**IOPS (IO Per Second)**: is defined as an input/output performance measurement used to characterized computer storage devices like hard disk drives, solid-state drives, and storage area networks. They should be related or at least impact one and the other.

# vCore

This purchasing model was launched in 2017. This was initially launched as “Gen 4”, and for all intents and purposes, become synonymous with DSv2-era Azure gear. With vCore Gen 4, the customers know what they were getting. They could buy “cores” one at a time 1-10, which was a benefit over IaaS as customers could buy precisely how many computers they need.

In general, vCore is short for virtual core and it is a model that was designed to make it simpler to translate your on-premises hardware resource specs into similar specs on the Azure SQL database platform. For example, picking vCore will let you have some visibility into the actual amount of RAM that is available for you, as well as some idea of the type of processor and the speed of the processor that is being used on the hardware.

**General Purpose**

This will be the cheapest option for vCore purchasing model. This model costs you 195.21$ per vCore, and 0.14$ for the GB of storage per month. This model requires you to have at least 2 vCores with 1.3 GB of storage (307.2 MB space will be allocated for log), which will make the cheapest spec of this model to be 390.59$ per month. The pricing is based on the number of vCores, reserved storage but IOPS are not charged.

The highest price will require you to have 128 vCores, with 4077 GB of storage (1TB is allocated for logs) which will cost 28,684.40$ per month.

It fits most business workloads and offers balanced options for computing and storage with a budget in mind. It allows up to 1 replica but no read-scale replicas and zone-redundant high availability.

Price comparison (per month)

* Cheapest price: 390.59$
* Highest price: 25,687.00$

**Hyperscale**

This model will cost 219.65$ per vCore, with 0.12$ per GB of storage per month. This model will require you to have at least 2 vCores, which will make the lowest spec of this model to be 439.42$ per month. You do not need to set up the storage size, but it has an additional HA (High-Availability) Secondary Replica vCore, which can be used for simple read scale scenarios. This HA replicas are optional, but it can cost you 148.68$ per vCore if you choose them.

This is for business workloads with highly scalable storage and read-scale requirements. This model offers high resilience to failures by allowing multiple isolated database replicas. It allows zone-redundant high availability. The pricing is based on the number of vCores for each replica and used storage. IOPS are not charged but this could change in the future.

Price comparison (per month)

* Cheapest price: 1036.81$
* Highest price: 64,508.53$

**Business Critical**

The cost per vCore itself is 518.21$, with the storage costs 0.30$ per GB. This model requires you to have a minimum of 2 vCores and 1GB of storage, which will make the lowest spec on this model to cost you 1036.81$ per month. The pricing is based on the number vCores, reserved storage, and backup storage but IOPS are not charged again.

The highest spec consists of 128 vCores and 4096 GB of storage (1TB of space allocated for logs), which will have the price of 67,854.29$ per month.

This is for the business loads that need the highest resiliency to failures. This tier uses several isolated replicas and provides the highest IO performance per database per replica. It allows up to 3 replicas and +1 read-scale replica and zone redundant high availability.

Price comparison (per month)

* Cheapest price: 1036.81$
* Highest price: 67,854.29$

**SQL Server License**

All the models of the vCore have an option to choose from if you already own a SQL Server License, which can be saved with Azure Hybrid Benefit. This will provide you with a discount on the pricing, and the saving will be vary based on the region and performance tier.

**Serverless tier**

This is the one that can bridge the gap between vCore and DTU. Serverless tier allows you to pause the workload after disuse. This allows for scaling-up/down based on demand. However, this scaling is not immediate. However, this scaling is not immediate. Microsoft requires a minimum of 1 hour of inactivity before the database can be paused. This will make it lousy for production causing timeouts, but a valuable option for non-production/ testing/ research.

Below is a good indicator on when to choose vCore purchasing model:

* You want to have control over hardware resources.
* Your workload requires high resilience to failures.
* Your workload requires high IO performance.
* Your workload requires highly scalable storage.
* Must have replicas.
* You can manage a reasonable amount of unpredictable monthly costs.

# DTU (Database Transaction Unit)

This model was the first to be introduced by Azure SQL DB (DTU-only) in around 2013.

The DTU itself is a measure. It is a blended measure of CPU, memory, data IO, and transaction IO. With the DTU purchasing model, the data max size (in GB) will not affect the pricing, unlike its counterpart, the vCore purchasing model.

The range of DTUs can reach from 5 on the low end to 4,000 on the high end. The main characteristic of this model is that everything is fixed.

**Basic**

With the basic service tier, the cost per month of this database will be a fixed amount of 4.90$. This tier has the fixed amount of 5 DTUs (min and max), each DTU costs 0.95, which will make it

**Standard**

The standard tier requires you to have a minimum of 10 DTUs, each DTU costs 1.47, which will make the estimated cost per month 14.72$.

In general, the following list is a good indication of necessary information when choosing DTU purchasing model:

* If you want to have a predictable, fixed monthly cost.
* You have no need to control the hardware resources.
* Your workload does not require high resilience to failures, IO performances, or scalable storage.

# Backup Storage Redundancy

# Conclusion

In conclusion, for the app that I am making it is best to use the basic tier of DTU, as it has a fixed cost of 4.9$. Seeing the nature of this project, if QICT plans to continue, which is to show this app as a template to potential customers, it is recommended that QICT sticks to the DTU purchasing model for the database of this application. DTU’ advantage is fractional compute. The application will not ever need a whole CPU core, but keep in mind that low DTU amounts do have some mild functional limitations. This is advantageous, for the app will only use a low volume, underutilized (perhaps even quasi-legacy) database that it needs to keep online for occasional reference to the company’s table.

Below is the conclusion between the DTU and vCore purchasing models:

DTU purchasing model has an advantage in simplicity, and for just getting started with Azure SQL database. It offers more options at the lower end of performance, and it starts at a lower point than with vCore. It computes resources into a single, easier-to-manage unit of measure that is billed at a fixed monthly price, however, it does not allow for hardware generation selection or fine-tune the compute resources needed for a workload. DTU remains competitive as you assign very small fractions of computers with very high amounts of storage both possible and included, especially with the low computer commitment.

If the company already has software assurance with Microsoft and is familiar with how that works, there are some advantages using vCore. It offers great flexibility for computing resources and hardware generation as well as higher limits, scalability, and resilience to failures. If you have been using the DTS database and the utilization has increased above 100 DTU and if you already have a better understanding of your workload, then this approach might be more applicable and understandable. Furthermore, there is the Serverless function which is great for a workload to go dormant without consequences.