Common Software Architecture Patterns

M-V-C

Software architecture - the structure of the system - that separates domain/application/business logic from the rest of the user interface. It does this by separating the application into three parts:

Model

The lowest level of the pattern which is responsible for maintaining data.

View

This is responsible for displaying all or a portion of the data to the user.

Controller

Software Code that controls the interactions between the Model and View.

Pipe & Filter

Pipe-And-**Filter**. A very simple, yet powerful **architecture**, that is also very robust. It consists of any number of components (**filters**) that transform or **filter** data, before passing it on via connectors (**pipes**) to other components.
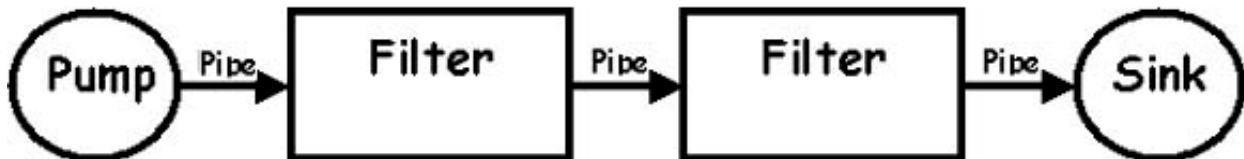

Pump: the data source. It can be astatic text file , or a key board input device, continuously creating new data, or data of another application.

• Pipe: is the connector that passes data from one filter to the next. It is a directional stream of data that is usually implemented by a data buffer to store all data, until the next filter has time to process it.

• Filter: transforms or filters the data it receives via the pipes with which it is connected. A filter can have any number of input pipes and any number of output pipes.

• Sink: or consumer is the data target. It can be another file, a DB, computer screen, or another application.

The layered architecture

The layered architecture pattern closely matches the traditional IT communication and organizational structures found in most companies, making it a natural choice for most business application development efforts.

Components within the layered architecture pattern are organized into horizontal layers, each layer performing a specific role within the application
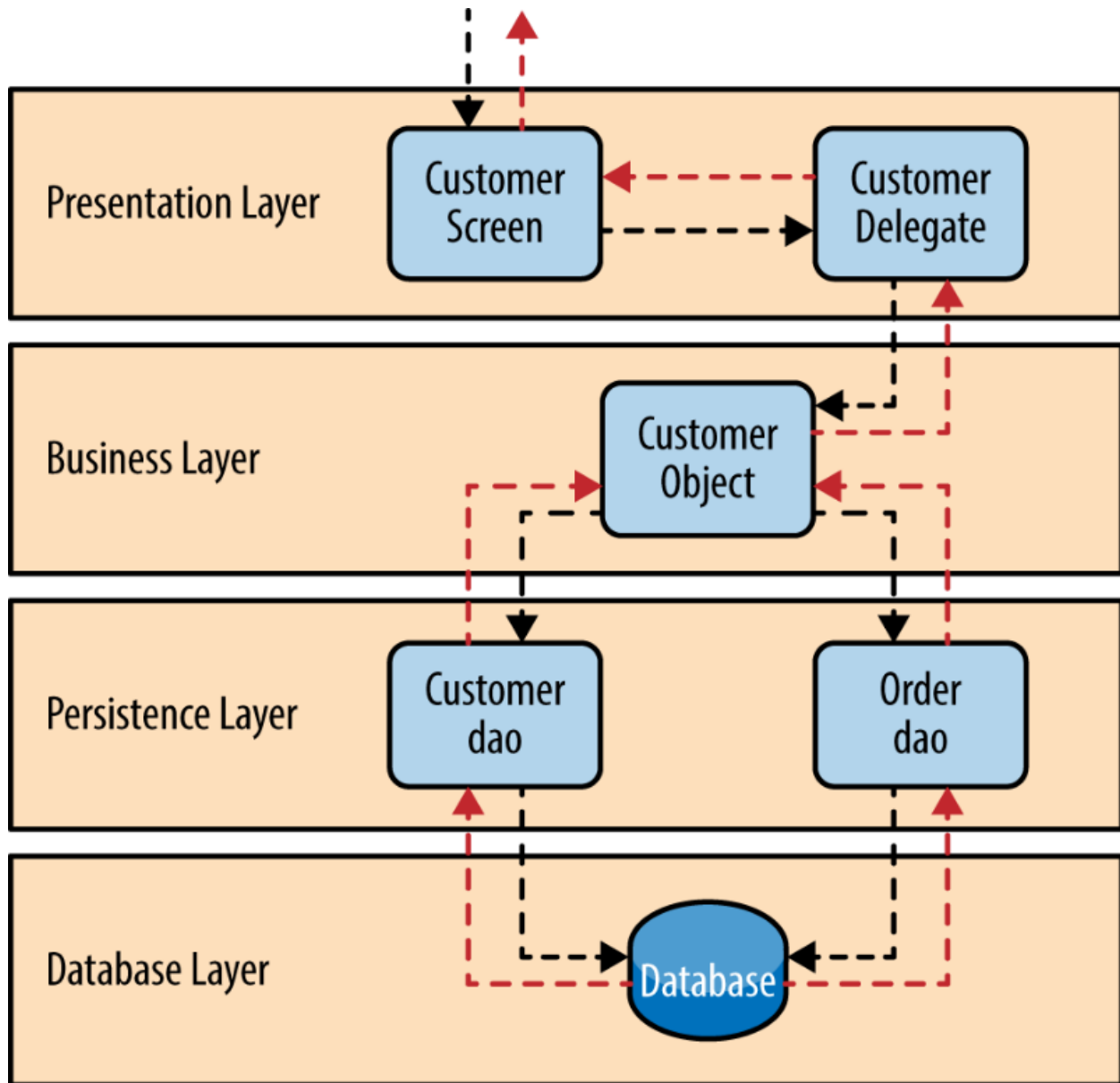
Microkernel

 The Microkernel architectural pattern applies to software systems that must be able to adapt to changing system requirements. It separates a minimal functional core from extended

functionality and customer-specific parts. The microkernel also serves as a socket for plugging in these extensions and coordinating their collaboration
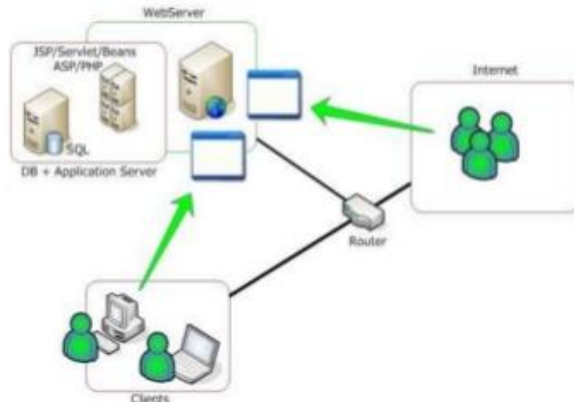
Client-server architecture

Is a network architecture in which each computer or process on the network is either a *client* or a *server*.

Servers are powerful computers or processes dedicated to managing disk drives (*file servers*), printers (*print servers*), or network traffic (*network servers*). Clients are PCs or workstations on which users run applications. Clients rely on servers for resources, such as files, devices, and even processing power.

Client-Server Architecture

- Web Server
  - Protocols
- Application Server
  - PC LAN application
- Database Server
  - 3 tier structure

Multitier Architecture

(Often referred to as *n-tier architecture*) or **multilayered architecture** is a client–server architecture in which presentation, application processing, and data management functions are physically separated. The most widespread use of multitier architecture is the **three-tier architecture**.

N-tier application architecture provides a model by which developers can create flexible and reusable applications. By segregating an application into tiers, developers acquire the option of modifying or adding a specific layer, instead of reworking the entire application. A three-tier architecture is typically composed of a *presentation* tier, a *domain logic* tier, and a *data storage* tier.

Application Logic Tier

Data Tier

Presentation / GUI Tier
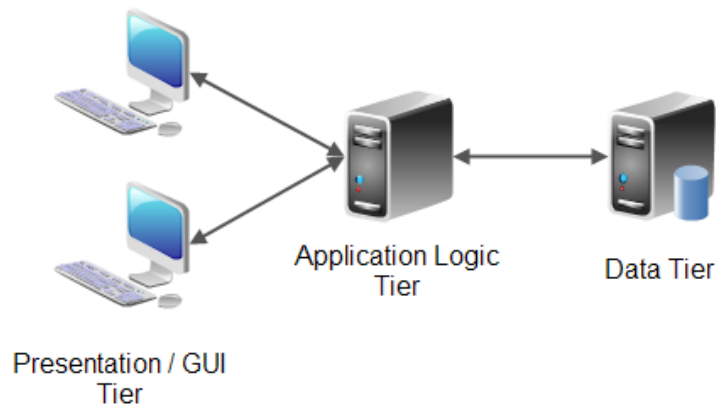
Repository Architecture

 A system that will allow several interfacing components to share the same data. Each component interfaces the same dataset that is utilized system wide. Data manipulation taking place in one component will reflect an identical representation of data in another component. Components can be interchanged and are independent of other system components. A good example of a repository architecture would be a database management system. Such a system would provide both a console and graphical user interface to update both the structure and dataset of any particular database.

Administrator

Course Feedback

Approvals

Repository

Registration

Reports
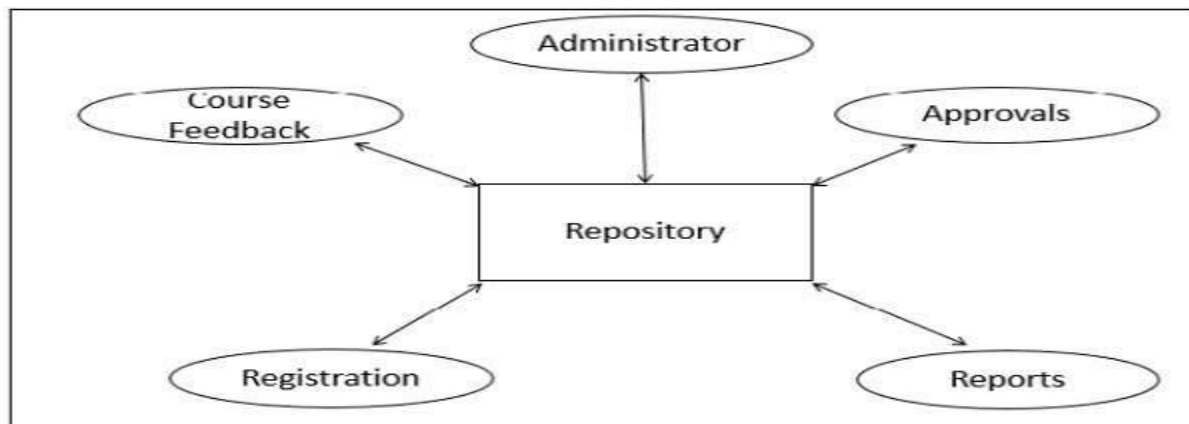
Blackboard system

is an artificial intelligence approach based on the blackboard architectural model where a common knowledge base, the "blackboard", is iteratively updated by a diverse group of specialist knowledge sources, starting with a problem specification and ending with a solution. Each knowledge source updates the blackboard with a partial solution when its internal constraints match the blackboard state. In this way, the specialists work together to solve the problem.

Multi-agent system (M.A.S.)

A computerized system composed of multiple interacting intelligent agents within an environment. Multi-agent systems can be used to solve problems that are difficult or impossible for an individual agent or a monolithic system to solve. Intelligence may include some methodic, functional, procedural approach, algorithmic search or reinforcement learning.
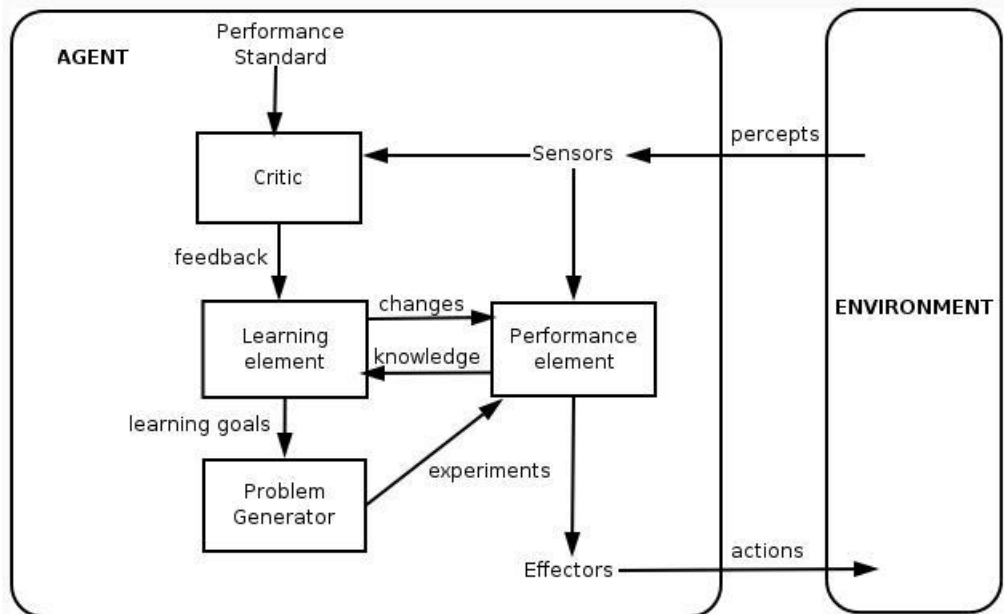

SOA

 Defined as the policies, practices, frameworks that enable application functionality to be provided and consumed as sets of services published at a granularity relevant to the service consumer. Service scan be invoked , published and discovered, and are abstracted away from the implementation using a single, standards based form of interface


Master / Slave

Master system is responsible for dispatching work of some sort to a collection of connected worker nodes / slaves. The slaves are usually specialized machines to optimize performance for the kind of work that they are intended to perform
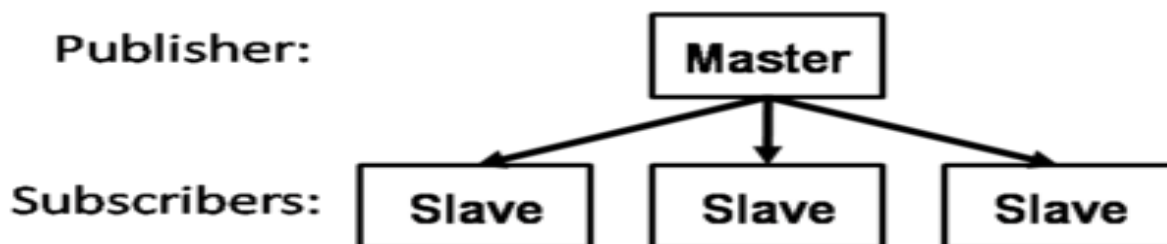
Message Bus

A combination of a common data model, a common command set, and a messaging infrastructure to allow different systems to communicate through a shared set of interfaces.
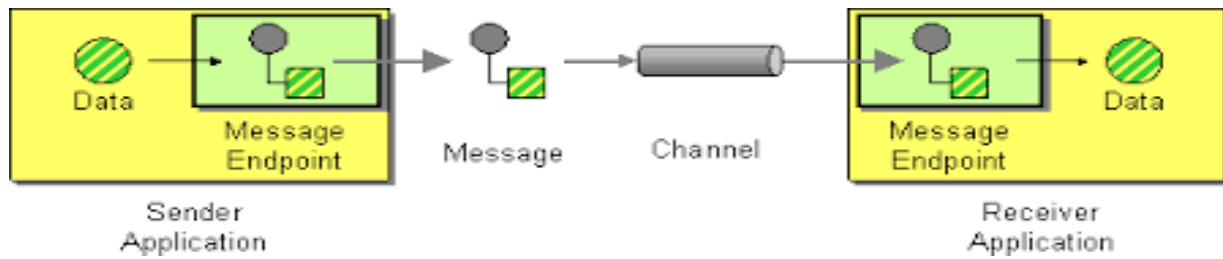
Peer-to-Peer

A Peer-to-Peer, or P2P, Service is a decentralized platform whereby two individuals interact directly with each other, without intermediation by a third-party, or without the use of a company of business selling a product or service. The buyer and the seller transact directly with each other via the P2P service