A Discussion of

Certain Criticisms Concerning

The Third Manifesto

by

C. J. Date

*Ask an impertinent question,
and you are on the way to a pertinent answer*
—Jacob Bronowski

July 17th, 2006

This note is meant as a brief introduction to three separate but interrelated papers having to do with *The Third Manifesto*. *The Third Manifesto*—the *Manifesto* for short—is a formal proposal by Hugh Darwen and myself for a foundation for data and database management systems (DBMSs). Like Codd's original papers on the relational model, it can be seen as an abstract blueprint for the design of a DBMS. It consists in essence of a rigorous set of principles, stated in the form of a series of prescriptions and proscriptions, that we—i.e., Hugh and myself— require adherence to on the part of a hypothetical database programming language that we call **D**. The various prescriptions and proscriptions are described in detail in our book *Databases, Types, and the Relational Model: The Third Manifesto,* 3rd edition (Addison-Wesley, 2006), which I'll refer to from this point forward as "the *Manifesto* book."

Now, any serious scientific endeavor is quite properly the subject of careful scrutiny and questioning, and the *Manifesto* and its language **D** are no exception in this regard. Indeed, some of the improvements we've been able to make over the years have been the direct result of criticisms we've received at various times. In other cases, we've been able to show that the criticisms were invalid for some reason; in still others, the jury is still out, in the sense that it's not yet clear whether changes are needed or not. The three papers that follow have to do with criticisms that fall at least partly into this third category. The criticisms in question arose in the course of a private correspondence in late 2005 - early 2006 between Hugh and two other parties (deliberately not identified here). In essence, the two critics claimed that:

1. **D** permits the formulation of undecidable (because paradoxical) expressions.

2. **D** is required to be computationally complete.

3. **D** is required to support relation variables (relvars) and relational assignment.

Let me say immediately that the second and third of these claims are certainly true (at least, they're true so long as we assume, as the *Manifesto* book explicitly does, that the language **D** is imperative in style), and the first is probably true too (at least, it doesn't hurt to assume for the purposes of this introductory note that it is). In each case, therefore, what's at issue isn't so much the claim itself as it is the consequences of that claim. I've addressed the claims one by one in the following three papers:

1. Gödel, Russell, Codd: A Recursive Golden Crowd

2. And Now for Something Completely Computational

3. To Be Is to Be a Value of a Variable

Please understand that these papers aren't meant to be the last word on the subject; they're merely my own best shot at responding to the three criticisms (in particular, at bringing various relevant issues to the surface, as it were, so that they can be carefully examined). As I've already said, the papers are interrelated; however, I wrote them in such a way as to allow each to stand on its own—partly because I think the issues can be treated separately to some degree but also, and more importantly, because I think it makes the arguments less indigestible than might otherwise be the case. However, I have to warn you that this decision on my part does mean the papers include a small amount of overlap.

There are a couple more preliminary remarks I need to make in this introduction. The first has to do with what we call **Tutorial D** and how it relates to the language **D**. The name **D** is meant to be generic—it's used in the *Manifesto* book to refer generically to any language that conforms to the principles laid down in the *Manifesto*. Thus, there could be any number of distinct languages all qualifying as a valid **D**. **Tutorial D** is intended to be one such; it's defined, more or less formally, in the *Manifesto* book itself, and it's used throughout that book (and elsewhere) as a basis for examples. Unfortunately, however, our critics often don't distinguish properly between **D** and **Tutorial D**, even though there's a clear logical difference between the two. As a result, it's sometimes hard to tell whether a given criticism is aimed at the *Manifesto* in general or at **Tutorial D**, considered as a specific and perhaps flawed attempt at defining a **D**, in particular—a state of affairs that can make it hard to respond properly, sometimes, to the criticism in question.

As for the second of my preliminary remarks, I'll begin with a lightly edited extract from the *Manifesto* book itself:

> We must stress that what we are *not* doing is proposing some kind of "new" or "extended" relational model. Rather, we're concerned with what might be called the "classical" version of that model; we've tried to provide as careful and accurate a description of that classical model as we possibly can. It's true that we've taken the opportunity to dot a few *i*'s and cross a few *t*'s (i.e., to perform a few minor tidying activities here and there); however, the model as we describe it departs in no essential respects from Codd's original vision as documented in [his early relational papers] ... The ideas of the *Manifesto* are in no way intended to supersede those of the relational model, nor do they do so; rather, they use the ideas of the relational model as a base on which to build ... We see our *Manifesto* as being very much in the spirit of Codd's

original work and continuing along the path he originally laid down. We're interested in evolution, not revolution.

The reason I quote this passage here, at length, is because of a phenomenon we've observed in certain criticisms of our work: namely, a tendency to complain that something we propose conflicts with something in Codd's own writings—presumably with the implication that what we're proposing must therefore be wrong, ipso facto. We reject the existence of such conflict as adequate justification for criticism, and we reject the presumed implication. Our admiration for Codd's genius in inventing the relational model in the first place, and for the extraordinary series of papers he wrote on the subject in the years 1969-1974, is second to none. However, it doesn't follow that we agree with all of Codd's relational writings unreservedly, and indeed we don't. Thus, there are definitely aspects of the *Manifesto* where our ideas do depart from Codd's—not many, I hasten to add, but some. Support for nulls is a case in point; Codd required it (albeit not in the earliest of his relational papers), but the *Manifesto* rejects it.

In closing this introduction, I'd like to thank Hugh Darwen for his careful review of an early draft of all three of the papers that follow.

*** End *** End *** End ***