

A General Data-definition Framework and Random Testing in ACL2

Harsh R. Chamarthi and Peter C. Dillinger and Panagiotis Manolios
Northeastern University
{harshrc,pcd,pete}@ccs.neu.edu

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Abstract

We describe a general data-definition framework in ACL2 that enables users to define custom types describing subsets of the ACL2 universe. The framework provides built-in support for the basic ACL2 types, e.g., `booleanp`, `posp`, `natp`, `stringp`, and so on. The framework also provides operators for defining enumerated, union, record and list types, and supports mutually recursive data definitions. Our data-definition framework is tightly integrated with a QuickCheck-inspired random testing facility that can be used to test conjectures before a proof is attempted. The lack of counterexamples can increase user confidence that conjectures are theorems. On the other hand, if testing leads to counterexamples, they can be used to debug conjectures, something that currently can be a very time-consuming and tedious process.