Branch Predictor Analysis

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INTRODUCTION

The different types of the branch predictors that we have used as part of the project are the following:-

.**Always Taken**- This predictor assumes that the branch instruction will always be taken and therefore calculates the would be next pc, if this would be next pc matches the actual next pc then we say that this predictor correctly predicted.

.**Always Not Taken**- This predictor assumes that the branch instruction will never be taken and therefore calculates the would be next pc that will be the current pc + 4, if this would be next pc matches the actual next pc then we say that this predictor correctly predicted.

.**One bit**- This predictor predicts based on whether the last time this instruction was executed so was the branch taken or not taken.

If the last time the branch was taken then this predictor predicts that this time also the branch will be taken.

If the last time the branch was not taken then this predictor predicts that this time also the branch will not be taken.

If the assumption matches the actual next pc then we said the predictor correctly predicted.

.**Two bit**- This predictor predicts based on the result of the last two times when this instruction was executed if the result of the last two times was:

.TT(strongly taken)- then it assumes that this time also the branch will be taken.

.NN(strongly not taken)- then it assumes that this time also the branch will not be taken.

.NT(weakly not taken)-then it assumes that this time also the branch will not be taken.

.TN(weakly taken)-then it assumes that this time also the branch will be taken.

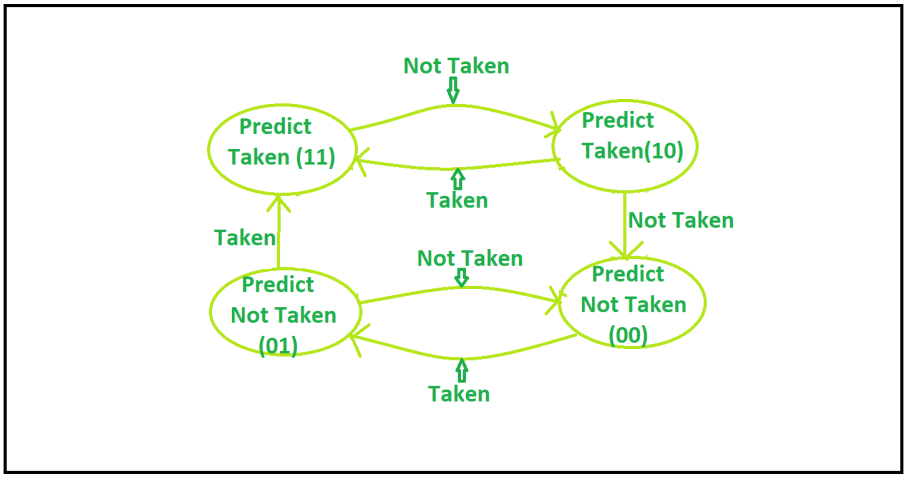

Fig1-Two Bit Branch Predictor

Results Obtained-

Predictor Type-> **File name**	**Always Taken**	**Always Not Taken**	**One bit**	**Two Bit**
Bubble_test_Lab	**52.45%**	**47.54%**	**96.31%**	**96.00%**
Fac_test_Lab	**63.75%**	**36.24%**	**88.38%**	**88.13%**
sqrt_test_Lab	**61.71%**	**38.28%**	**95.12%**	**94.77%**
qsort_test_Lab	**68.23%**	**31.76%**	**93.59%**	**92.86%**
Recursion_test_Lab	**72.03%**	**27.96%**	**96.19%**	**95.69%**

wikisort_test_Lab	**61.71%**	**38.28%**	**95.12%**	**94.77%**
recrusion_test_Lab	**68.08%**	**31.91%**	**77.91%**	**75.27%**

Here the accuracy is being calculated by using the following formula:

Accuracy (%) = ((Correct Predictions by the predictor)/(Total Predictions made))*100

From the results it can be inferred that the accuracy of the One bit predictor and the Two bit predictor are very accurate and similar , and for large traces the accuracy of the two bit predictor would be better.