

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*

$desc? : Description$

$point! : Point$

$desc? \in dom\ locations$

$point! = locations(desc?)$

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

<i>LocationAlreadyKnown</i>
$\Xi(locations)$
<i>description? : Descriptionresult! : Message</i>
<i>description? <math>\in domlocations</math></i>
<i>result! = location<sub>a</sub>lready<sub>k</sub>nown</i>

<i>noLocationFound</i>
$\Xi(locations)$
<i>description? : Descriptionresult! : Message</i>
<i>description? <math>\notin domlocations</math></i>
<i>result! = no<sub>l</sub>ocation<sub>f</sub>ound</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*  $\geq 0$

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

*count* = 0

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

$\Delta(\textit{count})$

*count'* = *count* + 1

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

$\Delta(\textit{count})$

*count'* = *count* - 1

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

*count'* = *count*

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

*count'* = *count*