

DATABASE SYSTEM DEVELOPMENT LIFECYCLE

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BT2102 DATA MANAGEMENT AND VISUALISATION

Information System (IS)

Information systems are resources that **enable collection, management, control, and dissemination of information throughout an organization.**

Database is fundamental component of IS, and its development/usage should be viewed from perspective of the wider requirements of the organization.

Database System Development Lifecycle

Database planning

- Planning how the stages of the lifecycle can be realized most efficiently and effectively.

System definition

- Specifying the scope and boundaries of the database system, including the major user views, its users, and application areas.

Requirements collection and analysis

- Collection and analysis of the requirements for the new database system.

Database design

- **Conceptual, logical and physical design of the database.**

Application design

- Designing the user interface and the application programs that use and process the database.

Implementation

- Creating the physical database definitions and the application programs.

Data conversion and loading

- Loading data from the old system to the new system and, where possible, converting any existing applications to run on the new database.

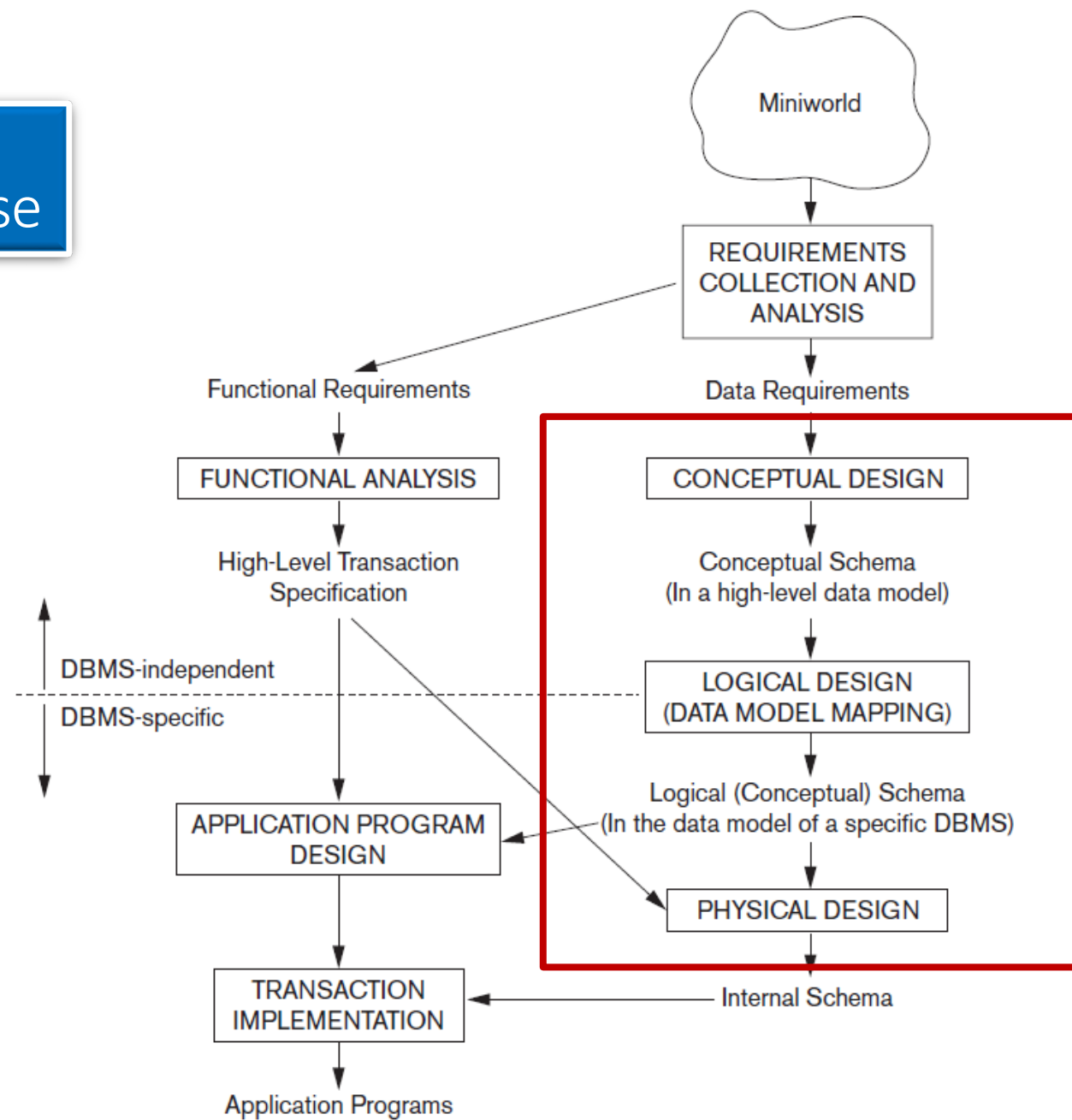
Testing

- Database system is tested for errors and validated against the requirements specified by the users.

Operational maintenance

- Database system is fully implemented. The system is continuously monitored and maintained. When necessary, new requirements are incorporated into the database system through the preceding stages of the lifecycle.

Database Design Phase



ANSI-SPARC Three-Level Architecture

External Level

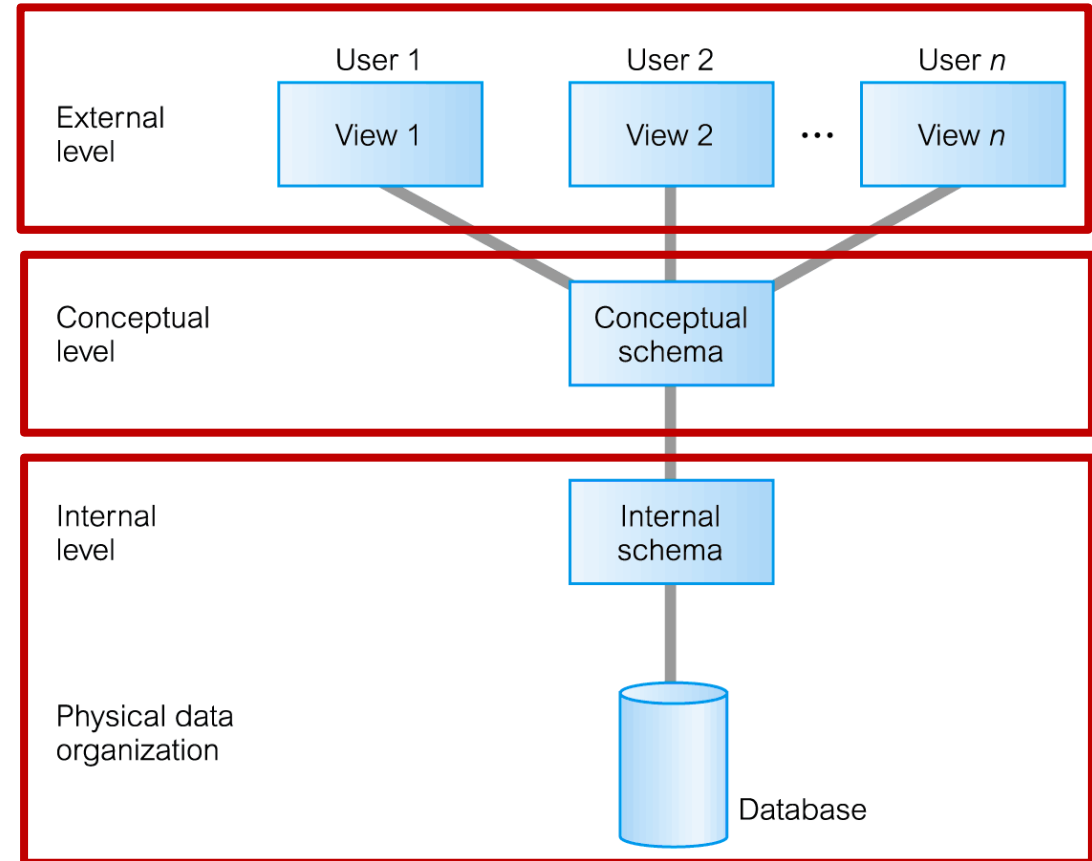
- Users' view of the database.
- Describes that part of database that is **relevant to a particular user**.

Conceptual Level

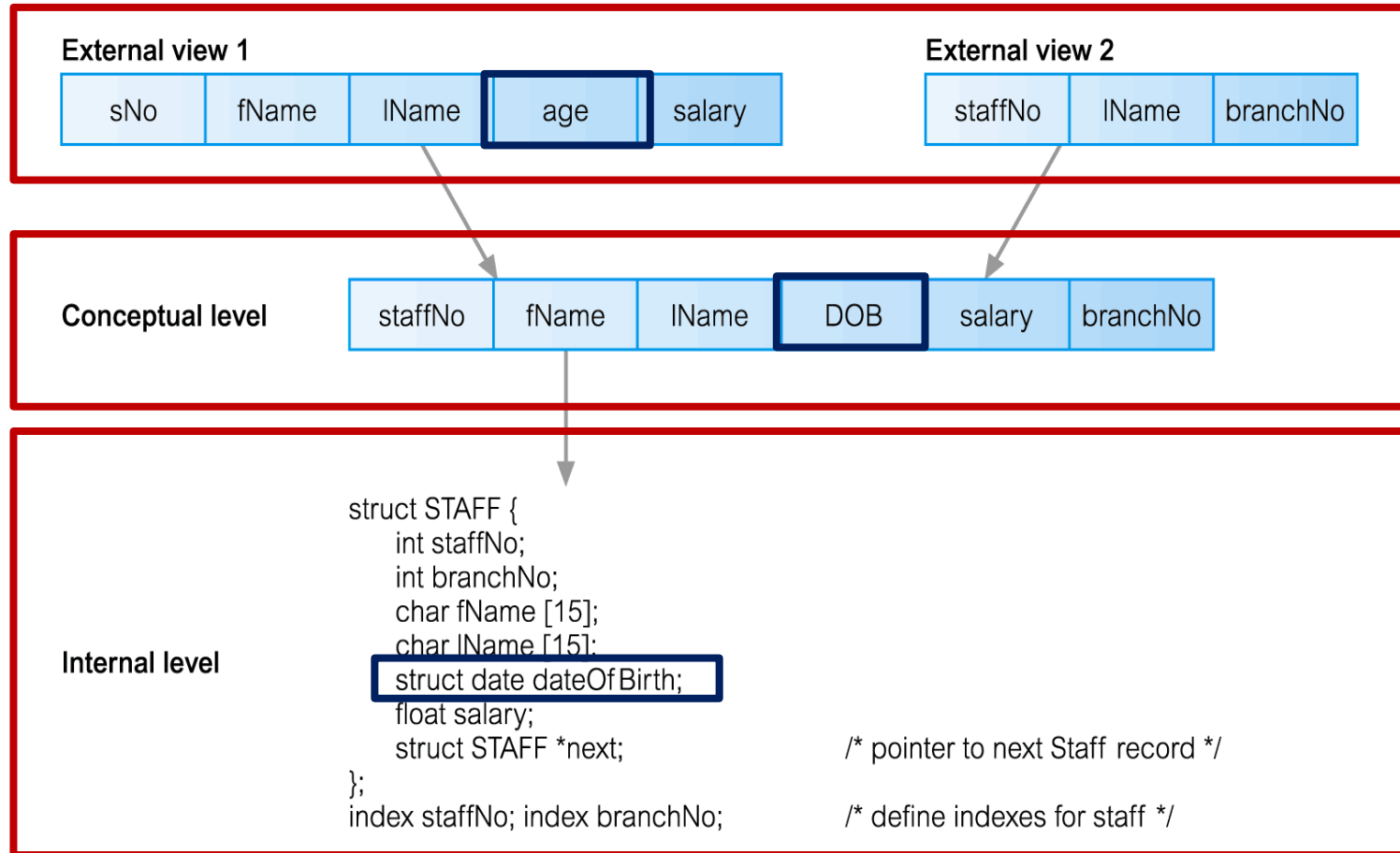
- Community view of the database.
- Describes **what data is stored** in database and relationships among the data.

Internal Level

- Physical representation of the database on the computer.
- Describes **how the data is stored** in the database.



Example: Three Levels of ANSI-SPARC Architecture



Why Three-Level Architecture

All users should be able to **access same data**.

A user's view is **immune to changes** made in other views.

Users should **not need to know physical database** storage details.

DBA should be **able to change database storage structures** without affecting the users' views.

Internal structure of database should be **unaffected by changes** to physical aspects of storage.

DBA should be able to **change conceptual structure** of database without affecting all users.

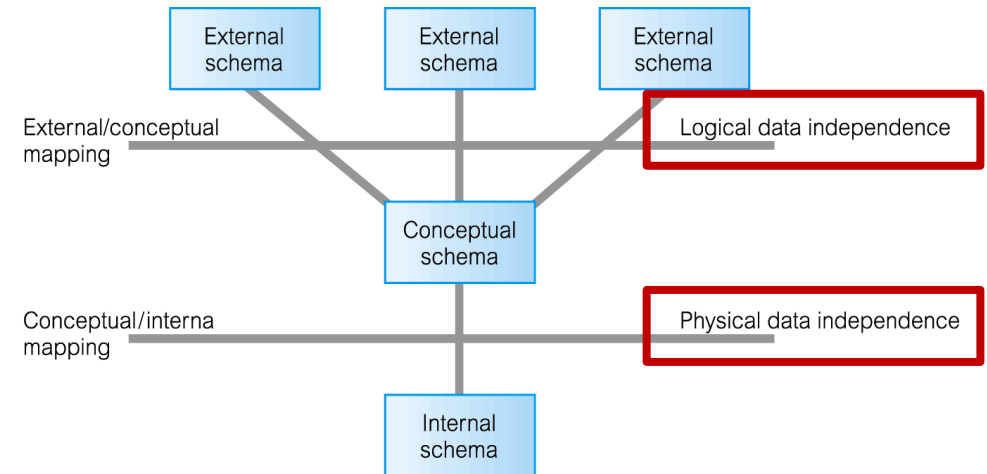
Data Independence

Logical Data Independence

- Refers to immunity of external schemas to changes in conceptual schema e.g., addition/removal of entities.
- Should not require changes to external schema or rewrites of application programs.

Physical Data Independence

- Refers to immunity of conceptual schema to changes in the internal schema e.g., using different file organizations, storage structures/devices.
- Should not require change to conceptual or external schemas.



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