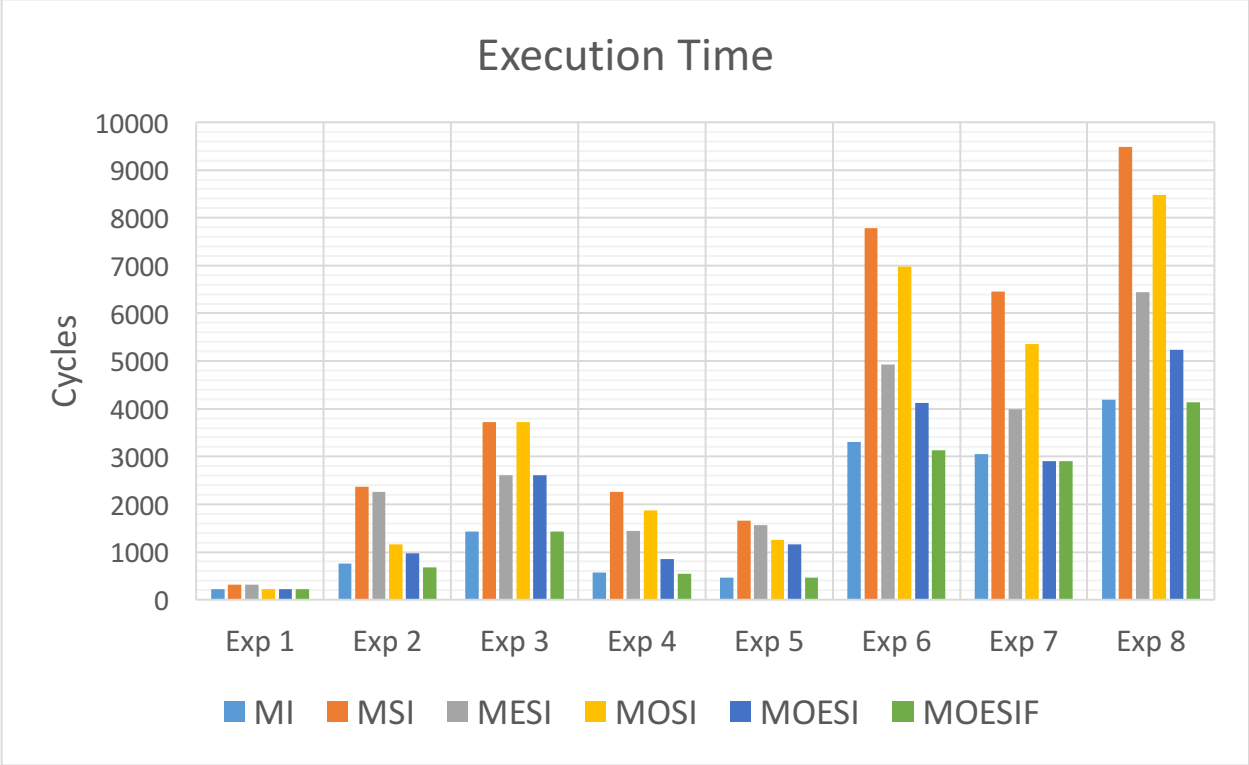
Project 3: Report

Experiment Results

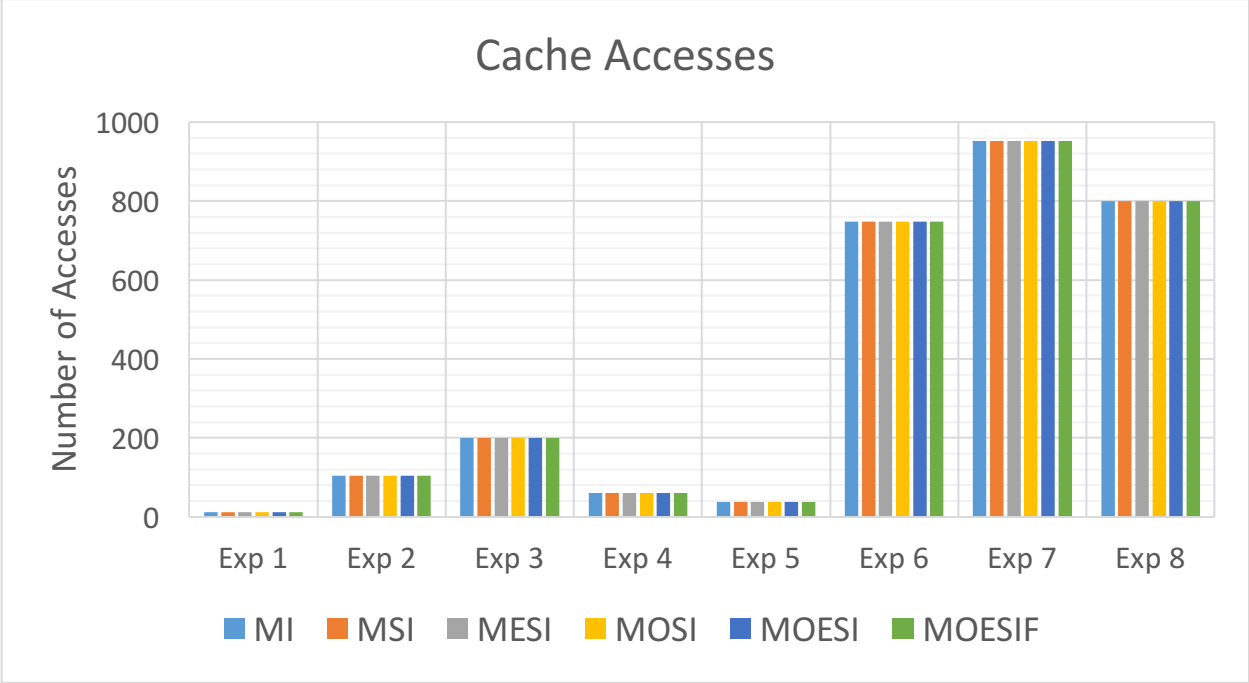
Below are charts that show the results of running all 8 provided experiments using each of the implemented cache coherence protocols.

Parameter Charts

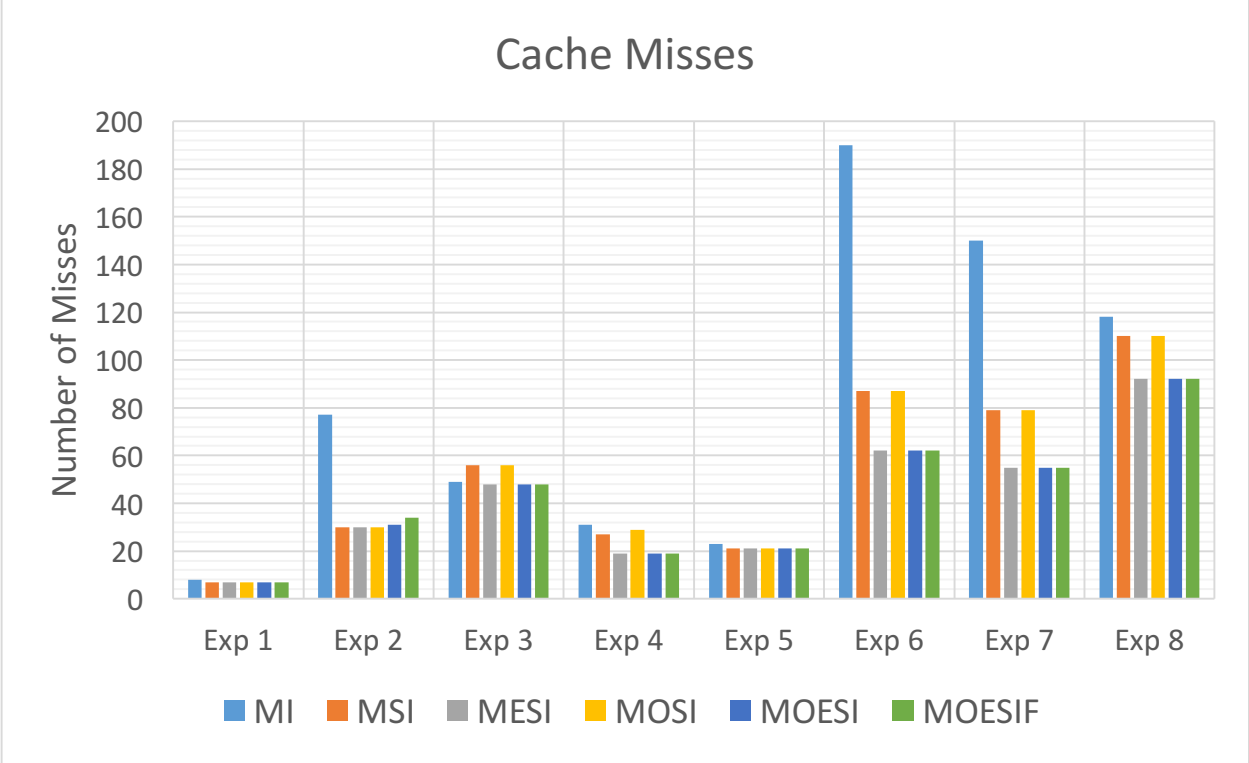
For execution time, we see that MI, MOESI, and MOESIF perform consistently better than the remaining protocols for all of the experiments.



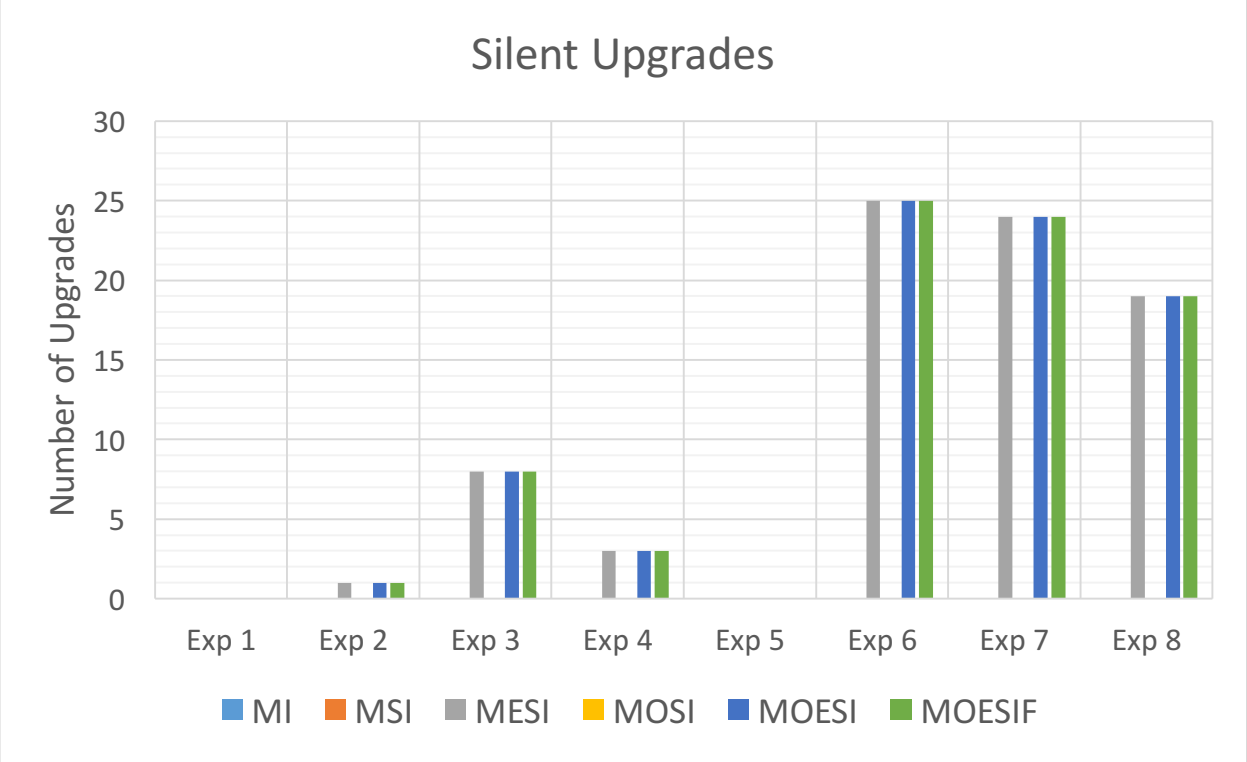
Cache accesses are uniform within each experiment given that the traces are the same.



As for cache misses, MI performs much worse than the rest for experiments 2, 6, and 7 (why?). The remaining protocols perform about the same.

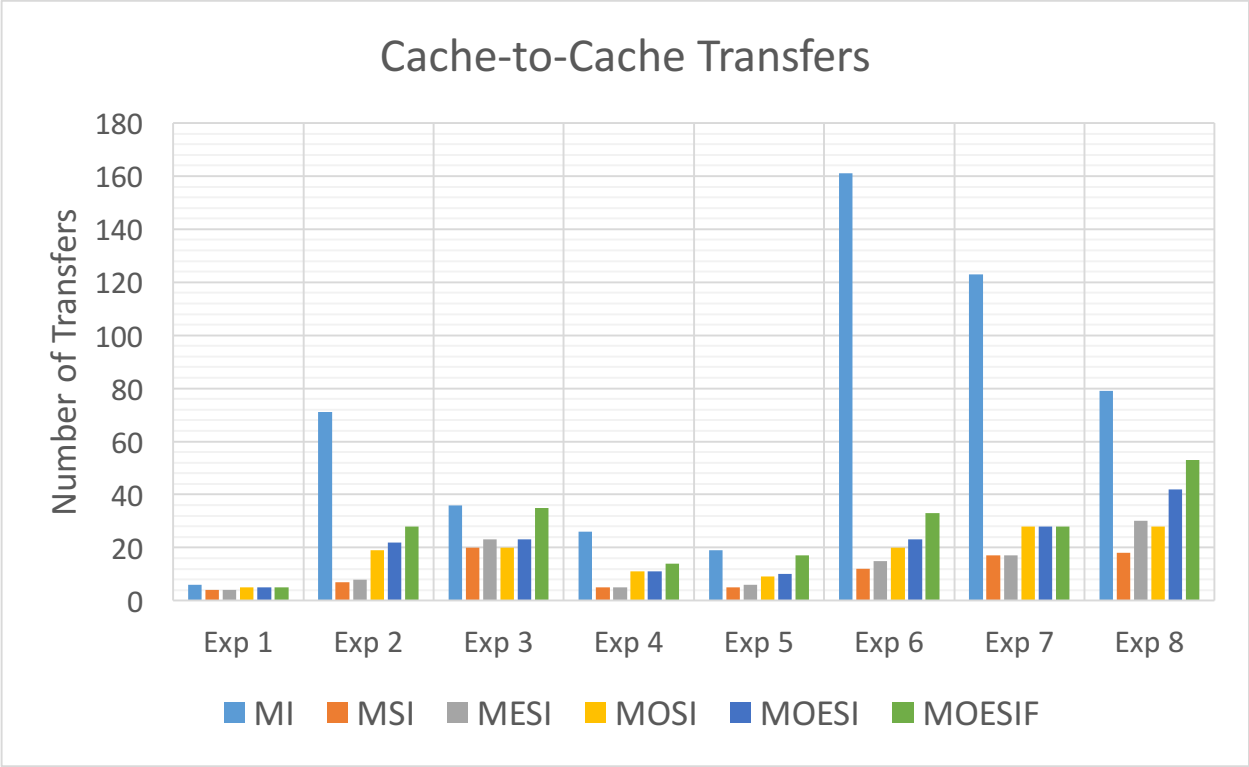


Silent upgrades are only present in protocols with an E state (i.e., MESI, MOESI, and MOESIF), and are not present in experiments 1 and 5 (why?).



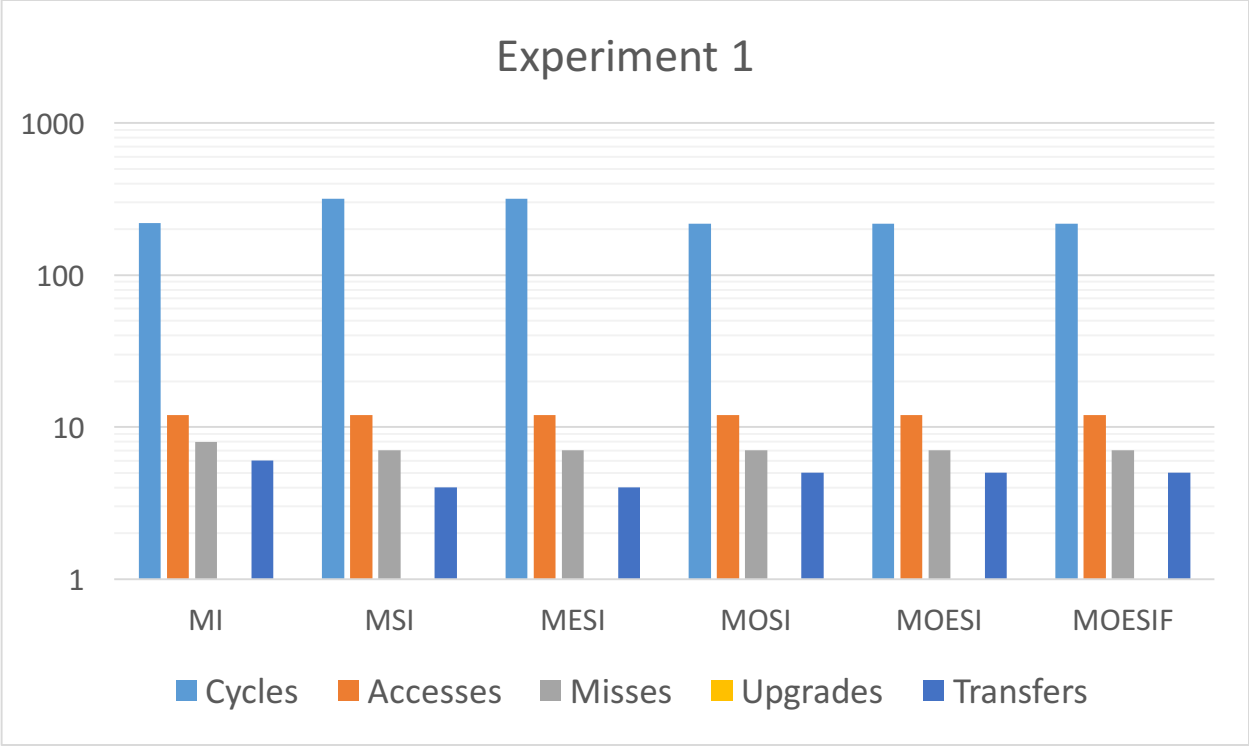
For cache-to-cache transfers, MI performs significantly more such transfers in most of the experiments. The reason is the absence of a S state – in other words, a block is either "dirty" or invalid.

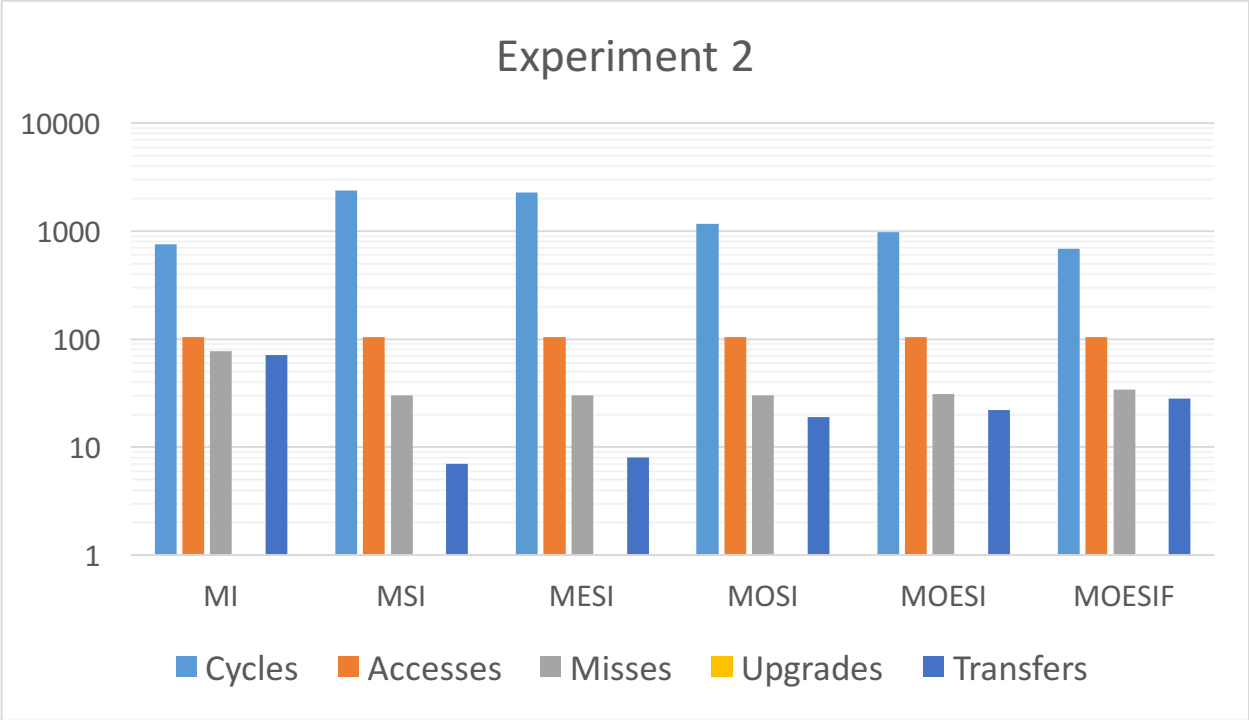
Furthermore, MOESIF seems to perform more transfers than the remaining protocols. One explanation for this is the presence of the F state.

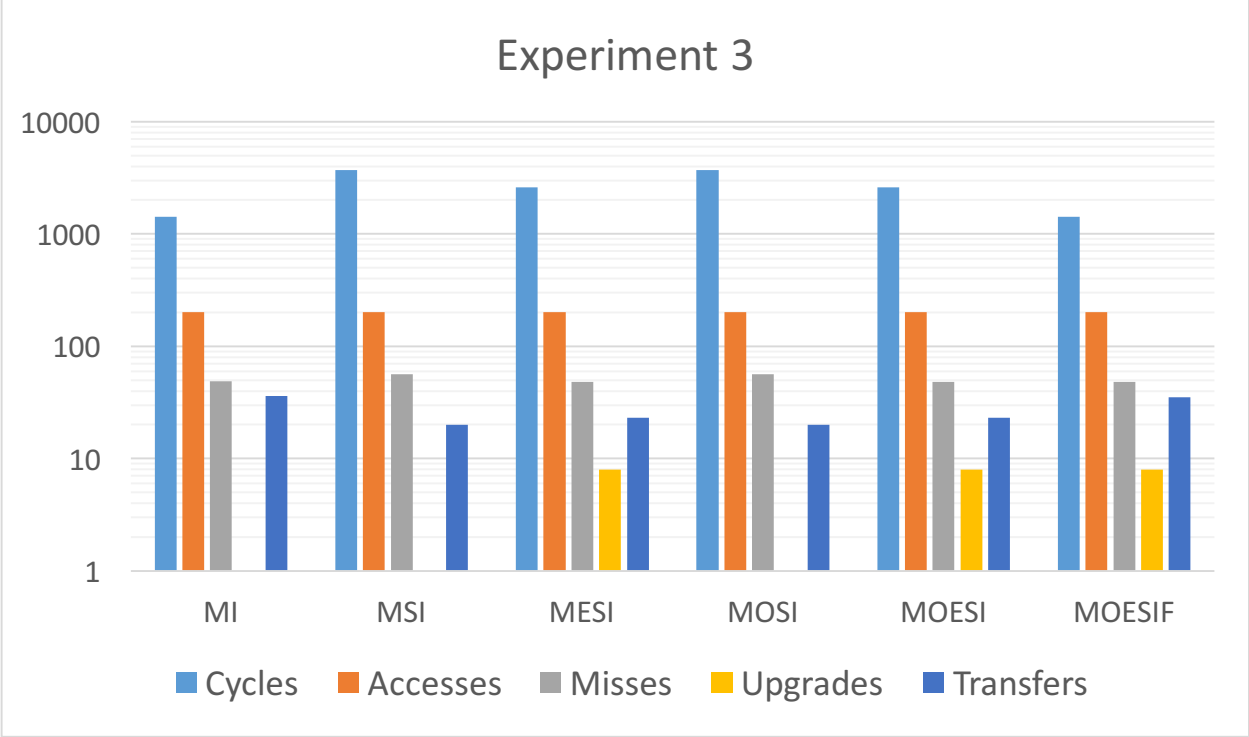


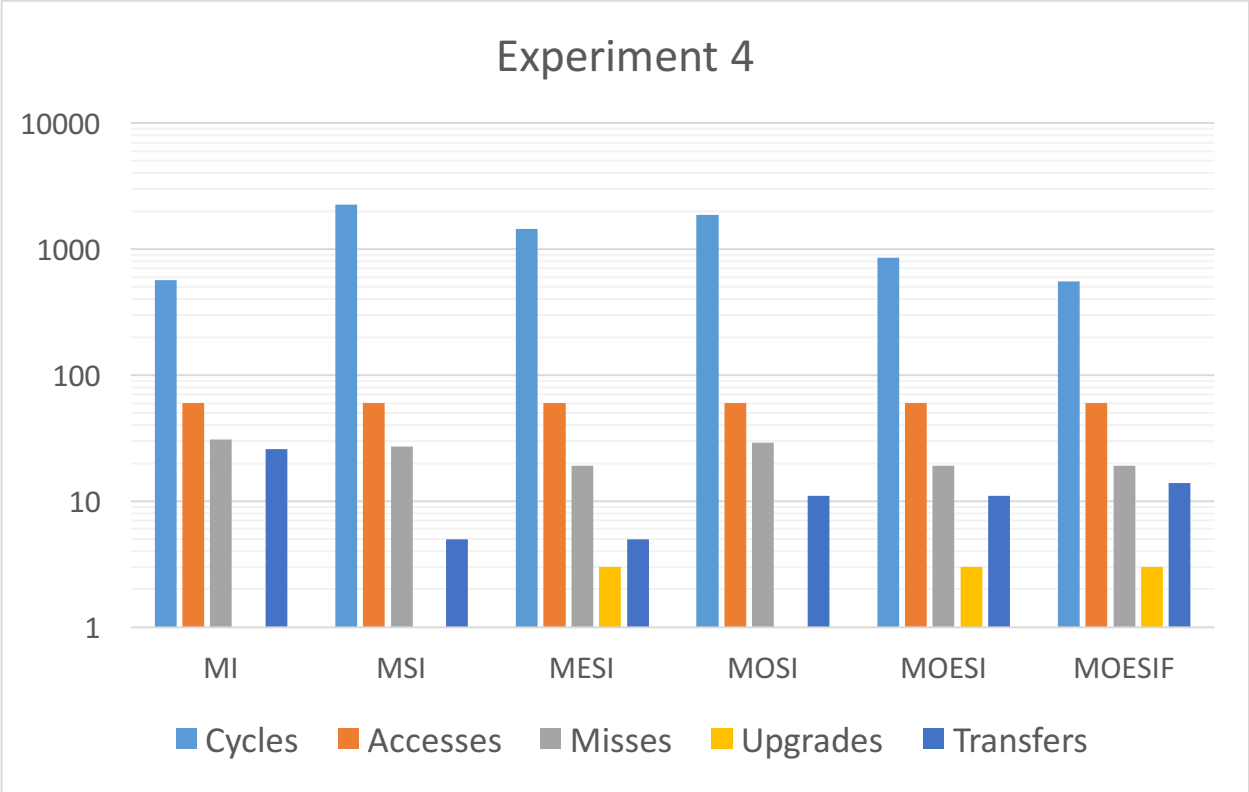
Experiment Charts

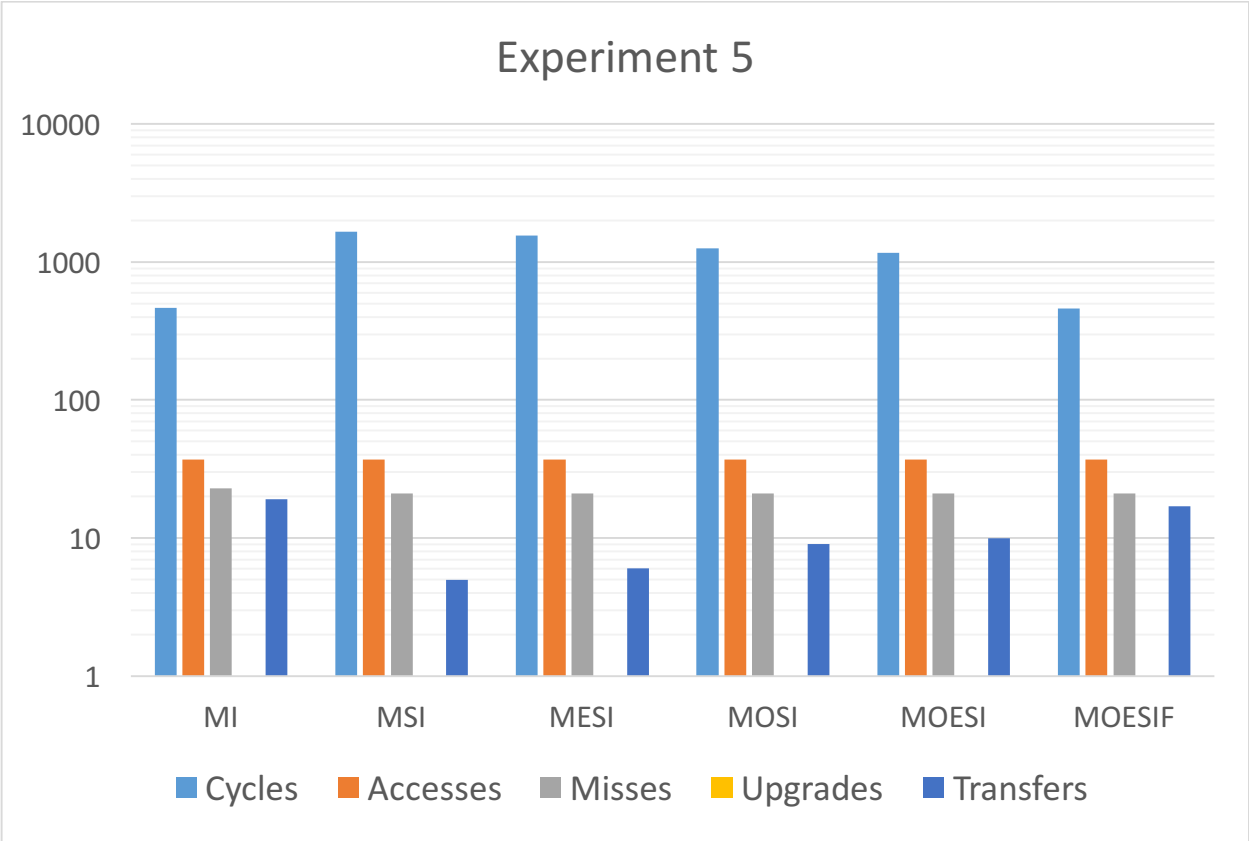
The following charts show protocol performance across each single experiment. Note that the charts are plotted in *logarithmic* scale.

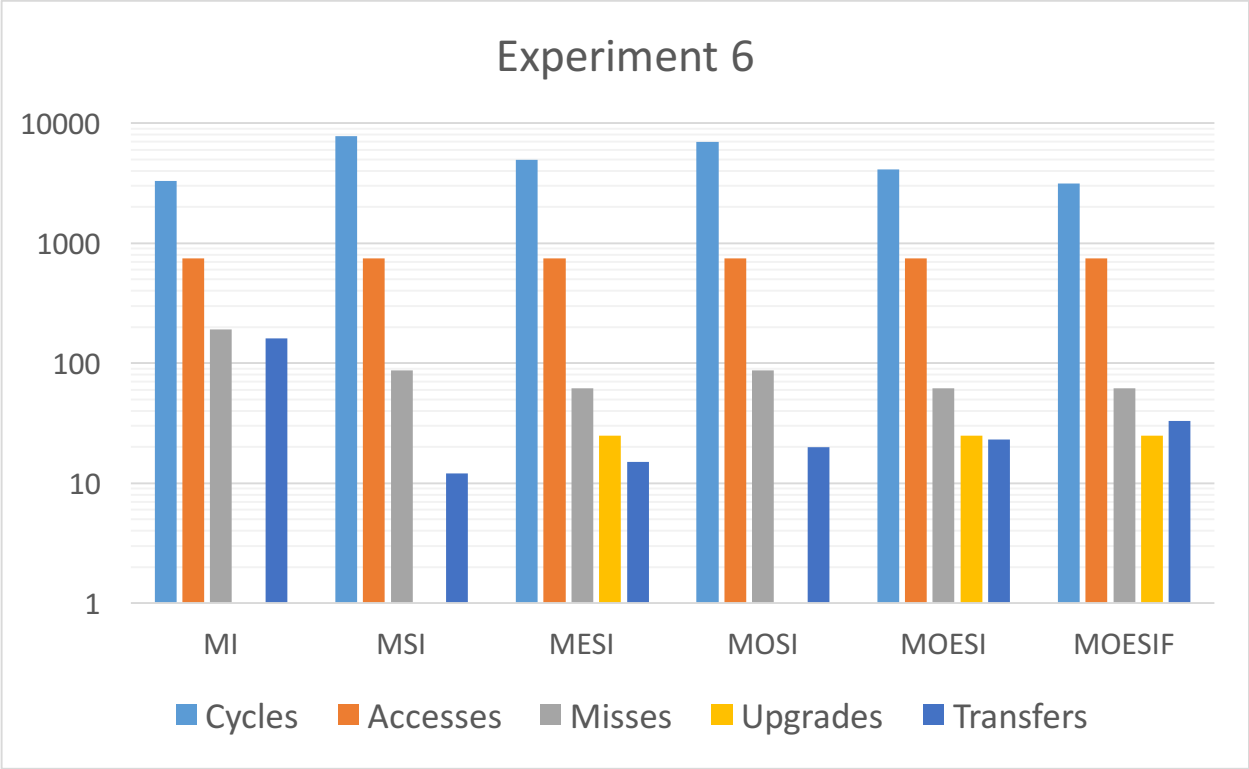


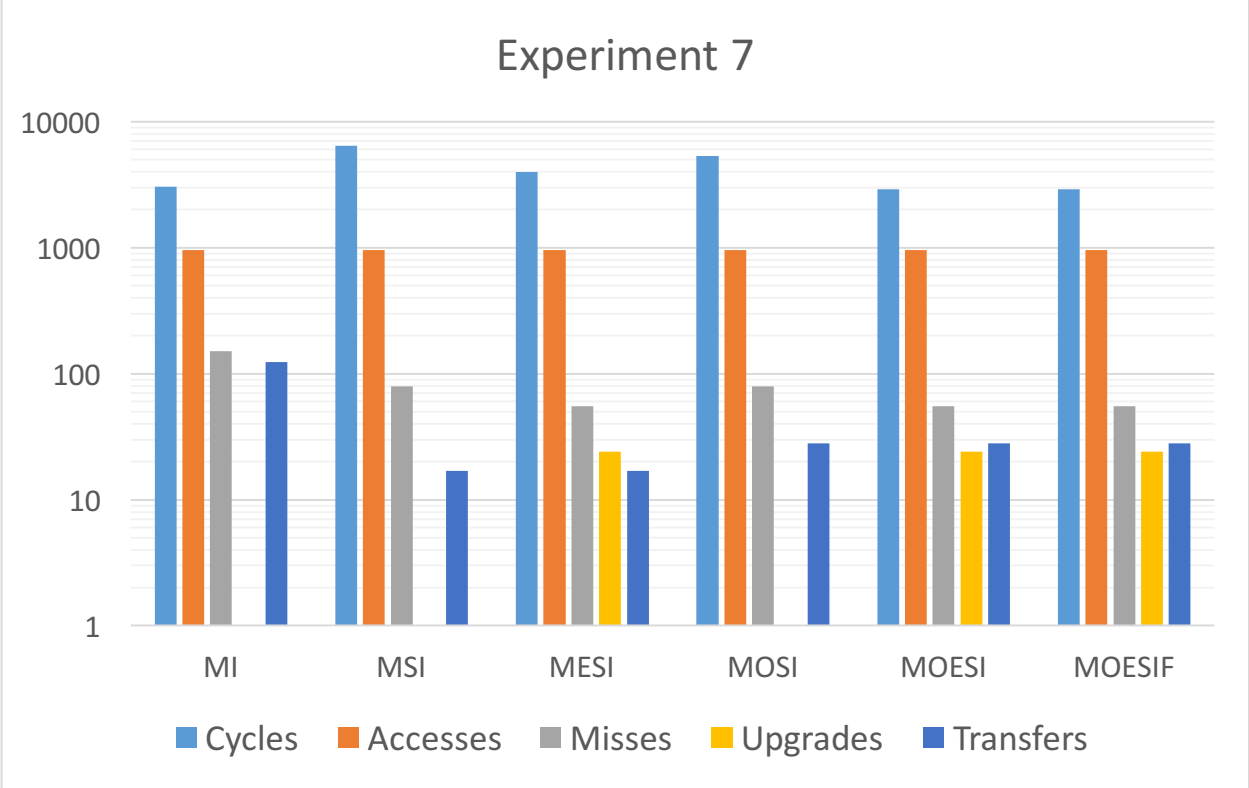

Experiment 2
10000
1000
100
10
1
MI
MSI
MESI
MOSI
MOESI
MOESIF
Cycles
Accesses
Misses
Upgrades
Transfers

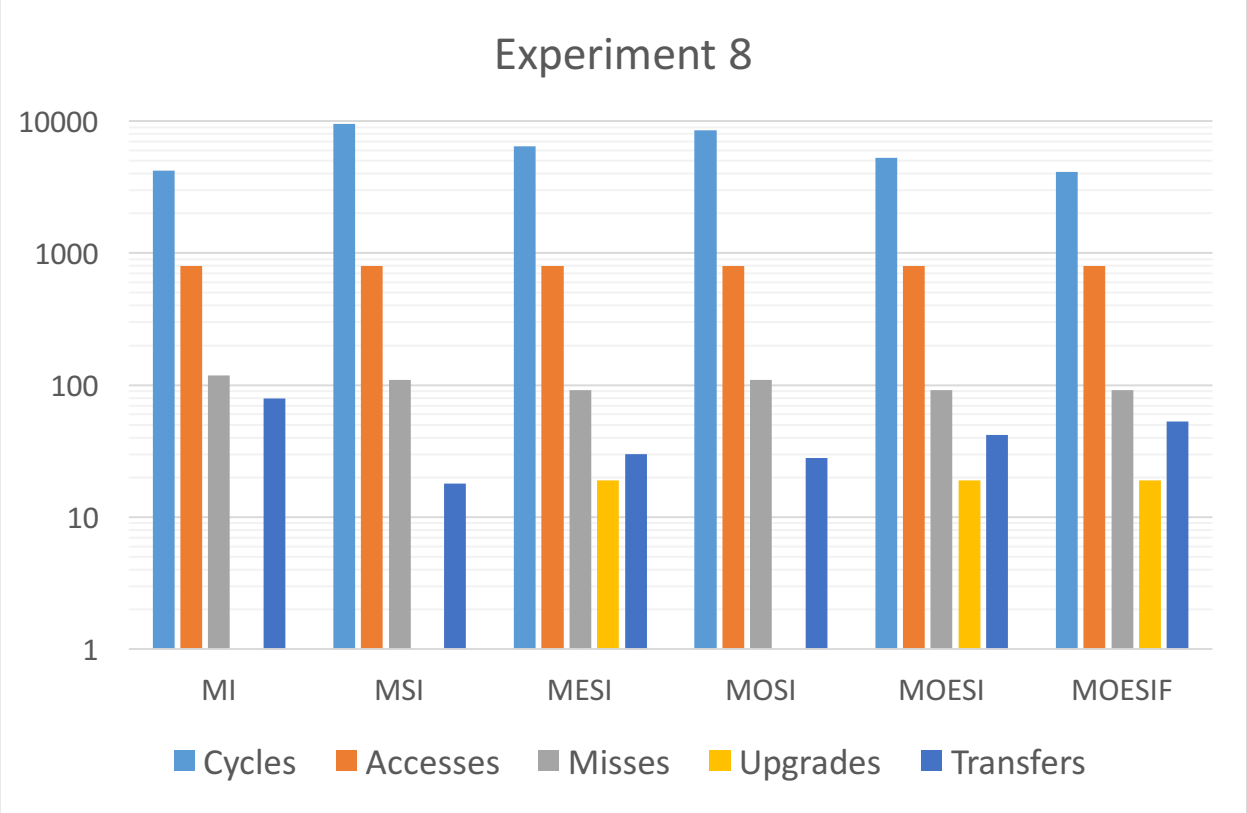

Experiment 3
10000
1000
100
10
1
MI
MSI
MESI
MOSI
MOESI
MOESIF
Cycles
Accesses
Misses
Upgrades
Transfers


Experiment 4
10000
1000
100
10
1
MI
MSI
MESI
MOSI
MOESI
MOESIF
Cycles
Accesses
Misses
Upgrades
Transfers


Experiment 5
10000
1000
100
10
1
MI
MSI
MESI
MOSI
MOESI
MOESIF
Cycles
Accesses
Misses
Upgrades
Transfers


Experiment 6
10000
1000
100
10
1
MI
MSI
MESI
MOSI
MOESI
MOESIF
Cycles
Accesses
Misses
Upgrades
Transfers


Experiment 7
10000
1000
100
10
1
MI
MSI
MESI
MOSI
MOESI
MOESIF
Cycles
Accesses
Misses
Upgrades
Transfers


Experiment 8
10000
1000
100
10
1
MI
MSI
MESI
MOSI
MOESI
MOESIF
Cycles
Accesses
Misses
Upgrades
Transfers