Project Title: Organic food tracking by using Blockchain in Lao PDR

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Background :

Organic food production is one of the largest industries. Moreover, the Organic food supply chain also becomes more global over time . ICT for food have mitigated some of these challenges there is still a lot of problem. Integration costs remain high, there is still a lot of undetected fraud, pesticide, and transparency levels are insufficient to comply with the current and future demands of consumers and other vendors. A new area of technology, the Blockchain, can potentially solve many of the remaining problems for food transparency and control. This research focus on Organic food tracking by using Blockchain.

Targets:

1. Identify the current state of organic food traceability and control, and technologies and projects that can be valuable in designing Blockchain solutions.
2. Identify Blockchain technologies and projects that can be applied within food traceability and control.
3. Develop the platform for organic food tracking by using Blockchain and Dataset.
4. Protecting consumer health by using proposed platform and testing performance of private blockchain.

5. Write a report and communicate the results to public authorities, the retail and food industry in order to stimulate interest and knowledge of the potential with the Blockchain technology.

6. Journal : 2

Speaker: Dr. Phonepadith PHOUMMAVONG

Project Title: Organic food tracking by using Blockchain in Lao PDR

Project Members :

1.Faculty of Engineering National University of Laos (Laos): Dr. Vimontha KHIEOVONGPHACHANH, Dr. Phonepadith PHOUMMAVONG, Dr. Somsanouk PATHOUMVANH, Mr. Tha BOUNTHANH, Mr. Senglathsamy CHANTHAMENAVONG, Dr. Khampheth Bounnady, Dr. Khamphao SISAAT

2. **King Mongkut's Institute of Technology Ladkrabang (Thailand**): Dr. Boonprasert Surakratanasakul

3. **Chulalongkorn University (Thailand):** Dr. Gridsuda Phanomcho, Dr. Ratchatin Chancharoen, Dr. Lunchakorn Wuttisitikulkij, Dr. Charnchai Pluempitiwiriyawej

4. **School of computing and informatics, Universiti Teknologi Brunei, Brunei Daussalam (Brunei):** Dr. Ravi Kumar Patchmuthu

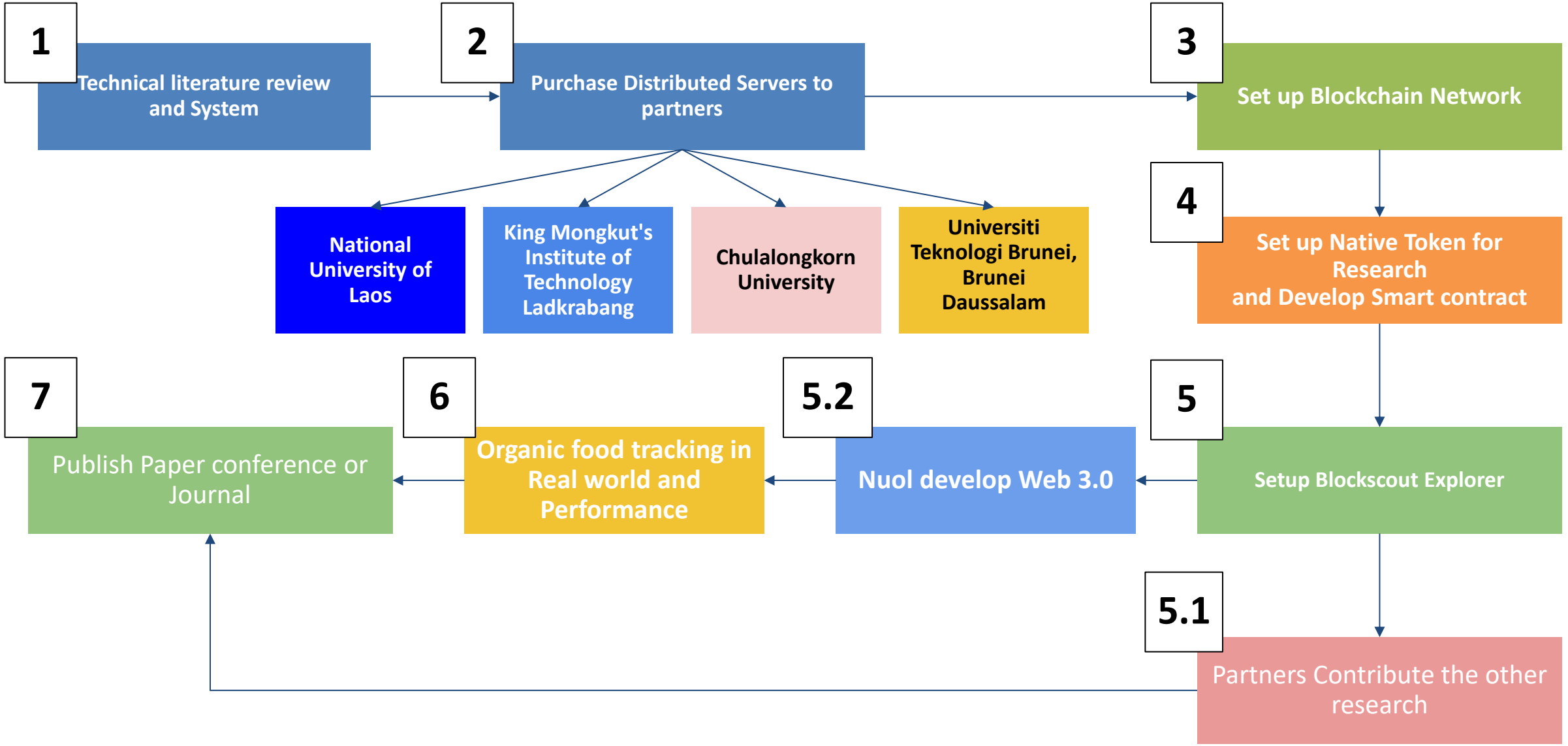
Project Duration :

05/2023 – 05/2025 (2 Years)

Project Budget:

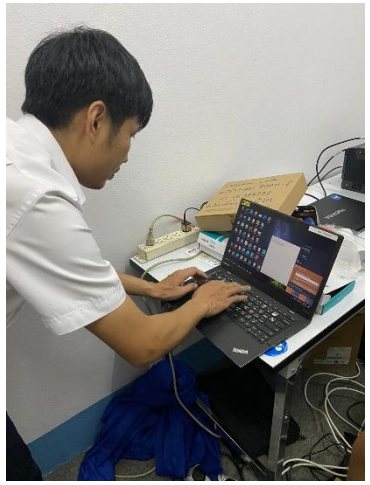
$71,975.00

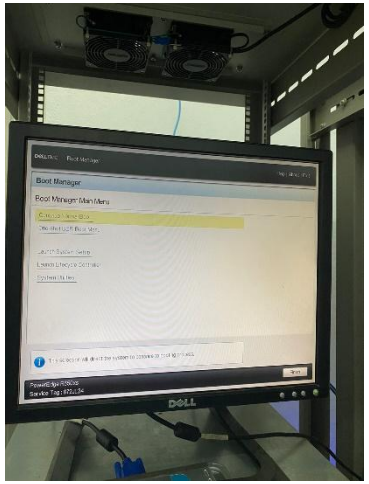
Overview of Implementation



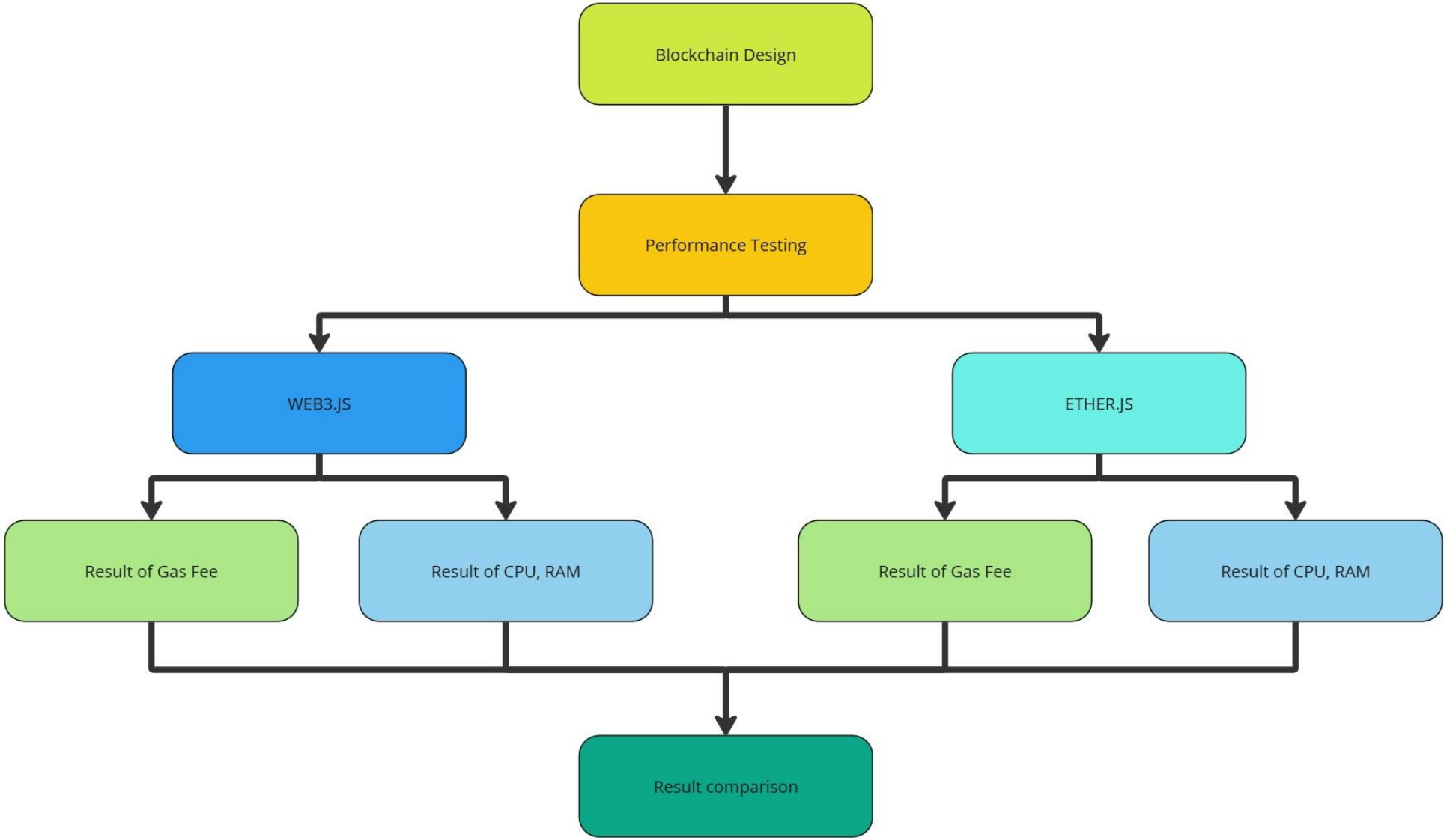
Project Activities: Host Academic Event and Field Visiting 28-30/July/2024

Project Activities: Servers Setup and Blockchain Configuration 9/2025



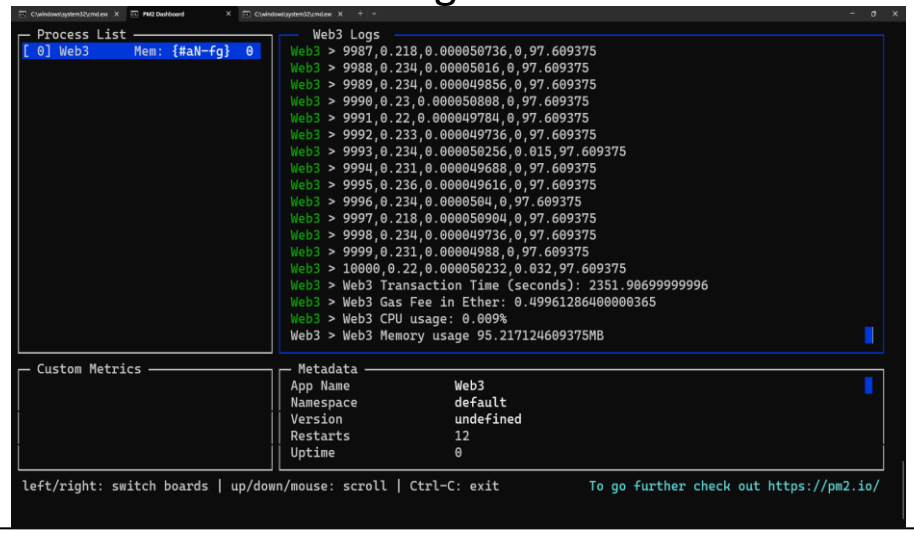


Project Activities: Exploring Performance of Web3.JS and Ethers.JS in Blockchain

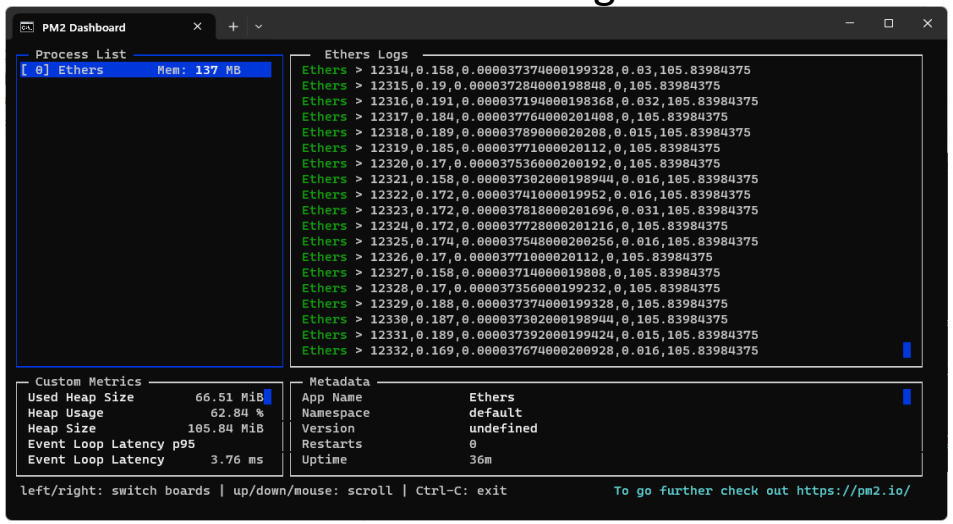


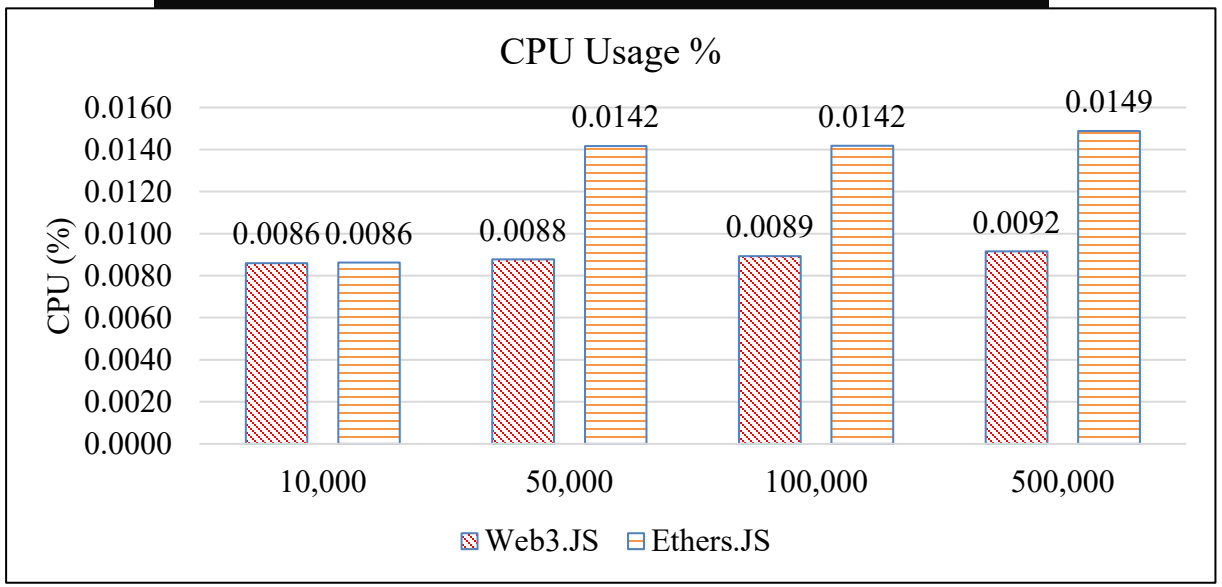
Project Activities: Exploring Performance of Web3.JS and Ethers.JS in Blockchain

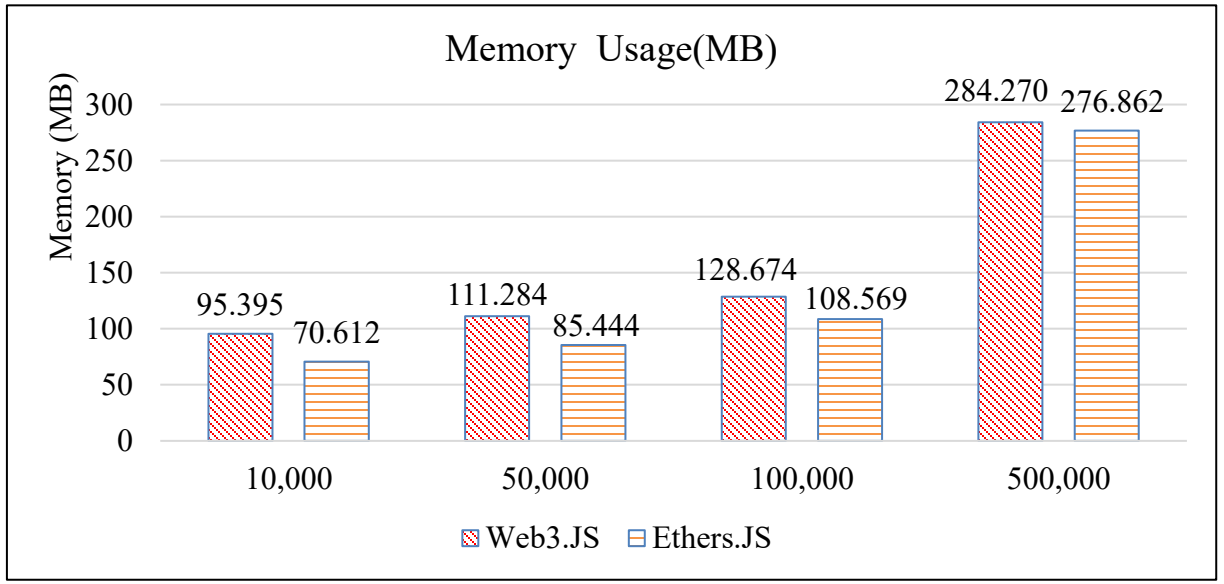
WEB3JS Testing



ETHERJS Testing







Project Activities:

- Initial Task for Server Setup 24-25/7/2024 (Main Site NUOL) - DONE
- Task Define the Information of Blockchain 29-30/8/2024 (HAE) - DONE
- Task for Server Setup 1-15/8/2024 (Main Site NUOL) - DONE
- Task for Server Setup 16-25/8/2024 (Partners Site) - DONE
- Task for Explorer Setup 1-10/9/2024 (Main Site NUOL) - DONE
- Performance testing for Ether.js and Web3.js 15 - 30/9/2024 (Main Site NUOL) - DONE
- Draft the first Journal and prepare to submit (1-15/10/2024) - DONE
- Deploy the Smart contract to apply Organic Architecture (Selected Case) (16-30/10/2024) - DONE
- Develop Web 3.0 for Front-end Application . (16-30/10/2024)- DONE
- Submit Journal Paper (1/11/2024 – 9/9/2025) – DONE
- Working with Government (Future Research)

Scientific Contribution:

Published Journal Papers:

No:	Paper title:	Author names	Affiliation	Journal name:	The publisher of the Journal	The volume number and Pages
1	Exploring Performance of Web3.JS and Ethers.JS for Ethereum Blockchain-Organic Food Registration	1. Phonepadith PHOUMMAVONG. 2. Vimontha Khieovongphachanh 3. Senglathsamy Chanthamenavong, 4. Sompasong VONGTHAVONE2	Souphanouvong University Journal of Multidisciplinary Research and Development	The SUJMRD online publication has been recorded permanently in the ISSN register as ISSN 2521-0653.	Souphanouvong University Journal of Multidisciplinary Research and Development (SUJMRD)	Accepted

Scientific Contribution:

Published Journal Papers:

No:	Paper title:	Author names	Affiliation	Journal name:	The publisher of the Journal	The volume number and Pages
2	The Proposal of the performance of Web3JS and EtherJS base on Private Blockchain	P. Phoummavong, V. Khieovongphachanh, K. Bounnady, S. Chanthamenavong, K. Sisaat, T. Bounthanh, K. Luangxaysana, S. Pathoumvanh, S. Vongthavone	National University of Laos	LAO SOCIAL SCIENCES JOURNAL	Scientific Journal of National University of Laos	Accepted

Societal Impact:

1. Promoting Consumer Trust and Food Safety:

Transparency for Consumers: By providing a system where consumers can verify the authenticity and journey of organic food products, the application builds consumer trust in organic labels. This is crucial in an era where mislabeling and counterfeit organic products are common.
Public Access to Traceability Data: The system gives the public access to information about the origin of food products, promoting informed decision-making. Through scanning a QR code, consumers can trace back every step in the food production and supply chain, ensuring it meets organic standards.

2. Supporting Organic Farmers:
Fair Trade Opportunities: Small-scale organic farmers, who are often overlooked in traditional supply chains, can gain visibility and prove the authenticity of their products. This can lead to better market access and potentially higher prices for genuine organic products.
Empowerment through Technology: By integrating blockchain technology, farmers are empowered to adopt modern, transparent systems, which could provide them a competitive advantage. This could help them secure certifications and partnerships more easily.
3. Improving Regulatory Compliance and Governance:

Standardization in Organic Certification: By working with relevant bodies and regulators, this project can contribute to creating a standard framework for organic certification that is verifiable on the blockchain. This could serve as a model for other countries or regions, helping to improve global organic food standards.
Collaboration with International Standards Organizations: The blockchain system's framework can be shared with international organizations and governments, contributing to the global conversation on organic food traceability and regulatory compliance. It could also lead to partnerships with international standard-setting bodies to further enhance and standardize practices in organic food tracking.

Societal Impact:

4. Environmental and Sustainability Benefits:
Encouraging Sustainable Farming Practices: By providing visibility into farming practices, the system encourages more farmers to adopt organic and sustainable methods, which can reduce harmful environmental impacts, such as pesticide use and deforestation.
Public Awareness Campaigns: As the system makes data available to the public, it could be used in campaigns to promote awareness of sustainable farming practices and their benefits for health and the environment.

5. Creating a Knowledge Base for Research and Development:
Public Data for Researchers: The application will provide anonymized data sets, available for public use, that can support academic and governmental research on organic farming, blockchain technology, and supply chain management.
Contributions to Academic Literature: The journal papers and documentation created during the project will contribute to academic and professional discourse, supporting other teams and organizations that are developing similar systems in different regions.

6. Economic and Social Development:
Boosting Local Economies: By increasing trust in locally produced organic products, the system could lead to greater demand for Lao organic products in both local and international markets, helping to strengthen the local economy.
Job Creation in Technology and Agriculture: The development and maintenance of the blockchain system will create jobs in technology, agriculture, and logistics, particularly in rural areas. As more farmers and supply chain participants adopt this technology, it will also create demand for training and support services.

Conclusion:

Conclusion of the Blockchain-Based Organic Food Tracking Project.

Scientific and Technological: Successfully integrated blockchain and IoT for secure, transparent tracking of organic food, ensuring data integrity and authenticity.

Application Development: Developed a scalable system with smart contracts and a user-friendly explorer, although challenges remain in Web 3.0 front-end integration and user adoption.

Experiments & Field Testing: Performance testing confirmed Ether.js as more efficient for transactions, while field tests highlighted connectivity challenges in remote areas and positive farmer reception with proper training.

Social & Economic Impact: Increased consumer trust, empowered small farmers, promoted sustainable practices, and contributed to discussions on standardizing organic certifications.

Thank you
Q & A