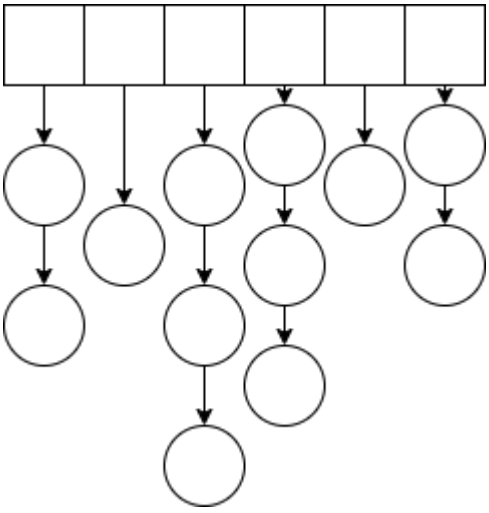
hash table

将大范围数映射到小范围数

通常采用模运算 最好采用质数，这样冲突概率最小

可能存在冲突

拉链法

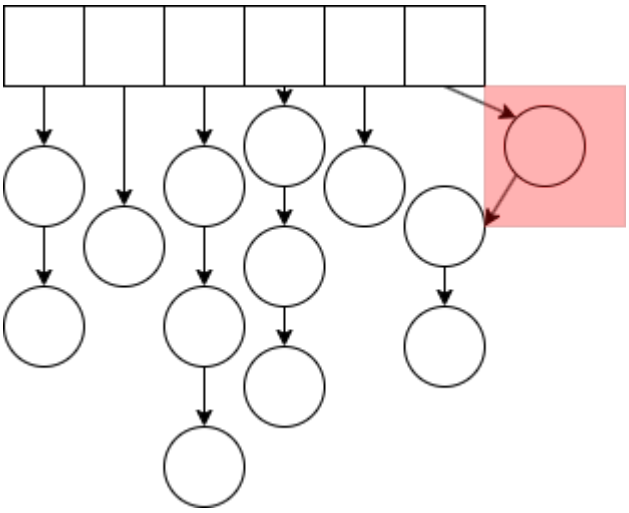


使用链表存储冲突数 一般冲突数很小

插入操作代码

```
int h[N], e[N], ne[N], idx;

void insert(int x){
    if(!find(x)){
        int k = (x % N + N) % N;
        e[idx] = x;
        ne[idx] = h[k];
        h[k] = idx ++;
    }
}
```



寻找是否存在x

```
bool find(int x){
    int k = (x % N + N) % N;
    for ( int i = h[k]; i != -1; i = ne[i]){
        if (e[i] == x) return true;
    }
    return false;
}
```

字符串哈希

- 获取l到r字符串的哈希值

```
int n, m;
char st[N];
ULL h[N], p[N];

ULL get(int l, int r){
    return h[r] - h[l - 1] * p[r - l + 1];
}
int main(){

    cin >> n >> m ;
    cin >> st;
    p[0] = 1;
    for (int i = 1; i <=  n; i ++ ){
        p[i] = p[i - 1] * P;
        h[i] = h[i - 1] * P + st[i - 1];
    }
        while(m -- ){
        int l1, r1, l2, r2;
        cin >> l1 >> r1 >> l2 >> r2;
        if(get(l1, r1) == get(l2, r2)) puts("Yes");
        else puts("No");
```

```
        }
    }
```