ICFP programming contest 2017
Futures (1.0)

ICFP programming contest organisers

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Punting is not just about flat-bottomed boats propelled by poles. As part of the setup phase, punters can now bid on the futures market in lambda routes. A future is a bet that the punter P will build a route from a mine M to a particular site S on the graph that is not a mine. Before the game begins, each punter may buy at most one future for each mine on the map.

Scoring At the end of the game, after calculating the score for routes in the usual way, the score for futures is added on.

If a future (P, M, S) is fulfilled (i.e., there is a route on P's rivers from M to S) at the end of the game, then P scores an additional $d \times d \times d$ points, where d is the length of the shortest route between M and S along any rivers (whether or not they have been claimed by P or any other punter).

If a future is not fulfilled at the end of the game, then P *loses* $d \times d \times d$ points, where d is the length of the shortest route between M and S along any rivers (whether or not they have been claimed by P or any other punter).

Changes to the Setup phase of the protocol Futures are sent from each punter to the server in the setup phase alongside the ready message as a list of pairs of site ids.

$$\begin{array}{ll} S \to P & \{\texttt{"punter"} : p, \texttt{"punters"} : n, \texttt{"map"} : \mathit{map}, \texttt{"settings"} : \mathit{settings}\} \\ P \to S & \{\texttt{"ready"} : p, \texttt{"futures"} : \mathit{futures}\} \end{array}$$

$$\mathit{settings} = \{\texttt{"futures"} : \mathsf{true}\}$$

$$\mathit{futures} \ : \ [\{\texttt{"source"} : \mathsf{SiteId}, \texttt{"target"} : \mathsf{SiteId}\}]$$

The `"settings"` and `"futures"` fields are additions to the messages in the **Setup** phase (described in Sections 4.3 and 4.4 of the main task description). The server indicates that futures are enabled by assigning the `"futures"` field the boolean value true in the `"settings"` field. If the `"settings"` field is absent then it is assumed that futures (and any other extensions) are disabled.

Whereas in the encoding of rivers it is not important which site is `"source"` and which is `"target"`, for futures this is important, as `"source"` must always be a mine and `"target"` must always not be a mine. Illformed futures will be ignored by the server. If more than one future is requested for the same mine, then all but the last are ignored by the server.