Build a production-ready full-stack system called SokoPrice, a real-time agricultural market price platform for farmers in Kenya.

The system must support USSD access via Safaricom so farmers with basic phones can check crop prices without internet.

⚙️ REQUIRED TECHNOLOGY STACK

Use exactly the following technologies:

Backend

Node.js

Express.js

TypeScript

REST API architecture

Database

MongoDB

Use Mongoose ODM

Frontend (Web Dashboards)

React

TypeScript

Responsive design

Mobile-first

USSD Integration

Safaricom USSD gateway via:

Daraja API (if applicable)

OR Africa’s Talking sandbox for development

Must follow Safaricom session-based USSD flow

SMS Integration

Africa’s Talking OR Safaricom SMS API

Deployment

Cloud-ready (AWS / GCP / Azure / DigitalOcean)

Docker support

👩‍🌾 CORE PRODUCT FUNCTION

Farmers dial a USSD code (e.g., *789#) to instantly see current market prices for crops in major markets.

No smartphone required.

📱 USSD USER FLOW (SAFARICOM STYLE)

Design the USSD session logic as follows:

Welcome Menu

Copy code

Welcome to SokoPrice

1. Check market prices

2. Submit today's price

3. Language

Check Prices Flow

Step 1 — Crop selection:

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Select crop:

1. Maize

2. Beans

3. Rice

4. Potatoes

Step 2 — Market selection:

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Select market:
1. Wakulima (Nairobi)
2. Eldoret
3. Kisumu
4. Nakuru
```

Step 3 — Result:

Copy code

```
Maize — Wakulima Market
KSh 3,500 per 90kg bag
Updated: Today 9:30 AM
Confidence: High
1. Get SMS copy
0. Back
```

🏪 PRICE SUBMISSION FLOW

For traders/enumerators:

Select crop

Select market

Enter price

Confirm submission

Store as pending approval

🗄️ DATABASE REQUIREMENTS (MongoDB)

Design collections for:

Crops

name

unit (e.g., 90kg bag)

Markets

name

county

region

Prices

cropId

marketId

price

date

confidenceScore

approved (boolean)

sourceId

Sources

name

phoneNumber

role (Trader / Official / Enumerator)

reliabilityScore

status

Users (optional)

phoneNumber

role (Farmer / Admin / Buyer)

language

Alerts

phoneNumber

cropId

marketId

targetPrice

active

📊 ADMIN WEB DASHBOARD (React + TypeScript)

Create a secure admin panel with:

Overview Page

Total users

Active markets

Prices submitted today

Pending approvals

Price trend charts

Price Management

Table with:

Crop

Market

Price

Source

Time submitted

Confidence score

Approve / Reject buttons

Source Management

Add/edit sources

Reliability score

Activity tracking

Analytics

Historical trends

Market comparisons

Export reports

📈 BUYER / NGO DASHBOARD

Separate interface showing:

Live prices across markets

Historical price graphs

Supply indicators

Downloadable reports

Filtering by crop and date

🔔 SMS ALERT SYSTEM

Farmers can subscribe to alerts:

Examples:

“Notify me when maize price in Nairobi ≥ 3,700”

Daily price summaries

System must:

Send SMS via Africa’s Talking or Safaricom

Support opt-in and opt-out

Handle bulk messaging efficiently

🔐 AUTHENTICATION & SECURITY

Implement:

JWT authentication for web users

Role-based access control

Admin-only operations for approvals

Input validation

Rate limiting for APIs

Secure storage of phone numbers

⚡ CONFIDENCE SCORING

System should calculate price reliability based on:

Number of submissions

Source reliability scores

Price variance

Approved price = weighted average.

☁️ DEPLOYMENT ARCHITECTURE

Design system to scale to millions of users:

Stateless backend

Load-balanced API servers

Managed MongoDB cluster

Caching (Redis recommended)

Monitoring & logging

Backup strategy

KE LOCALIZATION

Support English and Swahili

Optimize for low literacy

Use Kenyan currency (KSh)

Consider telecom session limits

🎯 OUTPUT REQUIREMENTS

Generate:

Full backend code structure

MongoDB schema models

USSD controller logic

API endpoints

React frontend structure

Deployment instructions

Sample environment configuration

Integration notes for Safaricom USSD