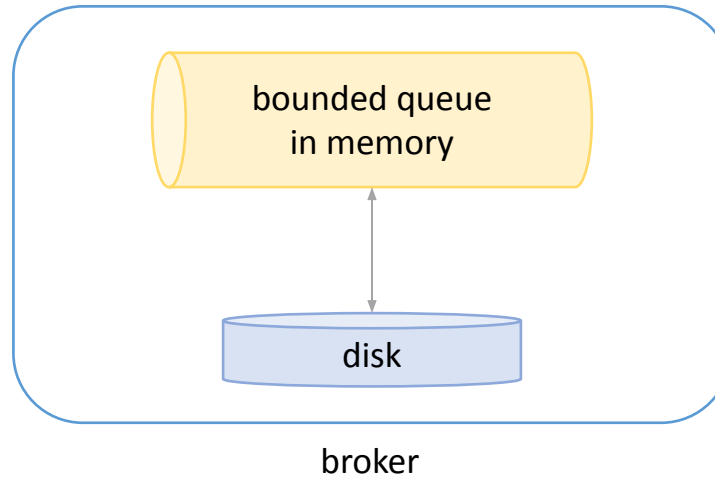# Log

pros

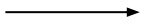- Put and get message operations are fast.

broker

cons

- Limited memory space.

  becomes a problem when
  - consumers get slower
  - messages are big
  - producers start to send more messages

- Low durability guarantee.
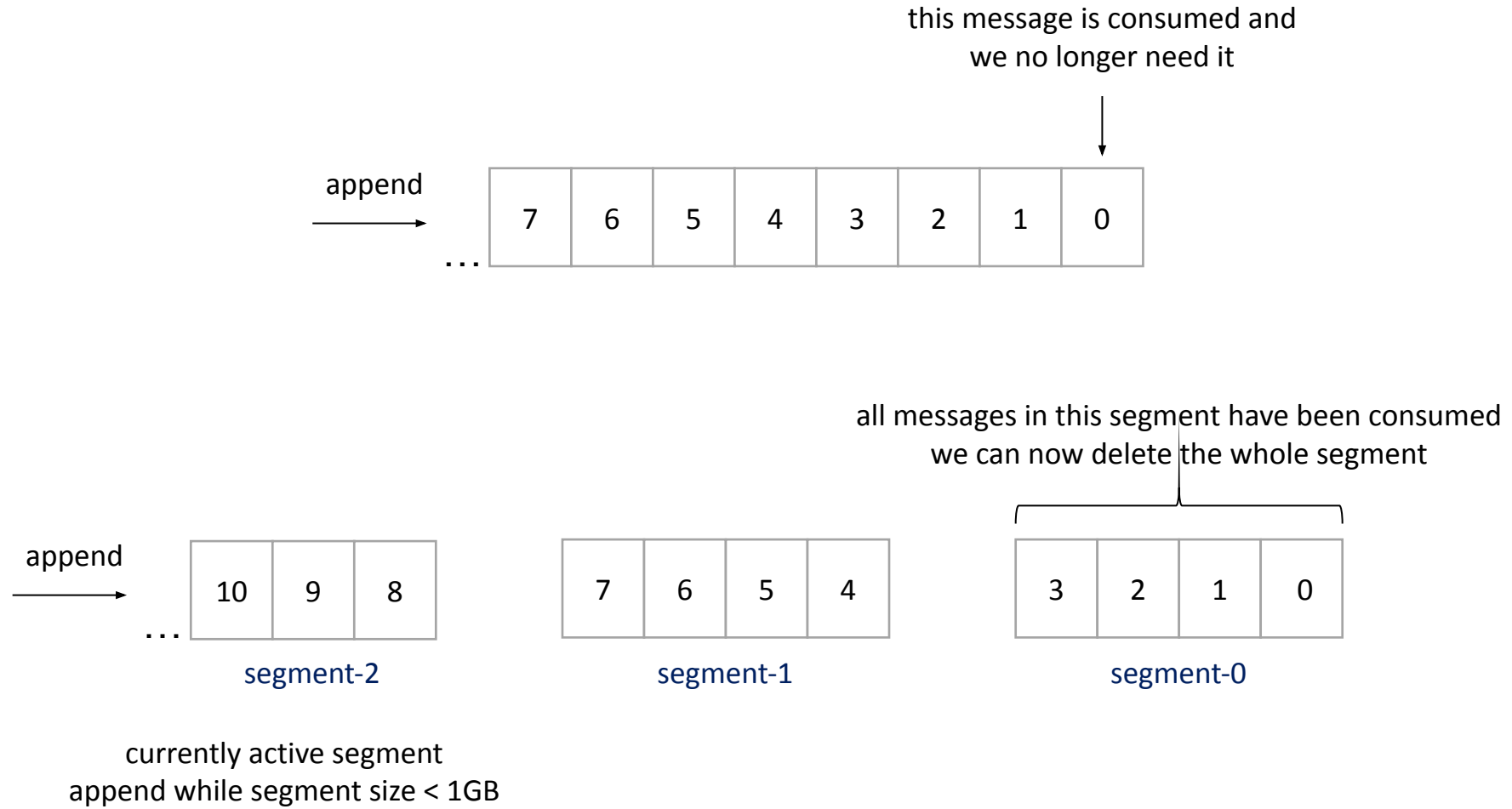
Log

in memory
queue data structure

add →
... | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

on disk
file

append →
... | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

log
(data log, journal)
append-only and totally-ordered sequence of records

Log

this message is consumed and
we no longer need it

append

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

...

all messages in this segment have been consumed
we can now delete the whole segment

append

| 10 | 9 | 8 |

...

segment-2

| 7 | 6 | 5 | 4 |

segment-1

| 3 | 2 | 1 | 0 |

segment-0

currently active segment
append while segment size < 1GB

Log

this is the message we need to retrieve
(message id = 2)

append →

| 10 | 9 | 8 |

...

segment-2

| 7 | 6 | 5 | 4 |

segment-1

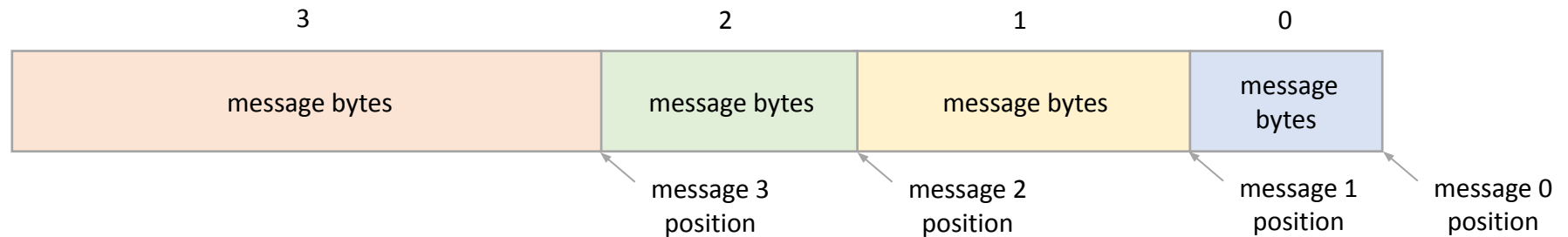| 3 | 2 | 1 | 0 |

segment-0

✘
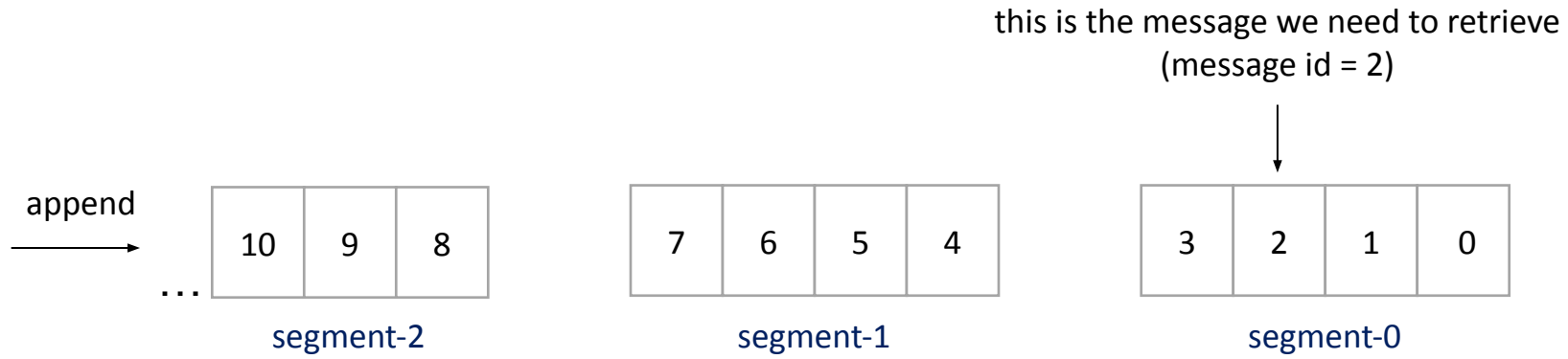
naïve approach
iterate over segments and messages starting with the oldest segment

✔

better approach
for each message know its position in the segment file

3	2	1	0
message bytes	message bytes	message bytes	message bytes

message 3 position   message 2 position   message 1 position   message 0 position

Log

mapping

Message Id	Segment	Position
0	segment-0	0
1	segment-0	104
2	segment-0	316
3	segment-0	426
…	…	…

segment-0

3	2	1	0
message bytes	message bytes	message bytes	message bytes

message 3
position: 426

message 2
position: 316

message 1
position: 104

message 0
position: 0
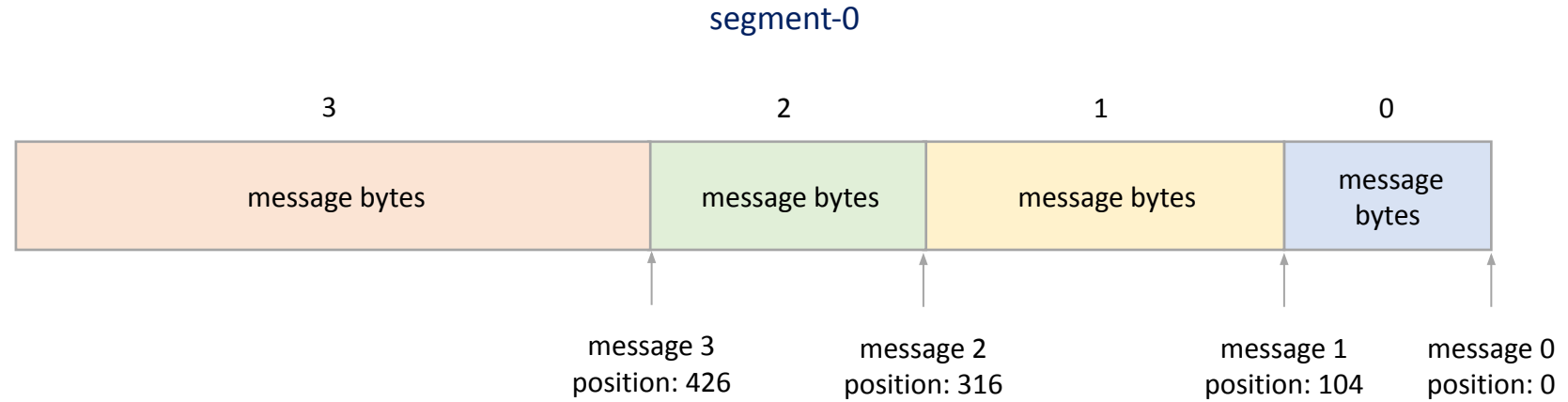
where and **how**
do we store this mapping?