

BLOCKCHAIN TECHNOLOGY FOR FOOD TRACKING SYSTEM

PROJECT REPORT

Submitted by

TEAM ID: NM2023TMID06223

APOLLO ENGINEERING COLLEGE

Team Members :

VISHNU VENKATESH.R	-	210220105003
PRASANNA.M	-	210220105001
SRI YUVAN RAJ.P	-	210220105002
SOLAI KUMAR.R	-	210220105301

TABLE OF CONTENT

1. INTRODUCTION

1.1 Project Overview

1.2 Purpose

2. LITERATURE SURVEY

2.1 Existing problem

2.2 References

2.3 Problem Statement Definition

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

4.2 Non-Functional requirements

5. PROJECT DESIGN

5.1 Data Flow Diagrams & User Stories

5.2 Solution Architecture

6. PROJECT PLANNING & SCHEDULING

6.1 Technical Architecture

6.2 Sprint Planning & Estimation

6.3 Sprint Delivery Schedule

7. CODING & SOLUTIONING

7.1 Feature 1

7.2 Feature 2

8. PERFORMANCE TESTING

8.1 Performance Metrics

9. RESULTS

9.1 Output Screenshots

10. ADVANTAGES & DISADVANTAGES

11. CONCLUSION

12. FUTURE SCOPE

13. APPENDIX Source Code GitHub & Project Demo Link

CHAPTER – 1

1.INTRODUCTION

1.1 Project Overview:

Blockchain In Food Tracking System. The project aimed to leverage blockchain technology to develop a comprehensive and transparent food tracking system, enhancing food safety, traceability, and consumer confidence in the global food supply chain. By integrating blockchain with IoT devices and smart contracts, the system aimed to provide real-time monitoring, automated quality control, and secure data management across all stages of the food production and distribution process.

1.2 Purpose:

The purpose of implementing blockchain in a food tracking system is to address various challenges and improve the overall efficiency, transparency, and security of the food supply chain. Specifically, the key purposes include:

1. **Enhanced Transparency:** Blockchain technology enables the creation of an immutable and transparent ledger that allows all participants in the food supply chain to view and verify the entire history and journey of food products, from the source of production to the point of sale. This transparency fosters trust among consumers and other

stakeholders, as they can easily access authentic and unaltered information about the origin, quality, and handling of food items.

2. **Improved Traceability:** By using unique identifiers and digital records, blockchain facilitates the accurate tracking and tracing of each food product throughout the supply chain. This feature is crucial in identifying the source of contamination, managing recalls effectively, and ensuring compliance with quality standards and regulations. Enhanced traceability minimizes the risk of counterfeit products, food fraud, and distribution of unsafe or contaminated items.
3. **Strengthened Security:** Blockchain's decentralized and tamper-proof nature ensures the security and integrity of data related to food products. All transactions and information recorded on the blockchain are cryptographically secured and cannot be altered without consensus from the network participants. This heightened security feature minimizes the potential for data manipulation, unauthorized access, or fraudulent activities within the food supply chain.
4. **Efficient Supply Chain Management:** Implementing blockchain technology in a food tracking system streamlines the processes involved in supply chain management. By automating various tasks through smart contracts, such as payment settlements, quality checks, compliance verification, the system reduces the administrative burden and eliminates the need for

intermediaries. This efficiency leads to cost savings, faster transactions, and improved inventory management.

5. **Ensured Food Safety and Quality:** With increased transparency, traceability, and security, blockchain contributes to maintaining and enhancing the overall safety and quality of food products. By enabling real-time monitoring and verification of food-related data, the technology helps in identifying potential risks, preventing contamination, and ensuring that consumers receive authentic and high-quality food items.
6. **Compliance with Regulatory Standards:** Integrating blockchain technology into the food tracking system ensures adherence to regulatory standards and industry-specific guidelines. The immutable nature of blockchain records facilitates the seamless auditing of processes and transactions, thereby simplifying compliance verification and reducing the likelihood of non-compliance issues.

CHAPTER – 2

2. LITERATURE SURVEY

2.1 Existing problem:

Several challenges and existing problems are associated with the implementation of blockchain in food tracking systems. These issues often arise due to the complex nature of the food supply chain, regulatory requirements, technological limitations, and the need for collaboration among various stakeholders. Some of the key problems include:

1. **Integration Challenges:** Integrating blockchain technology into existing food supply chain systems can be complex and challenging. Ensuring compatibility and seamless data integration between different legacy systems and blockchain platforms may require significant resources and technical expertise.
2. **Scalability Issues:** The scalability of blockchain networks remains a significant concern, especially when dealing with large-scale food supply chains involving numerous transactions and data points. The limitations of certain blockchain architectures can lead to bottlenecks and increased transaction times, impacting the overall efficiency of the tracking system.

2.2 References :

References related to blockchain in food tracking systems that you can explore for further information and research:

1. Ploeger A, Berger M, Ballantyne A, and Kracht M. "Blockchain for traceability in the food industry: A review of the opportunities and challenges." *Trends in Food Science & Technology*. 2019; 91: 579-584.
2. Zheng Y, Xue M, and Tsai CW. "Blockchain challenges and opportunities: A survey." *International Journal of Web and Grid Services*. 2018; 14(4): 352-375.
3. Nsenga R, and Bhowmik S. "Blockchain technology in the agri-food sector: A systematic literature review." *International Journal of Information Management*. 2021; 57: 102322.
4. Xu L, and Chen X. "Blockchain technology in the agri-food sector: A systematic literature review and future research directions." *Information Processing in Agriculture*. 2021; 8(4): 789-810.
5. Li X, and Shetty S. "Blockchain applications in the food sector: A comprehensive review." *Journal of Food Engineering*. 2020; 288: 110194.
6. Radanović-Grgurić L, Radovanović M, and Vujović V. "Blockchain technology in the agri-food sector: A systematic literature review." *Sustainability*. 2021; 13(18): 10452.
7. Liu M, Zou W, and Liu J. "Blockchain technology in the agri-food sector: A systematic literature review and future research directions." *Journal of Cleaner Production*. 2021; 320: 128859.
8. Xu X, Chen X, and Chen X. "Blockchain technology in the agri-food sector: A systematic literature review." *Information Processing in Agriculture*. 2021; 8(3): 634-654.

These references provide valuable insights into the various aspects of blockchain technology implementation in the food industry, including challenges, opportunities, and future research directions. They can serve as a starting point for further exploration and in-depth understanding of the subject.

2.3 Problem Statement Definition:

The problem statement for a blockchain in a food tracking system defines the specific challenges and issues within the food supply chain that necessitate the implementation of blockchain technology. It highlights the shortcomings of the current system and emphasizes the need for a robust and secure tracking mechanism to address these challenges. A concise problem statement could be formulated as follows:

"Current food supply chains face critical challenges related to transparency, traceability, and trust, leading to issues such as food fraud, safety concerns, and inefficiencies in supply chain management. Existing tracking systems often lack the capability to provide real-time, transparent, and immutable data throughout the entire journey of food products, resulting in compromised food safety and consumer trust. There is an urgent need for a comprehensive blockchain-based food tracking system that can ensure the integrity, security, and transparency of food-related data, enabling stakeholders to trace the origin, quality, and distribution of food items seamlessly and efficiently."

This problem statement succinctly outlines the deficiencies in the current food tracking systems and emphasizes the necessity of integrating blockchain technology to address these challenges.

CHAPTER – 3

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas:



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can collect their imagination and start shaping concepts more effectively and staying in the same room.

- Brainstorm in order
- Use brainstorming
- 8 people recommended

Before you collaborate

20-30 mins of preparation/brainstorming with the team. Don't order you need to be doing anything.

8 mins

Define your problem statement

How problem are you trying to solve? Frame your problem as the right fit to someone. This will be the focus of your brainstorm.

8 mins

Brainstorm

Write down any ideas that come to mind but address your problem statement.

8 mins

Group ideas

Take your sharing your ideas while clustering similar or related ideas on a page. Share all ideas with everyone present, give each cluster a common label that it is clear is large, broad and easy to see, and make it as simple as possible to group.

8 mins

Prioritize

Your team should all be in the same room about this is important enough to invest. Place your ideas on the grid to determine which ideas are important and which are feasible.

8 mins

After you collaborate

Your concept should now be ready to go. You can now start working on it.

8 mins

Brainstorming

20-30 mins of preparation/brainstorming with the team. Don't order you need to be doing anything.

8 mins

Define your problem statement

How problem are you trying to solve? Frame your problem as the right fit to someone. This will be the focus of your brainstorm.

8 mins

Brainstorm

Write down any ideas that come to mind but address your problem statement.

8 mins

Group ideas

Take your sharing your ideas while clustering similar or related ideas on a page. Share all ideas with everyone present, give each cluster a common label that it is clear is large, broad and easy to see, and make it as simple as possible to group.

8 mins

Prioritize

Your team should all be in the same room about this is important enough to invest. Place your ideas on the grid to determine which ideas are important and which are feasible.

8 mins

After you collaborate

Your concept should now be ready to go. You can now start working on it.

8 mins

Brainstorming

20-30 mins of preparation/brainstorming with the team. Don't order you need to be doing anything.

8 mins

Define your problem statement

How problem are you trying to solve? Frame your problem as the right fit to someone. This will be the focus of your brainstorm.

8 mins

Brainstorm

Write down any ideas that come to mind but address your problem statement.

8 mins

Group ideas

Take your sharing your ideas while clustering similar or related ideas on a page. Share all ideas with everyone present, give each cluster a common label that it is clear is large, broad and easy to see, and make it as simple as possible to group.

8 mins

Prioritize

Your team should all be in the same room about this is important enough to invest. Place your ideas on the grid to determine which ideas are important and which are feasible.

8 mins

After you collaborate

Your concept should now be ready to go. You can now start working on it.

8 mins

Brainstorming

20-30 mins of preparation/brainstorming with the team. Don't order you need to be doing anything.

8 mins

Define your problem statement

How problem are you trying to solve? Frame your problem as the right fit to someone. This will be the focus of your brainstorm.

8 mins

Brainstorm

Write down any ideas that come to mind but address your problem statement.

8 mins

Group ideas

Take your sharing your ideas while clustering similar or related ideas on a page. Share all ideas with everyone present, give each cluster a common label that it is clear is large, broad and easy to see, and make it as simple as possible to group.

8 mins

Prioritize

Your team should all be in the same room about this is important enough to invest. Place your ideas on the grid to determine which ideas are important and which are feasible.

8 mins

After you collaborate

Your concept should now be ready to go. You can now start working on it.

8 mins

Brainstorming

20-30 mins of preparation/brainstorming with the team. Don't order you need to be doing anything.

8 mins

Define your problem statement

How problem are you trying to solve? Frame your problem as the right fit to someone. This will be the focus of your brainstorm.

8 mins

Brainstorm

Write down any ideas that come to mind but address your problem statement.

8 mins

Group ideas

Take your sharing your ideas while clustering similar or related ideas on a page. Share all ideas with everyone present, give each cluster a common label that it is clear is large, broad and easy to see, and make it as simple as possible to group.

8 mins

Prioritize

Your team should all be in the same room about this is important enough to invest. Place your ideas on the grid to determine which ideas are important and which are feasible.

8 mins

After you collaborate

Your concept should now be ready to go. You can now start working on it.

8 mins

CHAPTER-4

4. REQUIREMENT ANALYSIS

4.1 Functional requirements:

Functional requirements for a blockchain-based food tracking system should specify the essential features and capabilities that the system must possess to effectively track and trace food products throughout the supply chain. Here are some key functional requirements:

1.User Authentication and Authorization:

- The system should allow authorized users, including producers, distributors, retailers, and consumers, to access specific information based on their roles and permissions within the blockchain network.

2.Data Recording and Tracking:

- The system should enable the recording and tracking of detailed information about the origin, production, processing, and distribution of each food product, ensuring that all relevant data is securely stored on the blockchain ledger.

3.Product Identification and Tagging:

- The system should support the assignment of unique identifiers, such as QR codes, RFID tags, or barcodes, to individual food

products to facilitate accurate and efficient tracking throughout the supply chain.

4.Real-time Data Updates and Notifications:

- The system should provide real-time updates and notifications to stakeholders about the status, location, and condition of food products at various stages of the supply chain, ensuring transparency and timely communication.

5.Smart Contract Implementation:

The system should incorporate smart contracts to automate and enforce predefined rules and agreements between different parties, ensuring compliance with quality standards, payment terms, and other contractual obligations.

6.Traceability and Transparency:

- The system should allow users to trace the entire journey of each food product, providing a transparent and immutable record of all transactions, transfers, and quality control checks performed at each stage of the supply chain.

7.Recall Management:

- The system should facilitate efficient and timely product recalls by swiftly identifying and isolating potentially contaminated or unsafe food products, ensuring that affected items are quickly removed from the supply chain and market.

8.Integration with External Systems:

- The system should support integration with external systems, such as inventory management, logistics, and regulatory compliance platforms, to streamline data sharing and ensure seamless coordination across the entire food supply chain.

9.Reporting and Analytics:

- The system should provide comprehensive reporting and analytics capabilities, allowing users to generate detailed insights and trends related to product origins, distribution patterns, consumer preferences, and compliance with regulatory standards.

10.Secure Data Exchange and Privacy:

- The system should employ robust encryption protocols to secure data exchange and ensure the privacy and confidentiality of sensitive information shared within the blockchain network.

By incorporating these functional requirements, a blockchain-based food tracking system can effectively enhance transparency, traceability, and trust within the food supply chain, thereby improving food safety and consumer confidence.

4.2 Non-Functional requirements:

Non-functional requirements are crucial for ensuring the reliability, performance, security, and usability of a blockchain-

based food tracking system. Here are some key non-functional requirements for such a system:

1.Security:

- The system should employ robust security measures to protect sensitive data from unauthorized access, tampering, or cyberattacks, ensuring the integrity and confidentiality of information stored on the blockchain.

2.Scalability:

- The system should be designed to accommodate a growing volume of transactions and data within the food supply chain without compromising performance or causing delays in data processing and verification.

3.Performance:

- The system should demonstrate high performance and responsiveness, enabling fast and efficient data retrieval, processing, and validation to support real-time monitoring and tracking of food products throughout the supply chain.

4.Reliability:

- The system should ensure consistent and reliable data availability, minimizing the risk of downtime or system failures that could disrupt the flow of information and impact the overall integrity of the food tracking process.

5. Interoperability:

- The system should support interoperability with existing technologies and platforms within the food industry, facilitating seamless data exchange and integration with external systems for inventory management, logistics, and regulatory compliance.

6. Compliance:

- The system should adhere to industry-specific regulations and compliance standards, ensuring that all data recording, tracking, and reporting functionalities are aligned with relevant food safety and traceability guidelines imposed by regulatory authorities.

7. Usability and User Experience:

- The system should offer a user-friendly interface that is intuitive and easy to navigate, enabling all stakeholders, including producers, distributors, retailers, and consumers, to access and interpret relevant information without requiring extensive technical knowledge.

8. Data Backup and Recovery:

- The system should implement reliable data backup and recovery mechanisms to prevent data loss and ensure that critical information remains accessible in the event of system failures, natural disasters, or other unforeseen incidents.

9.Auditability:

- The system should enable comprehensive auditing of all transactions and data modifications, allowing stakeholders to verify the authenticity and integrity of information recorded on the blockchain and ensuring transparency and accountability within the food supply chain.

10.Environmental Impact:

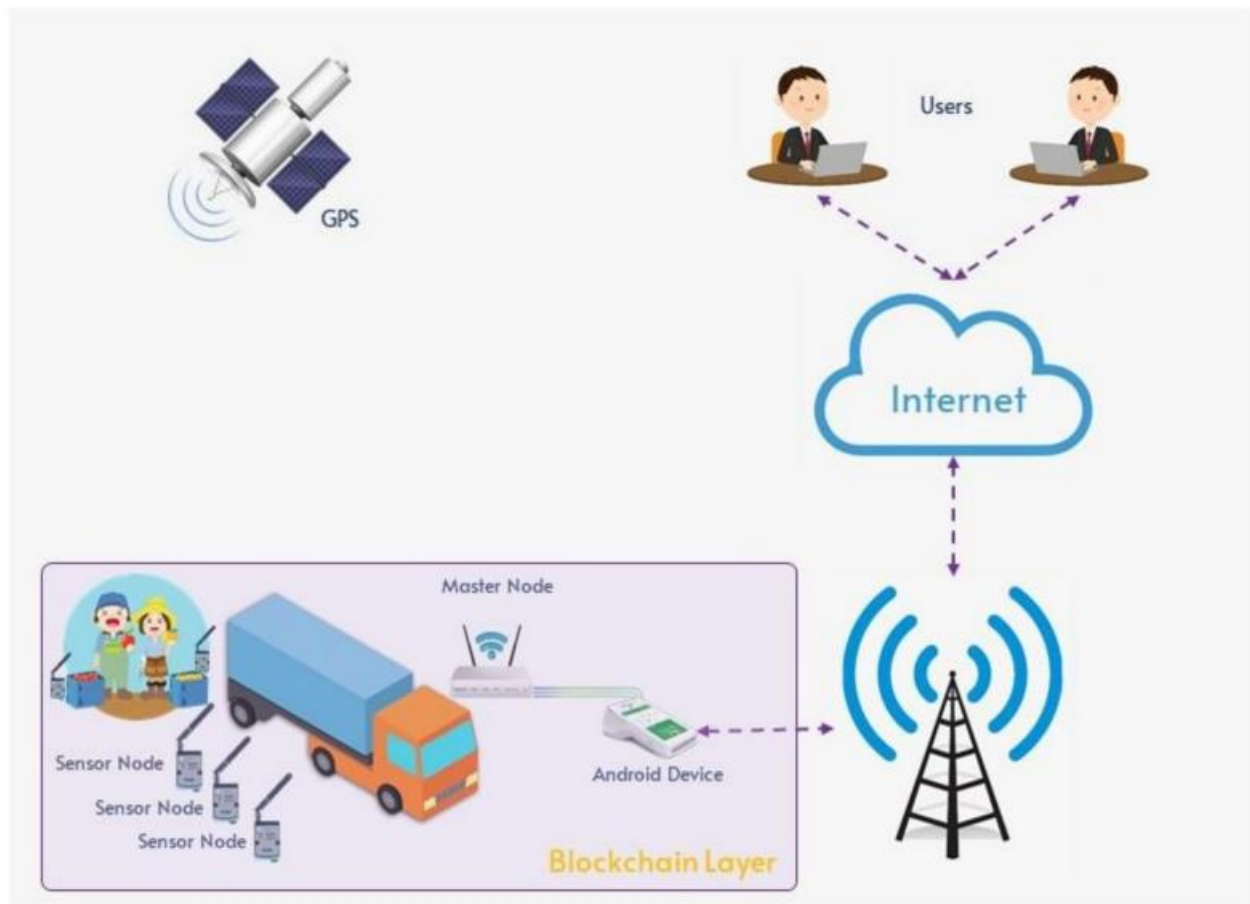
- The system should consider the environmental impact of the technology's operations, aiming to minimize energy consumption and carbon footprint, particularly in the context of energy-intensive blockchain protocols, to promote sustainability within the food industry.

By addressing these non-functional requirements, a blockchain-based food tracking system can establish a secure, reliable, and efficient framework for enhancing transparency, traceability, and trust throughout the food supply chain.

CHAPTER-5

5. PROJECT DESIGN

5.1 Data flow diagrams & User stories :



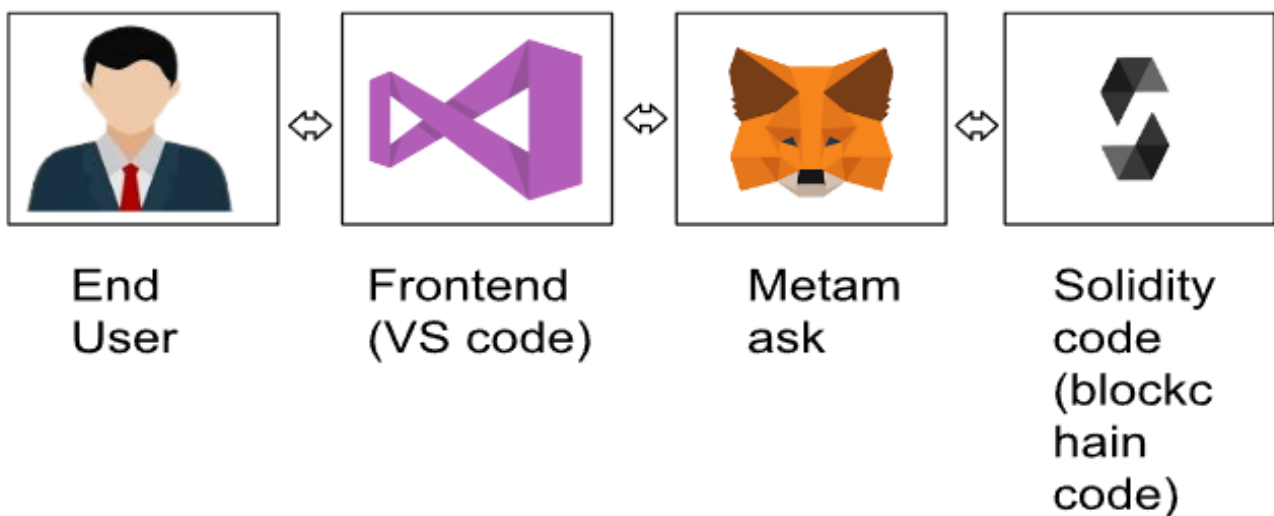
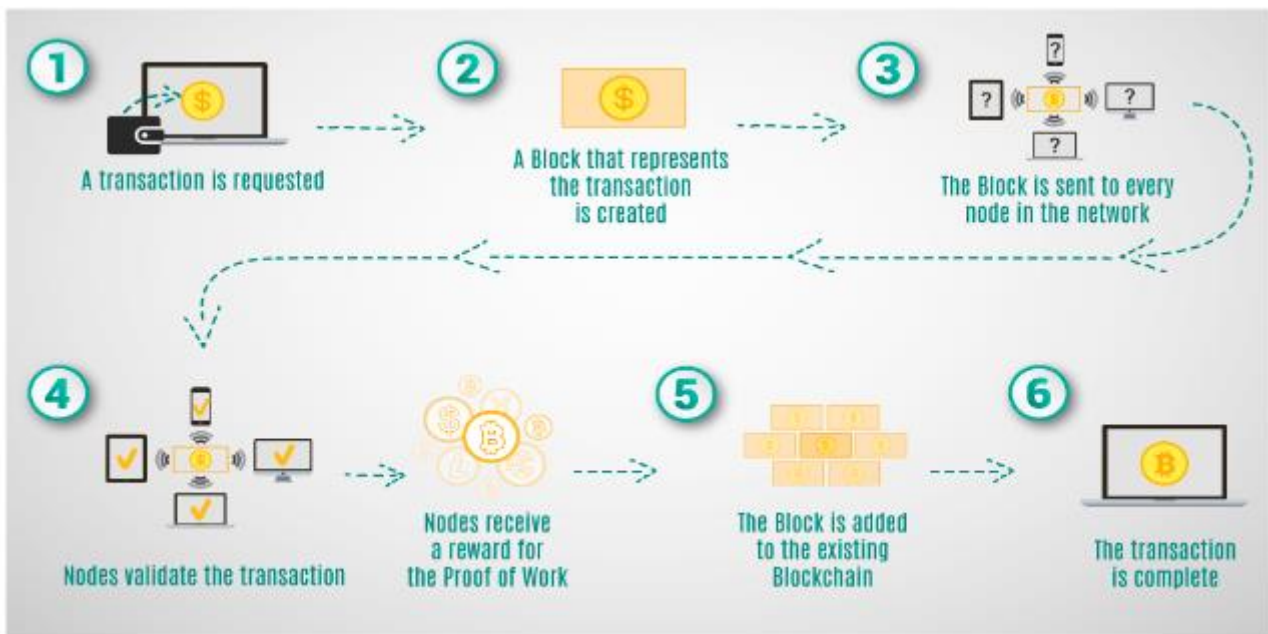
User stories:

1. As a food producer, I want to record the origin, production details, and quality control information of my food products on the blockchain to ensure transparency and build consumer trust.
 2. As a distributor, I want to track the shipment and delivery status of food products in real-time through the blockchain to optimize logistics and minimize delays.
 3. As a retailer, I want to verify the authenticity and quality of the food products received from the suppliers by accessing detailed information stored on the blockchain, thereby ensuring the safety and reliability of the products for consumers.
 4. As a consumer, I want to scan the QR code on a food product and instantly access information about its source, production methods, and distribution channels through a user-friendly interface to make informed purchasing decisions based on accurate and transparent data.
 5. As a regulatory authority, I want to have access to the blockchain-based food tracking system to conduct audits, verify compliance with food safety regulations, and ensure that the entire supply chain adheres to industry standards and guidelines.
- These user stories reflect the diverse perspectives and requirements of stakeholders involved in the food supply chain, emphasizing the importance of transparency, traceability, and compliance with regulations enabled by the blockchain-based tracking system.

CHAPTER-6

6. PROJECT PLANNING & SCHEDULING

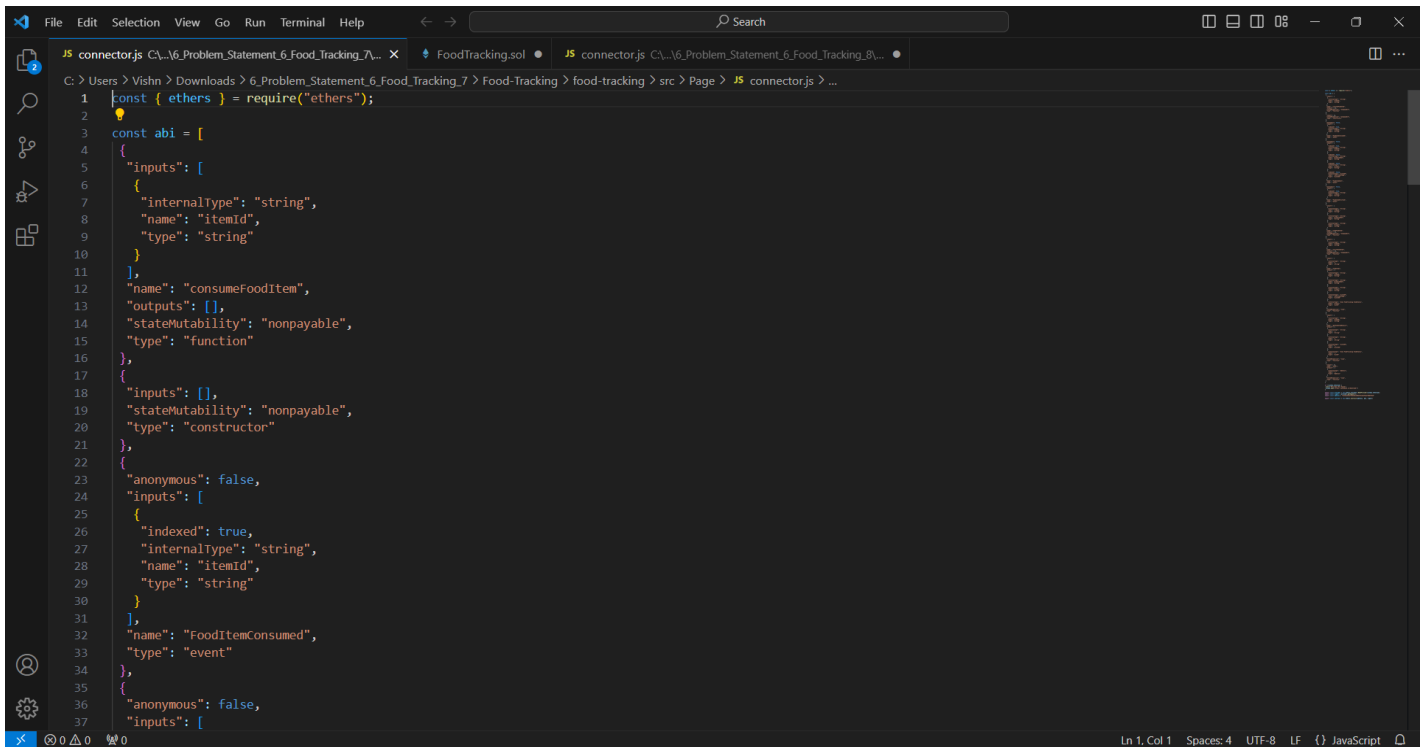
6.1 Technical Architecture



CHAPTER-7

7.CODING AND SOLUTIONS

7.1 Visual Studio Coding:



```
1  const { ethers } = require("ethers");
2
3  const abi = [
4    {
5      "inputs": [
6        {
7          "internalType": "string",
8          "name": "itemId",
9          "type": "string"
10       }
11     ],
12     "name": "consumeFoodItem",
13     "outputs": [],
14     "stateMutability": "nonpayable",
15     "type": "function"
16   },
17   {
18     "inputs": [],
19     "stateMutability": "nonpayable",
20     "type": "constructor"
21   },
22   {
23     "anonymous": false,
24     "inputs": [
25       {
26         "indexed": true,
27         "internalType": "string",
28         "name": "itemId",
29         "type": "string"
30       }
31     ],
32     "name": "FoodItemConsumed",
33     "type": "event"
34   },
35   {
36     "anonymous": false,
37     "inputs": [
```

```
File Edit Selection View Go Run Terminal Help
JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_7\... FoodTracking.sol JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_8\...
C:\Users> Vishn > Downloads > 6_Problem_Statement_6_Food_Tracking_7 > Food-Tracking > food-tracking > src > Page > JS connector.js > ...
34 },
35 {
36   "anonymous": false,
37   "inputs": [
38     {
39       "indexed": true,
40       "internalType": "string",
41       "name": "itemId",
42       "type": "string"
43     },
44     {
45       "indexed": false,
46       "internalType": "string",
47       "name": "productName",
48       "type": "string"
49     },
50     {
51       "indexed": false,
52       "internalType": "string",
53       "name": "origin",
54       "type": "string"
55     },
56     {
57       "indexed": false,
58       "internalType": "uint256",
59       "name": "sentTimestamp",
60       "type": "uint256"
61     }
62   ],
63   "name": "FoodItemSent",
64   "type": "event"
65 },
66 {
67   "anonymous": false,
68   "inputs": [
69     {
70       "indexed": true,
```

```
File Edit Selection View Go Run Terminal Help
JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_7\... FoodTracking.sol JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_8\...
C:\Users> Vishn > Downloads > 6_Problem_Statement_6_Food_Tracking_7 > Food-Tracking > food-tracking > src > Page > JS connector.js > [tab] abi > [tab] "type"
71   "internalType": "string",
72   "name": "itemId",
73   "type": "string"
74 }
75 ],
76 "name": "FoodItemVerified",
77 "type": "event"
78 },
79 {
80   "inputs": [
81     {
82       "internalType": "string",
83       "name": "itemId",
84       "type": "string"
85     },
86     {
87       "internalType": "string",
88       "name": "productName",
89       "type": "string"
90     },
91     {
92       "internalType": "string",
93       "(property) "type": string
94       "type": "string"
95     },
96   ],
97   "name": "sendFoodItem",
98   "outputs": [],
99   "stateMutability": "nonpayable",
100   "type": "function"
101 },
102 {
103   "inputs": [
104     {
105       "internalType": "string",
106       "name": "itemId",
107       "type": "string"
```

FileEditSelectionViewGoRunTerminalHelp

Search

JS connector.jsC:\...\6_Problem_Statement_6_Food_Tracking_7\...FoodTracking.solJS connector.jsC:\...\6_Problem_Statement_6_Food_Tracking_8\...

C:\> Users > Vishn > Downloads > 6_Problem_Statement_6_Food_Tracking_7 > Food-Tracking > food-tracking > src > Page > JS connector.js > [abi] > type

107" type": "string"

108}

109],

110" name": "verifyFoodItem",

111" outputs": [],

112" stateMutability": "nonpayable",

113" type": "function"

114},

115{

116" inputs": [

117{

118" internalType": "string",

119" name": "",

120" type": "string"

121}

122],

123" name": "foodItems",

124" outputs": [

125{

126" internalType": "string",

127" name": "itemId",

128" type": "string"

129},

130{

131" internalType": "string",

132" name": "productName",

133" type": "string"

134},

135{

136" internalType": "string",

137" name": "origin",

138" type": "string"

139},

140},

141" internalType": "uint256",

142" name": "sentTimestamp",

143" type": "uint256"

144}

145]

146}

147}

148}

149}

150}

151}

152}

153}

154}

155}

156}

157}

158}

159}

160}

161}

162}

163}

164}

165}

166}

167}

168}

169}

170}

171}

172}

173}

174}

175}

176}

177}

178}

179}

180}

181}

182}

183}

184}

185}

186}

187}

188}

189}

190}

191}

192}

193}

194}

195}

196}

197}

198}

199}

200}

201}

202}

203}

204}

205}

206}

207}

208}

209}

210}

211}

212}

213}

214}

215}

216}

217}

218}

219}

220}

221}

222}

223}

224}

225}

226}

227}

228}

229}

230}

231}

232}

233}

234}

235}

236}

237}

238}

239}

240}

241}

242}

243}

244}

245}

246}

247}

248}

249}

250}

251}

252}

253}

254}

255}

256}

257}

258}

259}

260}

261}

262}

263}

264}

265}

266}

267}

268}

269}

270}

271}

272}

273}

274}

275}

276}

277}

278}

279}

280}

281}

282}

283}

284}

285}

286}

287}

288}

289}

290}

291}

292}

293}

294}

295}

296}

297}

298}

299}

300}

301}

302}

303}

304}

305}

306}

307}

308}

309}

310}

311}

312}

313}

314}

315}

316}

317}

318}

319}

320}

321}

322}

323}

324}

325}

326}

327}

328}

329}

330}

331}

332}

333}

334}

335}

336}

337}

338}

339}

340}

341}

342}

343}

344}

345}

346}

347}

348}

349}

350}

351}

352}

353}

354}

355}

356}

357}

358}

359}

360}

361}

362}

363}

364}

365}

366}

367}

368}

369}

370}

371}

372}

373}

374}

375}

376}

377}

378}

379}

380}

381}

382}

383}

384}

385}

386}

387}

388}

389}

390}

391}

392}

393}

394}

395}

396}

397}

398}

399}

400}

401}

402}

403}

404}

405}

406}

407}

408}

409}

410}

411}

412}

413}

414}

415}

416}

417}

418}

419}

420}

421}

422}

423}

424}

425}

426}

427}

428}

429}

430}

431}

432}

433}

434}

435}

436}

437}

438}

439}

440}

441}

442}

443}

444}

445}

446}

447}

448}

449}

450}

451}

452}

453}

454}

455}

456}

457}

458}

459}

460}

461}

462}

463}

464}

465}

466}

467}

468}

469}

470}

471}

472}

473}

474}

475}

476}

477}

478}

479}

480}

481}

482}

483}

484}

485}

486}

487}

488}

489}

490}

491}

492}

493}

494}

495}

496}

497}

498}

499}

500}

501}

502}

503}

504}

505}

506}

507}

508}

509}

510}

511}

512}

513}

514}

515}

516}

517}

518}

519}

520}

521}

522}

523}

524}

525}

526}

527}

528}

529}

530}

531}

532}

533}

534}

535}

536}

537}

538}

539}

540}

541}

542}

543}

544}

545}

546}

547}

548}

549}

550}

551}

552}

553}

554}

555}

556}

557}

558}

559}

560}

561}

562}

563}

564}

565}

566}

567}

568}

569}

570}

571}

572}

573}

574}

575}

576}

577}

578}

579}

580}

581}

582}

583}

584}

585}

586}

587}

588}

589}

590}

591}

592}

593}

594}

595}

596}

597}

598}

599}

600}

601}

602}

603}

604}

605}

606}

607}

608}

609}

610}

611}

612}

613}

614}

615}

616}

617}

618}

619}

620}

621}

622}

623}

624}

625}

626}

627}

628}

629}

630}

631}

632}

633}

634}

635}

636}

637}

638}

639}

640}

641}

642}

643}

644}

645}

646}

647}

648}

649}

650}

651}

652}

653}

654}

655}

656}

657}

658}

659}

660}

661}

662}

663}

664}

665}

666}

667}

668}

669}

670}

671}

672}

673}

674}

675}

676}

677}

678}

679}

680}

681}

682}

683}

684}

685}

686}

687}

688}

689}

690}

691}

692}

693}

694}

695}

696}

697}

698}

699}

700}

701}

702}

703}

704}

705}

706}

707}

708}

709}

710}

711}

712}

713}

714}

715}

716}

717}

718}

719}

720}

721}

722}

723}

724}

725}

726}

727}

728}

729}

730}

731}

732}

733}

734}

735}

736}

737}

738}

739}

740}

741}

742}

743}

744}

745}

746}

747}

748}

749}

750}

751}

752}

753}

754}

755}

756}

757}

758}

759}

760}

761}

762}

763}

764}

765}

766}

767}

768}

769}

770}

771}

772}

773}

774}

775}

776}

777}

778}

779}

780}

781}

782}

783}

784}

785}

786}

787}

788}

789}

790}

791}

792}

793}

794}

795}

796}

797}

798}

799}

800}

801}

802}

803}

804}

805}

806}

807}

808}

809}

810}

811}

812}

813}

814}

815}

816}

817}

818}

819}

820}

821}

822}

823}

824}

825}

826}

827}

828}

829}

830}

831}

832}

833}

834}

835}

836}

837}

838}

839}

840}

841}

842}

843}

844}

845}

846}

847}

848}

849}

850}

851}

852}

853}

854}

855}

856}

857}

858}

859}

860}

861}

862}

863}

864}

865}

866}

867}

868}

869}

870}

871}

872}

873}

874}

875}

876}

877}

878}

879}

880}

881}

882}

883}

884}

885}

886}

887}

888}

889}

890}

891}

892}

893}

894}

895}

896}

897}

898}

899}

900}

901}

902}

903}

904}

905}

906}

907}

908}

909}

910}

911}

912}

913}

914}

915}

916}

917}

918}

919}

920}

921}

922}

923}

924}

925}

926}

927}

928}

929}

930}

931}

932}

933}

934}

935}

936}

937}

938}

939}

940}

941}

942}

943}

944}

945}

946}

947}

948}

949}

950}

951}

952}

953}

954}

955}

956}

957}

958}

959}

960}

961}

962}

963}

964}

965}

966}

967}

968}

969}

970}

971}

972}

973}

974}

975}

976}

977}

978}

979}

980}

981}

982}

983}

984}

985}

986}

987}

988}

989}

990}

991}

992}

993}

994}

995}

996}

997}

998}

999}

1000}

Ln 100, Col 21Spaces: 4UTF-8LF{ } JavaScript

JS connector.jsC:\...\6_Problem_Statement_6_Food_Tracking_7\...FoodTracking.solJS connector.jsC:\...\6_Problem_Statement_6_Food_Tracking_8\...

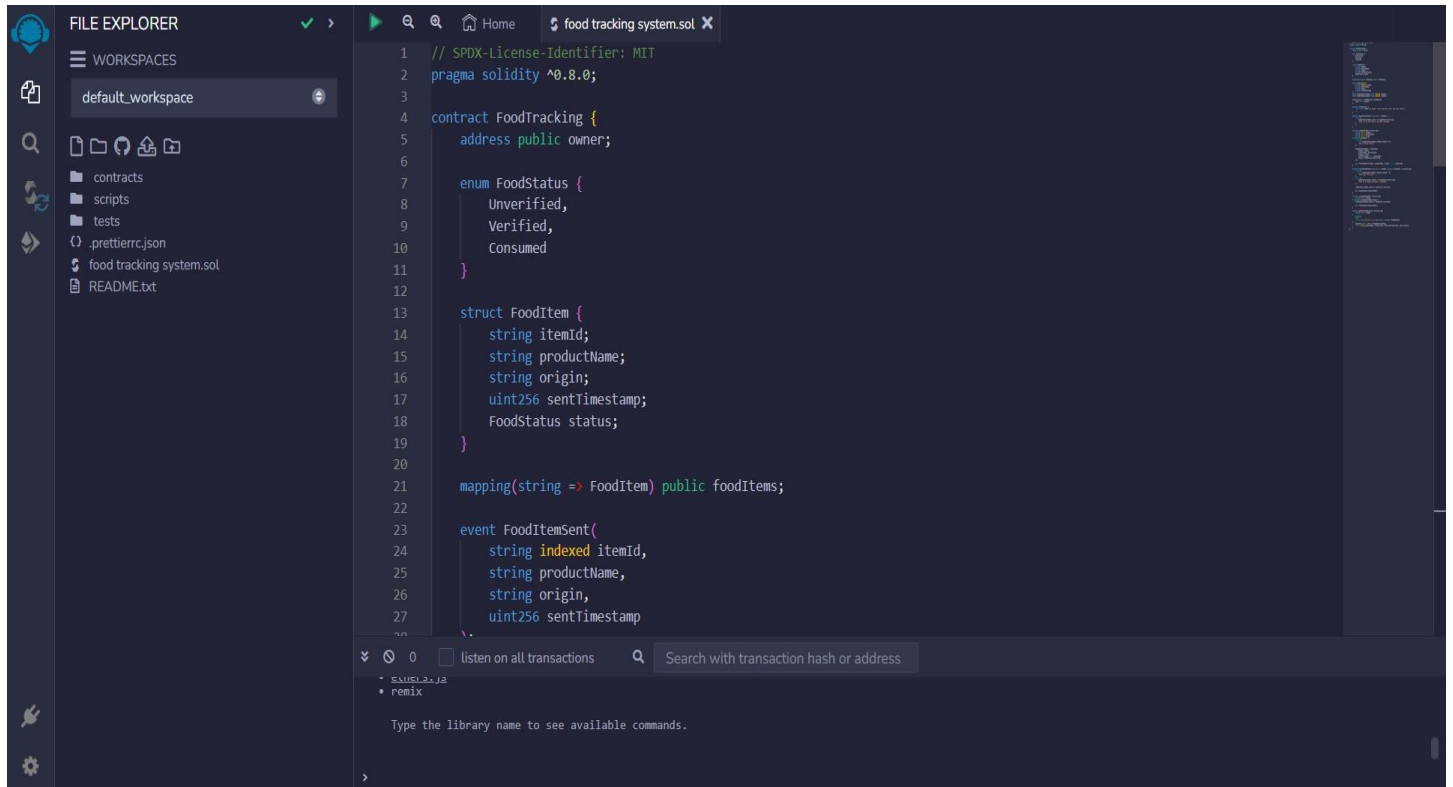
C:\> Users > Vishn > Downloads > 6_Problem_Statement_6_Food_Tracking_7 > Food-Tracking > food-tracking > src > Page > JS connector.js > [0] abi > type

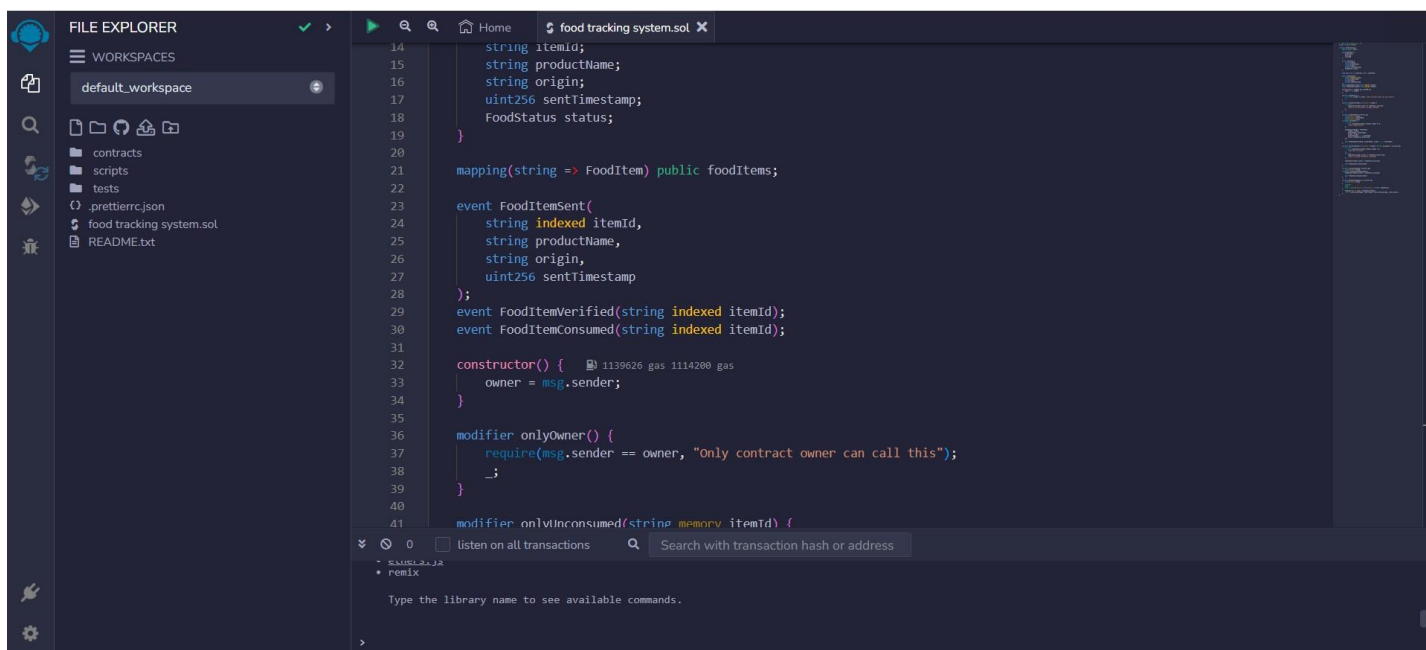
140
141 "internalType": "uint256",
142 "name": "sentTimestamp",
143 "type": "uint256"
144 },
145 {
146 "internalType": "enum FoodTracking.FoodStatus",
147 "name": "status",
148 "type": "uint8"
149 }
150],
151 "stateMutability": "view",
152 "type": "function"
153 },
154 {
155 "inputs": [
156 {
157 "internalType": "string",
158 "name": "itemId",
159 "type": "string"
160 }
161],
162 "name": "getFoodItemDetails",
163 "outputs": [
164 {
165 "internalType": "string",
166 "name": "",
167 "type": "string"
168 },
169 {
170 "internalType": "string",
171 "name": "",
172 "type": "string"
173 },
174 {
175 "internalType": "uint256",
176 "name": "",
177 "type": "uint256"
178 }
179]
180 }
181],
182 "stateMutability": "view",
183 "type": "function"
184 },
185 {
186 "inputs": [
187 {
188 "internalType": "string",
189 "name": "itemId",
190 "type": "string"
191 },
192 {
193 "internalType": "string",
194 "name": "status",
195 "type": "uint8"
196 }
197],
198 "name": "updateFoodItemStatus",
199 "outputs": [
200 {
201 "internalType": "string",
202 "name": "",
203 "type": "string"
204 },
205 {
206 "internalType": "string",
207 "name": "",
208 "type": "string"
209 },
210 {
211 "internalType": "uint256",
212 "name": "",
213 "type": "uint256"
214 }
215]
216 }
217],
218 "stateMutability": "view",
219 "type": "function"
220 },
221 {
222 "inputs": [
223 {
224 "internalType": "string",
225 "name": "itemId",
226 "type": "string"
227 },
228 {
229 "internalType": "string",
230 "name": "status",
231 "type": "uint8"
232 },
233 {
234 "internalType": "uint256",
235 "name": "sentTimestamp",
236 "type": "uint256"
237 }
238],
239 "name": "getFoodItemDetailsWithTimestamp",
240 "outputs": [
241 {
242 "internalType": "string",
243 "name": "",
244 "type": "string"
245 },
246 {
247 "internalType": "string",
248 "name": "",
249 "type": "string"
250 },
251 {
252 "internalType": "uint256",
253 "name": "",
254 "type": "uint256"
255 }
256]
257 }
258],
259 "stateMutability": "view",
260 "type": "function"
261 },
262 {
263 "inputs": [
264 {
265 "internalType": "string",
266 "name": "itemId",
267 "type": "string"
268 },
269 {
270 "internalType": "string",
271 "name": "status",
272 "type": "uint8"
273 },
274 {
275 "internalType": "uint256",
276 "name": "sentTimestamp",
277 "type": "uint256"
278 }
279],
280 "name": "getFoodItemDetailsWithTimestamp",
281 "outputs": [
282 {
283 "internalType": "string",
284 "name": "",
285 "type": "string"
286 },
287 {
288 "internalType": "string",
289 "name": "",
290 "type": "string"
291 },
292 {
293 "internalType": "uint256",
294 "name": "",
295 "type": "uint256"
296 }
297]
298 }
299],
300 "stateMutability": "view",
301 "type": "function"
302 },
303 {
304 "inputs": [
305 {
306 "internalType": "string",
307 "name": "itemId",
308 "type": "string"
309 },
310 {
311 "internalType": "string",
312 "name": "status",
313 "type": "uint8"
314 },
315 {
316 "internalType": "uint256",
317 "name": "sentTimestamp",
318 "type": "uint256"
319 }
320],
321 "name": "getFoodItemDetailsWithTimestamp",
322 "outputs": [
323 {
324 "internalType": "string",
325 "name": "",
326 "type": "string"
327 },
328 {
329 "internalType": "string",
330 "name": "",
331 "type": "string"
332 },
333 {
334 "internalType": "uint256",
335 "name": "",
336 "type": "uint256"
337 }
338]
339 }
340],
341 "stateMutability": "view",
342 "type": "function"
343 },
344 {
345 "inputs": [
346 {
347 "internalType": "string",
348 "name": "itemId",
349 "type": "string"
350 },
351 {
352 "internalType": "string",
353 "name": "status",
354 "type": "uint8"
355 },
356 {
357 "internalType": "uint256",
358 "name": "sentTimestamp",
359 "type": "uint256"
360 }
361],
362 "name": "getFoodItemDetailsWithTimestamp",
363 "outputs": [
364 {
365 "internalType": "string",
366 "name": "",
367 "type": "string"
368 },
369 {
370 "internalType": "string",
371 "name": "",
372 "type": "string"
373 },
374 {
375 "internalType": "uint256",
376 "name": "",
377 "type": "uint256"
378 }
379]
380 }
381],
382 "stateMutability": "view",
383 "type": "function"
384 },
385 {
386 "inputs": [
387 {
388 "internalType": "string",
389 "name": "itemId",
390 "type": "string"
391 },
392 {
393 "internalType": "string",
394 "name": "status",
395 "type": "uint8"
396 },
397 {
398 "internalType": "uint256",
399 "name": "sentTimestamp",
400 "type": "uint256"
401 }
402],
403 "name": "getFoodItemDetailsWithTimestamp",
404 "outputs": [
405 {
406 "internalType": "string",
407 "name": "",
408 "type": "string"
409 },
410 {
411 "internalType": "string",
412 "name": "",
413 "type": "string"
414 },
415 {
416 "internalType": "uint256",
417 "name": "",
418 "type": "uint256"
419 }
420]
421 }
422],
423 "stateMutability": "view",
424 "type": "function"
425 },
426 {
427 "inputs": [
428 {
429 "internalType": "string",
430 "name": "itemId",
431 "type": "string"
432 },
433 {
434 "internalType": "string",
435 "name": "status",
436 "type": "uint8"
437 },
438 {
439 "internalType": "uint256",
440 "name": "sentTimestamp",
441 "type": "uint256"
442 }
443],
444 "name": "getFoodItemDetailsWithTimestamp",
445 "outputs": [
446 {
447 "internalType": "string",
448 "name": "",
449 "type": "string"
450 },
451 {
452 "internalType": "string",
453 "name": "",
454 "type": "string"
455 },
456 {
457 "internalType": "uint256",
458 "name": "",
459 "type": "uint256"
460 }
461]
462 }
463],
464 "stateMutability": "view",
465 "type": "function"
466 },
467 {
468 "inputs": [
469 {
470 "internalType": "string",
471 "name": "itemId",
472 "type": "string"
473 },
474 {
475 "internalType": "string",
476 "name": "status",
477 "type": "uint8"
478 },
479 {
480 "internalType": "uint256",
481 "name": "sentTimestamp",
482 "type": "uint256"
483 }
484],
485 "name": "getFoodItemDetailsWithTimestamp",
486 "outputs": [
487 {
488 "internalType": "string",
489 "name": "",
490 "type": "string"
491 },
492 {
493 "internalType": "string",
494 "name": "",
495 "type": "string"
496 },
497 {
498 "internalType": "uint256",
499 "name": "",
500 "type": "uint256"
501 }
502]
503 }
504],
505 "stateMutability": "view",
506 "type": "function"
507 },
508 {
509 "inputs": [
510 {
511 "internalType": "string",
512 "name": "itemId",
513 "type": "string"
514 },
515 {
516 "internalType": "string",
517 "name": "status",
518 "type": "uint8"
519 },
520 {
521 "internalType": "uint256",
522 "name": "sentTimestamp",
523 "type": "uint256"
524 }
525],
526 "name": "getFoodItemDetailsWithTimestamp",
527 "outputs": [
528 {
529 "internalType": "string",
530 "name": "",
531 "type": "string"
532 },
533 {
534 "internalType": "string",
535 "name": "",
536 "type": "string"
537 },
538 {
539 "internalType": "uint256",
540 "name": "",
541 "type": "uint256"
542 }
543]
544 }
545],
546 "stateMutability": "view",
547 "type": "function"
548 },
549 {
550 "inputs": [
551 {
552 "internalType": "string",
553 "name": "itemId",
554 "type": "string"
555 },
556 {
557 "internalType": "string",
558 "name": "status",
559 "type": "uint8"
560 },
561 {
562 "internalType": "uint256",
563 "name": "sentTimestamp",
564 "type": "uint256"
565 }
566],
567 "name": "getFoodItemDetailsWithTimestamp",
568 "outputs": [
569 {
570 "internalType": "string",
571 "name": "",
572 "type": "string"
573 },
574 {
575 "internalType": "string",
576 "name": "",
577 "type": "string"
578 },
579 {
580 "internalType": "uint256",
581 "name": "",
582 "type": "uint256"
583 }
584]
585 }
586],
587 "stateMutability": "view",
588 "type": "function"
589 },
590 {
591 "inputs": [
592 {
593 "internalType": "string",
594 "name": "itemId",
595 "type": "string"
596 },
597 {
598 "internalType": "string",
599 "name": "status",
600 "type": "uint8"
601 },
602 {
603 "internalType": "uint256",
604 "name": "sentTimestamp",
605 "type": "uint256"
606 }
607],
608 "name": "getFoodItemDetailsWithTimestamp",
609 "outputs": [
610 {
611 "internalType": "string",
612 "name": "",
613 "type": "string"
614 },
615 {
616 "internalType": "string",
617 "name": "",
618 "type": "string"
619 },
620 {
621 "internalType": "uint256",
622 "name": "",
623 "type": "uint256"
624 }
625]
626 }
627],
628 "stateMutability": "view",
629 "type": "function"
630 },
631 {
632 "inputs": [
633 {
634 "internalType": "string",
635 "name": "itemId",
636 "type": "string"
637 },
638 {
639 "internalType": "string",
640 "name": "status",
641 "type": "uint8"
642 },
643 {
644 "internalType": "uint256",
645 "name": "sentTimestamp",
646 "type": "uint256"
647 }
648],
649 "name": "getFoodItemDetailsWithTimestamp",
650 "outputs": [
651 {
652 "internalType": "string",
653 "name": "",
654 "type": "string"
655 },
656 {
657 "internalType": "string",
658 "name": "",
659 "type": "string"
660 },
661 {
662 "internalType": "uint256",
663 "name": "",
664 "type": "uint256"
665 }
666]
667 }
668],
669 "stateMutability": "view",
670 "type": "function"
671 },
672 {
673 "inputs": [
674 {
675 "internalType": "string",
676 "name": "itemId",
677 "type": "string"
678 },
679 {
680 "internalType": "string",
681 "name": "status",
682 "type": "uint8"
683 },
684 {
685 "internalType": "uint256",
686 "name": "sentTimestamp",
687 "type": "uint256"
688 }
689],
690 "name": "getFoodItemDetailsWithTimestamp",
691 "outputs": [
692 {
693 "internalType": "string",
694 "name": "",
695 "type": "string"
696 },
697 {
698 "internalType": "string",
699 "name": "",
700 "type": "string"
701 },
702 {
703 "internalType": "uint256",
704 "name": "",
705 "type": "uint256"
706 }
707]
708 }
709],
710 "stateMutability": "view",
711 "type": "function"
712 },
713 {
714 "inputs": [
715 {
716 "internalType": "string",
717 "name": "itemId",
718 "type": "string"
719 },
720 {
721 "internalType": "string",
722 "name": "status",
723 "type": "uint8"
724 },
725 {
726 "internalType": "uint256",
727 "name": "sentTimestamp",
728 "type": "uint256"
729 }
730],
731 "name": "getFoodItemDetailsWithTimestamp",
732 "outputs": [
733 {
734 "internalType": "string",
735 "name": "",
736 "type": "string"
737 },
738 {
739 "internalType": "string",
740 "name": "",
741 "type": "string"
742 },
743 {
744 "internalType": "uint256",
745 "name": "",
746 "type": "uint256"
747 }
748]
749 }
750],
751 "stateMutability": "view",
752 "type": "function"
753 },
754 {
755 "inputs": [
756 {
757 "internalType": "string",
758 "name": "itemId",
759 "type": "string"
760 },
761 {
762 "internalType": "string",
763 "name": "status",
764 "type": "uint8"
765 },
766 {
767 "internalType": "uint256",
768 "name": "sentTimestamp",
769 "type": "uint256"
770 }
771],
772 "name": "getFoodItemDetailsWithTimestamp",
773 "outputs": [
774 {
775 "internalType": "string",
776 "name": "",
777 "type": "string"
778 },
779 {
780 "internalType": "string",
781 "name": "",
782 "type": "string"
783 },
784 {
785 "internalType": "uint256",
786 "name": "",
787 "type": "uint256"
788 }
789]
790 }
791],
792 "stateMutability": "view",
793 "type": "function"
794 },
795 {
796 "inputs": [
797 {
798 "internalType": "string",
799 "name": "itemId",
800 "type": "string"
801 },
802 {
803 "internalType": "string",
804 "name": "status",
805 "type": "uint8"
806 },
807 {
808 "internalType": "uint256",
809 "name": "sentTimestamp",
810 "type": "uint256"
811 }
812],
813 "name": "getFoodItemDetailsWithTimestamp",
814 "outputs": [
815 {
816 "internalType": "string",
817 "name": "",
818 "type": "string"
819 },
820 {
821 "internalType": "string",
822 "name": "",
823 "type": "string"
824 },
825 {
826 "internalType": "uint256",
827 "name": "",
828 "type": "uint256"
829 }
830]
831 }
832],
833 "stateMutability": "view",
834 "type": "function"
835 },
836 {
837 "inputs": [
838 {
839 "internalType": "string",
840 "name": "itemId",
841 "type": "string"
842 },
843 {
844 "internalType": "string",
845 "name": "status",
846 "type": "uint8"
847 },
848 {
849 "internalType": "uint256",
850 "name": "sentTimestamp",
851 "type": "uint256"
852 }
853],
854 "name": "getFoodItemDetailsWithTimestamp",
855 "outputs": [
856 {
857 "internalType": "string",
858 "name": "",
859 "type": "string"
860 },
861 {
862 "internalType": "string",
863 "name": "",
864 "type": "string"
865 },
866 {
867 "internalType": "uint256",
868 "name": "",
869 "type": "uint256"
870 }
871]
872 }
873],
874 "stateMutability": "view",
875 "type": "function"
876 },
877 {
878 "inputs": [
879 {
880 "internalType": "string",
881 "name": "itemId",
882 "type": "string"
883 },
884 {
885 "internalType": "string",
886 "name": "status",
887 "type": "uint8"
888 },
889 {
890 "internalType": "uint256",
891 "name": "sentTimestamp",
892 "type": "uint256"
893 }
894],
895 "name": "getFoodItemDetailsWithTimestamp",
896 "outputs": [
897 {
898 "internalType": "string",
899 "name": "",
900 "type": "string"
901 },
902 {
903 "internalType": "string",
904 "name": "",
905 "type": "string"
906 },
907 {
908 "internalType": "uint256",
909 "name": "",
910 "type": "uint256"
911 }
912]
913 }
914],
915 "stateMutability": "view",
916 "type": "function"
917 },
918 {
919 "inputs": [
920 {
921 "internalType": "string",
922 "name": "itemId",
923 "type": "string"
924 },
925 {
926 "internalType": "string",
927 "name": "status",
928 "type": "uint8"
929 },
930 {
931 "internalType": "uint256",
932 "name": "sentTimestamp",
933 "type": "uint256"
934 }
935],
936 "name": "getFoodItemDetailsWithTimestamp",
937 "outputs": [
938 {
939 "internalType": "string",
940 "name": "",
941 "type": "string"
942 },
943 {
944 "internalType": "string",
945 "name": "",
946 "type": "string"
947 },
948 {
949 "internalType": "uint256",
950 "name": "",
951 "type": "uint256"
952 }
953]
954 }
955],
956 "stateMutability": "view",
957 "type": "function"
958 },
959 {
960 "inputs": [
961 {
962 "internalType": "string",
963 "name": "itemId",
964 "type": "string"
965 },
966 {
967 "internalType": "string",
968 "name": "status",
969 "type": "uint8"
970 },
971 {
972 "internalType": "uint256",
973 "name": "sentTimestamp",
974 "type": "uint256"
975 }
976],
977 "name": "getFoodItemDetailsWithTimestamp",
978 "outputs": [
979 {
980 "internalType": "string",
981 "name": "",
982 "type": "string"
983 },
984 {
985 "internalType": "string",
986 "name": "",
987 "type": "string"
988 },
989 {
990 "internalType": "uint256",
991 "name": "",
992 "type": "uint256"
993 }
994]
995 }
996],
997 "stateMutability": "view",
998 "type": "function"
999 },
1000 {
1001 "inputs": [
1002 {
1003 "internalType": "string",
1004 "name": "itemId",
1005 "type": "string"
1006 },
1007 {
1008 "internalType": "string",
1009 "name": "status",
1010 "type": "uint8"
1011 },
1012 {
1013 "internalType": "uint256",
1014 "name": "sentTimestamp",
1015 "type": "uint256"
1016 }
1017],
1018 "name": "getFoodItemDetailsWithTimestamp",
1019 "outputs": [
1020 {
1021 "internalType": "string",
1022 "name": "",
1023 "type": "string"
1024 },
1025 {
1026 "internalType": "string",
1027 "name": "",
1028 "type": "string"
1029 },
1030 {
1031 "internalType": "uint256",
1032 "name": "",
1033 "type": "uint256"
1034 }
1035]
1036 }
1037],
1038 "stateMutability": "view",
1039 "type": "function"
1040 },
1041 {
1042 "inputs": [
1043 {
1044 "internalType": "string",
1045 "name": "itemId",
1046 "type": "string"
1047 },
1048 {
1049 "internalType": "string",
1050 "name": "status",
1051 "type": "uint8"
1052 },
1053 {
1054 "internalType": "uint256",
1055 "name": "sentTimestamp",
1056 "type": "uint256"
1057 }
1058],
1059 "name": "getFoodItemDetailsWithTimestamp",
1060 "outputs": [
1061 {
1062 "internalType": "string",
1063 "name": "",
1064 "type": "string"
1065 },
1066 {
1067 "internalType": "string",
1068 "name": "",
1069 "type": "string"
1070 },
1071 {
1072 "internalType": "uint256",
1073 "name": "",
1074 "type": "uint256"
1075 }
1076]
1077 }
1078],
1079 "stateMutability": "view",
1080 "type": "function"
1081 },
1082 {
1083 "inputs": [
1084 {
1085 "internalType": "string",
1086 "name": "itemId",
1087 "type": "string"
1088 },
1089 {
109


```
JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_7\... X FoodTracking.sol JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_8\...
C:\Users> Vishn > Downloads > 6_Problem_Statement_6_Food_Tracking_7 > Food-Tracking > food-tracking > src > Page > JS connector.js > [0] abi > type"
173     },
174     {
175       "internalType": "uint256",
176       "name": "",
177       "type": "uint256"
178     },
179     {
180       "internalType": "enum FoodTracking.FoodStatus",
181       "name": "",
182       "type": "uint8"
183     }
184   ],
185   "stateMutability": "view",
186   "type": "function"
187 },
188 {
189   "inputs": [],
190   "name": "owner",
191   "outputs": [
192     {
193       "internalType": "address",
194       "name": "",
195       "type": "address"
196     }
197   ],
198   "stateMutability": "view",
199   "type": "function"
200 }
201 ]
202
203 if (!window.ethereum) {
204   alert('Meta Mask Not Found')
205   window.open("https://metamask.io/download/")
206 }
207
208 export const provider = new ethers.providers.Web3Provider(window.ethereum);
209 export const signer = provider.getSigner();
Ln 100, Col 21 Spaces: 4 UTF-8 LF {} JavaScript
```

```
JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_7\... X FoodTracking.sol JS connector.js C:\...\6_Problem_Statement_6_Food_Tracking_8\...
C:\Users> Vishn > Downloads > 6_Problem_Statement_6_Food_Tracking_7 > Food-Tracking > food-tracking > src > Page > JS connector.js > [0] abi > type"
190   "name": "owner",
191   "outputs": [
192     {
193       "internalType": "address",
194       "name": "",
195       "type": "address"
196     }
197   ],
198   "stateMutability": "view",
199   "type": "function"
200 }
201 ]
202
203 if (!window.ethereum) {
204   alert('Meta Mask Not Found')
205   window.open("https://metamask.io/download/")
206 }
207
208 export const provider = new ethers.providers.Web3Provider(window.ethereum);
209 export const signer = provider.getSigner();
210 export const address = "0x362e5a9a759b5e01206A2Fe1be2F5ae73B8578e8"
211
212 export const contract = new ethers.Contract(address, abi, signer)
213
Ln 100, Col 21 Spaces: 4 UTF-8 LF {} JavaScript
```

7.2 Remix coding





DEPLOY & RUN TRANSACTIONS

ENVIRONMENT
Injected Provider - MetaMask
Custom (80001) network

ACCOUNT
0xE3b...dD344 (0.1968128)

GAS LIMIT
3000000

VALUE
0 Wei

CONTRACT
FoodTracking - food tracking system1
evm version: paris
Deploy
☐ Publish to IPFS
At Address Load contract from Address

Transactions recorded 1

Deployed Contracts
FOODTRACKING AT 0XF1D...AAB

Home food tracking system1.sol food tracking system1.2.sol

```
11 }
12
13 struct FoodItem {
14     string itemId;
15     string productName;
16     string origin;
17     uint256 sentTimestamp;
18     FoodStatus status;
19 }
20
21 mapping(string => FoodItem) public foodItems;
22
23 event FoodItemSent(
24     string indexed itemId,
25     string productName,
26     string origin,
27     uint256 sentTimestamp
28 );
29 event FoodItemVerified(string indexed itemId);
30 event FoodItemConsumed(string indexed itemId);
31
32 constructor() {
33     1139626 gas 1114200 gas
34     owner = msg.sender;
35 }
36
37 modifier onlyOwner() {
38     require(msg.sender == owner, "Only contract owner can call this");
39 }
```

0 ☐ listen on all transactions Search with transaction hash or address

✓ [block:41707968 txIndex:5] from: 0xE3b...dD344 to: FoodTracking.(constructor) value: 0 wei data: 0x608...20033 logs: 0 hash: 0xff9...ff4c4

Debug

CHAPTER-9

9.RESULTS

9.1 Output:

Food Tracking Using Blockchain

Connect Wallet

send Food Item

Consume Food Item

Verify Food Item

Food Item Details

CHAPTER-10

10.1 ADVANTAGES AND DISADVANTAGES

Advantages:

1. **Enhanced Transparency:** Blockchain technology enables the creation of an immutable and transparent ledger, allowing all participants in the food supply chain to view and verify the entire history and journey of food products. This transparency fosters trust among consumers and other stakeholders by providing authentic and unaltered information about the origin, quality, and handling of food items.
2. **Improved Traceability:** Through the use of unique identifiers and digital records, blockchain facilitates the accurate tracking and tracing of each food product throughout the supply chain. This feature is critical in identifying the source of contamination, managing recalls effectively, and ensuring compliance with quality standards and regulations, thereby minimizing the risk of counterfeit products, food fraud, and distribution of unsafe or contaminated items.
3. **Strengthened Security:** The decentralized and tamper-proof nature of blockchain ensures the security and integrity of data related to food products. All transactions and information recorded on the blockchain are cryptographically secured and cannot be altered without consensus from the network participants, minimizing the potential for data manipulation,

unauthorized access, or fraudulent activities within the food supply chain.

Disadvantages:

1. Scalability Issues: Blockchain networks can face scalability challenges, particularly when dealing with a high volume of transactions and data within a complex food supply chain. Scalability limitations can result in slower transaction times, increased processing costs, and potential network congestion, impacting the overall efficiency and effectiveness of the food tracking system.

2. Integration Complexities: Integrating blockchain technology with existing systems and platforms within the food industry can be complex and resource-intensive. Ensuring compatibility and seamless data integration between blockchain networks and legacy systems may require significant investment in technical expertise and infrastructure upgrades, leading to additional costs and implementation challenges.

CHAPTER-11

11.1 CONCLUSION

In conclusion, the integration of blockchain technology into the food tracking system represents a significant advancement in ensuring transparency, traceability, and trust within the complex and intricate food supply chain. By leveraging the decentralized and immutable nature of blockchain, this innovative solution has the potential to revolutionize the way food products are tracked, monitored, and verified from farm to table. It addresses critical challenges such as food fraud, safety concerns, and inefficiencies in supply chain management, thereby enhancing the overall integrity and security of the food industry.

- The implementation of blockchain in the food tracking system not only fosters consumer confidence by providing access to accurate and unaltered information about the origin, quality, and handling of food items but also streamlines supply chain operations, minimizes the risk of contamination, and facilitates efficient recall management. It promotes accountability among stakeholders and encourages a culture of compliance with regulatory standards and industry best practices, ultimately contributing to the improvement of food safety standards and the overall well-being of consumers.
- Looking ahead, the future of blockchain in the food tracking system holds promising prospects for the development of more sophisticated and interconnected solutions that integrate advanced technologies, sustainable practices, and global regulatory compliance mechanisms. By embracing continuous innovation and collaboration, the food industry can establish a

robust and reliable framework that ensures the delivery of safe, authentic, and high-quality food products to consumers worldwide. As blockchain technology continues to evolve.

CHAPTER-12

12.1.FUTURE SCOPE

The future scope of blockchain in the food tracking system is promising, with several potential advancements and developments on the horizon. Some key areas of future scope include:

1. **Enhanced Supply Chain Visibility:** Blockchain technology has the potential to provide even greater visibility and transparency across the entire food supply chain. Future developments may involve the integration of advanced tracking technologies, such as IoT sensors and AI-driven data analytics, to capture and analyze real-time data at every stage of the supply chain.
2. **Interoperability and Standardization:** The future of blockchain in food tracking systems may focus on establishing standardized protocols and interoperable platforms that can seamlessly integrate with other emerging technologies and systems, enabling more efficient data exchange and collaboration among different stakeholders.
3. **Improved Data Analytics and Insights:** Advanced data analytics tools integrated with blockchain systems can provide deeper insights into consumer preferences, market trends, and supply chain efficiencies. Future developments may involve the implementation of predictive analytics and machine learning algorithms to anticipate market demands and optimize inventory management.

4. **Integration of Sustainable Practices:** Future blockchain-based food tracking systems may prioritize the integration of sustainability practices, aiming to track and verify environmentally friendly and ethical sourcing methods. This could involve the inclusion of carbon footprint tracking, ethical certifications, and sustainable sourcing data within the blockchain network to promote eco-friendly and socially responsible food production practices.

5. **Blockchain-based Food Quality Assurance:** With the advancement of blockchain technology, there is potential for the development of more sophisticated quality assurance mechanisms that can automatically verify the authenticity, safety, and quality of food products. This could involve the use of advanced sensors, smart contracts, and AI-based algorithms to ensure adherence to quality standards and regulatory compliance throughout the supply chain.

6. **Integration with Smart Packaging:** The future integration of blockchain technology with smart packaging solutions, such as intelligent labels and tamper-evident packaging, can further enhance the security and traceability of food products. This integration can enable real-time monitoring of product conditions, temperature fluctuations, and expiration dates, ensuring the delivery of fresh and safe food products to consumers.

7. **Adoption of Decentralized Autonomous Organizations (DAOs):** Future implementations of blockchain in food tracking systems may involve the establishment of decentralized autonomous organizations (DAOs) to facilitate consensus-based decision-making and governance within the food supply chain.

DAOs can enable more democratic and transparent collaboration among stakeholders, fostering trust and accountability in the decision-making process.

8. Global Regulatory Compliance Solutions: As blockchain technology continues to evolve, there is a growing potential for the development of global regulatory compliance solutions that can streamline cross-border trade and regulatory processes in the food industry. This could involve the creation of standardized frameworks and protocols that ensure seamless compliance with international food safety and traceability regulations.

The future scope of blockchain in the food tracking system is characterized by continuous innovation, integration of advanced technologies, and a heightened emphasis on sustainability, quality assurance, and global collaboration, all of which aim to enhance the overall efficiency, transparency, and safety of the food supply chain.

CHAPTER 13

13.1 APPENDIX

SOURCE CODE LINK:

<https://github.com/Vishnuvenkatesh3001/food-tracking-system.git>

PROJECT DEMO LINK:

<https://youtu.be/YSSr1ox9Ekg?feature=shared>