# Architectural Patterns

Sections 6.3, 6.4

CMPT 276
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# Topics

1) What are architectural patterns?
2) What is the advantage of using known application architectures?

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# Architectural patterns

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• Object Oriented Design patterns:
  – Common "low level" patterns such as observer and decorator.
  – Used when implementing a system.

• Architectural pattern:
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  – Has been tried and tested in different environments.

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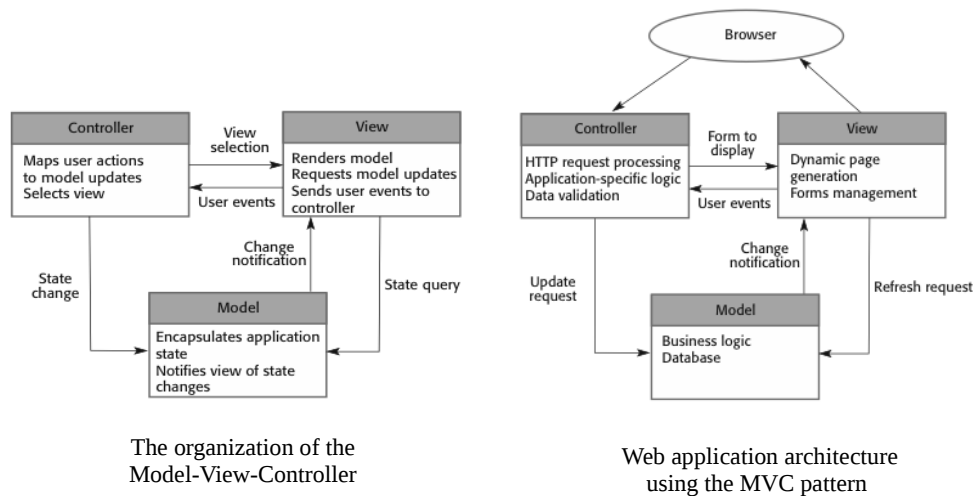
# Model-View-Controller (MVC) pattern

| Name | MVC (Model – View – Controller) |
|---|---|
| Description | |
| | - Model:<br>- View:<br>- Controller: Manages user-interaction. |
| Example | A telephone dialer application: the phone numbers should be stored separate from how they are displayed on the screen. |
| When used | When there are multiple ways to view & interact with the data. Or, when requirements for future interaction are unknown. |
| Advantages | |
| | Supports multiple views of the same data, and changing the data in one view changes it in all views. |
| Disadvantages | Can add complexity to code if the data (model) and interactions are simple. |

# MVC Diagrams



The organization of the
Model-View-Controller

Web application architecture
using the MVC pattern

# Layered Architecture

| Name | **Layered Architecture** |
|---|---|
| **Description** | |
| | with related functionality associated with each layer. A layer provides services to the layers above it. |
| **Example** | A web-based library information system. |
| **When used** | |
| | Different teams developing different layers of the system; System requires multiple levels of security. |
| **Advantages** | Able to replace an entire layer of the system, as long as.. |
| **Disadvantages** | Reduces performance due to multiple levels of interpretation, can be difficult to design a clean separation between layers. |

# Layered architecture diagrams



A generic layered architecture

The architecture of the LIBSYS system
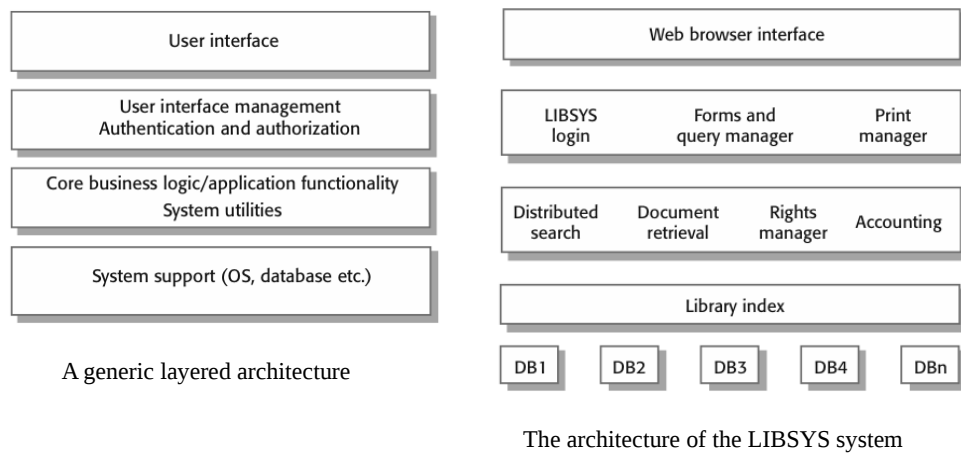
# Client-server architecture

| Name | **Client-server Architecture** |
|---|---|
| **Description** | |
| | The functionality is organized into.. Each service delivered by a separate.. ..use the servers. (Client and server may be on same computer.) |
| **Example** | Network file server, web-server (ex: Apache). |
| **When used** | When a shared database or service |
| | Can replicate servers as required to balance system load. |
| **Advantages** | Servers can be distributed over a network, Many clients use service without implementing it. |
| **Disadvantages** | Server can be a.. for denial of service attack. |

# Client-server example
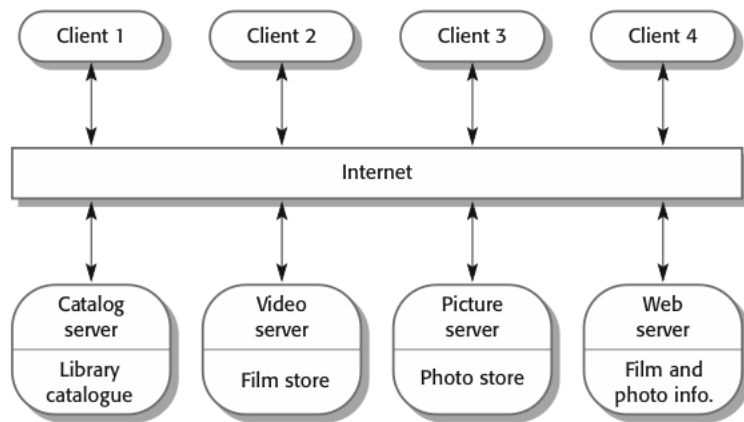


A client-server architecture for a film library

# Application Architectures

# Application architectures

- Generic application architecture:

| Application Types | Description |
| --- | --- |
| **Data processing** | Data driven app. that... without explicit user intervention during the processing. |
| **Transaction processing** | Data-centred applications that process user requests and... - Ex: E-commerce systems; Reservation systems. |
| **Event processing** | Applications where system actions depend on interpreting events from the system's environment. |
| **Language processing** | Applications where the commands are specified in a formal language that is processed by the system. - Ex: Compilers; Command interpreters. |

# Transaction processing systems

- Process user requests for information from a database or requests to update the database.
  - Users requests are then processed by...
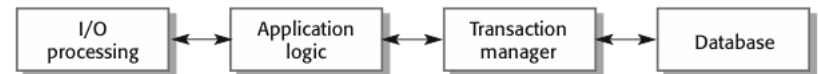


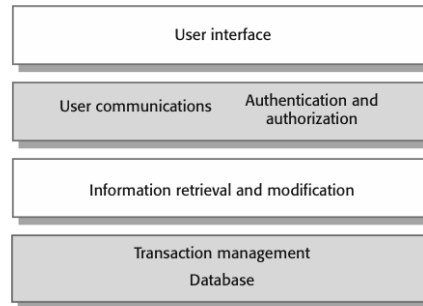The structure of transaction processing applications.

# Web-based information systems

- Web-based Information systems:
  - Transaction-based systems, because these systems generally involve database transactions.
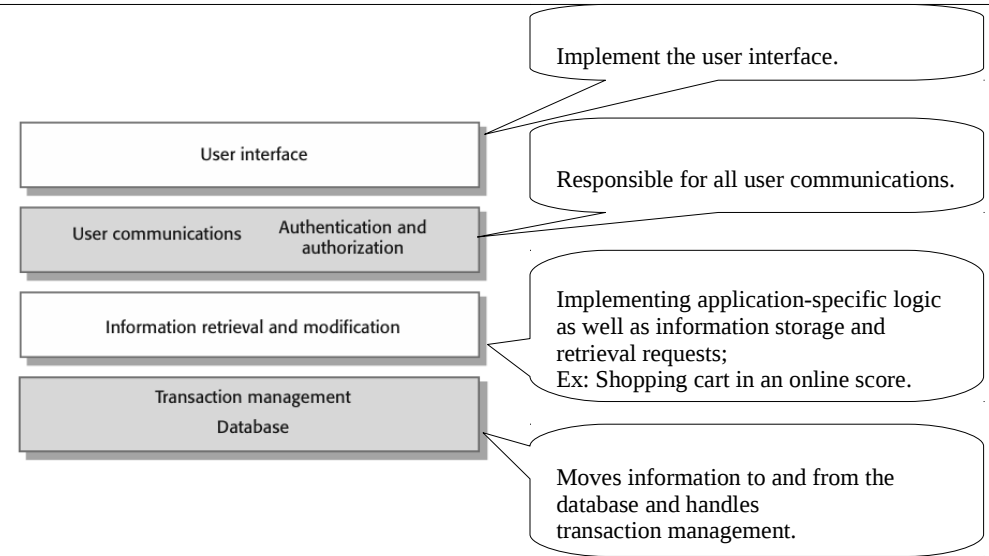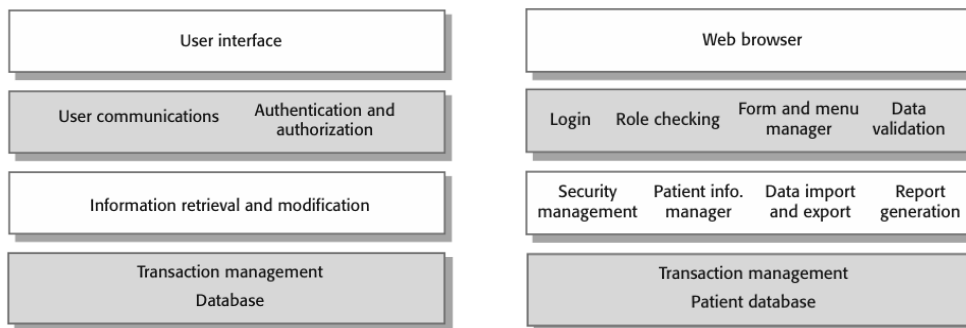- These systems are often implemented as...

  (discussed in Chapter 18)

# Web-based system layers



Implement the user interface.

Responsible for all user communications.

Implementing application-specific logic as well as information storage and retrieval requests;
Ex: Shopping cart in an online score.

Moves information to and from the database and handles transaction management.

# MHC-PMS' architecture



Generic web-based layered architecture.

MHC-PMS specific architecture.

# Summary

- Architectural patterns are a means of reusing knowledge about generic system architectures.
  - Describes the architecture;
  - Explain when it may be used; and
  - Describe its advantages and disadvantages.
- Models of application systems architectures help us reuse large components.
  - Web-based information systems are transaction-based systems implemented as multi-tier client/server architectures.