DP-300 Mega Case Study – Trainer Edition

Enterprise-Scale Monitoring, Performance, and Operational Optimization in Azure SQL

Trainer Usage Instructions
This document contains the **FULL case study exactly as participants see it**, with **Trainer Answer Keys placed immediately after each participant task**.
Use this live: pause at each task, collect answers, then reveal the trainer notes.

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1. Organization Background

Helios One Commerce Platform (HOCP) is a multi-tenant B2C and B2B commerce ecosystem operating across India, the Middle East, and Southeast Asia.

HOCP supports: - Online retail transactions - Vendor onboarding and settlements - Real-time inventory synchronization - Internal analytics and forecasting

The platform operates 24×7 and experiences extreme load variability.

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2. Business and Technical Expectations

- High availability during peak traffic
- Early detection of performance degradation
- Consistent query performance at scale
- Reduced operational overhead
- Predictable and justified cloud costs

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3. Azure SQL Architecture (Summary)

- Azure SQL Managed Instance (Business Critical) – OLTP
- Azure SQL Database Elastic Pool – Reporting
- Azure Monitor + Log Analytics

SECTION A – Monitoring Complexity and Blind Spots

Observed Metrics

- MI average CPU ~60%, spikes to 95%
- Memory usage consistently high
- Storage latency increases unpredictably
- Elastic pool metrics appear healthy

❓ Participant Task A

Design a monitoring strategy that distinguishes normal vs abnormal behavior and detects slow degradation.

✅Trainer Answer Key A

Expected solution elements:

- Use **Azure Monitor metrics** at multiple levels (MI, elastic pool, individual databases)
- Track sustained thresholds, not spikes
- Establish **baselines** using historical metrics
- Correlate CPU, IO, memory with workload timing
- Use Log Analytics / Azure SQL Insights for trend analysis

DP-300 Concepts Tested: - Metrics vs logs - Baseline-driven monitoring - Proactive alerting

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SECTION B – Query Performance at Scale

Observed Symptoms

- Exponential query slowdown
- Same query, multiple plans
- Query Store bloated
- Plan forcing reverted earlier

❓ Participant Task B

Explain how Query Store, execution plans, and statistics should be used together to stabilize performance.

✅Trainer Answer Key B

Expected reasoning:

- Query Store is primary tool to identify regressed queries
- Multiple plans indicate parameter sensitivity or stats issues
- Inconsistent statistics cause poor plan selection
- Controlled plan forcing after root-cause analysis
- Regular statistics updates and index maintenance

DP-300 Concepts Tested: - Query Store - Plan regression - Statistics management

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SECTION C – Read vs Write Contention

Observed Symptoms

- OLTP latency increases during reporting
- Blocking occurs despite read scale-out

❓ Participant Task C

Why did read scale-out not eliminate contention, and what should be changed?

✅Trainer Answer Key C

Expected reasoning:

- Read scale-out only offloads readable workloads
- Poor query design causes shared resource contention
- Index scans consume CPU and IO
- Reporting workload should be isolated or optimized

DP-300 Concepts Tested: - Read replicas - Concurrency vs resource contention

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SECTION D – Elastic Pool Paradoxes

Observed Symptoms

- Pool CPU ~50%
- Individual DB throttling
- Scaling increases cost, not stability

❓ Participant Task D

Explain elastic pool governance and noisy-neighbor behavior.

✅ Trainer Answer Key D

Expected explanation:

- Pool-level metrics hide per-database pressure
- Noisy neighbors monopolize resources
- Database-level monitoring required
- Workload isolation or pool restructuring

DP-300 Concepts Tested: - Elastic pool resource governance - Cost-performance tradeoffs

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SECTION E – Automatic vs Manual Optimization

Observed Situation

- Manual tuning weekly
- Automatic tuning disabled

❓ Participant Task E

Design a safe automatic tuning adoption strategy.

✅ Trainer Answer Key E

Expected approach:

- Enable automatic index create/drop
- Monitor recommendations before enforcing
- Use rollback safety built into Azure SQL
- Combine with Query Store insights

DP-300 Concepts Tested: - Automatic tuning - Intelligent performance

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SECTION F – Long-Term Operational Strategy

Strategic Challenges

- Rapid data growth
- Fixed DBA capacity

• Increasing incidents

❓ Participant Task F

Design a scalable long-term operational model.

✅ Trainer Answer Key F

Expected strategy:

- Proactive monitoring and baselines
- Automatic tuning and insights
- Periodic architecture review
- Optimize before scaling
- Cost-aware capacity planning

DP-300 Concepts Tested: - Operational excellence - Continuous optimization

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Trainer Wrap-Up Notes

This mega case tests: - End-to-end Azure SQL operational thinking - DP-300 exam-style elimination - Architecture + performance reasoning

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End of Mega Case Study – Trainer Edition