1. Two desirable properties of a hash function:

+, It should be very fast to compute;

+, It should minimize duplication of output values (collisions)

a, collisions are handled by chaining:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|  | 20 |  |  | 16 | 44 | 94 | 12 |  | 13 |  |
|  |  |  |  | 5 | 88 | 39 | 23 |  |  |  |
|  |  |  |  |  | 11 |  |  |  |  |  |

b, collisions are handled by linear probing:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 44 | 12 | 13 | 88 | 23 | 11 | 94 | 39 | 16 | 20 | 5 |

a, collisions are handled by chaining:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|  | 16 |  |  | 1 | 36 | 3 |  |  | 23 |  | 8 |  |  | 11 |  |  |
|  |  |  |  | 18 |  | 20 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 35 |  |  |  |  |  |  |  |  |  |  |  |  |

b, collisions are handled by linear probing:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|  | 1 | 18 | 3 | 35 | 36 | 23 | 20 | 8 |  |  | 11 |  |  |  |  | 16 |