ECE 5900_04 - Spring ‘01

Laboratory Exercise #1

Introduction to SimpleScalar 3.0

Assigned: 1/22

Due: 1/29

All work should be done individually, no group work allowed for this assignment

Purpose:

The purpose of this exercise is to introduce the students to the SimpleScalar 3.0 architectural simulation environment. This introduction will include building to tools from available FTP source code, and running some of the tools on provided benchmarks and input sets. No modification of the source code is required for this assignment, though changes may be required for environmental reasons.

Problem Specification:

For completion of this assignment, each student will be required to download, build, test, and run the SimpleScalar 3.0 architectural simulation tool upon programs which are not part of the SimpleScalar distribution. You will have provided to you a set of PISA (big-endian) benchmark binaries, and the input set for those binaries. As described in class - the SimpleScalar architectural simulation tool allows you to model a system architecture. When modeling an architecture, it is of little interest to model an idle system, thus a workload must be used to exercise the model. The benchmarks and associated input sets serve as a workload in this project.

It is recommended that you follow the suggested procedure, but if you are able to complete the requirements of the problem, the procedure is secondary.

Suggested Procedure:

It is suggested that the following procedure be followed on one of the “kirchhoff#” machines in the 7th floor lab.

1. Download the SimpleScalar 3.0b distribution from the ftp site located on the course homepage.
2. Build the SimpleScalar 3.0 package following the instructions contained in the README file contained in the root directory of the distribution.

   If using a Solaris on SPARC machine, the PISA architectural choice is recommended

Hopefully in the near future, we will have a shared directory which will contain the benchmarks and the benchmark input sets. When that occurs, you can use links to access these files rather than having redundant copies of the files in all of our user spaces.

3. Download from the directories available via the webpage benchmark binaries and benchmark input sets.
4. Execute one of the simulation tools (sim-*) upon the benchmarks and an associated input set to verify the operation of the simulation toolset. It is recommended - but certainly not necessary - that you follow the below convention for invoking the simulator. Simulation invocations can be (a) manually input to the command line, (b) static lines in a shell script or (c) dynamically produced by a perl script. Some benchmark/input_set combinations which are known to work are included in the table below. Execution of the simulator may take a long time, depending upon the benchmark and input set, so execution in the background is advised.

   (*sim_path*/sim-bin *bmark_path*/benchmar_bin *input_set_path*/input_set > output_file) &> err_out_file

Benchmark	**sample invocation**
mcf	simplesim-3.0/sim-outorder ss3.0_pisa_big_bin/mcf benchData/mcf00/data/test/input/inp.in
cc1.ss	simplesim-3.0/sim-safe ss3.0_pisa_big_bin/cc1.ss benchData/cc1/data/test/input/cccp.i
go.ss	simplesim-3.0/sim-fast ss3.0_pisa_big_bin/go.ss benchData/go/data/train/input/2stone9.in
vpr	simplesim-3.0/sim-fast ss3.0_pisa_big_bin/vpr benchData/vpr00/data/test/input/net.in benchData/vpr00/data/test/input/arch.in benchData/vpr00/data/test/input/place.in vpr00.route.out

5. Using at least two different simulation tools from the package (sim-*) run three unique simulations, at least two of which are not included in the list above. Write your output from these simulations to text file(s) - hardcopy of these output file(s) will be turned in with your assignment - and should include both STDOUT and STDERR output from the simulation executions.

Considerations:

1. Describe the difference between the multiple simulation tools (sim-*), why is more than one necessary?
2. Examine the output of your various simulation runs. Each output should contain statistics under the heading “sim: ** simulation statistics **”. Compare the statistics given for the two different simulation tools you used (sim-*).
3. Describe an appropriate usage of one or more of the SimpleScalar simulation tools in an industrial ASIC design environment.

Deliverables

1. Lab report, format specified in lab guidelines
2. Output from minimally three simulation runs, attached to lab report.