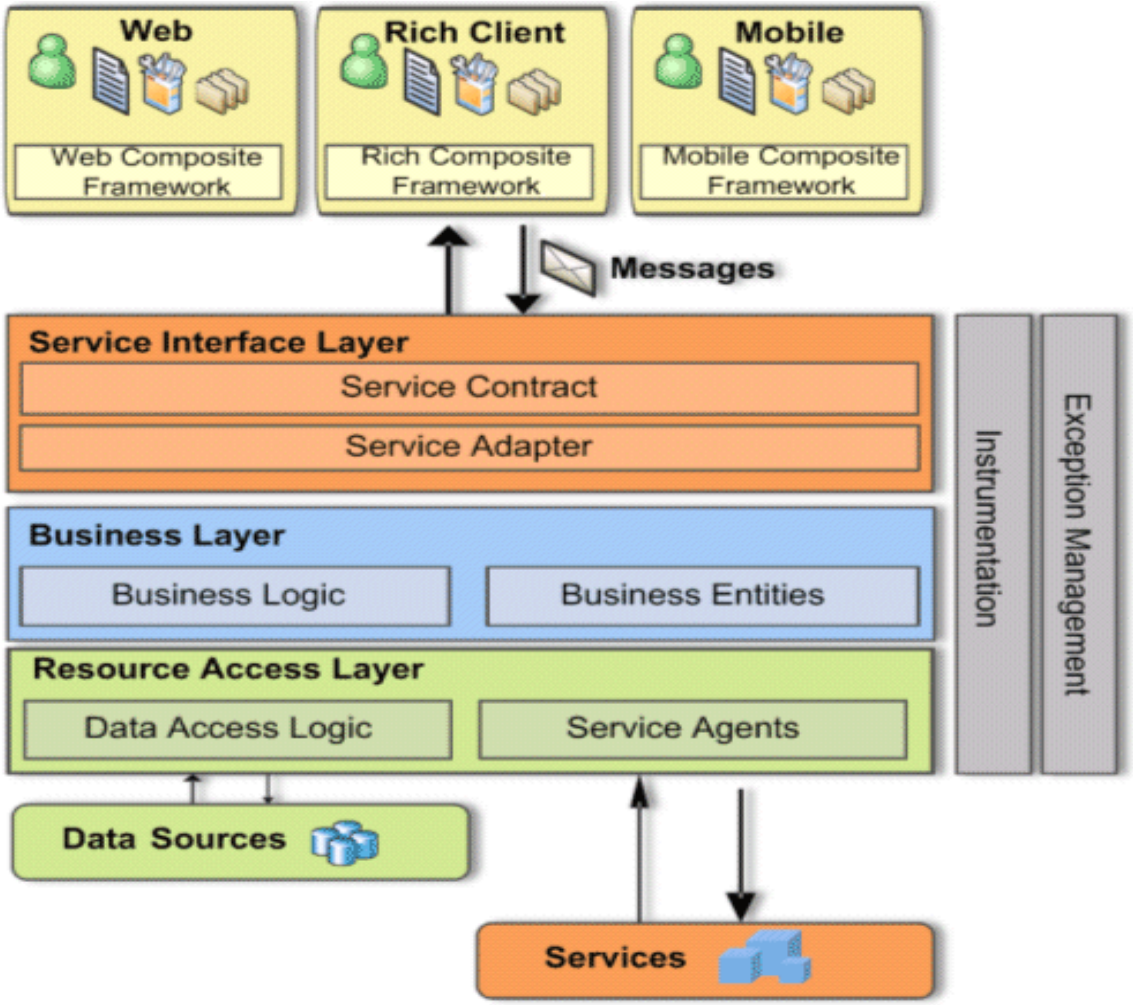
Software Architecture

Software Engineering

Theoretical Concepts

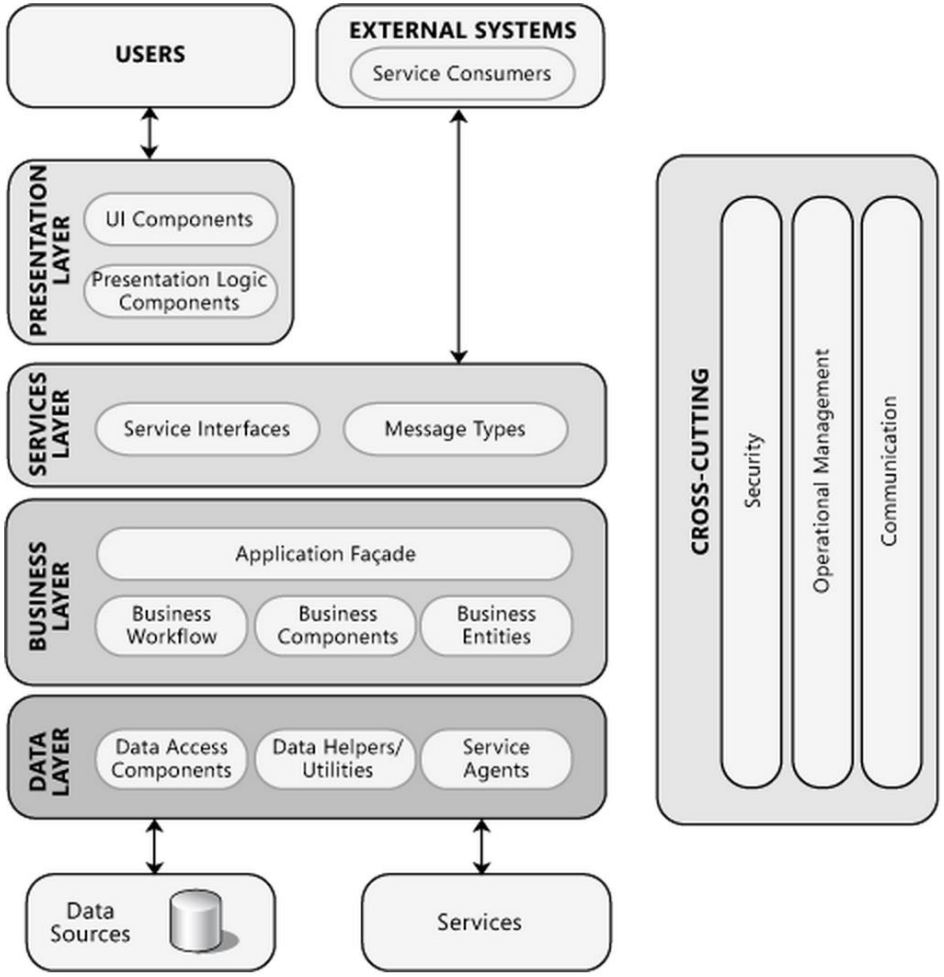
1. Software architecture definition.
2. Stakeholders.
    1. Management.
    2. Categorization.
3. Characteristics
    1. Separation of concerns.
    2. Quality-Driven.
4. Software architecture description language (ADL).
5. Architectural patterns:
    1. Client-server.
    2. Component-based.
    3. Data-centric.
    4. Event-driven.
    5. Layered.
    6. Peer-to-peer.
    7. Pipes and filters.
    8. Service-oriented.
9. Conclusion.
10. Questions.

Software Architecutre

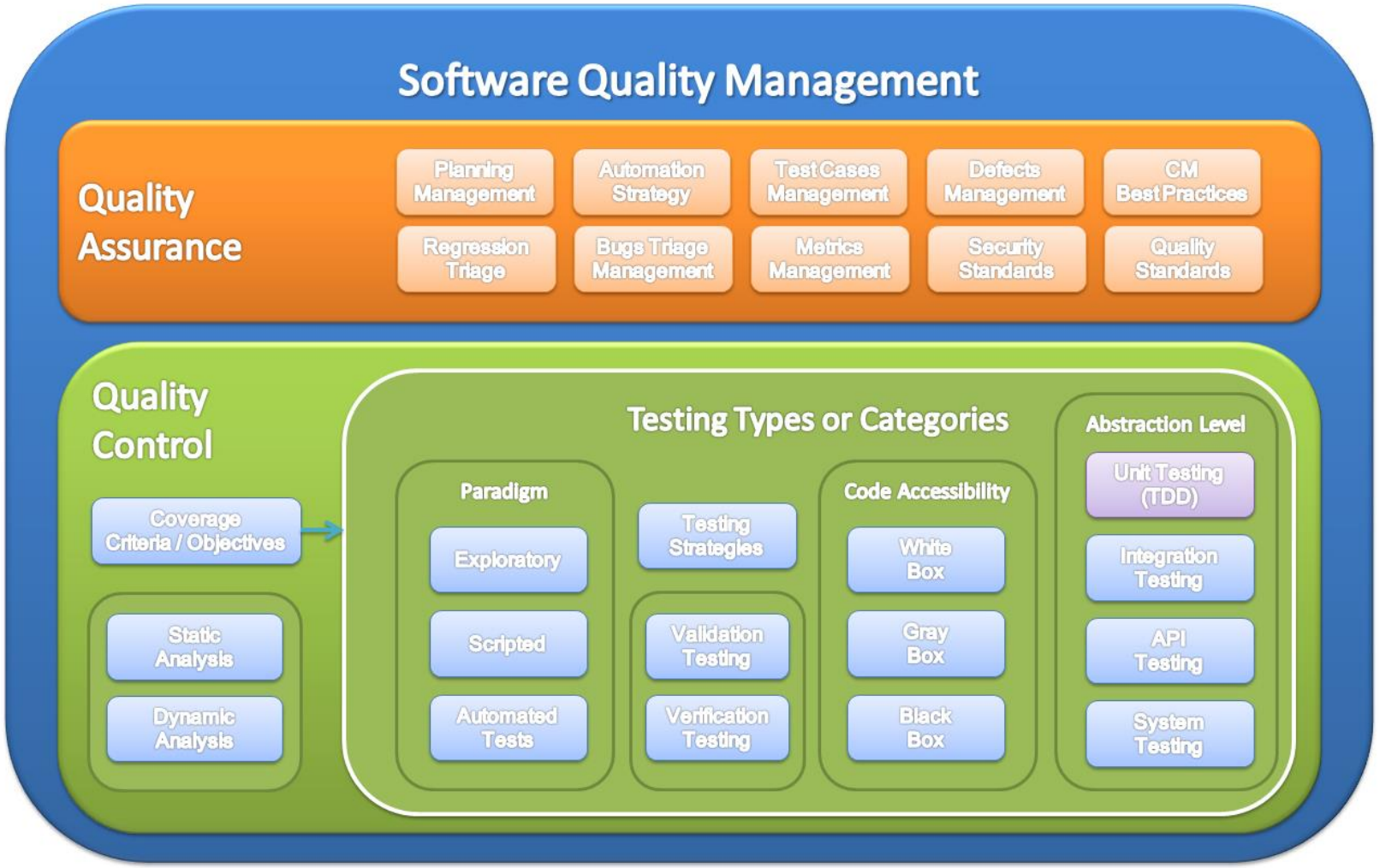


Stakeholders (management & categorization)

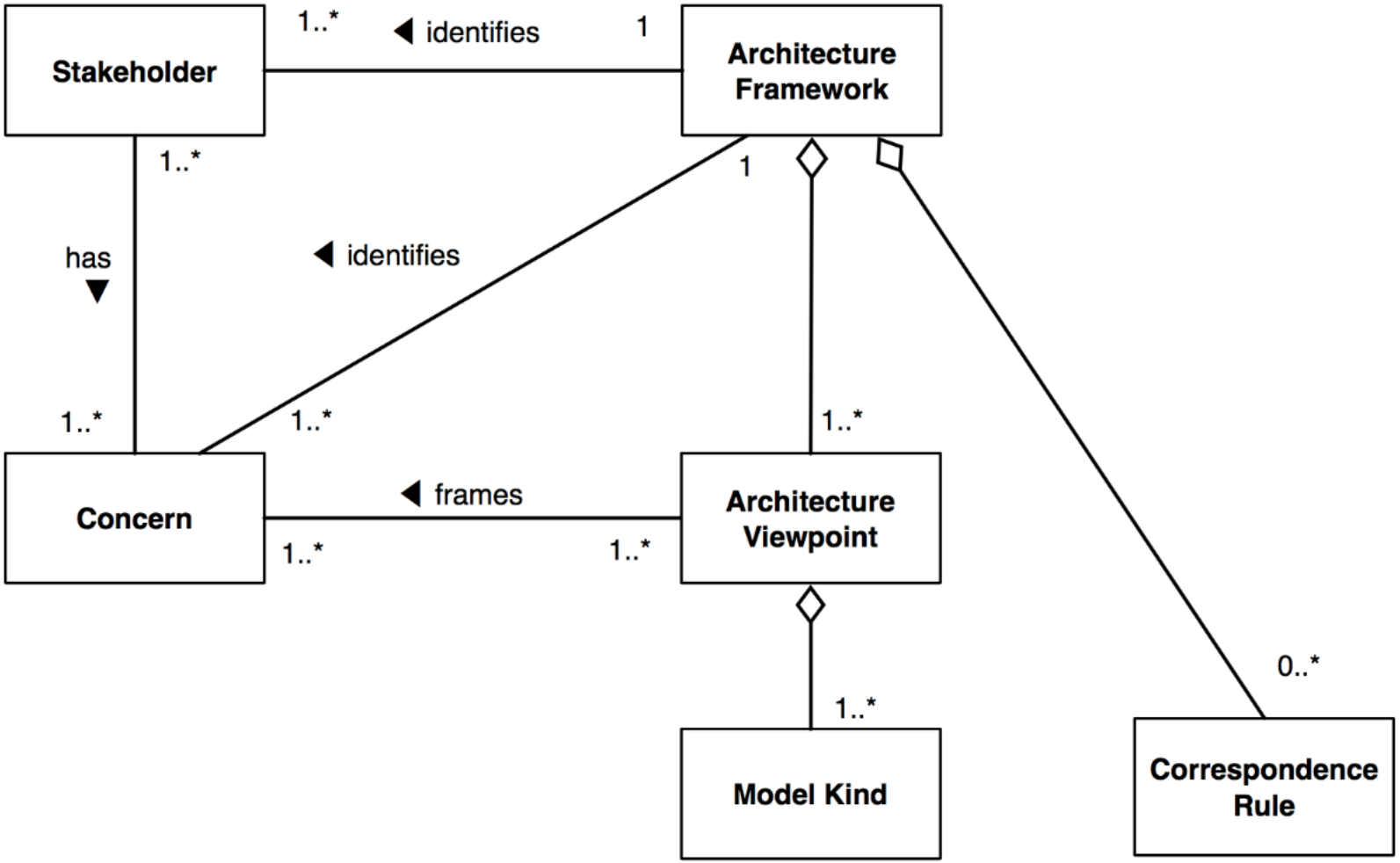
Separation of Concerns



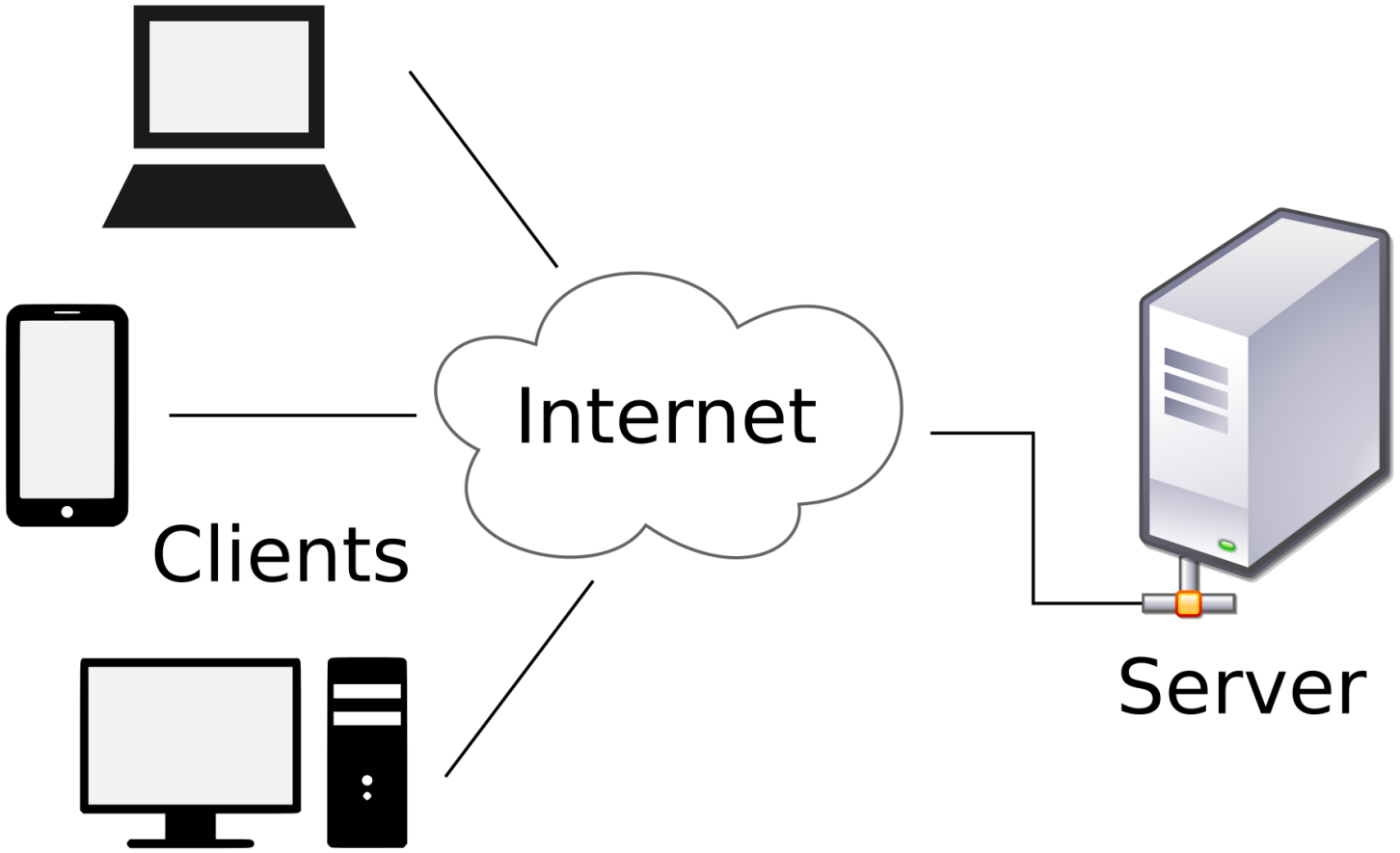
Quality-Driven



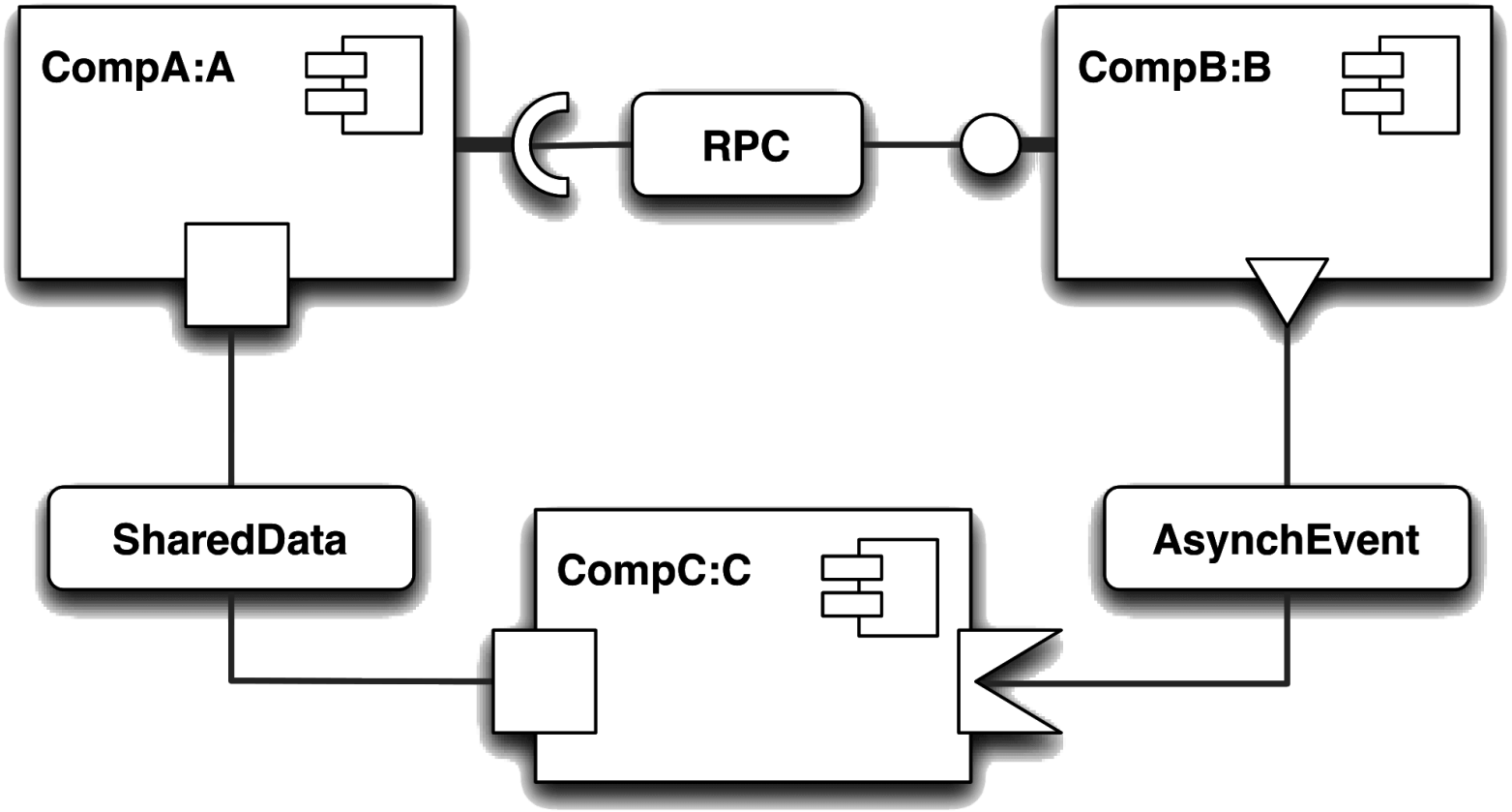
Software architecture description language (ADL)



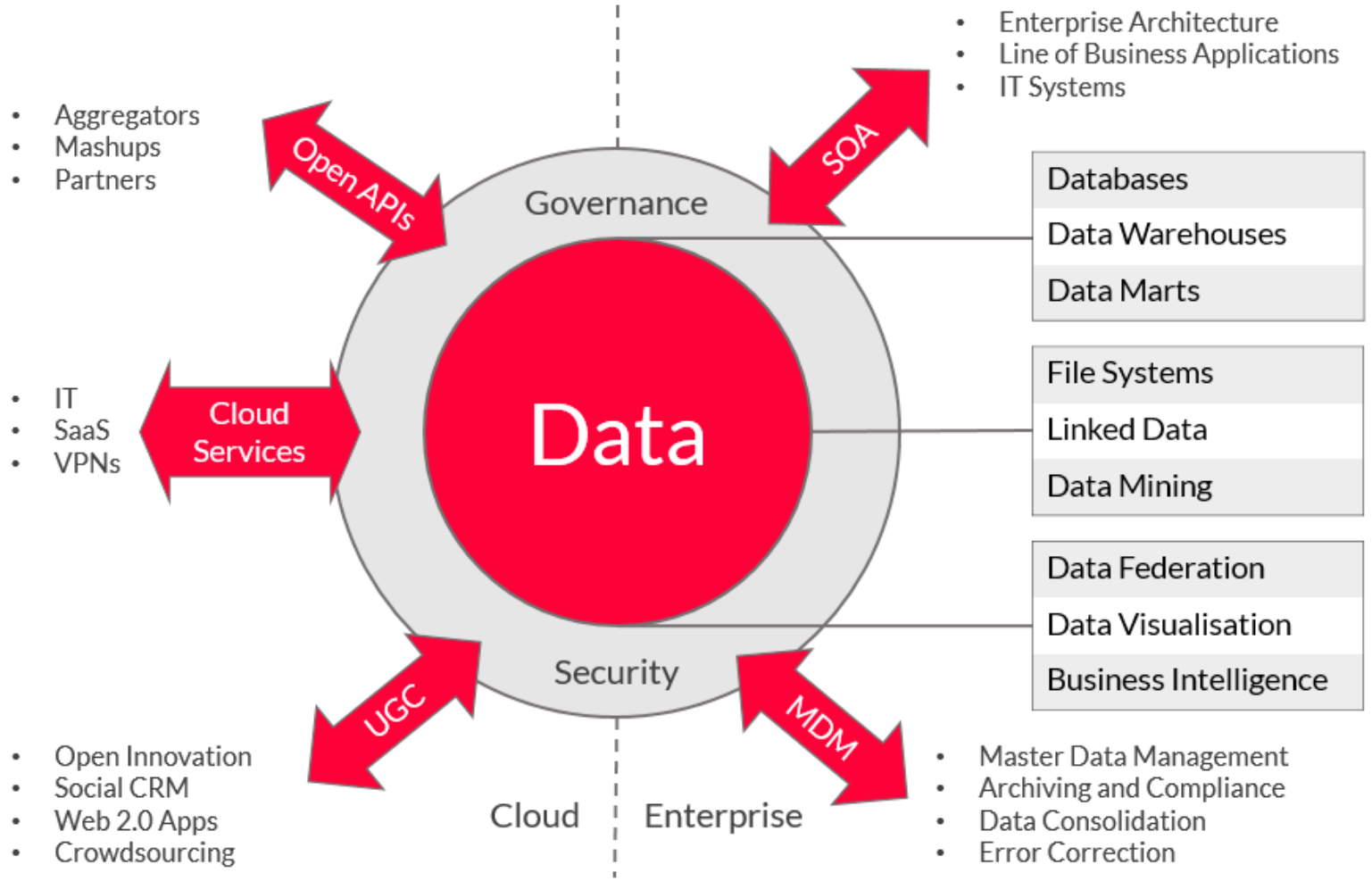
Architectural patterns(Client-Server)



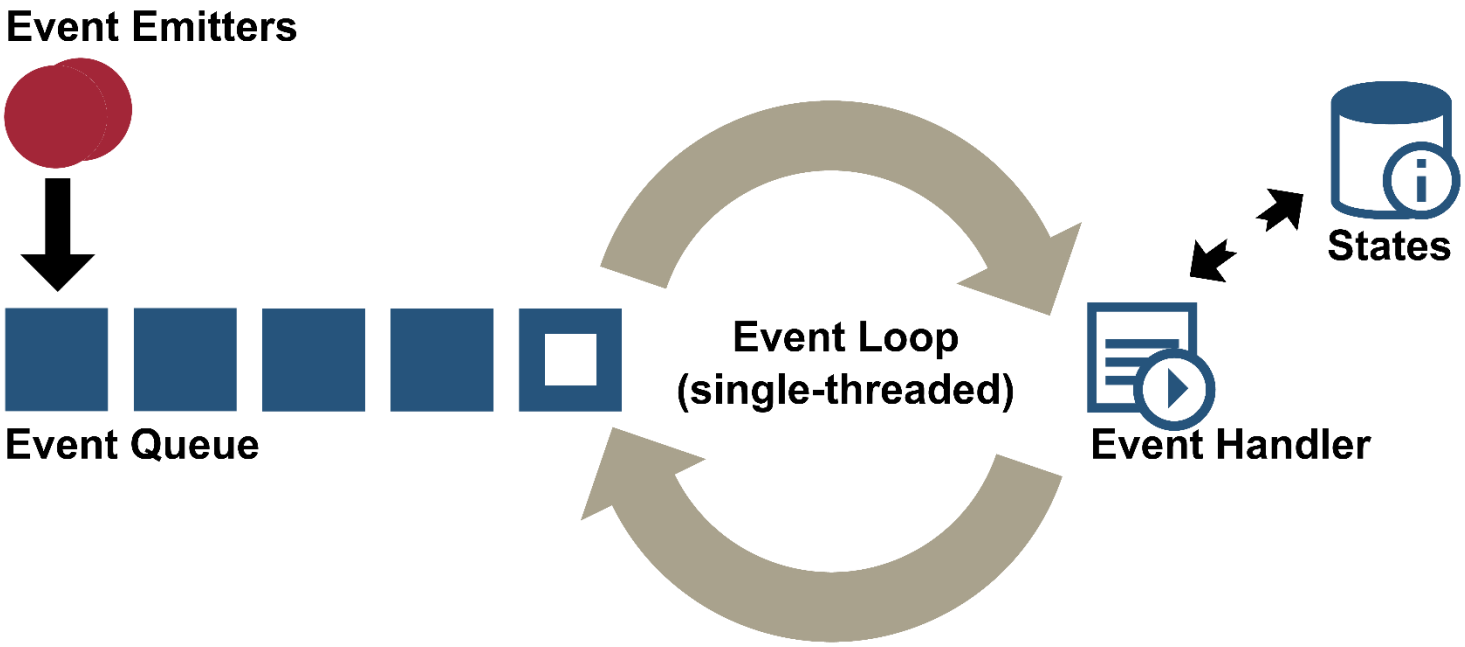
Architectural patterns(Component-Based)



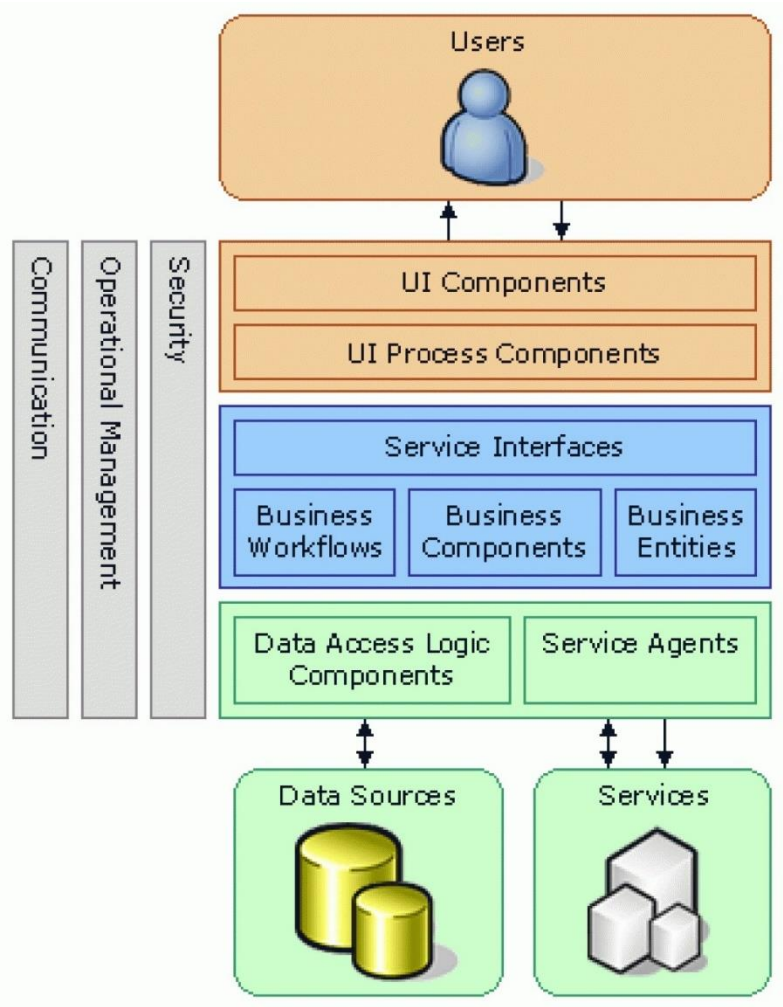
Architectural patterns(Data-Centric)



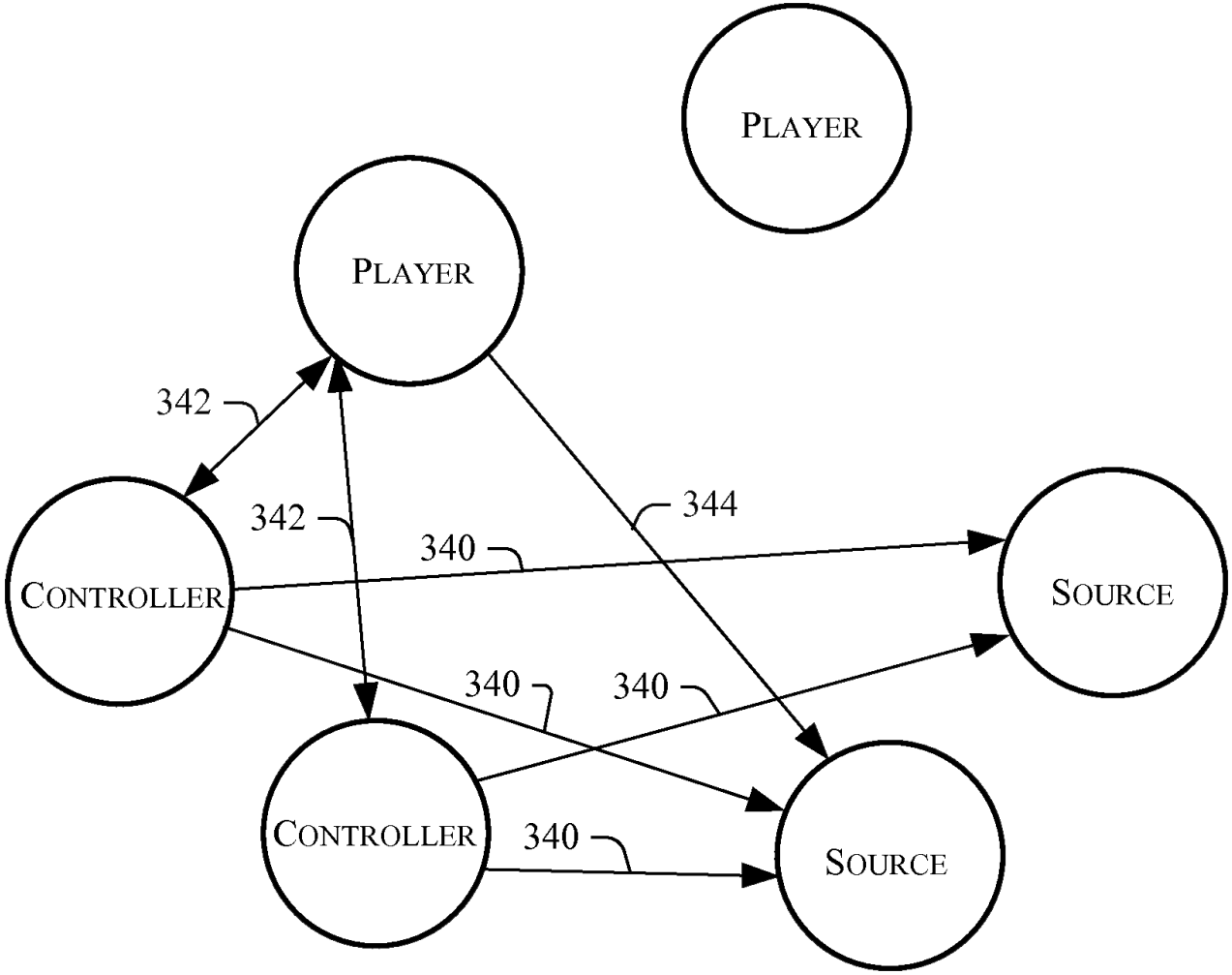
Architectural patterns(Event-Driven)



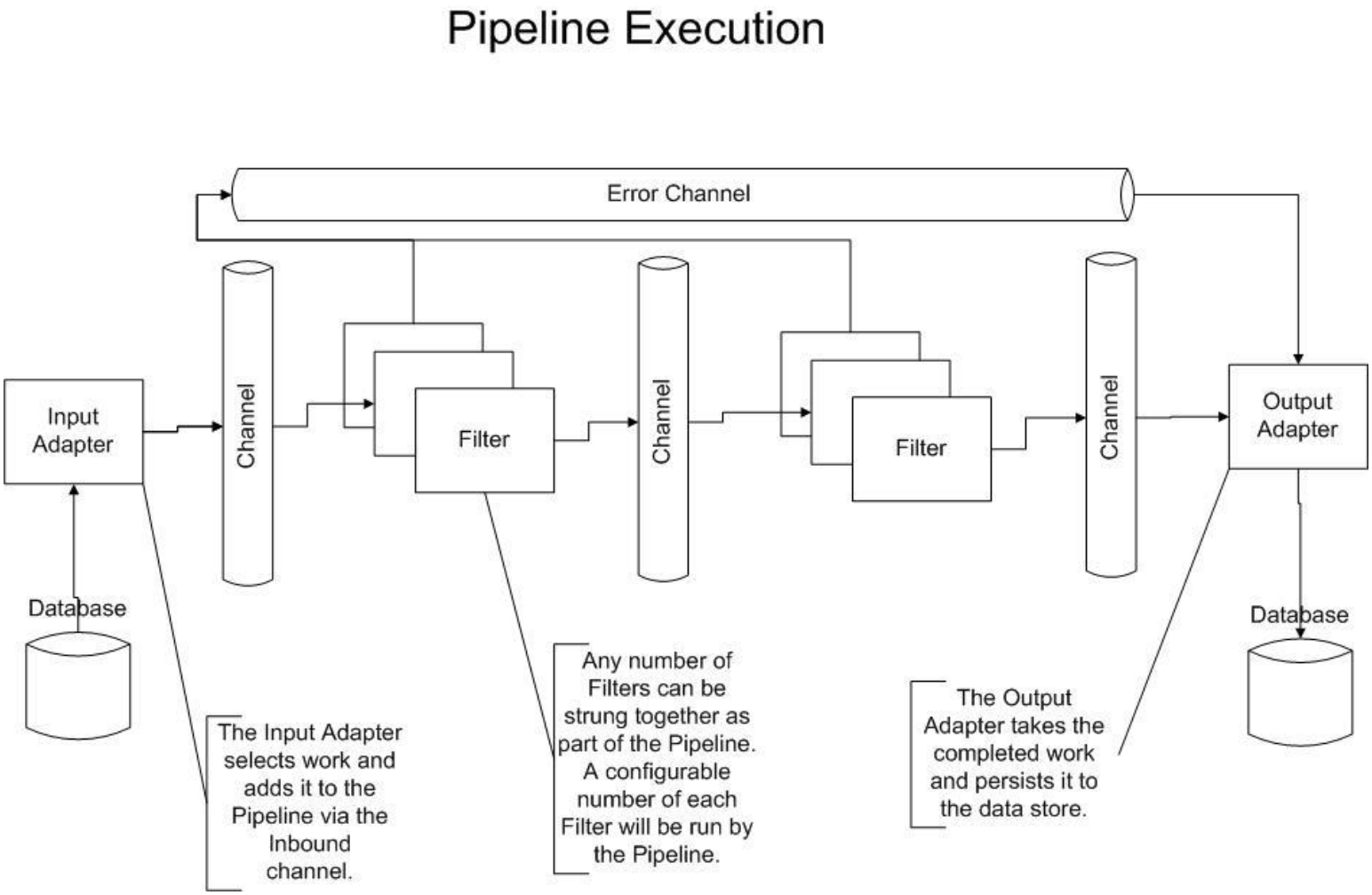
Architectural patterns(Layered)



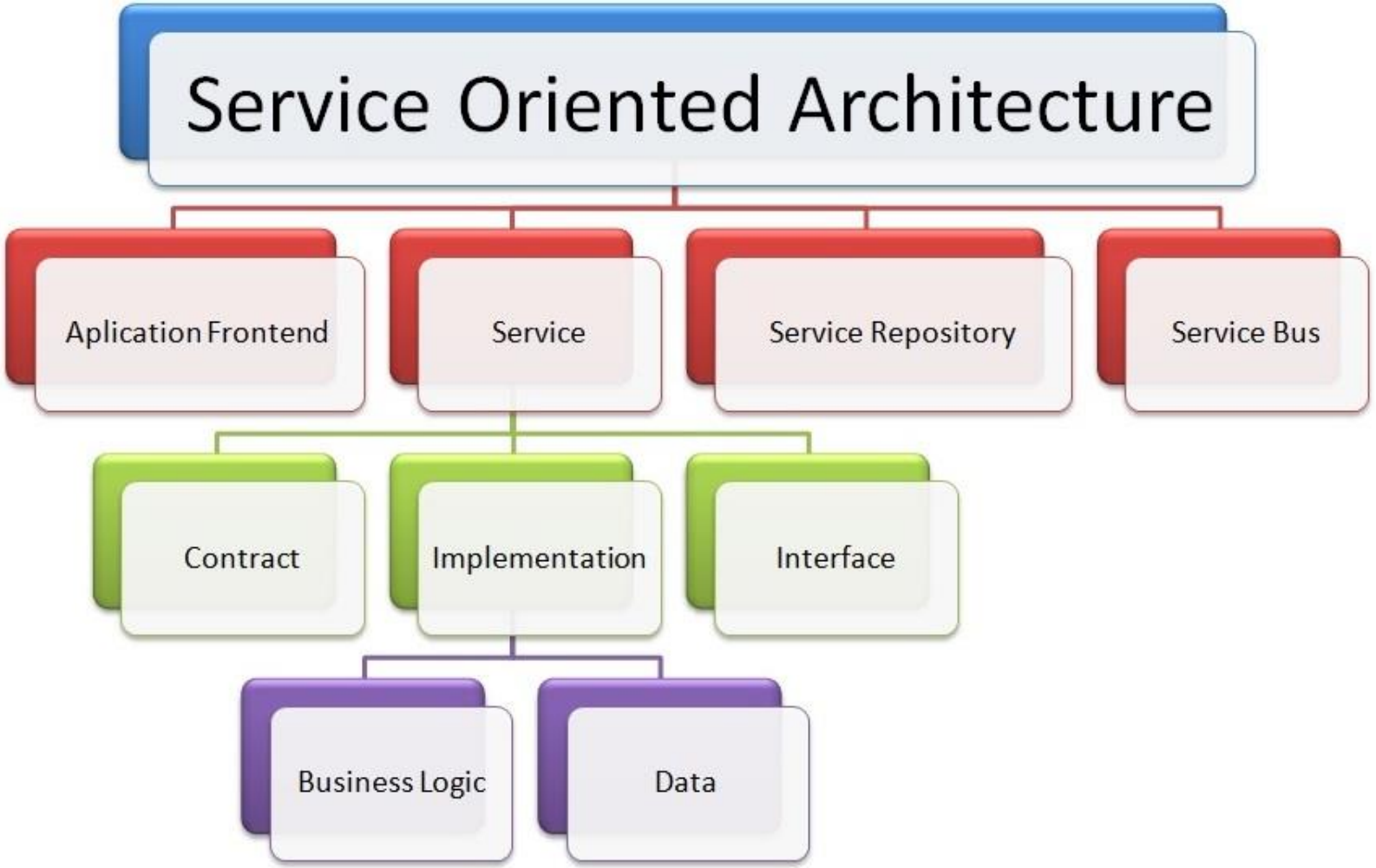
Architectural patterns(Peer-to-Peer)



Architectural patterns(Pipes and Filters)



Architectural patterns(Service-Oriented)



Conclusion

- **The software architecture** of a program or computing system is:
  - a depiction of the system that aids in the understanding of how the system will behave.
  - it serves as the blueprint for both the system and the project developing it.
- **Stakeholder**: A person, group or organization that has interest or concern in an organization.
- Software architecture characteristics:
  - **Separation of concerns**: divide an application into distinct features with as little overlap in functionality as possible. The important factor is minimization of interaction points to achieve high cohesion and low coupling.
  - **Quality driven**: it is a method to ensure qualities such as maintainability, modularity, scalability, or extensibility in software architectures and emphasizes the need for a person in charge (i.e. the software architect) to actively manage and control such qualities.

Conclusion (Cont.)

- **Software architecture description language (ADL)**:
  - Provides a means to model and analyze software architectures in order to improve software quality and correctness.
- **Architectural patterns**:
  - **Client-server**: Client-server architecture (client/server) is a network architecture in which each computer or process on the network is either a client or a server.
  - **Component-based**: It ensures applying separation of concerns to different functionalities available throughout a software system.
  - **Data-centric**: it is the architecture where databases are have the main role in.
  - **Event-driven**: is an architecture that orchestrates behavior around the production, detection and consumption of events as well as the responses they evoke.
  - **Layered**: A multilayered (software) architecture is using different layers for allocating the responsibilities of an application.

Conclusion (Cont.)

- **Peer-to-peer**: It is a commonly used computer networking architecture in which each workstation, or node, has the same capabilities and responsibilities.
- **Pipes and filters**: It provides a structure for systems that process a stream of data. Each processing step is encapsulated in a filter component. Data is passed through pipes between adjacent filters. Recombining filters allows you to build families of related filters
- **Service-oriented**: it is an approach used to create an architecture based upon the use of services. Services (such as RESTful Web services) carry out some small function, such as producing data, validating a customer, or providing simple analytical services.

Questions

1. What is software architecture?
2. List most used architectural patterns for distributed applications development.
3. When is it recommended to use event-driven architecture?
4. What are the advantages of using Separation-of-Concerns in software architectures?
5. Why does the Data-Centric architecture useful in Big Data applications?
6. List different types of stakeholders.
7. List 3 disadvantages of using ADLs.

Thanks!