

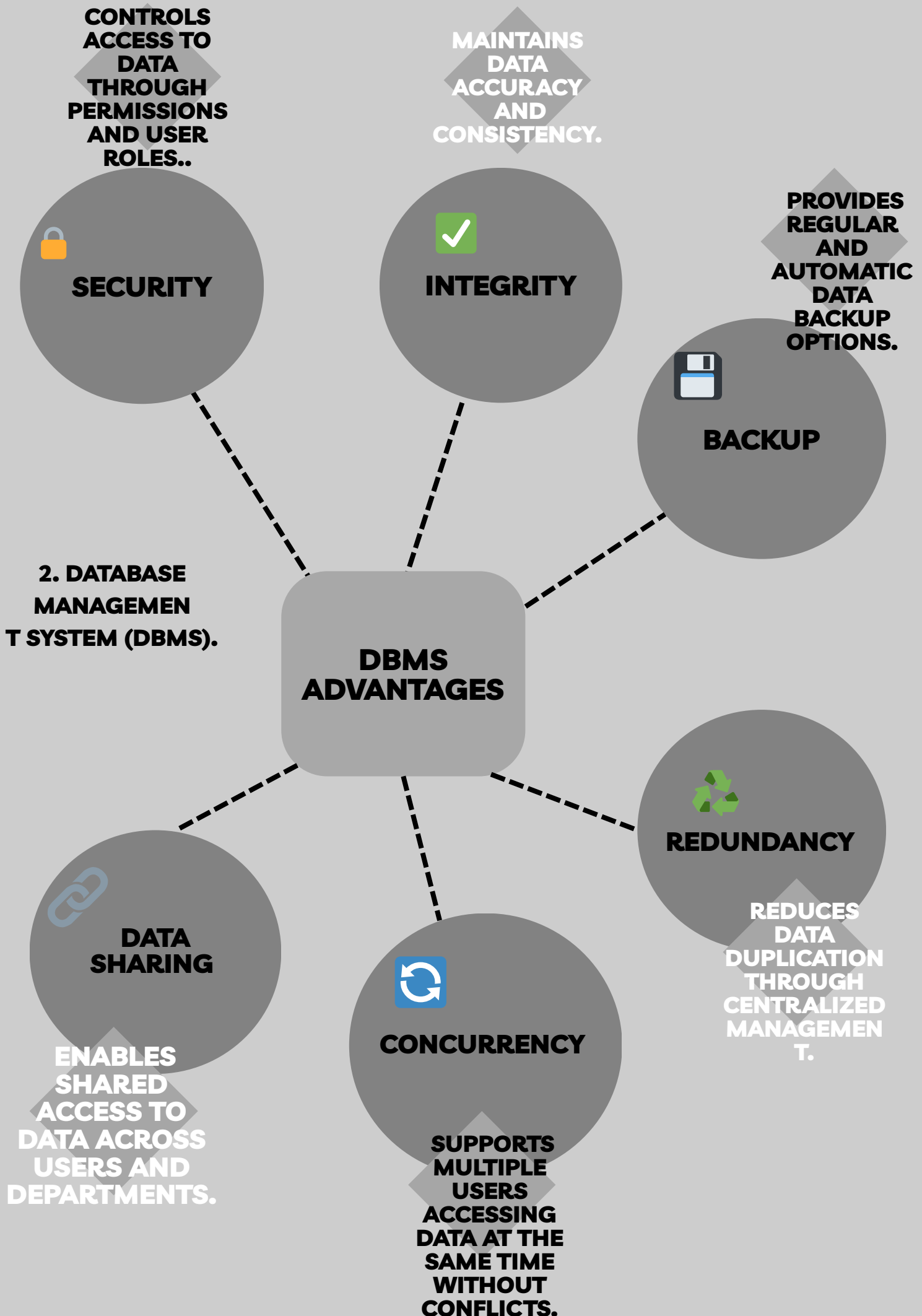
DATABASE SEARCH AND REPORTING

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TASK SECTIONS & REQUIREMENTS

1. COMPARISON: FLAT FILE SYSTEMS VS. RELATIONAL DATABASES

Aspect	Flat File Systems	Relational Databases
Structure	Stores data in plain text files with a simple, one-table-per-file format.	Organizes data in structured tables with defined schemas and relationships.
Data Redundancy	High; repeated data across multiple files.	Low; data is normalized and managed efficiently to reduce duplication.
Relationships	No inherent support for linking data.	Supports robust relationships using primary and foreign keys.
Use Cases	Basic data storage (e.g., configuration files, logs, CSV datasets).	Complex systems such as banking, inventory management, and enterprise applications.
Limitations	Poor scalability, no integrity constraints, and prone to data inconsistency.	Requires database management systems and expertise; higher setup and maintenance costs.



1. SYSTEM ANALYST

ACTS AS THE LINK BETWEEN BUSINESS NEEDS AND TECHNICAL SOLUTIONS. THEY ANALYZE REQUIREMENTS, DEFINE SYSTEM FUNCTIONALITY, AND ENSURE THE DATABASE SYSTEM ALIGNS WITH ORGANIZATIONAL GOALS.

3. KEY ROLES IN A DATABASE SYSTEM

2. DATABASE DESIGNER

RESPONSIBLE FOR DESIGNING THE DATABASE STRUCTURE. THEY CREATE THE DATA MODELS, DEFINE RELATIONSHIPS, AND ENSURE THE DATABASE IS EFFICIENT, NORMALIZED, AND SCALABLE.

3. DATABASE DEVELOPER

BUILDS AND CODES THE DATABASE BASED ON THE DESIGN. THEY WRITE SQL QUERIES, STORED PROCEDURES, AND INTEGRATE DATABASE LOGIC WITH APPLICATIONS FOR SMOOTH DATA OPERATIONS.

4. DATABASE ADMINISTRATOR (DBA)

MANAGES THE DATABASE ENVIRONMENT. TASKS INCLUDE SETTING UP SYSTEMS, MONITORING PERFORMANCE, ENSURING SECURITY, HANDLING BACKUPS, AND MAINTAINING DATA INTEGRITY AND AVAILABILITY.

6. BUSINESS INTELLIGENCE (BI) DEVELOPER

FOCUSES ON DATA ANALYSIS AND REPORTING. THEY CREATE DASHBOARDS, PERFORM DATA TRANSFORMATION (ETL), AND DELIVER INSIGHTS TO SUPPORT BUSINESS DECISION-MAKING.

5. APPLICATION DEVELOPER

DEVELOPS SOFTWARE THAT INTERACTS WITH THE DATABASE. THEY DESIGN USER INTERFACES, WRITE APPLICATION LOGIC, AND ENSURE DATA IS CORRECTLY ENTERED, RETRIEVED, AND PROCESSED.

4. TYPES OF DATABASES

1. RELATIONAL VS. NON-RELATIONAL DATABASES

RELATIONAL DATABASES USE A STRUCTURED, TABLE-BASED FORMAT IDEAL FOR TRANSACTIONAL SYSTEMS AND DATA CONSISTENCY. NON-RELATIONAL DATABASES, ALSO KNOWN AS NOSQL, OFFER FLEXIBLE DATA STORAGE AND ARE BUILT FOR PERFORMANCE AND SCALABILITY, ESPECIALLY WHEN DEALING WITH LARGE OR UNSTRUCTURED DATASETS.

Feature	Relational Database (RDBMS)	Non-Relational Database (NoSQL)
Data Format	Structured: tables with rows and columns	Flexible: documents, key-value pairs, graphs, columns
Schema	Predefined and fixed	Dynamic or schema-less
Query Language	SQL (Structured Query Language)	Varies by database (e.g., MongoDB Query, Cassandra CQL)
Examples	MySQL, PostgreSQL, Oracle	MongoDB (document), Cassandra (wide-column)
Best For	Banking, ERP systems, CRM, where data integrity is critical	Big data, real-time apps, social networks, IoT platforms

2. CENTRALIZED, DISTRIBUTED, AND CLOUD DATABASES

THE WAY DATA IS STORED AND ACCESSED DEPENDS ON THE DATABASE ARCHITECTURE. CENTRALIZED DATABASES ARE SIMPLE AND LOCAL. DISTRIBUTED DATABASES SPREAD DATA ACROSS MULTIPLE SERVERS TO INCREASE AVAILABILITY AND PERFORMANCE. CLOUD DATABASES OFFER FULLY MANAGED SOLUTIONS ACCESSIBLE OVER THE INTERNET, COMBINING SCALABILITY WITH MINIMAL MAINTENANCE.

Type	Description	Use Case Examples
Centralized	Data is stored in a single location. Easy to manage but has a single point of failure.	Small office systems, legacy applications
Distributed	Data is spread across multiple physical locations or servers. Improves fault tolerance and performance.	Telecom networks, multinational e-commerce platforms
Cloud-Based	Hosted on cloud platforms. Offers remote access, high scalability, and provider-managed maintenance.	SaaS applications, real-time dashboards, analytics platforms
Popular Examples	Centralized: MS Access Distributed: Google Bigtable Cloud: Amazon RDS, Azure SQL, Google Cloud Spanner	

5. CLOUD STORAGE AND DATABASES



◆ WHAT IS CLOUD STORAGE AND HOW DOES IT SUPPORT DATABASES?

CLOUD STORAGE IS A MODEL OF DATA STORAGE WHERE DIGITAL DATA IS STORED ON REMOTE SERVERS ACCESSED THROUGH THE INTERNET. THESE SERVERS ARE MAINTAINED AND MANAGED BY CLOUD SERVICE PROVIDERS (E.G., AMAZON WEB SERVICES, MICROSOFT AZURE, GOOGLE CLOUD).

HOW IT SUPPORTS DATABASES:

- ACTS AS THE UNDERLYING STORAGE LAYER FOR CLOUD DATABASES.
- ALLOWS ON-DEMAND SCALABILITY OF STORAGE RESOURCES.
- ENABLES DATA BACKUPS, REPLICATION, AND DISASTER RECOVERY.
- SUPPORTS REMOTE ACCESS, ALLOWING APPLICATIONS AND USERS TO INTERACT WITH DATA GLOBALLY IN REAL TIME.

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ADVANTAGES OF CLOUD-BASED DATABASES

Advantage	Explanation
Scalability	Automatically adjusts storage and compute power as data or users grow.
High Availability	Built-in failover and replication across data centers to ensure uptime.
Cost Efficiency	Pay-as-you-go pricing reduces infrastructure costs.
Reduced Maintenance	Cloud providers manage updates, security, backups, and patching.
Accessibility	Accessible globally via internet, ideal for remote teams and distributed apps.

POPULAR SERVICES:

- AZURE SQL (MICROSOFT) – FULLY MANAGED RELATIONAL DATABASE WITH AI-POWERED PERFORMANCE TUNING.
- AMAZON RDS (AWS) – SUPPORTS MULTIPLE DATABASE ENGINES LIKE MYSQL, POSTGRESQL, ORACLE.
- GOOGLE CLOUD SPANNER – COMBINES RELATIONAL CONSISTENCY WITH HORIZONTAL SCALABILITY.

DISADVANTAGES / CHALLENGES OF CLOUD-BASED DATABASES

Challenge	Explanation
Security Concerns	Sensitive data is stored off-premise; may require encryption and strong access control.
Internet Dependency	Requires a stable and fast internet connection for consistent access.
Limited Control	Custom configurations may be restricted due to provider limitations.
Compliance Issues	Must adhere to data residency and regulatory laws (e.g., GDPR, HIPAA).
Vendor Lock-In	Migration between providers can be complex and costly.