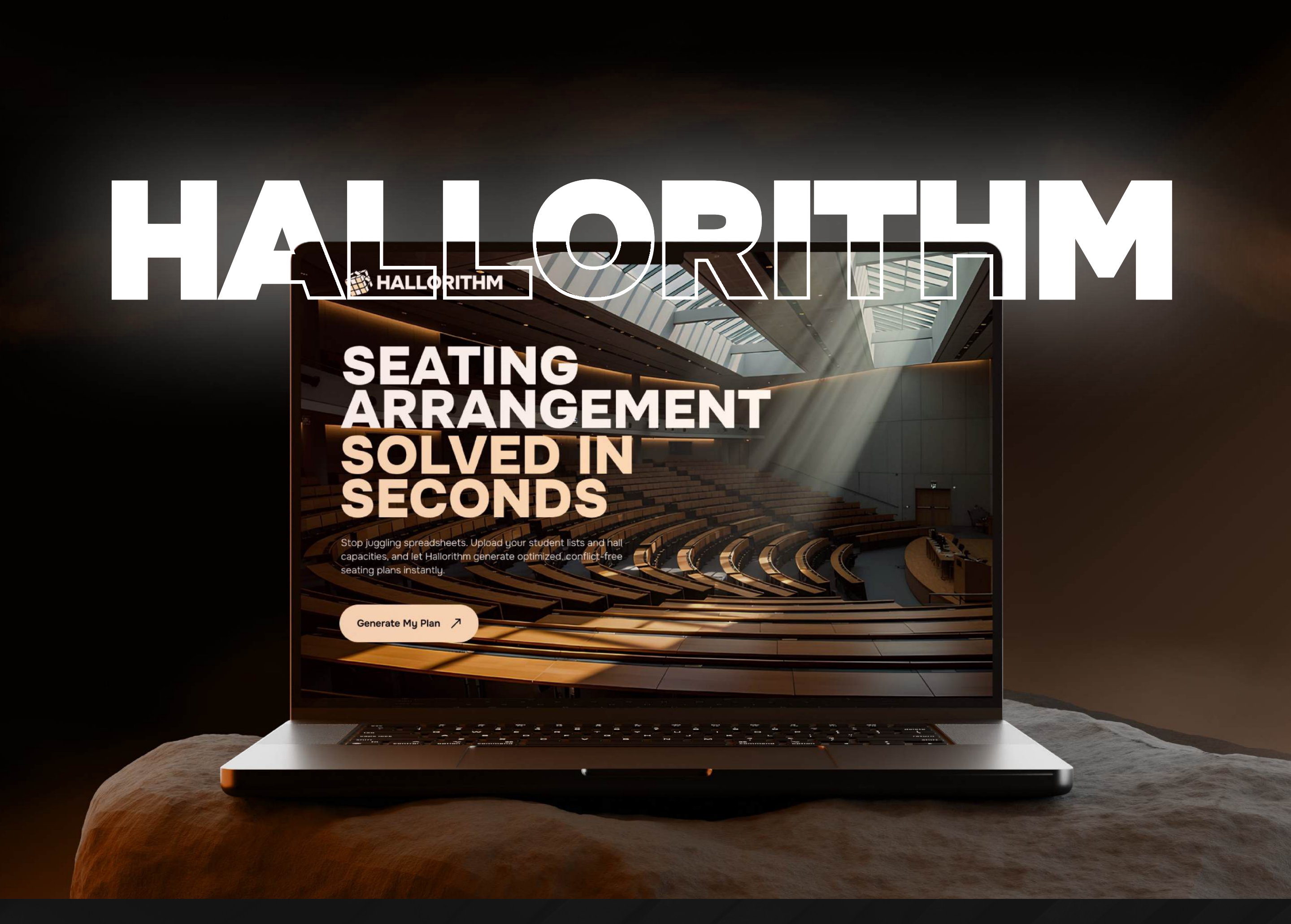


HALLORITHM

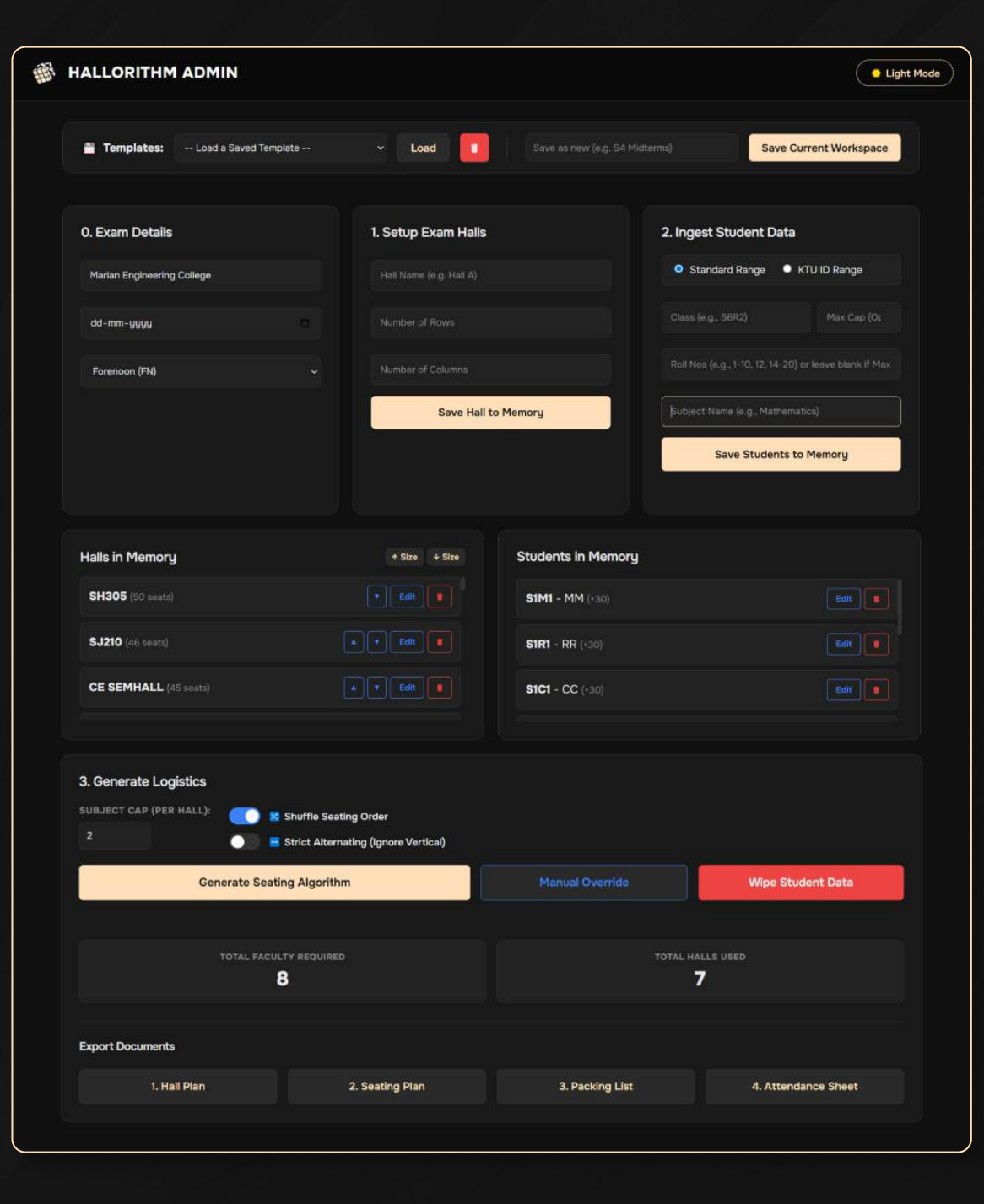
HALLORITHM
SEATING ARRANGEMENT SOLVED IN SECONDS
Stop juggling spreadsheets. Upload your student lists and hall capacities, and let Hallorithm generate optimized, conflict-free seating plans instantly.
Generate My Plan

The Nightmare of Manual Logistics

Examination sections in engineering colleges face a recurring administrative nightmare: **manually allocating** hundreds of students across multiple halls while guaranteeing that no two adjacent students share the same question paper. Legacy systems rely on rigid, outdated algorithms or manual spreadsheet entry, leading to inefficient room usage, fragmented data, and **high risks of academic malpractice.**

The Algorithmic Cure

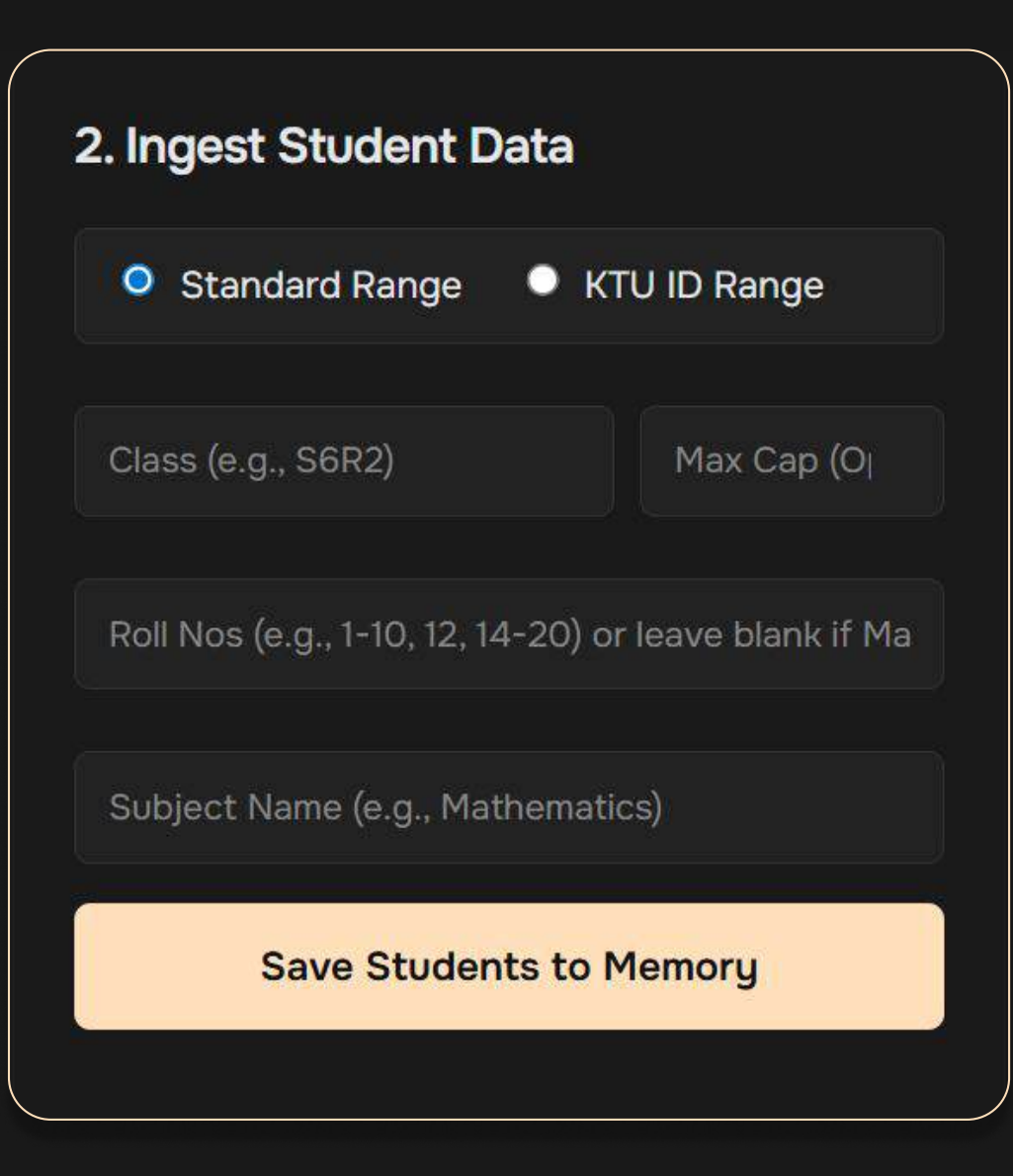
Hallorithm is a self-contained, automated seating arrangement system built to eliminate spreadsheet fatigue. Powered by a custom greedy checkerboard interleaving algorithm, the web application guarantees **zero-conflict seating** in milliseconds. With features like dynamic hall configurations, KTU ID parsing, and one-click generation of print-ready official PDF documents, Hallorithm transforms an hours-long logistical headache into a **seamless digital experience**.



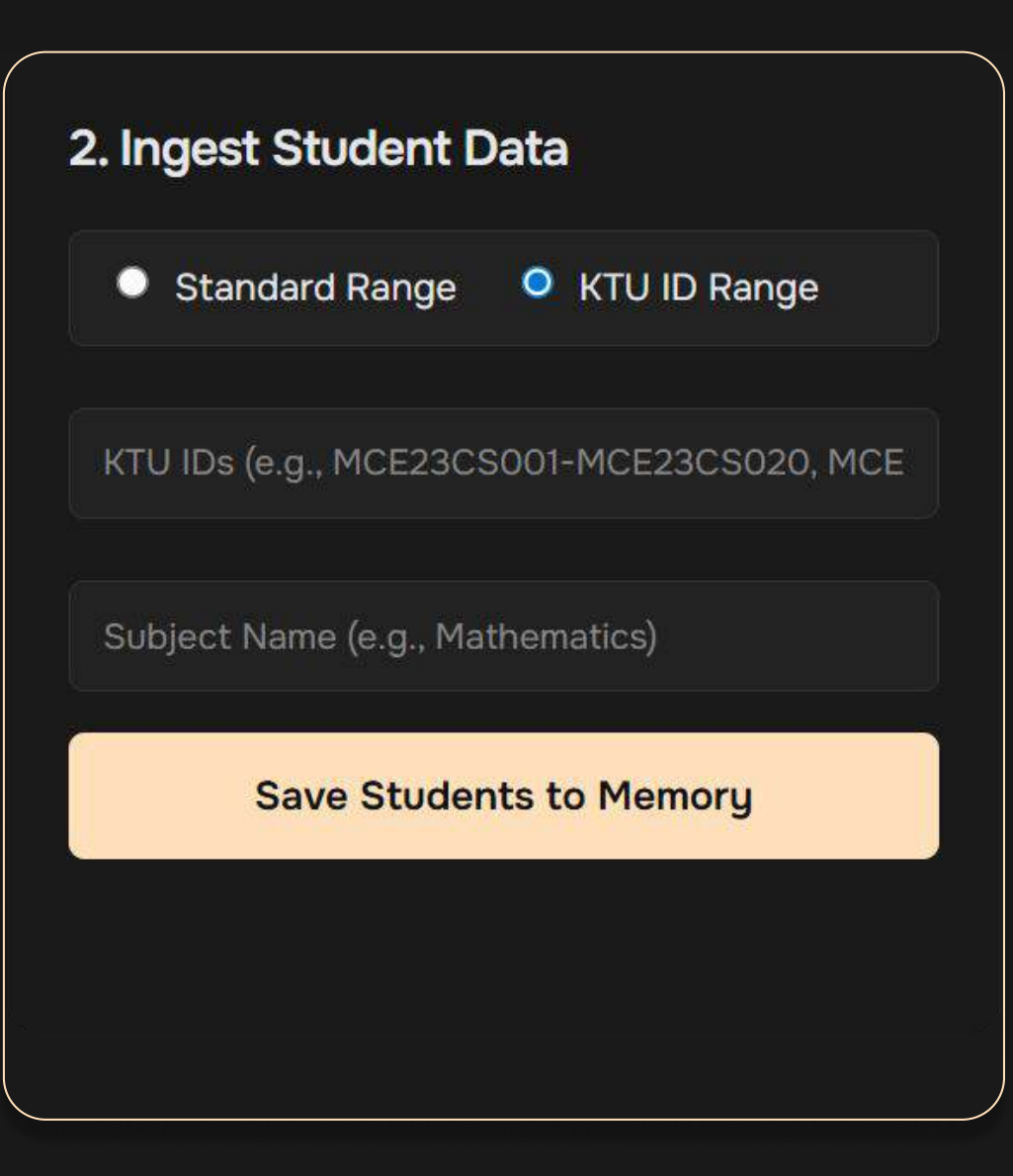
HALLORITHM ADMIN
Light Mode
Templates:
-- Load a Saved Template --
Load
Save as new (e.g. S4 Midterms)
Save Current Workspace
0. Exam Details
1. Setup Exam Halls
Hall Name (e.g. Hall A)
Number of Rows
Number of Columns
Save Hall to Memory
2. Ingest Student Data
Standard Range
KTU ID Range
Class (e.g., S6R2)
Max Cap (O)
Roll Nos (e.g., 1-10, 12, 14-20) or leave blank if Max
Subject Name (e.g., Mathematics)
Save Students to Memory
Halls in Memory
Students in Memory
3. Generate Logistics
SUBJECT CAP (PER HALL):
Shuffle Seating Order
Strict Alternating (Ignore Vertical)
Generate Seating Algorithm
Manual Override
Wipe Student Data
TOTAL FACULTY REQUIRED
TOTAL HALLS USED
Export Documents
1. Hall Plan
2. Seating Plan
3. Packing List
4. Attendance Sheet

Marian Engineering College
dd-mm-yyyy
Forenoon (FN)
SH305 (50 seats)
SJ210 (46 seats)
CE SEMHALL (45 seats)
S1M1 - MM (+30)
S1R1 - RR (+30)
S1C1 - CC (+30)
SUBJECT CAP (PER HALL): 2
TOTAL FACULTY REQUIRED 8
TOTAL HALLS USED 7

Frictionless Data Entry



2. Ingest Student Data
● Standard Range
○ KTU ID Range
Class (e.g., S6R2)
Max Cap (O
Roll Nos (e.g., 1-10, 12, 14-20) or leave blank if Ma
Subject Name (e.g., Mathematics)
Save Students to Memory

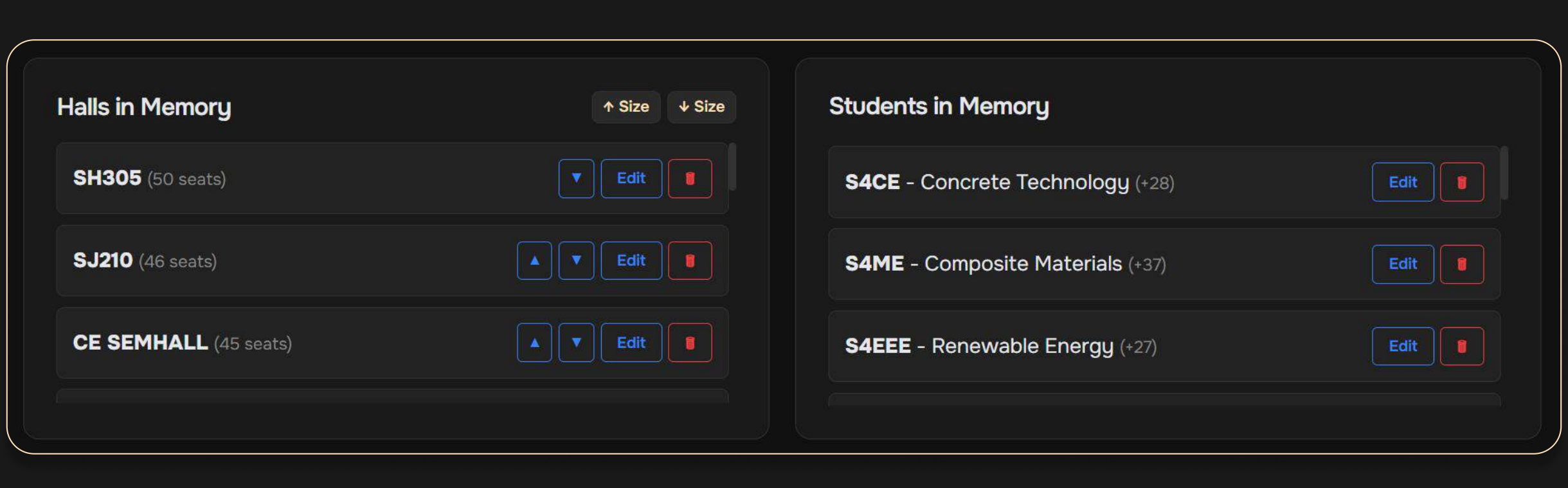


2. Ingest Student Data
○ Standard Range
● KTU ID Range
KTU IDs (e.g., MCE23CS001-MCE23CS020, MCE
Subject Name (e.g., Mathematics)
Save Students to Memory

A great algorithm is useless if gettingdata into it is a chore. Hallorithm's ingestion engine is built for speed and flexibility, supporting two distinct input modes:

- **Standard Range Mode:** Automatically parses ranges (e.g., "1-45") and individual comma-separated rolls, intelligently zero-padding numbers to match class prefixes.
- **KTU ID Range Mode:** Purpose-built for Kerala Technological University, this mode seamlessly parses continuous alphanumeric university ID blocks (e.g., "MCE23CS001-MCE23CS060") into individual student records.

Persistent, Live-Updating Workspaces



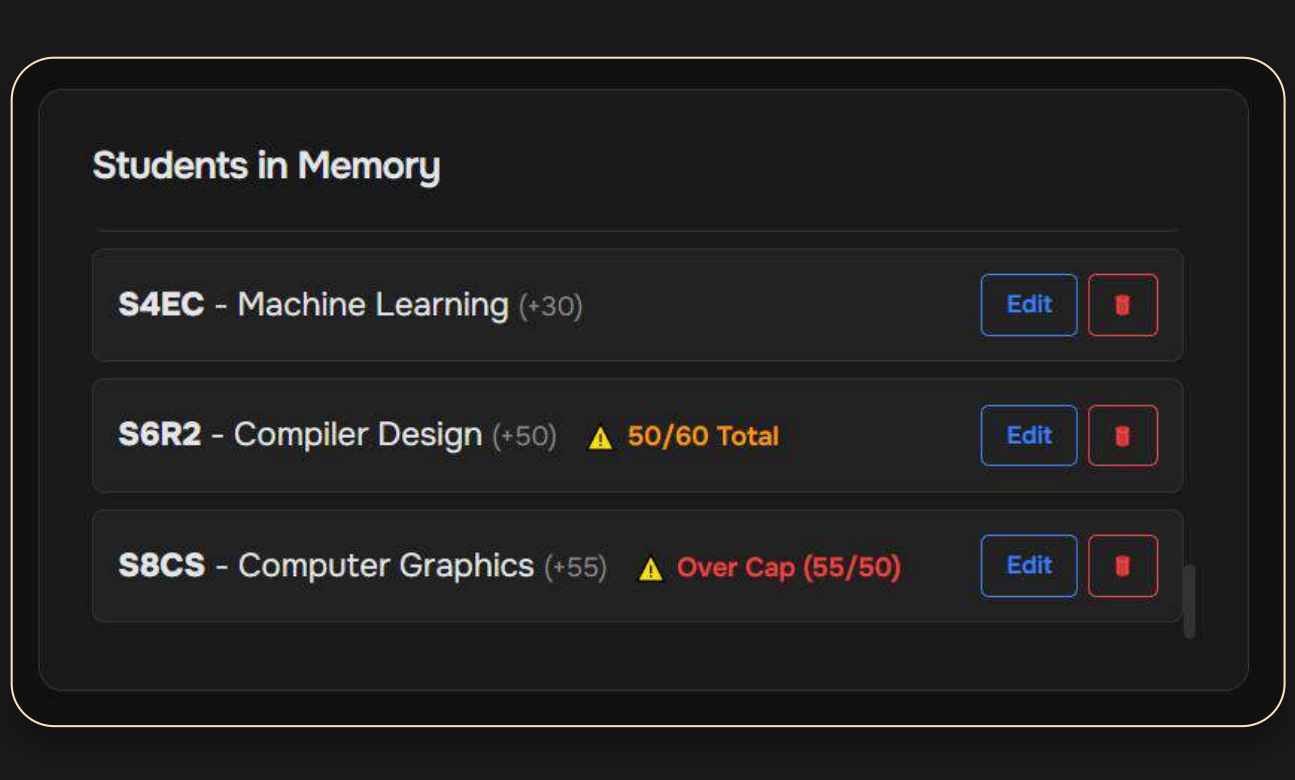
Halls in Memory
↑ Size
↓ Size
Edit
Students in Memory
Edit

SH305 (50 seats)
SJ210 (46 seats)
CE SEMHALL (45 seats)

S4CE - Concrete Technology (+28)
S4ME - Composite Materials (+37)
S4EEE - Renewable Energy (+27)

To prevent the frustration of repetitive data entry, Hallorithm operates on an embedded SQLite database. Hall configurations and student batches are saved to persistent memory panels that update in real-time.

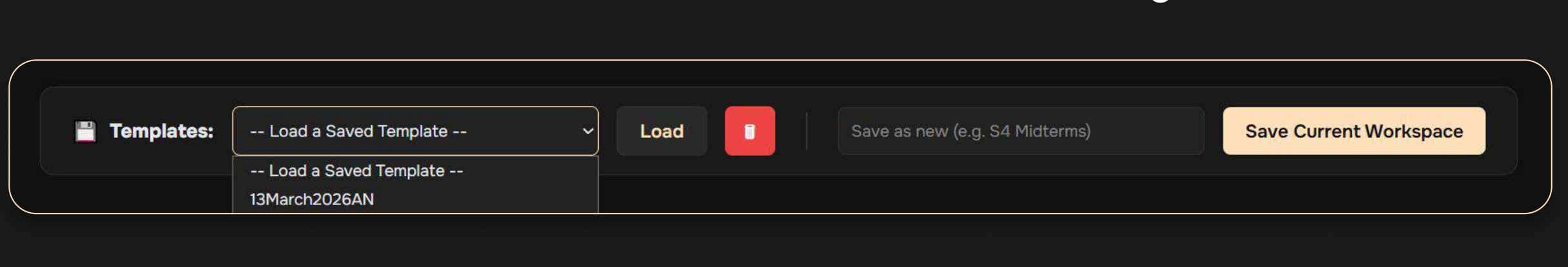
- **Smart Sorting:** Halls can be dynamically reordered or auto-sorted by capacity to optimize the fill sequence.
- **Capacity Warnings:** The system actively monitors student counts against predefined class capacities, throwing dynamic visual warnings if a batch is over-capacity or missing students.



Students in Memory
Edit

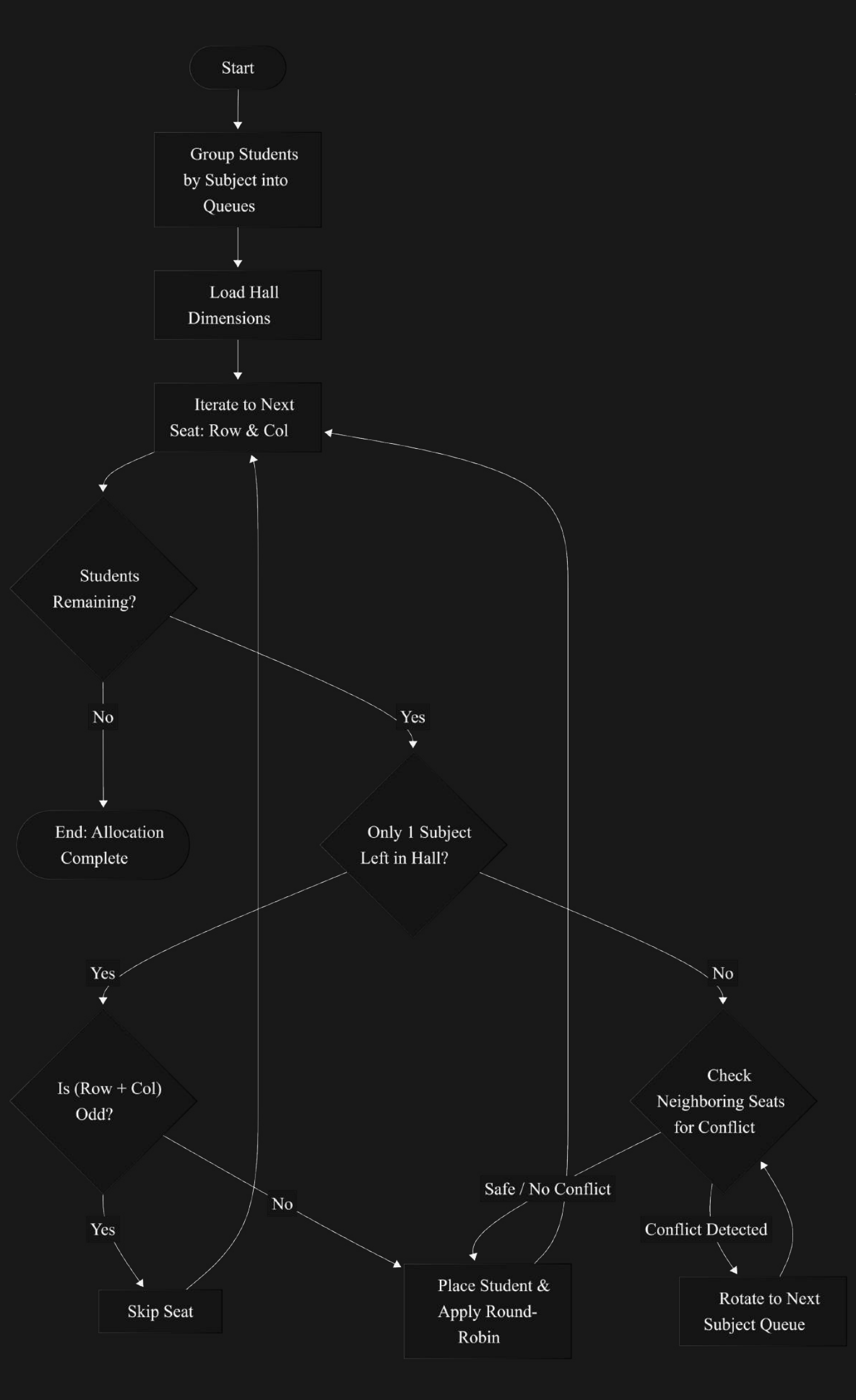
S4EC - Machine Learning (+30)
S6R2 - Compiler Design (+50) ⚠ 50/60 Total
S8CS - Computer Graphics (+55) ⚠ Over Cap (55/50)

- **Template Snapshots:** Coordinators can freeze their entire workspace as a "Preset" and load it for future midterms or finals with a single click.



Templates:
-- Load a Saved Template --
-- Load a Saved Template --
13March2026AN
Load
Save as new (e.g. S4 Midterms)
Save Current Workspace

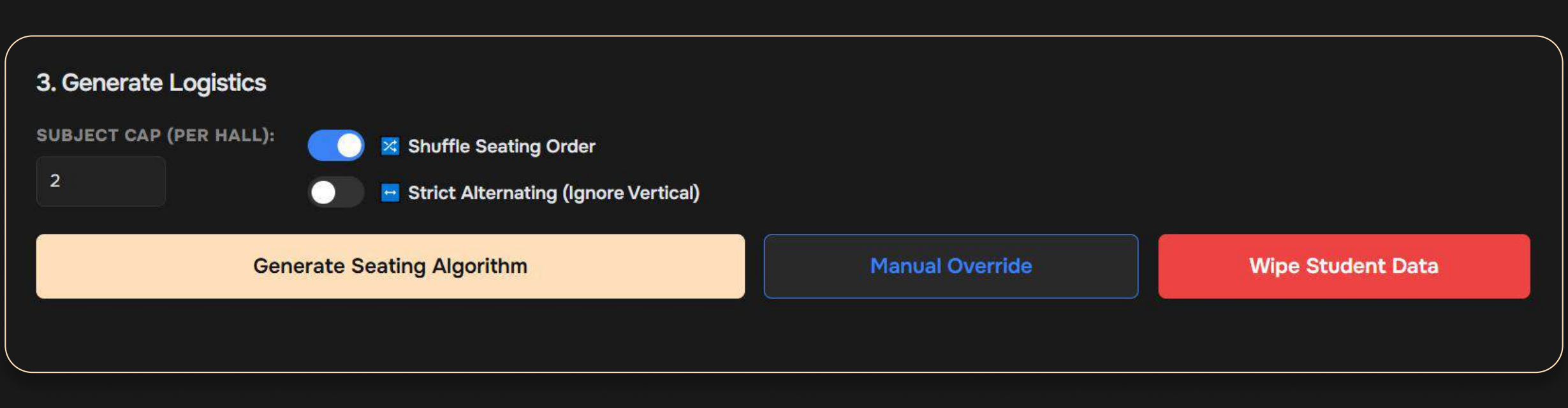
Zero-Conflict by Design



Start
Group Students by Subject into Queues
Load Hall Dimensions
Iterate to Next Seat: Row & Col
Students Remaining?
No
Yes
End: Allocation Complete
Only 1 Subject Left in Hall?
Yes
No
Is (Row + Col) Odd?
Check Neighboring Seats for Conflict
Yes
No
Safe / No Conflict
Conflict Detected
Skip Seat
Place Student & Apply Round-Robin
Rotate to Next Subject Queue

At the core of Hallorithm is a mathematically rigorous allocation engine designed to neutralize cheating while maximizing hall space.

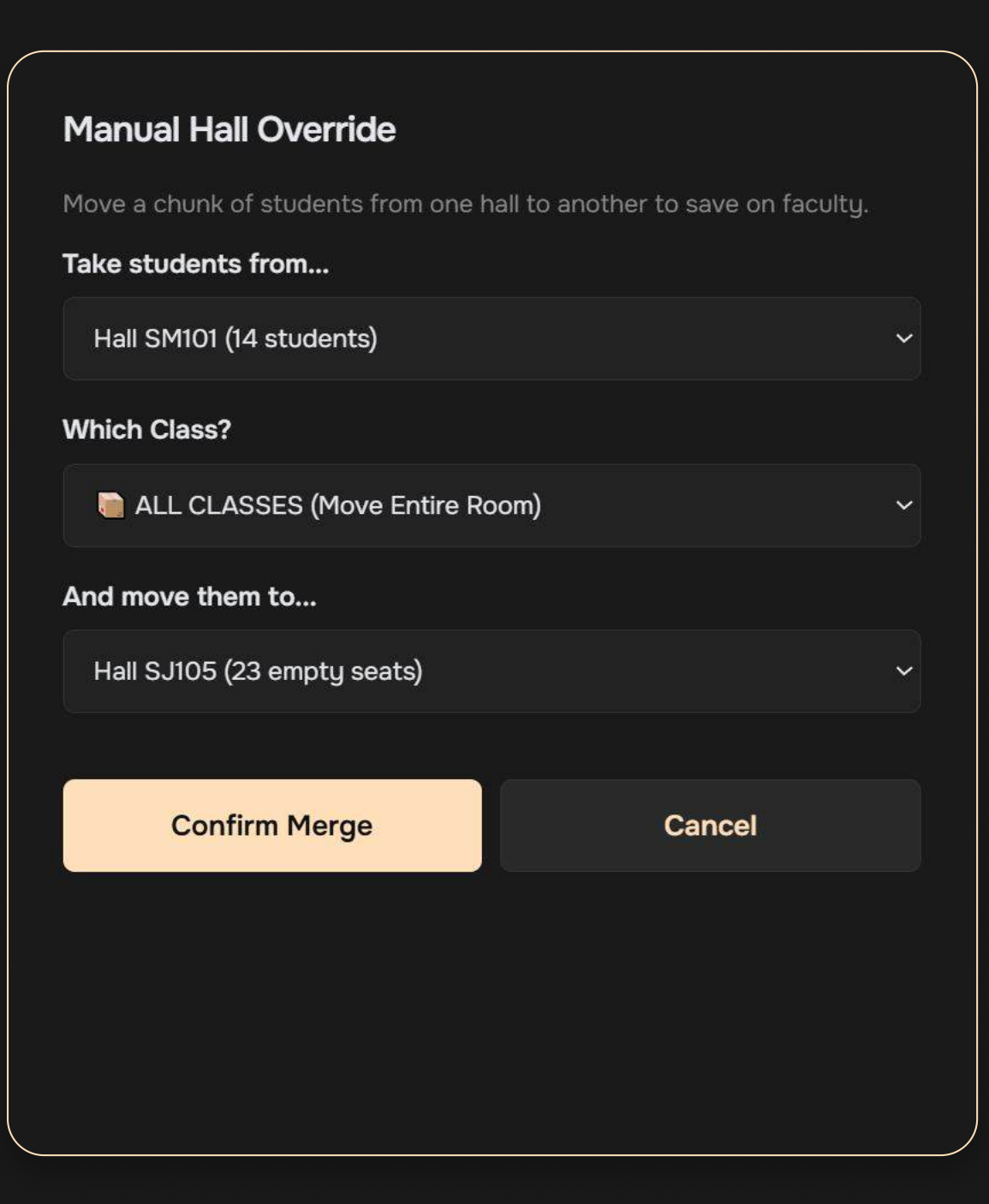
- **Round-Robin Interleaving:** The engine utilizes O(1) subject queues, continuously rotating through active subjects to guarantee that no two horizontally or vertically adjacent seats contain students from the same batch.
- **Strict Alternating (Long-Bench Failsafe):** To accommodate real-world physical constraints like long continuous benches, coordinators can toggle "Strict Alternating." This instructs the algorithm to ignore verticality and enforce a pure, horizontal 1-2-1-2 subject alternation.
- **Subject Caps:** Granular control allows coordinators to strictly lock the maximum number of distinct subjects allowed in any single hall.



3. Generate Logistics
Shuffle Seating Order
Strict Alternating (Ignore Vertical)
Generate Seating Algorithm
Manual Override
Wipe Student Data

SUBJECT CAP (PER HALL): 2

Human-in-the-Loop Override



Manual Hall Override

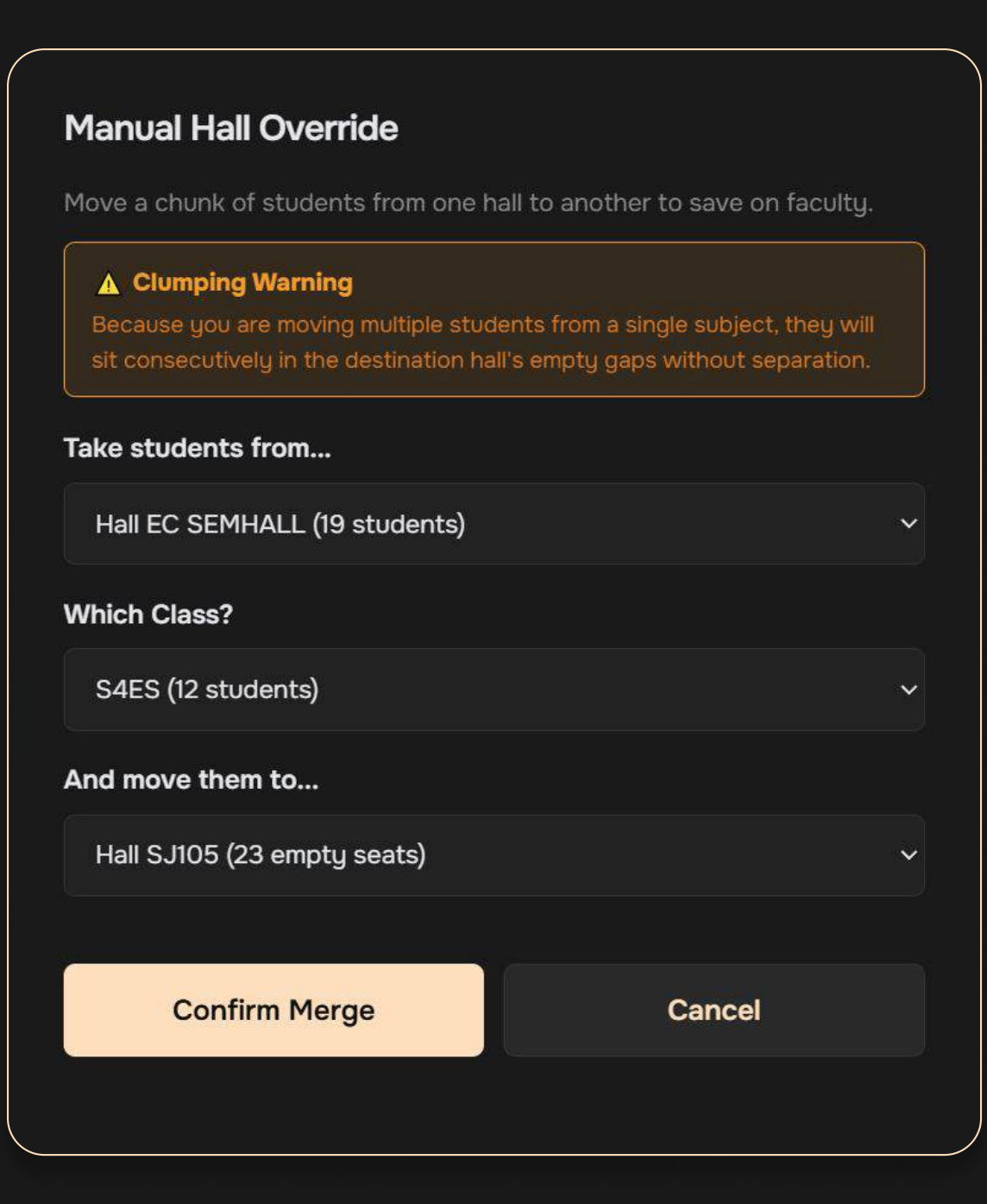
Move a chunk of students from one hall to another to save on faculty.

Take students from... Hall SM101 (14 students)

Which Class? ALL CLASSES (Move Entire Room)

And move them to... Hall SJ105 (23 empty seats)

Confirm Merge
Cancel



Manual Hall Override

Move a chunk of students from one hall to another to save on faculty.

⚠ Clumping Warning

Because you are moving multiple students from a single subject, they will sit consecutively in the destination hall's empty gaps without separation.

Take students from... Hall EC SEMHALL (19 students)

Which Class? S4ES (12 students)

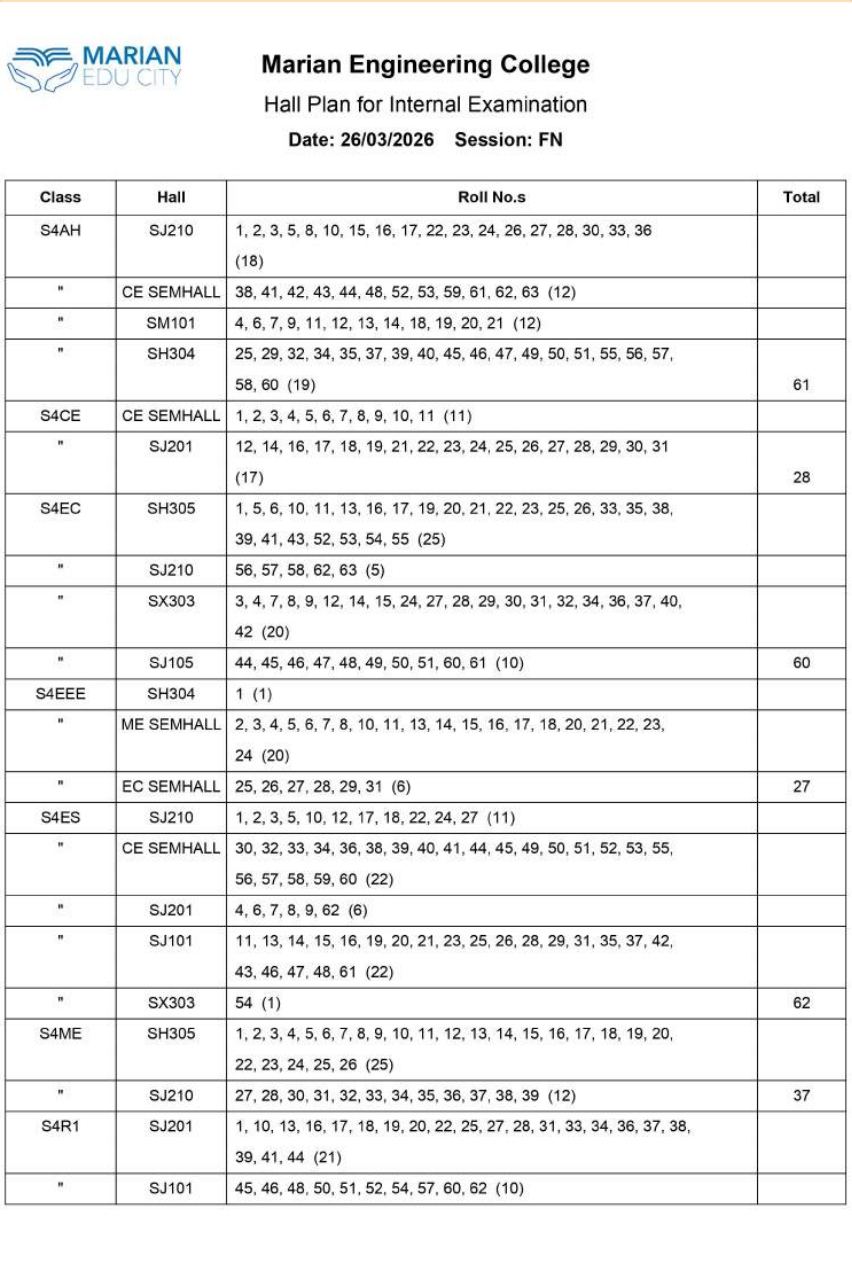
And move them to... Hall SJ105 (23 empty seats)

Confirm Merge
Cancel

- **Move Entire Rooms:** The system allows for bulk extraction—moving an entire room's worth of multi-subject students and automatically interleaving them into the empty seats of a destination hall.
- **Dynamic Clumping Warnings:** If a user attempts a risky move—such as dropping multiple students of the same subject into a hall—the UI dynamically detects the anti-cheating violation and flashes a "Clumping Warning" before the merge is confirmed.

Print-Ready in One Click

The ultimate goal of the system is the physical output. Instead of wrestling with Word templates, Hallorithm's stateless FPDF2 engine reads the finalized JSON allocation and instantly generates the **four official documents** required for university examinations:

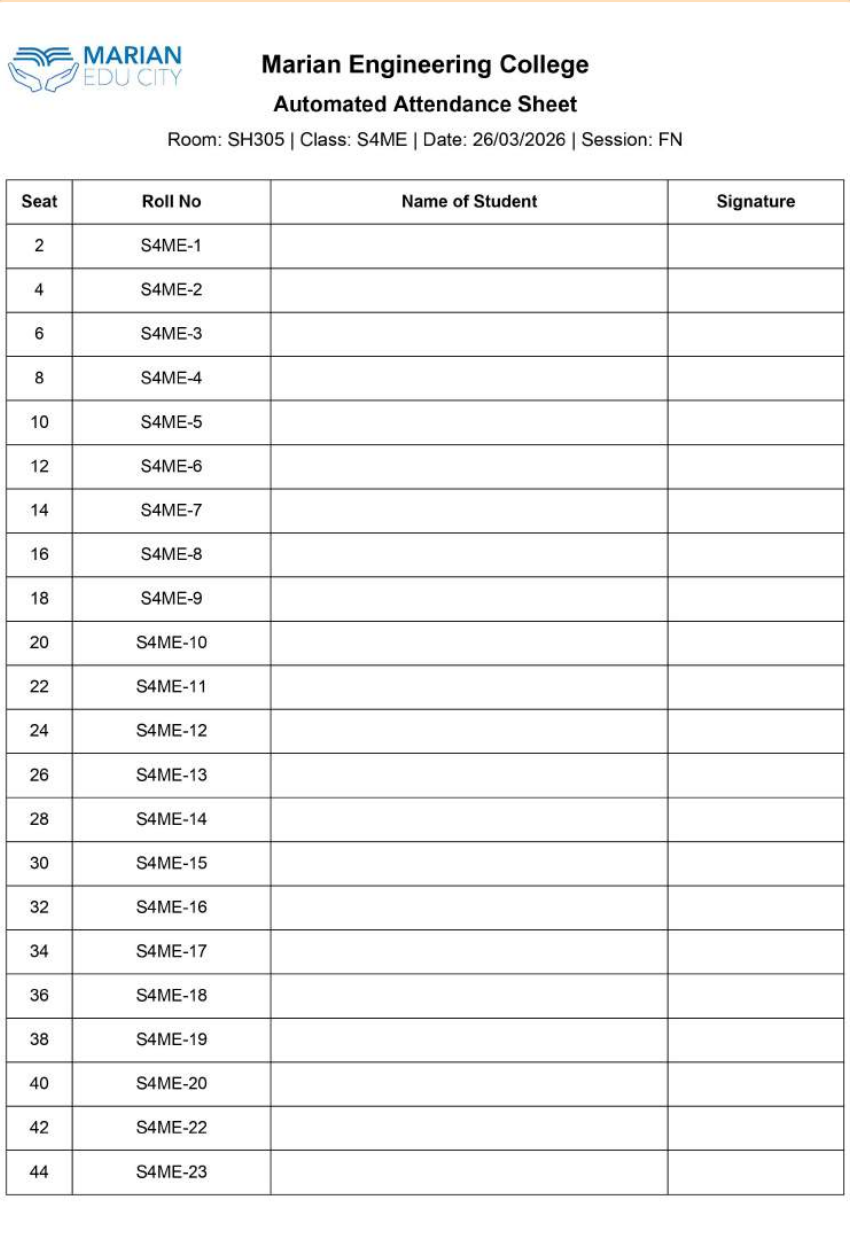


MARIAN EDU CITY

Marian Engineering College
Hall Plan for Internal Examination
Date: 26/03/2026 Session: FN

Class	Hall	Roll No.s	Total
S4AH	SJ210	1, 2, 3, 5, 8, 10, 15, 16, 17, 22, 23, 24, 26, 27, 28, 30, 33, 36 (18)	
"	CE SEMHALL	38, 41, 42, 43, 44, 48, 52, 53, 59, 61, 62, 63 (12)	
"	SM101	4, 6, 7, 9, 11, 12, 13, 14, 18, 19, 20, 21 (12)	
"	SH304	25, 29, 32, 34, 35, 37, 39, 40, 45, 46, 47, 49, 50, 51, 55, 56, 57, 58, 60 (19)	61
S4CE	CE SEMHALL	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 (11)	
"	SJ201	12, 14, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31 (17)	28
S4EC	SH305	1, 5, 6, 10, 11, 13, 16, 17, 19, 20, 21, 22, 23, 25, 26, 33, 35, 38, 39, 41, 43, 52, 53, 54, 55 (25)	
"	SJ210	56, 57, 58, 62, 63 (5)	
"	SX303	3, 4, 7, 8, 9, 12, 14, 15, 24, 27, 28, 29, 30, 31, 32, 34, 36, 37, 40, 42 (20)	
"	SJ105	44, 45, 46, 47, 48, 49, 50, 51, 60, 61 (10)	60
S4EEE	SH304	1 (1)	
"	ME SEMHALL	2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24 (20)	
"	EC SEMHALL	25, 26, 27, 28, 29, 31 (6)	27
S4ES	SJ210	1, 2, 3, 5, 10, 12, 17, 18, 22, 24, 27 (11)	
"	CE SEMHALL	30, 32, 33, 34, 36, 38, 39, 40, 41, 44, 45, 49, 50, 51, 52, 53, 55, 56, 57, 58, 59, 60 (22)	
"	SJ201	4, 6, 7, 8, 9, 62 (6)	
"	SJ101	11, 13, 14, 15, 16, 19, 20, 21, 23, 25, 26, 28, 29, 31, 35, 37, 42, 43, 46, 47, 48, 61 (22)	
"	SX303	54 (1)	62
S4ME	SH305	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26 (25)	
"	SJ210	27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39 (12)	37
S4R1	SJ201	1, 10, 13, 16, 17, 18, 19, 20, 22, 25, 27, 28, 31, 33, 34, 36, 37, 38, 39, 41, 44 (21)	
"	SJ101	45, 46, 48, 50, 51, 52, 54, 57, 60, 62 (10)	

The Hall Plan: A master summary for the Examination Controller featuring algorithmically compressed roll-number ranges.

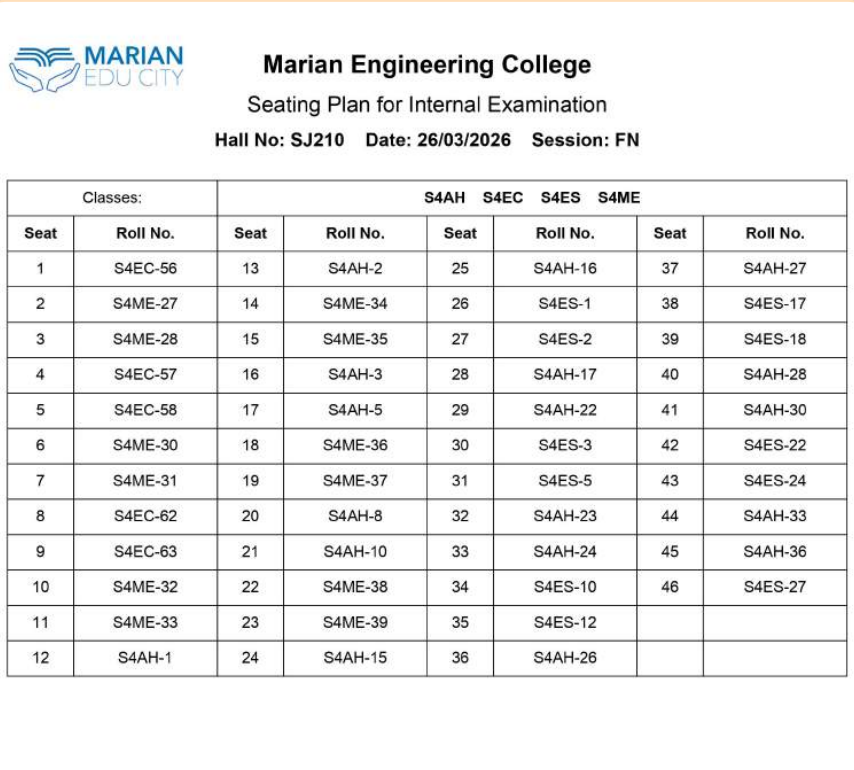


MARIAN EDU CITY

Marian Engineering College
Automated Attendance Sheet
Room: SH305 | Class: S4ME | Date: 26/03/2026 | Session: FN

Seat	Roll No	Name of Student	Signature
2	S4ME-1		
4	S4ME-2		
6	S4ME-3		
8	S4ME-4		
10	S4ME-5		
12	S4ME-6		
14	S4ME-7		
16	S4ME-8		
18	S4ME-9		
20	S4ME-10		
22	S4ME-11		
24	S4ME-12		
26	S4ME-13		
28	S4ME-14		
30	S4ME-15		
32	S4ME-16		
34	S4ME-17		
36	S4ME-18		
38	S4ME-19		
40	S4ME-20		
42	S4ME-22		
44	S4ME-23		

Automated Attendance Sheets: Pre-filled signature sheets sorted sequentially by roll number for every specific class inside a hall.

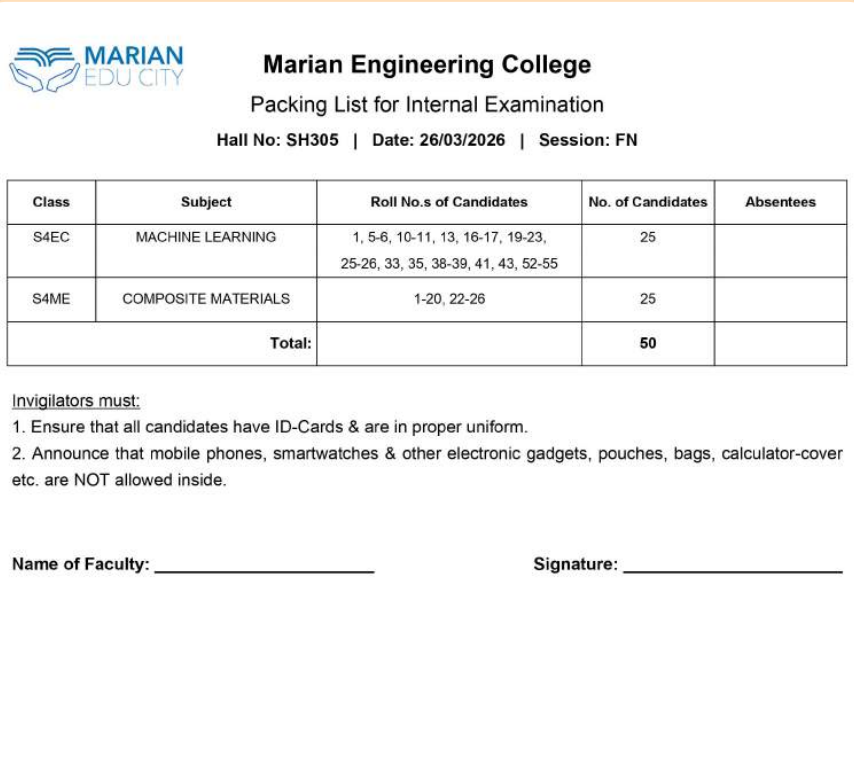


MARIAN EDU CITY

Marian Engineering College
Seating Plan for Internal Examination
Hall No: SJ210 Date: 26/03/2026 Session: FN

Classes:		S4AH S4EC S4ES S4ME					
Seat	Roll No.	Seat	Roll No.	Seat	Roll No.	Seat	Roll No.
1	S4EC-56	13	S4AH-2	25	S4AH-16	37	S4AH-27
2	S4ME-27	14	S4ME-34	26	S4ES-1	38	S4ES-17
3	S4ME-28	15	S4ME-35	27	S4ES-2	39	S4ES-18
4	S4EC-57	16	S4AH-3	28	S4AH-17	40	S4AH-28
5	S4EC-58	17	S4AH-5	29	S4AH-22	41	S4AH-30
6	S4ME-30	18	S4ME-36	30	S4ES-3	42	S4ES-22
7	S4ME-31	19	S4ME-37	31	S4ES-5	43	S4ES-24
8	S4EC-62	20	S4AH-8	32	S4AH-23	44	S4AH-33
9	S4EC-63	21	S4AH-10	33	S4AH-24	45	S4AH-36
10	S4ME-32	22	S4ME-38	34	S4ES-10	46	S4ES-27
11	S4ME-33	23	S4ME-39	35	S4ES-12		
12	S4AH-1	24	S4AH-15	36	S4AH-26		

The Seating Plan: A visual, grid-based layout for students to locate their desks.



MARIAN EDU CITY

Marian Engineering College
Packing List for Internal Examination
Hall No: SH305 | Date: 26/03/2026 | Session: FN

Class	Subject	Roll No.s of Candidates	No. of Candidates	Absentees
S4EC	MACHINE LEARNING	1, 5-6, 10-11, 13, 16-17, 19-23, 25-26, 33, 35, 38-39, 41, 43, 52-55	25	
S4ME	COMPOSITE MATERIALS	1-20, 22-26	25	
	Total:		50	

Invigilators must:
1. Ensure that all candidates have ID-Cards & are in proper uniform.
2. Announce that mobile phones, smartwatches & other electronic gadgets, pouches, bags, calculator-cover etc. are NOT allowed inside.

Name of Faculty: ____________________ Signature: ____________________

The Packing List: Formatted data for the invigilator to verify question paper distributions.

Tech Stack & Architecture

Engineered for Institutional Deployment Hallorithm was intentionally architected to be a lightweight, self-contained powerhouse.

Frontend: Built with vanilla HTML5, CSS3, and JavaScript. No bulky frameworks or Node.js build tools required.

Backend: Powered by Python and Flask, exposing fast, RESTful API endpoints.

Database: Embedded SQLite ensures zero external network dependencies, making it deployable on highly restricted, offline institutional servers.

HALLORITHM

Hallorithm bridges the gap between complex algorithmic logic and user-centric design. The system proves that enterprise logistics software doesn't have to be clunky - it can be **fast, intelligent, and beautifully designed.**

Designed and Developed by

Jamshid Khan • Neeraj PS • Parthiv Shankar P • Thejus P Manoj