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1. The “InstrumentPass” pass uses a ” InstrumentPass “ class, which is a subclass of LoopPass. This pass will first call the runOnLoop() method .It then uses the LoopInfoWrapperPass to get the loop information.It then calls the getInnerMostLoop, which will be used for finding the reverse topological sort,assigning values to edges and printing the paths.The findReverseTopologicalSort method uses depthFirstSearch and compareByLength methods to find the reverse tolopogical sort.

2. After finding the reverse tolopogical sort , the assignEdges method is called.This is then used to find the edge values and the NumPaths for each of the blocks in the loop.These values are calculated according to the Ball-Larus Instrumentation algorithm as specified in the paper. The edge values are stored in an edgeValue map and the numPaths map is used for storing the values of blocks.

3. printPaths, printhAllPaths and printRecursive are all used for printing path description.printPaths first calls printRecursive, which is then called recursively.Finally printAllPaths is called which will print the path information for each loop.

4. The getOrInsertFunction method is used for adding function declaration.Then CallInst::Create method is used for inserting function calls inside the main c program.It adds init_path_reg(), inc_path_reg(), and finalize_path_reg() functions at appropriate locations inside main c code.The successors required in the pass are found by using succ_iterator which iterates over each of the successors using succ_begin and succ_end.All the basic blocks inside a loop are found by using block_iterator .

5. The epp_runtime.cpp file implements the runtime library.It has It has two global maps i.e. count and r.The count will store the number of times each loop and path gets executed .And the r map will be incremented as an edge gets executed.It key is the loopId.The library implements the init_path_reg(), inc_path_reg(), finalize_path_reg() and dump_path_regs() functions.

6. The class is registered,using command line argument “epp”, and a name “Efficient Path Profiling Instrument Pass."”.
There has been no changes made in the epp_runtime.h files and the run.sh files

To run the script , we will use ./run.sh filename

Eq.) simpleloop.cc files can be run by

./run.sh simpleloop

7. **The archive contains** (The archive contains file after running the ./run.sh simpleloop command)

   a.) epp_runtime.h InstrumentPass.cpp InstrumentPass.o libepp_runtime.a output.bc path-prof.ll run.sh test epp_runtime.cpp epp_runtime.o InstrumentPass.h instrument.so Makefile path-desc.ll ready simpleloop.bc a.out

   b.) test(this directory contains all the testcases) : a.out simpleloop.cc test2.cc test4.cc test5.cc test6.cc test9.cc