Tutorial: Get started with ASP.NET Core SignalR

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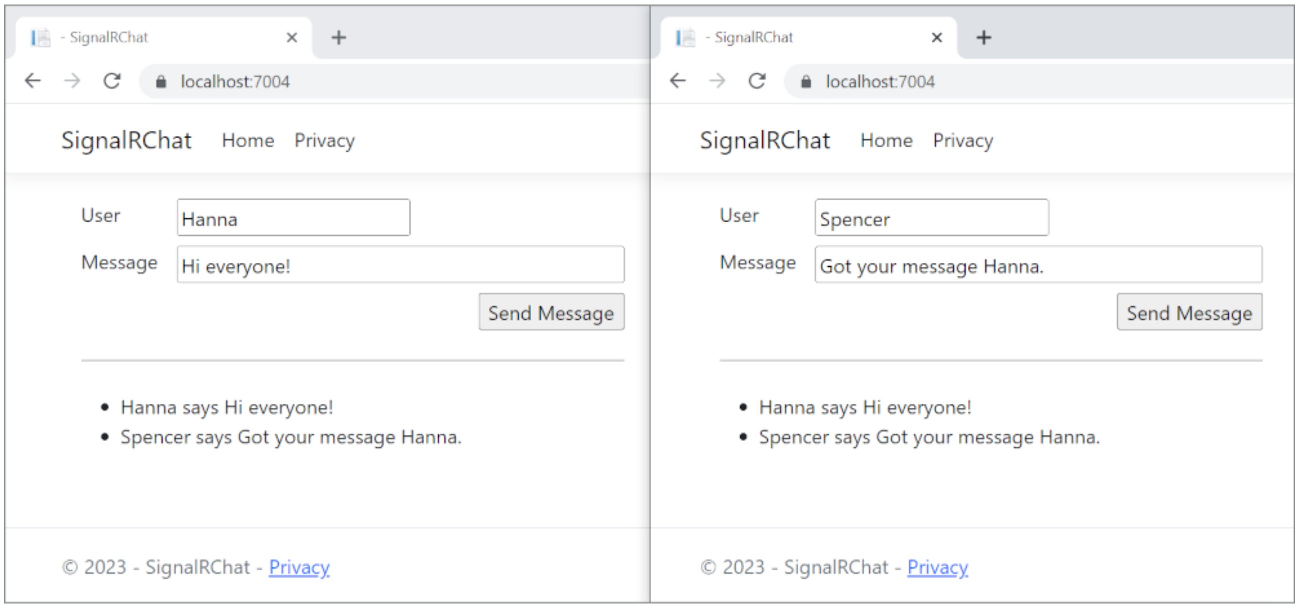
This tutorial teaches the basics of building a real-time app using SignalR. You learn how to:

- ✓ Create a web project.
- ✓ Add the SignalR client library.
- ✓ Create a SignalR hub.
- ✓ Configure the project to use SignalR.
- ✓ Add code that sends messages from any client to all connected clients.

At the end, you'll have a working chat app:



User: Hanna
Message: Hi everyone!

- Hanna says Hi everyone!
- Spencer says Got your message Hanna.

User: Spencer
Message: Got your message Hanna.

- Hanna says Hi everyone!
- Spencer says Got your message Hanna.

Prerequisites

Visual Studio Code

- Visual Studio Code
- C# for Visual Studio Code (latest version)
- .NET 7.0 SDK

The Visual Studio Code instructions use the .NET CLI for ASP.NET Core development functions such as project creation. You can follow these instructions on macOS, Linux, or Windows and with any code editor. Minor changes may be required if you use something other than Visual Studio Code.

Create a web app project

Visual Studio Code

The tutorial assumes familiarity with VS Code. For more information, see Getting started with VS Code

- Select **New Terminal** from the **Terminal** menu to open the integrated terminal .
- Change to the directory (`cd`) that will contain the project.
- Run the following commands:

.NET CLI

```
dotnet new webapp -o SignalRChat
code -r SignalRChat
```

The `dotnet new` command creates a new Razor Pages project in the `SignalRChat` folder.

The `code` command opens the `SignalRChat1 folder in the current instance of Visual Studio Code.

Visual Studio Code might display a dialog box that asks: **Do you trust the authors of the files in this folder?**

- If you trust all files in the parent folder, select **Trust the authors of all files in the parent folder**.
- Select **Yes, I trust the authors** since the project folder has files generated by .NET.
- When Visual Studio Code requests that you add assets to build and debug the project, select **Yes**. If Visual Studio Code doesn't offer to add build and debug assets, select **View** > **Command Palette** and type " `.NET` " into the search box. From the list of commands, select the `.NET: Generate Assets for Build and Debug` command.

Visual Studio Code adds a `.vscode` folder with generated `launch.json` and `tasks.json` files.

Add the SignalR client library

The SignalR server library is included in the ASP.NET Core shared framework. The JavaScript client library isn't automatically included in the project. For this tutorial, use Library Manager (LibMan) to get the client library from unpkg. `unpkg` is a fast, global content delivery network for everything on npm.

Visual Studio Code

In the integrated terminal, run the following commands to install LibMan after uninstalling any previous version, if one exists.

.NET CLI

```
dotnet tool uninstall -g Microsoft.Web.LibraryManager.Cli
dotnet tool install -g Microsoft.Web.LibraryManager.Cli
```

Note

By default the architecture of the .NET binaries to install represents the currently running OS architecture. To specify a different OS architecture, see **dotnet tool install, --arch option**. For more information, see GitHub issue **dotnet/AspNetCore.Docs #29262**.

Navigate to the project folder, which contains the `SignalRChat.csproj` file.

Run the following command to get the SignalR client library by using LibMan. It may take a few seconds before displaying output.

Console

```
libman install @microsoft/signalr@latest -p unpkg -d wwwroot/js/signalr --
files dist/browser/signalr.js
```

The parameters specify the following options:

- Use the unpkg provider.
- Copy files to the `wwwroot/js/signalr` destination.
- Copy only the specified files.

The output looks like the following example:

Console

```
wwwroot/js/signalr/dist/browser/signalr.js written to disk
wwwroot/js/signalr/dist/browser/signalr.js written to disk
Installed library "@microsoft/signalr@latest" to "wwwroot/js/signalr"
```

Create a SignalR hub

A *hub* is a class that serves as a high-level pipeline that handles client-server communication.

In the SignalRChat project folder, create a `Hubs` folder.

In the `Hubs` folder, create the `ChatHub` class with the following code:

C#

```csharp
using Microsoft.AspNetCore.SignalR;

namespace SignalRChat.Hubs
{
    public class ChatHub : Hub
    {
        public async Task SendMessage(string user, string message)
        {
            await Clients.All.SendAsync("ReceiveMessage", user, message);
        }
    }
}
```

The `ChatHub` class inherits from the SignalR Hub class. The `Hub` class manages connections, groups, and messaging.

The `SendMessage` method can be called by a connected client to send a message to all clients. JavaScript client code that calls the method is shown later in the tutorial. SignalR code is asynchronous to provide maximum scalability.

Configure SignalR

The SignalR server must be configured to pass SignalR requests to SignalR. Add the following highlighted code to the `Program.cs` file.

C#

```
using SignalRChat.Hubs;

var builder = WebApplication.CreateBuilder(args);

// Add services to the container.
builder.Services.AddRazorPages();
builder.Services.AddSignalR();

var app = builder.Build();

// Configure the HTTP request pipeline.
if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/Error");
    // The default HSTS value is 30 days. You may want to change this for pro-
duction scenarios, see https://aka.ms/aspnetcore-hsts.
    app.UseHsts();
}

app.UseHttpsRedirection();
app.UseStaticFiles();

app.UseRouting();

app.UseAuthorization();

app.MapRazorPages();
app.MapHub<ChatHub>("/chatHub");

app.Run();
```

The preceding highlighted code adds SignalR to the ASP.NET Core dependency injection and routing systems.

Add SignalR client code

Replace the content in `Pages/Index.cshtml` with the following code:

CSHTML

```
@page
<div class="container">
    <div class="row p-1">
        <div class="col-1">User</div>
        <div class="col-5"><input type="text" id="userInput" /></div>
    </div>
    <div class="row p-1">
        <div class="col-1">Message</div>
        <div class="col-5"><input type="text" class="w-100" id="messageInput"
/></div>
    </div>
    <div class="row p-1">
        <div class="col-6 text-end">
            <input type="button" id="sendButton" value="Send Message" />
        </div>
    </div>
    <div class="row p-1">
        <div class="col-6">
            <hr />
        </div>
    </div>
    <div class="row p-1">
        <div class="col-6">
            <ul id="messagesList"></ul>
        </div>
    </div>
</div>
<script src="~/js/signalr/dist/browser/signalr.js"></script>
<script src="~/js/chat.js"></script>
```

The preceding markup:

- Creates text boxes and a submit button.
- Creates a list with `id="messagesList"` for displaying messages that are received from the SignalR hub.
- Includes script references to SignalR and the `chat.js` app code is created in the next step.

In the `wwwroot/js` folder, create a `chat.js` file with the following code:

JavaScript

```
"use strict";

var connection = new
```

```
signalR.HubConnectionBuilder().withUrl("/chatHub").build();

//Disable the send button until connection is established.
document.getElementById("sendButton").disabled = true;

connection.on("ReceiveMessage", function (user, message) {
    var li = document.createElement("li");
    document.getElementById("messagesList").appendChild(li);
    // We can assign user-supplied strings to an element's textContent because
it
    // is not interpreted as markup. If you're assigning in any other way, you
    // should be aware of possible script injection concerns.
    li.textContent = `${user} says ${message}`;
});

connection.start().then(function () {
    document.getElementById("sendButton").disabled = false;
}).catch(function (err) {
    return console.error(err.toString());
});

document.getElementById("sendButton").addEventListener("click", function
(event) {
    var user = document.getElementById("userInput").value;
    var message = document.getElementById("messageInput").value;
    connection.invoke("SendMessage", user, message).catch(function (err) {
        return console.error(err.toString());
    });
    event.preventDefault();
});
```

The preceding JavaScript:

- Creates and starts a connection.
- Adds to the submit button a handler that sends messages to the hub.
- Adds to the connection object a handler that receives messages from the hub and adds them to the list.

Run the app

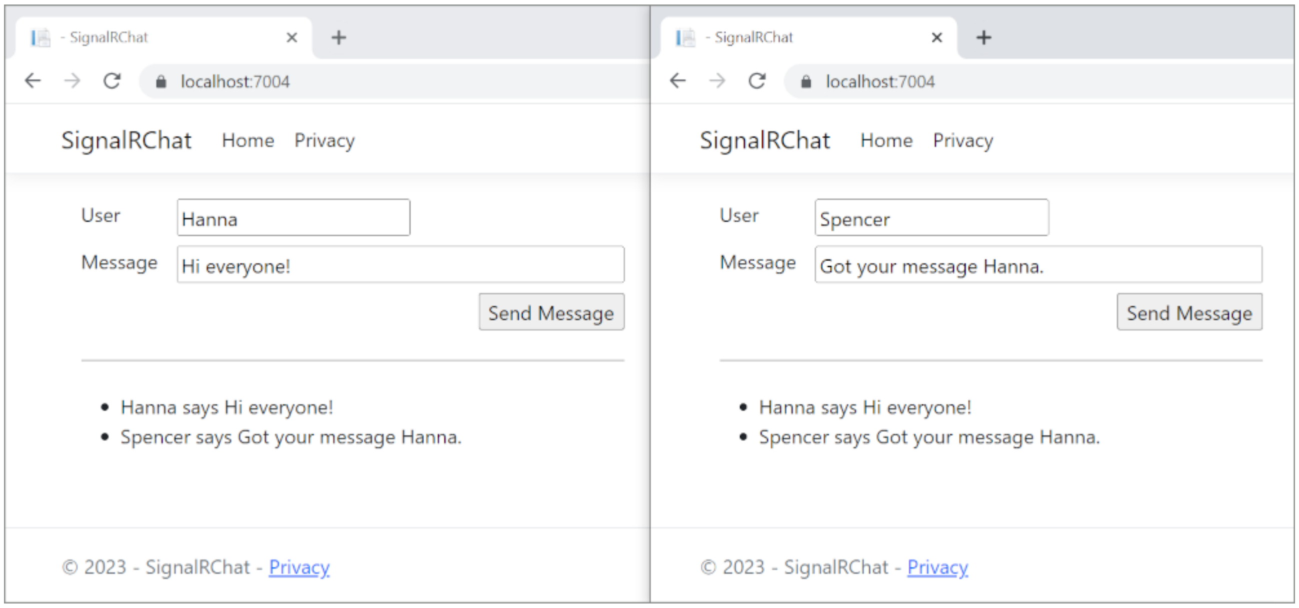
Visual Studio Code

Select `Ctrl`+`F5` to run the app without debugging.

Copy the URL from the address bar, open another browser instance or tab, and paste the URL in the address bar.

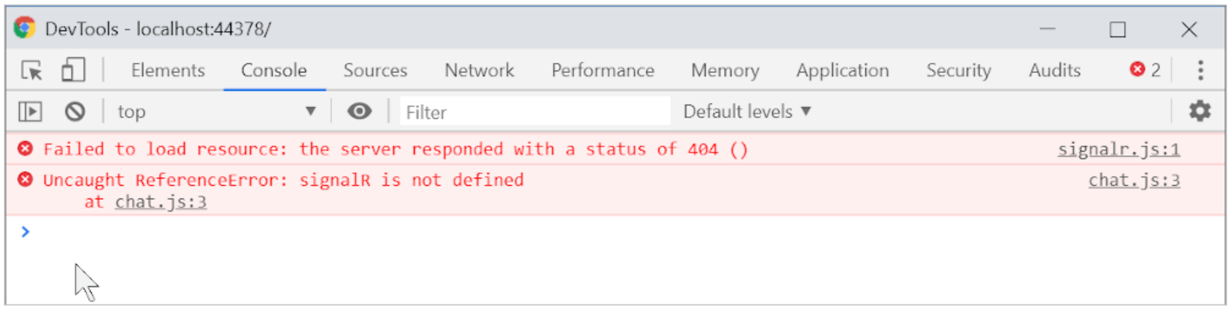
Choose either browser, enter a name and message, and select the **Send Message** button.

The name and message are displayed on both pages instantly.



💡 **Tip**

If the app doesn't work, open the browser developer tools (F12) and go to the console. Look for possible errors related to HTML and JavaScript code. For example, if `signalr.js` was put in a different folder than directed, the reference to that file won't work resulting in a 404 error in the console.



```
Failed to load resource: the server responded with a status of 404 ()    signalr.js:1
Uncaught ReferenceError: signalR is not defined                          chat.js:3
    at chat.js:3
```

If an `ERR_SPDY_INADEQUATE_TRANSPORT_SECURITY` error has occurred in Chrome, run the following commands to update the development certificate:

.NET CLI

```
dotnet dev-certs https --clean
dotnet dev-certs https --trust
```

Publish to Azure

For information on deploying to Azure, see Quickstart: Deploy an ASP.NET web app. For more information on Azure SignalR Service, see What is Azure SignalR Service?.

Next steps

- Use hubs
- Strongly typed hubs
- Authentication and authorization in ASP.NET Core SignalR
- View or download sample code (how to download)