

# Errata to *Specifying Systems*

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These are all the errors and omissions to the first printing (July 2002) of the book *Specifying Systems* reported as of 28 October 2010. Positions in the book are indicated by page and line number, where the top line of a page is number 1 and the bottom line is number  $-1$ . A running head and a page number are not considered to be lines, but all other lines are. Please report any additional errors to the author, whose email address is posted on <http://lamport.org>. The first person to report an error will be acknowledged in any revised edition.

## Uncorrected Errors

### page xiv

The table of contents should list the index, which begins on page 349. [First reported by Dominique Coutourier on 23 August 2002.]

### page 36, line 3 and page 37, line 16

This is not an error, but it would be better if “tail” were replaced by “end”. [First reported by Taj Khattrra on 9 December 2004.]

### page 32, line -11

Add the following footnote to that sentence.

However, that section of the specification may not contain ( $*$  or  $*$ ), as in the string constant “ $a*$ b”.

[First reported by Damien Doligez on 27 February 2007.]

### page 53

When the error on page 341, line 12 described below is corrected, a side note should be added beside the definition of *Tail* indicating that the actual definition of *Tail* in the *Sequences* module differs from the one given here. [First reported by Dominique Coutourier on 23 August 2002.]

**page 54, line 21**

Readers who want the function *Acker* to equal Ackermann's function should replace the last THEN expression  $Acker[m - 1, 0]$  with  $Acker[m - 1, 1]$ . [First reported by Jesse Bingham on 16 March 2003.]

**page 56, line 15**

Replace “leave unchanged *vmem*” with “leave unchanged *wmem*”. [First reported by Keith Marzullo on 1 October 2002.]

**page 66, line 20**

Add “page” before “341”.  
[First reported by Lásaro Jonas Camargos on 9 August 2004.]

**page 71, lines 18–19**

When the error on page 341, line 12 described below is corrected, the phrase “The definition of *Tail*” should be changed to “The definition of *Tail* given above”. [First reported by Dominique Coutourier on 23 August 2002.]

**page 89, line 4**

Replace “pair of steps” by “pair of states”. [First reported by Matthieu Lemerre on 28 October 2010.]

**page 96, line –5**

Replace  $\langle Hnxt \rangle_{hr}$  by  $\langle HCnxt \rangle_{hr}$ .  
[First reported by Santiago Zanella Béguelin on 11 June 2003.]

**page 100, line 17**

Replace “instead of (8.7)” by “instead of (8.6)”. [First reported by Lucio Nardelli on 11 July 2010.]

**page 115, lines –1 and –2**

Replace “rdy” by “busy”.  
[First reported by Casey Klein on 15 February 2010.]

**page 140, line -8**

Replace  $N(k)$  with  $N_k$ . [First reported by Rodrigo Schmidt on 9 November 2006.]

**page 189, line -7**

Add the missing space between “*opId*” and “to”.  
[First reported by Rodrigo Schmidt on 9 November 2006.]

**page 234, line 8**

Replace “on page 14.5.3” with “on page 261”.  
[First reported by William A. Welch on 25 July 2002.]

**page 237, Section 14.2.5**

The description of overriding should state that a Java class need not override all the definitions in a module. The definitions of operators not overridden are taken from the module. [First reported by Yuan Yu on 31 May 2002.]

**page 243, line -13**

Replace “*key*” with “*seed*”. [First reported by Simon Zambrovski on 21 April 2009.]

**page 252, line -13**

Delete “*num*”. [First reported by Jesse Bingham on 15 June 2004.]

**page 256, footnote**

Delete “though unlikely,”. [First reported by Jesse Bingham on 15 June 2004.]

**page 278, definition of *InfixOp***

The set of *InfixOp* token strings should include “<=” and “\notin”. [First reported by Damien Doligez on 28 February 2007.]

**page 280ff**

The BNF production for *G.Expression* is missing this alternative:

| *G.Expression* & tok(“.”) & *Name*

**page 289, line 15**

This isn’t an error, but the various possibilities would be better illustrated if this line were replaced by

INSTANCE *M* WITH + ← *Plus*, *Minus* ← -

[First reported by Damien Doligez on 19 March 2007.]

**page 293**

The formula

$$\exists x, y \in S, z \in T : p \triangleq \exists x \in S : (\exists y \in S : (\exists z \in T : p))$$

is incorrect. It should state that the formulas on either side of the  $\triangleq$  are equivalent if  $S$  and  $T$  contain no occurrences of  $x$ ,  $y$ , or  $z$ . [First reported by Stephan Merz on 7 November 2006.]

**page 303, bottom of page**

To my surprise (and I think to his too), Stephan Merz discovered that the rules for the operator  $[x \in S \mapsto e]$  are incomplete and the following additional rule should be added.

$$IsAFcn([x \in S \mapsto e])$$

[First reported by Stephan Merz on 2 August 2005.]

**page 304, line 4**

This “ $\triangleq$ ” relation holds only for  $n > 1$ .

**page 307, line -11**

The list of characters that can appear in a string should include “!”. [First reported by Damien Doligez on 26 March 2007.]

**page 316, line 11**

The definition of  $\sim_x$  should be

$$\sigma \sim_x \tau \triangleq \text{!}\sigma = [n \in \text{DOMAIN } \text{!}\tau \mapsto (\text{!}\tau[n])_{x \leftarrow \text{!}\sigma[n][x]}]$$

[First reported by Raymond Boute on 5 October 2005.]

**Section 17.4 (page 325ff)**

The rules for defining the meaning of a  $\lambda$  expression do not prevent “variable capture” in all cases. A more sophisticated definition is needed. [First reported by Georges Gonthier on 9 May 2007.]

**page 326, line -10**

Between “ $e$  is” and “where”, add “LET  $Op \triangleq d$  IN  $exp$ ”.

[First reported by Rodrigo Schmidt on 9 November 2006.]

**page 332, Section 17.5.6**

The two forms

THEOREM  $Op \triangleq exp$     and    ASSUME  $Op \triangleq exp$

are not part of the language; all reference to them should be omitted.

[First reported by Rodrigo Schmidt on 9 November 2006.]

**pages 337–338**

The two bulleted subitems of item 2 at the bottom of page 337 should be modified so that, before doing the indicated substitutions in  $A$ ,  $B$ , and  $C$ , the following substitutions are performed to their subexpressions, for any  $e$  and  $v$ :

$$\begin{array}{ll} \text{UNCHANGED } v & \rightarrow v' = v \\ [e]_v & \rightarrow e \vee (v' = v) \\ \langle e \rangle_v & \rightarrow e \wedge (v' \neq v) \end{array}$$

[First reported by Yuan Yu on 1 October 2002.]

**page 341, line 12**

The definition of *Tail* in the *Sequences* module defines the tail of the empty sequence to be the empty sequence. The tail of the empty sequence should be left unspecified. One possible definition is:

$$\begin{array}{l} Tail(s) \triangleq \text{ IF } Len(s) \neq 0 \text{ THEN } [i \in 1 .. (Len(s) - 1) \mapsto s[i + 1]] \\ \text{ ELSE CHOOSE } n : \text{ FALSE} \end{array}$$

**page 345, module *Peano***

The definition of *PeanoAxioms* needs the following additional conjunct asserting that the function *Sc* is injective.

$$\wedge \forall m, n \in N : (Sc[m] = Sc[n]) \Rightarrow (m = n)$$

[First reported by Stephan Merz on 3 August 2005.]

**page 347, line 17**

In this comment, “continuity condition” should be changed to “monotonicity condition”. [First reported by Peter Hancock on 13 August 2002.]

**Index**

The index should contain the entries

octal representation, 308  
numbers, representation of, 308

The entry for “string” should also include a reference to page 47.