Amazon's Database Migration Service, a magical wand for moving from closed source solutions ?

Dimitri Vanoverbeke
Solution Engineer
@ **Percona**

Who Am I

- I am your innocent Percona Solution Engineer.
- Living in Bruges, Belgium
- Works together with Sales, consulting, any departement.
- @dim0 on twitter (personal)

What is the exact point?

- Migrating towards a new infrastructure can be cumbersome
- A “silver bullet” to migrate Oracle, Microsoft SQL, Postgres to MySQL or another solution?
  - Easy migrations not requiring large downtime
  - Easy schema migrations using the Amazon Schema migration tool.
  - Performs automated feasibility assessment
- Supports a multitude of source database environments and a multitude of target databases.

What is a typical migration process

- Feasibility study
  - Can we migrate to required technology?
  - What are the limitations to the future technology?
    - What problems could we envision moving to the new technology.
  - What is really technology specific?
    - Stored procedures
    - Specific plugins
- Proof of Concept setup
  - Setup infrastructure
  - Schema migration
  - Migration of the data
- Benchmarking testing
- Application testing
- Migration planning
- Migration
- …

So what tools does Amazon provide

- Schema migration tool (Amazon SCT)
  - Windows, Ubuntu, MacOS package
  - Java tool
- Amazon Database migration services
  - AWS hosted environment providing replication to a multitude of technologies
- AWS DBaaS ecospace
  - Amazon RDS
  - Amazon RDS Aurora
- Amazon EC2 with your own choice of database

Schema Migration Tool interesting features

- Schema assessment report (per schema)
  - Verifies the schema for any problematic behavior:
  - Assesses the amount of manual actions for moving the schema to the new environment.
  - Verifies functions and checks if it can be migrated to the new environment.
  - Creates seperation in the following categories:
    - < 1hour, < 4 hours, > 4 hours
  - A list of manual actions (or better proposed manual actions)
- Converts schema's and provides you with the table create statements.
- Can verify application code for embedded SQL statements.

Schema conversion tool (best use)

- You can essentially analyze the amount of effort for:
  - Functionality gaps
  - PL/SQL usage and modification
  - Column type differences
  - Assessment
- Essentially you could compare multiple targets and choose the one with less effort.

Schema migration Tool

- Two components
  - Java tool (eek)
  - Database driver
    - Multiple connectors supported (needs to be Java connector)
- Supports a lot of Technologies, even data warehousing solutions for migration to Redshift.
- Typically used for large Databases

Highlevel Best Practices / Limitations

- JVM based
  - Options for Performance
    - Balance speed with Memory consumption

```
[JVMUserOptions]
-Xmx16128m
-Xms4096m
```

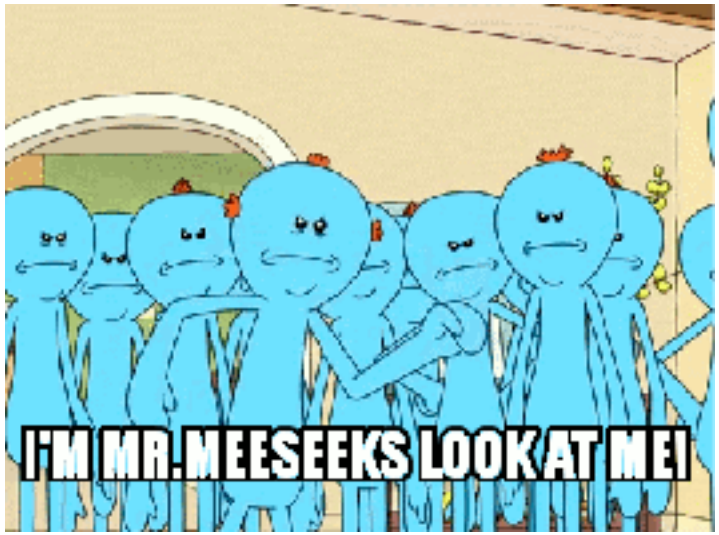
    - Modify the amount of Memory
    - Run it on Linux (Mac OS X implementation seems broken)
- Use it to convert schema's or copy database schema's into the new infrastructure.
- You can still do it manual if it's the same engine environment (using xtrabackup or mysqldump)

So what is Amazon Database migration services

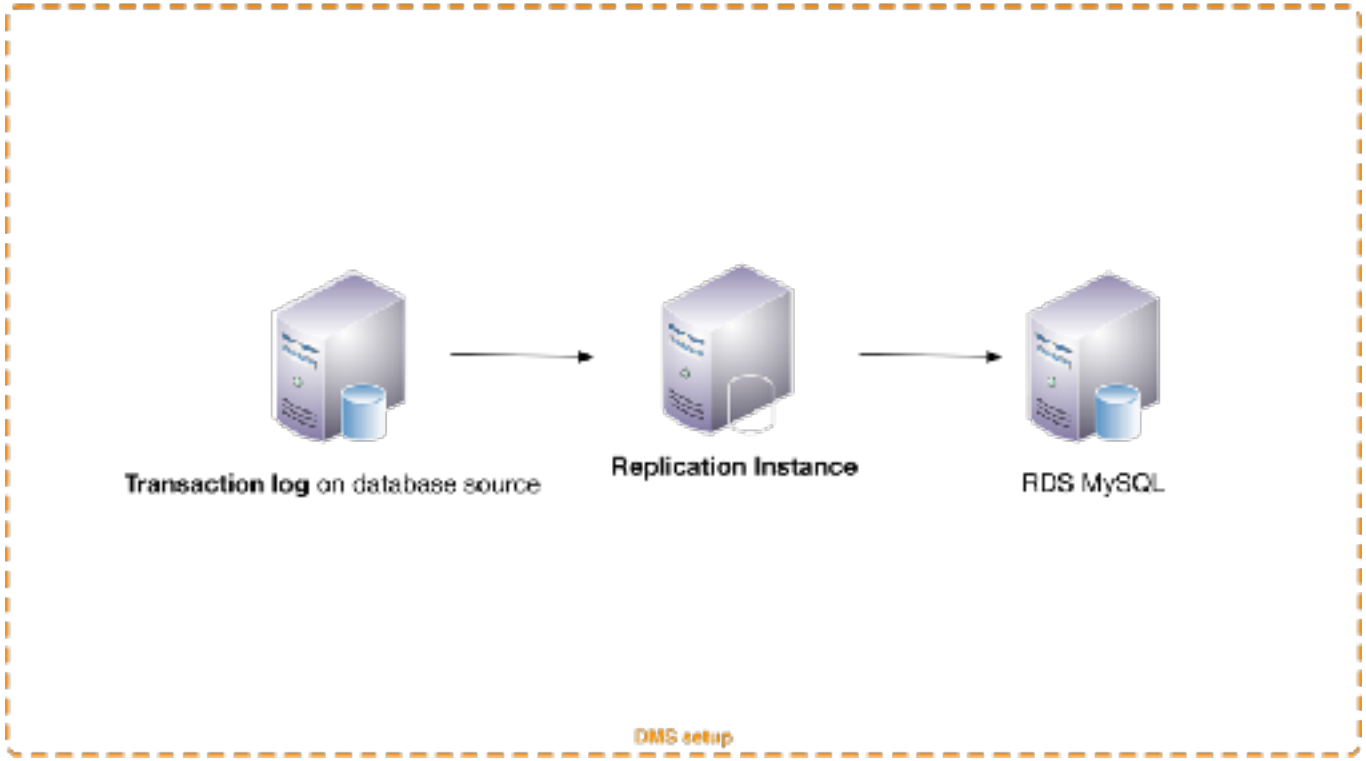
- Replication instance
- Sources
- Targets
- Events and notifications

Replication instance

- Replication instance that replicates the activities in the transaction log of the source database, transforms and pushes the changes to the database backend.
- Multi AZ option (to make sure the replication environment is not a SPOF)



Replication instance



Sources

- On premise sources
- EC2 instances
- Amazon RDS instances
- Versions:
  - Oracle 10.2 and later
  - Microsoft SQL server
  - PostgreSQL
  - MongoDB 2.6 >
  - Amazon RDS (Aurora, MySQL, …)
  - MySQL 5.5 - 5.7
  - MariaDB

Targets

- On premise
- AWS EC2 instance
- Amazon RDS instance
- Versions:
  - Oracle > 10g
  - Microsoft SQL server
  - MySQL 5.5 - 5.7
  - Postgres
  - Amazon RDS MySQL, Oracle, Aurora, MariaDB

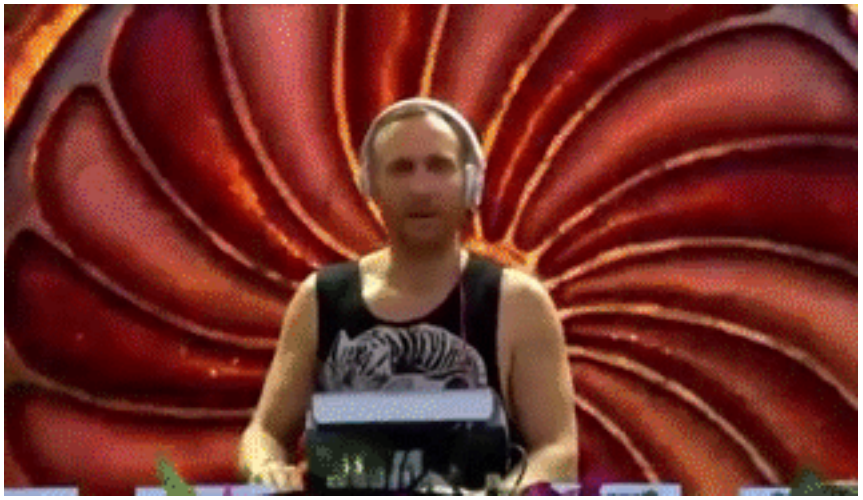
Tasks

- Tasks are the actual workers for the migration.
  - Define the schema's or tables to migrate
  - It’s like a trigger for the actual tasks done on the replication instance level.
- Migration tasks
  - Full load of data to target database
  - Perform cached changes during load
  - Migrate + Migrate changes on the source data base
  - Only migrate changes
  - Table mapping tasks (Filter, transform)

Events and notifications

Based on tasks

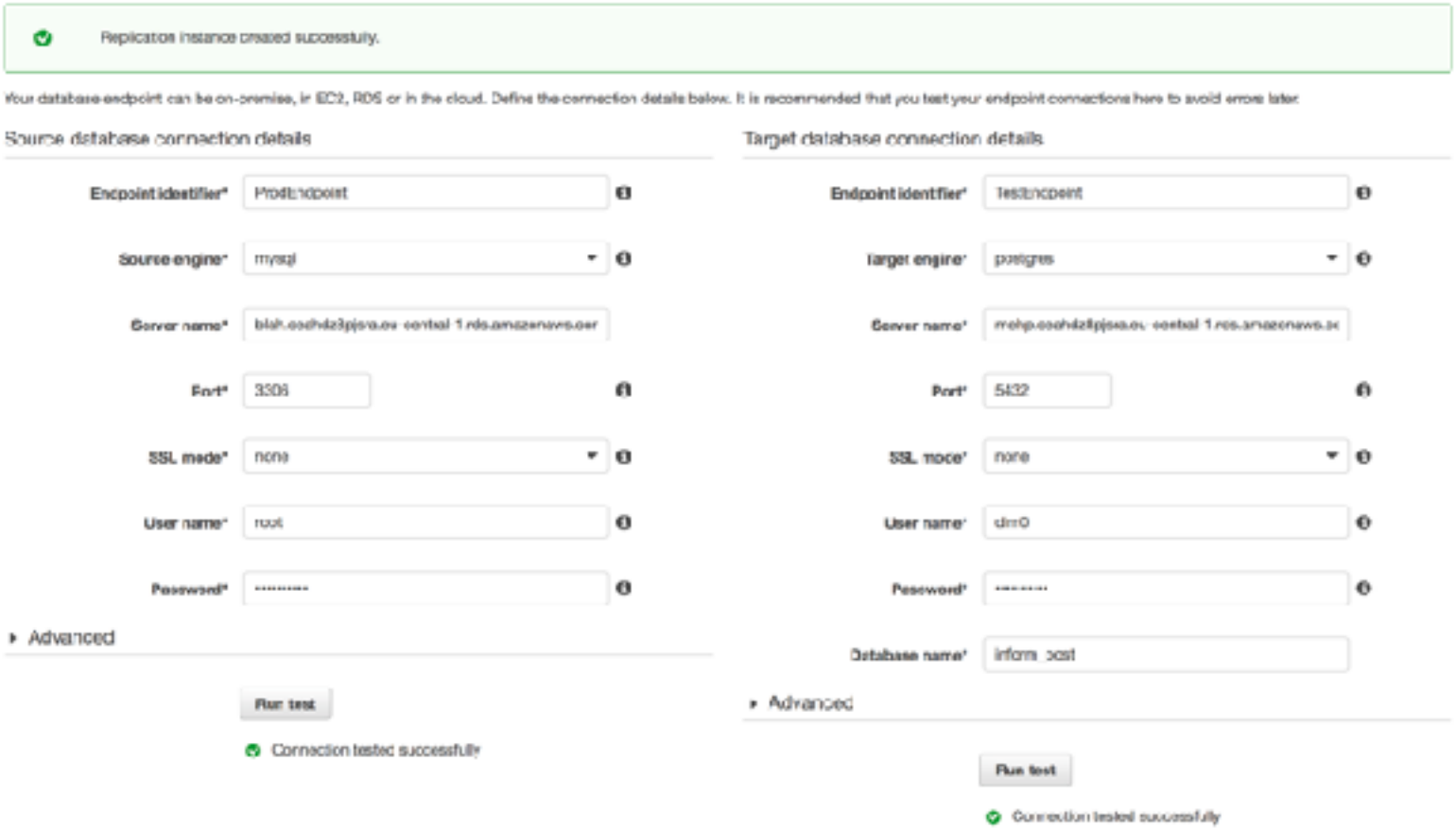
Can be determined events on the replication instance:
BEGIN_SCALE_STORAGE – The storage for the replication instance is being increased.
REPLICATION_INSTANCE_FAILURE – The replication instance has gone into storage failure.



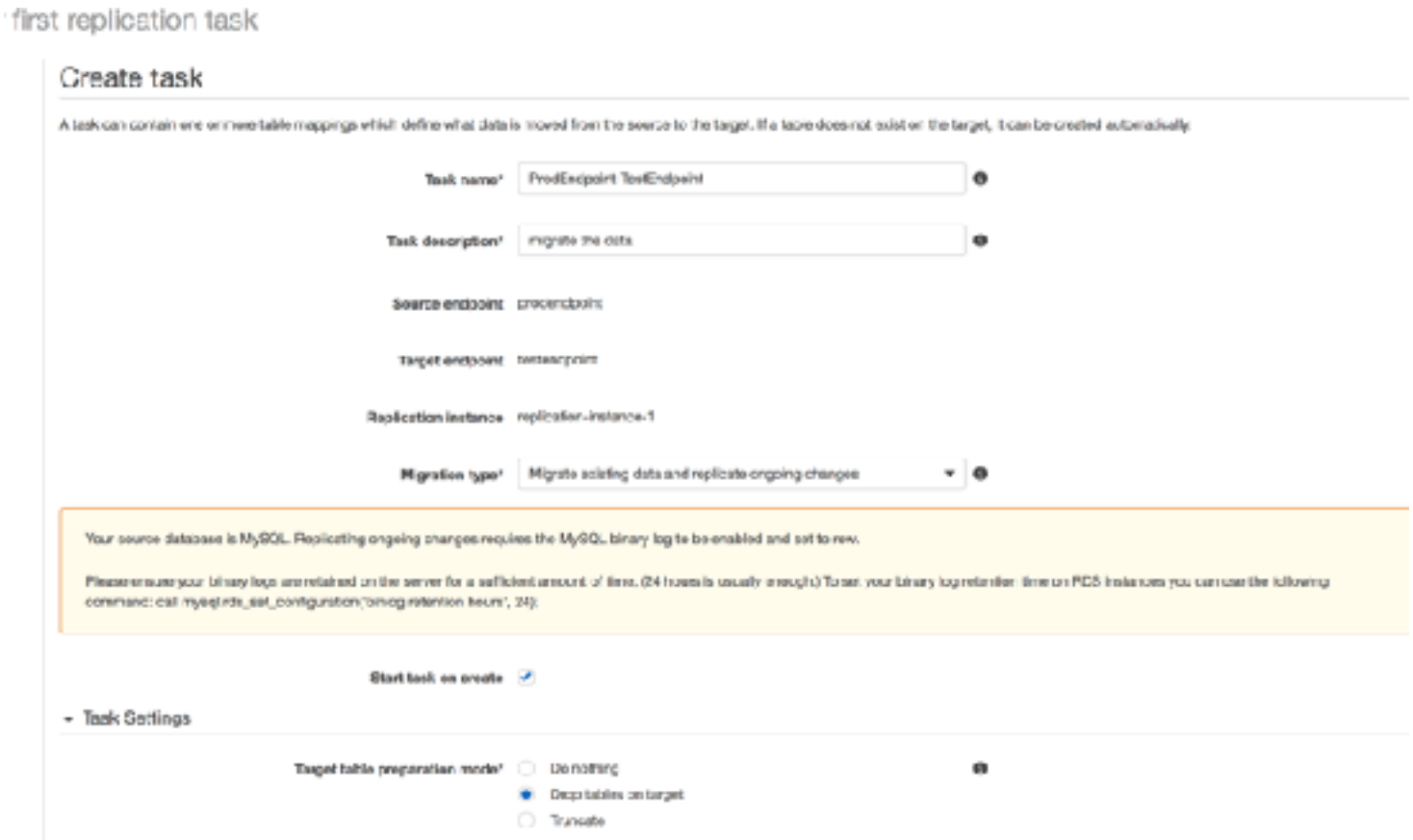
So how do I start?

- Perform a schema conversion using SCT
  If not DMS will try to do it for you, if you use the correct parameters
  - Prepare your source/target database
    - eg. Oracle Archivelog mode, and identification key logging
    - Create the target database DMS user
- Create a replication server. (there's a button)
- Create source and target endpoints that have connection information about your data stores.
- Create one or more tasks to migrate data between the source and target data stores.

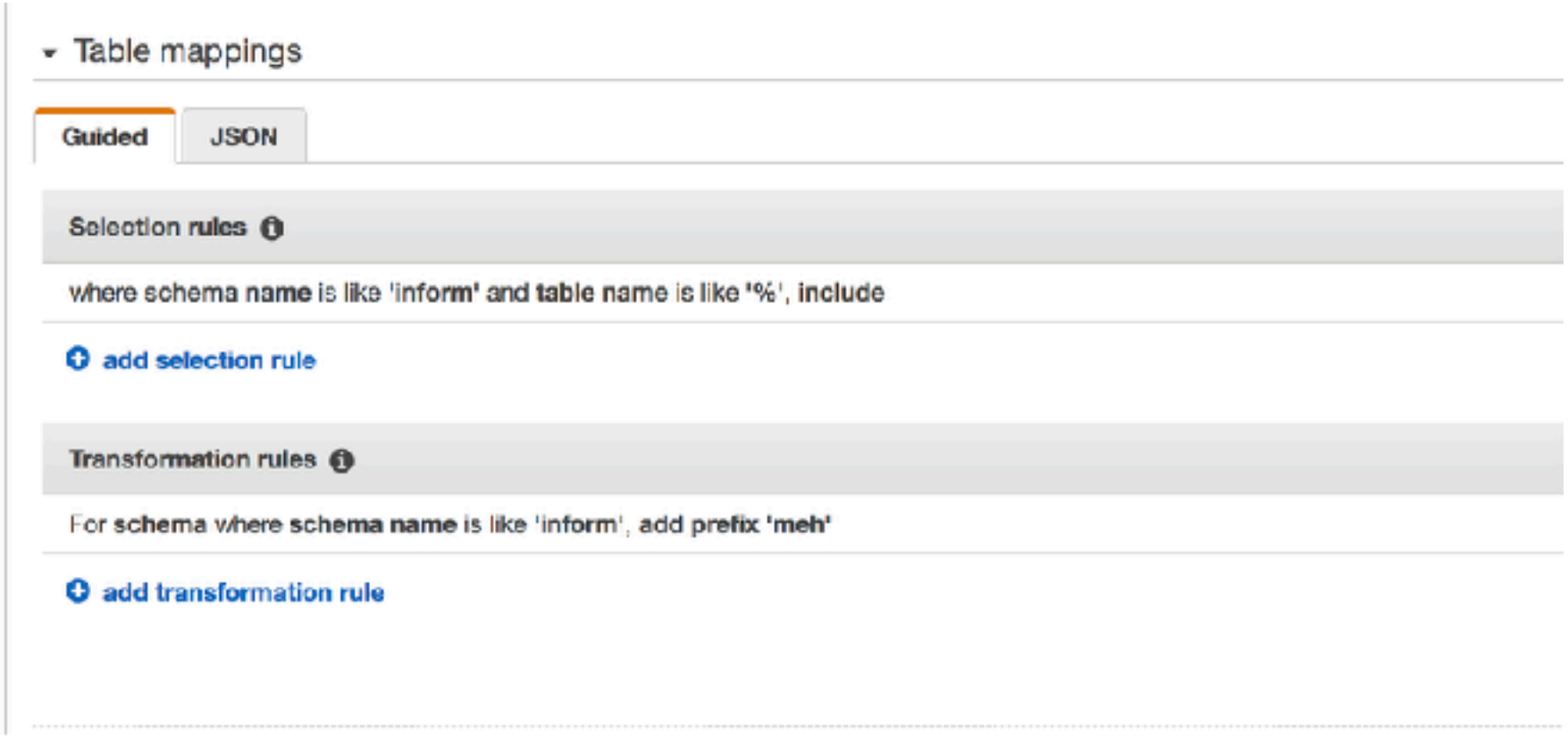
Create a replication instance



Create tasks



Create a tablemapping

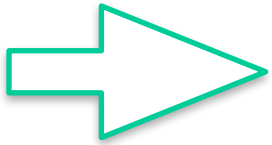


Status information

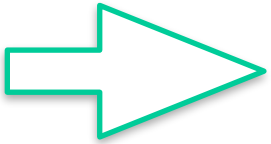
Task name	prodendpoint-testendpoint
Task ARN	arn:aws:dms:eu-central-1:360140939573:task:FAD3DIKAGPT2Q6HYXMHQSEXOGQ
Status	Load complete, replication ongoing
Migration type	Full Load, Ongoing Replication
Replication Instance	replication-instance-1
Source endpoint	prodendpoint
Target endpoint	testendpoint
Mapping method	{"rules":[{"rule-type":"selection","rule-id":"1","rule-name":"1","object-locator":{"schema-name":"inform","table-name":"%"},"rule-action":"include"},{"rule-type":"transformation","rule-id":"2","rule-name":"2","rule-target":"schema","object-locator":{"schema-name":"inform"},"rule-action":"add-prefix","value":"moh"}]}

How can Amazon database migration service help

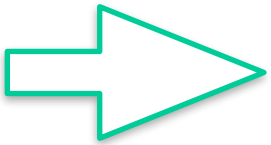
- Feasibility study
  - Can we migrate to required technology?
  - What are the limitations to the future technology?
    - What problems could we envision moving to the new technology.
  - What is really technology specific?
    - Stored procedures
    - Specific plugins
- Proof of Concept setup
  - Setup infrastructure
  - Conversion of the Schema (this will take effort)
  - Migration of the data
- Benchmarking testing
- Application testing
- Migration planning
- Migration
- …



SCT/DMS



SCT/DMS



DMS

Best Practices for replication instance

- Make sure you scale it enough, investigate how much caching is required for the data set
- Parallel import (8 tables are loaded by default)
  - Limit or increase the threads
- Having multiple tasks can put strain on the replication instance
- Data migration services create full table scans on the source environment
- It does migrate the schema if it can but SCT might be better to do so. (Best practice)
- Limit LOB's (as it might influence replication performance)

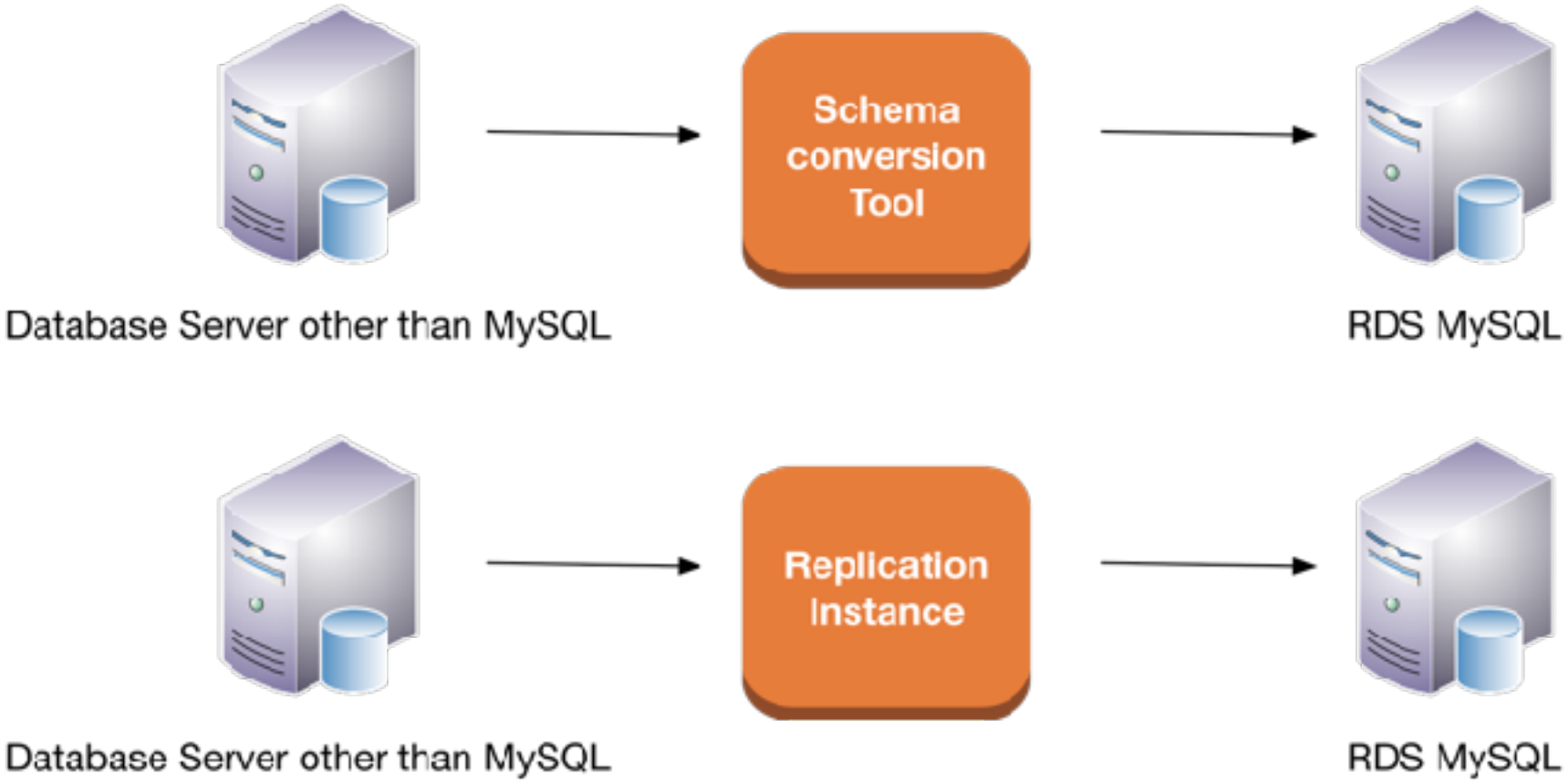
Best Practices for replication instance

- Make sure to migrate the Data if you did not do this prior to it.
- Activate task log
- Don’t do DDL’s on the source database (it will ignore most of them)

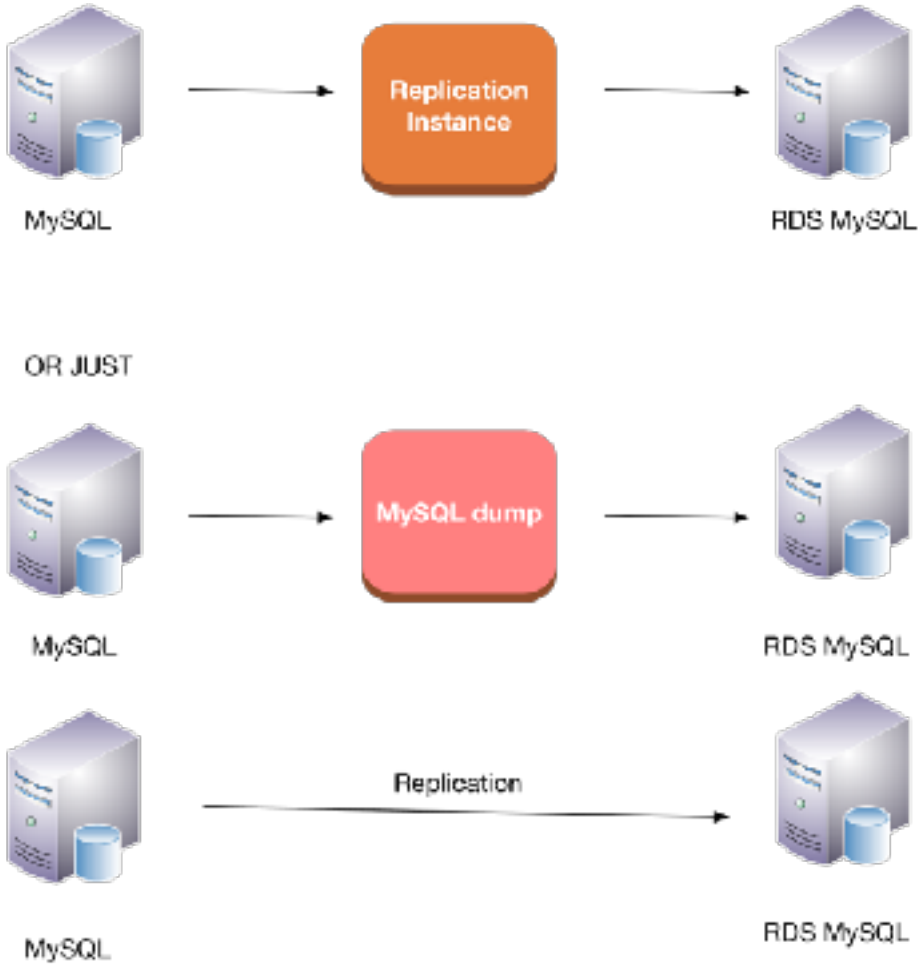
Best Practices for replication instance

- It doesn't create secondary indexes, non-primary key constraints. (remove them from the source)
- Foreign key constraints need to be disabled during the migration's "full load" and "cached change apply" phases.
- Avoid using Multi-AZ on the target during migration of the data.
- Perform validation!!! EnableValidation = true

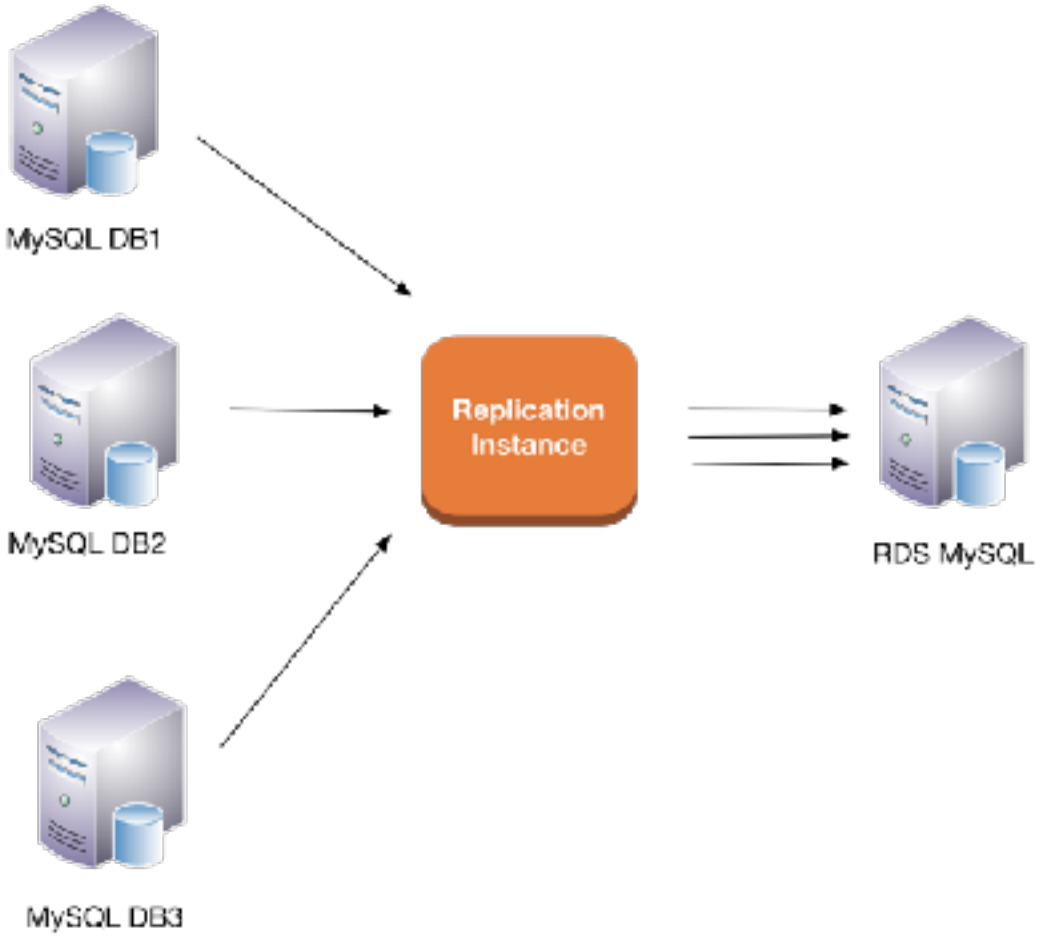
So how would it work?



What if your source is MySQL and target is RDS



But also it can help you consolidating…



Stay aware

- Make sure you are aware what you are getting into.
- This tool is to facilitate migrations not make them a success
- Test your migration and document your findings
- Imply your development team, moving to another database engine might require training
- Understand that some parts are a blackbox

Conclusion

- It’s interesting to see that Amazon has invested so many resources in this tool
- The database migration instances are a simple way to replicate to a new infrastructure.
- It apparently has a lot of traction.
- Try it if you are interested and test it if it works for your infrastructure. (https://github.com/aws-samples/aws-database-migration-samples)