

# 1 Repartition of teams for the competition

## 1.1 Preliminary ordering teams

In order to avoid early confrontations between the best teams of each league, since there are no preliminary phases for the competition, teams are ordered according to their performance during the previous year competition. The order is specific to each league.

Since the ranking are not strict, teams with similar performances on the previous year are considered as equivalent and their order is chosen randomly. Team are considered to have similar performances if they reached the same phase during the knock-out stage. In case a team did not participate in the knock-out stage, its ranking is based on its group ranking during the last group stage. Teams which did not compete previous year are all considered as having similar performances and are ranked after all teams competing during the previous year.

The preliminary phase results in a strictly ordered list of teams, from 1 to  $n$ , with 1 the favorite team.

An example of preliminary order is given in Table 1. In this example, four teams who participated previous year did not register this year and three new teams were registered. Teams with different performances are separated by an horizontal line. Attribution follows the following procedure :

1. Rank 1 is attributed to team A who won last year.
2. Rank 2 is attributed to team B who reached second place last year.
3. Rank 3 is attributed to team C who reached third place last year.
4. The ranks 4,5,6 are attributed randomly to teams E,F and H who all reached quarter finals previous year.
5. The ranks 7 to 12 are attributed randomly to teams I,J,K,M,N and P (they all reached quarter finals).
6. The ranks 13 to 15 are attributed randomly to the three new teams : Q,R and S.

## 1.2 Group stage

During the group stage, also called pool stage, all the teams are separated in small groups and play a round robin tournament to establish a ranking inside each group. All teams belonging to the same group play once against each other. A team scores three points per win, one point per draw and zero point per loss.

At the end of a group stage, teams are ranked according to the following based on (in decreasing priority) :

1. the number of earned points,
2. the goal-difference,
3. the absolute number of goals,
4. the result of a direct match,
5. the time needed to score a penalty into an empty goal (up to five alternating attempts to score, until at least one team scored),
6. the drawing of a lot.

The repartition of teams inside the different groups follows the snake rules, see Table 2. Note that if the number of teams participating is not a multiple of the number of groups, some groups might contain one more team than others.

The number of games in a group of  $p$  player is  $\frac{p(p-1)}{2}$ .

TABLE 1 – Preliminary ordering : example

Team name	Previous year result	preliminary rank
Team A	1st	1
Team B	2nd	2
Team C	3rd	3
Team D	4th	Not registered
Team E	quarter finals	6
Team F	quarter finals	4
Team G	quarter finals	Not registered
Team H	quarter finals	5
Team I	Round of 16	9
Team J	Round of 16	10
Team K	Round of 16	7
Team L	Round of 16	Not registered
Team M	Round of 16	12
Team N	Round of 16	8
Team O	Round of 16	Not registered
Team P	Round of 16	11
Team Q	Not participating	15
Team R	Not participating	13
Team S	Not participating	14

TABLE 2 – Repartition of teams in  $k$  groups of 4

Group 1	Group 2	...	Group $k - 1$	Group $k$
1	2	...	$k - 1$	$k$
$2k$	$2k - 1$	...	$k + 2$	$k + 1$
$2k + 1$	$2k + 2$	...	$3k - 1$	$3k$
$4k$	$4k - 1$	...	$3k + 2$	$3k + 1$

### 1.3 Knock-out stage

The knock-out stage is based on multiple rounds. During a round each qualified team plays once and only the winner is qualified for the next stage. Note that during the first round of a knock-out stage with  $n$  teams, there can be teams automatically qualified automatically if there is no  $k \in \mathbb{N}$  such as  $2^k = n$ .

In the knock-out games of a tournament two further equal periods of 5 minutes each are played if the game is not decided after the regular playing time. If during regular playing time none of the two teams in a knock-out match was able to kick the ball to reach their respective opponent's goal the extra time is skipped and the game immediately continues by the five alternating penalty kick trials. If both teams agree, the regular penalty kick trials may be skipped and the extended penalty kick procedure applies instead.

The number of games during a knockout stage involving  $n$  teams is  $n$ , including the 3rd place game.

### 1.4 Multiple stage tournament

Tournaments in RoboCup Humanoid leagues use multiple stage tournament. First, teams are separated in groups using the snake method, see Table 2. Best teams of each groups are qualified for the knock-out stage. The number of teams per group and the number of teams

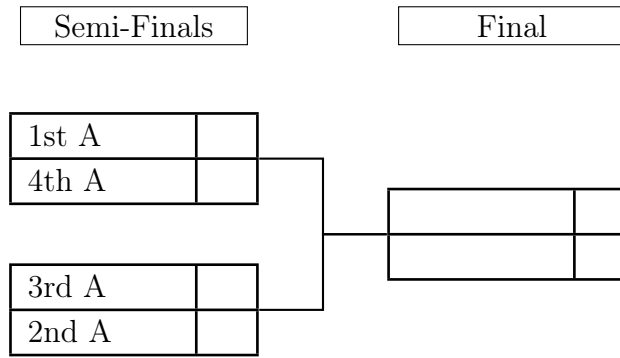


FIGURE 1 – Knock-out bracket for 1 group with 4 qualified per group

qualified are provided in Table 3. The number of games played during the competition is detailed in Table 4.

TABLE 3 – Number and size of groups depending on number of teams

Number of players	Number of groups	Group maximal size	Qualified per groups
4-7	1	4-7	4
8	2	4	4
9-10	2	5	4
11-12	2	6	4
13-16	4	4	4
17-20	4	5	4
21-23	4	6	4
24	8	3	2

Repartition of teams according to group position is provided in Figures 1, 2, 3, 4. The repartition scheme used ensures that during the knockout stage :

- If the first and the second player of the previous year are ranked first of their groups, they cannot play against each other before final.
- The first and the second player of any group cannot play against each other before final.

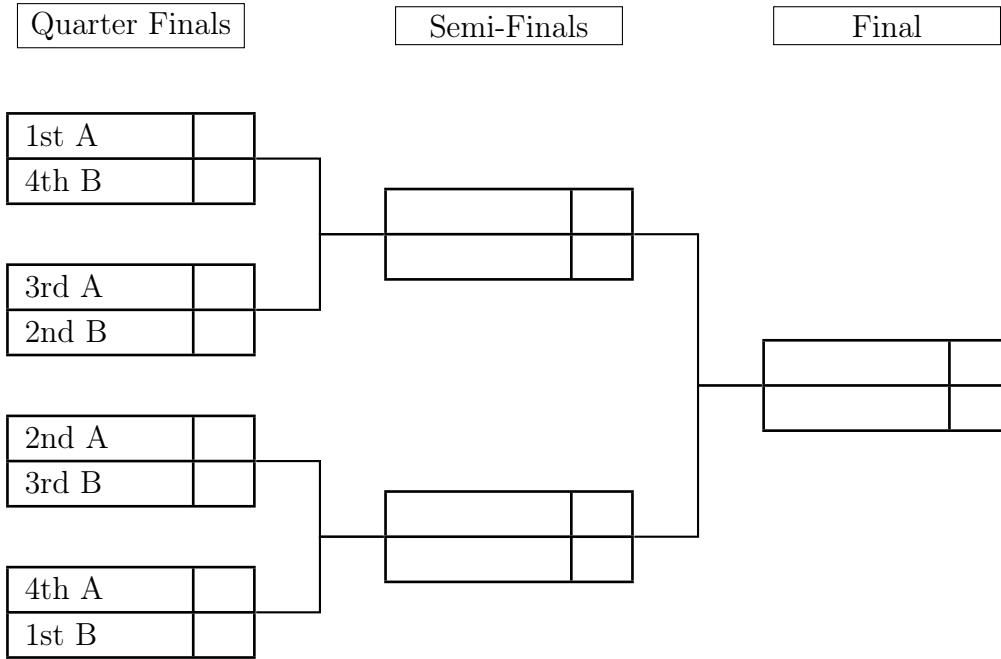


FIGURE 2 – Knock-out bracket for 2 groups and 4 qualified per group

TABLE 4 – Number of games depending on the number of teams

Number of players	Games per team	group games	knock-out games	total games
4	4-5	6	4	10
5	4-6	10	4	14
6	5-7	15	4	19
7	6-8	21	4	25
8	4-6	12	8	20
9	4-7	16	8	24
10	4-7	20	8	28
11	4-8	25	8	33
12	5-8	30	8	38
13	3-7	15	16	31
14	3-7	18	16	34
15	3-7	21	16	37
16	4-7	24	16	40
17	3-8	28	16	44
18	3-8	32	16	48
19	3-8	36	16	52
20	4-8	40	16	56
21	4-9	45	16	61
22	4-9	50	16	66
23	4-9	55	16	71
24	2-6	24	16	40

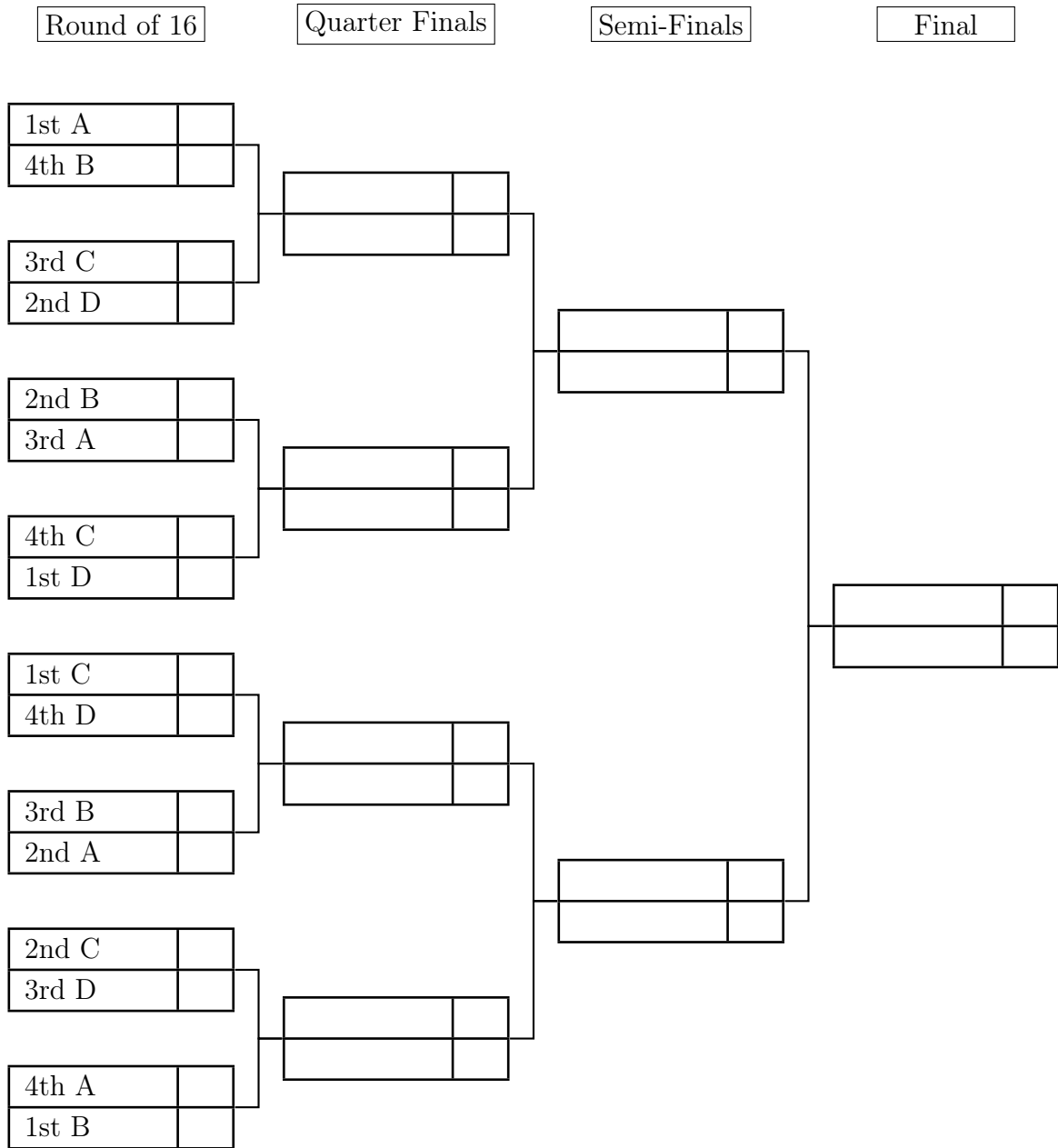


FIGURE 3 – Knock-out bracket for 4 groups and 4 qualified per group



FIGURE 4 – Knock-out bracket for 8 groups and 2 qualified per group