

Badminton Tournament Manager - Match Scheduling & Court Assignment (Priority 3)

Goal: Automatically create and manage match schedules and court assignments, ensuring fairness, rest, and efficiency.

Inputs:

Tournament	Dates, start/end times, venue, and courts
Draws	List of matches per round and category
Category Rules	Singles/Doubles, round durations, restrictions
Settings	Match duration, buffer, rest time, court priorities

Outputs:

- Schedule slots with court, start, and end times.
- Validation report for conflicts.
- Change logs for manual edits.

Constraints:

Hard: No overlapping player matches, court capacity = 1, round order, idempotency.
Soft: Balanced court use, rest preference, finals on main court.

Scheduling Flow:

1. Prepare Candidate Pool	Filter matches by round/day and sort by dependencies.
2. Generate Time Grid	Compute available slots per court minus locked matches and buffers.
3. Assign Matches	Choose feasible court/time based on rest, balance, and priorities.
4. Backtracking Light	Attempt local swaps if conflict arises.
5. Finalize & Lock	Allow organizers to freeze confirmed matches.

Admin UI Overview:

A Gantt-style board shows courts as lanes and matches as cards with category colors, rest indicators, and lock icons.

Sample Visualization:

Below is a conceptual layout of match scheduling per court.

Court 1	9:00 - Match #12	9:45 - Match #34	10:30 - Match #55
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Court 2	9:00 - Match #22	9:50 - Match #33	10:40 - Match #61
Court 3	9:00 - Match #13	9:40 - Match #41	10:20 - Match #62

Testing Criteria:

- 1. No player or court overlaps.
- 2. Enforce minimum rest time.
- 3. Stable results for same input (idempotent).
- 4. Partial regeneration keeps locked matches unchanged.
- 5. Handles delays gracefully.

Future Enhancements:

Later phases may include AI-based optimization, live updates, and predictive rescheduling based on delays.