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1  ┌────────────────────────── MODULE LAM_ISA_Move ───────────────────┐
2  EXTENDS Naturals, Sequences
3
4  CONSTANTS InstrCount, RegisterCount, Nil
5
6  RegisterKinds  $\triangleq$  { "local", "global" }
7
8  --algorithm LAM_ISA_Move
9  variables
10   global_registers = (0 .. RegisterCount)  $\times$  { Nil },
11   local_registers = (0 .. RegisterCount)  $\times$  { Nil },
12   current_count = InstrCount,
13   current_move = Nil
14   ;
15
16  define
17
18   AllRegistersAreValid  $\triangleq$   $\vee$  current_move = Nil
19    $\vee$   $\wedge$  current_move.dst[1]  $\in$  RegisterKinds
20    $\wedge$  current_move.src[1]  $\in$  RegisterKinds
21    $\wedge$  current_move.dst[2]  $\in$  (0 .. RegisterCount)
22    $\wedge$  current_move.src[2]  $\in$  (0 .. RegisterCount)
23
24  end define ;
25
26  procedure perform_move(move) begin
27   Move:
28   if move.dst[1] = "global"  $\wedge$  move.src[1] = "global" then
29    global_registers[move.dst[2]] := global_registers[move.src[2]]
30   elseif move.dst[1] = "local"  $\wedge$  move.src[1] = "local" then
31    local_registers[move.dst[2]] := local_registers[move.src[2]]
32   elseif move.dst[1] = "global"  $\wedge$  move.src[1] = "local" then
33    global_registers[move.dst[2]] := local_registers[move.src[2]]
34   elseif move.dst[1] = "local"  $\wedge$  move.src[1] = "global" then
35    local_registers[move.dst[2]] := global_registers[move.src[2]]
36   end if ;
37   return ;
38  end procedure ;
39
40  begin
41   Run:
42   while current_count > 0 do
43    MakeMove:
44    current_move := [
45     src  $\mapsto$ 
46     CHOOSE k  $\in$  RegisterKinds :
47     CHOOSE n  $\in$  (0 .. RegisterCount) :  $\langle k, n \rangle$ ,
48     dst  $\mapsto$ 

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49      CHOOSE  $k \in RegisterKinds$  :
50      CHOOSE  $n \in (0 \dots RegisterCount)$  :  $\langle k, n \rangle$ 
51    ];
52     $current\_count := current\_count - 1$ ;
53    call  $perform\_move(current\_move)$ ;
54  end while ;
55 end algorithm ;

57 BEGIN TRANSLATION ( $chksum(pcal) = "c6cc4c7" \wedge chksum(tla) = "c697ae07"$ )
58 CONSTANT  $defaultInitValue$ 
59 VARIABLES  $global\_registers, local\_registers, current\_count, current\_move, pc,$ 
60            $stack$ 

62 define statement
63  $AllRegistersAreValid \triangleq \vee current\_move = Nil$ 
64            $\vee \wedge current\_move.dst[1] \in RegisterKinds$ 
65            $\wedge current\_move.src[1] \in RegisterKinds$ 
66            $\wedge current\_move.dst[2] \in (0 \dots RegisterCount)$ 
67            $\wedge current\_move.src[2] \in (0 \dots RegisterCount)$ 

69 VARIABLE  $move$ 

71  $vars \triangleq \langle global\_registers, local\_registers, current\_count, current\_move, pc,$ 
72            $stack, move \rangle$ 

74  $Init \triangleq$  Global variables
75            $\wedge global\_registers = (0 \dots RegisterCount) \times \{Nil\}$ 
76            $\wedge local\_registers = (0 \dots RegisterCount) \times \{Nil\}$ 
77            $\wedge current\_count = InstrCount$ 
78            $\wedge current\_move = Nil$ 
79           Procedure  $perform\_move$ 
80            $\wedge move = defaultInitValue$ 
81            $\wedge stack = \langle \rangle$ 
82            $\wedge pc = "Run"$ 

84  $Move \triangleq \wedge pc = "Move"$ 
85            $\wedge$  IF  $move.dst[1] = "global" \wedge move.src[1] = "global"$ 
86             THEN  $\wedge global\_registers' = [global\_registers \text{ EXCEPT } ![move.dst[2]] = global\_registers[move.src[2]]]$ 
87                  $\wedge$  UNCHANGED  $local\_registers$ 
88             ELSE  $\wedge$  IF  $move.dst[1] = "local" \wedge move.src[1] = "local"$ 
89               THEN  $\wedge local\_registers' = [local\_registers \text{ EXCEPT } ![move.dst[2]] = local\_registers[move.src[2]]]$ 
90                    $\wedge$  UNCHANGED  $global\_registers$ 
91               ELSE  $\wedge$  IF  $move.dst[1] = "global" \wedge move.src[1] = "local"$ 
92                 THEN  $\wedge global\_registers' = [global\_registers \text{ EXCEPT } ![move.dst[2]] = global\_registers[move.src[2]]]$ 
93                      $\wedge$  UNCHANGED  $local\_registers$ 
94                 ELSE  $\wedge$  IF  $move.dst[1] = "local" \wedge move.src[1] = "global"$ 
95                   THEN  $\wedge local\_registers' = [local\_registers \text{ EXCEPT } ![move.dst[2]] = local\_registers[move.src[2]]]$ 

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* Modification History
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