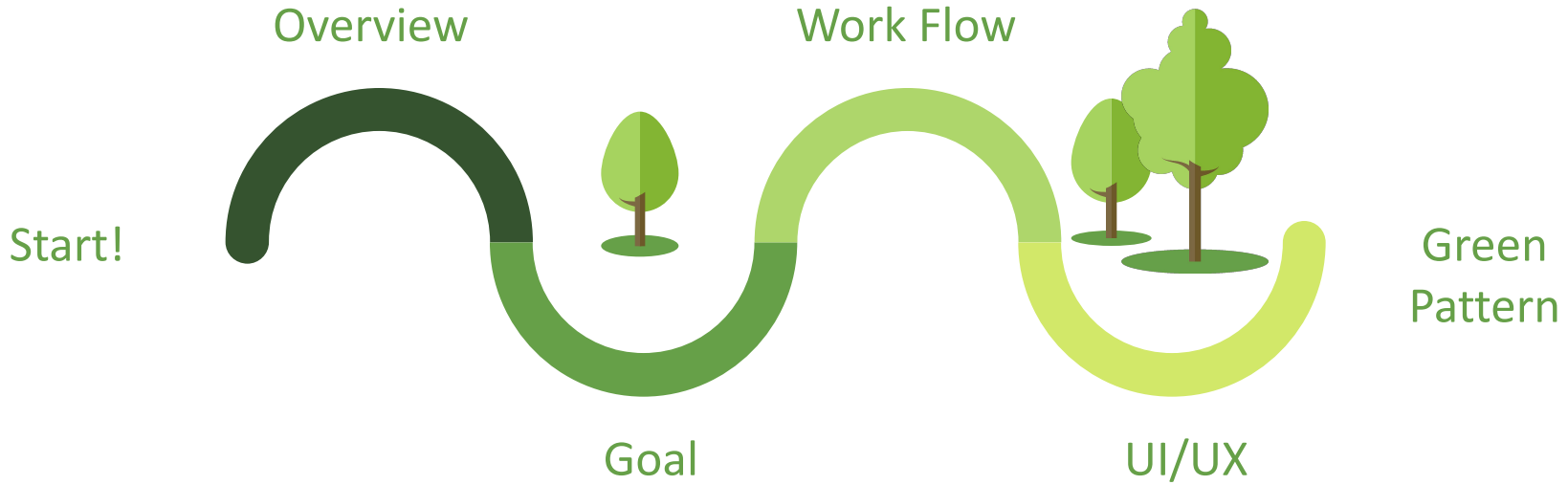
Eco Merge

2024 Software Engineering Team 5

목차



Overview

Tools

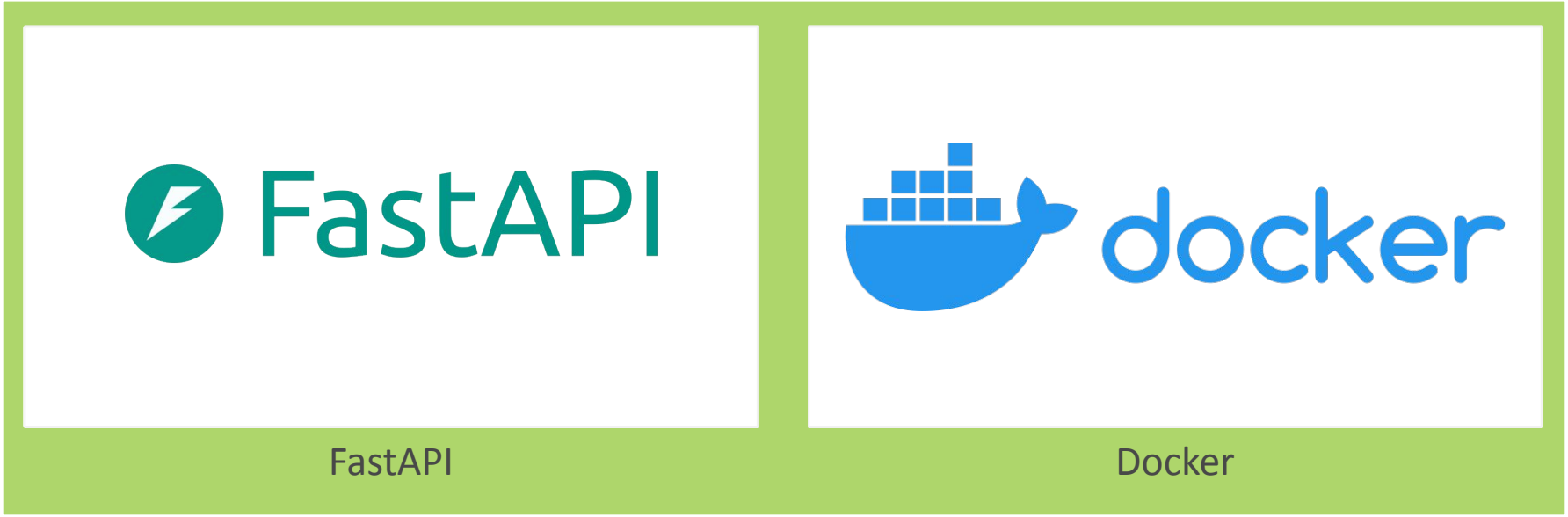
Frontend

Next.js

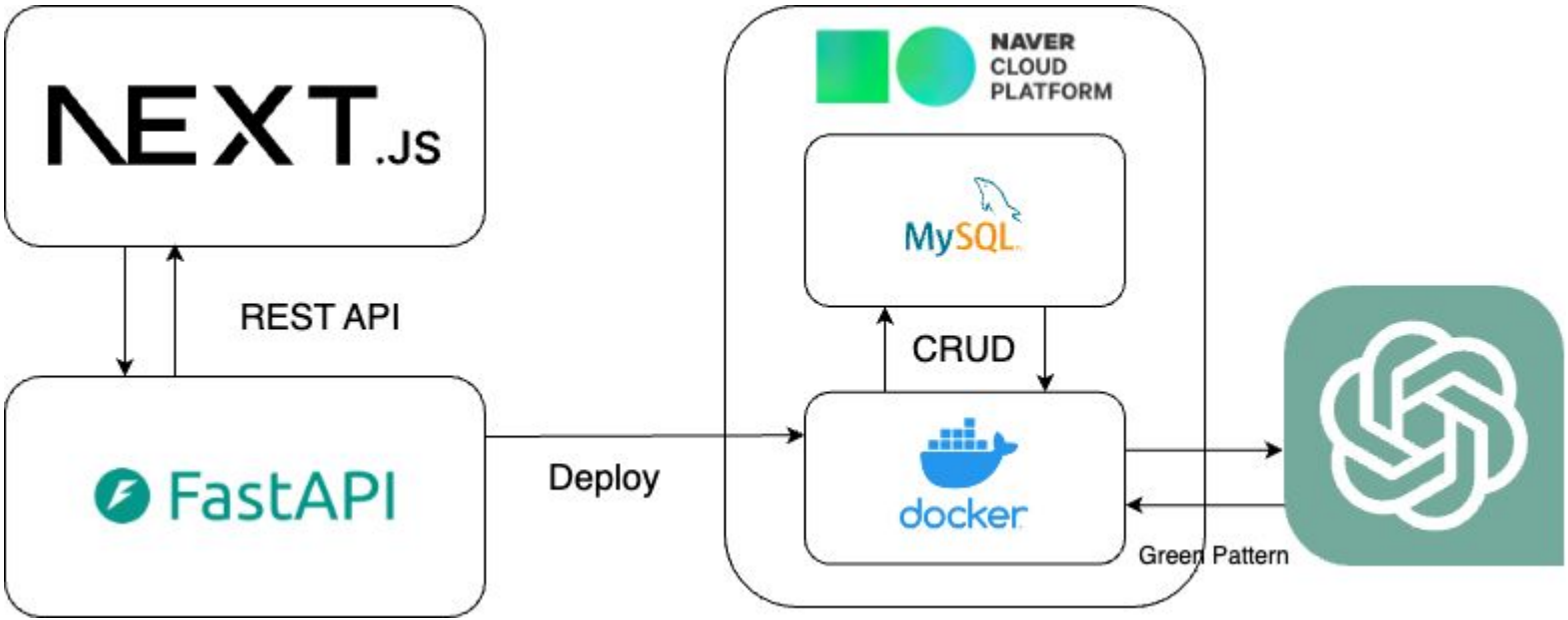
TailwindCSS

Tools

Backend



Architecture
프로젝트 구조도



Goal

Goal
궁극적인 목표

탄소 배출 절감 코드 작성 독려

탄소배출 절감 코드 작성이 막막한 사용자들을 위해 코드 변경사항을 제안하고, 이를 토대로 리팩토링을 진행할 수 있는 환경을 제공한다.

Goal
세부 목표

직관적인 개선 수치 제시

익숙한 단위를 이용해 탄소배출량 표현

사용자 동기 부여

사용자의 성취감을 자극하는 요소 추가

서비스 진입 장벽 완화

주 사용자층을 고려한 UI/UX 설계 및 이용 가이드 제공

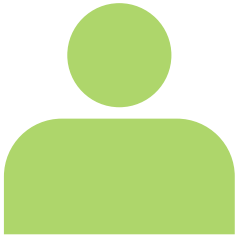
Work Flow

Team

Frontend

김주영 배정우

이병철 이송목



Backend

이원영

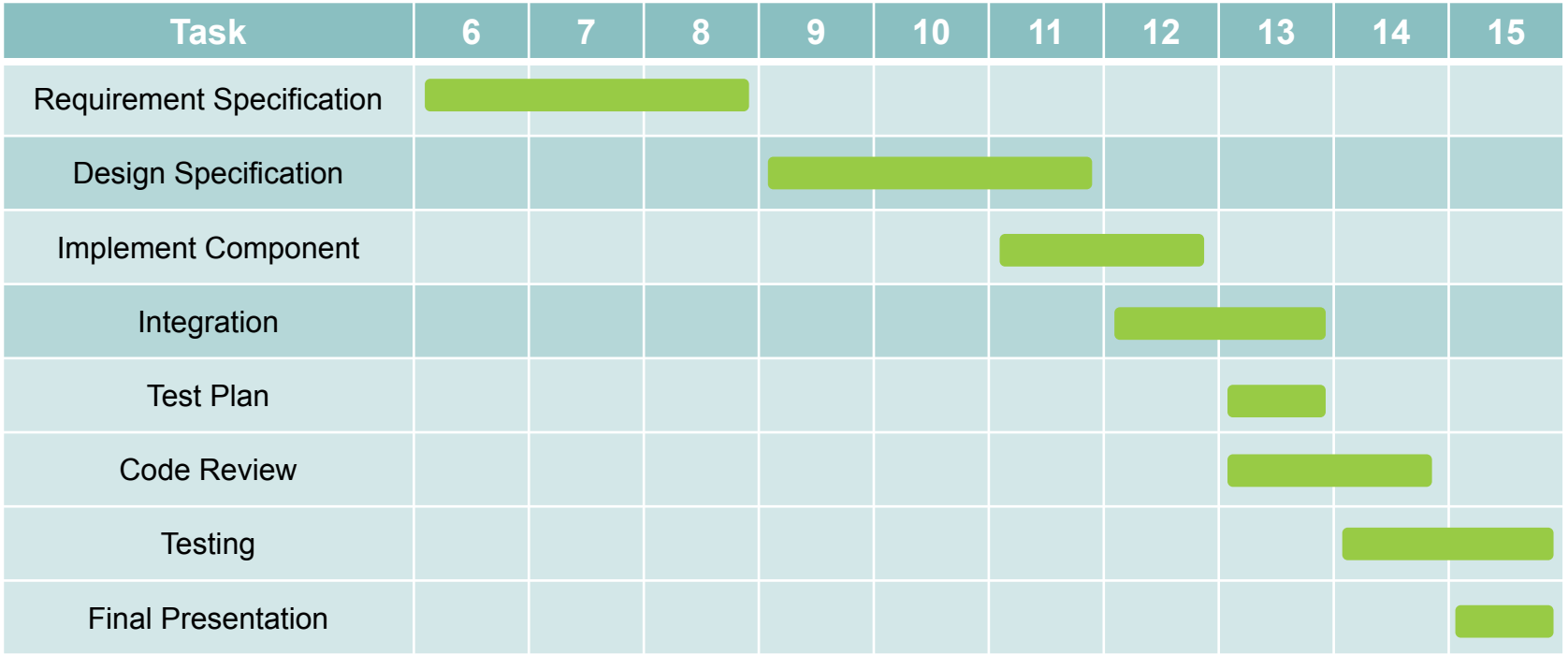
황정민

Green Pattern

이원영

Work Flow

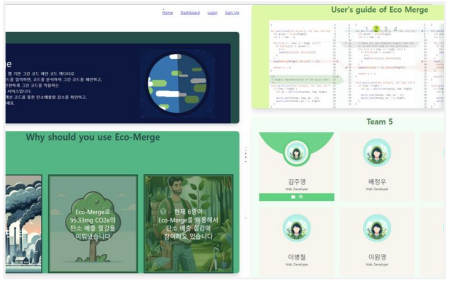
주차 별 진행 상황



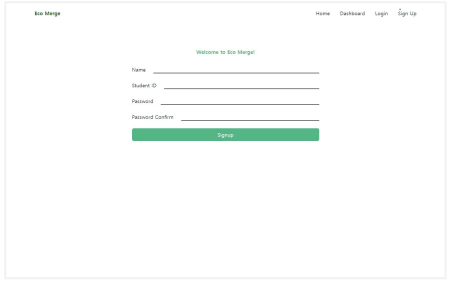
UI/UX

UI/UX 시나리오 Overview

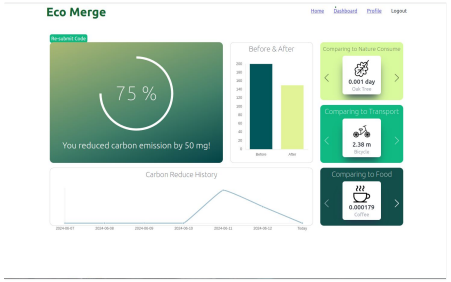
Using eco merge, become sustainable developer



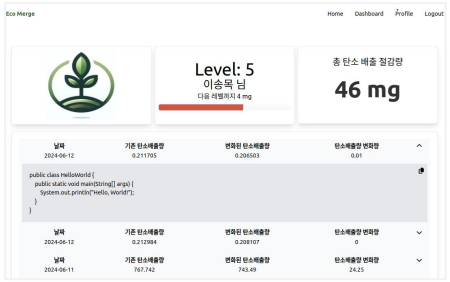
Home
Eco-merge 서비스와 팀원 소개



Sign up / Login
로그인과 회원가입 페이지



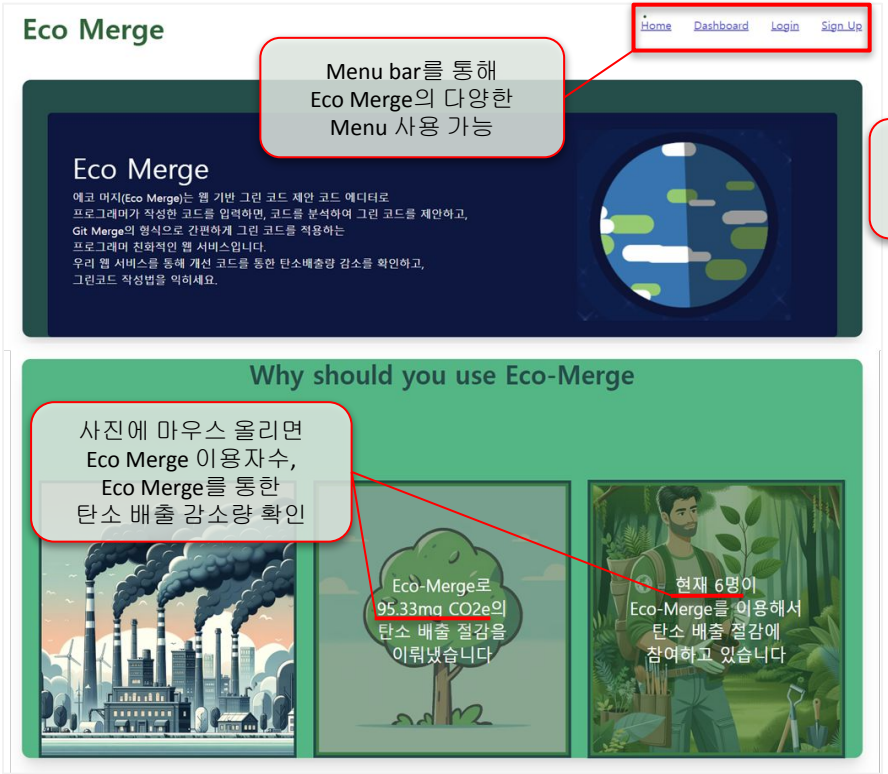
Dashboard
코드를 입력하고 탄소발자국 시각화



Profile
자신의 Eco-level, 코드 내역을 확인

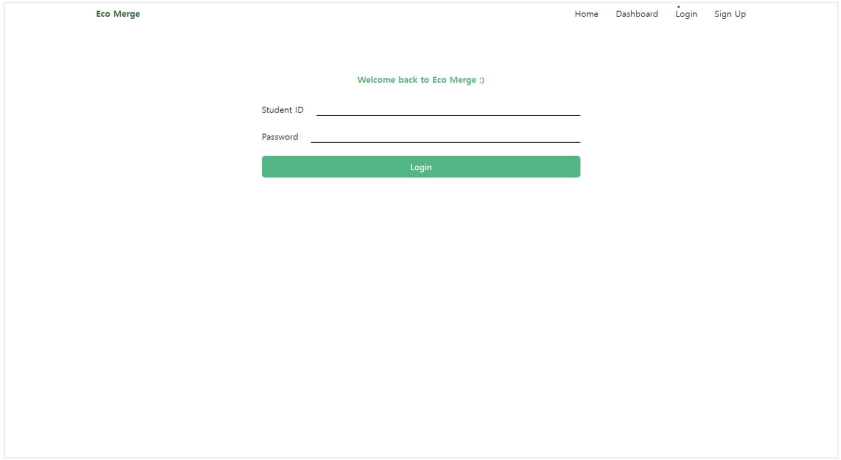
Home

Eco Merge Service and Team Formulation

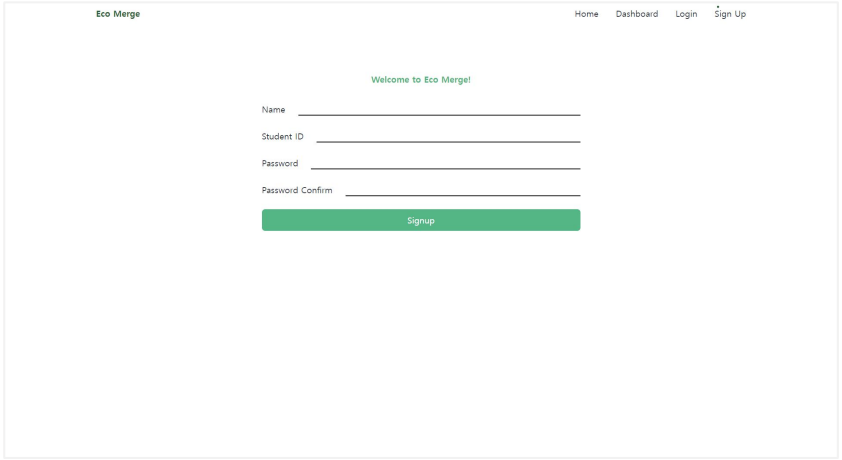


Login / Sign up

How to join us

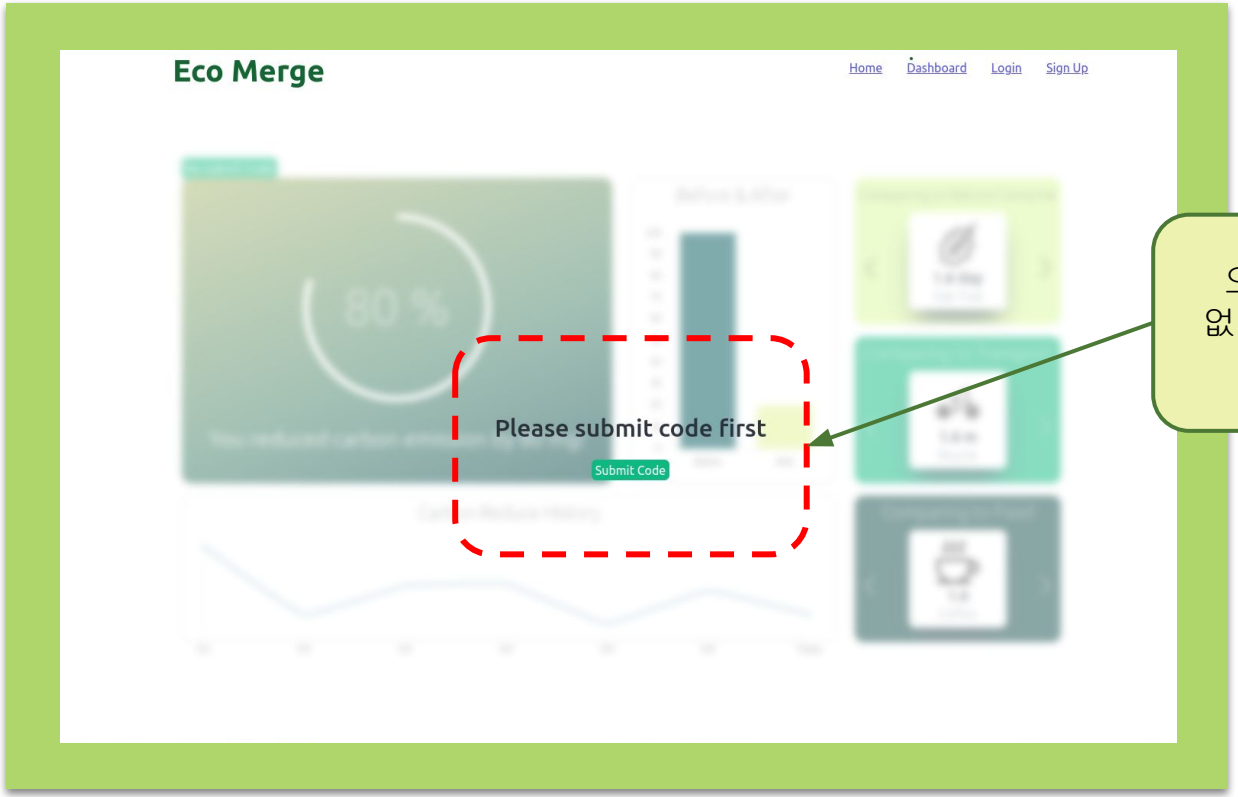


학번, 비밀번호로 로그인



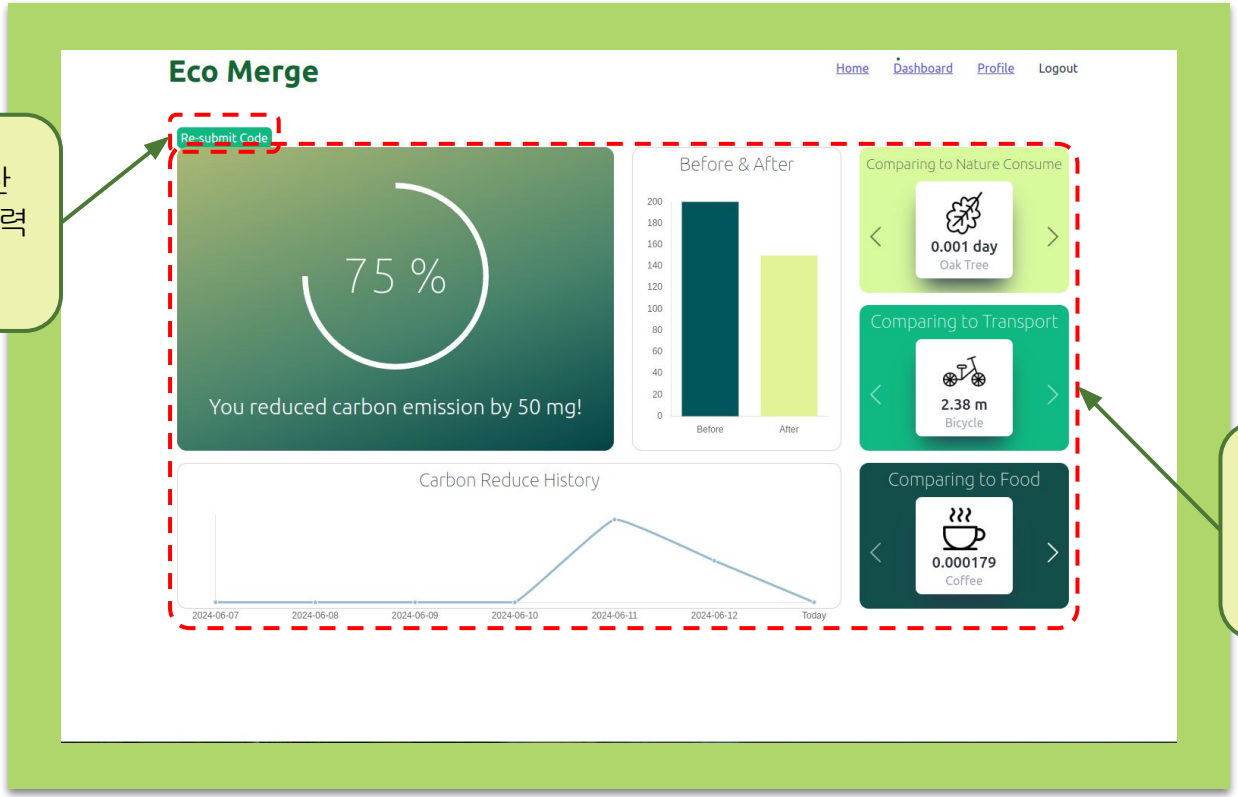
이름, 학번, 비밀번호로 회원가입

Dashboard


Eco Merge
Home
Dashboard
Login
Sign Up
Please submit code first
Submit Code
오늘자 기록이
없을시 코드 입력
버튼 표시

Dashboard

다른 코드로 계산 원할시 코드 재입력 버튼 클릭

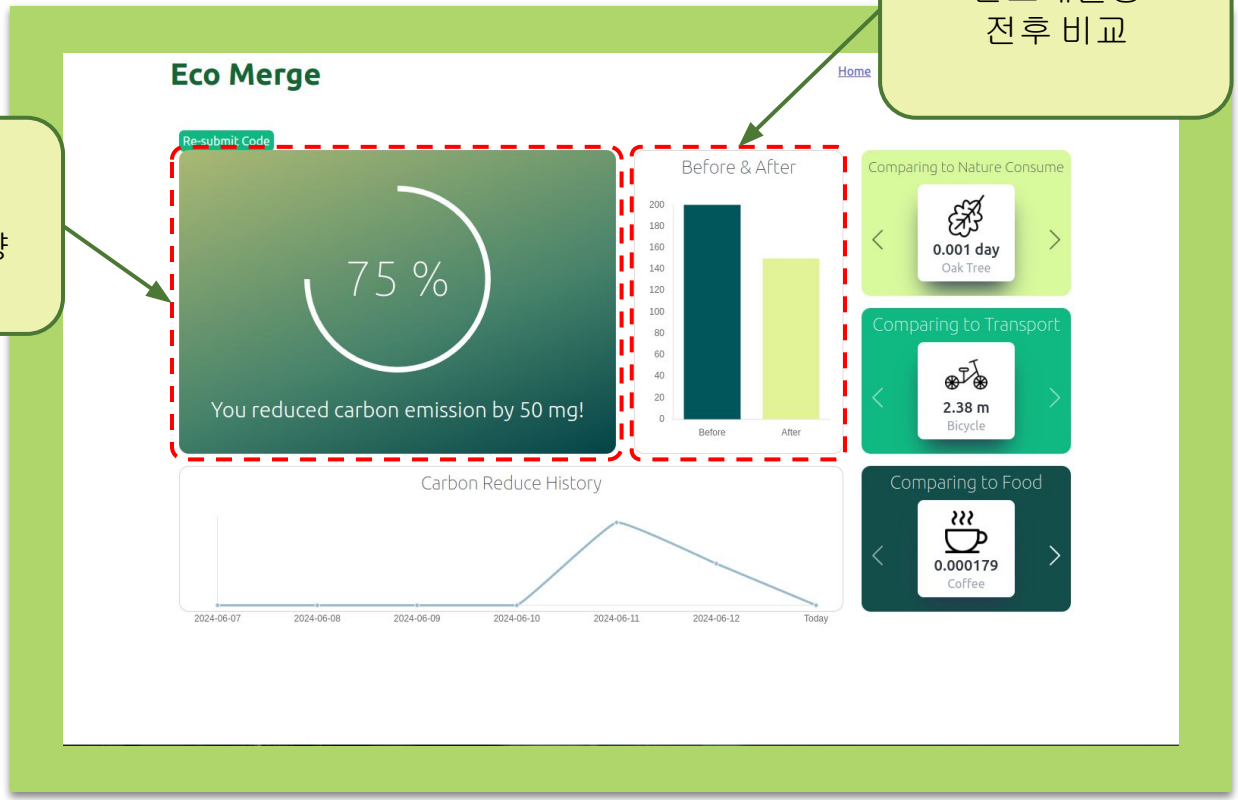


메인 대시보드 창

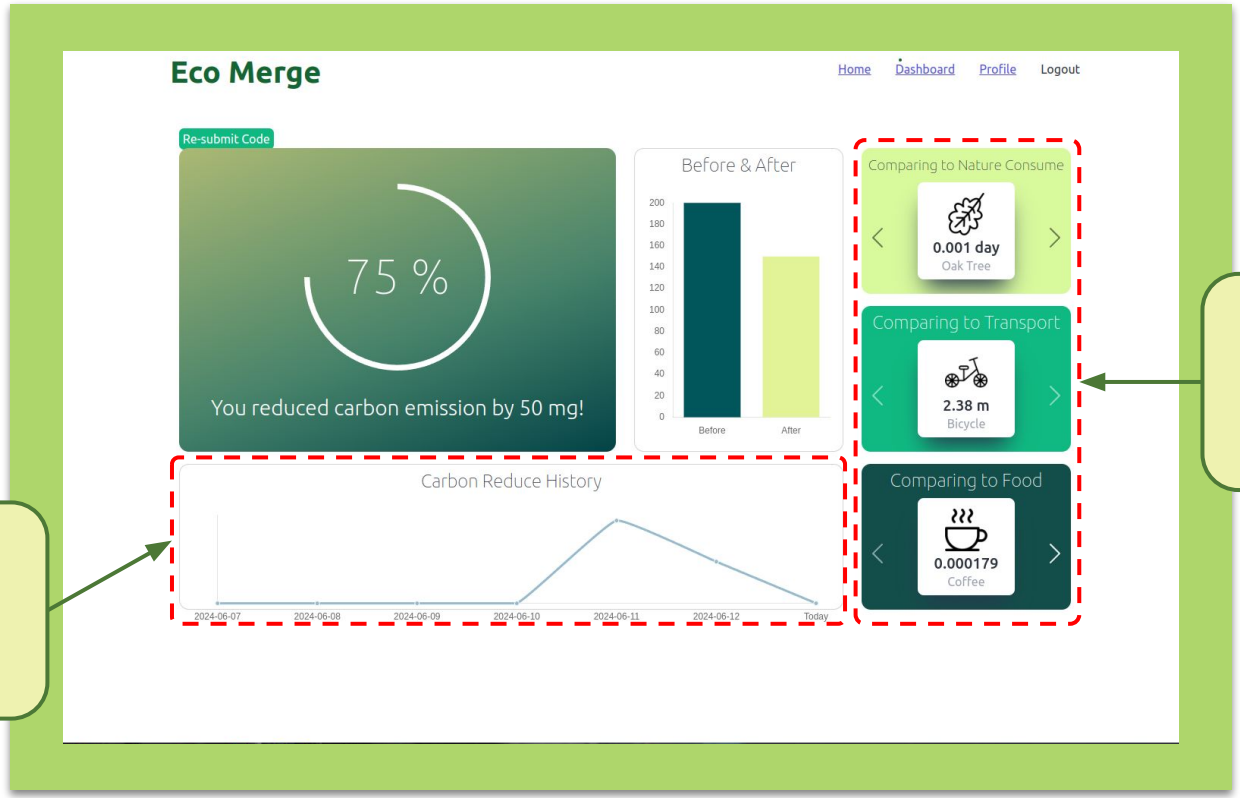
Dashboard

탄소배출량
전후 비교

탄소배출
절감율 & 절감량



Dashboard



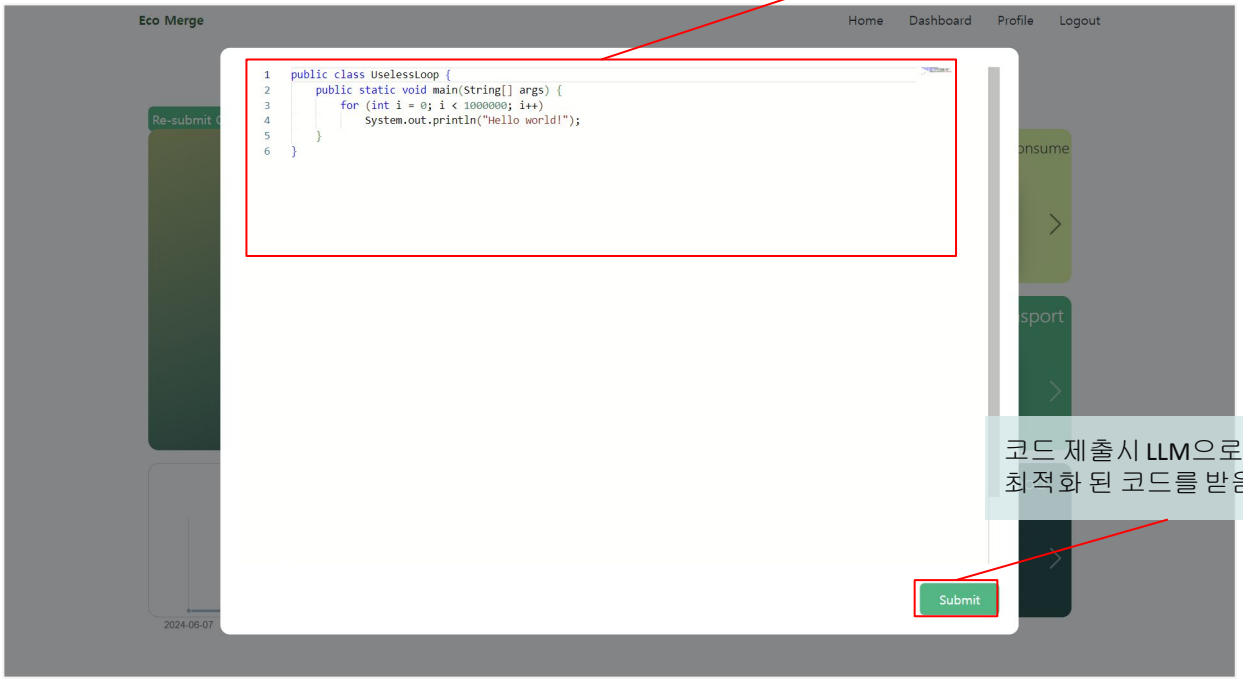
지난 일주일간
기록 표시

탄소배출 절감량을
실제 일상 활동과
비교

Dashboard - editor

Code editor

기존 자신이 작성한 코드 입력

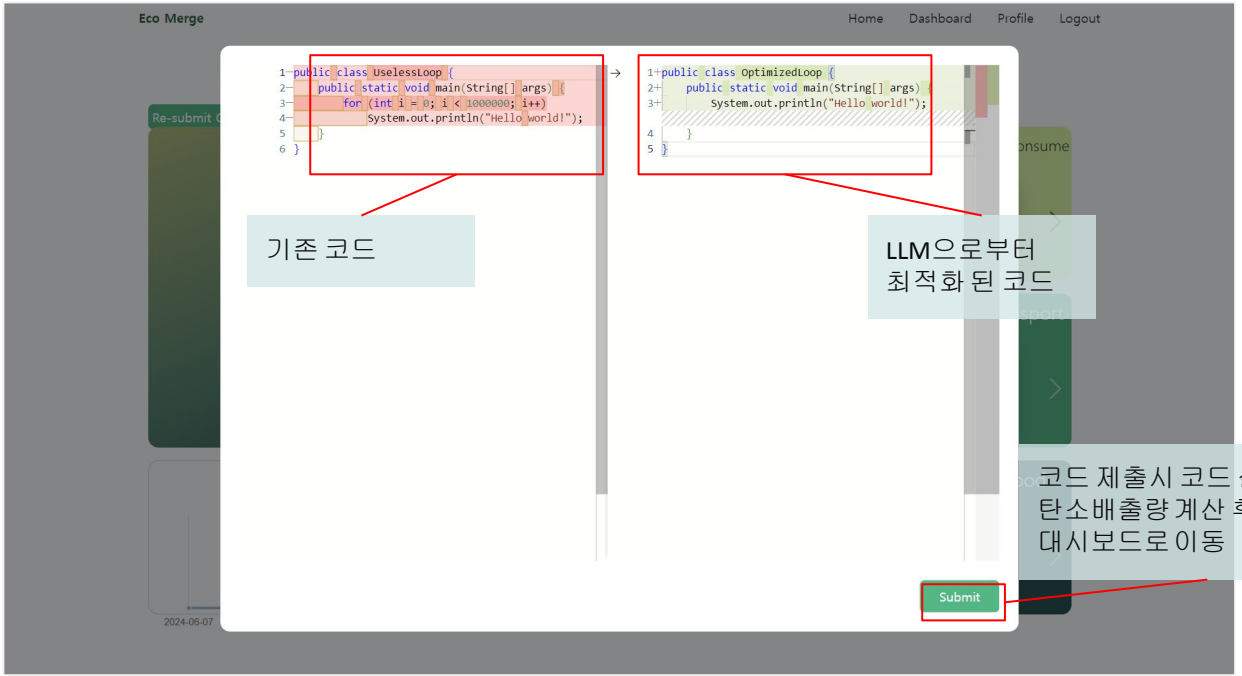


코드 제출시 LLM으로부터 최적화 된 코드를 받음

- 로그인 되지 않은 경우 로그인 페이지로 리다이렉션
- 코드 제출 후 Merge editor로 이동

Dashboard - editor

Merge editor



- 코드 병합 기능 (merge editor)
- 오류 발생시 alert

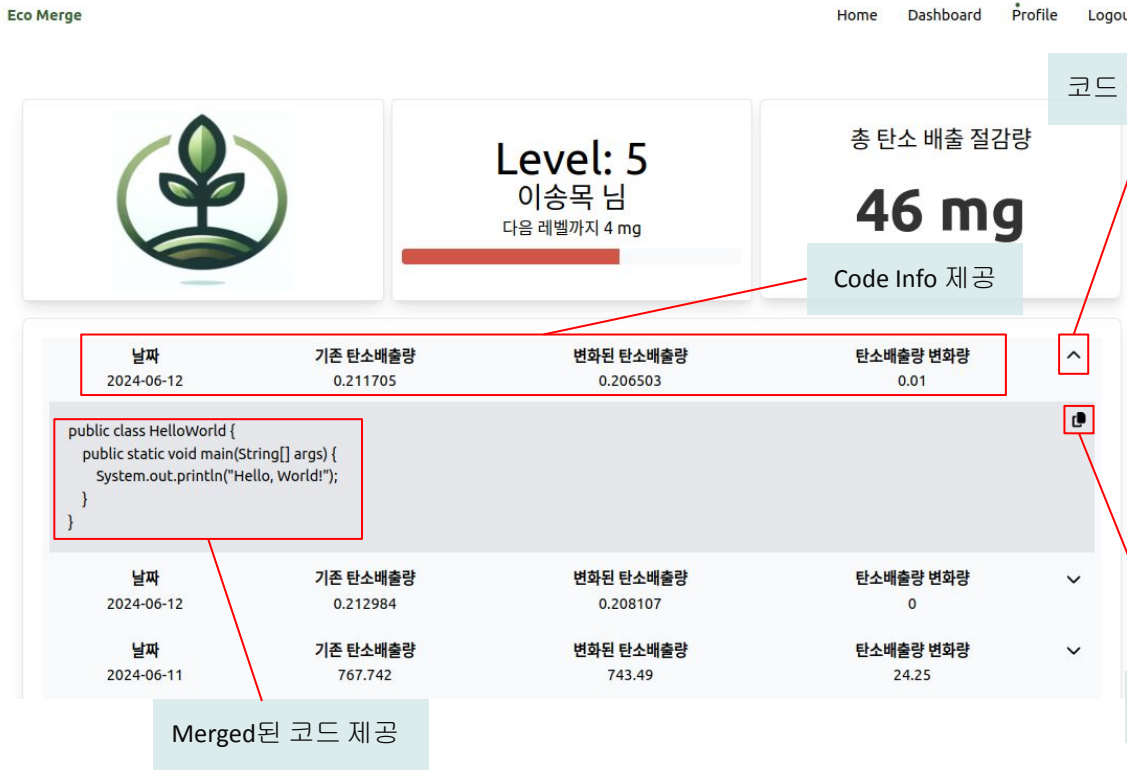
Profile

User Info

- 사용자 히스토리를 종합적으로 표시
- 게이지 바와 다이얼 애니메이션을 이용해 동적인 웹페이지 구성

Profile

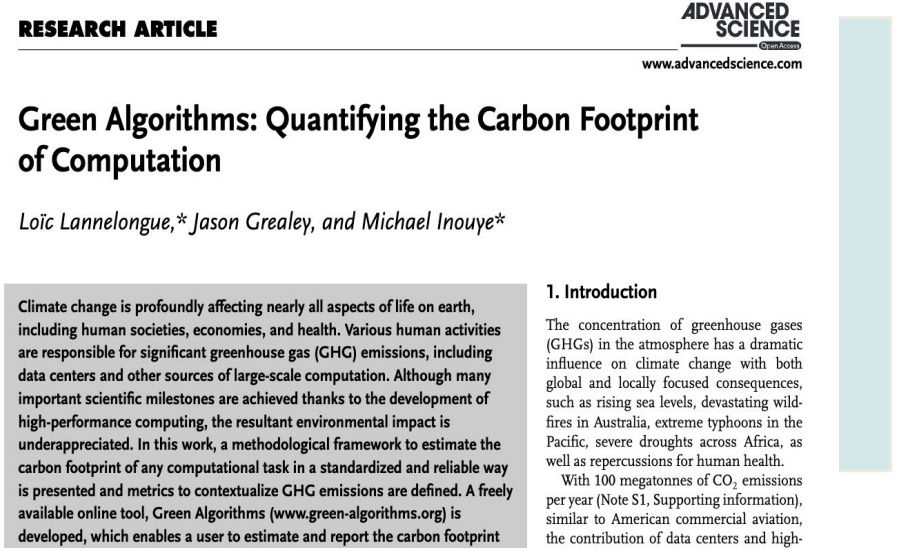
Code history & Copy



- 이전 사용 이력을 저장
- 날짜, 기존 탄소 배출량, 변화된 탄소배출량, 탄소배출량 변화량을 계산하여 나타냄
- Merged된 코드와 복사 버튼 제공

Green Pattern

Carbon Calculator



RESEARCH ARTICLE

ADVANCED SCIENCE Open Access

www.advancedscience.com

Green Algorithms: Quantifying the Carbon Footprint of Computation

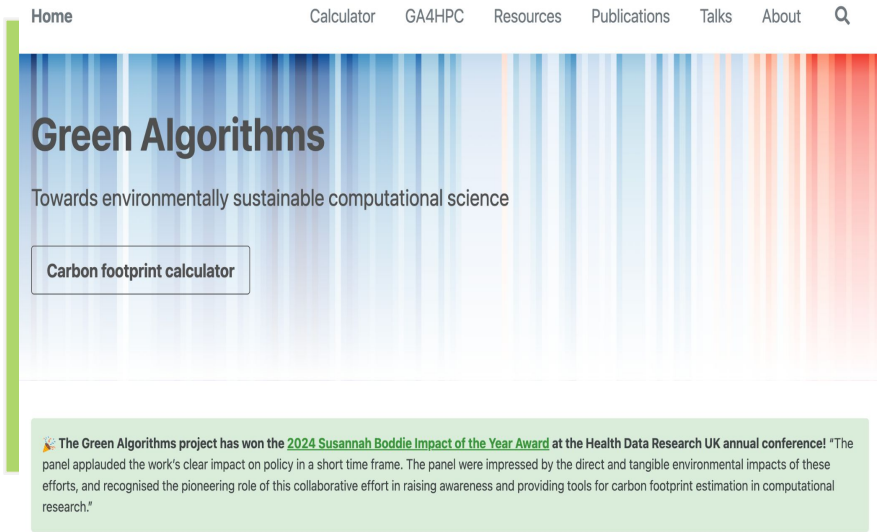
Loïc Lannelongue, Jason Grealey, and Michael Inouye**

Climate change is profoundly affecting nearly all aspects of life on earth, including human societies, economies, and health. Various human activities are responsible for significant greenhouse gas (GHG) emissions, including data centers and other sources of large-scale computation. Although many important scientific milestones are achieved thanks to the development of high-performance computing, the resultant environmental impact is underappreciated. In this work, a methodological framework to estimate the carbon footprint of any computational task in a standardized and reliable way is presented and metrics to contextualize GHG emissions are defined. A freely available online tool, Green Algorithms (www.green-algorithms.org) is developed, which enables a user to estimate and report the carbon footprint

1. Introduction

The concentration of greenhouse gases (GHGs) in the atmosphere has a dramatic influence on climate change with both global and locally focused consequences, such as rising sea levels, devastating wildfires in Australia, extreme typhoons in the Pacific, severe droughts across Africa, as well as repercussions for human health.

With 100 megatonnes of CO_2 emissions per year (Note S1, Supporting information), similar to American commercial aviation, the contribution of data centers and high-



Home Calculator GA4HPC Resources Publications Talks About

Green Algorithms

Towards environmentally sustainable computational science

Carbon footprint calculator

🎉 **The Green Algorithms project has won the 2024 Susannah Boddie Impact of the Year Award at the Health Data Research UK annual conference!** "The panel applauded the work's clear impact on policy in a short time frame. The panel were impressed by the direct and tangible environmental impacts of these efforts, and recognised the pioneering role of this collaborative effort in raising awareness and providing tools for carbon footprint estimation in computational research."

Lannelongue, Loïc, Jason Grealey, and Michael Inouye. "Green algorithms: quantifying the carbon footprint of computation." *Advanced science* 8.12 (2021): 2100707.

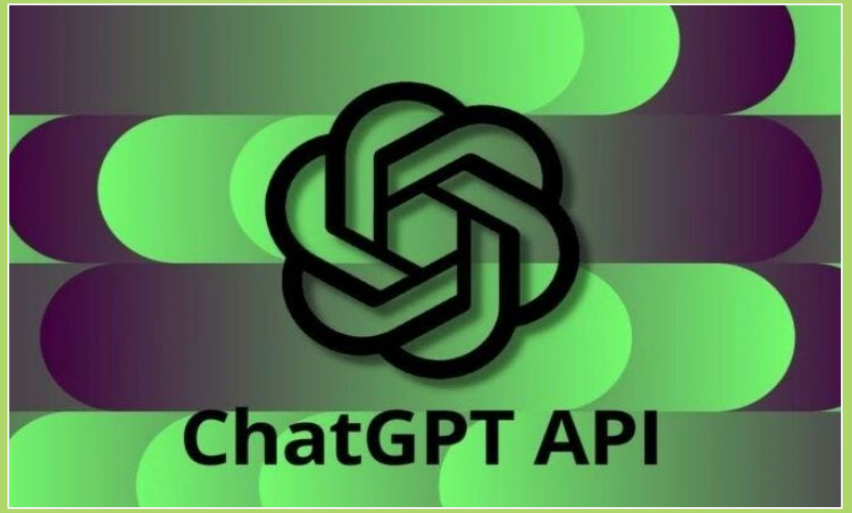
Carbon Calculator

$$\text{Energy needed} = t \times (n_c \times P_c \times u_c + n_m \times P_m) \times PUE \times PSF$$

Carbon footprint = energy needed x carbon intensity

t : code execution time (s)
n_c : number of cores
P_c : power draw of computing core
u_c : core usage factor
N_m : size of memory available
P_m : power draw of memory
PUE : efficiency coefficient of the data center
PSF : pragmatic scaling factor

Green Pattern



Thank you!