SOEN331: Introduction to Formal Methods for Software Engineering

Assignment 2 on Object-Z specification

Yifan Yang 40038814

March 5, 2019

1 Type

Basic Type:[Description; Coordinate]

Composite Type:Point = Coordinate × Coordinate

Enumerated Type:Message::=$ok|already\_exist \mid not\_exist$

2 Map

*Map*1

$\upharpoonright (AddLocationOk, DeleteLocationOk, ModifyLocationOk, FindLocationOk)$

$point : Description \pfun Point$

INIT

$point = \varnothing$

---

*AddLocationOk*1

$\Delta(point)$
$description? : Description$
$coordinate? : Coordinate$

$description? \notin dom\ point$
$point' = point \cup \{description? \mapsto coordinate?\}$

---

*DeleteLocationOk*1

$\Delta(point)$
$description? : Description$

$description? \in dom\ point$
$point' = \{description?\} \ndres point$

---

*ModifyLocationOk*1

$\Delta(point)$
$description? : Description$
$newCoordinate? : Coordinate$

$description? \in dom\ point$
$point' = point \oplus \{description? \mapsto newCoordinate?\}$

---

*FindLocationOk*1

$\Xi(point)$
$description? : Description$
$coordinate! : Coordinate$

$description? \in dom\ point$
$coordinate! = point(description?)$

Success

$result! : Message$

$result! = ok$

---

alreadyExist

$\Xi(point)$
$description? : Description$
$result! : Message$

$description? \in dom\ point$
$result! = already\_exist$

notExist

$\Xi(point)$
$description? : Description$
$result! : Message$

$description? \notin dom\ point$
$result! = not\_exist$

$AddLocationOk \mathrel{\widehat=} (AddLocationOk1 \land Success) \lor already\_exist$
$DeleteLocationOk \mathrel{\widehat=} (DeleteLocationOk1 \land Success) \lor not\_exist$
$ModifyLocationOk \mathrel{\widehat=} (ModifyLocationOk1 \land Success) \lor not\_exist$
$FindLocationOk \mathrel{\widehat=} (FindLocationOk1 \land Success) \lor not\_exist$

Map2

$\upharpoonright (AddLocationOk, DeleteLocationOk, ModifyLocationOk, FindLocationOk)$
Map1

$count : \mathbb{N}$

$count >= 0$

INIT

$count = 0$

AddLocationOk1

$\Delta(point, count)$

$count' = count + 1$

DeleteLocationOk1

$\Delta(point, count)$

$count' = count - 1$