Assignment1_Answer

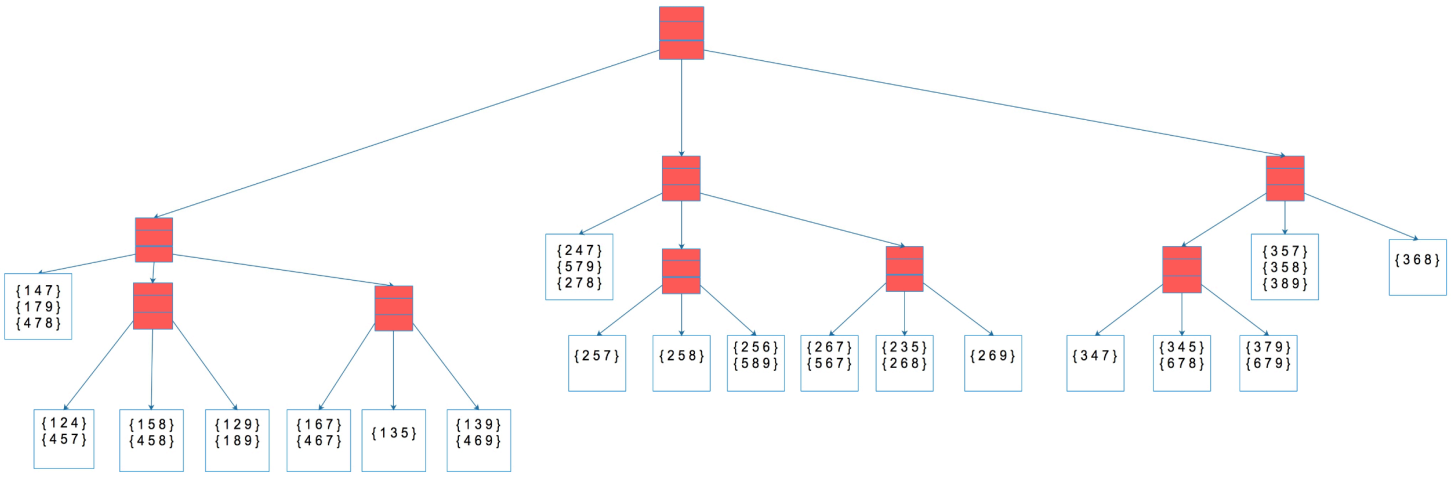
Q1:

(a) hash_tree.py

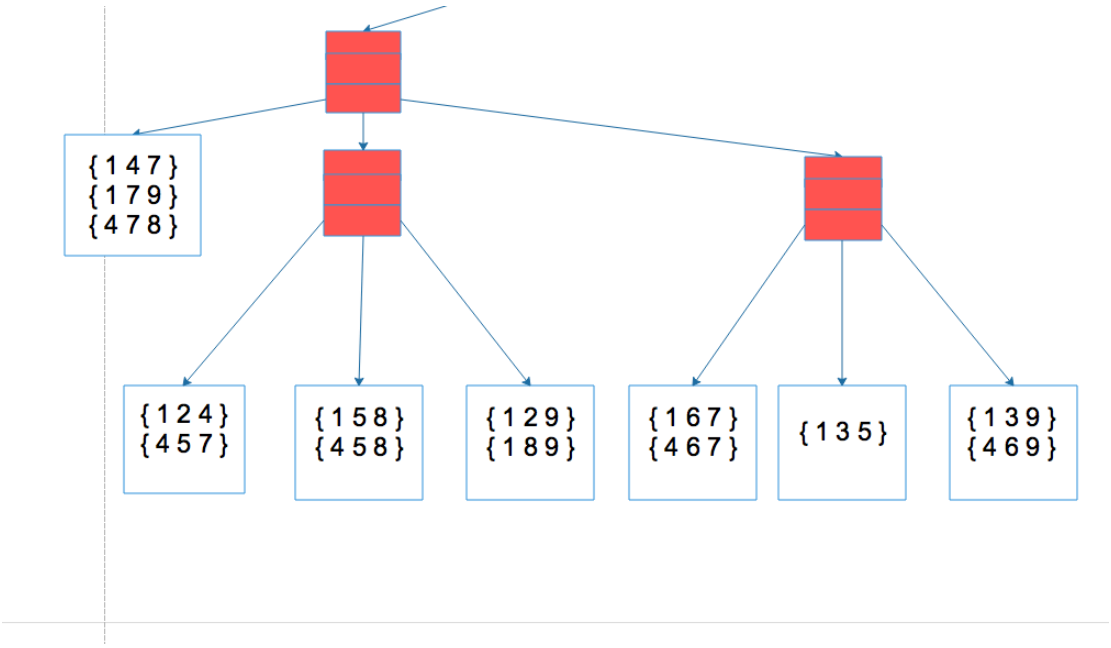
nested list: [[[[1, 4, 7], [1, 7, 9], [4, 7, 8]], [[[1, 2, 4], [4, 5, 7]], [[1, 5, 8], [4, 5, 8]], [[1, 2, 9], [1, 8, 9]]], [[[1,6, 7], [4, 6, 7]], [1, 3, 5], [[1, 3, 9], [4, 6, 9]]]], [[[2, 4, 7], [2, 7, 8], [5, 7, 9]], [[2, 5, 7], [2, 5, 8], [[2, 5, 6], [5, 8, 9]]], [[[2, 6, 7], [5, 6, 7]], [[2, 3, 5], [2, 6, 8]], [2, 6, 9]]], [[[3, 4, 7], [[3, 4, 5], [6, 7,8]], [[3, 7, 9], [6, 7, 9]]], [[3, 5, 7], [3, 5, 8], [3, 8, 9]], [3, 6, 8]]]

```
(base) ➜ Ax_cguac_20527420 /Users/guchenghao/anaconda3/bin/python /Users/guchenghao/Desktop/DataMing-5002/Ax_cguac_20527420
/A1_cguac_20527420_Q1_code/hash_tree.py
[[[[1, 4, 7], [1, 7, 9], [4, 7, 8]], [[[1, 2, 4], [4, 5, 7]], [[1, 5, 8], [4, 5, 8]], [[1, 2, 9], [1, 8, 9]]], [[[1, 6, 7],
[4, 6, 7]], [1, 3, 5], [[1, 3, 9], [4, 6, 9]]]], [[[2, 4, 7], [2, 7, 8], [5, 7, 9]], [[2, 5, 7], [2, 5, 8], [[2, 5, 6], [5,
8, 9]]], [[[2, 6, 7], [5, 6, 7]], [[2, 3, 5], [2, 6, 8]], [2, 6, 9]]], [[[3, 4, 7], [[3, 4, 5], [6, 7, 8]], [[3, 7, 9], [6,
7, 9]]], [[3, 5, 7], [3, 5, 8], [3, 8, 9]], [3, 6, 8]]]
```

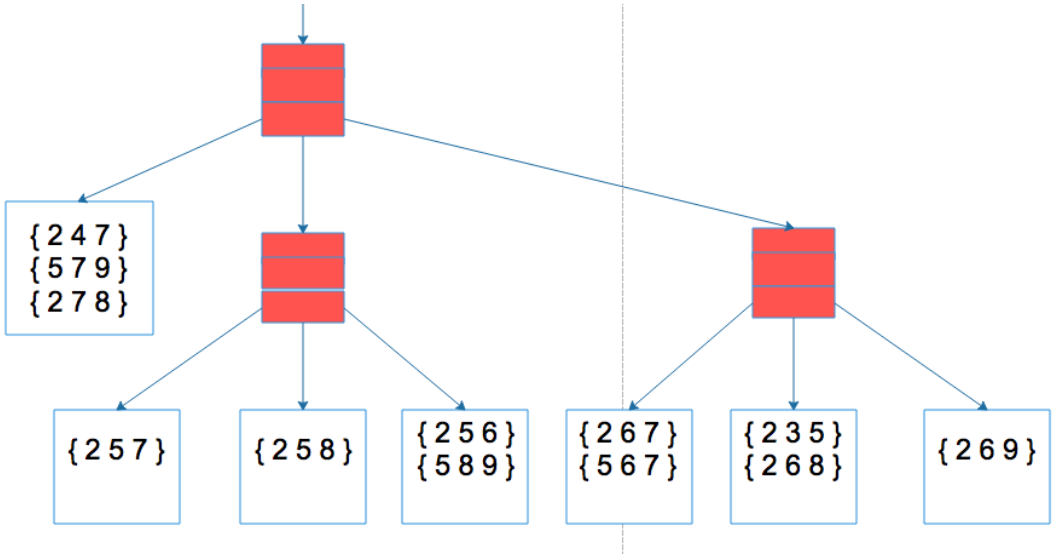
Picture of hash tree:



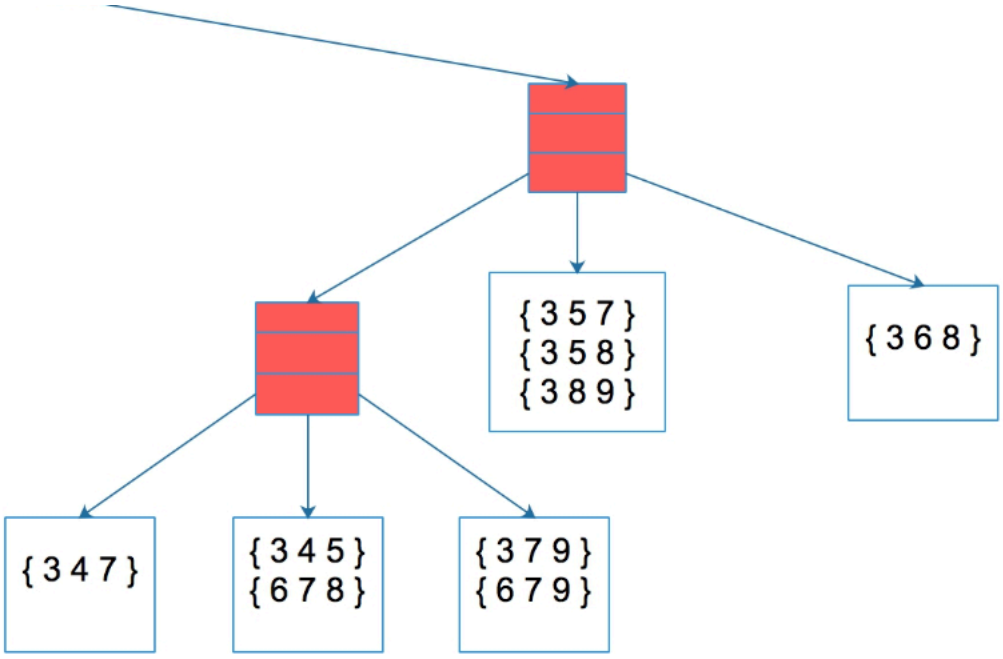
Left Tree:



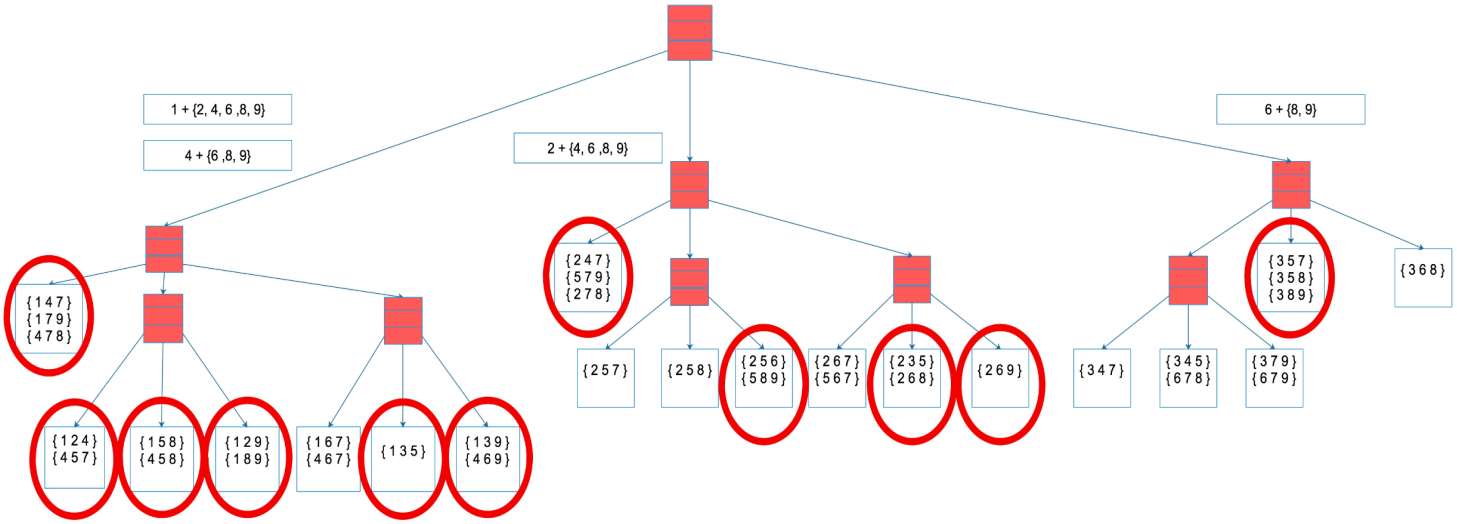
Middle Tree:



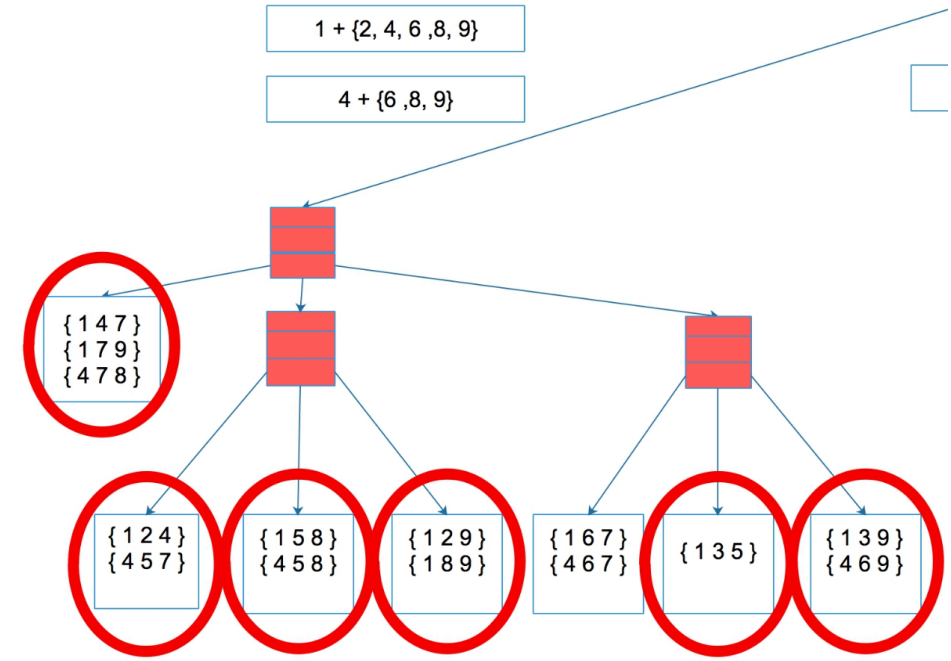
right Tree:



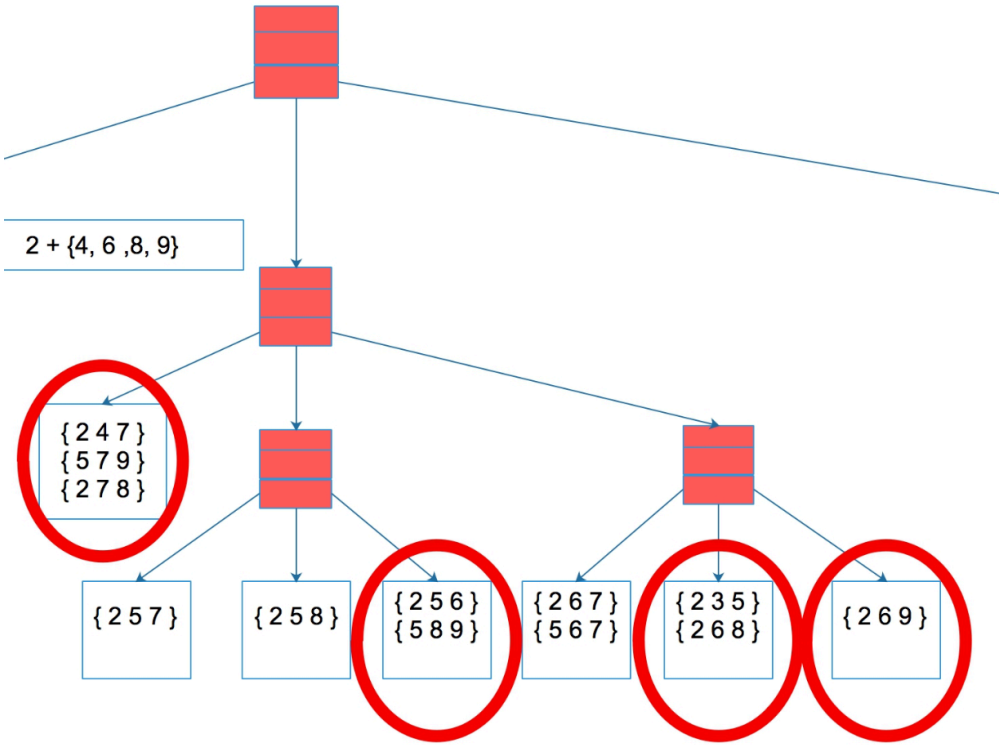
(b) We just compare items in the circled buckets with the candidate items in input transaction. So, the transaction items {1, 2, 4, 6, 8, 9} needs **23 times** comparisons using this hash tree. (3 + 2 + 2 + 2 + 1 + 2 + 3 + 2 + 2 + 1 + 3 = **23**) The Following pictures show the circled buckets in the hash tree.



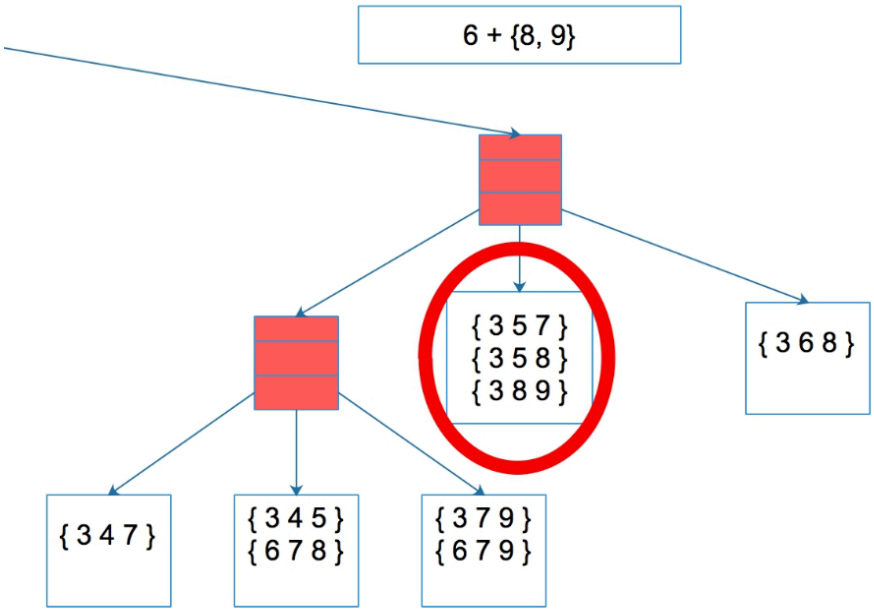
Left Tree:



Middle Tree:



Right Tree:



Q2:

(a) FP_tree.py, the frequent item set can be found in 'submission.csv'

(b) The results of FP-conditional trees:

```
The FP-conditional trees of other vegetables: ['Null set 1', ['whole milk 736']]
The FP-conditional trees of rolls/buns: ['Null set 1', ['other vegetables 243', ['whole milk 557', ['other vegetables 176']]
]]
The FP-conditional trees of soda: ['Null set 1', [['rolls/buns 290', ['other vegetables 54']], ['whole milk 394', ['other ve
getables 94', ['rolls/buns 87', ['other vegetables 43']]]], 'other vegetables 131']]
The FP-conditional trees of yogurt: ['Null set 1', [['whole milk 551', [['other vegetables 219', ['rolls/buns 59']], 'rolls/
buns 94']], 'rolls/buns 131', ['other vegetables 208', ['rolls/buns 54']]]]
The FP-conditional trees of bottled water: ['Null set 1', ['whole milk 338']]
The FP-conditional trees of root vegetables: ['Null set 1', ['other vegetables 238', ['whole milk 481', ['other vegetables 2
28']]]]
The FP-conditional trees of tropical fruit: ['Null set 1', ['other vegetables 185', ['whole milk 416', ['other vegetables 16
8']]]]
The FP-conditional trees of sausage: ['Null set 1', ['rolls/buns 301']]
The FP-conditional trees of pastry: ['Null set 1', ['whole milk 327']]
The FP-conditional trees of citrus fruit: ['Null set 1', ['whole milk 300']]
The FP-conditional trees of whipped/sour cream: ['Null set 1', ['whole milk 317']]
(base) ➜ A1_cguac_20527420_Q2_code
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The FP-conditional trees of **other vegetables**: ['Null set 1', ['whole milk 736']]

The FP-conditional trees of **rolls/buns**: ['Null set 1', ['other vegetables 243', ['whole milk 557', ['other vegetables 176']]]]

The FP-conditional trees of **soda**: ['Null set 1', [['rolls/buns 290', ['other vegetables 54']], ['whole milk 394', ['other vegetables 94', ['rolls/buns 87', ['other vegetables 43']]]], 'other vegetables 131']]

The FP-conditional trees of **yogurt**: ['Null set 1', [['whole milk 551', [['other vegetables 219', ['rolls/buns 59']], 'rolls/buns 94']], 'rolls/buns 131', ['other vegetables 208', ['rolls/buns 54']]]]

The FP-conditional trees of **bottled water**: ['Null set 1', ['whole milk 338']]

The FP-conditional trees of **root vegetables**: ['Null set 1', ['other vegetables 238', ['whole milk 481', ['other vegetables 228']]]]

The FP-conditional trees of **tropical fruit**: ['Null set 1', ['other vegetables 185', ['whole milk 416', ['other vegetables 168']]]]

The FP-conditional trees of **sausage**: ['Null set 1', ['rolls/buns 301']]

The FP-conditional trees of **pastry**: ['Null set 1', ['whole milk 327']]

The FP-conditional trees of **citrus fruit**: ['Null set 1', ['whole milk 300']]

The FP-conditional trees of **whipped/sour cream**: ['Null set 1', ['whole milk 317']]