SOFTWARE ARCHITECTURE AND DESIGN

CSC 815
3 units

MSC

BY

Dr. Chinwe
Peace Igiri

ARCHITECTURAL PATTERNS

Architecture Patterns

DEFINITION

An architectural pattern is a general, reusable solution to a commonly occurring problem in software architecture within a given context.

TYPES

- Layered Architecture
- Pipe and Filter
- Client Server
- Model View Controller
- Event Driven Architecture
- Microservices Architecture

Layered Patterns

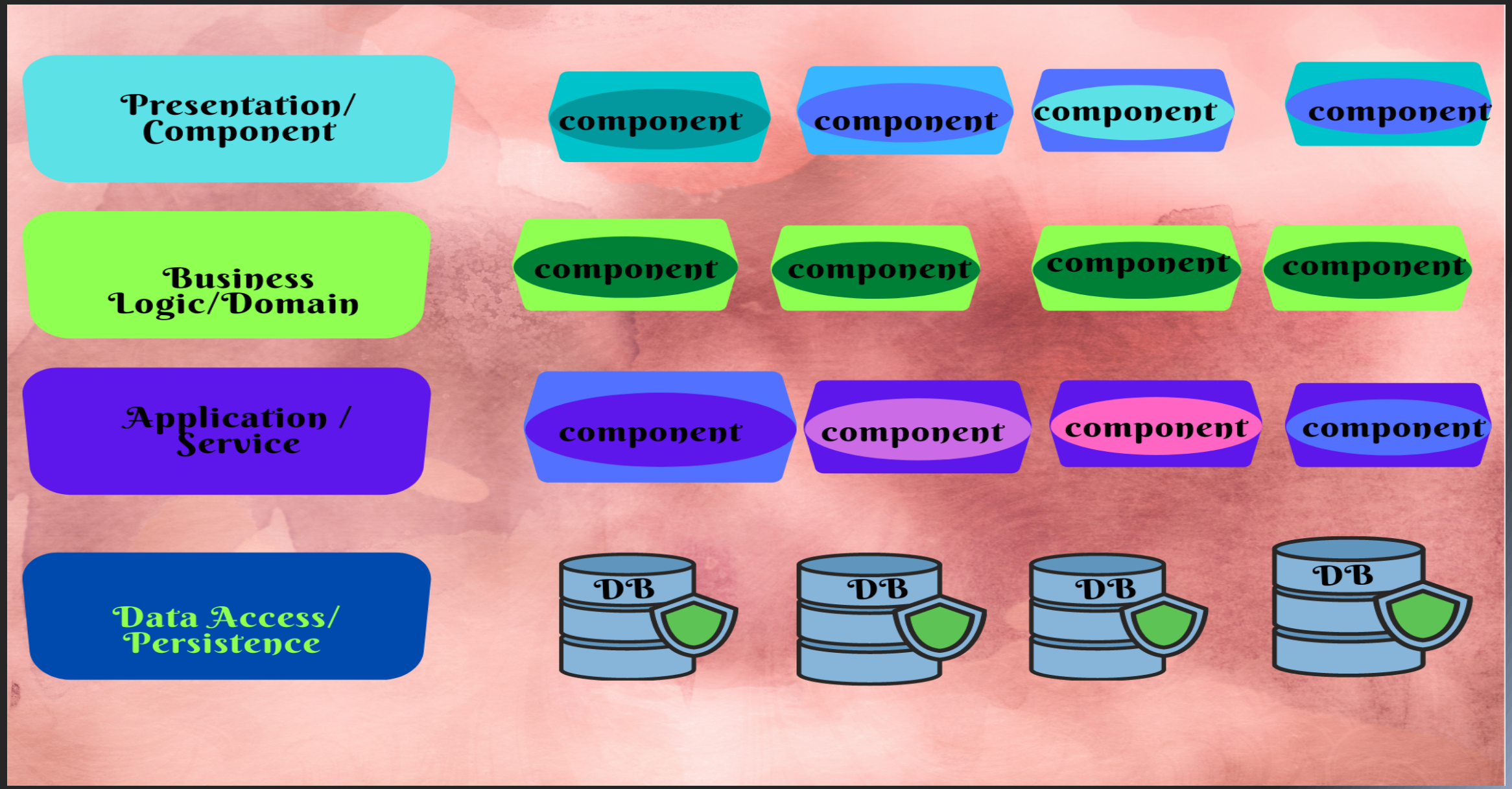
- Components are organized in horizontal layers
- Connected
- Independent of one another

- Presentation Layer
- Application Layer
- Business Layer
- Data Access Layer

Use Case

Desktop applications
E-commerce

Layer Pattern



Pipe and Filter Layer Patterns

Many systems are required to transform streams of discrete data items, from input to output. Many types of transformations occur repeatedly in practice, and so it is desirable to create these as independent, reusable parts.

- It is unidirectional
- Task that facilitate simple one-way processing

Use Case

EDI

ETL tools

Client Server Layer

Shared resources and services that large numbers of distributed clients wish to access,
Where there is need for control or quality of service.

- Components, called “clients,” send requests to a component, called “server,” and wait for a reply.
- A server component receives a request from a client and sends it the reply.

Use Case

Online applications such as:

- Email
- Document sharing
- Banking

Model View Controller

- Where the user interface is typically the most frequently modified portion of an interactive application.
- Users often wish to look at data from different perspectives, such as a bar graph or a pie chart.
- These representations should both reflect the current state of the data.

Use Case Web and Mobile app user interface

Model View controller Contd...

- The model-view-controller (MVC) pattern separates application functionality into three kinds of components as follows.
- A model, which contains the application's data.
- A view, which displays some portion of the underlying data and interacts with the user.
- A controller, which mediates between the model and the viewand manages the notifications of state changes.

The Software Architecture Views Contd...

Process View

- System dynamics
- How the processes interract among themselves
- Focuses on the runtime behaviour

Physical view

- System engineer's point of view
- The topology of the components on the physical layer
- How the system communicates with the hardware

ROLE OF S/A

- To help the stakeholders understand the their needs accurately and effectively
- To create an architectural concept of the product that is feasible with the available resources and time
- To provide an interface through which different stakeholders and interest group communicate with each other
- It is the center of development of the software product and how the design drives the development

ROLE OF S/A IN SDLC

- Understand business needs and constraints
- Extract requirements
- Represent the components in a framework
- design the architecture
- detailed design
- Monitors the implementation to ensure that it complies with the design
- Involved in the testing to ensure the business needs are accurately implemented
- Monitors the deployment to ensure seamless interaction with the physical environment in
- Involved in the maintenance in case of need for changes