006 BE Practical.docx

Smart Contract Development and Unit Testing using Hardhat

Problem Statement

Develop a basic Personal Portfolio Smart Contract that stores

and retrieves portfolio details (name, role, and description).

Write unit tests to validate the contract functions using Hardhat

Code

```
<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Blockchain Lab: Portfolio Smart Contract System</title>


<script src="https://cdn.tailwindcss.com"></script>

<script src="https://cdn.jsdelivr.net/npm/chart.js"></script>

<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/6.4.0/css/all.min.css">


<style>

.chart-container {

    position: relative;

    width: 100%;

    max-width: 600px;

    margin: auto;

    height: 300px;

}

</style>

</head>


<body class="bg-slate-50 text-slate-800 min-h-screen flex flex-col">
```

```html
<!-- NAVBAR -->
<header class="bg-white shadow-sm sticky top-0 z-50">
<div class="max-w-7xl mx-auto px-4 py-4 flex justify-between items-center">
<div class="flex items-center cursor-pointer" onclick="navigateTo('dashboard')">
<i class="fa-solid fa-cube text-red-600 text-2xl mr-2"></i>
<span class="font-bold text-xl">BLOCKCHAIN<span class="text-red-600">LAB</span></span>
</div>
<nav class="hidden md:flex space-x-6">
<button onclick="navigateTo('dashboard')">Dashboard</button>
<button onclick="navigateTo('upload')">Upload</button>
<button onclick="navigateTo('portfolio')">Portfolio</button>
<button onclick="navigateTo('verify')">Verify</button>
</nav>
</div>
</header>


<main class="flex-grow max-w-7xl w-full mx-auto px-4 py-8">


<!-- DASHBOARD -->
<section id="dashboard" class="view-section space-y-6">
<h1 class="text-3xl font-bold">System Overview</h1>


<div class="grid grid-cols-1 md:grid-cols-3 gap-6">
<div class="bg-white p-6 rounded-xl shadow">
<p>Total Secured Docs</p>
<p class="text-2xl font-bold" id="stat-total">1248</p>
</div>
<div class="bg-white p-6 rounded-xl shadow">
<p>Verification Rate</p>
<p class="text-2xl font-bold">99.8%</p>
```

```
</div>

<div class="bg-white p-6 rounded-xl shadow">

<p>Latest Block</p>

<p class="text-2xl font-bold">14920301</p>

</div>

</div>


<div class="grid grid-cols-1 lg:grid-cols-2 gap-8">

<div class="bg-white p-6 rounded-xl shadow">

<h3>Portfolio Integrity</h3>

<div class="chart-container">

<canvas id="integrityChart"></canvas>

</div>

</div>


<div class="bg-white p-6 rounded-xl shadow">

<h3>Monthly Upload Activity</h3>

<div class="chart-container">

<canvas id="activityChart"></canvas>

</div>

</div>

</div>

</section>


<!-- UPLOAD -->

<section id="upload" class="view-section hidden space-y-6">

<h1 class="text-3xl font-bold">Upload Portfolio PDF</h1>


<div class="bg-white p-8 rounded-xl shadow border-2 border-dashed border-red-400 text-center
cursor-pointer" id="drop-zone">

<i class="fa-solid fa-cloud-arrow-up text-5xl text-red-500 mb-4"></i>
```

```html
<h3 class="text-xl font-bold">Drag & Drop PDF or Click</h3>

<input type="file" id="file-input" class="hidden" multiple accept=".pdf">

</div>


<div id="simple-result" class="mt-4 text-green-600 font-bold"></div>

</section>


<!-- PORTFOLIO TABLE -->

<section id="portfolio" class="view-section hidden space-y-6">

<h1 class="text-3xl font-bold">Retrieved Portfolio Details</h1>


<div class="bg-white p--6 rounded-xl shadow">

<table class="min-w-full border">

<thead class="bg-slate-100">

<tr>

<th class="border p-3">Name</th>

<th class="border p-3">Role</th>

<th class="border p-3">Description</th>

<th class="border p-3">PDF File</th>

</tr>

</thead>

<tbody id="portfolio-table-body"></tbody>

</table>

</div>

</section>


<!-- VERIFY -->

<section id="verify" class="view-section hidden space-y-6">

<h1 class="text-3xl font-bold">Verify Hash</h1>

<input type="text" id="verify-input" class="w-full p-3 border rounded" placeholder="Enter SHA-256 hash">
```

```html
<button onclick="runVerification()" class="bg-slate-800 text-white px-6 py-2 rounded mt-4">Verify</button>

<div id="verification-result" class="hidden mt-6 bg-white p-6 rounded shadow text-center">
<i class="fa-solid fa-check text-green-600 text-4xl mb-2"></i>
<p class="font-bold">Verification Successful</p>
</div>
</section>

<!-- SMART CONTRACT SECTION -->
<section class="space-y-6 mt-12">
<h1 class="text-2xl font-bold">Smart Contract Data Structure</h1>

<div class="bg-slate-900 text-green-400 p-6 rounded-xl font-mono text-sm">
<pre>
string public name;
string public role;
string public description;
</pre>
</div>

<div class="bg-slate-900 text-green-400 p-6 rounded-xl font-mono text-sm mt-4">
<pre>
struct Portfolio {
    string name;
    string role;
    string description;
}
</pre>
</div>
</section>
```

<!-- HARDHAT TEST SECTION -->

<section class="space-y-6 mt-12">

<h1 class="text-2xl font-bold">Hardhat Unit Test</h1>

<div class="bg-slate-900 text-green-400 p-6 rounded-xl font-mono text-sm">

<pre>

```
describe("Portfolio Contract", function () {

  it("Should store portfolio details", async function () {
    await contract.setPortfolio("John", "Developer", "Web3 Builder");
    const data = await contract.getPortfolio();
    expect(data[0]).to.equal("John");
  });

});
```

</pre>

</div>

</section>

</main>

<footer class="bg-white border-t p-4 text-center text-sm">

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</footer>

<script>

/* Navigation */

```
function navigateTo(viewId){
document.querySelectorAll('.view-section').forEach(el=>el.classList.add('hidden'));
```

```javascript
document.getElementById(viewId).classList.remove('hidden');
}


/* Charts */
document.addEventListener('DOMContentLoaded', function(){
new Chart(document.getElementById('integrityChart'),{
type:'doughnut',
data:{labels:['Verified','Pending','Failed'],
datasets:[{data:[85,12,3],backgroundColor:['#16a34a','#fbbf24','#dc2626']}]}
});


new Chart(document.getElementById('activityChart'),{
type:'bar',
data:{labels:['Sep','Oct','Nov','Dec','Jan','Feb'],
datasets:[{label:'Uploads',data:[45,59,80,81,120,145],backgroundColor:'#e11d48'}]}
});
});


/* Upload Logic */
const dropZone=document.getElementById('drop-zone');
const fileInput=document.getElementById('file-input');
const simpleResult=document.getElementById('simple-result');


dropZone.addEventListener('click',()=>fileInput.click());
fileInput.addEventListener('change',()=>handleFiles(fileInput.files));


function handleFiles(files){
if(files.length===0)return;


Array.from(files).forEach(file=>{
if(file.type!=="application/pdf"){
```

```javascript
alert("Only PDF files allowed!");

return;

}


const portfolioFileName="portfolio_"+Date.now()+".portfolio.pdf";

simpleResult.innerHTML=" ✅ Uploaded Successfully<br>"+portfolioFileName;


const name="John Doe";

const role="Blockchain Developer";

const description="Personal Portfolio Smart Contract Data";


addPortfolioToTable(name,role,description,portfolioFileName);

navigateTo('portfolio');


const totalEl=document.getElementById('stat-total');

totalEl.innerText=parseInt(totalEl.innerText)+1;

});

}


function addPortfolioToTable(name,role,description,pdf){

const tableBody=document.getElementById("portfolio-table-body");

const row=document.createElement("tr");

row.innerHTML=`

<td class="border p-3">${name}</td>

<td class="border p-3">${role}</td>

<td class="border p-3">${description}</td>

<td class="border p-3 text-red-600">${pdf}</td>

`;

tableBody.appendChild(row);

}
```

```
/* Verification */

function runVerification(){

const input=document.getElementById('verify-input');

if(input.value.length<10){

alert("Enter valid hash");

return;

}

document.getElementById('verification-result').classList.remove('hidden');

}


</script>


</body>

</html>
```

output: