LSU EE 7700-2 Homework 3 Due: 17 November 2003

To solve this assignment use the files in the following tarball: /home/classes/ee4720/com/tca/hw3.tar.bz2. Instructions will be added to the procedures page on how to do this on Wednesday morning.

Problem 1: Write a program which the local predictor will predict less accurately than the gshare predictor. Verify that program using the `pred` analyzer. In the comments explain the idea behind the program.

Problem 2: Design and test your own branch prediction algorithm by modifying the pred analyzer, adding your new predictor to it. Test the predictor using the gcc and TEX benchmarks and a benchmark of your own. Your benchmark, which you are encouraged to write yourself, should be predicted more accurately using your predictor than any of the ones already simulated by `pred`.

Your predictor must be qualitatively different than the four already simulated. That is, you cannot just tweak table sizes and the like.

Here are some ideas for new predictors.

- On a procedure return ghr may only contain callee history. Devise some way of restoring some caller history.
- While in a procedure branch behavior might correlate with the caller. Devise some way of including some caller information.
- Perhaps different ghr sizes (or none at all) could be used if the branch condition was computed a long time ago or was loaded from memory.
- The local history predictor is an inefficient way of predicting fixed iteration loops because the table size is 2^{n-1}, where n is the most number of iterations that can be perfectly predicted. Design a predictor that can handle much larger loops.