SOEN331: Introduction to Formal Methods for Software Engineering

for Software Engineering

Assignment 2 on Object-Z specification

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1 Map

$\quad$ Map
$\quad$ [Description, Coordinate]
$\quad$ Point == Coordinate $\times$ Coordinate
$\quad$ Message ::== ok | location_already_known | no_location_found

$\quad\quad$ locations : Description $\nrightarrow$ Point

$\quad\quad$ INIT
$\quad\quad$ locations = {}

$\quad\quad$ AddLocationOK
$\quad\quad$ $\Delta(locations)$
$\quad\quad$ newDescription? : Description
$\quad\quad$ newPoint? : Point

$\quad\quad$ newDescription? $\notin$ dom locations
$\quad\quad$ locations' = locations $\cup$ {newDescription? $\rightarrow$ newPoint?}

$\quad\quad$ DeleteLocationOK
$\quad\quad$ $\Delta(locations)$
$\quad\quad$ location? : locations

$\quad\quad$ location? $\in$ locations
$\quad\quad$ locations' = locations $\setminus$ {location?}

$\quad\quad$ ModifyLocationOK
$\quad\quad$ $\Delta(locations)$
$\quad\quad$ desc? : Description
$\quad\quad$ newPoint? : Point

$\quad\quad$ desc? $\in$ dom locations
$\quad\quad$ locations' = locations $\oplus$ {desc? $\rightarrow$ newPoint?}

$\quad\quad$ FindLocationOK
$\quad\quad$ $\Xi(locations)$
$\quad\quad$ desc? : Description
$\quad\quad$ point! : Point

$\quad\quad$ desc? $\in$ dom locations
$\quad\quad$ point! = locations(desc?)

$\quad\quad$ Success
$\quad\quad$ $\Xi(locations)$
$\quad\quad$ result! : Message

$\quad\quad$ result! = ok

$\underline{\quad LocationAlreadyKnown \quad}$
$\Xi(locations)$
$description? : Description$
$result! : Message$

$description? \in dom\ locations$
$result! = location\_already\_known$

$\underline{\quad noLocationFound \quad}$
$\Xi(locations)$
$description? : Description$
$result! : Message$

$description? \notin dom\ locations$
$result! = no\_location\_found$

$AddLocation \stackrel{\triangle}{=} (\text{AddLocationOk} \land Sucess) \lor locationAlreadyKnown$

$deleteLocation \stackrel{\triangle}{=} (\text{DeleteLocationOK} \land Sucess) \lor NoLocationFound$

$modifyLocation \stackrel{\triangle}{=} (\text{ModifyLocationOK} \land Sucess) \lor NoLocationFound$

$findLocation \stackrel{\triangle}{=} (\text{FindLocationOK} \land Sucess) \lor NoLocationFound$

Map2

Map

$count : \mathbb{N}$

$count >= 0$

INIT

$count = 0$

AddLocationOK

$\Delta(count)$

$count' = count + 1$

DeleteLocationOK

$\Delta(count)$

$count' = count - 1$

ModifyLocationOK

$count' = count$

FindLocationOK

$count' = count$

Success

$\Xi(count)$

LocationAlreadyKnown

$\Xi(count)$

noLocationFound

$\Xi(count)$