Portfolio Exercise 1 Relational Algebra and SQL

1.

```
drop table deposit;
drop table acct_holding;
drop table customer;
drop table account;
drop table store;

create table store
(store_location varchar2(30) not null primary key,
store_region varchar2(30) not null,
assets number(10,2) not null);

create table account
(account_no varchar2(10) not null primary key,
store_location varchar2(30) not null references store(store_location),
balance number(10,2) not null);

create table customer
(customer_name varchar2(30) not null primary key,
cust_street varchar2(30) not null,
cust_city varchar2(30) not null);

create table acct_holding
(customer_name varchar2(30) not null references customer(customer_name),
account_no varchar2(25) not null references account (account_no),
CONSTRAINT PK_acct_holding PRIMARY KEY (customer_name, account_no));

create table deposit
(deposit_id number(10) not null primary key,
account_no varchar2(10) not null references account(account_no),
store varchar2(30) not null references store (store_location),
deposit number (10,2) not null,
customer varchar2(30) not null references customer (customer_name));

insert into store
values ('Durham','Durham', 7100000);
insert into store
values ('Jesmond','Newcastle', 9000000);
insert into store
values ('St. Peter''s','Sunderland', 1700000);
insert into store
values ('Seaham','Durham', 300000);
insert into store
```

```
values ('Scotswood','Newcastle', 2100000);

insert into account
values ('C-101','Jesmond', 10000);
insert into account
values ('C-102','Scotswood', 8000);
insert into account
values ('C-201','Durham', 18000);
insert into account
values ('C-305','Seaham', 4000);
insert into account
values ('C-222','Seaham', 16000);

insert into customer
values ('Ashley','Spring', 'Durham');
insert into customer
values ('Bonington','Senator', 'Sunderland');
insert into customer
values ('Christy','North', 'Newcastle');
insert into customer
values ('Harvard','Main', 'Durham');
insert into customer
values ('Jenkins','Alma', 'Sunderland');
insert into customer
values ('Thompson','Putnam', 'Newcastle');
insert into customer
values ('Jackson','Jarvis', 'Newcastle');

insert into acct_holding
values ('Harvard','C-102');
insert into acct_holding
values ('Jenkins','C-101');
insert into acct_holding
values ('Jenkins','C-201');
insert into acct_holding
values ('Thompson','C-305');
insert into acct_holding
values ('Jackson','C-222');

insert into deposit
values (1,'C-102', 'Seaham', 2500,'Ashley');
insert into deposit
values (2,'C-102', 'Seaham', 800,'Harvard');
insert into deposit
values (3,'C-305', 'St. Peter''s', 1500,'Christy');
insert into deposit
values (4,'C-222', 'Scotswood', 1200,'Jenkins');
COMMIT;
```

Number ▲	Elapsed	Statement	Feedback	Rows
1	0.04	drop table deposit	Table dropped.	0
2	0.02	drop table acct_holding	Table dropped.	0
3	0.02	drop table customer	Table dropped.	0
4	0.02	drop table account	Table dropped.	0
5	0.02	drop table store	Table dropped.	0
6	0.01	create table store (store_location varchar2(30) not null pri	Table created.	0
7	0.02	create table account (account_no varchar2(10) not null prima	Table created.	0
8	0.01	create table customer (customer_name varchar2(30) not null p	Table created.	0
9	0.02	create table acct_holding (customer_name varchar2(30) not nu	Table created.	0
10	0.02	create table deposit (deposit_id number(10) not null primary	Table created.	0
11	0.01	insert into store values ('Durham','Durham', 7100000)	1 row(s) inserted.	1
12	0.00	insert into store values ('Jesmond','Newcastle', 9000000)	1 row(s) inserted.	1
13	0.00	insert into store values ('St. Peter''s','Sunderland', 17000	1 row(s) inserted.	1
14	0.00	insert into store values ('Seaham','Durham', 300000)	1 row(s) inserted.	1
15	0.00	insert into store values ('Scotswood','Newcastle', 2100000)	1 row(s) inserted.	1
16	0.01	insert into account values ('C-101','Jesmond', 10000)	1 row(s) inserted.	1
17	0.00	insert into account values ('C-102','Scotswood', 8000)	1 row(s) inserted.	1
18	0.00	insert into account values ('C-201','Durham', 18000)	1 row(s) inserted.	1
19	0.00	insert into account values ('C-305','Seaham', 4000)	1 row(s) inserted.	1
20	0.00	insert into account values ('C-222','Seaham', 16000)	1 row(s) inserted.	1
21	0.01	insert into customer values ('Ashley','Spring', 'Durham')	1 row(s) inserted.	1
22	0.00	insert into customer values ('Bonington','Senator', 'Sunderl	1 row(s) inserted.	1
23	0.00	insert into customer values ('Christy','North', 'Newcastle')	1 row(s) inserted.	1
24	0.00	insert into customer values ('Harvard','Main', 'Durham')	1 row(s) inserted.	1
25	0.01	insert into customer values ('Jenkins','Alma', 'Sunderland')	1 row(s) inserted.	1
26	0.00	insert into customer values ('Thompson','Putnam', 'Newcastle	1 row(s) inserted.	1
27	0.00	insert into customer values ('Jackson','Jarvis', 'Newcastle'	1 row(s) inserted.	1
28	0.00	insert into acct_holding values ('Harvard','C-102')	1 row(s) inserted.	1
29	0.00	insert into acct_holding values ('Jenkins','C-101')	1 row(s) inserted.	1
30	0.00	insert into acct_holding values ('Jenkins','C-201')	1 row(s) inserted.	1
31	0.01	insert into acct_holding values ('Thompson','C-305')	1 row(s) inserted.	1
32	0.00	insert into acct_holding values ('Jackson','C-222')	1 row(s) inserted.	1
33	0.01	insert into deposit values (1,'C-102', 'Seaham', 2500,'Ashle	1 row(s) inserted.	1
34	0.00	insert into deposit values (2,'C-102', 'Seaham', 800,'Harvar	1 row(s) inserted.	1
35	0.01	insert into deposit values (3,'C-305', 'St. Peter''s', 1500,	1 row(s) inserted.	1
36	0.00	insert into deposit values (4,'C-222', 'Scotswood', 1200,'Je	1 row(s) inserted.	1
37	0.00	COMMIT	Statement processed.	0

2.

a.

SQL: SELECT * FROM deposit where store = 'Seaham'

DEPOSIT_ID	ACCOUNT_NO	STORE	DEPOSIT	CUSTOMER
1	C-102	Seaham	2500	Ashley
2	C-102	Seaham	800	Harvard

Relational Algebra: σ store = 'Seaham' deposit

b.

SQL: select a.account_no, c.customer_name Name, c.cust_street Street, c.cust_city City, a.balance, d.store, s.store_region, a.store_location Account_Branch

from customer c, account a, acct_holding ah, store s, deposit d

where c.customer_name = d.customer AND a.account_no = ah.account_no AND d.store = s.store_location AND d.account_no = a.account_no

ACCOUNT_NO	NAME	STREET	CITY	BALANCE	STORE	STORE_REGION	ACCOUNT_BRANCH
C-102	Harvard	Main	Durham	8000	Seaham	Durham	Scotswood
C-102	Ashley	Spring	Durham	8000	Seaham	Durham	Scotswood
C-222	Jenkins	Alma	Sunderland	16000	Scotswood	Newcastle	Seaham
C-305	Christy	North	Newcastle	4000	St. Peter's	Sunderland	Seaham

Relational Algebra: π account.account_no, customer.customer_name, customer.cust_street, customer.cust_city, account.balance, deposit.store, store.store_region, account.store_location

σ customer.customer_name = deposit.customer AND account.account_no = acct_holdings.account_no AND deposit.store = store.store_location AND deposit.account_no = account.account_no

customer × account × acct_holding × deposit

c.

SQL: select c.customer_name Name, c.cust_city City

from customer c

left join deposit d

on c.customer_name = d.customer

where d.customer is null

NAME	CITY
Jackson	Newcastle
Bonington	Sunderland
Thompson	Newcastle

Relational Algebra: π customer.customer_name,

customer.cust_city σ deposit.customer = null customer ⟗ customer.customer_name = depsoit.customer deposit

3.

```
select a.account_no, c.customer_name Name, c.cust_street Street, c.cust_city City,
a.store_location, s.store_region,a.balance,a.balance + sum(d.deposit)

from customer c, account a, acct_holding ah, store s, deposit d

where c.customer_name = ah.customer_name AND

a.account_no = ah.account_no AND

a.store_location = s.store_location AND

a.account_no = d.account_no

group by a.account_no, c.customer_name, c.cust_street, c.cust_city, a.store_location,
s.store_region, a.balance

order by account_no asc
```

ACCOUNT_NO	NAME	STREET	CITY	STORE_LOCATION	STORE_REGION	BALANCE	A.BALANCE+SUM(D.DEPOSIT)
C-102	Harvard	Main	Durham	Scotswood	Newcastle	8000	11300
C-222	Jackson	Jarvis	Newcastle	Seaham	Durham	16000	17200
C-305	Thompson	Putnam	Newcastle	Seaham	Durham	4000	5500

3 rows returned in 0.01 seconds Download