

We have studied six dynamic branch prediction schemes. Each are depicted below. For each, write

1. a 2 or 3 sentence description of how they work ,and
2. a 2 or 3 sentence description of why they work.

The technical report that describes these can be found locally in the class afs directory, or on the web at [www.ee.lsu.edu/tca/mcf.pdf](http://www.ee.lsu.edu/tca/mcf.pdf).

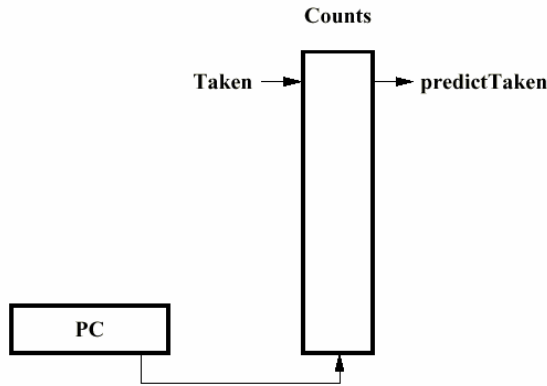


Figure 1: Bimodal Predictor Structure

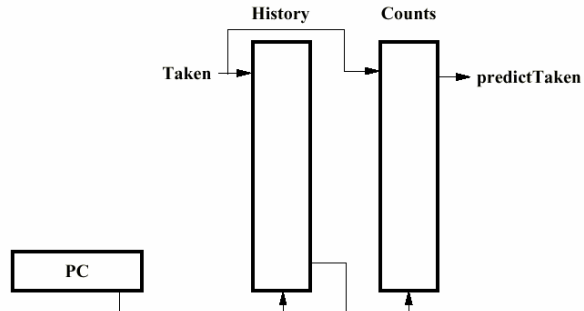


Figure 4: Local History Predictor Structure

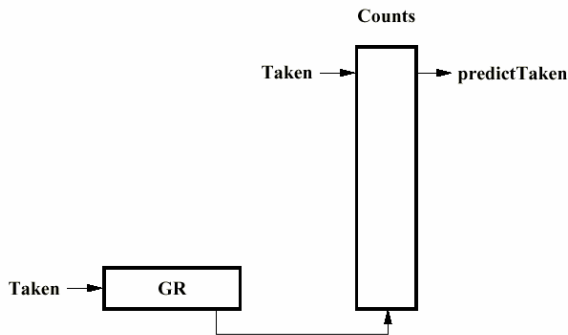


Figure 6: Global History Predictor Structure

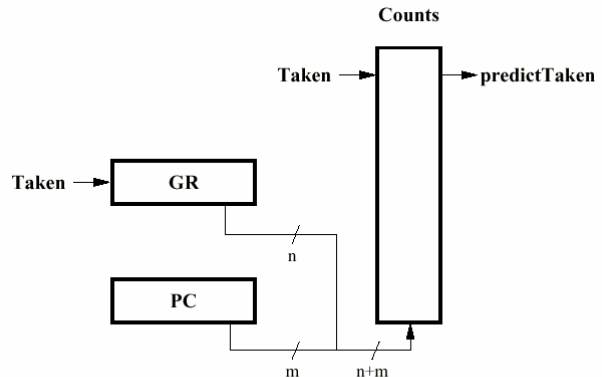


Figure 8: Global History Predictor with Index Selection

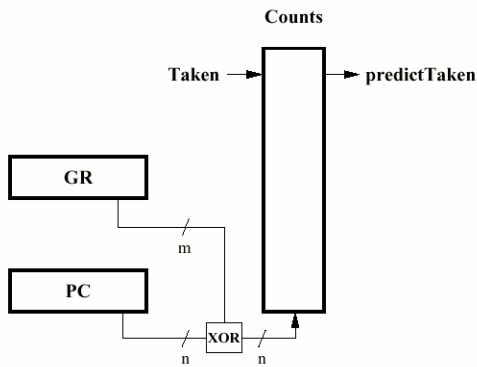


Figure 10: Global History Predictor with Index Sharing

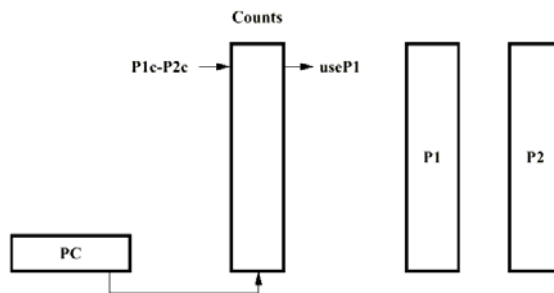


Figure 12: Combined Predictor Structure

*Dynamic Branch Prediction.* The local history predictor uses both a *history* table and a *counts* table. The following loop is being executed with the *history* and *counts* tables initialized as shown below. Show the contents of the tables after each time through the loop.

```
for(i=1; i<=4; i++) {}
```

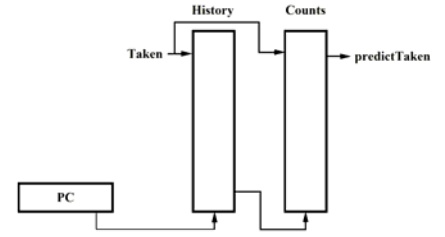
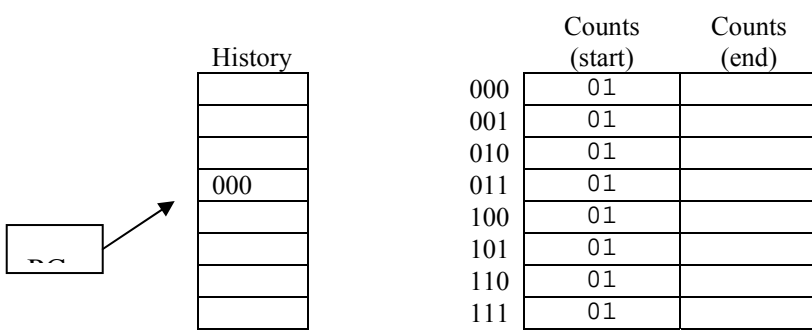


Figure 4: Local History Predictor Structure

Iteration	History	Prediction (circle one)		Actual Direction	
1 <sup>st</sup>	000	Taken	Not Taken	Taken	Not Taken
2 <sup>nd</sup>		Taken	Not Taken	Taken	Not Taken
3 <sup>rd</sup>		Taken	Not Taken	Taken	Not Taken
4 <sup>th</sup>		Taken	Not Taken	Taken	Not Taken
1 <sup>st</sup>		Taken	Not Taken	Taken	Not Taken
2 <sup>nd</sup>		Taken	Not Taken	Taken	Not Taken
3 <sup>rd</sup>		Taken	Not Taken	Taken	Not Taken
4 <sup>th</sup>		Taken	Not Taken	Taken	Not Taken
1 <sup>st</sup>		Taken	Not Taken	Taken	Not Taken
2 <sup>nd</sup>		Taken	Not Taken	Taken	Not Taken
3 <sup>rd</sup>		Taken	Not Taken	Taken	Not Taken
4 <sup>th</sup>		Taken	Not Taken	Taken	Not Taken