Amazon Smbhav Hackathon 2024: Prototype Phase Submission

Team Details

Team Name: Pravah

Team Members:

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Theme Details

Theme Name: 4 - Develop Sustainable Solutions for the E-commerce Industry

Theme Benefits:

EcoChain directly addresses **EcoShip Logistics'** sustainability goals by introducing **innovative and eco-friendly logistics solutions** tailored for **small and medium businesses (SMBs)**. By implementing **AI-driven optimization, eco-friendly packaging**, and a **low-emission courier marketplace**, EcoChain enables SMBs to achieve:

- **Reduced Carbon Footprint**: Through optimized routes and sustainable logistics practices.
- **Cost Efficiency**: By reducing operational costs with reusable packaging and green courier services.
- **Scalability**: Seamless integration into Amazon's ecosystem ensures long-term growth potential.

Idea and Approach Details

Solution Overview:

EcoChain is a robust **AI-powered logistics platform** that optimizes delivery operations for SMBs while promoting **sustainability and cost-efficiency**. It integrates with Amazon's ecosystem to provide:

1. **Eco-Route Optimization**: Reduces delivery distances, fuel consumption, and emissions using real-time traffic and weather data.
2. **Smart Packaging Exchange Network (SPEN)**: Facilitates packaging reuse and recycling to minimize waste and promote circular economy practices.
3. **Low-Emission Courier Marketplace**: Connects SMBs to green courier services, prioritizing electric vehicles and eco-conscious partners.
4. **Eco-Dashboard**: Tracks **Amazon Green Score**, **EcoPoints**, and sustainability metrics, driving engagement and long-term loyalty.

Technical Stack:

1. **Frontend**:
   - **Next.js**: Ensures fast, SEO-friendly, and scalable web development.
   - **Tailwind CSS**: Provides a responsive and consistent UI for enhanced usability.
2. **Backend**:
   - **Django**: Offers a secure and scalable backend for handling APIs and database interactions.
   - **AWS Services**: Includes **Lambda**, **DynamoDB**, and **API Gateway** for a serverless, cost-efficient architecture.
3. **AI/ML**:
   - **AWS SageMaker** and **TensorFlow**: Power advanced machine learning for route optimization and predictive analytics.
4. **IoT**:
   - **AWS IoT Core**: Supports SPEN integration by tracking reusable packaging inventory.

Decision Rationale:

- **Assumptions**: SMBs value cost-effective, user-friendly solutions that support **green logistics**.
- **Constraints**: Seamless integration with Amazon's network is critical for scalability.

Key Decisions:

- Use of **AWS infrastructure** for reliability and cost efficiency.
- Adoption of **Next.js** and **Django** to ensure scalability and seamless user interaction.

Innovation Highlights:

1. **First-of-its-kind SPEN**: Enables SMBs to share and reuse packaging, reducing waste significantly.
2. **Gamification**: The **EcoPoints system** and **Amazon Green Score** incentivize SMBs and customers to adopt sustainable practices.
3. **Market Differentiation**: By combining cost efficiency with environmental stewardship, EcoChain stands out as a **scalable and innovative solution**. [Highlight what makes your solution original and innovative and stand out]

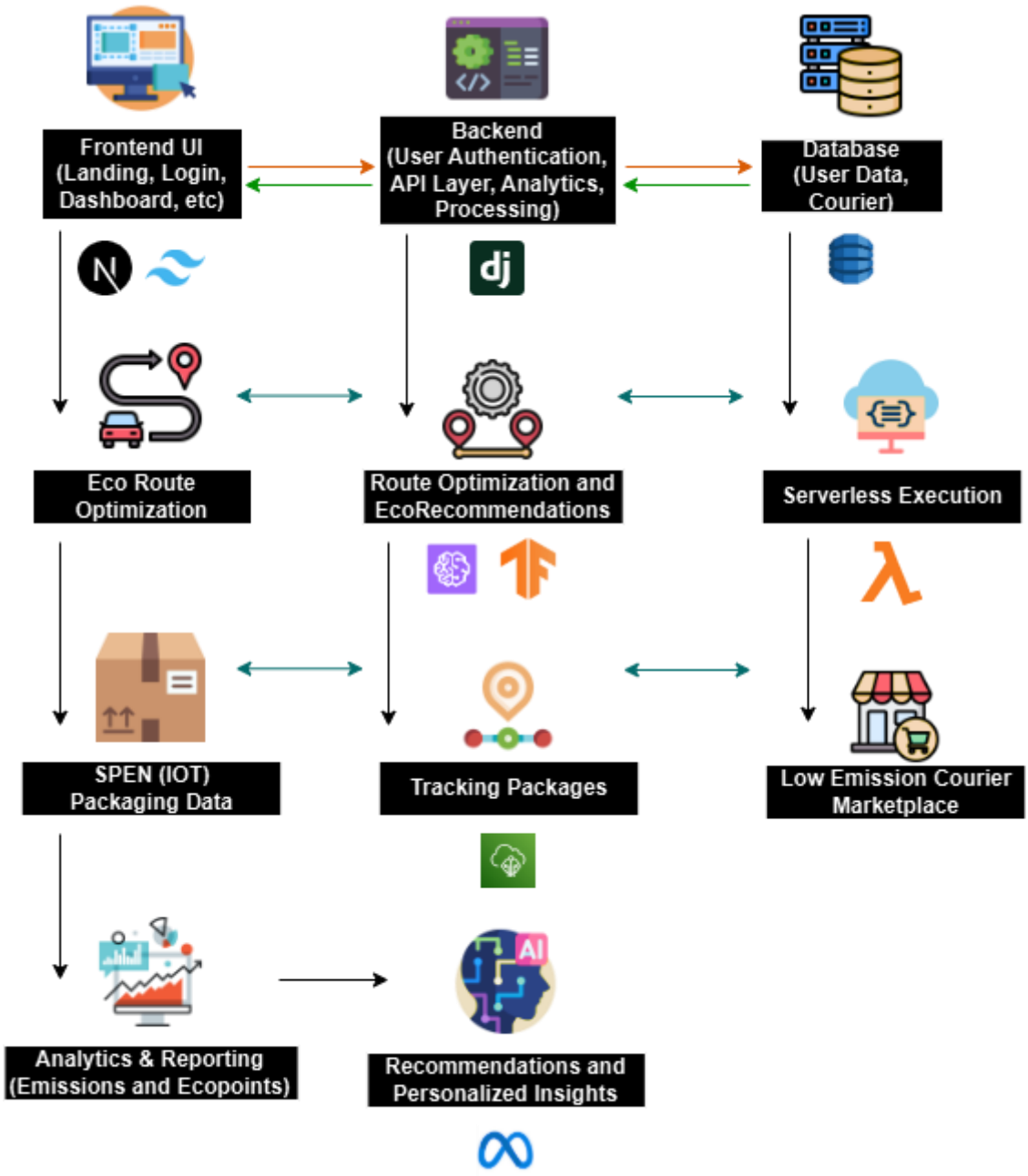
Feasibility and User-Friendliness:

1. **Realistic Adoption**: The platform is built on familiar, scalable technologies like **AWS**, **Next.js**, and **Django**.
2. **Efficiency**: Provides immediate cost savings through optimized logistics and sustainability initiatives.
3. **Long-Term Success**: Ensures future scalability and relevance with a focus on **green logistics** and **digital transformation**.

Success Metrics:

1. **Adoption Metrics**: Track SMB registrations and daily usage rates of EcoChain features.
2. **Environmental Impact**: Measure **emission reductions** and **packaging reuse rates** over time.
3. **Engagement Metrics**: Monitor **EcoPoints redemptions** and SMB retention rates.

Methodology/Architecture Diagram



Open-Source Disclosure:

1. **OSRM (Open Source Routing Machine)**
    - **License**: BSD-2-Clause

- **Usage**: Route optimization for delivery planning and emissions reduction.
- **Link**: OSRM GitHub

2. **Chart.js**

- **License**: MIT
- **Usage**: Visualization of sustainability metrics such as **EcoPoints trends**, **emissions saved**, and **packaging reuse rates** on the analytics dashboard.
- **Link**: Chart.js GitHub

3. **ReactJS (via Next.js)**

- **License**: MIT
- **Usage**: Frontend for building a responsive and user-friendly **Eco-Dashboard** and interaction pages such as the **Route Optimization** and **SPEN** sections.
- **Link**: ReactJS GitHub

4. **Django**

- **License**: BSD-3-Clause
- **Usage**: Backend framework for handling **API endpoints**, managing database interactions for SPEN, and processing sustainability metrics for **Amazon Green Score** and **EcoPoints**.
- **Link**: Django GitHub

Prototype Demonstration

Demo Link: https://youtu.be/T19mErbyoBw

Deployment Link: https://eco-chain-three.vercel.app/

Source Code Repository: https://github.com/fromjyce/EcoChain

README Instructions:
https://github.com/fromjyce/EcoChain/blob/main/README.md
