

SOEN331: Introduction to Formal Methods
for Software Engineering

Assignment 2 on Object-Z specification

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1 Map

$[Description, Coordinate]$

$Point == Coordinate \times Coordinate$

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

Map

$locations : Description \rightarrow Point$

INIT

$locations = \{\}$

AddLocationOK

$\Delta(locations)$

$newDescription? : Description$

$newPoint? : Point$

$newDescription? \notin \text{dom } locations$

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

DeleteLocationOK

$\Delta(locations)$

$description? : Description$

$description? \in \text{dom } locations$

$locations' = \{description?\} \triangleleft locations$

ModifyLocationOK

$\Delta(locations)$

$desc? : Description$

$newPoint? : Point$

$desc? \in \text{dom } locations$

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

FindLocationOK

$\Xi(locations)$

$desc? : Description$

$point! : Point$

$desc? \in \text{dom } locations$

$point! = locations(desc?)$

Success
$\Xi(\text{locations})$ $\text{result!} : \text{Message}$
$\text{result!} = \text{ok}$
$\text{LocationAlreadyKnown}$
$\Xi(\text{locations})$ $\text{description?} : \text{Description}$ $\text{result!} : \text{Message}$
$\text{description?} \in \text{dom locations}$ $\text{result!} = \text{location_already_known}$
NoLocationFound
$\Xi(\text{locations})$ $\text{description?} : \text{Description}$ $\text{result!} : \text{Message}$
$\text{description?} \notin \text{dom locations}$ $\text{result!} = \text{no_location_found}$
$\text{AddLocation} \stackrel{\wedge}{=} (\text{AddLocationOk} \wedge \text{Success}) \vee \text{LocationAlreadyKnown}$ $\text{DeleteLocation} \stackrel{\wedge}{=} (\text{DeleteLocationOK} \wedge \text{Success}) \vee \text{NoLocationFound}$ $\text{ModifyLocation} \stackrel{\wedge}{=} (\text{ModifyLocationOK} \wedge \text{Success}) \vee \text{NoLocationFound}$ $\text{FindLocation} \stackrel{\wedge}{=} (\text{FindLocationOK} \wedge \text{Success}) \vee \text{NoLocationFound}$

2 Map2

Map2

Map

LocationsCount : \mathbb{N}

INIT

LocationsCount = 0

AddLocationOK

$\Delta(\textit{LocationsCount})$

LocationsCount' = *LocationsCount* + 1

DeleteLocationOK

$\Delta(\textit{LocationsCount})$

LocationsCount' = *LocationsCount* - 1

ModifyLocationOK

LocationsCount' = *LocationsCount*

FindLocationOK

LocationsCount' = *LocationsCount*

Success

LocationsCount' = *LocationsCount*

LocationAlreadyKnown

LocationsCount' = *LocationsCount*

NoLocationFound

LocationsCount' = *LocationsCount*