Enchanted Wings: Marvels of Butterfly Species

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Team Members:

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Phase 1: Understanding Butterfly Diversity

Problem statement:. Many people lack access to accurate, engaging, and scientifically reliable information about butterfly species. This results in missed opportunities for environmental education, conservation awareness, and ecological appreciation. There's a need for an interactive and visually rich system to explore and identify butterfly species.

Proposed Solution: We propose an educational web application called "Enchanted Wings" that uses a structured database and intuitive design to showcase various butterfly species. Users can explore species by habitat, color, size, and location, with detailed descriptions and high-quality images to enhance learning and engagement.

Target Users: Students, nature enthusiasts, researchers, educators, eco-tourists, and wildlife conservationists.

Expected Outcome: An informative and user-friendly platform that enhances awareness about butterfly species, promotes conservation, and supports education through engaging content and visuals.

Phase 2: Requirements Analysis

Technical Requirements:

- React.js (Frontend)
- Node.js + Express.js (Backend)
- MongoDB (Database)
- Cloudinary or local image storage for species pictures

Functional Requirements:

- Browse butterfly species
- Search and filter by criteria (e.g., color, region, size)
- View detailed species profiles (image, description, habitat, range)
- Submit sightings or feedback

Constraints & Challenges:

- Quality image sourcing
- Accurate scientific classification
- Ensuring fast load times for image-rich content

Phase 3: Project Design

- **System Architecture Diagram& user flow:**

User
⇩
Web Interface (React)
⇩
API Request
⇩
Node.js Backend
⇩
MongoDB
⇩
Fetch Data
⇩
Display on UI

- **User journey:**

User opens the website
⇩
Browses for butterfly species
⇩
views species details including image, description,and range
⇩
A new species sighting

UI/UX Considerations:

- Clean, nature-inspired theme
- Responsive and mobile-friendly layout
- Intuitive navigation by species categories
- Interactive image gallery and map view

Phase 4: Project Planning (Agile Methodologies)

- **Sprint Planning:**

  - ✓ Week 1: Collect species data and images
  - ✓ Week 2: Backend development & database integration
  - ✓ Week 3: Frontend development
  - ✓ Week 4: Testing, documentation, and deployment

- **Task Allocation:**
  - ✓ Member A: Database & species data collection
  - ✓ Member B: Backend API development
  - ✓ Member C: Frontend UI/UX
  - ✓ Member D: Testing & final documentation

- **Timeline & Milestones:**

  - ✓ Milestone 1: Dataset ready (week 1)
  - ✓ Milestone 2: Model trained (week 2)
  - ✓ Milestone 3: Web integration (week 3)
  - ✓ Milestone 4: Testing + Report (week 4)

Phase 5: Project Development

- **Technology stack used:**
  - React.js
  - Node.js + Express.js
  - MongoDB
  - Cloudinary (for image hosting)

- **Development Process:**
  - ❖ Designed species schema for MongoDB
  - ❖ Built REST API endpoints to fetch butterfly data
  - ❖ Developed frontend with dynamic search and filters
  - ❖ Integrated image gallery and species detail pages
- **Challenges & Fixes:**
  - ❖ Improved contrast, font sizes, and added ARIA labels.
  - ❖ Added input validation, CAPTCHA, and admin moderation.
  - ❖ Configured environment variables and used MongoDB Atlas.

Phase 6: Functional & Performance testing

- **Test cases Executed:**
  - ❖ Verified API responses for all endpoints
  - ❖ Checked image display and responsiveness
  - ❖ Tested search and filter accuracy

- **BUG Fixes & improvements:**
  - ❖ Resolved UI layout shifts on mobile
  - ❖ Fixed species data loading delays
  - ❖ Improved image loading with lazy loading

- **Final Validation:**
  - ❖ The platform successfully presents butterfly species in an engaging, informative way
  - ❖ Meets educational, environmental, and user experience goals