Data Structures

Hashing

Team Emertxe

Hashing -Operation

Introduction

Operations

- create_hashtable : Create a Hashtable
- insert_hashtable: Insert an element in Hashtable
- search_hashtable: Search an element in Hashtable
- delete_hashtable : Delete the entire Hashtable

Create Hashtable

Data Structure –Hashing

create_hashtable(arr)

```
typedef struct node
{
        int key;
        int value;
        struct node* link;
} hash_t;
```

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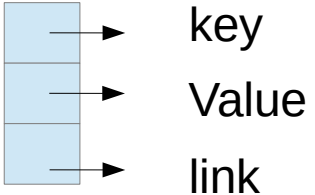

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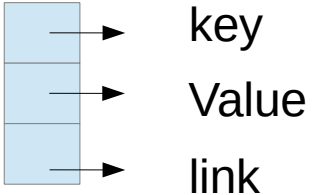

hash_t arr[SIZE] ;

SIZE = 5

create_hashtable(arr)

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- **Algorithm**

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```
for (i = 0 upto SIZE)
        arr[i].key = i
        arr[i].value = -1
        arr[i].link = NULL
```

create_hashtable(arr)

SIZE = 5

- **Algorithm**

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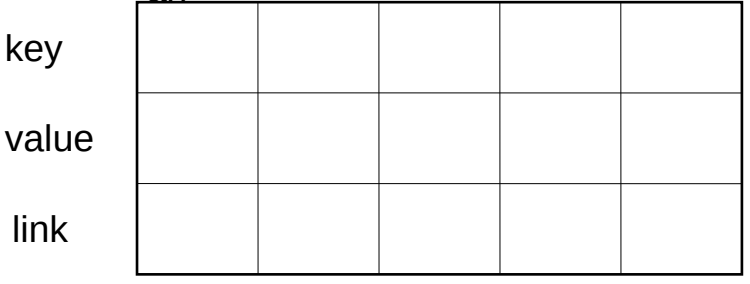
arr



create_hashtable(arr)

SIZE = 5

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```

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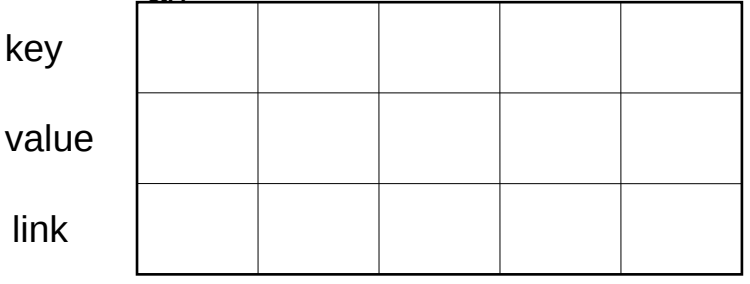

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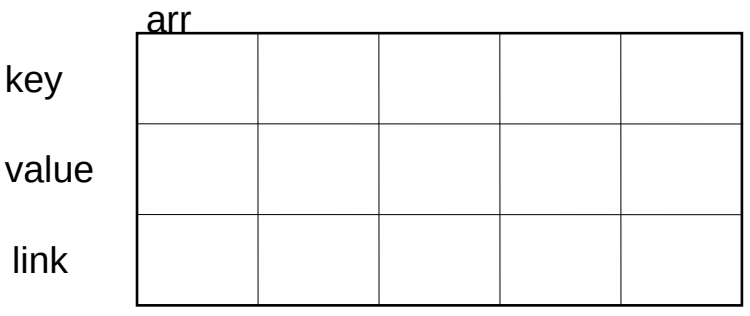

create_hashtable(arr)

SIZE = 5

- **Algorithm**

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for (i = 0 upto SIZE)
    arr[i].key = i
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```

arr

key	0				
value					
link					

create_hashtable(arr)

SIZE = 5

- **Algorithm**

```
for (i = 0 upto SIZE)
        arr[i].key = i
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key	0				
value	-1				
link					

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for (i = 0 upto SIZE)
        arr[i].key = i
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```

arr

key	0				
value	-1				
link	NULL				

create_hashtable(arr)

SIZE = 5

- **Algorithm**

```
for (i = 0 upto SIZE)
        arr[i].key = i
        arr[i].value = -1
        arr[i].link = NULL
```

arr

key	0	1			
value	-1	-1			
link	NULL	NULL			

create_hashtable(arr)

SIZE = 5

- **Algorithm**

```
for (i = 0 upto SIZE)
        arr[i].key = i
        arr[i].value = -1
        arr[i].link = NULL
```

arr

key	0	1	2		
value	-1	-1	-1		
link	NULL	NULL	NULL		

create_hashtable(arr)

SIZE = 5

- **Algorithm**

```
for (i = 0 upto SIZE)
        arr[i].key = i
        arr[i].value = -1
        arr[i].link = NULL
```

arr

key	0	1	2	3	
value	-1	-1	-1	-1	
link	NULL	NULL	NULL	NULL	

create_hashtable(arr)

SIZE = 5

- **Algorithm**

```
for (i = 0 upto SIZE)
        arr[i].key = i
        arr[i].value = -1
        arr[i].link = NULL
```

arr

	0	1	2	3	4
key					
value	-1	-1	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

Hashing -insert_hashtable(arr,data)

insert_hashtable(arr,data)

Input Specification:

arr : Pointer that contains address of structure array (hash_t)

data: Item to be added

Output Specification:

Status : e_true / e_false

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

arr

	0	1	2	3	4
key					
value	-1	-1	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

arr

	0	1	2	3	4
key					
value	-1	-1	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 1

arr

key	0	1	2	3	4
value	-1	-1	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

index = data % SIZE

index = 1 % 5 = 1

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Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 1

arr

key	0	1	2	3	4
value	-1	**-1**	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

index = data % SIZE

index = 1 % 5 = 1

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Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 1

arr

key	0	1	2	3	4
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link	NULL	NULL	NULL	NULL	NULL

EMERTXE

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 1

arr

key	0	1	2	3	4
value	-1	1	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

EMERTXE

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 3

arr

key	0	1	2	3	4
value	-1	1	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

index = data % SIZE

index = 3 % 5 =3

EMERTXE

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 3

arr

key	0	1	2	3	4
value	-1	1	-1	-1	-1
link	NULL	NULL	NULL	NULL	NULL

index = data % SIZE

index = 3 % 5 =3

EMERTXE

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 3

arr

key	0	1	2	3	4
value	-1	1	-1	3	-1
link	NULL	NULL	NULL	NULL	NULL

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 11

arr

key	0	1	2	3	4
value	-1	1	-1	3	-1
link	NULL	NULL	NULL	NULL	NULL

index = data % SIZE

index = 11 % 5 = 1

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 11

arr

key	0	1	2	3	4
value	-1	1	-1	3	-1
link	NULL	NULL	NULL	NULL	NULL

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 11

arr

key	0	1	2	3	4
value	-1	1	-1	3	-1
link	NULL	NULL	NULL	NULL	NULL

new

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Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 11

arr

key	0	1	2	3	4
value	-1	1	-1	3	-1
link	NULL	NULL	NULL	NULL	NULL

new

11
NULL

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 11

arr

key	0	1	2	3	4
value	-1	1	-1	3	-1
link	NULL	NULL	NULL	NULL	NULL

new

1
11
NULL

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 11

arr

key	0	1	2	3	4
value	-1	1	-1	3	-1
link	NULL	NULL	NULL	NULL	NULL

new

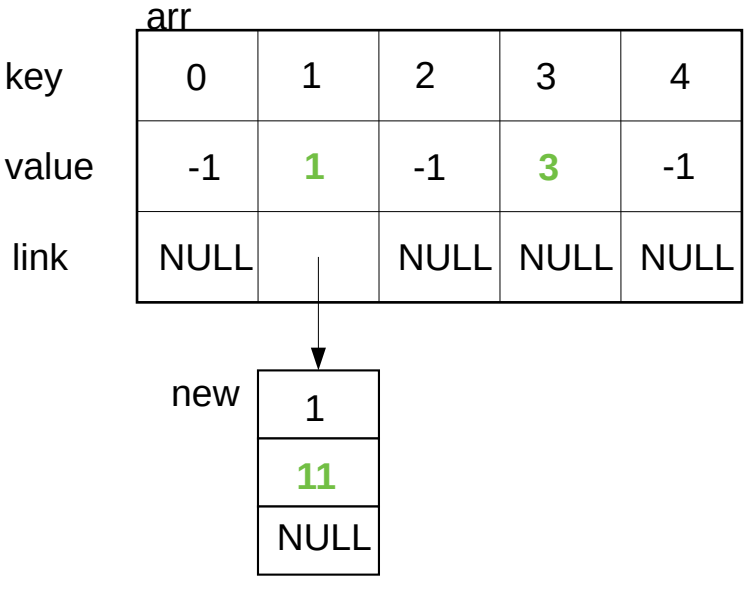
1
11
NULL

Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 11

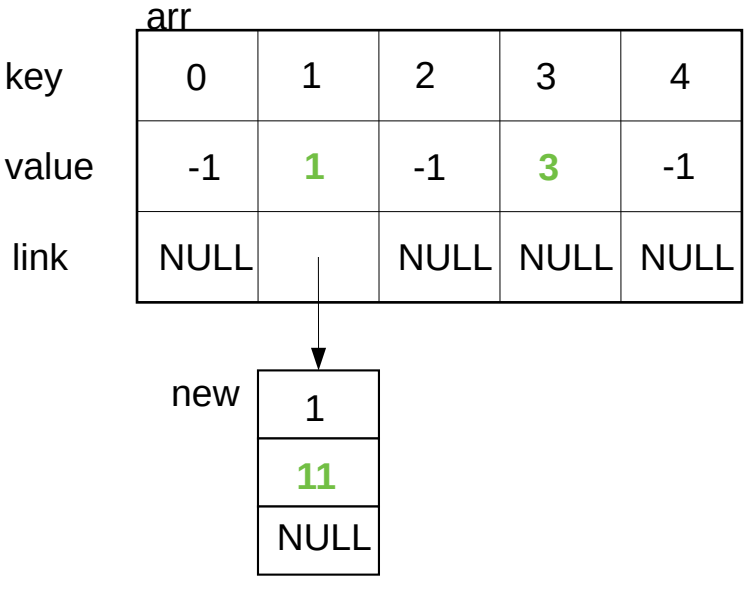


Data Structure –Hashing

insert_hashtable(arr,data)

SIZE = 5

data = 21



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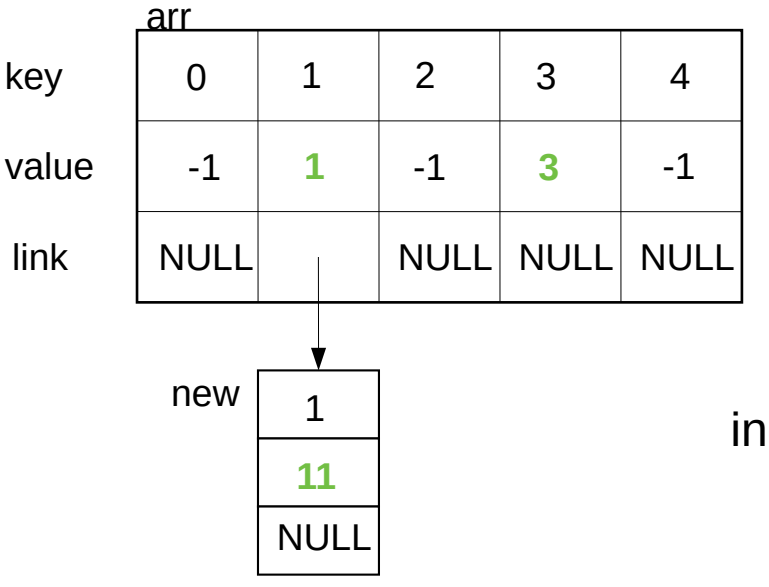

index = 21%5 = 1

Data Structure –Hashing

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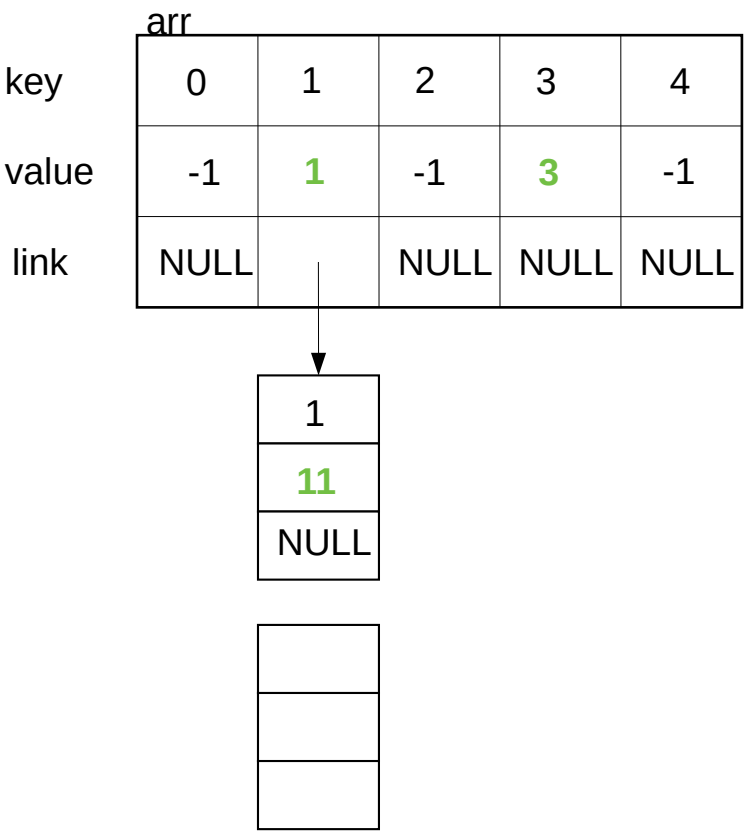

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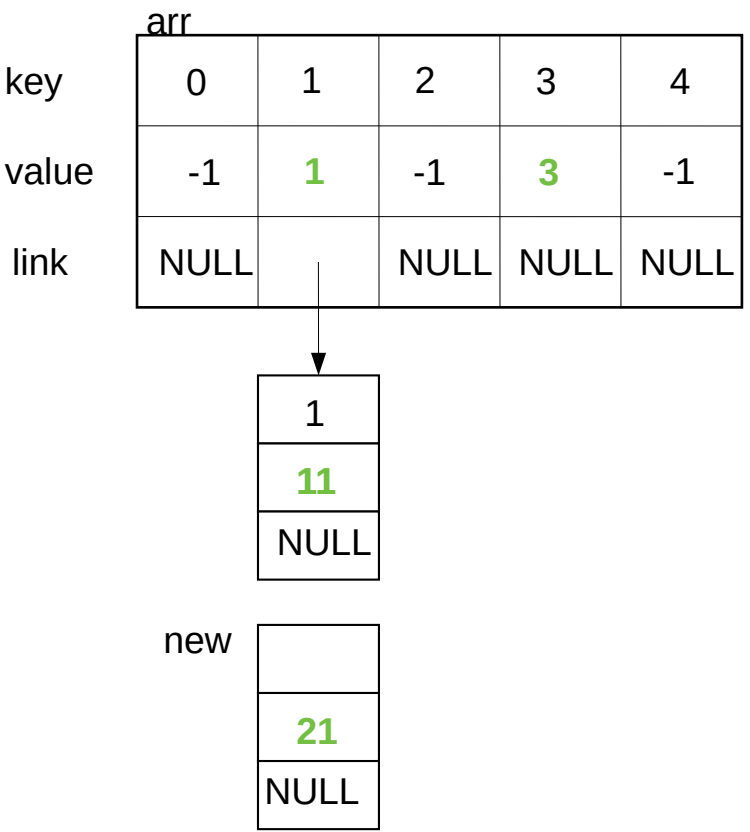

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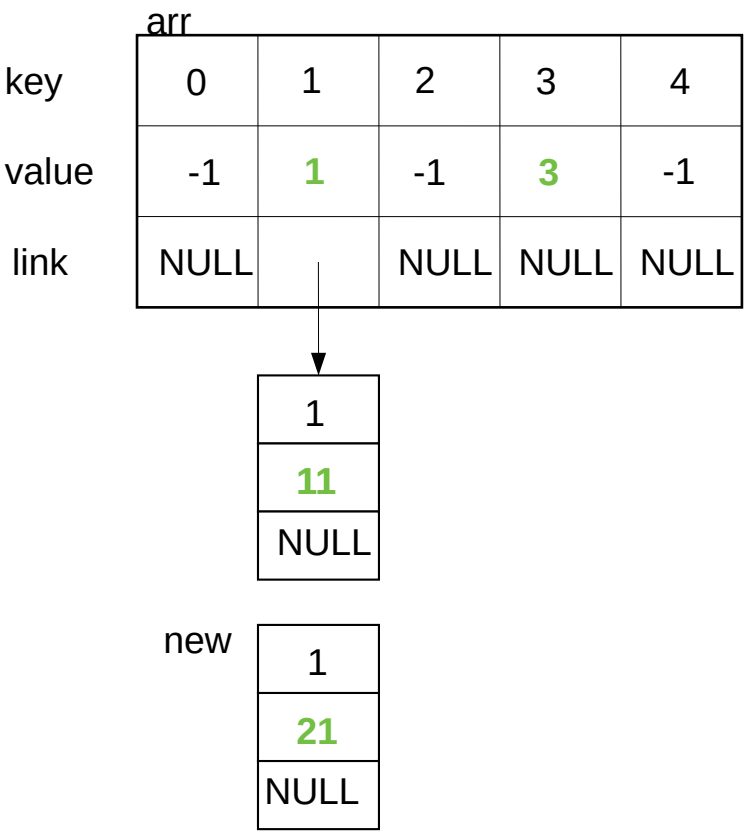

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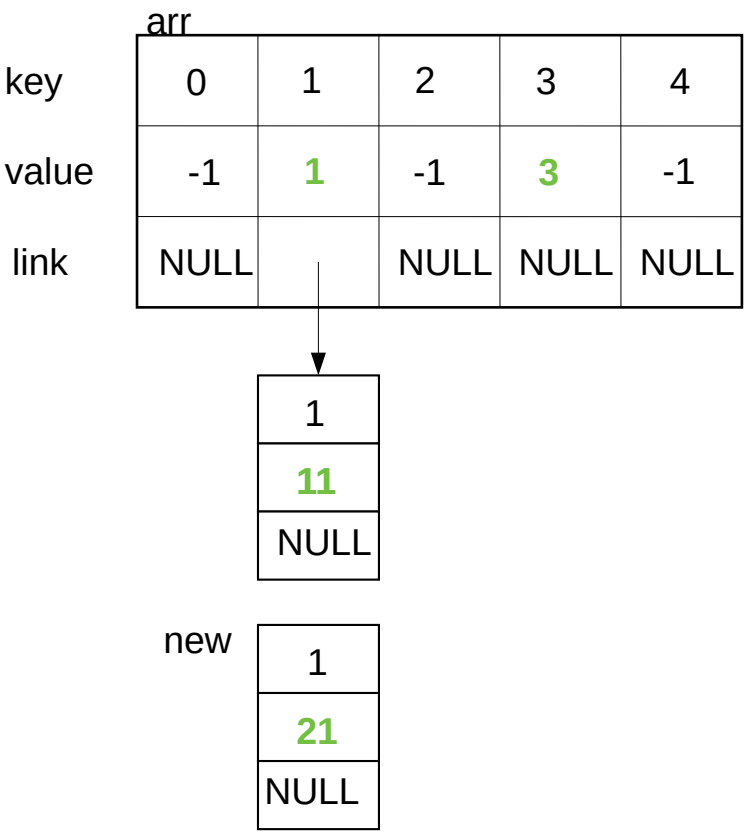

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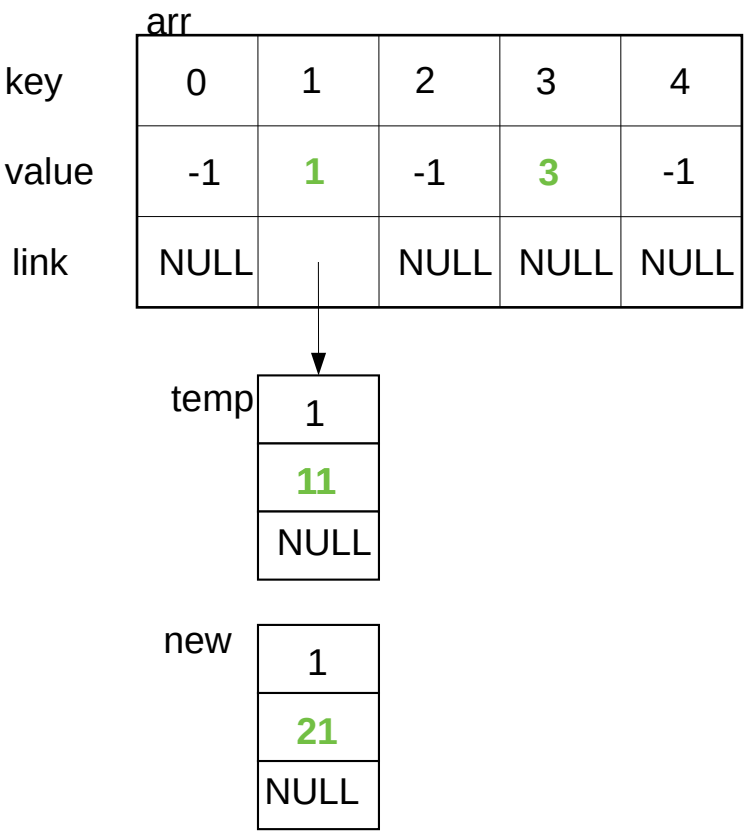

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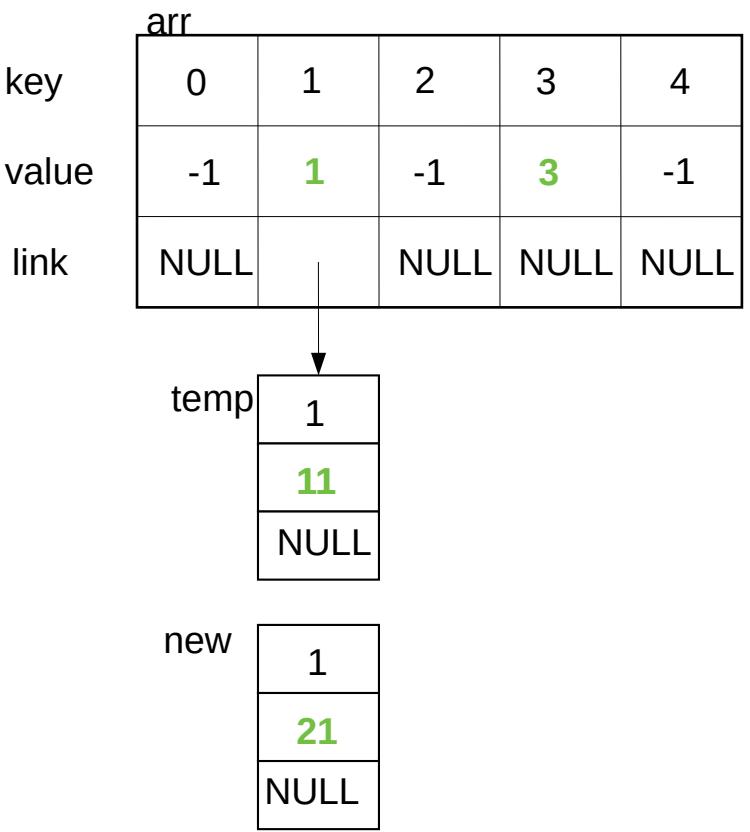

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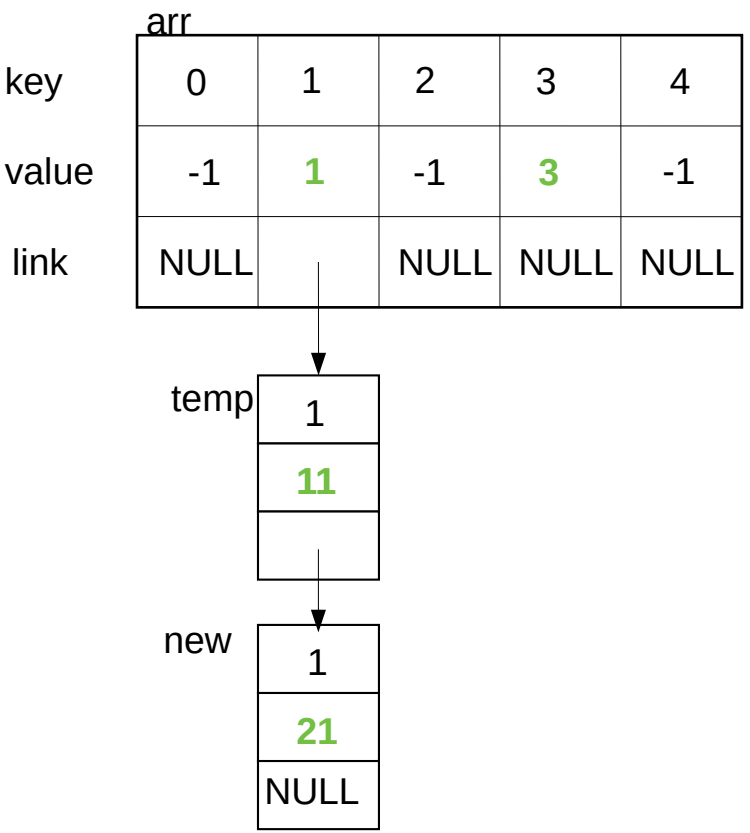

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Data Structure –Hashing

insert_hashtable(arr,data)

```
index = data % SIZE
if( arr[index].value = -1 )
        arr[index].value = data
        return e_true
new = Memalloc(sizeof(hash_t))
if(new = NULL )
        return e_false
new -> value = data,new->link = NULL
new -> key = index
if( arr[ index ].link = NULL )
        arr[index].link = new
        return e_true
temp = arr[index].link
while( temp -> link != NULL )
        temp = temp -> link
temp -> link = new
return e_true
```

SIZE = 5

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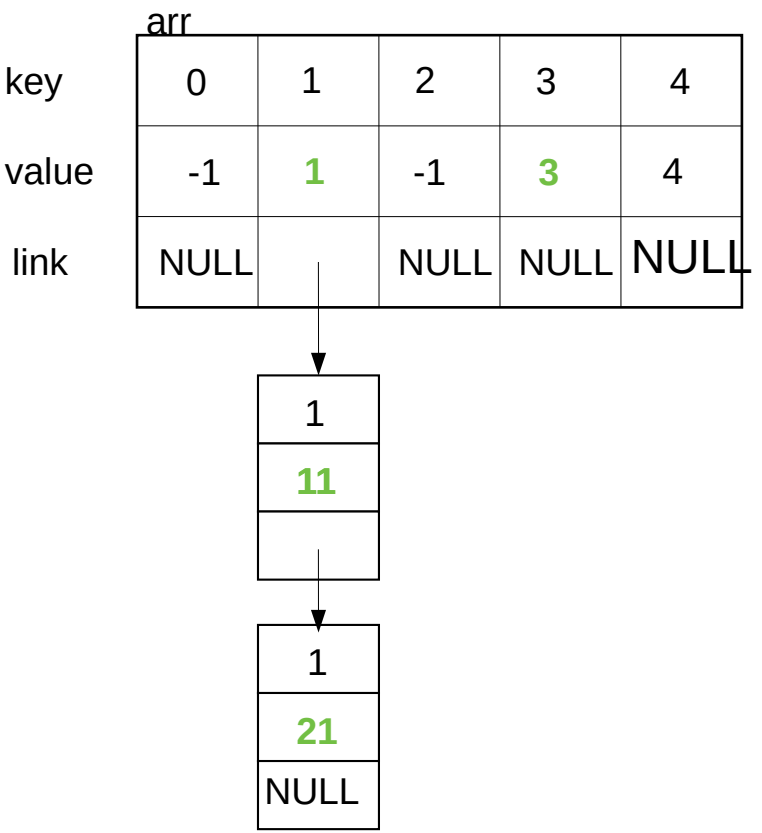

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