WPF MVVM in Depth

MVVM PATTERN FUNDAMENTALS

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MVVM Pattern Fundamentals

What

Why

Where

How

Model-View-ViewModel
(MVVM)
is mostly about
trying to achieve good
Separation of Concerns

No Separation of Concerns

Easy to put clothes away

Really hard to get dressed

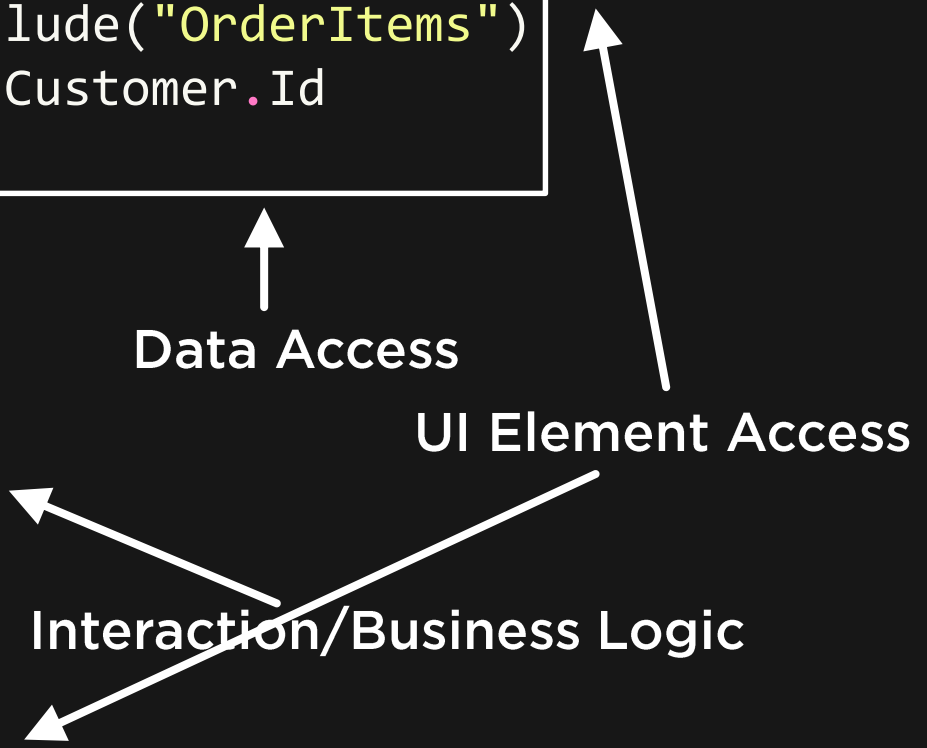
Good Separation of Concerns

A bit more work to put things where they belong

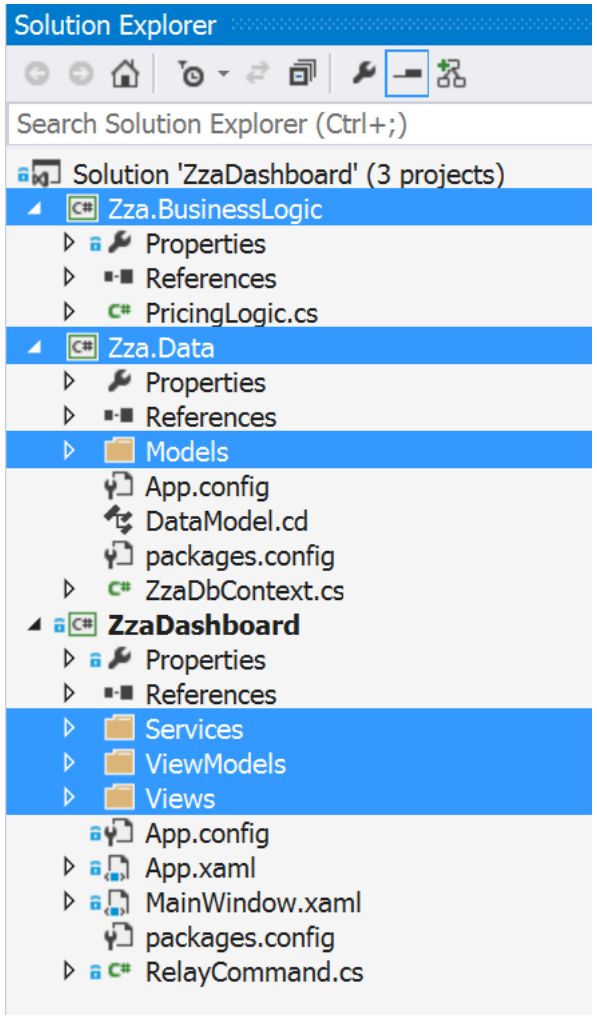
Makes getting dressed easy

No Separation of Concerns

```
private void ComputeCustomerOrdersTotal(object sender, RoutedEventArgs e)
{
    var selectedCustomer = this.customerDataGrid.SelectedItem as Customer;
    var orders = (from order in dbContext.Orders.Include("OrderItems")
                  where order.CustomerId == selectedCustomer.Id
                  select order);
    var sum = 0;
    foreach (var order in orders)
    {
        foreach (var item in order.OrderItems)
        {
            sum += item.UnitPrice * item.Quantity;
        }
    }
    this.customerOrderTotal.Text = sum.ToString();
}
```



Good Separation of Concerns



Business Logic

Data Access

Model Entities

Shared Client Logic

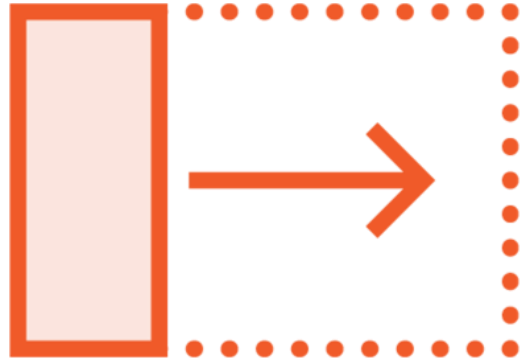
View Interaction Logic

UI Element Access

MVVM Goals/Benefits

Maintainability

Testability



Extensibility

Model-View-Controller (MVC)

Dates back to early 1970's

Favored by modern Web platforms

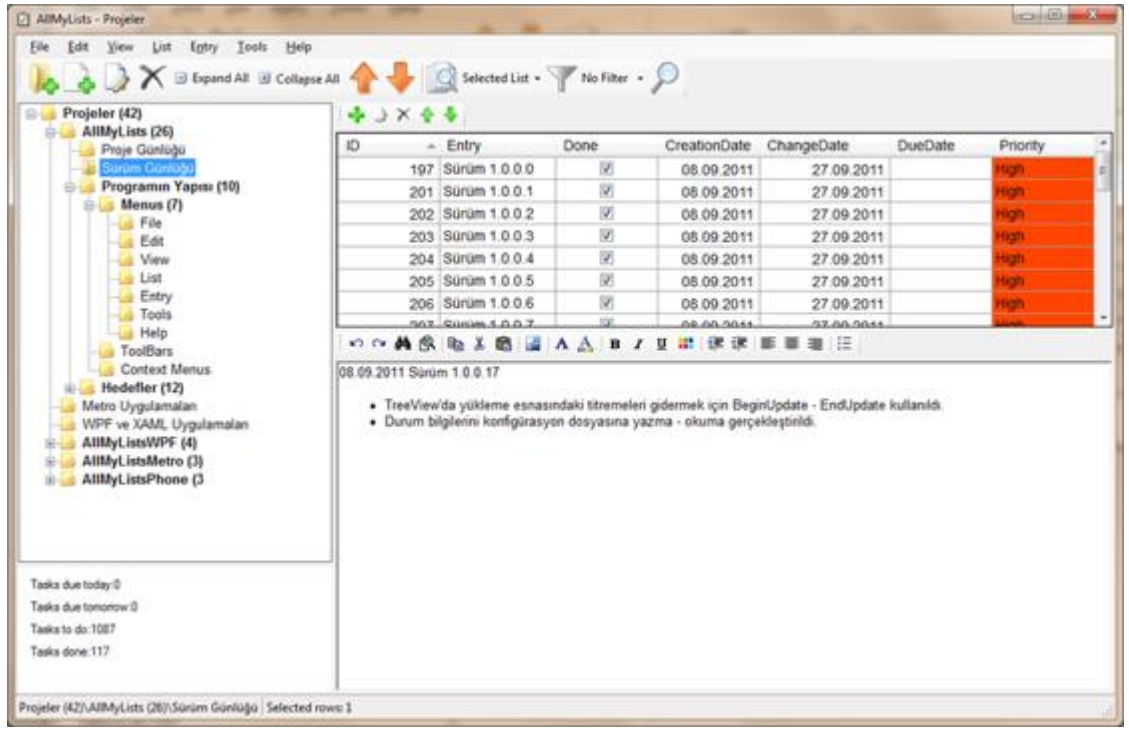
Lifetime separation between Controller and View

Model-View-Presenter (MVP)

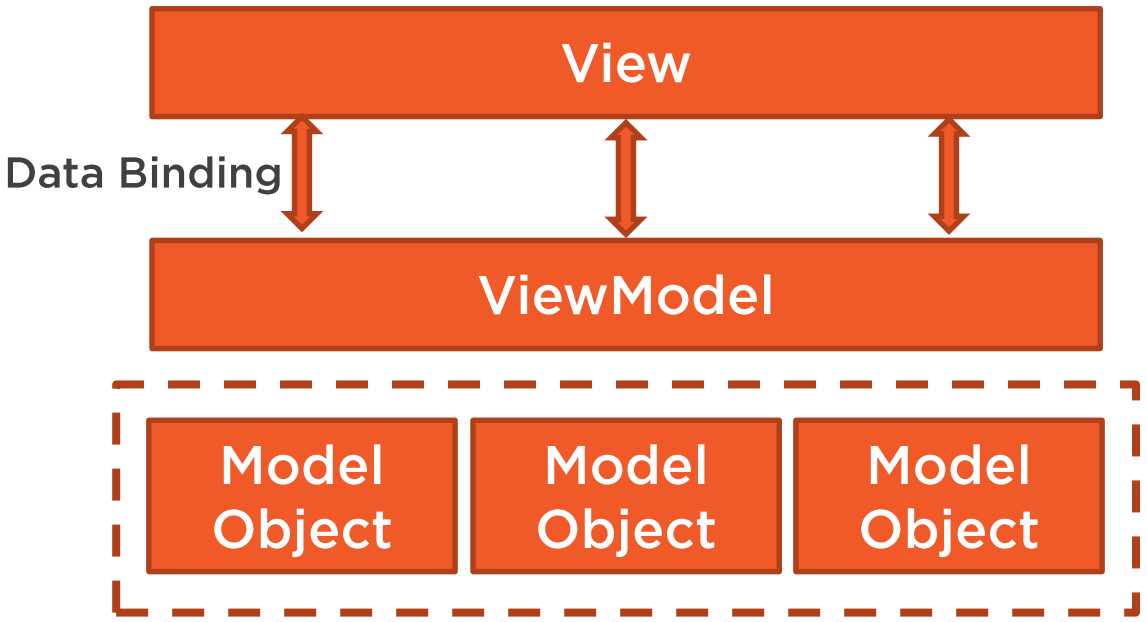
Mid-2000's rich/smart client apps

Ongoing communication between View and Presenter

Primarily method calls back and forth – interface decoupling



Model-View-ViewModel (MVVM)



Ongoing interaction between View and ViewModel

Data flow and communications primarily through data binding

MVVM Across Platforms
Windows Desktop

WPF

Silverlight

Windows 8

Windows Runtime

Windows 10

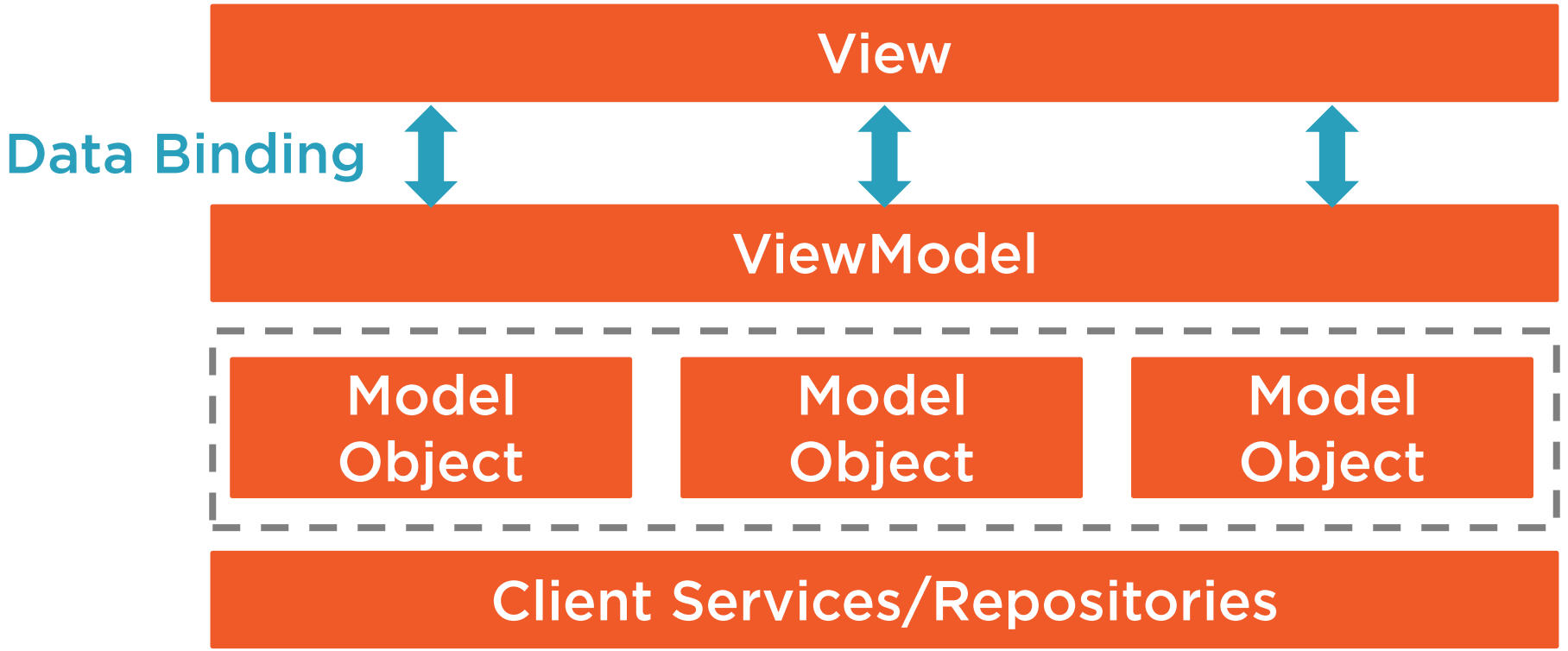
UWP

MVVM Across Platforms
SPA Clients

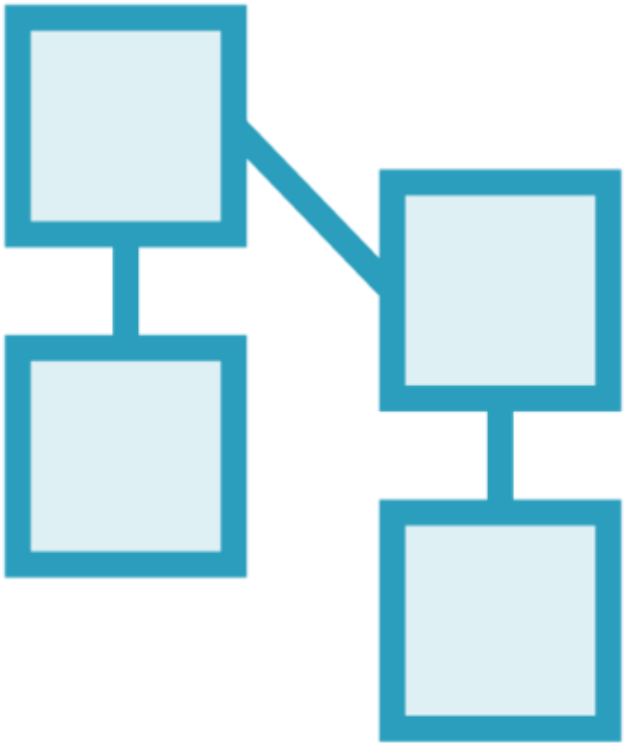
Knockout **AngularJS** **VueJS**

MVVM Across Platforms
Mobile Clients

MVVM Responsibilities



Model Responsibilities



- Contain the client data
- Expose relationships between model objects
- Computed properties
- Raise change notifications
- INotifyPropertyChanged.PropertyChanged
- Validation
- INotifyDataErrorInfo/IDataErrorInfo

View Responsibilities

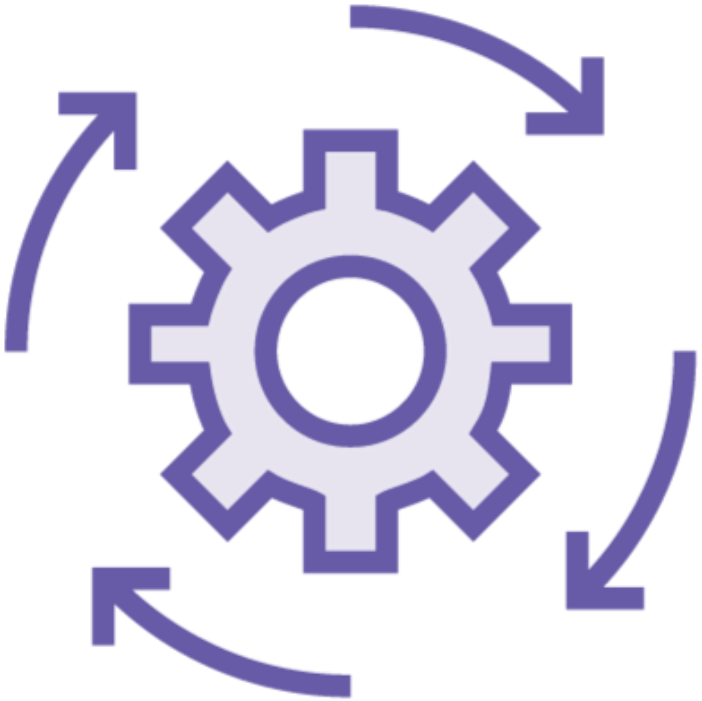
Structural definition of what the user sees on the screen

- Static and dynamic

Goal: "No Code Behind"

- Always have at least constructor
- Avoid event handling, interaction logic, and data manipulation in code behind
- Code that works directly with UI elements sometimes needed

ViewModel Responsibilities

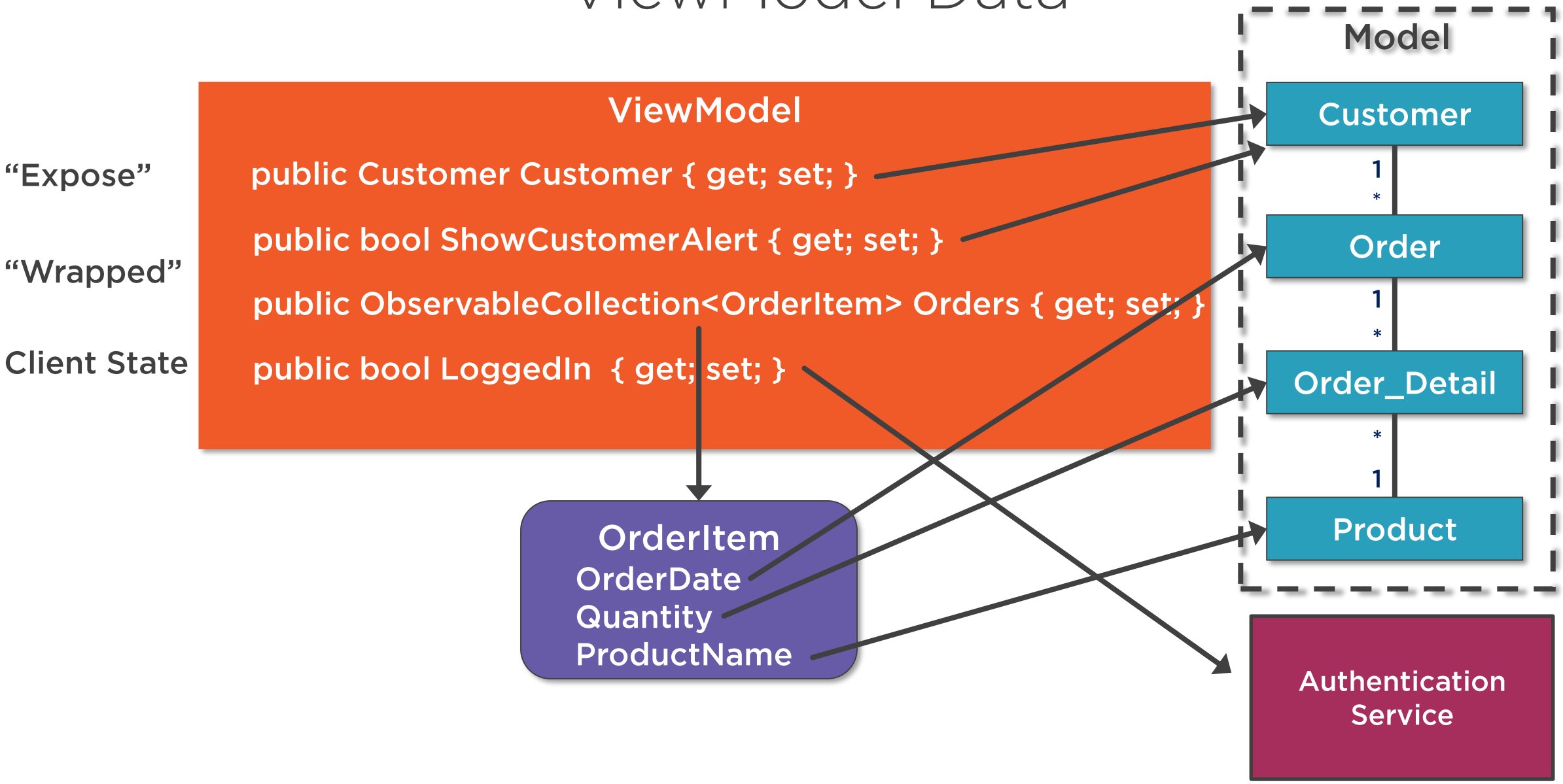


Expose data to the view for presentation and manipulation

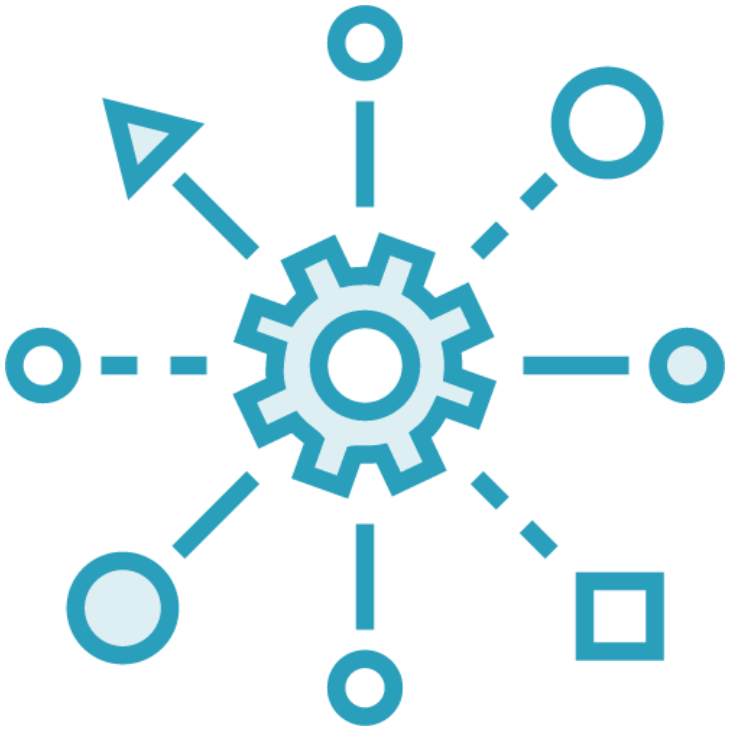
Encapsulate interaction logic

- Calls to business/data layer/service
- Navigation logic
- State transformation logic

ViewModel Data



Client Services/Repositories



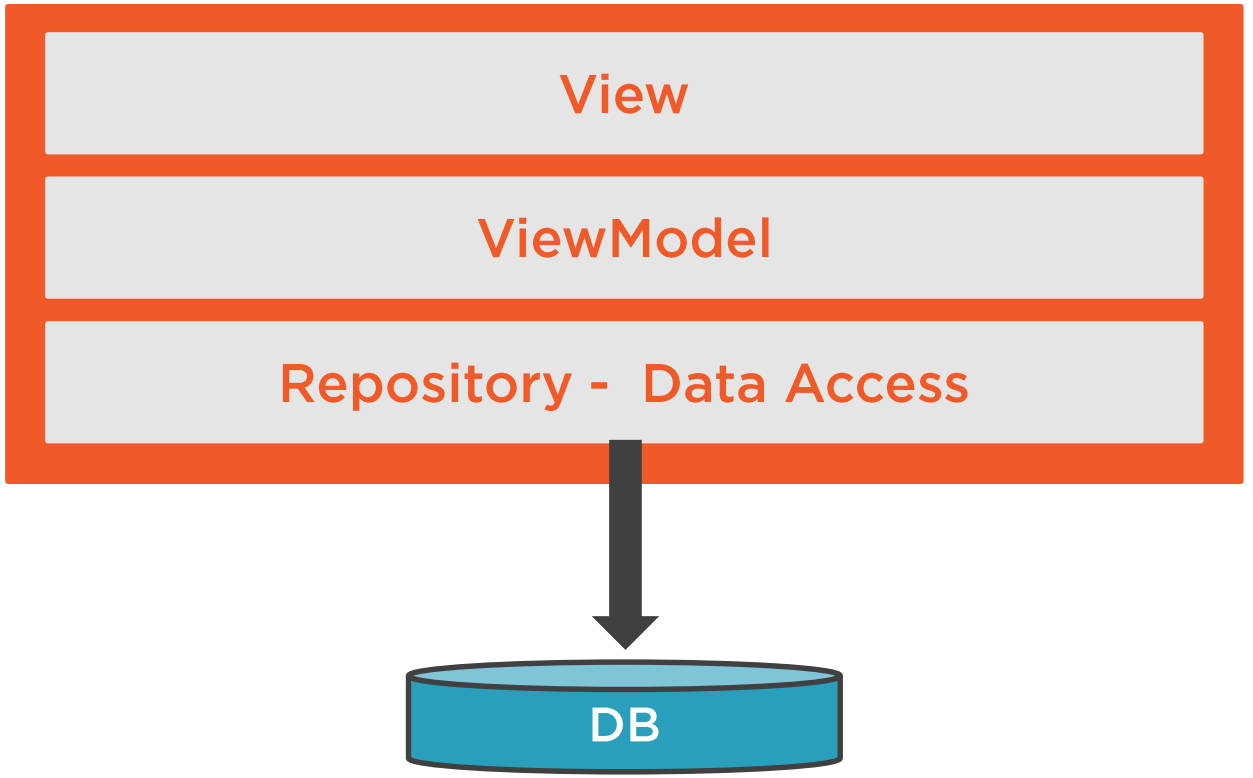
Encapsulate shared logic or data access

Consumed by one or more ViewModels

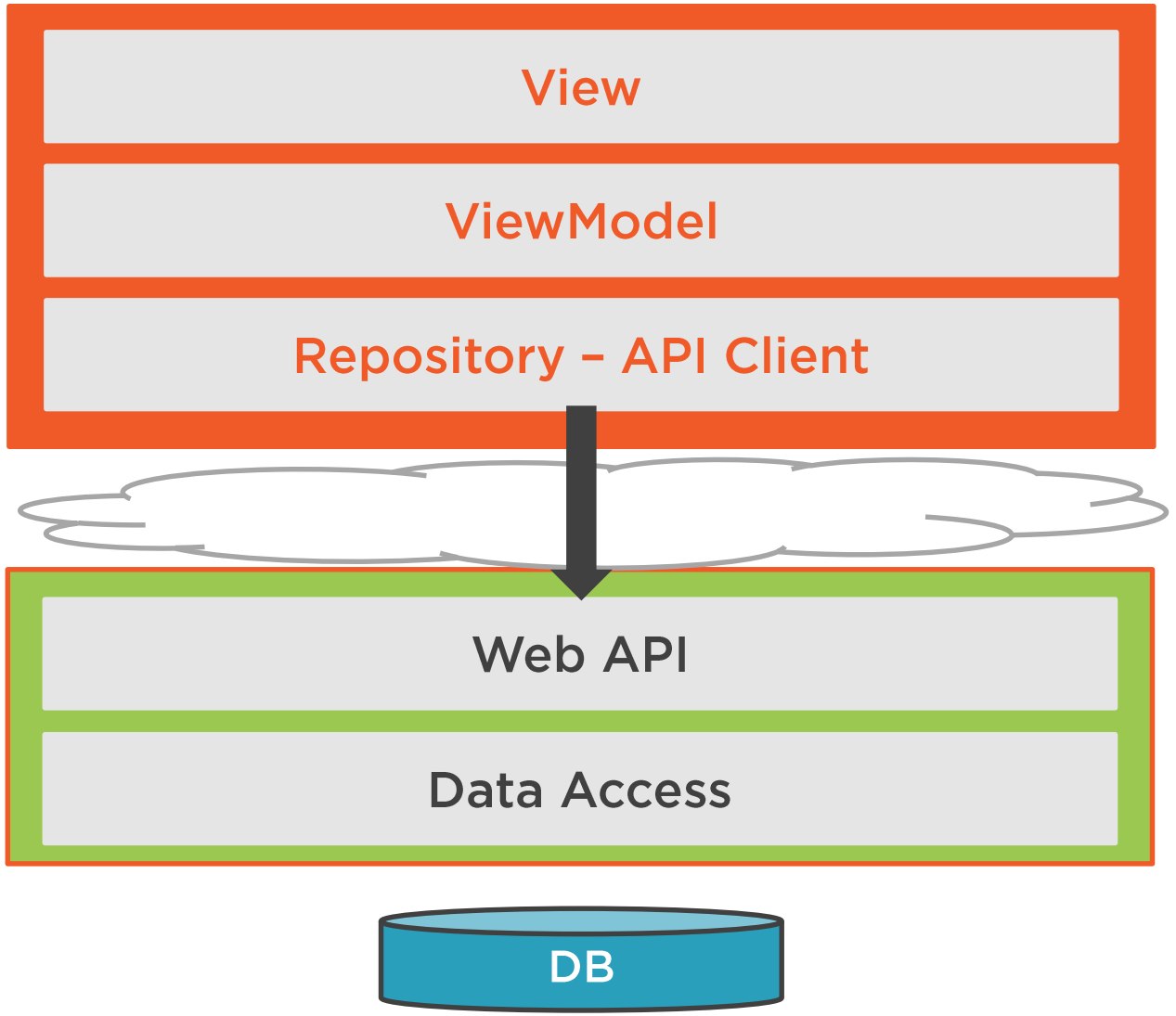
Decouples ViewModels from external dependencies

- Data access
- Shared functionality or data
- Web service calls
- Data caching

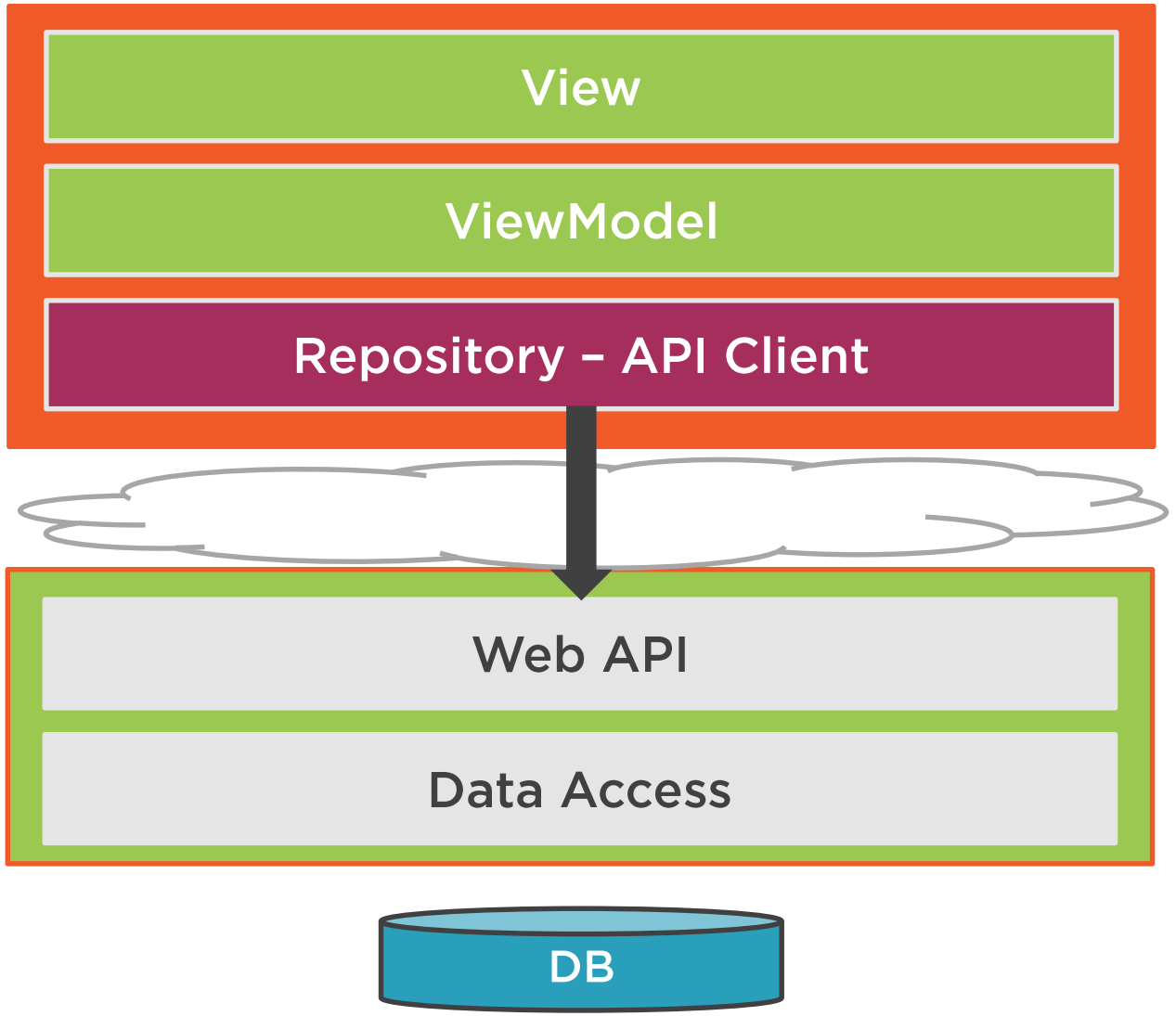
Client Services/Repositories



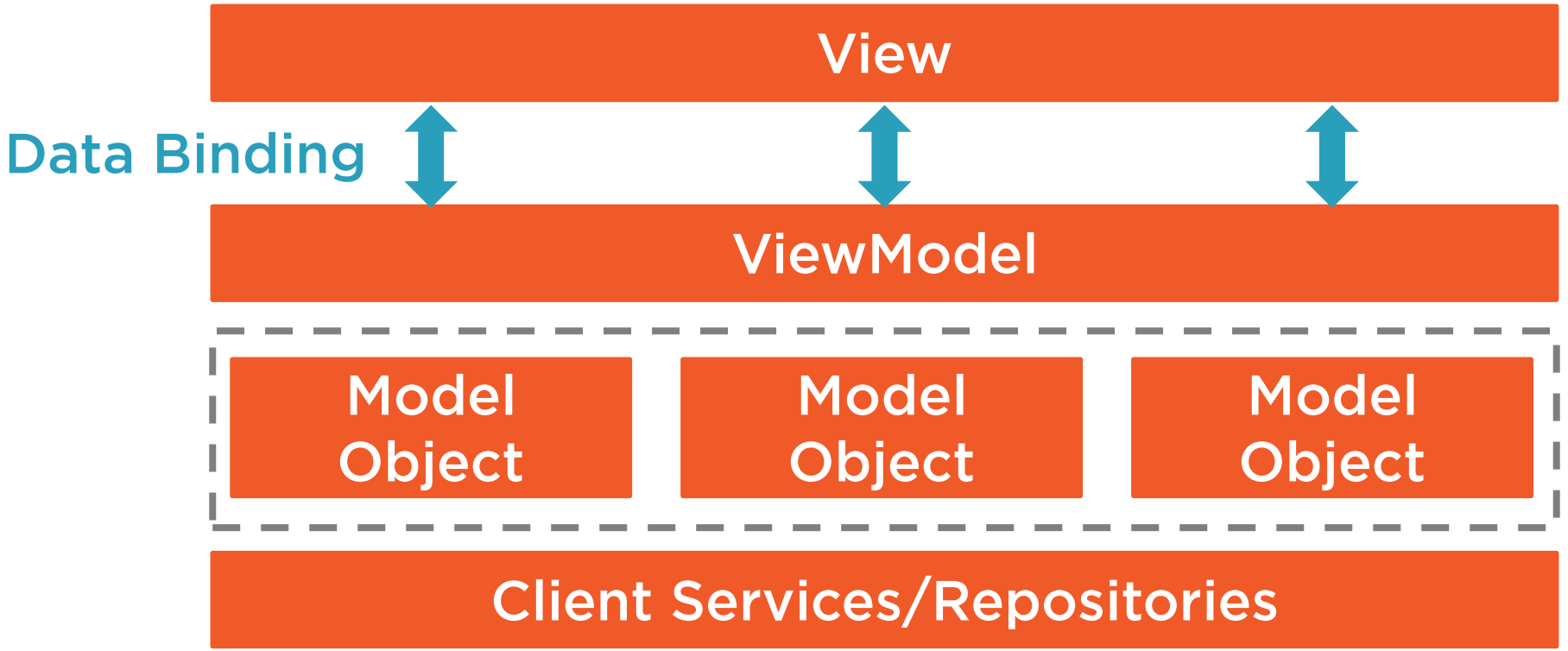
Client Services/Repositories



Client Services/Repositories



MVVM Responsibilities



Fundamental equation of MVVM:

View.DataContext = ViewModel

View/ViewModel Instantiation

View-First

View is constructed first

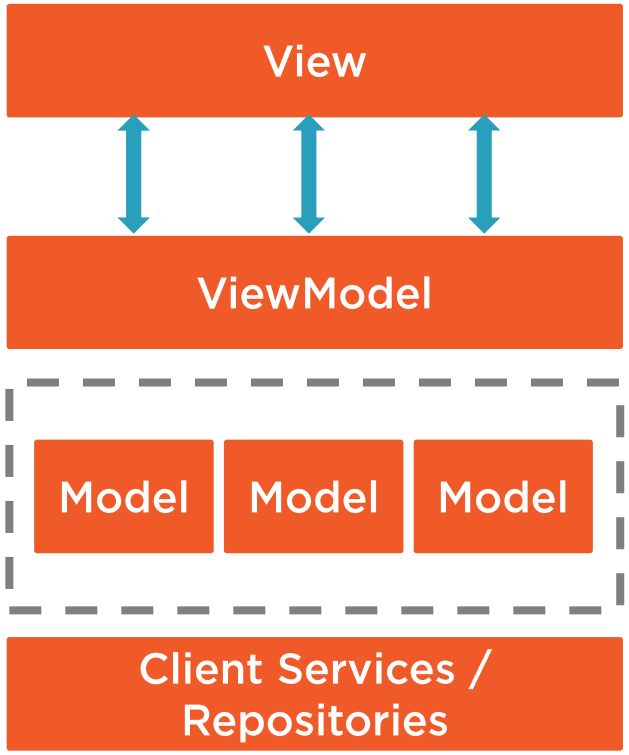
ViewModel gets constructed and attached to DataContext via View

ViewModel-First

ViewModel is constructed first

View is constructed as a consequence of ViewModel being added to UI

MVVM Concepts Summary



MVVM helps you build better structured apps

Each part has a specific responsibility

View.DataContext = ViewModel