Module 8: Databases

AWS Academy Cloud Foundations

Amazon Relational Database Service

Amazon Relational Database Service (Amazon RDS)

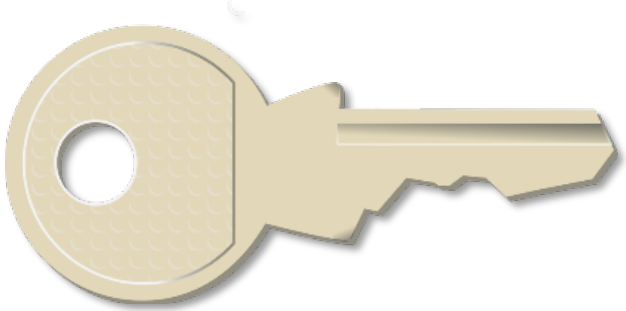
Unmanaged versus managed services

Unmanaged:

Scaling, fault tolerance, and availability are managed by you.

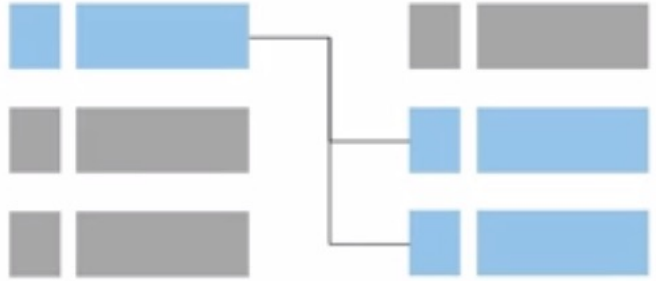
Managed:

Scaling, fault tolerance, and availability are typically built into the service.



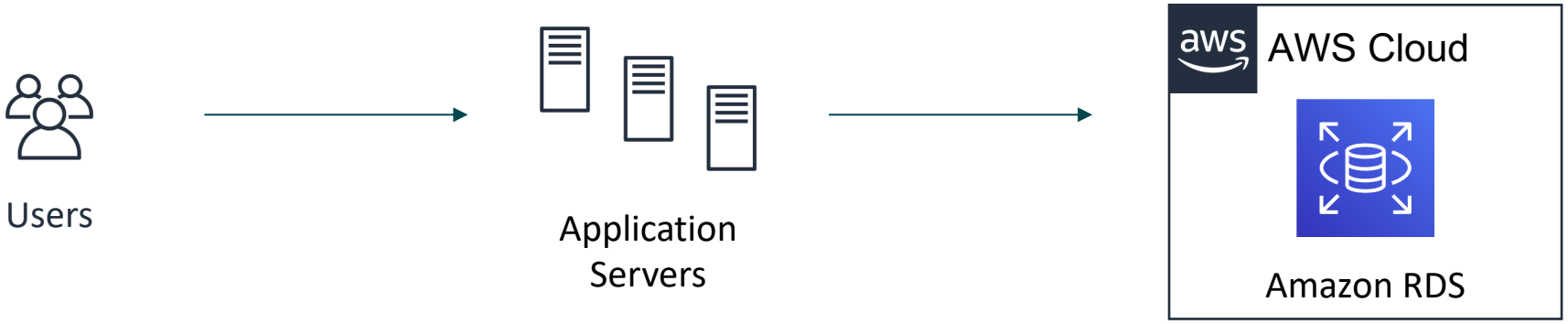
Challenges of relational databases

- Server maintenance and energy footprint
- Software installation and patches
- Database backups and high availability
- Limits on scalability
- Data security
- Operating system (OS) installation and patches

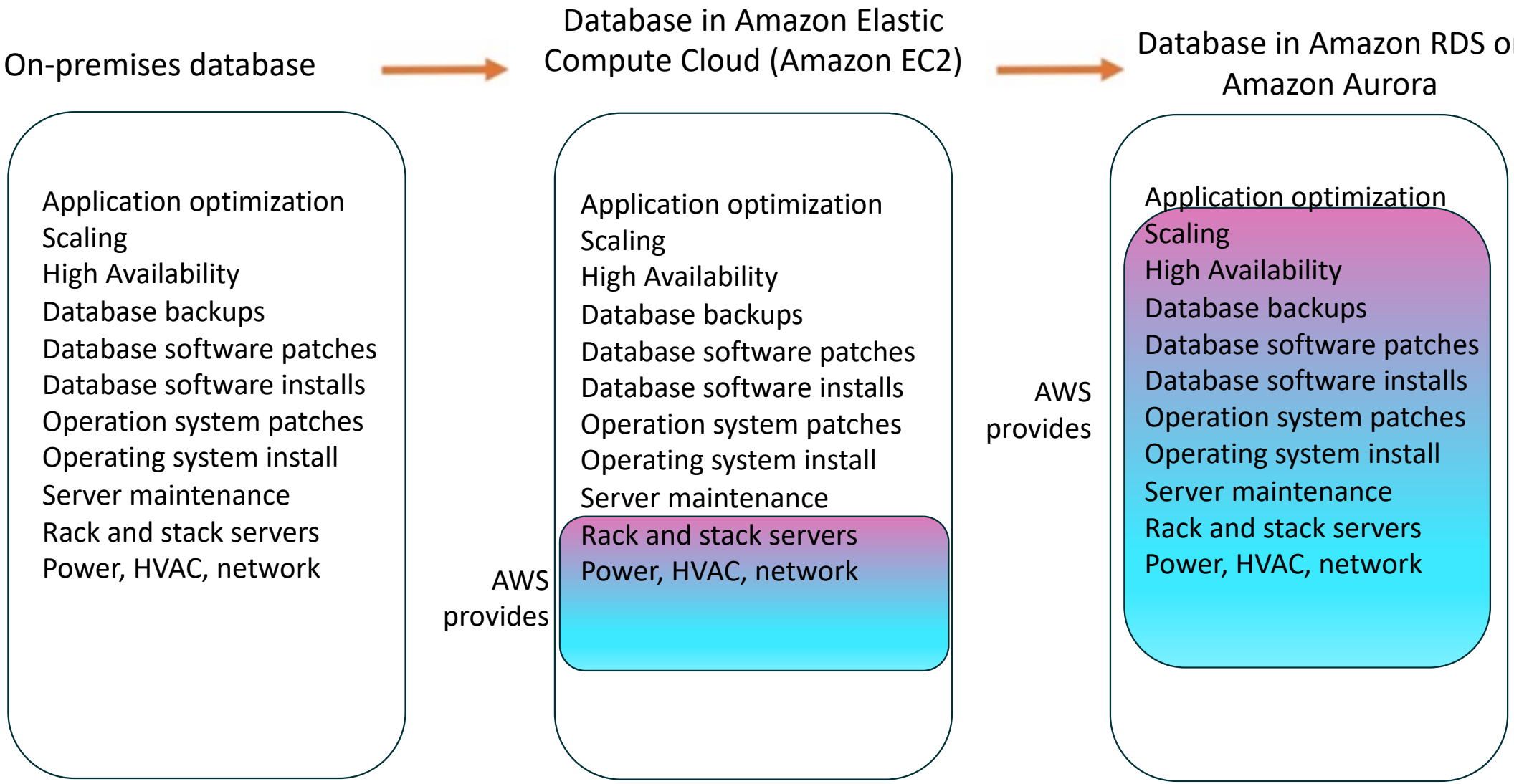


Amazon RDS

Managed service that sets up and operates a relational database in the cloud.



From on-premises databases to Amazon RDS



Managed services responsibilities

You manage:

- Application optimization

AWS manages:

- OS installation and patches
- Database software installation and patches
- Database backups
- High availability
- Scaling
- Power and racking and stacking servers
- Server maintenance

Amazon RDS

Amazon RDS DB instances

Amazon RDS

Amazon RDS DB main instance

DB Instance Class

- CPU
- Memory
- Network performance

DB Instance Storage

- Magnetic
- General Purpose (solid state drive, or SSD)
- Provisioned IOPS

MySQL

Amazon Aurora

Microsoft SQL Server

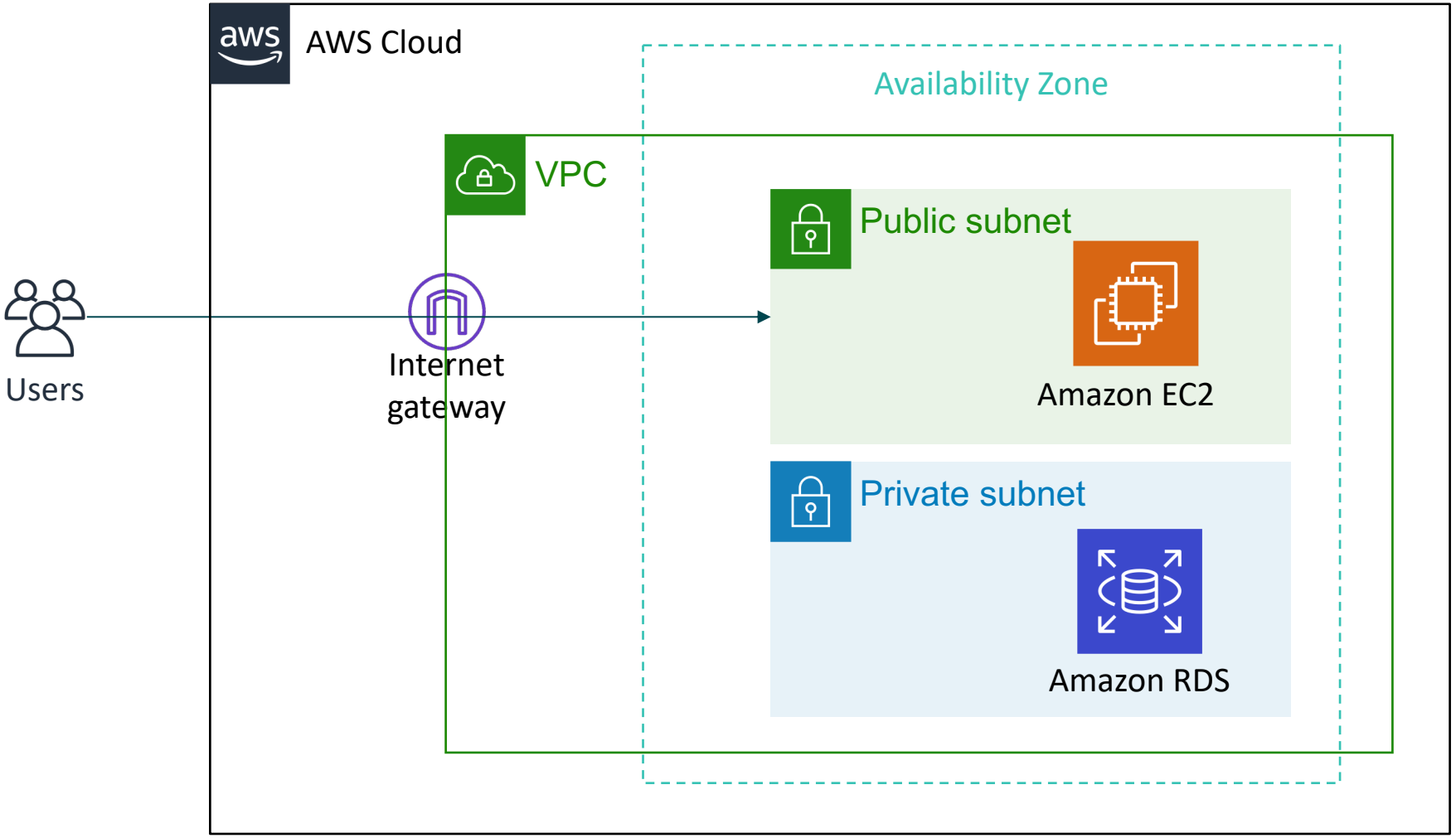
PostgreSQL

MariaDB

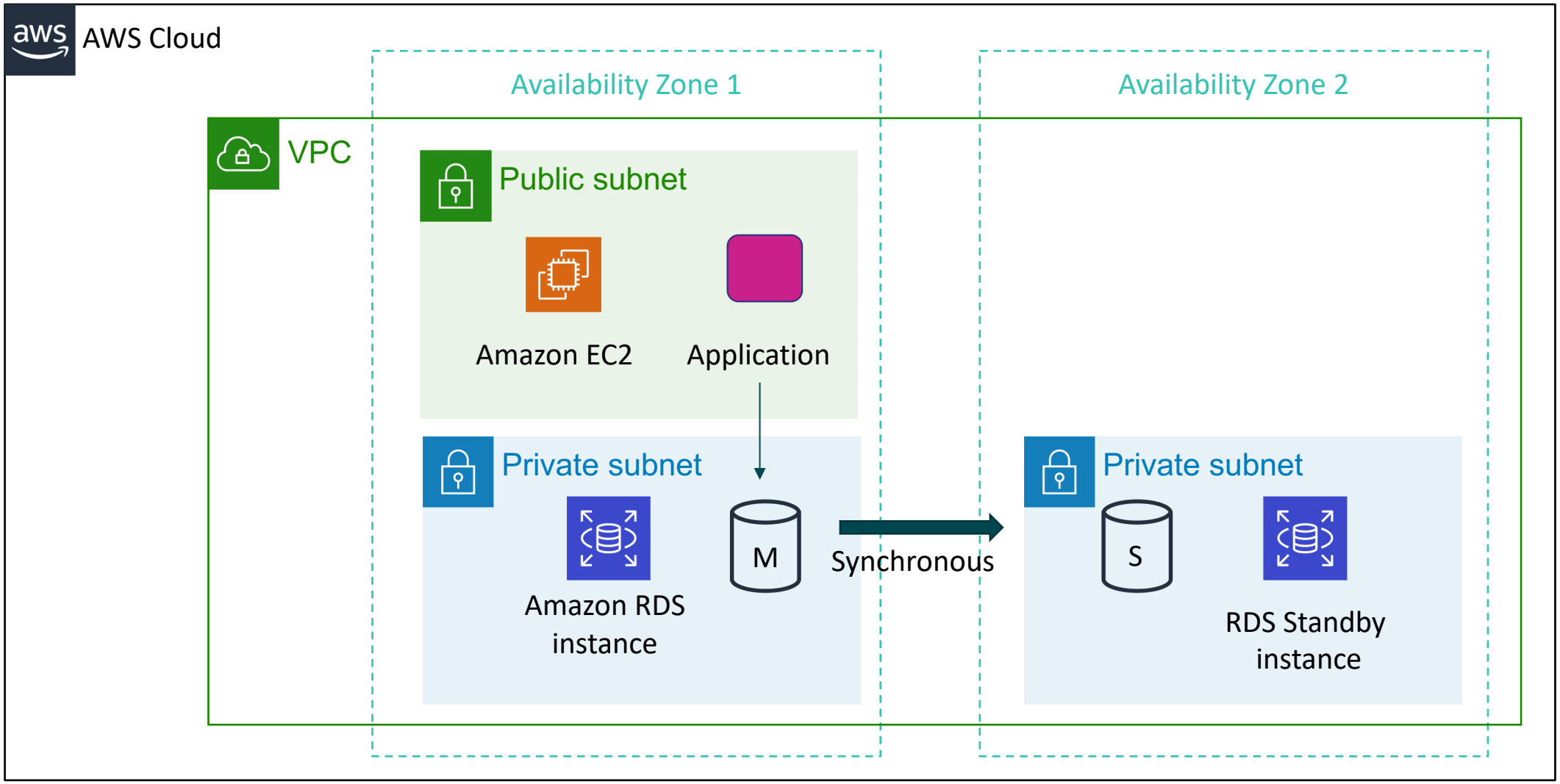
Oracle

DB engines

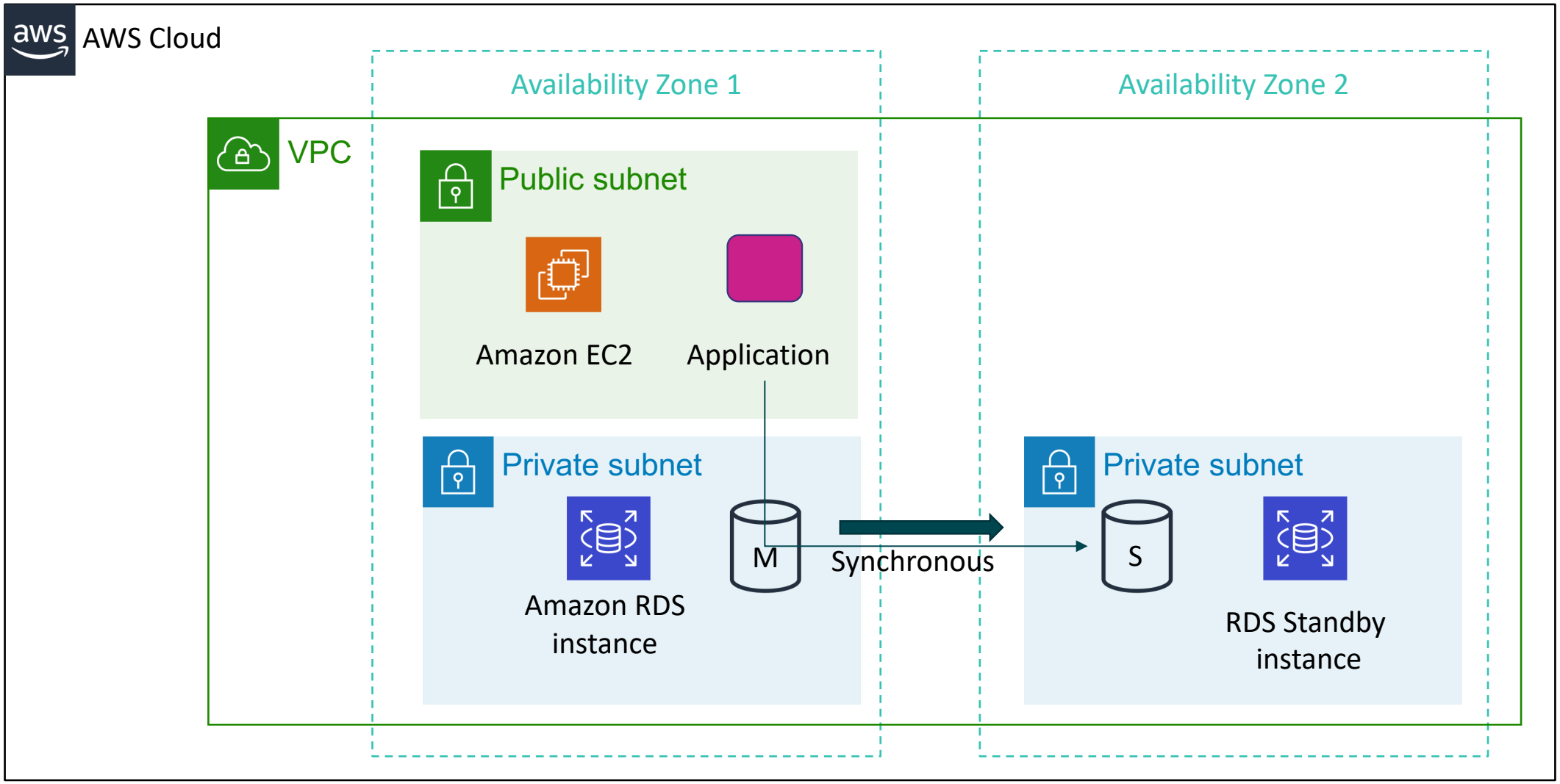
Amazon RDS in a virtual private cloud (VPC)



High availability with Multi-AZ deployment (1 of 2)



High availability with Multi-AZ deployment (2 of 2)



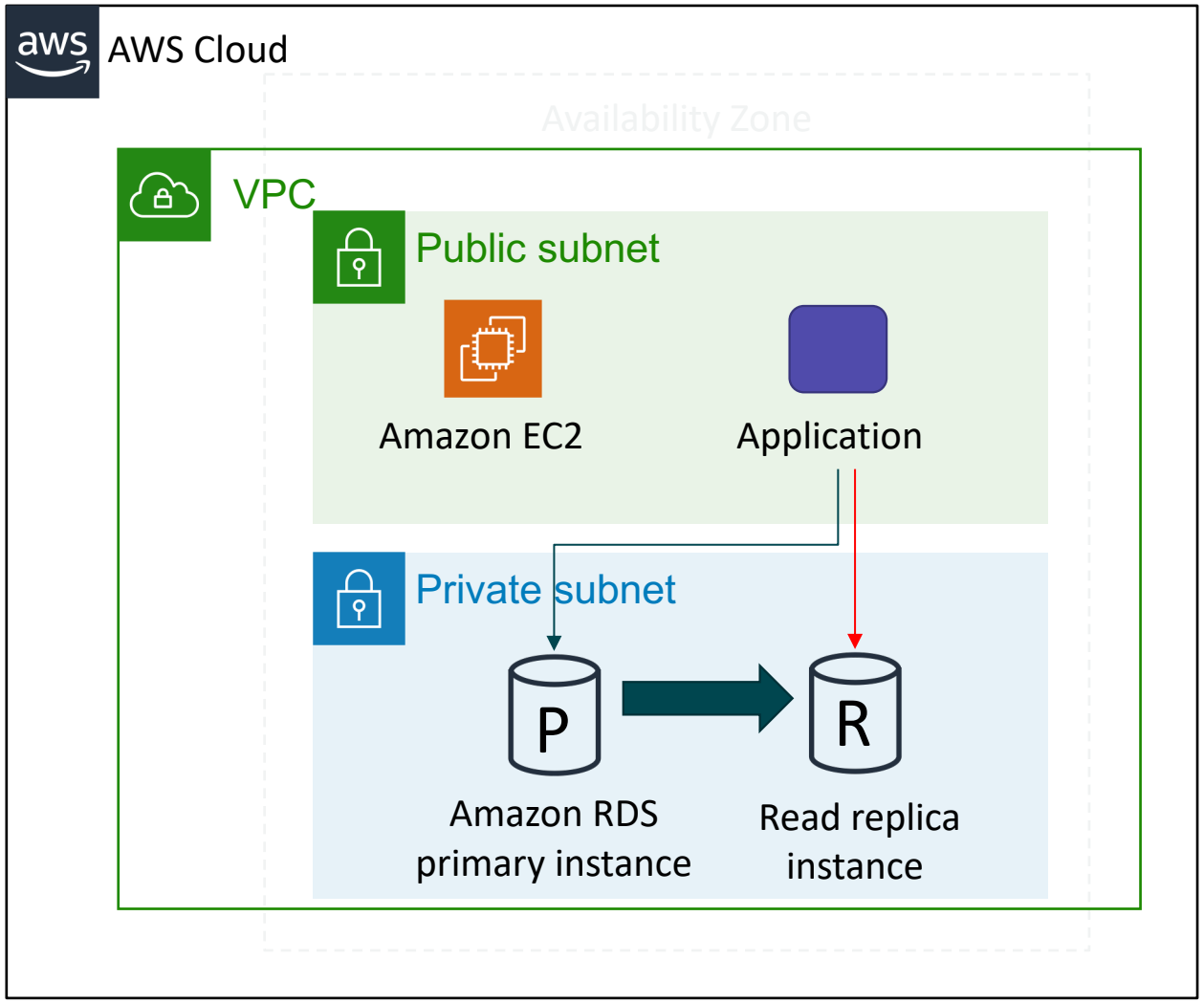
Amazon RDS read replicas

Features

- Offers asynchronous replication
- Can be promoted to primary if needed

Functionality

- Use for read-heavy database workloads
- Offload read queries



Use cases

Web and mobile applications	✓ High throughput ✓ Massive storage scalability ✓ High availability
Ecommerce applications	✓ Low-cost database ✓ Data security ✓ Fully managed solution
Mobile and online games	✓ Rapidly grow capacity ✓ Automatic scaling ✓ Database monitoring

When to Use Amazon RDS

Use Amazon RDS when your application requires:

- Complex transactions or complex queries
- A medium to high query or write rate – Up to 30,000 IOPS (15,000 reads + 15,000 writes)
- No more than a single worker node or shard
- High durability

- **Do not use Amazon RDS when your application requires:**
  - Massive read/write rates (for example, 150,000 write/second)
  - Sharding due to high data size or throughput demands
  - Simple GET or PUT requests and queries that a NoSQL database can handle
  - Relational database management system (RDBMS) customization

Section 2: Amazon DynamoDB

Module 8: Databases

Relational versus non-relational databases

<table>
<tr><th></th><th>Relational (SQL)</th><th>Non-Relational</th></tr>
<tr><td>Data Storage</td><td>Rows and columns</td><td>Key-value, document, graph</td></tr>
<tr><td>Schemas</td><td>Fixed</td><td>Dynamic</td></tr>
<tr><td>Querying</td><td>Uses SQL</td><td>Focuses on collection of documents</td></tr>
<tr><td>Scalability</td><td>Vertical</td><td>Horizontal</td></tr>
<tr><td>Example</td><td>
<table>
<tr><th>ISBN</th><th>Title</th><th>Author</th><th>Format</th></tr>
<tr><td>3111111223439</td><td>Withering Depths</td><td>Jackson, Mateo</td><td>Paperback</td></tr>
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}</td></tr>
</table>

What is Amazon DynamoDB?

Fast and flexible NoSQL database service for any scale

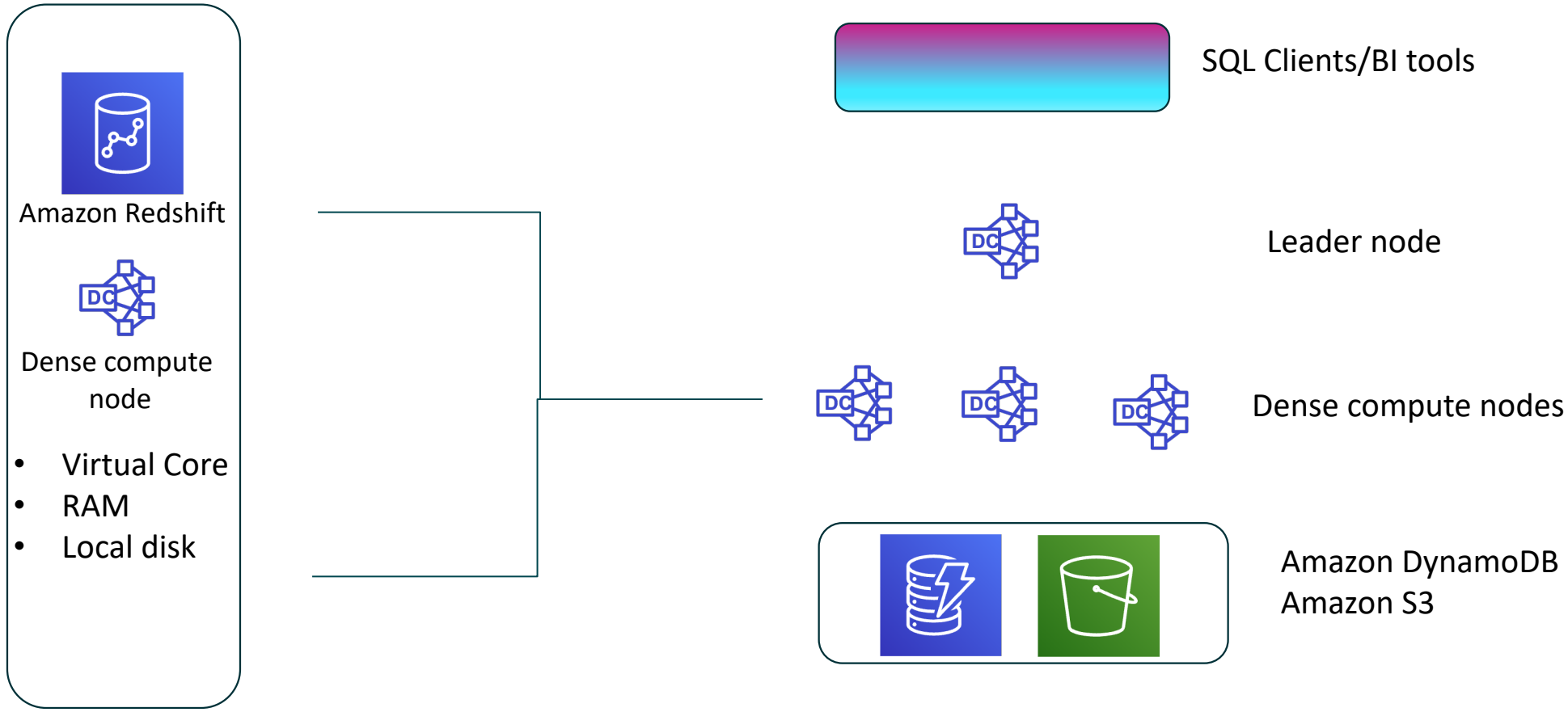
Amazon DynamoDB

- NoSQL database tables
- Virtually unlimited storage
- Items can have differing attributes
- Low-latency queries
- Scalable read/write throughput

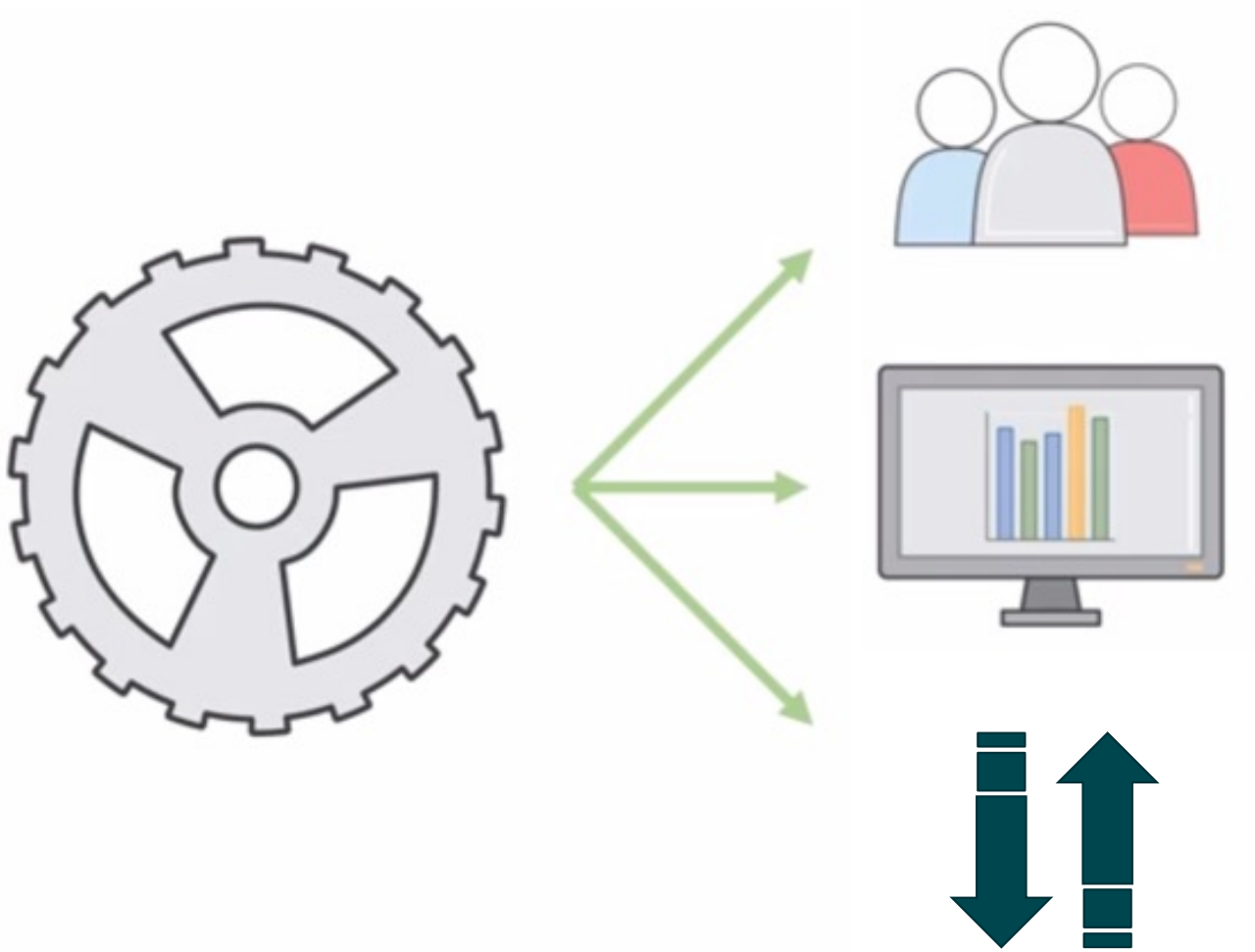
Amazon Redshift

Amazon Redshift

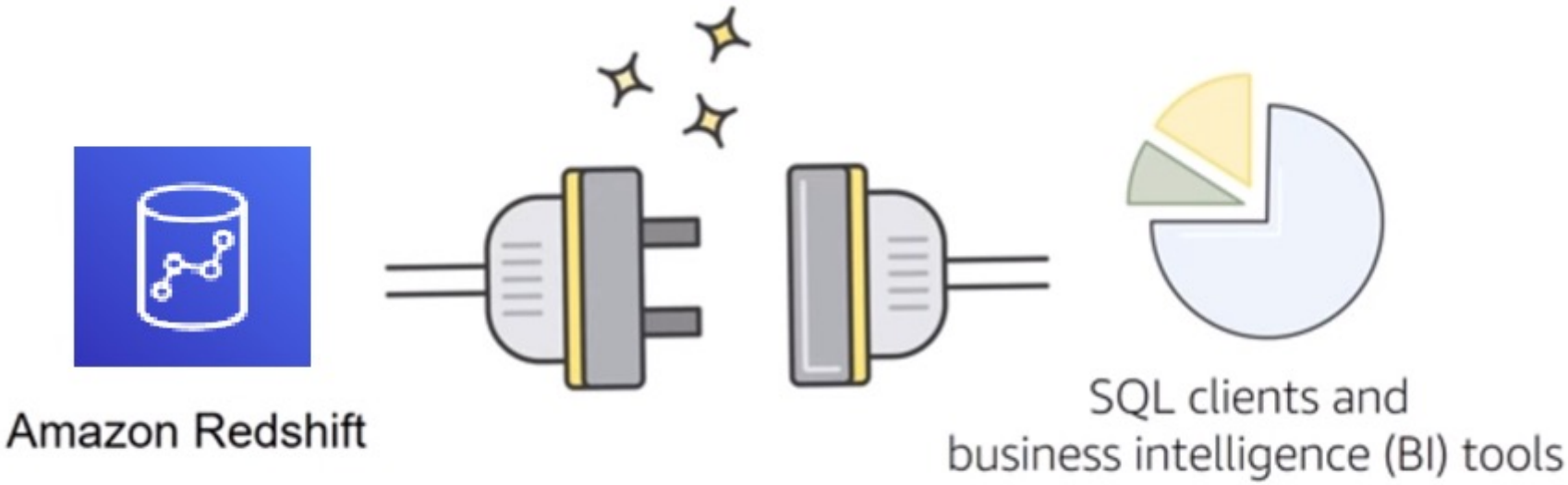
Parallel processing architecture



Automation and scaling



Compatibility



Amazon Redshift use cases (1 of 2)

- Enterprise data warehouse (EDW)
  - Migrate at a pace that customers are comfortable with
  - Experiment without large upfront cost or commitment
  - Respond faster to business needs
- Big data
  - Low price point for small customers
  - Managed service for ease of deployment and maintenance
  - Focus more on data and less on database management

Amazon Redshift use cases (2 of 2)

- Software as a service (SaaS)
  - Scale the data warehouse capacity as demand grows
  - Add analytic functionality to applications
  - Reduce hardware and software costs

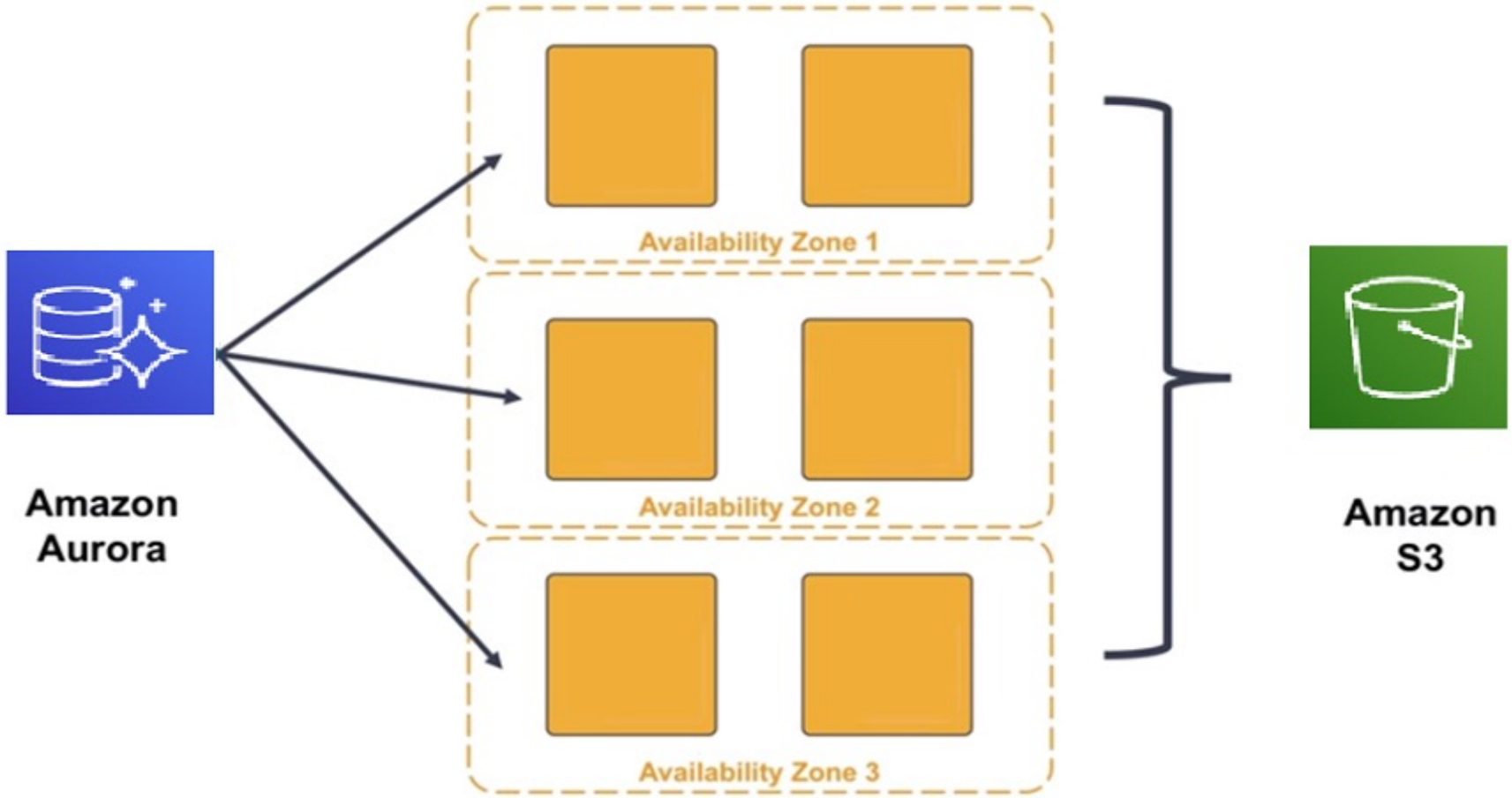
Amazon Aurora

Amazon Aurora

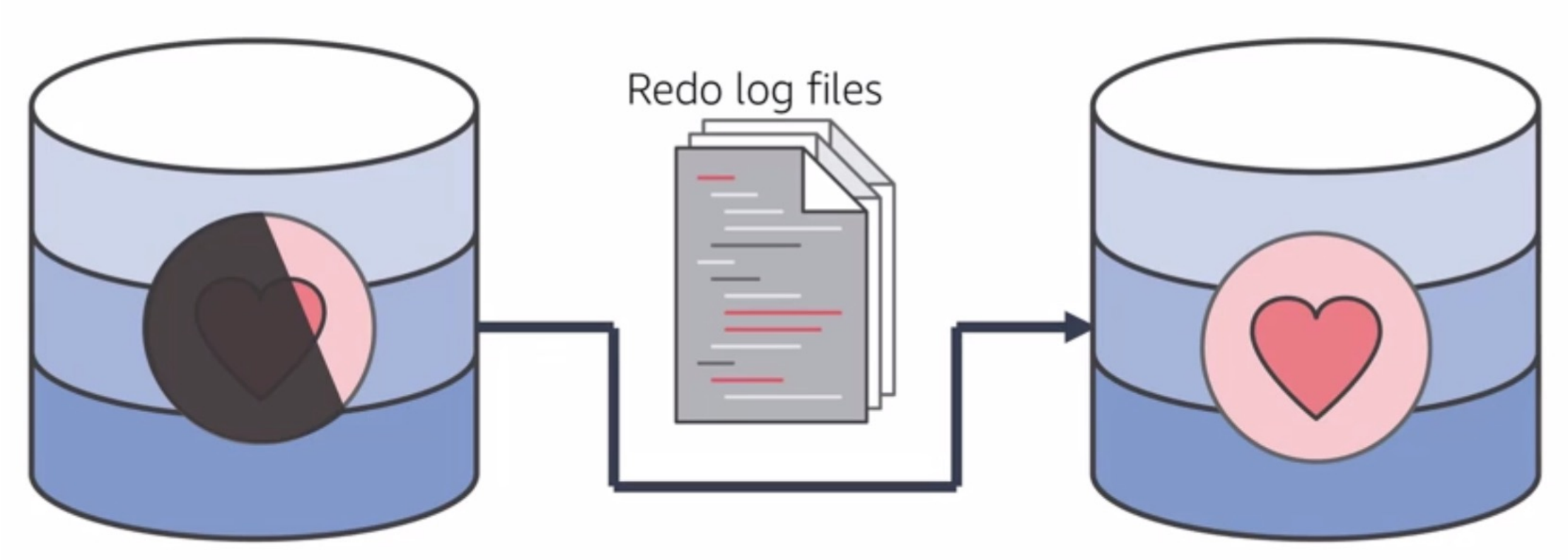
- Enterprise-class relational database
- Compatible with MySQL or PostgreSQL
- Automate time-consuming tasks (such as provisioning, patching, backup, recovery, failure detection, and repair).

Amazon Aurora service benefits

High availability



Resilient design



The right tool for the right job

What are my requirements?	
Enterprise-class relational database	Amazon RDS
Fast and flexible NoSQL database service for any scale	Amazon DynamoDB
Operating system access or application features that are not supported by AWS database services	Databases on Amazon EC2
Specific case-driven requirements (machine learning, data warehouse, graphs)	AWS purpose-built database services

Thank you

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