



MICHIGAN ENGINEERING  
UNIVERSITY OF MICHIGAN

# Statistics Computation

Due On: Jan 29, 2024

# LLVM Pass

Basic unit used to perform analysis and transformations on the source code.

**Analysis Pass:** Does not change the code

**Transform Pass:** Changes the code

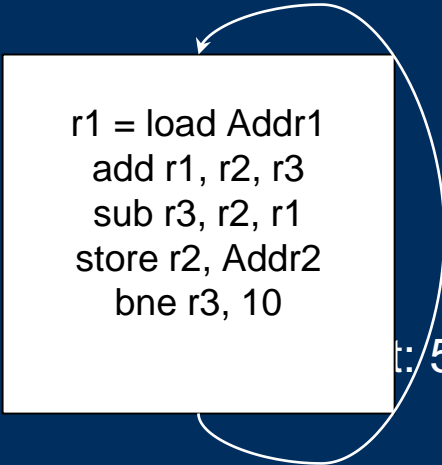
# Profiling

Compute run-time information to supplement analysis of program.

- Sample-based
- **Instrumentation-based**

# Statistics Computation

Dynamic Operation Counts for various instruction categories.



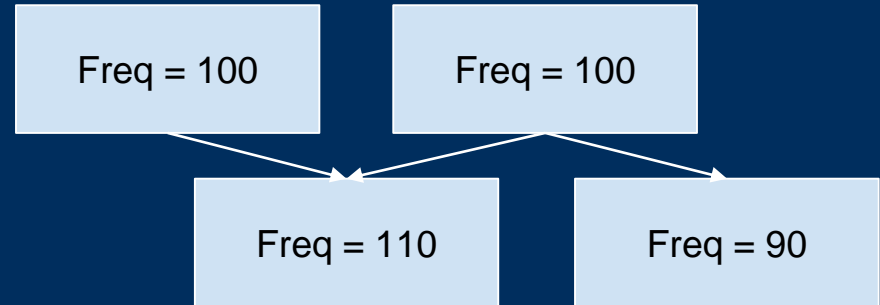
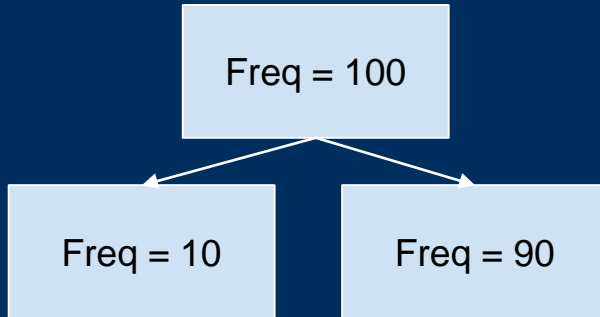
```
r1 = load Addr1  
add r1, r2, r3  
sub r3, r2, r1  
store r2, Addr2  
bne r3, 10
```

The diagram shows a white rectangular box containing assembly code. A curved arrow originates from the right side of the box and points back to the top-left corner, indicating a loop or iteration over the code block.

t: 5\*frequency

# Branch Bias

- Remember: Branch is an **instruction** that lies at the end of the BB. Two (or more) arrows coming out of a BB still represents one branch.
- How often is a branch taken?



# Submission Guidelines

- Create a tar ball with your code and stats files and submit on server.
  - No extra validation
  - We will run your code, so longer turn-around time
- Submit just the hw1pass.cpp on Gradescope
  - Submission validation
  - Not very informative yet

## Useful References

- <https://llvm.org/docs/ProgrammersManual.html>
- `llvm/IR/Instruction.def`, `llvm/IR/Instruction.h`
- [https://llvm.org/doxygen/classllvm\\_1\\_1BranchProbabilityInfo.html](https://llvm.org/doxygen/classllvm_1_1BranchProbabilityInfo.html)
- [https://llvm.org/doxygen/classllvm\\_1\\_1BlockFrequencyInfo.html](https://llvm.org/doxygen/classllvm_1_1BlockFrequencyInfo.html)



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Thank you