

SOEN331: Introduction to Formal Methods
for Software Engineering

Assignment 2 on Object-Z specification

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1 Map

Map

$[Description, Coordinate]$

$Point == Coordinate \times Coordinate$

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

$locations : Description \rightarrow Point$

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

$\Xi(locations)$

$desc? : Description$

$point! : Point$

$desc? \in dom\ locations$

$point! = locations(desc?)$

Success

$\Xi(locations)$

$result! : Message$

$result! = ok$

$\text{LocationAlreadyKnown}$
$\Xi(\text{locations})$ $\text{description?} : \text{Description}$ $\text{result!} : \text{Message}$
$\text{description?} \in \text{dom locations}$ $\text{result!} = \text{location_already_known}$
noLocationFound
$\Xi(\text{locations})$ $\text{description?} : \text{Description}$ $\text{result!} : \text{Message}$
$\text{description?} \notin \text{dom locations}$ $\text{result!} = \text{no_location_found}$
$\text{AddLocation} \stackrel{\wedge}{=} (\text{AddLocationOk} \wedge \text{Sucess}) \vee \text{locationAlreadyKnown}$ $\text{deleteLocation} \stackrel{\wedge}{=} (\text{DeleteLocationOK} \wedge \text{Sucess}) \vee \text{NoLocationFound}$ $\text{modifyLocation} \stackrel{\wedge}{=} (\text{ModifyLocationOK} \wedge \text{Sucess}) \vee \text{NoLocationFound}$ $\text{findLocation} \stackrel{\wedge}{=} (\text{FindLocationOK} \wedge \text{Sucess}) \vee \text{NoLocationFound}$

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*

Success _____

count' = *count*

LocationAlreadyKnown _____

count' = *count*

noLocationFound _____

count' = *count*