

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<IIsoptions>(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 Harsh
            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 insiidde 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" >
```



```
<input type="number" name="cost" id="cost" placeholder="Project Cost">
<input type="text" name="developer" id="developer" placeholder="Developer Name ">
<input type="text" name="status" id="status" placeholder="Project status">
<input type="submit" value="Add">
<a onclick="hyupdate()">&nbsp;Want to Update? Update</a>
<a onclick="hydelete()">&nbsp;Want to Delete? Delete</a>
</fieldset>
</form>
```

```
</div>
```

```
<div class="sideproject" id="hyupdate">
<form action="javascript:void(0);" onsubmit="updateProject()">
<fieldset>
<legend>Update Project</legend>
<input type="number" id="edit-id" placeholder="Project ID">
<input type="text" name="customer" id="edit-customer" placeholder="Customer Name
">
<input type="text" id="edit-name" placeholder="Name of project">
<textarea name="description" id="edit-description" cols="30" rows="10"
placeholder="Description of project"></textarea>
<input type="date" name="edit-duedate" id="edit-duedate" >
<input type="number" name="edit-cost" id="edit-cost" placeholder="Project Cost">
<input type="text" name="edit-developer" id="edit-developer"
placeholder="Developer Name ">
<input type="text" name="edit-status" id="edit-status" placeholder="Project
status">
<input type="submit" value="Save">
<a onclick="hyaddnew()">&nbsp;Want to Add New? Add</a>
<a onclick="hydelete()">&nbsp;Want to Delete? Delete</a>
</fieldset>
</form>
</div>
```

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

<form action="javascript:void(0);" onsubmit="deleteProject()">
<fieldset>
<legend>Delete Project</legend>
<input type="number" id="delete-id" placeholder="Project ID">
<input type="submit" value="Delete">
<a onclick="hyaddnew()">&nbsp;Want to Add New? Add</a>
<a onclick="hyupdate()">&nbsp;Want to Update? Update</a>
</fieldset>
</form>

</div>
```

```
<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 rubbish 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 rubbish 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

Example of a dummy code we can add to confuse hackers

```

1  x ← 0
2  for i ← 1 to n + 1
3      Z[i] ← A[i + 1]
4  end for
5  "new state"
6  n ← 1
7  do
8      i ← 0
9      while i < n
10         x ← A[i + 1] * Z[i] - x
11         i ← i + 1
12     end while
13     i ← n
14     if i < n
15         i ← i + 1
16     end if
17     if i < n
18         i ← i + 1
19     end if
20     if i < n
21         i ← i + 1
22     end if
23     if i < n
24         i ← i + 1
25     end if
26     if i < n
27         i ← i + 1
28     end if
29     if i < n
30         i ← i + 1
31     end if
32     if i < n
33         i ← i + 1
34     end if
35     if i < n
36         i ← i + 1
37     end if
38     if i < n
39         i ← i + 1
40     end if
41     if i < n
42         i ← i + 1
43     end if
44     if i < n
45         i ← i + 1
46     end if
47     if i < n
48         i ← i + 1
49     end if
50     if i < n
51         i ← i + 1
52     end if
53     if i < n
54         i ← i + 1
55     end if
56     if i < n
57         i ← i + 1
58     end if
59     if i < n
60         i ← i + 1
61     end if
62     if i < n
63         i ← i + 1
64     end if
65     if i < n
66         i ← i + 1
67     end if
68     if i < n
69         i ← i + 1
70     end if
71     if i < n
72         i ← i + 1
73     end if
74     if i < n
75         i ← i + 1
76     end if
77     if i < n
78         i ← i + 1
79     end if
80     if i < n
81         i ← i + 1
82     end if
83     if i < n
84         i ← i + 1
85     end if
86     if i < n
87         i ← i + 1
88     end if
89     if i < n
90         i ← i + 1
91     end if
92     if i < n
93         i ← i + 1
94     end if
95     if i < n
96         i ← i + 1
97     end if
98     if i < n
99         i ← i + 1
100    end if
101 end do
102 return x
103 end

```



```

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1 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 439, 441, 443, 445, 447, 449, 451, 453, 455, 457, 459, 461, 463, 465, 467, 469, 471, 473, 475, 477, 479, 481, 483, 485, 487, 489, 491, 493, 495, 497, 499, 501, 503, 505, 507, 509, 511, 513, 515, 517, 519, 521, 523, 525, 527, 529, 531, 533, 535, 537, 539, 541, 543, 545, 547, 549, 551, 553, 555, 557, 559, 561, 563, 565, 567, 569, 571, 573, 575, 577, 579, 581, 583, 585, 587, 589, 591, 593, 595, 597, 599, 601, 603, 605, 607, 609, 611, 613, 615, 617, 619, 621, 623, 625, 627, 629, 631, 633, 635, 637, 639, 641, 643, 645, 647, 649, 651, 653, 655, 657, 659, 661, 663, 665, 667, 669, 671, 673, 675, 677, 679, 681, 683, 685, 687, 689, 691, 693, 695, 697, 699, 701, 703, 705, 707, 709, 711, 713, 715, 717, 719, 721, 723, 725, 727, 729, 731, 733, 735, 737, 739, 741, 743, 745, 747, 749, 751, 753, 755, 757, 759, 761, 763, 765, 767, 769, 771, 773, 775, 777, 779, 781, 783, 785, 787, 789, 791, 793, 795, 797, 799, 801, 803, 805, 807, 809, 811, 813, 815, 817, 819, 821, 823, 825, 827, 829, 831, 833, 835, 837, 839, 841, 843, 845, 847, 849, 851, 853, 855, 857, 859, 861, 863, 865, 867, 869, 871, 873, 875, 877, 879, 881, 883, 885, 887, 889, 891, 893, 895, 897, 899, 901, 903, 905, 907, 909, 911, 913, 915, 917, 919, 921, 923, 925, 927, 929, 931, 933, 935, 937, 939, 941, 943, 945, 947, 949, 951, 953, 955, 957, 959, 961, 963, 965, 967, 969, 971, 973, 975, 977, 979, 981, 983, 985, 987, 989, 991, 993, 995, 997, 999, 1001, 1003, 1005, 1007, 1009, 1011, 1013, 1015, 1017, 1019, 1021, 1023, 1025, 1027, 1029, 1031, 1033, 1035, 1037, 1039, 1041, 1043, 1045, 1047, 1049, 1051, 1053, 1055, 1057, 1059, 1061, 1063, 1065, 1067, 1069, 1071, 1073, 1075, 1077, 1079, 1081, 1083, 1085, 1087, 1089, 1091, 1093, 1095, 1097, 1099, 1101, 1103, 1105, 1107, 1109, 1111, 1113, 1115, 1117, 1119, 1121, 1123, 1125, 1127, 1129, 1131, 1133, 1135, 1137, 1139, 1141, 1143, 1145, 1147, 1149, 1151, 1153, 1155, 1157, 1159, 1161, 1163, 1165, 1167, 1169, 1171, 1173, 1175, 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1191, 1193, 1195, 1197, 1199, 1201, 1203, 1205, 1207, 1209, 1211, 1213, 1215, 1217, 1219, 1221, 1223, 1225, 1227, 1229, 1231, 1233, 1235, 1237, 1239, 1241, 1243, 1245, 1247, 1249, 1251, 1253, 1255, 1257, 1259, 1261, 1263, 1265, 1267, 1269, 1271, 1273, 1275, 1277, 1279, 1281, 1283, 1285, 1287, 1289, 1291, 1293, 1295, 1297, 1299, 1301, 1303, 1305, 1307, 1309, 1311, 1313, 1315, 1317, 1319, 1321, 1323, 1325, 1327, 1329, 1331, 1333, 1335, 1337, 1339, 1341, 1343, 1345, 1347, 1349, 1351, 1353, 1355, 1357, 1359, 1361, 1363, 1365, 1367, 1369, 1371, 1373, 1375, 1377, 1379, 1381, 1383, 1385, 1387, 1389, 1391, 1393, 1395, 1397, 1399, 1401, 1403, 1405, 1407, 1409, 1411, 1413, 1415, 1417, 1419, 1421, 1423, 1425, 1427, 1429, 1431, 1433, 1435, 1437, 1439, 1441, 1443, 1445, 1447, 1449, 1451, 1453, 1455, 1457, 1459, 1461, 1463, 1465, 1467, 1469, 1471, 1473, 1475, 1477, 1479, 1481, 1483, 1485, 1487, 1489, 1491, 1493, 1495, 1497, 1499, 1501, 1503, 1505, 1507, 1509, 1511, 1513, 1515, 1517, 1519, 1521, 1523, 1525, 1527, 1529, 1531, 1533, 1535, 1537, 1539, 1541, 1543, 1545, 1547, 15
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1  def __init__(self, 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, bo, bp, bq, 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, jj, 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, kk, 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, ll, 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, 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, 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, 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, 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, vv, 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, 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)
2  self.a = a
3  self.b = b
4  self.c = c
5  self.d = d
6  self.e = e
7  self.f = f
8  self.g = g
9  self.h = h
10 self.i = i
11 self.j = j
12 self.k = k
13 self.l = l
14 self.m = m
15 self.n = n
16 self.o = o
17 self.p = p
18 self.q = q
19 self.r = r
20 self.s = s
21 self.t = t
22 self.u = u
23 self.v = v
24 self.w = w
25 self.x = x
26 self.y = y
27 self.z = z
28 self.aa = aa
29 self.ab = ab
30 self.ac = ac
31 self.ad = ad
32 self.ae = ae
33 self.af = af
34 self.ag = ag
35 self.ah = ah
36 self.ai = ai
37 self.aj = aj
38 self.ak = ak
39 self.al = al
40 self.am = am
41 self.an = an
42 self.ao = ao
43 self.ap = ap
44 self.aq = aq
45 self.ar = ar
46 self.as = as
47 self.at = at
48 self.au = au
49 self.av = av
50 self.aw = aw
51 self.ax = ax
52 self.ay = ay
53 self.az = az
54 self.ba = ba
55 self.bb = bb
56 self.bc = bc
57 self.bd = bd
58 self.be = be
59 self.bf = bf
60 self.bg = bg
61 self.bh = bh
62 self.bi = bi
63 self.bj = bj
64 self.bk = bk
65 self.bl = bl
66 self.bm = bm
67 self.bn = bn
68 self.bo = bo
69 self.bp = bp
70 self.bq = bq
71 self.br = br
72 self.bs = bs
73 self.bt = bt
74 self.bu = bu
75 self.bv = bv
76 self.bw = bw
77 self.bx = bx
78 self.by = by
79 self.bz = bz
80 self.ca = ca
81 self.cb = cb
82 self.cc = cc
83 self.cd = cd
84 self.ce = ce
85 self.cf = cf
86 self.cg = cg
87 self.ch = ch
88 self.ci = ci
89 self.cj = cj
90 self.ck = ck
91 self.cl = cl
92 self.cm = cm
93 self.cn = cn
94 self.co = co
95 self.cp = cp
96 self.cq = cq
97 self.cr = cr
98 self.cs = cs
99 self.ct = ct
100 self.cu = cu
101 self.cv = cv
102 self.cw = cw
103 self.cx = cx
104 self.cy = cy
105 self.cz = cz
106 self.da = da
107 self.db = db
108 self.dc = dc
109 self.dd = dd
110 self.de = de
111 self.df = df
112 self.dg = dg
113 self.dh = dh
114 self.di = di
115 self.dj = dj
116 self.dk = dk
117 self.dl = dl
118 self.dm = dm
119 self.dn = dn
120 self.do = do
121 self.dp = dp
122 self.dq = dq
123 self.dr = dr
124 self.ds = ds
125 self.dt = dt
126 self.du = du
127 self.dv = dv
128 self.dw = dw
129 self.dx = dx
130 self.dy = dy
131 self.dz = dz
132 self.ea = ea
133 self.eb = eb
134 self.ec = ec
135 self.ed = ed
136 self.eg = eg
137 self.eh = eh
138 self.ei = ei
139 self.ej = ej
140 self.ek = ek
141 self.el = el
142 self.em = em
143 self.en = en
144 self.eo = eo
145 self.ep = ep
146 self.eq = eq
147 self.er = er
148 self.es = es
149 self.et = et
150 self.eu = eu
151 self.ev = ev
152 self.ew = ew
153 self.ex = ex
154 self.ey = ey
155 self.ez = ez
156 self.fa = fa
157 self.fb = fb
158 self.fc = fc
159 self.fd = fd
160 self.fe = fe
161 self.fg = fg
162 self.fh = fh
163 self.fi = fi
164 self.fj = fj
165 self.fk = fk
166 self.fl = fl
167 self.fm = fm
168 self.fn = fn
169 self.fo = fo
170 self.fp = fp
171 self.fq = fq
172 self.fr = fr
173 self.fs = fs
174 self.ft = ft
175 self.fu = fu
176 self.fv = fv
177 self.fw = fw
178 self.fx = fx
179 self.fy = fy
180 self.fz = fz
181 self.ga = ga
182 self.gb = gb
183 self.gc = gc
184 self.gd = gd
185 self.ge = ge
186 self.gf = gf
187 self.gg = gg
188 self.gh = gh
189 self.gi = gi
190 self.gj = gj
191 self.gk = gk
192 self.gl = gl
193 self.gm = gm
194 self.gn = gn
195 self.go = go
196 self.gp = gp
197 self.gq = gq
198 self.gr = gr
199 self.gs = gs
200 self.gt = gt
201 self.gu = gu
202 self.gv = gv
203 self.gw = gw
204 self.gx = gx
205 self.gy = gy
206 self.gz = gz
207 self.ha = ha
208 self.hb = hb
209 self.hc = hc
210 self.hd = hd
211 self.he = he
212 self.hf = hf
213 self.hg = hg
214 self.hi = hi
215 self.hj = hj
216 self.hk = hk
217 self.hl = hl
218 self.hm = hm
219 self.hn = hn
220 self.ho = ho
221 self.hp = hp
222 self.hq = hq
223 self.hr = hr
224 self.hs = hs
225 self.ht = ht
226 self.hu = hu
227 self.hv = hv
228 self.hw = hw
229 self.hx = hx
230 self.hy = hy
231 self.hz = hz
232 self.ia = ia
233 self.ib = ib
234 self.ic = ic
235 self.id = id
236 self.ie = ie
237 self.if = if
238 self.ig = ig
239 self.ih = ih
240 self.ii = ii
241 self.ij = ij
242 self.ik = ik
243 self.il = il
244 self.im = im
245 self.in = in
246 self.io = io
247 self.ip = ip
248 self.iq = iq
249 self.ir = ir
250 self.is = is
251 self.it = it
252 self.iu = iu
253 self.iv = iv
254 self.iw = iw
255 self.ix = ix
256 self.iy = iy
257 self.iz = iz
258 self.ja = ja
259 self.jb = jb
260 self.jc = jc
261 self.jd = jd
262 self.je = je
263 self.jf = jf
264 self.jg = jg
265 self.jh = jh
266 self.ji = ji
267 self.jj = jj
268 self.jk = jk
269 self.jl = jl
270 self.jm = jm
271 self.jn = jn
272 self.jo = jo
273 self.jp = jp
274 self.jq = jq
275 self.jr = jr
276 self.js = js
277 self.jt = jt
278 self.ju = ju
279 self.jv = jv
280 self.jw = jw
281 self.jx = jx
282 self.jy = jy
283 self.jz = jz
284 self.ka = ka
285 self.kb = kb
286 self.kc = kc
287 self.kd = kd
288 self.ke = ke
289 self.kf = kf
290 self.kg = kg
291 self.kh = kh
292 self.ki = ki
293 self.kj = kj
294 self.kk = kk
295 self.kl = kl
296 self.km = km
297 self.kn = kn
298 self.ko = ko
299 self.kp = kp
300 self.kq = kq
301 self.kr = kr
302 self.ks = ks
303 self.kt = kt
304 self.ku = ku
305 self.kv = kv
306 self.kw = kw
307 self.kx = kx
308 self.ky = ky
309 self.kz = kz
310 self.la = la
311 self.lb = lb
312 self.lc = lc
313 self.ld = ld
314 self.le = le
315 self.lf = lf
316 self.lg = lg
317 self.lh = lh
318 self.li = li
319 self.lj = lj
320 self.lk =
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1 | B & A & ! B and c, return "0" )
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