ICFP programming contest 2017
Options (1.0)

ICFP programming contest organisers

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Tony Hoare refers to null pointers as his billion-dollar mistake [1]. Option types, popularised by functional programming languages, provide a much cleaner alternative. This extension has nothing whatsoever to do with null pointers or option types!

In a standard lambda punter game, once a river is claimed by a punter, no other punter can use that river. With the Options extension, a second punter may buy an option to use a river already claimed by another punter. A punter is not allowed to buy the option on a river they have already claimed in the normal way. Each punter may buy up to n options during a game where n is the number of mines on the map. Only a single option is available for each river claimed by a punter, so that a river can be used by up to two punters in total (the owner and the option holder).

If the Splurges extension is also enabled, then the route of a splurge move may contain rivers claimed by another punter, providing the options for these rivers are still available. Each option on the route reduces the remaining options by one. Therefore, this splurge move is only valid if the number of options required for the route does not exceed the remaining options available to the punter.

Scoring   The rules for scoring are unaffected, but buying options may help to increase your score.

Changes to the protocol   Options are enabled when the `"settings"` message of the setup phase contains a boolean `"options"` field with the value set to true.

In order to support options, the Move data type (described in Section 4.2 of the main task description) is extended as follows:

$$\begin{aligned} \text{Move} = {} & \{\texttt{"claim"} : \{\texttt{"punter"} : \text{PunterId}, \texttt{"source"} : \text{SiteId}, \texttt{"target"} : \text{SiteId}\}\} \\ & \mid \{\texttt{"pass"} : \{\texttt{"punter"} : \text{PunterId}\}\} \\ & \mid \{\texttt{"splurge"} : \{\texttt{"punter"} : \text{PunterId}, \texttt{"route"} : [\text{SiteId}]\}\} \\ & \mid \{\texttt{"option"} : \{\texttt{"punter"} : \text{PunterId}, \texttt{"source"} : \text{SiteId}, \texttt{"target"} : \text{SiteId}\}\} \end{aligned}$$

The river identified by `"source"` and `"target"` in an option move must by claimed by another punter and the option for this river must still be available. Therefore, it is an illegal move and interpreted as a pass, if a punter tries to buy an option for a river that is not yet claimed by anyone or for which the option is already held by another punter.

References

[1] T. Hoare. Null references: the billion dollar mistake, 2009.