

Quals Question: Professor Olukotun

1. Why is dynamic branch prediction important in modern processors?
2. Given then general classes of scientific and transaction processing applications. In which class are branches harder to predict? Why?
3. What is the simplest dynamic predictor you could use?
4. Given an unlimited number of single bit predictors without using any other kinds of history for any particular application at what point will the branch prediction accuracy saturate?
5. Suppose we want to improve the branch prediction accuracy beyond this point by using more branch history. There are two types of history, what are their names?
6. Define local and global history, explain how they can be used to improve branch prediction accuracy. Why are more predictors required? Why does this work?
7. Assume branch B1, B2 and B3 are executed repeatedly in a loop and two bits of history are kept for each branch. For each history bit determine which history information (local or global) will provide the best branch accuracy for branches B2 and B3. Indicate your answer by placing a G or an L in the appropriate box.

Assume any initial condition of the predictors that you like.

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| b1: | T | N | T | T | T | N | T | N | G/L | G/L |
| b2: | N | N | T | N | T | T | N | N | | |
| b3: | T | T | N | T | N | T | T | T | | |

8. How can you decide dynamically which history to use?
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