

Link to repo = <https://github.com/scandum/wolfsort>

The workload I chose is a benchmark of a sorting algorithm that the owner of the repository had made. The sorting algorithm in mind is called **wolfsort**, it is a hybrid sorting algorithm that combines properties of radix sort, quicksort and merge sort. The workload runs a benchmark that compares wolfsort to other hybrid sorting algorithms.

## Downloading and running the workload

To download the repository, run the following command

```
git clone https://github.com/scandum/wolfsort
```

After cloning the repository, you can run and compile the benchmark as such:

```
cd wolfsort/src
gcc -O3 bench.c
./a.out
```

To compile it into a RISC-V binary run the following compile line

```
riscv64-linux-gnu-gcc -O3 -static bench.c -o bench.rv
```

The bash script I used to run the workload is the following code

```
ESESC_BIN=${1:-../main/esesc}

export ESESC_ReportFile="part2Report"
export ESESC_BenchName="./wolfsort/src/bench.rv"
export ESESC_DL1_core_bsize=8
if [ -f $ESESC_BIN ]; then
    $ESESC_BIN
else
    $ESESC_BenchName
fi
exit 0
```

## Initial Results

The initial run of the benchmark showed an IPC of 0.41, and a total instruction count of 362,993,027 instructions, with a running time of 702 seconds. The full report given by esesc can be seen below

```
*****
# File : esesc_part2Report.MmbRku : Wed Nov  2 22:46:46 2022
*****
Sampler 0 (Procs 0)
  KIPS  96758  N/A  241765  580  10365
  Tlme   5.5%   0.0%   1.8%  92.0%   : Sln Tlme (s) 702.049 Exe 521.754 ms Sln (1700MHz)
  Inst  51.0%   0.0%  43.0%   5.2%   : Approx Total Tlme 10057.350 ms Sln (1700MHz)
*****
Proc : Delay : Avg.Tlme : BPTYPE : Total : RAS : BPred : BTB : iBTB : BTAC : WasteRatio : MPKI
0 : 3 : 12.906 : 2bit : 89.93% : 99.99% of 8.37% : 88.53% of 87.79% : 88.03% of 47.94% : 0.00% : 0.00% : 0.00% : 23.06
0 : 4 : 12.906 : 2level : 89.93% : 0.00% of 0.00% : 88.91% of 90.82% : 72.34% of 0.09% : 47.85% : ( 3.09% fixed) : 23.06
*****
Proc : nCommit : nInst : AALU : BALU : CALU : LALU : SALU : LD Fwd : Replay : Worst Unit (clk)
0 : 362993011 : 362993027 : 47.88% : 24.82% : 0.05% : 14.34% : 12.91% : 0.02% : N/A : 0.00
*****
Proc IPC uIPC Active Cycles Busy LDQ STQ IWLn ROB Regs IO maxBr MisBr Br4Clk brDelay
0 0.41 0.41 1.00 886981795 20.5 0.0 49.2 0.2 0.0 1.1 0.0 0.0 0.0 0.0 9.4
*****
Cache Occ AvgMenLat MemAccesses MissRate ( RD , WR , BUS)
IL1(0) 0.0 2.0 263038050 0.0% 0.0% (100.0%, 0.0%, 0.0%) 31.5 0.0 GB/s
*****
DL1(0) 0.0 87.9 98913154 56.2% 56.3% ( 44.7%, 42.6%, 0.0%) 11.8 0.0 GB/s
*****
L2(0) 0.0 146.9 55547124 23.1% 76.5% ( 50.4%, 0.0%, 0.0%) 6.7 0.0 GB/s
Memory(0) 0.0 60.0 13157388 0.0% 0.0% (100.0%,100.0%, 0.0%) 1.6 0.0 GB/s
*****
```