Exam Assignments V10

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1. **Name** and **explain** some **useful compiler flags** during development.
   - **-Wall** (enables all compiler's warning messages)
   - **-g** (generates debug information to be used by debugger and profiler)
   - **-fsanitize=address** (detects out-of-bounds access, use-after-free and memory leaks)
   - **-fsanitize=undefined** (detects undefined behavior at runtime)[1]

2. **How** could **Intel oneAPI help you write better programs**?

Intel's oneAPi enables developers to work without the exhaustion of juggling with different languages, tools, libraries and different hardware." [1]

It enables developer engagement and innovation across multiple hardware architectures, including CPUs, GPUs, FPGAs, AI accelerators, and more. These tools all have very different properties and are thus used for various operations–which oneAPI attempts to simplify by unifying them under one model. [2]

3. **What can we learn** from the **following quote**?

Premature optimization is the root of all evil (Donald Knuth).

Premature optimization is spending a lot of time on something that you may not actually need.

"The real problem is that programmers have spent far too much time worrying about efficiency in the wrong places and at the wrong times; premature optimization is the root of all evil (or at least most of it) in programming." [3]

we should optimize our code in this order:

1) **solve** the **problem** first without optimizations
2) **make sure** that the **program is working correctly** (unit tests)
write test file (catch)
3) **if:** **performance** of the implementation is **good enough** for needs, it is **done**
4) **else:** **optimize** the implementation (find **bottlenecks**, improve the algorithm, parallelize, vectorize, . . .)
5) **goto:** step 2)

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[1] A Beginner's Guide To Intel oneAPI (analyticsindiamag.com)
[2] A Beginner's Guide To Intel oneAPI (analyticsindiamag.com)
[3] Why Premature Optimization Is the Root of All Evil – Stackify