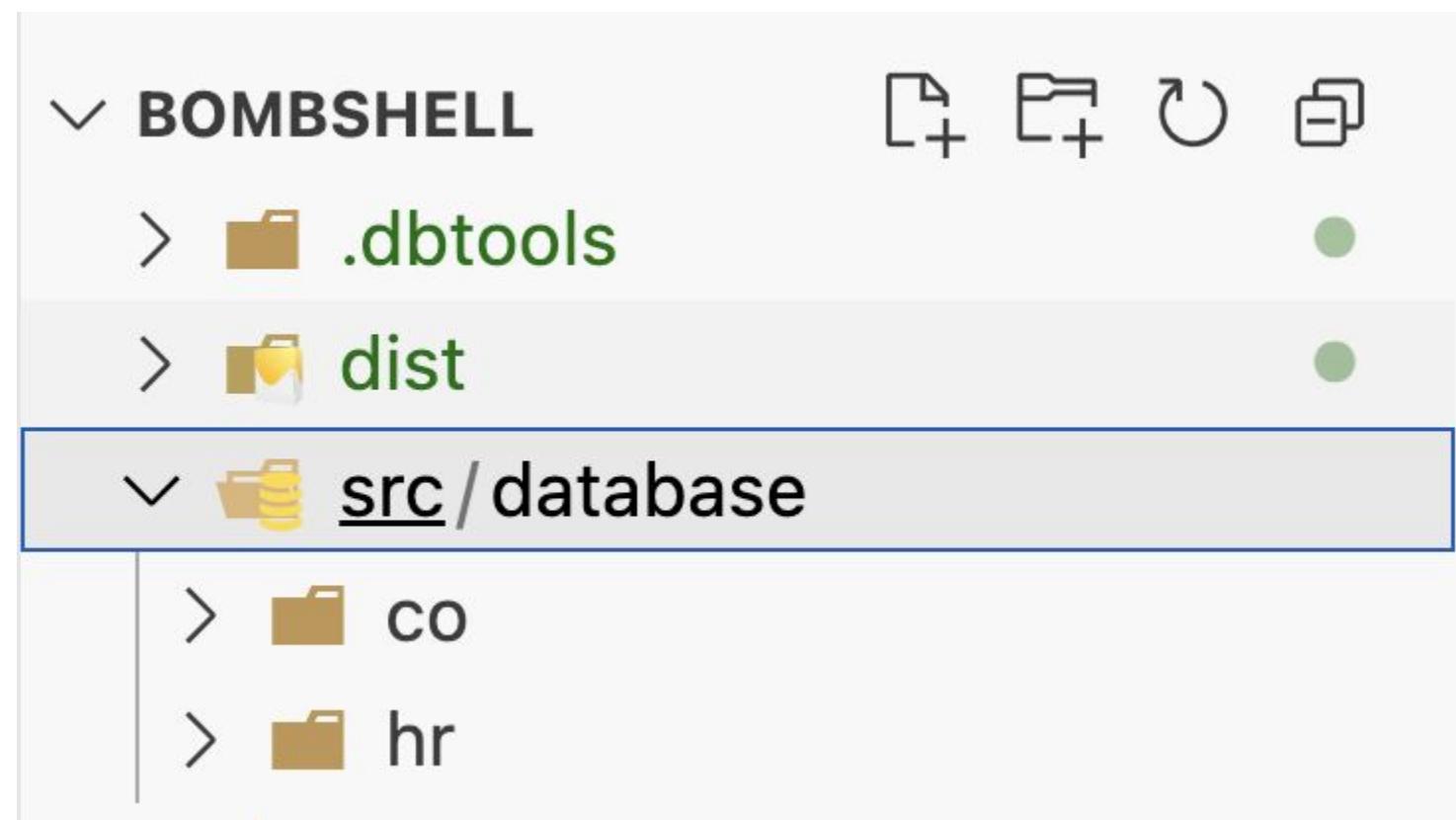
.dbtools - project configuration files



```
project.filters U X
.dbtools > filters > project.filters
1 /* Comma separated list of predicates to be fine-tuned for individual project.
2 Run
3   project export -debug
4   to double check the dictionary queries
5   with internal and custom filters applied.
6 */
7
8
9 -- Uncomment the line below if don't want to export grants:
10 -- export_type not in ('ALL_TAB_PRIVS','USER_SYS_PRIVS'),
11 /* Reference list of export_types from internal.fixed.filters
12   'ALL_OBJECTS',
13   'APEX_APPLICATIONS',
14   'ALL_COL_COMMENTS',
15   'ALL_TAB_COMMENTS',
16   'ALL_TAB_PRIVS',
17   --'USER_SYS_PRIVS',
18   'ALL_DEPENDENCIES',
19   'ALL_MVIEW_LOGS',
```

The code editor displays the 'project.filters' file. The content defines a list of predicates for fine-tuning projects. It includes instructions for running the project export with specific filters applied. Below this, it lists various export types such as 'ALL_OBJECTS', 'APEX_APPLICATIONS', etc.

.src - source files from exported schema(s)



- Export will be done in next steps

.dist - generated install files and releases

The screenshot shows a code editor interface with the following details:

- EXPLORER** sidebar:
 - BOMBSHELL** folder:
 - .dbtools
 - dist** folder (selected)
 - install.sql
 - src/database
 - .gitignore
 - readme.md
- install.sql** file in the main editor area:

```
1 -- SQLcl uses the SQLCL engine for formatted sql changelog not the JDBC engine
2 -- By default, a project will not use substitution variables and allows blank
3 -- lines in sql statements.
4
5 set define off
6 set sqlblanklines on
7
8 -- Prechecks modifiable helper
9 -- Check running with SQLcl
10 -- Check minimum DB version
11 -- Check character set
```

Modify install.sql

- If you deploy to more than one schema - you need to specify schema to store Liquibase tracking table
- The liquibase DATABASECHANGELOG tracking table (automatically created) is an object that holds all of the information about what and when was already deployed



```
bombshell
dist/install.sql

Unstaged Stage
dist/install.sql

@@ -19,3 +19,3 @@ set sqlblanklines on
prompt "Installing/updating schemas"
- lb update -log -changelog-file releases/main.changelog.xml -search-path "."
+ lb update -log -changelog-file releases/main.changelog.xml -search-path "." -liquibase-schema-name HR
```

2. Take a snapshot of

existing

Database & APEX code

Export ALL database objects

> project **export**

Questions & Answers

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The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. The title bar at the top has the text "bomshell". The left sidebar contains icons for Explorer, Search, Problems (with 10 items), Outline, and other development tools. The Explorer section shows a project structure for "BOMBSHELL" with folders ".dbtools", "dist" (which is currently selected), "src", and ".gitignore", along with a "readme.md" file. The main workspace area features a large "X" icon. Below the workspace are tabs for PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL, SCRIPT OUTPUT, SQL HISTORY, and TASK MONITOR. The TERMINAL tab is active, displaying the following text:
07:16:55 SQL> project export
The current connection DEVELOPMENT_HIGH ADMIN will be used for all operations
A status bar at the bottom shows "viins | 1:14 | ADMIN | dev_admin" and other system information like file version and git status.

All selected objects were exported [CO]

The screenshot shows a code editor interface with the following details:

- EXPLORER** pane on the left, showing a tree structure of project files under **BOMBSHELL**. The **tables** folder is expanded, and the **customers.sql** file is selected.
- customers.sql** tab is active in the main editor area.
- The code in the editor is as follows:

```
src > database > co > tables > customers.sql > ...
1  create table co.customers (
2      customer_id    number(*, 0)
3          generated by default on null as identity minvalue 1 maxvalue 99999999999999999999
4          20 noorder nocycle nokeep noscale
5      not null enable,
6      email_address  varchar2(255 char) not null enable,
7      full_name       varchar2(255 char) not null enable
8  );
9
10 alter table co.customers add constraint customers_email_u unique ( email_address )
11     using index enable;
12
13 alter table co.customers
14     add constraint customers_pk primary key ( customer_id )
15         using index enable;
16
17 -- sqlcl_snapshot {"hash":"f835d77b0003fd457a5c9ff266250a6eff263ed0","type":"TABLE","name'}
```

The code defines a table `co.customers` with columns `customer_id`, `email_address`, and `full_name`. It also adds a unique constraint `customers_email_u` on `email_address` and a primary key constraint `customers_pk` on `customer_id`.

All selected objects were exported [HR]

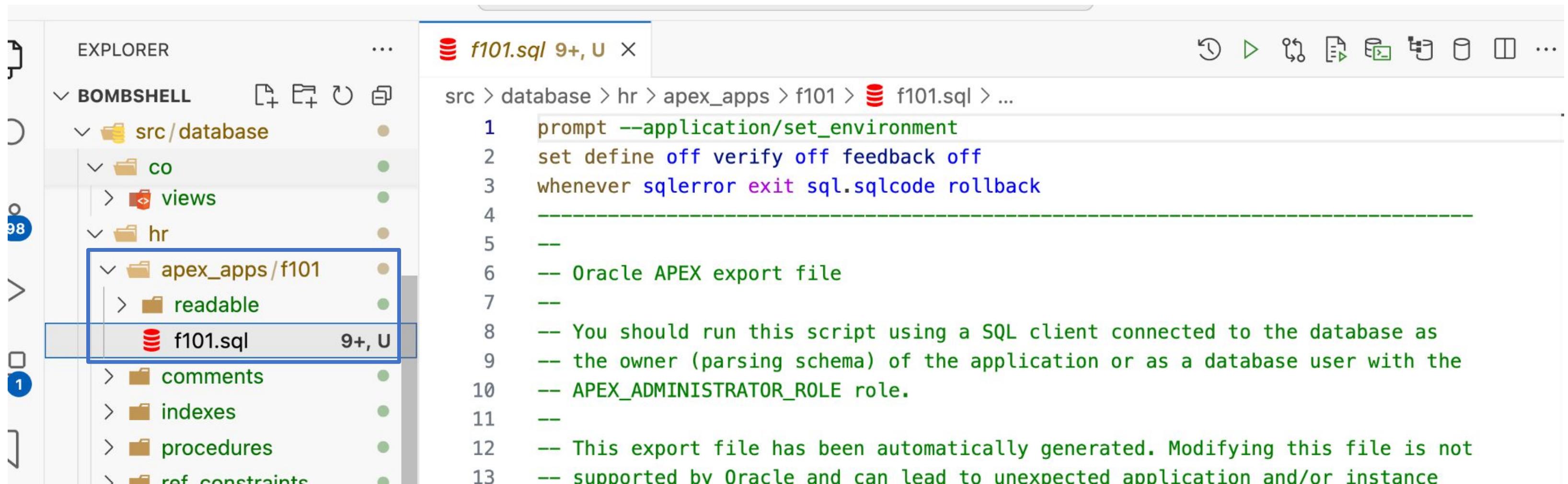
The screenshot shows the Oracle SQL Developer interface. The left pane is the Explorer, displaying a project named 'BOMBSHELL' with a tree structure:

- src / database
- co
- hr
 - apex_apps
 - comments
 - indexes
 - procedures
 - ref_constraints
 - countr_reg_fk.sql
 - dept_loc_fk.sql
 - dept_mgr_fk.sql

The 'ref_constraints' folder is highlighted with a blue border. The right pane shows the contents of the file 'countr_reg_fk.sql':

```
1 alter table hr.countries
2   add constraint countr_reg_fk
3     foreign key ( region_id )
4       references hr.regions ( region_id )
5   enable;
6
7
8 -- sqlcl_snapshot {"hash":"cd645bb78c0bf0280ccde8abd8b719cf39f96368","type":"REF_CONSTRAINT"}
```

All APEX applications were exported



The screenshot shows a code editor interface with an Explorer sidebar on the left and a main editor window on the right.

EXPLORER pane:

- Project: BOMBSHELL
- src/database/
 co
 views
 hr/
 apex_apps/f101/
 readable/
 f101.sql (selected)
- src/comments
src/indexes
src/procedures
src/ref_constraints

EDITOR pane:

f101.sql 9+, U X

```
src > database > hr > apex_apps > f101 > f101.sql > ...
1  prompt --application/set_environment
2  set define off verify off feedback off
3  whenever sqlerror exit sql.sqlcode rollback
4  --
5  --
6  -- Oracle APEX export file
7  --
8  -- You should run this script using a SQL client connected to the database as
9  -- the owner (parsing schema) of the application or as a database user with the
10 -- APEX_ADMINISTRATOR_ROLE role.
11 --
12 -- This export file has been automatically generated. Modifying this file is not
13 -- supported by Oracle and can lead to unexpected application and/or instance
```

—
— Optionally export only selected objects:

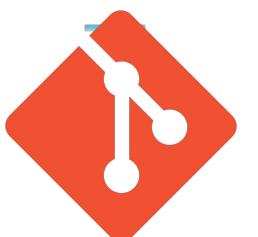
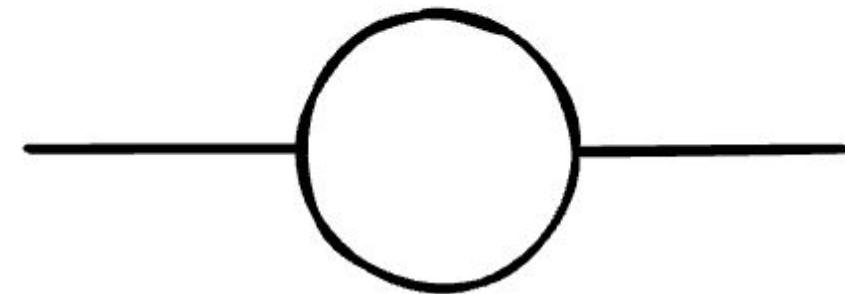
> project **export -objects** HR.COUNTRIES, CO.CUSTOMERS

> project **export -objects** APEX.101

3. Mark current state of
DB & APEX
[release 1.0]

Commit current state of DB & APEX [release 1.0]

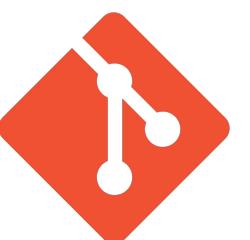
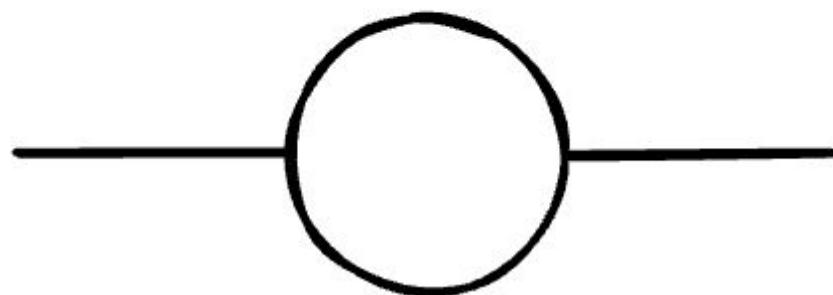
git commit



pretius

release 1.0

git commit



The screenshot shows the Bombshell Git interface. On the left, the repository structure is displayed with branches: main, dev (selected), test, Remotes, Tags, Stashes, and Submodules. The main pane shows a commit history for the dev branch:

doc: Initial state of Bombshell project - current version 1.0

AUTHOR: Grzegorczyk Rafal rgrzegorczyk@pretius.com
15 May 2025 at 14:55:47 CEST

REFS: dev

SHA: 0db7737a67a535be2588492072694199dbc89065

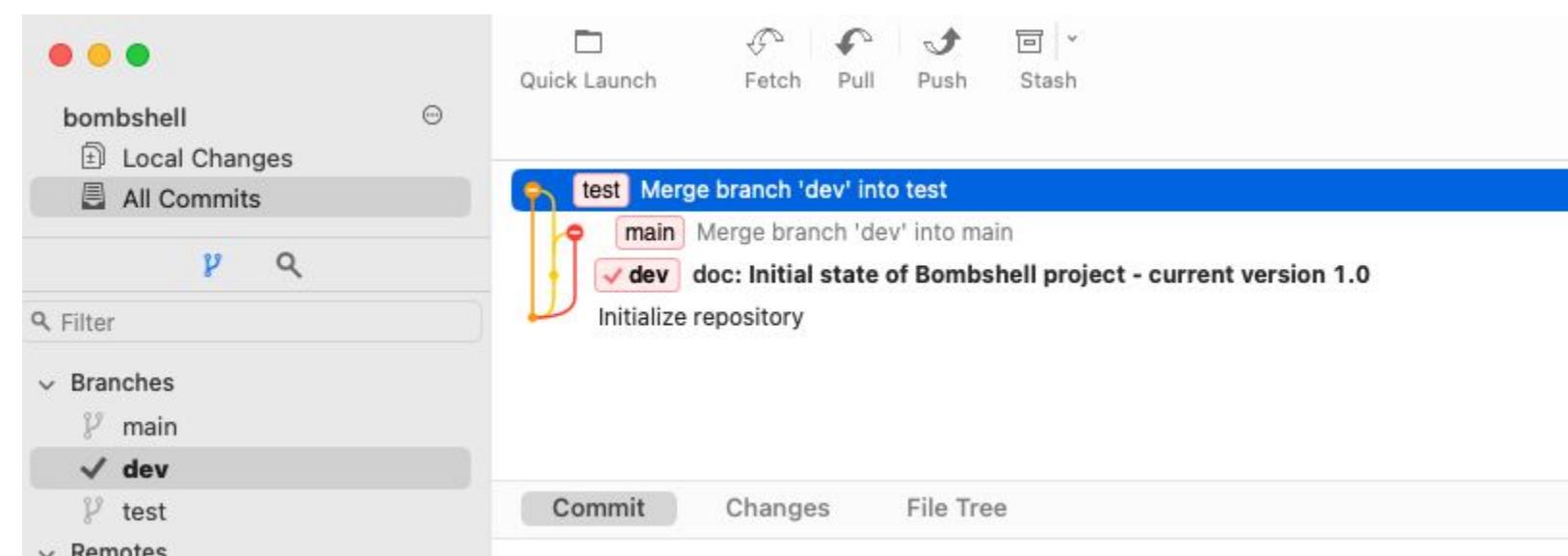
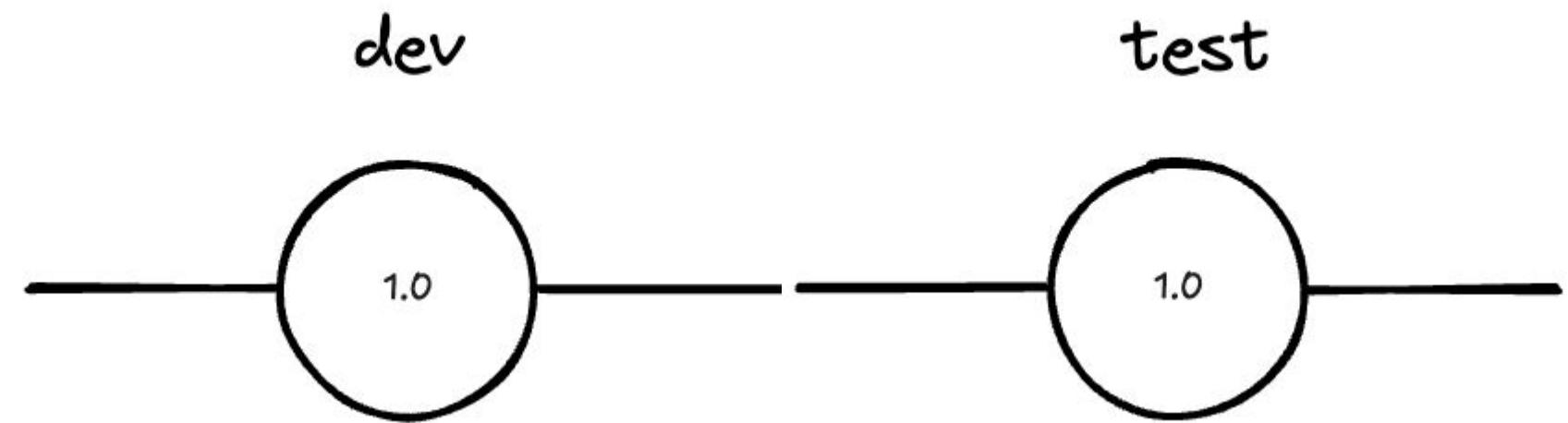
PARENTS: [7d84db8](#)

doc: Initial state of Bombshell project - current version 1.0

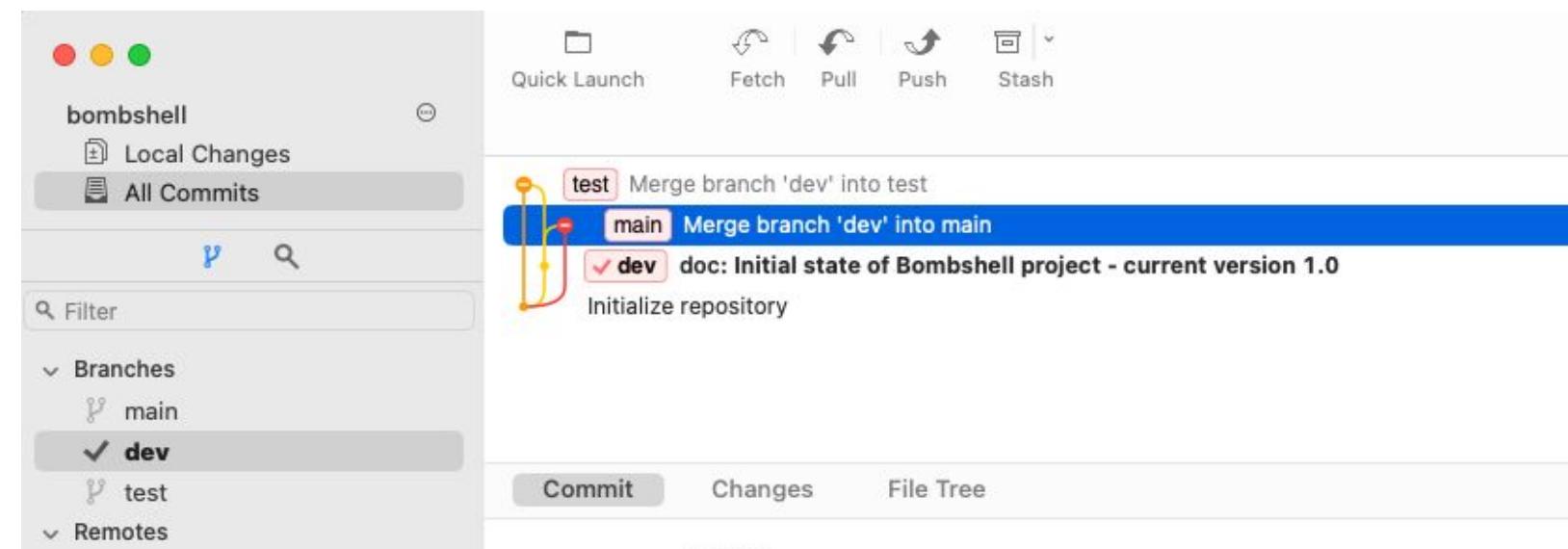
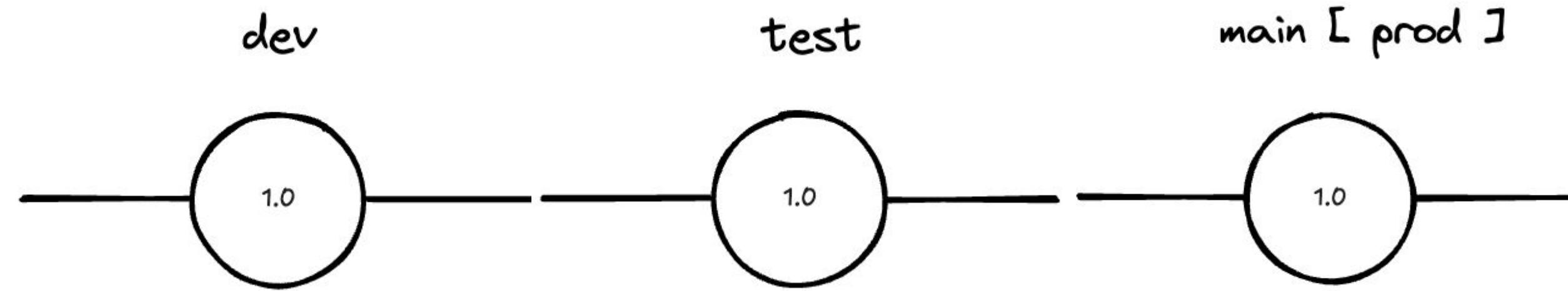
File Tree:

- ref_constraints
- sequences
- tables
- triggers
- views
- .gitignore
- readme.md

Merge dev into test



Merge dev into main [prod]

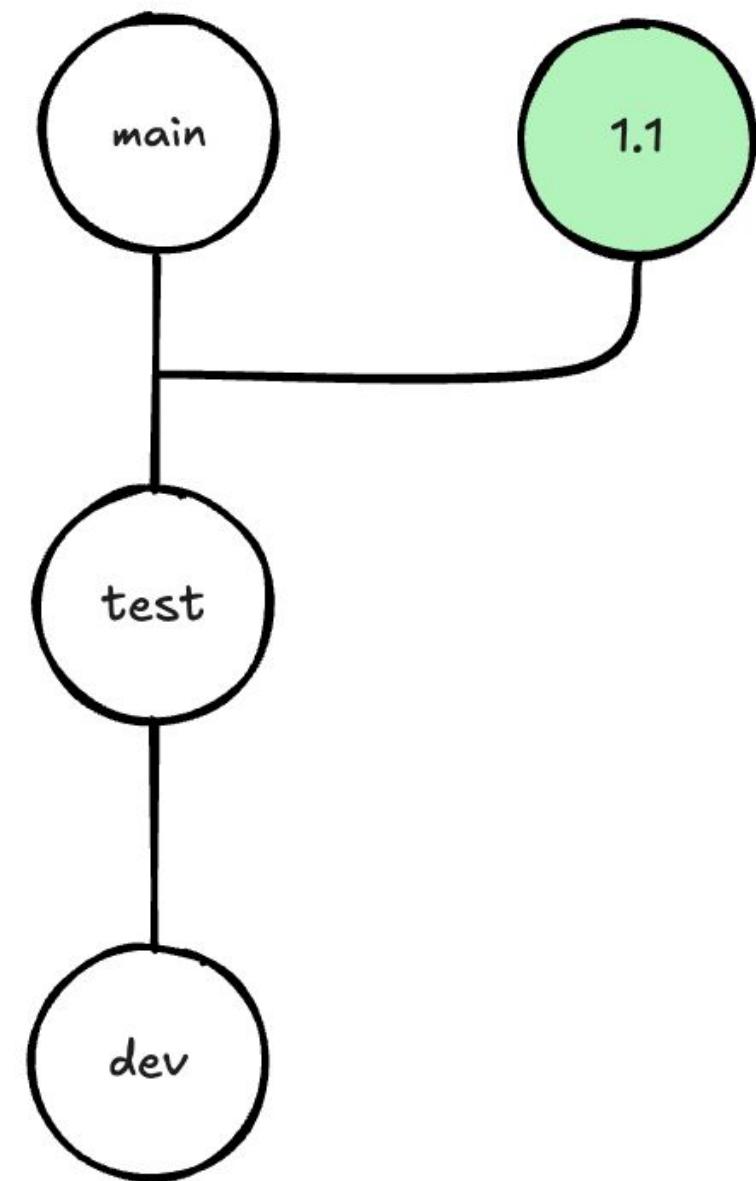


4.New development

[release 1.1]

Create new GIT branch [1.1]

1.0



Questions & Answers

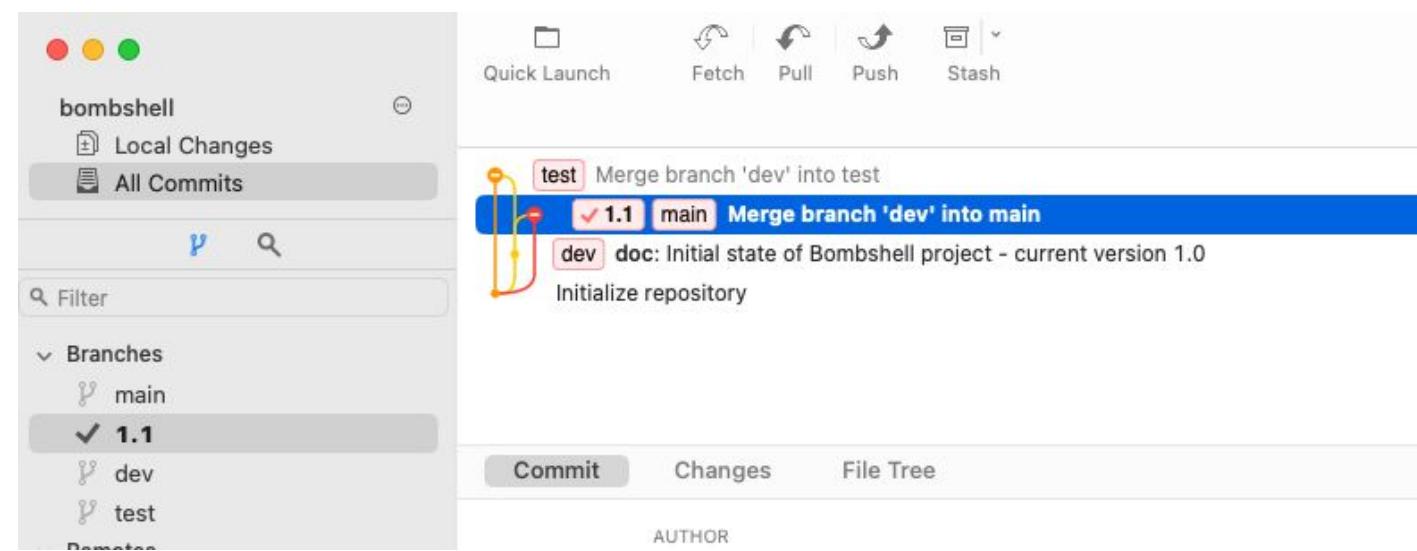
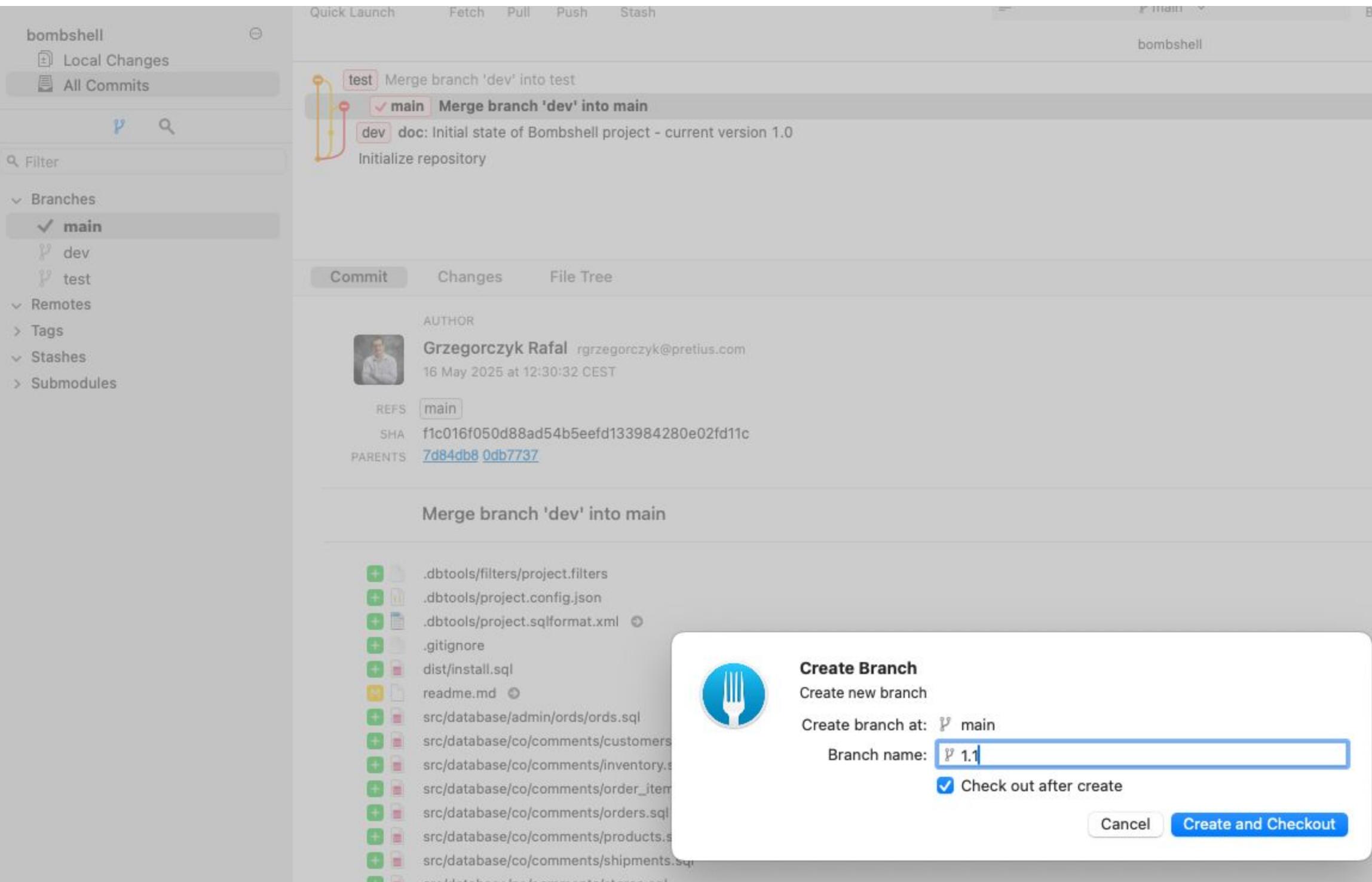
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release 1.1

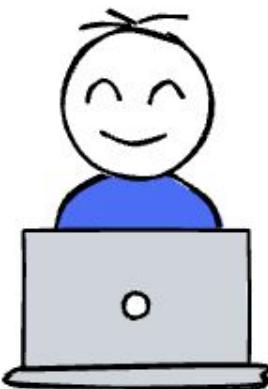


Developer RAFAL makes some changes on DEV

```
ALTER TABLE hr.employees ADD (
    phone_prefix VARCHAR2(10)
);
COMMENT ON COLUMN hr.employees.phone_prefix IS 'Phone number prefix';
```

```
CREATE OR REPLACE VIEW hr.v_emp_names_phones AS
SELECT e.first_name,
       e.last_name,
       e.phone_number,
       e.phone_prefix
FROM employees e;
```

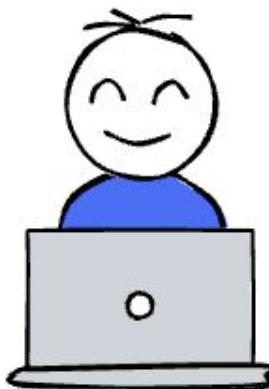
RAFAL



— RAHAL exports changes using SQLcl Project Export

```
> project export -objects HR.EMPLOYEES,HR.V_EMP_NAMES_PHONES
```

RAHAL



The screenshot shows the pretius IDE interface. On the left, there is a sidebar with the following icons and their corresponding numbers:

- SQL DEVELOPER (1)
- SQL SNIPPETS
- CONNECTIONS (3)
 - Priv
 - BOMBSHELL
 - DEVELOPMENT (4)
 - dev_admin
 - dev_co
 - dev_hr
 - dev_hr_john
 - dev_hr_rafal- REPORTS
- PROBLEMS
- OUTPUT
- DEBUG CONSOLE
- TERMINAL
- SCRIPT OUTPUT (selected)
- SQL HISTORY
- TASK MONITOR

The main area is a code editor titled "bombshell" containing the following SQL script:

```
ALTER TABLE hr.employees ADD ( Untitled-1 )  
1 ALTER TABLE hr.employees ADD (  
2 phone_prefix VARCHAR2(10)  
3 );  
4 COMMENT ON COLUMN hr.employees.phone_prefix IS 'Phone number prefix';  
5  
6 CREATE OR REPLACE VIEW hr.v_emp_names_phones AS  
7 SELECT e.first_name,  
8 e.last_name,  
9 e.phone_number,  
10 e.phone_prefix  
11 FROM employees e;
```

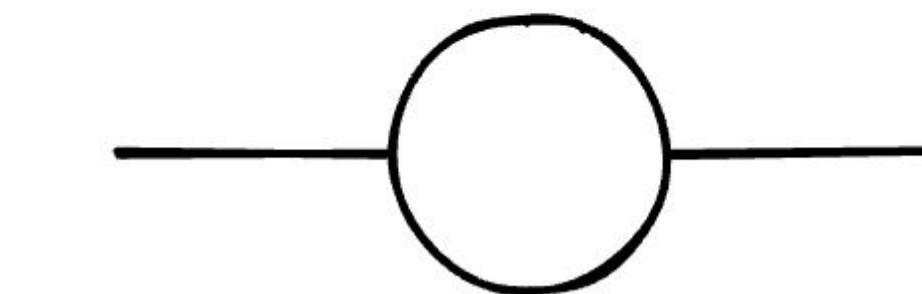
At the bottom, there is a status bar with the following information:

RAFAL
1 1.1* 0 0 Git Graph bombshell Ln 1, Col 1 (290 selected) Spaces: 2 UTF-8 LF {} PL/SQL (Dedicated) dev_hr_rafal

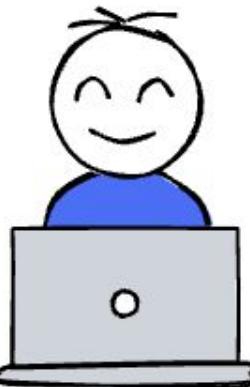
A cartoon character icon for "RAFAL" is also present in the bottom left corner.

RAFAL commits changes into GIT 1.1 branch

git commit



RAFAL



The screenshot shows a Git commit interface with the following details:

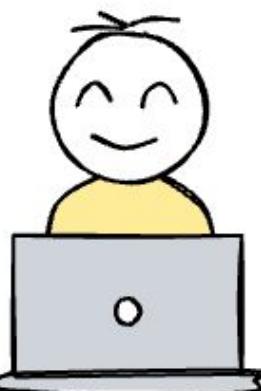
- Commit Message:** feature 1.1 [RAFAL] - Added phone prefix to employees
- Description:** Description
- Staged:** Unstage
- Files:** src/database/hr/comments/employees.sql, src/database/hr/tables/employees.sql, src/database/hr/views/v_emp_names_phones.sql
- Diff:** A diff view showing changes to the SQL file.
- Log:** Shows a log entry for 'feature 1.1 [RAFAL] - Added phone prefix to employees'.
- Branches:** main, 1.1
- Actions:** Amend, Commit 3 Files

```
@@ -39,2 +39,5 @@ comment
+comment on column hr.emplo
+'Phone number prefix'
+
CO
@@
new file mode 1
@@ -0,0 +1,
1 +create or r
2 + first_n
3 + last_na
4 + phone_n
5 + phone_p
6 +) as
7 + select
8 + e.first
9 + e.last_name,
10 + e.phone_number,
11 + e.phone_prefix
12 + from
13 + employees
14 +-- sqlcl_snapshot
15 +-- No newline at end of file
```

Developer JOHN makes some changes on DEV

```
CREATE TABLE CO.APPLICATION_PARAMS  
  (ID NUMBER GENERATED ALWAYS AS IDENTITY NOT NULL,  
   NAME VARCHAR2(20) UNIQUE,  
   VALUE VARCHAR2(20),  
   CONSTRAINT APPLICATION_PARAMS_PK PRIMARY KEY (ID)  
 );  
COMMENT ON COLUMN CO.APPLICATION_PARAMS.ID IS 'Unique ID';  
COMMENT ON COLUMN CO.APPLICATION_PARAMS.NAME IS 'Parameter name';  
COMMENT ON COLUMN CO.APPLICATION_PARAMS.VALUE IS 'Parameter value';
```

JOHN

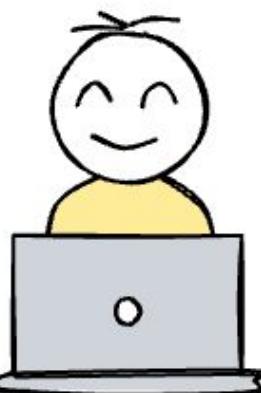


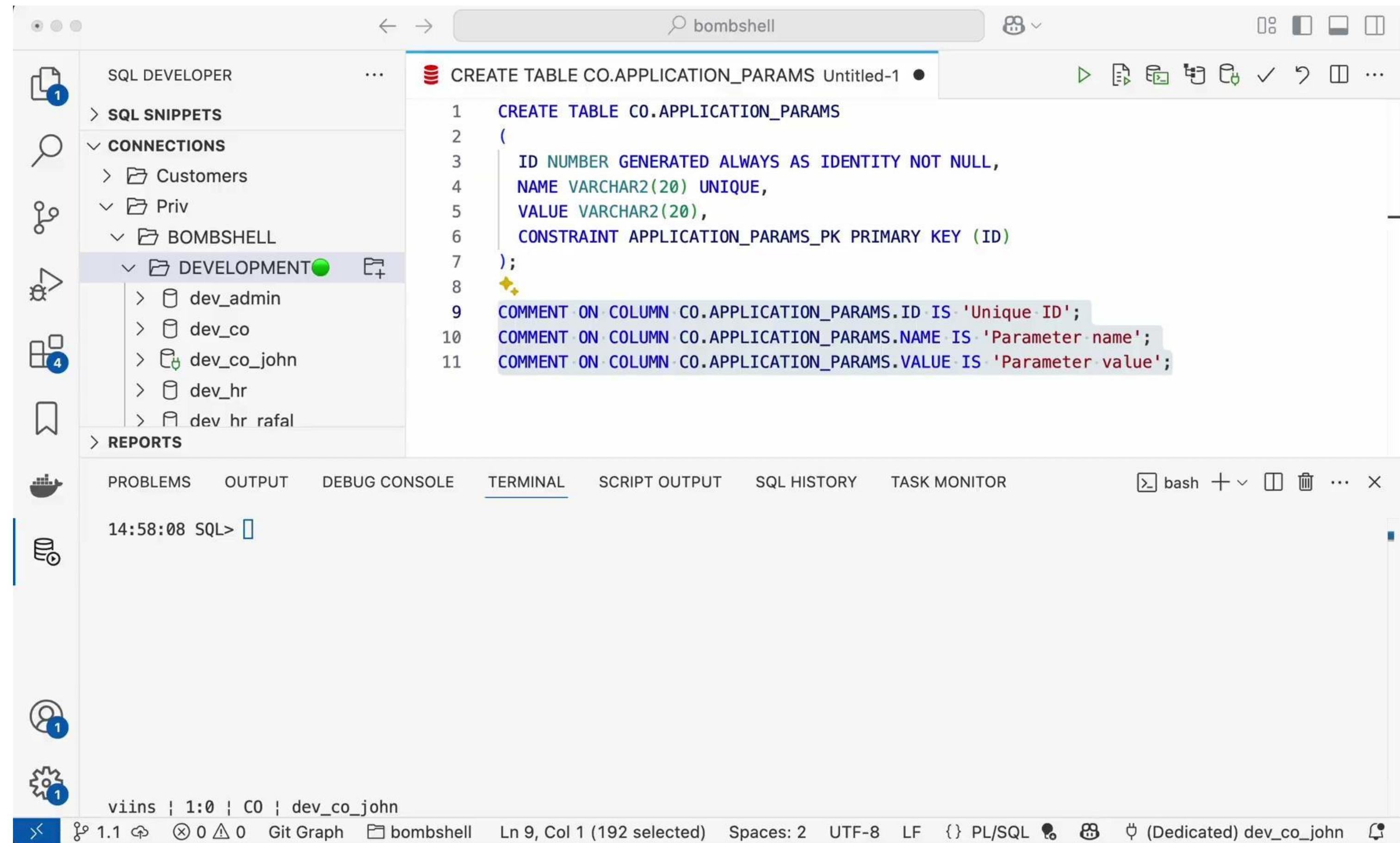
```
INSERT INTO CO.APPLICATION_PARAMS (NAME, VALUE) VALUES  
  ('support_email', 'hello@pretius.com');
```

— JOHN exports changes using SQLcl Project Export

```
> project export -objects CO.APPLICATION_PARAMS
```

JOHN





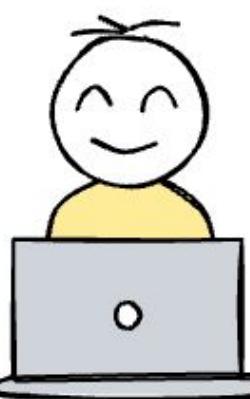
The screenshot shows the pretius IDE interface. On the left is a sidebar with various icons and sections: SQL DEVELOPER, SQL SNIPPETS, CONNECTIONS (Customers, Priv, BOMBSHELL, DEVELOPMENT), REPORTS, PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL, SCRIPT OUTPUT, SQL HISTORY, and TASK MONITOR. The DEVELOPMENT section under CONNECTIONS is currently selected. The main area is a code editor titled "CREATE TABLE CO.APPLICATION_PARAMS Untitled-1". The code is as follows:

```
1 CREATE TABLE CO.APPLICATION_PARAMS
2 (
3     ID NUMBER GENERATED ALWAYS AS IDENTITY NOT NULL,
4     NAME VARCHAR2(20) UNIQUE,
5     VALUE VARCHAR2(20),
6     CONSTRAINT APPLICATION_PARAMS_PK PRIMARY KEY (ID)
7 );
8
9 COMMENT ON COLUMN CO.APPLICATION_PARAMS.ID IS 'Unique ID';
10 COMMENT ON COLUMN CO.APPLICATION_PARAMS.NAME IS 'Parameter name';
11 COMMENT ON COLUMN CO.APPLICATION_PARAMS.VALUE IS 'Parameter value';
```

The bottom status bar shows the time as 14:58:08, the current file as "SQL>" (selected in the terminal tab), and other details like version 1.1, Git Graph, and file paths.

JOHN adds new IR in APEX app 101

JOHN



Bombshell App

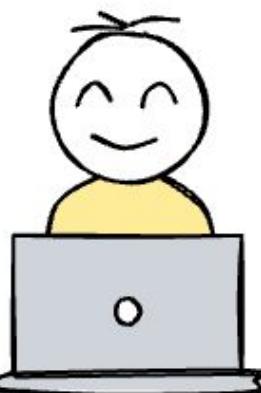
John's Report

Employee Id	First Name	Last Name	Email	Phone Number	Hire Date	Job Id	Salary	Commission Pct	Manager Id	Department Id	Phone Prefix
100	Steven	King	SKING	1.515.555.0100	6/17/2013	AD_PRES	24000			90	
101	Neena	Yang	NYANG	1.515.555.0101	9/21/2015	AD_VP	17000		100	90	
102	Lex	Garcia	LGARCIA	1.515.555.0102	1/13/2011	AD_VP	17000		100	90	
103	Alexander	James	AJAMES	1.590.555.0103	1/3/2016	IT_PROG	9000		102	60	
104	Bruce	Miller	BMILLER	1.590.555.0104	5/21/2017	IT_PROG	6000		103	60	
105	David	Williams	DWILLIAMS	1.590.555.0105	6/25/2015	IT_PROG	4800		103	60	
106	Valli	Jackson	VJACKSON	1.590.555.0106	2/5/2016	IT_PROG	4800		103	60	
107	Diana	Nguyen	DNGUYEN	1.590.555.0107	2/7/2017	IT_PROG	4200		103	60	
108	Nancy	Gruenberg	NGRUENBE	1.515.555.0108	8/17/2012	FI_MGR	12008		101	100	
109	Daniel	Faviet	DFAVIET	1.515.555.0109	8/16/2012	FI_ACCOUNT	9000		108	100	

JOHN also adds custom change on DEV

```
INSERT INTO CO.APPLICATION_PARAMS (NAME, VALUE) VALUES ('support_email', 'hello@pretius.com');
```

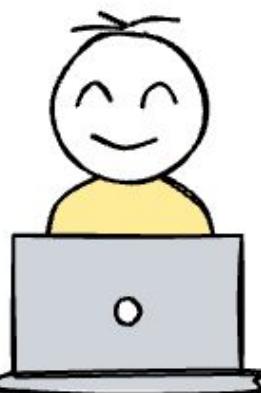
JOHN



JOHN adds custom file to SQLcl Project's stage

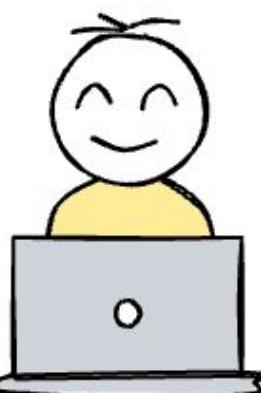
```
> project stage add-custom -file-name application_params_dml_1
```

JOHN

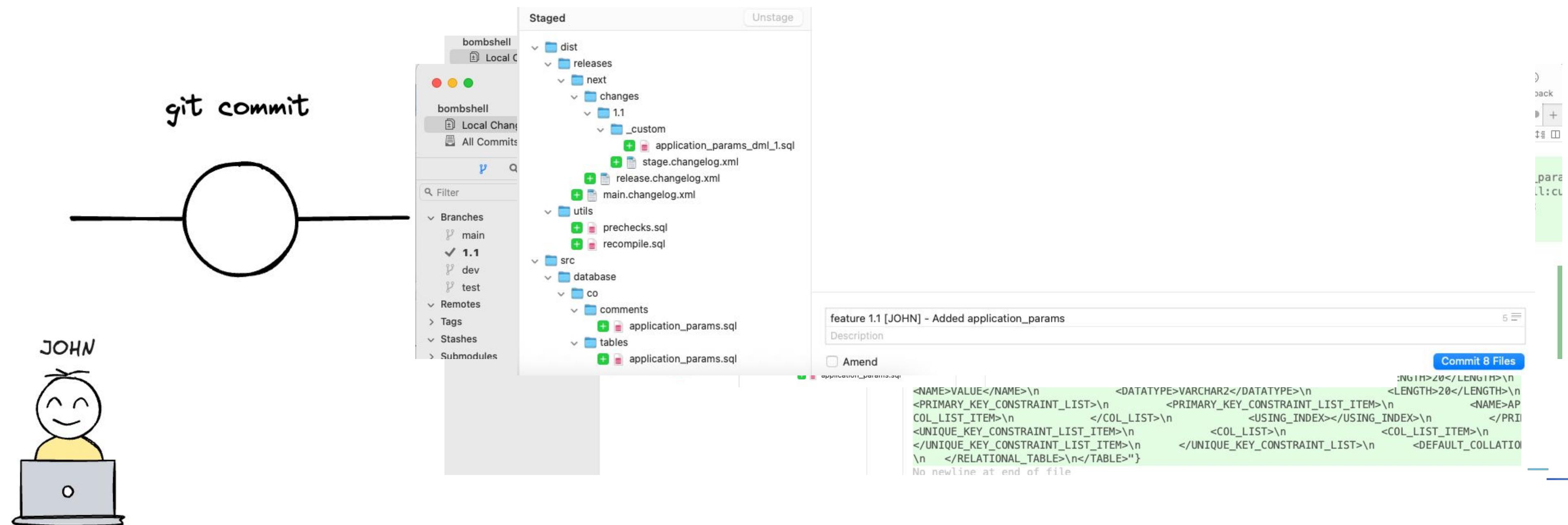


The screenshot shows the pretius IDE interface. On the left is a sidebar with icons for SQL DEVELOPER (1), SQL SNIPPETS, CONNECTIONS (2), REPORTS (4), and a database icon. The CONNECTIONS section is expanded, showing a 'Priv' folder containing a 'BOMBSHELL' folder which has a 'DEVELOPMENT' folder. Inside 'DEVELOPMENT' are connections: dev_admin (yellow), dev_co (yellow), dev_co_john (green), dev_hr (yellow), and dev_hr_rafal (yellow). Below 'DEVELOPMENT' is a 'PRODUCTION' folder with a red exclamation mark. At the top, a search bar contains 'bombshell'. The main area displays a script titled 'INSERT INTO CO.APPLICATION_PARAMS (NAME, Untitled-1)'. The first line of the script is: `1 INSERT INTO CO.APPLICATION_PARAMS (NAME, VALUE) VALUES ('support_email', 'hello@pretius.co'`. To the right of the script are several small icons. Below the main area are tabs: PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL, SCRIPT OUTPUT (underlined), SQL HISTORY, and TASK MONITOR. The bottom status bar includes icons for file operations, Git Graph, and a connection status for 'dev_co_john'.

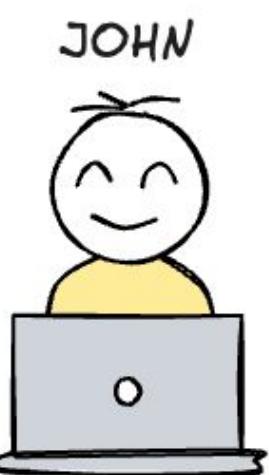
JOHN



JOHN commits changes into GIT 1.1 branch



Liquibase syntax is fully handled by SQLcl Project



The image shows three screenshots of the SQLcl interface, each displaying a different XML changelog file:

- Top Screenshot:** Shows the contents of `dist/releases/next/changes/1.1/stage.changelog.xml`. It includes an XML declaration, a databaseChangeLog element with namespaces and schemaLocation, and an include statement for `_custom/application_params_dml_1.sql`.
- Middle Screenshot:** Shows the contents of `dist/releases/next/release.changelog.xml`. It includes an XML declaration, a databaseChangeLog element with namespaces and schemaLocation, an include statement for `changes/1.1/stage.changelog.xml`, and an end tag for databaseChangeLog.
- Bottom Screenshot:** Shows the contents of `dist/releases/main.changelog.xml`. It includes an XML declaration, a databaseChangeLog element with namespaces and schemaLocation, an include statement for `next/release.changelog.xml`, and an end tag for databaseChangeLog. A note at the bottom right says "No newline at end of file".

The left sidebar of each screenshot shows a tree view of the project structure under "Unstaged", including `dist`, `releases`, `next`, `changes`, `1.1`, and `_custom` directories, along with files `application_params_dml_1.sql` and `stage.changelog.xml`.

5.Prepare for deployment of release 1.1

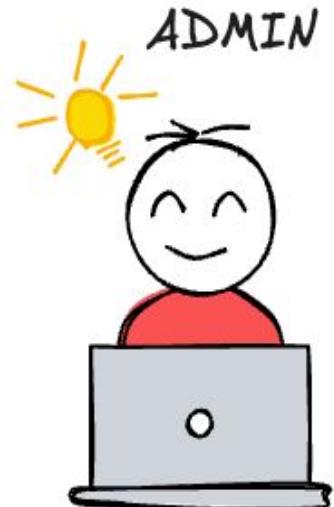
[DEV to TEST]

* Similar steps for deployment to any other environment

Export ALL database objects

```
> sql -name dev_admin  
> project export
```

- This step ensures you won't miss any changes that were omitted in GIT



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07:14:35 SQL> **project export**

The current connection DEVELOPMENT_HIGH ADMIN will be used for all operations

*** TABLES ***

*** PROCEDURES ***

*** SEQUENCES ***

*** VIEWS ***

*** INDEXES ***

*** TRIGGERS ***

*** COMMENTS ***

*** REF_CONSTRAINTS ***

*** APEX_APPLICATIONS ***

Exporting Workspace BOMBSHELL - application 101:Bombshell App

<u>APEX_APPLICATION</u>	1
COMMENT	15
INDEX	18
PROCEDURE	2
REF_CONSTRAINT	19
SEQUENCE	3
TABLE	15
TRIGGER	2
VIEW	6

Exported 81 objects

Elapsed 74 sec

07:16:06 SQL> ■





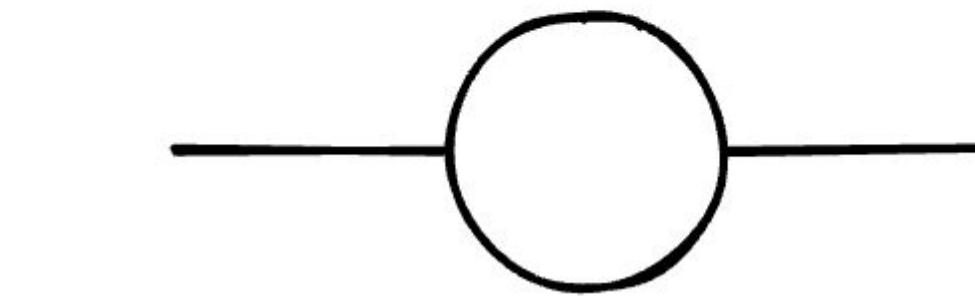
Unstaged Stage

src/database/hr/apex_apps/f101/readable/application/pages/p00001.yaml

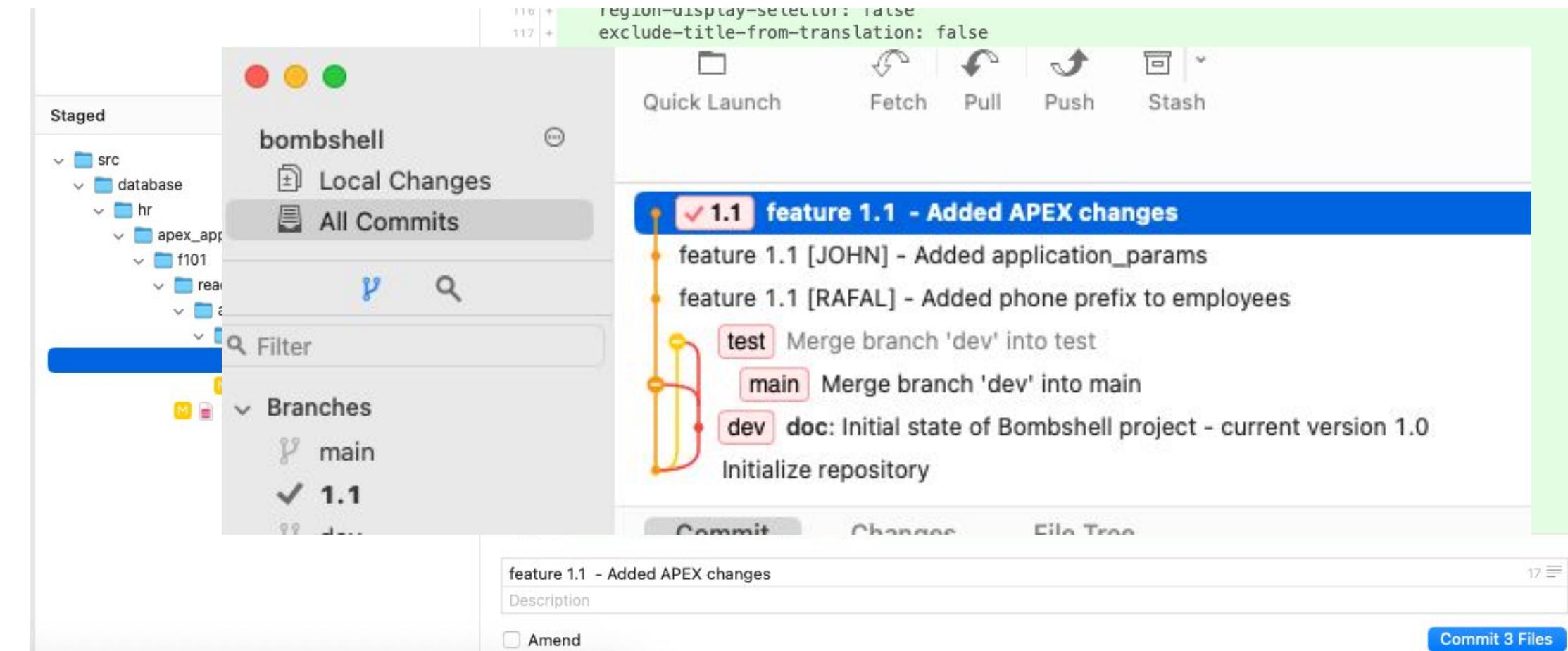
```
@@ -1,80 +80,646 @@ regions:  
1 80  
81 + # ===== Region: John's Report =====  
82 + id: 15709240491311201  
83 + identification:  
84 + name: John's Report  
85 + type: Interactive Report  
86 +  
87 + source:  
88 + location: Local Database  
89 + type: Table / View  
90 + table-owner: Parsing Schema  
91 + table-name: EMPLOYEES  
92 + include-rowid-column: false  
93 +  
94 + layout:  
95 + sequence: 10  
96 + parent-region: No Parent  
97 + slot: BODY  
98 + start-new-layout: false  
99 + start-new-row: true  
100 + column: Automatic  
101 + new-column: true  
102 + column-span: Automatic  
103 +  
104 + appearance:  
105 + template: Standard  
106 + template-options:  
107 + - '#DEFAULT#'  
108 + - t-Region--scrollBody  
109 + render-components: Above Content  
110 +  
111 + accessibility:  
112 + use-landmark: true  
113 + landmark-type: Template Default  
114 +  
115 + advanced:
```

ADMIN commits extra changes into GIT 1.1 branch

git commit



ADMIN



Project Stage

- Automatically **generates Liquibase changelogs/changesets** from all source and custom SQL files.
- Compares the current branch **(1.1)** with the target branch **(test)** to create changelogs that apply the necessary database updates.
- Organizes the output into a well-structured folders and files in a **/dist/** directory.



Project Stage

> project **stage -branch-name** test

Parameters:

- “-branch-name” - (optional) branch name for comparison.

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The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. On the left is the Explorer sidebar, which displays a project structure under the 'BOMBSHELL' folder. The structure includes '.dbtools', 'dist', 'src', '.gitignore', and 'readme.md'. Below the Explorer is the Outline view, which is currently collapsed. The main workspace contains a terminal window with the following content:

```
16:38:24 SQL> project stage -branch-name test
```

At the bottom of the terminal window, there is a status bar with the following information:

viins | 1:31 | ADMIN | dev_admin

On the far left, there is a vertical sidebar with icons and a user profile section labeled 'ADMIN'. The icons include a sun, a person at a laptop, a gear, and a mail icon with a '1'. The user profile shows a cartoon character with a sun above their head.

Project Stage

- Review generated files and change order of custom changelogs if required



The screenshot shows a code editor interface with the following details:

- EXPLORER** pane on the left showing the project structure:
 - BOMBSHELL**: .dbtools, dist, releases (apex, next), changes/1.1 (_custom, co, hr)
 - stage.changelog.xml (selected)
 - release.changelog.xml
- Editor** pane on the right showing the XML content of `stage.changelog.xml`:

```
dist > releases > next > changes > 1.1 > stage.changelog.xml
1  <?xml version="1.0" encoding="UTF-8"?>
2  <databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3  xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
4  http://www.liquibase.org/xml/ns/dbchangelog-dbchangelog-4.3.xsd">
5
6  <include file="_custom/application_params_dml_1.sql" relativeToChangelogFile="true"/>
7  <include file="hr/tables/employees.sql" relativeToChangelogFile="true"/>
8  <include file="hr/views/v_emp_names_phones.sql" relativeToChangelogFile="true"/>
9  <include file="co/tables/application_params.sql" relativeToChangelogFile="true"/>
10 <include file="co/comments/application_params.sql" relativeToChangelogFile="true"/>
11 <include file="hr/comments/employees.sql" relativeToChangelogFile="true"/>
12
13 </databaseChangeLog>
```

A blue rectangular selection highlights the line containing the first include statement (line 6). A green vertical bar is positioned to the left of line 6, and a dotted blue arrow points from the end of line 6 down towards the bottom of the code editor.

Project Stage

- Review generated files and change order of custom changelogs if required



The screenshot shows a file explorer interface with the following structure:

- EXPLORER**:
 - BOMBSHELL**:
 - .dbtools
 - dist
 - releases
 - apex
 - next
 - changes/1.1
 - _custom
 - co
 - hr

The current file being edited is `stage.changelog.xml`, which contains the following XML code:

```
</> stage.changelog.xml M ●  
dist > releases > next > changes > 1.1 > </> stage.changelog.xml  
1   <?xml version="1.0" encoding="UTF-8"?>  
2   <databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
3   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  
4   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog  
5   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  
6   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  
6   <include file="hr/tables/employees.sql" relativeToChangelogFile="true"/>  
7   <include file="hr/views/v_emp_names_phones.sql" relativeToChangelogFile="true"/>  
8   <include file="co/tables/application_params.sql" relativeToChangelogFile="true"/>  
9   <include file="co/comments/application_params.sql" relativeToChangelogFile="true"/>  
10  <include file="hr/comments/employees.sql" relativeToChangelogFile="true"/>  
11  <include file="_custom/application_params_dml_1.sql" relativeToChangelogFile="true"/>  
12  |  
12  |<include file="hr/tables/employees.sql" relativeToChangelogFile="true"/>  
13  |</databaseChangeLog>  
14
```

Project Stage - commit [GIT branch 1.1]

The screenshot shows a Git commit interface with the following details:

- Unstaged:** A file named `stage.changelog.xml` is shown with two new lines added:

```
@@ -5,2 +5,7 @@
      http://www.liquibase.org/xml/ns/dbchangelog.xml
+<include file="hr/tables/employees.sql" relativeToChangelogEnd="true"/>
+<include file="hr/views/v_emp_names_phones.sql" relativeToChangelogEnd="true"/>
```
- Staged:** A commit titled "feature 1.1 - staged changes" is being prepared. The commit message is "feature 1.1 - staged changes".
- Commit Buttons:** "Commit 10 Files" and "Amend" buttons are visible.
- File Tree:** The commit includes 10 files:
 - `dist/releases/apex/apex.changelog.xml` (new)
 - `dist/releases/apex/f101/f101.sql` (new)
 - `dist/releases/apex/f101/f101.xml` (new)
 - `dist/releases/main.changelog.xml` (modified)
 - `dist/releases/next/changes/1.1/co/comments/application_params.sql` (new)
 - `dist/releases/next/changes/1.1/co/tables/application_params.sql` (new)
 - `dist/releases/next/changes/1.1/hr/comments/employees.sql` (new)
 - `dist/releases/next/changes/1.1/hr/tables/employees.sql` (new)
 - `dist/releases/next/changes/1.1/hr/views/v_emp_names_phones.sql` (new)
 - `dist/releases/next/changes/1.1/stage.changelog.xml` (modified)
- Author:** Grzegorczyk Rafal (rgrzegorczyk@pretius.com) on 22 May 2025 at 09:59:59 CEST.
- Refs:** Branch 1.1.
- SHA:** 5c993c570beb131f609cec9286c62d2152d4dd9d
- Parents:** 18770e2

ADMIN is written above a cartoon character icon in the bottom left corner.

6.Create release [1.1]

Project Release

- Transitions current work set into a released state and initiates a fresh set of work
- The `release` command renames the contents of `dist/next` directory to the specified version number
- Afterwards, it generates a new `next` folder inside `dist`
- Once the code is moved into a release, it must not be altered.

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Project Release

```
> project release -version 1.1 -verbose
```

Parameters:

- “-version” - specify the version to label release
- “-verbose” - (optional) show extra details about current process.



The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. The title bar includes a search bar with the text "bombshell" and a user icon. The left sidebar features an "EXPLORER" view with a tree structure showing a project named "BOMBSHELL" containing ".dbtools", "dist", "src", ".gitignore", and "readme.md". Below the Explorer is an "OUTLINE" view. The main area contains a terminal window with the following content:

```
10:21:19 SQL> project release -version 1.1 -verbose
```

At the bottom of the screen, there is a status bar with the following information:

ADMIN
viins | 1:37 | ADMIN | dev_admin

1.1 ↗ 0 ⚠ 0 Git Graph bombshell

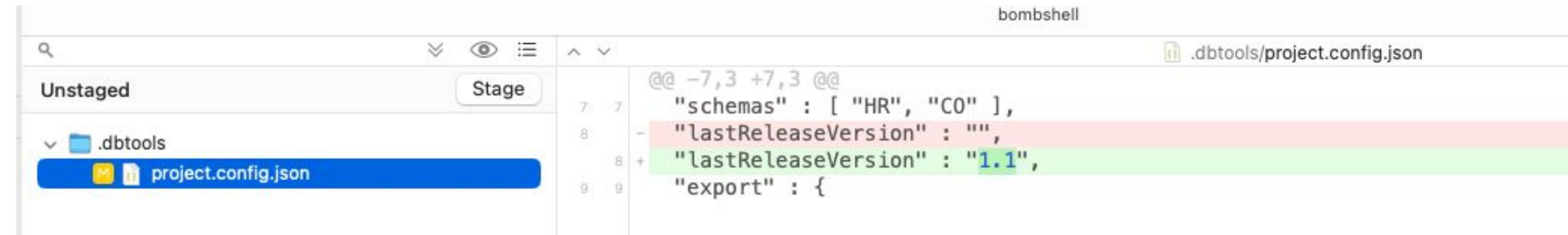
Several files and folders were created/changed:

```
10:21:19 SQL> project release -version 1.1 -verbose
Creating a release version 1.1 for the current body of work

Updated change:dist/releases/main.changelog.xml
Moved folder "dist/releases/next" to "dist/releases/1.1"
Created file: dist/releases/next
Created change:dist/releases/next/release.changelog.xml
Created change:dist/releases/next/release.changelog.xml
Created file: bombshell/.dbtools/project.config.json
Process completed successfully
10:21:28 SQL>
```



Version was changed in `project.config.json`



bombshell

.dbtools/project.config.json

Unstaged	Stage
.dbtools	
project.config.json	

```
@@ -7,3 +7,3 @@
"schemas" : [ "HR", "CO" ],
- "lastReleaseVersion" : "",
+ "lastReleaseVersion" : "1.1",
"export" : {
```



Updated dist/releases/main.changelog.xml

```
dist/releases/main.changelog.xml
@@ -5,4 +5,5 @@
      http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
- <include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
+ <include file="1.1/release.changelog.xml" relativeToChangelogFile="true"/>
- <include file="apex/apex.changelog.xml" relativeToChangelogFile="true"/>
+ <include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
</databaseChangeLog>
```



Created dist/releases/1.1/release.changelog.xml

The screenshot shows a diff tool interface comparing two XML files. The top file is 'dist/releases/main.changelog.xml' and the bottom file is 'dist/releases/1.1/release.changelog.xml'. A blue box highlights the title of the bottom file. A blue arrow points from the bottom file's title to the corresponding line in the top file.

```
diff --git a/dist/releases/main.changelog.xml b/dist/releases/1.1/release.changelog.xml
@@ -5,4 +5,5 @@
 http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
-<include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
+<include file="1.1/release.changelog.xml" relativeToChangelogFile="true"/>
-<include file="apex/apex.changelog.xml" relativeToChangelogFile="true"/>
+<include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
</databaseChangeLog>
```



```
@@ -0,0 +1,8 @@
+<?xml version="1.0" encoding="UTF-8"?>
+<databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
+                     xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
+                     xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
+                                         http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
+<!--CHANGES-->
+<include file="changes/1.1/stage.changelog.xml" relativeToChangelogFile="true"/>
+</databaseChangeLog>
```



Created dist/releases/1.1/changes/1.1/stage.changelog.xml

The terminal window shows the command:

```
dist/releases/1.1/stage.changelog.xml
```

The output is:

```
@@ -0,0 +1,8 @@
+<?xml version="1.0" encoding="UTF-8"?>
+<databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
+    xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
+    xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
+        http://www.liquibase.org/xml/ns/dbchangelog-dbchangelog-4.3.xsd">
+<!--CHANGES-->
+<include file="changes/1.1/stage.changelog.xml" relativeToChangelogFile="true"/>
+</databaseChangeLog>
```

The commit interface shows the staged changes:

```
dist/releases/1.1/stage.changelog.xml
```

The commit message is:

new file mode 100755

```
@@ -0,0 +1,12 @@
+<?xml version="1.0" encoding="UTF-8"?>
+<databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
+    xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
+    xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
+        http://www.liquibase.org/xml/ns/dbchangelog-dbchangelog-4.3.xsd">
+<include file="hr/tables/employees.sql" relativeToChangelogFile="true"/>
+<include file="hr/views/v_emp_names_phones.sql" relativeToChangelogFile="true"/>
+<include file="co/tables/application_params.sql" relativeToChangelogFile="true"/>
+<include file="co/comments/application_params.sql" relativeToChangelogFile="true"/>
+<include file="hr/comments/employees.sql" relativeToChangelogFile="true"/>
+<include file="_custom/application_params_dml_1.sql" relativeToChangelogFile="true"/>
+</databaseChangeLog>
```

The file browser shows the directory structure:

- Unstaged
- Stage
- .dbtools
- dist
- releases
- 1.1
- changes
- 1.1
- _custom
- co
- hr

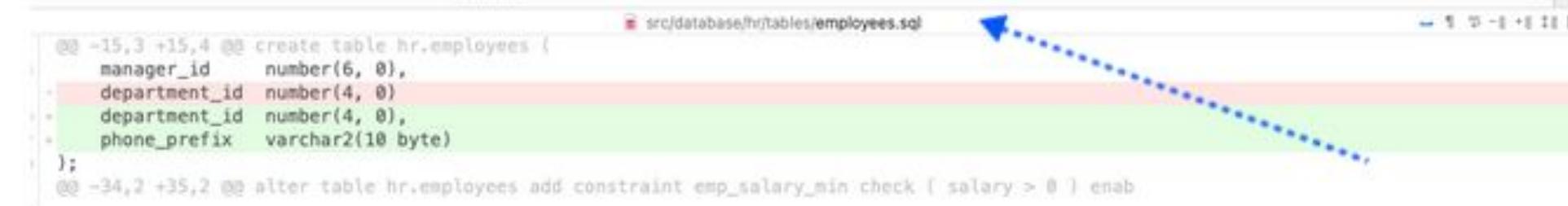
A new file "stage.changelog.xml" is being added.

ADMIN

A cartoon character icon with a sun and a laptop.

Do you remember this slide?

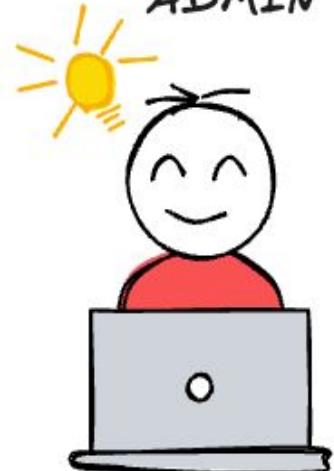
RAFAL commits changes into GIT 1.1 branch



```
diff --git a/src/database/hr/tables/employees.sql b/src/database/hr/tables/employees.sql
@@ -15,3 +15,4 @@ create table hr.employees (
     manager_id    number(6, 0),
     department_id number(4, 0)
-    department_id number(4, 0),
-    phone_prefix  varchar2(10 byte)
+);
@@ -34,2 +35,2 @@ alter table hr.employees add constraint emp_salary_min check ( salary > 0 ) enab
```



ADMIN



SQLcl Project automatically created necessary DDL:

The screenshot shows the SQLcl IDE interface. On the left, the Explorer pane displays a project structure under 'BOMBSHELL' with folders like '.dbtools', 'dist', 'releases', '1.1', 'changes/1.1', '_custom', 'co', 'hr', 'comments', and 'tables'. A file named 'employees.sql' is selected in the Explorer. On the right, the main editor pane shows the contents of 'employees.sql'. The code includes a Liquibase formatted SQL changeset for the 'hr.employees' table, specifically adding a 'phone_prefix' column of type VARCHAR2(10). The code is annotated with comments: '-- liquibase formatted sql', '-- changeset HR:1747665513507 stripComments:false logica', '-- sqlcl_snapshot src/database/hr/tables/employees.sql:1', 'alter table hr.employees add (', ' phone_prefix varchar2(10)', ')', '/'. A blue arrow points from the code editor back towards the Explorer pane, indicating the automatic generation of the DDL.

ADMIN

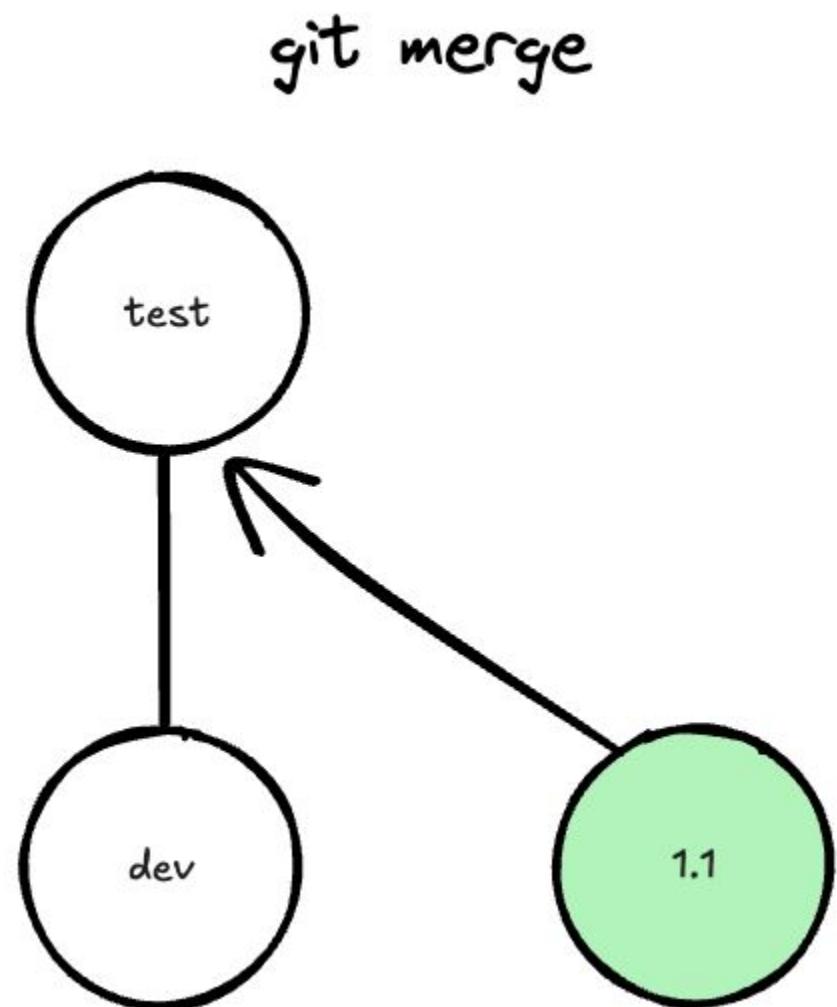
```
src/database/hr/tables/employees.sql
@@ -15,3 +15,4 @@ create table hr.employees (
 15   manager_id      number(6, 0),
 16 - department_id  number(4, 0)
 16 + department_id  number(4, 0),
 17 + phone_prefix   varchar2(10 byte)

EXPLORER
... dist > releases > 1.1 > changes > 1.1 > hr > tables > employees.sql > ...
... .dbtools
... dist
... releases
... 1.1
... changes/1.1
... _custom
... co
... hr
... comments
... tables
... employees.sql R
```

```
employees.sql R X
-- liquibase formatted sql
-- changeset HR:1747665513507 stripComments:false logica
-- sqlcl_snapshot src/database/hr/tables/employees.sql:1
alter table hr.employees add (
    phone_prefix varchar2(10)
)
/
10
```

Merge 1.1 into test

- Merge 1.1 into test
- Merge 1.1 into dev as well



Merge 1.1 into test

The screenshot shows a Git commit interface with the following details:

- Staged:** .dbtools, dist/releases/1.1/changes/1.1/_custom/application_params_dml_1.sql, dist/releases/1.1/changes/1.1/co/comments/application_params.sql, dist/releases/1.1/changes/1.1/tables/application_params.sql, dist/releases/1.1/hr/comments/employees.sql, dist/releases/1.1/hr/tables/employees.sql, dist/releases/1.1/views/v_emp_names_phones.sql, dist/releases/1.1/stage.changelog.xml, dist/releases/1.1/release.changelog.xml, apex/f101/f101.sql, apex/f101/f101.xml, apex/apex.changelog.xml, next/changes/1.1/stage.changelog.xml, next/changes/1.1/release.changelog.xml, next/main.changelog.xml, utils/prechecks.sql.
- Merge branch '1.1' into test**
- Description:** (empty)
- Amend:**
- Commit 26 Files**

7. Generate artifact

Project Gen-Artifact

- Generates an artifact representing the current state of your project.

```
> sql -name test_admin
```

```
> project gen-artifact -name test -version 1.1 -verbose
```

Questions & Answers

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Parameters (most used)

- "-name" - custom name (I named it with my target environment)
- "-version" - artifact version (use release version)



The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. The title bar includes the pretius logo, a search bar with the text "bombshell", and several status icons. The left sidebar features the Explorer view, which is expanded to show the contents of a folder named "BOMBSHELL". Inside "BOMBSHELL", there are subfolders ".dbtools", "dist", and "src", along with files ".gitignore" and "readme.md". Below the Explorer is the Outline view, which is currently collapsed. The main workspace contains a large, semi-transparent watermark of a bomb with a lit fuse. At the bottom of the screen is a terminal window. The tab bar at the top of the terminal indicates it is a "bash" terminal. The terminal output shows the command: "13:47:29 SQL> project gen-artifact -name test -version 1.1". The status bar at the bottom displays the user "viins", the session time "1:44", the profile "ADMIN", and the name "dev_admin". A small icon of a person with a sunburst above their head is labeled "ADMIN". The bottom navigation bar includes icons for file operations like back, forward, and search, as well as links for "1.1", "Git Graph", and the current folder "bombshell".

8.Deploy [1.1]

[DEV to TEST]

Project Deploy

- Deploys the artifact on a target database (TEST database, deployed from GIT branch 1.1)

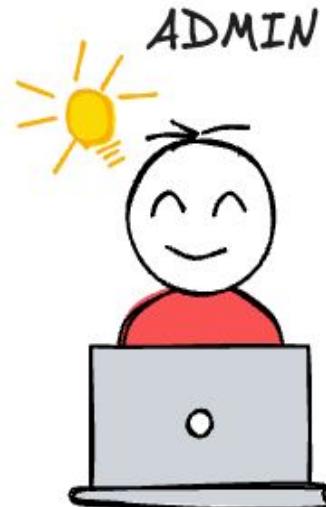
```
> sql -name test_admin
```

```
> project deploy -file artifact/test-1.1.zip
```

Parameters

- “-file” - location of artifact file





A screenshot of the Bombshell IDE interface. The top navigation bar shows the title "bombshell". The left sidebar contains icons for Explorer, Search, Task, Terminal, and Database. The Explorer section shows a project named "BOMBSHELL" with subfolders ".dbtools", "artifact" (which is selected), "dist", "src", and ".gitignore". The Terminal tab is active, showing the command "16:13:43 SQL> project deploy -file artifact/test-1.1.zip". The bottom status bar shows "emacs | 1:42 | ADMIN | test_admin".

Questions & Answers
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Verify TEST after deployment

The image shows the SQL Developer interface. On the left, the connection tree is visible, showing the 'test_co' connection expanded, with the 'TEST' folder selected. Inside 'TEST', 'Tables' is expanded, and 'APPLICATION_PARAMS' is selected. The table structure is shown with columns: ID, NAME, and VALUE.

The main workspace displays the 'APPLICATION_PARAMS' table from the 'test_co' connection. The table has one row:

ID	NAME	VALUE
1	support_email	hello@pretius.com

Below the table are standard database operation buttons: Insert, Export, Delete Selected, Commit, Undo All, and a SQL editor.

ADMIN is written vertically next to the user icon.

Verify TEST after deployment

SQL DEVELOPER

...

> SQL SNIPPETS

✓ CONNECTIONS

✓ Priv

✓ BOMBSHELL

✓ TEST

> test_admin

> test_co

> test_hr

✓ Tables

> COUNTRIES

> DATABASECHANGELOG

> DATABASECHANGELOGLOCK

> DATABASECHANGELOG_ACTIONS

> DEPARTMENTS

✓ EMPLOYEES

EMPLOYEE_ID
FIRST_NAME
LAST_NAME
EMAIL
PHONE_NUMBER
HIRE_DATE

EMPLOYEES X

test_hr > object > HR > TABLE > EMPLOYEES

Columns Data JSON Schema Constraints Grants
Triggers Flashback Dependencies Details Partitic
SQL

	COLUMN_NAME	DATA_TYPE
1	EMPLOYEE_ID	NUMBER(6,0)
2	FIRST_NAME	VARCHAR2(20 BYTE)
3	LAST_NAME	VARCHAR2(25 BYTE)
4	EMAIL	VARCHAR2(25 BYTE)
5	PHONE_NUMBER	VARCHAR2(20 BYTE)
6	HIRE_DATE	DATE
7	JOB_ID	VARCHAR2(10 BYTE)
8	SALARY	NUMBER(8,2)
9	COMMISSION_PCT	NUMBER(2,2)
10	MANAGER_ID	NUMBER(6,0)
11	DEPARTMENT_ID	NUMBER(4,0)
12	PHONE_PREFIX	VARCHAR2(10 BYTE)



Verify TEST after deployment

SQL DEVELOPER

... 

> SQL SNIPPETS

▽ CONNECTIONS

- ▽ Priv
- ▽ BOMBSHELL
- ▽ TEST 
- ▽ test_hr 
- ▽ Views

> **V_EMP_NAMES_PHONES** 

> Duality Views

> Indexes

> Packages

> Procedures

 ADMIN

V_EMP_NAMES_PHONES 

test_hr > object > HR > VIEW > V_EMP_NAMES_PHONES

Columns Data JSON Schema Grants Dependencies Details

Triggers SQL Errors

	COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT
1	FIRST_NAME	VARCHAR2(20)	Yes	(null)
2	LAST_NAME	VARCHAR2(25)	No	(null)
3	PHONE_NUMBER	VARCHAR2(20)	Yes	(null)
4	PHONE_PREFIX	VARCHAR2(10)	Yes	(null)

Liquibase - tracking table



ID	AUTHOR	FILENAME	DATEEXECUTED
1	HR	1.1/hr/tables/employees.sql	22/05/25 14:15:21.111
2	HR	1.1/hr/views/v_emp_names_phones.sql	22/05/25 14:15:23.336
3	CO	1.1/co/tables/application_params.sql	22/05/25 14:15:26.138
4	co	1.1/co/comments/application_params.sql	22/05/25 14:15:29.005
5	hr	1.1/hr/comments/employees.sql	22/05/25 14:15:34.786
6	Sqlcl	1.1/_custom/application_params_dml_1.sql	22/05/25 14:15:36.978
7	INSTALL_101	releases/apex/f101/f101.xml	22/05/25 14:16:06.526

We've just deployed
release 1.1 to TEST but....

What if production is on fire?



Issue on production

```
Error starting at line : 1 in command -
Insert into HR.JOBS (JOB_ID,JOB_TITLE,MIN_SALARY,MAX_SALARY)
values ('APEX','Oracle APEX Professional Certified APEX Low-Code Pretius Developer',20080,40000)
Error at Command Line : 2 Column : 16
Error report -
SQL Error: ORA-12899: value too large for column "HR"."JOBS"."JOB_TITLE" (actual: 66, maximum: 35)
```

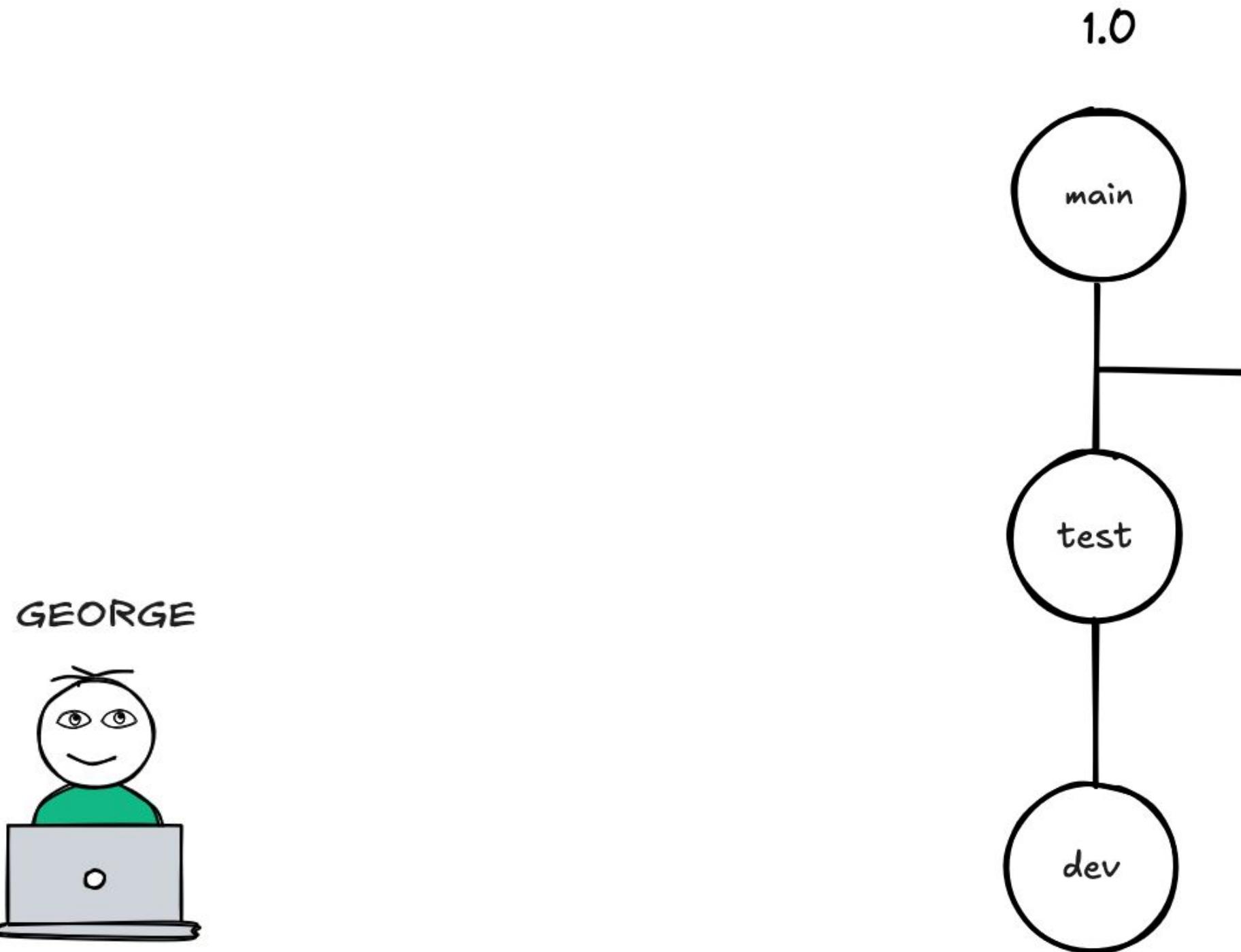
Questions & Answers

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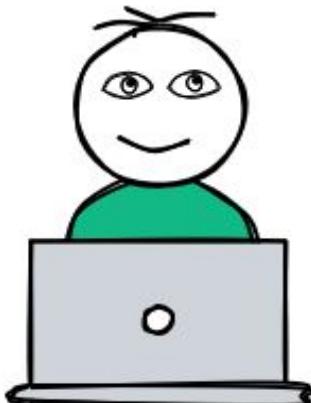
Create new GIT branch [fix-1.0] and switch to it



Prepare a fix on DEV environment

```
ALTER TABLE hr.jobs MODIFY job_title varchar2(100);
```

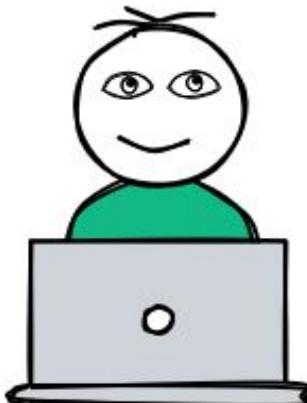
GEORGE



Export changes using SQLcl Project Export

```
> project export -objects HR.JOB$
```

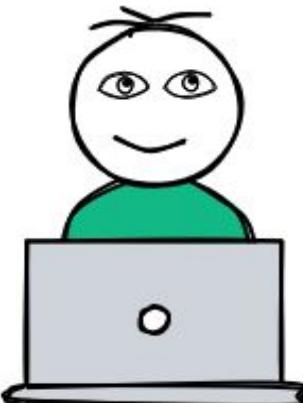
GEORGE



Export changes using SQLcl Project Export

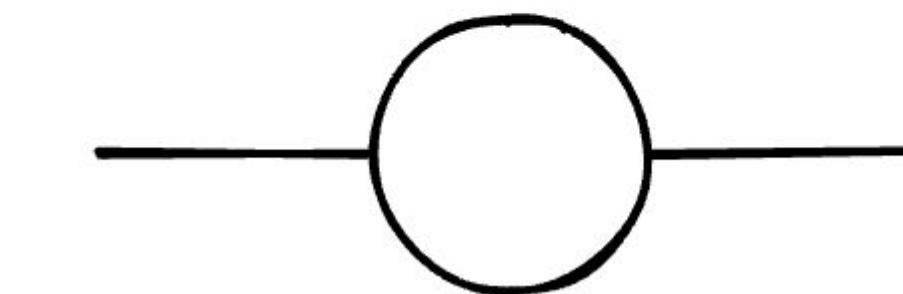
```
14:17:55 SQL> project export -objects HR.JOB$  
The current connection DEVELOPMENT_HIGH HR will be used for all operations  
*** TABLES ***  
*** COMMENTS ***  
-----  
COMMENT 1  
TABLE 1  
-----  
Exported 2 objects  
Elapsed 21 sec  
14:18:44 SQL>
```

GEORGE

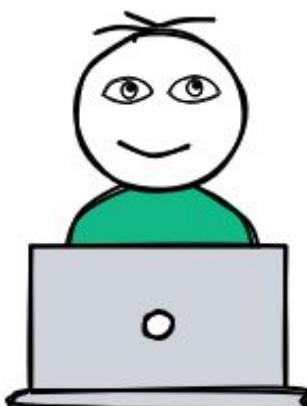


GEORGE commits changes into fix-1.0

git commit



GEORGE



bombshell

src/database/hr/tables/jobs.sql

```
@@ -2,3 +2,3 @@ create table hr.jobs (
    job_id      varchar2(10 byte),
    job_title   varchar2(35 byte)
+   job_title   varchar2(100 byte)
        constraint job_title_nn not null enable,
@@ -19,2 +19,2 @@ alter table hr.jobs

-- sqlcl_snapshot {"hash":"9a36822cda4e6440a4f19c69e3ca05985221ce75","type":"TABLE","name":"JOBS","schemaName":"HR","sxml":"
<RELATIONAL_TABLE>\n    <COL_LIST>\n        <COL_LIST_ITEM>\n            <NAME>JOB_ID</NAME>\n            <DATATYPE>VARCHAR
\&n        <COL_LIST_ITEM>\n            <NAME>JOB_TITLE</NAME>\n            <DATATYPE>VARCHAR2</DA
<NOT_NULL>\n            <NAME>JOB_TITLE_NN</NAME>\n            </NOT_NULL>\n\&n            <COL_LIST_ITEM>\n                <NAME>JOB_TITLE</NAME>\n                <DATATYPE>VARCHAR2</DA
<PRECISION>6</PRECISION>\n            <SCALE>0</SCALE>\n\&n            <COL_LIST_ITEM>\n                <NAME>JOB_ID</NAME>\n                <PRECISION>
PRECISION>\n                <SCALE>0</SCALE>\n\&n                <COL_LIST_ITEM>\n                    <NAME>JOB_ID</NAME>\n                    <PRECISION>
<COL_LIST>\n            <COL_LIST_ITEM>\n                <NAME>JOB_ID</NAME>\n                <PRECISION>
<PRIMARY_KEY_CONSTRAINT_LIST>\n            <DEFAULT_COLLATION>USING_NLS_COMP</DEFAULT_COLLATION>\n            <PHYSICAL_PROPERTIES>\nNo newline at end of file
-- sqlcl_snapshot {"hash":"fcba1f5c21282af87643c1dc2cf54d925dd40036","type":"TABLE","name":"JOBS","schemaName":"HR","sxml":"
<RELATIONAL_TABLE>\n    <COL_LIST>\n        <COL_LIST_ITEM>\n            <NAME>JOB_ID</NAME>\n            <DATATYPE>VARCHAR
\&n        <COL_LIST_ITEM>\n            <NAME>JOB_TITLE</NAME>\n            <DATATYPE>VARCHAR2</DA
<NOT_NULL>\n            <NAME>JOB_TITLE_NN</NAME>\n            </NOT_NULL>\n\&n            <COL_LIST_ITEM>\n                <NAME>JOB_TITLE</NAME>\n                <DATATYPE>VARCHAR2</DA
<PRECISION>6</PRECISION>\n            <SCALE>0</SCALE>\n\&n            <COL_LIST_ITEM>\n                <NAME>JOB_ID</NAME>\n                <PRECISION>
PRECISION>\n                <SCALE>0</SCALE>\n\&n                <COL_LIST_ITEM>\n                    <NAME>JOB_ID</NAME>\n                    <PRECISION>
<COL_LIST>\n            <COL_LIST_ITEM>\n                <NAME>JOB_ID</NAME>\n                <PRECISION>
<PRIMARY_KEY_CONSTRAINT_LIST>\n            <DEFAULT_COLLATION>USING_NLS_COMP</DEFAULT_COLLATION>\n            <PHYSICAL_PROPERTIES>\nNo newline at end of file
```

fix-1.0 Extended hr.jobs.job_title column from 35 to 100 varchar2

Description

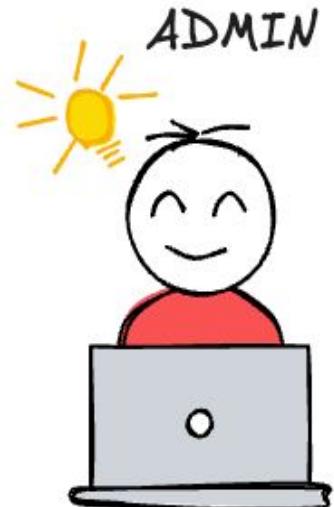
Amend

Commit 1 File

Project Stage

```
> sql -name dev_admin  
> !git checkout fix-1.0  
> project stage -branch-name main
```

- Compares the current branch (**fix-1.0**) with the production branch (**main**) to create changelogs that apply the necessary database updates.
- Parameter `-branch-name` is optional in that case as **main** branch is default in `project.config`



Project Stage

```
18:41:23 SQL> project stage -branch-name main -verbose
```

Starting execution of stage command using the current branch

Stage is Comparing:

Old Branch refs/heads/main
New Branch refs/heads/fix-1.0

```
Created dir: dist/releases
Created dir: dist/utils
Created dir: dist/releases/next
Created dir: dist/releases/next/changes
Created dir: dist/releases/next/changes/fix-1.0
Created dir: dist/releases/next/changes/fix-1.0/_custom
Created change:dist/releases/next/changes/fix-1.0/stage.changelog.xml
Created change:dist/releases/main.changelog.xml
Created change:dist/releases/next/release.changelog.xml
Created file: dist/utils/recompile.sql
Created file: dist/utils/prechecks.sql
Updated file: dist/releases/next/changes/fix-1.0/hr/tables/jobs.sql
Updated change:dist/releases/next/changes/fix-1.0/stage.changelog.xml
Updated change:dist/releases/next/changes/fix-1.0/stage.changelog.xml
Updated change:dist/releases/next/release.changelog.xml
Updated change:dist/releases/next/release.changelog.xml
Created change:dist/releases/apex/apex.changelog.xml
Created change:dist/releases/apex/apex.changelog.xml
Created file: dist/releases/apex/f101/f101.sql
Created change:dist/releases/apex/f101/f101.xml
Updated change:dist/releases/apex/apex.changelog.xml
Updated change:dist/releases/main.changelog.xml
```

Completed executing stage command on branch: fix-1.0

Stage processesing completed, please review and commit your changes to repository



Project Stage

- Review generated files



The image shows a screenshot of a file explorer window titled "EXPLORER". The left pane displays a tree structure of project folders under "BOMBSHELL". The "dist" folder contains "releases" and "next". The "next" folder contains "changes/fix-1.0", which in turn contains "_custom" and "hr/tables". Inside "hr/tables", there is a file named "jobs.sql" and another file named "stage.changelog.xml". The right pane shows the contents of the "jobs.sql" file. The file path is listed as "dist > releases > next > changes > fix-1.0 > hr > tables > jobs.sql". The file content is a SQL script:

```
1 -- liquibase formatted sql
2 -- changeset HR:1748018521326 stripComment
3 -- sqlcl_snapshot src/database/hr/tables/j
4
5 alter table hr.jobs modify (
6   job_title varchar2(100)
7 )
8 /
9
10
```

A blue rectangular box highlights the line "alter table hr.jobs modify (".

Project Stage - commit [GIT branch fix-1.0]

Staged Unstage

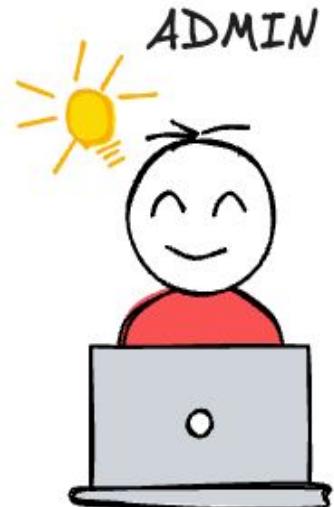
- dist
 - releases
 - apex
 - next
 - changes
 - fix-1.0
 - hr
 - tables
 - jobs.sql
 - stage.changelog.xml
 - release.changelog.xml
 - main.changelog.xml
 - utils

fix-1.0 Staged changes 28

Description

Amend

Commit 9 Files



Project Release

```
> project release -version fix-1.0 -verbose
```

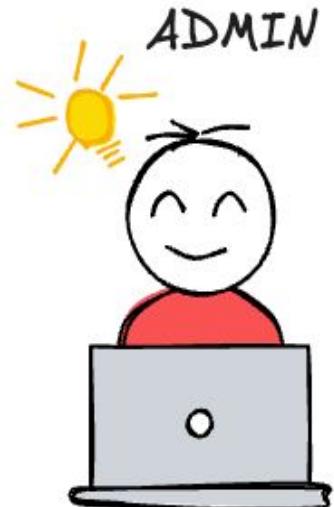


Several files and folders were created/changed:

▼ TERMINAL

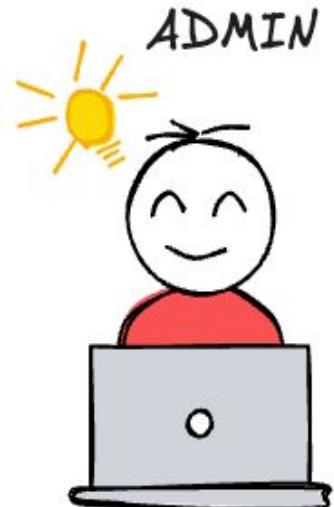
```
18:54:25 SQL> project release -version fix-1.0 -verbose
Creating a release version fix-1.0 for the current body of work

Updated change:dist/releases/main.changelog.xml
Moved folder "dist/releases/next" to "dist/releases/fix-1.0"
Created file: dist/releases/next
Created change:dist/releases/next/release.changelog.xml
Created change:dist/releases/next/release.changelog.xml
Created file: bombshell/.dbtools/project.config.json
Process completed successfully
18:54:35 SQL>
```



Version was changed in `project.config.json`

```
📁 .dbtools/project.config.json
@@ -7,3 +7,3 @@
"schemas" : [ "HR", "CO" ],
- "lastReleaseVersion" : "",
+ "lastReleaseVersion" : "fix-1.0",
"export" : {
```



Updated dist/releases/main.changelog.xml

```
dist/releases/main.changelog.xml @@ -5,4 +5,5 @@
http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
- <include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
+ <include file="fix-1.0/release.changelog.xml" relativeToChangelogFile="true"/>
<include file="apex/apex.changelog.xml" relativeToChangelogFile="true"/>
+ <include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
</databaseChangeLog>
No newline at end of file
```



Created dist/releases/fix-1.0/release.changelog.xml

The screenshot shows a diff tool comparing two XML files. The top window is titled "dist/releases/main.changelog.xml" and the bottom window is titled "dist/releases/fix-1.0/release.changelog.xml". A blue arrow points from the bottom window up to the top window, indicating the flow of changes.

dist/releases/main.changelog.xml

```
@@ -5,4 +5,5 @@
      http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
-<include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
+<include file="fix-1.0/release.changelog.xml" relativeToChangelogFile="true"/>
 <include file="apex/apex.changelog.xml" relativeToChangelogFile="true"/>
+<include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
</databaseChangeLog>
No newline at end of file
```

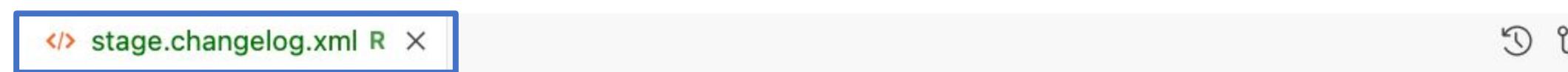
dist/releases/fix-1.0/release.changelog.xml

```
@@ -0,0 +1,8 @@
+<?xml version="1.0" encoding="UTF-8"?>
+<databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
+                     xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
+                     xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
+                                         http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
+<!--CHANGES-->
+<include file="changes/fix-1.0/stage.changelog.xml" relativeToChangelogFile="true"/>
+</databaseChangeLog>
```



Created dist/releases/fix-1.0/changes/fix-1.0/stage.changelog.xml

```
@@ -0,0 +1,8 @@
+<?xml version="1.0" encoding="UTF-8"?>
+<databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
+                     xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
+                     xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
+                                         http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
+    <!--CHANGES-->
+    <include file="changes/fix-1.0/stage.changelog.xml" relativeToChangelogFile="true"/>
+</databaseChangeLog>
```



dist > releases > fix-1.0 > changes > fix-1.0 > [stage.changelog.xml](#)

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3 |     xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
4 |     xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
5 |                         http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
6 <include file="hr/tables/jobs.sql" relativeToChangelogFile="true"/>
7 </databaseChangeLog>
```



SQLcl Project automatically created necessary DDL:



The screenshot shows a SQLcl project interface. On the left, the Explorer view displays a file tree under the 'BOMBSHELL' root. The 'dist/releases/fix-1.0/changes/fix-1.0/hr/tables' path is expanded, showing 'jobs.sql' as the selected file. In the center, a code editor window titled 'jobs.sql A' shows the following SQL code:

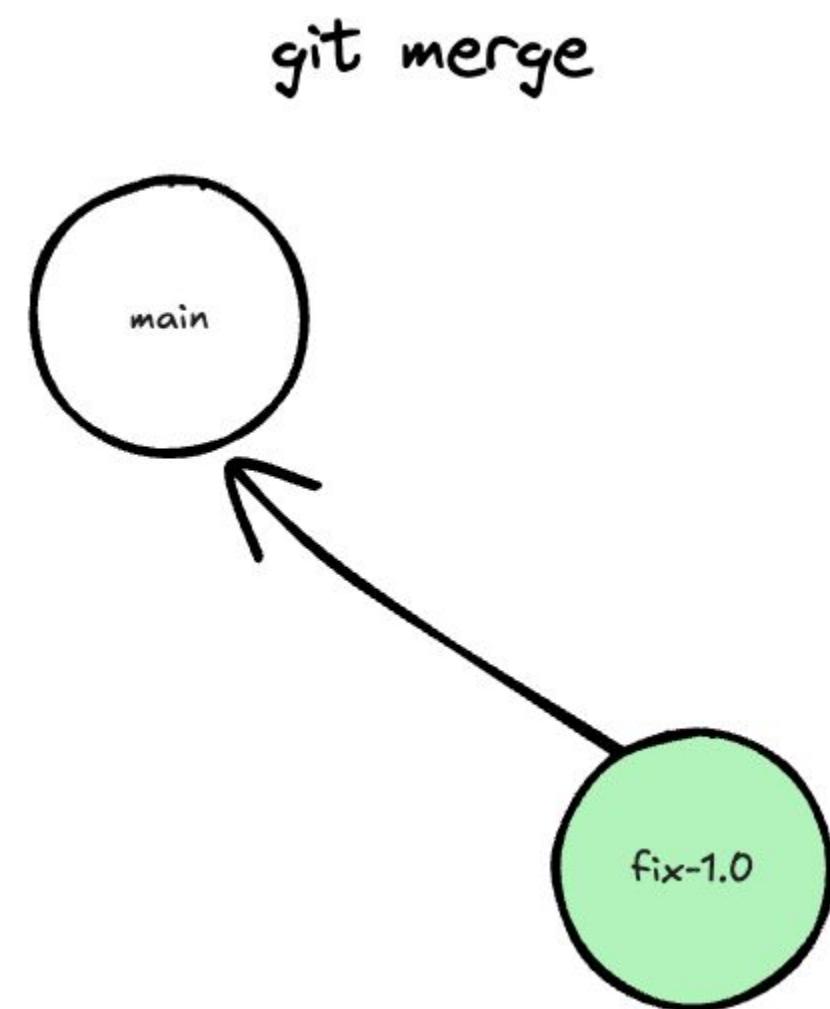
```
src/database/hr/tables/jobs.sql
@@ -2,3 +2,3 @@ create table hr.jobs (
 2   job_id      varchar2(10 byte),
 3-  job_title   varchar2(35 byte)
 3+  job_title   varchar2(100 byte)
 4    constraint job_title_nn not null enable,
@@ -19,2 +19,2 @@ alter table hr.jobs
```

A dotted arrow points from the code editor back to the 'jobs.sql' entry in the Explorer view. The status bar at the bottom indicates the file is 'A' (new).

```
dist > releases > fix-1.0 > changes > fix-1.0 > hr > ta
 1  -- liquibase formatted sql
 2  -- changeset HR:1748018521326 stripCo
 3  -- sqlcl_snapshot src/database/hr/tab
 4
 5  alter table hr.jobs modify (
 6    |   job_title varchar2(100)
 7  )
 8 /
 9
10
```

Merge fix-1.0 into main [production]

- Merge fix-1.0 into main
- Merge fix-1.0 into dev, test



Project Gen-Artifact

- Generates an artifact representing the current state of your project.

```
> sql -name prod_admin  
> !git checkout main  
> project gen-artifact -name prod -version fix-1.0
```

```
19:25:39 SQL> project gen-artifact -name prod -version fix-1.0  
Your artifact has been generated prod-fix-1.0.zip  
19:25:43 SQL> █
```



Project Deploy

- Deploys the artifact on a target database

```
> sql -name prod_admin
```

```
> project deploy -file artifact/prod-fix-1.0.zip
```



The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. The title bar displays the project name "fix-1.0". The Explorer sidebar on the left shows a folder structure for "BOMBSHELL" containing ".dbtools", "artifact", "dist", "src", ".gitignore", and "readme.md". The Terminal tab is active, showing the prompt "19:38:40 SQL>". The bottom status bar shows the command "viins | 1:0 | ADMIN | prod_admin". A large watermark of a bomb with a lit fuse is overlaid on the center of the screen. In the bottom-left corner, there is a cartoon illustration of a person sitting at a laptop with a sun icon above their head, labeled "ADMIN". The bottom navigation bar includes icons for file operations like "main", "Git Graph", and "bombshell".

Tips and tricks

Keep your DB users minimally privileged

- Do not use OVERprivileged users like SYS
- Use PROXY users instead:

```
CREATE USER JOHN IDENTIFIED BY password;
```

```
ALTER USER HR GRANT CONNECT THROUGH JOHN;
```

Questions & Answers

Join at slido.com

#2527 130

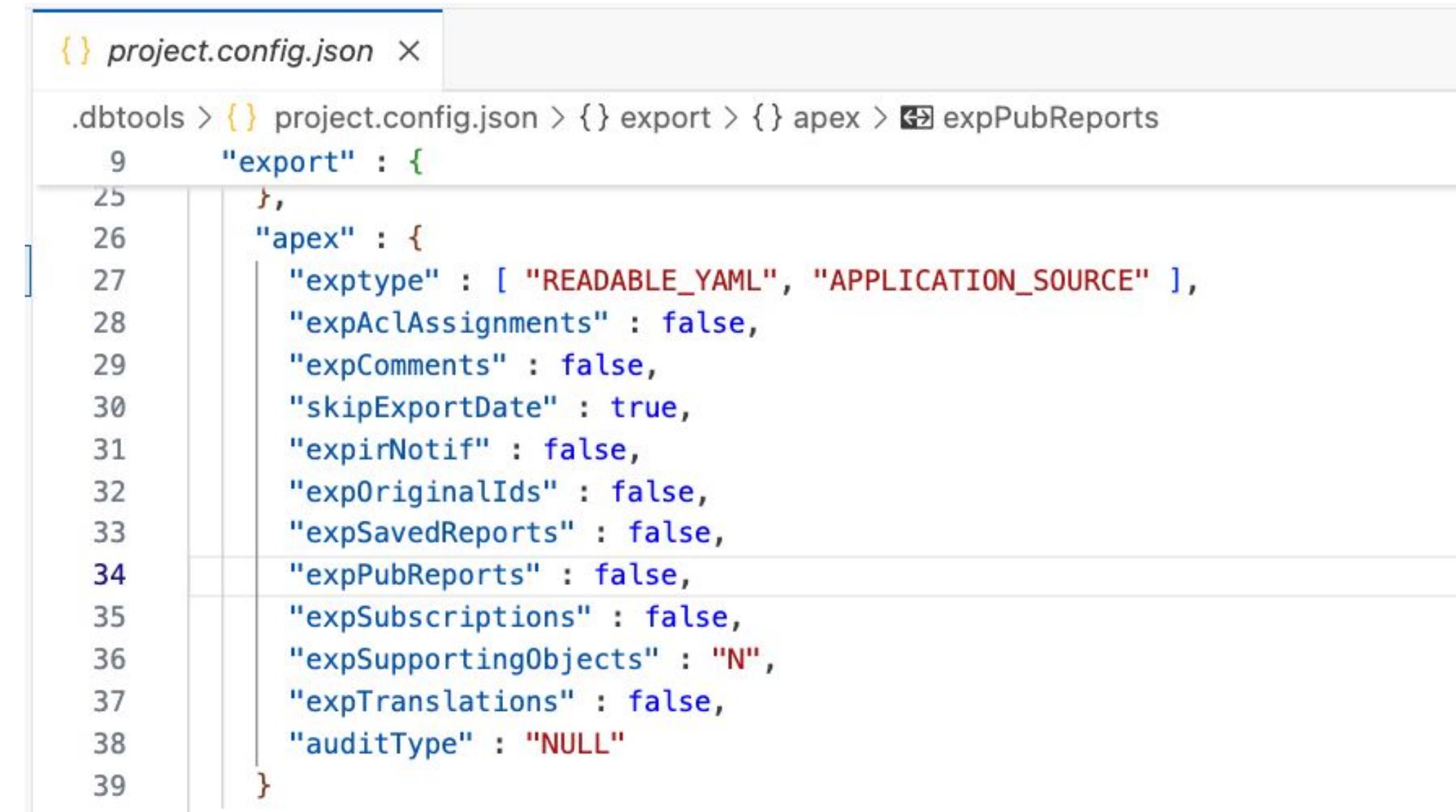
- Consider schema-level privileges (23 AI)

```
GRANT SELECT ANY TABLE ON SCHEMA HR TO JOHN;
```

```
GRANT EXECUTE ANY PROCEDURE ON SCHEMA HR TO JOHN;
```



Adjust your APEX export



The image shows a code editor window with the file name "project.config.json" at the top. The file path ".dbtools > project.config.json > export > apex > expPubReports" is visible above the code. The code itself is a JSON object with several properties and their values:

```
{ "export": { "apex": { "exptype": [ "READABLE_YAML", "APPLICATION_SOURCE" ], "expAclAssignments": false, "expComments": false, "skipExportDate": true, "expirNotif": false, "expOriginalIds": false, "expSavedReports": false, "expPubReports": false, "expSubscriptions": false, "expSupportingObjects": "N", "expTranslations": false, "auditType": "NULL" } } }
```

Use default connectionName

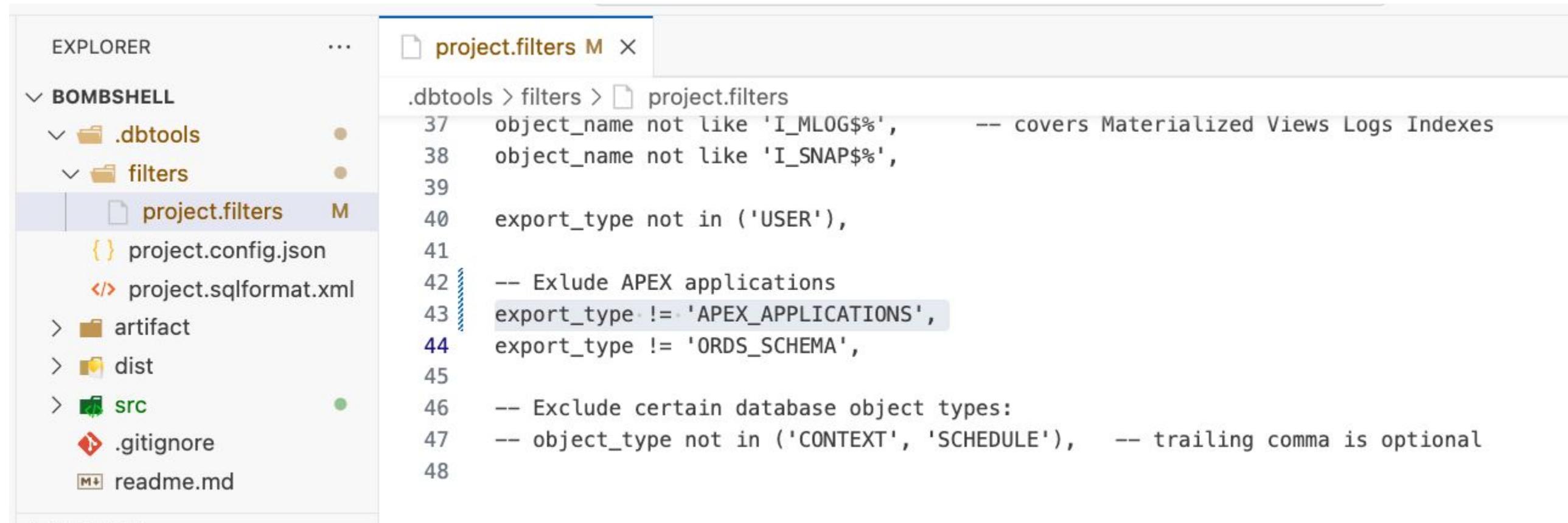
The screenshot shows the Oracle SQL Developer interface with the following components:

- EXPLORER** pane: Shows a project named "BOMBSHELL" with the following structure:
 - .dbtools (selected)
 - filters
 - project.config.json
 - project.sqlformat.xml
 - artifact
- EDITOR** pane: Displays the contents of `project.config.json`:

```
{ } project.config.json X  
.dbtools > { } project.config.json > {} sqlcl  
1 {  
2   "project" : "bombshell",  
3   "sqlcl" : {  
4     "connectionName" : "dev_admin",  
5     "version" : "25.1.1.0"  
6   },  
7 }
```
- TERMINAL** pane: Shows the output of SQL commands:

```
09:39:35 09:31:28 SQL> show connection  
SP2-0640: Not connected  
09:39:40 09:31:28 SQL> project export -o APEX.101  
Current connection is not set  
Connecting using the named connection dev_admin from the project config  
Connected.
```

Exclude APEX from export

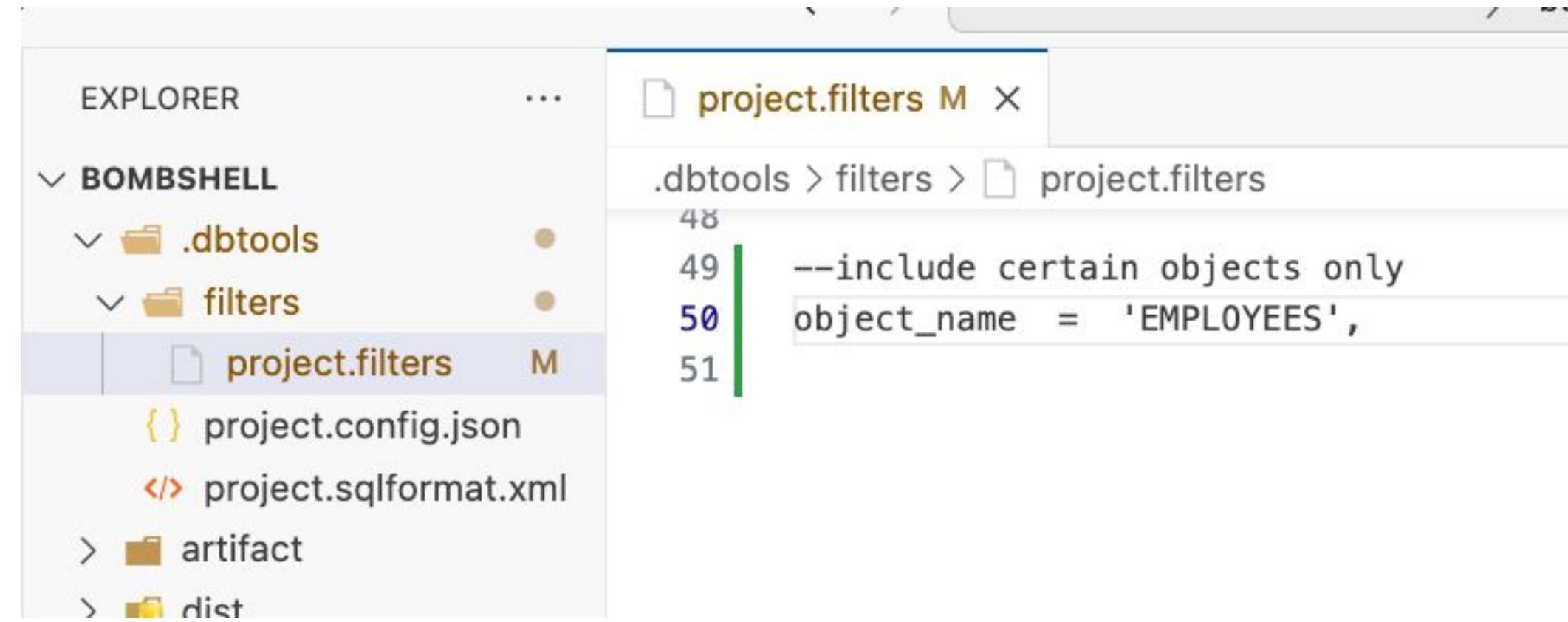


The image shows a screenshot of a code editor with an Explorer sidebar on the left. The Explorer sidebar lists several project folders and files under a 'BOMBSHELL' root. The 'filters' folder contains a file named 'project.filters'. The code editor's main area displays the contents of this file:

```
.dbtools > filters > project.filters
37 object_name not like 'I_MLOG%',      -- covers Materialized Views Logs Indexes
38 object_name not like 'I_SNAP$%',
39
40 export_type not in ('USER'),
41
42 -- Exclude APEX applications
43 export_type != 'APEX_APPLICATIONS',
44 export_type != 'ORDS_SCHEMA',
45
46 -- Exclude certain database object types:
47 -- object_type not in ('CONTEXT', 'SCHEDULE'), -- trailing comma is optional
48
```

The code uses SQL-like syntax with numbered lines (37, 38, 39, etc.) to filter database objects based on their name and type. It specifically excludes Materialized Views, Logs, and Indexes, and then excludes APEX applications and ORDS schemas. It also excludes certain database object types like CONTEXT and SCHEDULE.

Export certain objects only



```
project.filters M
.dbtools > filters > project.filters
48
49 --include certain objects only
50 object_name = 'EMPLOYEES',
51
```

Interested what's in the background of SQLcl Project?

- Run your commands with **-debug** parameter

```
> project export -debug
```

The screenshot shows the pretius IDE interface with the following details:

- Top Bar:** Includes standard OS window controls (red, yellow, green), a back/forward button, a search bar containing "bombshell", a pinned tab icon, and a status bar.
- Sidebar:** Features icons for Explorer, Search, Terminal, and Database. The Terminal icon has a blue circle with the number "2" indicating new activity.
- Explorer:** Shows a tree structure under the "BOMBSHELL" project. The "dbtools" folder contains a "filters" file, which is currently selected.
- Terminal Tab:** Active tab, showing the output of a command. It includes tabs for OUTPUT, DEBUG CONSOLE, TERMINAL (active), SQL HISTORY, and TASK MONITOR.
- Terminal Output:** Displays the following command and its execution results:

```
10:25:13 09:31:28 SQL> project export -debug
----- DISPLAY ARGUMENTS -----
LIST: null
OBJECTS: null
SCHEMAS: null
THREADS: null
DEBUG: true
VERBOSE: false
----- END ARGUMENTS -----
List:false
Objects:[]
Schemas:[]
Threads:5
Debug: true
Verbose: false
Exporting database objects...
The current connection DEVELOPMENT_HIGH ADMIN will be used for all operations
/* Main dictionary query against ALL_OBJECTS: */
select * from (SELECT OWNER, OBJECT_NAME, SUBOBJECT_NAME, OBJECT_ID, DATA_OBJECT_ID,
OBJECT_TYPE, CREATED, LAST_DDL_TIME, TIMESTAMP, STATUS,
TEMPORARY, GENERATED, SECONDARY, NAMESPACE, EDITION_NAME,
SHARING, EDITIONABLE, ORACLE_MAINTAINED, APPLICATION, DEFAULT_COLLATION,
```
- Status Bar:** Shows file version (1.1*), Git status (0 changes), a Git Graph icon, the current file name ("bombshell"), line and column numbers (Ln 48, Col 1), character encoding (UTF-8), line endings (LF), plain text mode, and notification icons.

ADMIN [DEV] [ACE] [CHICAGO]

Worksheet Query Builder

```
1 select * from (SELECT OWNER, OBJECT_NAME, SUBOBJECT_NAME, OBJECT_ID, DATA_OBJECT_ID,
2 OBJECT_TYPE, CREATED, LAST_DDL_TIME, TIMESTAMP, STATUS,
3 TEMPORARY, GENERATED, SECONDARY, NAMESPACE, EDITION_NAME,
4 SHARING, EDITIONABLE, ORACLE_MAINTAINED, APPLICATION, DEFAULT_COLLATION,
5 DUPLICATED, SHARDED, CREATED_APPID, CREATED_VSNID,
6 MODIFIED_APPID, MODIFIED_VSNID, 'ALL_OBJECTS' EXPORT_TYPE
7 FROM Dba_objects) Dba_objects where 1=1
8 filters --
9 and (not /*object_type in ('TABLE','VIEW','SEQUENCE') and*/ object_name like 'AQ$%') --<-- sqlcl internal.fixed.filters
10 and (export_type not in ('USER')) --<-- project.filters
11 and (not(Dba_objects.object_name = 'HTMLDB_PLAN_TABLE' and Dba_objects.object_type = 'TABLE')) --<-- sqlcl internal.fixed.filters
12 and (oracle_maintained = 'N') --<-- sqlcl internal.fixed.filters
13 and (not (object_type = 'TABLE' and object_name like 'MLOG$\_%' escape '\'
14 /* object_name in (select log_table from all_mview_logs)*/) ) --<-- sqlcl internal.fixed.filters
15 and (not (object_type = 'TRIGGER' and object_name ='DATABASECHANGELOG_ACTIONS_TRG')) --<-- project.filters
16 and (object_name not like 'I MLOG$%') --<-- project.filters
```

Script Output x | Query Result x

SQL | All Rows Fetched: 26 in 0.381 seconds

OWNER	OBJECT_NAME	SUBOBJECT_NAME	OBJECT_ID	DATA_OBJECT_ID	OBJECT_TYPE	CREATED	LAST_DDL_TIME	TIMESTAMP	STATUS	TEMPORARY	GENER
CO	APPLICATION_PARAMS	(null)	133896	133896	TABLE	2025-05-19 12:58:32	2025-05-19 12:58:37	2025-05-19 12:58:32	VALID	N	N
CO	CUSTOMERS	(null)	131985	131985	TABLE	2025-05-12 07:59:23	2025-05-12 08:00:54	2025-05-12 08:00:54	VALID	N	N
CO	INVENTORY	(null)	132002	132002	TABLE	2025-05-12 07:59:24	2025-05-12 08:00:54	2025-05-12 08:00:54	VALID	N	N
CO	ORDERS	(null)	131997	131997	TABLE	2025-05-12 07:59:24	2025-05-12 08:00:54	2025-05-12 08:00:54	VALID	N	N
CO	ORDER_ITEMS	(null)	132001	132001	TABLE	2025-05-12 07:59:24	2025-05-12 07:59:37	2025-05-12 07:59:24	VALID	N	N
CO	PRODUCTS	(null)	131991	131991	TABLE	2025-05-12 07:59:24	2025-05-12 08:00:53	2025-05-12 08:00:53	VALID	N	N
CO	SHIPMENTS	(null)	131999	131999	TABLE	2025-05-12 07:59:24	2025-05-12 08:00:54	2025-05-12 08:00:54	VALID	N	N
CO	STORES	(null)	131987	131987	TABLE	2025-05-12 07:59:23	2025-05-12 08:00:53	2025-05-12 08:00:53	VALID	N	N
HR	COUNTRIES	(null)	132028	132028	TABLE	2025-05-12 08:01:38	2025-05-12 08:01:47	2025-05-12 08:01:38	VALID	N	N
HR	DEPARTMENTS	(null)	132033	132033	TABLE	2025-05-12 08:01:39	2025-05-12 08:01:54	2025-05-12 08:01:39	VALID	N	N
HR	EMPLOYEES	(null)	132038	132038	TABLE	2025-05-12 08:01:40	2025-05-24 05:51:45	2025-05-23 12:12:48	VALID	N	N
HR	JOB_HISTORY	(null)	132036	132036	TABLE	2025-05-12 08:01:40	2025-05-23 12:17:52	2025-05-23 12:17:52	VALID	N	N
HR	JOB_HISTORY	(null)	132042	132042	TABLE	2025-05-12 08:01:41	2025-05-12 08:01:47	2025-05-12 08:01:41	VALID	N	N
HR	LOCATIONS	(null)	132030	132030	TABLE	2025-05-12 08:01:39	2025-05-12 08:01:45	2025-05-12 08:01:39	VALID	N	N
HR	REGIONS	(null)	132026	132026	TABLE	2025-05-12 08:01:38	2025-05-12 08:01:44	2025-05-12 08:01:38	VALID	N	N
HR	ADD_JOB_HISTORY	(null)	132058	(null)	PROCEDURE	2025-05-12 08:01:55	2025-05-12 08:01:55	2025-05-12 08:01:55	VALID	N	N
HR	SECURE_DML	(null)	132056	(null)	PROCEDURE	2025-05-12 08:01:54	2025-05-12 08:01:54	2025-05-12 08:01:54	VALID	N	N
HR	DEPARTMENTS_SEQ	(null)	132035	(null)	SEQUENCE	2025-05-12 08:01:40	2025-05-12 08:01:40	2025-05-12 08:01:40	VALID	N	N
HR	EMPLOYEES_SEQ	(null)	132041	(null)	SEQUENCE	2025-05-12 08:01:41	2025-05-12 08:01:41	2025-05-12 08:01:41	VALID	N	N
HR	LOCATIONS_SEQ	(null)	132032	(null)	SEQUENCE	2025-05-12 08:01:39	2025-05-12 08:01:39	2025-05-12 08:01:39	VALID	N	N
CO	CUSTOMER_ORDER_PRODUCTS	(null)	132004	(null)	VIEW	2025-05-12 07:59:25	2025-05-15 11:56:46	2025-05-12 07:59:25	VALID	N	N
CO	PRODUCT_ORDERS	(null)	132007	(null)	VIEW	2025-05-12 07:59:25	2025-05-15 11:56:52	2025-05-12 07:59:25	VALID	N	N
CO	PRODUCT_REVIEWS	(null)	132006	(null)	VIEW	2025-05-12 07:59:25	2025-05-12 07:59:40	2025-05-12 07:59:25	VALID	N	N
CO	STORE_ORDERS	(null)	132005	(null)	VIEW	2025-05-12 07:59:25	2025-05-15 11:56:59	2025-05-15 11:56:59	VALID	N	N
HR	EMP_DETAILS_VIEW	(null)	132044	(null)	VIEW	2025-05-12 08:01:42	2025-05-12 08:01:42	2025-05-12 08:01:42	INVALID	N	N
HR	V_EMP_NAMES_PHONES	(null)	133884	(null)	VIEW	2025-05-19 10:39:09	2025-05-19 10:39:09	2025-05-19 10:39:09	VALID	N	N

SQLcl will warn you about DROP statements

- HR.JOB.MAX_SALARY column was dropped

```
diff --git a/src/database/hr/tables/jobs.sql b/src/database/hr/tables/jobs.sql
--- a/src/database/hr/tables/jobs.sql
+++ b/src/database/hr/tables/jobs.sql
@@ -4,4 +4,3 @@ create table hr.jobs (
    constraint job_title_nn not null enable,
    min_salary number(6, 0),
    max_salary number(6, 0)
);
@@ -19,2 +18,2 @@ alter table hr.jobs
-- sqlcl_snapshot {"hash":"fcba1f5c21282af87643c1dc2cf54d925dd40036","type":"TABLE","name":"JOBS"
<RELATIONAL_TABLE>\n      <COL_LIST>\n          <COL_LIST_ITEM>\n              <NAME>JOB_ID</NAME>\n      </COL_LIST_ITEM>\n      <COL_LIST_ITEM>\n          <NAME>JOB_TITLE</NAME>\n      </COL_LIST_ITEM>\n      <NOT_NULL>\n          <NAME>JOB_TITLE_NN</NAME>\n      </NOT_NULL>\n      \n      <PRECISION>6</PRECISION>\n          <SCALE>0</SCALE>\n      \n      <PRECISION>\n          <SCALE>0</SCALE>\n      \n      <COL_LIST>\n          <COL_LIST_ITEM>\n              <NAME>JOB_ID</NAME>\n      </COL_LIST_ITEM>\n      PRIMARY_KEY_CONSTRAINT_LIST>\n          <DEFAULT_COLLATION>USING_NLS_COMP</DEFAULT_COLLATION>\n
```

SQLcl will warn you about DROP statements

- HR.JOB.MAX_SALARY column was dropped

```
10:56:09 SQL> project stage -branch-name test
```

```
Stage is Comparing:
```

Old Branch	refs/heads/test
New Branch	refs/heads/1.1.1

```
Stage processing completed, please review and commit your changes to repository
```

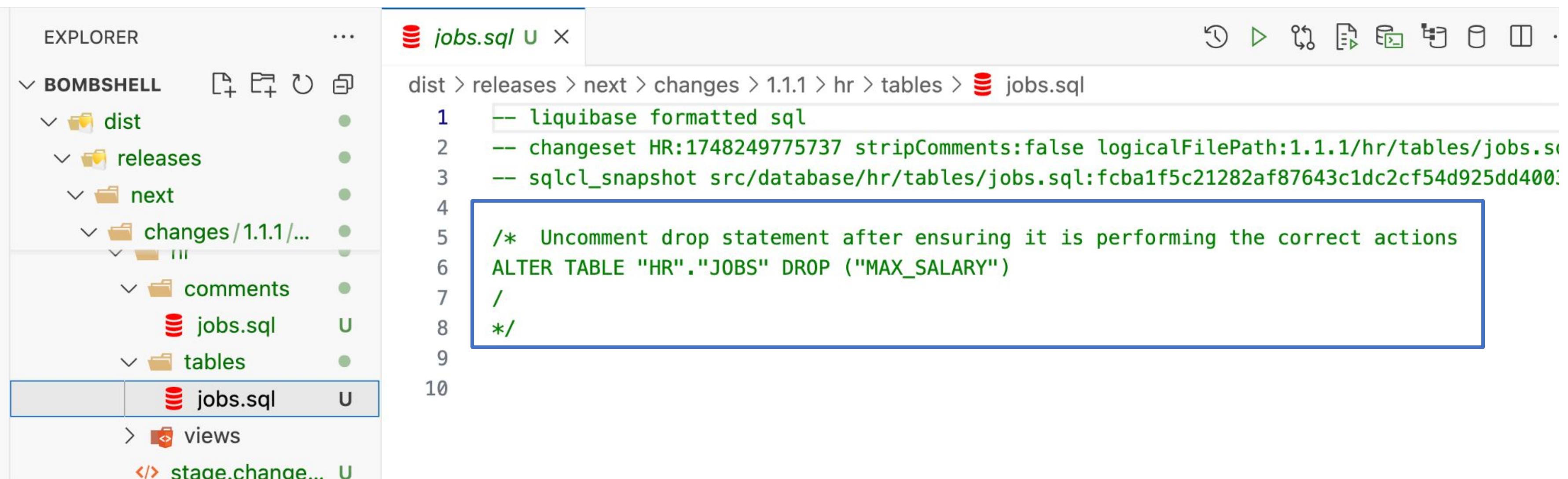
WARN: Your changes contain changelogs with one or more DROP statements.

These statements are commented out in the changeset and must be manually uncommented prior to execution.

This is done to ensure no destructive operations happen without notice.

NOTE: In latest SQLcl 25.1 above warning is not shown. Bug is reported and will be fixed soon

SQLcl will warn you about DROP statements



The screenshot shows a code editor interface with an Explorer sidebar on the left and a main editor area on the right.

EXPLORER sidebar:

- BOMBSHELL
 - dist
 - releases
 - next
 - changes/1.1.1/...
 - jobs.sql
 - tables
- views
- stage.change... U

Editor Area:

File: jobs.sql

Path: dist > releases > next > changes > 1.1.1 > hr > tables > jobs.sql

```
1 -- liquibase formatted sql
2 -- changeset HR:1748249775737 stripComments:false logicalFilePath:1.1.1/hr/tables/jobs.s
3 -- sqlcl_snapshot src/database/hr/tables/jobs.sql:fcbaf5c21282af87643c1dc2cf54d925dd400:
4
5 /* Uncomment drop statement after ensuring it is performing the correct actions
6 ALTER TABLE "HR"."JOBS" DROP ("MAX_SALARY")
7 /
8 */
```

Want more about certain SQLcl command?

```
> help project [command][examples|syntax]
```

Want more about certain SQLcl command?

```
13:47:44 13:47:31 SQL> help project export  
Export database objects to your repository
```

Usage:

```
project|proj  export|ex {OPTIONS}
```

Options:

```
-list|-l
```

List all objects in alphabetical order

Outputs the list of objects that will be exported based on the current parameters

```
-objects|-o <objects>
```

Define a comma-separated list of objects to export, e.g. HR.COUNTRIES,HR.EMPLOYEES

```
-schemas|-s <schemas>
```

Specify a comma-separated list of schemas to export, e.g., HR

Want more about certain SQLcl command?

```
13:48:58 13:47:31 SQL> help project export examples
```

- Examples of custom export filters are in ".dbtools/filters/project.filters"
- ```
SQL> project export -debug -list -objects REGIONS,COUNTRIES -schemas HR,SCOTT -threads 4
```

```
13:49:02 13:47:31 SQL> █
```

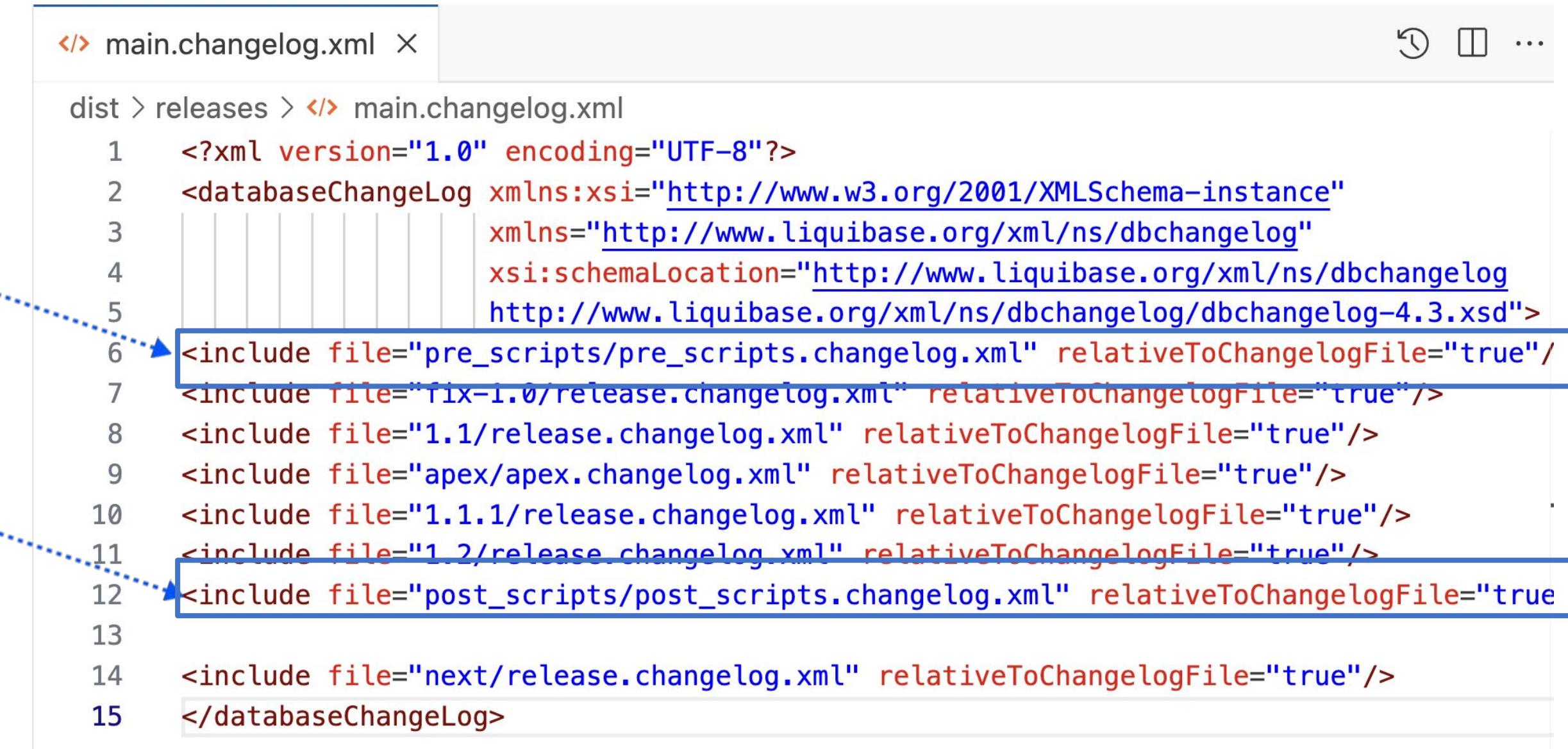
```
13:49:38 13:47:31 SQL> help project stage syntax
```

```
project|proj stage|st [[add-custom|ac]] | [[-branch-name|-bn <branch-name>] [-debug|-de] [-verbose|-v]]
```

```
13:50:34 13:47:31 SQL> █
```

# Want to add repeatable PRE and POST scripts to your deployments?

- Modify main.changelog.xml



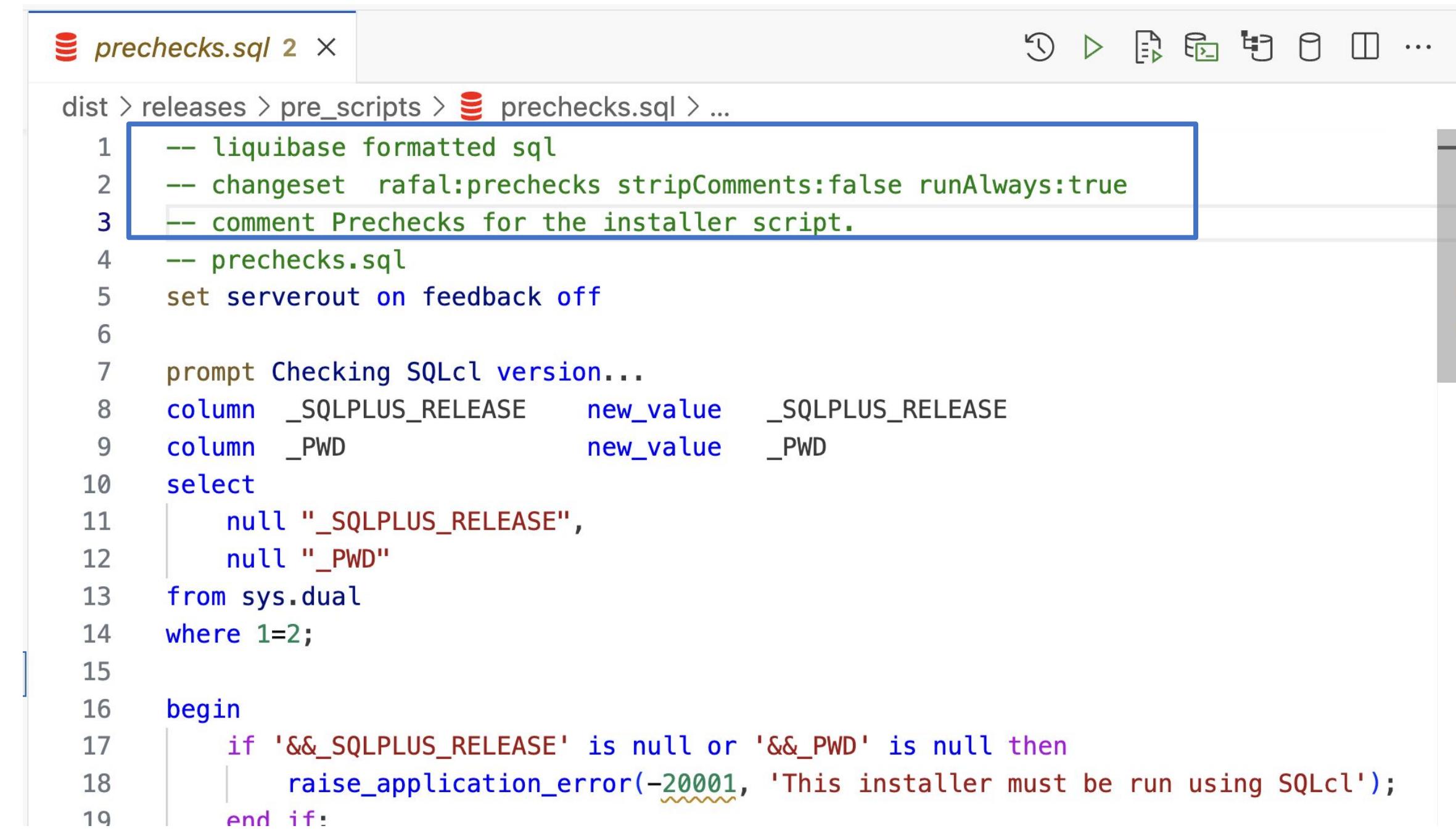
```
</> main.changelog.xml <...>
dist > releases > </> main.changelog.xml
1 <?xml version="1.0" encoding="UTF-8"?>
2 <databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3 | xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
4 | xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
5 | http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
6 <include file="pre_scripts/pre_scripts.changelog.xml" relativeToChangelogFile="true"/>
7 <include file="fix-1.0/release.changelog.xml" relativeToChangelogFile="true"/>
8 <include file="1.1/release.changelog.xml" relativeToChangelogFile="true"/>
9 <include file="apex/apex.changelog.xml" relativeToChangelogFile="true"/>
10 <include file="1.1.1/release.changelog.xml" relativeToChangelogFile="true"/>
11 <include file="1.2/release_changelog.xml" relativeToChangelogFile="true"/>
12 <include file="post_scripts/post_scripts.changelog.xml" relativeToChangelogFile="true"/>
13
14 <include file="next/release.changelog.xml" relativeToChangelogFile="true"/>
15 </databaseChangeLog>
```

# Want to add repeatable PRE and POST scripts to your deployments?

The screenshot shows the Liquibase IDE interface. The left pane, labeled "EXPLORER", displays a project structure under "BOMBSHELL". It includes a "dist" folder containing "releases" (with subfolders 1.1, 1.1.1, 1.2), "apex", "fix-1.0", "next", "post\_scripts", and a "pre\_scripts" folder containing "pre\_scripts.changelog.xml" and "prechecks.sql". The right pane, labeled "main.changelog.xml" and "pre\_scripts.changelog.xml", shows the XML code for the changelog. The "pre\_scripts.changelog.xml" tab is active, highlighted with a blue border. The XML code is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<databaseChangeLog xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
 xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
 http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-4.3.xsd">
 <!--CHANGES-->
 <include file="prechecks.sql" relativeToChangelogFile="true"/>
</databaseChangeLog>
```

# Want to add repeatable PRE and POST scripts to your deployments?



The screenshot shows a code editor window with a tab labeled "prechecks.sql 2 X". The file path is shown as "dist > releases > pre\_scripts > prechecks.sql > ...". The code itself is a SQL script:

```
1 -- liquibase formatted sql
2 -- changeset rafal:prechecks stripComments:false runAlways:true
3 -- comment Prechecks for the installer script.
4 -- prechecks.sql
5 set serverout on feedback off
6
7 prompt Checking SQLcl version...
8 column _SQLPLUS_RELEASE new_value _SQLPLUS_RELEASE
9 column _PWD new_value _PWD
10 select
11 null "_SQLPLUS_RELEASE",
12 null "_PWD"
13 from sys.dual
14 where 1=2;
15
16 begin
17 if '&&_SQLPLUS_RELEASE' is null or '&&_PWD' is null then
18 raise_application_error(-20001, 'This installer must be run using SQLcl');
19 end if;
```

The first three lines of the script are highlighted with a blue box.

# Preview scripts instead of direct deployment? Easy

- Generate a copy of install.sql file and call it e.g. my\_preview\_script.sql
- Change update command to **update-sql**
- Provide a path to preview file



The screenshot shows a code editor window with a tab labeled "my\_preview\_script.sql 1, U X". The file path is "dist > my\_preview\_script.sql". The code content is as follows:

```
17
18 -- Kick off Liquibase
19 prompt "Generate SQL Preview file - IT WILL NOT DEPLOY ANYTHING"
20 lb update-sql -log -changelog-file releases/main.changelog.xml -search-path "." -liquibase-schema-name HR -output-file preview.sql
21
```

Two blue dashed arrows point upwards from the bottom of the slide towards the underlined "update-sql" command in the code. The first arrow is on the left, and the second is on the right.

# Preview scripts instead of direct deployment? Easy

- Connect to target env and execute @dist/my\_preview\_script.sql

The screenshot shows a code editor interface with the following details:

- EXPLORER** panel on the left:

  - BOMBSHELL** folder:
    - Search (F)
    - releases
    - utils
    - install.sql
    - my\_preview\_script.sql** (selected, 1, U)
    - preview.sql

- my\_preview\_script.sql** tab in the top bar.
- Content of my\_preview\_script.sql:**

```
17
18 -- Kick off Liquibase
19 prompt "Generate SQL Preview file - IT WILL NOT DEPLOY ANYTHING"
20 lb update-sql -log -changelog-file releases/main.changelog.xml -sear
21
22
```
- TERMINAL** tab is active at the bottom.
- Terminal Output:**

```
12:40:53 SQL> @dist/my_preview_script.sql;
```

```

dist > preview.sql > ...
146 -- sqlcl_snapshot src/database/co/tables/orders.sql:4084312c5833d82e2806b031b774a93f
147
148 alter table co.orders modify (
149 | order_status varchar2(20 char)
150);
151
152 update HR.DATABASECHANGELOG_ACTIONS set status = 'RAN' where id = '1748427658649' and
153
154 INSERT INTO HR.DATABASECHANGELOG (ID, AUTHOR, FILENAME, DATEEXECUTED, ORDEREXECUTED,
155
156 -- Changeset releases/post_scripts/recompile.sql::recompile::rafal
157 -- Logging Oracle Liquibase Extension actions to HR.DATABASECHANGELOG_ACTIONS
158 DECLARE
159 id varchar2(2000) := 'post_scripts/recompile';
160 status varchar2(2000) := 'PREPARING';
161 rawAction clob;
162 rawXml clob;
163 myrow varchar2(2000);
164 action clob := '';
165
166 begin
167 insert into HR.DATABASECHANGELOG (ID, AUTHOR, FILENAME, DATEEXECUTED, ORDEREXECUTED, STATUS)
168 values (id, 'rafal', 'post_scripts/recompile.sql', sysdate, 1, status);
169
170 update HR.DATABASECHANGELOG_ACTIONS set status = 'RAN' where id = 'post_scripts/recompile';
171
172 commit;
173 end;
174
175
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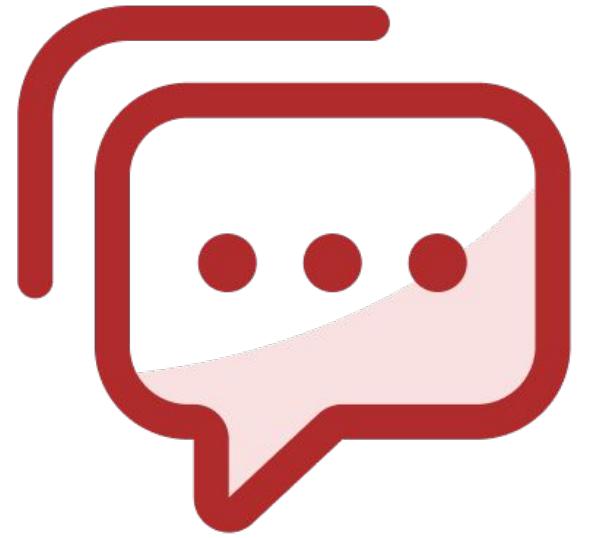
```

```

dist > preview.sql > ...
1 -- Lock Database
2 UPDATE HR.DATABASECHANGELOGLOCK SET LOCKED = 1, LOCKEDBY = 'MacBook-Pro.local (192.168.1.11)'
3
4 --- ****
5 --- Update Database Script
6 --- ****
7 --- Change Log: releases/main.changelog.xml
8 --- Ran at: 5/28/25, 12:40 PM
9 --- Against: ADMIN@jdbc:oracle:thin:@TEST_LOW
10 --- Liquibase version: 4.30.0
11 --- ****
12
13 --- Changeset releases/pre_scripts/prechecks.sql::prechecks::rafal
14 --- Prechecks for the installer script.
15 --- Logging Oracle Liquibase Extension actions to HR.DATABASECHANGELOG_ACTIONS
16 DECLARE
17 id varchar2(2000) := 'prechecks';
18 status varchar2(2000) := 'PREPARING';
19 rawAction clob;
20 rawXml clob;
21 myrow varchar2(2000);
22 action clob := '';

```

# Questions & Answers



## Audience Q&A



Presenting with animations, GIFs or speaker notes? Enable our [Chrome extension](#)



How confident do you feel about using SQLcl Project  
for Oracle Database & APEX deployments?

## Useful links

1. Everything you need to know about SQLcl Project by Matt Mulvaney

<https://pretius.com/blog/sqlcl-project-reference/>

2. Oracle SQLcl Project: The only CI/CD tool for APEX you need?

<https://pretius.com/blog/oracle-sqlcl-project-command/>

3. SQLcl Project seen through one of the creator's eyes - Dan McGhan's Blog

<https://danmcghan.hashnode.dev/>

4. Official SQLcl Documentation

<https://docs.oracle.com/en/database/oracle/sql-developer-command-line/index.html>

Don't  
miss out!



- Building Global-Scale Applications with Oracle APEX and Autonomous Database  
**Matt Mulvaney**  
**Monday, June 16th 03:45 pm - 04:15 pm @ Fort Worth 2**
- Maps in Oracle APEX: From Basic Skills to Advanced Techniques  
**Lech Cieślik**  
**Tuesday, June 17 09:00 am - 09:50 am @ Fort Worth 6-7**
- APEX New Features 25.1 : An honest review from a non-APEX team perspective  
**Matt Mulvaney**  
**Tuesday, June 17, 01:30 pm - 02:30 pm @ Fort Worth 3**
- Oracle APEX Globalization Demystified: An In-Depth Look  
**Matt Mulvaney**  
**Wednesday, June 18 09:00 am - 09:50 am @ Fort Worth 3**
- APEX Lightning Rounds  
**Matt Mulvaney**  
**Thursday June 19, 09:00 am - 10:15 am @ Grapevine 5-6**



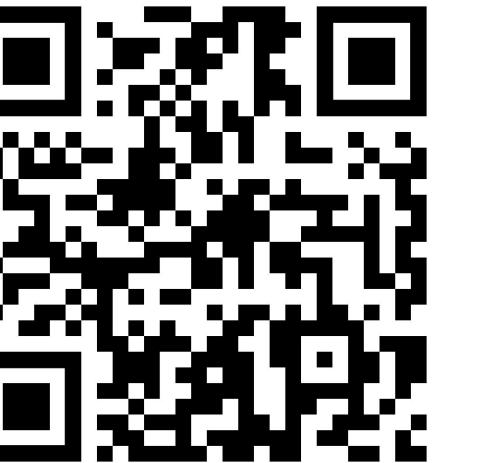
Thank you!  
Feel free to reach me at  
the event or online!



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You can find more at  
[www.pretius.com](http://www.pretius.com)



Partner





# ODTUG Kscope25

dallas - ft worth      june 15 - 19



**Don't Forget To Fill Out Your EvalS**

# Extra slides( hidden)

# project config

**View current configuration for the project:**

> project config **-list -verbose**

| SETTING NAME         | VALUE       | DEFAULT VALUE | DESCRIPTION                                 |
|----------------------|-------------|---------------|---------------------------------------------|
| project              | bombshell   |               | the project name                            |
| sqlcl.connectionName | dev_admin   |               | Connection name                             |
| sqlcl.version        | 25.1.1.0    |               | SQLcl version                               |
| schemas              | ["HR","CO"] |               | Array of schemas to include in this project |
| lastReleaseVersion   |             |               | The last version released                   |
| export.format.enable | true        | true          | Format code after export                    |

# project config

**View current configuration for the project:**

> project config **-list -verbose**

|                               |                                        |                                   |                                                                                                    |
|-------------------------------|----------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|
| export.apex.exptype           | ["READABLE_YAML","APPLICATION_SOURCE"] | READABLE_YAML, APPLICATION_SOURCE | READABLE_YAML and APPLICATION_SOURCE are the default. See -expType attribute for available options |
| export.apex.expAclAssignments | false                                  | false                             | Export ACL User Role Assignments                                                                   |
| export.apex.expComments       | false                                  | false                             | Export developer comments                                                                          |
| export.apex.skipExportDate    | true                                   | true                              | Skip export date in application export files                                                       |
| export.apex.expirNotif        | false                                  | false                             | Export all interactive report notifications                                                        |

# project config

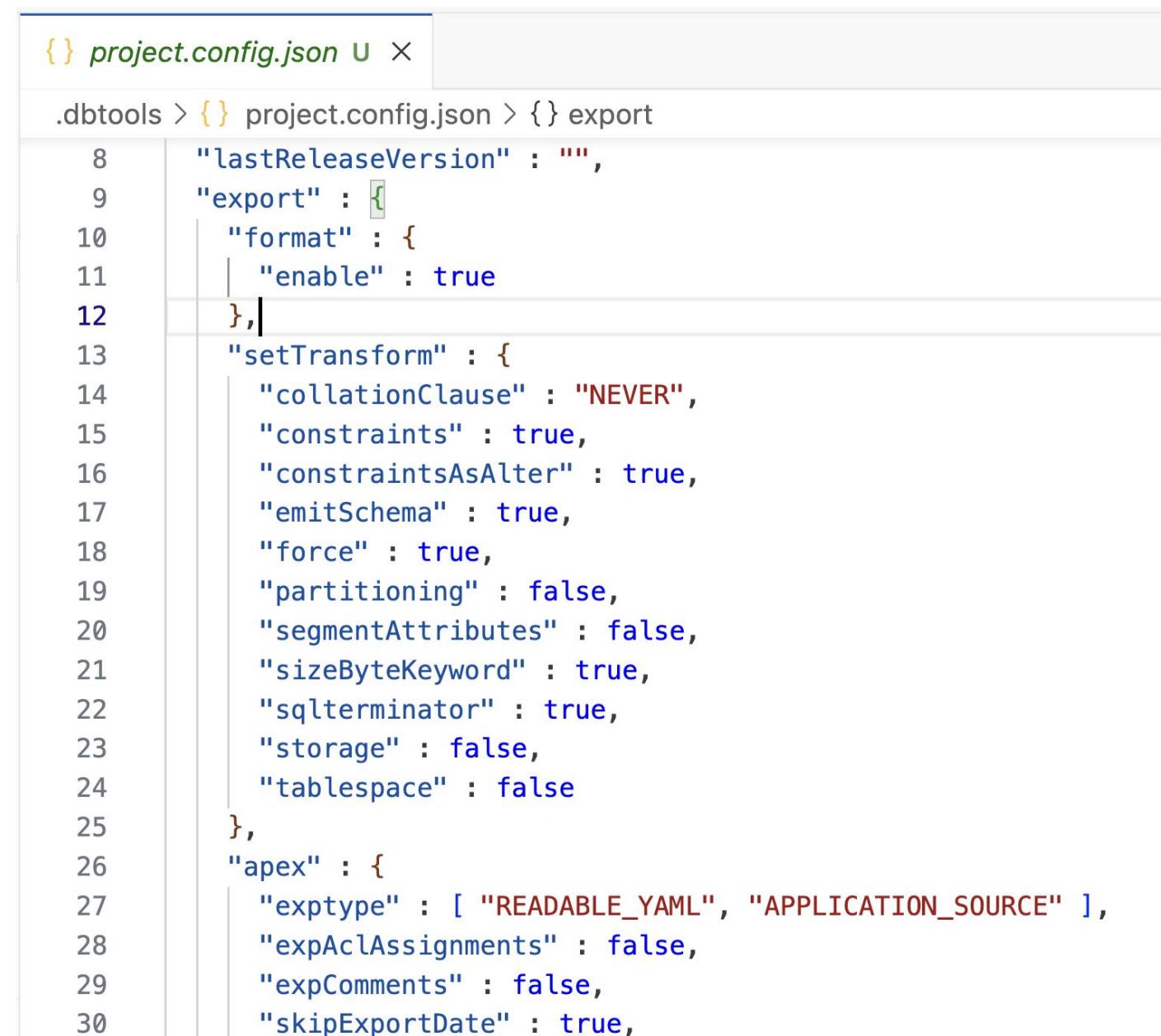
**View current configuration for the project:**

> project config **-list -verbose**

|                                             |       |       |                                                                                            |
|---------------------------------------------|-------|-------|--------------------------------------------------------------------------------------------|
| export.apex.expPubReports                   | false | false | Export all user saved public interactive reports                                           |
| export.apex.expSubscriptions                | false | false | Export references to subscribed components                                                 |
| <u>export.apex.expSupportingObje</u><br>cts | N     | N     | Pass (Y)es, (N)o or (I)nstall to override the default                                      |
| export.apex.expTranslations                 | false | false | Export the translation mappings and all text from the translation repository               |
| export.apex.auditType                       | NULL  | NULL  | Specifies the detail of audit information to include: DATE_S_ONLY, NAMES_AND_DATES or NULL |

# project config - adjust settings

## Manually:



The image shows a code editor window with the file `project.config.json` open. The file contains configuration settings for a database export. The code is written in JSON and includes comments indicating the purpose of various parameters.

```
{ } project.config.json U X
.dbtools > { } project.config.json > {} export
 8 "lastReleaseVersion": "",
 9 "export": {
10 "format": {
11 "enable": true
12 },
13 "setTransform": {
14 "collationClause": "NEVER",
15 "constraints": true,
16 "constraintsAsAlter": true,
17 "emitSchema": true,
18 "force": true,
19 "partitioning": false,
20 "segmentAttributes": false,
21 "sizeByteKeyword": true,
22 "sqlterminator": true,
23 "storage": false,
24 "tablespace": false
25 },
26 "apex": {
27 "exptype": ["READABLE_YAML", "APPLICATION_SOURCE"],
28 "expAclAssignments": false,
29 "expComments": false,
30 "skipExportDate": true,
31 "skipExportFile": false
32 }
33 }
```

## project config - adjust settings

### Using command line:

```
> project config set -name sqlcl.version -type INTEGER -value 24 -verbose
```

Edit project.filters to adjust your export:

```
project.filters U X .dbtools > filters > project.filters
25 object_type != 'TABLE' or object_name not in ('DATABASECHANGELOG',
26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
32
33 -- DM generated tables
34 --not (object_type = 'TABLE' and object_name like 'DM$%'),
35 --not (object_type = 'VIEW' and object_name like 'DM$V%'),
36 object_name not like 'DM$%', -- covers tables, views, indexes
37 object_name not like 'I_MLOG$%', -- covers Materialized Views Logs Indexes
38 object_name not like 'I_SNAP$', --
39
40 export_type not in ('USER'),
41
42 -- Export APEX application only:
43 -- export_type = 'APEX_APPLICATIONS',
44
45 -- Exclude certain database object types:
46 -- object_type not in ('CONTEXT', 'SCHEDULE'), -- trailing comma is optional
47
```

The screenshot shows the Visual Studio Code (VS Code) interface with a terminal window open. The terminal is titled 'bash' and contains the following command and its output:

```
14:33:42 SQL> project export -objects HR.COUNTRIES,CO.CUSTOMERS,APEX.101
The current connection DEVELOPMENT_HIGH ADMIN will be used for all operations
\
```

The terminal window is located in the 'TERMINAL' tab of the interface. The left sidebar shows various icons for 'EXPLORER', 'BOMBSHELL', 'OUTLINE', 'PROBLEMS', 'OUTPUT', 'DEBUG CONSOLE', 'SQL HISTORY', and 'TASK MONITOR'. The 'BOMBSHELL' icon has a blue badge with the number '98'. The bottom status bar shows the user 'viins', the time '1:58', the session 'ADMIN', and the connection 'dev\_admin'.



project export -objects -list

Preview your export:

> project **export -objects** HR.COUNTRIES, CO.CUSTOMERS **-list**

## Preview your export:

```
14:26:04 SQL> project export -objects HR.COUNTRIES,CO.CUSTOMERS -list
The current connection DEVELOPMENT_HIGH ADMIN will be used for all operations
```

```
*** TABLES ***
```

```
CO.CUSTOMERS
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HR.COUNTRIES
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*** INDEXES ***
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CO.CUSTOMERS_NAME_I
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*** COMMENTS ***
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CO.CUSTOMERS
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HR.COUNTRIES
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CO.CUSTOMERS
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CO.CUSTOMERS
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```
*** REF_CONSTRAINTS ***
```

```
HR.COUNTR_REG_FK
```

|                |   |
|----------------|---|
| INDEX          | 1 |
| REF_CONSTRAINT | 1 |
| TABLE          | 2 |

Listed 4 objects

# 5.1 Verify

# Project Verify

- Test various aspects of your project (snapshots, changes, overall project).
- Command is not working in SQLcl 25.1 - use it from future versions

```
> project verify -verbose
```

## Parameters:

- “-verbose” - (optional) show extra details about current process.

