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Trouble with Codes in Lab1

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Java Fast IO

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✕ Memory Exceeded

#	状态	耗时	内存占用
#1	✓ Accepted	129ms	16.227 MiB
#2	✓ Accepted	127ms	16.453 MiB
#3	✓ Accepted	143ms	16.816 MiB
#4	✓ Accepted	133ms	17.207 MiB
#5	✓ Accepted	115ms	16.438 MiB
#6	✓ Accepted	129ms	16.641 MiB
#7	✓ Accepted	814ms	64.488 MiB
#8	✓ Accepted	1699ms	139.941 MiB
#9	✕ Time Exceeded	≥2551ms	≥227.078 MiB
#10	✕ Memory Exceeded	≥3041ms	≥256.0 MiB

No Fast IO (MLE&TLE)

✓ Accepted

#	状态	耗时	内存占用
#1	✓ Accepted	78ms	14.816 MiB
#2	✓ Accepted	81ms	14.781 MiB
#3	✓ Accepted	98ms	14.738 MiB
#4	✓ Accepted	90ms	15.223 MiB
#5	✓ Accepted	107ms	14.77 MiB
#6	✓ Accepted	86ms	14.766 MiB
#7	✓ Accepted	325ms	27.832 MiB
#8	✓ Accepted	432ms	54.062 MiB
#9	✓ Accepted	919ms	130.469 MiB
#10	✓ Accepted	1474ms	193.551 MiB

Fast IO (AC)

Limited: 1s, 256MB (Java has 2s)

C++ Cin

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```
#define endl "\n"
```

```
ios_base::sync_with_stdio(false);
cin.tie(0); cout.tie(0);
```

Save time

Impossible?

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The cycle will end definitely: Men do not propose to the same woman twice. And when a man proposes n times, he must have a spouse.

```
except:
    print("impossible")
```

No need

HashMap or TreeMap

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```
TreeMap<String, Person> map=new TreeMap<>();
```

≥2323ms	≥192.52 MiB

TLE

```
HashMap<String, Person> map=new HashMap<>(2*n);
```

1792ms	194.027 MiB

AC

```
Warmup populate
Time to populate 10000000 entries in a HashMap: 230
Time to populate 10000000 entries in a TreeMap: 1995
Warmup get
Time to get() 10000000 entries in a HashMap: 140
Time to get() 10000000 entries in a TreeMap: 1164
```

TreeMap is based on Red Black Tree.
HashMap is based on Hash Table.
If you don't need to sort the data, Hashmap is the better choice.

Hash value

AC

```
const int name_len = 10;
const int MAXN = 2e6;
using namespace std;
int t;
struct Node{
    string name;
    int girl_num{ };
    int index = -1;
    struct Node* next = nullptr;
    struct Node* prev = nullptr;
};


char boys_list[1010][name_len];
char girls_list[1010][name_len];

Node boys_prefer[MAXN];
vector< int >girls_prefer[MAXN];
int boyfriend[MAXN];
int girlfriend[MAXN];
char boys_name[MAXN][name_len];
char girls_name[MAXN][name_len];

stack<int> free_boy;

int hash_name(char name[]){
    hash<string> hash_fn;
    size_t str_hash = hash_fn(name) % 1999957;
    return str_hash;
```

MLE

```
const int name_len = 10;
const int MAXN = 3e6;
using namespace std;
int t;
struct Node{
    string name;
    int girl_num{ };
    int index = -1;
    struct Node* next = nullptr;
    struct Node* prev = nullptr;
};


char boys_list[1010][name_len];
char girls_list[1010][name_len];

Node boys_prefer[MAXN];
vector< int >girls_prefer[MAXN];
int boyfriend[MAXN];
int girlfriend[MAXN];
char boys_name[MAXN][name_len];
char girls_name[MAXN][name_len];

stack<int> free_boy;

int hash_name(char name[]){
    hash<string> hash_fn;
    size_t str_hash = hash_fn(name) % 2999957;
    return str_hash;
}
```

Pay attention to the range of Hash.

If the hash value is too large, it will cause MLE.

Hash Value

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```
for(int i=0;i<s.length();i++){
    val*=10;
    val+=s[i];
    val%=1217;
}
```

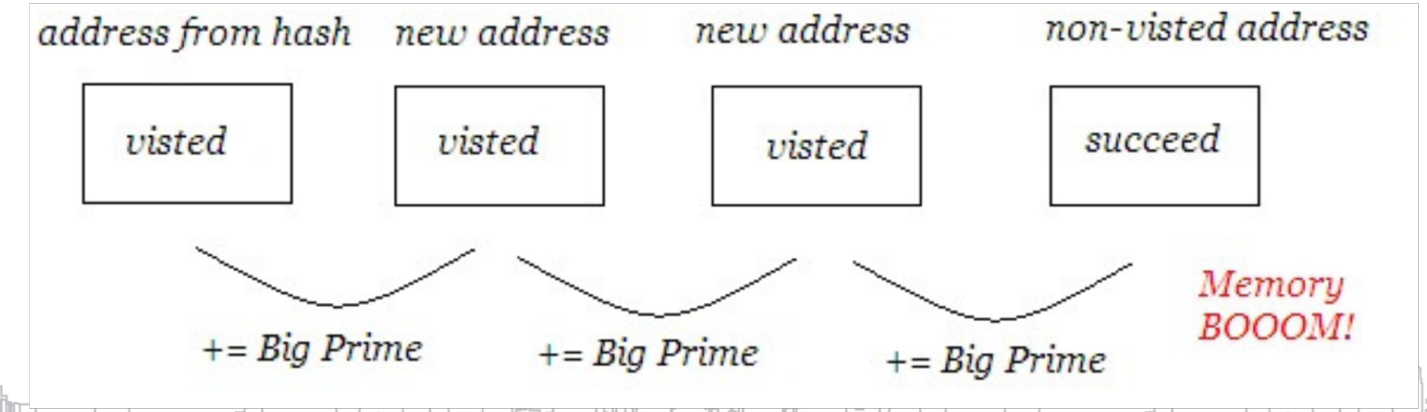
```
for(int i=0;i<s.length();i++){
    val*=10;
    val+=s[i];
    val%=6907;
}
```

There may be some collisions in a particular hash value. Try changing to another hash value.

Or there are some methods for solving hash collision:

Hash collision

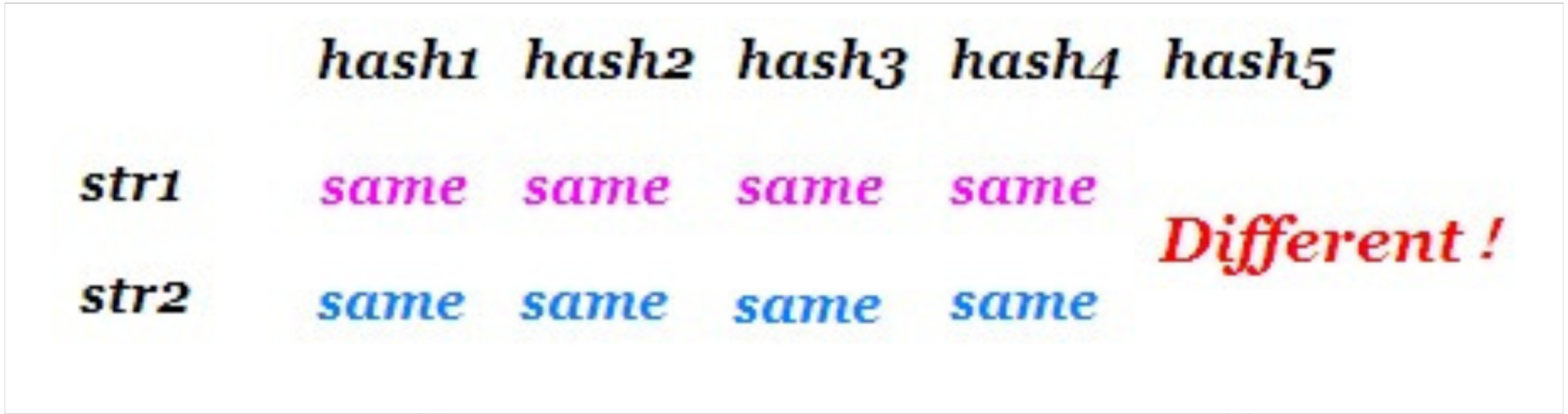
1. **Error-free Hash(无错哈希)**: Record each hash value that has been generated, and then for each new hash value, we can judge whether it conflicts with the existing hash value. If there is a conflict, then the new hash value can be continuously added a large prime number until no more conflict. (Beware of MLE)




```
for(int i=1;i<=m;i++)//m个串
{
cin>>str;//下一行的check为bool型
while(check[hash(str)])hash[i]+=19260817;
hash[i]+= hash(str) ;
}
```

Hash collision

2. **Multiple hash(多重哈希)**: You use two or more different hashes, and then compare whether each hash value is the same. Obviously, it increases space and time, but it does increase its correctness.



Hash collision

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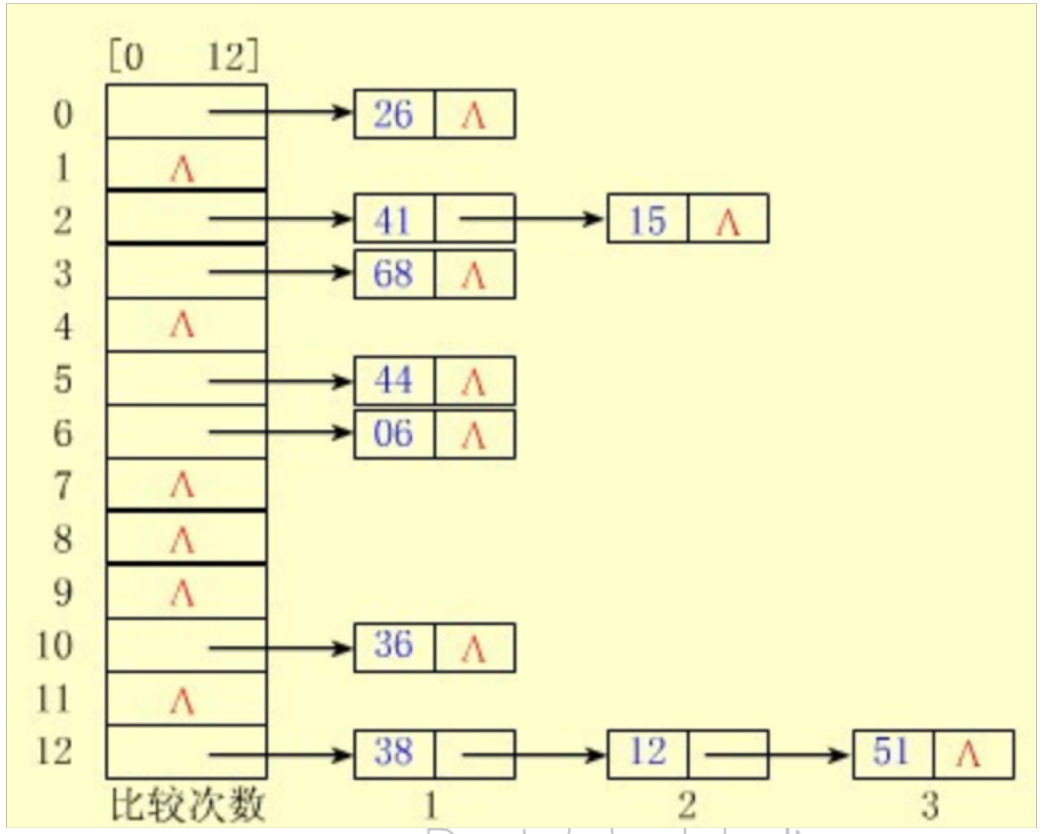
3. Zipper method(拉链法):



Link all nodes with keywords as synonyms in the same single linked list.

Unnecessary penalties

✓ Accepted	C 重测 | P1001 Valentine's Day (隐藏)
✕ Runtime Error	C 重测 | P1001 Valentine's Day (隐藏)
✕ Memory Exceeded	C 重测 | P1001 Valentine's Day (隐藏)
✕ Memory Exceeded	C 重测 | P1001 Valentine's Day (隐藏)
✕ Memory Exceeded	C 重测 | P1001 Valentine's Day (隐藏)
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✕ Memory Exceeded	C 重测 | P1001 Valentine's Day (隐藏)
✕ Memory Exceeded	C 重测 | P1001 Valentine's Day (隐藏)

Don't give up!

BUT

Please check the code carefully before each submission to avoid unnecessary penalties.

Naive

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```
1  package Lab1;
2
3  import java.io.*;
4  import java.math.BigDecimal;
5  import java.math.BigInteger;
6  import java.util.*;
```

No need package

1549ms	61.703 MiB	C++
0ms	0 Bytes	C

Compile Error

```
for (int i = 1; i < n+1; i++) {
```

```
for (int i = 0; i < n+1; i++) {
```

Index starts from 0

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Thanks for listening