

Event B Exercises 6 Refinement

The objective of this tutorial is to get some experience in using refinement.

1. (a) Develop some refinements of the following events.
(b) For each if-then-else construct give the equivalent select construct.
(c) What are the rules for such a refinement?
(d) How do you ensure that feasibility has not been diminished?

MACHINE Q1

This example is concerned with refinement of guards in events. The actions are intended to be representative of general actions. Main concern is with resolving nondeterminism.

VARIABLES

x
 n

INVARIANTS

$x \in \mathbb{N} \wedge n \in \mathbb{N}$

E1 $\hat{=}$

when
 $x = 1$
then
 $n := 1$
end

E2 $\hat{=}$

when
 $x < 5$
then
 $n := 2$
end

E3 $\hat{=}$

when
 $x > 3$
then
 $n := 3$
end

E4 $\hat{=}$

when
 $x \geq 4$
then
 $n := 4$
end

END

2. Suppose you have a constant sequence $s, s \in 1..n \rightarrow X$ and a constant $x, x \in X$ and you want to find the value of pos such that $s(pos) = x$.
 - (a) Write an abstract specification of the problem.
 - (b) Develop a refinement.
 - (c) Discuss the difference between $x \in \text{ran}(s)$ and $x \notin \text{ran}(s)$.
3. Repeat the above exercise when it is known that s is ordered, that is $\forall i, j. i \in \text{dom}(s) \wedge j \in \text{dom}(s) \wedge i \leq j \implies s(i) \leq s(j)$.
4. Similar to 2, but this time we replace the sequence by a function $f, f \in X \leftrightarrow Y$ and there is no ordering of X .