

c)

Since no indexes available, for join operation, a block-based nested loop join should be applied. We can push the selection directly to the Order, which means the equivalent query should be $(\sigma_{ShipDate \leq :today} Order) \bowtie Inventory$. For selection part, linear search is required since no index available.

I/O cost:

$$\text{For } \sigma_{ShipDate \leq :today} Order: B(Order) = \frac{60000}{10} = 6000$$

Assume the ShipDate is uniformly distributed over its range, and the range is from :today to :today-999

$$\text{Then } |\sigma_{ShipDate \leq :today} Order| = \frac{6000}{1000} = 6$$

$$\text{For block-based nested loop join part, the cost is } 6 + \frac{6}{8-2} \times \frac{40000}{10} = 4006$$