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Advanced Computer Architecture

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Name
Last Name
Professor:

You'll have 15' to complete the exam

Problem 1 (25% aka 1pt)	
Problem 2 (25% aka 1pt)	
Problem 3 (25% aka 1pt)	
Problem 4 (25% aka 1pt)	
Total (100%)	

Problem 1
Which of the following statements about branch prediction are FALSE?
We may have more than a single FALSE statement. Only correct answers will be counted for the score.

Answer 1: The behavior of each branch is always assumed independent from other branches
Answer 2: Branch prediction can only happen at compile time

Answer 3: Different techniques can be combined in order to improve prediction accuracy
Answer 4: Profile-Driven is an example of a static branch predictor

Problem 2
The "Branch Always Taken" technique is not applicable to the five-stage MIPS pipeline! Is this statement true or false?

Problem 3
What is the reason a 1 bit-BHT is usually outperformed by a 2 bit-BHT?
We may have more than a single TRUE statement. Only correct answers will be counted for the score.

Answer 1: A 2-bit BHT leverages more information about the history of a branch
Answer 2: The use of 2 bits allows to index a larger number of branch instructions
Answer 3: The difference in performance is not significant
Answer 4: The use of 2 bits improves the accuracy of the associated BTB

Problem 4

In the context of branch hazards, which of the following assertions are FALSE?

We may have more than a single FALSE statement. Only correct answers will be counted for the score.

Answer 1: The Early Evaluation of PC behaves in the same way regardless of the preceding instructions

Answer 2: The Early Evaluation of PC computes branch target address during the EX phase

Answer 3: With only forwarding and stalling, it requires two clock cycles until the branch decision is taken

Answer 4: The Early Evaluation of PC could need stalls in some particular cases

Problem 1

Which of the following statements about branch prediction are FALSE?

We may have more than a single FALSE statement. Only correct answers will be counted for the score.

Answer 1: The behavior of each branch is always assumed independent from other branches F THIS IS VALID ONLY FOR THE "NO COLLISION" APPROACH!

Answer 2: Branch prediction can only happen at compile time F IT IS THE CASE OF STATIC BRANCH PREDICTION

Answer 3: Different techniques can be combined in order to improve prediction accuracy ✓

Answer 4: Profile-Driven is an example of a static branch predictor ✓

Problem 2

The "Branch Always Taken" technique is not applicable to the five-stage MIPS pipeline! Is this statement true or false?

IT IS BUT IT HAS NO EFFECT, AS EVALUATIONS ARE MADE IN D, BUT WE STILL NEED TO WAIT FOR OTHER INSTRUCTIONS OUTCOME

Problem 3

What is the reason a 1 bit-BHT is usually outperformed by a 2 bit-BHT?

We may have more than a single TRUE statement. Only correct answers will be counted for the score.

Answer 1: A 2-bit BHT leverages more information about the history of a branch ✓

Answer 2: The use of 2 bits allows to index a larger number of branch instructions ✗

Answer 3: The difference in performance is not significant ✗

Answer 4: The use of 2 bits improves the accuracy of the associated BTB ✗

Problem 4

In the context of branch hazards, which of the following assertions are FALSE?

We may have more than a single FALSE statement. Only correct answers will be counted for the score.

Answer 1: The Early Evaluation of PC behaves in the same way regardless of the preceding instructions ✗

Answer 2: The Early Evaluation of PC computes branch target address during the EX phase ✗ DURING D

Answer 3: With only forwarding and stalling, it requires two clock cycles until the branch decision is taken ✓

Answer 4: The Early Evaluation of PC could need stalls in some particular cases ✓