

CS 260 Homework 8

Semanti Basu

August 25, 2017

Question 1

part a

$h(1)=1 \bmod 7=1$
 $h(8)=8 \bmod 7=1$
 $h(27)=27 \bmod 7=6$
 $h(64)=64 \bmod 7=1$
 $h(125)=125 \bmod 7=6$
 $h(216)=216 \bmod 7=6$
 $h(343)=343 \bmod 7=0$

Open Hash Table

Row	List
0→	[343]
1→	[1,8,64]
2→	□
3→	□
4→	□
5→	□
6→	[27,125,216]

part b

Closed Hash Table

1=slot 1
8=slot(1+1)=slot 2
27=slot 6
64=slot(1+1+1)=slot 3
125=slot(6+1)=slot 0
216=slot(6+1+1+1+1+1)=slot 4
343=slot(0+1+1+1+1+1)=slot 5

Slot	Number
0→	125
1→	1
2→	8
3→	64
4→	216
5→	343
6→	27

Question 2

$$h(23)=23 \bmod 5=3$$

$$h(48)=48 \bmod 5=3$$

$$h(35)=35 \bmod 5=0$$

$$h(4)=4 \bmod 5=4$$

$$h(10)=10 \bmod 5=0$$

$$23=\text{slot } 3$$

$$48=\text{slot } (3+1)=\text{slot } 4$$

$$35=\text{slot } 0$$

$$4=\text{slot } (4+1+1)=\text{slot } 1$$

$$10=\text{slot } (0+1+1)=\text{slot } 2$$

Slot	Number
0→	35
1→	4
2→	10
3→	23
4→	48

Question 3

part a

This is not a good hash function because there are several strings which have same length. So there will be multiple collisions which will have to be dealt with.

For Ex:

$$h1(\text{"tea"})=h1(\text{"you"})=h1(\text{"cat"})=h1(\text{"mat"})=h1(\text{"rat"})=h1(\text{"dog"})=h1(\text{"hat"})=3$$

$$h1(\text{"four"})=h1(\text{"roar"})=h1(\text{"soar"})=h1(\text{"sear"})=h1(\text{"sore"})=4$$

There are a large number of collisions in each case which is not practical from a coding perspective.

part b

This is not a good hash function because it will return a different hash for the same string. It is not guaranteed to return the same hash value. So it will be impossible to look up anything in the hash table.

For ex:

$h1(\text{"hello"})=3$ but $h1(\text{"hello"})=6$ when called a second time. The function can have different values for same string, hence it is not a good hash function.