LLVM Advisor

A Unified Visualization Tool for Compiler Artifacts

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Context

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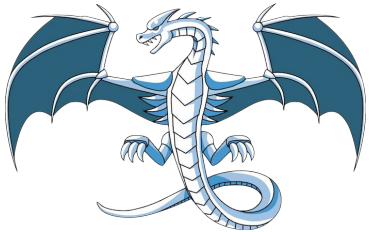
- **LLVM** reports **valuable compilation data**
  - Optimization remarks
  - Profiling data
  - Timing data



Context

- **LLVM** reports **valuable compilation data**
  - Optimization remarks
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- However…
  - Multiple compilation **flags**
  - Different **output data formats**
  - **Finding remarks** in specific regions

```
remark: in artificial function
      '__omp_offloading_803_29744d_main_l9_omp_outlined_omp_outlined',
      alloca ('%15') without debug info with static size of 4 bytes
      [-Rpass=kernel-info]
test.c:9:5: remark: in artificial function
      '__omp_offloading_803_29744d_main_l9_omp_outlined_omp_outlined',
      direct call, callee is '@llvm.lifetime.start.p0' [-Rpass=kernel-info]
    9 |     #pragma omp target teams distribute parallel for map(to: a, b) m
...
      |     ^
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test.c:9:5: remark: in artificial function
      '__omp_offloading_803_29744d_main_l9_omp_outlined_omp_outlined',
      'load' instruction ('%25') accesses memory in flat address space
      [-Rpass=kernel-info]
test.c:9:5: remark: in artificial function
      '__omp_offloading_803_29744d_main_l9_omp_outlined_omp_outlined',
      direct call, callee is '@__kmpc_for_static_init_4'
      [-Rpass=kernel-info]
test.c:11:16: remark: in artificial function
      '__omp_offloading_803_29744d_main_l9_omp_outlined_omp_outlined',
```
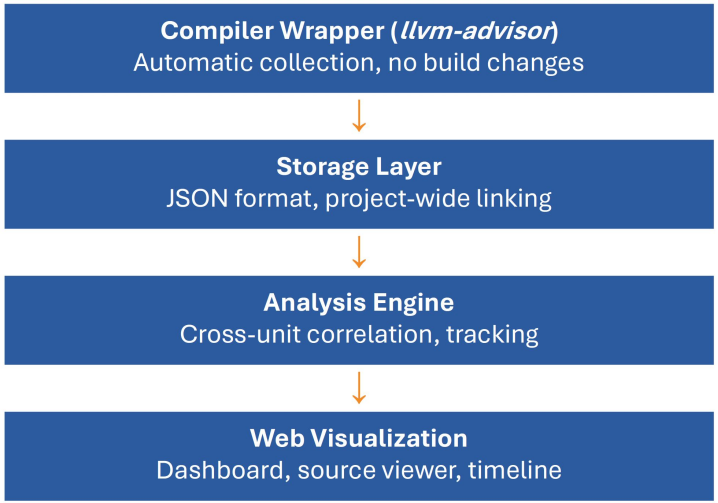

```
 "/home/cc/Files/llvm/bin/clang-offload-packager" "-o" "/tmp/test-f38eb3.out
" "--image=file=/tmp/test-sm_75-7a20ba.o,triple=nvptx64-nvidia-cuda,arch=sm_
75,kind=openmp,feature=+ptx85"
 "/home/cc/Files/llvm/bin/clang-21" "-cc1" "-triple" "x86_64-unknown-linux-g
nu" "-O2" "-emit-obj" "-dumpdir" "a-" "-disable-free" "-clear-ast-before-bac
kend" "-disable-llvm-verifier" "-discard-value-names" "-main-file-name" "tes
t.c" "-mrelocation-model" "pic" "-pic-level" "2" "-pic-is-pie" "-mframe-poin
ter=none" "-fmath-errno" "-ffp-contract=on" "-fno-rounding-math" "-mconstruc
tor-aliases" "-funwind-tables=2" "-target-cpu" "x86-64" "-tune-cpu" "generic
" "-debug-info-kind=constructor" "-dwarf-version=5" "-debugger-tuning=gdb" "
-fdebug-compilation-dir=/home/cc/testing" "-fcoverage-compilation-dir=/home/
cc/testing" "-resource-dir" "/home/cc/Files/llvm/lib/clang/21" "-ferror-limi
t" "19" "-fmessage-length=76" "-fopenmp" "-fgnuc-version=4.2.1" "-fskip-odr-
check-in-gmf" "-fcolor-diagnostics" "-vectorize-loops" "-vectorize-slp" "-fe
mbed-offload-object=/tmp/test-f38eb3.out" "--offload-targets=nvptx64-nvidia-
cuda" "-faddrsig" "-D__GCC_HAVE_DWARF2_CFI_ASM=1" "-o" "/tmp/test-835b01.o"
"-x" "ir" "/tmp/test-8a78b4.bc"
```

Solution: LLVM Advisor

LLVM Advisor

- **LLVM Advisor** provides a **unified infrastructure**
  - **Gather** and **organize** compilation data
  - **Analyze** and correlate data
  - **Visualize** on a modern web interface



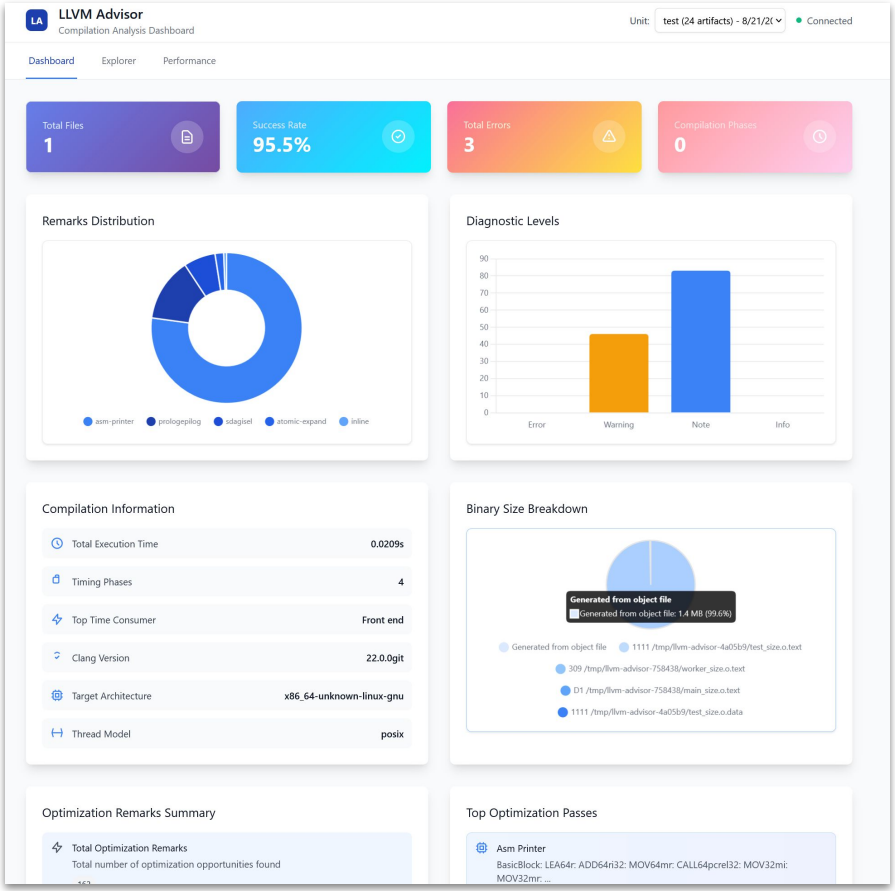
LLVM Advisor

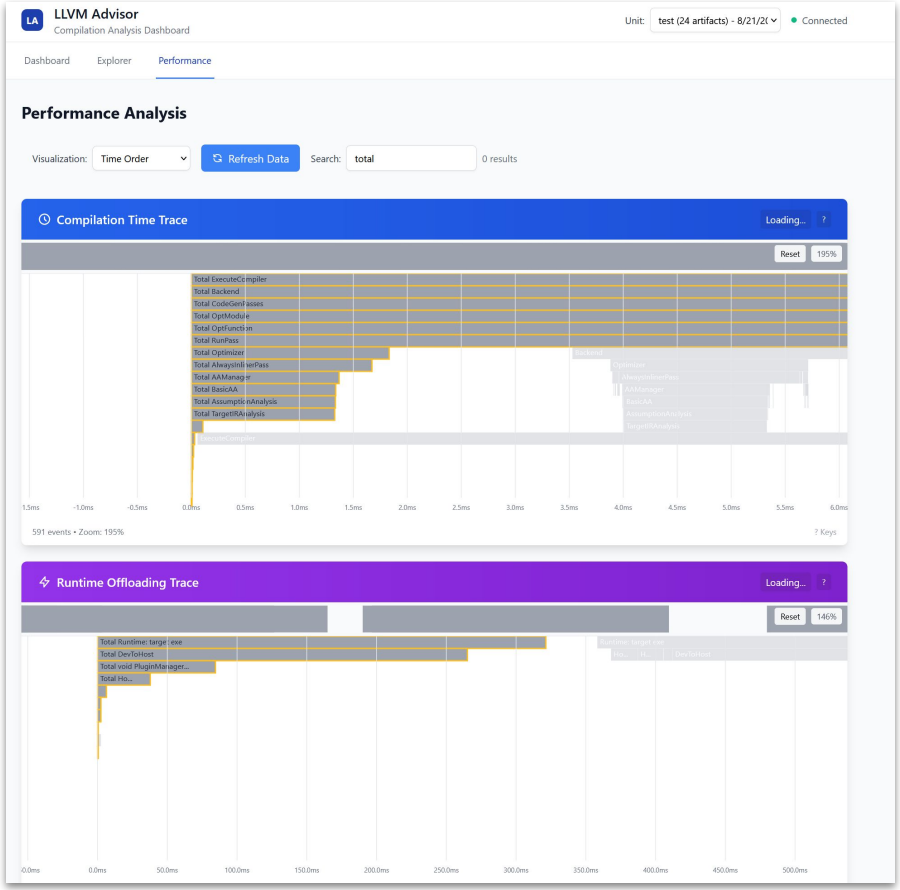
- Compile with data collection

```
$ llvm-advisor clang -O2 -g main.c -o main
```

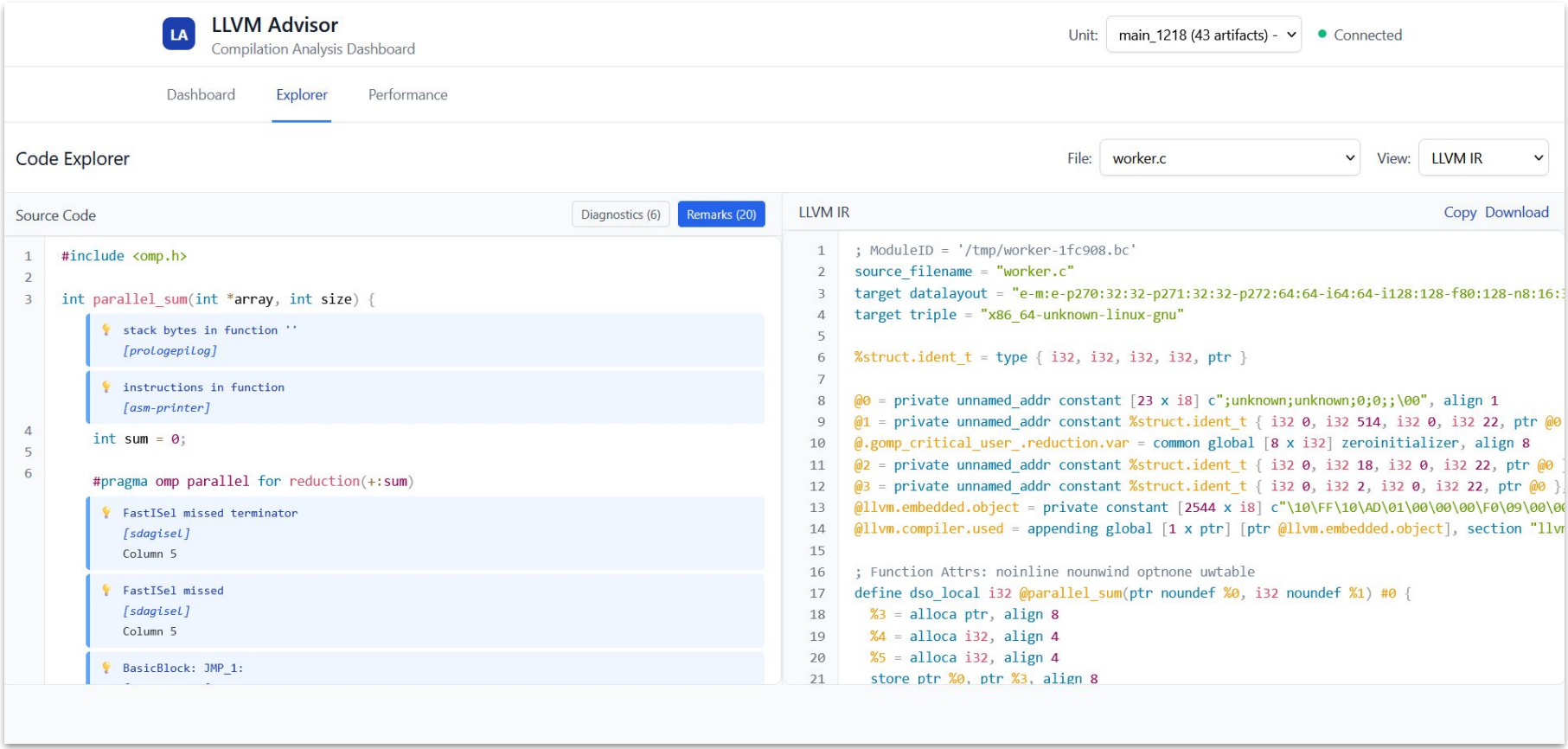
```
$ tree -a .llvm-advisor
.llvm-advisor/
└── main/
    └── main_20250825_143022/  # Timestamped compilation session
        ├── ir/main.ll         # LLVM IR output
        ├── assembly/main.s    # Assembly output
        ├── ast/main.ast       # AST dump
        ├── diagnostics/       # Compiler warnings/errors
        └── ...                # Additional analysis data
```

LLVM Advisor





LLVM Advisor



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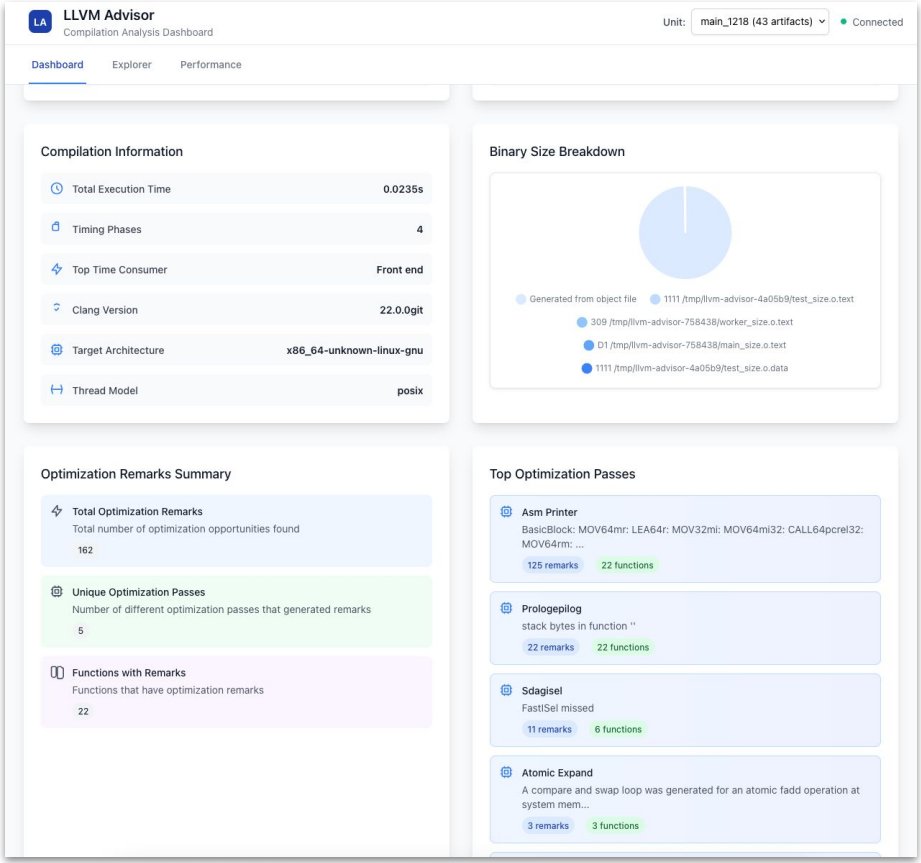

- Who can benefit?
  - **Advanced developers**
  - **Newcomers** in LLVM
  - **Educators**

Questions?

Visit the poster session tomorrow!

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Try LLVM Advisor

https://llvm-advisor.onrender.com/

LLVM PR #147451
https://github.com/llvm/llvm-project/pull/147451