ASP.NET Core 1.0
ASP.NET Core 1.0 MVC

What's new in Security?

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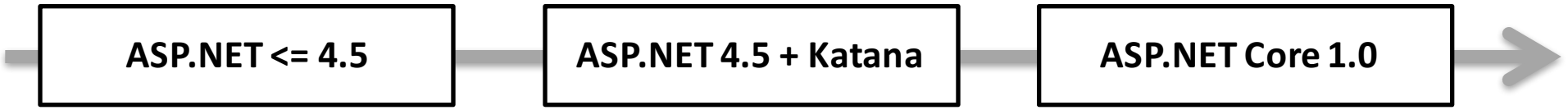
Where are we?



System.Web.dll
Modules & Handlers

ASP.NET WebForms
ASP.NET MVC

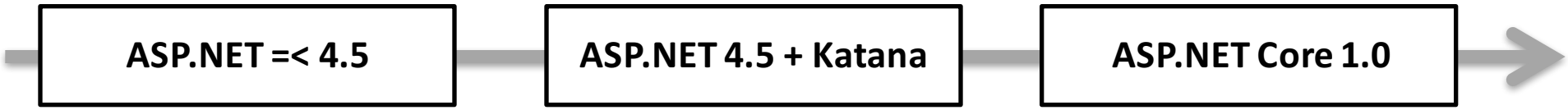
(Simple) Membership

"Empty Web Application"

Web.config*

```
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <configSections>
    <!-- For more information on Entity Framework configuration, visit http://go.microsoft.com/fwlink/?LinkID=237468 -->
    <section name="entityFramework" type="System.Data.Entity.Internal.ConfigFile.EntityFrameworkSection, EntityFramework, Version=6.0.0.0, Culture
  </configSections>
  <connectionStrings>
    <add name="DefaultConnection" connectionString="Data Source=(LocalDb)\v11.0;AttachDbFilename=|DataDirectory|\aspnet-MvcApplication1-2013122112
      providerName="System.Data.SqlClient" />
  </connectionStrings>
  <appSettings>
    <add key="webpages:Version" value="3.0.0.0" />
    <add key="webpages:Enabled" value="false" />
    <add key="ClientValidationEnabled" value="true" />
    <add key="UnobtrusiveJavaScriptEnabled" value="true" />
  </appSettings>
  <system.web>
    <authentication mode="None" />
    <compilation debug="true" targetFramework="4.5" />
    <httpRuntime targetFramework="4.5" />
  </system.web>
  <system.webServer>
    <modules>
      <remove name="FormsAuthenticationModule" />
    </modules>
  </system.webServer>
  <runtime>
    <assemblyBinding xmlns="urn:schemas-microsoft-com:asm.v1">
      <dependentAssembly>
        <assemblyIdentity name="System.Web.Helpers" publicKeyToken="31bf3856ad364e35" />
        <bindingRedirect oldVersion="1.0.0.0-3.0.0.0" newVersion="3.0.0.0" />
      </dependentAssembly>
      <dependentAssembly>
        <assemblyIdentity name="System.Web.Mvc" publicKeyToken="31bf3856ad364e35" />
        <bindingRedirect oldVersion="1.0.0.0-5.0.0.0" newVersion="5.0.0.0" />
      </dependentAssembly>
      <dependentAssembly>
        <assemblyIdentity name="System.Web.WebPages" publicKeyToken="31bf3856ad364e35" />
        <bindingRedirect oldVersion="1.0.0.0-3.0.0.0" newVersion="3.0.0.0" />
      </dependentAssembly>
      <dependentAssembly>
        <assemblyIdentity name="WebGrease" publicKeyToken="31bf3856ad364e35" />
        <bindingRedirect oldVersion="1.0.0.0-1.5.2.14234" newVersion="1.5.2.14234" />
      </dependentAssembly>
    </assemblyBinding>
  </runtime>
  <entityFramework>
    <defaultConnectionFactory type="System.Data.Entity.Infrastructure.LocalDbConnectionFactory, EntityFramework">
      <parameters>
        <parameter value="v11.0" />
      </parameters>
    </defaultConnectionFactory>
    <providers>
      <provider invariantName="System.Data.SqlClient" type="System.Data.Entity.SqlServer.SqlProviderServices, EntityFramework.SqlServer" />
    </providers>
```

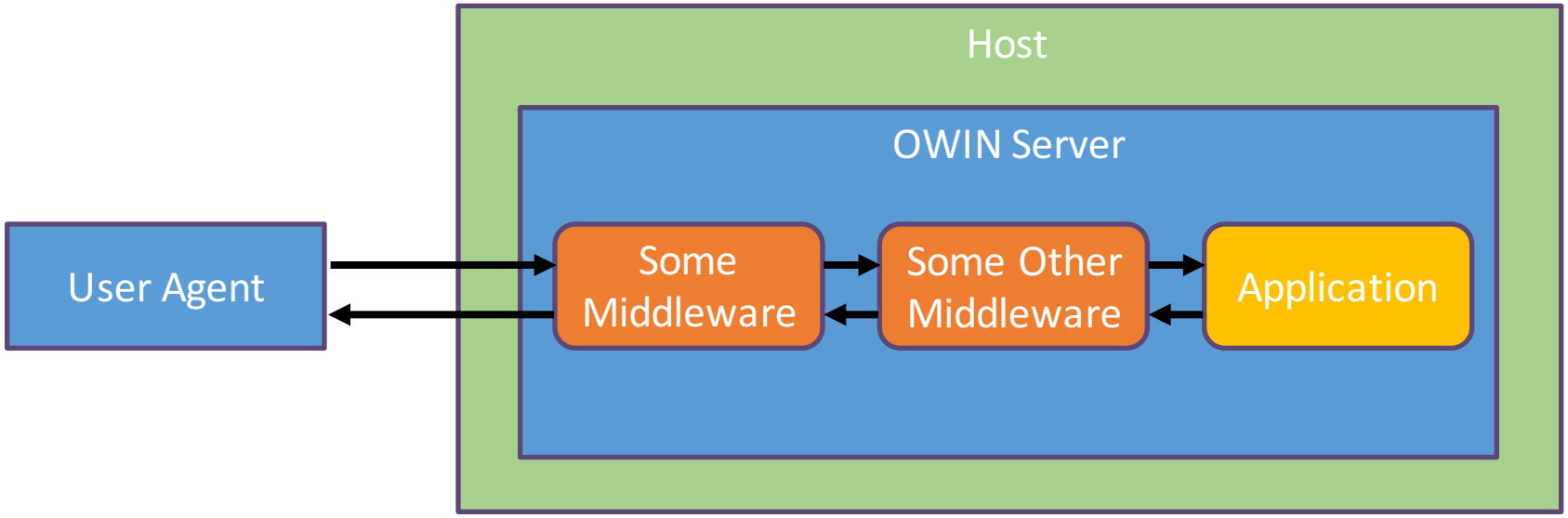
Where are we?



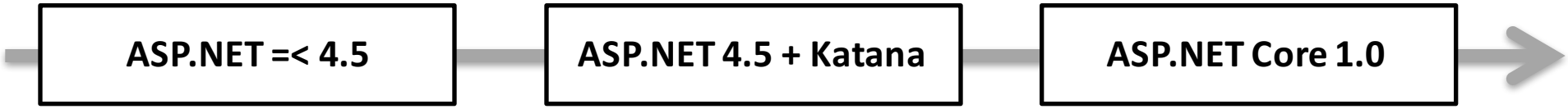
ASP.NET =< 4.5	ASP.NET 4.5 + Katana	ASP.NET Core 1.0
"System.Web.dll"	**"System.Web.dll"**	
Modules & Handlers	**Modules & Handlers**	
ASP.NET WebForms	ASP.NET WebForms	
ASP.NET MVC	ASP.NET MVC	
(Simple) Membership	**OWIN & Katana**	
	ASP.NET Web API	
	ASP.NET SignalR	
	ASP.NET Identity 1/2	

Middleware Architecture

- **Middleware are linked components that process requests**
- **Application code targeting a framework (e.g. Web API)**



Where are we?



"System.Web.dll"
Modules & Handlers

ASP.NET WebForms
ASP.NET MVC

(Simple) Membership

"System.Web.dll"
Modules & Handlers

ASP.NET WebForms
ASP.NET MVC

OWIN & Katana

ASP.NET Web API
ASP.NET SignalR

ASP.NET Identity 1/2

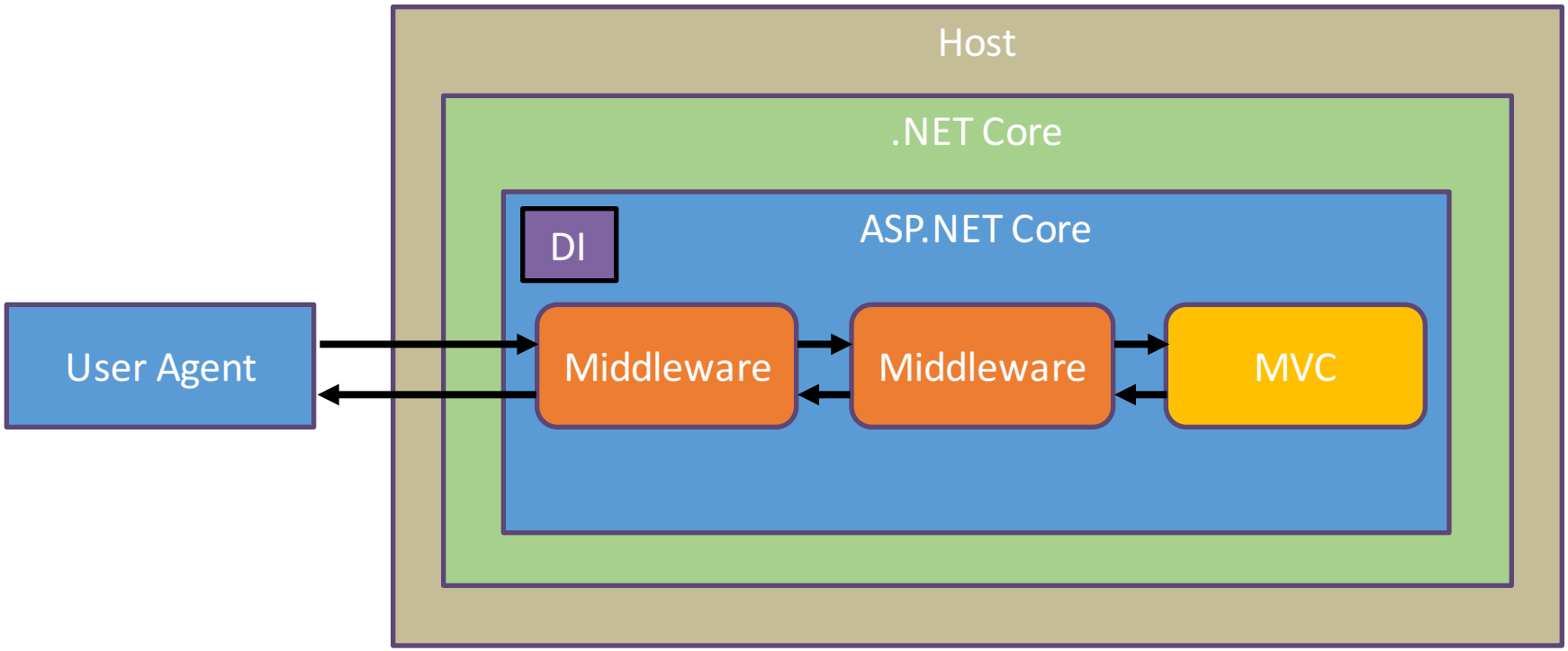
.NET Core
BYOCLR

Re-design
X-Plat
Inspired by OWIN

MVC + Web APIs
ASP.NET Identity 3

ASP.NET Core Architecture

- **ASP.NET Core is the runtime (hosted by .NET Core)**
- **MVC is Microsoft's primary application framework**
  - combines web UI & API



Security Architecture in ASP.NET Core

- **Everything is based on *ClaimsPrincipal***
  - no more custom *IPrincipal*
- **Authentication is implemented as middleware**
  - cookies
  - external authentication
- **Other security related services**
  - CORS, logging, encoding, anti-forgery
- **New data protection API**
- **New authorization API**

Identity & Authentication APIs

- **The new *HttpContext***
  - https://github.com/aspnet/HttpAbstractions/blob/dev/src/Microsoft.AspNetCore.Http.Abstractions/HttpContext.cs

- ***AuthenticationManager***
  - https://github.com/aspnet/HttpAbstractions/blob/dev/src/Microsoft.AspNetCore.Http.Abstractions/Authentication/AuthenticationManager.cs

Cookie Authentication Middleware

- **Triggered with *HttpContext.Authentication.SignInAsync***

```
app.UseCookieAuthentication(options =>
{
    options.AuthenticationScheme = "Cookies";
    options.AutomaticAuthenticate = true;
    options.AutomaticChallenge = true;

    options.LoginPath =
       new PathString("/account/login");
    options.AccessDeniedPath =
       new PathString("/account/forbidden");
});
```

Claims Transformation

- **Per-request manipulation of principal & claims**

```
app.UseClaimsTransformation(user =>
{
    if (user.Identity.IsAuthenticated)
    {
        user.Identities.First().AddClaims(GetAppRoles(user));
    }

    return Task.FromResult(user);
});
```

External Authentication

- **Triggered with *HttpContext.Authentication.ChallengeAsync***

```
app.UseGoogleAuthentication(options =>
{
    options.AuthenticationScheme = "Google";
    options.SignInScheme = "Cookies";

    options.ClientId = "43…43";
    options.ClientSecret = "3g…Wo";
});
```

* turns external identity automatically into a trusted application cookie

External Authentication w/ Callback

- ***HttpContext.Authentication.ChallengeAsync***
- ***HttpContext.Authentication.AuthenticateAsync***

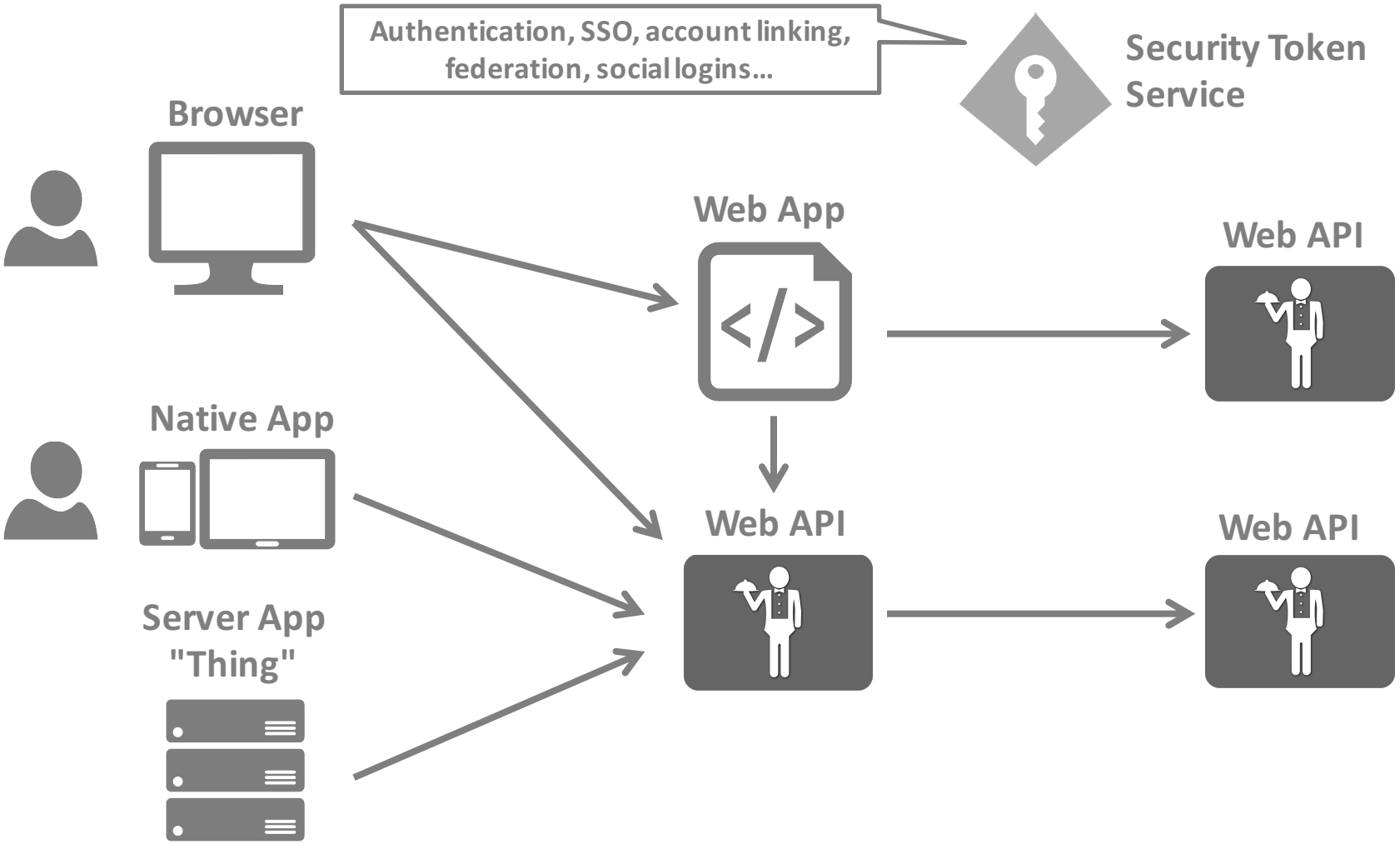
```
app.UseCookieAuthentication(options =>
{
    options.AuthenticationScheme = "Temp";
    options.AutomaticAuthenticate = false;
});

app.UseGoogleAuthentication(options =>
{
    options.AuthenticationScheme = "Google";
    options.SignInScheme = "Temp";
});
```

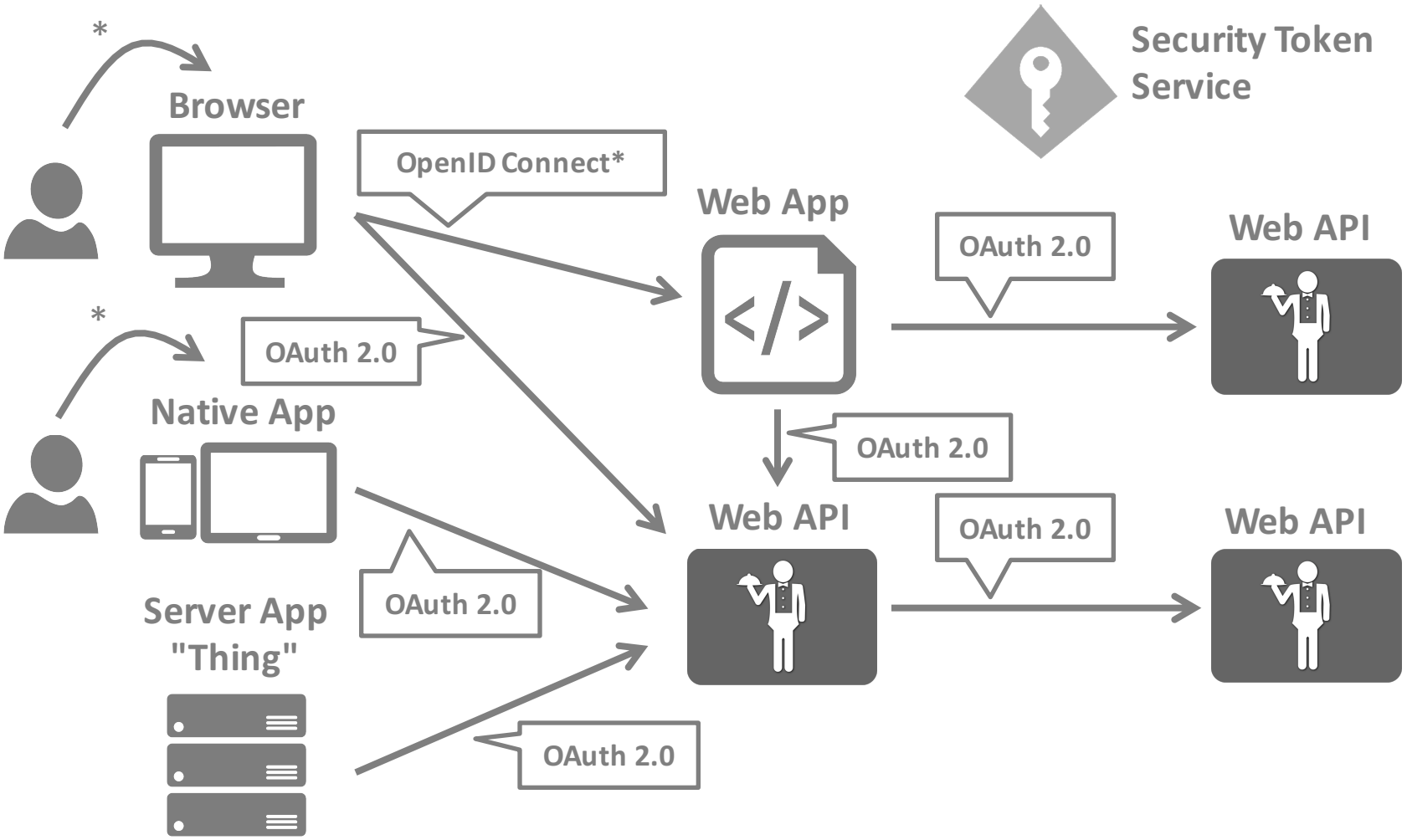
Generic OAuth 2.0 Middleware

- **Many "social" providers abuse OAuth 2.0 for login**
  - many incompatible dialects (but similar)
- **New generic OAuth 2.0 base-middleware makes implementation easier**
  - https://github.com/aspnet-contrib/AspNet.Security.OAuth.Providers
- **Community provided middleware**
  - LinkedIn, Slack, Spotify, WordPress, Yahoo, Github, Instragram, BattleNet, Dropbox, Paypal, Vimeo…

The way forward…



Security Protocols



OpenID Connect Middleware

- **Much improved**
  - code flow support, finer grained notifications, cleanup…

```
app.UseOpenIdConnectAuthentication(options =>
{
    options.AuthenticationScheme = "OIDC",
    options.SignInScheme = "Cookies";
    options.AutomaticAuthenticate = true;

    options.Authority = "https://identityserver.io";
    options.ClientId = "mvc6";

    options.Scope.Add("openid");
    options.Scope.Add("email");
});
```

Web API Authentication

- **Middleware for JWT access tokens built-in**
  - cookies not recommended

```
app.UseOAuthBearerAuthentication(options =>
{
    options.Authority = "https://localhost:44300";
    options.Audience = "my.api";

    options.AutomaticAuthenticate = true;
    options.AutomaticChallenge = true;
});
```

Issuing Tokens

- **No built-in token issuance middleware anymore**
- **Microsoft recommends IdentityServer (me too)**
  - OpenID Connect and OAuth 2.0 token service

http://github.com/identityserver

http://leastprivilege.com/2016/01/11/announcing-identityserver-for-asp-net-5-and-net-core/

Data Protection

- **Who thought this would be a good idea??**

```
<system.web>
   <!– copied from google seemed legit -->
   <machineKey decryptionKey="656E7...617365206865726547A5"
               validationKey="07C1493415E4405F08...6EF8B1F" />
</system.web>
```

For giggles: "https://www.google.com/#q=<machineKey filetype:config"

Key Container Locations

- **On Azure Web Apps (no encryption)**
  - %HOME%\ASP.NET\DataProtection-Keys
- **If user profile is loaded (encrypted)**
  - %LOCALAPPDATA%\ASP.NET\DataProtection-Keys
- **IIS / no profile (encrypted)**
  - Registry HKLM
- **In-Memory**
- **Manual configuration**

```
<?xml version="1.0" encoding="utf-8"?>
<key id="eacc6495-83a3-4aaf-ad29-fee164c69963" version="1">
  <creationDate>2015-05-02T08:20:38.6577127Z</creationDate>
  <activationDate>2015-05-02T08:20:38.6424674Z</activationDate>
  <expirationDate>2015-07-31T08:20:38.6424674Z</expirationDate>
  <descriptor>
    <descriptor>
      <encryption algorithm="AES_256_CBC" />
      <validation algorithm="HMACSHA256" />
      <encryptedSecret>
        <encryptedKey xmlns="">
          <!-- This key is encrypted with Windows DPAPI. -->
          <value>AQAAANCMnd8BFdERjHoAwE/Cl+sBAA..g==</value>
        </encryptedKey>
      </encryptedSecret>
    </descriptor>
  </descriptor>
</key>
```

Manual Configuration

- **Web farm scenarios will require a shared location**
  - Might also prefer certificate rather than DPAPI

```
public void ConfigureServices(IServiceCollection services)
{
    services.AddDataProtection();
    services.ConfigureDataProtection(configure =>
    {
        configure.PersistKeysToFileSystem(
            new DirectoryInfo(@"\\server\share\directory\"));
        configure.ProtectKeysWithCertificate("thumbprint");
        configure.SetApplicationName("my application");
    });
}
```

Authorization

- **Complete re-write**
  - support for *unauthorized* vs *forbidden*
  - better separation of business code and authorization logic
  - re-usable policies
  - resource/action based authorization
  - DI enabled

[Authorize]

- **Similar syntax**
  - roles still supported*

```
[Authorize]
public class HomeController : Controller
{
    [AllowAnonymous]
    public IActionResult Index()
    {
        return View();
    }

    [Authorize(Roles = "Sales")]
    public IActionResult About()
    {
        return View(User);
    }
}
```

* …and who thought that would be a good idea?

Authorization policies

Startup

```
services.ConfigureAuthorization(options =>
{
    options.AddPolicy("SalesSenior", policy =>
    {
        policy.RequireAuthenticatedUser();
        policy.RequireClaim("department", "sales");
        policy.RequireClaim("status", "senior");
    });
};
```

Controller

```
[Authorize("SalesSenior")]
public IActionResult Manage()
{
    // stuff
}
```

Resource-based Authorization

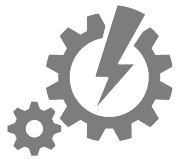
Subject

- client ID
- subject ID
- scopes

- more claims

+ DI

Operation



- read
- write
- send via email
- ...

Object

- ID
- owner

- more properties

+ DI

Example: Document resource

```
public class DocumentAuthorizationHandler :
    AuthorizationHandler<OperationAuthorizationRequirement, Document>
{
    public override void Handle(
      AuthorizationContext context,
      OperationAuthorizationRequirement operation,
      Document resource)
    {
        // authorization logic
    }
}
```

DI

```
services.AddTransient<IAuthorizationHandler, DocumentAuthorizationHandler>();
```

Invoking the authorization handler

```
public class DocumentController : Controller
{
    private readonly IAuthorizationService _authz;

    public DocumentController(IAuthorizationService authz)
    {
        _authz = authz;
    }

    public async Task<IActionResult> Update(Document doc)
    {
        if (!await _authz.AuthorizeAsync(User, doc, Operations.Update))
        {
            // forbidden
            return new ChallengeResult();
        }

        // do stuff
    }
}
```

Resources

- **https://github.com/aspnet**
  - home
  - security
  - announcements

- **http://docs.asp.net**

thank you!