Governance.ai

Compliance Bot (GST Filing Verification System)

1. Problem Statement

Indian businesses incur significant financial losses every year due to **avoidable GST non-compliance penalties**, including late fees and penal interest**.** These penalties are rarely caused by an inability to pay tax, but rather due to **verification failures** such as:

- Missed statutory deadlines
- Assumptions that returns are filed when they are only saved as drafts
- Lack of real-time confirmation from government systems
- Delayed receipt of GST notices, by which time penalties have already compounded

2. Proposal

The proposal is to build **Governance.ai – Free Compliance Bot**, an automated compliance verification system that:

- Accepts a GSTIN from a user via WhatsApp
- Periodically verifies GST filing status using a legal, API-based GST data provider
- Determines filing status (Filed / Pending) using deterministic rules
- Sends proactive alerts before statutory deadlines
- Operates on free or near-zero-cost infrastructure

3. Workflow Overview

- ➔ User sends GSTIN to Governance.ai WhatsApp number
- ➔ System validates GSTIN format
- ➔ GST filing data is fetched using a government-linked wrapper API
- ➔ Latest filed return period is identified
- ➔ Expected statutory filing period is calculated
- ➔ Filing status is derived by comparison
- ➔ User receives immediate confirmation (Filed / Pending)
- ➔ System continues automated monitoring near due dates

4. Technical Stack

Backend - Python, FastAPI (API orchestration, business logic, webhook handling)

Database - PostgreSQL Supabase (Store GSTIN, phone number, check status, timestamps)

Messaging - WhatsApp Cloud API Meta (User interaction, alerts, confirmations)

Data Source - GST Wrapper API via RapidAPI (Fetch GST return metadata without scraping or CAPTCHA bypass)

Scheduler - GitHub Actions/Cron-job.org (Trigger automated daily or deadline-based checks)

Hosting- Render (Host FastAPI backend with HTTPS support)

5. Detailed Implementation Process

Phase 1: GST Data Source Integration (Obtain reliable GST return metadata legally)

- ➔ Register on RapidAPI
- ➔ Subscribe to GST Return Status API
- ➔ Test endpoint with real GSTINs
- ➔ Validate availability of:
    - ◆ Latest GSTR-3B filing period
    - ◆ Sync timestamps
- ➔ Document API response structure and rate limits
- ➔ Confirm working API and Stable JSON response schema

Phase 2: Backend Development (Implement core logic and APIs)

- ➔ Create FastAPI project structure
- ➔ Implement GSTIN format validation
- ➔ Create API client for GST wrapper API
- ➔ Implement filing status derivation logic:
    - ◆ Calculate expected filing period
    - ◆ Compare with latest filed period
- ➔ Create webhook endpoint to receive WhatsApp messages
- ➔ Implement response handling and error cases

Phase 3: Database Setup (Persist user and compliance data)

- ➔ Create Supabase project
- ➔ Define tables:
  - ◆ users (phone, gstin, created_at)
  - ◆ compliance_status (gstin, latest_period, last_checked)
- ➔ Store and update filing status per check

Phase 4: WhatsApp Cloud API Integration

- ➔ Create Meta Developer account
- ➔ Create WhatsApp Cloud API app
- ➔ Obtain Phone Number ID and access token
- ➔ Configure webhook callback URL
- ➔ Implement message templates:
  - ◆ Filing confirmed
  - ◆ Pending alert
  - ◆ Deadline warning
- ➔ Test end-to-end message delivery

Phase 5: Scheduler & Automation

- ➔ Create scheduled job (daily or deadline-based)
- ➔ Query all registered GSTINs
- ➔ Re-check filing status
- ➔ Trigger alerts if:
    - ◆ Filing is pending
    - ◆ Due date is approaching
- ➔ Log execution results

Phase 6: Hosting & Deployment

- ➔ Push code to GitHub repository
- ➔ Deploy FastAPI app to Render / Railway
- ➔ Configure environment variables securely
- ➔ Verify HTTPS endpoint
- ➔ Re-validate WhatsApp webhook connectivity

Phase 7: Testing & Validation

1. Test with multiple GSTINs
2. Validate Filed vs Pending logic across dates
3. Simulate deadline scenarios
4. Validate message clarity and timing

ASSIGNMENT – I (Seminar)

S.No	Reg. No	Name	Topics
1	25PCS201	ARUN PANDIAN V	AI & Machine Learning in Operating Systems
2	25PCS202	KRISHNA KUMAR B	Quantum Operating Systems
3	25PCS203	MUTHUPANDI M	IoT & Embedded OS
4	25PCS204	MATHAVAN C	Containerization & Cloud OS
5	25PCS205	MOGESHWARAN M	Decentralized & Blockchain OS
6	25PCS206	SANJAY S	Real-Time Operating Systems (RTOS)
7	25PCS207	SYED IBRAHIM SHA	Green Computing in OS
8	25PCS208	VIGNESH M	Mobile Operating Systems
9	25PCS209	VISHALI S	AI & Machine Learning in Operating Systems
10	25PCS210	JAMBATH KUMAR S	Quantum Operating Systems
11	25PCS211	KATHIR P	IoT & Embedded OS
12	25PCS212	ASHWIN YAHEL S	Containerization & Cloud OS
13	25PCS215	AAKASH GANDHI MGR	Decentralized & Blockchain OS
14	25PCS216	HARINI R	Real-Time Operating Systems (RTOS)
15	25PCS217	RIYAZ AHAMED R	Coda (NFS)
16	25PCS218	RIZANA FATHIMA HUSSAIN B	Mobile Operating Systems
17	25PCS219	JAMES JEFFERSON	AI & Machine Learning in Operating Systems
18	25PCS220	DHARSHANA L	Quantum Operating Systems
19	25PCS221	BALAJI A	Sun Network File Systems