

FULLSTACK DOTNET TUTORIAL

In this tutorial, we are going to build a full stack dotnet project, which is connected to a database and an HTML frontend

Let Start With The BACKEND

STEP 1

- ➔ Create the project by using the visual studio code application
- ➔ Click on the [project>Manage nugget packages] to install the following packages
 1. Microsoft.EntityFrameworkCore
 2. Microsoft.EntityFrameworkCore.SqlServer
 3. Microsoft.EntityFrameworkCore.Design
 4. Microsoft.identity.Client
 5. Microsoft.Data.SqlClient
 6. Microsoft.SqlServer.Server
- ➔ To add CORS to your application, create a folder in the project root and name it Extensions
- ➔ Inside the Extensions folder, create a file and name it **ServiceExtensions.cs** and paste this code

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;

namespace ProjectManager.Extensions
{
    public static class ServiceExtensions
    {
        public static void ConfigureServices(this IServiceCollection services) =>
        services.AddCors(options =>
        {
            options.AddPolicy("CorsPolicy", builder =>
            builder.AllowAnyOrigin()
            .AllowAnyMethod()
            .AllowAnyHeader());
        });

        public static void ConfigureIISIntegration(this IServiceCollection services) =>
        services.Configure<IISSOptions>(options =>
        {
        });

    }
}

➔ In the Program.cs, add ConfigureServices and ConfigureIISIntegration as a service and also register the CORS in the Program.cs file. In the Program.cs, we need to call the DataContext in it too like this [builder.Services.AddDbContext<DataContext>();]
```

The entire **Program.cs** should look like this

```
using Microsoft.AspNetCore.HttpOverrides;
using ProjectManager.Data;
using ProjectManager.Extensions;

var builder = WebApplication.CreateBuilder(args);

// Add services to the container.

builder.Services.ConfigureCors();
builder.Services.ConfigureIISIntegration();

builder.Services.AddControllers();
// Learn more about configuring Swagger/OpenAPI at https://aka.ms/aspnetcore/swashbuckle
builder.Services.AddEndpointsApiExplorer();
builder.Services.AddSwaggerGen();
builder.Services.AddDbContext<DataContext>();

var app = builder.Build();

if (app.Environment.IsDevelopment())
    app.UseDeveloperExceptionPage();
else
    app.UseHsts();

// Configure the HTTP request pipeline.
if (app.Environment.IsDevelopment())
{
    app.UseSwagger();
    app.UseSwaggerUI();
}

app.UseDefaultFiles();
app.UseStaticFiles();
app.UseForwardedHeaders(new ForwardedHeadersOptions
{
    ForwardedHeaders = ForwardedHeaders.All
});
app.UseCors("CorsPolicy");

app.UseHttpsRedirection();

app.UseAuthorization();

app.MapControllers();
```

```
app.Run();
```

Step 2

In the Root folder, create 2 folders, Models and Data

In the Models folder create this Four Models

Project.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;

namespace ProjectManager.Models
{
    public class Project
    {
        public int Id {get; set;}
        public string name {get;set;}
        public string description {get;set;}
        public DateTime dueDate {get;set;}
        public double cost {get;set;}
        public string developer {get;set;}
        public string customer {get;set;}
        public string status {get;set;}
    }
}
```

User.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;

namespace FlexiSecure.Models
{
    public class User
    {
        public int Id { get; set; }

        public string Name { get; set; } = string.Empty;
        public string Email { get; set; } = string.Empty;
        public byte[] PasswordHash { get; set; } = new byte[32];
        public byte[] PasswordSalt { get; set; } = new byte[32];
        public string? VerificationToken {get; set; }
        public DateTime? VerifiedAt { get; set; }
    }
}
```

```

public string? PasswordResetToken { get; set; }
public DateTime? ResetTokenExpires{get; set; }

}
}

```

UserRegisterRequest.cs

```

using System;
using System.Collections.Generic;
using System.ComponentModel.DataAnnotations;
using System.Linq;
using System.Threading.Tasks;

namespace FlexiSecure.Models
{
    public class UserRegisterRequest
    {
        [Required,MinLength(3, ErrorMessage ="Enter a valid name")]
        public string Name { get; set; } = string.Empty;
        [Required, EmailAddress]
        public string Email { get; set; } = string.Empty;
        [Required, MinLength(6,ErrorMessage ="Please enter at least 6 characters ")]
        public string Password { get; set; } = string.Empty;
        [Required, Compare("Password")]
        public string ConfirmPassword{get; set; } = string.Empty;

    }
}

```

UserLoginRequest.cs

```

using System;
using System.Collections.Generic;
using System.ComponentModel.DataAnnotations;
using System.Linq;
using System.Threading.Tasks;

namespace FlexiSecure.Models
{
    public class UserLoginRequest
    {

        [Required, EmailAddress]
        public string Email { get; set; } = string.Empty;
        [Required]
        public string Password { get; set; } = string.Empty;

    }
}

```

```
}
```

In the Data folder, Create a **DataContext.cs** file and paste this content

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;
using FlexiSecure.Models;
using Microsoft.EntityFrameworkCore;
using ProjectManager.Models;

namespace ProjectManager.Data
{
    public class DataContext : DbContext
    {
        //Empty constructor
        public DataContext(): base(){
        }

        //Database Connection String
        protected override void OnConfiguring(DbContextOptionsBuilder optionsBuilder)
        {
            base.OnConfiguring(optionsBuilder);
            optionsBuilder.UseSqlServer("Server=localhost,1433;Database=Projects;User=sa;Password=HydotTech;TrustServerCertificate=true;");
        }

        //Data Set, where Project and User are models in the Model folder
        public DbSet<Project> Projects => Set<Project>();
        public DbSet<User> Users => Set<User>();

    }
}
```

Step 3

Open the Controller Folder and Create 2 Controllers,

ProjectController.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;
using Microsoft.AspNetCore.Mvc;
using Microsoft.EntityFrameworkCore;
using ProjectManager.Data;
using ProjectManager.Models;

namespace ProjectManager.Controllers
{
    [ApiController]
    [Route("api/Projects")]
    public class ProjectController : ControllerBase
    {
        private readonly DataContext _context;
        public ProjectController(DataContext context){
            _context = context;
        }
        [HttpPost()]
        public async Task<IActionResult> AddProject(Project project){
            //Call the Project.cs model to create a skeleton
            var my_project = new Project{
                name = project.name,
                description = project.description,
                dueDate = project.dueDate,
                cost = project.cost,
                developer = project.developer,
                customer = project.customer,
                status = project.status
            };
            _context.Projects.Add(my_project);
            await _context.SaveChangesAsync();
            return Ok("Projects Created Successfully");
        }
        [HttpGet()]
        public async Task<ActionResult<IEnumerable<Project>>> GetItems()
        {
            var items = await _context.Projects.ToListAsync(); // Replace "YourModels" with
            your actual DbSet name

            return Ok(items);
        }
        [HttpGet("{Id}")]
        public async Task<ActionResult<Project>> GetItem(int Id){
```

```

var item = await _context.Projects.FindAsync(Id);
if (item == null){
return NotFound();
}
return Ok(item);

}

```

```

[HttpPut("{id}")]
public async Task<IActionResult> UpdateItem(int id, Project updatedItem){
if (id != updatedItem.Id)
{
return BadRequest("The IDS DONT MATCH"); // Returns HTTP 400 if the ID in the
route does not match the ID in the updated item
}
}

```

```

_context.Entry(updatedItem).State = EntityState.Modified;

```

```

try
{
await _context.SaveChangesAsync();
}
catch(DbUpdateConcurrencyException){
if (!ItemExists(id))
{
return NotFound(); // Returns HTTP 404 if the item with the specified ID is not
found
}
else
{
throw;
}
}
return NoContent();
}
private bool ItemExists(int id)
{
return _context.Projects.Any(e => e.Id == id);
}
}

```

```

[HttpDelete("{id}")]
public async Task<IActionResult> DeleteItem(int id)
{

```

```
var item = await _context.Projects.FindAsync(id);
```

```
if (item == null)
{
    return NotFound("Item not found");
}
```

```
_context.Projects.Remove(item);
await _context.SaveChangesAsync();
```

```
return NoContent();
}
```

```
}
```

```
}
```


UserController.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Security.Cryptography;
using System.Threading.Tasks;
using FlexiSecure.Models;
using Microsoft.AspNetCore.Mvc;
using Microsoft.EntityFrameworkCore;
using ProjectManager.Data;

namespace FlexiSecure.Controllers
{
    [ApiController]
    [Route("api/Auth")]
    public class UserController : ControllerBase
    {
        private readonly DataContext _context;
        public UserController(DataContext context)
        {
            _context = context;
        }

        [HttpPost("register")]
        public async Task<IActionResult> Register(UserRegisterRequest request)
        {
            //Check if Email is already registered
            if(_context.Users.Any(u=> u.Email == request.Email)){
                return BadRequest("The user account is already registered");
            };

            //Create a Password Hash
            CreatePasswordHash(request.Password, out byte[]passwordHash,out
            byte[]passwordSalt);

            //Call the user model from User.cs, create a new objects
            var user = new User{
                Name = request.Name,
                Email = request.Email,
                PasswordHash=passwordHash,
                PasswordSalt = passwordSalt,
                VerificationToken = CreateRandomToken(),
            };

            // The _context is called from the DataContext file and insiide that file, we
            have the Users data set
            //The Users dataset is using the User model
        }
    }
}
```

```
//We will the add the user object we created to the Users dataset
_context.Users.Add(user);
await _context.SaveChangesAsync();

return Ok("Hello "+request.Name+", your account has successfully been created");

}
```

```
[HttpPost("login")]
public async Task<IActionResult>Login(UserLoginRequest request)
{

var user = await _context.Users.FirstOrDefaultAsync(u => u.Email ==
request.Email);
if(user==null){
return BadRequest("User not found");
}

if(!VerifyPasswordHash(request.Password, user.PasswordHash, user.PasswordSalt))
{
return BadRequest("Password is incorrect");
}

if(user.VerifiedAt == null){
return BadRequest("User is not verified");
}

return Ok($"Welcome Back, {user.Name}! ");

}
```

```
[HttpPost("verify")]
public async Task<IActionResult>Verify(string token)
{

var user = await _context.Users.FirstOrDefaultAsync(u => u.VerificationToken ==
token);
if(user==null){
return BadRequest("Invalid token");
}

user.VerifiedAt = DateTime.Now;
```

```
await _context.SaveChangesAsync();
```

```
return Ok("Congratulations! You have been verified");
```

```
}
```

```
private static bool VerifyPasswordHash(string password, byte[] passwordHash,  
byte[] passwordSalt)
```

```
{  
    using (var hmac = new HMACSHA512(passwordSalt))  
    {
```

```
        var computedHash = hmac.ComputeHash(System.Text.Encoding.UTF8.GetBytes(password));  
        return computedHash.SequenceEqual(passwordHash);
```

```
    }
```

```
}
```

```
private static void CreatePasswordHash(string password, out byte[] passwordHash,  
out byte[] passwordSalt)
```

```
{  
    using (var hmac = new HMACSHA512())  
    {
```

```
        passwordSalt = hmac.Key;  
        passwordHash = hmac.ComputeHash(System.Text.Encoding.UTF8.GetBytes(password));
```

```
    }
```

```

}

private string CreateRandomToken(){
return Convert.ToHexString(RandomNumberGenerator.GetBytes(64));
}

}
}

```

Bonus Feature

If you want to add forgot password and reset password feature,

1. Create a **ResetPasswordRequest.cs** model and add the following code

```

using System;
using System.Collections.Generic;
using System.ComponentModel.DataAnnotations;
using System.Linq;
using System.Threading.Tasks;

namespace FlexiSecure.Models
{
public class ResetPasswordRequest
{
[Required]
public string Token { get; set; } = string.Empty;
[Required, MinLength(6, ErrorMessage = "Please enter at least 6 characters ")]
public string Password { get; set; } = string.Empty;
[Required, Compare("Password")]
public string ConfirmPassword { get; set; } = string.Empty;

}
}

```

Inside the **UserController.cs**, add the following code

```

[HttpPost("forgot-password")]
public async Task<IActionResult> ForgotPassword(string email)
{

var user = await _context.Users.FirstOrDefaultAsync(u => u.Email == email);
if(user==null){
return BadRequest("User " + email + " does not exist");
}

user.PasswordResetToken = CreateRandomToken();
user.ResetTokenExpires = DateTime.Now.AddDays(1);
await _context.SaveChangesAsync();

return Ok("You may now reset your password");
}

```

```
}
```

```
[HttpPost("reset-password")]
public async Task<IActionResult>ResetPassword(ResetPasswordRequest request)
{

    //The PasswordResetToken which i declared in the User.cs model and it is made
    //availabe in the
    //DataContext.cs through the DbSet should be equal to the Token the user will
    //declare in the ResetPasswordRequest model
    var user = await _context.Users.FirstOrDefaultAsync(u => u.PasswordResetToken ==
    request.Token);
    if(user==null || user.ResetTokenExpires<DateTime.Now ){
        return BadRequest("Invalid Token");
    }

    CreatePasswordHash(request.Password, out byte[] passwordHash, out byte[]
    passwordSalt);
    user.PasswordHash = passwordHash;
    user.PasswordSalt = passwordSalt;
    user.PasswordResetToken = null;
    user.ResetTokenExpires = null;

    await _context.SaveChangesAsync();

    return Ok("Password successfully reset.");
}
```

Step 4

Ensure that the Database is running in Docker or any place. To create a Database in Docker, follow this tutorial

Adding Database

Follow this link to create a database sql server using docker in Mac Os

<https://builtin.com/software-engineering-perspectives/sql-server-management-studio-mac>

In the terminal, install dotnet-ef tool by running this command [dotnet tool install --global dotnet-ef]

Migrate the DbContext by running the command [dotnet ef migrations add Initial]

This will create a migration folder in the root folder

Also run the command to push the migration to the database [dotnet ef database update]

Install Azure Data Studio and Connect it to the Database you have created

server: *localhost*

Username: *sa*

Password: *YourPassword*

Run The Application By Typing [dotnet watch run]

LET DIVE INTO THE FRONTEND

Step 1

Open the launchSettings.json file from the Properties folder in the root folder and delete the **"launchUrl": "Swagger"** line so that the application will open the default index.html file.

The launchSettings.json file should look like this

```
{
  "$schema": "https://json.schemastore.org/launchsettings.json",
  "iisSettings": {
    "windowsAuthentication": false,
    "anonymousAuthentication": true,
    "iisExpress": {
      "applicationUrl": "http://localhost:29732",
      "sslPort": 44348
    }
  },
  "profiles": {
    "http": {
      "commandName": "Project",
      "launchBrowser": true,
      "applicationUrl": "http://localhost:5217",
      "environmentVariables": {
        "ASPNETCORE_ENVIRONMENT": "Development"
      }
    },
    "dotnetRunMessages": true
  }
}
```

```
{
  "https": {
    "commandName": "Project",
    "launchBrowser": true,
    "applicationUrl": "https://localhost:7273;http://localhost:5217",
    "environmentVariables": {
      "ASPNETCORE_ENVIRONMENT": "Development"
    }
  },
  "dotnetRunMessages": true
},
"IIS Express": {
  "commandName": "IISExpress",
  "launchBrowser": true,
  "environmentVariables": {
    "ASPNETCORE_ENVIRONMENT": "Development"
  }
}
}
```

Create a folder called **wwwroot**, inside this folder, create the css, image and js folders

Outside the `wwwroot` folder, which is the root of the application, create the `index.html`

inside the index.html file, paste this code

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=p">
<title>Projects Manager</title>

<link rel="stylesheet" href="./css/styles.css">
</head>
<body>
<div class="header">
<div class="header-name">HyProject Manager</div>
</div>

<div id="loginContainer" class="sign-in">
<form action="javascript:void(0);" method="POST" onsubmit="authenticateUser()">
<h1>Sign In</h1>
<div class="empty"></div>
<input type="email" id="username" placeholder="#9993&nbsp;&nbsp; Username"/>
```

```
<input type="password" id="password"
placeholder="#128272  *****"/>
<input type="submit" value="Sign in">
<a onclick="hysignup()"> Not Registered? Sign Up</a>
</form>

</div>
<br/><br/>
<div class="signup" id="signup">
<form action="javascript:void(0);" method="POST" onsubmit="signUP()">
<h1>Sign Up</h1>
<input type="text" name="name" id="name" placeholder="#128100  Full
Name">
<input type="email" name="email" id="email"
placeholder="#9993  user@example.com">
<input type="password" name="password" id="password1"
placeholder="#128274  Password">
<input type="password" name="password" id="password2"
placeholder="#128272  Confirm Password">
<a onclick="hyverify()"> Already Registered? Verify</a>

<input type="submit" value="Sign Up">
</form>

</div>
<div class="veriToken" id="veriToken">
<form action="javascript:void(0);" method="POST" onsubmit="verifyUser()">
<h1>Verify Account</h1>
<input type="text" name="verificationToken " id="token"
placeholder="#128477  Enter the verification token">
<input type="submit" value="Verify">
</form>

</div>

<div id="dashboardContainer" class="hidden">

<div class="sidebar" id="sidebar">
<div class="sideproject" id="hyaddnew">

<form action="javascript:void(0);" method="POST" onsubmit="addProject()"
class="addProject">
<fieldset>
<legend>Add Project</legend>
<input type="text" name="customer" id="customer" placeholder="Customer Name ">
<input type="text" id="project-name" placeholder="Name of project">
<textarea name="description" id="description" cols="30" rows="10"
placeholder="Description of project"></textarea>
<input type="date" name="duedate" id="duedate" >
```



```



```

```

</div>

```

```

<div class="sideproject" id="hyupdate">
<form action="javascript:void(0);" onsubmit="updateProject()">
<fieldset>
<legend>Update Project</legend>


```

```

<div class="sideproject" id="hydelete">

<form action="javascript:void(0);" onsubmit="deleteProject()">
<fieldset>
<legend>Delete Project</legend>


```

```

<br/><br/><br/>
</div>

```

```
<div class="display_projects" id="display_projects">
<div class="organizer">

<h2 id="welcomeMessage" class="welcome"></h2>

<div class="open" id="opener" onclick="opener()">Click to Add, Edit or Delete
Project</div>

</div>
<div class="container" id="container"></div>

</div>

</div>
```

```
<script src="js/script.js" asp-append-version="true"></script>
<script type="text/javascript">
getProject();
</script>
```

```
</body>
</html>
```

Inside the css folder, create the **styles.css** add the following code

```
.header{
height: 10vh;
display: flex;
justify-content: center;
background: rgba(47, 45, 45,1);

border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
```

```
backdrop-filter: blur(19.9px);
-webkit-backdrop-filter: blur(19.9px);
border: 1px solid rgba(255, 255, 255, 0.65);

}

.header-name{
font-size: 2rem;
padding-top: 1rem;
padding-bottom: 1rem;
color: rgba(255, 255, 255, 0.9);
font-family: 'Times New Roman', Times, serif;
}

.hidden {
display: none;
}

.card{
width:25rem;
word-wrap: break-word;
/* From https://css.glass */
background: rgba(47, 45, 45,1);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(13.1px);
-webkit-backdrop-filter: blur(13.1px);
border: 1px solid rgba(255, 255, 255, 0.65);
font-size: 2rem;
font-family: 'Times New Roman', Times, serif;
display: flex;
flex-direction: column;
gap: 1rem;
word-wrap: break-word;
}

.card-1>span{

color:#f06040
}

.card-1{
color: grey;
}

.container{
display: flex;
flex-direction: row;
```

```
gap: 2rem;
flex-wrap: wrap;
}
```

```
.card-2{
font-size: 2rem;
font-weight:700;

background: rgba(240, 96, 64, 0.55);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(15.7px);
-webkit-backdrop-filter: blur(15.7px);
border: 1px solid rgba(240, 96, 64, 1);
justify-content: center;
display: flex;
}
```

```
.sign-in{
display: flex;
justify-content: center;
margin-top: 10rem;
}
```

```
.sign-in>form{
display: flex;
flex-direction: column;
gap: 1rem;
width: 40rem;
height: 30rem;
background: rgba(255, 255, 255, 0.2);
/* From https://css.glass */
background: rgba(255, 255, 255, 0.74);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(16.8px);
-webkit-backdrop-filter: blur(16.8px);
border: 1px solid rgba(255, 255, 255, 0.79);

}
```

```
.sign-in>form>input{
border-radius: 2rem;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
height: 3rem;
font-size: 2rem;
```

```
border-radius: 16px;
/* From https://css.glass */
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);
cursor:pointer;
}
.sign-in>form>a{
border-radius: 2rem;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
margin-top: 2rem;
height: 3rem;
font-size: 2rem;
border-radius: 16px;
cursor:pointer;
/* From https://css.glass */
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);

}
```

```
.sign-in>form>h1{
text-align: center;
font-size: 3rem;
margin-top: 2rem;
margin-bottom: 2rem;
}
```

```
body{
background-image: url("../image/2.jpeg");
background-size: cover;
background-repeat: no-repeat;
background-position: center center;
background-attachment: fixed;

}
```

```
.signup{
display: none;
justify-content: center;
margin-top: 10rem;
}
```

```
.signup>form{
display: flex;
flex-direction: column;
gap: 1rem;
width: 40rem;
height: 40rem;
background: rgba(255, 255, 255, 0.2);
/* From https://css.glass */
background: rgba(255, 255, 255, 0.74);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(16.8px);
-webkit-backdrop-filter: blur(16.8px);
border: 1px solid rgba(255, 255, 255, 0.79);
}
```

```
.signup>form>input{
border-radius: 2rem;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
height: 3rem;
font-size: 2rem;
border-radius: 16px;
/* From https://css.glass */
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);
cursor:pointer;
}
```

```
.signup>form>a{
border-radius: 2rem;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
margin-top: 2rem;
height: 3rem;
font-size: 2rem;
border-radius: 16px;
cursor:pointer;
}
```

```
/* From https://css.glass */
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);

}
```

```
.signup>form>h1{
text-align: center;
font-size: 3rem;
margin-top: 2rem;
margin-bottom: 2rem;
}
```

```
.veriToken{
display: none;
justify-content: center;
margin-top: 10rem;
}
```

```
.veriToken>form{
display: flex;
flex-direction: column;
gap: 1rem;
width: 40rem;
height: 20rem;
background: rgba(255, 255, 255, 0.2);
/* From https://css.glass */
background: rgba(255, 255, 255, 0.74);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(16.8px);
-webkit-backdrop-filter: blur(16.8px);
border: 1px solid rgba(255, 255, 255, 0.79);
}
```

```
.veriToken>form>input{
border-radius: 2rem;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
height: 3rem;
font-size: 2rem;
border-radius: 16px;
```

```
/* From https://css.glass */
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);
cursor:pointer;
}
```

```
.veriToken>form>h1{
text-align: center;
font-size: 3rem;
margin-top: 2rem;
margin-bottom: 2rem;
}
```

```
.sidebar{
display: none;
flex-direction: column;
}
```

```
.sideproject>form>fieldset{
display: flex;
flex-direction: column;
gap:2rem;
width: 40rem;
background: rgba(255, 255, 255, 0.74);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(16.8px);
-webkit-backdrop-filter: blur(16.8px);
border: 1px solid rgba(255, 255, 255, 0.79);
}
```

```
.sideproject>form>fieldset>input{
border-radius: 2rem;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
height: 3rem;
font-size: 2rem;
border-radius: 16px;
/* From https://css.glass */
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
```



```
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);
cursor:pointer;
}
```

```
.sideproject>form>fieldset>a{
border-radius: 2rem;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
height: 3rem;
font-size: 2rem;
border-radius: 16px;
/* From https://css.glass */
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);
cursor:pointer;
}
```

```
.sideproject>form>fieldset>textarea{
font-size: 2rem;
background: rgba(255, 255, 255, 0.32);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(3.9px);
-webkit-backdrop-filter: blur(3.9px);
border: 1px solid rgba(255, 255, 255, 0.68);
cursor:pointer;
width: 35rem;
margin-left: 2rem;
margin-right: 2rem;
}
.sideproject>form>fieldset>legend{
font-size: 2.5rem;
font-weight: bold;
}
```

```
#hyupdate{
display: none;
}
```

```
#hydelete{
```

```

display:none;
}

.welcome,.open{
font-size: 2rem;
font-weight:700;
height: 2rem;
background: rgba(240, 96, 64, 0.55);
border-radius: 16px;
box-shadow: 0 4px 30px rgba(0, 0, 0, 0.1);
backdrop-filter: blur(15.7px);
-webkit-backdrop-filter: blur(15.7px);
border: 1px solid rgba(240, 96, 64, 1);
justify-content: center;
display: flex;
}
.sideproject {
position: absolute;
top: 100%;
left: 50%;

transform: translate(-50%, -50%);
}

.organizer{
display: flex;
flex-direction: row;
justify-content: space-evenly;
flex-wrap: wrap;
margin-bottom: 2rem;
}

```

*Inside the js folder, create a **script.js** and add the following code*

```

window.onload = function(){
Projects()
}
const uri = 'api/Projects';
const auth = "api/Auth";
let projects = [];
function getProject(){
fetch(uri)
.then(response => response.json())
.catch(error=> console.error('Unable to get items.', error))
}
/*
Create a Project
*/

```

```

function addProject(){
const addCustomer = document.getElementById("customer");
const addName = document.getElementById("project-name");
const addDescription = document.getElementById("description");
const addDuedate = document.getElementById("duedate");
const addCost = document.getElementById("cost");
const addDeveloper = document.getElementById("developer");
const addStatus = document.getElementById("status");
const projectItem = {
customer: addCustomer.value.trim(),
name: addName.value.trim(),
description: addDescription.value.trim(),
dueDate: addDuedate.value.trim(),
cost : addCost.value.trim(),
developer : addDeveloper.value.trim(),
status: addStatus.value.trim(),
};
fetch(uri, {
method: 'POST',
headers: {
'Accept': 'application/json',
'Content-Type': 'application/json'
},
body: JSON.stringify(projectItem)
})
.then(response => response.json)
.then(()=>{
getProject();
addCustomer.value = "";
addStatus.value = "";
addDescription.value = "";
addDuedate.value = "";
addCost.value = "";
addDeveloper.value = "";
addName.value = "";
})
.catch(error => console.error('Unable to add Project.', error));
}

/*
Update a Project
*/
function updateProject(){
projectId = document.getElementById('edit-id').value.trim();
const projectItem = {
Id : document.getElementById('edit-id').value.trim(),
customer: document.getElementById('edit-customer').value.trim(),
name: document.getElementById('edit-name').value.trim(),
description: document.getElementById('edit-description').value.trim(),
dueDate: document.getElementById('edit-duedate').value.trim(),
cost: document.getElementById('edit-cost').value.trim(),

```

```

developer: document.getElementById('edit-developer').value.trim(),
status:document.getElementById('edit-status').value.trim(),
};
fetch(`${uri}/${projectId}`, {
method: 'PUT',
headers: {
'Accept': 'application/json',
'Content-Type': 'application/json'
},
body: JSON.stringify(projectItem)
})
.then(response => response.json)
.then(() =>{
getProject();
document.getElementById('edit-id').value = "";
document.getElementById('edit-customer').value = "";
document.getElementById('edit-name').value = "";
document.getElementById('edit-description').value = "";
document.getElementById('edit-duedate').value = "";
document.getElementById('edit-cost').value = "";
document.getElementById('edit-developer').value = "";
document.getElementById('edit-status').value = "";
})
.catch(error => console.error('Unable to update projects.', error));
return false;
}
/*
DELETE PROJECT
*/
function deleteProject() {
projectId = document.getElementById("delete-id").value.trim();
fetch(`${uri}/${projectId}`, {
method: 'DELETE'
})
.then(() => {
getProject();
document.getElementById("delete-id").value = "";
})
.catch(error => console.error('Unable to delete item.', error));
}
async function Projects(){
try{
const response = await fetch(uri);
const items = await response.json();
const container = document.getElementById("container");

items.forEach(function(item){
const Card = document.createElement("div");
Card.className = "card"
const customer = document.createElement("div");

```

```

customer.className = "card-2";
customer.innerHTML = `&#128188;&nbsp; ${item.customer}`;
Card.appendChild(customer);
const Id = document.createElement("div");
Id.className = "card-1";
Id.innerHTML = `<span >&#128273 ID:</span> ${item.id}`;
Card.appendChild(Id);
const name = document.createElement("div");
name.className = "card-1";
name.innerHTML = `<span >&#128450 Name:</span> ${item.name}`;
Card.appendChild(name);
const description = document.createElement("div");
description.className = "card-1";
description.innerHTML = `<span >&#128452 Description:</span> ${item.description}`;
Card.appendChild(description);
const cost = document.createElement("div");
cost.className = "card-1";
cost.innerHTML = `<span >&#128181 Cost:</span> GHS ${item.cost}`;
Card.appendChild(cost);
const duedate = document.createElement("div");
duedate.className = "card-1";
duedate.innerHTML = `<span >&#128198 Duedate:</span> ${item.dueDate}`;
Card.appendChild(duedate);
const developer = document.createElement("div");
developer.className = "card-1";
developer.innerHTML = `<span >&#128100 Developer:</span> ${item.developer}`;
Card.appendChild(developer);

const status = document.createElement("div");
status.className = "card-1";
status.innerHTML = `<span >&#128640 Status:</span>${item.status}`;
Card.appendChild(status);
container.appendChild(Card)
})
}
catch(error){
console.error("Error fetching Items",error);
}
}
async function verifyUser() {
const token = document.getElementById("token").value.trim();
try {
const response = await fetch(auth+"/verify?token=" + token, {
method: "POST"
});
const data = await response.text();
if (response.ok) {
// Verification successful
alert("Verification successful! " + data);
document.getElementById("signup").style.display = "none";

```

```

document.getElementById("veriToken").style.display = "none";
document.getElementById("loginContainer").style.display="flex"
} else {
// Verification failed
alert("Verification failed: " + data);
}
} catch (error) {
console.error("Error verifying user:", error);
}
}
//Signup
async function signUP(){
const name = document.getElementById("name").value;
const email = document.getElementById("email").value;
const password1 = document.getElementById("password1").value;
const password2 = document.getElementById("password2").value;
const register = {
Name: name.trim(),
Email: email.trim(),
Password: password1.trim(),
ConfirmPassword: password2.trim()
}
try{
const response = await fetch(auth+"/register",{
method: "POST",
headers: {
'Accept': 'application/json',
'Content-Type': 'application/json'
},
body: JSON.stringify(register),
})
const data = await response.json();
if (response.ok){
alert(data);
document.getElementById("signup").style.display = "none";
document.getElementById("veriToken").style.display="flex";
}
else{
alert(data)
}
}
catch(error){
console.error("Error registering user:", error);
}
}
//Login Function
async function authenticateUser() {
const username = document.getElementById("username").value.trim();
const password = document.getElementById("password").value.trim();
const login = {

```

```

Email:username,
Password:password
}
try {
const response = await fetch(auth+'/login', {
method: "POST",
headers: {
'Accept': 'application/json',
'Content-Type': 'application/json'
},
body: JSON.stringify(login)
});
const data = await response.json();
if (response.ok) {
// Authentication successful
showDashboard(data);
document.getElementById("loginContainer").style.display = "none";
} else {
// Authentication failed
alert("Authentication failed: " + data);
}
} catch (error) {
console.error("Error authenticating user:", error);
}
}

function showDashboard(data) {
const welcomeMessage = document.getElementById("welcomeMessage");
document.getElementById("signup").style.display = "none";
document.getElementById("veriToken").style.display = "none";
document.getElementById("loginContainer").style.display = "none";
document.getElementById("dashboardContainer").style.display="flex";
;
// Display the username in the welcome message
welcomeMessage.textContent = data;
}

function hysignup(){
document.getElementById("signup").style.display = "flex";
document.getElementById("loginContainer").style.display = "none";
}

function hyverify(){
document.getElementById("veriToken").style.display = "flex";
document.getElementById("signup").style.display = "none";
}

function opener(){
document.getElementById("sidebar").style.display = "flex";
document.getElementById("display_projects").style.display = "none";
document.getElementById("opener").style.display = 'none';
}

```

```

}
function hyupdate(){
document.getElementById("hyupdate").style.display = "flex"
document.getElementById("hydelete").style.display = "none"
document.getElementById("hyaddnew").style.display = "none"
}

function hydelete(){
document.getElementById("hydelete").style.display = "flex"
document.getElementById("hyaddnew").style.display = "none"
document.getElementById("hyupdate").style.display = "none"
}

function hyaddnew(){
document.getElementById("hyaddnew").style.display = "flex"
document.getElementById("hyupdate").style.display = "none"
document.getElementById("hydelete").style.display = "none"

}

```

SECURITY

The script.js file can be visible to the hacker and the hacker can manipulate the code for illegal means but this is how you can beat the system

1. Make a copy of your code and store it internally now the production code, you can change all the variable to a single letter
2. You can copy other ruubbish code and add it to your code for it to look bulky and meaningless
3. 500 lines of code can be changed to 18000 lines by adding additional ruubbish code
4. Remove all comment in production code and use uglifyjs.net to compress it by removing all spaces in the code
5. Rename all your functions to be a nonsense one
6. We can also minify the html with this website

This Code block can be pasted in all empty space between functions

```

{()=
{
var a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z,aa,ab,ac,ad,ae,af,ag,ah,ai,aj,ak,al,am,an,ao,ap,aq,ar,as,at,au,av,aw,ax,ay,az,ba,bb,bc,bd,be,bf,bg,bh,bi,bj,bk,bl,bm,bn,bob,bo,br,bs,bt,bu,bv,bw,bx,by,bz,ca,cb,cc,cd,ce,cf,cg,ch,ci,cj,ck,cl,cm,cn,co,cp,cq,cr,cs,ct,cu,cv,cw,cx,cy,cz,da,db,dc,dd,de,df,dg,dh,di,dj,dk,dl,dm,dn,do,dp,dq,dr,ds,dt,du,dv,dw,dx,dy,dz,ea,eb,ec,ed,ee,ef,eg,eh,ei,ej,ek,el,em,en,eo,ep,eq,er,es,et,eu,ev,ew,ex,ey,ez,fa,fb,fc,fd,fe,ff,fg,fh,fi,fj,fk,fl,fm,fn,fo,fp,fq,fr,fs,ft,fu,fv,fw,fx,fy,fz,ga,gb,gc,gd,ge,gf,gg,gh,gi,gj,gk,gl,gm,gn,go,gp,gq,gr,gs,gt,gu,gv,gw,gx,gy,gz,ha,hb,hc,hd,he,hf,hg,hh,hi,hj,hk,hl,hm,hn,ho,hp,hq,hr,hs,ht,hu,hv,hw,hx,hy,hz,ia,ib,ic,id,ie,if,ig,ih,ii,ij,ik,il,im,in,io,ip,iq,ir,is,it,iu,iv,iw,ix,iy,iz,ja,jb,jc,jd,je,jf,jg,jh,ji,aj,jk,jl,jm,jn,jo,jp,jq,jr,js,jt,ju,jv,jw,jx,jy,jz,ka,kb,kc,kd,ke,kf,kg,kh,ki,kj,kl,km,kn,ko,kp,kq,kr,ks,kt,ku,kv,kw,kx,ky,kz,la,lb,lc,ld,le,lf,lg,lh,li,lj,lk,lm,ln,lo,lp,lq,lr,ls,lt,lu,lv,lw,lx,ly,lz,ma,mb,mc,md,me,mf,mg,mh,mi,mj,mk,ml,mm,mn,mo,mp,mq,mr,ms,mt,mu,mv,mw,mx,my,mz,na,nb,nc,nd,ne,nf,ng,nh,ni,nj,nk,nl,nm,nn,no,np,nq,nr,ns,nt,nu,nv,nw,nx,ny,nz,oa,ob,oc,od,oe,of,og,oh,oi,oj,ok,ol,om,on,oo,op,oq,or,os,ot,ou,ov,ow,ox,oy,oz,pa,pb,pc,pd,pe,pf,pg,pd,ph,pi,pj,pk,pl,pm,pn,po,pp,pq,pr,ps,pt,pu,pv,pw,px,py,pz,qa,qb,qc,qd,qe,qf,qg,qh,qi,qj,qk,ql,qm,qn,qo,qp,qq,qr,qs,qt,qu,qv,qw,qx,qy,qz,ra,rb,rc,rd,re,rf,rg,rh,ri,rj,rk,rl,rm,rn,ro,rp,rq,rr,rs,rt,ru,rv,rw,rx,ry,rz,sa,sb,sc,sd,se,sf,sg,sh,si,sj,sk,sl,sm,sn,so,sp,sq,sr,ss,st,su,sv,sw,sx,sy,sz,ta,tb,tc,td,te,tf,tg,th,ti,tj,tk,tl,tm,tn,to,tp,tq,tr,ts,tt,tu,tv,tw,tx,ty,tz,ua,ub,uc,ud,ue,uf,ug,u,uh,ui,uj,uk,ul,um,un,uo,up,uq,ur,us,ut,uu,uv,uw,ux,uy,uz,va,vb,vc,vd,ve,vf,vg,vh,vi,vj,vk,vl,vm,vn,vo,vp,vq,vr,vs,vt,vu,vw,vx,vy,vz,wa,wb,wc,wd,we,wf,wg,wh,wi,wj,wk,wl,wm,wn,wo,wp,wq,wr,ws,wt,wu,wv,ww,wx,wy,wz,xa,xb,xc,xd,x,xe,xf,xg,xh,xi,xj,xk,xl,xm,xn,xo,xp,xq,xr,xs,xt,xu,xv,xw,xx,xy,xz,ya,yb,yc,yd,ye,yf,yg,yh,yi,yj,yk,yl,ym,yn,yo,yp,yq,yr,ys,yt,yu,yv,yw,yx,yy,yz,za,zb,zc,zd,ze,zf,zg,zh,zi,zj,zk,zl,zm,zn,zo,zp,zq,zr,zs,zt,zu,zv,zw,zx,zy,zz}
}

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1  def f(x):
2      if x < 0:
3          return -x
4      else:
5          return x
6
7  # Example 1: Simple function
8  def f(x):
9      return x**2
10
11 # Example 2: Function with multiple arguments
12 def f(x, y):
13     return x + y
14
15 # Example 3: Function with default arguments
16 def f(x, y=1):
17     return x * y
18
19 # Example 4: Function with variable arguments
20 def f(*args):
21     return sum(args)
22
23 # Example 5: Function with keyword arguments
24 def f(x, y=1, z=2):
25     return x + y + z
26
27 # Example 6: Function with docstring
28 """
29 This is a function that takes a string and returns its length.
30 """
31 def f(s):
32     return len(s)
33
34 # Example 7: Function with lambda expression
35 f = lambda x: x**2
36
37 # Example 8: Function with nested function
38 def f():
39     def g():
40         return 1
41     return g()
42
43 # Example 9: Function with global and local variables
44 x = 1
45 def f():
46     x = 2
47     return x
48
49 # Example 10: Function with return statement
50 def f():
51     return 1
52
53 # Example 11: Function with break statement
54 def f():
55     for i in range(10):
56         if i == 5:
57             break
58     return i
59
60 # Example 12: Function with continue statement
61 def f():
62     for i in range(10):
63         if i == 5:
64             continue
65     return i
66
67 # Example 13: Function with pass statement
68 def f():
69     pass
70
71 # Example 14: Function with raise statement
72 def f():
73     raise ValueError("Error")
74
75 # Example 15: Function with try-except statement
76 def f():
77     try:
78         1/0
79     except:
80         pass
81
82 # Example 16: Function with with statement
83 def f():
84     with open('file.txt') as f:
85         f.read()
86
87 # Example 17: Function with assert statement
88 def f():
89     assert 1 == 1
90
91 # Example 18: Function with isinstance statement
92 def f():
93     isinstance(1, int)
94
95 # Example 19: Function with is statement
96 def f():
97     1 is 1
98
99 # Example 20: Function with in statement
100 def f():
101     1 in [1, 2, 3]
102
103 # Example 21: Function with not statement
104 def f():
105     not 1
106
107 # Example 22: Function with and statement
108 def f():
109     1 and 2
110
111 # Example 23: Function with or statement
112 def f():
113     1 or 2
114
115 # Example 24: Function with xor statement
116 def f():
117     1 ^ 2
118
119 # Example 25: Function with left shift statement
120 def f():
121     1 << 2
122
123 # Example 26: Function with right shift statement
124 def f():
125     1 >> 2
126
127 # Example 27: Function with bitwise and statement
128 def f():
129     1 & 2
130
131 # Example 28: Function with bitwise or statement
132 def f():
133     1 | 2
134
135 # Example 29: Function with bitwise xor statement
136 def f():
137     1 ^ 2
138
139 # Example 30: Function with bitwise not statement
140 def f():
141     ~1
142
143 # Example 31: Function with bitwise complement statement
144 def f():
145     ~1
146
147 # Example 32: Function with bitwise left shift statement
148 def f():
149     1 << 2
150
151 # Example 33: Function with bitwise right shift statement
152 def f():
153     1 >> 2
154
155 # Example 34: Function with bitwise and statement
156 def f():
157     1 & 2
158
159 # Example 35: Function with bitwise or statement
160 def f():
161     1 | 2
162
163 # Example 36: Function with bitwise xor statement
164 def f():
165     1 ^ 2
166
167 # Example 37: Function with bitwise not statement
168 def f():
169     ~1
170
171 # Example 38: Function with bitwise complement statement
172 def f():
173     ~1
174
175 # Example 39: Function with bitwise left shift statement
176 def f():
177     1 << 2
178
179 # Example 40: Function with bitwise right shift statement
180 def f():
181     1 >> 2
182
183 # Example 41: Function with bitwise and statement
184 def f():
185     1 & 2
186
187 # Example 42: Function with bitwise or statement
188 def f():
189     1 | 2
190
191 # Example 43: Function with bitwise xor statement
192 def f():
193     1 ^ 2
194
195 # Example 44: Function with bitwise not statement
196 def f():
197     ~1
198
199 # Example 45: Function with bitwise complement statement
200 def f():
201     ~1
202
203 # Example 46: Function with bitwise left shift statement
204 def f():
205     1 << 2
206
207 # Example 47: Function with bitwise right shift statement
208 def f():
209     1 >> 2
210
211 # Example 48: Function with bitwise and statement
212 def f():
213     1 & 2
214
215 # Example 49: Function with bitwise or statement
216 def f():
217     1 | 2
218
219 # Example 50: Function with bitwise xor statement
220 def f():
221     1 ^ 2
222
223 # Example 51: Function with bitwise not statement
224 def f():
225     ~1
226
227 # Example 52: Function with bitwise complement statement
228 def f():
229     ~1
230
231 # Example 53: Function with bitwise left shift statement
232 def f():
233     1 << 2
234
235 # Example 54: Function with bitwise right shift statement
236 def f():
237     1 >> 2
238
239 # Example 55: Function with bitwise and statement
240 def f():
241     1 & 2
242
243 # Example 56: Function with bitwise or statement
244 def f():
245     1 | 2
246
247 # Example 57: Function with bitwise xor statement
248 def f():
249     1 ^ 2
250
251 # Example 58: Function with bitwise not statement
252 def f():
253     ~1
254
255 # Example 59: Function with bitwise complement statement
256 def f():
257     ~1
258
259 # Example 60: Function with bitwise left shift statement
260 def f():
261     1 << 2
262
263 # Example 61: Function with bitwise right shift statement
264 def f():
265     1 >> 2
266
267 # Example 62: Function with bitwise and statement
268 def f():
269     1 & 2
270
271 # Example 63: Function with bitwise or statement
272 def f():
273     1 | 2
274
275 # Example 64: Function with bitwise xor statement
276 def f():
277     1 ^ 2
278
279 # Example 65: Function with bitwise not statement
280 def f():
281     ~1
282
283 # Example 66: Function with bitwise complement statement
284 def f():
285     ~1
286
287 # Example 67: Function with bitwise left shift statement
288 def f():
289     1 << 2
290
291 # Example 68: Function with bitwise right shift statement
292 def f():
293     1 >> 2
294
295 # Example 69: Function with bitwise and statement
296 def f():
297     1 & 2
298
299 # Example 70: Function with bitwise or statement
300 def f():
301     1 | 2
302
303 # Example 71: Function with bitwise xor statement
304 def f():
305     1 ^ 2
306
307 # Example 72: Function with bitwise not statement
308 def f():
309     ~1
310
311 # Example 73: Function with bitwise complement statement
312 def f():
313     ~1
314
315 # Example 74: Function with bitwise left shift statement
316 def f():
317     1 << 2
318
319 # Example 75: Function with bitwise right shift statement
320 def f():
321     1 >> 2
322
323 # Example 76: Function with bitwise and statement
324 def f():
325     1 & 2
326
327 # Example 77: Function with bitwise or statement
328 def f():
329     1 | 2
330
331 # Example 78: Function with bitwise xor statement
332 def f():
333     1 ^ 2
334
335 # Example 79: Function with bitwise not statement
336 def f():
337     ~1
338
339 # Example 80: Function with bitwise complement statement
340 def f():
341     ~1
342
343 # Example 81: Function with bitwise left shift statement
344 def f():
345     1 << 2
346
347 # Example 82: Function with bitwise right shift statement
348 def f():
349     1 >> 2
350
351 # Example 83: Function with bitwise and statement
352 def f():
353     1 & 2
354
355 # Example 84: Function with bitwise or statement
356 def f():
357     1 | 2
358
359 # Example 85: Function with bitwise xor statement
360 def f():
361     1 ^ 2
362
363 # Example 86: Function with bitwise not statement
364 def f():
365     ~1
366
367 # Example 87: Function with bitwise complement statement
368 def f():
369     ~1
370
371 # Example 88: Function with bitwise left shift statement
372 def f():
373     1 << 2
374
375 # Example 89: Function with bitwise right shift statement
376 def f():
377     1 >> 2
378
379 # Example 90: Function with bitwise and statement
380 def f():
381     1 & 2
382
383 # Example 91: Function with bitwise or statement
384 def f():
385     1 | 2
386
387 # Example 92: Function with bitwise xor statement
388 def f():
389     1 ^ 2
390
391 # Example 93: Function with bitwise not statement
392 def f():
393     ~1
394
395 # Example 94: Function with bitwise complement statement
396 def f():
397     ~1
398
399 # Example 95: Function with bitwise left shift statement
400 def f():
401     1 << 2
402
403 # Example 96: Function with bitwise right shift statement
404 def f():
405     1 >> 2
406
407 # Example 97: Function with bitwise and statement
408 def f():
409     1 & 2
410
411 # Example 98: Function with bitwise or statement
412 def f():
413     1 | 2
414
415 # Example 99: Function with bitwise xor statement
416 def f():
417     1 ^ 2
418
419 # Example 100: Function with bitwise not statement
420 def f():
421     ~1
422
423 # Example 101: Function with bitwise complement statement
424 def f():
425     ~1
426
427 # Example 102: Function with bitwise left shift statement
428 def f():
429     1 << 2
430
431 # Example 103: Function with bitwise right shift statement
432 def f():
433     1 >> 2
434
435 # Example 104: Function with bitwise and statement
436 def f():
437     1 & 2
438
439 # Example 105: Function with bitwise or statement
440 def f():
441     1 | 2
442
443 # Example 106: Function with bitwise xor statement
444 def f():
445     1 ^ 2
446
447 # Example 107: Function with bitwise not statement
448 def f():
449     ~1
450
451 # Example 108: Function with bitwise complement statement
452 def f():
453     ~1
454
455 # Example 109: Function with bitwise left shift statement
456 def f():
457     1 << 2
458
459 # Example 110: Function with bitwise right shift statement
460
```

[illegible]

[illegible]