COMP3711: Design and Analysis of Algorithms

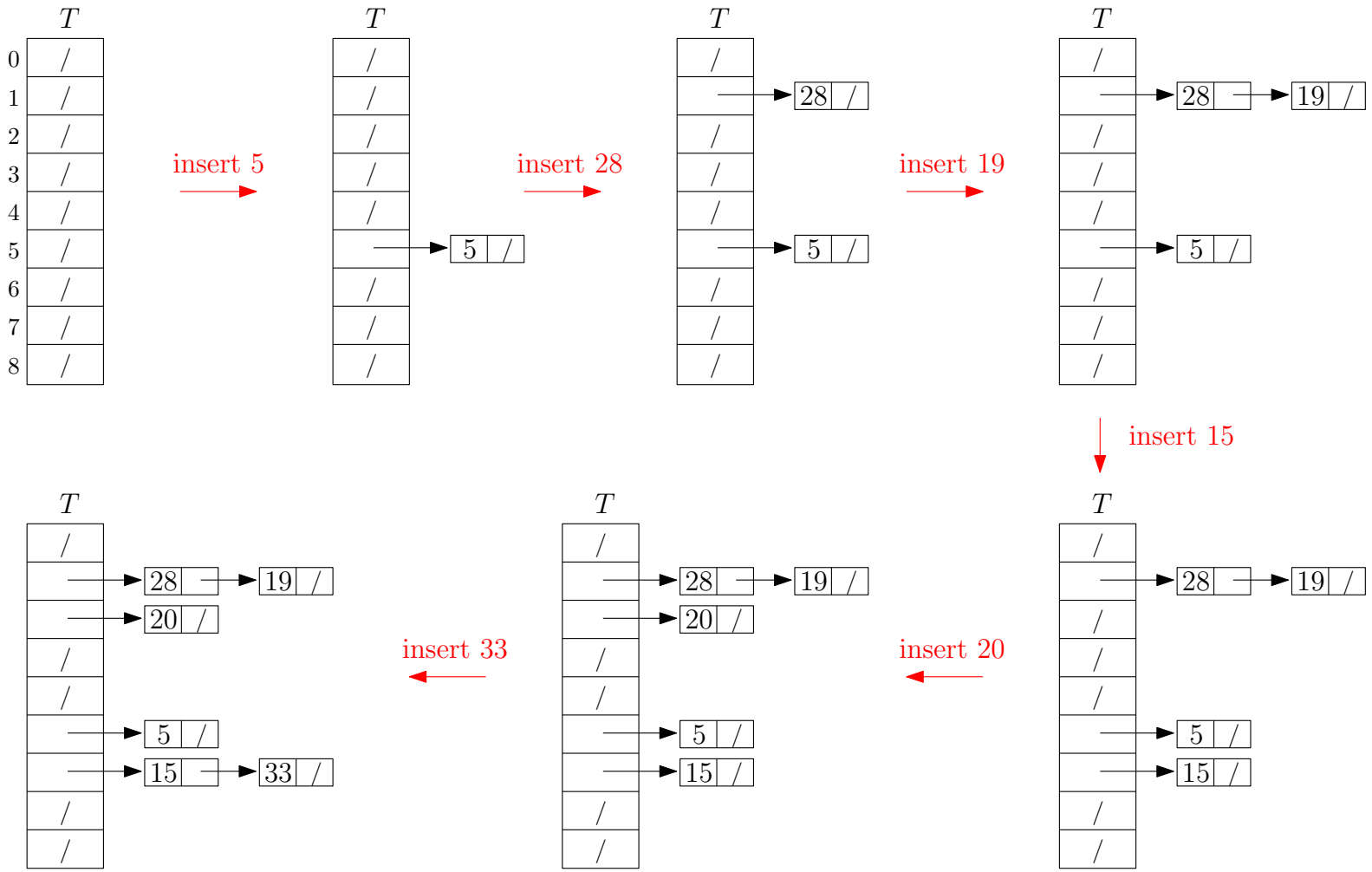
Tutorial 7

HKUST

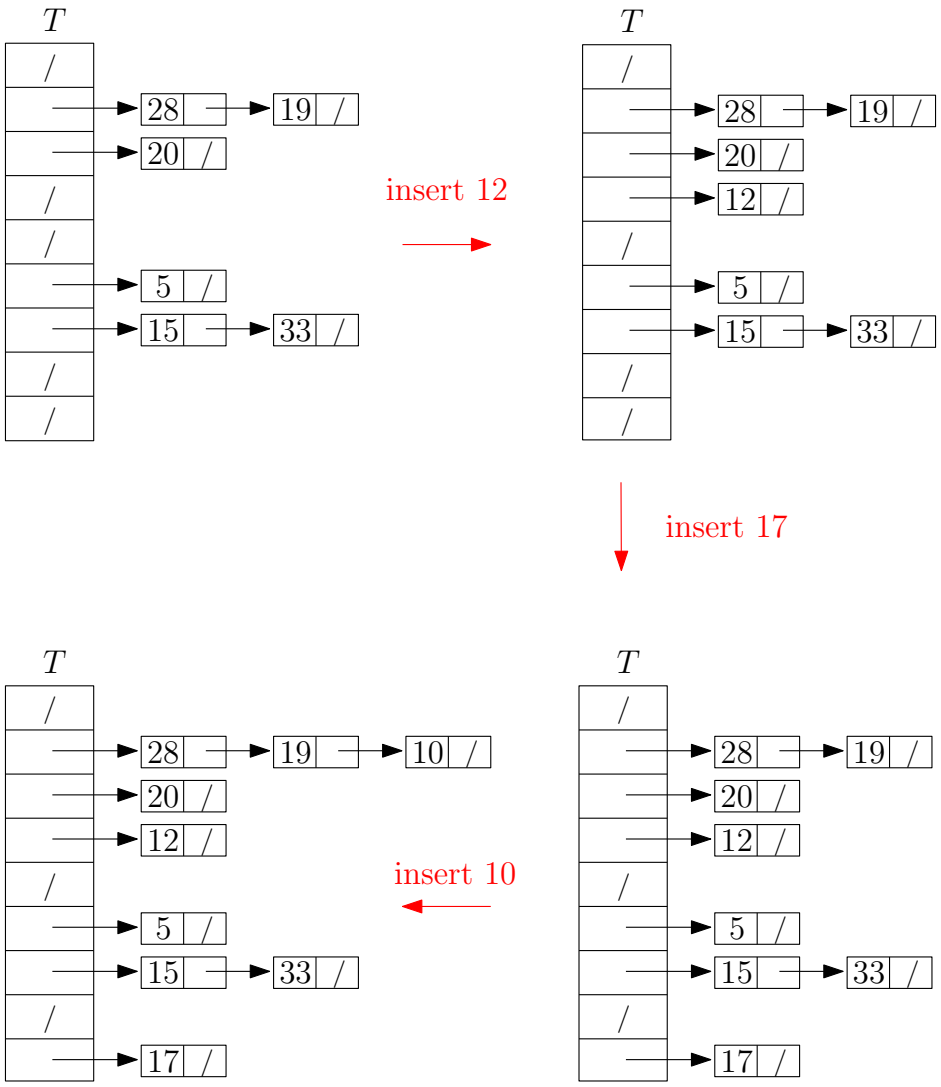
Question 1

Demonstrate what happens when we insert the keys $5, 28, 19, 15, 20, 33, 12, 17, 10$ into a hash table with collisions resolved by chaining. Let the table have 9 slots, and let the hash function be $h(k) = k \bmod 9$.

Solution 1


T
0
1
2
3
4
5
6
7
8
insert 5
insert 28
insert 19
insert 15
insert 20
insert 33
28
19
20
5
15
33

Solution 1


T
/
28
19
/
20
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5
/
15
33
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insert 12
T
/
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19
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20
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12
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insert 17
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28
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10
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20
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12
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5
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15
33
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17
/
insert 10
T
/
28
19
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20
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12
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5
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15
33
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17
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Question 2

Consider inserting the keys $10, 22, 31, 4, 15, 28, 17, 88, 59$ into a hash table of length $m = 11$ using open addressing with the auxiliary hash function $h'(k) = k \bmod m$. Illustrate the result of inserting these keys using linear probing, using quadratic probing with $c_1 = 1$ and $c_2 = 3$, and using double hashing with $h_1(k) = k$ and $h_2(k) = 1 + (k \bmod (m - 1))$.

Solution 2

Linear probing

0	22
1	88
2	
3	
4	4
5	15
6	28
7	17
8	59
9	31
10	10

Quadratic probing

0	22
1	
2	88
3	17
4	4
5	
6	28
7	59
8	15
9	31
10	10

Double hashing

0	22
1	
2	59
3	17
4	4
5	15
6	28
7	88
8	
9	31
10	10