

ADVANCED PROGRAMMING

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BACKGROUND & GOALS

Project Context:

- Publish–subscribe computational agents
- Each agent = specialized operation (add / mul / inc / etc.)
- Topics = named data channels

Goal:

- Complete View layer (upload config + interact)
- Real-time visibility & manipulation in browser

ARCHITECTURE OVERVIEW

System Architecture:

- Core: TopicManager (Singleton, pub/sub hub)
- Agents: Reactive + stateless/derived logic
- HTTP Server: Custom (Sockets, threads, parser)
- Servlet Layer: Clean separation (Controller role)
- View: Static templates + dynamic HTML/SVG generation

MVC

CLEAR SEPARATION OF CONCERNS

MODEL

- Re-used existing graph package (Topics & Agents)

VIEW

- Brand-new views package
- View interface → concrete views: TopicView, HtmlView, JsonView

CONTROLLER

- New servlets package
- TopicDisplayer, SimpleConfLoader, HtmlLoader



SOLID PRINCIPLES IN ACTION

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Single Responsibility

- TopicDisplayer only serves display requests
- SimpleConfLoader handles config uploads
- TopicView just renders HTML

O

Open/Closed

- Add new agent types by implementing Agent
- Add XML/PDF outputs by implementing View—no existing classes modified

L

Liskov Substitution

- Any Agent (e.g., PlusAgent, DivAgent) can replace another—system works transparently

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Interface Segregation

- Lean, focused APIs: Servlet has handle() & close()
- View has render() & getContentType()

D

Dependency

Inversion

- MyHTTPServer depends on the Servlet abstraction, not concrete servlets
- Controllers depend on View interface, not specific view classes

EXTRA FEATURES

1. Multi-Format Configuration

- Text + JSON configuration support
- Robust parsing and validation

2. Reflection-Based Agent Instantiation

- Dynamic class loading from configuration
- Extensible agent system

3. Comprehensive Logging

- Deploy, publish, compute trace
- Debug and monitoring capabilities

LEARNINGS

1

ENGINEERING PRINCIPLES:

- I LEARNED THAT BOTH MVC ARCHITECTURE AND SOLID PRINCIPLES ARE ESSENTIAL FOUNDATIONS THAT EVERY ENGINEER WHO WRITES CODE SHOULD EMBRACE.

2

FRONTEND INTEGRATION SKILLS

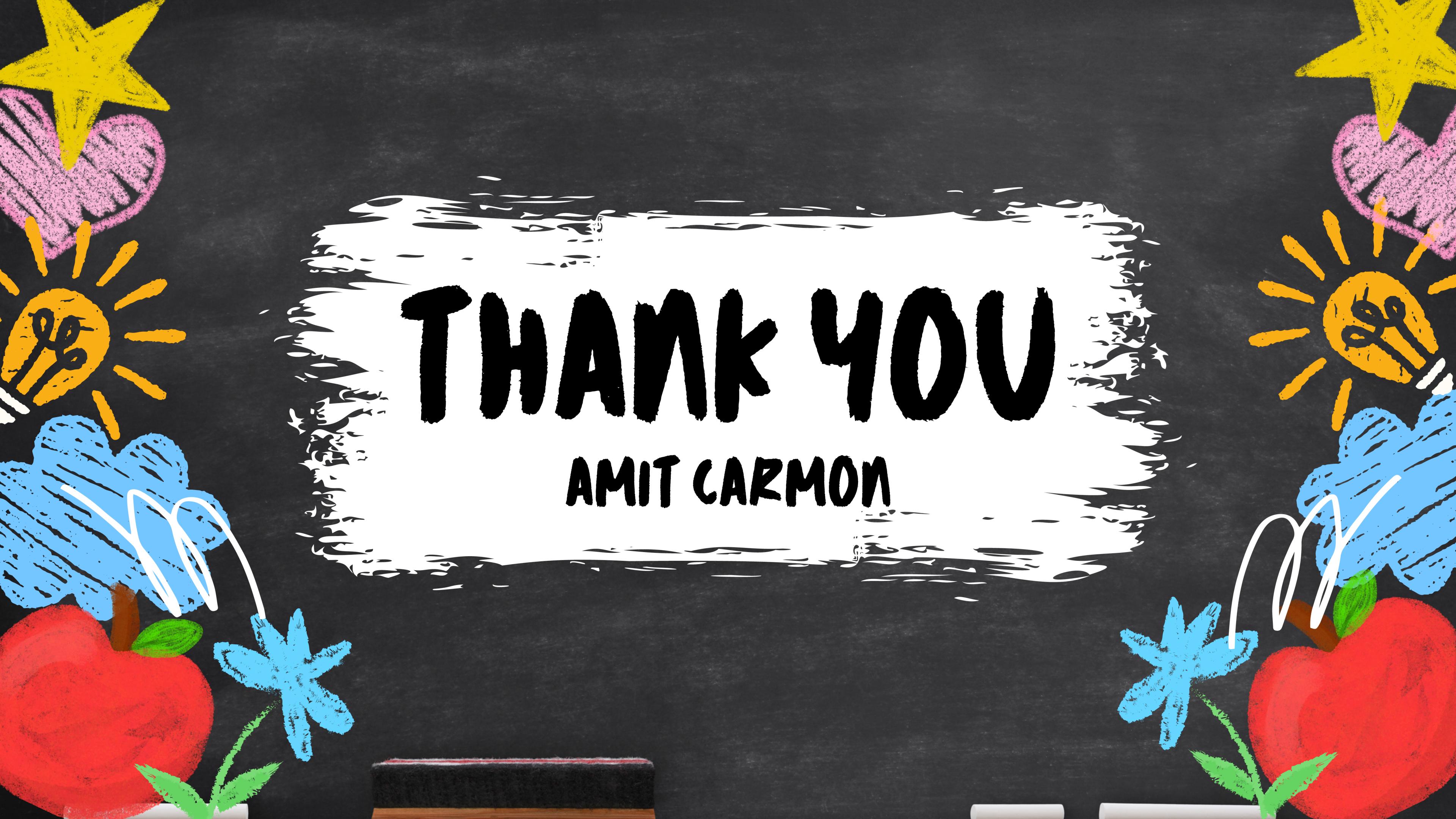
- CONNECT A JAVA BACKEND TO DYNAMIC HTML / JAVASCRIPT FRONTENDS
 - PRODUCE HTML FROM JAVA VIEWS, THEN ENHANCE IN-BROWSER WITH JS
 - USE CONTENT-TYPE NEGOTIATION TO SERVE MULTIPLE FORMATS
 - KEEP UI CONCERNSS IN DEDICATED VIEW CLASSES SO LAYOUT TWEAKS NEVER BREAK SERVER LOGIC

3

FUTURE ENHANCEMENTS:

- PERSISTENCE LAYER FOR CONFIGURATION STORAGE
- AUTHENTICATION & AUTHORIZATION
- RICHER ANALYTICS AND PERFORMANCE METRICS
- WEB SOCKET SUPPORT FOR TRUE REAL-TIME UPDATES





THANK YOU
AMIT CARMON