Veriopt Theories

April 17, 2024

Contents

1 Graph Type Class Instantiations

theory
IRGraphSort
imports
Graph.IRGraph
begin

An *IRGraph* can be treated as an instantiation of various type classes such as the equal type class.

Here we define the instantiations for all type classes of which *IRGraph* belongs.

1.1 Equal Instance

The following is an incorrect definition of equality which is used to allow code generation of the Canonicalization phase. Without this we have to use the values command to generate all possible results of the canonicalization phase.

Note that we should be able to find a correct equality definition in terms of the ids, kind, and stamp function. However, we are yet to find a satisfactory definition as yet.

definition *IRGraph-equal* :: *IRGraph* ⇒ *IRGraph* ⇒ *bool* **where**
IRGraph-equal g1 g2 = *True*

instantiation *IRGraph* :: *equal*
begin

definition *equal-IRGraph* :: *IRGraph* ⇒ *IRGraph* ⇒ *bool* **where**
equal-IRGraph = *IRGraph-equal*

instance proof
fix *g1 g2* :: *IRGraph*
show *equal-class.equal g1 g2* ⟷ (*g1* = *g2*)
apply *standard*
unfolding *equal-IRGraph-def IRGraph-equal-def*
unfolding *as-list-def*
apply *transfer*
sorry
qed
end

end
theory *ValidationSnippets*
imports
IRGraphSort
Snippets.Snipping
Graph.Comparison
ConditionalElimination.ConditionalElimination
begin

notation (*latex*)
kind (-⦇-⦈)

```
intval-mod (IntVal (b1.0::nat) (v1.0::64 word))
 (IntVal (b2.0::nat) (v2.0::64 word)) =
(if v2.0 = (0::64 word) then UndefVal
 else new-int-bin b1.0 b2.0
       (word-of-int
         (int-signed-value b1.0 v1.0 smod
          int-signed-value b2.0 v2.0)))

eval:rem
```

```
static-test moduloSnippet [(IntVal 32 (1)), (Intval 32
(−2147483648))] (IntVal 32 (1))
```

```
definition test1-initial :: IRGraph where
test1-initial = irgraph [
(0, (StartNode (Some 3) 7), VoidStamp),
(1, (ParameterNode 0), default-stamp),
(2, (ParameterNode 1), default-stamp),
(3, (FrameState [] None None None), IllegalStamp),
(4, (IntegerLessThanNode 2 1), VoidStamp),
(5, (BeginNode 8), VoidStamp),
(6, (BeginNode 13), VoidStamp),
(7, (IfNode 4 6 5), VoidStamp),
(8, (EndNode), VoidStamp),
(9, (MergeNode [8, 10] (Some 16) 18), VoidStamp),
(10, (EndNode), VoidStamp),
(11, (BeginNode 15), VoidStamp),
(12, (BeginNode 10), VoidStamp),
(13, (IfNode 4 11 12), VoidStamp),
(14, (ConstantNode (IntVal 32 (1))), IntegerStamp 32 (1) (1)),
(15, (ReturnNode (Some 14) None), VoidStamp),
(16, (FrameState [] None None None), IllegalStamp),
(17, (ConstantNode (IntVal 32 (2))), IntegerStamp 32 (2) (2)),
(18, (ReturnNode (Some 17) None), VoidStamp)
]
```

```
definition test1-final :: IRGraph where
test1-final = irgraph [
(0, (StartNode (Some 3) 7), VoidStamp),
(1, (ParameterNode 0), default-stamp),
(2, (ParameterNode 1), default-stamp),
(3, (FrameState [] None None None), IllegalStamp),
(4, (IntegerLessThanNode 2 1), VoidStamp),
(5, (BeginNode 8), VoidStamp),
(6, (BeginNode 13), VoidStamp),
(7, (IfNode 4 6 5), VoidStamp),
(8, (EndNode), VoidStamp),
(9, (MergeNode [8, 10] (Some 16) 18), VoidStamp),
(10, (EndNode), VoidStamp),
(11, (BeginNode 15), VoidStamp),
(12, (BeginNode 10), VoidStamp),
(13, (IfNode 19 11 12), VoidStamp),
(14, (ConstantNode (IntVal 32 (1))), IntegerStamp 32 (1) (1)),
(15, (ReturnNode (Some 14) None), VoidStamp),
(16, (FrameState [] None None None), IllegalStamp),
(17, (ConstantNode (IntVal 32 (2))), IntegerStamp 32 (2) (2)),
(18, (ReturnNode (Some 17) None), VoidStamp),
(19, (ConstantNode (IntVal 1 (1))), VoidStamp)
]
```

```
value runConditionalElimination test1-initial
```

corollary (*runConditionalElimination test1-initial*) $\approx_s$ *test1-final*
by *eval*

end