You are to design a set of simulation experiments to investigate the inner workings of the Alpha 21264 Tournament Predictor. Your goal is to study the behavior of the global predictor versus the local predictor.

Write code (in any language) to simulate the Alpha 21264 Tournament Predictor exactly as described in your textbook. You can get partial credit for implementing subsets of the whole predictor.

(a) 20 pts. Implement the global predictor with 4K 2-bit entries indexed by global history of the last 12 branches. For partial credit, run the global predictor on the traces described below and report the misprediction rate for each trace.

(b) 40 pts. Implement the local predictor – a two-level predictor where the top level is a table of 1024 10-bit entries where the ith entry represents the history of the 10 most recent branch outcomes for branch i. The value from this table is used to index the lower level of the local predictor which has 1K entries consisting of 3-bit predictors. For partial credit, run the local predictor on the traces described below and report the local misprediction rate for each trace.

© 100 pts if you do the whole tournament predictor. In addition to (a) and (b) also implement the selector – a 2 bit counter that determines whether the global or local predictor's decision is utilized. For each trace, report % of time local predictor selected (versus % of time global predictor selected); overall misprediction rate; % time the local predictor is selected but mispredicts; % time the global predictor is selected but mispredicts.

Present the results of your simulation in a series of well-labeled graph/histograms. Write a short discussion evaluating the performance of the 21264 on these traces. Attach a print out of your code.

Branch Traces to drive your simulations.

There are two sets of traces provided for you in /cs/classes/www/07W/cis429/SIMULATIONS, one from UCSD and the other from U. Texas.

Instructions the format of the data in each trace and on how to unzip and efficiently read the traces are in SIMULATIONS/ucsd-spec-traces.html and SIMULATIONS/ utexas-trace.html
See SIMULATIONS/ucsd-spec-traces.html for use of
go_cbr_trace.gz
li.trace.gz
mcf.trace.gz
ijpeg.trace.gz
m88k.trace.gz
perl.trace.gz

See SIMULATIONS/utexas-trace.html for use of
utexas-trace-large.gz
utexas-trace-small.gz

Extra credit if you locate, use, and document some more traces suitable for use in this assignment.

Note: this assignment is not de-bugged, so if you run into problems, talk to your classmates, email me, do not panic. Since I will not be available next week, if there are major problems, I will adjust the due date in class on Tuesday 2/6.