Spot the Difference with **LLVM-FLOW**: an open-source interactive visualization tool for comparing IR CFGs

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1. Control Flow Graph (CFG)
A **Control Flow Graph** is a directed graph that represents the program's control flow, where nodes represent basic blocks, and edges represent the flow of control between those blocks.

Representing LLVM IR as a CFG allows for efficient analysis and optimization of code.

The LLVM optimizer has analysis pass (-dot-cfg, -view-cfg) that visualizes the CFG.

https://llvm.org/docs/Passes.html, https://releases.llvm.org/11.0.0/tools/flang/docs/ControlFlowGraph.html
However,

Here are two pictures. One is CFG before optimization, the other is after.

Can you tell what has changed?

from 'Brooklyn Nine-Nine'
2. LLVM-FLOW
What is LLVM-FLOW?

✅ visualization tool for comparing IR CFGs

✅ interactive web-based interface

✅ open-source
Example
Example
Example

before [Node: 9, Edge: 10]

vertical layout horizontal layout

after [Node: 7, Edge: 8]

vertical layout horizontal layout
Example
How to get started?

Get started with:

1. visiting the LLVM-FLOW website ([https://llvmflow.kc-ml2.com/](https://llvmflow.kc-ml2.com/)),

2. running it directly on local environment using Docker.
LLVM-FLOW

Visualize the LLVM CFG interactively.

Tutorial
<table>
<thead>
<tr>
<th>date</th>
<th>user name</th>
<th>file</th>
<th>LLVM's passes</th>
<th>show graph</th>
</tr>
</thead>
<tbody>
<tr>
<td>2023.04.24/16:53:33</td>
<td>jinmyoung</td>
<td>simple.cpp</td>
<td>-simplify -o simple.cpp</td>
<td>start</td>
</tr>
<tr>
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3. Conclusion
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LLVM-FLOW is an open-source tool that enables easy comparison of changes in the CFG.

With your feedback and participation, we hope LLVM-FLOW grows into a project that contributes to the LLVM community :)

ML2 | Machine Learning Lab (kc-ml2.com)