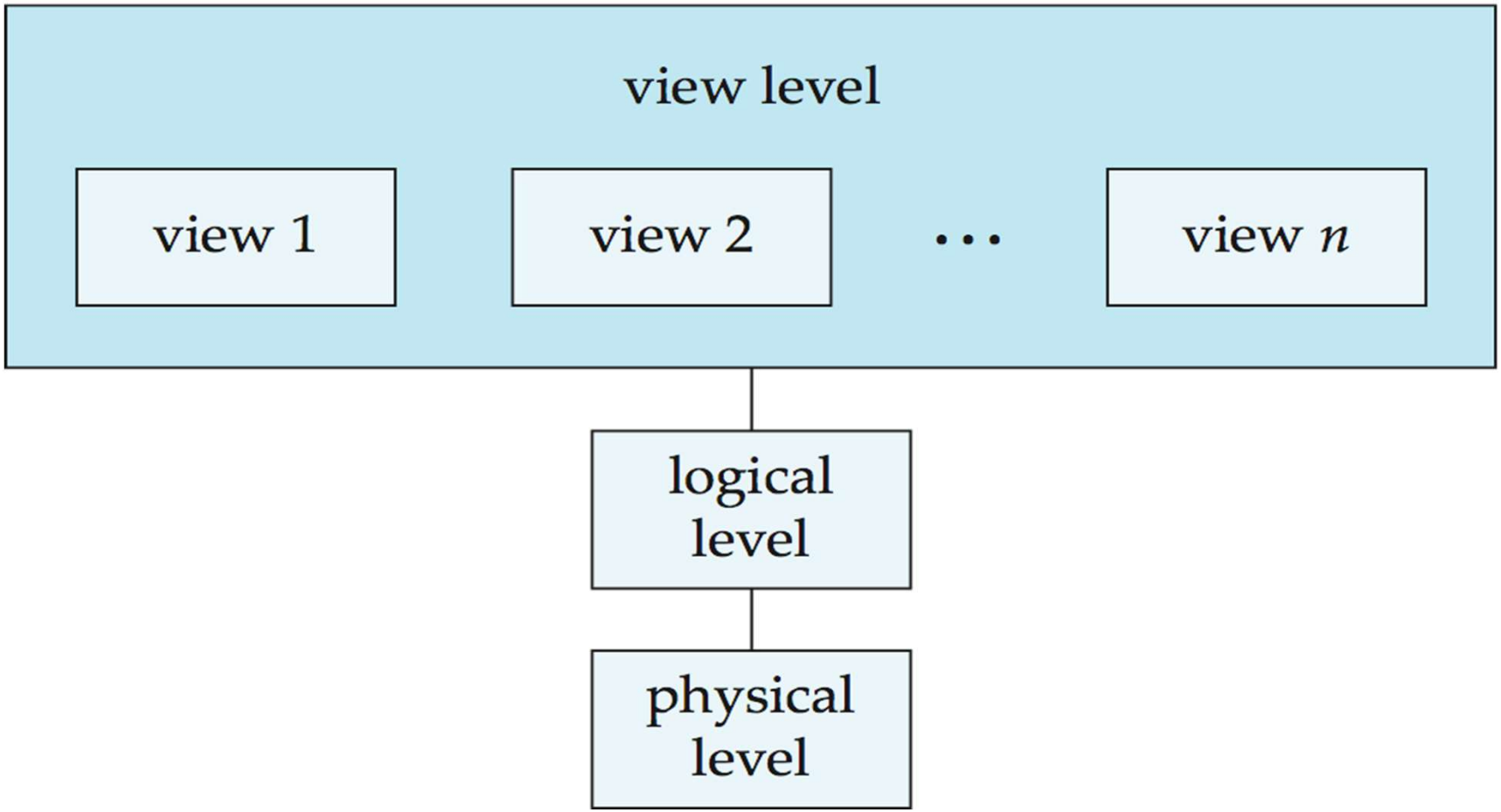
Levels of Abstraction

- **Physical level:** describes how a record (e.g., instructor) is stored.
- **Logical level:** describes data stored in database, and the relationships among the data.

```
type instructor = record
                      ID : string;
                      name : string;
                      dept_name : string;
                      salary : integer;
                  end;
```

- **View level:** application programs hide details of data types. Views can also hide information (such as an employee's salary) for security purposes.

View of Data



Three Levels of data abstraction

Instances and Schemas

- Similar to types and variables in programming languages
- **Logical Schema** – the overall logical structure of the database
  - Example: The database consists of information about a set of customers and accounts in a bank and the relationship between them

    Analogous to type information of a variable in a program
- **Physical schema**– the overall physical structure of the database
- **Instance** – the actual content of the database at a particular point in time
  - Analogous to the value of a variable
- **Physical Data Independence** – the ability to modify the physical schema without changing the logical schema
  - Applications depend on the logical schema
  - In general, the interfaces between the various levels and components should be well defined so that changes in some parts do not seriously influence others.