

A Summary Function Model for the Validation of Interprocedural Analysis Results

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Abstract

The validation of data flow results safely separates complex program analyses from the use of their results. This is useful in mobile code scenarios where a code consumer with limited computational capabilities wishes to enforce that the code exhibits properties described by the analysis results in order to check security policies or to safely apply optimisations to the program.

Any valid data flow solution has to solve the system of data flow equations which describes the data flow problem for the given program. The check that a given solution solves the system of data flow equations is more efficient than the original analysis because it requires a single pass over the equation system only. Essentially, the validation phase does not have to recompute the fix-point computations of the iterative data flow algorithm because a fix-point is given by the transmitted result.

This general principle can be applied to the validation of interprocedural summary functions which yields a validation strategy for interprocedural analysis results. An important requirement is that the consumer can compare summary functions with each other. We present a function model which provides a checkable order relation on summary functions as well as all other operations needed during the validation process. The model is based on expressions which establish the connection to the inducing data flow problem in a generic way.

The additional integration of function variables into the summary function model allows for the representation and late integration of analysis results from unavailable program parts. This gives rise to an incremental validation scenario, where the code consumer can subsequently validate analysis results of several software modules.

Key words: Validation, Data Flow Analysis, Interprocedural Analysis, Mobile Code

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