

Q.1. Using object-oriented databases create the following types:

- a) AddrType (Pincode:number, Street:char, City:char, State:char)**
- b) BranchType (address: AddrType, phone1: integer, phone2: integer)**
- c) AuthorType (name:char, address: AddrType)**
- d) PublisherType (name:char, address:AddrType, branches:BranchType)**
- e) AuthorListType as varray, which is a reference to AuthorType**

Next create the following tables:

Branch of BranchType

Authors of AuthorType

Books (title:varchar,year:date,published_by ref Publishertype, authors AuthorListType)

Publishers of PublisherType

SQL Query:

```
Create or replace type AddrType1 as object(  
Pincode number(5),  
Street char(20),  
City varchar2(50),  
state varchar2(40),  
no number(4) );
```

```
create or replace type BranchType as object(  
address AddrType1,  
phone1 integer,  
phone2 integer );
```

```
create or replace type BranchTableType as table of BranchType;
```

```
create or replace type AuthorType as object(  
name varchar2(50),  
addr AddrType1 );
```

```
create table authors of AuthorType;
```

```
create or replace type AuthorListType as varray(10) of ref  
AuthorType;
```

```
create or replace type PublisherType as object(  
name varchar2(50),  
addr AddrType1, branches BranchTableType);
```

```
create table Publishers of PublisherType NESTED TABLE branches  
STORE as branchtable;
```

```
create table books(  
title varchar2(50),  
year date,  
published_by ref PublisherType,  
authors AuthorListType);
```

```
insert into Authors values('stallings',  
AddrType1(5002,'street','pune','mha',04));
```

```
insert into Authors values('stallings',  
AddrType1(7007,'street','mumbai','mha',1007));
```

```
insert into Authors values('Navathe',  
AddrType1(7008,'nstreet','nasik','mha',08));
```

```
insert into Authors values('Dhumdhare',  
AddrType1(7003,'dstreet','mumbai','mha',1003));
```

```
insert into Authors values('Dhumdhare',  
AddrType1(7008,'sstreet','mumbai','mha',1007));
```

```
insert into Authors values('Aho',  
AddrType1(7006,'nstreet','mumbai','mha',1006));
```

```
insert into Authors values('rabiner',  
AddrType1(8002,'dstreet','pune','mha',1003));
```

```
insert into Authors values('Dhanovan',  
AddrType1(8003,'dstreet','pune','mha',1003));
```

```
insert into Publishers values('tata',AddrType1(4002,'rstreet','mumbai','mha',03),  
BranchTableType(BranchType(AddrType1(5002,'fstreet','mumbai','mha',03),23406,69896)));
```

```
insert into Publishers values('seth',  
AddrType1(7007,'sstreet','mumbai','mha',1007),  
BranchTableType(BranchType( AddrType1(7007,'sstreet','mumbai','mha',1007),4543545,8676775))  
);
```

```
insert into Publishers values('joshi',  
AddrType1(7008,'sstreet','mumbai','mha',1007),  
BranchTableType(BranchType(  
AddrType1(1002,'sstreet','nasik','mha',1007),456767,7675757)));
```

```
insert into Publishers values('seth',  
AddrType1(7002,'sstreet','pune','mha',1007),  
BranchTableType(BranchType(  
AddrType1(1002,'sstreet','pune','mha',1007),4543545,8676775)));
```

```
insert into Publishers values('chetana',  
AddrType1(6002,'sstreet','nasik','mha',1007),  
BranchTableType(BranchType(  
AddrType1(6002,'sstreet','nasik','mha',1007),4543545,8676775)));
```

```
insert into books  
select 'java','28-may-1983',ref(pub),AuthorListType(ref(aut)) from  
Publishers pub,Authors aut where pub.name='joshi' and aut.name='Aho';
```

```
insert into books  
select 'java','28-may-1983',ref(pub),AuthorListType(ref(aut)) from  
Publishers pub,Authors aut where pub.name='chetana' and aut.name='stallings';
```

```
insert into books  
select 'compiler','09-jan-1890',ref(pub),AuthorListType(ref(aut)) from  
Publishers pub,Authors aut where pub.name='chetana' and aut.name='Dhanovan';
```

insert into books

```
select 'c','25-may-1983',ref(pub),AuthorListType(ref(aut)) from  
Publishers pub,Authors aut where pub.name='tata' and aut.name='stallings';
```

Insert records into the above tables and fire the following queries:

a) List all of the authors that have the same pin code as their publisher:

SQL Query:

```
select a.name from Authors a, Publishers p where a.addr.pincode = p.addr.pincode;
```

NAME
stallings
Navathe
Dhumdhare

b) List all books that have 2 or more authors:

SQL Query:

```
SELECT b.title, COUNT(a.name) AS AuthorCount  
FROM books b  
JOIN Authors a ON b.authors_by.name = a.name  
GROUP BY b.title  
HAVING COUNT(a.name) >= 2;
```

TITLE	AUTHORCOUNT
c	4
java	5

c) List the name of the publisher that has the most branches

SQL Query:

```
SELECT p.name AS PublisherName, COUNT(b.address) AS BranchCount  
FROM Publishers p  
JOIN TABLE(p.branches) b ON 1=1  
GROUP BY p.name  
ORDER BY BranchCount DESC  
FETCH FIRST 1 ROW ONLY;
```

PUBLISHERNAME	BRANCHCOUNT
seth	2

d) Name of authors who have not published a book

SQL Query:

```
SELECT a.name AS AuthorName
FROM Authors a
LEFT JOIN books b ON a.name = b.authors.name
WHERE b.title IS NULL;
```

AUTHORNAME
rabiner
Navathe
Dhumdhare
Dhumdhare

e) List all authors who have published more than one book

SQL Query:

```
SELECT a.name AS AuthorName
FROM Authors a
JOIN books b ON a.name = b.authors_by.name
GROUP BY a.name
HAVING COUNT(b.authors_by.name) > 1;
```

AUTHORNAME
stallings

f) Name of authors who have published books with at least two different publishers

SQL Query:

```
SELECT a.name AS AuthorName, b1.title as BookName
FROM books b1, Authors a JOIN books b ON a.name = b.authors_by.name
GROUP BY a.name HAVING COUNT(b.authors_by.name) >=2;
```

AUTHORNAME
stallings
Navathe
Dhumdhare
Dhumdhare
Aho
rabiner
Dhanovan
stallings