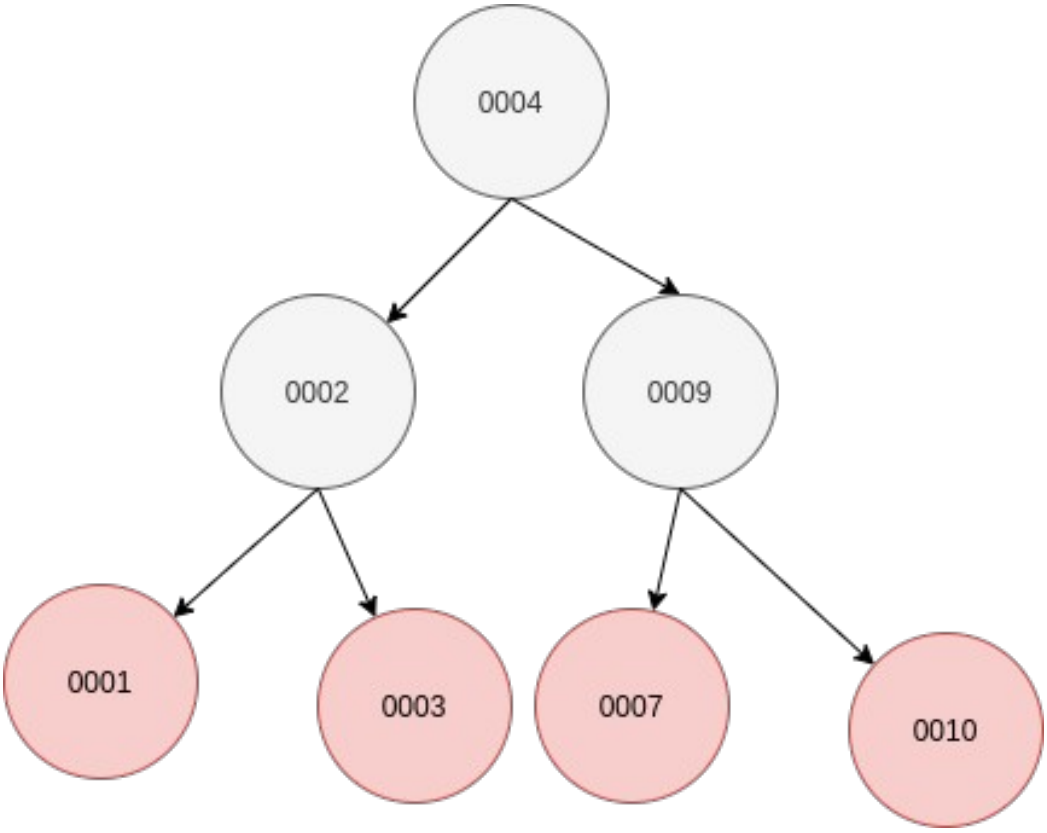
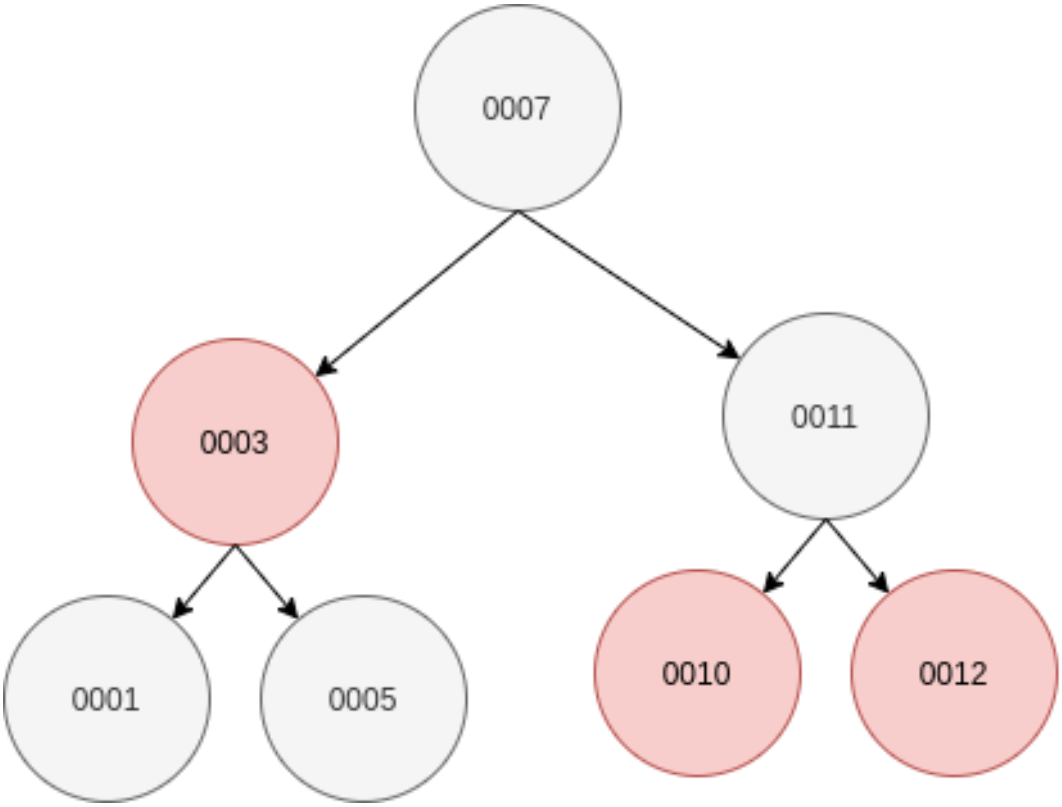
Joseph Steeb
3-27-2021
1.

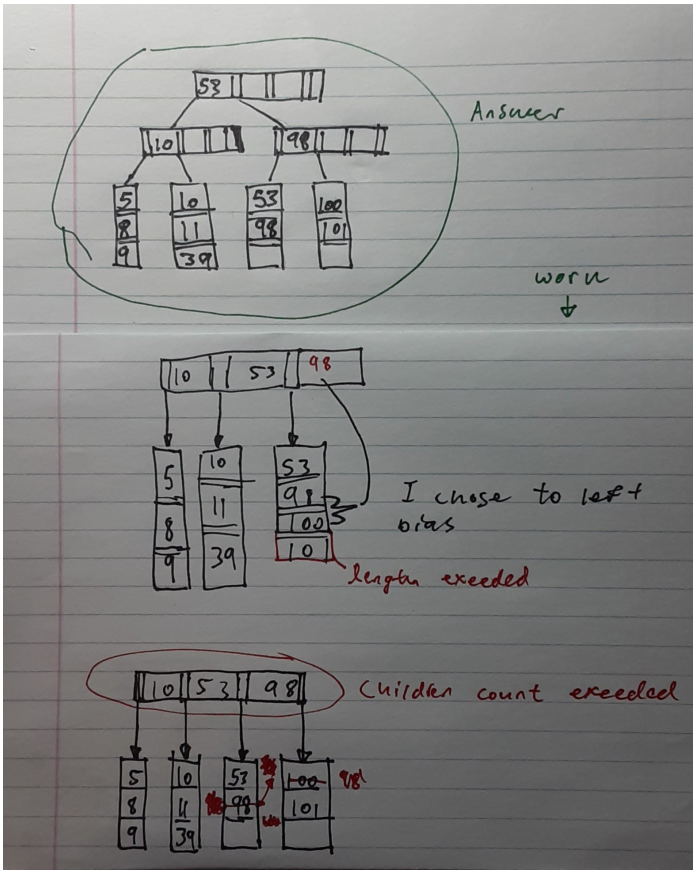


2.

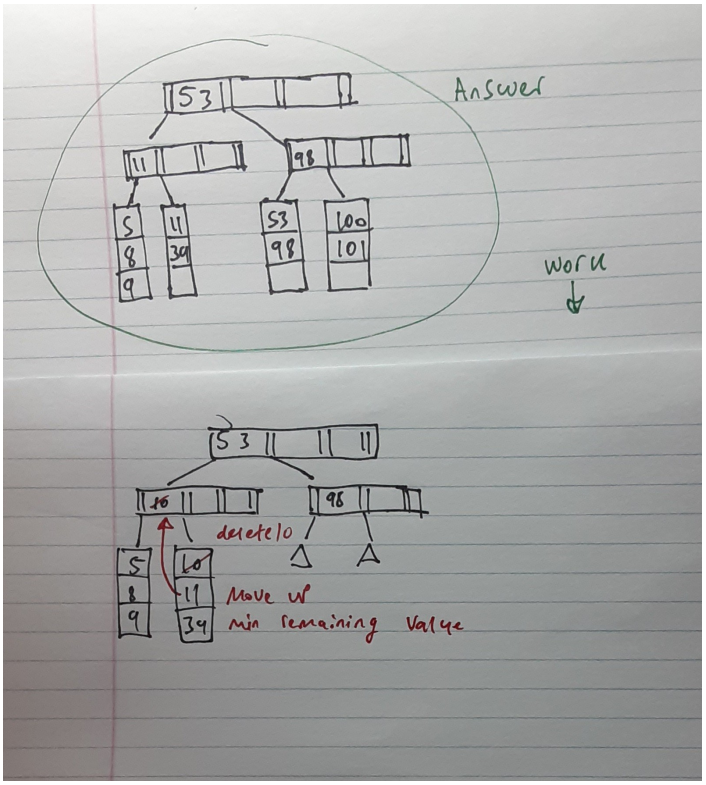


3.

a.


Answer
worn
I chose to left bias
length exceeded
children count exceeded

b.


Answer
worn
delete 10
Move up min remaining value

4.

a. Assuming each internal node can at most fill one block of disk space in Ext4; a max size node would contain 8192 bytes. Each element of an internal node will contain a UUID and pointers on either side. The calculation to find max is as follows.

UUID size = 64/8 = 8 bytes

8192 – 8 = 8184 subtracting eight bytes because there is always one more pointer then keys.
8184/(8+8) = 511.5 key pointer pairs + 1 extra pointer
total number of pointers = 512

b. Again asuming that a whole block should be used for leaf nodes, the same process as part a should be used. Leaf nodes however contain aditional bytes to store name and sales.

Sales size = 32/8= 4
name size = 32
UUID = 8
4 + 32 + 8 = 44bytes

8192 – 8 = 8184 subtracting eight bytes because each leaf node has a pointer to the next leave
8184/(44) = 186
total number of records = 186

c. Height = $\log_m(N) = \log_{512}(N)$
d. Height = $\log_{512}(30000) = 2$
e. Height = $\log_{512}(2500000) = 3$