MÔ HÌNH PHẦN MỀM PHÂN LỚP

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CONTENT

- Software architecture
- Layers
- Tiers

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SOFTWARE ARCHITECTURE

- *Software architecture is an abstraction, or a high-level view of the system. It focuses on aspects of the system that are most helpful in accomplishing major goals, such as **reliability**, **scalability**, and **changeability**. The architecture explains how you go about accomplishing those goals*

Software architecture is a blueprint of your application

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LAYERS AND TIERS

- Logical Separation
  and
- Physical Separation

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MULTI-LAYER ARCHITECTURE

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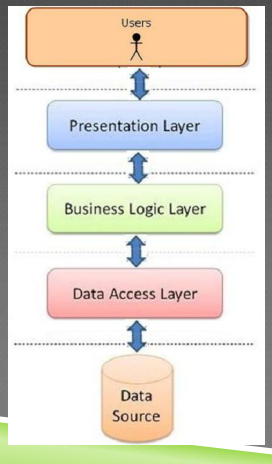

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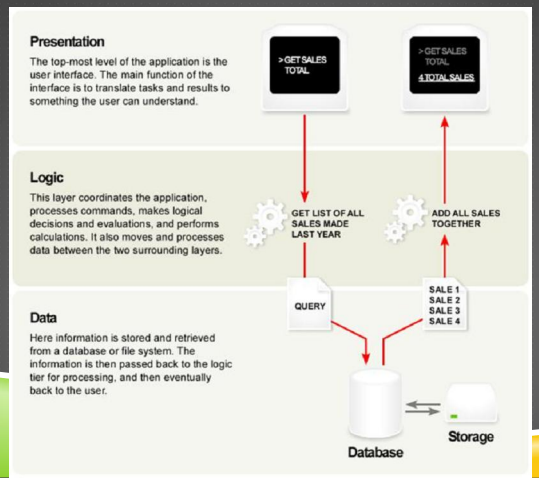
3-TIER ARCHITECTURE



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DATA ACCESS LAYER (DAL)

- A set of classes used to encapsulate data access methods
- CRUD (Create Read Update and Delete) operations as well as any other methods
- Accessing data from a data store (known as Data Layer). DAL's primary job is to communicate with the Data layer, which can be any RDBMS, set of XML files, text files, and so on.
- The DAL layer should not contain any specific logic in its classes, and it should be used like a "utility" or "helper" class to fetch and store data to and from a data store.

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DATA ACCESS LAYER

- *Data Access* layer provides an interface between the business logic and the database
- *Data Access* layer interacts with the data management tier to retrieve, update, and remove information
- *Data Access* layer doesn't actually manage or store the data
- *Data Access* logic components may connect to the database directly using a data access API such as ADO.NET

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BUSINESS LOGIC LAYER (BLL)

- Contains the business logic and set of operational rules particular to the application and talks to the data access layer (DAL) to:
  - fetch data on which it has to apply rules
  - save updated data after applying rules to it
  - perform operations and validate data
- BLL usually presents the data to the higher Layers (like a GUI layer) after performing business rules on it. This layer may also include error handling, logging, and exception handling strategies, besides encapsulating all the business rules of the project.

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BUSINESS LOGIC LAYER (CONT.)

- Some main methods need on a object:
  - Create new data
  - Update data
  - Delete data
  - Check data exists
  - Get all data in table
  - Get detail data with correlative key

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UI LAYER

- **UI layer** contains the graphical display components
- Functionality
  - Restrict the types of input a user can enter
  - Perform data entry validation
  - Perform simple mapping and transformations of the information provided by the user controls to values needed by the underlying components

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N-LAYER PROJECT OF **THICK-CLIENT**

- User Interface forms (Window forms or Web forms) as the Presentation layer
- Business logic code as the Business Layer (BL)
- Data access code as the Data Access Layer (DAL)
- The physical database as the Data Layer (DL)

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LOGIC MODEL **FRAMEWORK DESIGN**

Presentation	=	Windows/Web/Mobile
UI	=	Windows Forms/Web Forms
Business Logic	=	.NET Business Objects
Data Access	=	Business Objects & ADO.NET
Data Storage	=	SQL Server

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MULTI-TIER ARCHITECTURE

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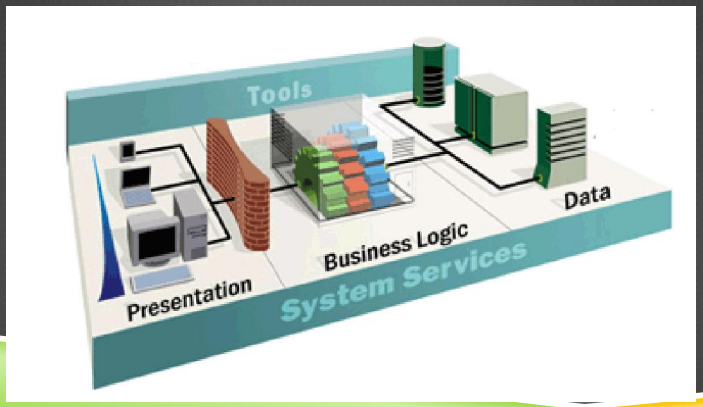
PHYSICAL SEPARATION



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EVOLUTION TO THE 3-TIER ARCHITECTURE

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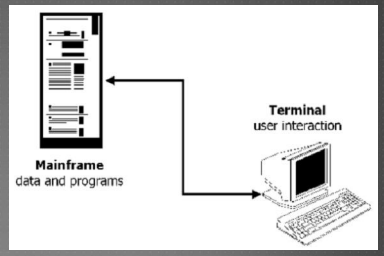
SINGLE TIER ARCHITECTURE

- Time of Huge "Mainframe"
- All Processing in Single Computer
- All Resources Attached to the same Computer
- Access Via Dumb Terminals



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SINGLE TIER – ADVANTAGES & DISADVANTAGES

- Advantages
  - Simple
  - Uncomplicated
  - Quick
- Disadvantages
  - Very Expensive
  - Difficult to maintain
  - Difficult to reuse

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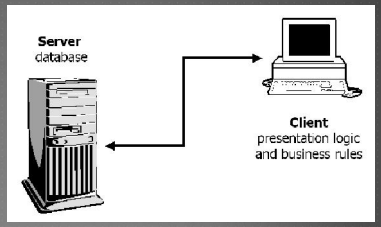
DUAL TIER ARCHITECTURE

- The Personal Computer
- Neccssity of Providing Personal Software
- The Client Server Model was Born!!
- Logical System Components – Most of which are on the Client



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DUAL TIER – ADVANTAGES & DISADVANTAGES

- Advantages
  - Less Expensive than Mainframe
- Disadvantages
  - The Connections to the Database Server are very Expensive
  - One can only connects a limited number of users to a server before Database Server spends more time managing connections than processing requests
  - Cost-ineffective. Many users only use their connections 2-3% of the time.

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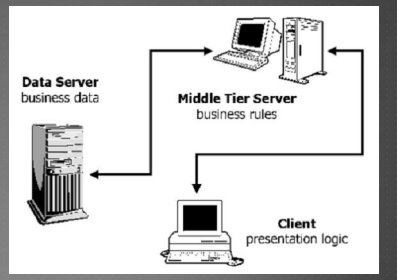
3-TIER ARCHITECTURE

- These Applications runs on the Traditional Client/Server Model But from a Application server.
- Client only Displays the GUI and data, but has no part in producing results
- Database Server Serves to few Connections



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3-TIER ARCHITECTURE

- A three-way interaction in a client/Server environment
  - The User Interface is stored in the Client.
  - The Business Application Logic is Stored in one or more Servers.
  - The Data is Stored in a Database Server.

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3-TIER ADVANTAGES

- Scalability
  - The Application Servers can be deployed on many machines
  - The Database no longer requires a connection from every client.
- Reusability
  - If a standard object is employed, the specific language of implementation of middle tier can be made transparent.
- Data Integrity
  - The middle tier can ensure that only valid data is allowed to be updated in the database.

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3-TIER ADVANTAGES

- Improved Security
  - Since the client doesn't have direct access to the database, Data layer is more secure.
  - Business Logic is generally more secure since it is placed on a secured central server.
- Reduced Distribution
  - Changes to business logic only need to be updated on application servers and need not to distributed on clients
- Improved Availability
  - Mission Critical Applications can make use of redundant application servers and redundant application servers, so it can recover from network of server failures.

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3-TIER DISADVANTAGES

- Increased Complexity / Effort
  - In General 3-tier Architecture is more complex to build compared to 2-tier Architecture.
  - Point of Communication are doubled.

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SOFTWARE ARCHITECTURE LAYERS & TIERS

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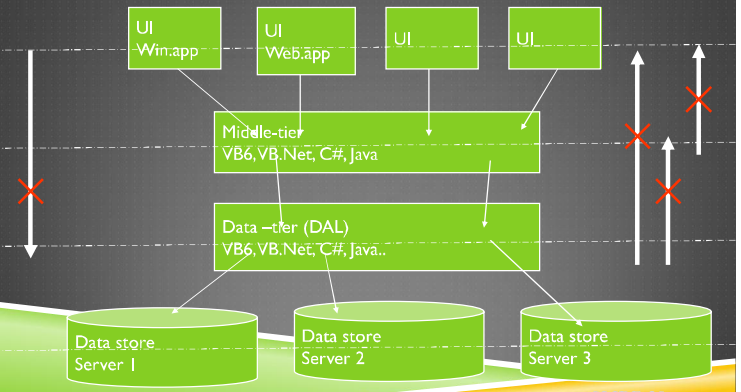
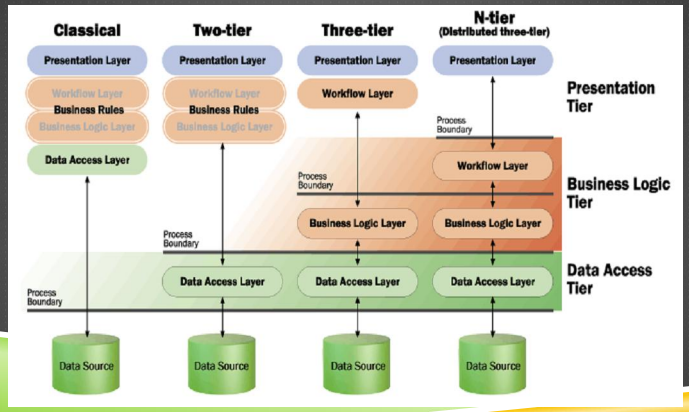
SOFTWARE ARCHITECTURE IN LOGIC AND PHYSIC



SLIDE 28

LOGICAL & PHYSICAL SEPARATION



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WEB BASED APPLICATIONS

- We have a built-in 3-tier architecture by default.
  - The presentation tier is the client-side browser (instead of Windows forms),
  - the code(assuming you have web forms, BL, and DAL in one assembly) is the Application tier,
  - the physical database is the Data tier.

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SINGLE TIER—SINGLE LAYER MODEL

- .NET Project (ASPX project) compiling into a DLL in the /bin folder and under a single namespace: MyApp
- No. of project files: 1
- No of namespaces: 1

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SINGLE TIER—TWO LAYER MODEL

- The UI code into one namespace, and the BL and DAL into another namespace.
- ASP.NET Web Project that has two folders:
- **Code:** This folder will have class files containing business logic and data
- access code under a single namespace, say MyApp.Code
- **Web:** This folder will have the user controls, ASPX pages, and other presentation-related code under the namespace, say MyApp.Web

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SINGLE TIER—THREE LAYER MODEL

- In this model, we logically break BL and DAL in different namespaces, introducing cleaner code separation
- ASP.NET Web Project that has logical separation between presentation, business
- logic and data access code:
- All presentation code will be under the MyApp.Web namespace (Layer 1).
- Furthermore, the single project can have two folders:
- Business (Layer 2): for business logic code, with namespace
- MyApp.Code.Business
- DAL (Layer 3): for data access code, with namespace MyApp.
- Code.DAL

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TWO TIER MODEL

- create two projects, one normal web project for UI code, and another class library project for the BL and DAL code.
- The solution will have:
- ASP.NET Web Project having GUI and presentation code (Tier 1)
- A class library project having business logic and data access coding under a
- single namespace, MyApp.Code; no separate namespaces for business logic
- and data access code (Tier 2)

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TWO TIER—TWO LAYER MODEL

- The solution will have:
- ASP.NET Web Project having Presentation Layer coding in ASPX and ASCX
- files, under the namespace, MyApp.Web (Tier 1)
- A class library project having two folders (Tier 2):
- Business: for business logic code, with namespace MyApp.
- Code.Business (Layer 1)
- DAL: for data access code, with namespace MyApp.Code.DAL
- (Layer 2)

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THREE TIER MODEL

- The solution will have:
- ASP.NET Web Project having Presentation Layer coding in ASPX and ASCX files, under namespace MyApp.Web (Tier 1)
- A class library project having business logic code, with namespace, MyApp.Code.Business (Tier 2)
- A class library project DAL for data access code, with namespace, MyApp.Code.DAL (Tier 3)

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EXAMPLES

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1-TIER 1-LAYER ARCHITECTURE

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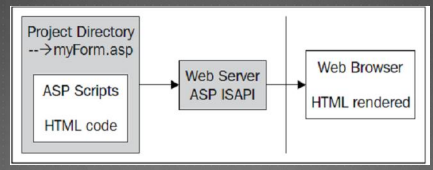
CLASSIC ASP STYLE: INLINE CODING



- Demo

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INLINE CODING - DISADVANTAGES

- No separation of business logic, data access code, and presentation (HTML)
- Code re-use
- Source Code Control (SCC) problems
- Compilation model
- Maintenance issue

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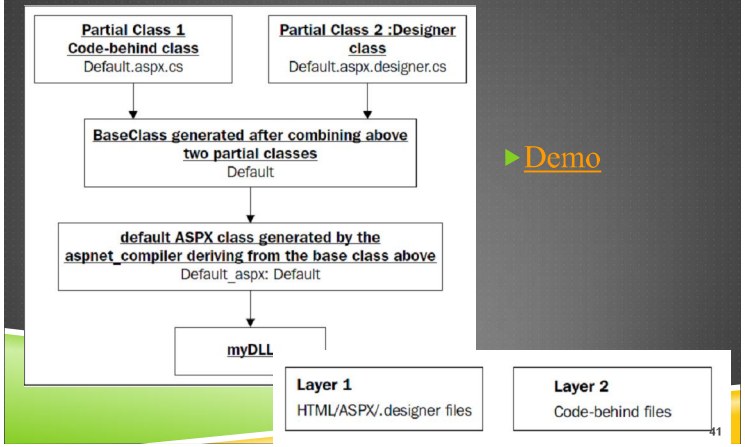
CODE-BEHIND MODEL



- Demo

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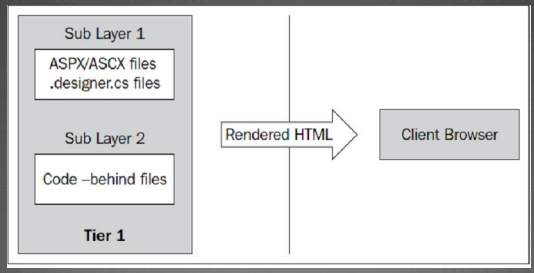
CODE-BEHIND MODEL



- From the given diagram, we can see that we still have one single physical DLL, but the UI code itself is logically separated into two layers — one in the markup code and the other in the code-behind file

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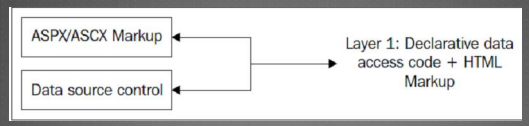
DATA SOURCE CONTROLS



- Demo

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DATA SOURCE CONTROLS

- Good for turning out applications quickly
- But we lose finer control over data-access

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1-TIER N-LAYER ARCHITECTURE

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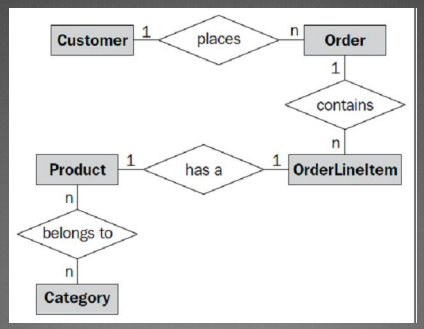
ER - DIAGRAM



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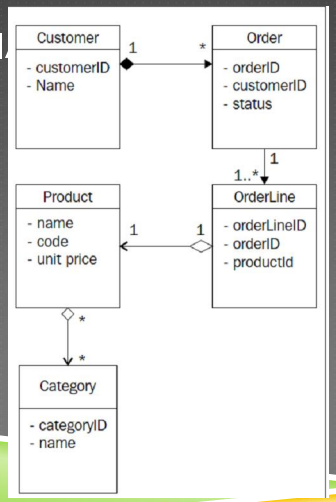
CLASS DI



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2-LAYER ARCHITECTURE

- UI-layer with ASPX and code-behind classes
- Data access classes under a different namespace but in the same project (DAL)
- Demo

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3-LAYER ARCHITECTURE

- UI-layer with ASPX and code-behind classes
- Business classes under a different namespace but in the same project (BL)
- Data access classes under a different namespace but in the same project (DAL)

- Demo

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N-TIER M-LAYER ARCHITECTURE

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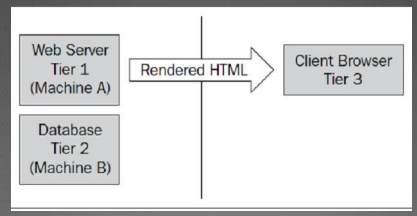
3 - TIER



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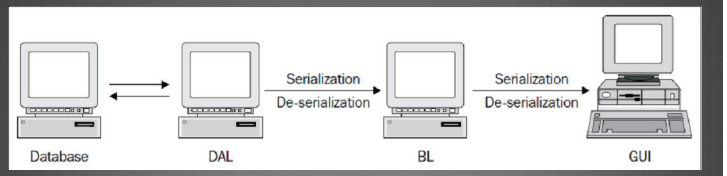

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TIERS

- Presentation tier: client-side browser
- UI tier: Web project having ASPX/ASCX, code-behind files
- Data access and business logic tier: in a separate class library project
- [Data tier: the physical database]

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DO IT

1. Create a new ASP.NET Web project in Visual Studio 2008 and name it **OMS.WebTier**.
2. This main web project contains UI classes (aspx files) of the 3-layers projects.
3. Create a new class library project named **OMS.CodeTier** that will hold the business logic as well as data access files.
4. Move all of the files from the BL and DAL folders we used in the 3-layers project into this new class library project. We just need to modify the namespaces used (we will see the code to do this soon).
5. Add a reference to this class library project in the main web project.

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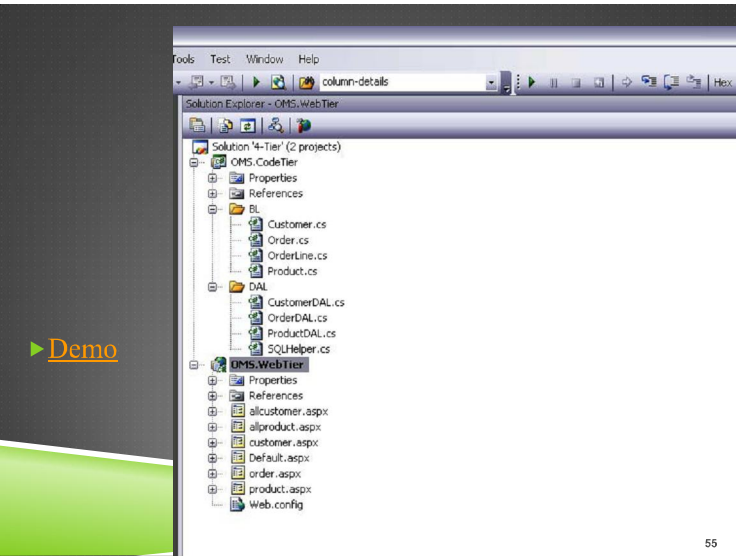
Demo
Tools Test Window Help
column-details
Solution Explorer - OMS.WebTier
Solution '4-Tier' (2 projects)
OMS.CodeTier
Properties
References
BL
Customer.cs
Order.cs
OrderLine.cs
Product.cs
DAL
CustomerDAL.cs
OrderDAL.cs
ProductDAL.cs
SQLHelper.cs
OMS.WebTier
Properties
References
allcustomer.aspx
allproduct.aspx
customer.aspx
Default.aspx
order.aspx
product.aspx
Web.config
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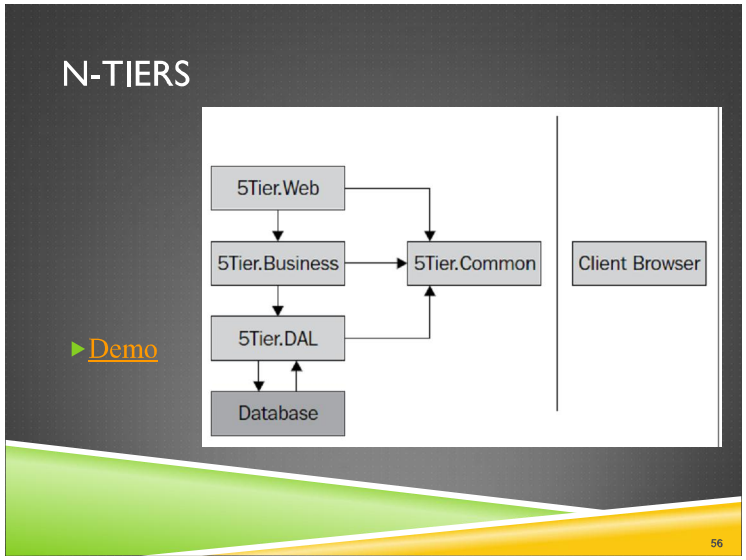
N-TIERS
Demo
5Tier.Web
5Tier.Business
5Tier.Common
Client Browser
5Tier.DAL
Database
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