

SOEN331: Introduction to Formal Methods
for Software Engineering

Assignment 2 on Object-Z specification

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February 25, 2019

1 Map

Map

$[Description, Coordinate]$

$Point == Coordinate \times Coordinate$

$Message ::= ok \mid location_already_known \mid no_location_found$

$locations : Description \rightarrow Point$

$\forall l1, l2 : locations \bullet (l1.description \neq l2.description)$

INIT

$locations = \{\}$

AddLocationOK

$\Delta(locations)$

$newDescription? : Description$

$newPoint? : Point$

$newDescription? \notin dom\ locations$

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

DeleteLocationOK

$\Delta(locations)$

$location? : locations$

$location? \in locations$

$locations' = locations \setminus \{location\}$

ModifyLocationOK

$\Delta(locations)$

$desc? : Description$

$newPoint? : Point$

$desc? \in dom\ locations$

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

FindLocationOK

$desc? : Description$

$point! : Point$

$desc? \in dom\ locations$

$point! = locations(desc?)$

<i>Success</i>
<i>result!</i> : <i>Message</i>
<i>result!</i> = <i>ok</i>

<i>LocationAlreadyKnown</i>
$\Xi(locations)$
<i>description?</i> : <i>Description</i> <i>result!</i> : <i>Message</i>
<i>description?</i> $\in domlocations$
<i>result!</i> = <i>location_already_known</i>

<i>noLocationFound</i>
$\Xi(locations)$
<i>description?</i> : <i>Description</i> <i>result!</i> : <i>Message</i>
<i>description?</i> $\notin domlocations$
<i>result!</i> = <i>no_location_found</i>

$AddLocation = (AddLocationOk \wedge Success) \vee locationAlreadyKnown$

$deleteLocation = (DeleteLocationOK \wedge Success) \vee NoLocationFound$

$modifyLocation = (ModifyLocationOK \wedge Success) \vee NoLocationFound$

$findLocation = (FindLocationOKSuccess)NoLocationFound \vdash$

Map2 _____

Map

count : \mathbb{N}

count ≥ 0

INIT _____

count = 0

AddLocationOK _____

$\Delta(\textit{count})$

count' = *count* + 1

DeleteLocationOK _____

$\Delta(\textit{count})$

count' = *count* - 1

ModifyLocationOK _____

count' = *count*

FindLocationOK _____

count' = *count*