

The Database Life Cycle (DBLC)

The Database Life Cycle (DBLC) contains six phases, as shown in the following Figure: database initial study, database design, implementation and loading, testing and evaluation, operation, and maintenance and evolution.



1. The Database Initial Study:

In the Database initial study, the designer must examine the current system's operation within the company and determine how and why the current system fails. The overall purpose of the database initial study is to:

- ✓ Analyze the company situation.
- ✓ Define problems and constraints.
- ✓ Define objectives.
- ✓ Define scope and boundaries.

a. Analyze the Company Situation:

The company situation describes the general conditions in which a company operates, its organizational structure, and its mission. To analyze the company situation, the database designer must discover what the company's operational components are, how they function, and how they interact.

b. Define Problems and Constraints:

The designer has both formal and informal sources of information. The process of defining problems might initially appear to be unstructured. Company end users are often unable to describe precisely the larger scope of company operations or to identify the real problems encountered during company operations.

c. Define Objectives:

A proposed database system must be designed to help solve at least the major problems identified during the problem discovery process. In any case, the database designer must begin to address the following questions:

- What is the proposed system's initial objective?
- Will the system interface with other existing or future systems in the company?
- Will the system share the data with other systems or users?

d. Define Scope and Boundaries:

The designer must recognize the existence of two sets of limits: scope and boundaries. The system's scope defines the extent of the design according to operational requirements. Will the database design encompass the entire organization, one or more departments within the organization, or one or more functions of a single department? Knowing the scope helps in defining the required data structures, the type and number of entities, the physical size of the database, and so on.

The proposed system is also subject to limits known as boundaries, which are external to the system. Boundaries are also imposed by existing hardware and software.

2. Database Design:

The second phase focuses on the design of the database model that will support company operations and objectives. This is arguably the most critical DBLC phase: making sure that the final product meets user and system requirements. As you examine the procedures required to complete the design phase in the DBLC, remember these points:

- The process of database design is loosely related to the analysis and design of a larger system. The data component is only one element of a larger information system.
- The systems analysts or systems programmers are in charge of designing the other system components. Their activities create the procedures that will help transform the data within the database into useful information.

3. Implementation and Loading:

The output of the database design phase is a series of instructions detailing the creation of tables, attributes, domains, views, indexes, security constraints, and storage and performance guidelines. In this phase, you actually implement all these design specifications.

a. Install the DBMS:

This step is required only when a new dedicated instance of the DBMS is necessary for the system. The DBMS may be installed on a new server or it may be installed on existing servers. One current trend is called virtualization. Virtualization is a technique that creates logical representations of computing resources that are independent of the underlying physical computing resources.

b. Create the Database(s):

In most modern relational DBMSs, a new database implementation requires the creation of special storage-related constructs to house the end-user tables. The constructs usually include the storage group (or file groups), the table spaces, and the tables.

c. Load or Convert the Data:

After the database has been created, the data must be loaded into the database tables. Typically, the data will have to be migrated from the prior version of the system. Often, data to be included in the system must be aggregated from multiple sources. Data may have to be imported from other relational databases, non-relational databases, flat files, legacy systems, or even manual paper-and-pencil systems

4. Testing and Evaluation:

In the design phase, decisions were made to ensure integrity, security, performance, and recoverability of the database. During implementation and loading, these plans were put into place. In testing and evaluation, the DBA tests and fine-tunes the database to ensure that it performs as expected. This phase occurs in conjunction with applications programming.

a. Test the Database:

During this step, the DBA tests the database to ensure that it maintains the integrity and security of the data. Data integrity is enforced by the DBMS through the proper use of primary and

foreign key rules. In database testing you must check Physical security allows, Password security, Access rights, Data encryption etc.

b. Fine-Tune the Database:

Although database performance can be difficult to evaluate because there are no standards for database performance measures, it is typically one of the most important factors in database implementation. Different systems will place different performance requirements on the database. Many factors can impact the database's performance on various tasks. Environmental factors, such as the hardware and software environment in which the database exists, can have a significant impact on database performance.

c. Evaluate the Database and Its Application Programs:

As the database and application programs are created and tested, the system must also be evaluated from a more holistic approach. Testing and evaluation of the individual components should culminate in a variety of broader system tests to ensure that all of the components interact properly to meet the needs of the users. To ensure that the data contained in the database are protected against loss, backup and recovery plans are tested.

5. Operation

Once the database has passed the evaluation stage, it is considered to be operational. At that point, the database, its management, its users, and its application programs constitute a complete information system. The beginning of the operational phase invariably starts the process of system evolution.

6. Maintenance and Evolution

The database administrator must be prepared to perform routine maintenance activities within the database. Some of the required periodic maintenance activities include:

- ✓ Preventive maintenance (backup).
- ✓ Corrective maintenance (recovery).
- ✓ Adaptive maintenance (enhancing performance, adding entities and attributes, and so on).
- ✓ Assignment of access permissions and their maintenance for new and old users.