YELLOWSENSE TECHNOLOGIES – Compliance Monitoring Solution for SEBI Hackathon

Brief description of our idea:

The proposed solution is a **Confidential Compliance Monitoring Platform** designed for small and mid-size brokers. Today, compliance monitoring is resource-heavy, forcing smaller brokers to either overspend on third-party systems or underinvest, leading to regulatory risks. Our platform leverages **confidential clean rooms and AI** to enable brokers to securely upload client and trading data into **Trusted Execution Environments (TEEs)**, where compliance checks are automatically executed. The regulator can receive only aggregated compliance scores, anomaly flags, and alerts— never raw sensitive data. This ensures **regulatory transparency, investor protection, and data confidentiality** simultaneously. By lowering cost and complexity, the solution democratizes compliance capabilities for small brokers, bringing them on par with larger players and strengthening market integrity.

Technology stack we intend to use:

Our solution combines **Confidential Computing infrastructure** with **AI-driven fraud detection models** to deliver a secure and scalable system.

1. **Confidential Computing:** Intel SGX/AMD SEV for secure clean room execution of compliance checks.
2. **AI/ML Modules:**
3. Anomaly detection for suspicious client trading behavior.
4. Pattern recognition for misreporting or non-compliance trends.
5. **Rule-based Engine:** Automated checks against SEBI compliance guidelines and reporting requirements.
6. **Data Governance:** DEPA-compliant consent layer, ensuring brokers retain ownership of data.
7. **Backend:** Microservices (Python/FastAPI), PostgreSQL for structured logs, Kafka for event streaming.

8. **Frontend:** Broker dashboard (compliance scorecards, anomaly alerts), SEBI/regulator view (aggregate reporting).
9. **Deployment:** Cloud-native with option for hybrid/on-prem for smaller brokers.

This stack ensures **robust cybersecurity**, **real-world feasibility**, and **scalability** to millions of trades, messages, and transactions daily, while strictly preserving privacy.

"Nirikshak-Compliance – Secure Compliance Monitoring for Brokers"
A low-cost, privacy-preserving platform that automates compliance checks for small and mid-size brokers while enabling regulators to maintain effective market surveillance. "Nirikshak" (निरीक्षक) means inspector / overseer in Hindi-Sanskrit.

The prototype demonstrates how a broker can upload client and transaction data into a **confidential clean room**. Inside this secure enclave, pre-coded compliance checks (KYC validity, exposure limits, unusual trading patterns, capital adequacy, reporting timelines) are executed.

The system generates a **compliance health score**, highlights breaches, and sends an anonymized summary to SEBI. This ensures regulators can monitor brokers effectively without accessing raw client-level data. The prototype dashboard shows brokers their risk posture and compliance trends, giving them actionable insights to improve adherence.

By combining **cutting-edge AI/ML, secure TEEs, and regulatory integration**, *Nirikshak* aligns directly with SEBI's mandate of investor protection and market integrity, offering a scalable and deployable tool to safeguard India's growing retail investor base.

Key features, intended users and functionality:

1. **Key Features:** Confidential clean rooms, automated compliance checks, anomaly detection, compliance health score, real-time alerts, multilingual support.
2. **Intended Users:** Small and medium brokers, regulators (SEBI, exchanges).
3. **Functionality:**

   a. Broker uploads encrypted data → compliance runs inside TEE → score + alerts generated.

   b. Regulators see aggregated results.

   c. Brokers track compliance posture and resolve gaps proactively.

Key innovation / differentiator:

Nirikshak goes beyond existing compliance monitoring tools by introducing a **privacy-preserving, AI-powered surveillance system** purpose-built for India's securities markets. Its differentiators lie in both **technological depth** and **regulatory alignment**.

1. First **confidential compliance monitoring tool** designed specifically for small/mid brokers.
2. **Data privacy by design:** regulators never see raw client trading data.
3. **Low-cost, plug-and-play** model—reduces infra burden on small brokers.
4. **Dual view:** empowers brokers with actionable dashboards and regulators with market-wide aggregated insights.
5. **AI-assisted anomaly detection:** complements static rule-based compliance with predictive risk monitoring.

By combining **advanced security (TEE), AI-driven fraud detection, and regulatory alignment**, *Nirikshak* becomes not just another compliance monitoring tool, but a **LeapTech innovation** capable of revolutionizing compliance monitoring in capital markets.

Nirikshak is unique because it brings **confidential computing, AI, and regulatory intelligence** together in a way no compliance monitoring system has achieved.

1. **Data Privacy by Design:** Instead of centralizing raw investor or broker data, *Nirikshak* processes information within **Trusted Execution Environments (TEEs)**. This ensures that even during compliance analysis, sensitive financial data is shielded from misuse—a critical differentiator in building regulator and market trust.

2. The solution addresses a critical gap: **compliance asymmetry between large and small brokers**. By enabling cost-effective, privacy-preserving compliance monitoring, it creates a **level playing field**.

3. Regulators get early warnings on non-compliance without overburdening small firms. For brokers, it reduces compliance overhead while protecting client data.

4. At scale, this strengthens **market integrity, investor trust, and SEBI's supervisory capacity**—without inflating costs. It transforms compliance from a burden into an enabler of safer market participation.

By blending **cutting-edge confidential computing with localized AI-driven member compliance monitoring**, *Nirikshak* is not just a compliance tool—it's a **market safeguard** designed to protect millions of Indian investors and uphold SEBI's mission of fair, transparent markets.

Demo Link / GitHub / Video:

https://github.com/ARox2005/Yellowsense_member_compliance_monitoring

---

Potential impact & scalability:

1. Nirikshak can significantly strengthen **market integrity and investor trust**, as the solution has the potential to **redefine compliance monitoring** in Indian

capital markets by making it accessible to **thousands of small and mid-size brokers** who currently struggle with cost and complexity.

2. By using **confidential computing**, it ensures investor data privacy while delivering regulators the compliance visibility they need. Impact: reduced compliance failures, lower fraud risks, and enhanced investor trust.

3. The system is **cloud-native, modular, and API-driven**, so it can scale across brokers of all sizes without infrastructure overhaul.

4. Over time, it can process **millions of transactions daily**, integrate with stock exchanges, and even extend globally as a **template for low-cost, privacy-preserving compliance infrastructure**.

How will this prototype address the respective problem?

1. Unlike existing point solutions, *Nirikshak* is built on **confidential computing**, where this enables brokers to securely share client and transaction data for compliance checks without exposing sensitive raw data.

2. Brokers simply upload data into a **confidential clean room**, where automated compliance rules and AI anomaly detection modules run in real-time.

3. The system generates a **compliance health score and alerts**, which are shared with brokers and regulators. Regulators get market-wide compliance visibility while brokers reduce reporting burden and cost.

4. For smaller firms, this levels the playing field by providing **enterprise-grade compliance capabilities at low cost**, while investors benefit from stronger safeguards against non-compliance and misconduct.

5. By creating a **trustworthy, scalable, and privacy-preserving member compliance monitoring layer**, the prototype not only prevents investor losses but also strengthens **confidence in Indian capital markets**, as per SEBI's directives.

Regards

YellowSense Team:

prakhargoyal@iitb.ac.in

animesh@ai.yellowsense.in

shashank2609@gmail.com

Members:

1. Prakhar Goyal (**_Leader_**): +91-9869-397-868
2. Animesh Sharma: +91- 9835-086-449
3. Shashank Naik: +91 – 9008-033-789