DB-01

Migrate Your Database to AWS with Ease and Choose the Correct Downtime Approach

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25+ years of career around databases, data analytics and maximum performance architectures

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True Bookworm

Lives to travel

Diversity Ambassador
Glamazon Finland Lead and Nordics Board Member

WHAT MATTERS?

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Agenda

Intro

Database Migration Challenges

Repeatable Database Migration Practice

Database Migration Tools

Choosing Your best path to Cloud

Worldline Database Migration

Demo & Summary

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Intro to Database Migrations

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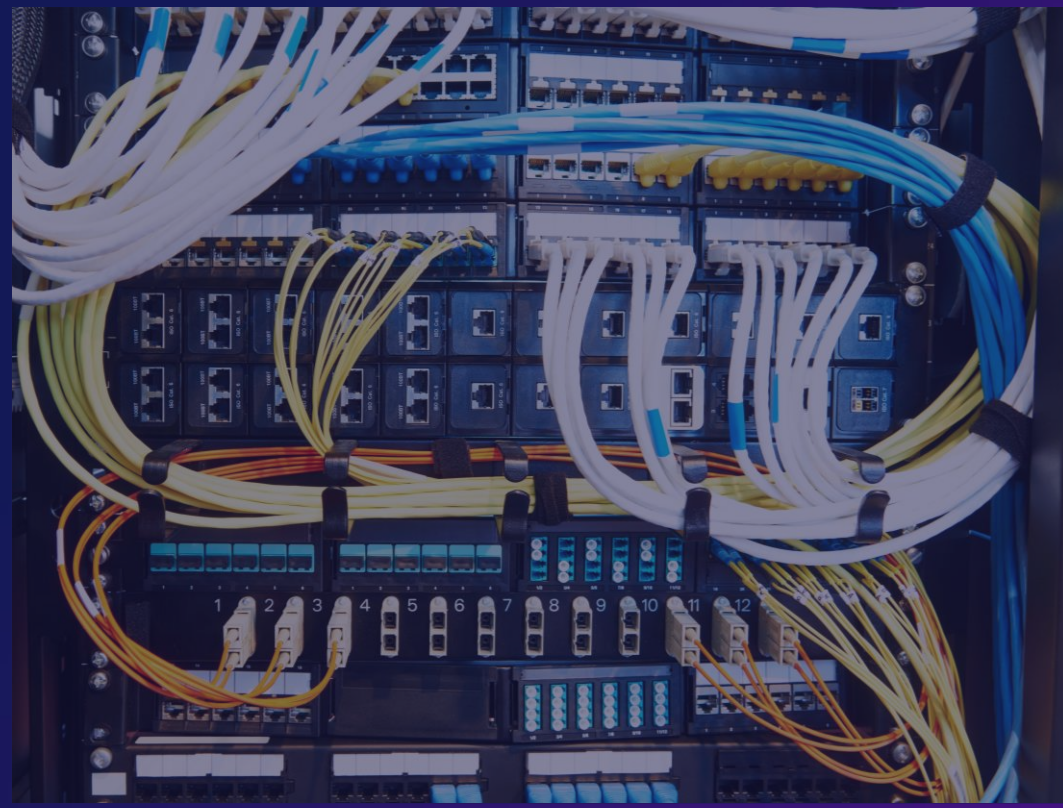
Legacy data infrastructure run on-premises or self-managed in the cloud could be costing you time and money

Manually building a database migration plan can be time-consuming, error-prone, and expensive

Organizations often spend weeks on inventory and assessment, and rely on third-party tools to collect information



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Enterprises across all industries are embracing the power of the cloud

AWS and AWS Partners have helped migrate

over 500K

databases to AWS for customers to save, grow, and innovate faster

Customers including

Samsung, Experian, and NASDAQ

have used AWS migration services and programs to ensure their migrations were effective and cost-optimized

A variety of

flexible ways to migrate

to AWS include AWS self-service migration tools, AWS ProServe, AWS Partners, and AWS database migration programs

New

post-migration tools include Babelfish for Amazon Aurora PostgreSQL, which makes it possible to run Microsoft SQL Server applications directly on Amazon Aurora

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With AWS, you access databases over the internet instead of buying, owning, and maintaining physical data centers and servers yourself

AWS database services take care of management tasks like

- Server provisioning
- Patching
- Configuration
- Backups

Free your teams from the time-consuming and undifferentiated heavy lifting of database administration so they can focus on adding value

Once migration is complete, you will still need to migrate your application logic to run on open-source engines like PostgreSQL

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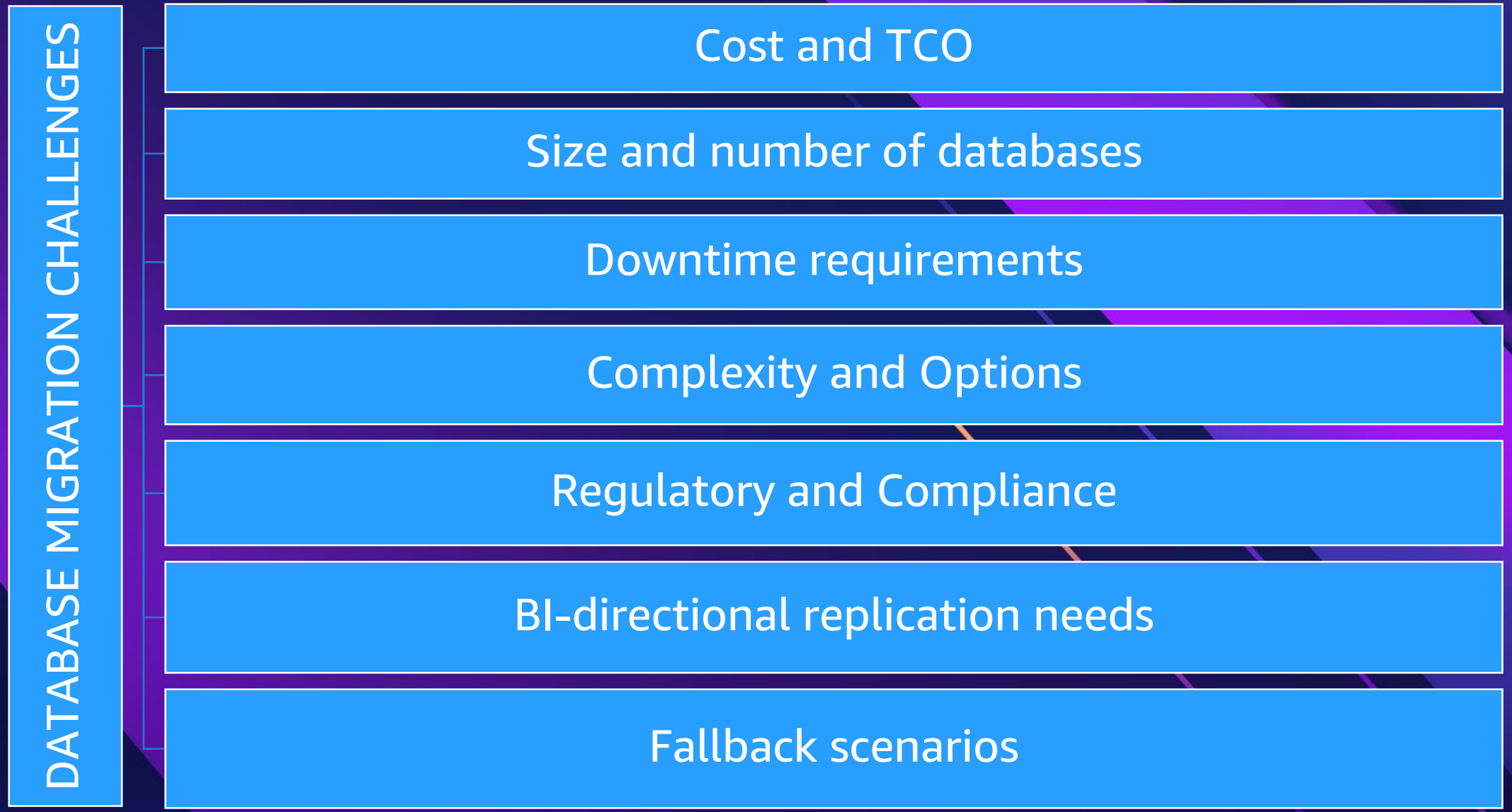

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Repeatable Database Migrations

Why repeatability matters?

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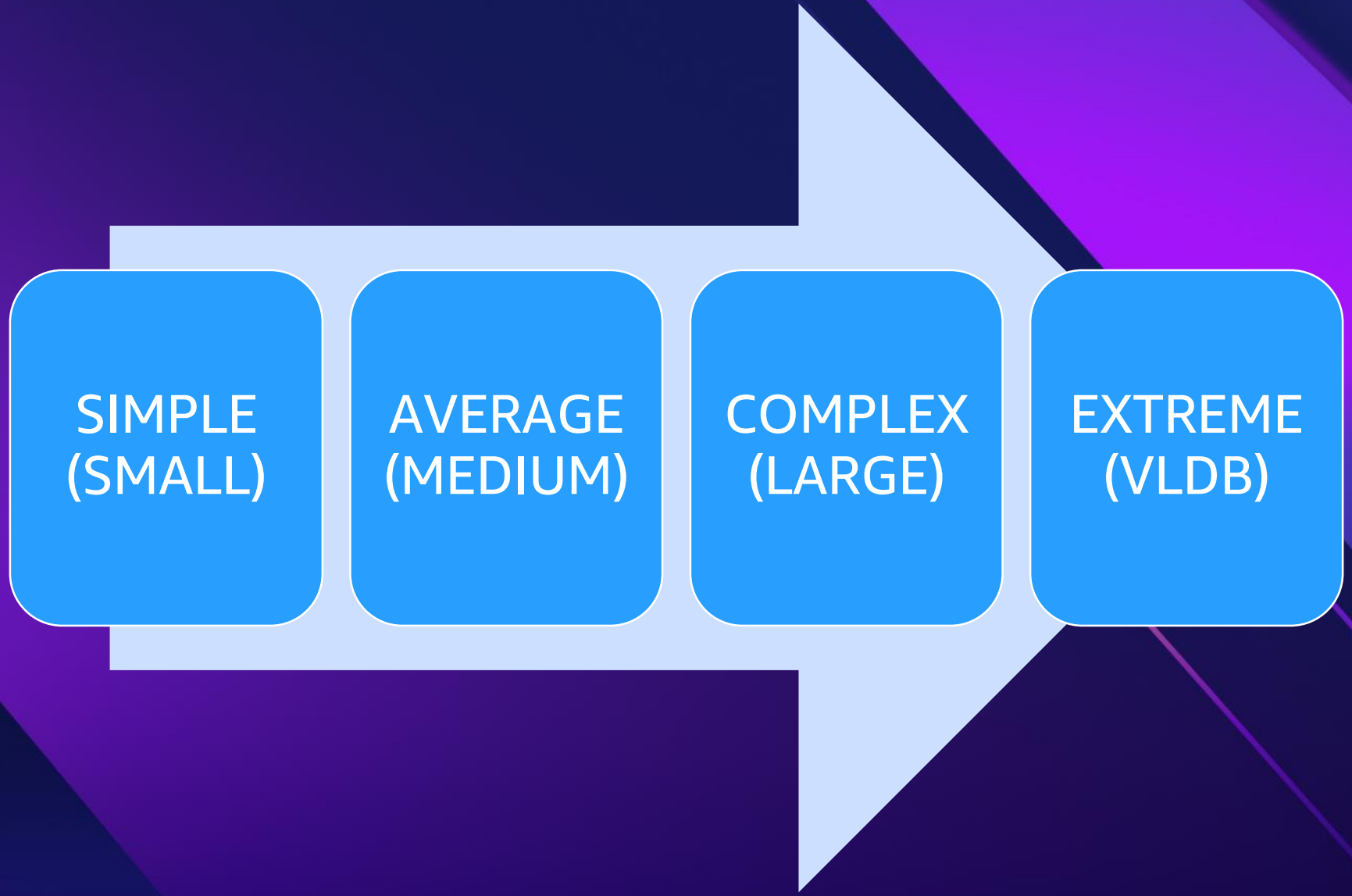
Categorizing database migrations



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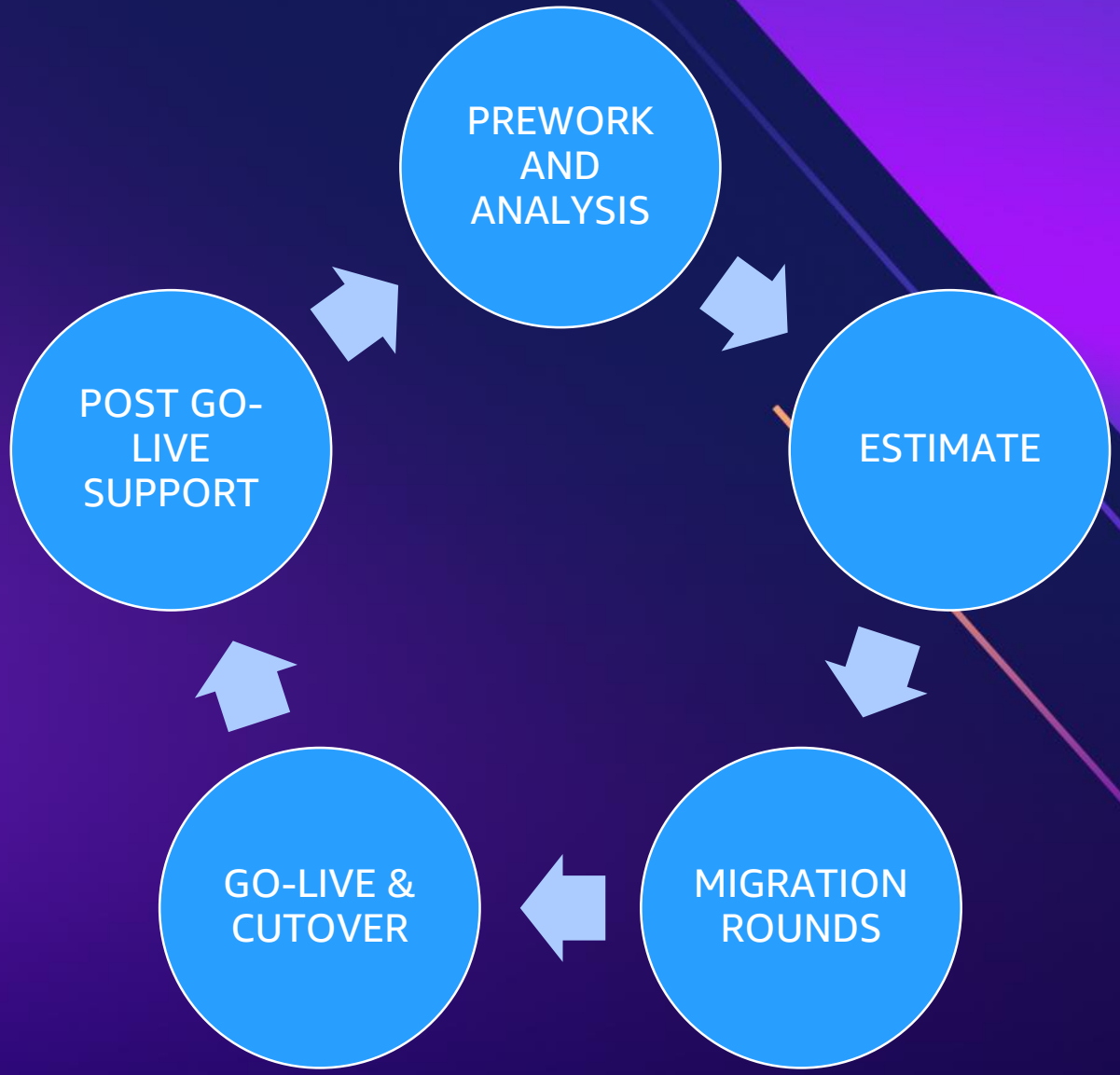
Database Migration Project Lifecycle



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PREWORK AND ANALYSIS

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ESTIMATE

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MIGRATION ROUNDS

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GO-LIVE CUTOVER

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POST GO-LIVE SUPPORT

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Database Migration Tools

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Migration Options

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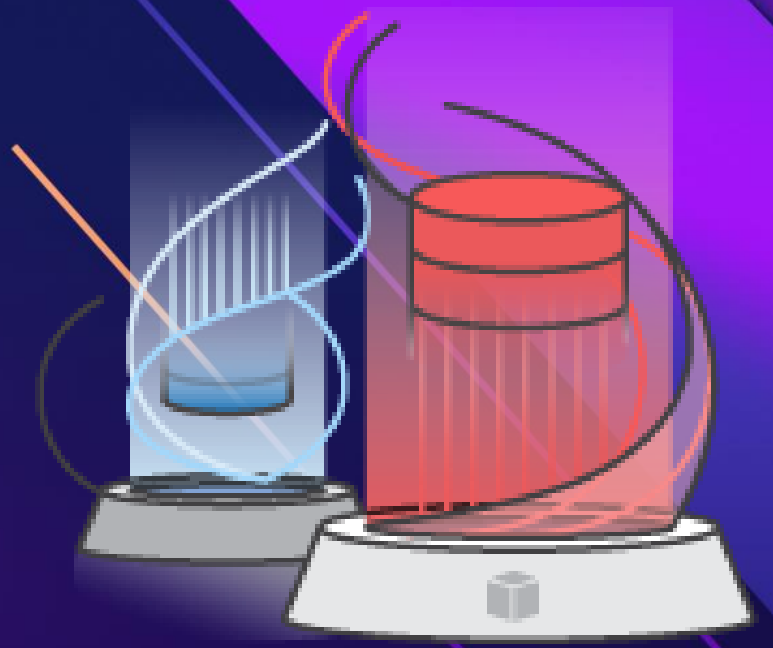
AWS Tools for Zero-downtime or Near Zero-downtime

SCT — Schema Conversion Tool

DMS — Database Migration Service



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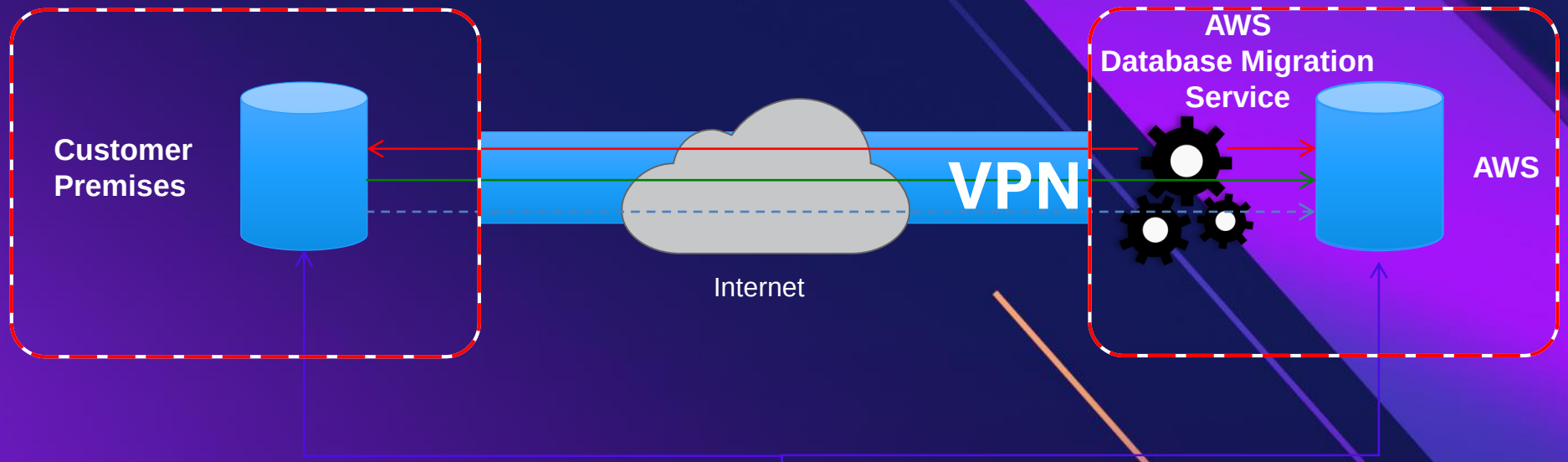
AWS Database Migration Service



- Start a replication instance
- Connect to source and target databases
- Select tables, schemas or databases

Application Users

Let the AWS Database Migration Service create tables, load data and keep them in sync

Switch applications over to the target at your convenience

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Simple to use

- No drivers or applications to install
- No changes to the source database in most cases
- Just a few clicks to start a migration from the console
- DMS manages the complexities of migration for you
- Automatically replicates changes
- Can be used for continuous replication

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Source and Target Support

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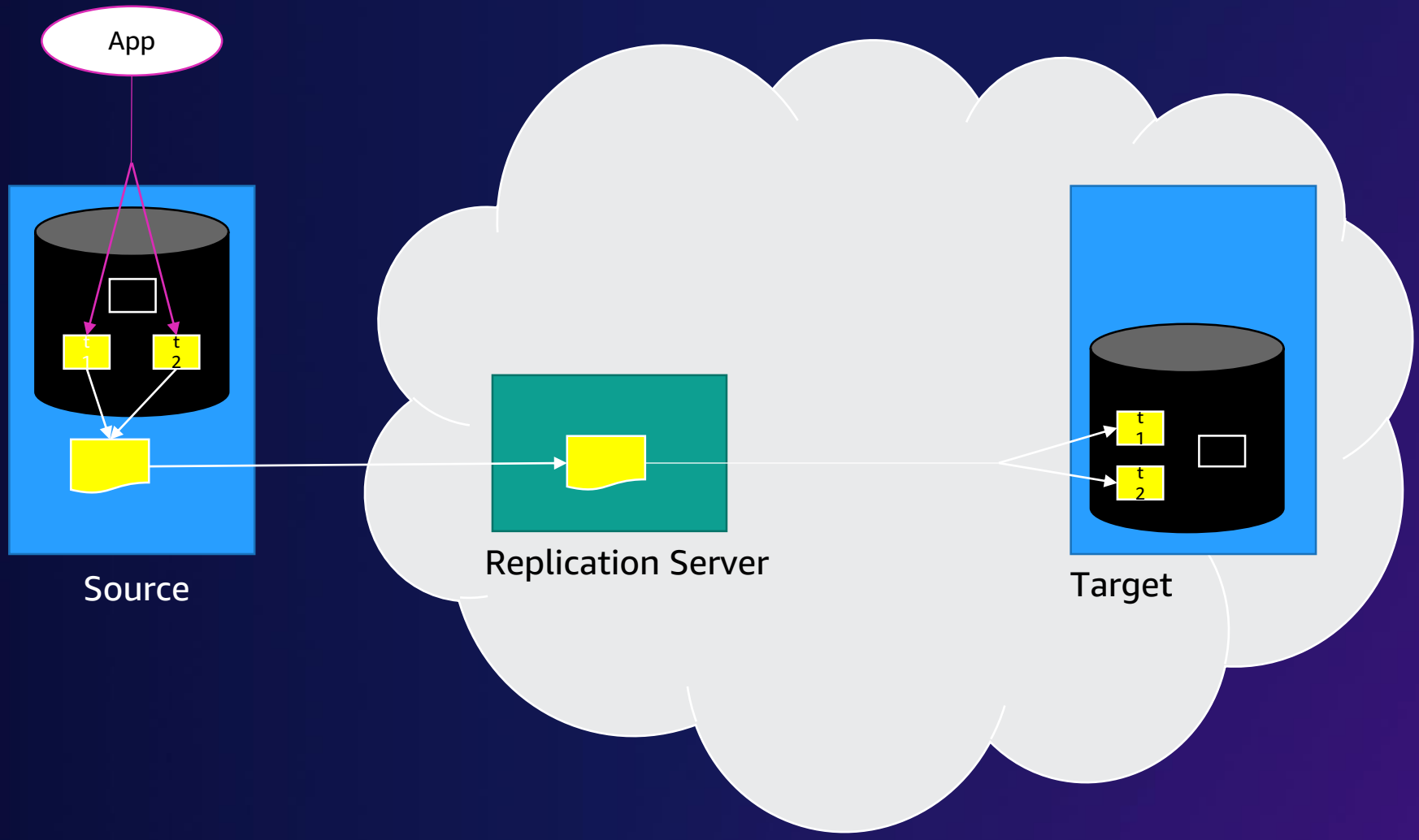
Transactional changes – mined from db logs



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DMS – change data capture (CDC)

- “No Touch” design
  - Reads recovery log of source database
  - Using the engine’s native change data capture API
  - No agent required on the source
  - Changes captured as transactions and applied in order
  - Activated when load starts
  - Changes are applied after initial load is complete

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DMS – change data capture (CDC)

- Some requirements
  - Oracle: Supplemental logging required
  - MySQL: Full image row level bin logging required
  - SQL Server: Recovery model bulk logged or full
  - Postgres: wal_level = logical; max_replication_slots >= 1; max_wal_Senders >=1; wal_sender_timeout = 0

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Possible migration preparation scenarios

DMS

SCT + DMS

NATIVE + DMS

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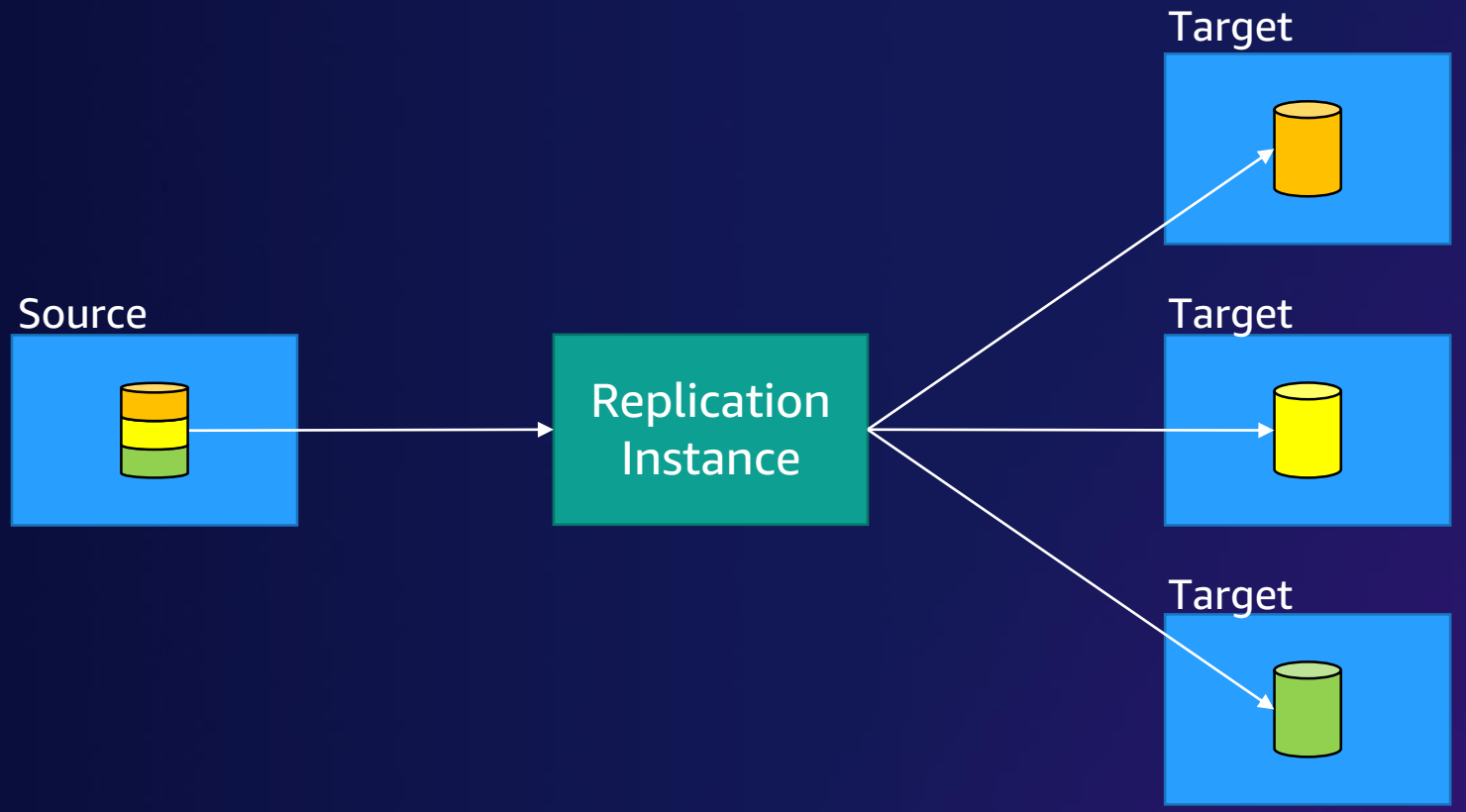
Multiple Targets



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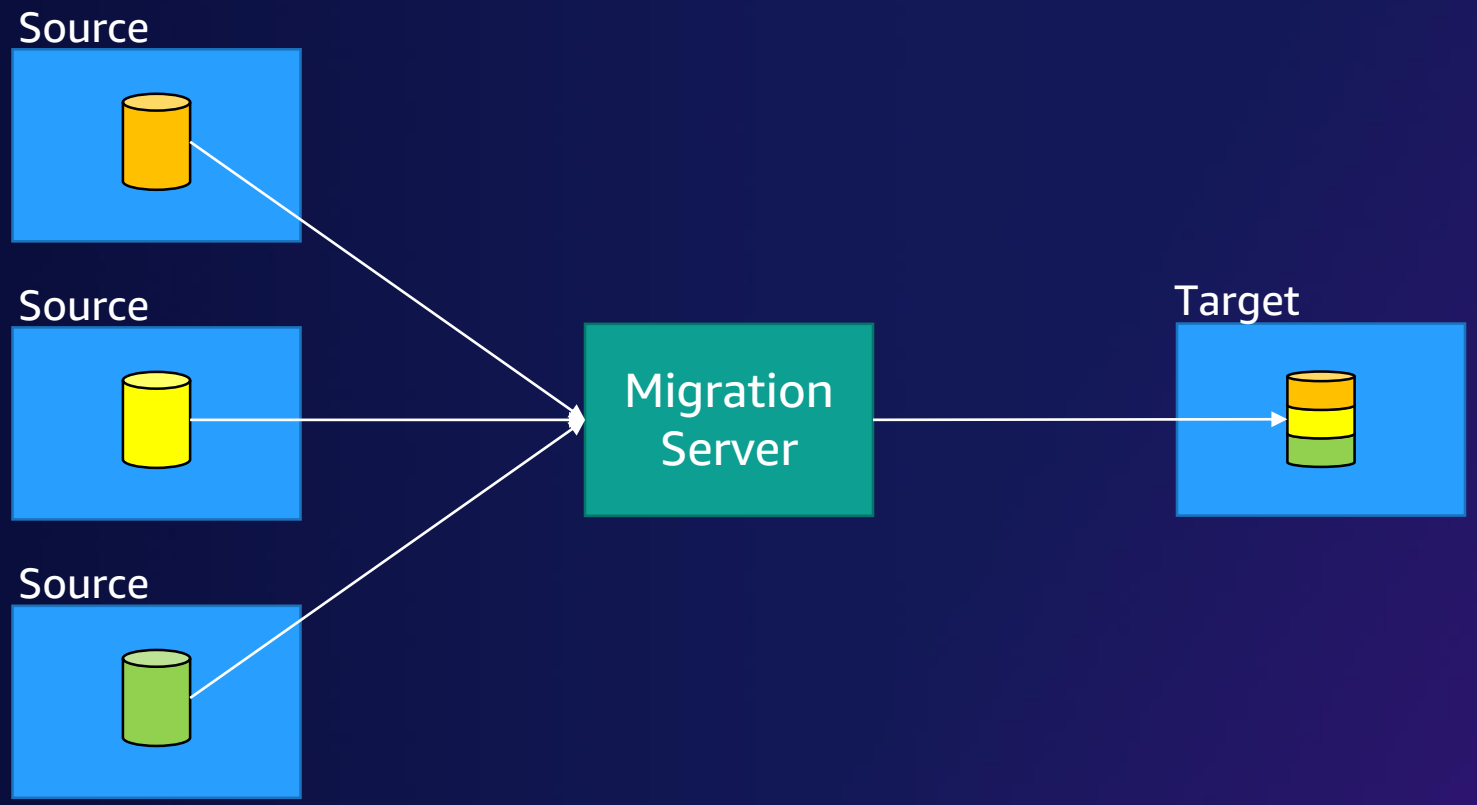
Multiple Sources



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Choosing YOUR MIGRATION path to Cloud

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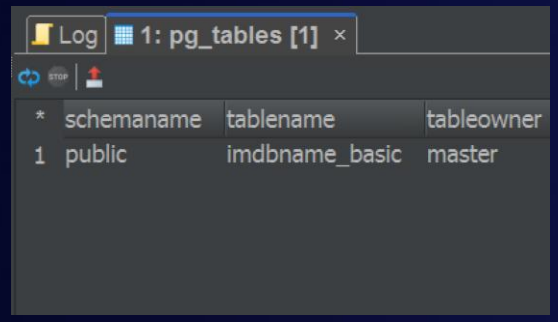
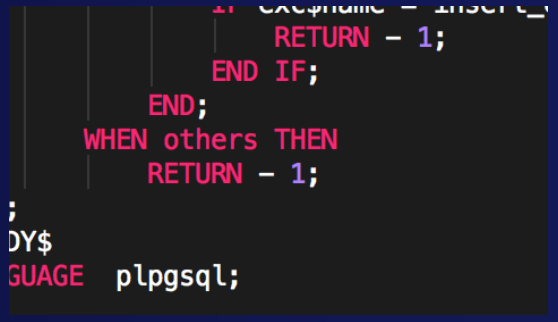
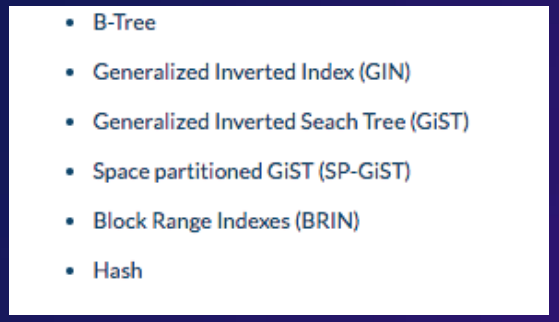
Understand basic database engine differences



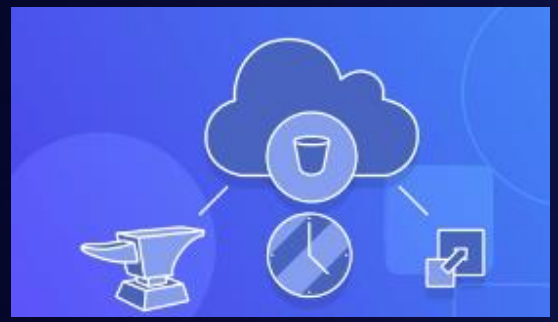
PostgreSQL is a lowercase data dictionary



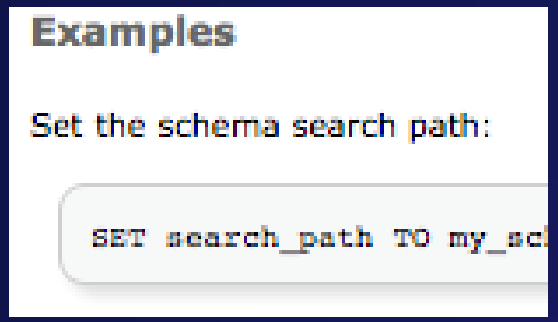
Use “exception handlers” when needed, not by default



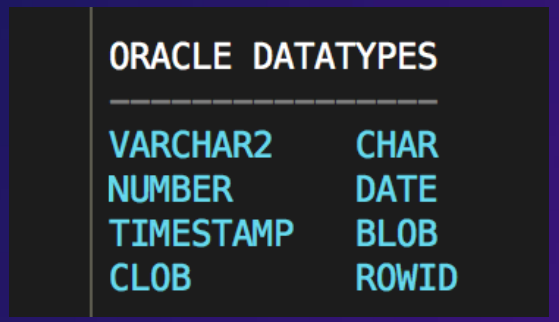
PostgreSQL has six different index types



Store your BLOBs in Amazon S3 instead of the database



search_path replaces PUBLIC SYNONYM



PostgreSQL has 64 datatypes

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What if my database size IS EXTREME?

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Setup and configuration tips

- Enable CloudWatch logs (not enabled by default)
- Choose LOB mode carefully
- Replication instance security group is default for VPC – change after creation
- Extra connection attributes can alter how the migration task operates
- Provide transformation rules for changing case

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Performance tips

- You don’t need to take everything. Transformation and rules.
- Use larger DMS instance for maximum throughput, CPU for type conversions
- Check network throughput and stability
- Split load across multiple tasks and/or DMS instances, Remember transaction boundaries when capturing changes
- Reduce contention on your target
- Turn off logging if applicable
- Run in single AZ

https://aws.amazon.com/blogs/database/

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Calculating Migration Total Cost

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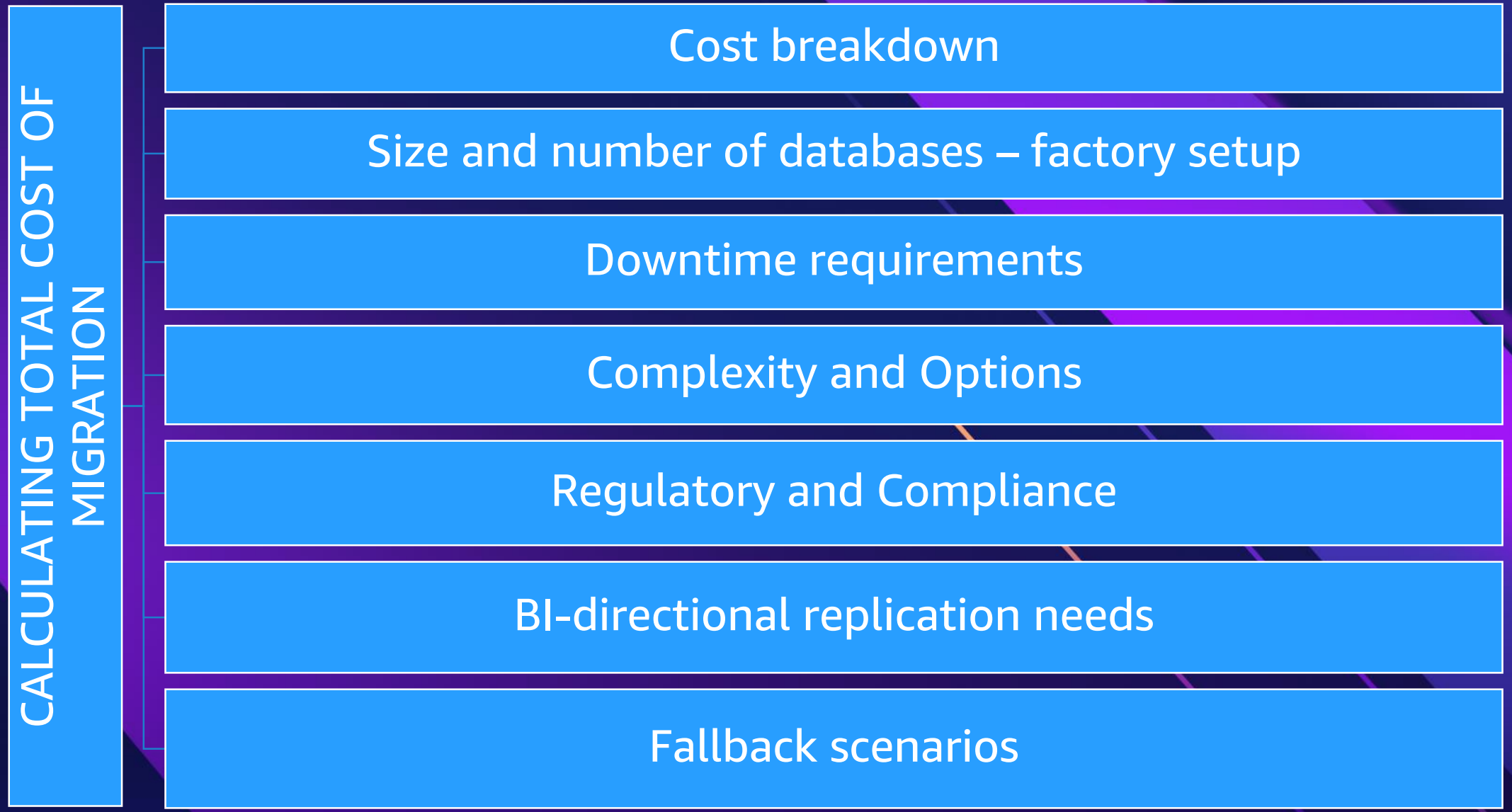

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Low cost

Compute resource

Additional log storage

Pricing Example

Instance Type	Hourly Rate	Duration	Activities	Total
t2.small	$0.036	2 weeks	Testing	$12.096
c4.large	$0.154	2 weeks	Initial Load & CDC Until Cutover	$51.744

Migrate a 1 TB DB for under $65 ($63.84)

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Worldline Database Migration

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Who am I and why am I here?

Katja Kantserova (she / her)

- 20+ years in IT branch
- Software Developer, Quality Assurance Engineer, DevOps Engineer, Team Lead, Development Manager
- 6+ years working with AWS
- Based in Stockholm, Sweden
- Here to talk about my team's cloud journey with focus on Oracle DB migration

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Who do I represent?

Worldline: Digital Payments for a Trusted World

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November 2020

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Teams at Götgatan

- 40+ developers
- 4 DevOps teams:
  - Elixir
  - Global Acquiring
  - Core Data
  - Platform Team

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Transitioning Money

Consumer

Merchant

Acquirer

Issuer

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Bambora Clearing and Settlement On-prem Platform

- Classic layered pattern architecture from year 2000
- Batch System
- Oracle DB and Pearl
- 30+ Linux/Windows servers
- Hosted in 2 Data Centers for geographical redundancy
- Infrastructure near end-of-life not scalable to meet current growth

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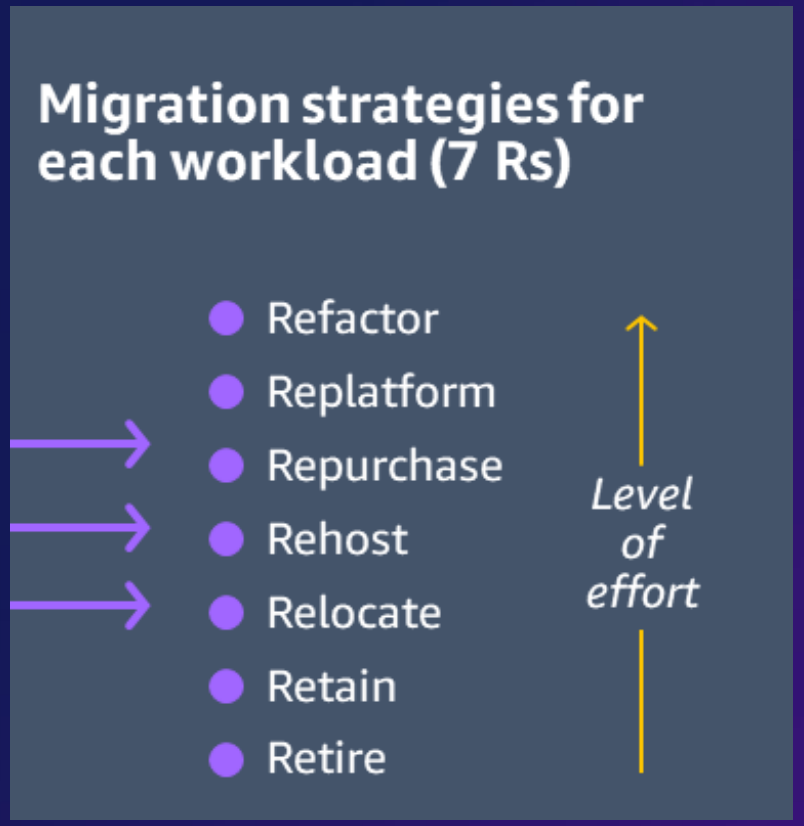
Choosing between Migration Strategies

- Retire - Re-write the system from scratch
- Relocate - Lift and Shift
- Re-platform - Migrate data to RDS Oracle and Pearl Apps as Docker Images



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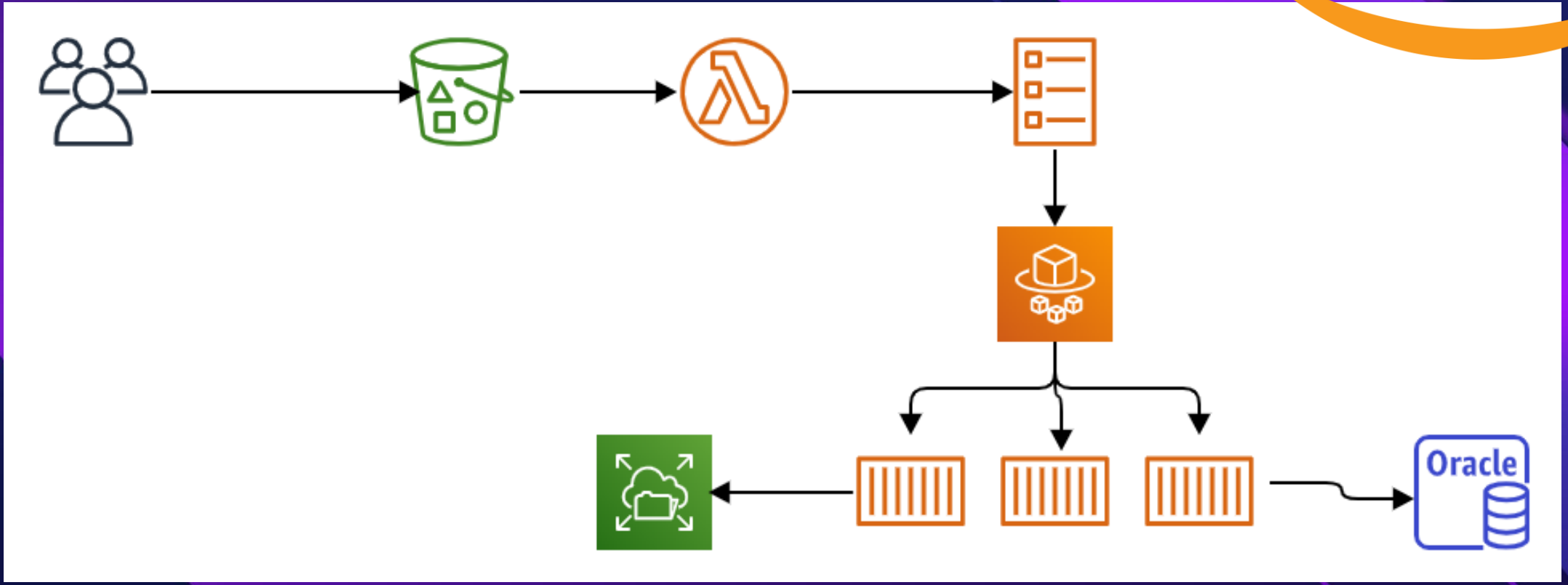
High-level Design



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Cloud Platform Advantages

- Multi Account Setup
- Staging Environment that mimics Production available from day one
- IaC
- PCI DSS Compliance
- AWS team available to help and support

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On-prem Database Setup

- 4 DB instances: 2 Production and 2 Staging
- Preferably zero-downtime in production
- 12.1.0.2.0 Release, Enterprise Edition
- Separation of CDE and Non-CDE data
- Amount and type of code inside: stored procedures, views etc. @Per
- Bi-directional replication is not an option
- Fallbacks?

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On-prem Database Setup

- Platform: Linux x86 64-bit
- CPU: 8
- Cores: 4
- Memory: 50 GB
- Amount of data in TB? @Per

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AWS Database Setup

- Release: 19.0.0.0.ru-2021-10.rur-2021-10.r1
- Db.r5.xlarge TODO!
  - CPU: 4
  - Cores: 2
  - Memory: 32 GB
- Standard Edition
- License-included model
- Multi AZ
- Encrypted with KMS CMK

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Data Migration

- Oracle 12.1.0.2.0 Enterprise to Oracle 19.0.0.0 Standard Edition
- AWS Database Migration Service has been considered, but …
- … end up with own tool based on SQL Loader
- Production historical data has been migrated long before the Cutover day
- On the Cutover day minimal last sync only is needed

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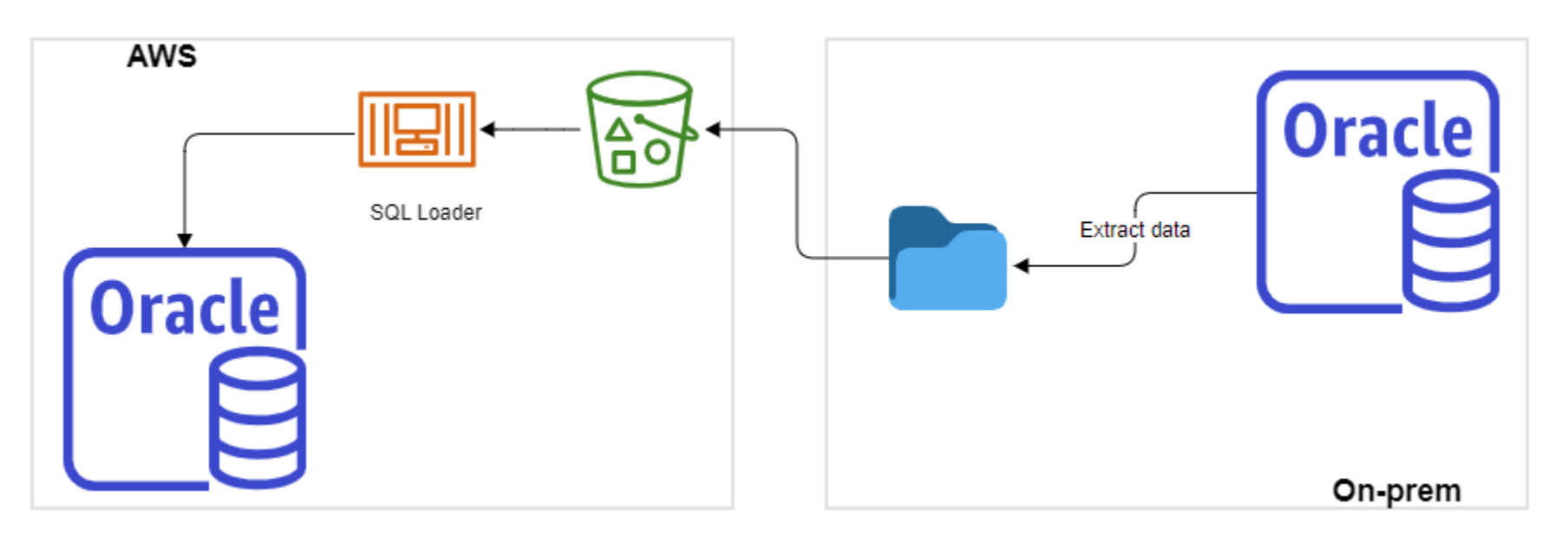
Data Extractor



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Where To Find Us

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Demo: Database Migration from Decision Making to Go-Live as a Timelapse

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Summary

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Repeatable Database Migration Practice

Database Migration Service

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Resources

Database Customer use cases
https://aws.amazon.com/products/databases/customers/

Database Migration Step-by-Step Walkthroughs
https://docs.aws.amazon.com/dms/latest/sbs/dms-sbs-welcome.html

AWS Database Blog
https://aws.amazon.com/blogs/database/

DMS Pricing
https://aws.amazon.com/dms/pricing/
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Thank you!

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