GROUP1

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REPORT

Chosen Representation: Binary Tree using Pointer-Based Nodes Rationale.

We used a pointer-based binary tree because each match naturally had two children (left and right team). Using Node* pointers makes it easy to link matches, build rounds, and propagate winners upward in the tree.

```
=== Round 1 ===
Match 1: Team A vs Team B -> Winner: Team A
Match 2: Team C vs Team D -> Winner: Team D
Match 3: Team E vs Team F -> Winner: Team F
Match 4: Team G vs Team H -> Winner: Team H
```

1. ROUND1: has 8 players, forming 4 leaf matches.
    Each winner moves up to Round 2 through propagation.

```
=== Round 2 ===
Match 5: Team A vs Team D -> Winner: Team A
Match 6: Team F vs Team H -> Winner: Team H
```

2. ROUND2: The winners from Round 1 become the inputs for Match 5 and Match 6 (the semifinals).
    The winners (Team A and Team H) propagate to the final match.

ROUND3

```
=== Round 3 ===
Match 7: Team A vs Team H -> Winner: Team H

Overall Winner: Team H
```

3. The last: match determines the overall champion.
    Team H wins the tournament.
5. Path to Final:
    Example:
    - TeamA: match1->match5->final
    - TeamF: match3->match6->final

Validation Rules:

1. Each match must have two players before entering a winner.
2. A match cannot be updated again once a winner is assigned.
3. Players must exist somewhere in the bracket before you can record their match result.
4. "WouldMeet" only works if the two players are in different subtrees of the root.

Propagation Logic:

1. When a match gets a winner, that winner must be moved to the parent match.
2. The function `proWinner(node, winnerName)` updates the parent match automatically.
3. It finds the parent using `findParent(root, node)`, searching the tree from the root downward.
4. If the winner comes from the left child, it fills `pL`. If from the right, it fills `pR`.
5. If one player is `"BYE"`, the other player auto-advances and propagation continues upward.
6. This process repeats until the winner reaches the final match (the root).