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Migrating Database Workloads to AWS

In collaboration with

accenture

Executive summary

Today, migration to the cloud is becoming a critical path for business growth as user demand increases. This is because the classic way of doing business is inefficient and slow, leading more organizations to evaluate a move to the cloud to enhance their efficiency and flexibility. With Amazon Web Services (AWS), decision-makers can migrate or transform legacy applications and databases and rapidly benefit from the cost and efficiencies of cloud economics while adopting next-generation database features.

In 2022, organizational focus shifted to modernization, and cloud adoption increased 19 percent, to $490 billion. In 2023, cloud adoption is expected to increase by 21 percent, to $591 billion—from $412 billion in 2021, as reported by Gartner.* In addition to this accelerated growth, digital transformation became critical during the Covid-19 pandemic, as the new challenges of a geographically dispersed workforce performing hybrid and remote work, rising technology costs, and labor uncertainties motivated SMBs and large enterprises to migrate workloads to the cloud.

As a decision-maker, you are responsible for steering and handling your users' demands while modernizing your applications and databases, lowering overall total costs. With the help of partners like AWS and Accenture, migration can be easy and fast. These partners bring vast experience with migrations, transformations, thought leadership, and lessons learned from prior engagements.

Introduction

With the accelerating change of the technology stack and the increase of business transactions, backend systems such as databases need to be transformed and modernized to keep up with customer demand. Every organization must respond by evolving its technology stack and help its customer base. Most of all, every application requires a mechanism to store user data and transactions.

Database selection

It can be difficult to select a database platform that provides supportability, scalability, and performance, all at a reasonable price. Nevertheless, it's critically important that your choice fits your requirements, provides necessary performance, meets demand requirements, and is optimized for your workload. Legacy databases often lack appropriate scaling capabilities, creating challenges when performance and demand requirements increase. With AWS database offerings, you can ensure that scaling accommodates changes in supply and demand.

Exit demands

Another driver for modernizing your database is the increasing demand to move away from client-managed or colocation datacenters to lower operating costs, which are typically very high. Migrating to AWS can reduce the burden of managing a datacenter, with all its intricacies, and free up resources to focus on innovation. With AWS, you can ensure that flexibility and agility are delivered from the beginning and are a part of your solutions. Accenture helps create solutions that can reduce costs and wasted resources.

For executives and decision-makers, it is critical that business isn't interrupted once migration or transformation begins. As an AWS Partner, Accenture provides this capability backed by the AWS platform. Over many years, Accenture has transformed and migrated numerous large databases to the cloud, and it brings with it past success stories and lessons learned.
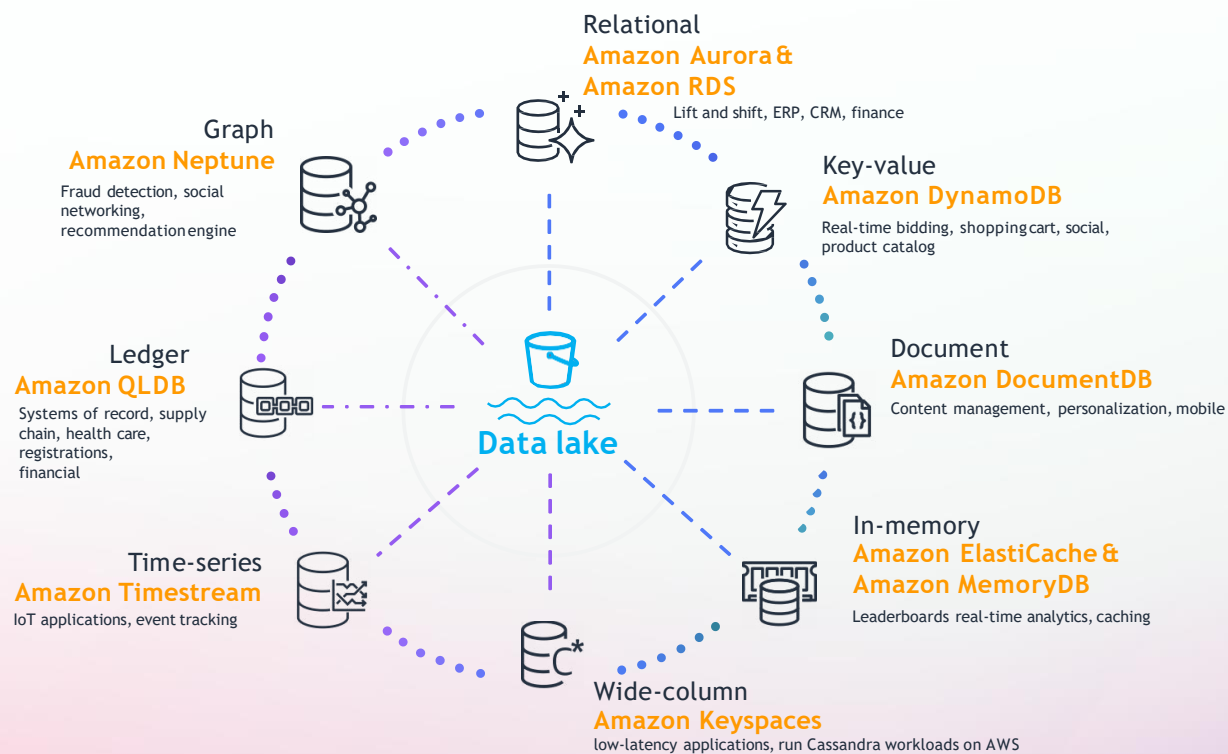
Broad portfolio of AWS purpose-built databases
Right tool for the right job

AWS database services

AWS offers a wide range of managed database services to support various use cases, as illustrated in the following diagram. Such purpose-built databases include relational and NoSQL databases, which support key-value, document, in-memory, graph, time-series, wide-column, and ledger data models. Managed databases free your teams from such time-consuming tasks such as server provisioning, patching, and creating backups. AWS fully managed database services provide continuous monitoring, self-healing storage, and automated scaling to help you focus on application development. Accenture helps you choose the right database platform by analyzing your data's lifecycle and evaluating your specific workloads and uses cases.
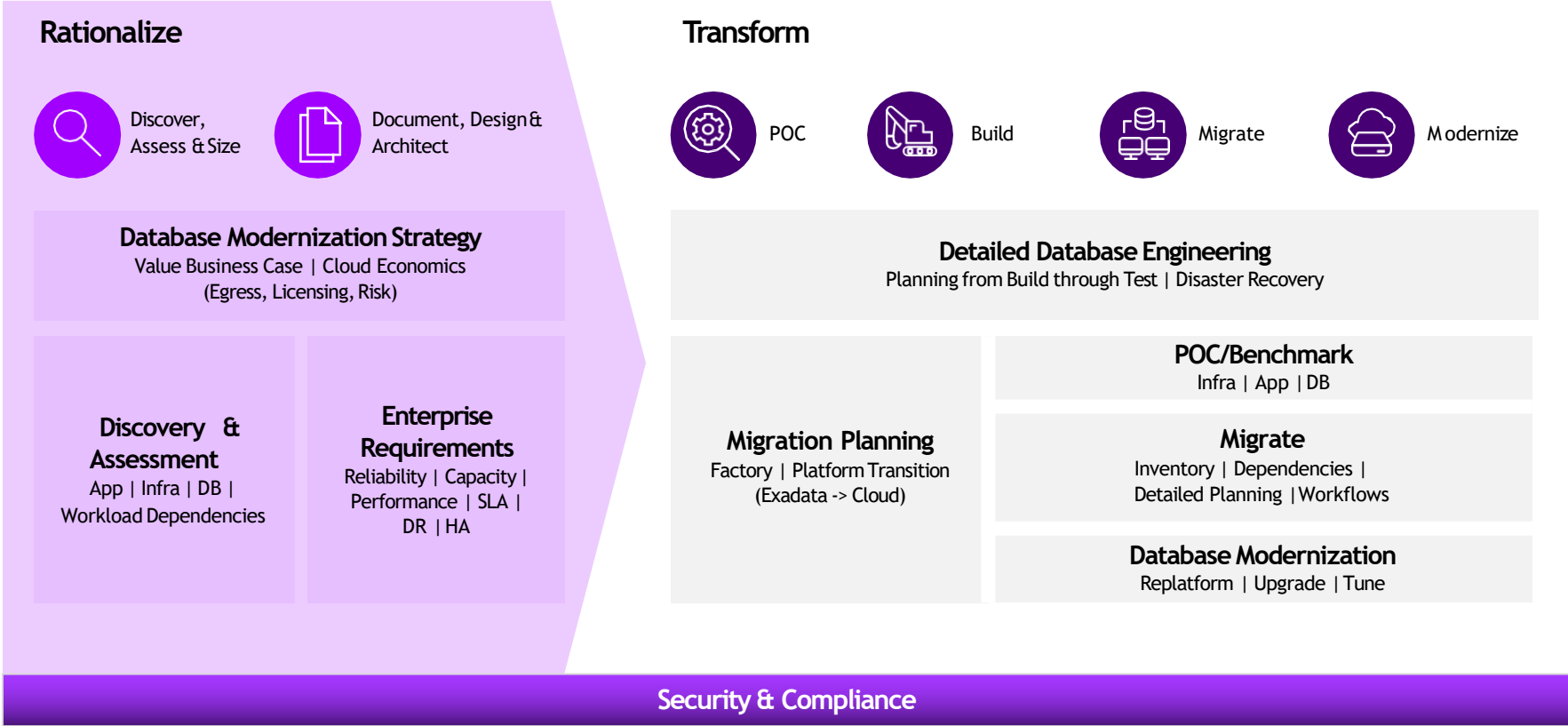
Relational
**Amazon Aurora &
Amazon RDS**
Lift and shift, ERP, CRM, finance

Key-value
Amazon DynamoDB
Real-time bidding, shopping cart, social, product catalog

Document
Amazon DocumentDB
Content management, personalization, mobile

In-memory
**Amazon ElastiCache &
Amazon MemoryDB**
Leaderboards real-time analytics, caching

Wide-column
Amazon Keyspaces
low-latency applications, run Cassandra workloads on AWS

Time-series
Amazon Timestream
IoT applications, event tracking

Ledger
Amazon QLDB
Systems of record, supply chain, health care, registrations, financial

Graph
Amazon Neptune
Fraud detection, social networking, recommendation engine

Data lake

AWS managed databases

Migration patterns

As with any migration to a new platform or ecosystem, there is always a technical debt associated with moving applications or databases to the next phase. Partners like AWS and Accenture bring their vast experience with migrating hundreds of clients. As a strategic partner, Accenture provides tools to predict the migration timeline, sizing, and performance on the target platform.

The planning and execution phase is critical when selecting tooling for a migration. To help clients during this key period, Accenture relies on assessment tools and discovery discussions with customers. Armed with information, it develops and designs a tailored solution backed by historical patterns. Accenture's database practice, the Accenture Enkitec Group, provides experience and expertise through a proven methodology to enable its customers' journey to AWS.

Database platforms and engineering

Rationalize

Discover, Assess & Size

Document, Design & Architect

Database Modernization Strategy
Value Business Case | Cloud Economics
(Egress, Licensing, Risk)

Discovery & Assessment
App | Infra | DB |
Workload Dependencies

Enterprise Requirements
Reliability | Capacity |
Performance | SLA |
DR | HA

Transform

POC   Build   Migrate   Modernize

Detailed Database Engineering
Planning from Build through Test | Disaster Recovery

Migration Planning
Factory | Platform Transition
(Exadata -> Cloud)

POC/Benchmark
Infra | App | DB

Migrate
Inventory | Dependencies |
Detailed Planning | Workflows

Database Modernization
Replatform | Upgrade | Tune

Security & Compliance

Database health check services

Provided by Accenture Enkitec Group

What? Multidimensional review of an Oracle database

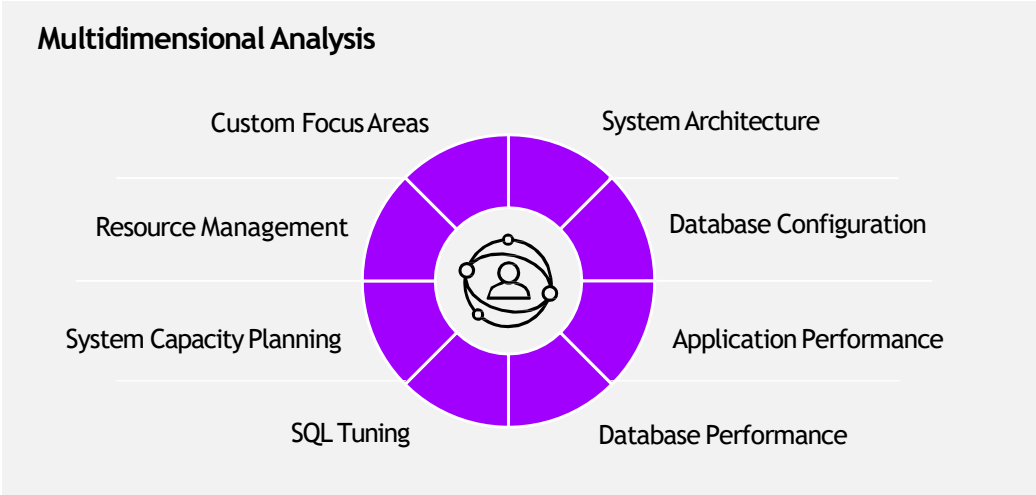**Why?** Usually as a preparation for an upgrade or re-platform

How? Identifying concerns and opportunities

Deliverable? Report with findings and recommendations

Diagnostic Tools

edb360	ash	os stats
orachk	addm	traces
awr	alert log	sqld360

Multidimensional Analysis

- Custom Focus Areas
- System Architecture
- Resource Management
- Database Configuration
- System Capacity Planning
- Application Performance
- SQL Tuning
- Database Performance

Health Check Process

Diagnostic Collection: Edb360, Orachk, ...	Accenture Enkitec Group: Expert Analysis	Accenture Enkitec Group: Report Preparation	Present Findings And Recommendations

Collection (1-3 Days)	Health Check Expert Analysis And Report Preparation (1-3 Weeks)	Presentation (1-2 Hours)

The approach is data-driven and uses proven in-house tools specifically developed to migrate to AWS services. With AWS and Accenture tools, you can be sure that your future platform is properly sized, whether it is rehosted, replatformed, or refactored.

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When migrating database platforms to AWS, we typically see the following three common patterns: rehost, replatform, and refactor

1 Rehost

Typically, existing databases running on x86 platforms can be migrated with minimal changes and without much effort to modernize infrastructure. This is commonly referred to as "lift and shift." If the application and database, such as Oracle database workloads, are in scope, the fastest path to the cloud is a rehosting approach. We use sizing tools like eDB360, Enkitec Sizing and Provisioning (ESP), and eLicense 360 to help with capacity planning for AWS database workloads and the license impact. Accenture tools precisely calculate which AWS shape and size are required to maintain business SLA and uptime.

2 Replatform

Our typical approach uses Amazon Relational Database Service (Amazon RDS), which works for most workloads. However in some complex scenarios, we recommend Amazon Elastic Compute Cloud (Amazon EC2) for apps that are not certified on Amazon RDS or are running legacy versions of database software. Replatforming is also needed when the source database is running on operating systems like AIX, Sun, or Solaris. Replatforming is slightly more challenging, and we use native database tools in conjunction with AWS Database Migration Service (AWS DMS) tools to migrate the data onto the target AWS platform. Accenture tools like EDB360, ESP, and eCompare ensure there is no data loss and that performance is identical to or better than on premises.

3 Refactor

Refactoring occurs when an application reaches its end-of-life and requires feature enhancements or a transfer to another platform to reduce costs and improve performance. One example is a migration from Oracle to Amazon Aurora PostgreSQL, which requires refactoring code. When customers have limited time, they typically migrate using a two-phased approach:

- Phase 1: Rehost as-is or with limited changes to AWS. This allows them to continue business operations without major disruptions.
- Phase 2: Refactor in the cloud after Phase 1 is complete. Then migrate the features of core applications in manageable chunks with limited or no interruptions.

Database migration should be carefully evaluated when migrating to a target platform. In our experience, reviewing migration timelines along with workload or database complexities will dictate the migration methods. If you have limited time, we recommend migrating to the cloud with minimal changes first and refactoring afterwards.

Migration challenges

The following are the common migration challenges we see when migrating to the cloud:

- Skills gaps and reluctance to adopt cloud-native features
- Suboptimal architecture design and migration strategy
- Complex database migrations needing additional optimization when moving from systems like Oracle Exadata
- Large number of applications with complex interdependencies
- Latency and throughput when infrastructure spans multiple geographies and isolated location

With any migration, there are several crucial factors for the database migration to be successful:

- Organizational and operational readiness, including addressing any skills or operational gaps
- Creating a business case and total cost of ownership (TCO) analysis for migrating to AWS
- Right sizing the target platform with actual utilization data instead of assumption-based sizing
- Security boundaries and data protection in the cloud
- Cost management of workloads in the cloud

Operational readiness

Maintaining, monitoring, and optimizing IT system behavior is an essential part of operational readiness. When AWS handles the undifferentiated heavy lifting tasks—such as provisioning the database, managing backup and recovery tasks, managing security patches, minor Oracle version upgrades, and storage—customers can focus on their business and applications. With AWS database services, customers can significantly lower operating costs and reduce unplanned downtime, resulting in more productive database administrators and development teams. For more information, see this IDC study, which shows how organizations can boost IT staff productivity and mitigate operational risks by deploying AWS managed databases.

Power of Accenture and AWS together

Accenture and AWS offer proven experience and hundreds of successful customer migrations to enable their customers' journey to the cloud. Accenture's proprietary tools for assessing database workloads, proven migration methodology, and tight collaboration with AWS teams ensure a timely and successful migration. Accenture Enkitec Group is comprised of database subject matter experts (SMEs) with years of domain and industry experience.

Accenture is committed to continuous investment in this practice, across people, tooling, and processes. It continues to raise the bar and deliver innovative solutions and successful outcomes to customers. This commitment as well as Accenture's own IP for migration acceleration and solutions are key differentiators we offer in a migration partner.

Transformation and migration benefits

The benefits customers typically realize after migrating their databases to AWS include:

- Lowered administration responsibilities
- Increased scalability
- Greater availability and durability
- Improved manageability
- Better cost-effectiveness
- Enhanced security

Case studies

Finance and Insurance Company: Migration from on-premises Oracle and SQL Server to Amazon RDS

The client is one of the largest finance and insurance companies in North America. Its legacy infrastructure, datacenter costs, and physical infrastructure maintenance were consuming a large part of its IT budget.

This client decided to modernize its applications and infrastructure by migrating to AWS. Amazon RDS was the preferred choice for both Oracle and SQL Server.

Its database portfolio was huge, with hundreds of SQL Server and Oracle databases. The overall data migrated was close to one petabyte. As soon as this client migrated its database to Amazon RDS, it started realizing a reduction in its day-to-day operations.

Energy Provider: Migration from on-premises Oracle to Amazon RDS for Oracle and Amazon EC2

The client is one of the major energy providers for Northern Texas. It faced unique challenges with its IT environment, given how its current architecture was running Oracle workloads on an on-premises hypervisor. It also experienced high operational costs associated with on-premises hardware and database licensing.

This client migrated to AWS using Amazon RDS and Amazon EC2 as a target platform for all its Oracle workloads. The Accenture team produced a target system with measurements provided by its sizing tools, using the source database to determine the right size of the target database. The migration patterns were mainly lift and shift into AWS offerings with native AWS and Oracle tools, such as AWS DMS and Oracle Data Guard.

Overall, over 100 databases were migrated to AWS over 8–12 months. As a result, the client greatly reduced operational costs after it migrated to AWS and retired its legacy hardware.

Financial Services Institution: Migration from on-premises Oracle RAC to Amazon Aurora

The client is a renowned financial services company specializing in retail services. Changes driven by consumers and technology, along with new competition, are increasing the pressure on the global banking sector. The client wanted to minimize licensing costs, starting with a proof-of-concept (POC) migration from Oracle Real Application Clusters (RAC) to Amazon Aurora. At the time, the client's source database was running on a two-node Oracle RAC with Oracle GoldenGate bidirectional replication.

This client partnered with Accenture for a phased migration approach with bidirectional replication between Amazon Aurora and its on-premises Oracle cluster. Using Aurora Multi-Availability Zone (Multi-AZ) deployment and read replica with Oracle RAC on premises, yielded high availability and horizontal scalability. Accenture successfully completed the POC, and the client achieved better performance on AWS compared with on premises.

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Key lessons

The following are some key lessons learned from successful migrations, such as those discussed in the case studies above, as well as hundreds more:

- Partnering with a top-quality solution integrator with deep expertise can ensure a successful and timely migration in a single attempt

- Using AWS managed databases can reduce running costs and eliminate infrastructure, system administration, and physical database administration tasks

- Performance, security, and reliability need to be prioritized when completing end-to-end architecture design and sizing

- Using cloud automation deployment tools ensures a secure, consistent quality build

- Network latency is a critical factor in cloud architecture, especially in hybrid deployments

- Migration of highly integrated environments needs detailed planning with all relevant stakeholders

Summary

A successful database migration to the cloud is no small undertaking. There can be multiple complexities and challenges, ranging from understanding legacy technologies to selecting the right service for the right use case in a future state. By working with Accenture and AWS, customers can take advantage of the combined expertise and experience of both organizations and minimize risk, time, and effort when migrating their databases to AWS. They can also use optimal services and cloud-native technologies to enable their organizations to innovate and grow.

Regardless of use case, industry, or perceived complexity, Accenture and AWS can help customers assess their current landscape, identify an optimal future state on AWS, and develop and execute a migration strategy. Partnering with Accenture and AWS helps to ensure that their business takes full advantage of all the benefits of the AWS Cloud as soon as possible.

References

* Gartner. 2022. "Gartner Forecasts Worldwide Public Cloud End-User Spending to Reach Nearly $600 Billion in 2023."

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