AWS re:Invent

ANT413-R

How to tame unpredictable analytics workloads with Amazon Redshift

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AWS re:Invent

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aws

What will you learn?

After this session, you will know how to

- Bring a new Amazon Redshift cluster up from a snapshot
- Configure automatic WLM with query priorities
- Alter query priorities on the fly for
  - A single query
  - The whole cluster
- Enable concurrency scaling to handle workload spikes

Demo: bring up a cluster

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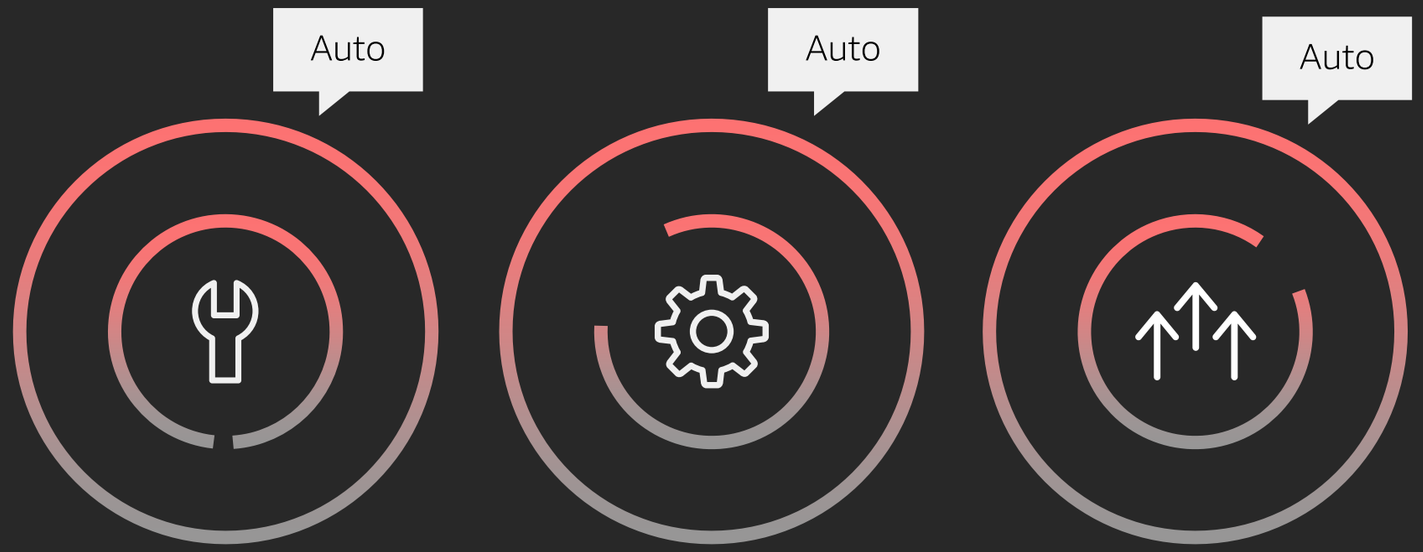
Automated cluster maintenance

New

Maintenance processes like vacuum & analyze will automatically run in the background

Moving toward zero maintenance

Amazon Redshift automatically adjusts the WLM concurrency setting to deliver optimal throughput



Analyze

WLM concurrency setting

Vacuum

Automatic WLM: spend resources where needed

Jun '19

Auto WLM – Dynamic concurrency

- ML to decide *how many queries to process in parallel* to optimize throughput and query run times
- Minimum waste of compute resources

Sept '19

Auto WLM – Query priorities

- Amazon Redshift manages query traffic and executes based on your priority
- Predictable SLAs
- Scale compute resources based on priority

Demo: configure auto WLM

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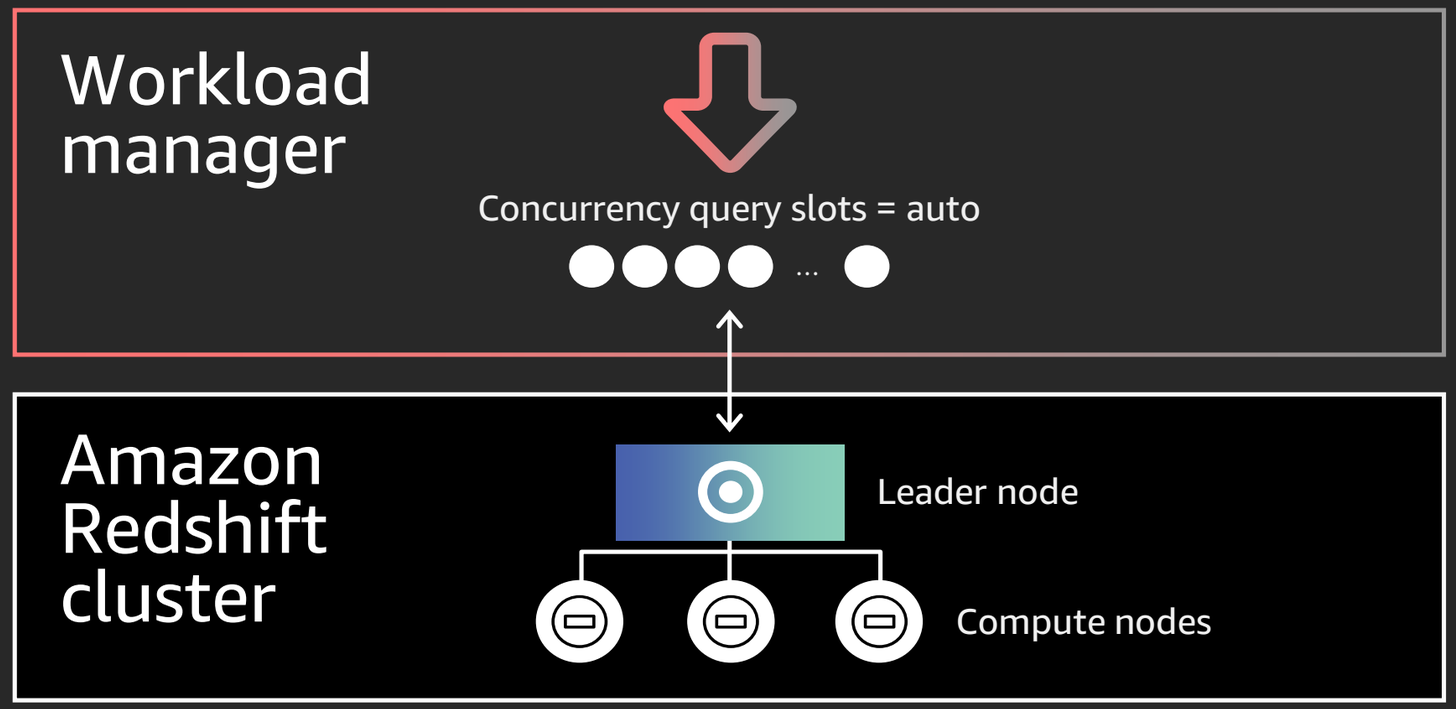
Auto WLM – Dynamic concurrency

With dynamic concurrency, Amazon Redshift determines the number of parallel queries **automatically and dynamically to deliver optimal throughput** for changing workloads

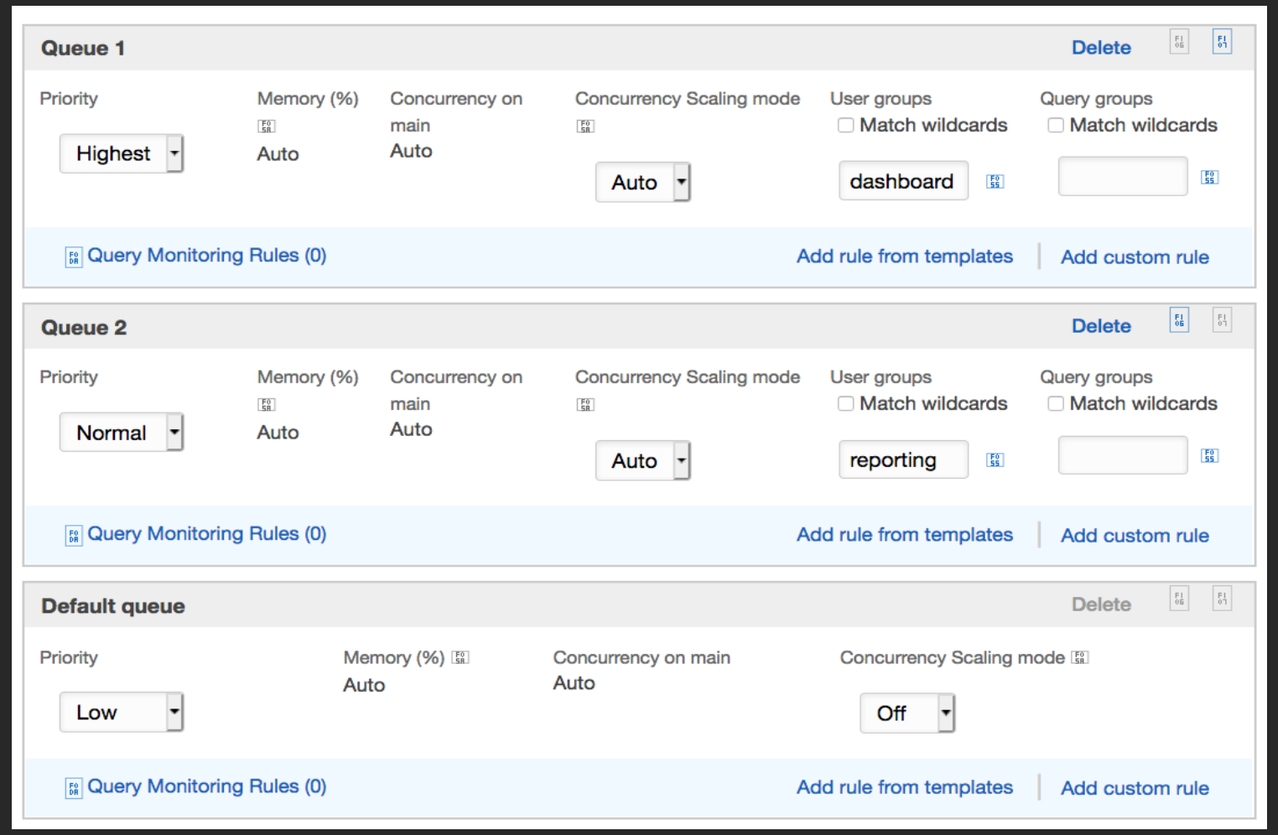


Amazon Redshift monitors the query traffic and automatically determines the number of parallel slots to **optimize memory allocation to queries**

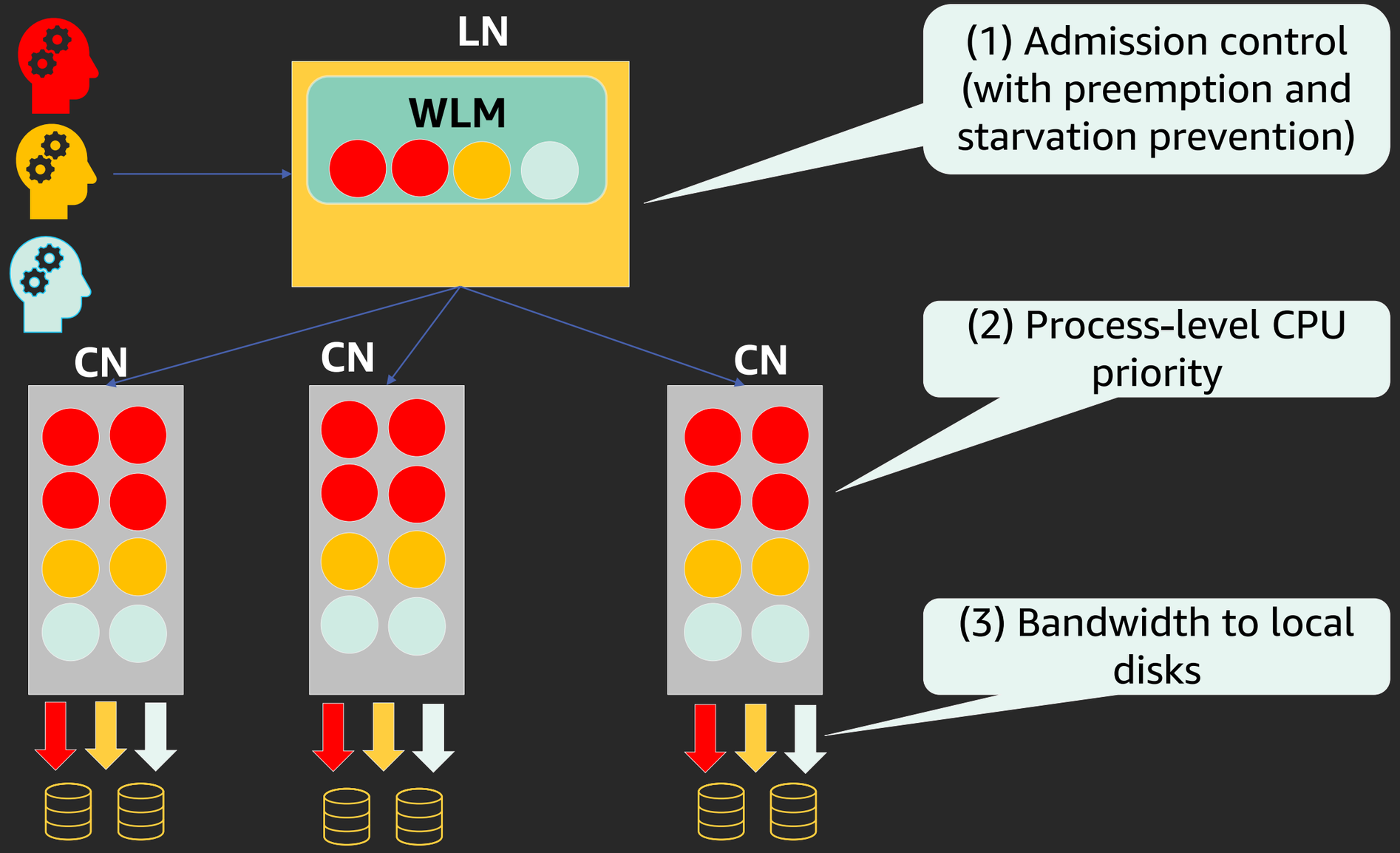
Amazon Redshift's WLM allows you to input the number of parallel queries that run on your cluster

What are query priorities?

- Gives customers ability to **categorize workloads based on business needs** and assign priorities—e.g., ETL, daily reporting, dashboards, data science team
- Amazon Redshift manages assignment of resources to queries based on priorities
- **Orders of magnitude simpler than manual WLM**
- No static partitioning of memory between workloads



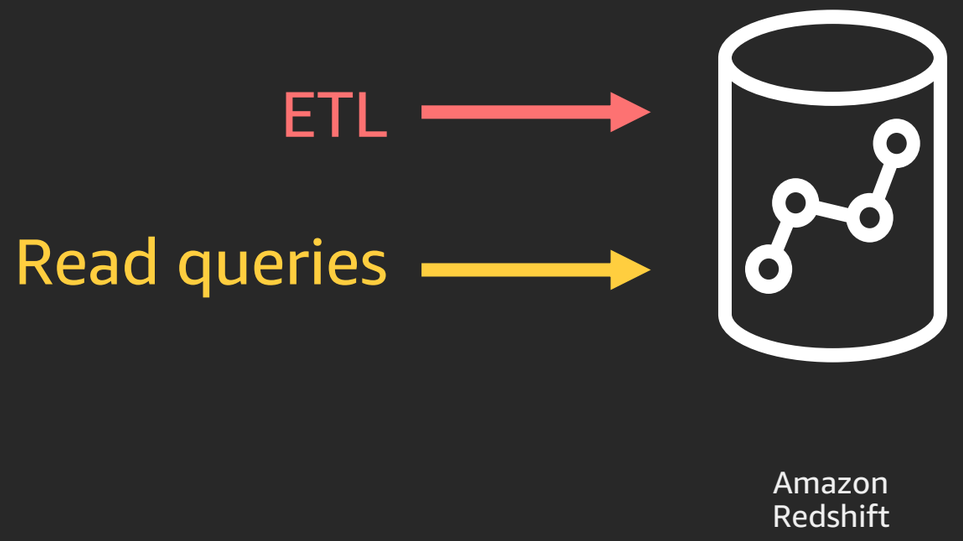
Query priorities – Under the hood



Auto WLM – Query priorities

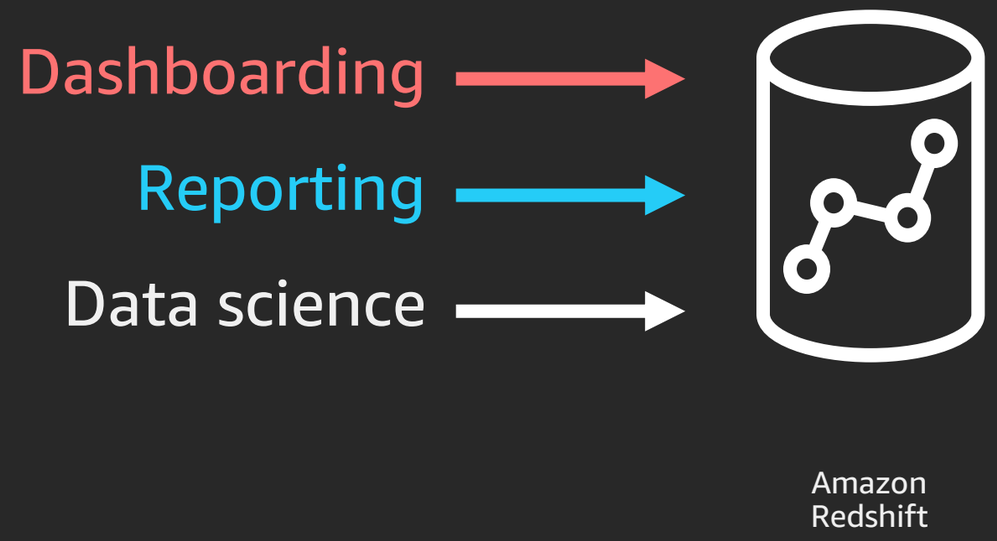
Scenario 1 – ETL

- ETL workload executing concurrently with other read queries



Scenario 2 – Reporting

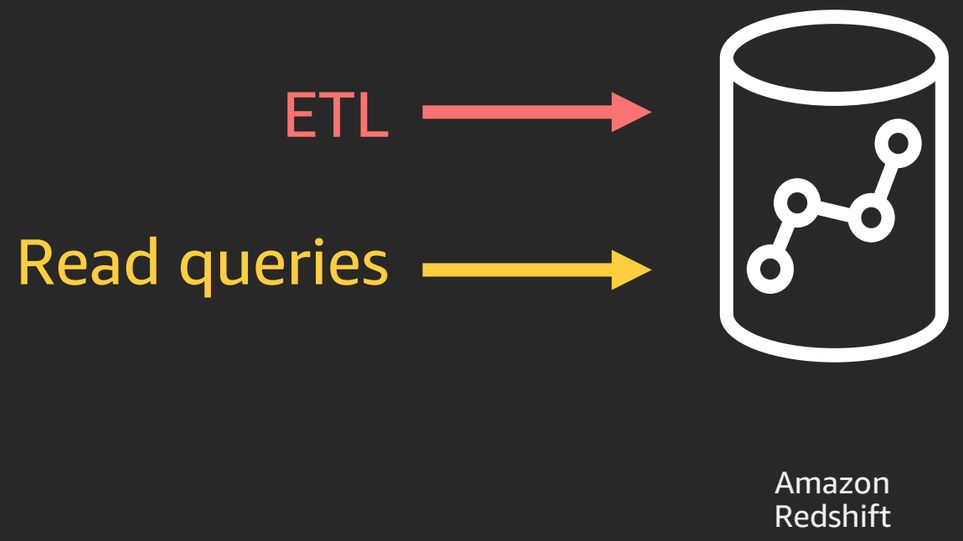
- Dashboarding, reporting & data science running concurrently



Auto WLM – Query priorities

ETL

- ETL workload executing concurrently with other read queries



No priorities

ETL	35 QpH
Read queries	245 QpH

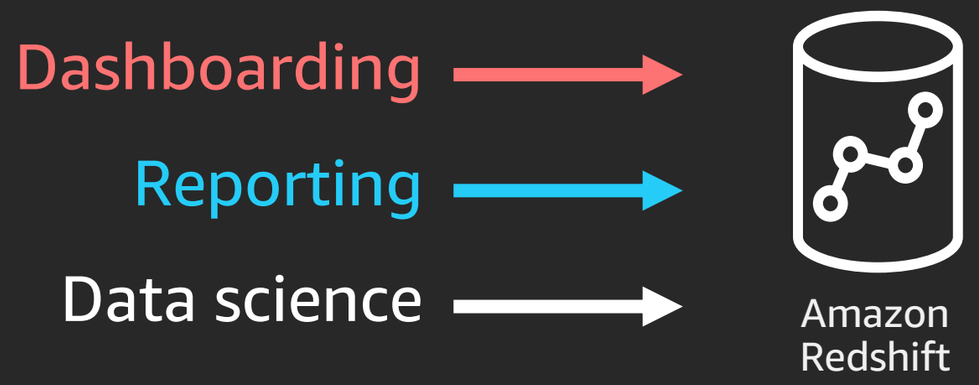
With priorities

ETL	117 QpH
Read queries	114 QpH

Auto WLM – Query priorities

Reporting

Dashboarding, reporting & data science running concurrently



**Using TPC-H 3T scale, 3 node dc2.8xl, 9 concurrency, on Amazon Redshift version 1.0.10480*

No priorities

Dashboarding (<10 secs)	230 QpH
Reporting (10–59 secs)	113 QpH
Data science (>60 secs)	70 QpH

With priorities

Dashboarding (highest)	436 QpH
Reporting (high)	160 QpH
Data science (lowest)	56 QpH

Demo: configure query priorities

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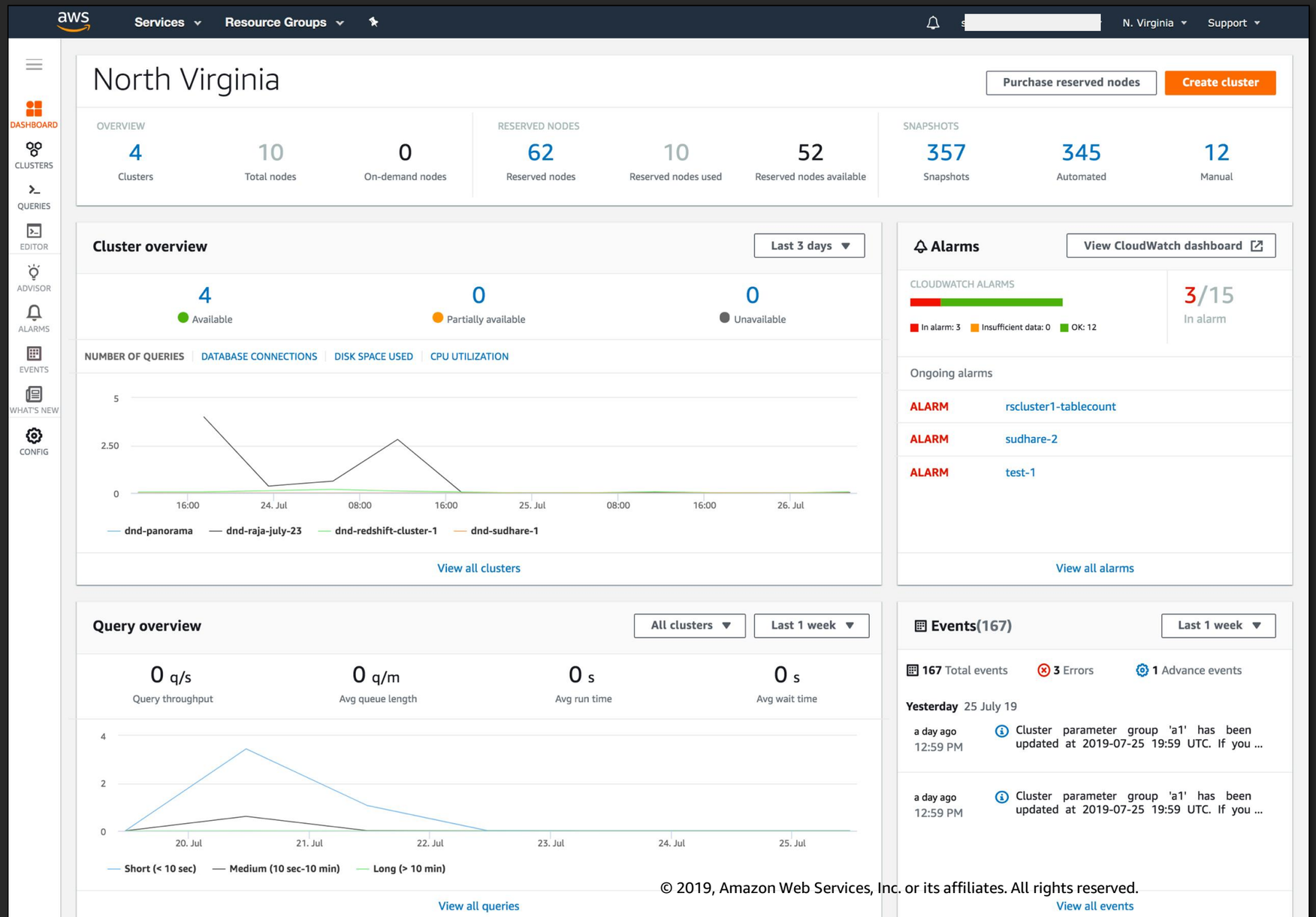
New monitoring dashboard



Consolidated view of all resources, activity, alarms & events

Easy navigation to specific areas in the console

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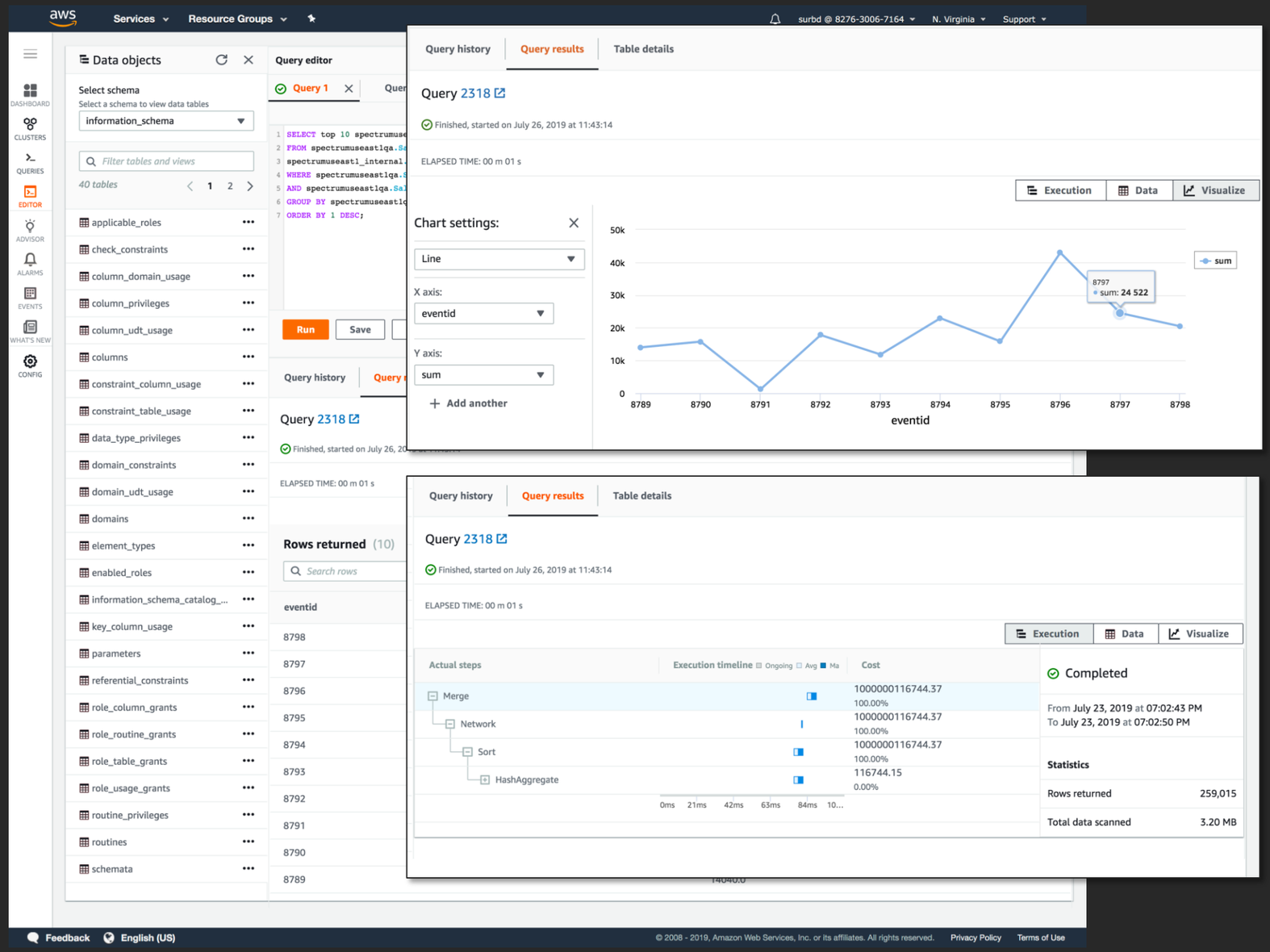
Feature-rich query editor on the console



Query execution

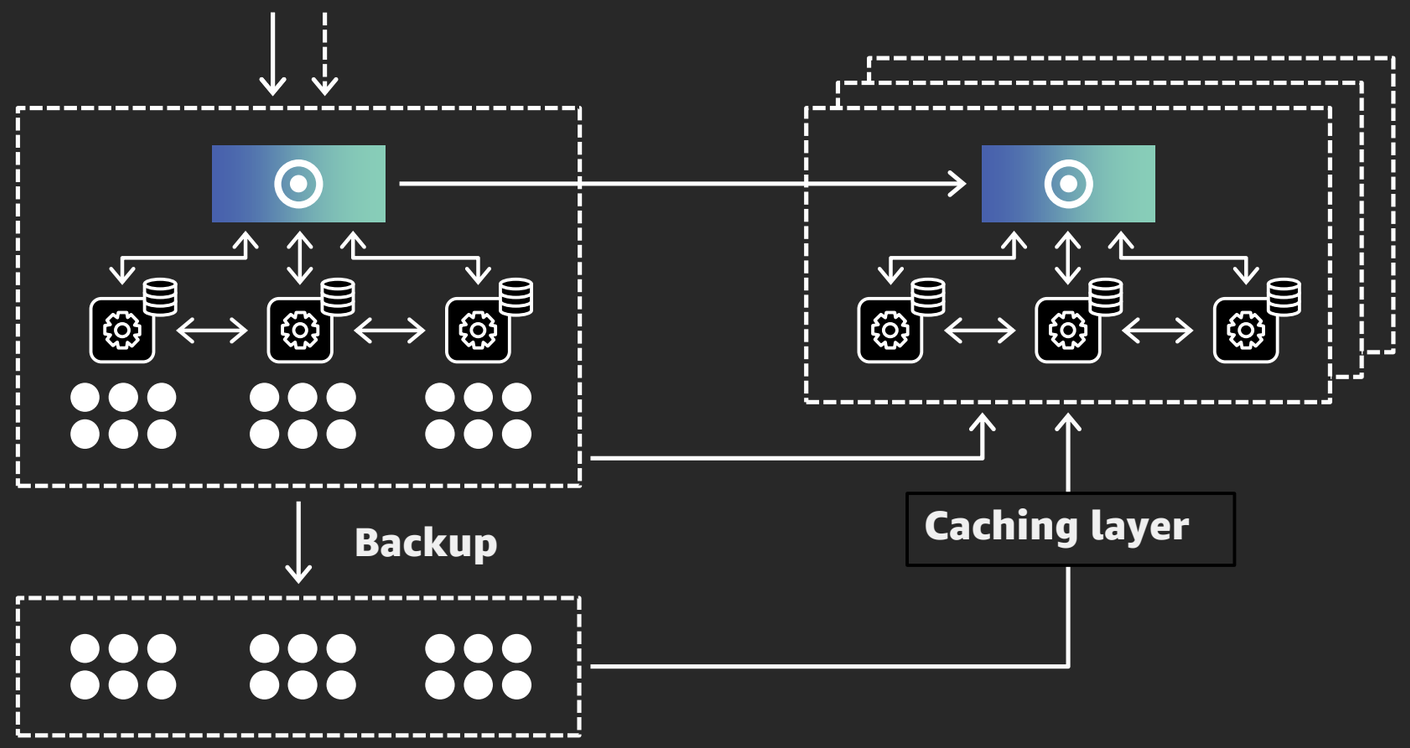
- Run one, run selected queries
- Full-screen writing mode
- Multiple query tabs
- Auto query formatting
- Insert saved snippets
- Query assist

Results

- Visual query plan
- Auto result visualizations
- Previewing data, schema

Concurrency scaling

Amazon Redshift automatically adds transient clusters, in seconds, to serve sudden spike in concurrent requests with consistently fast performance. No hydration required.



For every 24 hours that your main cluster is in use, you accrue a one-hour credit for concurrency scaling. This means that concurrency scaling is **free** for > 97% of customers.

How it works:

- All queries go to the leader node; user only sees less wait for queries
- When queries in designated WLM queue begin queuing, Amazon Redshift automatically routes them to the new clusters, enabling concurrency scaling automatically
- Amazon Redshift automatically spins up a new cluster, processes waiting queries & automatically shuts down the concurrency scaling cluster

Demo: enable concurrency scaling

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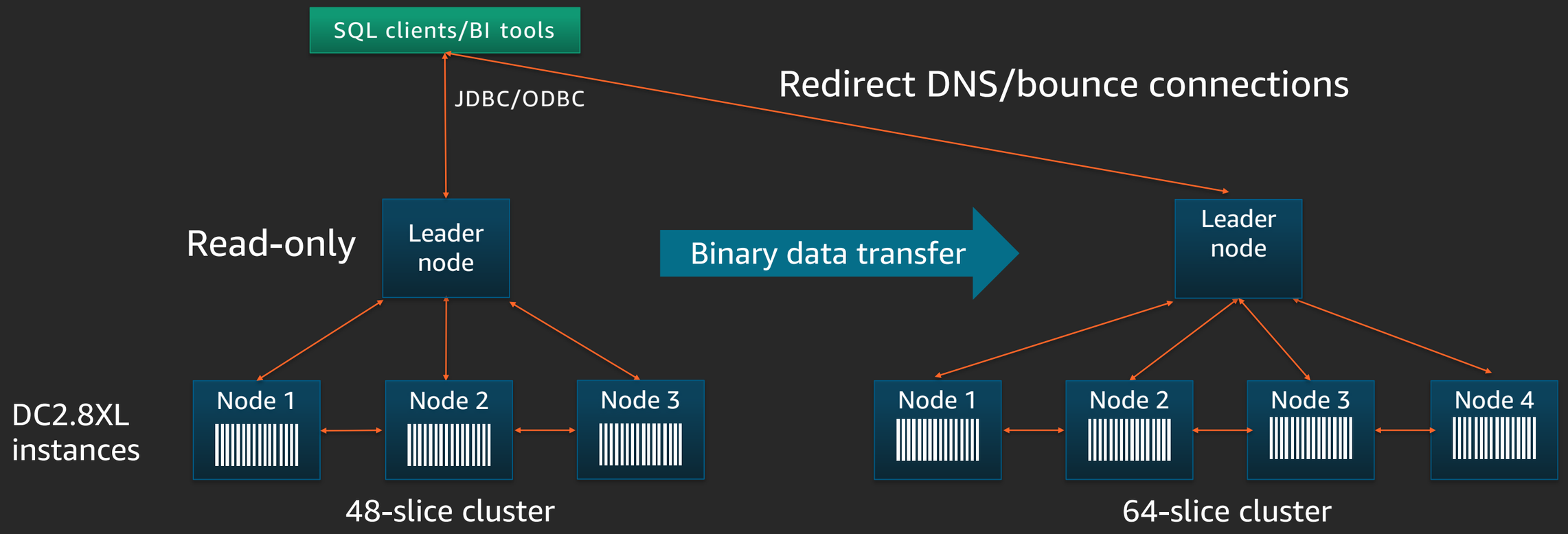
Resizing Amazon Redshift

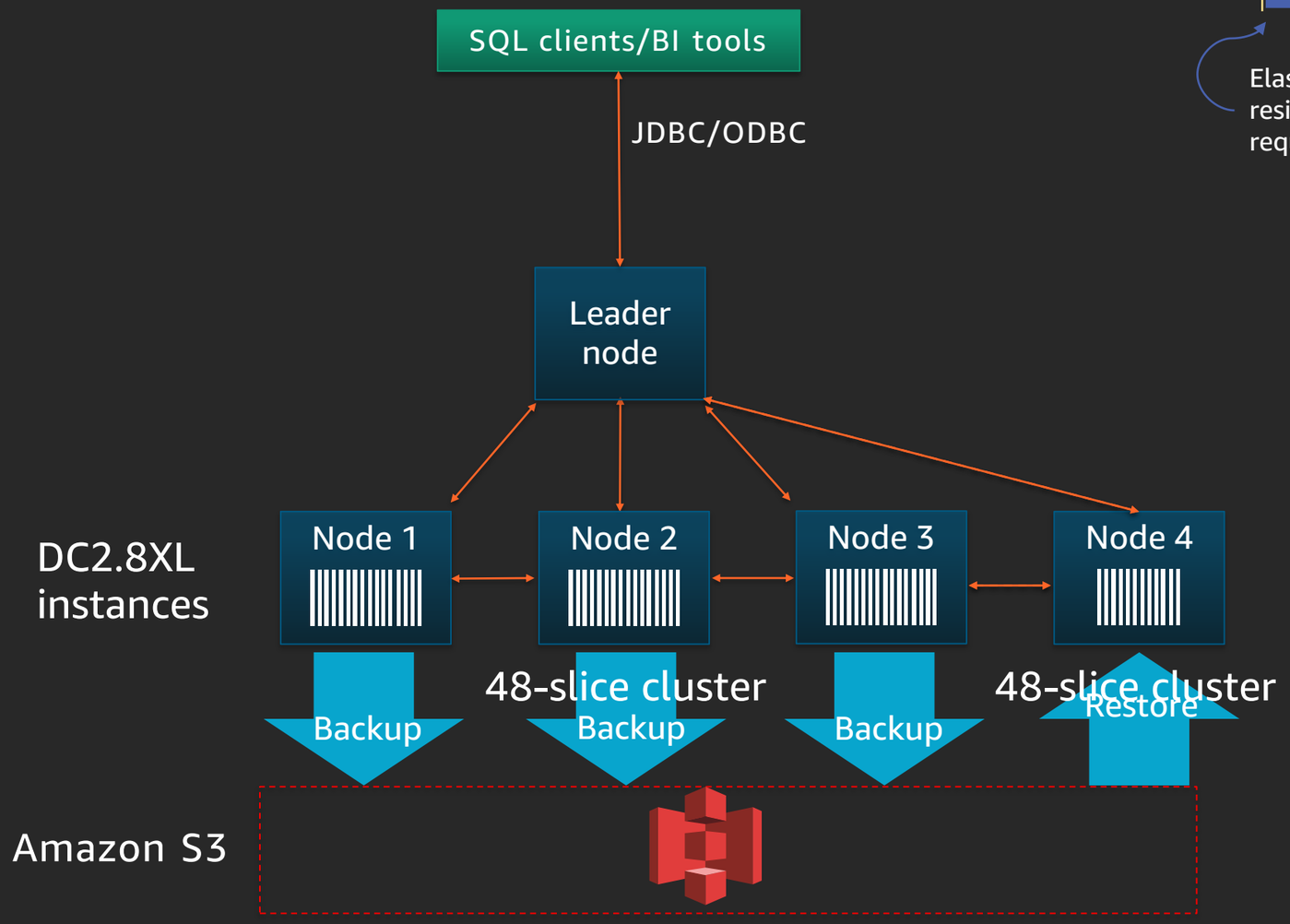
- Classic resize
  - Data is transferred from old cluster to new cluster
  - Cluster is read only while the resize is in progress
- Elastic resize
  - Nodes are quickly added/removed on existing cluster
- Cross-instance restore
  - Customers can now restore to new node types and counts

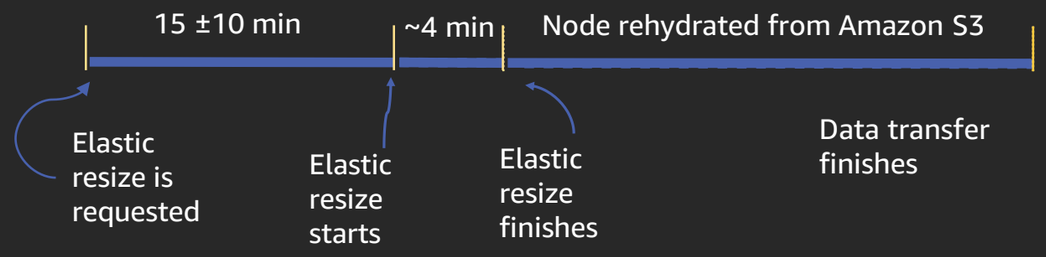
Classic resize



- Source cluster is placed into read-only mode during resize
- All data is copied and redistributed on the target cluster
- Allows for changing node types

Elastic resize





- At the start of elastic resize, we take an automatic snapshot to Amazon Simple Storage Service (Amazon S3) and provision the new node(s)
- Cluster is fully available for read and writes
- Slices are redistributed to/from nodes
- Inflight queries/connections are put on hold
- Some queries within transactions may be rollback
- Cluster is fully available; data transfer continues in the background
- Hot blocks are moved first

Q&A

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AWSLabs on GitHub – Amazon Redshift

https://github.com/awslabs/amazon-redshift-utils

https://github.com/awslabs/amazon-redshift-monitoring

https://github.com/awslabs/amazon-redshift-udfs

Admin scripts

Collection of scripts for running diagnostics on your cluster

Admin views

Collection of views for managing your cluster, generating schema DDL & so on

SimpleReplay utility

Utility that can replay Amazon Redshift audit logs; useful for testing new Amazon Redshift settings

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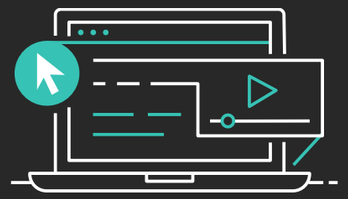
Resources created by the experts at AWS to help you build and validate data analytics skills



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