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23. - 25. 5. 2023 | PRAHA / ONLINE

Největší československá
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Implementing security interfaces in ASP.NET Core Identity

Ákos Nagy | **Teched 2023**

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Agenda

- ASP.NET Core Identity – overview
- Implementing defined interfaces to support security-related tasks
- Questions

ASP.NET Core Identity overview

- An API that supports UI login functionality
- Manage users, passwords, profile data, roles, claims token
- Support external login providers
- Support authorization functions

Special requirements related to security

- Extend the built-in user schema with extra information
- Extend information stored in the authentication token/cookie
- Implementing a custom user/scoped session
- Extend the cookie/token validation process
- Extend anti-forgery token/cookie handling
- Add protection to Personally Identifiable Information
- Add custom authentication ticket handling

Why should I care?

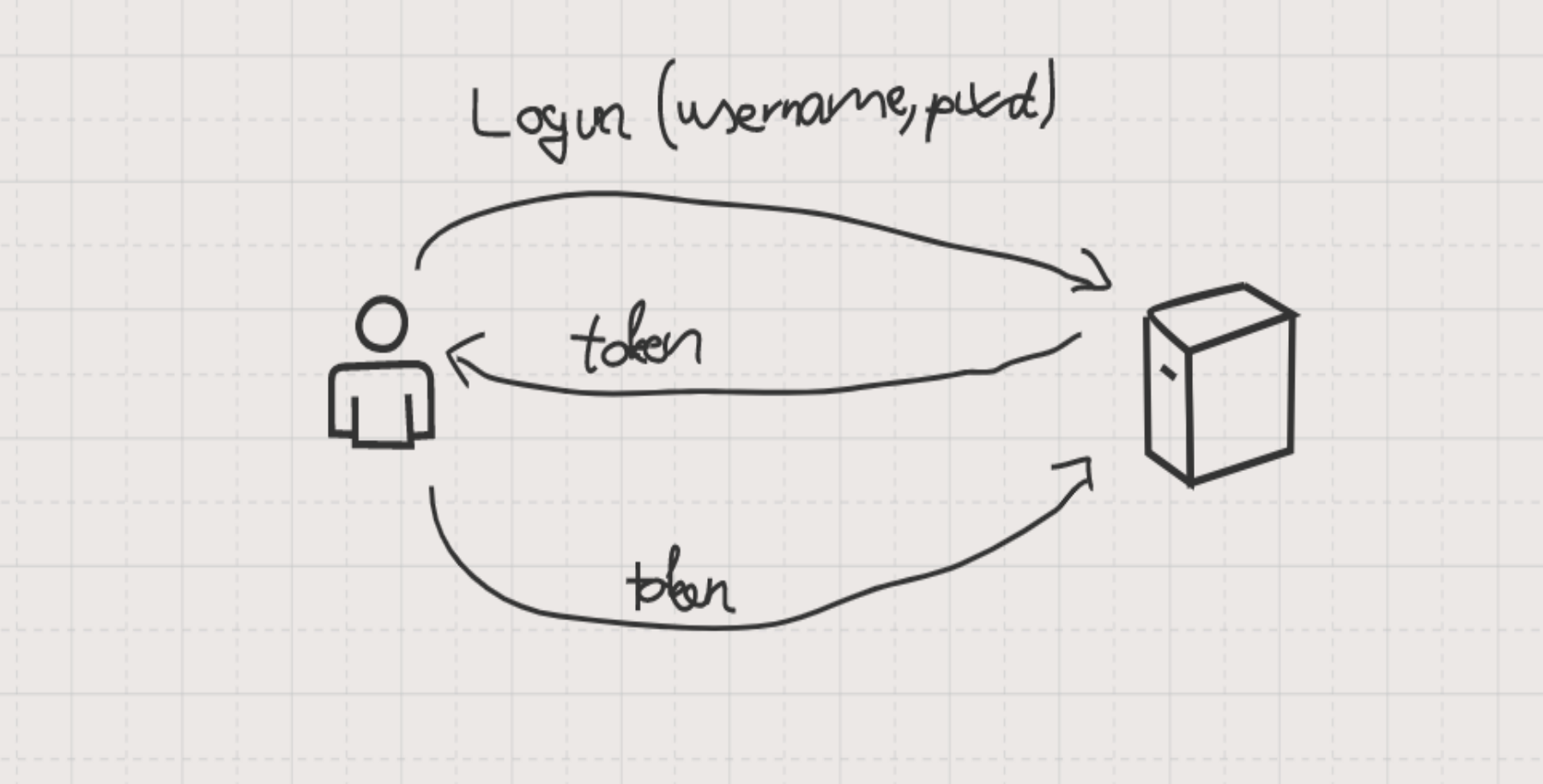
- **What is a framework?**
  - By definition, a framework provides interfaces that the programmer should implement, then instantiate and pass it back to the framework…
  - … creating custom interfaces not only makes using the framework completely useless
  - … but also starts a chain reaction (no part of the framework know about custom interfaces, so every part of the frameworks must be gradually replaced)
- **How is security "different"?**
  - Don't create your own security solutions (unless you're an expert in security solutions)
  - Broken authentication workflows
  - Information disclosure
  - Math ☹

Extending user information

- Create custom `IdentityUser` class
  - Add extra properties about the user

- Create custom `IdentityDbContext` class
  - Handles the custom user entites

Using the extended user information for authorization



Using the extended user information for authorization

- **What?**
  - A collection of claims
  - A claim is a piece of information that the server adds to the token about the user…
  - … so the user can later "claim" something about themselves
- **Why?**
  - This way sensitive information that can be used to identify the user don't need to be added to every request
  - The server doesn't need to query the information every time from the database
  - **The server can use this for authorization**
- **How?**
  - The token is digitally signed, so the server can trust the resubmitted token
  - In case of an MVC application, the token is sent in a cookie that is added to every subsequent request by the browser

Using the extended user information for authorization

- Create a custom `UserClaimsPrincipalFactory`
  - add any custom claims to the token
- Create a custom `IAthorizationRequirement`
  - a simple POCO that describes the requirement)
- Create a custom `AuthorizationHandler`
  - receives an instance of the requirement and the http context, so it can validate the claims from the context against the requirement
- Create a custom `AuthorizationAttribute`
  - can be applied to actions/controllers and can relate information to the requirement
- Create a custom `AuthorizationPolicyProvider`
  - processes the attribute, parse the data from the attribute and create the custom requirement

Protecting data

- Implement a custom `ILookupProtector`
  - Protects `UserName`, `NormalizedUserName`, `Email`, `NormalizedEmail`, `PhoneNumber`
  - Also protects any properties marked with `[PersonalData, ProtectedPersonalData]`
  - Supports key rotation
    - Gets the current key id from the keyring, encrypts the data and stores the keyed
    - When decrypting, queries the keyring for the key

- Implement a custom `ILookupProtectorKeyRing`
  - Manages the keys, rotates them using a given algorithm

- Implement `IPersonalDataProtector` (optional)
  - The default implementation uses the previous two to protect the data in the format keyId:encrypteddata

Remote sign-in management

- Implement `ITicketStore`
  - `ITicketStore` manages the users logins
  - Implementing a custom version helps us to store the logins and later list or delete them
  - `AuthenticationTickets` store claims, authentication methods and other information
  - Can be serialized and stored in a database

Extending anti-forgery protection

- Implement `IAntiForgeryAdditionalDataProvider`
  - Antiforgery tokens prevent CSRF attacks
  - Antiforgery tokens are scoped to the site and to the user (if there's authentication), but can be reused without time limitation
  - Using this interface, extra information can be added to the token
  - Later this information can be verified

Hooking up callbacks to token validation

- Implement `CookieAuthenticationEvents`
  - Has methods that can be overridden
    - Before and after sign in
    - Before sign out
    - Validating the claims in the token
    - Redirecting when authentication/authorization fails

Thank you for your attention!

- Source code available at: https://github.com/conwid/AspNetSecurity
  - Each complete demo is a commit
- Read more from me at: https://dotnetfalcon.com
- Available for hire (consultation, training): https://hireme.dotnetfalcon.com
- Keep in touch: https://linkedin.com/in/azakosnagy

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