Assignment – 03

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Course Title : Database Systems
Course Code : CSE370
Section : 06
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Answer to the Q. NO - 01 (i)

We know,

from the concept of 1NF conditions:

1) There will not be any composite values,
2) No multivalued attribute,
3) No nested tables.

Here,

In the given relation;

There are no composite o values, multivalued attributes and nested tables.

That means, the given relation meets the conditions of 1NF; and each attribute is of a single type.

Therefore, the relation is in 1NF.

(Ans:)

[p.T.O.]

Answer to the Q. NO - 01 (ii)

We Know,

the conditions of 2NF are :

1) Must be in 1NF form

2) There will be no partial functional dependency.

But the given relation has partial functional dependency.

Here,

The non-prime attribute Customer_phone is functionally dependent on Comp_ID; which is only part of the primary key.

Now,

To convert into 2NF;

applying normalization in the given relation :-

[P.T.O.]

we need to create :

Engineers

Eng_ID	Eng_Name	E_totalRepairs	E_com_percentage	Eng_phone

Computers_Date_Assigned

Comp_ID	comp_Data	Comp_Issue	Comp_priority_Level	Comp_Serve_chart

Computers_Info

Comp_ID	customers_name	Customers_phone

Computers_repair

Eng_ID	comp_ID	Comp_Data	Comp_data_Repair

This new relation from "Computers_Date_Assigned" and "Computers_Info" decomposes the given relation entirely into 2NF.

(Ans:)

[P.T.O.]

Answere to the Q. NO- 01 (iii)

We Know,

The conditions of 3NF are:

1) Must be in 2NF form

2) There will be no Transitive Functional Dependency.

Here, the given relation is not in 3NF form.

There remains "transitive functional dependency.

"Commission_Percentage" is transitively dependent on the primary key through "Total_Repairs"

To convert/decompose into 3NF form,

we need to create 3 relations by dividing.

[The relations are show in tables in the next page]

Here,

Engineers :

Eng_ID	Eng_Name	Total_Repairs	Eng_phone

Computers_Date_Assigned

Comp_ID	Date_Assigned	Issue	Priority_level	Service_charge

Computers

Comp_ID	Customer_name	Customer_phone

Computers_Repairs

Eng_ID	Comp_ID	Date_Assigned	Date_repaired

Priority

Priority_level	Service_Charge

Repairs_per_commission

Total_Repairs	Comp_Percentage

Here, 'Engineers', 'Repairs_Per_Commission' and 'computers_Date_Assigned' these 3 new relations converts the given relation into 3NF form.

(Ans:)

[P.T.O.]

Answer to the Q. NO - 02

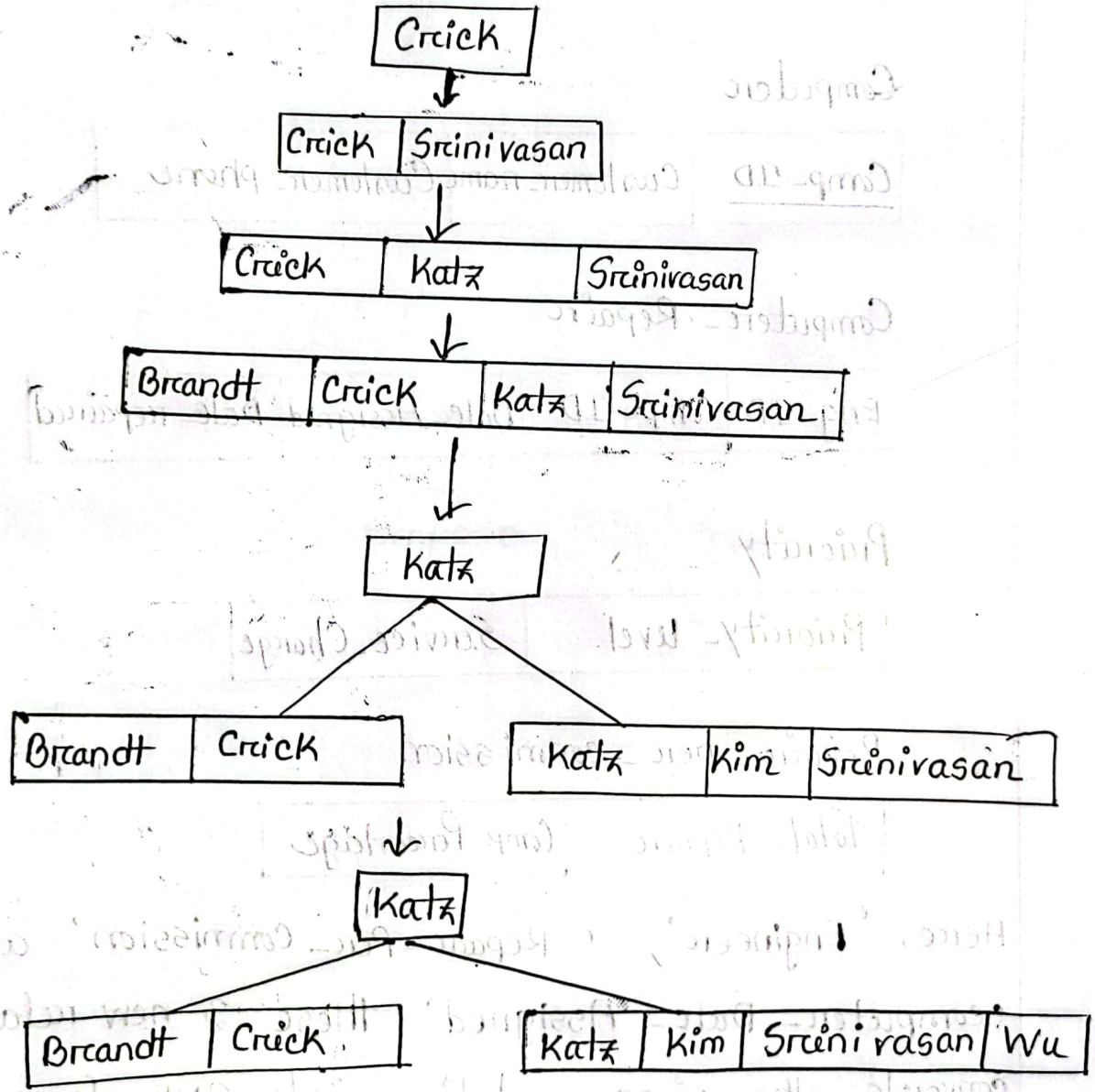
Given,

order, $n = 5$

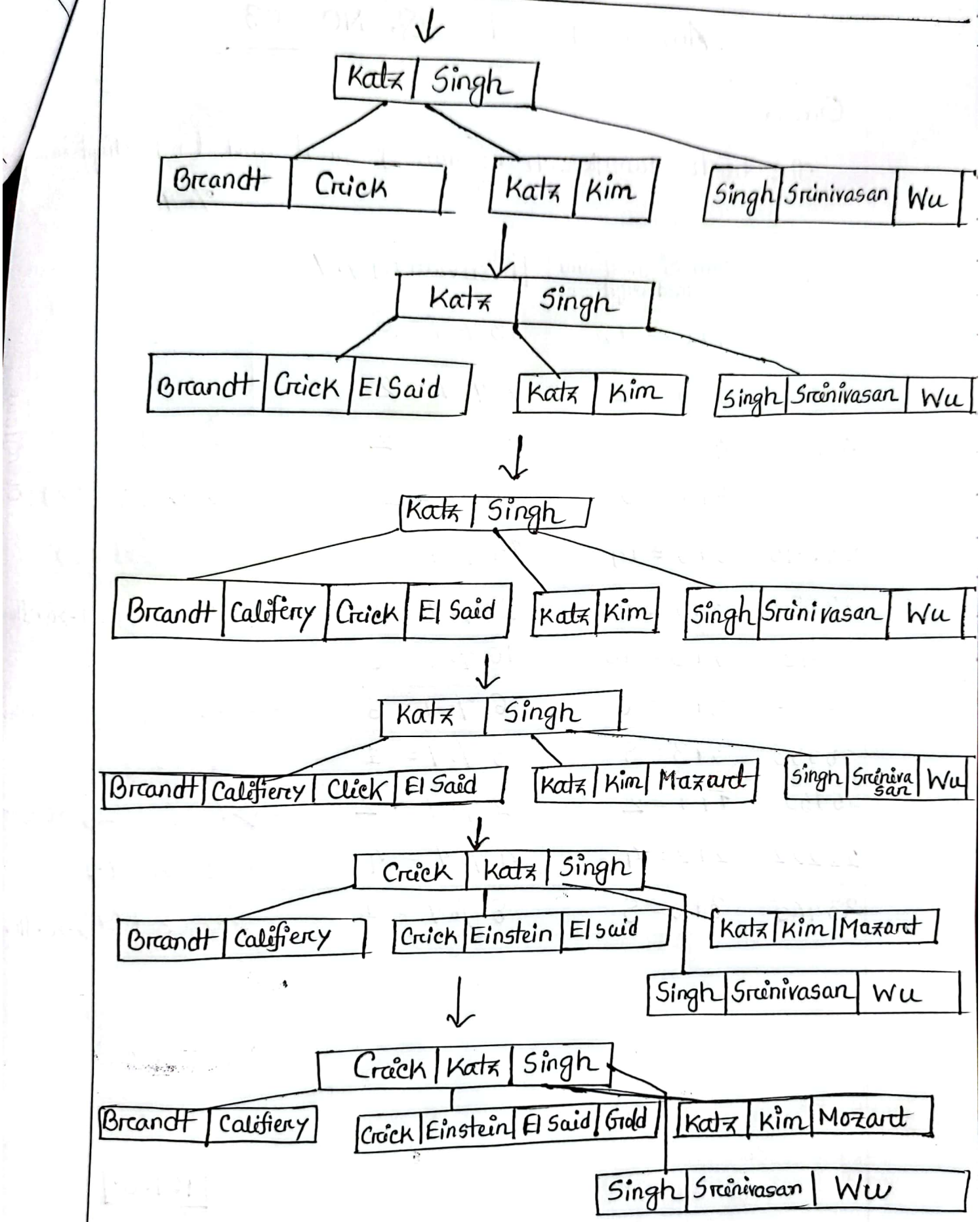
$\therefore$ max_num $= n - 1 = 5 - 1 = 4$

max_child $= 5$

B+ tree simulation:



P.T.O.


Katz | Singh
Brandt | Crick
Katz | Kim
Singh | Srinivasan | Wu
Katz | Singh
Brandt | Crick | El Said
Katz | Kim
Singh | Srinivasan | Wu
Katz | Singh
Brandt | Califerry | Crick | El Said
Katz | Kim
Singh | Srinivasan | Wu
Katz | Singh
Brandt | Califerry | Click | El Said
Katz | Kim | Mazard
Singh | Srinivasan | Wu
Crick | Katz | Singh
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Crick | Einstein | El said
Katz | Kim | Mazard
Singh | Srinivasan | Wu
Crick | Katz | Singh
Brandt | Califerry
Crick | Einstein | El said | Gidd
Katz | Kim | Mozard
Singh | Srinivasan | Wu

[P.T.O.]

Answer to the Q. NO - 03

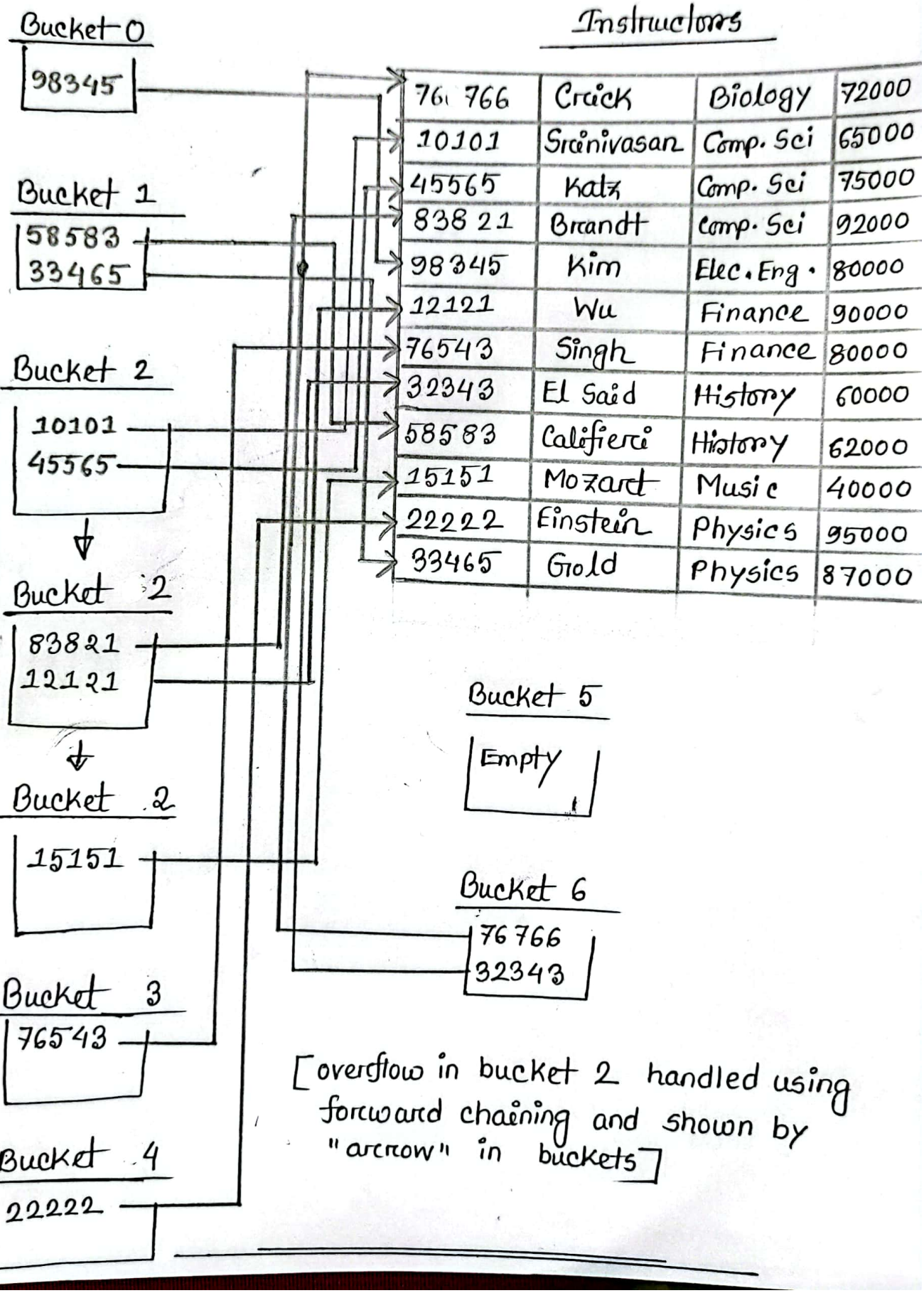
Given.

The hash function, $h = (\text{sum of first and last digit in ID}) \% 7$

ID	sum of first and last digit	[hash value] % 7	
76766.	7+6 = 13	13 % 7 = 6	→ (Bucket 6)
10101	1+1 = 2	2 % 7 = 2	→ Bucket (2)
45565	4+5 = 9	9 % 7 = 2	→ Bucket (2)
83821	8+1 = 9	9 % 7 = 2	→ Bucket (2)
98345	9+5 = 14	14 % 7 = 0	→ (Bucket (0)
12121	1+1 = 2	2 % 7 = 2	→ (Bucket (2) → o·flow
76543	7+3 = 10	10 % 7 = 3	→ Bucket (3)
32343	3+3 = 6	6 % 7 = 6	→ Bucket (6) → o·flow
58583	5+3 = 8	8 % 7 = 1	→ Bucket (1)
15151	1+1 = 2	2 % 7 = 2	→ Bucket (2) → o·flow
22222	2+2 = 4	4 % 7 = 4	→ Bucket (4)
33465	3+5 = 8	8 % 7 = 1	→ Bucket (1) → o·flow

overflow

[P.T.O.]


Bucket 0
98345
Bucket 1
58583
33465
Bucket 2
10101
45565
Bucket 2
83821
12121
Bucket 2
15151
Bucket 3
76543
Bucket 4
22222
Instructors
76766 Crick Biology 72000
10101 Srinivasan Comp. Sci 65000
45565 Katz Comp. Sci 75000
83821 Brandt Comp. Sci 92000
98345 Kim Elec. Eng. 80000
12121 Wu Finance 90000
76543 Singh Finance 80000
32343 El Said History 60000
58583 Califieri History 62000
15151 Mozart Music 40000
22222 Einstein Physics 95000
33465 Gold Physics 87000
Bucket 5
Empty
Bucket 6
76766
32343
[overflow in bucket 2 handled using forward chaining and shown by "arrow" in buckets]