Architectural Design

Lecture # 26

Lecture by Engr. Sidra

Architectural Styles

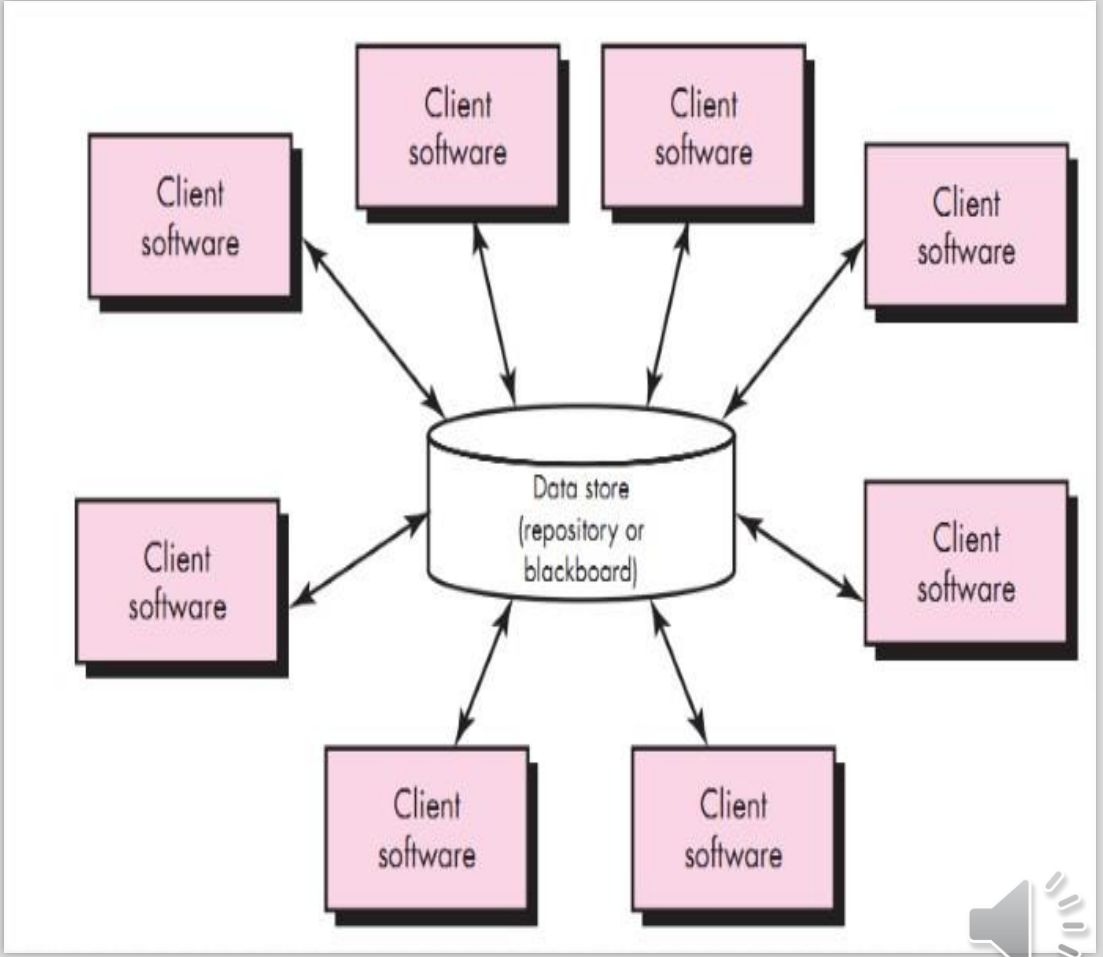
- Each style describes a system category that encompasses:
  - a set of components (e.g., a database, computational modules) that perform a function required by a system,
  - a set of connectors that enable "communication, coordination, and cooperation" among components,
  - constraints that define how components can be integrated to form the system, and
  - semantic models that enable a designer to understand the overall properties of a system.

Specific Styles

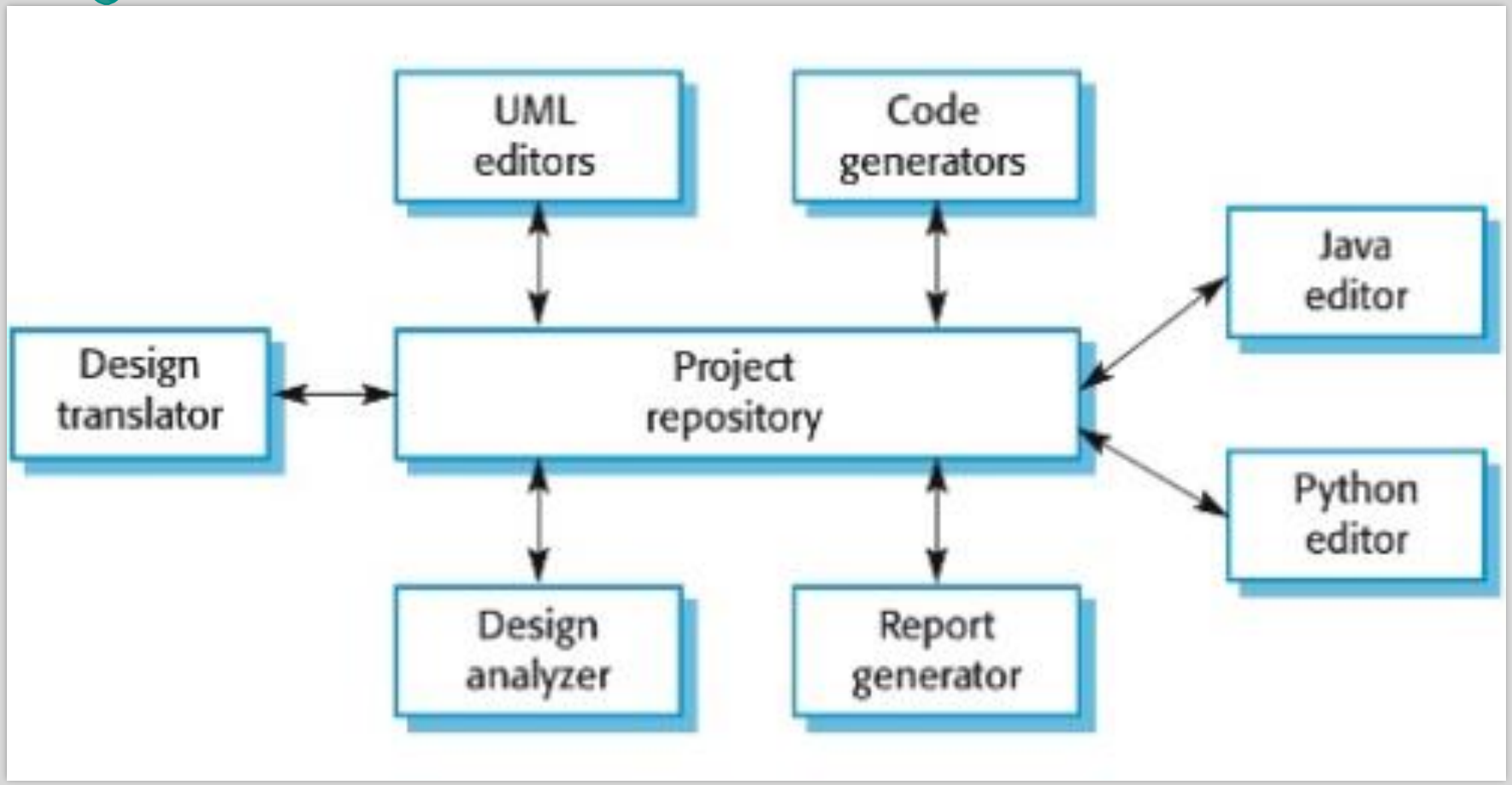
- Data-centered architecture
- Client-Server architecture
- Data flow architecture
- Call and return architecture
  - Main program or subprogram architecture
  - Remote procedure call architecture
  - Object-oriented architecture
  - Layered architecture

Data-Centered Architecture

- Repository architecture
- Sub-systems must exchange data. This may be done in two ways:
  - Shared data is held in a central database or repository and may be accessed by all sub-systems;
  - Each sub-system maintains its own database and passes data explicitly to other sub-systems.
- When large amounts of data are to be shared, the repository model of sharing is most commonly used as this is an efficient data sharing mechanism.

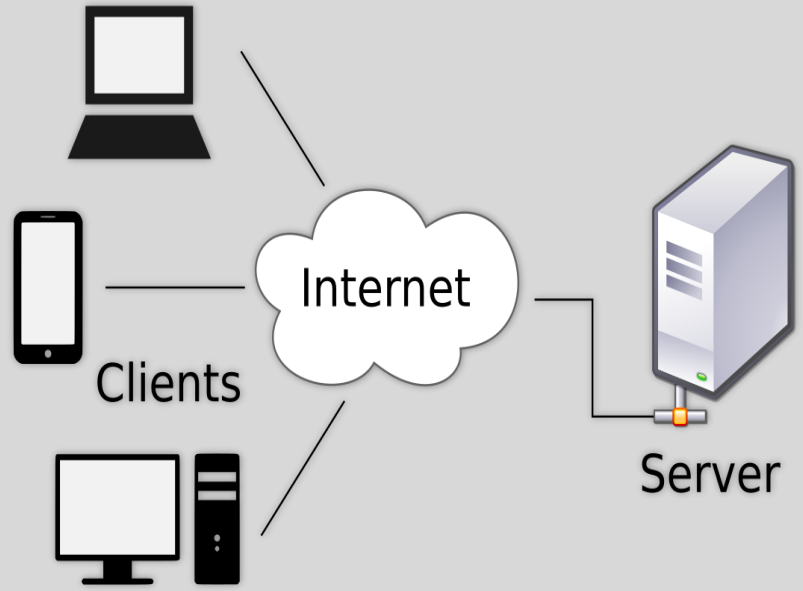


A Repository Architecture for an IDE

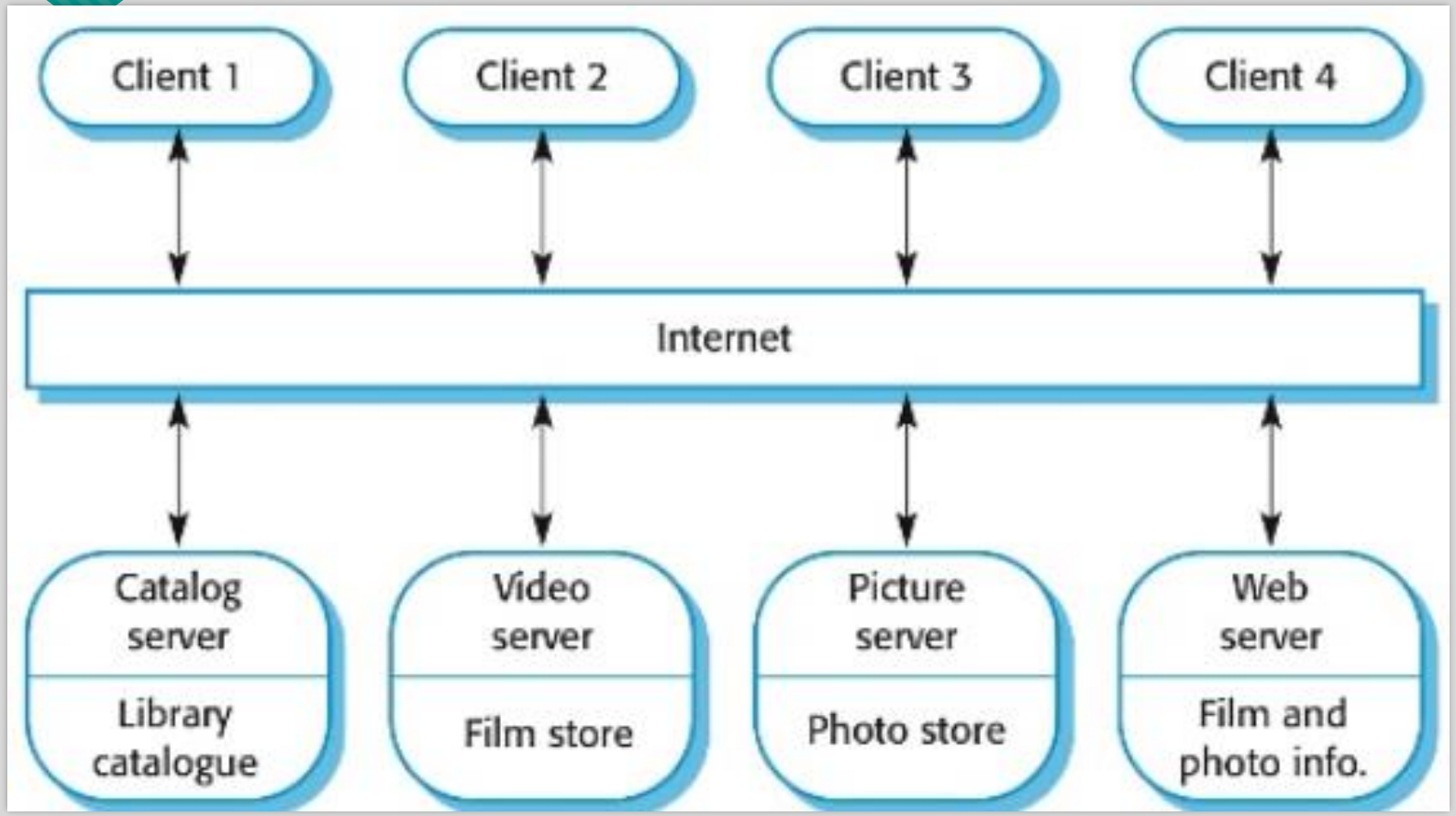


Client-Server Architecture

- Distributed system model which shows how data and processing is distributed across a range of components.
- Can be implemented on:
  - a single computer.
  - Set of stand-alone servers which provide specific services such as printing, data management, etc.
  - Set of clients which call on these services.
  - Network which allows clients to access servers

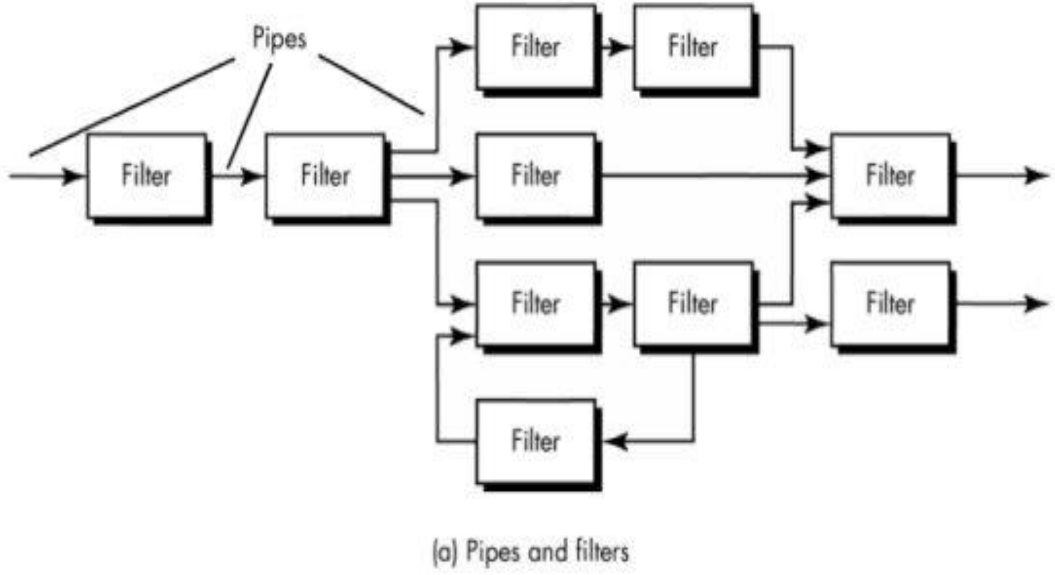


A Client-Server Archi. for Film Library



Data-Flow Architecture

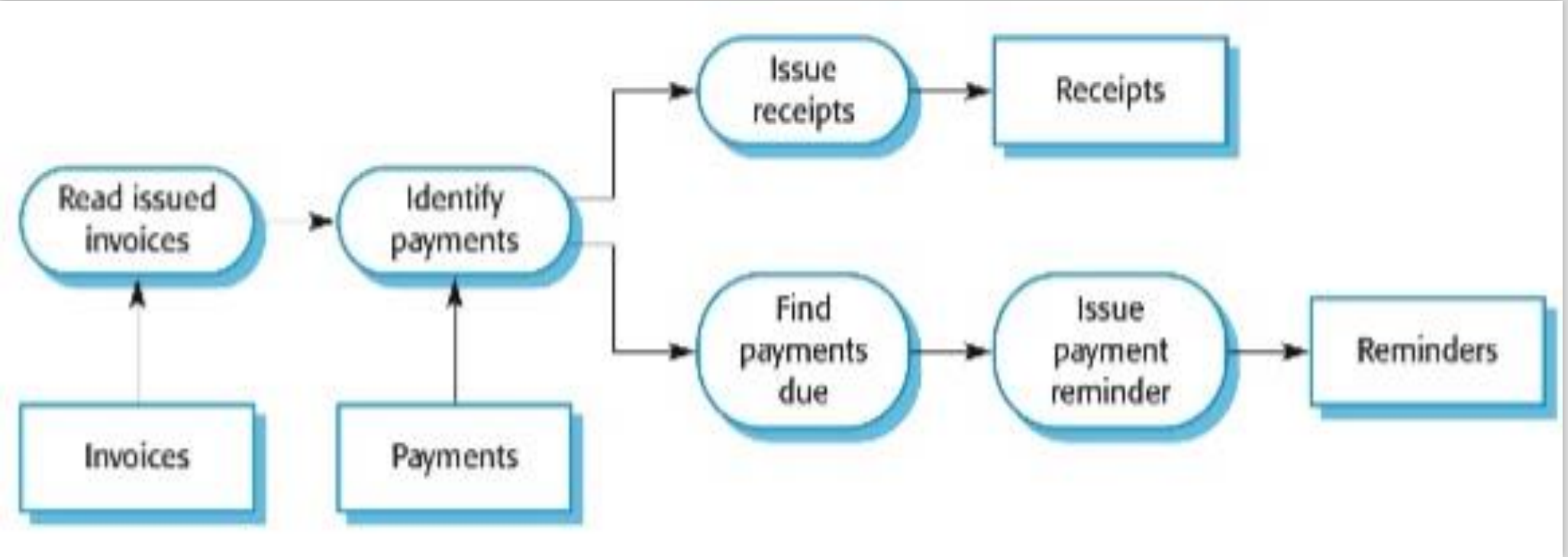
- Functional transformations process their inputs to produce outputs.
- May be referred to as a pipe and filter model
- Variants of this approach are very common. When transformations are sequential, this is a batch sequential model which is extensively used in data processing systems.
- Not really suitable for interactive systems



(a) Pipes and filters

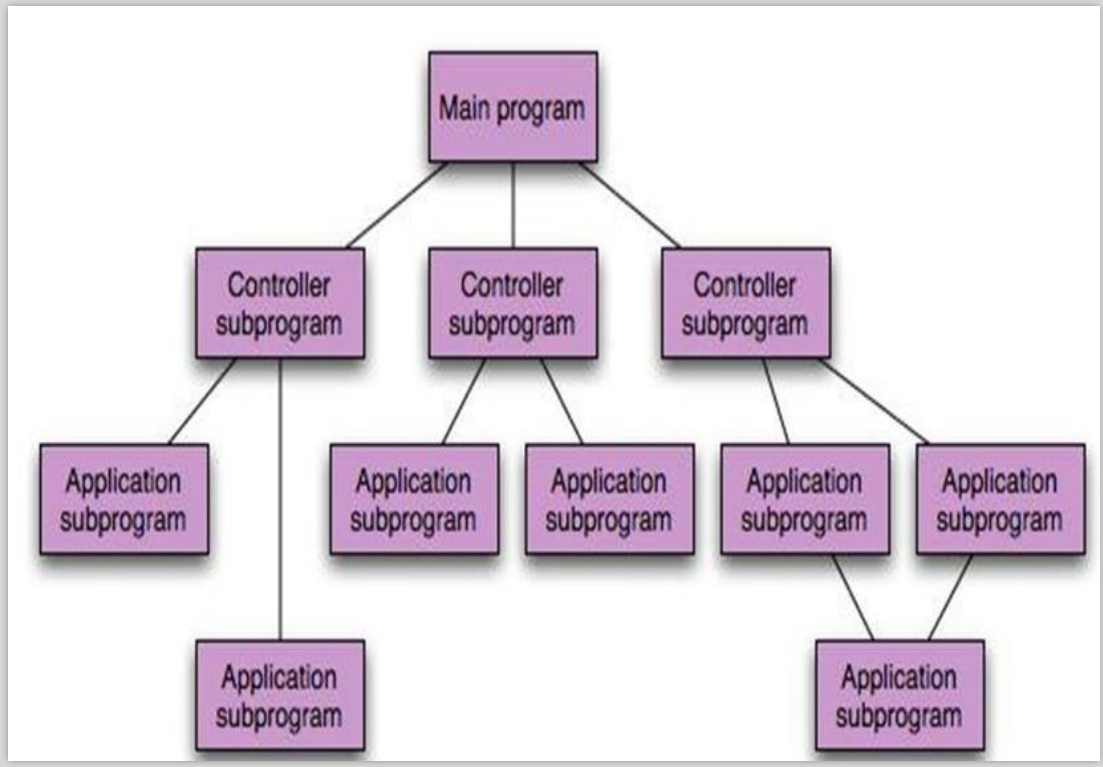
(b) Batch sequential

Example of Data-Flow Architecture



Call and Return Architecture

- **Main program or subprogram architecture:**
- The program is divided into smaller pieces hierarchically.
- The main program invokes many of program components in the hierarchy that program components are divided into subprogram



Call and Return Architecture

- **Remote procedure call architecture:**
  - The main program or subprogram components are distributed in network of multiple computers.
  - Remote Procedure Call (RPC) is a protocol that one program can use to request a service from a program located in another computer on a network without having to understand the network's details.
  - Uses Client Server Model