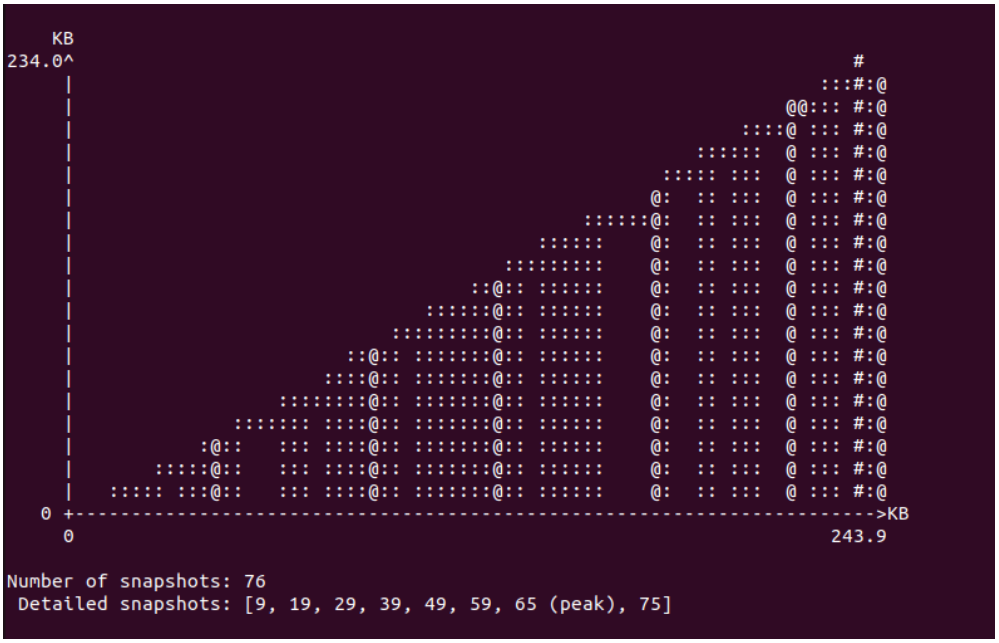
MSS HW2

1. **Memcheck**
   (1) Invalid write: The access to the memory region exceeds its allocated range.
   (2) Invalid read: The access to the memory region exceeds its allocated range.
   (3) Uninitialized value: The values of variables being used should be initialized or declared, otherwise it may cause undefined behavior.
   (4) Negative size of memory allocation: The size of memory allocation should be greater than zero.
   (5) Invalid free: Users should not free memory that has already been freed.
   (6) Memory leak: 40 bytes of memory were not correctly released at the end of the program.

2. **Cachegrind**
   (1) Difference
   The D1 miss rate of the bad one (referred to as Program A), which is ten times higher than that of the good one (referred to as Program B), suggests that A exhibits significantly lower efficiency in utilizing the Level 1 data cache, as it incurs more cache misses.
   (2) Reason
   The difference may stem from distinct memory access patterns between the two programs. Program A may suffer from poorer locality in data access, resulting in a higher rate of Level 1 cache misses. Conversely, Program B may demonstrate data access patterns more conducive to cache utilization, thus exhibiting a lower Level 1 cache miss rate.

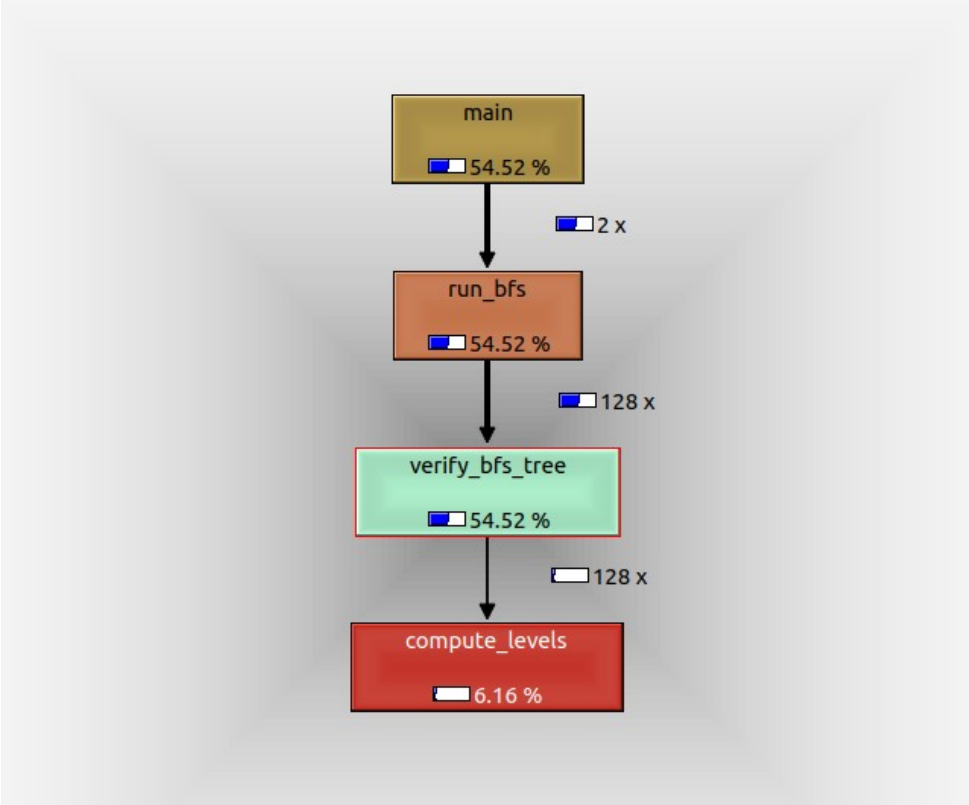
3. **Massif**
   (1) Screenshot



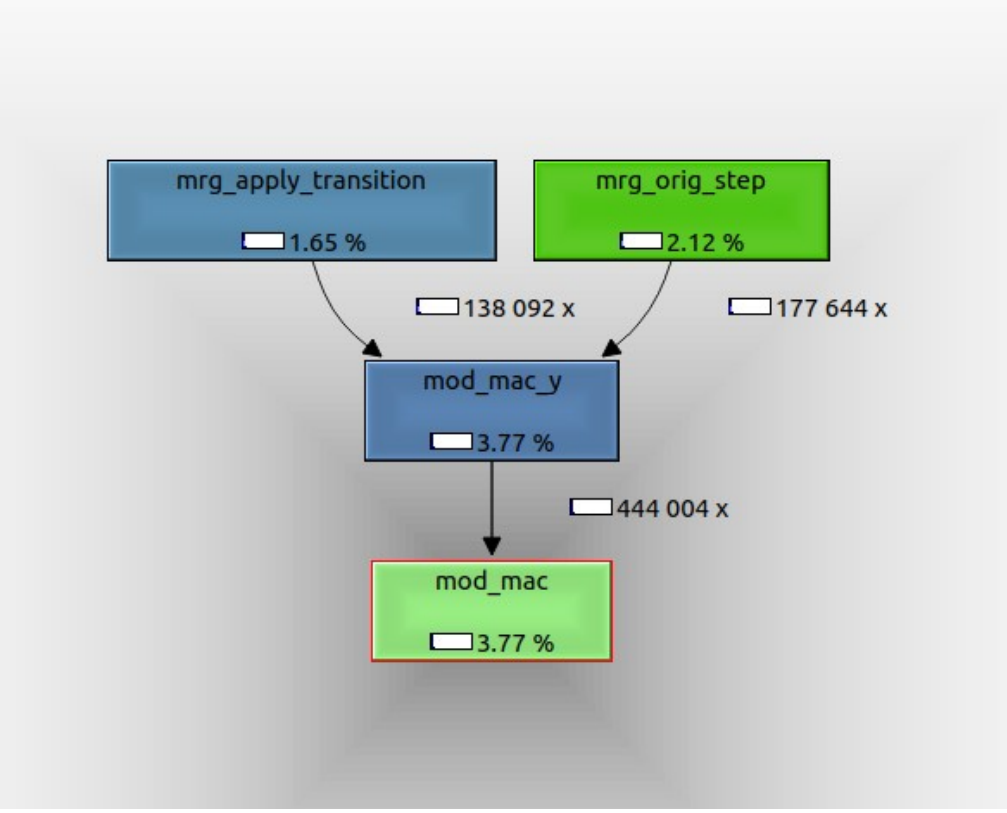
   (2) Peak
   Allocated: 239,600 bytes
   Used: 239,000 bytes

4. Callgrind

(1) verify_bfs_tree



(2) mod_mac (caller: mod_mac_y)



5. Pytorch

(1) Top 3: aten::addmm, aten::copy_, aten::einsum

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(base) corange@corange-Z790-AORUS-ELITE-AX:~/Desktop/MS_HW2$ python3 test2.py
cpu
STAGE:2024-05-15 16:47:33 1626362:1626362 ActivityProfilerController.cpp:314] Completed Stage: Warm Up
STAGE:2024-05-15 16:47:33 1626362:1626362 ActivityProfilerController.cpp:320] Completed Stage: Collection
STAGE:2024-05-15 16:47:33 1626362:1626362 ActivityProfilerController.cpp:324] Completed Stage: Post Processing
torch.Size([2, 7, 10])
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                     Name    Self CPU %     Self CPU   CPU total %     CPU total  CPU time avg       CPU Mem  Self CPU Mem    # of Calls
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               aten::addmm        35.39%       6.177ms        40.73%       7.109ms      73.289us       4.13 Mb       3.84 Mb            97
           model_inference        17.92%       3.128ms       100.00%      17.454ms      17.454ms       5.72 Mb      -5.07 Mb             1
               aten::copy_         8.73%       1.524ms         8.73%       1.524ms       6.743us     168.39 Kb     168.39 Kb           226
              aten::einsum         3.76%     657.000us        15.57%       2.717ms      75.472us       2.32 Mb           0 b            36
   aten::native_layer_norm         3.15%     549.000us         3.34%     583.000us      19.433us     939.66 Kb     269.29 Kb            30
                aten::bmm         2.95%     515.000us         2.95%     515.000us      14.306us     624.38 Kb     540.38 Kb            36
             aten::linear         2.57%     448.000us        46.22%       8.067ms      83.165us       4.13 Mb           0 b            97
               aten::tril         2.38%     416.000us         2.38%     416.000us     416.000us         196 b         196 b             1
            aten::clamp_min         2.14%     374.000us         2.14%     374.000us      31.167us       1.50 Mb       1.50 Mb            12
              aten::reshape         1.99%     347.000us         9.18%       1.602ms       6.539us       2.25 Mb           0 b           245
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Self CPU time total: 17.454ms
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(2) Top 2: aten::linear, aten::addmm