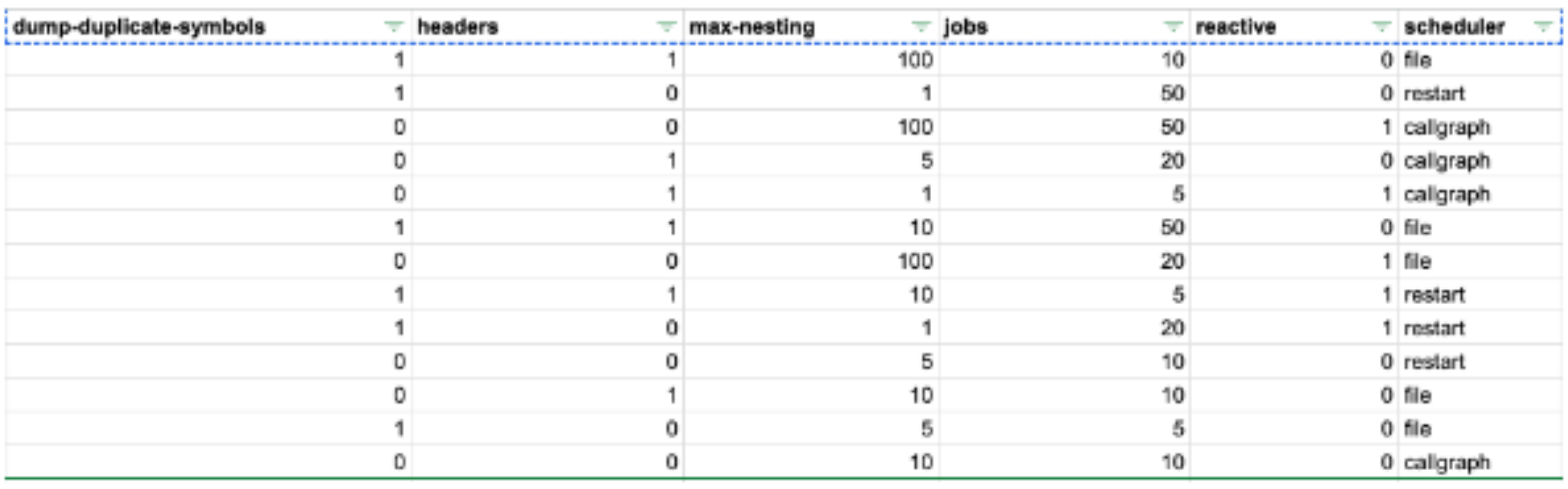
Detected non-deterministic results when --jobs is not set to 1

Open 4 tasks

Hi, I have recently been using Infer for an empirical study to detect non-deterministic behaviors in static analyzers. The experiments resulted in discovering some nondeterministic analysis results across multiple runs under various configurations of Infer.

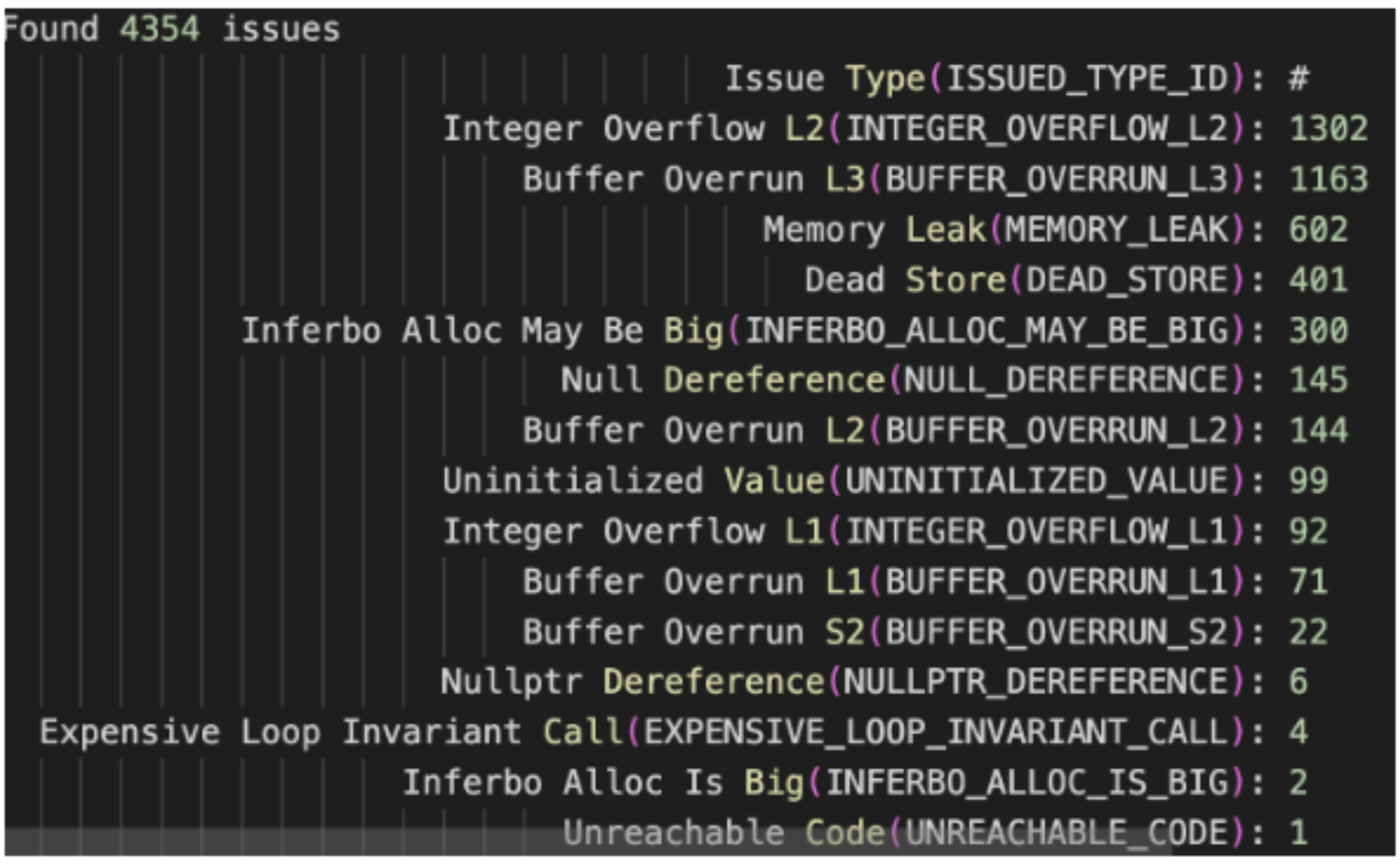
- ☐ The version of Infer I used is `v1.1.0`.
- ☐ The operating system is `ubuntu:20.04` and I am using Docker.
- ☐ I ran Infer on 20 sampling configurations. The base command I used is `infer --compilation-database compile_commands.json` with following checkers on `--annotation-reachability --bufferoverrun --cost --loop-hoisting --pulse`, as well as these options used `--dump-duplicate-symbols --headers --max-nesting --jobs --reactive --scheduler`.
- ☐ I ran Infer on each program-configuration combination 5 times and compared the results across 5 runs for detecting non-deterministic behaviors. The program I used is openssl. And the nondeterministic results are found under the configurations shown below. As observed, these nondeterminism all happen when the `--jobs` option is not set to 1.



dump-duplicate-symbols	headers	max-nesting	jobs	reactive	scheduler
1	1	100	10	0	file
1	0	1	50	0	restart
0	0	100	50	1	callgraph
0	1	5	20	0	callgraph
0	1	1	5	1	callgraph
1	1	10	50	0	file
0	0	100	20	1	file
1	1	10	5	1	restart
1	0	1	20	1	restart
0	0	5	10	0	restart
0	1	10	10	0	file
1	0	5	5	0	file
0	0	10	10	0	callgraph

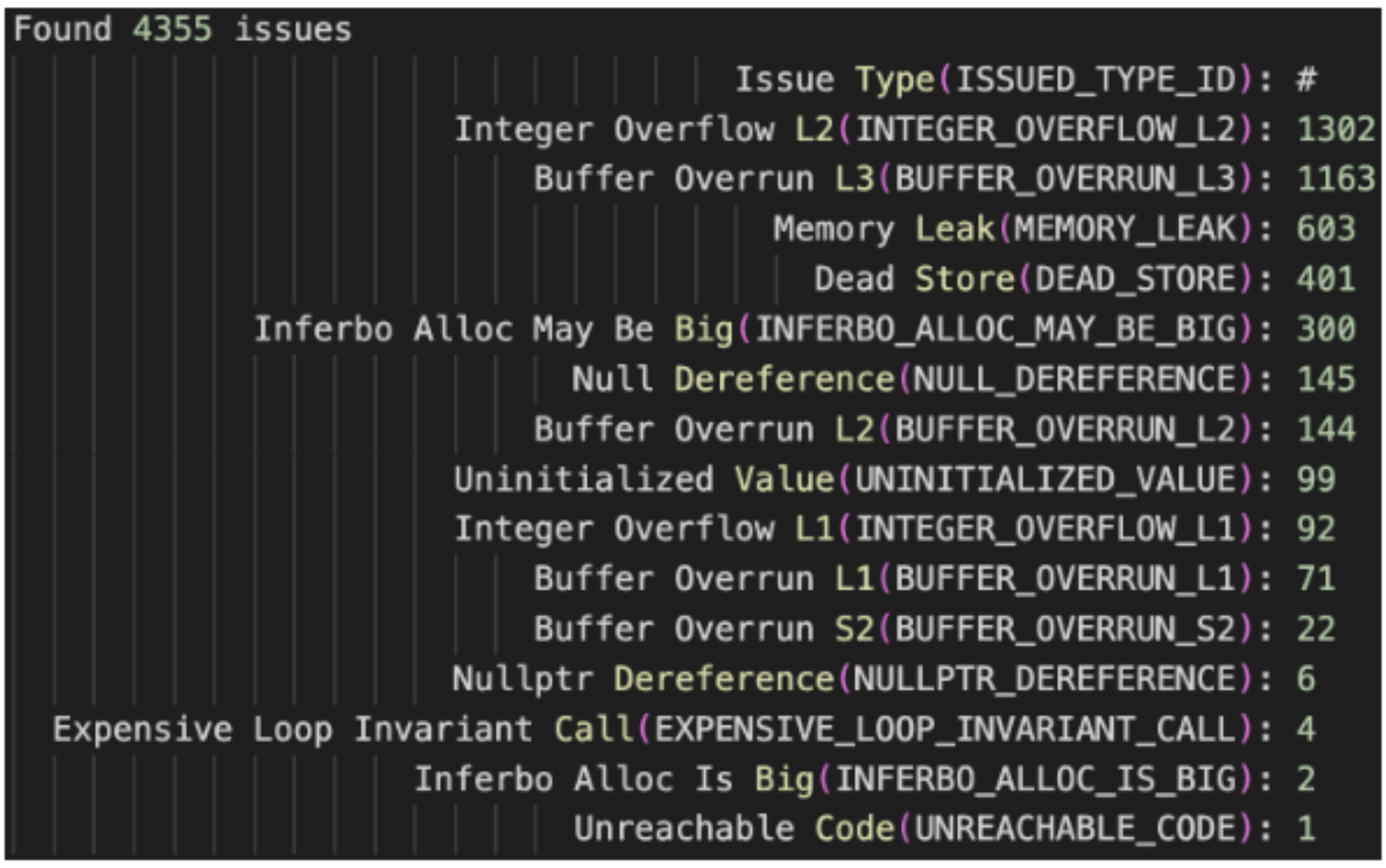
For example, here are some different results from the running Infer under the same configuration `--headers --max-nesting 1 --jobs 5 --reactive --scheduler callgraph`.

result 1:



```
Found 4354 issues
                                    Issue Type(ISSUED_TYPE_ID): #
                         Integer Overflow L2(INTEGER_OVERFLOW_L2): 1302
                           Buffer Overrun L3(BUFFER_OVERRUN_L3): 1163
                                      Memory Leak(MEMORY_LEAK): 602
                                        Dead Store(DEAD_STORE): 401
                  Inferbo Alloc May Be Big(INFERBO_ALLOC_MAY_BE_BIG): 300
                            Null Dereference(NULL_DEREFERENCE): 145
                           Buffer Overrun L2(BUFFER_OVERRUN_L2): 144
                        Uninitialized Value(UNINITIALIZED_VALUE): 99
                         Integer Overflow L1(INTEGER_OVERFLOW_L1): 92
                           Buffer Overrun L1(BUFFER_OVERRUN_L1): 71
                           Buffer Overrun S2(BUFFER_OVERRUN_S2): 22
                       Nullptr Dereference(NULLPTR_DEREFERENCE): 6
   Expensive Loop Invariant Call(EXPENSIVE_LOOP_INVARIANT_CALL): 4
                        Inferbo Alloc Is Big(INFERBO_ALLOC_IS_BIG): 2
                               Unreachable Code(UNREACHABLE_CODE): 1
```

result 2:



```
Found 4355 issues
                                    Issue Type(ISSUED_TYPE_ID): #
                         Integer Overflow L2(INTEGER_OVERFLOW_L2): 1302
                           Buffer Overrun L3(BUFFER_OVERRUN_L3): 1163
                                      Memory Leak(MEMORY_LEAK): 603
                                        Dead Store(DEAD_STORE): 401
                  Inferbo Alloc May Be Big(INFERBO_ALLOC_MAY_BE_BIG): 300
                            Null Dereference(NULL_DEREFERENCE): 145
                           Buffer Overrun L2(BUFFER_OVERRUN_L2): 144
                        Uninitialized Value(UNINITIALIZED_VALUE): 99
                         Integer Overflow L1(INTEGER_OVERFLOW_L1): 92
                           Buffer Overrun L1(BUFFER_OVERRUN_L1): 71
                           Buffer Overrun S2(BUFFER_OVERRUN_S2): 22
                       Nullptr Dereference(NULLPTR_DEREFERENCE): 6
   Expensive Loop Invariant Call(EXPENSIVE_LOOP_INVARIANT_CALL): 4
                        Inferbo Alloc Is Big(INFERBO_ALLOC_IS_BIG): 2
                               Unreachable Code(UNREACHABLE_CODE): 1
```

Assignees

No one assigned

Labels

None yet

Projects

None yet

Milestone

No milestone

Development

No branches or pull requests

Notifications

Unsubs

You're receiving notifications b
thread.

result 3:

```
Found 4353 issues
                                         Issue Type(ISSUED_TYPE_ID): #
                            Integer Overflow L2(INTEGER_OVERFLOW_L2): 1302
                                Buffer Overrun L3(BUFFER_OVERRUN_L3): 1163
                                            Memory Leak(MEMORY_LEAK): 602
                                              Dead Store(DEAD_STORE): 401
                Inferbo Alloc May Be Big(INFERBO_ALLOC_MAY_BE_BIG): 300
                                Null Dereference(NULL_DEREFERENCE): 144
                                Buffer Overrun L2(BUFFER_OVERRUN_L2): 144
                            Uninitialized Value(UNINITIALIZED_VALUE): 99
                            Integer Overflow L1(INTEGER_OVERFLOW_L1): 92
                                Buffer Overrun L1(BUFFER_OVERRUN_L1): 71
                                Buffer Overrun S2(BUFFER_OVERRUN_S2): 22
                            Nullptr Dereference(NULLPTR_DEREFERENCE): 6
  Expensive Loop Invariant Call(EXPENSIVE_LOOP_INVARIANT_CALL): 4
                          Inferbo Alloc Is Big(INFERBO_ALLOC_IS_BIG): 2
                                Unreachable Code(UNREACHABLE_CODE): 1
```

Could you please offer some insights into this issue and suggest ways to mitigate the non-deterministic behavior when running Infer with multiple jobs? Thank you.

[redacted] Author ···

Hello Infer team, I'm following up on this issue and would greatly appreciate any insights you could provide. Thank you!

[redacted] Member ···

Hi, it is indeed a known issue. Several fixes have landed on master since the 1.1 release (we ought to do one soon), so I would suggest:

- trying master
- disabling biabduction (if not already)
- using the restart scheduler
- code with recursive functions may still exhibit non-determinism.