Logical Representation of Data Flow

Abstract

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This is introducing Datalog language as a way to represent data flow. It shows that instead of long definitions, we can use rules defined in Datalog to have same meaning. This logical approach allows us to combine independent analyses into one integrated algorithm. Chapter explains basics elements and conventions of language, and how to form a rules and predicates. Detailed explanation is given to Intensional and Extensional predicates. The difference between these two types and their computation is explained on a few detailed examples. After explaining the language comes execution of Datalog programs. On example with pseudo-code is show a simple evaluation algorithm for input Datalog program and sets of facts. Efficiency of this algorithm can be increased by incremental evaluation show on next example. Last explained thing are problematic rules. There are certain Datalog rules or programs that technically have no meaning and should not be used. End of the chapter contains several examples for practise.

Topic 12: Purple Dragon book - Chapter 12.3 & 12.4 (Logical Representation of Data Flow & Simple Pointer-Analysis Algorithm)

Abstract

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A simple pointer-analysis algorithm discuss simple flow-insensitive pointer-alias analysis assuming no procedure calls. Fundamental question in pointer-analysis algorithm is whether a pair of pointers may be aliased. That fundamental question leads to computation of answer to the question “what objects can this pointer point to?” for every analysed pointer. Later in lecture we will discuss the difference between pointer analysis in C and Java programs. We will discover that points-to analysis is complicated by reason of re-analyzing all statements after discovery on new targets for a pointer.For the points-to computation we introduce a model for pointers and references based on Java for simplicity. Flow-insenstivity of pointer-alias analysis will be shown on simple example same as using type information in Java. Formalizing a flow-insensitive pointer-alias analysis is done using formulation in Datalog.