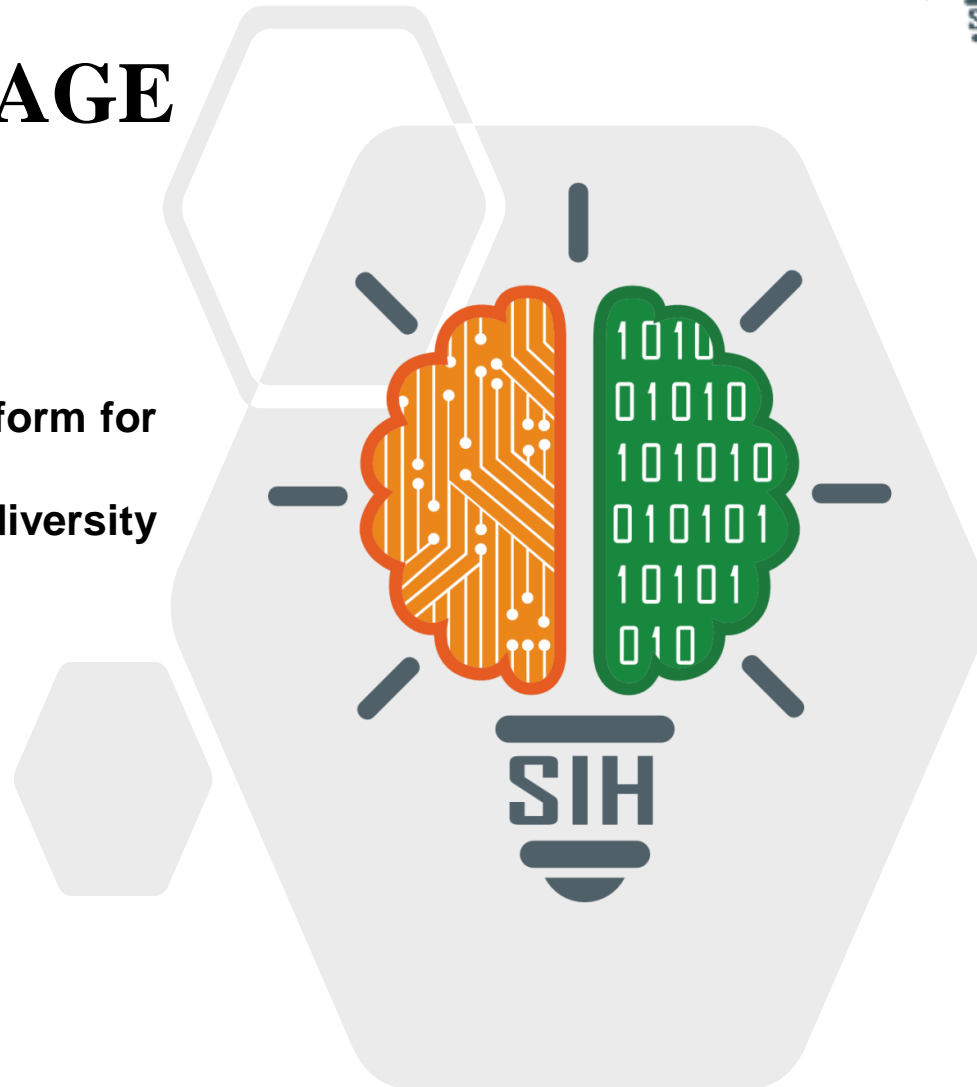


SMART INDIA HACKATHON 2025



TITLE PAGE

- Problem Statement ID – SIH 25041
- Problem Statement Title- AI-Driven Unified Data Platform for Oceanographic, Fisheries, and Molecular Biodiversity Insights
- Theme- Ocean Pulse AI
- PS Category- Software
- Team ID- SIH25-26
- Team Name (Registered on portal) - Aquamind



Challenges

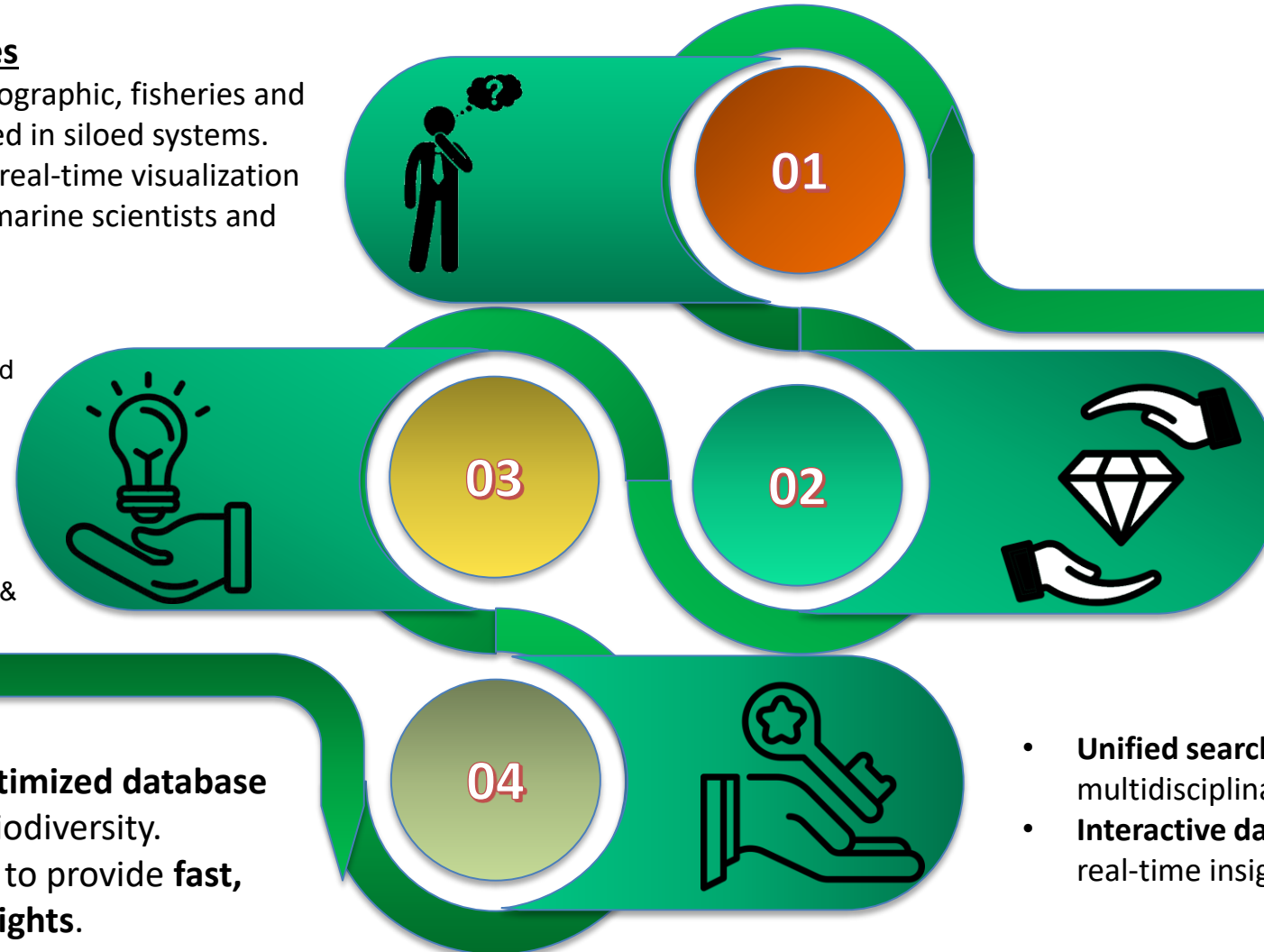
- **Data Fragmentation:** Oceanographic, fisheries and molecular biology data stored in siloed systems.
- **Accessibility Issues:** Lack of real-time visualization and advanced analytics for marine scientists and policymakers.

Proposed Solution

- **Unified Secure Platform** – Centralized cloud system integrating ocean, fisheries & molecular data.
- **AI/LLM Integration** – Advanced models for real-time predictions & seamless data processing.
- **Interactive Dashboard** – Search, maps & visuals for actionable insights to researchers & policymakers.

Uniqueness

- Developed a **proprietary, optimized database** tailored for oceanographic biodiversity.
- Leverages **AI/ML algorithms** to provide **fast, accurate, and actionable insights**.



Value Proposition

- Empowers **marine scientists** with unified, actionable data.
- Supports **policymakers** in making informed, evidence-based decisions.

Key Feature

- **Unified searchable database** for multidisciplinary marine data.
- **Interactive dashboard** with intuitive visuals and real-time insights.

Programming Language:

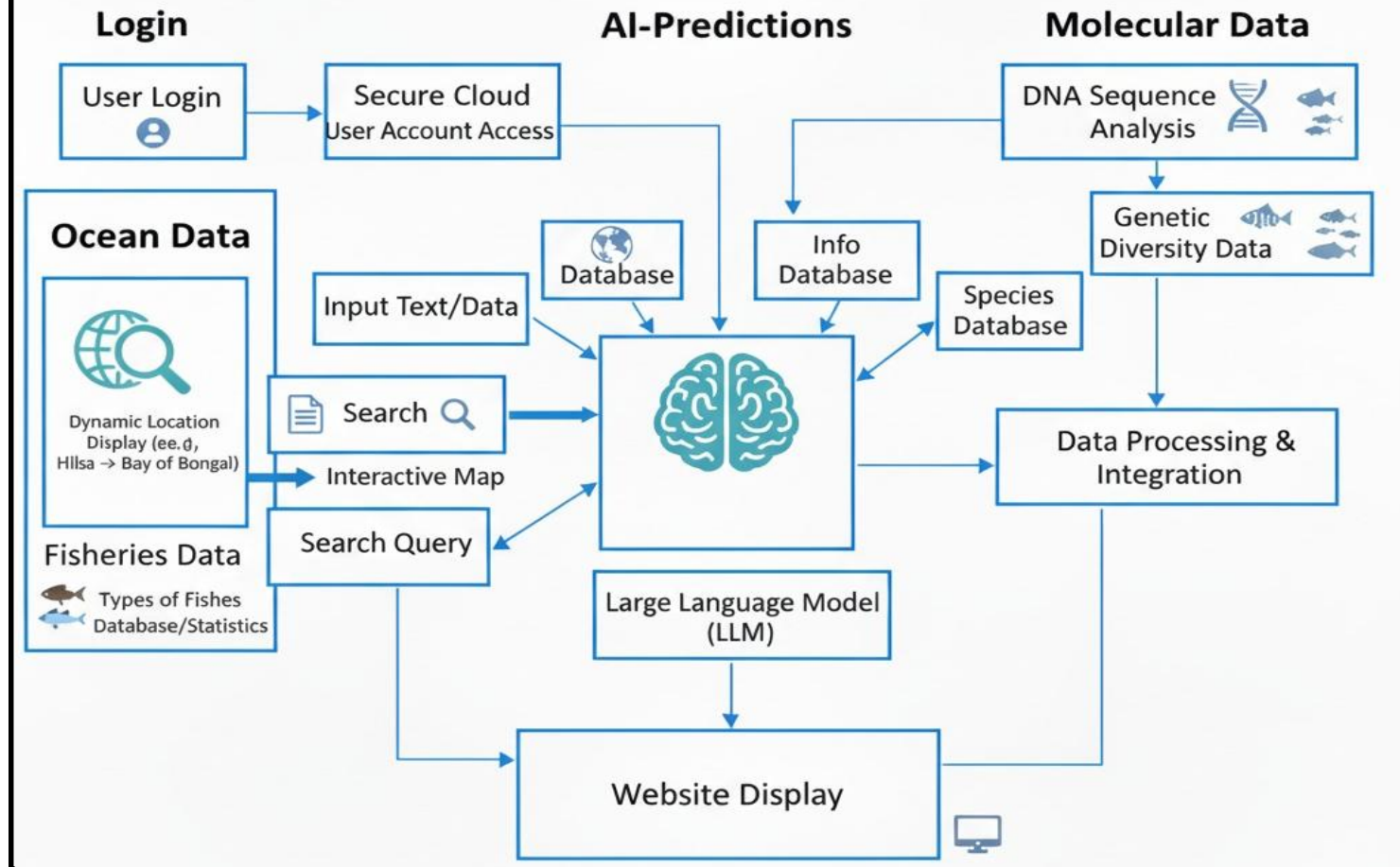
- **Python** : For developing and training ML models.
- **JavaScript**: Used for building dynamic web applications and integrating frontend with backend services.

Frameworks and Libraries :

- **React**: For building frontend services.
- **Node.js**: For backend services.
- **Leaflet.js**: For creating interactive maps.
- **Plotly.js**: For creating charts and graphs.
- **Matplotlib**: A key tool for data visualization and exploration.
- **Scikit-Learn**: Used for training, testing, and evaluating the machine learning model.
- **Supabase**: For authentication and database storage.

[Demo Video](#)[View Prototype](#)

Our product is 70% complete , now we are focused on gather updated data

Key Features of OceanAI

- **Analysis of the feasibility of the idea**
- AI frameworks (e.g., TensorFlow, Supabase) enable robust large-scale data integration.
- Scalable across CMLRE and other Indian marine institutions, with potential for national expansion.
- Intuitive interface designed for marine scientists and policymakers.
- Promotes sustainable marine management and benefits ecosystems.

Challenge 1

Cybersecurity & Data Privacy

Sensitive government and research datasets raise security, ownership, and sharing concerns



Solution

Implemented **end-to-end encryption** and role-based access controls, ensuring **99% data security** compliance with marine research standards

Challenge 2

Technology Limitations

Limitations in real-time processing of **unstructured data** and **AI accuracy** across diverse sources.



Solution

Integrated datasets from 4-5 authoritative sources (e.g., OBIS) and applied AI/ML algorithms to **ensure 80%+ accuracy in real-time processing**.

Challenge 3

Cost-Efficient Cloud Solution

High storage and **computing costs** for large oceanographic datasets.



Solution

Deployed scalable cloud services with provider credits and compression techniques, **reducing costs by 30%** while ensuring data accessibility.

Q1 Enhanced Efficiency

- Reduces data search and processing time, allowing researchers to focus on analysis.
- India's marine fisheries sector supports **14 million livelihoods**; our platform can increase efficiency by **30%**

Q3 Stronger Conservation

- Facilitates proactive strategies for protecting marine biodiversity and ecosystem.
- Over **7,000 marine species** in Indian waters need monitoring—AquaMind enables unified biodiversity tracking.

Q2 Informed Decision-Making

- Provides accessible , real-time insights for timely and effective policy interventions.

Q4 Global Collaboration

- Fosters a collaborative environment , accelerating scientific discovery and shared solutions.

Challenges faced:

- Fragmentation and Incompatibility: Data collected from various sources – oceanographic sensors, fishing vessels, and molecular labs – uses diverse formats and lacks universal standards, making integration difficult. (<https://share.google/Dxry7iPmVtXWhnAQW>)
- Enormous dataset sizes present management challenges for storage and interpretation.
- Accessing and Collecting Marine Data: Reaching vast and remote ocean areas for sample collection requires expensive research expeditions, while microbes in marine environments are often highly dilute. ([Link](#))

Existing Technology:

- <https://www.ncei.noaa.gov/products/world-ocean-database>
- <https://www.fao.org/fishery/statistics-query/en/home>
This site includes detailed statistics on fish production.