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There are **several ways to migrate an on-premises SQL Server to Microsoft Azure**, depending on your **business needs, downtime tolerance, and target platform**. Below is a **detailed, point-wise list** of the major migration options:

🔄 1. Azure SQL Database (PaaS) Migration

Azure SQL Database is a fully managed Platform-as-a-Service offering.

✅ Ways to migrate:

1.1 Using Azure Data Migration Assistant (DMA) + Azure Database Migration Service (DMS)

- Analyze schema and data for compatibility using **DMA**
- Use **Azure DMS** to move schema and data with **minimal downtime**
- Supports **online** (minimal downtime) and **offline** (long downtime) modes
- Suitable for: **Production workloads**, **modern applications**

1.2 BACPAC Export/Import

- Export database as **.bacpac** (schema + data)
- Import into **Azure SQL Database** using Azure Portal or SSMS
- Good for **smaller databases**, **non-critical systems**
- **Downtime required**

🖥️ 2. Azure SQL Managed Instance (PaaS) Migration

Managed Instance supports most on-prem features like SQL Agent, cross-database queries, etc.

✅ Ways to migrate:

2.1 Azure DMS (Online/Offline Migration)

- Supports **lift-and-shift** with minimal application changes
- Full database backup and restore support (to blob storage)
- Use **log shipping** for minimal downtime (online mode)

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2.2 Native Backup and Restore

- Take **.bak** backup and upload to Azure Blob Storage
- Use **RESTORE DATABASE FROM URL** on Managed Instance
- No need for Azure DMS
- Suitable for **medium downtime** scenarios

🖥️ 3. Azure SQL Server on Azure VM (IaaS)

This is Infrastructure-as-a-Service; SQL Server runs on an Azure Virtual Machine.

✅ Ways to migrate:

3.1 Backup and Restore

- Take full backup (.bak) and move to Azure VM via **Azure Blob Storage** or **File Share**
- Restore using SSMS
- Manual and **flexible** option

3.2 Detach and Attach

- Detach `.mdf` and `.ldf` files
- Copy files to Azure VM and attach the database
- Requires downtime
- Suitable for non-critical systems

3.3 Log Shipping / Database Mirroring

- Configure log shipping or mirroring to Azure VM
- Use **manual or automated failover**
- Low downtime migration technique

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3.4 Always On Availability Groups

- Extend **AG** to Azure VM as secondary replica
- Failover to Azure when ready
- Requires **Windows Failover Cluster + Domain**

3.5 Replication-Based Migration

- Setup replication (transactional) to Azure VM
- Cutover once synchronized
- **Low downtime**

☁️ 4. Hybrid or Staged Migrations

These involve intermediate steps or use hybrid tools.

✅ Ways to migrate:

4.1 Azure Arc-enabled SQL Server

- Use Arc for governance before full migration
- Useful for hybrid/multi-cloud strategies

4.2 SQL Server to Azure Synapse Link

- For **analytic workloads** (not transactional)
- Sync on-prem data to **Azure Synapse**

4.3 Third-Party Tools

- Tools like **Redgate**, **Quest**, **DBConvert**, **CloudEndure**
- Might offer **advanced scheduling**, automation, rollback

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✅ Summary Table of Migration Options

Target Platform	Migration Method	Downtime	Best For
Azure SQL Database	DMA + DMS, BACPAC	Low–High	Lightweight apps, modern apps
Azure SQL Managed Instance	DMS, Backup/Restore, Log Shipping	Low–Medium	Lift-and-shift with minimal changes
Azure VM (SQL Server)	Backup/Restore, AG, Replication, Mirroring	Low–Medium	Full control, legacy compatibility
Azure Synapse	Synapse Link, Data Factory	N/A (sync)	Analytics/Reporting
Hybrid	Azure Arc, Hybrid Tools	Varies	Staged cloud migration or multi-cloud setup

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