

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*

$\Xi(locations)$

$result! : Message$

$result! = ok$

$\text{LocationAlreadyKnown}$
$\Xi(\text{locations})$ $\text{description?} : \text{Description}$ $\text{result!} : \text{Message}$
$\text{description?} \in \text{dom locations}$ $\text{result!} = \text{location\_already\_known}$
$\text{noLocationFound}$
$\Xi(\text{locations})$ $\text{description?} : \text{Description}$ $\text{result!} : \text{Message}$
$\text{description?} \notin \text{dom locations}$ $\text{result!} = \text{no\_location\_found}$
$\text{AddLocation} \stackrel{\wedge}{=} (\text{AddLocationOk} \wedge \text{Sucess}) \vee \text{locationAlreadyKnown}$ $\text{deleteLocation} \stackrel{\wedge}{=} (\text{DeleteLocationOK} \wedge \text{Sucess}) \vee \text{NoLocationFound}$ $\text{modifyLocation} \stackrel{\wedge}{=} (\text{ModifyLocationOK} \wedge \text{Sucess}) \vee \text{NoLocationFound}$ $\text{findLocation} \stackrel{\wedge}{=} (\text{FindLocationOK} \wedge \text{Sucess}) \vee \text{NoLocationFound}$

*Map2* \_\_\_\_\_

*Map*

*count* :  $\mathbb{N}$

*count*  $\geq 0$

*INIT* \_\_\_\_\_

*count* = 0

*AddLocationOK* \_\_\_\_\_

$\Delta(\textit{count})$

*count'* = *count* + 1

*DeleteLocationOK* \_\_\_\_\_

$\Delta(\textit{count})$

*count'* = *count* - 1

*ModifyLocationOK* \_\_\_\_\_

*count'* = *count*

*FindLocationOK* \_\_\_\_\_

*count'* = *count*