Tech Stack for Blue Space Backend

This document outlines and justifies the chosen technologies for the backend development of the Blue Space system, which includes Spaza Shop Registration, Complaint Management, Government Interface, and Messaging Integration.

1. Backend Framework

Chosen Technology: Java Spring Boot

Justification:

- **Robust and Scalable**: Spring Boot is well-suited for building enterprise-grade applications with complex business logic.

- **Modular Architecture**: Encourages clean separation of concerns, ideal for microservices or layered designs.

- **Community and Support**: Backed by a large community and rich documentation.

- **Security**: Offers powerful tools like Spring Security for authentication and authorization.

- **REST APIs**: Makes it easy to build and expose RESTful endpoints for frontend consumption.

2. Programming Language

Chosen Language: Java

Justification:

- **Strong Typing**: Reduces runtime errors and increases code robustness.

- **Cross-Platform**: Java applications are platform-independent at the bytecode level.

- **Mature Ecosystem**: Rich libraries and frameworks for web, security, and database operations.

3. Database

Chosen Technology: PostgreSQL

Justification:

- **Relational DBMS**: Ideal for structured data with complex relationships (e.g., users, shops, complaints).

- **Open Source and Free**: Cost-effective without sacrificing performance or features.

- **Advanced Features**: Includes JSON support, indexing, full-text search, and strong ACID compliance.

- **Community Support**: Well-documented and actively maintained.

4. Hosting Platform

Recommendation: Render

Justification:

- **Ease of Use**: User-friendly dashboard and automatic deploys from GitHub.

- **Free Tier Available**: Great for development and testing stages.

- **Supports PostgreSQL**: Built-in support for PostgreSQL databases.

- **Custom Domains and SSL**: Easy setup for production.

- **Background Workers**: Can be used for scheduled jobs (e.g., complaint review summaries).

Alternatives Considered:

- **Heroku**: Popular but now limited in its free offerings.

- **Railway**: Powerful but less beginner-friendly compared to Render.

5. External APIs

WhatsApp Business API or Twilio:

- For sending automated notifications to customers about complaint status.

- Ensures real-time communication and enhances transparency.

Government Auth API (custom/internal):

- Interface for government officials to verify reports and flag accounts.

This tech stack provides a balance between scalability, performance, and ease of development, supporting the project's long-term goals and maintainability.