Western Indian Ocean

SYMPHONY

Software Overview

Technical workshop

October :: 2024

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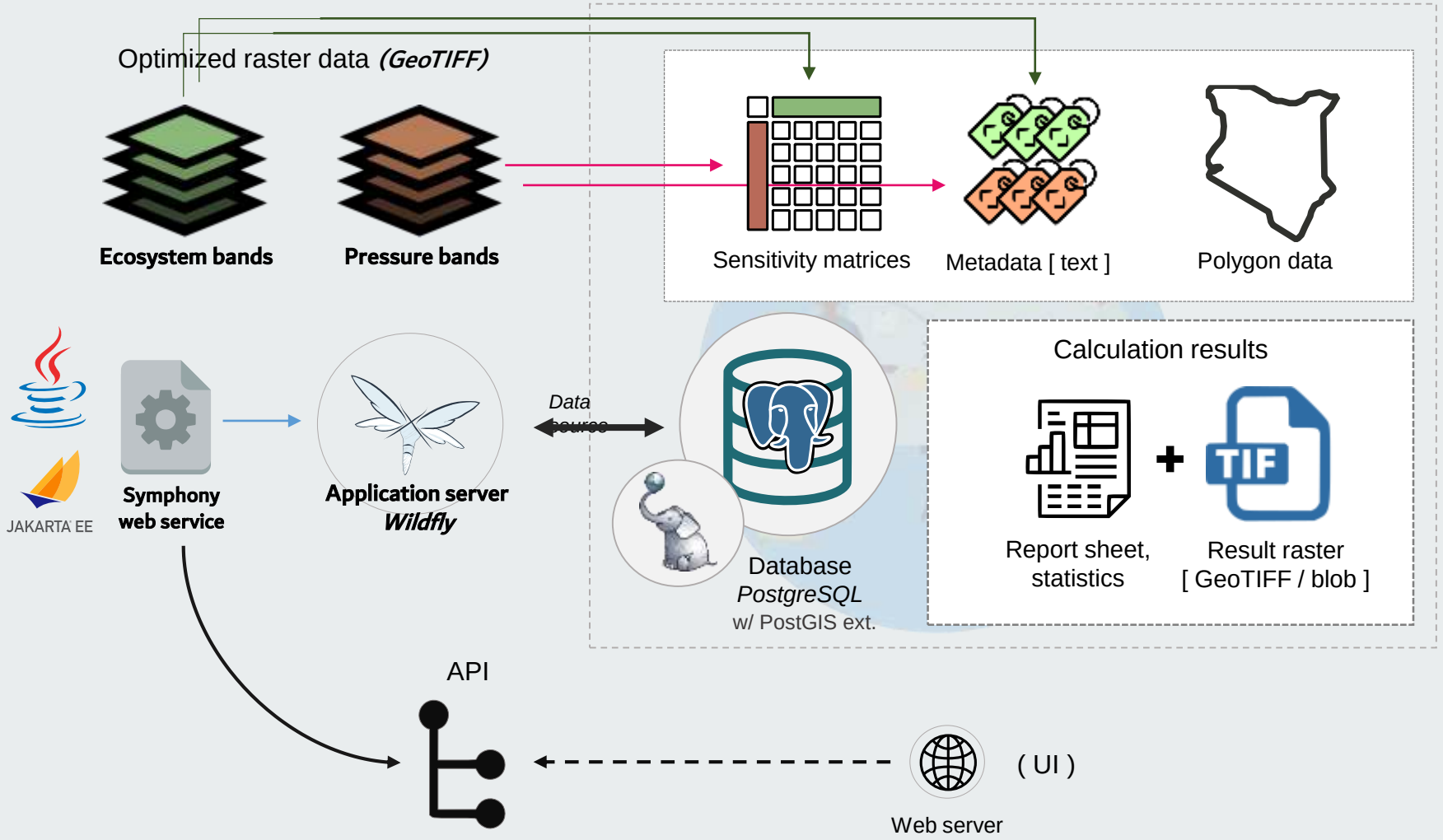
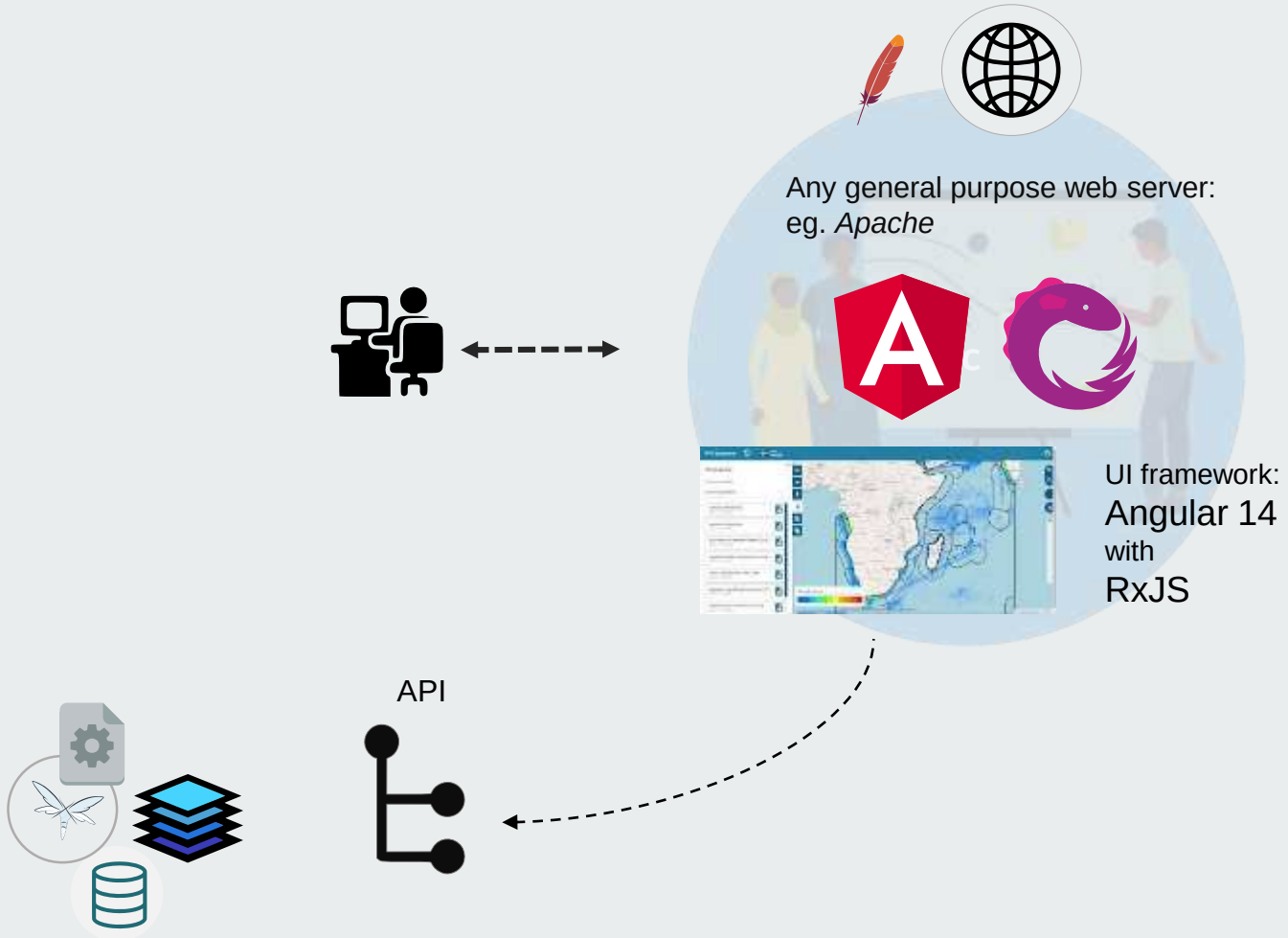
Serverside component



Notable details

- Jakarta EE – based app
- Wildfly app server
  - Configurable identity management
- PostgreSQL 14 with PostGIS extension

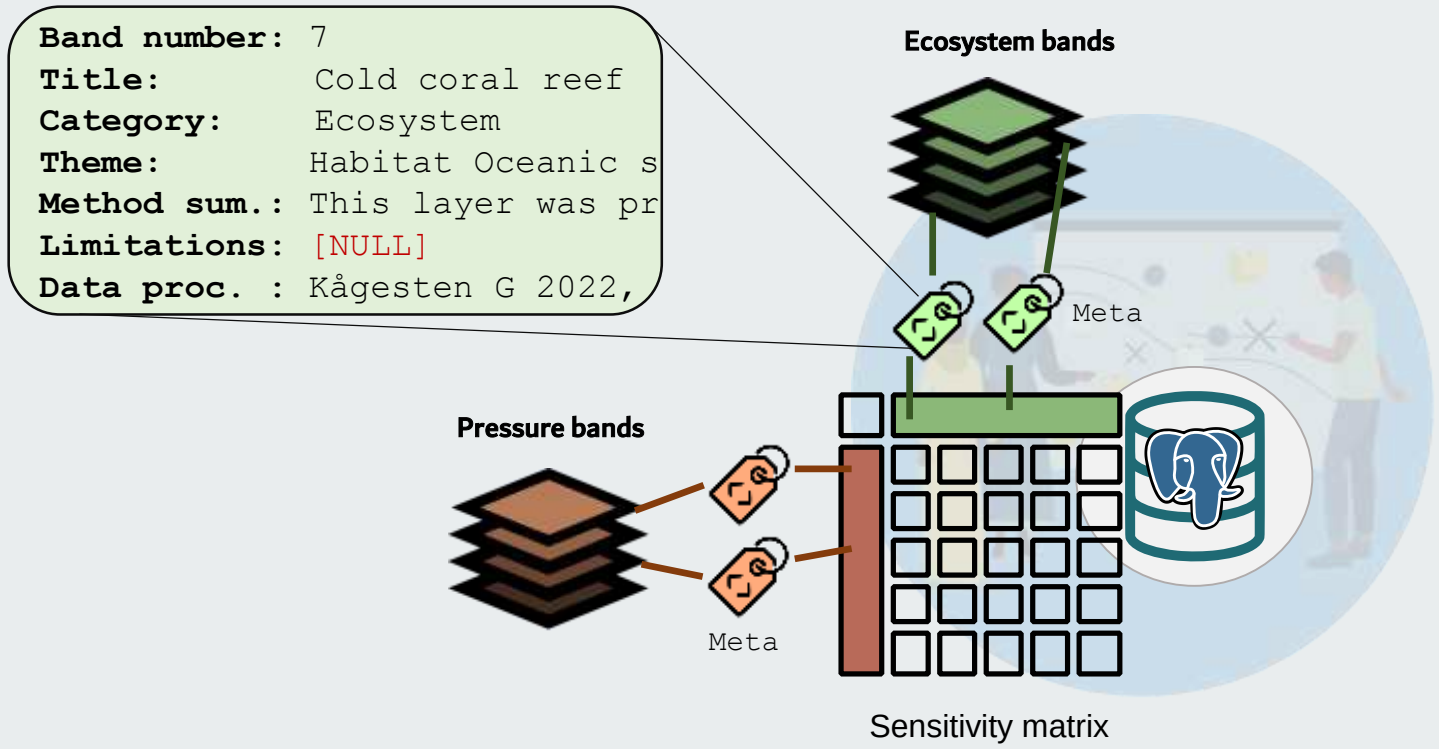
Web UI component



Notable details

- SPA Web UI built with Angular 17
- Utilizes RxJS for state management
- Utilizes translation module:
  - Currently maintained translations – English, French, Swedish
- *WIO Symphony* deviates from the main software branch only by inconsequential user interface details.

Raster data ↔ Database



- Note that there may be multiple read-only matrices defined for a baseline (but always one *default matrix*)
- Meta data corresponds to some specific baseline dataset and provides keys for sensitivity matrices
- Currently there are nine metadata fields in active use by WIO Symphony:

  - ✓ Band number
  - ✓ Title (eg. ”Cold coral reef”)
  - ✓ Category (Pressure / Ecosystem)
  - ✓ Theme (eg. ”Habitat Oceanic seafloor”)
  - ✓ Method summary
  - ✓ Limitations
  - ✓ Value range
  - ✓ Data processing details
  - ✓ Data sources (list)

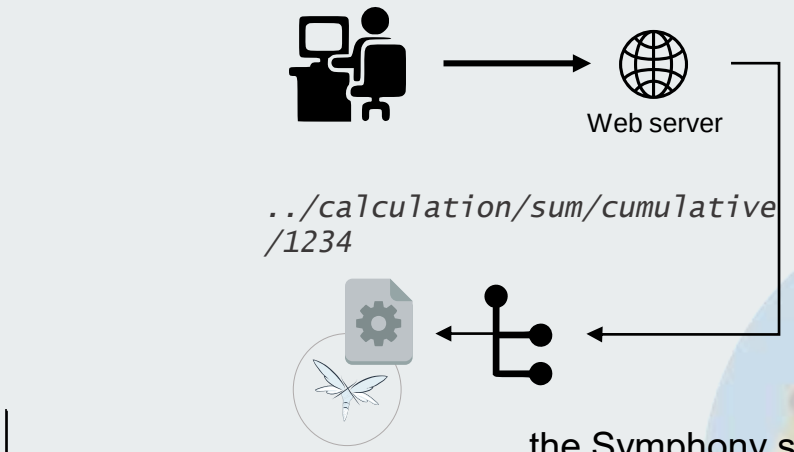
Polygons / boundaries

- Symphony uses geographic polygon data (GeoJSON) internally for two distinct purposes:
    1. As *Scenario Area* polygons
    2. As *Calculation area* boundaries
- **Scenario Area polygons** are either selected by the user from a predefined collection of polygons, drawn to the map interactively, or imported by file upload.
  These polygons, together with intensity settings, form the application-specific concept *Scenario*.
  Scenarios are central to the core functionality of the software: variable, user-initiated impact calculation.
- **Calculation area boundaries** are utilized by the application logic to determine system behaviours.
  Specifically, each *Calculation Area* is coupled to a default sensitivity matrix.

  Notably, Symphony may accomodate different *Calculation Areas,* to differentiate sensitivity scores by region.
  The instance of Symphony at SwAM (for the Baltic marine region and surroundings) defines three *Calculation Areas*.

  However, this feature isn't used in WIO Symphony instance, as there is only a singular Calculation Area defined – implying that the entire grid shares a common default sensitivity matrix.

Calculation step by step

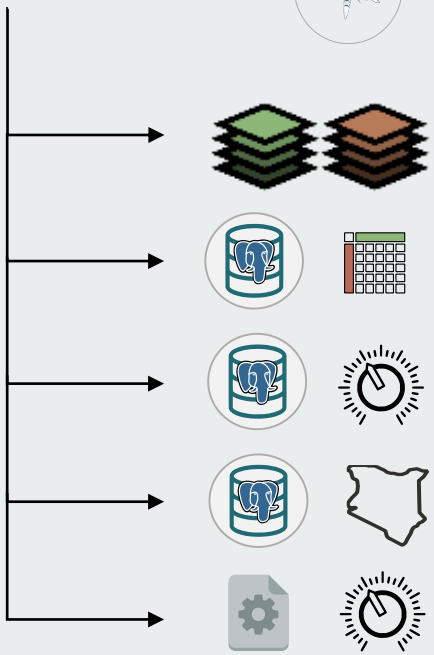


The user requests a calculation through the UI

The web app makes a request to the appropriate service endpoint

The backend component recieves the request via the API and initiates the calculation operation ..

the Symphony server component …



Fetches raster data from disk

Gets the requested sensitivity matrix that's been set for the scenario (from the data source)

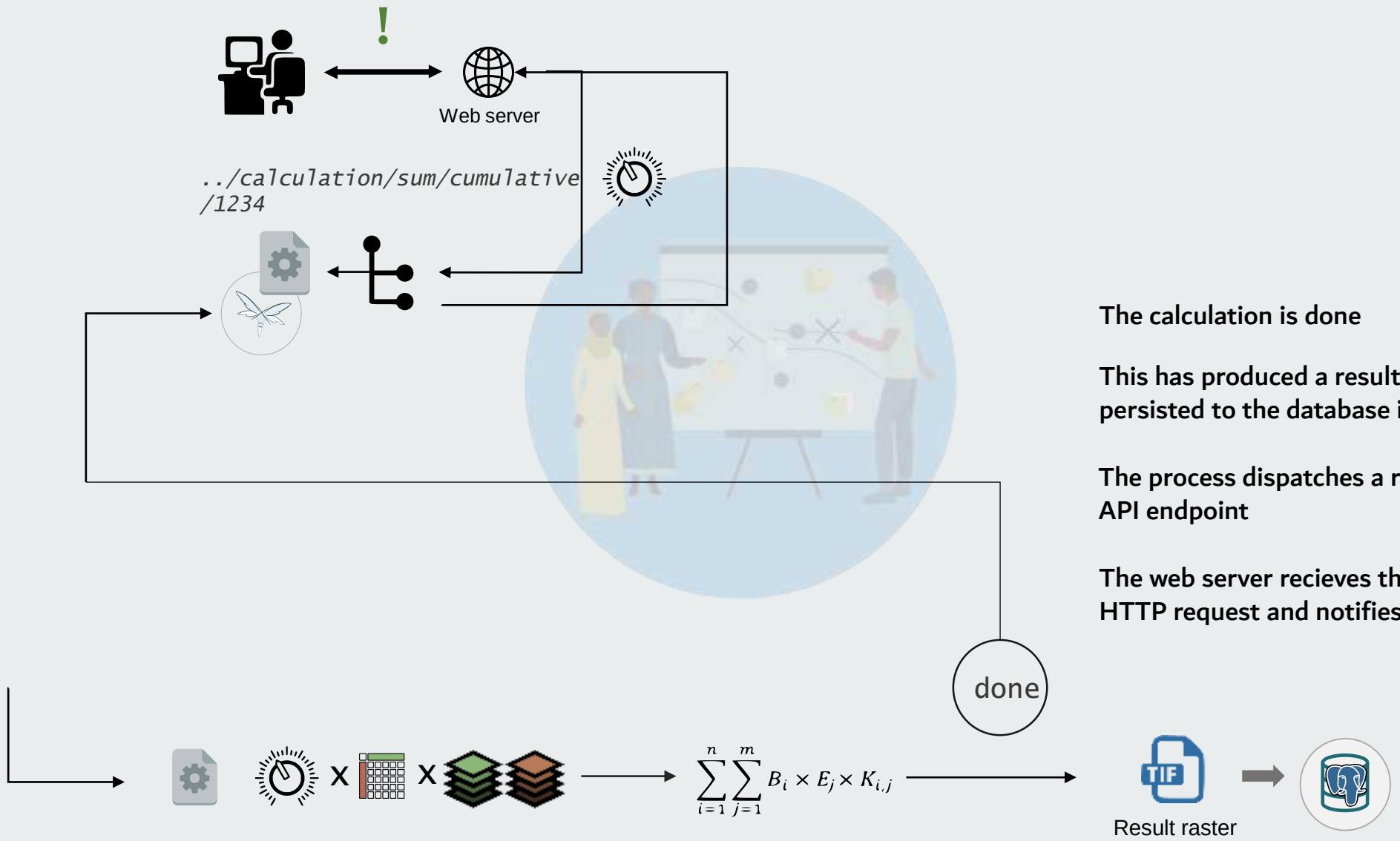
Gets all specific intensity changes that's been set for the scenario (from the ds)

Gets the area envelope (from the ds)

$$\sum_{i=1}^{n}\sum_{j=1}^{m} B_i \times E_j \times K_{i,j}$$

Filter out unused bands, apply transformation for each pixel (Main calculation step)

Calculation step by step



The calculation is done

This has produced a result raster that is now persisted to the database in binary form

The process dispatches a result through the API endpoint

The web server recieves the result of the HTTP request and notifies the user

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Thank you for listening!