DATABASE ADMINISTRATOR

WHAT IS DATABASE ADMINISTRATOR ?

A database administrator is a person responsible for the

- installation
- configuration
- upgradation
- administration
- monitoring and maintenance of databases.

Primary Roles Of DBA

- Database design
- Database accessibility
- Performance issues
- Capacity issues
- Data replication
- Table Maintenance

WHY DBA IS POPULAR ?

- Data is essential for the operation of any organization.
- Database are created to organize these data.
- Better the design and utility of database, the better is the organization.
- For a better database, we need a skilled database administrator to manage data properly.

SKILLS REQUIRED

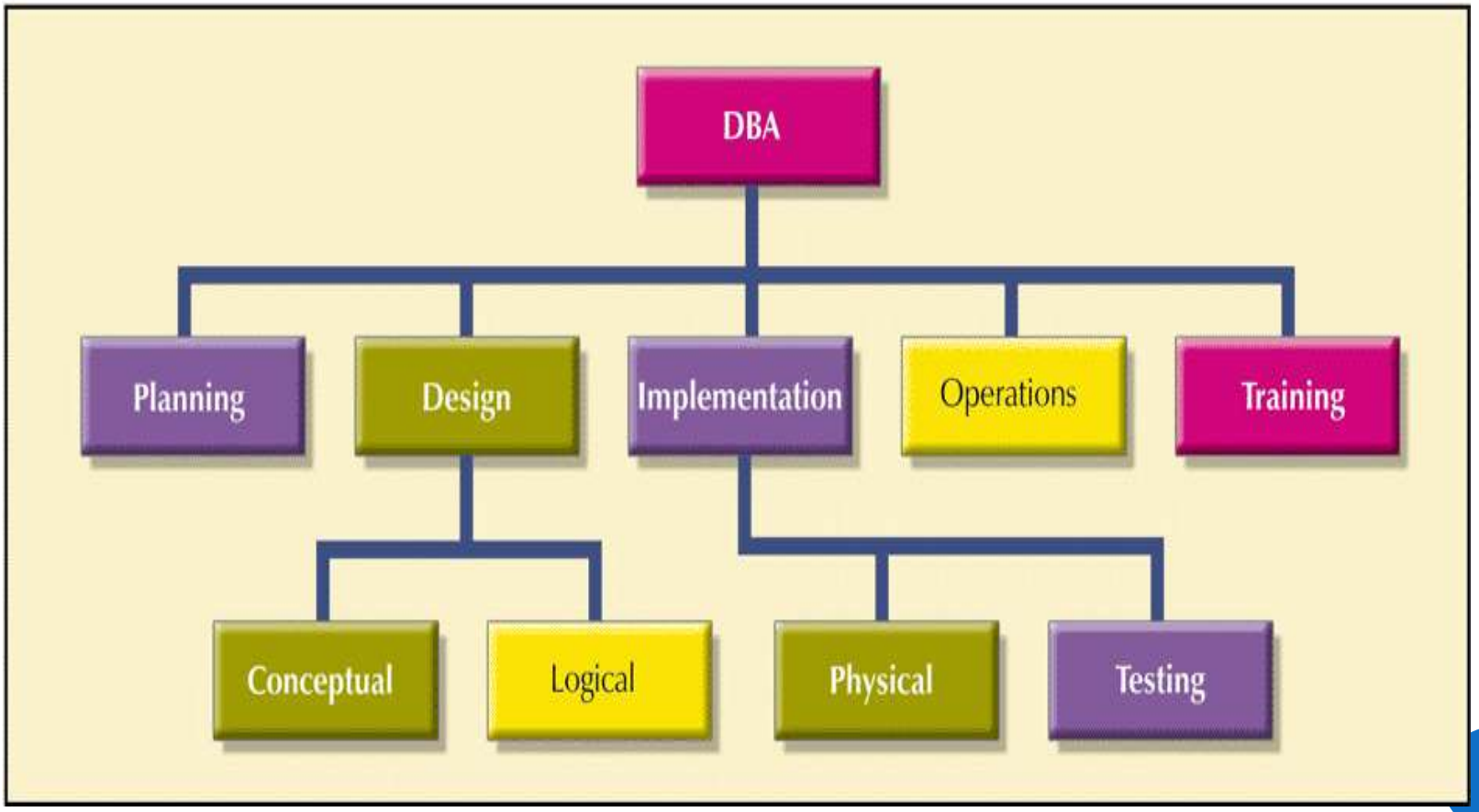
- Knowledge of Structured Query Language.
- Database designing.
- Understanding of distributed computing architectures.
- Knowledge of underlying operating system
  e.g. Windows Server 2003, Solaris, etc.
- Knowledge about the RDBMS itself e.g. Microsoft SQL Server, Oracle, etc.
- Ready to face challenges and solve them quickly.

Hierarchical Level Of DBA's

- Data Analysts/Query designers
- Junior DBA
- Midlevel DBA
- Senior DBA
- DBA consultant
- Manager/Director of Database Administration.

DBA Functional Organization

FIGURE 15.4 A DBA Functional Organization



Types of DBA

- System DBA
- Database architect
- Database analyst
- Data modeler
- Application DBA
- Task-orientated DBA
- Performance analyst
- Data warehouse administrator

System DBA

- Focuses on technical rather than business issues, primarily system administration area.
- Installing new DBMS versions and applying it
- Interfacing with any other technologies required by database applications .
- Ensuring appropriate storage for the DBMS .

Database Architect

- Involved only in new design and development work not in maintenance, administration, or tuning.
- Designing new databases skills are different from implementation and running existing database.
- Translating logical data models into physical database designs

Database Analyst

- Really no set definition for this position.
- Sometimes junior DBAs are referred to as database analysts. A role similar to that of the database architect.
- A database analyst is just another term used by some companies instead of database administrator.

Data Modeler

- Data models describe structured data for storage in data management systems such as relational databases.
- The main aim is to support the development of information systems by providing the definition and format of data.

Application DBA

- Expert in writing and debugging complex SQL.
- Knows the best ways to convert database requests into application programs.
- Focus on an individual application, result in better service to the developers of that application.
- Have a better understanding of how the application impacts the overall business.

Task-Orientated DBA

- Larger organizations create very specialized DBAs that focus on a specific DBA task.
- Example of a task-oriented DBA is a backup-and recovery.
- Knowledgeable specialists tackle very important DBA tasks.

Performance Analyst

- Performance analysts are a specific type of task-oriented DBA.
- The performance analyst focuses solely on the performance of database applications.
- A performance analyst will have very detailed technical knowledge of the DBMS.
- The performance analyst should not be a system DBA.
- Able to speak with application developers in their language to help them facilitate appropriate program changes for performance.

Data Warehouse Administrator

- Data warehouses are implemented for performing in-depth data analysis.
- To monitor and support the data warehouse environment DBA's are required.
- Data warehouse administration requires experience with BI and query tools.
- Specialized database design for data warehousing.
- So, knowledge on data warehousing technologies such as OLAP, ETL skills are required.

DBA Tasks

- Database design
- Performance monitoring and tuning
- Database availability
- Security
- Backup and recovery
- Data integrity
- Release migration

Database design

- DBA must understand the theory and implementation of the relational database management system (RDBMS) he's using to create the database.

- Database design - needs understanding of conceptual and logical data modeling techniques.

  - create and interpret entity-relationship diagrams is essential for designing a relational database.

- The DBA must ensure that the database design and implementation will enable a useful database for the applications and clients that will use it.

Performance Monitoring and Tuning

Five factors influence database performance:

- Workload
- Throughput
- Resources
- Optimization
- Contention

• Whenever performance problems are encountered by an application that uses a database, the DBA is usually the first one called to resolve the problem.

• An effective performance monitoring and tuning strategy requires not just DBMS expertise but knowledge outside the scope of database administration.

Availability

• Ensure that database information is always available to all users in a form that suits their needs.

• The faster the DBA can perform administrative tasks, the more available the data becomes.

• The DBA must understand all of these aspects of availability and ensure that each application is receiving the correct level of availability for its needs.

Security

• Once the database is designed and implemented, programmers and users will need to access and modify the data.

• However, to prevent security breaches and improper data modification, only authorized programmers and users should have access.

• It is the responsibility of the DBA to ensure that data is available only to authorized users.

Backup and Recovery

• The DBA must be prepared to recover data in the event of a problem.

• The majority of recoveries today occur as a result of application software error and human error.

• The DBA must be prepared to recover data to a usable point, no matter what the cause, and to do so as quickly as possible.

• To be prepared for any type of recovery, the DBA needs to develop a backup strategy to ensure that data is not lost in the event of an error in software, hardware, or a manual process.

Data Integrity

•A database must be designed to store the correct data in the correct way without that data becoming damaged or corrupted. To ensure this process, the DBA implements integrity rules using features of the DBMS.

•Three aspects of integrity :

physical
semantic
internal.

•Physical issues can be handled using DBMS features such as domains and data types.

•An example of semantic integrity is the quality of the data in the database. Redundancy is another semantic issue.

• The DBMS relies on internal structures and code to maintain links, pointers, and identifiers.

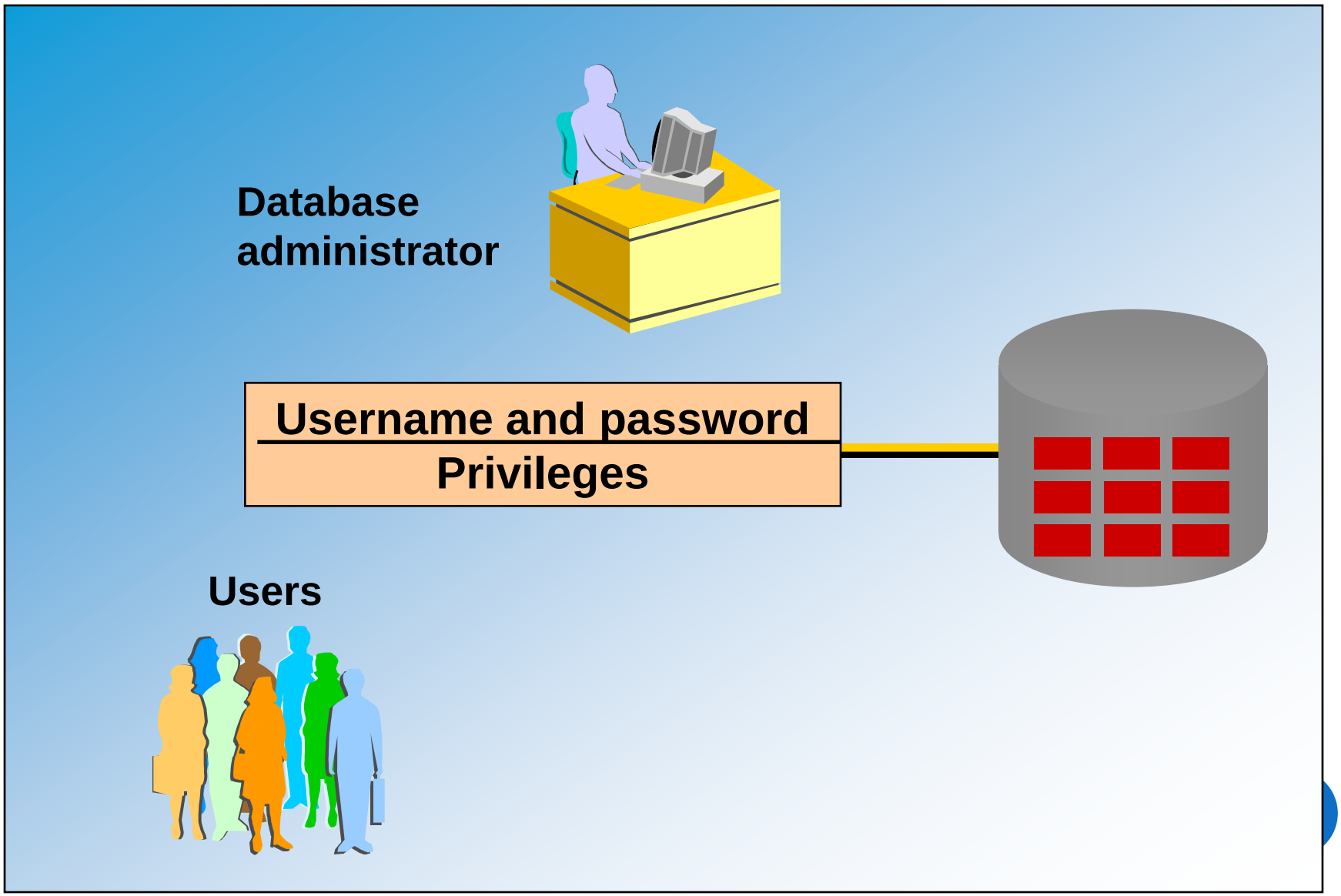
• In most cases, the DBMS will do a good job of maintaining these structures, but the DBA needs to be aware of their existence and how to cope when the DBMS fails.

DBMS Release Migration

• Installation, configuration and upgrading of Microsoft SQL Server/ My SQL /Oracle server software and related products.

• The DBA is also responsible for managing the migration from release to release of the DBMS.

Controlling User Access



PRIVILEGES

- **Database security:**
  - System security
  - Data security
- **System privileges**: Gaining access to the database
- **Object privileges:** Manipulating the content of the database objects
- **Schemas**: Collections of objects, such as tables, views, and sequences
- The database administrator has high-level system privileges for tasks such as:
  - Creating new users
  - Removing users
  - Removing tables
  - Backing up tables

LIFE AS A DBA

- DBA is expected to be available for 24*7.
- Must be an expert in Database technology.
- DBA is expected to know everything about everything.

  (i.e.) SQL queries, OS, Network protocols, handling advanced tools, computer hardware, etc,.
- DBA is often blamed if any fault occurs.
- They are forced to prove that database designed by him is not fault.

- DBAs are assisted with database administration tools.
- DBA is challenging and interesting job.
- One of the highest paid jobs in IT industry.

SALARY

- Average salary in India Rs 1,70,0010.
- Maximum salary in India is above Rs 9,86,000.

V$DATABASE

- Oracle has set of views that are frequently accessed by the DBA.
- V$DATABASE is one among those views.
- It contains more 30 columns.

Sample Query:

```
select * from v$database;
```

This query gives the details about database name, database ID, Open mode(read/write), Protection level(yes/no), Platform name(microsoft windows 32 bit), etc.

DBA Queries

Some of the frequent queries executed by DBA:

- **CREATE USER** statement to create and configure an database user.
- **ALTER DATABASE** statement to open/mount a database.
- **BACKUP** statement to take backup of control files.
- **RECOVER** statement to recover the saved control files.

Sample query:

- create directory my_dir as '/home/oracle/andyb‘;

Database Administration Tools

- **SQL Server Management Studio** is a software application first launched with the Microsoft SQL Server 2005 that is used for configuring, managing, and administering all components within Microsoft SQL Server.
- **Adminer** is a tool for managing content in MySQL databases.

  "Light-weight" - released in a form of a single file, approx160 KB in size. User-friendly interface .

DBA Certification Information

DBMS	WEBSITES
Oracle	http://www.oracle.com/education/certification
Microsoft SQL Server	http://www.microsoft.com/trainingandservices
IBM DB2	http://www.ibm.com/certify
Sybase Adaptive Server	Http://www.sybase.com/education/profcert

- Microsoft Certified Database Administrator
- Oracle DBA Certified Professional.
- PostgreSQL Certified Administrator

THANK YOU