

External merge sort

2/7/2017

[3, 4] [6, 2] [9, 4] [8, 7] [5, 7]

[3, 1] [2, 8] [7, 6] [1, 6] [8, 9] [5]

$M = 3$

pass 0

run 1 [2, 3] [4, 4] [6, 9]

run 2 [1, 3] [5, 6] [7, 8]

run 3 [1, 2] [6, 6] [7, 8]

~~[1, 5] [6, 8] [9]~~

run 4 [5, 8] [9]

pass 1

merge run 1 and run 2

run 1' [1, 2] [3, 3] [4, 4] [5, 6] [6, 7] [8, 9]

merge run 3 and run 4

run 2' [1, 2] [5, 6] [6, 7] [8, 8] [9]

552

merge run 1' and run 2'

[1.1] [2.2] [3.3] [4.4] [5.5] [6.6]
[6.6] [7.7] [8.8] [8.9] [9]

of merge passes

$$\lceil \log_{m-1} b_r / m \rceil$$

$$= \lceil \log_{3-1} \frac{11}{3} \rceil$$

$$= \lceil \log_2 3.67 \rceil$$

$$= 2$$

cost.

$$(pass0 + 2 * \# \text{ of merge passes}) b_r$$

$$= (1 + 2 * 2) b_r$$

$$= 5 b_r$$

$$= 5 * 11 = 55 \text{ pages}$$

$br = 108$ pages

$M = 5$ pages

pass 0: $\lceil \frac{108}{5} \rceil = 22$

generate 22 runs each contains
5 pages (except the last run)

pass 1: 4-way merge

$$\lceil \frac{22}{4} \rceil = 6$$

generate 6 runs each contains
20 pages

pass 2: 4-way merge

$$\lceil \frac{6}{4} \rceil = 2$$

generate 2 runs ^{one} each contains
80 page, one contains 28

pass 3: 2-way merge

~~the~~ # of merge passes $\lceil \log_{M-1} \frac{br}{M} \rceil$

$$= \lceil \log_4 \frac{108}{5} \rceil = \lceil 2.22 \rceil = 3$$