DP-300 Case Study (Participant Edition)

Module Focus: Monitoring & Optimizing Operational Resources + Query Performance in Azure SQL

> **Trainer Note for Participants**
> This is a **trainer-designed case study** intended to simulate a real production issue in Azure SQL.
> There are **no answers or hints** in this document. You are expected to analyze symptoms, correlate metrics, and design solutions using DP-300 concepts.

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1. Organization Context

ContosoPay Services is a digital payments platform processing UPI, card, and wallet transactions across India.

- Average Transactions per Day: ~6 million
- Peak Transactions per Hour: ~900,000
- Data Type: Financial transactions + customer identifiers
- Platform Availability Requirement: Very High

The company recently moved its core transactional database to Azure.

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2. Azure SQL Environment

- Azure SQL Database (Single Database)
- Service Tier: General Purpose
- Compute Model: Provisioned
- vCores: 8
- Storage: 2 TB
- Zone Redundancy: Disabled

The database supports: - OLTP workloads - Real-time reporting dashboards - Fraud detection queries

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3. Business Expectations

The business expects the database platform to:

- Maintain consistent performance during peak hours
- Scale predictably during transaction spikes
- Provide visibility into performance issues
- Detect and alert on problems proactively
- Ensure queries complete within acceptable SLAs

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4. Situation After Production Usage

Within one month of go-live, several operational issues are reported.

You are assigned as the **Azure SQL Administrator** to investigate and optimize the system.

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5. Observed Operational Issues

5.1 Resource Utilization Symptoms

- CPU usage frequently reaches **85–95%** during peak hours
- DTU/vCore metrics show sustained pressure rather than spikes
- Memory utilization remains consistently high
- Storage I/O latency increases during reporting hours

5.2 Query Performance Symptoms

- Some queries that previously ran in milliseconds now take several seconds
- The same query shows inconsistent execution times
- Blocking is observed during high write activity
- Long-running SELECT queries impact transaction throughput

5.3 Monitoring Gaps

- No alerts were triggered before performance degradation
- Operations team reacts only after application timeouts
- No baseline metrics were captured after go-live
- Limited visibility into top resource-consuming queries

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6. Your Assignment

Analyze the environment and propose a solution that addresses **both monitoring and query optimization**.

Task 1 – Monitor Operational Resources

Design a monitoring approach that enables you to:

- Track CPU, memory, storage, and I/O utilization
- Identify sustained vs transient resource pressure
- Detect abnormal behavior before user impact
- Correlate Azure metrics with database activity

Task 2 – Diagnose Resource Bottlenecks

Based on the symptoms, determine:

- Which resources are likely causing performance degradation
- Whether the issue is under-provisioning, inefficient usage, or both
- How you would confirm your hypothesis using Azure SQL tools

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Task 3 – Optimize Query Performance

Design a query optimization strategy that addresses:

- Identification of slow and expensive queries
- Execution plan regression and variability
- Blocking caused by read and write workloads
- Index efficiency and maintenance

Task 4 – Continuous Optimization Strategy

Propose an ongoing optimization approach that:

- Continuously captures performance insights
- Automatically recommends improvements where possible
- Minimizes manual intervention
- Aligns with Azure SQL best practices

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7. Constraints

You must work within the following constraints:

- No immediate application code changes
- Minimal downtime allowed
- Azure-native tools only
- Solution must be realistic and exam-aligned

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8. Discussion Expectations

Be prepared to:

- Justify every monitoring and tuning decision
- Explain why alternative approaches were not chosen
- Map your approach to DP-300 exam objectives

End of Case Study – Participant Edition