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Course: PL/SQL

Project Name: CropSense – Smart Weather-Based Crop Advisory System

Field: Agriculture / Climate Technology

Project Description

CropSense is a PL/SQL-based system designed to help farmers plan their planting and harvesting decisions using weather data.
It collects temperature, rainfall, and humidity data for different regions and provides automated farming advice based on recent trends.

For example, if heavy rain is forecasted, the system alerts the farmer not to apply fertilizer that day.

Problem Statement

Farmers in many regions struggle with unpredictable weather conditions and lack of timely data.
Without proper forecasting, they lose crops or waste inputs such as fertilizer and seeds.
CropSense solves this by automating data collection and generating simple advice using stored PL/SQL rules.
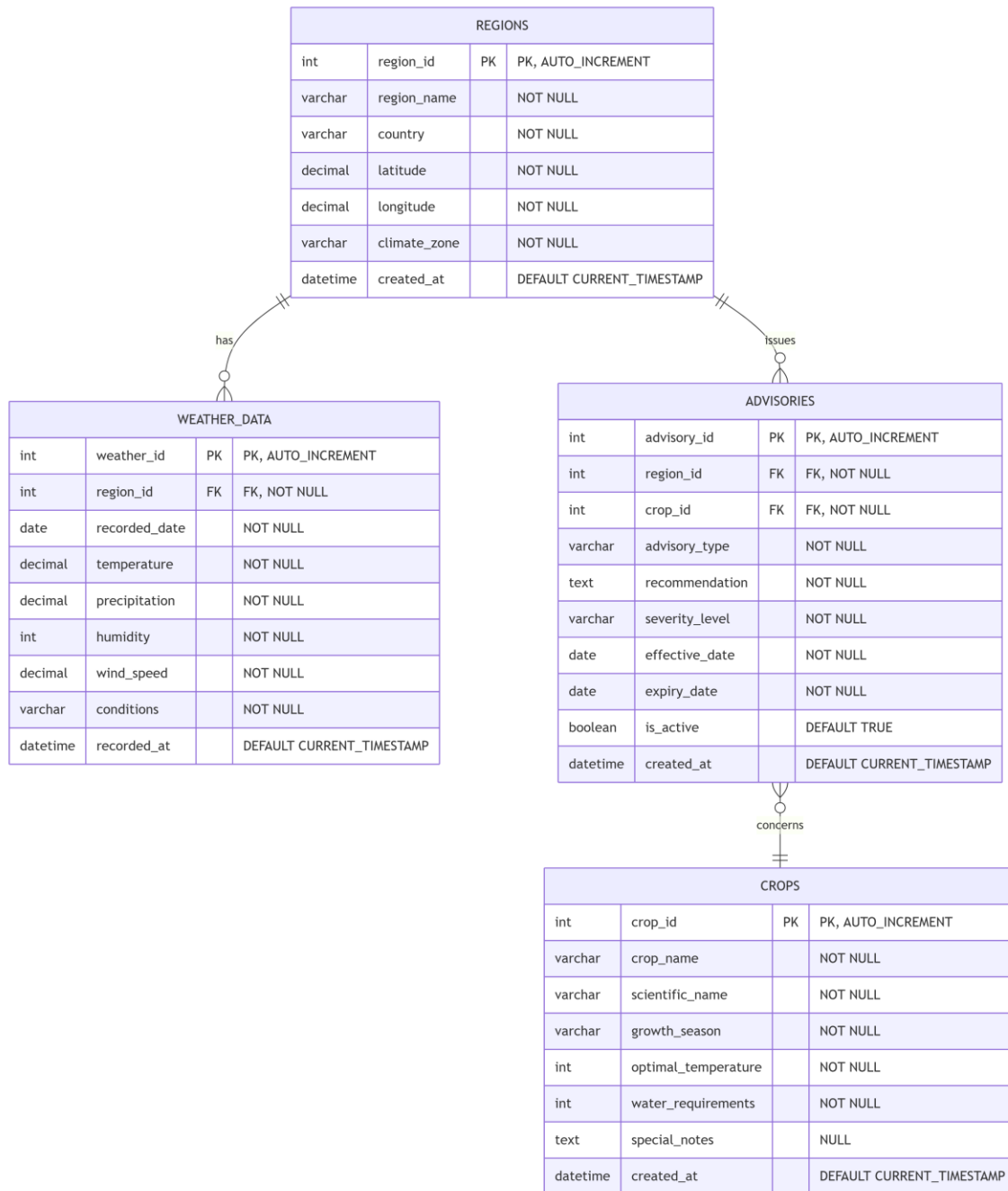
Objectives

- Record daily weather data for each farming region.

- Track rainfall, temperature, and humidity trends.

- Generate crop management advice automatically (e.g., "delay irrigation").

- Alert farmers about extreme weather conditions.

- Support smarter farming decisions through data.

Database Schema

Table	Description
regions(region_id, region_name, province)	Stores farming regions.
weather_data(data_id, region_id, record_date, temperature, humidity, rainfall_mm)	Records daily weather statistics.
crops(crop_id, crop_name, preferred_temp, ideal_rainfall, season)	Lists crops and their weather needs.
advisories(advisory_id, region_id, crop_id, message, created_at, status)	Stores generated recommendations.

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REGIONS

int	region_id	PK	PK, AUTO_INCREMENT
varchar	region_name		NOT NULL
varchar	country		NOT NULL
decimal	latitude		NOT NULL
decimal	longitude		NOT NULL
varchar	climate_zone		NOT NULL
datetime	created_at		DEFAULT CURRENT_TIMESTAMP

has

issues

WEATHER_DATA

int	weather_id	PK	PK, AUTO_INCREMENT
int	region_id	FK	FK, NOT NULL
date	recorded_date		NOT NULL
decimal	temperature		NOT NULL
decimal	precipitation		NOT NULL
int	humidity		NOT NULL
decimal	wind_speed		NOT NULL
varchar	conditions		NOT NULL
datetime	recorded_at		DEFAULT CURRENT_TIMESTAMP

ADVISORIES

int	advisory_id	PK	PK, AUTO_INCREMENT
int	region_id	FK	FK, NOT NULL
int	crop_id	FK	FK, NOT NULL
varchar	advisory_type		NOT NULL
text	recommendation		NOT NULL
varchar	severity_level		NOT NULL
date	effective_date		NOT NULL
date	expiry_date		NOT NULL
boolean	is_active		DEFAULT TRUE
datetime	created_at		DEFAULT CURRENT_TIMESTAMP

concerns

CROPS

int	crop_id	PK	PK, AUTO_INCREMENT
varchar	crop_name		NOT NULL
varchar	scientific_name		NOT NULL
varchar	growth_season		NOT NULL
int	optimal_temperature		NOT NULL
int	water_requirements		NOT NULL
text	special_notes		NULL
datetime	created_at		DEFAULT CURRENT_TIMESTAMP

Innovation

CropSense introduces a **PL/SQL-based decision engine** that uses IF/ELSE rules and triggers to analyze recent weather data.
For example, if rainfall is below 20mm for 5 days, a trigger inserts an advisory saying *"Irrigate maize in*

Region X".
It's simple, practical, and directly useful for local farmers.

PL/SQL Features

- **Trigger:** Creates a new advisory when rainfall is too high or low.

- **Procedure:** Analyzes weather patterns weekly.

- **Function:** Calculates average rainfall per region.

- **Cursor:** Scans all regions to detect abnormal weather.

- **Exception Handling:** Skips missing or incomplete readings.