

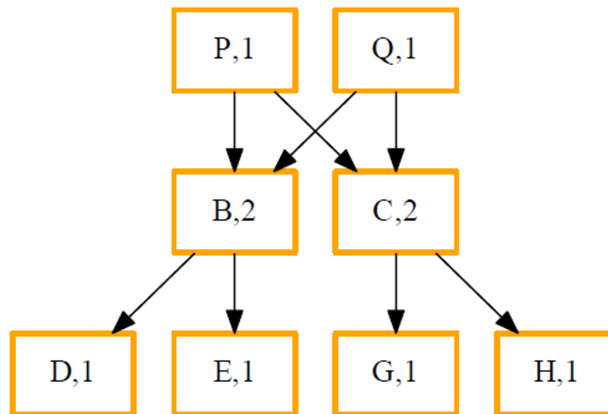
# CS5250 Advanced Operating Systems

## Pop Quiz 10

Name: \_\_\_\_\_ Ding Fan \_\_\_\_\_

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Assuming the following initial B-trees:

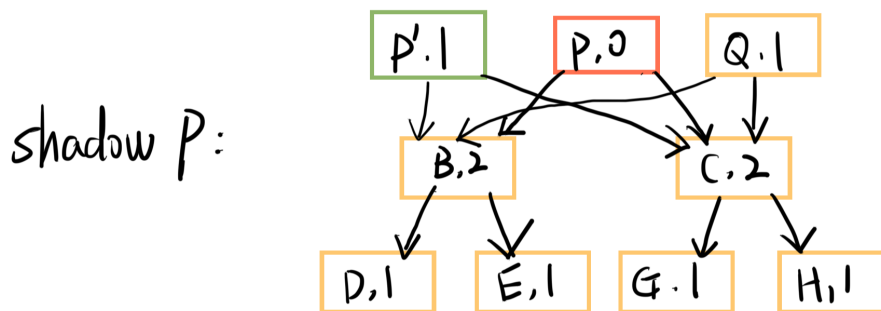


Show the steps involved in the COW-based leaf node E from tree P gets *updated*, along with the evolution of the reference counts, using the notations in the lecture slides. Clearly state any assumptions made.

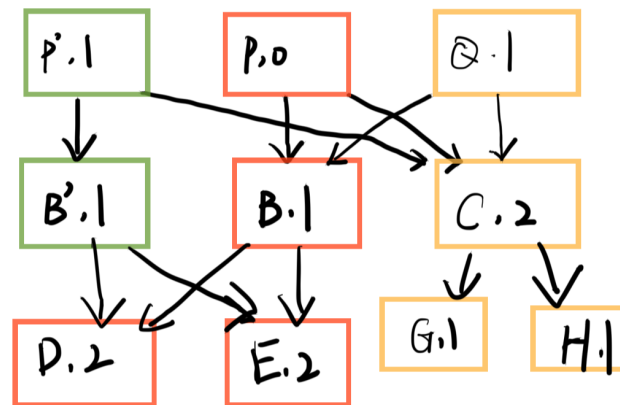
Bonus question: what do you think are the downsides of such a clever algorithm?

**Solution:**

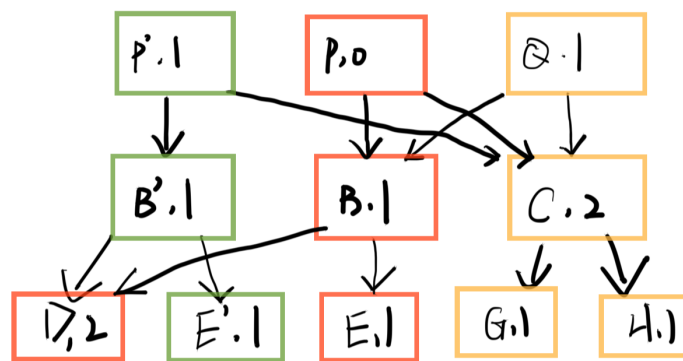
The path from P to E includes node {P,B,E}



Shadow B:



Shadow E



Downsides:

When a large number of write operations occurs, the performance overhead is relatively large.