Graph Algebra and Formally Defined Programs in Z

Using Haskell to Reason and Verify Programs

Leonard Kleinrock

01.jan.2022

Formal Methods International Congress

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Lists

1. Berlin
2. Hannover
3. Freiburg im Breisgau
4. Heidelberg
5. Hamburg

1. Leipzig
2. Dresden
3. München
4. Köln
5. Königsberg und Praga

Is Algebraic Graph Knowledge possible?

Research has been conducted in order to evaluate the possibility of reaching meaningful knowledge from Algebraic Graph transformations.

- Model Cheking and theorem prooving are viable paths.

When the neet to make strong assertions becomes inevitable:

- This is the first way: outstanding assertion !
- Even greater impact comes from: **hilight text** !

> * Note : This is a very long footnote line intended to test the layout of two lines.

H1

H2

H3

H4

H5

H6

- This is a fragment o normal text written here in order to exemplify the use of several featrues in CSS.
- This is a fragment o normal text written here in order to exemplify the use of several featrues in CSS.
  - This is one feature
  - This is another subjetc.

Lists

1. One
2. Two
3. Three
    i. abc
    ii. def
4. End of list

```haskell
primes = filterPrime [2..]
  where filterPrime (p:xs) =
          p : filterPrime [x | x <- xs, x `mod` p /= 0]

seqLength :: Num b ⇒ Sequence a → b
seqAppend :: Sequence a → Sequence a → Sequence a

seqLength Nil = 0
seqLength (Cons _ xs) = 1 + seqLength xs

seqAppend Nil ys = ys
seqAppend (Cons x xs) ys = Cons x (seqAppend xs ys)
```

Tables

Column A	Column B	Column C	Column D
A1	B1	C1	D1
A2	B2	C2	D2
A3	B3	C3	D3

Table: Exemple of use of tables.

LaTeX Equations

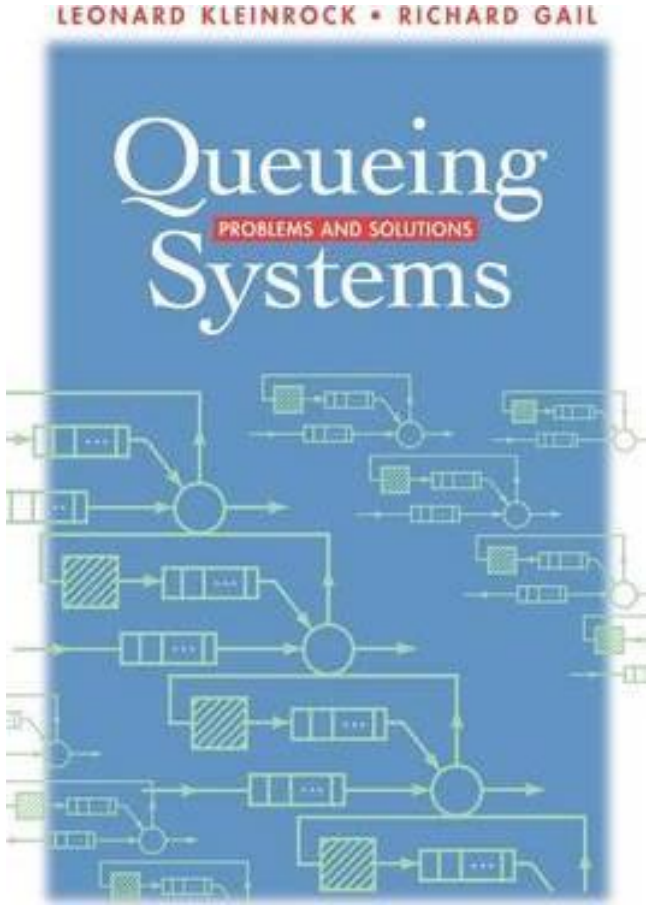
$$\frac{1}{c^2}\frac{\partial^2 \psi}{\partial t^2} = \nabla^2 \circ \psi$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

$$\nabla^2 \mathbf{E} = \mu\epsilon\frac{\partial^2 \mathbf{E}}{\partial t^2}$$

$$c = \sqrt{\frac{1}{\mu\epsilon}}$$

Images in Two Columns



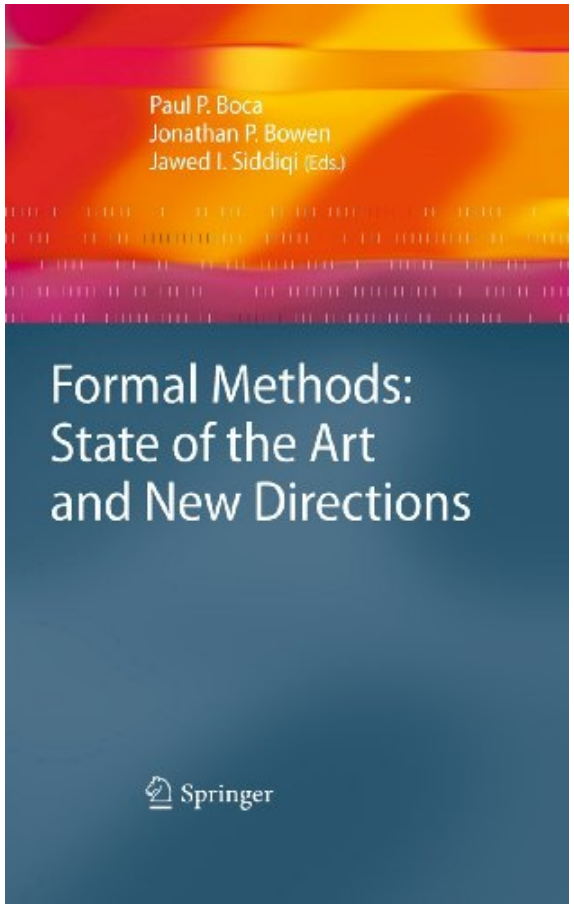


Image and text

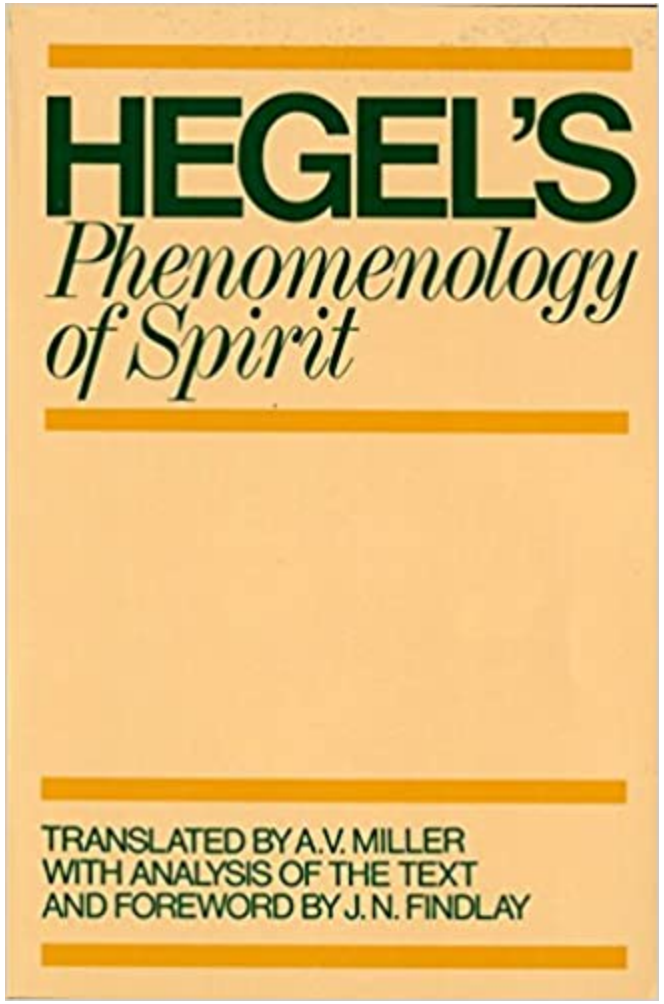


Figure: Oxford edition (1979).

Hegel's Phenomenology

The book was originally entitled "Phänomenologie des Geistes" by its author, G.W.F. Hegel.

- Published in 1807, marked a significant development in German idealism after Kant.
- In this book Hegel develops his concepts of dialectic.

Price at Amazon: $ 17.83

"There is an **increasing** demand of current information systems to incorporate the use of a higher degree of formalism in the development process. **Formal Methods** consist of a set of tools and techniques based on mathematical model and formal logic that are used to **specify and verify** requirements and designs for hardware and software systems."

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- Mona Batra -

Transition Slide

References

1. Boehm B. W.: Software Engineering Economics . Prentice Hall, 1981.
2. Pressman Roger S: Software Engineering - A Practitioner's Approach , McGraw Hill, 5th edition. 2000.
3. Rushby John: Formal Methods and the Certication of Critical Systems . Tech. Rep. SRI-CSL-93-7, Computer Science Laboratory, SRI International, Menlo Park, CA, Dec. 1993.

References

1. Boehm B. W.: Software Engineering Economics. Prentice Hall, 1981.
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