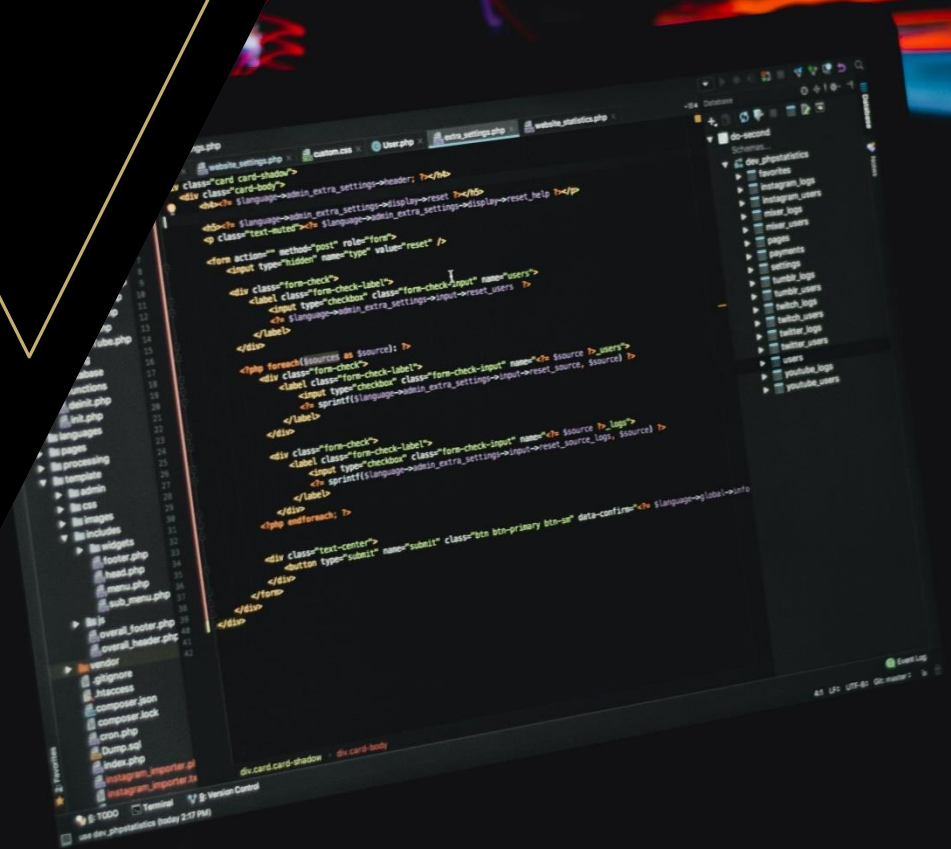


CSE 2004

DBMS ET_h Digital Assignment - 1

FALL SEMESTER 2020-21





Prof. Nancy Victor

Leveraging Cloud Computing using DBMS

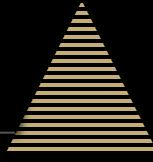
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Cloud service & DBMS: an intro



The DBMS is a software that user use to create, delete and maintain a database. Due to introduction of cloud computing, DBMS has emerged into a new type of a service having its own benefit.


A cloud database is a database that involves variety of designing, developing of hardware and software. It is a system in which variety of computers are connected through network such as internet. Traditional DBMS are not well versed to deal with the growing demands of cloud computing.

A cloud service reduces the cost and complexity of owning and operating computer networks and provide scalability, reliability and efficiency. In cloud computing the database outsourcing has become very important component nowadays.

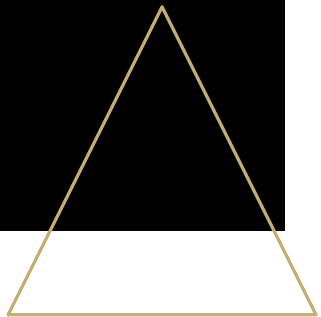
If DBMS is used as service for a larger package, it would likely be effective in its duties and cheaper in long run.



Data organization on the cloud



A cloud database is a database service built and accessed through a cloud platform. It serves many of the same functions as a traditional database with the added flexibility of cloud computing. Users install software on a cloud infrastructure to implement the database. Key features:

- A database service built and accessed through a cloud platform. Enables enterprise users to host databases without buying dedicated hardware
 - Can support relational databases (including MySQL and PostgreSQL) and NoSQL databases (including MongoDB and Apache CouchDB)
 - Can be managed by the user or offered as a service and managed by a provider
 - Accessed through a web interface or vendor-provided API
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Need of DBMS in Cloud

Challenges to cloud database:

- Internet speed
- Query and transactional workloads
- Multi-tenacity
- Elastic scalability
- Privacy

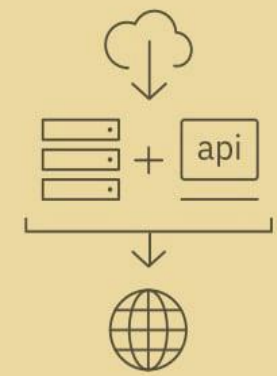
Database Management Systems as a cloud service are designed to run as a scalable, elastic service available on a cloud platform. Cloud based DBMS are structured only as a cloud offering and are not relational. For example, SQL Azure built by Microsoft is fully relational DBMS, while SQL services by Microsoft, Amazon's simple-db and Google's Big Table solution are distributed database cluster and have different persistence models.

Cloud based DBMS services are dynamic and have distributed environment with elastic resources allocation, for use in simple as well as complex transactions. Most of the currently available DBMS engines will run on cloud infrastructure, but are not specifically structured to take advantage of the cloud. This difference is the reason for the change in name from "DBMS in the Cloud" to "cloud service based on DBMS"; running on cloud infrastructure does not define a cloud service based on DBMS.

Why Cloud Databases?

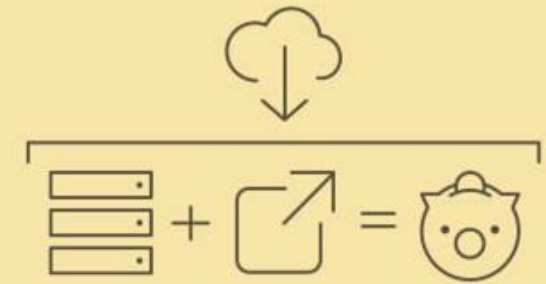
Ease of access

Users can access cloud databases from virtually anywhere, using a vendor's API or web interface.



Scalability

Cloud databases can expand their storage capacities on run-time to accommodate changing needs. Organizations only pay for what they use.



Disaster recovery

In the event of a natural disaster, equipment failure or power outage, data is kept secure through backups on remote servers.



Considerations of Cloud databases

- **Control options**

Users can opt for a virtual machine image managed like a traditional database or a provider's database as a service (DBaaS).

- **Database technology**

SQL databases are difficult to scale but very common. NoSQL databases scale more easily but do not work with some applications.

- **Security**

Most cloud database providers encrypt data and provide other security measures; organizations should research their options.

- **Maintenance**

When using a virtual machine image, one should ensure that IT staffers can maintain the underlying infrastructure.

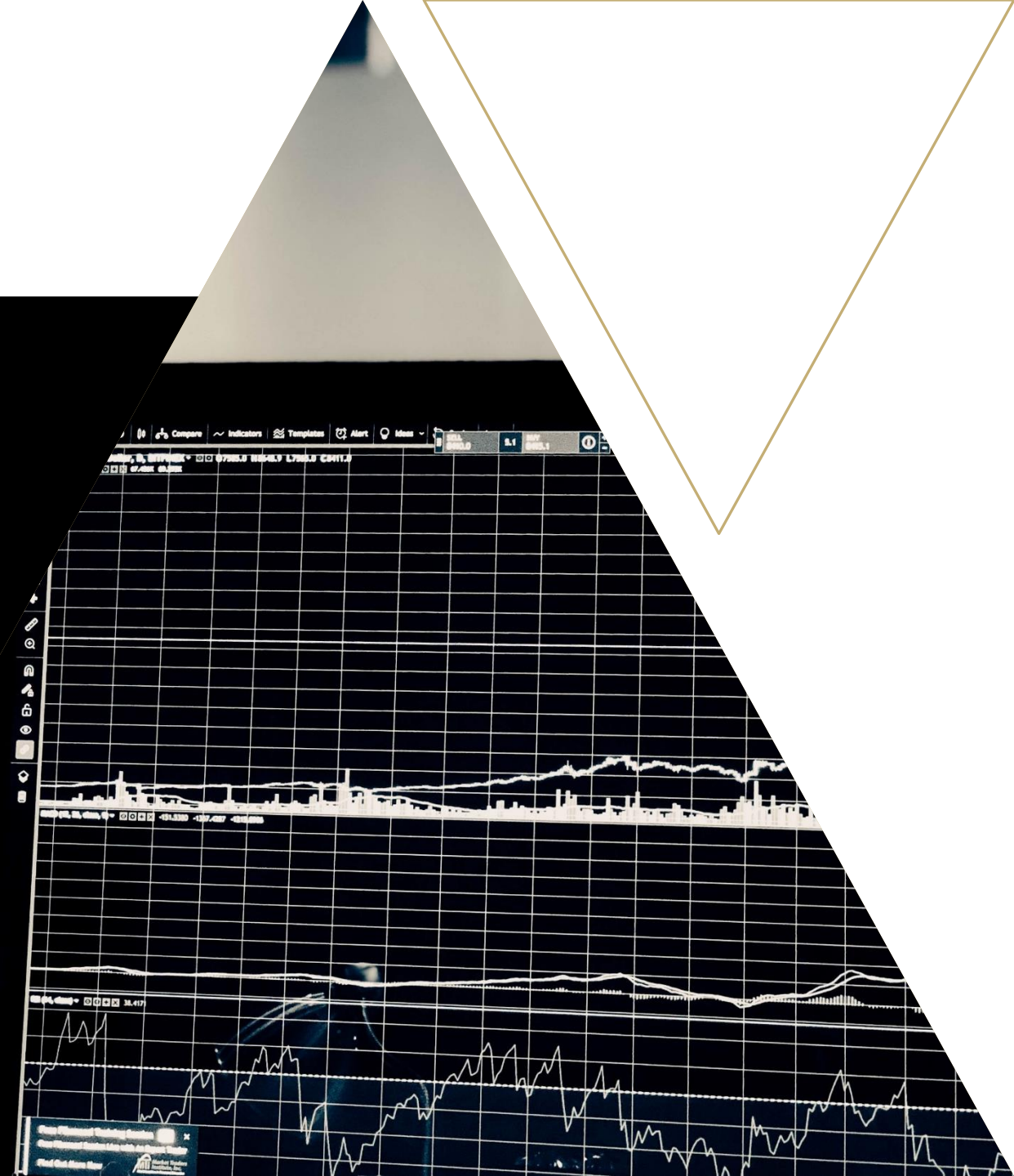


Cloud database management options

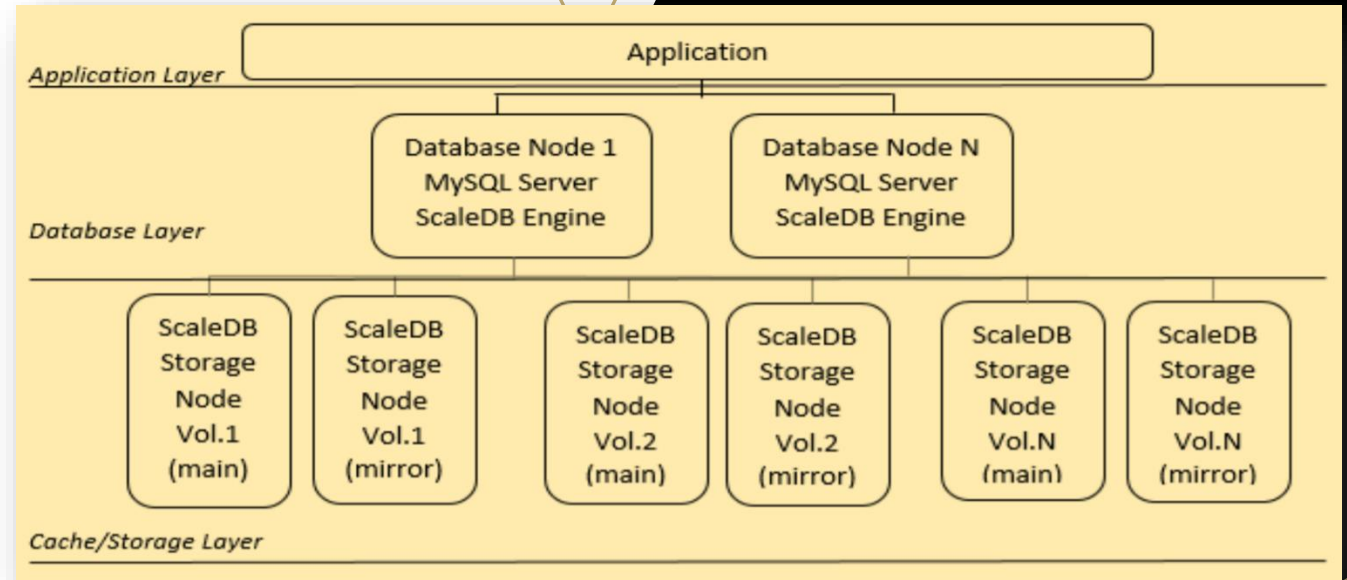
- [Microsoft Azure/SQL Database](#) – A “full featured relational database-as-a-service,” with “Tables” that offer NoSQL capabilities for storing large amounts of unstructured data, and “Blobs” (Binary Large Objects) for storing large amounts of unstructured text, video, audio and images.
- [Amazon Web Services/DynamoDB/Relational Database Service](#) – Amazon’s offerings include NoSQL, MySQL, Oracle and MS SQL Server solutions. [SimpleDB](#) is Amazon’s “highly available and flexible non-relational data store that [takes on] the work of database administration.”
- [Xeround](#) – A fully managed MySQL DBAAS that the vendor calls a “drop-in solution” because it “automates all configuration and ongoing DB operations.”
- [Google Cloud SQL/Google App Engine Datastore](#) – Google’s solutions for storing structured and unstructured data.
- [ClearDB](#) – This MySQL DBAAS boasts 100% uptime due to its “multi-regional read/write mirroring.”
- [Database.com](#) – A native cloud database service developed in house at Salesforce.com that became generally available in 2011. The vendor’s website says it was “built with the needs of a social and mobile world at its core, not as an afterthought.”

Cloud DBMS Architecture

The main focus is in SCALEDDB, which is a storage engine that is pluggable and compatible with MySQL applications & tools. SCALEDDB works on that way that nodes are clustered, & each node in the cluster has access to the entire database. On increased load, additional nodes can be added to increase the scalability and performance.



In this architecture we can see three layers, starting with Storage layer as the first layer, second layer is database layer, and the third layer is Application Layer. In the following we give description how they work. The first layer or storage layer is otherwise known as the cache layer, it is the exact place where the storage is plugged in. It may be local or in cloud, and the most important thing is the recovery of the data which is based on mirroring techniques. If the first drive crashes, the data is available in the second drive. The second layer is the database layer which is separated in multiple nodes, each node having access to the entire database. Each of these nodes works in shared architecture, they share information between them, and if we arrive in a point where the database usage increases then we can simply add new nodes without any problem. We notice that this layer is the splitter between the storage and the application layer. The third, Application layer, is the exact place where the applications are stored. It may be a web server, an application server or a load balancer. The parallelization software is placed in this layer. The three main characteristics of SCALEDDB are: it doesn't support distributed transactions, it is not an open source application, and it doesn't support stored procedures



ADVANTAGES of a cloud based DBMS:

- I. The technology has changed the way of business, and now the people use to shop over the internet and they rely on shopping for saving their time. This change in the business has let the companies think about the fastest way they can do business over the internet. There was a time when software needed to be installed to access the database of the company but now a day the employees even don't have time to install software on their computer rather they prefer to use a ready to available resources. They prefer to use the cloud database so that they can access the information stored in their database without wasting any time.
- II. The other advantage of using a cloud database is that it saves a lot of money. The company does not need to invest money in setting up their own data centers and then managing it by hiring extra staff for this purpose. Moreover, after setting up a data center, the company will need to buy the softwares as well and their maintenance is also required.

DISADVANTAGES:

- I. The companies have to pay for the usage of the cloud database as per decided. Every time the data is transferred from the database, the company will have to pay each time. If the traffic of the company for transferring data with the database is high then the company may be paying than its expectations.
- II. The other disadvantage of using a cloud database is that, we do not have a full control over the server where our database is being held. We do not have the control over the softwares installed on those computers. The client will have to rely on the provider only. The security issues can be a big problem for the companies.
- III. The data you have hosted on the cloud database is totally dependent on the service provider. The data and information about a company are the most important asset for the organization. The organizations cannot afford to lose its information about its customers and company policies. If the information is given in the wrong hands then the company or the organization may face heavy losses

ADVANTAGES:

III. The cloud database service providers of DBaaS providers also make the customer free from the tensions of making any immediate changes in the database. On the other hand, the cloud database providers also offer scalability on the peak times that does not let the performance of the company go down.

IV. Cloud computing has given the freedom to access the information from anywhere without any boundaries of getting to your personal computer at home. This makes it a very powerful technology and the companies prefer it as the customers, employees or the authorities of the companies can get the formation they want from anywhere at any time.

V. There are many other benefits of cloud database as well, that makes it the best option available to the larger organizations and companies who need to hold terabytes of data. The cloud database makes the availability of data possible anytime from anywhere.

DISADVANTAGES:

IV. As there are masses of data hosted on the cloud database so it is very difficult to transfer that data to your computer. For this purpose, internet speed must be high. On the other hand, the traditional database can transfer data at a very high speed.

V. If the client wants to switch database from one service provider to new one, then he may face problems. The reason is that each service provides use their own methods and techniques for storing data. The organization must be very careful about the selection of DBaaS provider.

VI. In case of cloud database, the data is to be fetched via internet, so if the server is down, then it may cause inability to access the data from the server. This causes huge losses when the information is not available when needed.

Leveraging Database Outsourcing

It has become easier due to the rapid advancements in a network technology:

[1]. The total cost of data management is five to ten times higher than the initial acquisition cost.

[2]. Cloud computing economics leveraging the power of multi-tenancy delivers extremely fast shared storage at a dramatically reduced cost.

[3]. It is just a matter of time before the shared disk DBMS establishes dominance in the cloud.

[4]. It is expected that this number will grow significantly in the future. An example of this is Software as a Service, which is an application that is delivered through the browser to customers



- [5]. Cloud applications connect to a database that is being run on the cloud and have varying degrees of efficiency.
- [6]. Technological advancements around transmission of data through the network have largely influenced the cost of transmitting the data per terabyte over long distances
- [7]. DBMSs have achieved progress in two comparisons dimensions, data management and data transfer.
- [8]. There is a rapidly growing interest in outsourcing DBMSs tasks to third parties that can provide these tasks for much lower cost due to economy of scale.

Conclusion

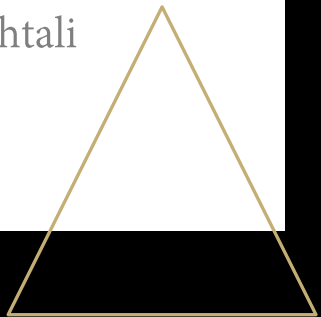
Clouds can be used with distributed database for handling large volume of data. It enhances reliability, elasticity, availability, scalability and all these capabilities are provided at low cost with enhanced performance compared to the dedicated infrastructure. Cloud services based on DBMS are gaining acceptance from vendors desiring low cost of developmental platform. It present the idea of cloud service based on DBMS.

It proposed architecture of cloud based on database management system. There are advantages and disadvantages as well; however the adoption the cloud database has proven that the advantages are more than the disadvantages.

The database services can offer more secure environments since it is in the cloud provider responsibility to keep our data secured and recoverable any time that anyone need. At last it decreases storage and network resources that are not used optimally management.



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Video presentation link:

<https://bit.ly/2Sreef5>

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