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ENT301

Babelfish: Efficiently modernize SQL Server to Amazon Aurora

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Thank you!

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Appendix

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Why modernize SQL Server to a database built for the cloud?

1. Reduce licensing cost
2. Reduce operational overhead
3. Difficult to scale SQL Server



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Roadblocks in modernizing SQL Server to a database built for the cloud

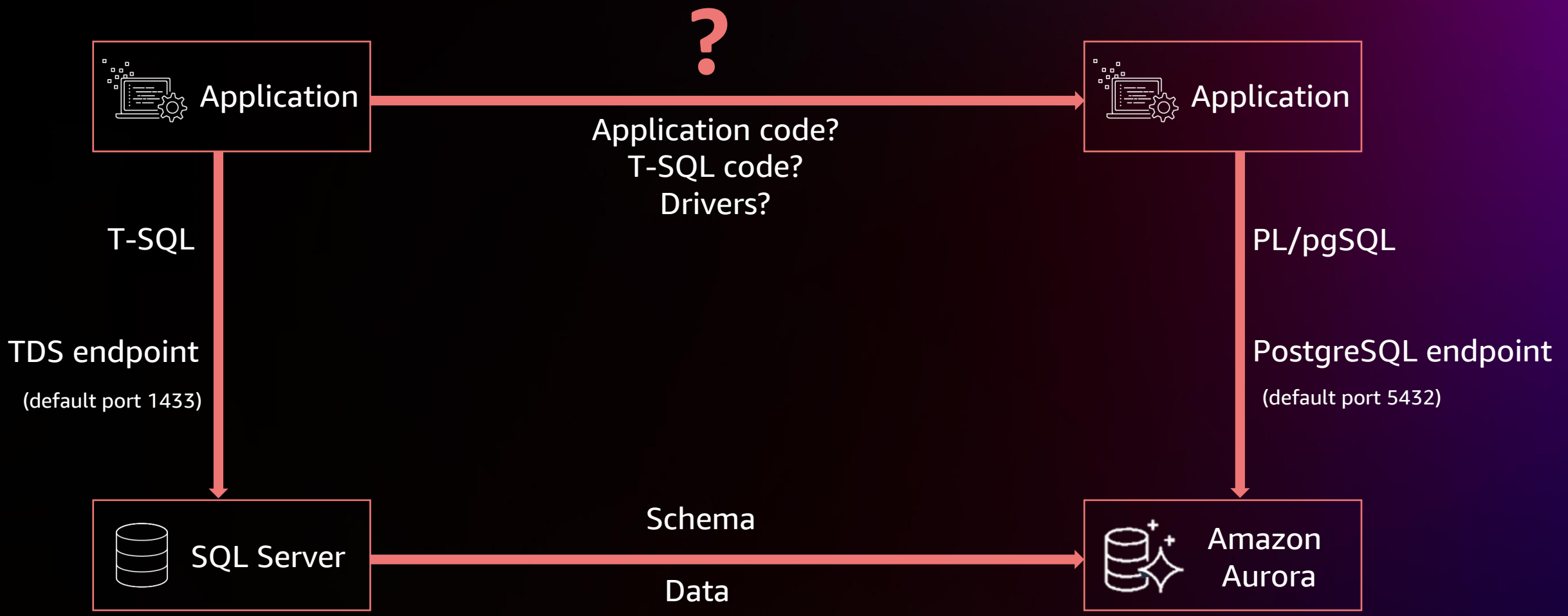
1. Don’t know where to start
2. Business logic is in stored procedures
3. Application code highly dependent on SQL Server



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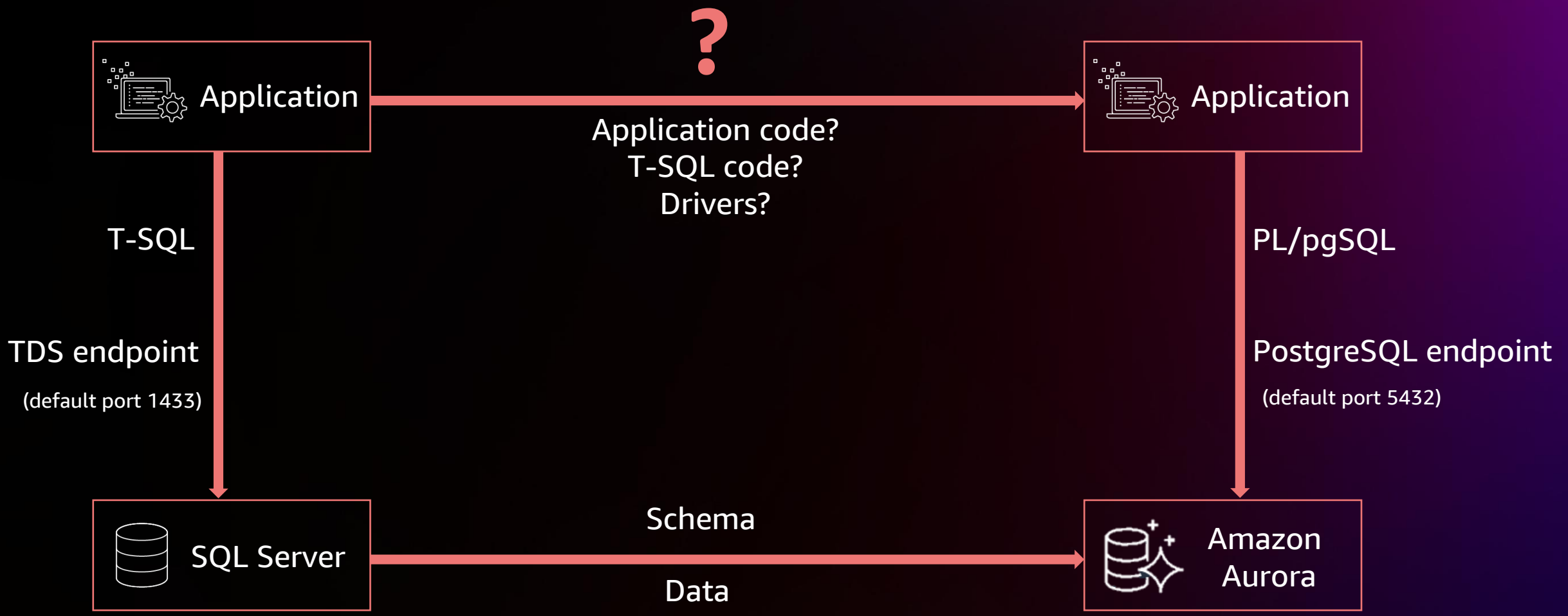
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SQL Server modernization journey



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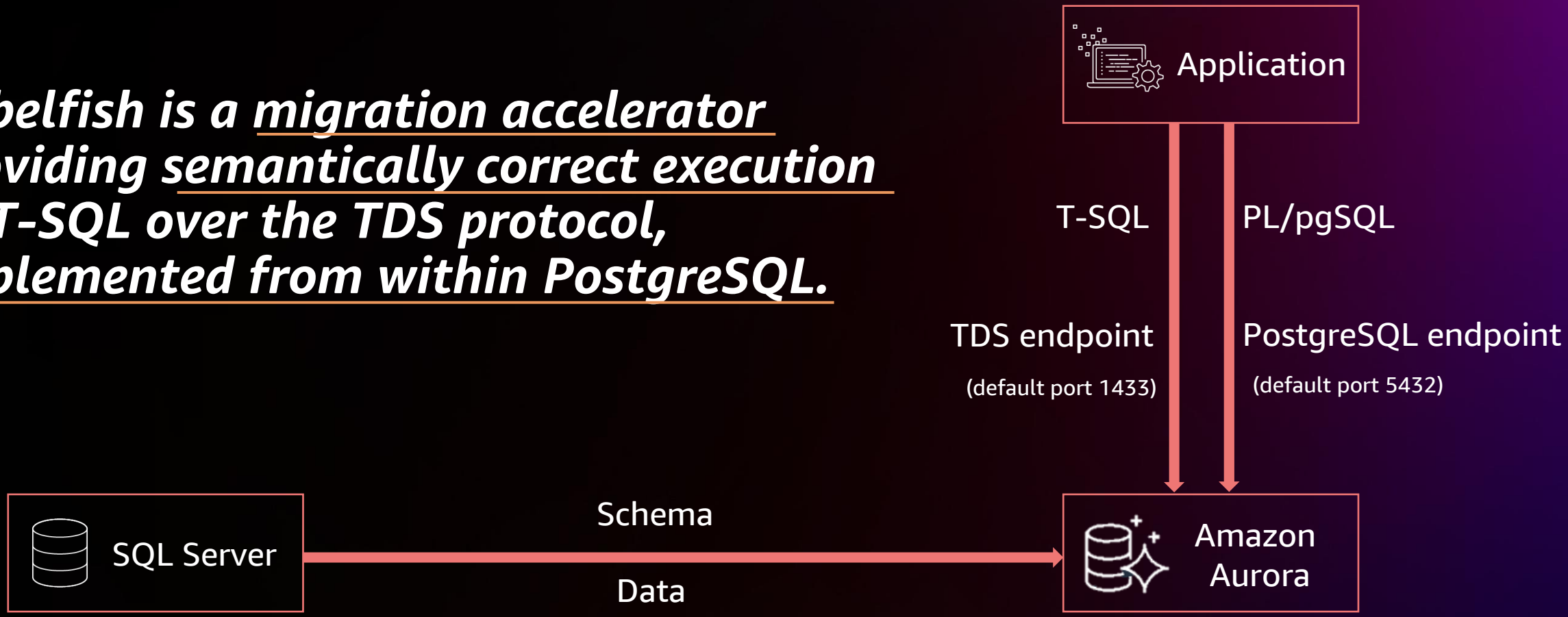
Babelfish for PostgreSQL



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Babelfish for PostgreSQL

Babelfish is a migration accelerator providing semantically correct execution of T-SQL over the TDS protocol, implemented from within PostgreSQL.



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Babelfish for PostgreSQL

Keep legacy application code

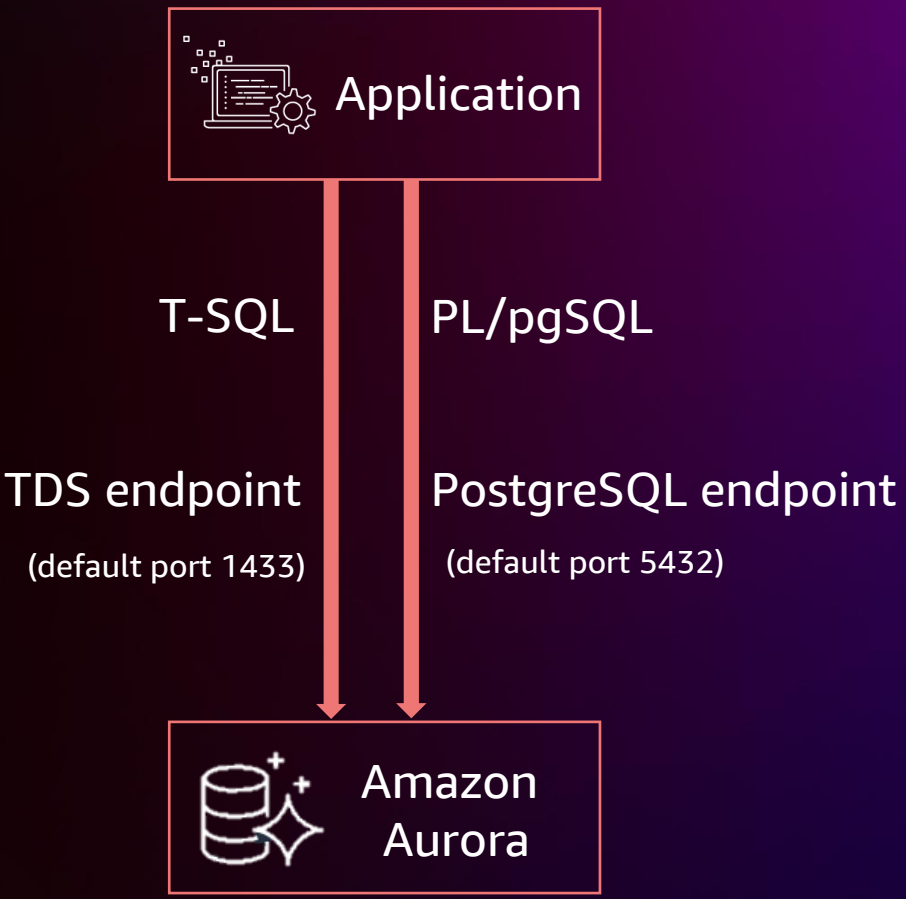
Keep existing queries

Keep database drivers

Reduce migration time and risk

Freedom to innovate

Open source



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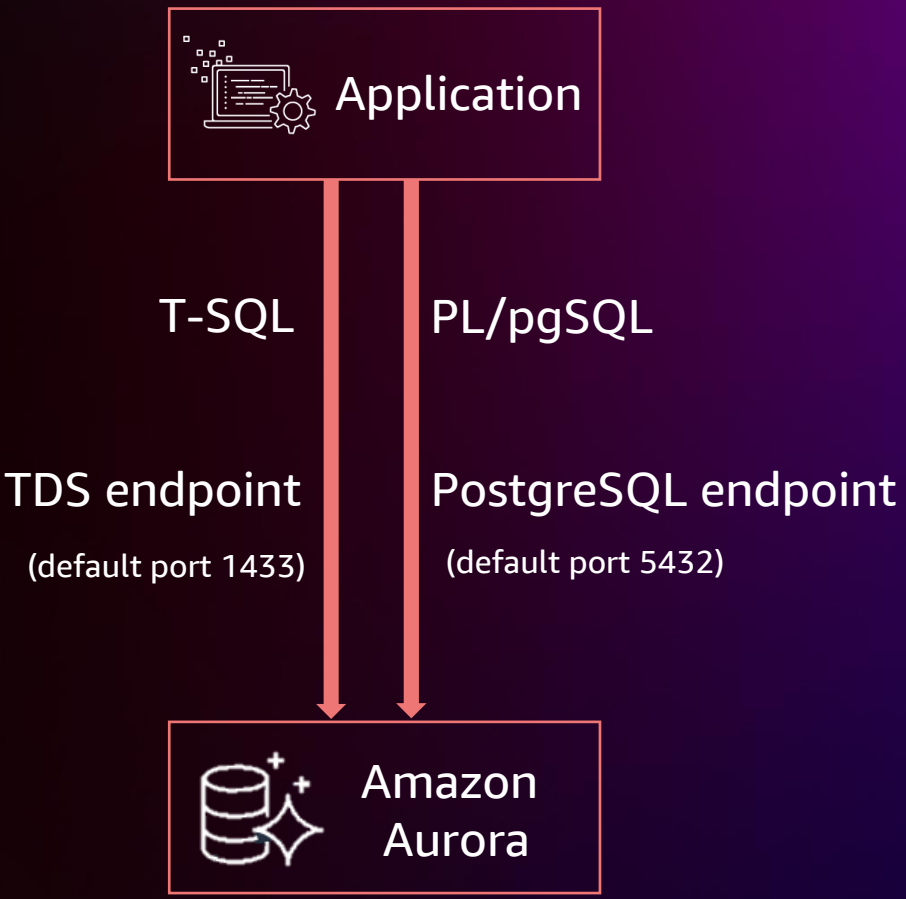
Babelfish for PostgreSQL

Babelfish Compass: Migration assessment tool

Open-source, standalone, command-line tool

Designed for Babelfish compatibility assessment

Analyzes SQL/DDL code to identify features
that are not compatible with Babelfish for PostgreSQL



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Modernizing MS SQL Server with Babelfish delivers $21k in savings per database

CHALLENGE

The customer needed to consolidate IT assets acquired through mergers and acquisitions over the last few years. The acquisition included a massive IT consolidation effort including more than 200 applications and 70 Microsoft SQL Server databases. The time and budget required open-source alternatives, but they didn't have enough capacity to modernize and consolidate at the same time.

SOLUTION

1CloudHub conducted a migration readiness assessment using AWS SCT and Babelfish Compass to determine the best fit to migrate the project. The team chose to leverage Babelfish based on the compatibility and ability to migrate with little to no code change. The Microsoft SQL Server databases were successfully migrated to Amazon Aurora PostgreSQL using Babelfish.

BENEFITS

- We were able to deliver cost savings of $21,000 per year for our customer with one database alone
- 70% of queries showed performance improvements
- Accelerated migration of complex systems

> We were able to deliver cost savings of $21,000 per year for our customer with one database alone.

Ramakrishna Phani, Global Head of Cloud Practice, 1CloudHub

1CloudHub

About 1CloudHub

1CloudHub is a cloud services and solutions provider, with skills spanning the entire spectrum of digital transformation – migration, legacy app modernization, SAP on AWS, cloud-centered app development and support, optimization of deployments across clouds, and SRE services

About the customer

The customer is one of the largest container shipping businesses in the world, with 250+ shipping routes connecting 400+ ports in 160 countries

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Migration steps

1. Create Babelfish cluster
2. Export DDL (generate DDL with SSMS)
3. Run Babelfish Compass assessment tool on the DDL to find incompatibilities
4. Import adjusted DDL script into Babelfish
5. Migrate data using Data Migration Service (DMS)
6. Reconfigure the client app to connect to Babelfish instead of SQL Server

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Current Babelfish releases

- October 2021: 1.0.0 — GA ! → PG 13.4
- February 2022: 1.1.0 → PG 13.5
- March 2022: 1.2.0 → PG 13.6
- May 2022: 1.3.0 → PG 13.7 (bug fix release for 1.2.0)
- July 2022: 2.1.0 → PG 14.3
- November 2022: 2.2.0 → PG 14.5

Documentation:
https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/babelfish.html

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Supported T-SQL features

SQL SERVER SPECIFIC FEATURES

- Triggers, stored procedures, scalar SQL functions, views
- T-SQL transactional semantics, including nested transactions and savepoints
- Data types (money, sql_variant, 3-millisecond datetime)
- Control-of-flow statements (e.g., GOTO, TRY/CATCH)
- Table data types, table parameters and table-valued functions
- Static cursors
- Computed columns
- Dynamic SQL (EXEC with string param) and sp_executesql
- Application locks
- SELECT . . . FOR XML { RAW | PATH } (ELEMENTS clause not supported)
- Multiple results sets per procedure/batch

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Supported T-SQL features

SQL SERVER SPECIFIC FEATURES

- #Temporary tables
- Built-in functions
- IDENTITY columns
- Case-insensitive identifiers
- Collation support
- DML OUTPUT clause support
- @@ERROR code mapping
- CREATE DATABASE; USE <db>
- SQL Server catalogs (selection)
- SSL/TLS; Kerberos

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v.1.2.0: Supported T-SQL features

SQL SERVER SPECIFIC FEATURES

- TIMESTAMP/ROWVERSION columns
- CREATE USER
- CREATE SCHEMA . . . AUTHORIZATION . . .
- GRANT/REVOKE object permissions to a DB user
  - SELECT,INSERT,UPDATE,DELETE,REFERENCES,EXECUTE
- Trigger functions: COLUMNS_UPDATED(), UPDATE()
- ISJSON(), JSON_QUERY(), JSON_VALUE()
- Additional SQL Server catalogs; system stored procs; INFORMATION_SCHEMA
- See release notes

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v.2.1.0: Supported T-SQL features

SQL SERVER SPECIFIC FEATURES

- DMS support for full load (supports Babelfish 1.2+)
- Easier SSMS logins allowing browsing of tables
- Import/Export Wizard improvements
- Support for CREATE ROLE
- Cross-DB support for SELECT, SELECT..INTO, INSERT, UPDATE, DELETE
- Support for OPENJSON()
- Support for additional collations, catalogs, system stored procedures
- See release notes

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v.2.2.0: Supported T-SQL features

SQL SERVER SPECIFIC FEATURES

- CROSS APPLY and OUTER APPLY
- Cross-DB support for EXECUTE procedure
- SET NO_BROWSETABLE (used by some connectivity drivers)
- Functions SYSTEM_USER, HOST_NAME(), OBJECTPROPERTY[EX](), INDEXPROPERTY()
- Support for DEFAULT_COLLATION
- Various enhancements to DATE{PART|NAME|DIFF|ADD}() functions
- Support for various catalogs
- Various bug fixes

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Currently not supported

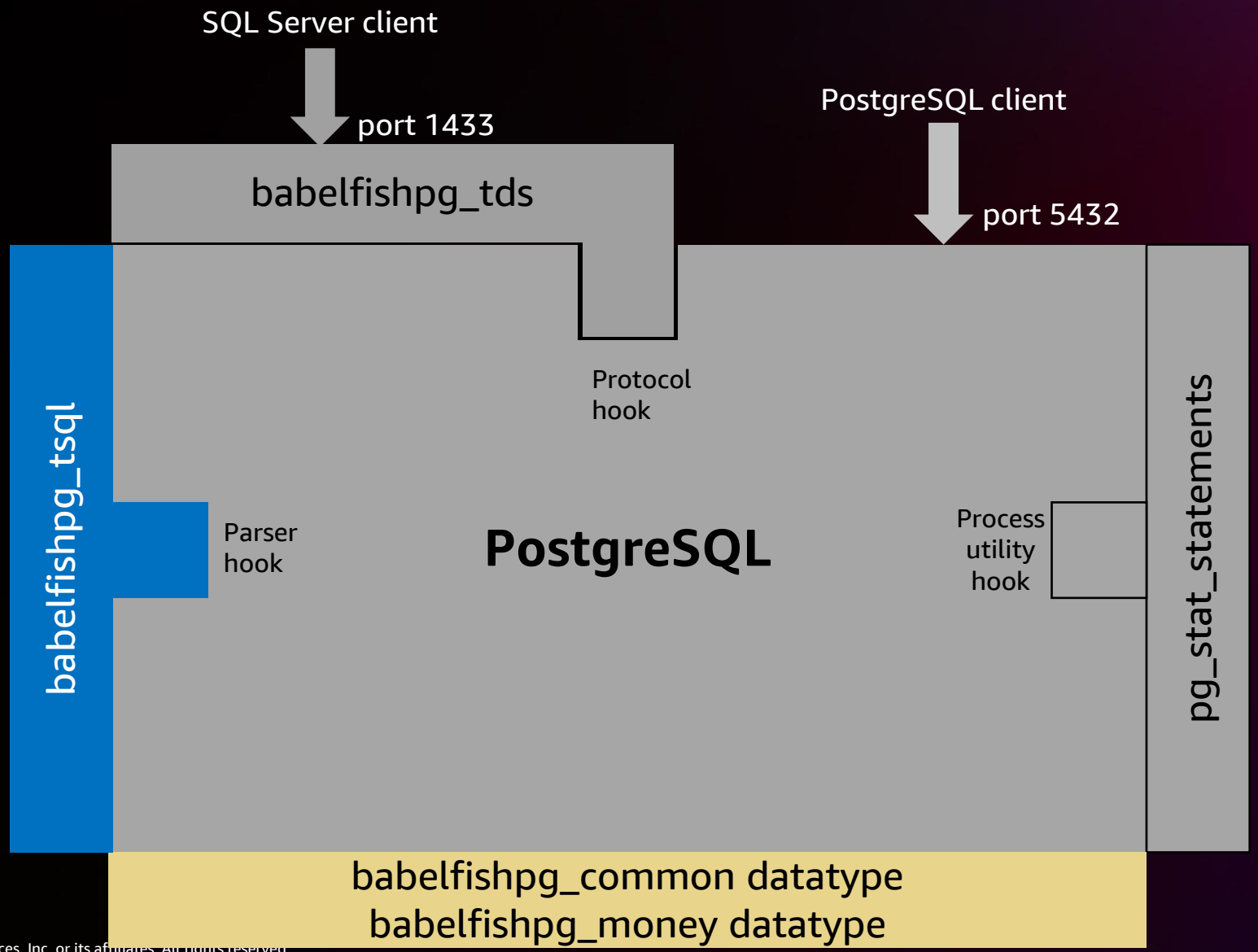
- Use of in-database encryption
- MARS, Database Mail, Geospatial, SQLCLR, Filetable, Columnstore
- Dependency on MSDTC OR SQL Server Agent
- Limited use case support with SSRS, SSIS, or SSAS
- Dependency on remote servers (linked servers)
- Dependency on OPENXML(), XQuery, Xpath
- SQL Server Parallel Data Warehouse
- Reverse-engineering DDL from Babelfish or PG catalogs

(see Aurora/PG documentation for more)

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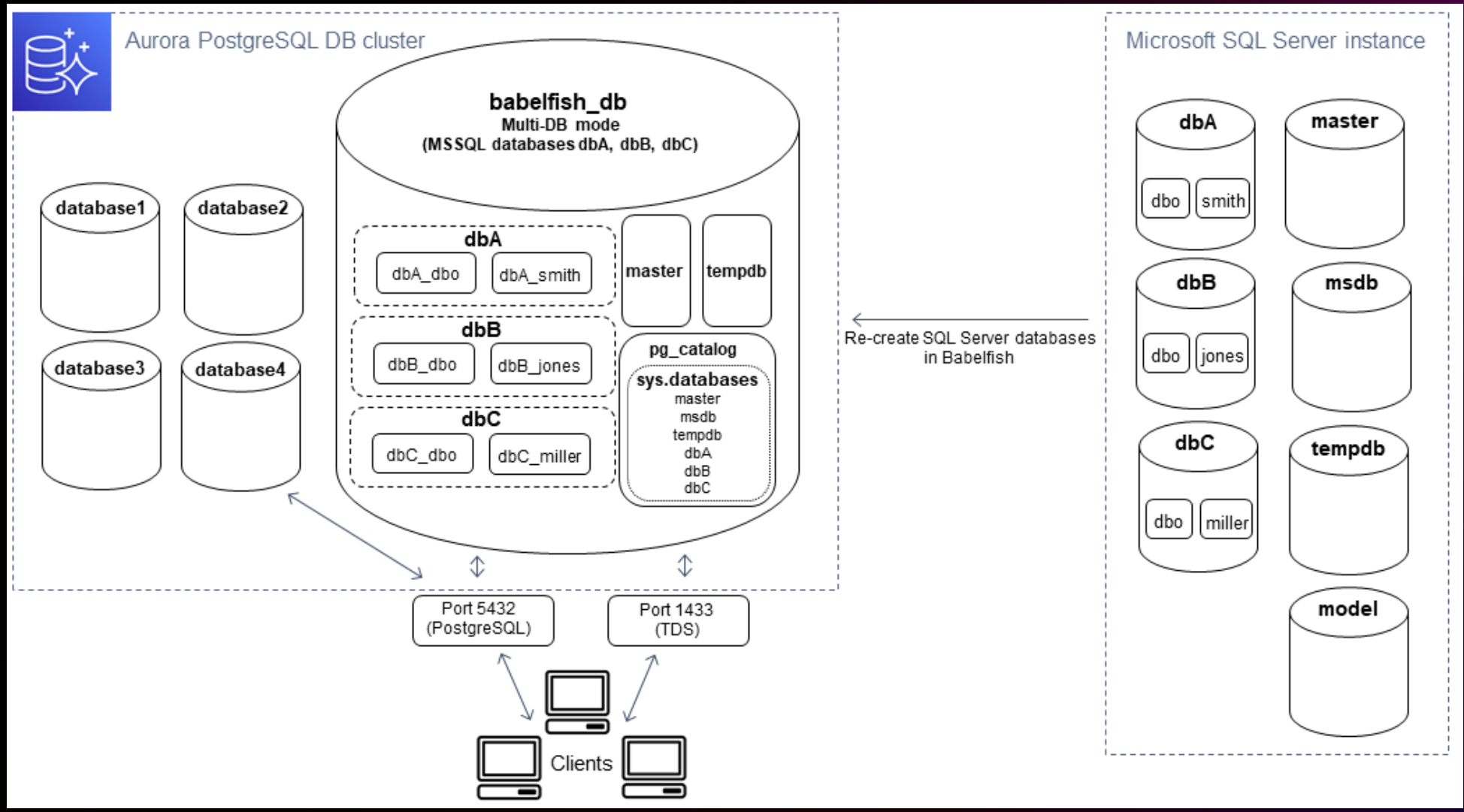
Babelfish for Aurora PostgreSQL architecture



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Migrating SQL Server database structure

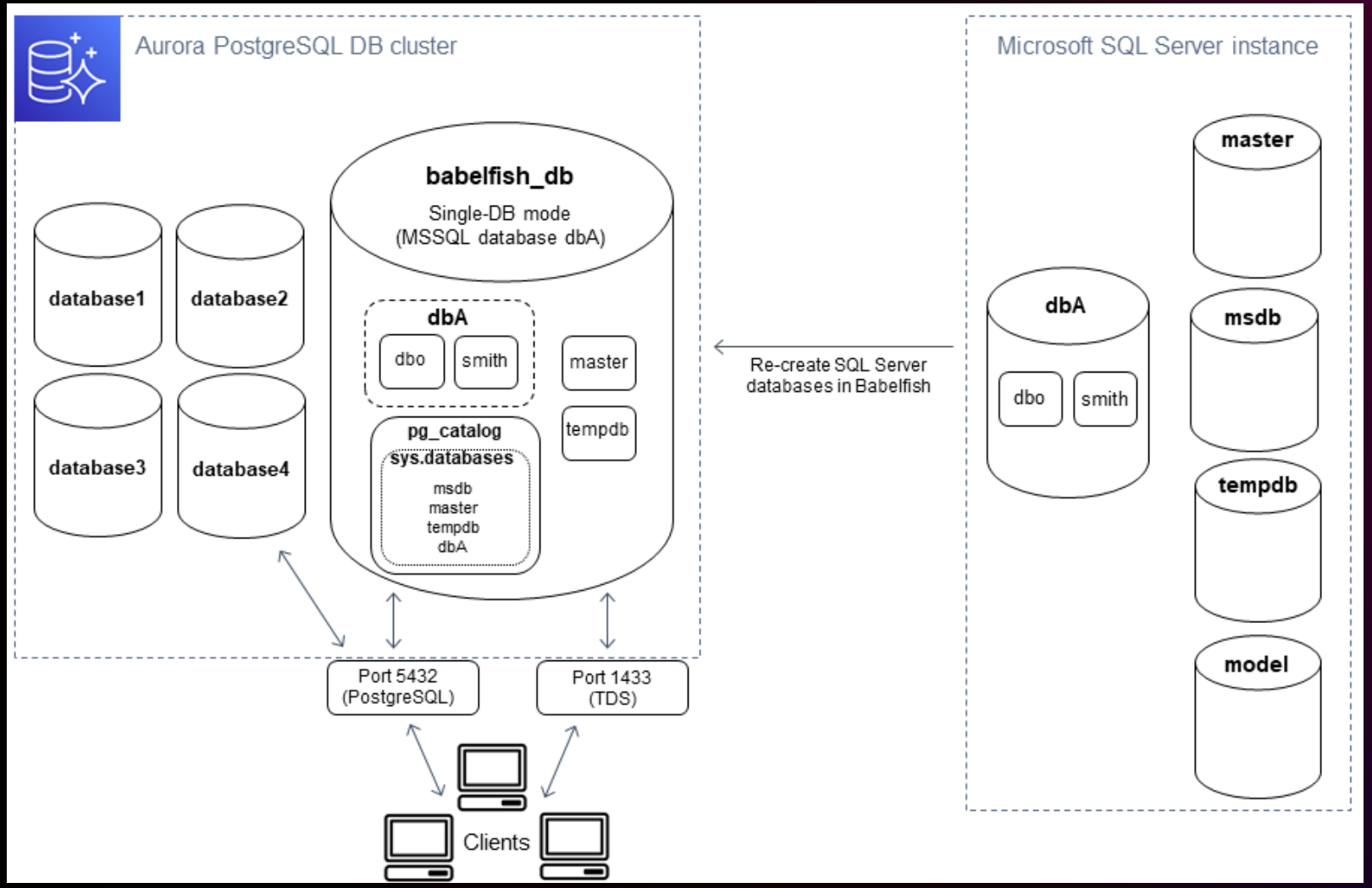
Multi-db mode: Schema names from SQL Server user DB are mapped to different PG schema names



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Migrating SQL Server database structure

Single-db mode: Schema names from SQL Server user DB remain unchanged in PG



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