Cloud Computing

Data Storage in the Cloud

- Cloud based data storage
- Advantages / disadvantages of cloud storage
- Cloud-based backup
- Cloud database and block storage

Cloud Computing

Next: Cloud-based Data Storage

Cloud Based Data Storage

- Cloud storage is the next step in the evolution of network storage devices.
- Instead of storing the data locally, the data can be stored on cloud and can be accessed through web.
- The user can have virtually unlimited storage space available at affordable rates.

Cloud Based Data Storage

There are various modes of data access in Cloud:

- Using web browser interfaces to move the files to and from the cloud storage.
- Through a mounted disk drive that appears local to the user's computer.
- Through API calls to access the cloud storage.

Cloud Based Data Storage

There are a number of cloud storage providers which offer file storage, sharing and synchronization. Such as:

- Dropbox
- OneDrive
- Google Drive
- Carbonite
- pCloud

- These providers offer a certain volume of free storage as well as paid storage at low prices.

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Cloud Storage - Advantages and Disadvantages

Data Storage in Clouds: Advantages & Disadvantages

Advantages:

- Scalability: The user can scale the storage capacity (up or down) according to requirement.
- Various convenient costing models are available from one time payment to monthly payment to pay as per use.
- Reliability: The storage providers provide the assurance for data reliability (through replication).
- The data can be accessed worldwide by using Internet.
- Various methods of data access are available (as discussed before).

Data Storage in Clouds: Advantages & Disadvantages

- Disadvantages:
  - Performance: Because of the Internet based access, the cloud storage can never be as fast as SAN or NAS based local storage.
  - Security: Not all the users may be able to trust the cloud provider for the users' data.
  - Data orphans: The user has to trust the data deletion policies of the provider. The files (on cloud storage) deleted by the user may not be immediately (or ever) be deleted from the cloud storage.

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Cloud-based Backup Systems

Cloud Based Backup Systems

- The term *backup* refers to the copying of (data and/or database) files to a secondary site for preservation in case of device or software failures.
- Backup is an important part of disaster recovery plan. In case of a disaster, the data can be restored to the state of last backup.

Cloud Based Backup Systems

- **Cloud based backup system** comprises of procedures to send the copy of data over a proprietary or public network to a remote server hosted by the cloud service provider.

- The provider charges the user according to number of accesses or data volume or number of users

- Cloud based backup or online backup system is implemented through a client software installed on the user's computer. The software collects, compresses and sends the data to cloud backup on timely basis.

Cloud Based Backup Systems

Advantages:

- The data is backed up in encrypted form.
- Backup can be performed on the convenience of user (daily, weekly, monthly).
- The user can easily retrieve the backup files from the cloud.

Disadvantages / Limitations:

- Due to security concerns, the critical data backup is preferably stored on local storage.
- The long term data storage in heavy volume over cloud may have humongous cost.
- Due to network cost, the incremental backup is preferred.

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Cloud database and block storage

Cloud Database and Block Storage

- A Cloud database is a database that resides on Cloud platform.
- The Cloud database can be accessed by:
  - The applications hosted on Cloud
  - The application hosted locally (can access through Internet)

Cloud Database and Block Storage

- The cloud database is provisioned in either of the following methods:
  - Installed on a rented VM by the user
  - As part of PaaS
  - Provided as a service by cloud provider or the database companies.

Cloud Database and Block Storage

Advantages of Cloud based Database solutions:

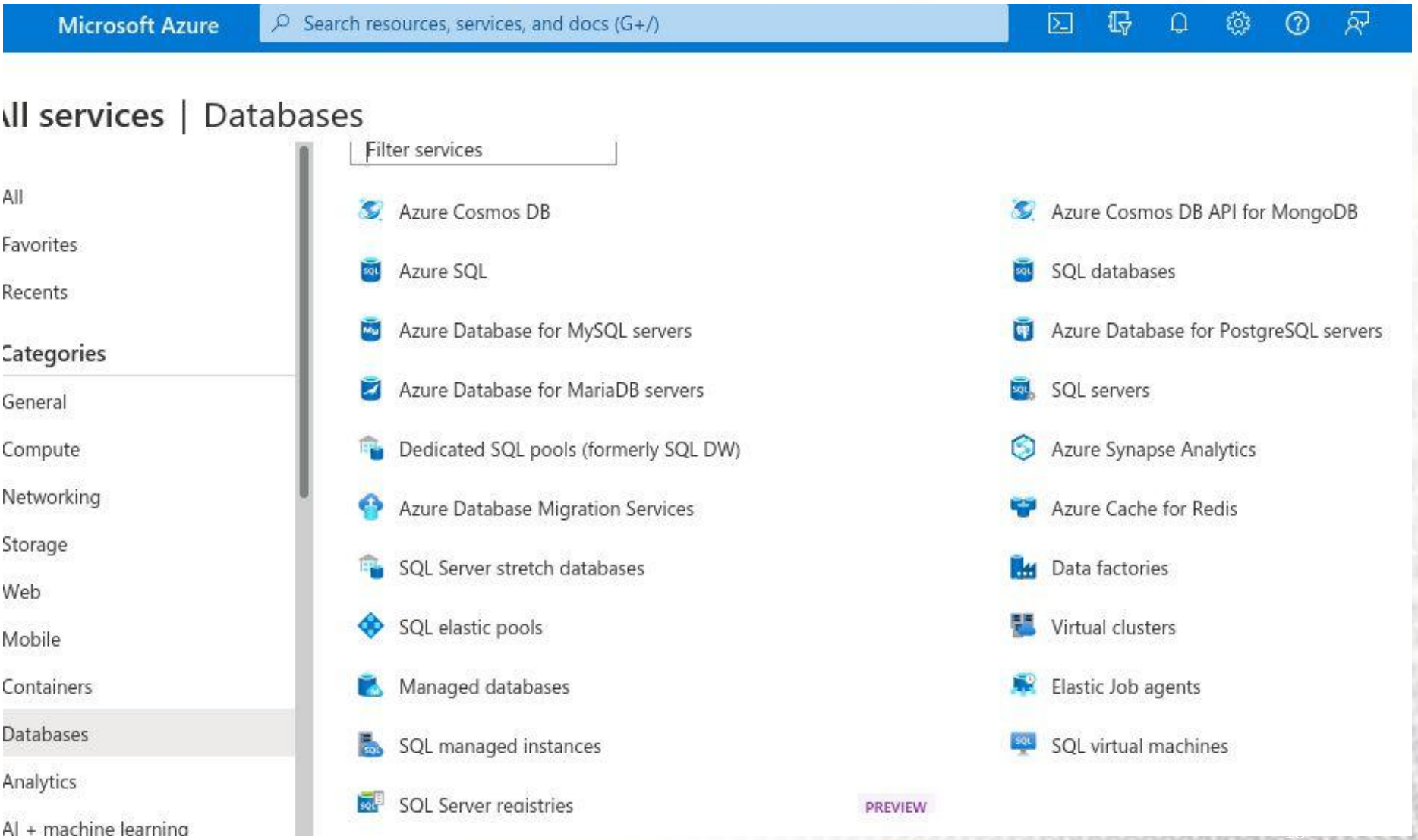
- Cost effective scalability as per use
- High availability of database software through redundant hardware (minimizes the downtime in case of failure)
- High availability of data due to replication of database
- Reduced administration of database provided as service or as part of PaaS.

Disadvantages of Cloud based database solutions:

- The user may not trust the cloud provider regarding sensitive data
- Due to Internet based access, the Cloud based database is not as fast as a locally installed database.

Cloud Database and Block Storage

- There are a number of cloud based database providers such as:
  - Oracle
  - Amazon
  - Microsoft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Analytics
AI + machine learning
Azure Cosmos DB
Azure SQL
Azure Database for MySQL servers
Azure Database for MariaDB servers
Dedicated SQL pools (formerly SQL DW)
Azure Database Migration Services
SQL Server stretch databases
SQL elastic pools
Managed databases
SQL managed instances
SQL Server registries
PREVIEW
Azure Cosmos DB API for MongoDB
SQL databases
Azure Database for PostgreSQL servers
SQL servers
Azure Synapse Analytics
Azure Cache for Redis
Data factories
Virtual clusters
Elastic Job agents
SQL virtual machines

Cloud Database and Block Storage

Block Storage

- Cloud based block storage is a sequence of bits and provided as a block on cloud storage.
- It is suitable in the following situations:
  - When the data may not map properly on a file system or on a database
  - The application developer wants to store data in a customized file system

Cloud Database and Block Storage

- Amazon Elastic Block Store (EBS) is a highly available, scalable and reliable block storage solution which supports block sizes of up to 1 terabytes.