<https://www.microsoft.com/en-us/sql-server/blog/2014/05/05/azure-sql-database-service-tiers-performance-qa/#:~:text=Learn%20more%20about%20SQL%20Database,across%20the%20different%20performance%20levels>?

There are six performance levels across the Basic, Standard, and Premium service tiers. The performance levels are Basic, S1, S2, P1, P2, and P3. Each performance level delivers a set of resources required to run lightweight to heavy-weight database workloads.

Database Throughput Unit (DTU). A DTU represents the power of the database engine as a blended measure of CPU, memory, and read and write rates.

Basic: 1 DTU S1: 5 DTU P1: 100 DTU  
S2: 25 DTU P2: 200 DTU  
 P3: 800 DTU

published Microsoft benchmark a cloud analog of [TPC-C](http://www.tpc.org/tpcc/) transaction rates

|  |  |  |
| --- | --- | --- |
| Basic | Standard | Premium |
| Basic: 3,467/hour | S1: 283/minute S2: 1,470/minute | P1: 98/second P2: 192/second P3: 730/second |

<https://learn.microsoft.com/en-us/sql/dma/dma-sku-recommend-sql-db?view=sql-server-ver16>

In Azure, “SKU” stands for “Stock Keeping Unit.” SKU refers to a specific version or offering of a resource within Azure. It defines the characteristics, capabilities, features, performance levels, and pricing of various Azure resources and services like virtual machines, storage accounts, databases, and more

DTU – Database Transaction (less used Throughput) Unit a blended measure of CPU, memory, reads, and writes, and is used to determine the performance level and pricing of the database service

The vCore purchasing model used by Azure SQL Database provides several benefits over the [DTU-based purchasing model](https://learn.microsoft.com/en-us/azure/azure-sql/database/service-tiers-dtu?view=azuresql):

* Higher compute, memory, I/O, and storage limits.
* Choice of hardware configuration to better match compute and memory requirements of the workload.
* Pricing discounts for [Azure Hybrid Benefit (AHB)](https://learn.microsoft.com/en-us/azure/azure-sql/azure-hybrid-benefit?view=azuresql).
* Greater transparency in the hardware details that power the compute, that facilitates planning for migrations from on-premises deployments.
* [Reserved instance pricing](https://learn.microsoft.com/en-us/azure/azure-sql/database/reserved-capacity-overview?view=azuresql) is only available for vCore purchasing model.
* Higher scaling granularity with multiple compute sizes available.

The vCore-based purchasing model has a provisioned compute tier and a [serverless](https://learn.microsoft.com/en-us/azure/azure-sql/database/serverless-tier-overview?view=azuresql) compute tier. In the provisioned compute tier, the compute cost reflects the total compute capacity continuously provisioned for the application independent of workload activity at a fixed price per hour.

In the serverless compute tier for Azure SQL Database, compute resources are autoscaled based on workload capacity and billed for the amount of compute used, per second.

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Throughput and IOPS are interrelated but there is a subtle difference between them. Throughput is a measurement of bits or bytes per second that can be processed by a storage device. IOPS refers to the number of read/write operations per second.

<https://learn.microsoft.com/en-us/azure/azure-sql/database/business-continuity-high-availability-disaster-recover-hadr-overview?view=azuresql>

[Monitoring and performance tuning - Azure SQL Database & Azure SQL Managed Instance | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/monitor-tune-overview?view=azuresql)

[Monitor Azure SQL Database - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/monitoring-sql-database-azure-monitor?view=azuresql)

[Detectable types of query performance bottlenecks - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/identify-query-performance-issues?view=azuresql)

[Monitor performance using DMVs - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/monitoring-with-dmvs?view=azuresql)

[Monitoring Azure SQL Database with metrics and alerts - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/monitoring-metrics-alerts?view=azuresql)

Perf Tuning

[Query Performance Insight - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/query-performance-insight-use?view=azuresql)

Query Performance Insight provides intelligent query analysis for single and pooled databases. It helps identify the top resource consuming and long-running queries in your workload. This helps you find the queries to optimize to improve overall workload performance and efficiently use the resource that you are paying for. Query Performance Insight helps you spend less time troubleshooting database performance by providing:

* Deeper insight into your databases resource (DTU) consumption
* Details on top database queries by CPU, duration, and execution count (potential tuning candidates for performance improvements)
* The ability to drill down into details of a query, to view the query text and history of resource utilization
* Annotations that show performance recommendations from [database advisors](https://learn.microsoft.com/en-us/azure/azure-sql/database/database-advisor-implement-performance-recommendations?view=azuresql)

[Enable automatic tuning - Azure SQL Database & Azure SQL Managed Instance | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/automatic-tuning-enable?view=azuresql)

[Automatic tuning email notifications how-to guide - Azure SQL Database & Azure SQL Managed Instance | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/automatic-tuning-email-notifications-configure?view=azuresql)

[Apply performance recommendations - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/database-advisor-find-recommendations-portal?view=azuresql)

[Setup alerts and notifications in the Azure portal - Azure SQL Database & Azure Synapse Analytics | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/alerts-create?view=azuresql&tabs=metric)

[Database advisor performance recommendations for Azure SQL Database - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/database-advisor-implement-performance-recommendations?view=azuresql)

[Diagnose and troubleshoot high CPU - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/high-cpu-diagnose-troubleshoot?view=azuresql)

[Stream data using Azure Stream Analytics integration (preview) - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/stream-data-stream-analytics-integration?view=azuresql)

[Understand and resolve Azure SQL blocking problems - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/understand-resolve-blocking?view=azuresql)

[Analyze and prevent deadlocks - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/analyze-prevent-deadlocks?view=azuresql&tabs=ring-buffer)

[Optimized locking - SQL Server | Microsoft Learn](https://learn.microsoft.com/en-us/sql/relational-databases/performance/optimized-locking?view=azuresqldb-current&viewFallbackFrom=azuresql)

[Configure the max degree of parallelism (MAXDOP) - Azure SQL Database | Microsoft Learn](https://learn.microsoft.com/en-us/azure/azure-sql/database/configure-max-degree-of-parallelism?view=azuresql)