

Results

Root

Test Case	Efficiency	# Of Items	Collisions	Successes	Slots	Idle
Customer 1	34.23%	12	17	12	35	6
Customer 2	35.46%	50	70	50	141	21
Customer 3	40.12%	132	164	132	329	33
Customer 4	39.16%	150	191	150	383	42
Customer 5	39.25%	177	225	177	451	49
Customer 6	43.46%	329	378	329	757	50
Customer 7	45.51%	441	484	441	969	44
Customer 8	45.84%	457	498	457	997	42
Customer 9	45.25%	433	478	433	957	46
Customer 10	44.01%	371	421	371	843	51

Leaf

Test Case	Efficiency	# Of Items	Collisions	Successes	Slots	Idle
Customer 1	1.17%	12	0	12	1024	1012
Customer 2	4.88%	50	0	50	1024	974
Customer 3	12.89%	132	0	132	1024	892
Customer 4	14.65%	150	0	150	1024	874
Customer 5	17.29%	177	0	177	1024	847
Customer 6	32.13%	329	0	329	1024	695
Customer 7	43.07%	441	0	441	1024	583
Customer 8	44.63%	457	0	457	1024	567
Customer 9	42.29%	433	0	433	1024	591
Customer 10	36.23%	371	0	371	1024	653

Questions

1. Which of the customers has the most items? How many items do they have?

Customer 8 had the most items, with 457 items.

2. When starting at the leaf level of the tree, which basket of goods takes the most time to scan?
How many time slots does it require?

All baskets take the same amount of time to scan, each taking 1024 slots. This is one slot for every possible item that can be scanned

3. When starting at the root level of the tree, which basket of goods takes the most time to scan?
How many time slots does it require?

The basket that took the most time to scan at the root level was Customer 8, with 997 slots. This matches with the fact they also have the most items to scan

4. *When starting at the root level of the tree, which basket of goods takes the least time to scan? How many time slots does it require?*

That basket that took the least amount of time to scan was Customer 1, with 35 slots. This also correlates with the fact that they had the least items to scan.

5. *When starting at the root level of the tree, which basket of goods generates the most collisions during scanning? How many collisions occur?*

The basket that generated the most collisions was Customer 8, with 498 collisions.

6. *When starting at the root level of the tree, which basket of goods generates the highest proportion of successful slots (i.e., efficiency) during scanning?*

The basket with the highest efficiency was Customer 8, with an efficiency of 45.84%.

Summary

It appears that the more items being scanned, the more effective it becomes scanning at the root level. This is surprising, as one could reasonably assume that generating more collisions would result in a lower efficiency, however this is evidently not that case. There appears to be a trend of increasing collisions and idle slots with increased items, however this begins to decrease somewhere after 371 items, as seen with Customer 10 and 9. Scanning at the leaf nodes requires a constant number of slots, as there is a constant number of items to be scanned. This, however, results in a decrease in idle slots the more items are being scanned, as a probing slot is a slot not spent idle. The efficiency starting at both the root and nodes increase with number of items being scanned, all of which are less than CSMA/CD, but some of which are greater than Pure and Slotted ALOHA; Slotted ALOHA having a max efficiency of 37%, meanwhile Customers 7, 8, and 9 having efficiencies greater than 45.