



# INFORMATICS INSTITUTE OF TECHNOLOGY In Collaboration with UNIVERSITY OF WESTMINSTER

### **Snakes and Ladders Game**

## Reasoning About Programs 6SENG003C

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#### **Structure Diagram**

#### **MACHINE Game**

#### **SETS & CONSTANTS**

REPORT = { MOVEMENT\_SUCCESSFUL, GO\_DOWN\_SNAKE, CLIMB\_UP\_LADDER, NORMAL\_SQUARE, HIGH\_DICE\_VALUE\_TO\_FINISH\_GAME, GAME, GAME\_MON, GAME\_ALREADY\_ENDED\_PLEASE\_START\_A\_NEW\_GAME, WIN\_GAME, GAME\_WON, GAME\_NOT\_OVER } ;

GAME STATUS = { GameWon, GameNotOver}

Board, Dice, StartPosition, EndPosition, Snakes, Ladders

Reset\_Game

#### PROPERTIES

```
Board = 1..100 &
Dice = {1, 2, 3, 4, 5, 6} &
StartPosition : Board &
StartPosition = 1 &
EndPosition : Board &
EndPosition = 100 &
Snakes : Board <-> Board &
Ladders : Board <-> Board &
Ladders : Board <-> Board &
Snakes = {16 |-> 13, 31 |-> 4, 47 |-> 25, 63 |-> 60, 66 |-> 52,
97 |-> 75} &
Ladders = {3 |-> 39, 10 |-> 12, 27 |-> 53, 56 |-> 84, 61 |-> 99,
72 |-> 90}
```

MissionStatus

RollDice

#### VARIABLES

currentPosition, diceValue, noOfMoves, noOfSnakesGoneDown, noOfLaddersGoneUp, visitedPosition, gameStatus

Squares\_Visited

#### INVARIANT

```
currentPosition : Board & diceValue <: INTEGER & card(diceValue) <= 1 & noofMoves : NATURAL1 & noofSnakesGoneDown : NATURAL1 & noofLaddersGoneUp : NATURAL1 & visitedPosition : seq(Board) & gameStatus <: GAME_STATUS
```

GameStatus