CSCB20
UTSC
Worksheet 1

January 14, 2019

1. In the figure below, are instances of two relations that might constitute part of a banking database. Indicate the following:

acctNo	*type*	*balance*
12345	savings	12000
23456	checking	1000
34567	savings	25

The relation `Accounts`

firstName	*lastName*	*idNo*	*account*
Robbie	Banks	901-222	12345
Lena	Hand	805-333	12345
Lena	Hand	805-333	23456

The relation `Customers`

Figure 1: *
For question1

(a) The attributes of each relation

(b) The tuples of each relation

(c) The components of one tuple from each relation

(d) The relation schema for each relation

(e) The database schema

(f) A suitable domain for each attribute

(g) Another equivalent way to present each relation.

2. Assume that the database schema consists of four relations, whose schemas are:

```
Product(maker, model, type)
PC(model, speed, ram, hd, price)
Laptop(model, speed, ram, hd, screen, price)
Printer(model, color, type, price)
```

We also give you a sample snapshot of these relations see below in figure ??. Write expressions of relational algebra to answer the following queries. Your answer should work for arbitrary data, not just the data of these figures. We also assume for convenience purposes that the model numbers are unique across all the different manufacturers and across all the product types.

(a) What PC models have a speed of atleast 3.00?

(b) Which manufactures make laptops with a hard disk of atleast 100GB?

(c) Find the model number and price of all products (of any type) made by manufacturer B?

(d) Find the model numbers of all color laser printers?

(e) Find those manufacturers that sell Laptops, but not PCs?

(f) Find those hard-disk sizes that occur in two or more PCs

(g) Find those pairs of PC models that have both the same speed and RAM. A pair should be listed only once; e.g. list (i,j) but not (j,i).

(h) Find those manufacturers of at-least two different computers (PC's or laptops) with speeds of at-least 2.80

(i) Find the manufacturer(s) of the computer (PC or laptop) with the highest available speed.

(j) Find the manufacturer of PC's with at-least three different speed.

(k) Find the manufacturers who sell exactly three different models of PC.

maker	*model*	*type*
A	1001	pc
A	1002	pc
A	1003	pc
A	2004	laptop
A	2005	laptop
A	2006	laptop
B	1004	pc
B	1005	pc
B	1006	pc
B	2007	laptop
C	1007	pc
D	1008	pc
D	1009	pc
D	1010	pc
D	3004	printer
D	3005	printer
E	1011	pc
E	1012	pc
E	1013	pc
E	2001	laptop
E	2002	laptop
E	2003	laptop
E	3001	printer
E	3002	printer
E	3003	printer
F	2008	laptop
F	2009	laptop
G	2010	laptop
H	3006	printer
H	3007	printer

Figure 2: *
Sample data for Product

model	*speed*	*ram*	*hd*	*price*
1001	2.66	1024	250	2114
1002	2.10	512	250	995
1003	1.42	512	80	478
1004	2.80	1024	250	649
1005	3.20	512	250	630
1006	3.20	1024	320	1049
1007	2.20	1024	200	510
1008	2.20	2048	250	770
1009	2.00	1024	250	650
1010	2.80	2048	300	770
1011	1.86	2048	160	959
1012	2.80	1024	160	649
1013	3.06	512	80	529

Figure 3: *
Sample data for relation PC

model	*speed*	*ram*	*hd*	*screen*	*price*
2001	2.00	2048	240	20.1	3673
2002	1.73	1024	80	17.0	949
2003	1.80	512	60	15.4	549
2004	2.00	512	60	13.3	1150
2005	2.16	1024	120	17.0	2500
2006	2.00	2048	80	15.4	1700
2007	1.83	1024	120	13.3	1429
2008	1.60	1024	100	15.4	900
2009	1.60	512	80	14.1	680
2010	2.00	2048	160	15.4	2300

Figure 4: *
Sample data for relation Laptop

model	*color*	*type*	*price*
3001	true	ink-jet	99
3002	false	laser	239
3003	true	laser	899
3004	true	ink-jet	120
3005	false	laser	120
3006	true	ink-jet	100
3007	true	laser	200

Figure 5: *
Sample data for relation Printer