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Data

- Examples of data include
  - Facts or observations about people, places, things, and events
  - Audio, music, photographs, and video
- Two ways to view data
  - Physical view
  - Logical view

	Industry	Value ($)	# Employees
1	Retail Trade	9777.47	12
2	Retail Trade	3595.79	12
3	Cult. and Rec. Services	2660.15	20
4	Retail Trade	2303.08	30
5	Manufacturing	644.57	6
6	Mining	3517.85	99
7	Agr., Forest. & Fishing	6905.25	8
8	Retail Trade	9916.39	60
9	Health & Community Services	1855.43	56
10	Property & Business Services	765.10	4

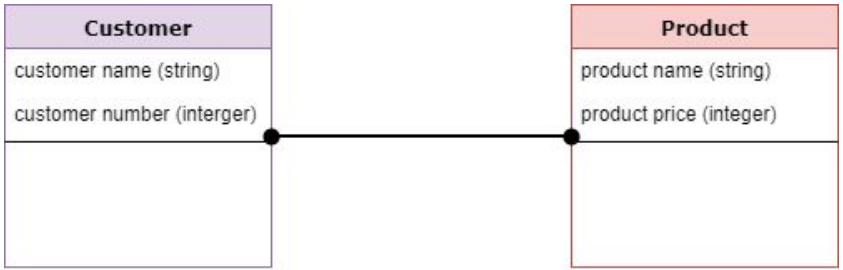
Physical Data VS Logical Data

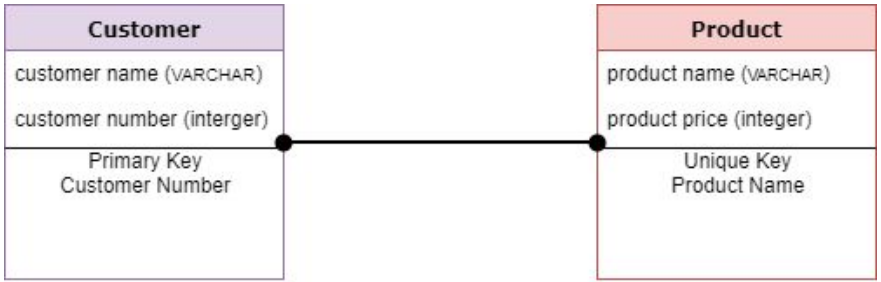
Logical

a define the structure of data elements and to set relationships between them

Physical

database-specific implementation of the data model that offers database abstraction and helps generate the schema



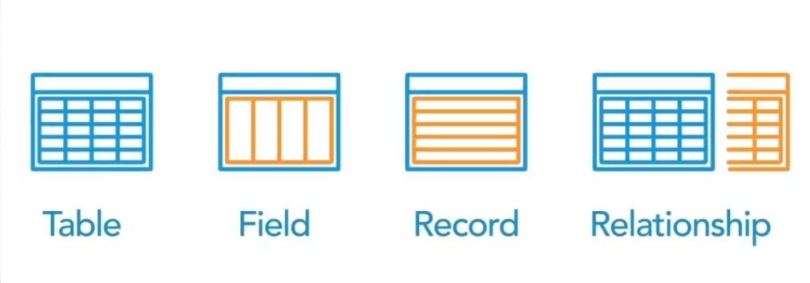


Introduction

- Like a library, secondary storage is designed to store information
- End users need to understand
  - How information is organized in fields, records, tables and databases
  - The different types of databases and structures
- Competent end users need to be able to find information that is stored in databases

Data Organization

- Table
- Field
- Record
- Relationship
- Database



Key field

- Unique identifier also known as **primary key**
- Common examples
  - Social Security Number
  - Student Identification Numbers
  - Employee Identification Numbers
  - Part Numbers
  - Inventory Numbers

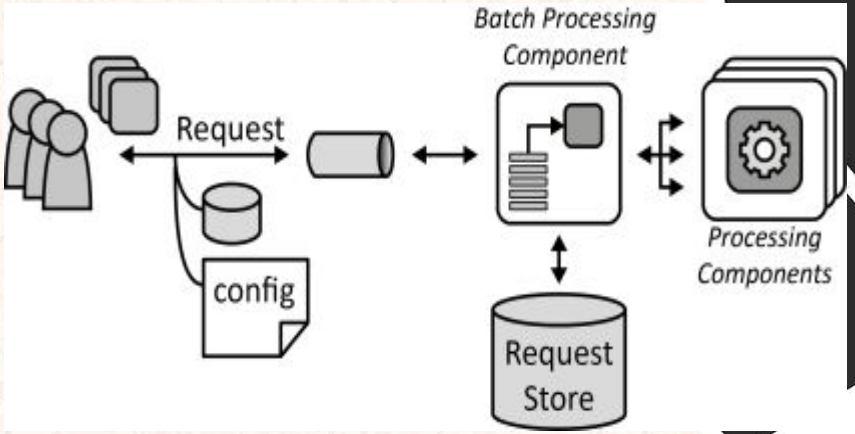
Example

Client & Visit Info

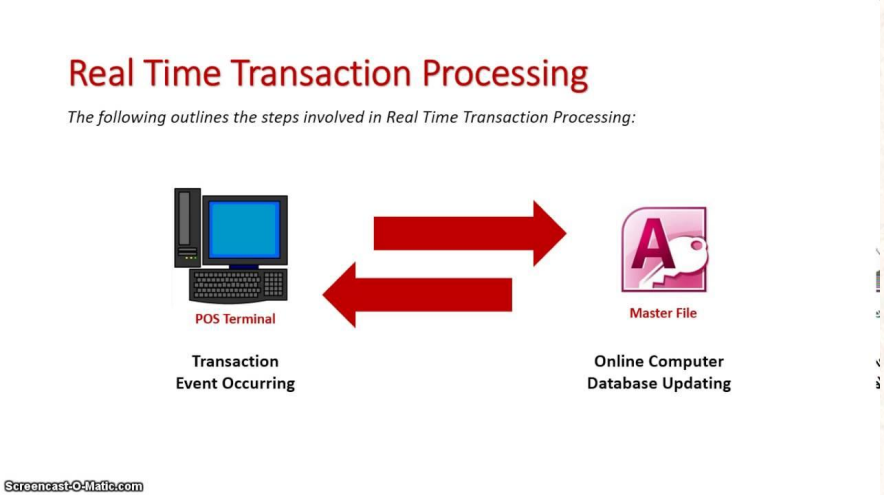
First Name	Last Name	Email	Visit Date	Notes
John	Smith	john@smith.com	3/1/17	Assessment
Jane	Doe	janedoe@janed.com	3/3/17	Assessment
Alyssa	Jones	alyssa123@jones.com	3/22/17	Follow-Up Visit
John	Peterson	j_peterson@peterson.com	4/1/17	Assessment
Alex	Peterson	a_peterson@peterson.com	4/15/17	New Prescription
John	Smith	johnmith1@smith.com	4/23/17	Assessment

Batch Processing

Batch processing is a method of running high-volume, repetitive data jobs. **Data** is collected over a period of time and the processing happens later all at one time.



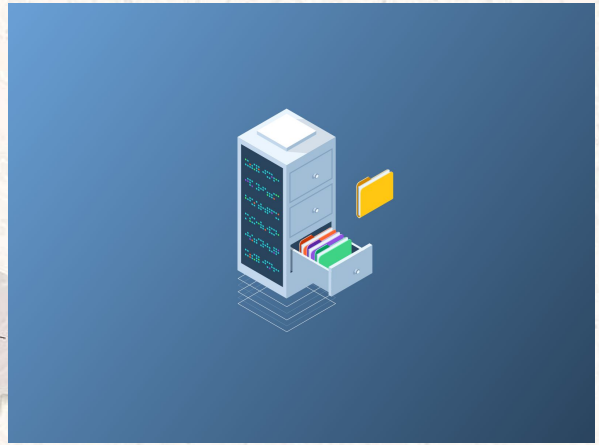
Real-Time Processing



- Also known as online processing because it happens immediately during the transaction
- Online processing is an automated way to enter and process data or reports continuously as use as the source documents are available

DATABASE

- Collection of integrated data. Logically related files and records



- Databases address **data redundancy** and **data integrity**

Importance of Database

Data can be easily shared.

Data can be imported into other **applications**, for example a mail-merge letter to students saying that an MOT test is due.

More than one person can access the same database at the same time

Data integrity.

- Accuracy and consistency of data stored
- Often used as a proxy for “data quality”
- Error checking and validation routines.
- Very related to Data’s Security

Less data redundancy

- Redundant vs Duplication
- Normalization and removing Duplication in Data

Data is more secured.

- Data encryption, which locks data by cipher
- Data backup, which stores a copy of data in an alternate location
- Access controls, including assignment of read/write privileges
- Input validation, to prevent incorrect data entry
- Data validation, to certify uncorrupted transmission

Database Management

DBMS engine

- **A database engine (or storage engine)** is the underlying software component that a **database management system** (**DBMS**) uses to create, read, update and delete (CRUD) data from a **database**.

Data definition subsystem

- **Data definition subsystem** helps the user create and maintain the **data** dictionary and **define** the structure of the files in a database

Data dictionary / schema

- **A data dictionary** is a file or a set of files that contains a database's metadata. The data dictionary contains records about other objects in the database, such as data ownership, data relationships to other objects, and other data.

Data Manipulation subsystem

- **Data Manipulation Subsystem** helps user to add, change, and delete information in a database and **query** it for valuable information. Software tools within the data manipulation subsystem are most often the primary interface between user and the information contained in a database. It allows user to specify its logical information requirements

Query

- **Queries** can perform many different functions in a **database**. Their most common function is to retrieve specific data from the tables. The data you want to see is usually spread across several tables, and **queries** allow you to view it in a single datasheet.

Database Management

SQL(Structured query language)

- SQL is a **domain-specific language** used in programming and designed for managing data held in a relational database management system, or for stream processing in a relational data stream management system.

Application generation subsystem

- **Application Generation Subsystem** contains facilities to help users to develop transactions-intensive **applications**. It usually requires that user perform a detailed series of tasks to process a transaction. It facilities easy-to-use data entry screens, programming languages, and interfaces.

Data administration subsystem

- **Data Administration Subsystem** helps users to manage the overall **database** environment by providing facilities for backup and recovery, security **management**, query optimization, concurrency control, and change **management**.

Database Administrators (DBAs)

- The role may include capacity planning, installation, configuration, database design, migration, performance monitoring, security, troubleshooting, as well as backup and data recovery.

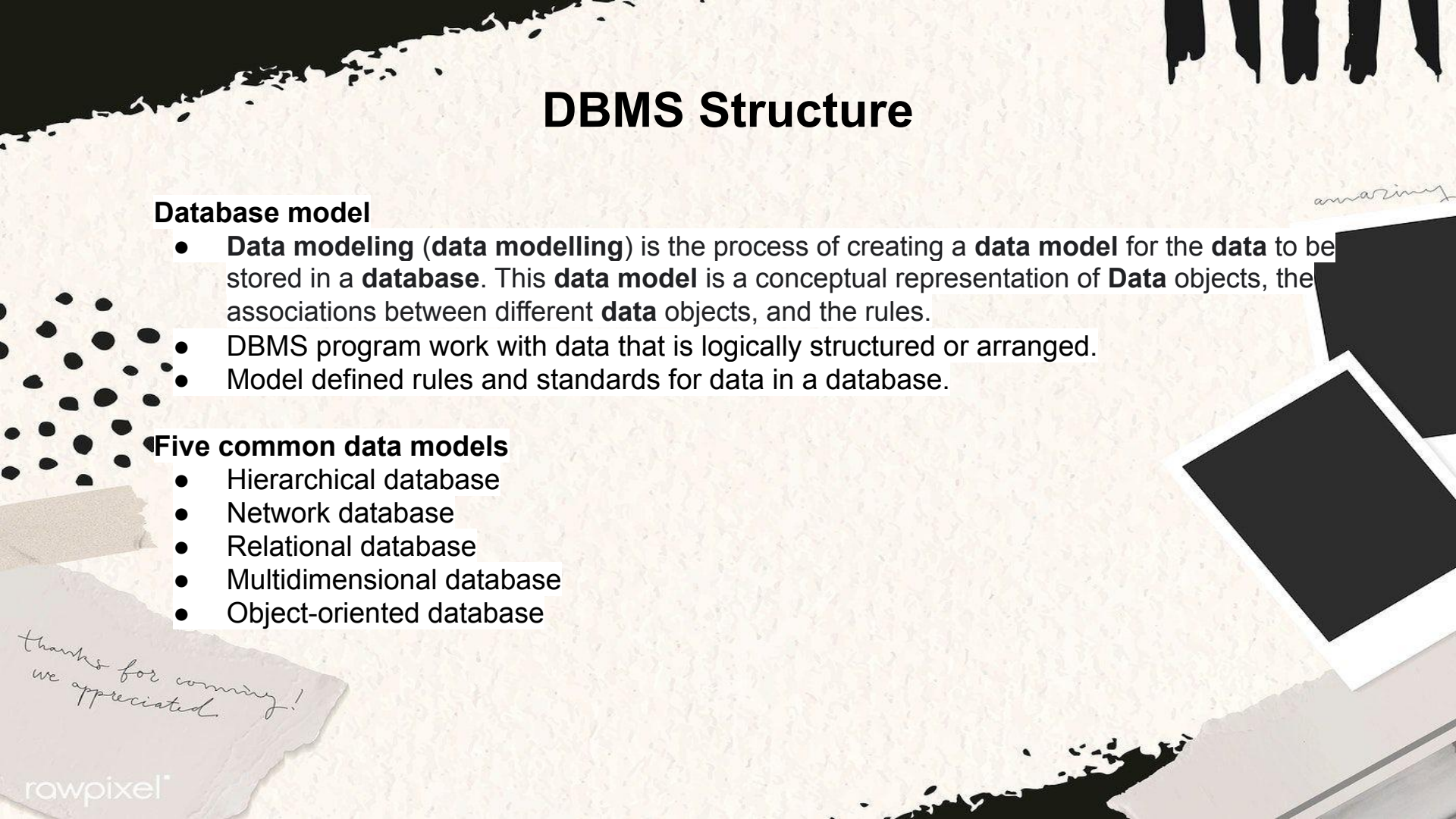
DBMS Structure

Database model

- **Data modeling** (**data modelling**) is the process of creating a **data model** for the **data** to be stored in a **database**. This **data model** is a conceptual representation of **Data** objects, the associations between different **data** objects, and the rules.
- DBMS program work with data that is logically structured or arranged.
- Model defined rules and standards for data in a database.

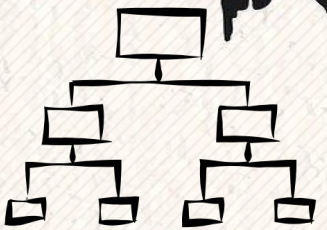
Five common data models

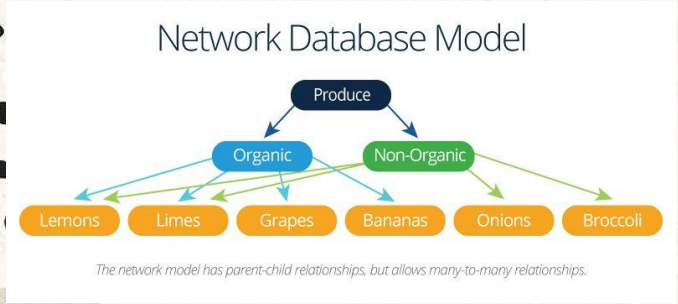
- Hierarchical database
- Network database
- Relational database
- Multidimensional database
- Object-oriented database



Hierarchical Database

- Follow hierarchical pattern
- Relationship between data
- One to one manner,between 'parent and child' nodes.



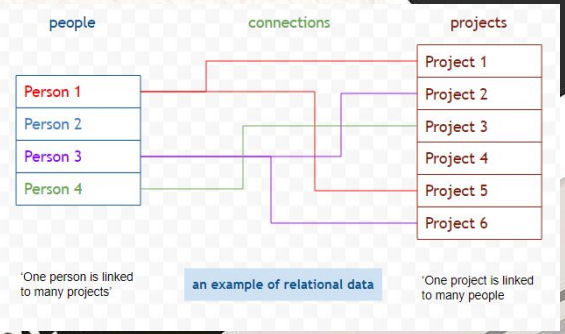


Network Database

- Follow hierarchical pattern
- This model supports many to many relationships
- Child tables can have more than one parent.

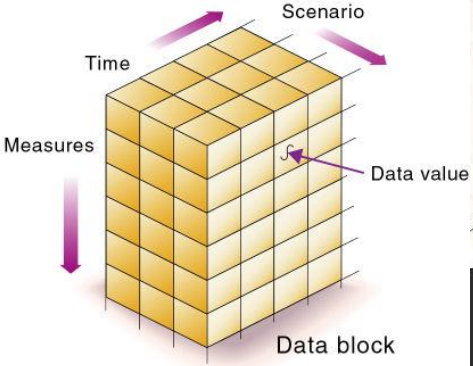
Relational Database

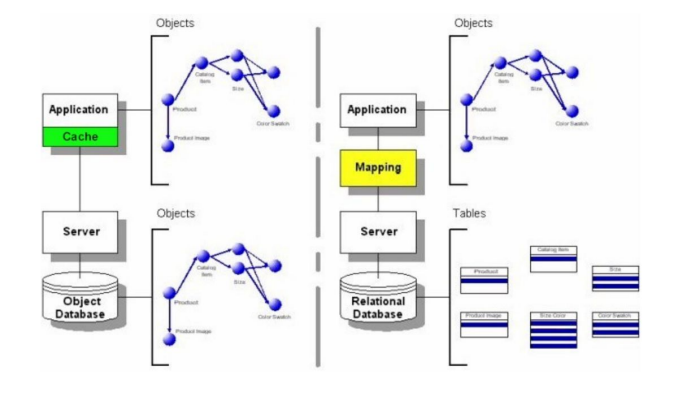
- Multiple tables of data with rows and columns that relate to each other
- Use Structured Query Language (SQL)
- Identify and access data in relation to another piece of data in the database.



Multidimensional Database

- Categorize data as being either facts with associated numerical measures
- Dimensions that characterize the facts and are mostly textual
- For example, in a retail business, products are sold to customers at certain times in certain amounts and at certain prices.





Object-oriented Database

- Information is represented in the form of objects
- Different from relational databases which are table-oriented
- Object-relational databases are a hybrid of both approaches

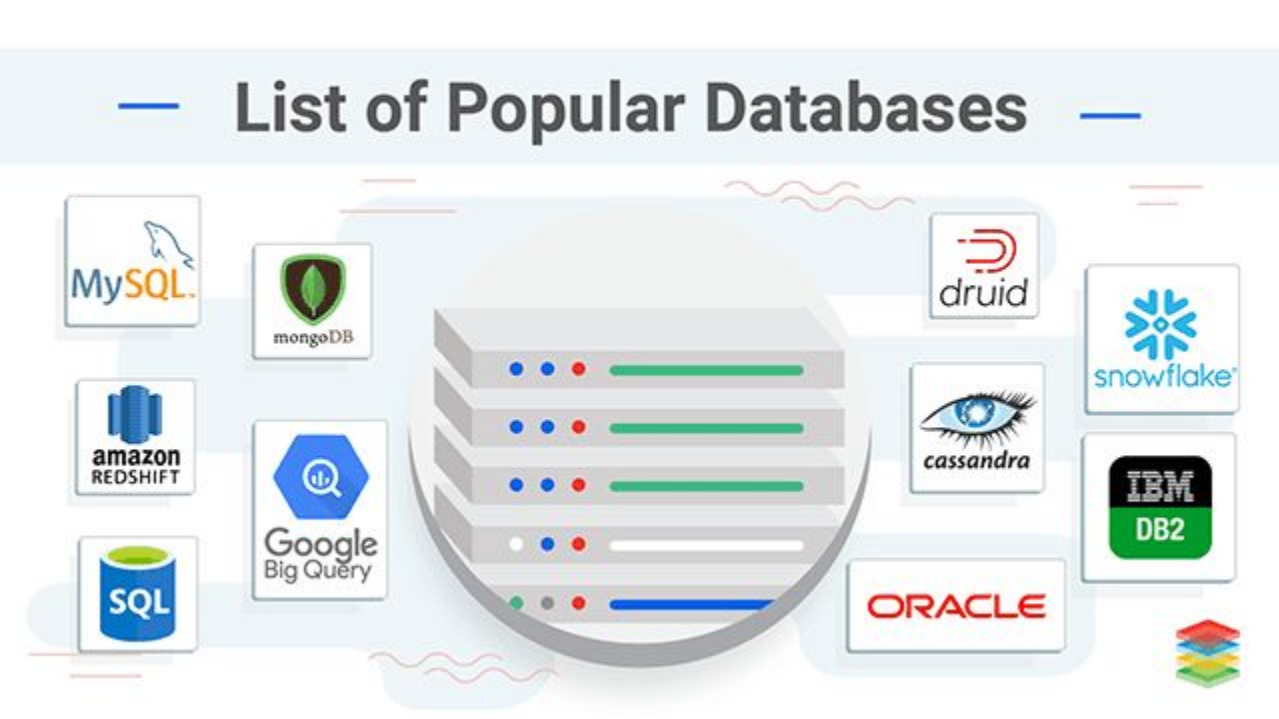
Types of Databases

- **Individual**
  - Integrated files used by one person
- **Company or shared**
  - Common operational or commonly used files in an organization
- **Distributed**
  - Databases spread geographically and access using databases server
- **Commercial**
  - Information utilities or data banks available to users on a wide range of topics

Database uses

- A database is an organized collection of data and it can be use at different organisation for different purpose.
- Database can store very large numbers of records efficiently.
- Databases aren't just for big business, they are for all type of business even though family business.
- Many people, family and business men use databases to keep track of family birthdays, bills and expenses in the home.

Popular databases



Database Issues

1. Data security
2. Performance
3. High availability
4. Data safety
5. Resource utilization

Future of Database

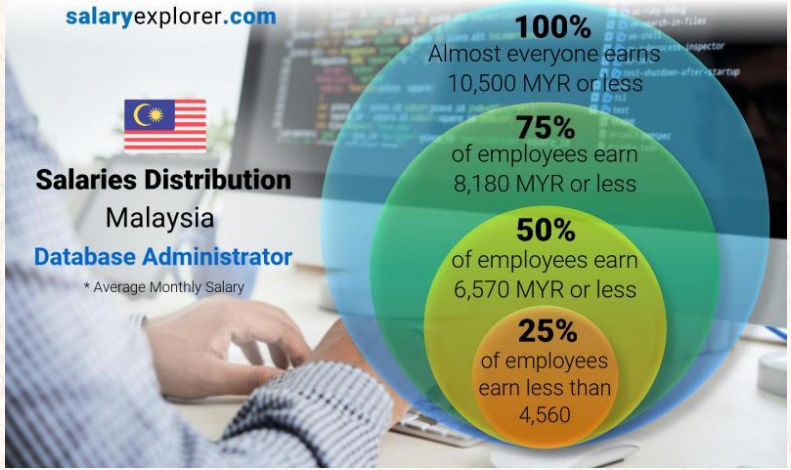
- New Database Models
  - Cloud database
- Include Graph Databases
  - Graph databases provide quick views of data relationships that can be assessed quickly, with less compute power overheads.
- Use Multi-Database Systems MDDBMS
  - Multi-database systems keep database management simple in that each database can keep its organizational schema while querying the whole group.

Careers In IT

- Database administrators
  - Determine the most efficient ways to organize and access a company’s data
  - Responsible for database security and backing up the system
- Employers look for
  - Bachelor's degree in Computer Science
  - Technical experience

DBA Salary

According to SalaryExpolrer a person working as a Database Administrator in Malaysia typically earns around 6,850 MYR per month. Salaries range from 3,560 MYR (lowest) to 10,500 MYR (highest).

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ANY QUESTIONS ?
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