**EcoVision User Journey Guide**

PoC/Working Demo

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| **Contributors: EcoVision Team** | **Praveen Kumar Madhava Rao** |
| **Design & Presentation Leader** | **Vidyashree Bharathwaj** |
| **Design Architect** | **Kavitha SureshKumar** |
| **Design Architect** | **Sasikala Palanisamy** |
| **Project Manager** | **Iwona Kwiek** |
| **Developer Lead** | **Kavya Singh** |
| **Review & Advancement Lead** | **Pedro Soares** |
| **Visual Innovator** | **Chandan Bhat** |
| **Visual Innovator** | **BhavyaShree Mucherla** |
| **Visual Innovation Lead** | **Usha Sham** |
| **Mentor** | **Antony Pulicken** |

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# **Preface**

By seamlessly integrating EcoVision, Kyndryl elevates its commitment to environmental responsibility while enhancing development efficiency. This use case illuminates Kyndryl's journey towards sustainable software engineering excellence, showcasing a harmonious blend of environmental consciousness and operational efficacy.  
 **Introduction:** In its quest for sustainable software engineering, Kyndryl embarked on a journey to optimize its DevSecOps pipeline. Initially, developers at Kyndryl faced the challenge of balancing environmental responsibility with operational efficiency. However, with the integration of EcoVision into their DevSecOps pipeline, Kyndryl's developers now enjoy the benefits of streamlined workflows tailored to minimize resource consumption and reduce carbon footprint. This transformation underscores Kyndryl's commitment to sustainability while ensuring essential tasks are efficiently executed.

**User Journey:**

## **Workflow:**

1. **PR Submission:**
   * When a developer receives a PR for a code change related to a microservice deployed on AWS Lambda, EcoVision automatically scans the affected codebase to assess its environmental impact.
2. **Environmental Impact Analysis:**
   * EcoVision calculates the environmental impact of each pipeline stage that could potentially be affected by the PR.
   * It considers factors such as the energy consumption of each stage and the carbon intensity of electricity used in the computing infrastructure.
3. **Recommendation Generation:**
   * Based on the environmental analysis, EcoVision recommends only the pipeline stages necessary to address the changes introduced in the PR.
   * For example, if the PR involves a minor code change, EcoVision may recommend running only the "Code Compilation" and "Unit Testing" stages, skipping more resource-intensive stages like "Integration Testing" or "Deployment."
4. **ESG Score Calculation:**
   * EcoVision assigns an Environmental, Social, and Governance (ESG) score to each recommended stage, quantifying its environmental impact.
   * The ESG score is calculated by multiplying the carbon intensity of electricity by the energy consumed during the execution of each stage.
5. **Developer Review:**
   * The developer reviewing the PR receives recommendations from EcoVision alongside the details of the PR.
   * They can see the recommended stages, their corresponding ESG scores, and the rationale behind EcoVision's recommendations.
6. **Decision Making:**
   * Armed with insights provided by EcoVision, the developer can make informed decisions about which pipeline stages to execute.
   * They may choose to follow EcoVision's recommendations to minimize environmental impact while ensuring that essential tasks are still performed.

## **DevSecOps Pipeline Stages: (imaginary)**

1. Code Compilation
2. Unit Testing
3. Security Scanning
4. Licensing Pipeline Stage
5. Deployment to Testing Environment
6. Integration Testing
7. Performance Testing
8. User Acceptance Testing
9. Staging Deployment
10. Production Deployment

## **Example Calculation:**

* **PR Request:** Change in code related to AWS Lambda microservice deployment.
* **EcoVision Recommendation Output:**
  + **Recommended Stages:**
    - Code Compilation
    - Unit Testing
  + **Corresponding ESG Scores:**
    - Code Compilation: 525 gCO₂
    - Unit Testing: 280 gCO₂

## **Calculation Steps:**

1. **ESG Score (Code Compilation):**
   * **CI (Carbon Intensity):** 350 gCO₂/kWh (as an example)
   * **Energy Consumed during Code Compilation:** 1.5 kWh (as an example)
   * **ESG Score (Code Compilation) = CI \* Energy Consumed**
   * **ESG Score (Code Compilation) = 350 gCO₂/kWh \* 1.5 kWh**
   * **ESG Score (Code Compilation) = 525 gCO₂**
2. **ESG Score (Unit Testing):**
   * **CI (Carbon Intensity):** 350 gCO₂/kWh (as an example)
   * **Energy Consumed during Unit Testing:** 0.8 kWh (as an example)
   * **ESG Score (Unit Testing) = CI \* Energy Consumed**
   * **ESG Score (Unit Testing) = 350 gCO₂/kWh \* 0.8 kWh**
   * **ESG Score (Unit Testing) = 280 gCO₂**
3. **Total Environmental Impact (Recommended Stages):**
   * **Total ESG Score (Recommended Stages) = ESG Score (Code Compilation) + ESG Score (Unit Testing)**
   * **Total ESG Score (Recommended Stages) = 525 gCO₂ + 280 gCO₂**
   * **Total ESG Score (Recommended Stages) = 805 gCO₂**

## **PR: Update the password encryption method used in a user authentication module:**

EcoVision Recommendation Output:

* **Recommended Stages:**
  + Security Scanning
* **Corresponding ESG Scores:**
  + Security Scanning: 450 gCO₂

## **Calculation Steps (Security Scanning):**

* **CI (Carbon Intensity):** 400 gCO₂/kWh (as an example)
* **Energy Consumed during Security Scanning:** 1.2 kWh (as an example)
* **ESG Score (Security Scanning) = CI \* Energy Consumed**
* **ESG Score (Security Scanning) = 400 gCO₂/kWh \* 1.2 kWh**
* **ESG Score (Security Scanning) = 480 gCO₂**

## **Total Environmental Impact (Overall Stages):**

Total ESG Score (Overall Stages) = Σ ESG Score (Individual Stages)

Total ESG Score (Overall Stages) = 525 + 280 + 450 + 300 + 200 + 350 + 400 + 300 + 250 + 300

Total ESG Score (Overall Stages) = 3555 gCO₂

## **PR : Package Version Change/Addition**

A developer receives a PR to update a package version and add a new package dependency to enhance functionality.

EcoVision Recommendation Output:

* **Recommended Stages:**
  + Licensing Pipeline Stage
* **Corresponding ESG Scores:**
  + Licensing Pipeline Stage: 300 gCO₂

**Calculation Steps (Licensing Pipeline Stage):**

* **CI (Carbon Intensity):** 350 gCO₂/kWh (as an example)
* **Energy Consumed during Licensing Pipeline Stage:** 0.9 kWh (as an example)
* **ESG Score (Licensing Pipeline Stage) = CI \* Energy Consumed**
* **ESG Score (Licensing Pipeline Stage) = 350 gCO₂/kWh \* 0.9 kWh**
* **ESG Score (Licensing Pipeline Stage) = 315 gCO₂**

## **Total Environmental Impact (Overall Stages):**

Total ESG Score (Overall Stages) = Σ ESG Score (Individual Stages)

Total ESG Score (Overall Stages) = 525 + 280 + 450 + 300 + 200 + 350 + 400 + 300 + 250 + 300

Total ESG Score (Overall Stages) = 3555 gCO₂

## **Reporting and Visualization:**

* EcoVision provides reporting and visualization tools to track the environmental impact of pipeline execution over time.
* Developers can monitor the efficiency gains achieved through EcoVision's recommendations and track the reduction in carbon footprint.

# **Conclusion:**

In Conclusion, the integration of EcoVision into Kyndryl's DevSecOps pipeline signifies a pivotal step towards sustainable software engineering practices. By seamlessly incorporating EcoVision's environmental impact analysis into the pipeline, Kyndryl reinforces its commitment to environmental responsibility while enhancing development efficiency. This integration not only reduces unnecessary resource consumption but also minimizes the carbon footprint associated with software development processes. As Kyndryl continues its journey towards sustainable software engineering excellence, the integration of EcoVision stands as a testament to the company's dedication to innovation and environmental stewardship.