Database Foundations for Business Analytics: Upload Assignment – Database Research

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a. A database is a system which stores a collection of related information in such a way that it enables the user to interact with the data and manipulate the data by accessing, retrieving, managing, and updating it. It is a shared and integrated computer structure that stores data such as end user data, metadata etc. and it helps to describe the data characteristics and relationships between them.
It is a very important to have a well-designed database system to store the user data. A well-designed database facilitates good data management and generate accurate and valuable information. Generating accurate and correct information is important to practice good decision making hence a well-designed database will avoid problems such as difficult to trace errors etc.
(Ref. "BUAN_6320_Week_1.pptx", Prof. Ahed Saleh, BUAN 6320-SEC504-27519, University of Texas at Dallas)

b. As per research evolution of database has a spread of over 40 years from a flat file system to relational and object-relational systems, database systems have come a long way.
<u>**Flat File System:**</u> Before the database was a flat file system where data was maintained in a flat file.
<u>**Era of Hierarchical Database:**</u> In this model files are related in a parent/child manner, with each child file having at most on parent file. Rockwell and IBM created the "Information Management System" which led the mainframe database market in 70's and early 80's.
<u>**Network Data Model:**</u> In Network model files are related as owners and members, like the common network problem but here each member file can have more than one owner. IDMS was the most prominent network DBMS. Hierarchical and Network Database were in use in the same era, but one is different from the other and can be considered an evolution.
<u>**Era of Relational Database and database Management:**</u> The relational database system can be defined using two terminologies – Instance (a table with rows or columns) and a Schema (specifies a structure – name of a relation, name and type of each column)
    ->Object Oriented Database Model: It supports the modelling and creation of the data as objects.
    ->Object Relational Database Model: It spans the object and relational concepts.

Current Trends in Database Technology:

Cloud-based DBMS: As from small businesses deciding to digitize and move to cloud-based DBMS to large organizations merging their data warehouses and data lakes to the cloud, there is an accelerated growth and development is cloud-based DBMS. A lot of cloud platforms such as AWS, Google Cloud, Azure have come up providing various data management and storage services. The database storage on cloud can support structured and unstructured data management, storage and manipulation. As the market for cloud-based database drives the market the demand for on-premises systems will fall further.

(Ref. 1 https://mhaadi.wordpress.com/2010/10/18/the-evolution-of-database/;
Ref. 2 https://www.dataversity.net/database-management-trends-in-2022/)

c. Databases can typically be classified into one of the below two types:
- Single File or Flat File Database: A single file database system holds text records in single line. It has a simple structure and does not have multiple tables and relations within data sets.
  Eg: A few examples of a flat file database can be plain text (csv, txt or tsv) or binary file, plain records containing one record per line like a list of names, addresses and phone numbersetc.

- Multi-File Relational or Structured Database: A Relational Database contains data in the form of a table with rows and columns. These rows and columns can represent relationship between the data and can be represented through special key fields. The data in a structured form can be manipulated like Reading, Create, Updating and deleting the data using the special tools available in the database system.
  Examples: Common examples are Excel files, SQL databases where data has structured rows and columns.

(Ref. https://www.nibusinessinfo.co.uk/content/types-database-system)

d. The list of applications that I used today that make use of databases are:
- Whatsapp
- Youtube
- Amazon Shopping
- Microsoft Outlook
- Instagram
- Linkedin
- Walmart Shopping
- Gmail

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e. AWS, Azure, and Google Cloud:

AWS: AWS is a cloud-based platform which provides over 200 online services provided by Amazon. The most in demand services are database storage, computing power, content delivery etc. One of the main reasons why multiple businesses use AWS is because it offers multiple types of storage to choose from and is accessible as well. It can be used for storage and file indexing to run critical business operations. AWS helps to build and Fully Manage Databases through their various services such as graph database service, Relational Database Service, NOSQL Database Service, Data Warehousing, Data Migration, In-Memory Data Store, In-Memory Database etc

Azure: Azure is a cloud computing platform managed by Microsoft. It provides REST and SDK API's for storing and accessing data on the cloud. It provides Software as a Service (Saas), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) and supports many programming languages, tools and frameworks.. As a part of Data Management Services, Azure Data Explorer provides big data analytics and data exploration tools. Cosmos DB is a NOSQL database service provided by Azure.

Google Cloud: Google Cloud platform is a cloud computing service provided by Google. It provides a series of cloud services which includes cloud computing, data storage, data analytics and machine learning. It provides Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and serverless computing environments. For Storage and Databases, Google Cloud provides cloud storage for unstructured data, Cloud SQL for structured data, Cloud Bigtable to manage NOSQL database, cloud spanner for relational database services etc.

As of Q4 2021, AWS has 33% market share for cloud infrastructure followed by Azure with 21% and Google Cloud with 10% as per Synergy Group.

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