

# Information System Architectures

## Weeks 10, 11

- **Questions:**

- What is an information system architecture?
- What alternatives are available?
- What are tradeoffs among alternatives?
- How would one choose?
- What complicates architectures description/decisions?
- What alternatives are prevalent in different circumstances?

- **Plan**

- Monday – Architectures and Alternatives
- Wednesday – Tradeoffs among architectures
- Friday – Prevalent architectures and complicating factors
- *Project – Providing recommendations about alternative...*

# Information System Architectures

## Warm-up

- Challenge: How to support students in finding open courses during registering?
- Assume:
  - Course registration information is stored on a database that the university maintains.
  - SQL query required is simple, something like...

```
SELECT courseName, allowableEnrollment-currentlyEnrolledCount as openSlots  
FROM courseEnrollments  
WHERE currentlyEnrolledCount < allowableEnrollment
```

# Information System Architectures

## Warm-up

- What are possible strategies by which user could get a response?
- What type of architecture does each strategy represent?

# Information Systems “Architectures”

**Architecture:** A specific configuration of hardware and software to accomplish the major components of a computing system. The major components are...

- Input/Output: Responsible for
  - Formatting and presenting data on the user’s screen or other output device,
  - Managing user input from a keyboard or other input device.
- Processing: Responsible for processing done to use data, such as
  - Data processing logic (e.g., data validation & identification of errors),
  - Business rules logic (specifically rules not coded at the DBMS level), and
  - Data management logic (identifying data for processing transaction or query).
- Storage: Includes for
  - Responsibility for data storage in from the physical storage
  - Responsibility for data retrieval from the physical storage
  - Actual data

**Observation** – *“Approach” from the previous list illustrates different architectures...*

# Stand-alone Architecture

- Explanation:
  - Single computer handles all components
- Example:
  - Give users a copy of database and database software
  - Give users a copy of a special course registration software application and the database...(everything local)

# Client Server Architecture

- General Description: A networked computing model that distributes components between clients, which request services, and servers, which supply the requested services.
  - Client:
    - The machine with which user interacts (local machine)
    - Sends a message to a server **requesting** that the server perform a task
  - Server:
    - A machine that performs tasks at the request of a client.
    - A shared resource...

*Different client-server architectures stem from different distributions of responsibilities across clients and servers.*

# Client-Server 1: File Server

- **General:**
  - Server is responsible for storing files
  - Client is responsible for everything else
    - Processing (applications, DBMS) and
    - Input and output
- **Examples**
  - Put the database on a file server and let students interact with it using a copy of the DBMS (e.g., Access).

# Client-Server 2: Database Server Only

- General:
  - Server contains database and software for interacting with data (DBMS)
  - Client is responsible for special application programs and for I/O
- Examples
  - A command line interface permits students to directly ask questions of the DMBS
  - A local application sends data requests to database server
  - Similar to calling a database administrator and telling them example what SQL query to execute.

# Client-Server 3: Three-tier Architecture

- General:
  - Two servers: one to manage data, one to handle applications between user and data.
  - Client is responsible for I/O
  - Note: Three tiered b/c (1) client, (2) application server, and (3) data server
- Examples

Similar to having users call an information line through which they can state their question and the person at the other end will provide the answer.

# Client-Server 3b: Web Architecture

- General: A form of 3-tier architecture
  - Web server – processes input from browser, creates pages
  - Data server – provides data to web server, holds data
  - Client - Browser is client, manages display
- Example...
  - Current system on university website...*

