Database Design

Sprint 2

Web-Based ESG Dashboard for Small and Medium Enterprises

By: Group 12

CS321:
Web Technologies

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Logical Database Design

Entities

- users - This entity stores the information of all the users that have created an account on the website.
- reports - This entity stores all ESG reports that are generated for the user based on their inputted KPI data.
- organization - This entity stores the information of all the organizations that have signed onto the platform.
- kpi_entries - This entity stores the relevant KPI data that is used to generate ESG reports.

Attributes of the ‘users’ entity

- user_id (Primary Key) - an attribute that uniquely identifies each user on the platform
- org_id (Foreign key that references ‘org_id’ in the ‘organization’ entity) - from the ‘organization’ entity, this attribute identifies all the users who work under a specific company.
- name - an attribute that identifies the user by their name
- password - this attribute stores the hash value for the users account password
- role - an attribute that defines the role of the user within their organization
- created_at - this attribute details when the user’s account was created.

Attributes of the ‘reports’ entity

- report_id (Primary Key) - an attribute that uniquely identifies each report generated for a user.

- org_id (Foreign key that references ‘org_id’ in the ‘organization’ entity) - from the ‘organization’ entity, this attribute shows that a report is being generated for the organization that corresponds to the organization id.
- period_start - this attribute shows the start date for the report to track KPI inputs.
- period_end - this attribute shows the end date for the report to track KPI inputs.
- esg_score - this attribute shows the ESG score calculated for the reporting period.
- generated_at - the attribute shows when the report was generated.

Attributes of the ‘organization’ entity

- org_id (Primary Key) - this attribute uniquely identifies every organization that is registered on the platform. This allows organization data to remain consistent across multiple users who belong to the organization.
- org_name - this attribute identifies each organization by name.
- sector - this attribute defines what sector the organization operates in.
- size_band - this attribute shows the size of the organisation in a numerical range.
- created_at - this attribute details when the organization was registered onto the platform.

Attributes of the ‘kpi_entries’ entity

- entry_id (Primary Key) - this attribute uniquely identifies every KPI entry made by a user on the platform.
- org_id (Foreign key that references ‘org_id’ in the ‘organization’ entity) - from the ‘organization’ entity, this attribute shows that the KPI data being inputted corresponds to a specific organization

- user_id (Foreign key that references ‘user_id’ in the ‘users’ entity) - from the ‘users’ entity, this attribute details which user made a KPI data entry.
- period_start - this attribute shows the start date recorder to track KPI inputs.
- period_end - this attribute shows the end date recorded to track KPI inputs.
- category - this attribute shows which ESG category the KPI data is being inputted for.
- kpi_key
- kpi_value
- unit
- created_at - this attribute details when the KPI entry was made.

Enterprise Rules Organisation & Users

- An organisation must exist before any User or KPI data can be created.
- Each User belongs to exactly one Organisation; email is a unique system-wide.
- Role-based access (admin/editor/viewer) governs write operations.
- ReportingPeriod is unique per Organisation by *(period_start, period_end)* and cannot overlap with another period for the same org; period_start ≤ period_end.
- Per Organisation & Period, there is at most one record each for EnvironmentalKPI, SocialKPI, and GovernanceKPI.
- KPI records require a valid ReportingPeriod (FK; referential integrity).
- Numeric KPIs are non-negative and stored in consistent units (kWh, m^3, kg, tCO_2e, hours, %).
- Every record captures created_at, updated_at, and created_by; deletions are soft (is_active) to preserve history.

- Passwords are hashed; key actions (login, create/update KPI, export report) are audit-logged.

Common Sprint Deliverables

Functionality

The major functionality of this sprint was aimed at creating data stores for the website. This would enable users to store their data for future reference. The aim of the website is for organisations to track their ESG goals. Data storage is essential for this to work. We created a database to store user and organisation accounts, KPI data inputs, and reports.

User Guide

Cenviro is an ESG KPI tracking platform for SMEs. To get started, create an account at http://localhost/cenviro/register.php by entering your organisation name, your name, email, and a password (8+ characters). After registration, you'll be logged in automatically. Log in with your credentials (demo account: demo@cenviro.com / Demo@123). The Dashboard shows your ESG score and KPIs (emissions, energy, water, employees, diversity, governance). To enter data, go to Data Input and use the Environmental, Social, and Governance tabs to submit values for electricity, water, waste, employee metrics, training hours, board meetings, etc. All data saves automatically and updates the dashboard. Generate reports in the Reports section by selecting a date range; the system calculates an ESG score from your entries and displays it alongside UN Sustainable Development Goals mapping. Use the sidebar to navigate between the Dashboard, Data Input, and Reports; click Logout when you are finished. All data is stored securely in the database, so your metrics persist between sessions.

Testing Strategy

Test TypesFunctional Testing: Verify user registration, login, data input (Environmental/Social/Governance tabs), dashboard display, report generation, and logout functionality.Database Testing: Validate user authentication, data persistence (ESG entries, reports), foreign key relationships, and data integrity when users are deleted.Security Testing: Test SQL injection prevention (form inputs), XSS protection (output escaping), session management, and password hashing (MD5 validation).UI/UX Testing: Check responsive design, form validation, error messages, navigation between pages, and tab functionality in data input.Integration Testing: Verify database connections, session handling across pages, form submissions to the database, and report calculations based on input data.Test Scenarios

- Registration: Valid data creates a user and organisation; duplicate email fails; weak password rejected.
- Login: Correct credentials redirect to dashboard; incorrect credentials show error; session persists across pages.
- Data Input: All three tabs accept and save data; date validation works; empty submissions are handled.
- Dashboard: Displays real-time stats from the database; empty states handled; calculations correct.
- Reports: Date range validation, ESG score calculation, and report list display correctly.

Test DataUse demo account (demo@cenviro.com / Demo@123) and create test organisations with varied ESG data entries across all categories.

Retrospective Commentary

In completing this sprint, we faced minimal challenges. As we continue to work as a group, we have become more comfortable in the various challenges. Prior to this sprint, we had already outlined the tables we would need to implement in the database creation stage of the project. This made creating our needed tables fairly simple and straightforward. The only challenge we

faced was in deciding what attributes were absolutely necessary for each table. There were certain attributes that may have overcomplexified the tables and their relationships. Ultimately, we decided to exclude such attributes as they weren't necessarily essential to the functionality of the website.