

COLLABORATION EARTH
Project-2

(Final Document)



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#### 1. Problem Statement:

- Designing and implementing a cutting-edge, safe, and intuitive Web3 platform with blockchain-hosted smart contracts integrated for Collaboration Earth is the main challenge.
- This involves overcoming significant technical, environmental, and educational challenges, requiring a diverse set of skills in web development, blockchain technology, cyber security, and user education.
- The major problem is that the CO2 level is increasing and to reduce this we need to create a digital earth saver coin which helps to promote environmental sustainability and conservative efforts through a digital currency. The earth saver coin allows individuals to take part in the carbon offset market.
- The EarthSaver token aims to introduce this market by allowing individuals to have a considerable influence on the carbon market and support sustainable practices.

## 2. User Requirement

- Users can interact with Smart Contracts through the Webpages or Website.
- The UI should be user-friendly and easy to use.
- The system must manage transactions efficiently.
- The system must ensure the security and privacy of user data and transactions.
- The system should be scalable to handle an increasing number of transactions.
- The system should be reliable.

## 3. Software Methodology used in the project (Agile Methodology)

At the initial stage, we decided to adopt the waterfall method for the development phase. After 1 week of development, we realized this method was not going to be suitable as it was dependent on the previous stages. As a result, it was slowing down the development stage. Moreover, if one stage fails, the method does not allow the development stage to proceed further.

After discussion with the developers, we decided to adopt the Agile Methodology for the development phase. As Agile methodology allows us to decompose the project into smaller subtasks, no stage was dependent on the previous stage.

We divided the projects into 4 parts, they are:

- (1) Frontend Development (UI)
- (2) Smart Contract Development
- (3) Backend Development
- (4) API Configuration

The Agile methodology really helped us in dividing the project task effectively and the development stage went on smoothly. This methodology provided us with more flexibility.

#### 4. Roles:

#### (i) Project Manager & Client Liaison:

Saikat Dutta Tanu is the project manager of this project. He coordinated with the team members and supervised the project development phase. He also documented the project (Project Proposal Documents, Final Deliverable Handover Presentation) with the help of the blockchain and back-end developer.

Saikat Dutta Tanu is the client liaison of this project team as well. Moreover, he is the contact link between the clients and the project team. He has organized client meetings; follow-up meetings and he is responsible for letting the clients know about the project status.

## (ii) Blockchain Developer:

Bhargav Rangani has acted as the Blockchain developer in this project. Generation of smart contract and integration of blockchain network with the backend of the project was performed by him. He has also configured the API partially. He has also assisted the project manager with documentation of project plan, final deliverable handover presentation document.

### (iii) Frontend developer:

Harshit Gajipara has developed the user interface of the project. He has designed and developed the front-end part of this project. He has partially developed the backend as well.

#### (iv) Backend and API:

Preetkumar Mulani has developed the backend of this project. He has configured the API as well. He also has helped with documentation along with the project manager. He has also assisted the blockchain developer in integrating the blockchain with the API.

#### (v) Tester:

Guangxin Sun is the tester of this project. He has performed all sorts of testing for this project and developed the test log.

#### (vi) Business Analyst:

Narinder Pal Kaur is the business analyst of this project. She has developed the Team Organization Document for this project. She has also analyzed the business aspect of this project.

No change was made in the project roles, and everyone performed up to the mark in their roles.

#### 5. Scopes of the project:

The scopes of the project are mentioned below: -

- Smart Contract Generation
- Token generation
- o Tokens withdraw
- Token deposit
- Token transfer
- EarthSaver Coin Generation
- Simple User Interface development
- Secure transactions
- o Deployment of Smart Contract in Blockchain Network

No scope was changed. Only we are facing issues with token withdrawal scope because of the server. We are still trying to figure out the issues regarding this.

## 6. Changes in Programming Language:

Initially, Python was chosen as the primary source code for the project's development. Later, JavaScript was chosen, as we were provided with the liberty by the client to choose any programming language as per the developers' preference. Moreover, for the seamless transactions of the project phases, JavaScript was our first preference.

As a result, we used JavaScript (NodeJS) for the project's development.

We have used HTML and CSS for the front-end development of the crypto-wallet webpage.

# 7. Updated Requirements (Functional and Non-Functional Requirements)

Functional	Description	Non-Functional	Description					
Requirements		Requirements						
Initial Smart contract	Earthsaver tokens	Security	Strong security					
creation and	should be able to be		measures must be put					
implementation	created via the system		in place on the system					
	based on		to guard against fraud,					
	predetermined criteria,		manipulation, and					
	like the total supply.		unauthorized access.					
Token Transfer	It should be possible	Scalability	Without compromising					
	for users to safely		performance, the					
	move Earthsaver		system should be					
	tokens between		scalable to handle an					
	blockchain addresses.		expanding user base					
			and rising transaction					
			volumes over time.					
Token deposit	Users provide account	Reliability	For continuous					
	information while		availability, the system					
	depositing Earthsaver		should have very few					
	tokens. In addition to		interruptions and					
	sending confirmations		downtime.					
	and doing validation							

	checks, the system							
	credits tokens.							
Tokens withdraw	Tokens for Earthsaver	Compliance	Regarding digital					
	can be withdrawn by		currencies and					
	users, who can		blockchain technology,					
	designate the quantity		the solution needs to					
	and destination.		adhere to industry					
	Tokens are deducted		standards and pertinent					
	by the system upon		regulatory regulations.					
	confirmation, which							
	also handles errors and							
	provide							
	acknowledgment.							
Smart Contract	Token transfers and	User Experience	Interacting with the					
Interactions	minting should be		digital money should					
	possible through user		have an intuitive, user-					
	interaction with the		friendly interface that					
	smart contracts		is compatible with a					
	controlling Earthsaver		variety of platforms					
	tokens.		and devices.					
Access Control	Only authorized parties	Performance	High performance					
	should be able to		should be					
	access sensitive smart		demonstrated by the					
	contract functions like		system, with quick					
	token minting.		transaction processing					
			times and low latency.					
Event Logging	For the sake of	Auditability	For the goal of					
	auditability and		accountability and					
	transparency, the		regulatory compliance,					
	system ought to record		the system should					
	pertinent events and		make it easier to audit					
	transactions on the		and trace transactions					
	blockchain.		and interactions					

			between smart
			contracts.
EarthSaver Coin	EarthSaver Coin needs	Compatibility	To ensure smooth
Generation	be generated and		integration and
	named as 'ESV' and		interoperability, the
	will be launched in		solution needs to work
	Sepolia Network.		with the current
			blockchain
			infrastructure as well
			as well-known wallets
			and blockchain
			explorers.
Smart Contract	The smart contract		
Deployment in	should be deployed in		
Blockchain Network	the Sepolia Network		
	for testing purposes.		

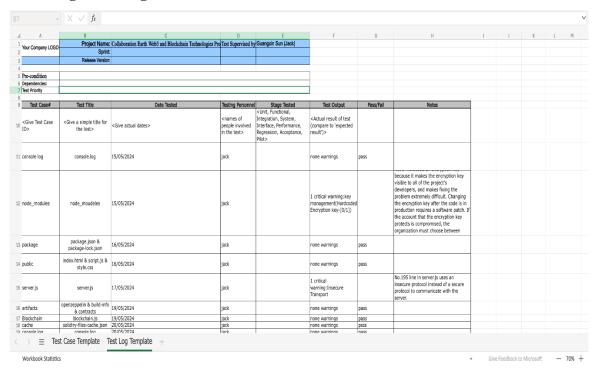
## 8. Testing

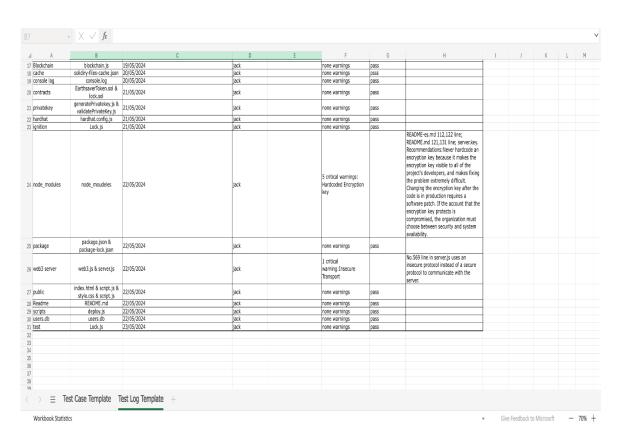
Testing was performed on the entire webpage and each module of the source code was tested. Initially, the testing displayed some warnings after the first development phase. Subsequently, when the source code was modified according to the clients' requirements, we took those warnings into consideration and all the bugs and warnings were fixed.

Test log document will be attached separately.

## Screenshot of Test Log

#### i. First Stage Test Log

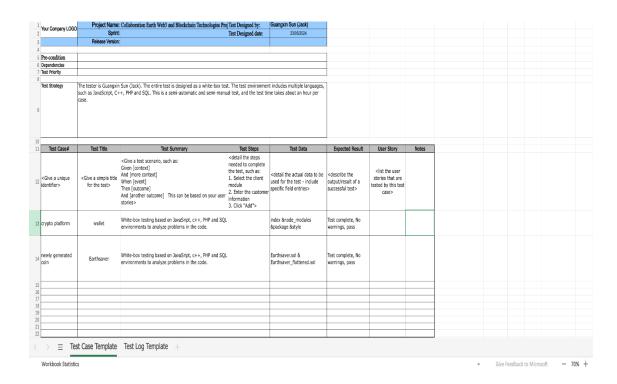




	A	В	C	D	E	F	G	H	1	1	K	L	M	N	0	P
Pre-condi	ition					1										
Dependen	ides	ľ.														
Test Priori	ty															
Test Strab			Sun (Jack). The entire test is designed as a white-box tes +, PHP and SQL. This is a semi-automatic and semi-manu													
Test	Case#	Test Title	Test Summery	Test Steps	Test Data	Expected Result	User Story	Notes								
<give a="" identifier<="" td=""><td></td><td><give a="" for="" simple="" test="" the="" title=""></give></td><td><give a="" as:<br="" scenario,="" such="" test="">Given (contex) And (more context) When (event) Then (outcome) And (another outcome) This can be based on your user stories&gt;</give></td><td><detail steps<br="" the="">needed to complete the test, such as: 1. Select the client module 2. Enter the customer information 3. Click "Add"&gt;</detail></td><td>used for the test - include</td><td><describe a="" of="" output="" result="" successful="" test="" the=""></describe></td><td><li>list the user stories that are tested by this test case&gt;</li></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></give>		<give a="" for="" simple="" test="" the="" title=""></give>	<give a="" as:<br="" scenario,="" such="" test="">Given (contex) And (more context) When (event) Then (outcome) And (another outcome) This can be based on your user stories&gt;</give>	<detail steps<br="" the="">needed to complete the test, such as: 1. Select the client module 2. Enter the customer information 3. Click "Add"&gt;</detail>	used for the test - include	<describe a="" of="" output="" result="" successful="" test="" the=""></describe>	<li>list the user stories that are tested by this test case&gt;</li>									
crypto pl	atform		White-box testing based on JavaSript, c++, PHP and SQL environments to analyze problems in the code.		console.log& node_modules& public& package &server.js	Everything is ok, but have the insecure transport and hardcoded encryption key's problems.										
newly ge coin	nerated		White-box testing based on JavaSript, c++, PHP and SQL environments to analyze problems in the code.		hardhat& ignition& node_modules& package&	Everything is ok, but have the insecure protocol and hardcoded encryption key's problems.										
							ć.									
			Test Log Template +				l.									

## ii. Updated Test Log





## 9. Lessons learned from the project:

#### Effective communication:

Consistent, clear, and open communication between team members is critical, and we maintained that, althrough the project. We used collaboration tools and held regular meetings to keep everyone on the same page.

## Defined Roles and Responsibilities:

Clearly identifying and conveying each team member's tasks and responsibilities to avoid confusion and overlap is a principal factor. We were in constant touch with each other in every phase of the project.

## Agile methodologies:

Agile approaches, such as regular sprints and iterative development, can improve flexibility and adaptability to change.

## Comprehensive Planning:

We spent time on rigorous project planning and requirements collecting to create a clear roadmap and avoid scope creep, which helped us to develop the project swiftly.

#### Resource Allocation:

Ensuring proper distribution of resources, such as time, budget, and staff, helps in minimizing bottlenecks and team overload.

#### Risk Management:

Identifying potential risks early and devising mitigation solutions are one of the most key factors. Regularly examining and updating the risk management plan is necessary for successful completion of the project.

#### Stakeholder Engagement:

Maintaining consistent communication with stakeholders to manage expectations and incorporate comments throughout the project's lifecycle is a crucial factor.

#### **Documentation:**

Maintaining thorough documentation of all project aspects, including code, methods, choices, and lessons learned, is essential to aid knowledge transfer and future initiatives.

#### **Quality Assurance:**

Integrating quality assurance procedures early in the development process is helpful to quickly detect and resolve issues, resulting in a high-quality final product.

#### Team Cohesion and Morale:

Creating a positive team environment by recognizing accomplishments, immediately resolving problems, and guaranteeing teammates a best work-life balance, upholds the morality of the team members.

## 10. Engagement of Clients

- After receiving the information on how to contact the client and how to approach the respected client, we wasted no time in being in touch with the client.
- The first meeting with the client was held on 26th March 2024, and we politely asked about the client's overview of the project. The clients discussed the project thoroughly.
- We arranged 3 follow-up meetings after that for the development of the "Project Proposal Document". We had several doubts and through these follow-up meetings, the doubts were

- clarified by the clients. We are grateful to the clients for clearing up all the doubts and then with all the information provided by the clients, we started the development phase.
- After the development phase, we were facing some problems about ETH coins, and we
  approached the client through the final follow-up meeting, and the problem was resolved
  by the client. The project manager was constantly in touch with the clients via email in
  outlook.
- The contact between the clients and the client member helped us complete the project.
- The final deliverable presentation took place on 24th May 2024 with the course convener and clients. On this occasion, the meeting was held in MS Teams. The clients instructed us to hold a Zoom Meeting on 28th May 2024.
- On 28<sup>th</sup> May 2024, the Zoom meeting was held, and we presented our project work again along with demonstration. After the presentation, the client instructed us to make some changes to the project. We asked for 7 days extension.
- Finally, on 5<sup>th</sup> June 2024, we presented the updated project work to the client and the client was happy to sign off after testing the project work in their system on 6<sup>th</sup> June 2024 meeting.

#### 11. Conclusion

The EarthSaver coin has been developed as a digital currency to support environmental sustainability and conservation initiatives. The goal of Earth Saver Coin is to encourage and compensate people and organizations for taking part in environmental preservation and protection initiatives. Earth Saver Coin can offer a transparent and safe platform to fund environmentally good projects like planting trees, cleaning up the seas, conserving wildlife, and renewable energy projects by utilizing blockchain technology. This virtual currency can be used to support environmentally friendly practices globally, crowdfund environmental projects, and increase public awareness of climate change. Earth Saver Coin is a tool that promotes good environmental effects and unites people all over the world in joint efforts to preserve the environment.