EDB
Postgres for the AI Generation

PostgreSQL 17 new features

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10th December 2024

Key features and performance improvements in PostgreSQL 17

Releases

Community Releases

PostgreSQL 17 released 2024-09-26

PostgreSQL 17.1 released 2024-11-14

PostgreSQL 17.2 released 2024-11-21

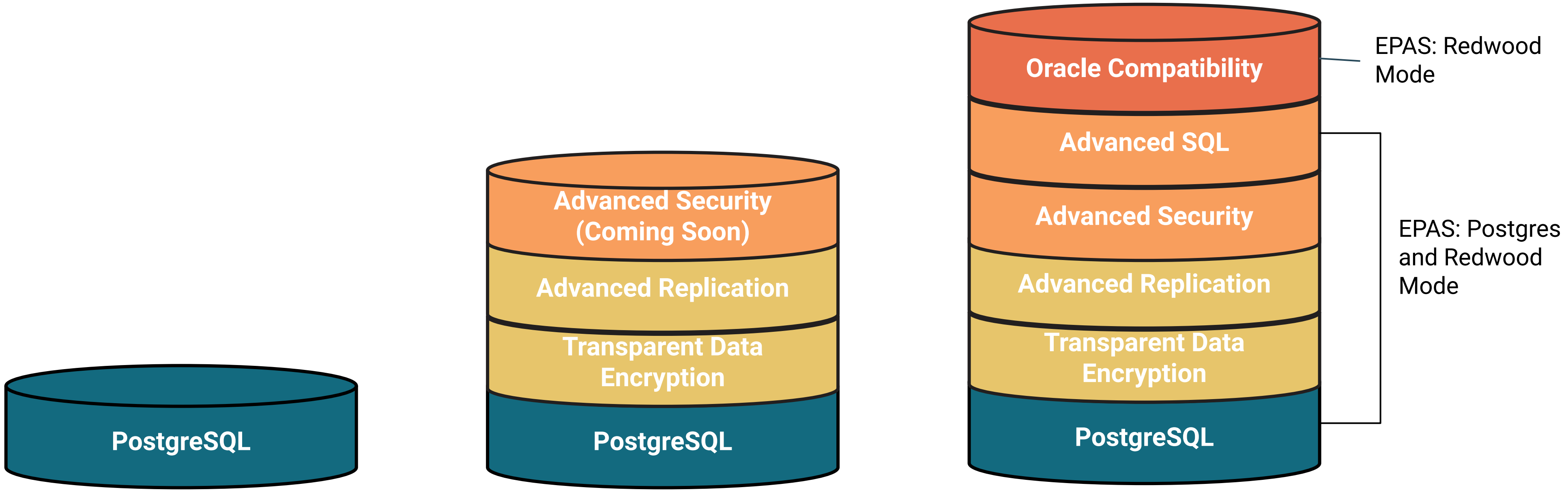
EDB Postgres 17

EDB Postgres Extended (PGE) Server 17.2 released 2024-11-21

EDB Postgres Advanced Server (EPAS) 17.2 released 2024-11-21

EDB tools and supported extensions certified for v17 ~2024-11-21

EDB Postgres databases



Community 360

Standard
EDB Postgres Extended (PGE)

Enterprise
EDB Postgres Advanced Server (EPAS)

Incremental Backups

- Only the changed blocks are copied

- pg_basebackup **`-i`** `old_manifest_file`

  pg_basebackup **`--incremental=`**`old_manifest_file`

- It requires **summarize_wal** enabled

- **pg_combinebackup** is used to reconstruct a full backup

Incremental Backups

- Test Challenge for PGDay Lowlands

Incremental Backups

- Barman 3.11.0 released 2024-08-22 supports it for PG 17 Beta3
- Barman 3.12.1 released 2024-11-21 latest

Incremental Backup

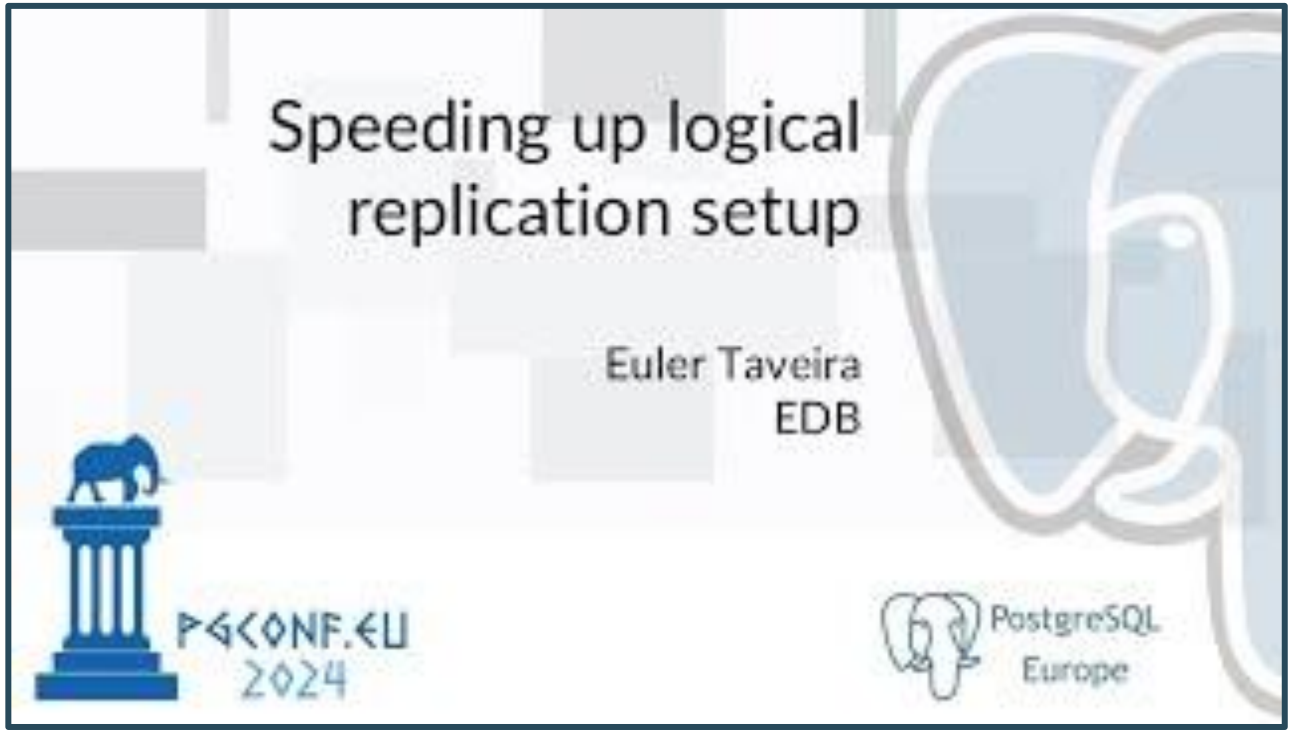
Incremental Backup
Robert Haas
EnterpriseDB

https://www.youtube.com/watch?v=F_uqARRaqNw

Logical Replication

- Failover of replication slots
- New tool **pg_createsubscriber**
- pg_upgrade preserves replication slots

pg_createsubscriber



Speeding up logical replication setup

Euler Taveira
EDB

PGCONF.EU
2024

PostgreSQL
Europe

https://www.youtube.com/watch?v=LPtmM2Dkdvg

Partitioning

- Allow partitions to be merged using

```
ALTER TABLE … MERGE PARTITIONS
```

- Allow partitions to be split using

```
ALTER TABLE … SPLIT PARTITION
```

And much more…

- Security
  - `pg_maintain` avoids superuser privileges for following: VACUUM, ANALYZE, CLUSTER, REFRESH MATERIALIZED VIEW, REINDEX, and LOCK TABLE on all relations
  - Make TLS connections without a network round-trip negotiation
- SQL
  - `COPY ON ERROR 'ignore'`
  - `JSON_TABLE()`
- Monitoring
  - New views:
    - `pg_wait_events`
    - `pg_stat_checkpointer`
  - Index Vacuum progress in `pg_stat_progress_vacuum`

CloudNativePG

- Postgres 17 supported
- Every single commit can be tested

More software PG17 ready

- TPA Trusted Postgres Architect
- PGD Postgres Distributed

What about AI

- pg_vector grows independently
- EDB AIDB integrates pg_vector with retrievers and generators

More details are here

https://www.postgresql.org/docs/17/release-17.html

Reducing Migration Times: EPAS 17

EDB

EDB Postgres Advanced Server (EPAS)

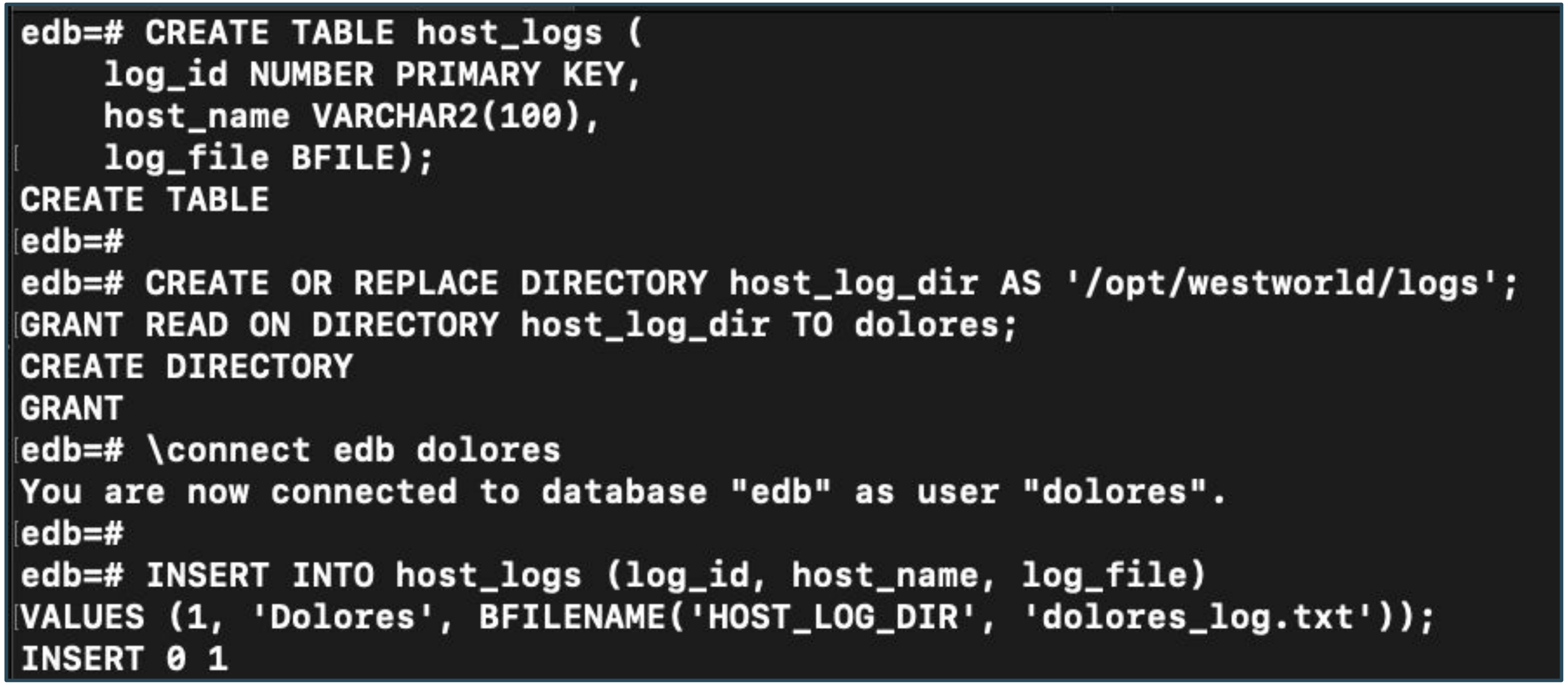
Q4 2024 (v17)

- Merge with upstream PostgreSQL:
  - Community Enhancements
- Simplified Migration for Legacy Oracle Applications:
  - XMLType Support
  - BFILE Support
- Oracle Compatibility enhancements based on Migration Portal:
  - SQL: NLS_UPPER, NLS_LOWER, NLS_INITCAP, SAVE EXCEPTION FOR ALL, FOR ALL MERGE
- Customer Requests and Miscellaneous:
  - JSON Support for EDB Audit Log, Directory Permissions, EDB Loader improvements, OCI Import Foreign Schema, Conceal Password

Bfile

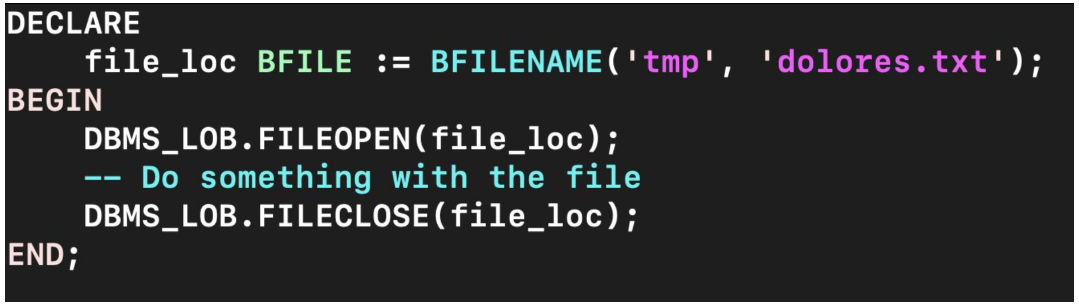
New native data type in EPAS 17

- Needed to expand DBMS_LOB support
    - Reached limit with other Binary Data types



```
edb=# CREATE TABLE host_logs (
    log_id NUMBER PRIMARY KEY,
    host_name VARCHAR2(100),
    log_file BFILE);
CREATE TABLE
edb=#
edb=# CREATE OR REPLACE DIRECTORY host_log_dir AS '/opt/westworld/logs';
GRANT READ ON DIRECTORY host_log_dir TO dolores;
CREATE DIRECTORY
GRANT
edb=# \connect edb dolores
You are now connected to database "edb" as user "dolores".
edb=#
edb=# INSERT INTO host_logs (log_id, host_name, log_file)
VALUES (1, 'Dolores', BFILENAME('HOST_LOG_DIR', 'dolores_log.txt'));
INSERT 0 1
```

DBMS_LOB



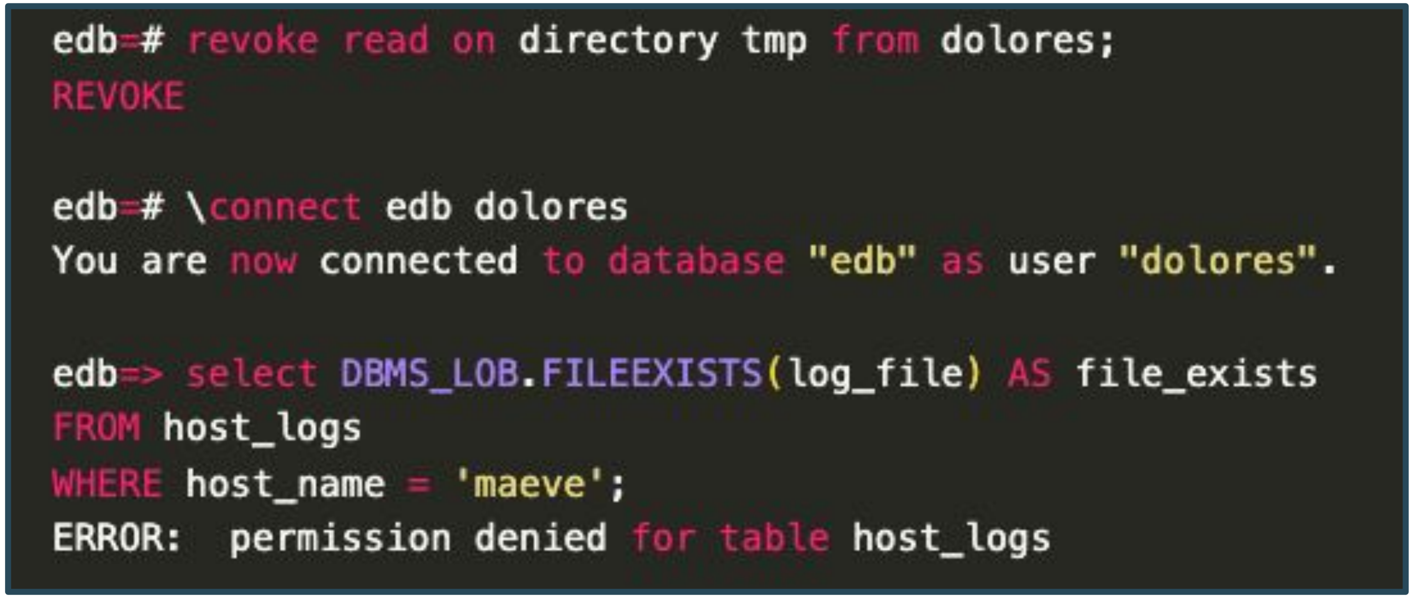
```
DECLARE
    file_loc BFILE := BFILENAME('tmp', 'dolores.txt');
BEGIN
    DBMS_LOB.FILEOPEN(file_loc);
    -- Do something with the file
    DBMS_LOB.FILECLOSE(file_loc);
END;
```

	v16	v17
APPEND	✓	✓
COMPARE	✓	✓
CONVERTTOBLOB	✓	✓
CONVERTTOCLOB	✓	✓
COPY	✓	✓
ERASE	✓	✓
FILECLOSE, CLOSE		✓
FILECLOSEALL		✓
FILEEXISTS		✓
FILEGETNAME		✓
FILEISOPEN, ISOPEN		✓
FILEOPEN, OPEN		✓
GET_STORAGE_LIMIT	✓	✓
GETLENGTH	✓	✓
INSTR	✓	✓
LOADBLOBFROMFILE		✓
LOADCLOBFROMFILE		✓
READ	✓	✓
SUBSTR		
TITLE NEEDED		✓
TRIM	✓	✓
WRITE	✓	✓
WRITEAPPEND	✓	✓

Directory Permissions

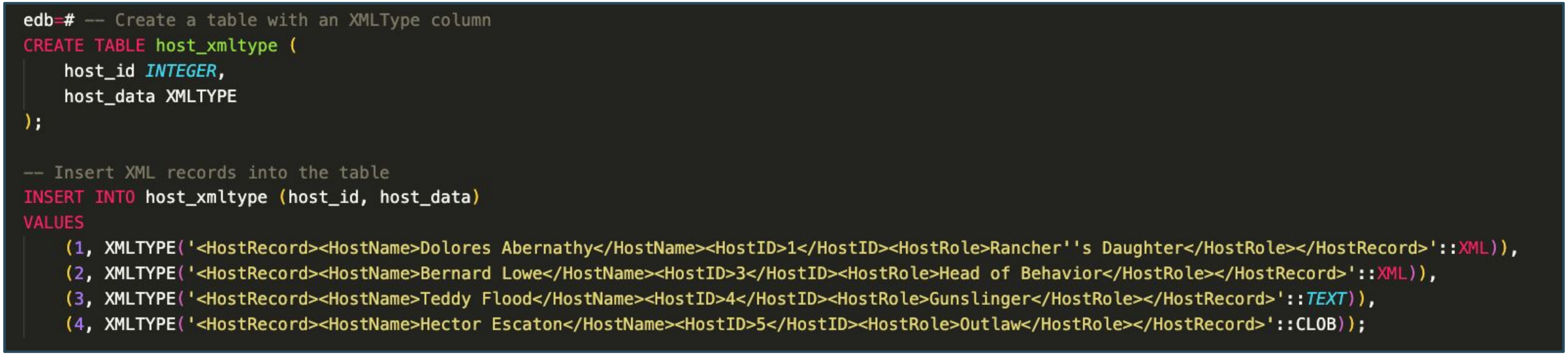
Before PostgreSQL v17, only superusers could create or drop directories, and there was no mechanism to grant these privileges to non-superusers

```
GRANT { CREATE | DROP }
        ANY DIRECTORY
        TO role_specification [, ...]
        [ GRANTED BY role_specification ]

GRANT { READ | WRITE | ALL [ PRIVILEGES ] }
        ON DIRECTORY directory_name [, ...]
        TO role_specification [, ...] [ WITH GRANT OPTION ]
        [ GRANTED BY role_specification ]

REVOKE [ GRANT OPTION FOR ]
        { READ | WRITE | ALL [ PRIVILEGES ] }
        ON DIRECTORY  directory_name [, ...]
        FROM role_specification [, ...]
        [ GRANTED BY role_specification ]
        [ CASCADE | RESTRICT ]
```



```
edb=# revoke read on directory tmp from dolores;
REVOKE

edb=# \connect edb dolores
You are now connected to database "edb" as user "dolores".

edb=> select DBMS_LOB.FILEEXISTS(log_file) AS file_exists
FROM host_logs
WHERE host_name = 'maeve';
ERROR:  permission denied for table host_logs
```

XMLType

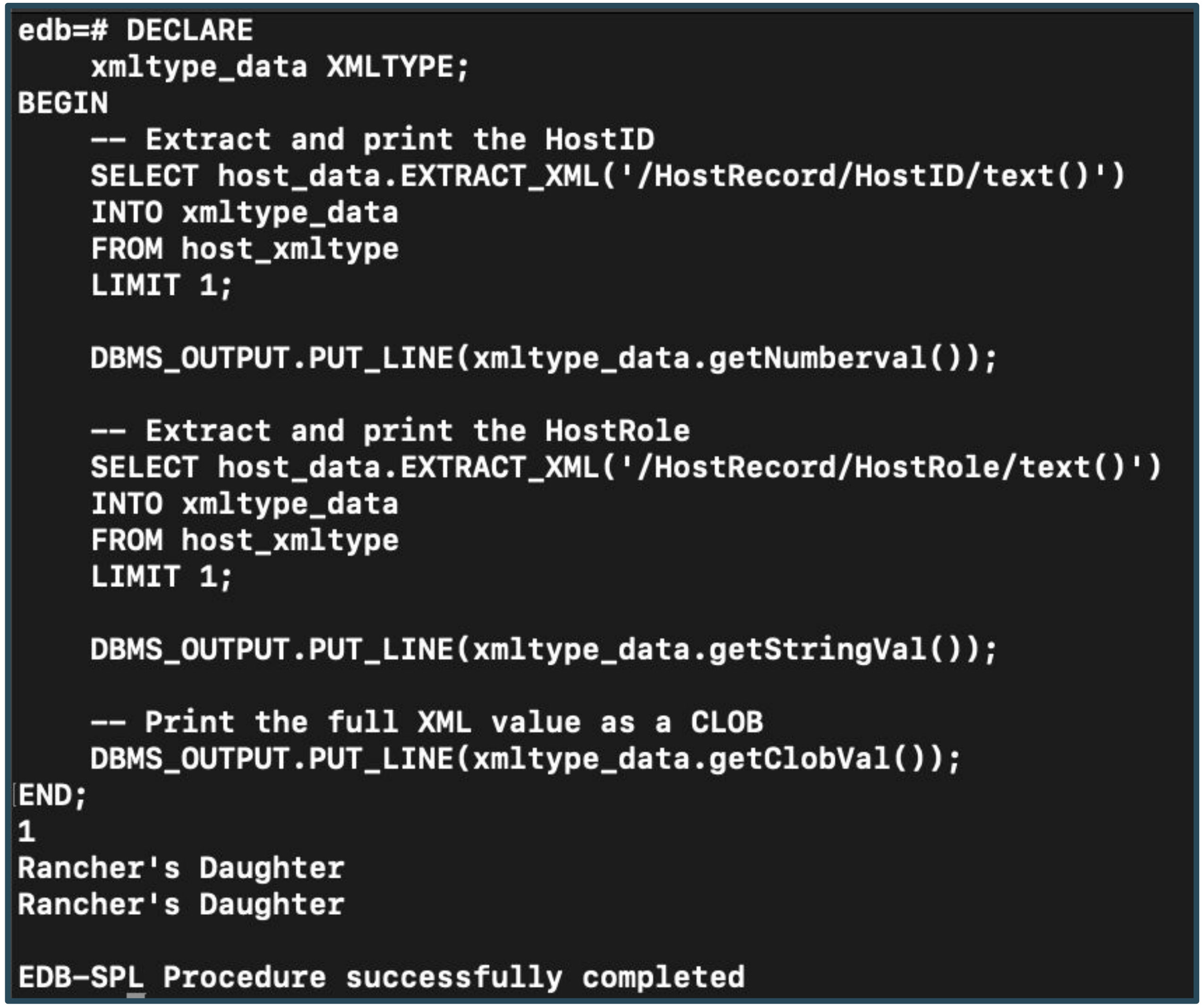


```
edb=# -- Create a table with an XMLType column
CREATE TABLE host_xmltype (
    host_id INTEGER,
    host_data XMLTYPE
);

-- Insert XML records into the table
INSERT INTO host_xmltype (host_id, host_data)
VALUES
    (1, XMLTYPE('<HostRecord><HostName>Dolores Abernathy</HostName><HostID>1</HostID><HostRole>Rancher''s Daughter</HostRole></HostRecord>'::XML)),
    (2, XMLTYPE('<HostRecord><HostName>Bernard Lowe</HostName><HostID>3</HostID><HostRole>Head of Behavior</HostRole></HostRecord>'::XML)),
    (3, XMLTYPE('<HostRecord><HostName>Teddy Flood</HostName><HostID>4</HostID><HostRole>Gunslinger</HostRole></HostRecord>'::TEXT)),
    (4, XMLTYPE('<HostRecord><HostName>Hector Escaton</HostName><HostID>5</HostID><HostRole>Outlaw</HostRole></HostRecord>'::CLOB));
```

XMLType

Example

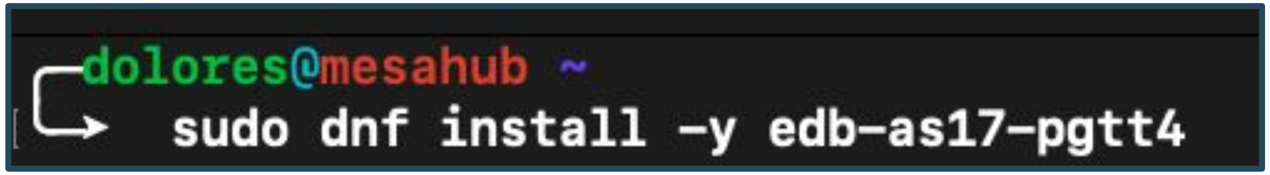
- Use member function to extract and print the host’s ID as a NUMBER
- Extract and print the host’s role as a string
- Return the entire XML value as a CLOB



```
edb=# DECLARE
    xmltype_data XMLTYPE;
BEGIN
    -- Extract and print the HostID
    SELECT host_data.EXTRACT_XML('/HostRecord/HostID/text()')
    INTO xmltype_data
    FROM host_xmltype
    LIMIT 1;

    DBMS_OUTPUT.PUT_LINE(xmltype_data.getNumberval());

    -- Extract and print the HostRole
    SELECT host_data.EXTRACT_XML('/HostRecord/HostRole/text()')
    INTO xmltype_data
    FROM host_xmltype
    LIMIT 1;

    DBMS_OUTPUT.PUT_LINE(xmltype_data.getStringVal());

    -- Print the full XML value as a CLOB
    DBMS_OUTPUT.PUT_LINE(xmltype_data.getClobVal());
END;
1
Rancher's Daughter
Rancher's Daughter

EDB-SPL Procedure successfully completed
```

PGTT

Added Support for Postgres Global Temporary Tables (pgtt)



```
dolores@mesahub ~
    sudo dnf install -y edb-as17-pgtt4
```

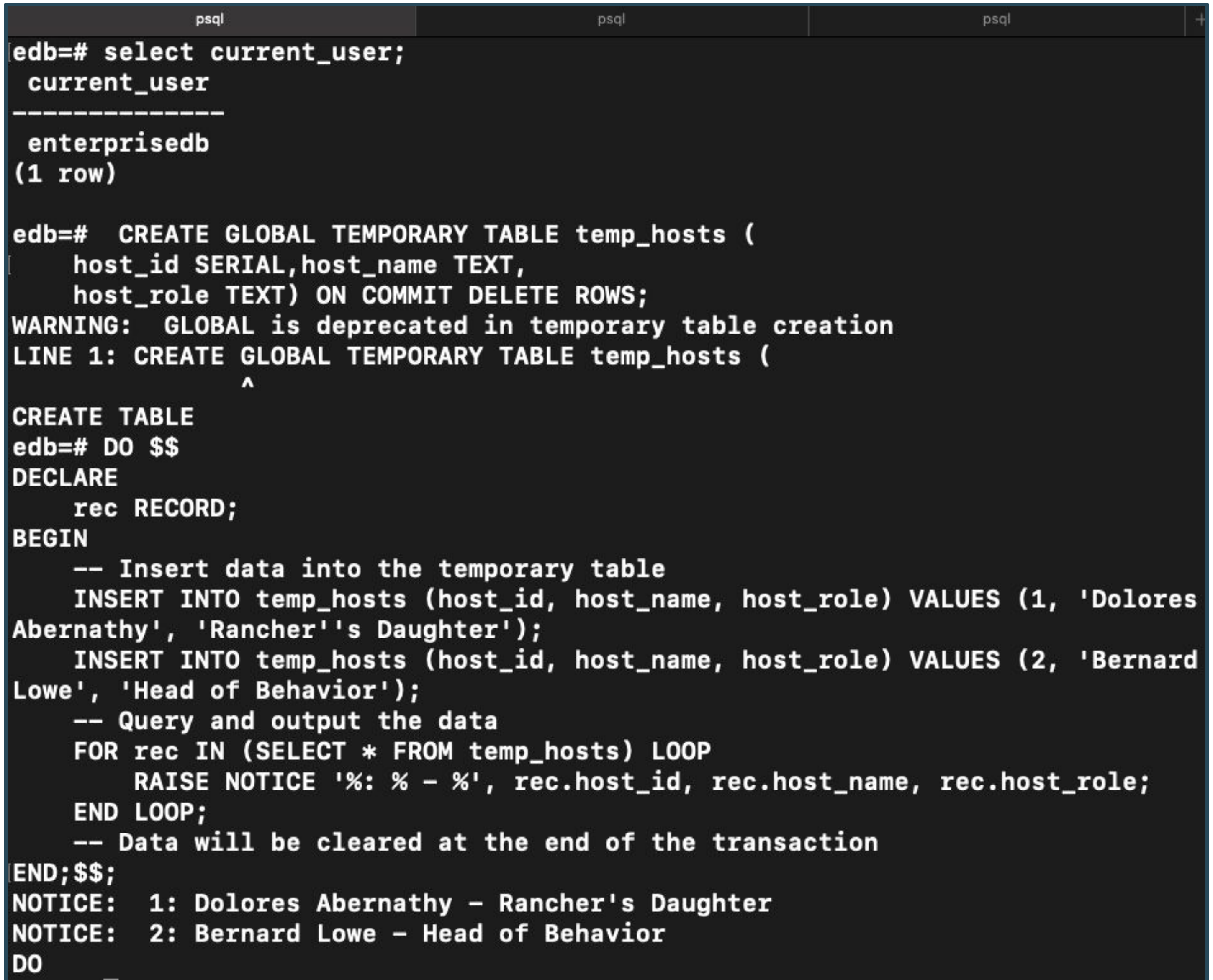
Overview

- Available for PostgreSQL, PGE, and EPAS 13-17
- A PostgreSQL extension providing functionality similar to Oracle Global Temporary Tables (GTT)
- Enables session- or transaction-specific temporary data storage

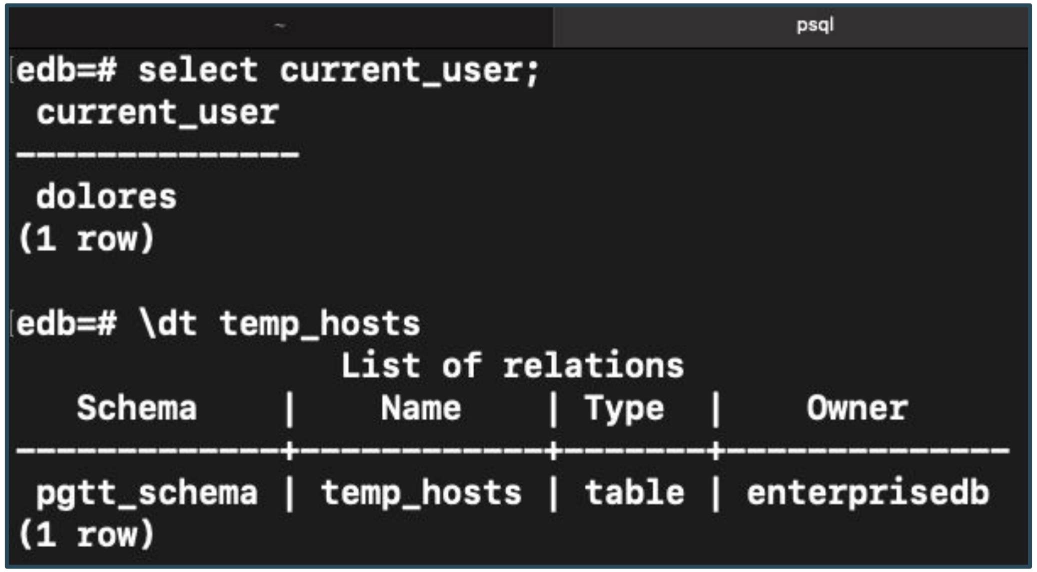
Why Add PGT to the Supported List?

- Enhanced Oracle Compatibility
- Developer Productivity

PGTT Example - Two Sessions



```
edb=# select current_user;
 current_user
--------------
 enterprisedb
(1 row)

edb=#  CREATE GLOBAL TEMPORARY TABLE temp_hosts (
    host_id SERIAL,host_name TEXT,
    host_role TEXT) ON COMMIT DELETE ROWS;
WARNING:  GLOBAL is deprecated in temporary table creation
LINE 1: CREATE GLOBAL TEMPORARY TABLE temp_hosts (
               ^
CREATE TABLE
edb=# DO $$
DECLARE
    rec RECORD;
BEGIN
    -- Insert data into the temporary table
    INSERT INTO temp_hosts (host_id, host_name, host_role) VALUES (1, 'Dolores
Abernathy', 'Rancher''s Daughter');
    INSERT INTO temp_hosts (host_id, host_name, host_role) VALUES (2, 'Bernard
Lowe', 'Head of Behavior');
    -- Query and output the data
    FOR rec IN (SELECT * FROM temp_hosts) LOOP
        RAISE NOTICE '%: % - %', rec.host_id, rec.host_name, rec.host_role;
    END LOOP;
    -- Data will be cleared at the end of the transaction
END;$$;
NOTICE:  1: Dolores Abernathy - Rancher's Daughter
NOTICE:  2: Bernard Lowe - Head of Behavior
DO
```



```
edb=# select current_user;
 current_user
--------------
 dolores
(1 row)

edb=# \dt temp_hosts
               List of relations
   Schema    |    Name    | Type  |    Owner
-------------+------------+-------+--------------
 pgtt_schema | temp_hosts | table | enterprisedb
(1 row)
```

Closing Words

- Plenty of interesting improvements on PG17
  - Incremental backups
  - Logical Replication
  - Table Partitioning
- Postgres does not have a community,
  it is a community

EDB
Postgres® for the AI Generation

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PostgreSQL 16 Administration Cookbook

Thank you