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SE 421 - Homework 8 write-up
11/10/2020

Problem 1:
- Atlas Version: 3.6.0.202005041938
- Eclipse Version: 2019-06 (4.12.0)
- JDK Version: openjdk version "11.0.9" 2020-10-20

Problem 2:
- universe.eval.nodes.size → 29114
- universe.eval.edges.size → 108726
- functions("*").eval.nodes.size → 274

Problem 3:
- cfg(functions("dskqopt")).eval.nodes.size → 46
- cfg(functions("dskqopt")).eval.edges.size → 48
- show(toQ(cfg(functions("dskqopt")).eval.edges)) → *See below*
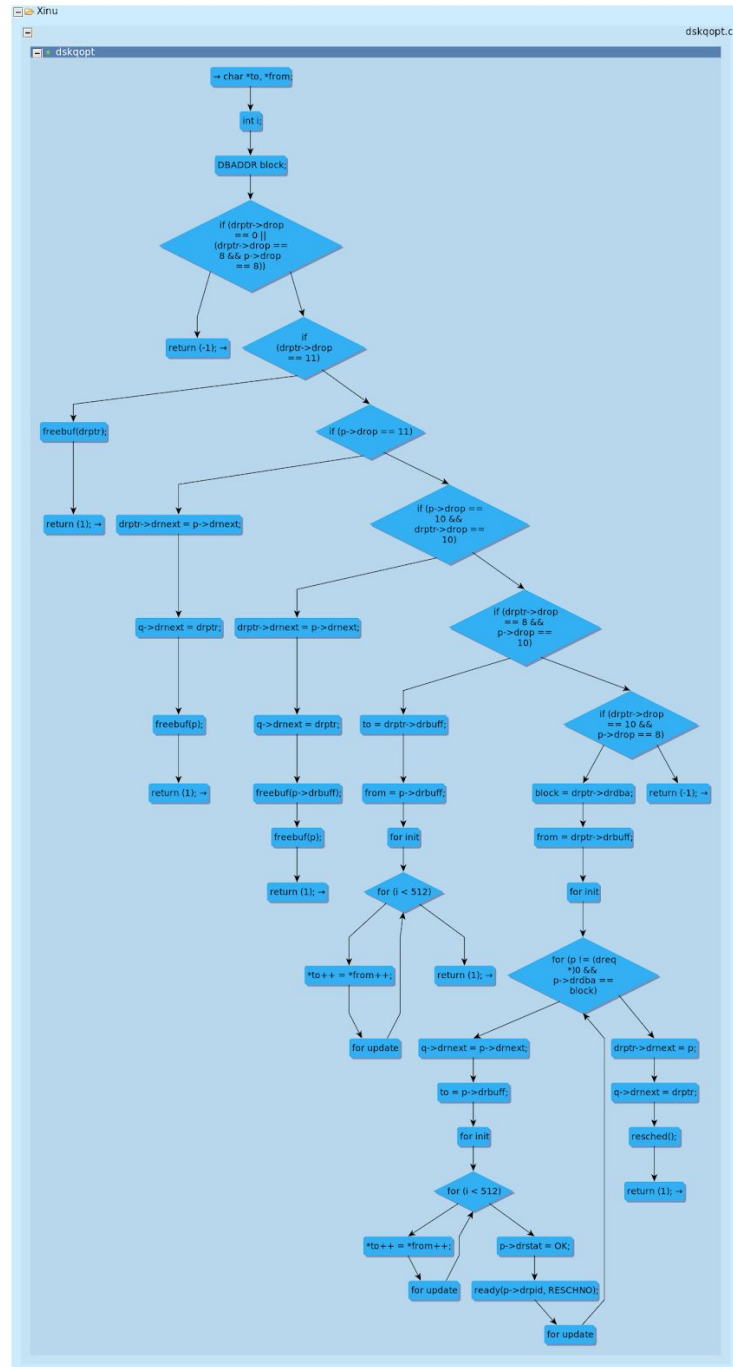
- (*Manual Count*) Number of *nodes* in dskqopt: 46
- (*Manual Count*) Number of *edges* in dskqopt: 48

Problem 4:
- dgread:
  - cfg(selected).eval.nodes.size → 39
  - cfg(selected).eval.edges.size → 42

- dgwrite:
    - cfg(selected).eval.nodes.size → 24
    - cfg(selected).eval.edges.size → 25

Problem 5:
- Corrected query: show(toQ(cfg(functions("dskqopt")).eval.nodes))

Problem 6:
- functions("ds*").induce(edges(XCSG.Call)).eval.nodes.size → 12
- functions("ds*").induce(edges(XCSG.Call)).eval.edges.size → 7
- show(functions("ds*").induce(edges(XCSG.Call))) → *After running this query, we get an output of the dependency graph containing the call edges for all functions within Xinu that start with "ds". The direction of the arrow signifies which function calls another function.*

Problem 7:
- functions("*").induce(edges(XCSG.Call)).eval.nodes.size → 274
- show(functions("*").induce(edges(XCSG.Call)))

Problem 8:
- show(cfg(functions("dskqopt")).nodes(XCSG.Loop)) → *When running this query, we get an output of the 3 loop-nodes contained in the function "dskqopt"*
- (*Manual Count*) The total number of loops in functions starting with "ds" → 7
- cfg(functions("ds*")).nodes(XCSG.Loop).eval.nodes.size → 7

Problem 9:
- The result of the queries provided is an <u>empty</u> graph
- (*Manual Count*) The number of call sites in function dskenq → 2
- (*Manual Count*) The number of call sites in functions starting with "ds" → 37
- Query sequence:

```
dfg(functions("ds*")).nodes(XCSG.SimpleCallSite).eval.nodes.size
```

- Resulting output:
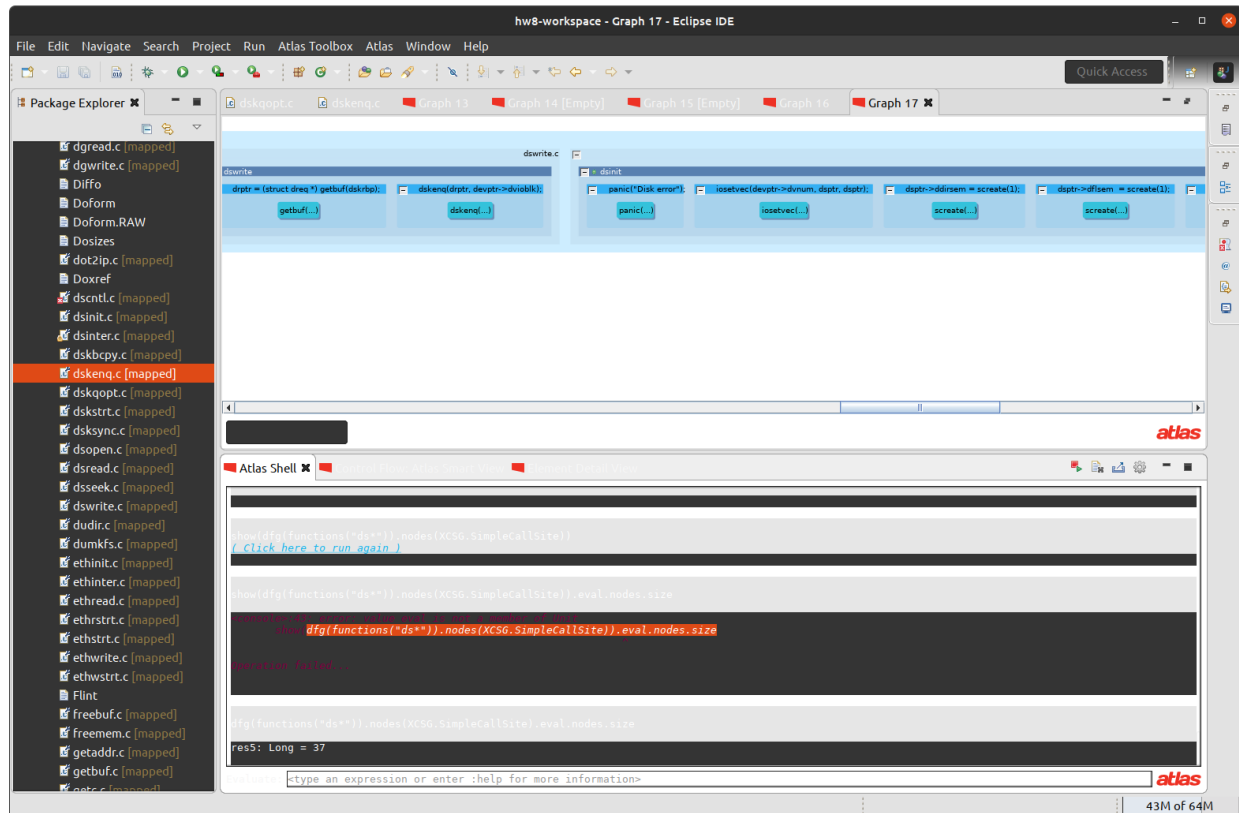
Problem 10:
- Query sequence:

```
functions("ds*").children().nodes(XCSG.ControlFlow_Node).children().nodes(XCSG.CallSite).eval.nodes.size
```

- (*Manual Count*) Total number of call sites in functions starting with "ds" → 37

Problem 11:
- Query sequence:

```
functions("r*").children().nodes(XCSG.ControlFlow_Node).children().nodes(XCSG.FunctionPointerCallSite).eval.nodes.size
```

- (*Manual Count*) Total number of function pointer calls in functions starting with "r" → 3
- Query sequence:

```
functions("*").children().nodes(XCSG.ControlFlow_Node).children().nodes(XCSG.FunctionPointerCallSite).eval.nodes.size
```

- Output → 14