MTCS-102

Advanced Architecture Assignment -2

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Probem Description

Explore following compilers from Compiler Explorer for the selection_sort.c program and note down the number of instructions of each case. Then take a benchmark program and calculate number of instructions with respect to various compilers.

Compiler	No. of instructions (selection_sort.c)	No. of instructions Benchmark
X86-64 clang 12.0.0	146	479
RISC-V rv32gc	210	660
ARM gcc 8.2	189	624
MIPS64 gcc 5.4	274	887
RISC-V rv32gc clang(trunk)	210	660
RISC-V rv64gc clang(trunk)	215	665

Observations:

1. For sorting code the CISC based compiler x86-64 generates small number of instructions compared to benchmark program.This suggests that the performance of x86-64 is well optimized for specific tasks but may require more instructions for the benchmark workload.

2. For RISC based compilers they produce the same number of instruction for selection sort.This suggests that RISC-V architecture has consistent performance for both the specific task and the benchmark workloads.

3. The ARM based compiler suggests that it is efficient for specific tasks but needs more instructions for the benchmark workloads.

4. For MIPS compiler indicates that the architecture may be less optimized for the specific task and requires more instructions for the benchmark workloads.

Conclusion:

These observations drawn are based solely on the number of instructions but it may not fully represent the overall performance of the architectures or compilers for other workloads or real world scenerios. A broader analysis would require a broader set of benchmarks and performance metrics. Also the performance of an architecture is influenced on various factors including the specific code ,compiler optimization and the workload characteristics.