

# Constructing Provably Correct Logic Programs

Ashish Jain, Marc Kirschenbaum<sup>†</sup>, and Leon Sterling

*Department of Computer Engineering and Science*

*Case Western Reserve University*

*Cleveland, Ohio, 44106, USA.*

*email: {jain,leon}@ces.cwru.edu*

## Abstract

*This paper demonstrates a process of constructing logic programs whereby logic programs can be proved correct with respect to specifications. Building on previous work on stepwise enhancement and program maps, we introduce program enhancement structures which capture the application of standard programming techniques to well understood programs. We give an overview of our views on correctness, followed by a detailed proof of correctness which uses the program enhancement structure.*

## 1 Motivation

The software crisis for procedural languages was precipitated by the failure of the prevailing ad-hoc attitude towards programming to scale to larger programming projects. One response to the software crisis was structured programming. The programmer would be trained to use well-defined programming constructs, and encouraged to take a disciplined approach. Ideally, a ‘science of programming’ would be developed where correctness theorems could be proved about programs.

This paper concerns an approach to systematize logic programming which can be viewed as an analog to structured programming in procedural languages. The programmer is given a collection of operations to construct complicated programs. Behavior of the complicated program can be inferred from the structure of the program and the behavior of the simpler pieces. Proofs of correctness can be leveraged from the construction. In our classroom experience, we are convinced that our approach significantly shortens the time it takes students to become competent Prolog programmers.

The emphasis of this paper is not, however, on our approach to logic programming. Rather we are concerned with demonstrating a process of programming where programs can be proved correct with respect to specifications. This paper builds on our previously published theory of program maps [3].

This paper is organized as follows. Section 2 presents program maps for logic programs.

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<sup>†</sup>Mathematics and Computer Science Department, John Carroll University, Cleveland, OH, 44118. email: kirsch@jcuasa.jcu.edu.

# Constructing Logic Programs

**M Carnoy**



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