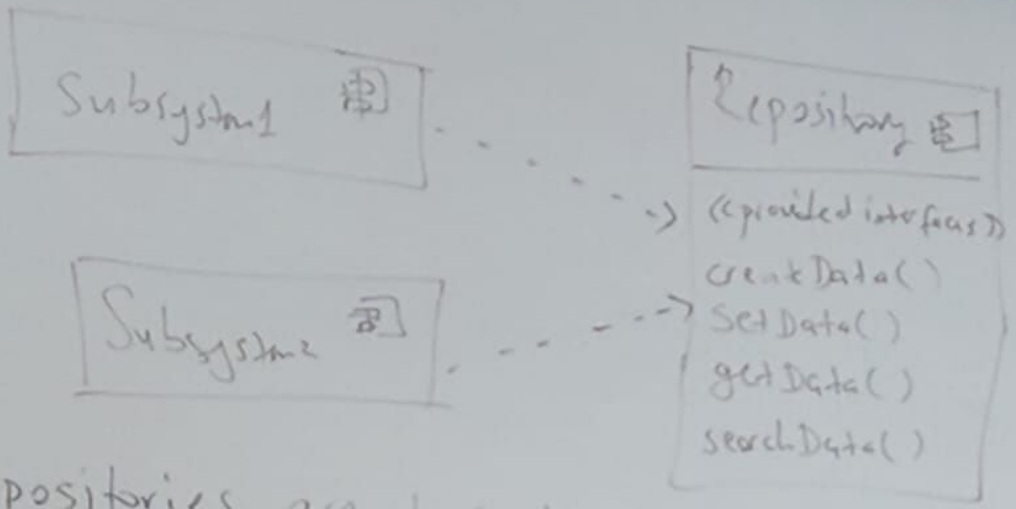
Architectural Styles: As the complexity of systems increases, the specification of system decomposition is critical.

↳ Identification of subsystems, services and their relationships to each other.

The architectural styles can be used as a basis for the architecture of different systems.

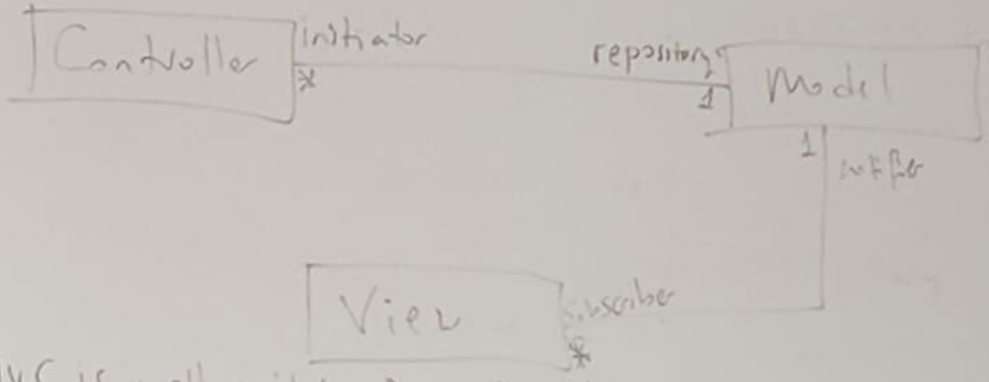
→ Repository: Subsystems access and modify a single data structure called the central repository. Subsystems are relatively independent and interact only through the repository. Every subsystem depends on only on a central data structure called the Repository. The Repository has no knowledge of the other Subsystems.



Repositories are typically used of database management systems, such as a payroll system or a bank system. The central location of the data makes it easier to deal with concurrency and integrity between subsystems.

Repositories are well suited for applications with constantly changing, complex data-processing tasks. Once a central repository is well defined, we can easily add new services in the form of additional subsystems. The main disadvantage of repository systems is that the central repository can quickly become a bottleneck.

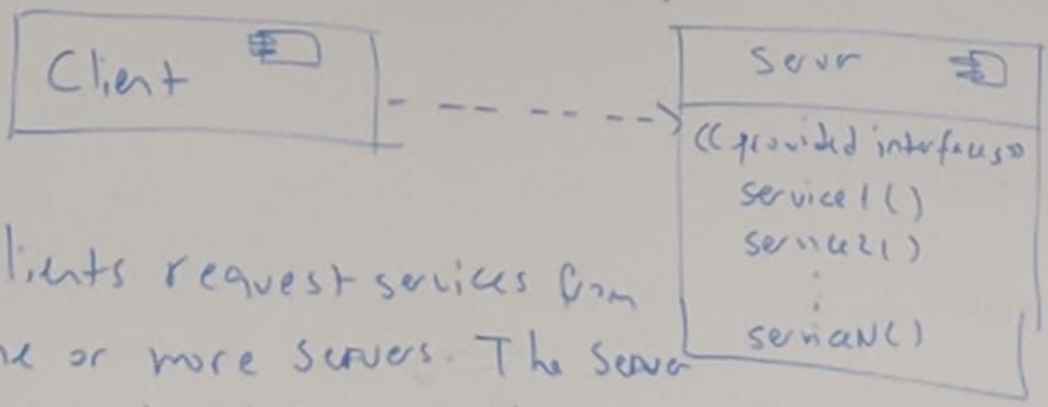
→ Model/View/Controller (MVC): subsystems are classified into 3 different types:
Model subsystems maintain domain knowledge,
View subsystems display it to the user
Controller subsystems manage the sequence of interactions with the user.
The model subsystems are developed such that they do not depend on any view or Controller subsystem



MVC is well suited for interactive systems, especially when multiple views of the same model are needed.

Client/Server : a subsystem, the server, provides services to instances of other subsystems called the clients, which are responsible for interacting with the user.

UML Component Diagram

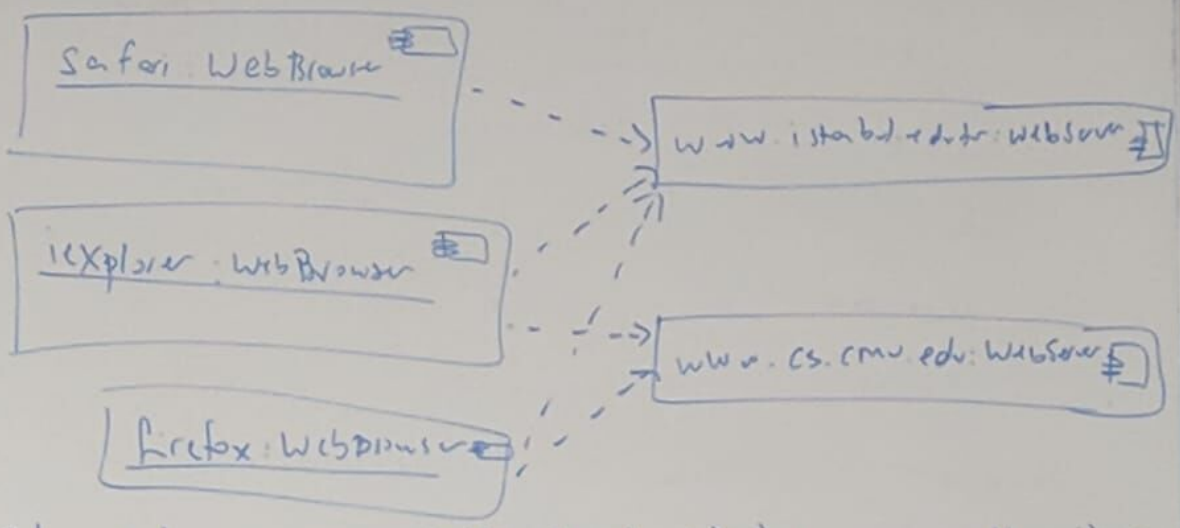


Clients request services from one or more servers. The server has no knowledge of the Client. This style is a specialization of the repository architectural style.

An information system with a central database is an example of a client/server architectural style.

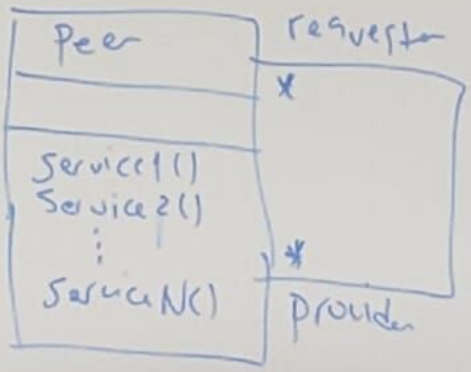
Client/server systems are not restricted to a single server. On the WWW, a single client can easily access data from thousands of different servers.

The Web as an instance of the client/server



Client/sever architectural styles are well suited for distributed systems that manage large amounts of data.

Peer-to-peer : Subsystems can act both as client or as servers. Each subsystem can request and provide services.



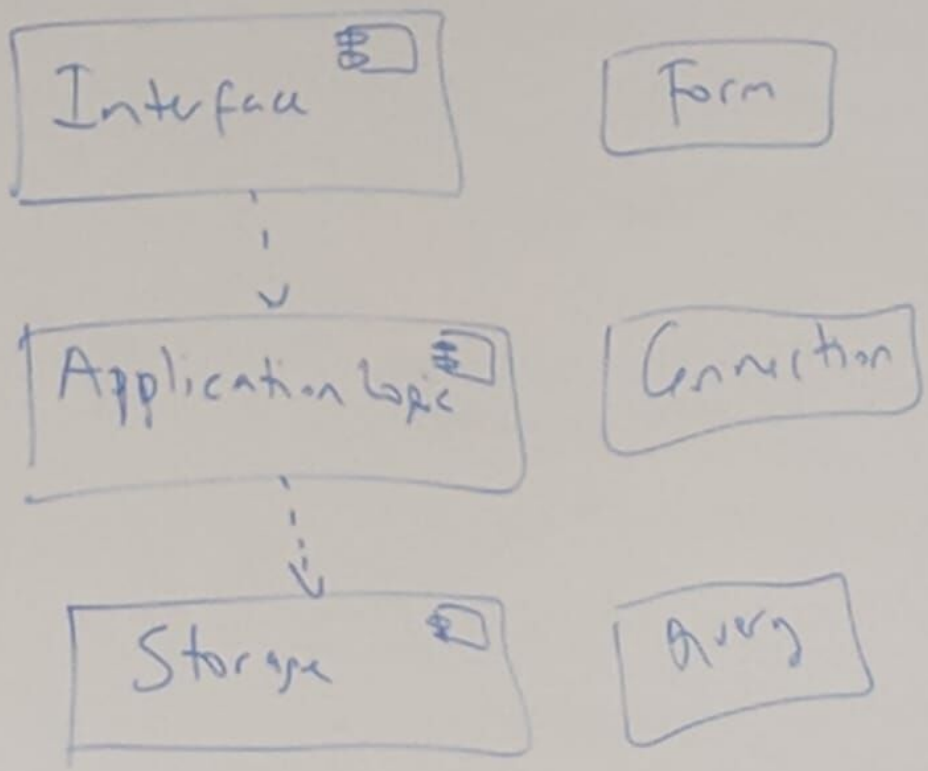
Peer-to-peer systems are more difficult to design than client/server systems because they have the possibility of deadlocks and complicate the control flow.

Three-tier organizes subsystems into 3 layers:

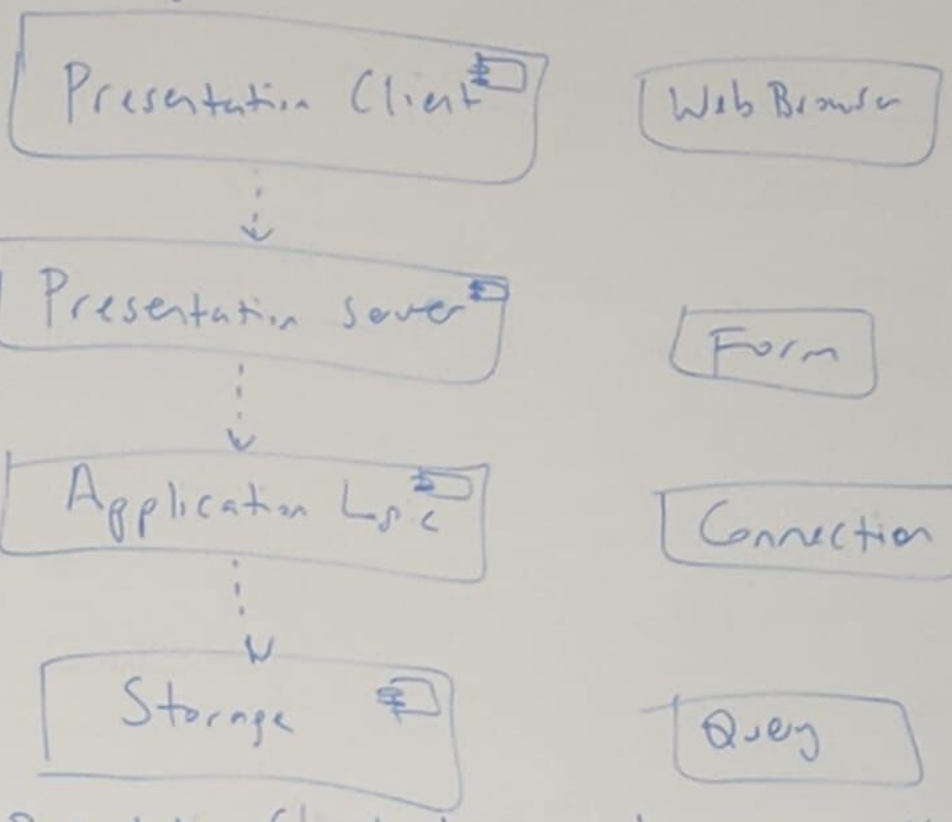
→ The interface layer includes all boundary objects that deal with the user, including windows, forms, web pages, etc.

→ The application logic layer includes all control and entity objects, realizing the processing, rule checking and notification required by the application.

→ The storage layer realizes the storage, retrieval and query of persistent data.

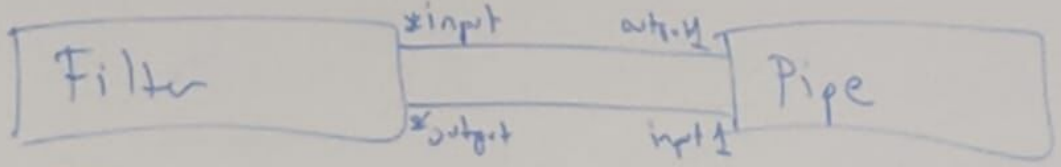


Four-tier: is a three-tier architecture in which the Interface Layer is decompored into a Presentation Client layer and a Presentation Server Layer.



The Presentation Client layer is located on the user machines whereas the Presentation Server layer can be located on one or more servers

Pipe-and-Filter : Subsystems process data received from a set of inputs and send results to other subsystems via a set of outputs.
The subsystems are called "filters" and the associations between the subsystems are called "pipes".
Each filter knows only the content and the format of the data received on the input pipes, not the filters that produced them.



A Filter can have many inputs and outputs.
A Pipe connects one of the outputs of a Filter to one of the inputs of another Filter.
∴ Filters can be substituted for others or reconfigured to achieve a different purpose.
The best known example of this architectural style is Unix shell.