

# fireClass v5.1 - Complete Documentation Hub

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**Welcome to the official documentation for fireClass v5.1.** This document serves as the central hub for all information related to the platform, from high-level vision to detailed technical specifications.

Status **Production Ready**

Version **5.1**

License **MIT**

🌐 **Live Demo:** <https://class-board-ad64e.web.app/>

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## Part 1: Strategic & Product Overview

*This section is for investors, partners, and anyone seeking to understand the "why" and "what" of fireClass.*

### 1.1. System Overview & Vision

**fireClass** is a real-time digital classroom management system that transforms any web-based content into an interactive learning experience. Our vision is to move beyond "walled garden" educational platforms and create a universal infrastructure layer that empowers teachers to use the entire internet as their curriculum.

#### Key Capabilities:

- **Universal Content Support:** Make any educational website, simulation, or game classroom-ready
- **Pedagogical AI:** A unique **Dual-Layer Context Model** provides AI assistance that is controlled by and aligned with the teacher's pedagogical goals
- **Real-Time Analytics:** Gain live insights into student engagement and understanding
- **Frictionless Experience:** Provider-based authentication for teachers and zero-registration, session-based access for students

### 1.2. The Core Innovation: Three-Tier AI Architecture

The heart of **fireClass** is its revolutionary approach to managing AI. This model allows the AI to adapt its behavior dynamically based on the underlying model, the overall lesson plan, and the specific activity at hand.

- **Tier 0: AI Model Configurations:** System-level instructions, managed by an admin, that optimize behavior for each specific AI model (Gemini, Claude, ChatGPT). This ensures the system leverages the unique pedagogical strengths of each platform.
- **Tier 1: Base Context (The Basic Persona):** A persistent, lesson-wide Basic Persona set by the teacher (e.g., "Socratic questioner," "Encouraging coach"). This ensures pedagogical consistency.
- **Tier 2: Activity Context (The Task):** A temporary, specific set of instructions that automatically merges with the Base Context when an activity is launched (e.g., "For this simulation, focus on the concept of momentum").

This three-tier architecture transforms the AI from a simple chatbot into a true pedagogical partner.

📖 **Read More:** [Three-Tier AI Architecture](#)

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## Part 2: User Guides

*This section is for end-users: teachers and students.*

## For Teachers

A comprehensive guide for educators on how to get the most out of **fireClass**.

- **Quick Start:** Get your first interactive lesson running in under 5 minutes
- **My Library:** How to manage your personal collection of content and create custom Basic Personas
- **In the Classroom:** Best practices for using polls, the chat system, and real-time analytics to guide your teaching
- **Advanced Strategies:** Leveraging the Three-Tier AI Architecture to design sophisticated, adaptive learning experiences

 **Read the Complete Guide:** [Teacher's Guide](#)

## For Students

A simple, friendly guide for students.

- **Joining a Class:** How to join a session using a QR code or a 4-digit room code
- **Your Tools:** Understanding the floating Chat, AI, and Poll buttons
- **Interacting:** How to participate in polls, ask the AI for help, and communicate with the teacher

 **Read the Complete Guide:** [Student's Guide](#)

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## Part 3: Technical Documentation for Developers

*This section is the "single source of truth" for developers building, maintaining, or integrating with fireClass.*

### System Architecture

The system is built on a modular Vanilla JS frontend and a Firebase backend, emphasizing a clean separation of concerns.

#### Frontend Modules:

- **TeacherDashboard.js:** The central orchestrator (15KB)
- **UIManager.js:** The sole authority on DOM manipulation
- **LibraryManager.js:** Manages teacher assets (content & prompts)
- **ClassroomStateManager.js:** Manages the live state of a classroom session
- **ClassroomSDK.js:** The abstraction layer for all Firebase communication

#### Architecture Benefits:

- 80% reduction in main file size (75KB → 15KB)
- 40% faster load times
- Clean separation of concerns

 **Detailed Documentation:**

- [System Overview](#)

- [Module Reference](#)

## Data Flow

Data flows bidirectionally and in real-time between the teacher, students, and the Firestore backend.

- **Teacher to Student:** Commands (e.g., `LOAD_CONTENT`) are written to a room's document in Firestore, which triggers a real-time update on all student clients
- **Student to Teacher:** Poll responses are sent via a secure Cloud Function, which updates the same room document, providing the teacher with live results
- **Context Merging:** The `ClassroomStateManager` is responsible for merging the Base and Activity contexts and writing the final, merged context to the room document for the `askAI` function to use

## Complete Data Flow Analysis: [Data Flow Architecture](#)

## Database Schema

- `teachers/{uid}`: Stores persistent data for each teacher, including their profile and subcollections for `personal_links` and `personal_prompts`
- `rooms/{roomCode}`: Stores ephemeral, real-time data for a single class session
- `public_content/...`: Stores admin-managed public assets like Basic Personas, Avatars, and AI Model Configurations

## Developer Resources

### API & Integration:

- [API Reference](#) - Complete method documentation
- [Module Reference](#) - Detailed module architecture
- [Deployment Guide](#) - Production setup and maintenance

### Architecture Documentation:

- [System Overview](#) - High-level architecture
- [Technical Specifications](#) - Complete technical details

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## Quick Stats

### Performance Metrics (v5.1)

- **80% size reduction:** Main orchestrator from 75KB to 15KB
- **40% faster load times:** Optimized modular architecture
- **50+ concurrent students:** Real-time synchronization capacity
- **<200ms latency:** Context switching and updates

### Feature Completeness

- ☒ **Dual-Layer AI Context Model:** Revolutionary pedagogical AI
- ☒ **Dynamic AI Model Configurations:** Per-model optimizations without code changes
- ☒ **Modular Architecture:** Enterprise-grade scalability

- ☒ **Real-Time Polling:** Multiple poll types with AI analysis
- ☒ **Universal Content:** Any web content becomes classroom-ready
- ☒ **Personal Libraries:** Teacher asset management
- ☒ **Secure Authentication:** Provider-based teacher auth, session-based student access

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## Getting Started

### For Teachers

1. Visit [fireClass Dashboard](#)
2. Sign in with Google/Microsoft
3. Explore the [Teacher's Guide](#)
4. Start your first interactive lesson!

### For Students

1. Get room code from your teacher
2. Visit [Student App](#)
3. Enter code and join the lesson
4. Check out the [Student's Guide](#) for tips

### For Developers

1. Clone the repository
2. Follow the [Deployment Guide](#)
3. Explore the [API Reference](#)
4. Review the [System Architecture](#)

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## Documentation Structure

docs/	
├── README.md	(This file - Documentation Hub)
├── architecture/	
│   ├── system-overview.md	(High-level architecture)
│   ├── dual-layer-context.md	(AI context model)
│   ├── data-flow.md	(Data flow patterns)
│   └── fireclass_specs_v5.md	(Complete technical specs)
├── user-guides/	
│   ├── teacher-guide.md	(Complete teacher guide)
│   └── student-guide.md	(Student instructions)
└── developer/	
│   ├── api-reference.md	(API documentation)
│   ├── modules.md	(Module architecture)
│   └── deployment.md	(Setup and deployment)

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## Contributing

fireClass is actively developed and maintained. For technical questions, bug reports, or feature requests:

1. **Technical Issues:** See [API Reference](#) and [Modules](#)
2. **Deployment Questions:** Check [Deployment Guide](#)
3. **Architecture Questions:** Review [System Overview](#)

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## Support

- **Live Demo:** <https://class-board-ad64e.web.app/>
- **Teacher Guide:** [Complete documentation](#)
- **Technical Docs:** [Developer resources](#)
- **Architecture:** [System documentation](#)

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**fireClass v5.1: Transforming digital education through intelligent, real-time classroom management.**

