

The Database Environment and Development Process

This presentation explores the fundamentals of database systems. It covers basic concepts, development methodologies, and the advantages of a database approach. We will discuss traditional file processing systems and their limitations. Finally, we will set the stage for database application development.



Core Concepts and Definitions

Data

Raw, unorganized facts needing processing.

Information

Processed data providing context.

Database

Organized data for efficient retrieval.

Key components include Data, Information, Databases, DBMS, and Metadata. Examples of databases are a customer database and a product catalog. DBMS examples include MySQL, PostgreSQL, and Oracle.



Traditional File Processing: Limitations



Data Redundancy

Duplication leads to inconsistency.



Data Inconsistency

Conflicting data versions.



Data Isolation

Difficult data access.

Traditional file processing suffers from redundancy, inconsistency, and isolation. Data dependence is another issue; applications are tightly coupled with file structure, and there is a lack of data integrity.

The Database Approach: Advantages



Centralization



Integrity



Security

Data centralization provides a single repository accessible by multiple applications. Data integrity ensures accuracy and consistency through rules and constraints. Data independence shields applications from storage changes, enhancing security.



Components of the Database Environment

Hardware

Servers, storage, network.

Software

DBMS, OS, Applications.

Data

Stored facts.

Key components include hardware (servers, storage), software (DBMS, operating systems), data, people (DBAs, designers), and procedures (backup, security policies).

Range of Database Applications

1

E-commerce

Product catalogs, orders, inventory.

2

Banking

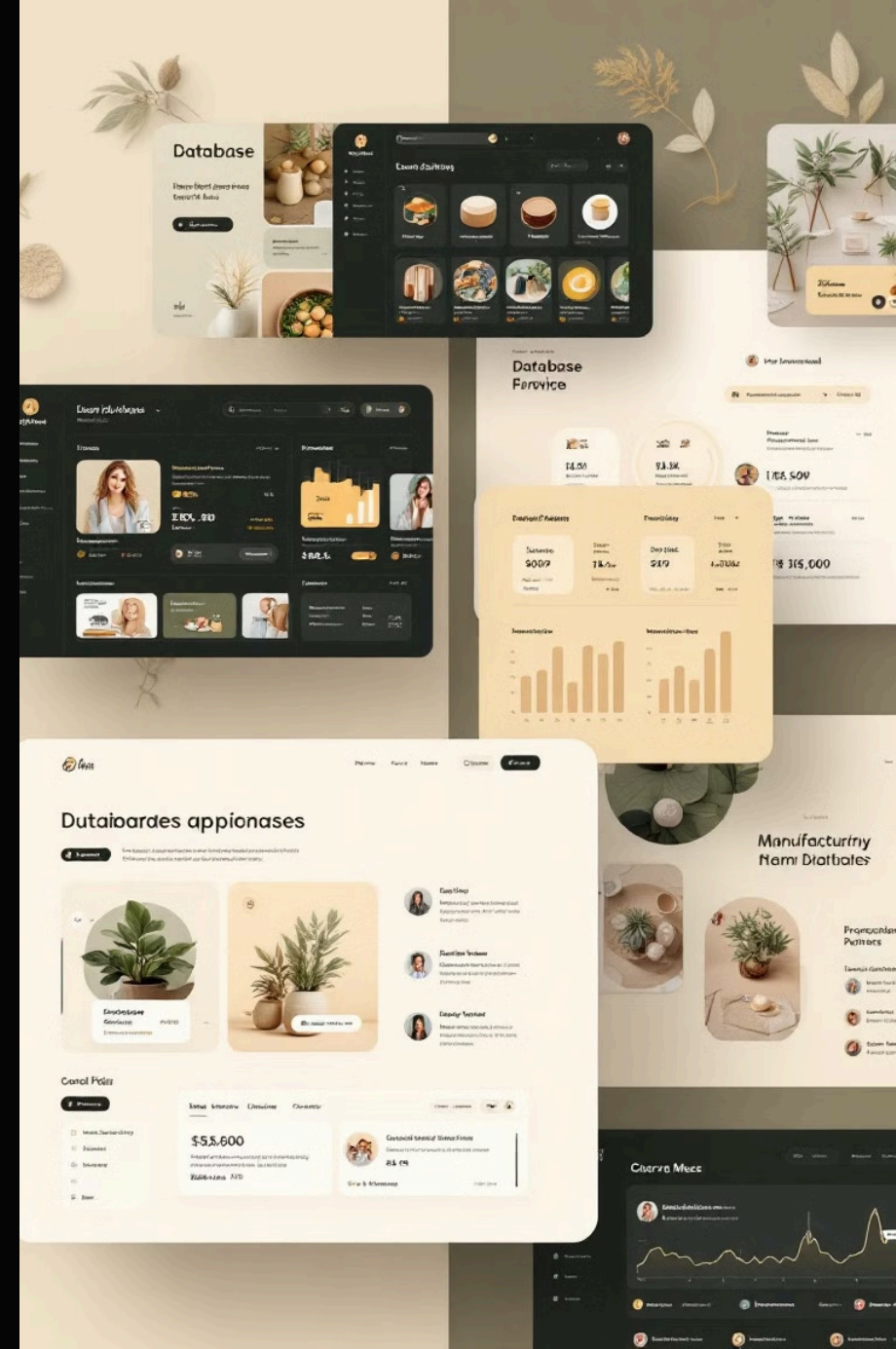
Accounts, transactions, loans.

3

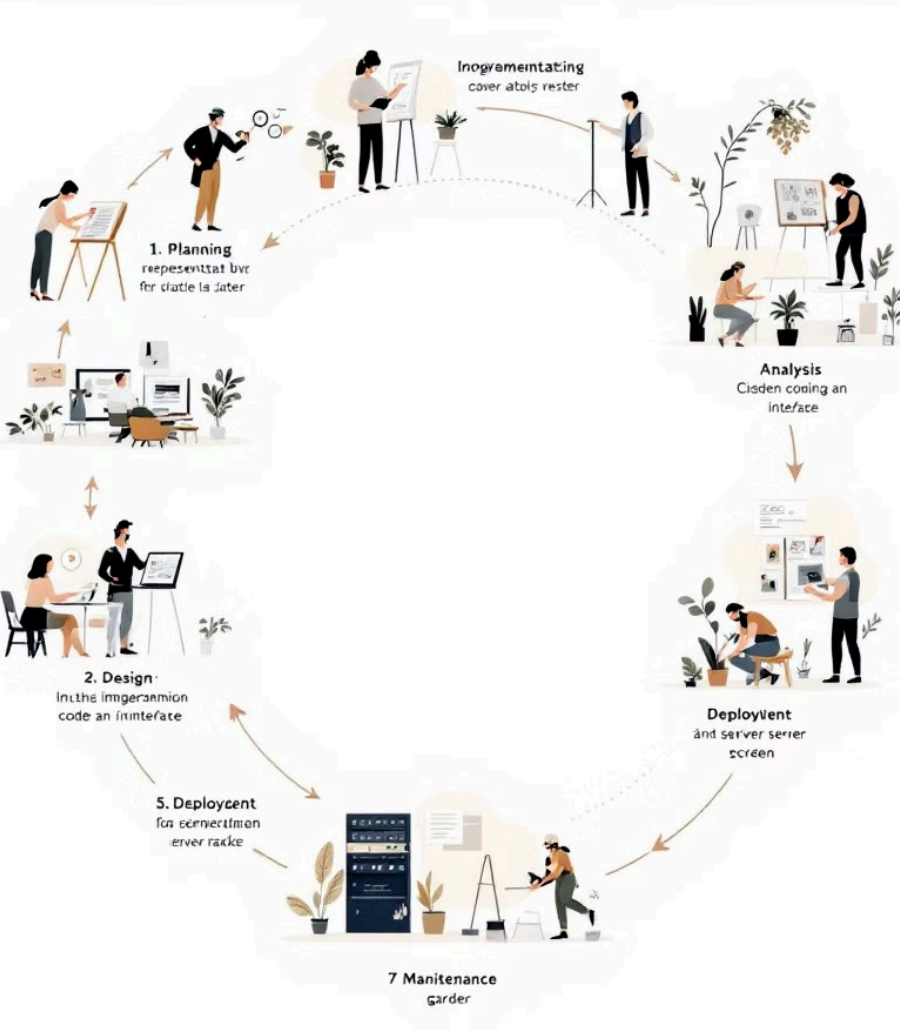
Healthcare

Patient records, appointments.

Databases support diverse applications like e-commerce (Amazon, Shopify), banking (Bank of America), healthcare (Epic, Cerner), manufacturing (SAP), and social media (Facebook).



Software devliign the software development lifecycle



The Database Development Process

1

Planning

Scope, objectives, requirements.

2

Analysis

Data requirements, user needs.

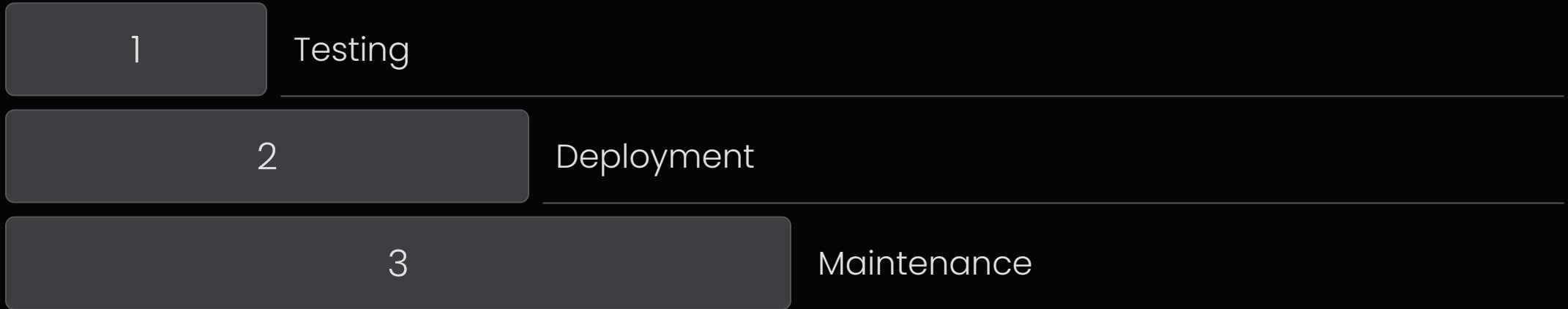
3

Design

Logical and physical models.

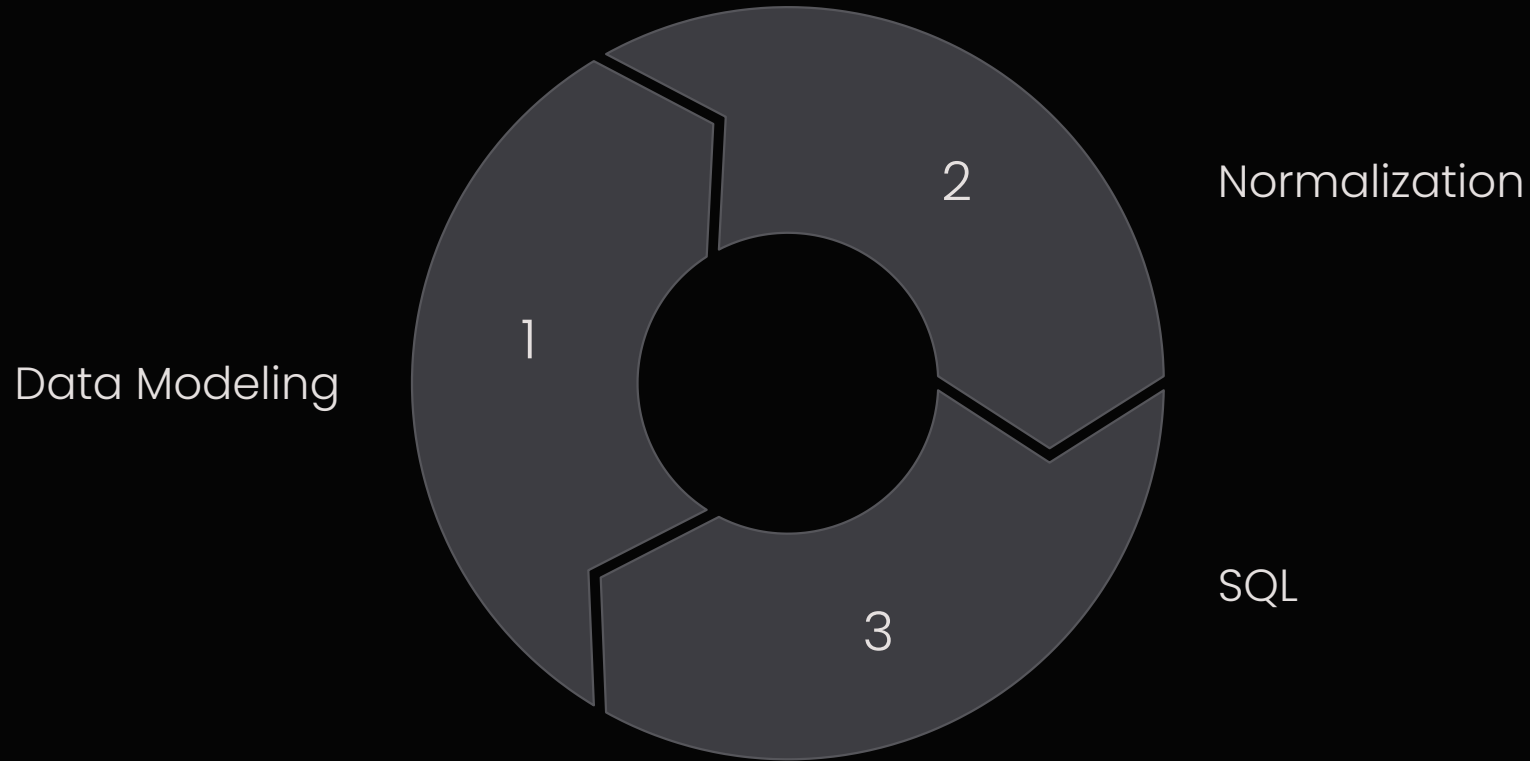
The process includes planning, analysis, design, and implementation. Examples include identifying data needs for a CRM system and creating entity-relationship diagrams.

Database Development: Detailed Steps




Key stages involve testing, deployment, and maintenance. Common methodologies used are Waterfall, Agile, and Spiral. Maintenance includes monitoring, optimization, and updates.

Database Development: Considerations



Essential considerations are data modeling, normalization, SQL, database security, and performance tuning. Normalization minimizes redundancy, and SQL is used for access and manipulation.



Conclusion: The Power of Databases

90%

Essential

For modern orgs

> File Systems

Advantages

Over traditional

Databases are essential for modern organizations. They offer advantages over file systems. Understanding the development process is crucial for effective applications. Data is a strategic asset, and databases unlock its value.