SOEN331: Introduction to Formal Methods for Software Engineering

Assignment 2 on Object-Z specification

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1 Map

[Description, Coordinate]

Point == Coordinate $\times$ *Coordinate*

Message ::= *ok* | *location_already_known* | *no_location_found*

Map

$locations : Description \nrightarrow Point$

INIT

$locations = \{\}$

AddLocationOK

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

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

DeleteLocationOK

$\Delta(locations)$
$description? : Description$

$description? \in dom\ locations$
$locations' = \{description?\} \lhd locations$

ModifyLocationOK

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

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

FindLocationOK

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

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

```
┌─ Success ──────────────────────────────────────────────
│ Ξ(locations)
│ result! : Message
│────────────────────────────────────────────────────────
│ result! = ok
└────────────────────────────────────────────────────────
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┌─ NoLocationFound ──────────────────────────────────────
│ Ξ(locations)
│ description? : Description
│ result! : Message
│────────────────────────────────────────────────────────
│ description? ∉ dom locations
│ result! = no_location_found
└────────────────────────────────────────────────────────
```

$AddLocation \stackrel{\triangle}{=} (AddLocationOk \wedge Sucess) \vee LocationAlreadyKnown$

$DeleteLocation \stackrel{\triangle}{=} (DeleteLocationOK \wedge Sucess) \vee NoLocationFound$

$ModifyLocation \stackrel{\triangle}{=} (ModifyLocationOK \wedge Sucess) \vee NoLocationFound$

$FindLocation \stackrel{\triangle}{=} (FindLocationOK \wedge Sucess) \vee NoLocationFound$

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

$count' = count$

LocationAlreadyKnown

$count' = count$

NoLocationFound

$count' = count$