Accelerate Database Development and Testing on AWS

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Webinar Agenda

- Overview of Amazon Aurora
- Agility enhancing features of Amazon Aurora
- Accelerating database development and testing with:
    - Aurora Serverless
    - Fast Database Cloning
    - Backtrack
    - Performance Insights

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Overview of Amazon Aurora

Amazon Aurora

A relational database re-imaged for the cloud:

Speed and **availability** of high-end commercial databases

Simplicity and **cost-effectiveness** of open source databases

Drop-in **compatibility** with MySQL and PostgreSQL

Simple **pay as you go** pricing

Delivered as a managed service

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"Intuit invests significantly to own and operate high-end commercial databases underpinning our business. Until now, there just wasn't a real alternative to obtain the **reliability** and **performance** our customers need. Amazon Aurora is a game-changer for us: providing the performance and availability features that rival expensive on-premises databases and SANs at a **significantly lower price point**. The RDS **management capabilities** on top of Amazon Aurora will allow us to focus our resources and energy on what matters most – building great applications and delighting our customers."

Troy Otillio, Director, Public Cloud, Intuit

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Amazon Aurora: re-imaging the relational database

1. **Scale-out, distributed architecture**
   Purpose-built, log-structured and failure tolerant distributed storage system

2. **Service-oriented architecture leveraging AWS services**
   Integrated with AWS Lambda, Amazon S3, AWS IAM and Amazon CloudWatch

3. **Automate administrative tasks – fully managed service**
   You focus on schema design, query construction and optimization, we do the rest

4. **Cloud-native capabilities simplify use**
   Auto-scaling, reduced lag readers, continuous backups, storage grows with workload

Amazon Aurora is fast…

5× faster than MySQL; 3× faster than PostgreSQL

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How did we achieve this?

DO LESS WORK

Do fewer I/Os

Minimize network packets

Cache prior results

Offload the database engine

BE MORE EFFICIENT

Process asynchronously

Reduce latency path

Use lock-free data structures

Batch operations together

NEW CAPABILITIES AND FEATURES

Elasticity enhancements

Instant crash recovery

Zero downtime patching

Adaptive thread pooling

Fast DDL operations

Engine performance enhancements

Monitoring and management features

Fast database cloning, backtrack

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Accelerating database development and testing

1. **Cost optimized lower environments, on-demand accessible**
   Ability to scale dev/test/staging database environments up or down based on usage

2. **Fast access to replicas of production data sets at scale**
   Data movement is slow with large data sets which impedes agility

3. **Ability to quickly undo mistakes**
   Mistakes are hard to fix, and take a long time to revert

4. **Easily assess performance of workload or changes to it**
   Impact of application and query patterns varies as workload scale increases

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Accelerate development and testing with Amazon Aurora

Amazon Aurora Serverless

Fast Database Cloning

Backtrack

Performance Insights

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Introducing Amazon Aurora Serverless

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Why Amazon Aurora Serverless?

Because sizing a relational database is hard…

PROVISION FOR PEAK

Handles spikes in usage

… But costs more

PROVISION FOR AVERAGE

Costs less

…But may not meet peak demand

This choice affects development and testing patterns, too!

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Amazon Aurora Serverless is different…

1. **Simple provisioning**
   No need to indicate storage or compute capacity needed

2. **Starts up on demand, shuts down when not in use**
   Data durably stored using the aurora purpose-built storage system, independent of DB engine

3. **Seamlessly scale with no servers to manage**
   No need to provision capacity, application connections are maintained

4. **Pay only for what you use**
   Billed per second for the database capacity used at that time

5. **Drop-in compatible with existing workloads**
   No application changes needed, available for MySQL-compatible workloads

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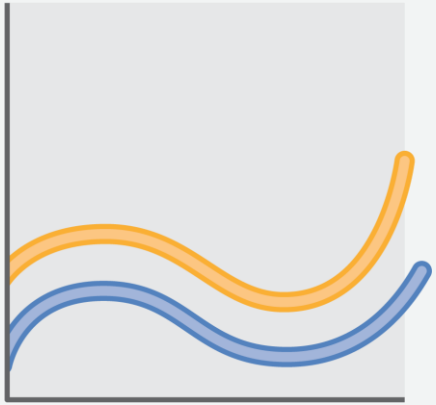
Aurora Serverless use cases

Development and test databases:

- Easily provisioned
- Cost savings when DBs are not in use
- Simplify dev/test pipelines

Infrequently used applications (e.g. low-volume blog site)

Applications with variable load - peaks of activity that are hard to predict (e.g. news site)



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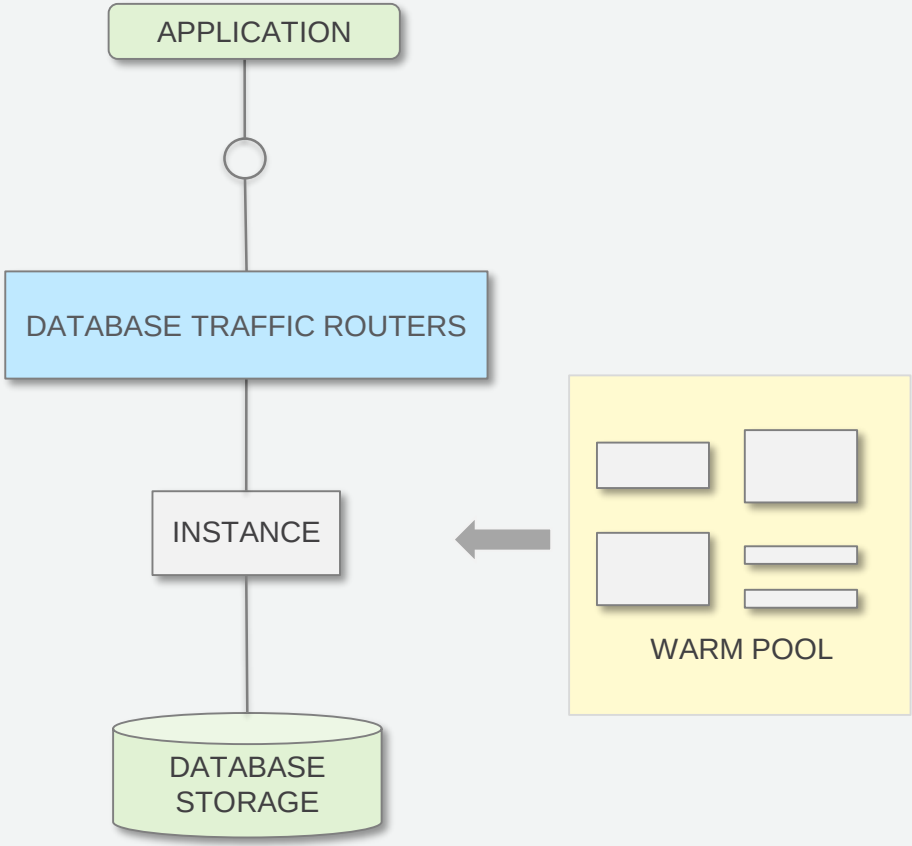
Aurora Serverless architecture

- Application talks to MySQL compatible endpoint
- Fleet of routers manage queue, client connections and route DB traffic
- Instance handles database operations
- Data kept durable and highly available on Aurora storage volume
- When scaling thresholds are reached we scale the instance substituting with capacity from warm pool
- Scaling operations are transparent to applications
- You configure min. and max. capacity, whether and when to pause DB if there's no activity



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Aurora Serverless pricing

You pay for capacity your database consumes while it is active

Database capacity is measured in **Aurora Capacity Units** (ACUs)

Flat rate per second of ACU usage, with a minimum of 5 minutes of usage each time the database is activated

Storage and I/O are billed the same as with Aurora instances

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Aurora Serverless demo

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Fast Database Cloning

Get faster access to copies of your data so you can:

1. Test changes in pre-production on relevant data sets
2. Reorganize a database with minimal production impact
3. Save a point in time snapshot for data analysis without impacting production systems

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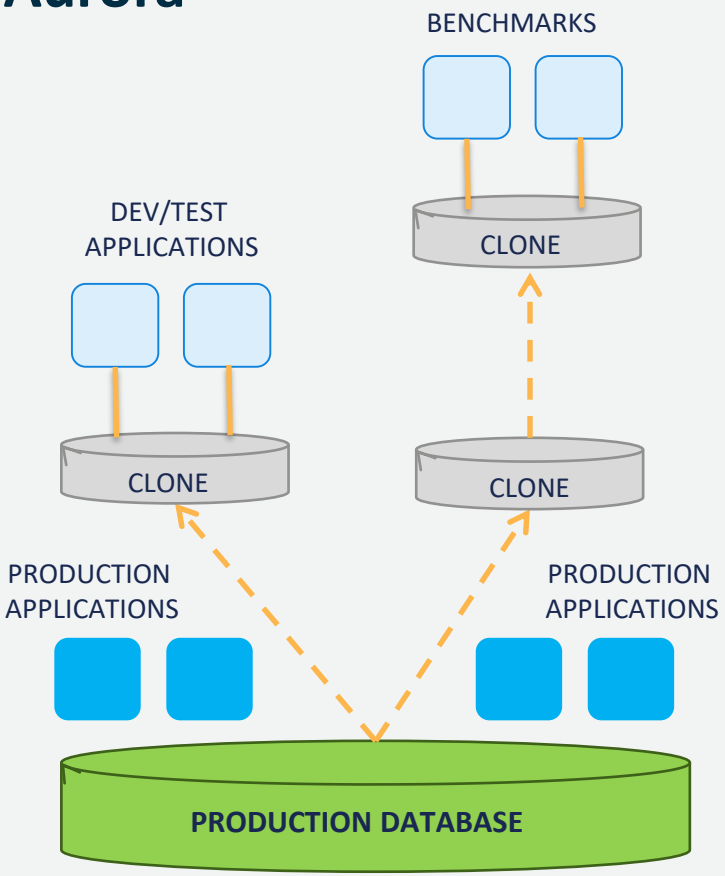
Fast database cloning with Amazon Aurora

Clone database cluster without copying the data

- Available for both **MySQL** and **PostgreSQL** compatible versions of Amazon Aurora
- Creation of clone is near instantaneous
- Data copy happens only on write, when the original and cloned volume start to differ
- Operations on clone do not affect the source cluster
- Up to 15 clones from the same source
- Pay only for the data storage difference on the clone



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Fast database cloning demo

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Backtrack Databases

Easily undo changes to your data

1. Reduce risk of database changes at scale
2. Undo unintentional DML and DDL changes
3. Mitigate risk of malicious changes to your data
4. Avoid time consuming data restore from backups

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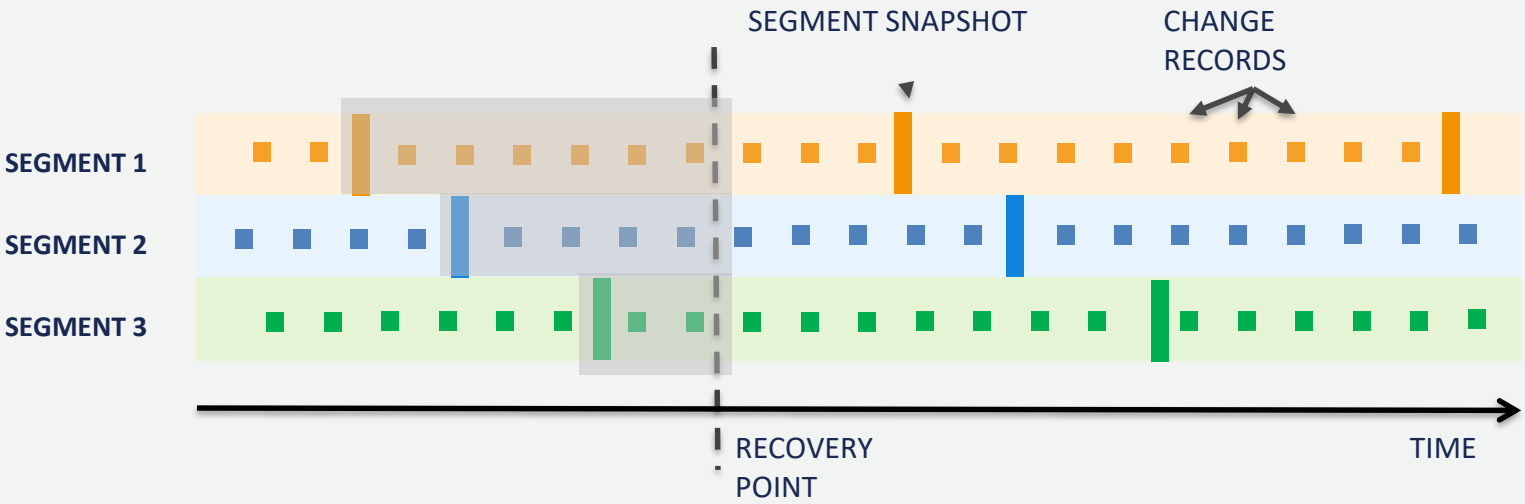
How does database backtrack work?



- We keep periodic snapshots of each segment; we also preserve the logs
- For backtrack, we identify the appropriate segment snapshots
- Apply log streams to segment snapshots in parallel and asynchronously

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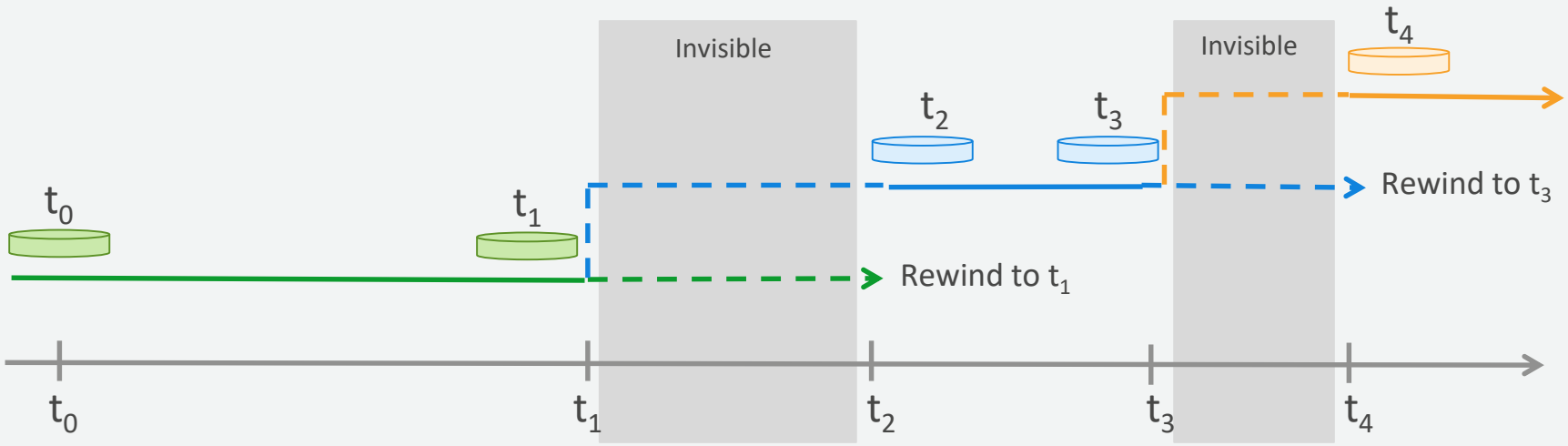
Going back in time with database backtrack



- Backtrack is not destructive
- You can backtrack multiple times to find the right point in time
- Pay for the volume of change records retained for the desired duration (up to 72 hours)
- Available for Aurora MySQL 5.6 compatible

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Backtrack demo

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Performance Insights

Monitor the performance of your queries

1. Establish a baseline of acceptable/desired query performance
2. Assess performance impact of workload changes
3. Troubleshoot poor performance, identify bottlenecks
4. Effective capacity planning

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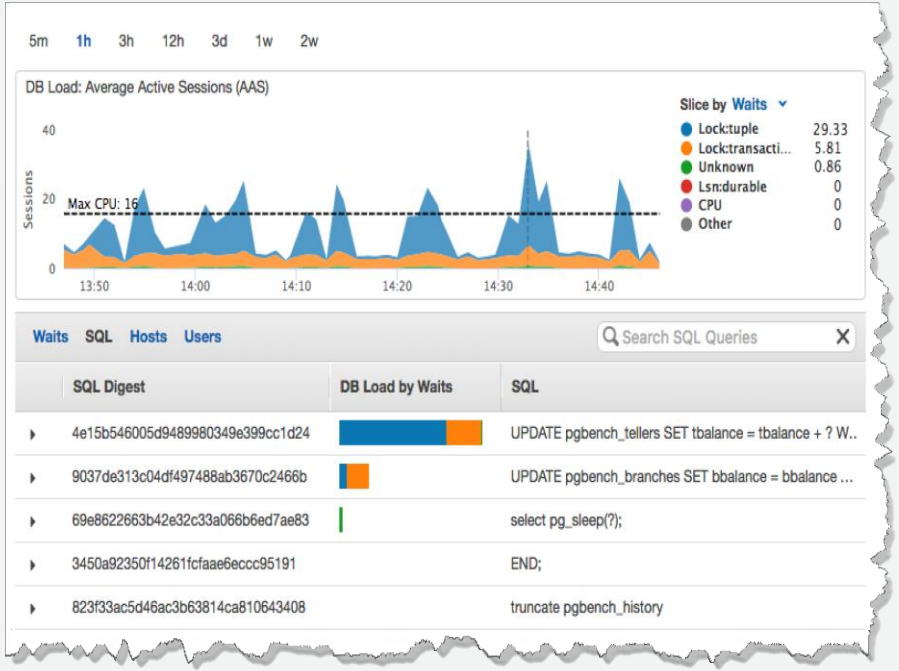
Performance Insights

- Easy and powerful dashboard showing load on your database
- Helps you identify source of bottlenecks: top SQL queries, wait statistics
- Adjustable time frame (hour, day week, month)
- 7 days of performance data history free – perfect for dev & test
- up to 2 years of long term retention for production use cases



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Performance Insights demo

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Summary

Amazon Aurora

Aurora's cloud-native capabilities simplify database operations

Accelerate database development and testing using Aurora features such as:

- Aurora Serverless
- Fast database cloning
- Database backtrack
- Performance Insights

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Thank you!

For additional details on Amazon Aurora visit:
https://aws.amazon.com/rds/aurora/

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