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**Describing design and code**

This Prolog program generates a valid schedule for a sports tournament with 30 teams divided into 6 groups. The code defines the teams in each group and includes predicates to generate a schedule, schedule group matches, and validate the schedule based on specific constraints.

The main components of the code are:

* Defining the teams in each group: This section specifies the teams in each of the 6 groups.
* schedule: This predicate generates a schedule S by finding all possible combinations of matches (group, team A, team B, day) that satisfy the scheduling constraints.
* schedule\_group: This predicate schedules group matches by selecting two teams from a given group and calculating the day on which the match will be played. The day calculation is based on the group number and team numbers.
* valid\_schedule: This predicate checks if a given schedule S is valid by ensuring that:
* There are no more than 3 matches on any day (max\_day\_limit)
* Each team has the same number of home and away fixtures (equal\_home\_away\_fixtures)
* There are at least 4 rest days between fixtures for each team (rest\_days\_between\_fixtures)
* Helper predicates like day\_match, home\_team, away\_team, has\_insufficient\_rest are used to filter, search, or manipulate the schedule.
* main: This is the main program that generates the schedule, sorts it, and writes the sorted schedule to the output.

**The output**

Each tuple in the list contains the following information:

* Group number: The group to which the competing teams belong.
* Team A: The first team competing in the match.
* Team B: The second team competing in the match.
* Day: The day on which the match is scheduled.

In summary, the code defines teams in groups, generates a schedule, and ensures that the schedule meets specific conditions like the maximum number of matches per day, equal home and away fixtures, and rest days between fixtures.