🔰 Phase 1: Solidify Core Backend Skills (Foundation Build)

যারা Django, Node.js, Express, বা Flask দিয়ে CRUD বানাতে পারে, তাদের এইটা মোটামুটি থাকে—but deepen করতে হবে:

✅ Core Topics:

- HTTP, REST, WebSocket (difference, usage)
- Status codes, headers, cookies vs tokens
- Async programming (Python: asyncio / Node: Promise, async-await)
- SQL: Joins, Indexing, Query Optimization
- ORM Deep Dive (Django ORM, SQLAlchemy)

📚 Resources:

- **Backend System Design** (ByteByteGo YouTube / Grokking the System Design Interview)
- **Book:** "Designing Data-Intensive Applications" by Martin Kleppmann (must-read)
- **Blog:** realpython.com, thepsf.org

🚀 Phase 2: Learn about Real-Time & Scalable Systems

তুমি যেমনটা বললে—MQTT, fallback, async buffer—এইগুলা system design এর advanced level।

✅ Topics:

- Message Queue (MQTT, Kafka, RabbitMQ)
- Data pipeline architecture (streaming vs batch)
- Pub/Sub pattern, back-pressure, circuit breaker
- Retry mechanism, dead-letter queues

📚 Learn From:

- **YouTube:** Conduktor Kafka Tutorials, MQTT Essentials
- **Google Cloud Docs:** Pub/Sub + BigQuery Pipelines
- **Course:** Udemy – "Apache Kafka Series" by Stephane Maarek

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⚙️ Phase 3: System Design & Observability

এটাই হিরো লেভেল – তুমি যদি latency, bottleneck, performance tuning বুঝতে পারো, তখন তুমি শুধুই developer না, তুমি engineer.

✅ **Topics:**

- Logs, Traces, Metrics (using ELK Stack, Prometheus + Grafana)
- Latency analysis: APM tools (Datadog, New Relic)
- Profiling and performance optimization
- Redis cache (eviction policies, memory usage, TTL)
- Kubernetes scaling, load balancing

📚 **Learn From:**

- awesome-scalability
- k8s.io
- Redis docs

💼 Phase 4: Build Serious Projects with Monitoring

✅ **Project Ideas:**

- **IoT Real-Time Dashboard**: Devices publish sensor data via MQTT → Broker → Python backend → Store in InfluxDB → Real-time dashboard with Grafana
- **Log Monitoring System**: Logs are sent via fluentd/logstash → Stored in Elasticsearch → Visualized in Kibana

- **Distributed Job Scheduler** (with RabbitMQ + Celery + Docker)

🛠️ **Tools to Use:**

- Docker
- Redis / Celery
- Nginx
- Postgres (with raw queries and optimization)

🌐 Phase 5: Share & Collaborate

যত deep শিখবা, তত তোমার GitHub ও blog/share করা দরকার, যেন অন্যরাও দেখত পারে।

✍️ **Tips:**

- System design case studies লিখো (e.g., “How I handled high-frequency IoT data in a Django app”)
- GitHub এ real-time pipeline অথবা latency-tuned API upload করো
- Open source এ contribution দাও (especially to Python backend tools)

Follow

- **Gaurav Sen** – System Design YouTube
- **Tech Dummies – Narendra L** – Deep backend + Java + Kubernetes
- **Ben Awad** – GraphQL & Real-time backend
- **ByteByteGo (Alex Xu)** – Visual System Design Concepts