What is an ‘Architecture’ of a DBMS?

**Definition: Schema**

**Definition: Architecture**
The ANSI/SPARC Architecture (1 / 4): Background

A product of the Standards Planning and Requirements Committee (SPARC) of the American National Standards Institute (ANSI)

Never formally adopted as an ANSI or International Standards Organization (ISO) standard, but still very influential

Created to standardize terms and concepts surrounding DBs and DBMSes

Goals:

- Allow for multiple views of the data to satisfy a range of users
- Allow for a physical (disk-level) description of the database
- Provide an abstraction layer to separate the two

The ANSI/SPARC Architecture (2 / 4): The Diagram
The ANSI/SPARC Architecture (3 / 4): The Levels

- External Level
- Conceptual Level
- Internal Level

The interfaces between the levels are known as mappings.

- External – External Mapping
- External – Conceptual Mapping
- Conceptual – Internal Mapping
Client - Server Architectures (1 / 3): Background

- Originally: DBMSes were built with a centralized architecture.
  - All components (OS, DBMS, compilers, etc.) on one computer

Client - Server Architectures (2 / 3): Two-Tier

- One possible division of services:
Why add more tiers?

Example of a Four-Tier architecture:

Service-Oriented Architectures (1 / 3): Motivation

- SOA is a software design technique:
  - Apps are built using pre-written service modules
    E.g., a data visualization module
  - Modules are located & accessed via a common interface
- Goal is to be flexible with the adoption of new business processes
- A web service is an interface used by service modules
  - That is, it can be a component of an SOA.
- Further details are beyond the scope of this course
Service-Oriented Architectures (2 / 3): Before/After


Service-Oriented Architectures (3 / 3): Accessing

Advertising, Finding and Using a Service:

1. Publish Service
2. Locate Service
3. Use Service

Distributed DBMSes (1 / 2): Motivation

- A single DBMS server (with its single DB) is a single point of failure
- Solution: A DBMS can be operated by several servers.
  - Each server has all, some, or none of the DB stored locally
    - (replication is permitted for performance and reliability)
  - DDBMS sites communicate to handle nearly all tasks
  - Goal: Be completely transparent to the users
- Again, details are beyond the scope of this course

Distributed DBMSes (2 / 2): Diagram
Additional DB–Related Architectures

- Web Services
  - Ex: Stock Quotations; Google Docs

  Two types:
  
  (a) Simple Object Access Protocol (SOAP)-based
      - Typically uses XML
  
  (b) RESTful (Representational State Transfer) – stateless
      - Ex: HTTP

- Data Warehouses
  - Support decision–making

- Cloud Computing
  - Provides dynamic resource provisioning (of DBMSes!)

DBMS Architectures – CSc 460 v1.1 (McCann) – p. 15/15