Code.Hub

The first Hub for Developers

MVC
(Model-View-Controller)

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Introduction

- Web vs Desktop (Develop, Deploy, Update, Debug)
- Web Sites vs Web Applications (Apps)

Terminology

- URLs – Resources

  https://google.com, ftp://ntua.gr/ubuntu, mailto:gpal@best.gr

- HTTP – The *language*
- MVC – The *pattern*
- ASP.NET Core MVC v2.1 – The *framework*

Mozilla Developer Network (MDN) is your friend

HTTP (1/4) - Introduction

Web Server: What do you think when you hear it?

- Physical Machine
- Application

Browser: What happens when you hit Enter?

- DNS Lookup, retrieve IP from Host Name
- Browser (*client*) opens connection to web server's address (*server*)
- Client sends request to Server (*HTTP Request*)
- Client receives response from Server (*HTTP Response*)
- Client retrieves content (*HTML*) + Renders it

HTTP (2/4) – HTTP Methods (Verbs)

HTTP Verbs convey *meaning / intention*

GET: Gets a resource. Most common verb. No state change.

POST: Post data to app -> Action taken (e.g. register account)

PUT: Update (replace). Replace current resource with payload

PATCH: Update (modify). Apply partial modification to resource

DELETE: Delete resource

Demo

GET https://jsonplaceholder.typicode.com/posts
(all posts)

GET https://jsonplaceholder.typicode.com/posts/1
(get post with id 1, note plural)

GET https://jsonplaceholder.typicode.com/posts/1/comments
(get comments of post w/ id 1)

GET https://jsonplaceholder.typicode.com/posts?userId=1
(filtering by userId, other than ids)

HTTP (3/4) – HTTP Status Codes

200 (OK): Request Succeeded.
201 (Created): Resource created (e.g. after POST)

2xx Successful Responses

301/308 (Moved *permanently*) 308 guarantees same verb
302/307 (Moved *temporarily*) 307 guarantees same verb
304 (Not Modified) Send header, but no content (e.g. cached)

3xx Redirection messages

400 (Bad Request): Server cannot understand request
(Domain validation, Bad syntax, Missing Params)
401 (Unauthorized): Missing or invalid auth headers.
403 (Forbidden): Authenticated, but has no permissions.
404 (Not Found): Resource not found (or masked 401/403)

4xx Client Errors

500 (Internal Server Error): Code Exception.
502 (Bad gateway): Gateway got invalid response
503 (Service unavailable): Server down/overloaded
504 (Gateway timeout): Gateway got no response

5xx Server Errors

HTTP (4/4) – HTTP Request Sample

POST / HTTP/1.1
Host: myserver.com
Content-Type: application/json
Content-Length: 56

HTTP Verb

HTTP Headers

```
{
  “firstname”: “Johnny”,
  “lastname”: “Mnemonic”
}
```

HTTP Body

MVC (Model – View – Controller)

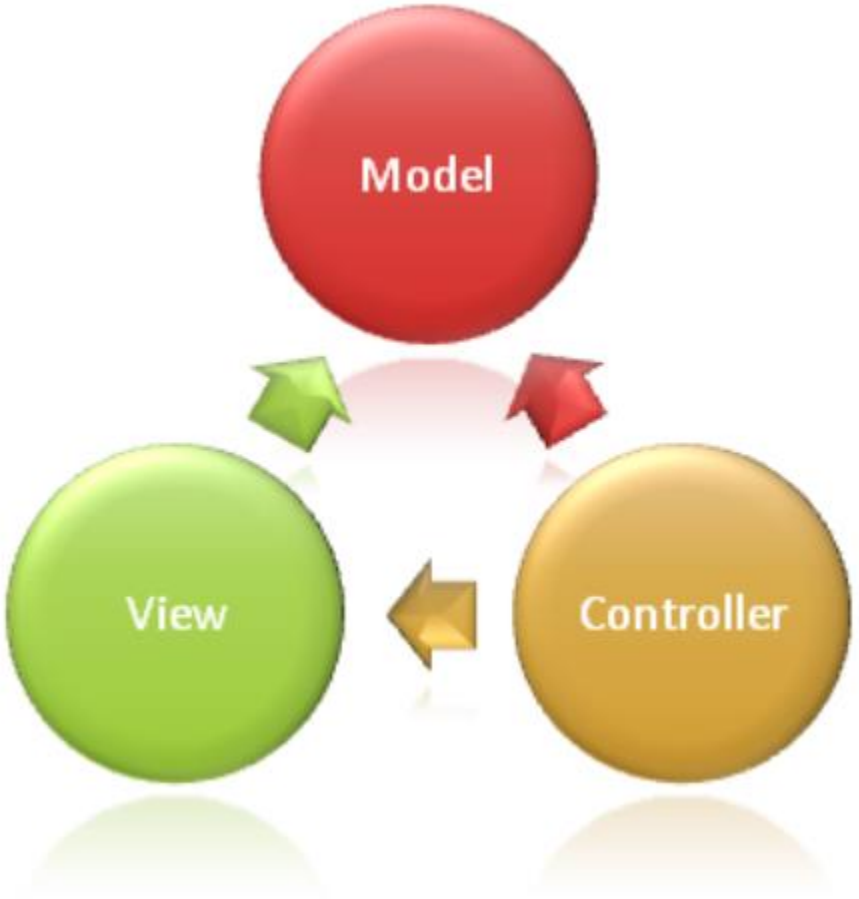
MVC: *Design Pattern* (Separation of Concerns). Popular in Web.

Model: A web app to be functional needs:
data and *business logic*.

Controllers: Web Apps interact with user through HTTP.
Way to *map URLs to methods*.

Views: Data needs to be *displayed*, in different formats
(e.g. web/mobile).

MVC (Model – View – Controller)

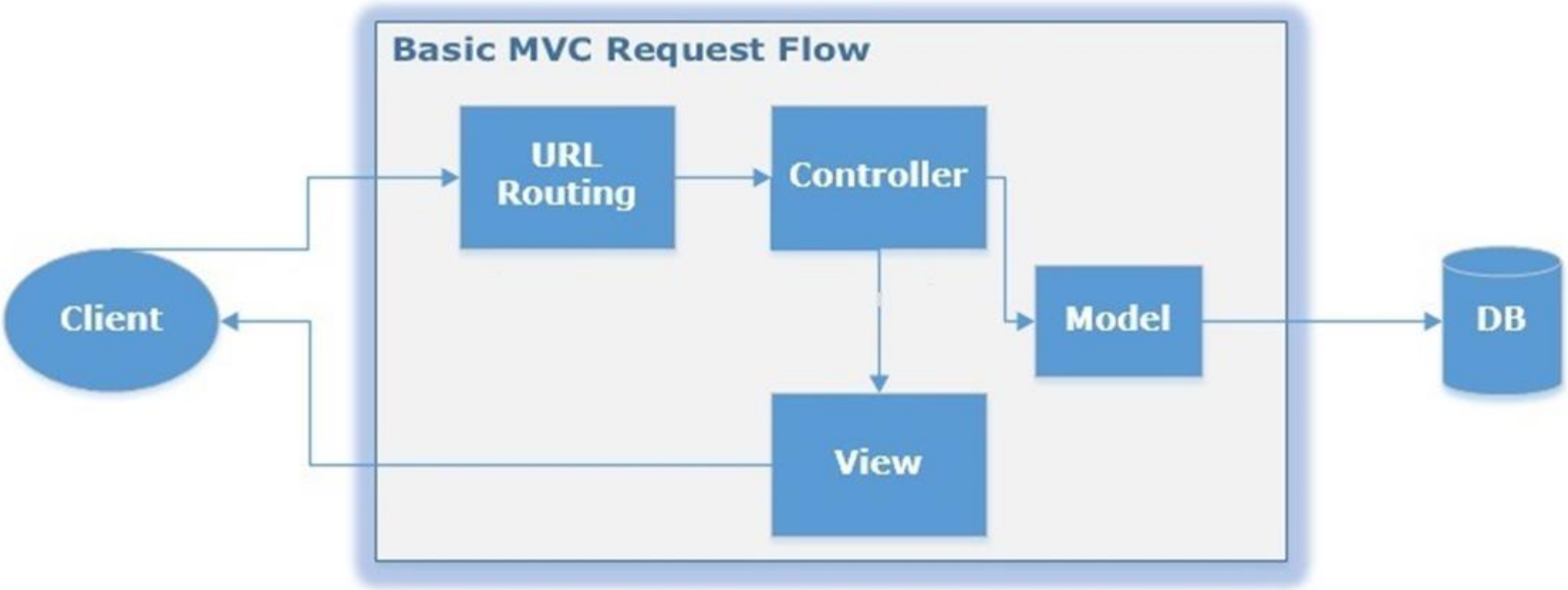


View, Controller *depend* on model

Model depends on **neither**

Controllers shouldn't be overly complicated. Mainly **routing.**

MVC (Model – View – Controller)



ASP.NET Core MVC – What is it?

- Microsoft's solution to MVC.
- Open Source (https://github.com/aspnet/Home)
- Cross-platform: Build on one platform. Run everywhere (Windows/Linux/Mac).
- Cloud-based: Easily deploy to Cloud (e.g. Azure)
- Small footprint (Package based), Very fast!!

ASP.NET Core MVC – Project Structure

- Project Structure
- Services & Middleware
- launchsettings.json / appsettings.json - Configuration
- IIS Express or Self-hosted
- Run!

ASP.NET Core MVC - Routing

- **Conventional Routing:**
  - *Convention* for URLs: {controller}/{action}/{id}
  - Execute in order defined
  - Controller/Action name **do** play role.

- **Attribute Routing:**
  - Define routes closer to actions.
  - Greater flexibility/control (more code).
  - Controller/Action name **don't** play role.
  - [Route], [HttpGet], [HttpPost], …

- **Mixed Routing:** Default conventional,
  unless [Attribute] used **(overrides)**

ASP.NET Core MVC - Controllers

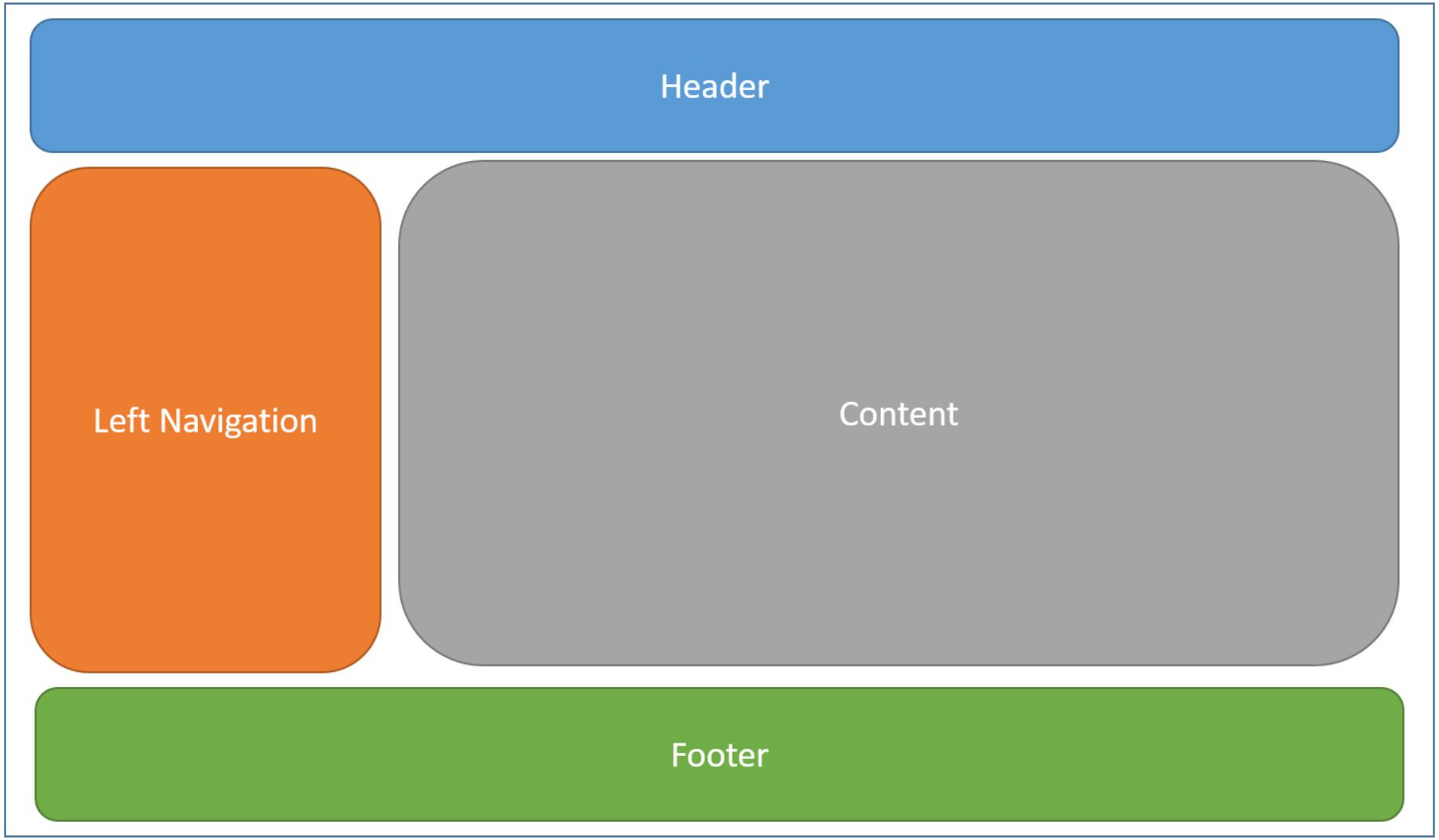
- **Controllers/** folder
- Inherit *Controller* (view) or *ControllerBase* (no view)

- Return *IActionResult* or *ActionResult<T>*

- return:
  - View(),
  - Content(),
  - Empty(),
  - File(),
  - Json(),
  - Redirect()
  - PartialView(), ViewComponent()

Should Validate Data?

ASP.NET Core MVC – Views (Layout Example)



ASP.NET Core MVC - Views

- **Views/** folder
- Display data, Interacts with User (quick validation)
- .cshtml files, (default: *Index.cshtml*)
- **_Layout**: Layout page: DRY, provides consistency
  must: **RenderBody(), *may:*** **RenderSection()**
- **_ViewStart**: Code that runs before every page
- **_ViewImports**: Using directives / Tag Helpers / DI for all pages

ASP.NET Core MVC – Passing data to Views

- Loosely-typed: ViewData[“Key”] or ViewBag.Key

  Avoid! Use sparingly, e.g. for Title

- Strongly-typed: View Models

  Recommended! More structured

ASP.NET Core MVC – Razor (C# in HTML)

- Can be mixed

```
<p>@DateTime.Now</p>
```

- Code blocks

```
@{
    var quote = "The future depends on what you do today.";
}
<p>@quote</p>
```

- Control Logic

```
@foreach, @for, @while, @do
@if, else, else if, @switch
```

- Reference Model from Controller

```
@model
```

ASP.NET Core MVC - Model

```
public class Movie
{
  public int Id { get; set; }

  public string Title { get; set; }

  public DateTime ReleaseDate { get; set; }

  public string Genre { get; set; }

  public decimal Price { get; set; }
}
```

ASP.NET Core MVC – Model Validation

Required: **[Required]**
Data Types: **[DataType(DataType.*)]**

Format:

- **[CreditCard], [EmailAddress], [Phone], [Url]**
- **[Range]**: Validates value falls within given range.
- **[RegularExpression]**: Validates data matches specified RegEx.
- **[StringLength]**: Validates string has at most given max length.

Other:

- **[Compare]**: Validates two properties in a model match.
- **[Remote]:** Server-side call

ASP.NET Core MVC – Tag Helpers (Overview)

```
<form asp-controller="Demo" asp-action="Register" method="post">
<!-- Input and Submit elements -->
</form>

<label asp-for="Email"></label>
<input asp-for="Email" /> <br />

<textarea asp-for="Description"></textarea>

<span asp-validation-for="Email"></span>
<div asp-validation-summary="ModelOnly"></div>

// SelectList (string)
<select asp-for="Country" asp-items="Model.Countries"></select>

// SelectList (Enum)
<select asp-for="EnumCountry"
        asp-items="Html.GetEnumSelectList<CountryEnum>()"> />
```

ASP.NET Core MVC – Tag Helpers (Select from string)

```
<select asp-for="Country" asp-items="Model.Countries"></select>

public class CountryViewModel
{
  public string Country { get; set; }

  public List<SelectListItem> Countries { get; } = new List<SelectListItem> {
    new SelectListItem { Value = "MX", Text = "Mexico" },
    new SelectListItem { Value = "CA", Text = "Canada" },
    new SelectListItem { Value = "US", Text = "USA" },
  };
}

public IActionResult IndexOption(int id)
{
  var model = new CountryViewModel();
  model.Country = "CA";
  return View(model);
}
```

ASP.NET Core MVC – Tag Helpers (Select from Enum)

```
public class CountryEnumViewModel
{
  public CountryEnum EnumCountry { get; set; }
}

public enum CountryEnum
{
  [Display(Name = "United Mexican States")]
  Mexico,
  [Display(Name = "United States of America")]
  USA,
  Canada,
  France,
  Germany,
  Spain
}
```

```
<select asp-for="EnumCountry" asp-items="Html.GetEnumSelectList<CountryEnum>()"> >
</select>
```

ASP.NET Core MVC – Partial Views

1. Reusable code shared among many views.
2. More readable code (like methods).
3. Don’t run _ViewStart.cshtml (like normal views)

```
<!-- name: required. use simple name for view discovery or explicit path -->
<!-- for: use to pass model to partial view (use for or model) -->
<partial name="Shared/_ProductPartial.cshtml" for="Product" />

<!-- model: use to pass model to partial (use model or for) -->
<partial name="_ProductPartial“ model='new Product {
  Number = 1, Name = "Test product", Description = "This is a test" }' />

<!-- pass view data to partial -->
<partial name="_ProductViewDataPartial" for="Product" view-data="@ViewData" />
```

Thank You!

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Bonus: Create Model from Existing Db

```
// ef core for db provider you want
Install-Package Microsoft.EntityFrameworkCore.SqlServer

// create model from db
Install-Package Microsoft.EntityFrameworkCore.Tools

// asp.net core scaffolding tools
Install-Package Microsoft.VisualStudio.Web.CodeGeneration.Design

// reverse engineer model
Scaffold-DbContext
"Server=(localdb)\mssqllocaldb;Database=Movies;Trusted_Connection=True;"
Microsoft.EntityFrameworkCore.SqlServer -OutputDir Models
```

Bonus: Create Model from Existing Db

Add DbContext in DI services (ConfigureServices):

```
var connection = @"Server=(localdb)\mssqllocaldb;
        Database=Movies;
        Trusted_Connection=True;
        ConnectRetryCount=0";

services.AddDbContext<MoviesContext>(
        options => options.UseSqlServer(connection));
```

Fine-tune model using EF Core Fluent API (precedence over Attributes):
https://docs.microsoft.com/en-us/ef/core/modeling/