Why Oracle GoldenGate for PostgreSQL replication

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About RheoData

A global systems integrator headquartered in Atlanta, Georgia. Providing solutions across the enterprise with architecture design/assessments, implementation, data replication, and professional services to ensure high-quality enterprise systems leveraging Oracle and other enterprise technologies. RheoData works hand-in-hand with our strategic partners and their sales teams to build and deploy high performance and scalable enterprise solutions in addition to providing clients with cost savings professional services for turnkey enterprise management.

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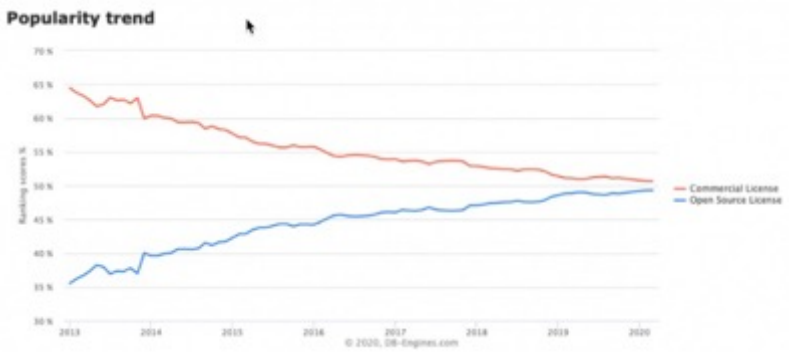
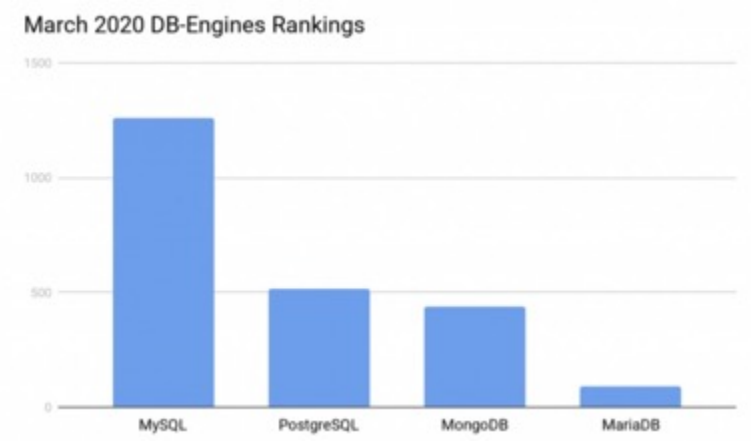
SDVOSB

Adoption over time

Open Source vs. Commercial



Ranked #2

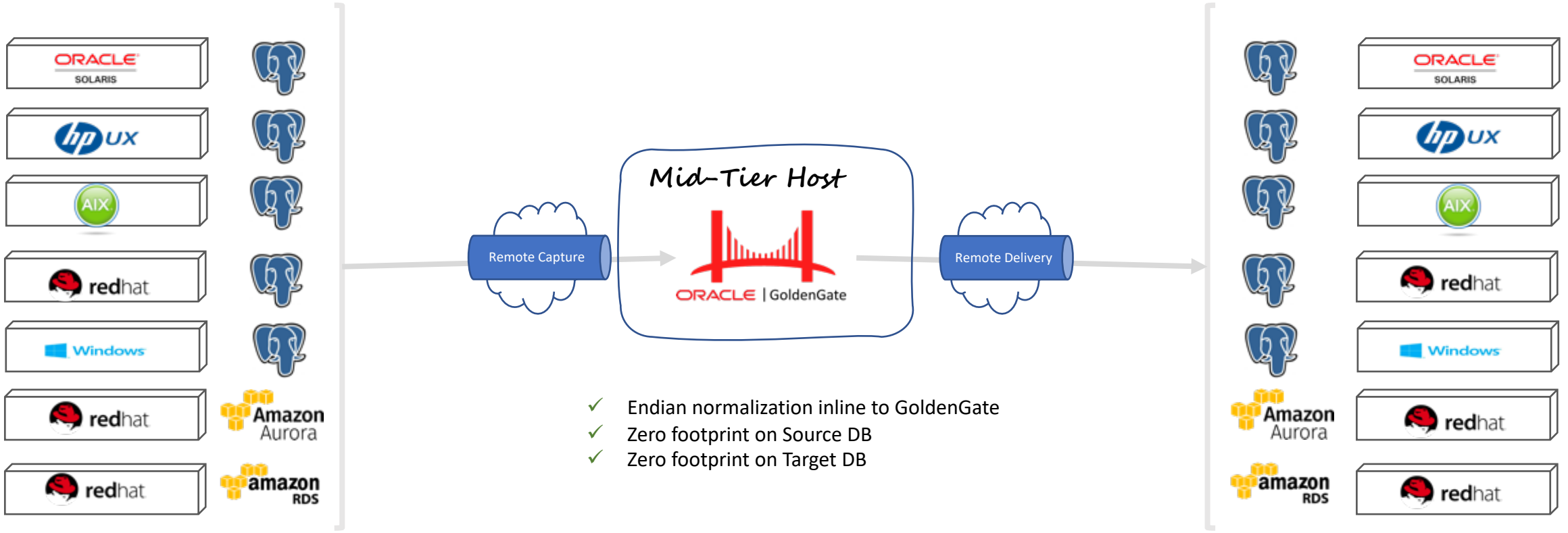


Steady Growth

https://www.percona.com/blog/2020/04/22/the-state-of-the-open-source-database-industry-in-2020-part-three/

GoldenGate Mappings

Middle-Tier Support



- ✓ Endian normalization inline to GoldenGate
- ✓ Zero footprint on Source DB
- ✓ Zero footprint on Target DB

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Benefits of GoldenGate PostgreSQL Capture

- ✓ Initial Load – to/from PostgreSQL Database
  - ✓ PostgreSQL v10 & above - Capture support
    - ✓ Native build on Linux platform
      - ✓ Majority of data types, plus CLOB/BLOB supported
        - ✓ SSL enabled database supported – capture & delivery
          - ✓ Globalization Support
            - ✓ Multiple replication slots to increase capture throughput
              - ✓ Co-Exist with native replication tool
                - ✓ Heartbeat Table support
                  - ✓ Coordinated replicat & BatchSQL support
                    - ✓ Conflict, Detection & Resolution (CDR) Support

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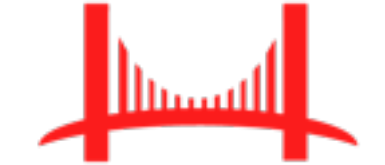
GoldenGate for PostgreSQL
Prerequisites

- Required RPMs
- `PostgreSQL.conf` file
- Replication Users, i.e. GoldenGate User (`ggate`)
- Environment Variables
- Open Database Connector file (`ODBC.ini`)

PostgreSQL



ORACLE | GoldenGate

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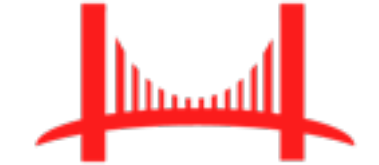
GoldenGate for PostgreSQL
Prerequisites - RPMS

- Ensure all the required RPMs are installed
  - `PostgreSQL##-contrib`
  - `oracle-database-preinstall-19c`

PostgreSQL



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GoldenGate for PostgreSQL
Prerequisites – PostgreSQL.conf

- Location will vary depending on PostgreSQL version
- Updates required:

Parameter	Value	Description
wal_level	logical	Default
max_replication_slots	10	Default
max_wal_sender	10	Default
wal_receiver_status_interval		Optional
wal_sender_timeout		Optional
track_commit_timestamp	False	Optional

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GoldenGate for PostgreSQL
Prerequisites – GoldenGate User

```
psql# create user {user} with password '{passwd}' login;

psql# alter user {user} with replication;
```

PostgreSQL

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GoldenGate for PostgreSQL
Prerequisites – Environment Variables

Environment Variable	Value (change as needed)
PG_HOME	/usr/pgsql-12
OGG_HOME	/opt/app/oracle/19.1.0/oggcore_1
LD_LIBRARY_PATH	$PG_HOME/lib:$OGG_HOME/lib:$LD_LIBRARY_PATH
ODBCINI	{path to odbc.ini}/odbc.ini
PATH	$ODBCINIT:$PATH

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GoldenGate for PostgreSQL
Prerequisites – ODBC.ini

- Location of ODBC.ini file can be anywhere, just needing to be referenced by environment variables
- Sets up default connection items for PostgreSQL

```
[ODBC Data Sources]
postgre=DataDirect 7.1 PostgreSQL Wire Protocol
#pgdsn=DataDirect 7.1 PostgreSQL Wire Protocol

[ODBC]
IANAAppCodePage=4
InstallDir=/opt/app/oracle/19.1.0/oggcore_1

[pgdsn]
Driver=/opt/app/oracle/19.1.0/oggcore_1/lib/GGpsql25.so
Description=DataDirect 7.1 PostgreSQL Wire Protocol
Database=postgres
HostName=10.0.2.15
#HostName=localhost
PortNumber=5432
LogonID=postgres
Password=Welcome1
```

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GoldenGate for PostgreSQL
GoldenGate Installation

- Same as any other Oracle GoldenGate Classic installation
  - `unzip/tar -xvf` into $OGG_HOME
  - `$OGG_HOME/GGSCI`
    - `CREATE SUBDIRS`

```
drwxr-x---. 2 oracle oinstall          6 Aug 26 00:51 dirwlt
drwxr-x---. 2 oracle oinstall          6 Aug 26 00:51 dirdef
drwxr-x---. 2 oracle oinstall          6 Aug 26 00:51 dircrd
drwxr-x---. 2 oracle oinstall         31 Aug 26 01:39 dirdmp
drwxr-x---. 2 oracle oinstall         29 Aug 26 02:43 dirsql
drwxr-x---. 2 oracle oinstall         63 Aug 26 10:48 dirdat
drwxr-x---. 2 oracle oinstall         59 Aug 26 10:53 dirprm
drwxr-x---. 2 oracle oinstall         44 Aug 26 11:00 dirchk
drwxr-x---. 2 oracle oinstall       4096 Aug 26 11:00 dirrpt
drwxr-x---. 2 oracle oinstall         59 Aug 26 11:00 dirpcs
drwxr-x---. 2 oracle oinstall         86 Aug 26 11:00 dirtmp
```

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GoldenGate for PostgreSQL
Manager

- Configure and start Manager (MGR)
  - $OGG_HOME/GGSCI
    - EDIT PARAMS MGR
      - Port 16000 (default 7809)

```
drwxr-x---. 2 oracle oinstall        59 Aug 26 10:53 dirprm
|
 -rw-r-----. 1 oracle oinstall        11 Aug 26 00:52 mgr.prm
```

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GoldenGate for PostgreSQL
Add Trandata


```
GGSCI> dblogin sourcedb {dsn} userid {userid} password {password}
GGSCI> add trandata {schema}.{table} [ALLCOLS]|[KEYCOLSONLY}
```

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GoldenGate for PostgreSQL
Register Extract


```
GGSCI> dblogin sourcedb {dsn} userid {userid} password {password}
GGSCI> register extract {extract_name}
```

Make sure that the RPM for *PostgreSQL##-contrib* is installed (Linux platforms)

If RPM is not installed, then registering will not happen:

2020-08-26 02:57:43 WARNING OGG-00552 Database operation failed: Executing statement to create replication slot. ODBC error: SQLSTATE S1000 native database error 8803729. [Oracle][ODBC PostgreSQL Wire Protocol driver][PostgreSQL]ERROR: VERROR; could not access file **"test_decoding"**: No such file or directory(File dfmgr.c; Line 210; Routine internal_load_library;.

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GoldenGate for PostgreSQL
Add Extract


```
GGSCI> add extract {extract_name}
GGSCI> add exttrail ./dirdat/aa, extract {extract_name}
GGSCI> edit params {extract_name}
```

- Extract Data Pumps can be created *IF* trail file shipping is required

GoldenGate for PostgreSQL
Add Replicat


```
psql# create schema {schema}

GGSCI> dblogin sourcedb {dsn} userid {userid} password {passwd}
GGSCI> add checkpointtable {schema}.{checkpointtable_name}
GGSCI> add replicat {replicat_name}, exttrail ./dirdat/aa, checkpointtable {schema}.{checkpointtable_name}
GGSCI> edit params {extract_name}
```

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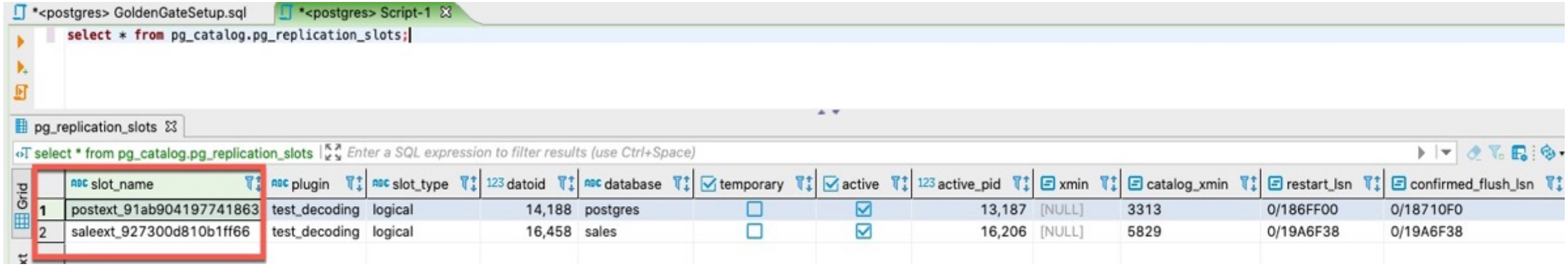
PostgreSQL
Replication Slots

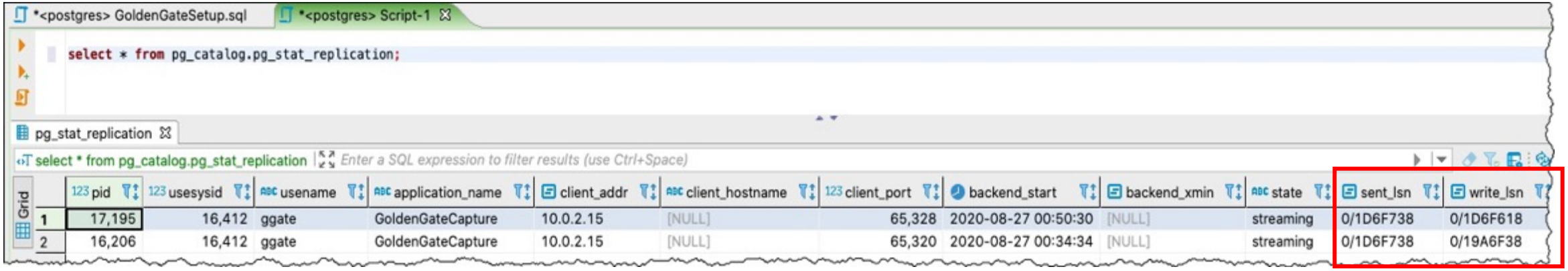
```
psql# select * from pg_catlog.pg_replication_slots;
```



- Provides information on the physical slots

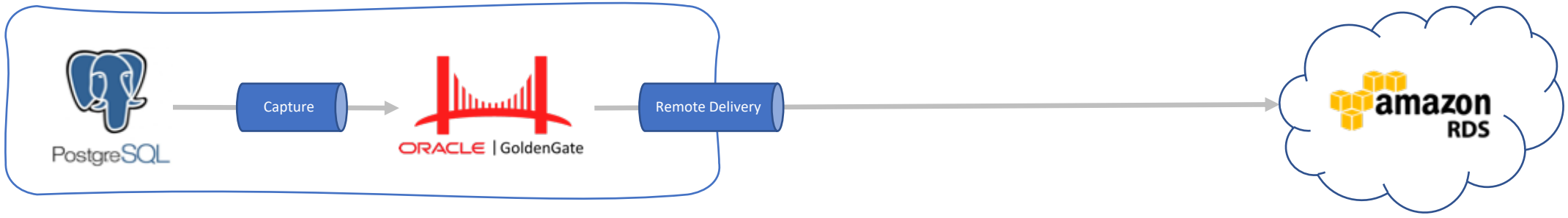
PostgreSQL
Replication Stats

```
psql# select * from pg_catlog.pg_stat_replication;
```



- Information on replay lag
- Information on outgoing/sent LSN

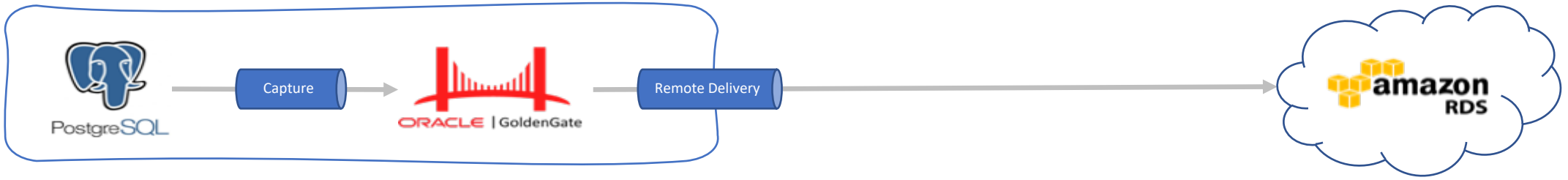
On-Premises to Cloud
Remote Apply



Key Item: Connection needs to be >= 100ms

Note: Used AWS Free Tier during testing

On-Premises to Cloud
Configure Remote Apply

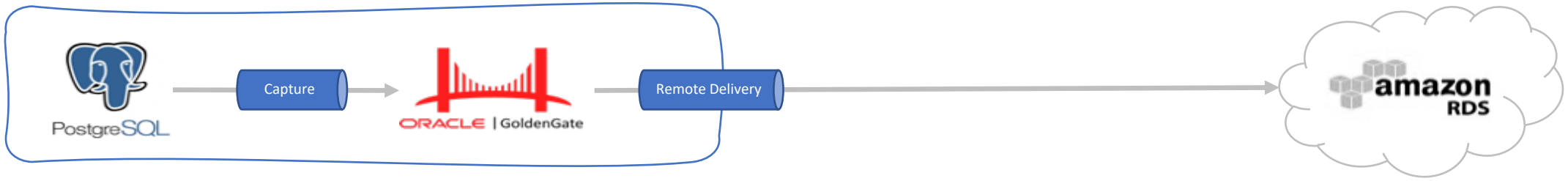


AWS Items:

- Open up ACL for Security Groups
  - Make sure that your host can access in/out of the AWS network
  - Gather connection details
- Endpoint Address - DNS style
  - Port (5432)

Note: Used AWS Free Tier during testing

On-Premises to Cloud
Configure Remote Apply



Host Items:

- Create/Update ODBC DSN
  - Make sure that your host can access in/out of the AWS network
- Endpoint Address - DNS style
  - Use same parameters to make connection to a database

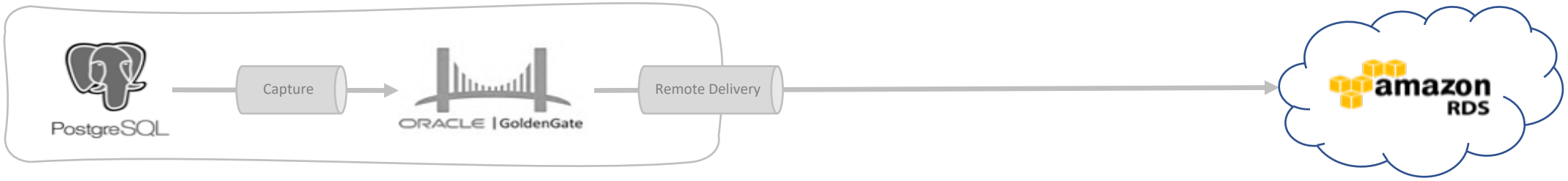
    SOURCEDB DSNNAME USERID, userid, PASSWORD password

```
[aws]
Driver=/opt/app/oracle/19.1.0/oggcore_1/lib/GGpsql25.
so
Description=DataDirect 7.1 PostgreSQL Wire Protocol
Database=ggtest
HostName=ggtesting.cc36pqhw59w8.us-east-
2.rds.amazonaws.com
PortNumber=5432
LogonID=postgres
Password=<password>
```

Note: Used AWS Free Tier during testing

On-Premises to Cloud

Configure PostgreSQL (RDS)



RDS Setup:

- Create Tablespaces

```
Create tablespace <ts_name> owner <schema> location '<path>';
```

- Create Schemas

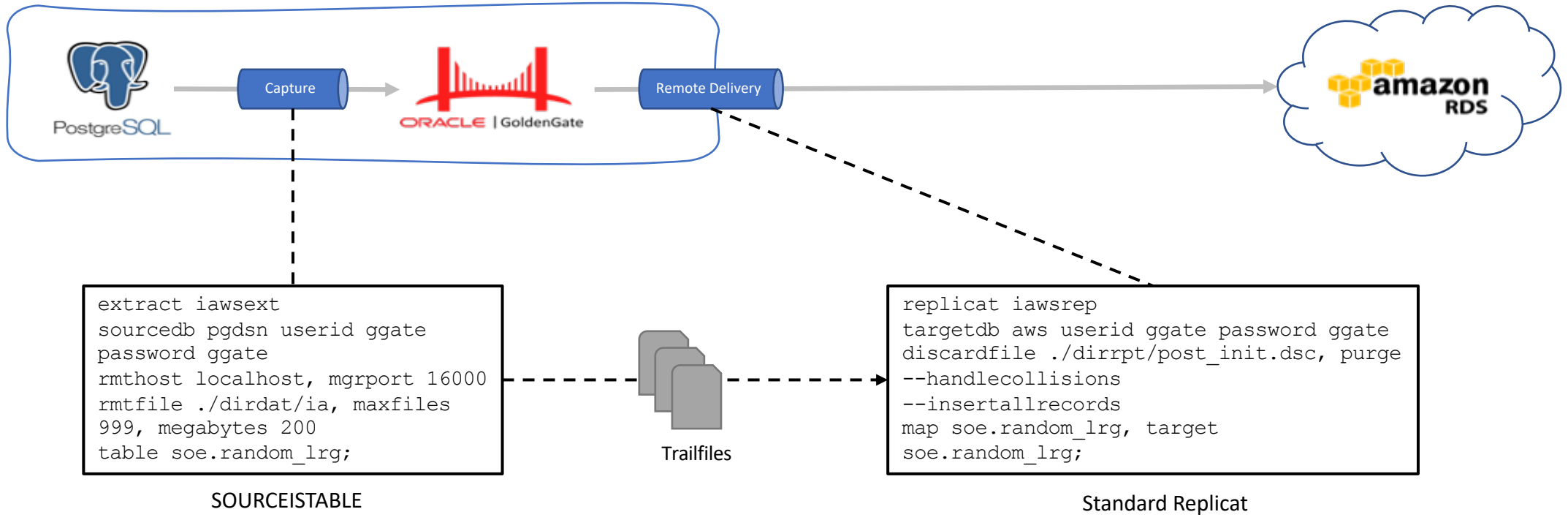
```
Create schema <schema>;
```

- Create Users/Role

```
Create user <role> with password '<passwd>' login;
Grant all on tablespace <ts_name> to <user>;
Grant all on schema <schema> to <user>;
```

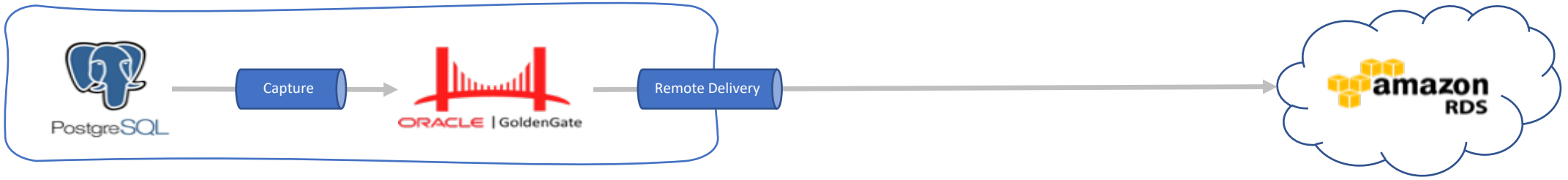
Note: Used AWS Free Tier during testing

On-Premises to Cloud
Initial Load - Tables



Note: Used AWS Free Tier during testing

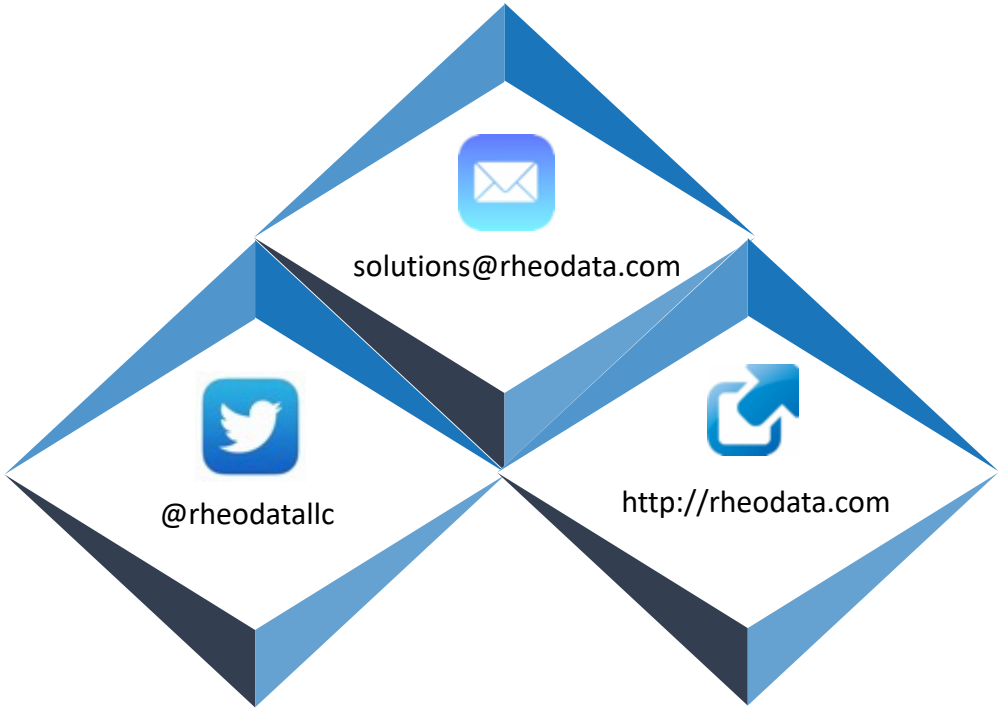
On-Premises to Cloud
Thinks to consider



- Network bandwidth could be a bottleneck
  - Connection should be >= 100ms; anything greater will cause latency
- Size of the RDS instance determine processing speed
  - EC2 and other cloud-based PostgreSQL environment – may provide more direct access and options
- All connections work over ODBC (Data Direct drivers)
  - Remote Capture
  - Remote Delivery

Note: Used AWS Free Tier during testing

Contact RheoData



Why RheoData

Advantage:

RheoData services are specifically designed and optimized for customers who are looking for data migration and infrastructure solutions to maximize their investment on-premises and in the cloud. By leveraging the right combination of experience, expertise, and up-to-date product knowledge, Rheodata can customize a solution to fit your needs. Our staff offers top-notch service that is backed by a proven track record of excellence, weather performed on-site or remote. RheoData provides services from the beginning of the architecture design process through the implementation phase, ensuring an aligned and complete project based on overall customer goals.

Dynamic Teaming:

- Supplemental IT Services for Customers
- Onshore Resources
- Complete Infrastructure Services/Management

Consulting Services:

- Cloud Platforms (OCI, Azure, AWS)
- Database Migrations and Upgrades
- Streaming Data Platforms (Apache Kafka)
- Engineered Systems
- Architecture Assessments/Implementations
- Enterprise Monitoring

Strategic Services:

- Software Selection Assistance
- Solution Architecture
- Proof of Concepts (POC)
- Implementation, Upgrade, Migration and Conversion Estimates

Tools & Platforms:

Database:
- Oracle
- Microsoft SQL Server
- PostgreSQL
- MySQL

Infrastructure as Code:
- Terraform
- Vault

Data Integration:
- Oracle GoldenGate
- Apache Kafka
- HVR

Engineered Systems:
- Exadata
- Oracle Database Appliance

Cloud Platforms:
- AWS
- Microsoft Azure
- Oracle Cloud Infrastructure

Staff:

RheoData is founded and owned by a former Oracle Product Manager that brings 25+ years of industry experience to any project. This background and expertise is critical for customer project success and allows RheoData exceptional access to support channels as well as product development to ensure success of any project.

Contact:

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