ComS 363
Homework 3

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1)

With 4000 B per page and 400 B per tuple, each page can contain 10 tuples.
This leaves R to take 1000 pages, and S to take 200 pages.

(a) Testing R as outer:
Need 1000 I/Os to read outer, and 4000 to join
Total = 1000 + 4000 = 5000 I/Os

Testing S as outer:
Need 200 I/Os to read outer, and 4000 to join
Total = 200 + 4000 = 4200 I/Os

$4200 < 5000 \Rightarrow$ Using S as outer, cost is 4200 I/Os

Buffer should contain the entirety of the smaller relation (S), plus the output and the inner relation size.
Thus buffer must be of size 200 + 1 + 1 = 202 pages

(b) Partition:
2 * R + 2 * S $\Rightarrow$ 2(1000) + 2(200) = 2400 I/Os

Probing:
Buffer (52) must be $\geq$ (fudge)(N)/(Mem - 1) $\Rightarrow$ (1.1)(1000)/(52 - 1) = 21.5 ✓
I/O for this section is then 1000 + 200 = 1200

Total I/O cost = 2400 + 1200 = 3600 I/Os

(c) Sorting:
Cost for R = 2(2 * 1000) = 4000 Cost for S = 2(2 * 200) = 800

Merging:
Cost = 1000 + 200 = 1200 I/Os

Total = 4000 + 800 + 1200 = 6000 I/Os

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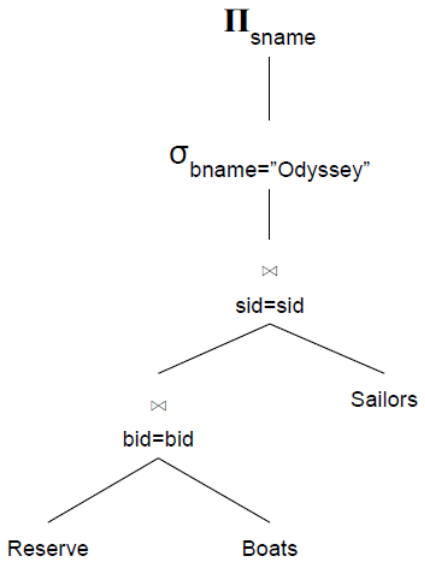
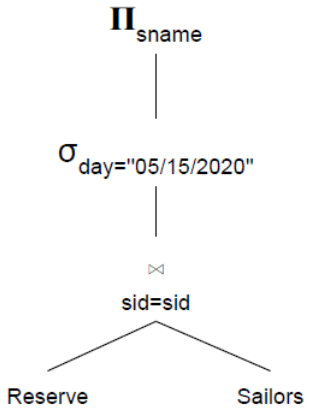
2)

(a) $\Pi_{sname}((\sigma_{bname="Odyssey"}(Reserve \bowtie Boats)) \bowtie Sailors)$



(b) $\Pi_{sname}(\sigma_{day="05/15/2020"}(Sailors \bowtie Reserve))$



(c) $\Pi_{sname}(Sailors - (Sailors \bowtie Reserve)))$