随堂测验_0408

1.考虑三种分支预测机制：预测分支不发生，预测分支发生和动态分支预测。假定它们在预测正确时无开销，预测错误时开销为两个时钟周期，动态预测器的平均准确率为90%。在次情况下，对下面的分支而言哪种预测器是最好的选择？

1. 分支发生概率为5%
2. 分支发生概率为95%
3. 分支发生概率为70%

2.一个循环分支，它在一行代码上发生了9次，而不是一次。假设分支的预测位保存在预测缓存中 (single bit prediction)。这种分支预测的正确率是多少？

3.

Instruction in buffer	Prediction	Actual branch	Penalty cycles
yes	taken	taken	0
yes	taken	not taken	2
no		taken	2
no		not taken	0

Table 1 . Penalty for all possible combinations of whether the branch is in the buffer and what it actually does, assuming we store only taken branches in the buffer. There is no branch penalty if everything is correctly predicted and the branch is found in the target buffer, If the branch is not correctly predicted, the penalty is equal to 1 clock cycle to update the buffer with the correct information(during which an instruction cannot be fetched) and 1 clock cycle, if needed, to restart fetching the next correct instruction for the branch, If the branch is not found and taken, a 2-cycle penalty is encountered, during which time the buffer is updated.

Determine the total branch penalty for a branch-target buffer assuming the penalty cycles for individual mispredictions from table 1. Make the following assumptions about the prediction accuracy and hit rate:

- Prediction accuracy is 90% (for instructions in the buffer).
- Hit rate in the buffer is 90% (for branches predicted taken).