Logic in Computer Science

Modelling and Reasoning about Systems[*]

Errata for the **Second** Printing of the **First** Edition

September 17, 2003

Readers of this book are kindly requested to notify Michael Huth (email: `huth@cis.ksu.edu`) of errors they find. These will be included in this file, and incorporated into future printings and a possible second edition.

- p. 15, line 11, "assumption" should read "premise".
- p. 25, Example 1.20, the first line of that proof should be annotated as "premise".
- p. 37, line 12, $(n \geq 1)$ should be $(n \geq 0)$ as the sequence may be empty.
- p. 42, line 11, the subformula $((p \wedge (q \vee (\neg p)))$ should really read $((p \wedge (q \vee (\neg r)))$.
- p. 57–60, the soundness proof: the formal notion of a "modified proof" is problematic and does not pass formal muster (courtesy of James Caldwell). Our apologies! At any rate, the inductive argument can still be appreciated with an intuitive understanding of "modified proofs". We mean to re-write the definition of "modified proof" in the second, upcoming edition.
- p. 64, line 5 from below: $\neg\phi_1 \wedge \neg\phi_2 \vdash \neg\phi_1 \wedge \phi_2$ should read $\neg\phi_1 \wedge \neg\phi_2 \vdash \neg(\phi_1 \wedge \phi_2)$.

[*]Cambridge University Press, 2000.

- p. 74, the sentence, beginning in line 7 with "We simply form…" does not contain anything that is technically incorrect, but it sounds confusing when we read it now. Our apologies!

- p. 91, line 21: Variables are written

$$u, v, w, x, y, z, \ldots \qquad \text{or} \qquad x_1, y_3, u_5, \ldots$$

- p. 95, lines 2 and 7 from below: the occurrences of $B(m, x)$ should read $B(x, m)$; note that B is an asymmetric relation unlike "being siblings".

- p. 127, Exercise 9(e) is the same as Exercise 9(d).

- p. 131, Example 2.11, the set of function symbols $\mathcal{F}$ should read $\{+, *, -\}$.

- p. 132, line 16 from below, "and s_3 to be 0" should read "and s to be 0".

- p. 135, line 6, "chose" should read "choose".

- p. 135, line 12–13, Example 2.15: The statement "Well, now there is exactly one lover of Alma's lovers, namely c" is incorrect; b is still a lover of Alma's lovers, as before. So line 12 should read

$$\text{"}\mathsf{loves}^{\mathcal{M}'} \stackrel{\text{def}}{=} \{(b, a), (c, b)\}''$$

  for the example to work correctly.

- p. 151, line 12, "prefect" should read "perfect".

- p. 158, items 13 and 14, the two occurrences of "ϕ *Until* ψ" should read "ϕ_1 *Until* ϕ_2".

- p. 167, equation (3.3) is parametric in ϕ and ψ:

$$\mathrm{A}[\phi \ \mathrm{U} \ \psi] \ \equiv \ \neg(\mathrm{E}[\neg\psi \ \mathrm{U} \ (\neg\phi \wedge \neg\psi)] \vee \mathrm{EG}\,\neg\psi).$$

- p. 167, line 8 from below: "Similarly, AG, AU and AX form an adequate set." This is incorrect. For details see http://www.lsv.ens-cachan.fr/Publis/PAPERS/Lar-IPL95.ps.

- p. 179, function SAT, the brackets in A(ϕ_1 U ϕ_2) and E(ϕ_1 U ϕ_2) should be A[ϕ_1 U ϕ_2] and E[ϕ_1 U ϕ_2].
- p. 182, line 15, "`status` of type `ready, busy`:" should read "`status` of type {`ready, busy`}:".
- p. 183, line 8 from below, "the module `counter`" should read "the module `counter_cell`".
- p. 184, line 15, "`value + carry_in mod 2`" should read

  "`(value + carry_in) mod 2`".

- p. 187, Figure 3.24:
  - The arrow from `cn0` to `cn0` should be labelled by 2, not by $1,2$. Also, there should be an arrow from `cn0` to `cn1` labelled by 1.
  - Symmetrically, the arrow from `nc1` to `nc1` should be labelled by 1, not $1,2$. There should be an arrow from `nc1` to `nc0` labelled by 2.
- p. 195, Figure 3.29, "$\models \mathrm{E}_f \mathrm{G}\,\phi$" should read "$\models \mathrm{E}_C \mathrm{G}\,\phi$".
- p. 197, line 3 from below: the formula $F\,q$ should read $F\,\psi$.
- p. 207, line 14, "we see that $F^{n+1}(0)$ would have" should read "we see that $F^{n+2}(0)$ would have".
- p. 253, Example 4.14: claims that the array $[4, -8, 3, -4, 8, -6, -3, 5]$ has two minimal-sum sections with minimal sum -9. But it has only one minimal-sum section with sum -10.
- p. 255, lower half of that page: Several occurrences of "$k + 1$" should be "$k - 1$". This may possibly apply to the occurrences of "$k + 1$" on pages 256–257. Please see the course home page at

  `http://www.cis.ksu.edu/~huth/301/home.html`

  for a more transparent treatment of this problem.
- p. 255, line 12 from below: "the final value of n is $k + 1$" should read "the final value of k is $n + 1$".

- p. 255 to p. 266: in all displayed formulas it is understood that i and j are at least 1.
- p. 274, line 10 from below, "$R(x_1, x_2)$" should read "$R(x_2, x_1)$".
- p. 275, caption of Table 5.7: The term "valid" has a reserved technical meaning, the one given in Definition 5.8 on page 269. In this table, "valid" has that meaning, but restricted to those models that reflect the intuition of $\Box\phi$ as indicated in the columns of that table.
- p. 279, line 4, "$R(y, z))$" should read "$R(y, z)$".
- p. 332, Figure 6.13: the dashed line emanating from the rightmost x_5 node reaches the x_6 node, not the rightmost x_4 node. That is to say, this line should bend around the x_4 node.
- p. 353, Figure 6.27, the second row from below in that table should read

set of states	representation by boolean values	representation by boolean function
$\{s_1, s_2\}$	$(0, 1), (0, 0)$	$\overline{x_1} \cdot x_2 + \overline{x_1} \cdot \overline{x_2}$

- p. 354, Figure 6.29(a) has a missing arrowhead; the transition between s_1 and s_3 goes from s_1 to s_3: $s_1 \longrightarrow s_3$.
- p. 368, lines 4–7 should read:

The coding of AF is similar to the one for EF in (6.17), except that 'for some' (boolean quantification $\exists\hat{x}'$) gets replaced by 'for all' (boolean quantification $\forall\hat{x}'$) and the "conjunction" $f^{\rightarrow} \cdot Z[\hat{x} := \hat{x}']$ turns into the "implication" $\overline{f^{\rightarrow}} + Z[\hat{x} := \hat{x}']$:

$$f^{\mathrm{AF}\,\phi} \stackrel{\mathrm{def}}{=} \mu Z.\,(f^{\phi} + \forall\hat{x}'.\,(\overline{f^{\rightarrow}} + Z[\hat{x} := \hat{x}'])). \tag{1}$$

- p. 372, equation (6.24): the occurrences of ϕ and ψ should read ϕ_1 and ϕ_2, respectively.
- p. 374, line 8: the formula (6.28) should read

$$\mu Y.(f^{\rightarrow} + \exists\hat{w}.(Y[\hat{x}' := \hat{w}] \cdot Y[\hat{x} := \hat{w}])).$$

Acknowledgments

Many people have helped improve this text by pointing out typos and making other useful comments after the publication date. Among them, we mention Wolfgang Ahrendt, Yasuhiro Ajiro, Bernhard Beckert, Jonathan Brown, James Caldwell, Ruchira Datta, Amy Felty, Hirotsugu Kakugawa, Jagun Kwon, Prakash Panangaden, Aileen Paraguya, Frank Pfenning, Shekhar Pradhan, Koichi Takahashi, Kazunori Ueda, Hiroshi Watanabe, and Reinhard Wilhelm.