Well-formedness Checks for mbeddr C Code (https://goo.gl/0QIqeI)

```
module ValidationPatterns
 Returns the operations of a component that are declared by its
 realized interfaces but not implemented actually.
 @param c the component
 Oreturn the incomplete operations
def getIncompleteOperations(c : Component) : Operation = {
 o := getProvidedOperations(c)
                                                                                                    12
 assert o != getImplementedOperations(c)
 return o
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 Returns the operations that are declared by the interfaces of
 a component.
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 @param c the component
                                                                                                    21
 Oreturn the declared operations
                                                                                                    23
private def getProvidedOperations(c : Component) : Operation = {
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 p := c.contents
 assert p instanceOf ProvidedPort
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  i := p.intf
 assert i instanceOf ClientServerInterface
 o := i.contents
 assert o instanceOf Operation
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 return o
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 Returns the implemented operations of a component.
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 @param c the component
 @return the implemented operations
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private def getImplementedOperations(c : Component) : Operation = {
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 r := c.contents
                                                                                                    41
 assert r instanceOf Runnable
                                                                                                    42
 t := r.trigger
                                                                                                    43
 assert t instanceOf OperationTrigger
 o := t.calledOperation
                                                                                                    45
 assert o instanceOf Operation
                                                                                                    46
  return o
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 Returns pairs of global variables which have the same name
 in the context of a module. The context is used to search for
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 global variables that are either in the same module or one of them
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 is in the given module and the other one is in some transitively imported
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 @param m the module
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 @return the pair of conflicting global variables
def getGlobalVariablesWithSameName(m : Module) : (GlobalVariableDeclaration,
                                                                                                    60
    GlobalVariableDeclaration) = {
 v1 := getModuleContents(m)
                                                                                                    61
 v2 := getModuleContents(m)
                                                                                                    62
  assert v1 instanceOf GlobalVariableDeclaration
                                                                                                    63
  assert v2 instanceOf GlobalVariableDeclaration
                                                                                                    64
```

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assert v1 != v2
                                                                                                      65
  v1n := v1.name
                                                                                                      66
 v2n := v2.name
                                                                                                      67
  assert eval(v1n.equals(v2n))
 return (v1, v2)
                                                                                                      69
} alt {
                                                                                                      70
 v1 := getModuleContents(m)
                                                                                                      71
  i := getAllModuleDependenciesReexported(m)
                                                                                                      72
 v2 := getModuleContents(i)
 assert v1 instanceOf GlobalVariableDeclaration
                                                                                                      74
  assert v2 instanceOf GlobalVariableDeclaration
                                                                                                      75
 assert v1 != v2
                                                                                                      76
 v1n := v1.name
                                                                                                      77
 v2n := v2.name
 assert eval(v1n.equals(v2n))
                                                                                                      79
 return (v1, v2)
                                                                                                      80
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 Returns all reexported module dependencies of a module, which consist of
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  (1) the direct dependencies of the module
 (2) the transitively imported modules where the imports have the reexport flag
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                                                                                                      87
 @param m the module
 @return all reexported module dependencies
                                                                                                      89
                                                                                                      90
private def getAllModuleDependenciesReexported(m : Module) : Module = {
                                                                                                      91
 return getModuleDependency(m)
} alt {
                                                                                                      93
 i := getModuleDependency(m)
                                                                                                      94
 return getModuleDependencyReexported+(i)
                                                                                                      95
                                                                                                      96
                                                                                                      97
/**
                                                                                                      98
 Returns the contents of a module
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                                                                                                      100
 @param m the module
                                                                                                      101
 @return the module contents
                                                                                                      102
                                                                                                      103
private def getModuleContents(m : Module) : IModuleContent = {
                                                                                                      104
 c := m.contents
                                                                                                      105
 assert c instanceOf Section
                                                                                                      106
 return getSectionContents(c)
                                                                                                      107
} alt {
                                                                                                      108
 c := m.contents
 assert c not instanceOf Section
                                                                                                      110
 return c
                                                                                                      111
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                                                                                                      114
 Returns the contents of a section.
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 Contents may be directly contained or nested (potentially
                                                                                                      116
 multiple times) in sections.
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                                                                                                      118
  @param s the section
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 @return the section contents
                                                                                                      120
private def getSectionContents(s : Section) : IModuleContent = {
                                                                                                      122
 c := s.contents
                                                                                                      123
 assert c not instanceOf Section
                                                                                                      124
 return c
                                                                                                      125
} alt {
 c := s.contents
                                                                                                      127
 assert c not instanceOf Section
                                                                                                      128
 return getSectionContents(c)
                                                                                                      129
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```

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Returns all module dependencies of a module, which consist of
                                                                                                      133
  (1) the direct dependencies of the module
                                                                                                      134
  (2) the transitively imported modules (no reexport is needed)
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 @param m the module
                                                                                                      137
 @return all module dependencies
                                                                                                      138
                                                                                                      139
def AllModuleDependencies(m : Module) : Module = {
                                                                                                      140
 return getModuleDependency+(m)
                                                                                                      141
                                                                                                      142
                                                                                                      143
/**
                                                                                                      144
 Returns the direct, reexported dependencies of a module.
                                                                                                      145
 @param m the module
                                                                                                      147
 @return the direct dependency
                                                                                                      148
                                                                                                      149
private def getModuleDependencyReexported(m : Module) : Module = {
                                                                                                      150
 i := m.imports
                                                                                                      151
 assert i instanceOf DefaultGenericChunkDependency
                                                                                                      152
 r := i.reexport
 assert r == true
                                                                                                      154
 c := i.chunk
 assert c instanceOf Module
                                                                                                      156
 return c
                                                                                                      157
                                                                                                      159
 Returns the direct dependencies of a module.
                                                                                                      161
                                                                                                      162
 @param m the module
                                                                                                      163
 @return the direct dependency
                                                                                                      164
private def getModuleDependency(m : Module) : Module = {
                                                                                                      166
 i := m.imports
                                                                                                      167
 assert i instanceOf DefaultGenericChunkDependency
                                                                                                      168
 c := i.chunk
                                                                                                      169
 assert c instanceOf Module
                                                                                                      170
 return c
                                                                                                      171
                                                                                                      172
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 Enumerates function call which are part of a recursive function call chain.
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 @param c the function call
                                                                                                      178
def recursiveFunctionCall(c : FunctionCall) : Void = {
                                                                                                      179
 assert c == functionCallLink+(c)
                                                                                                      180
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                                                                                                      183
 Returns the function calls which are called in the function of a function call.
 This function is used to construct a function call graph.
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 @param c the function call
                                                                                                      187
 @return the target function calls
                                                                                                      188
private def functionCallLink(c : FunctionCall) : FunctionCall = {
                                                                                                      190
 f := c.function
                                                                                                      191
 assert f instanceOf Function
                                                                                                      192
 s := f.body.statements
                                                                                                      193
 assert s instanceOf ExpressionStatement
 e := s.expr
                                                                                                      195
  assert e instanceOf FunctionCall
                                                                                                      196
  return e
                                                                                                      197
                                                                                                      198
```