

# CS 4320 / 7320

# Software Engineering

Module 5 – Design:  
Structure & Architecture, UI Design

# Software Structure and Architecture: *Architectural Design:*

A problem-solving, **creative** process  
with decisions involving **trade-offs**,  
often on **quality** attributes

# Software Structure and Architecture: *Architectural Styles*

General structures: layers, pipes, filters

Distributed systems: client-server, 3-tiered, broker

Interactive systems: Model-View-Controller,

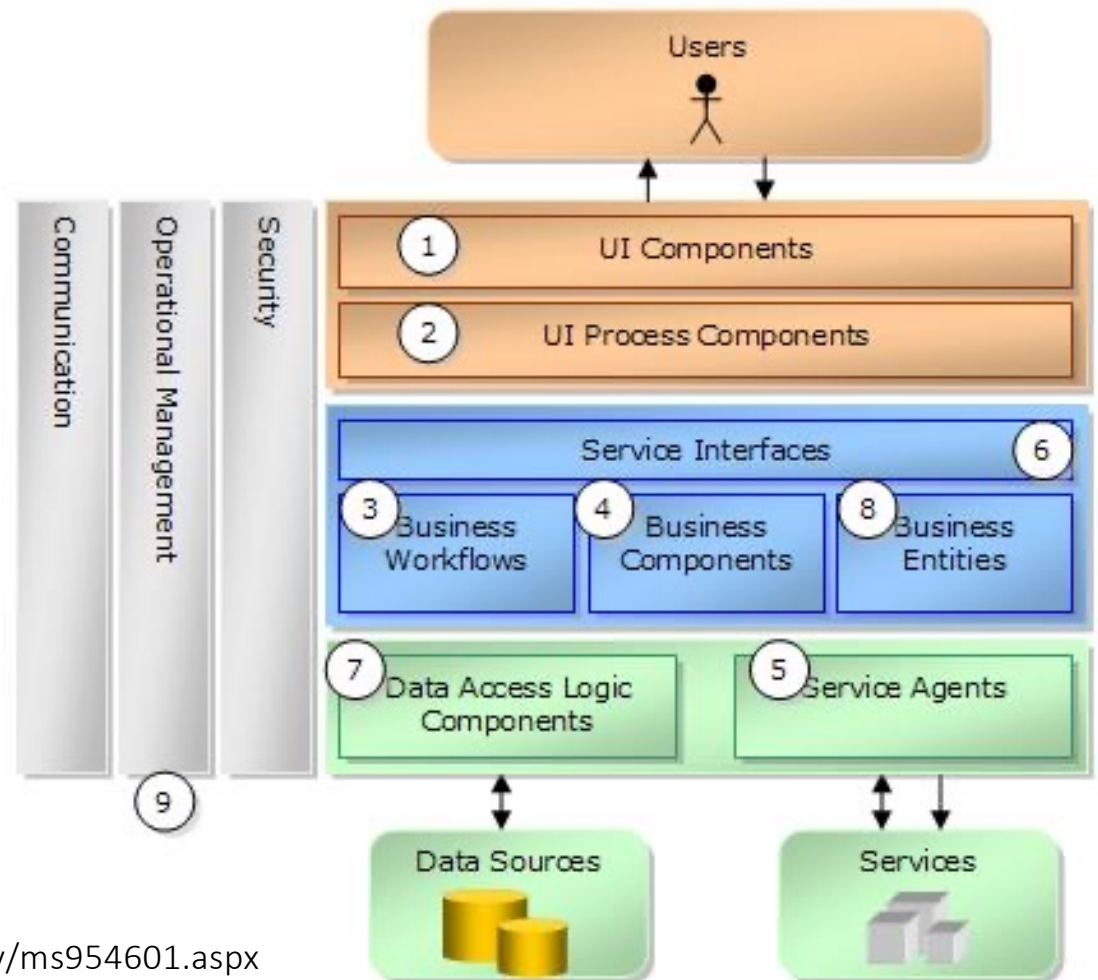
Presentation-Abstraction-Control

Others...

# Software Structure and Architecture: *Architectural Styles*

What do you know about architecture styles for a typical web application?

# Typical Layered Design



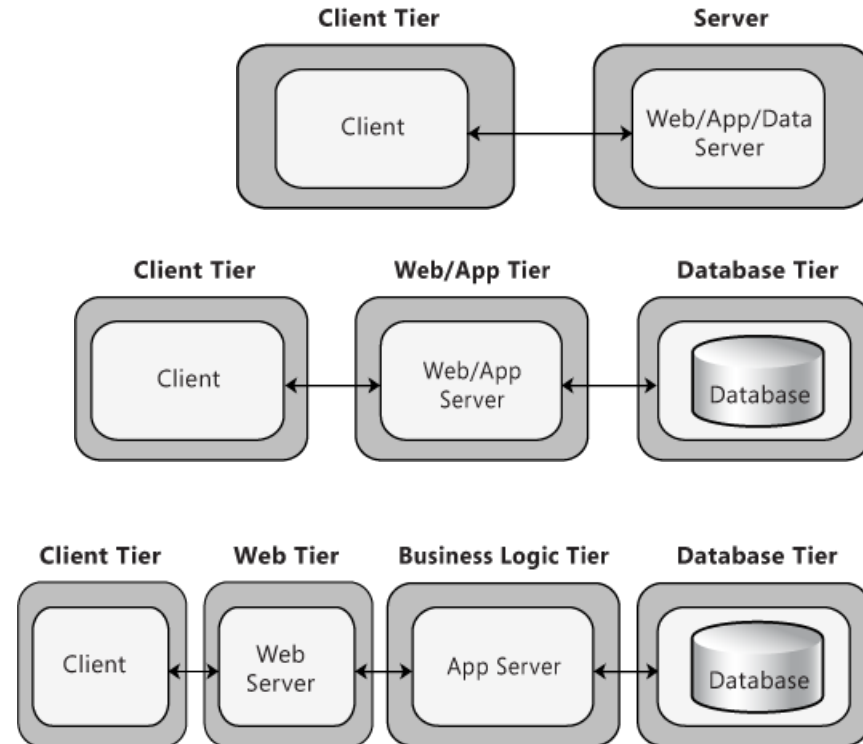
Source: <https://msdn.microsoft.com/en-us/library/ms954601.aspx>

# Distributed Deployment Patterns

Client-Server

3-tier

4-tier



Source: <https://msdn.microsoft.com/en-us/library/ee658120.aspx>

# Software Structure and Architecture: *Architectural Styles*

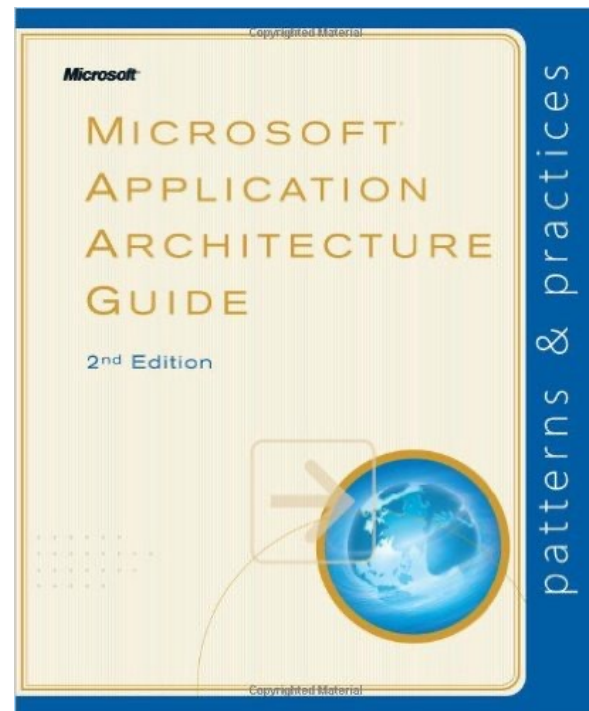
Microsoft Application Architecture Guide, 2nd  
Edition by Microsoft Patterns & Practices Team

ISBN-13: 978-0735627109 ISBN-10: 073562710X

Publisher: Microsoft Press (November 22, 2009)

Online Book: <https://msdn.microsoft.com/en-us/library/ff650706.aspx>

Chapter 3: Architectural Patterns and Styles



# Software Structure and Architecture: *Design Patterns*

Common solutions to a common problem

Object-oriented design patterns

Creational: builder, factory, prototype, singleton

Structural: adapter, bridge, composite, façade, proxy

Behavioral: command, interpreter, iterator, observer



# Software Structure and Architecture: *Design Patterns*

**Design Patterns:** Elements of Reusable Object-Oriented Software by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides (the GangOfFour)

ISBN 978-0201633610, ISBN 0-201-63361-2

Publisher: AddisonWesley Professional (November 10, 1994)

<http://wiki.c2.com/?DesignPatternsBook>



# Software Structure and Architecture: *Frameworks*

## Framework:

A software system providing some **generic functionality** to **facilitate development** of software solutions.

Examples: Sprint MVC (java), .Net Framework (Microsoft),  
**Django (python)**, Bootstrap (html, css, js),  
*many, many, more....*

# User Interface Design: *General Principles*

First, **know your users**. Then consider...

- Learnability

  - User familiarity

  - Consistency

  - Minimal surprise

  - Recoverability (from errors)

  - User guidance (feedback)

  - User diversity (accessibility)

# User Interface Design:



<https://www.usability.gov/what-and-why/user-interface-design.html>



<https://www.w3.org/WAI/intro/accessibility.php>