CREATE TABLE people (name VARCHAR2(30), phone VARCHAR2(20));

CREATE TYPE person AS OBJECT (name VARCHAR2(30), phone VARCHAR2(20));/

CREATE TABLE person\_table OF person;

Select \* from people

Select p.name from person\_table p

DESCRIBE person\_table

**--CAU 3**

INSERT INTO people VALUES ('Le Van A', '1-800-555-1212');

INSERT INTO people VALUES ('Nguyen Van B', '1-700-555-1414');/

INSERT INTO people VALUES ('Nguyen Van C', '0977586539');/

INSERT INTO people VALUES ('Le Van D', '036278489');/

INSERT INTO people VALUES ('Tran Van Quan', '0976587780');/

INSERT INTO person\_table VALUES ('John Smith', '1-800-555-1212' );

INSERT INTO person\_table VALUES ('Tran Van A', '0978586532');/

INSERT INTO person\_table VALUES ('Nguyen Bao Ngoc', '0977586538');/

INSERT INTO person\_table VALUES ('Le Anh Quan', '036278456');/

INSERT INTO person\_table VALUES ('Nguyen Phuong Nga', '0979588539');/

**--CAU 4**

CREATE OR REPLACE TYPE job AS OBJECT(job\_ID INT, jobtitle VARCHAR(20), salary\_amount INT, years\_of\_experience INT);/

CREATE TABLE job\_table OF job;

INSERT INTO job\_table VALUES (job(01, 'MC', 3000000, 10));/

INSERT INTO job\_table VALUES (job(02, 'Accounting', 1000000, 5));/

INSERT INTO job\_table VALUES (job(03, 'Singer', 5000000, 15));/

INSERT INTO job\_table VALUES (job(04, 'Developer', 10000000, 20));/

INSERT INTO job\_table VALUES (job(05, 'Actor', 7000000, 12));/

Select jb.\* from job\_table jb

**--CAU 5**

SELECT p.last\_name, p.phone.home FROM person\_table p

WHERE p.last\_name = 'A';

SELECT VALUE(p).last\_name FROM person\_table p

WHERE p.last\_name = 'A';

SELECT \* FROM person\_table p

WHERE p.last\_name = 'A';

SELECT last\_name FROM person\_table

WHERE last\_name = 'A';

**--CAU 6**

CREATE TYPE street AS OBJECT (snumber NUMBER, sname VARCHAR2(30), flat\_number NUMBER);/

CREATE OR REPLACE TYPE address AS OBJECT (street\_and\_number street, city VARCHAR2(30), postal\_code VARCHAR2(8), country VARCHAR2(30));/

**--CAU 7**

DROP TABLE person\_table

DROP TYPE person FORCE

**--CAU 8,9,10**

CREATE OR REPLACE TYPE person AS OBJECT (first\_name VARCHAR2(30), middle\_initial VARCHAR2(20), last\_name VARCHAR2(20), phone phone\_typ, addr address);/

CREATE OR REPLACE TYPE phone\_typ AS OBJECT (business VARCHAR2(30), home VARCHAR2(20), mobile VARCHAR2(12));/

CREATE TABLE person\_table OF person;

INSERT INTO person\_table VALUES ('Nguyen', 'Van', 'A', phone\_typ('7786-987-456', '0987654890', '0367543890'), address(street(1, 'Le Viet Thuat', 30), 'Vinh', '7654879', 'Nghe An'));/

INSERT INTO person\_table VALUES ('Nguyen', 'Van', 'B', phone\_typ('7787-999-456', '0987654567', '0367543567'), address(street(2, 'Nguyen Van Cu', 10), 'Vinh', '5467378', 'Nghe An'));/

INSERT INTO person\_table VALUES ('Nguyen', 'Van', 'C', phone\_typ('', '0956732682', '0945728165'), address(street(3, 'Nguyen Truong Thi', 12), 'HN', '8974928', 'HN'));/

INSERT INTO person\_table VALUES ('Nguyen', 'Van', 'D', phone\_typ('3425-646-342', '', ''), address(street(4, 'Le Duan', 02), 'Ha Noi', '56348924', 'HN'));/

INSERT INTO person\_table VALUES ('Nguyen', 'Van', 'E', phone\_typ('5424-643-231', '0345728165', '0983627582'), address(street(5, 'Phan Boi Chau', 19), 'Ho Chi Minh', '82645174', 'HCM'));/

**--2.2 Subtypes**

select \* from person\_table;

select p.first\_name, p.last\_name, p.addr.city, p.phone.home from person\_table p;

**-- CAU 11, 12**

ALTER TYPE person NOT FINAL CASCADE;

CREATE TYPE employee UNDER person (emp\_ID INT) NOT FINAL ;/

CREATE TABLE employee\_table OF employee;

INSERT INTO employee\_table VALUES ('Nguyen', 'Van', 'A', phone\_typ('7786-987-456', '0987654890', '0367543890'), address(street(1, 'Tran Phu', 30), 'Hue', '7654879', 'Hue'), 100);/

INSERT INTO employee\_table VALUES ('Nguyen', 'Van', 'B', phone\_typ('7786-987-456', '0987654890', '0367543890'), address(street(2, 'Kim Dong', 30), 'Vinh', '7654879', 'Nghe An'), 101);/

INSERT INTO employee\_table VALUES ('Nguyen', 'Van', 'C', phone\_typ('', '0987654890', '0367543890'), address(street(3, 'Phan Chau Trinh', 30), 'Da Nang', '7654879', 'Da Nang'), 102);/

SELECT value(p).first\_name, value(p).middle\_initial, value(p).last\_name, value(p).addr.street\_and\_number.sname, value(p).addr.city, value(p).phone.home

FROM employee\_table p;

**-- CAU 13**

select SYS\_NC\_OID$ from person\_table;

ALTER TABLE job\_table

ADD (CONSTRAINT jobID PRIMARY KEY (job\_ID));

ALTER TABLE employee\_table

ADD (CONSTRAINT empID PRIMARY KEY (emp\_ID));

**-- 2.4 References or REFs**

**-- CAU 14, 15, 17, 18, 19**

CREATE TABLE employment (employee REF employee SCOPE IS employee\_table, position REF job SCOPE IS job\_table);

INSERT INTO employment

SELECT REF(e), REF(j)

FROM job\_table j, employee\_table e

WHERE e.emp\_ID = 101

AND j.job\_ID = 01;

INSERT INTO employment

SELECT REF(e), REF(j)

FROM job\_table j, employee\_table e

WHERE e.emp\_ID = 100

AND j.job\_ID = 02;

SELECT emp.employee.first\_name, emp.employee.middle\_initial, emp.employee.last\_name

FROM employment emp;

SELECT DEREF(emp.employee).first\_name, DEREF(emp.employee).middle\_initial, DEREF(emp.employee).last\_name

FROM employment emp;

SELECT emp.employee.first\_name, emp.employee.middle\_initial, emp.employee.last\_name

FROM employment emp

WHERE emp.position.salary\_amount > 20000;

SELECT emp.employee.first\_name, emp.employee.middle\_initial, emp.employee.last\_name

FROM employment emp

WHERE emp.employee.addr.city = 'Hue';

CREATE OR REPLACE TYPE project AS OBJECT (project\_id NUMBER, project\_leader REF person, project\_title VARCHAR2(30));/

CREATE TABLE project\_table OF project;

ALTER TABLE project\_table ADD (CONSTRAINT projectID PRIMARY KEY (project\_id ));

INSERT INTO project\_table VALUES (1, (SELECT REF(e) FROM person\_table e WHERE e.last\_name= 'B'), 'Quan Ly Thu Tu');/

INSERT INTO project\_table VALUES (2, (SELECT REF(e) FROM person\_table e WHERE e.last\_name= 'A'), 'Quan Ly Thuoc');/

INSERT INTO project\_table VALUES (3, (SELECT REF(e) FROM person\_table e WHERE e.last\_name= 'C'), 'Data Mining');/

CREATE TABLE project\_membership (project\_id REF project SCOPE IS project\_table, member REF person SCOPE IS employee\_table);

INSERT INTO project\_membership

SELECT REF(p), REF(e)

FROM project\_table p, employee\_table e

WHERE p.project\_id = 1 AND e.emp\_ID = 100;

INSERT INTO project\_membership

SELECT REF(p), REF(e)

FROM project\_table p, employee\_table e

WHERE p.project\_id = 2 AND e.emp\_ID = 101;

INSERT INTO project\_membership

SELECT REF(p), REF(e)

FROM project\_table p, employee\_table e

WHERE p.project\_id = 3 AND e.emp\_ID = 102;

SELECT p.member.first\_name AS Firstname, p.member.middle\_initial AS Middlename, p.member.last\_name AS Lastname, p.project\_id.project\_title AS ProjectTitle, p.member.phone.home AS Phone, p.member.addr.city AS Address FROM project\_membership p;

**----- 3.2 Member Methods -----------**

CREATE OR REPLACE TYPE job2 AS OBJECT (job\_id int, jobtitle varchar(20), salary\_amount int, years\_of\_experience int, MEMBER FUNCTION evaluate\_qualification RETURN STRING);

CREATE OR REPLACE TYPE BODY job2 AS

MEMBER FUNCTION evaluate\_qualification RETURN STRING IS

BEGIN

IF self.years\_of\_experience < 2 THEN

RETURN 'Too bad';

ELSIF self.years\_of\_experience = 2 THEN

RETURN 'OK';

ELSE

RETURN 'Great!';

END IF;

END evaluate\_qualification;

END;

**----CÂU 20**

ALTER TYPE job2

ADD MEMBER FUNCTION salary\_fraction(N REAL) RETURN REAL

CASCADE;

CREATE OR REPLACE TYPE BODY job2 AS

MEMBER FUNCTION evaluate\_qualification RETURN STRING IS

BEGIN

IF self.years\_of\_experience < 2 THEN

RETURN 'Too bad';

ELSIF self.years\_of\_experience = 2 THEN

RETURN 'OK';

ELSE

RETURN 'Great!';

END IF;

END evaluate\_qualification;

MEMBER FUNCTION salary\_fraction(N REAL) RETURN REAL IS

BEGIN

RETURN (self.salary\_amount/N);

END salary\_fraction;

END;

**----CÂU 21**

CREATE TABLE job2\_table OF job2;

INSERT INTO job2\_table VALUES (10, 'Teacher', 5000000, 3);/

INSERT INTO job2\_table VALUES (11, 'Lawyer', 7000000, 2);/

INSERT INTO job2\_table VALUES (12, 'Electrician', 100000, 2);/

INSERT INTO job2\_table VALUES (13, 'IT', 10000000, 5);/

INSERT INTO job2\_table VALUES (14, 'Accounting', 600000, 1);/

SELECT j.evaluate\_qualification(), j.salary\_fraction(12) FROM job2\_table j;

SELECT j.jobtitle FROM job2\_table j

WHERE j.evaluate\_qualification() = 'OK' AND j.salary\_fraction(6) > 10000;

**------------ 3.3 Adding methods to existing types --------------**

**----CÂU 22:**

ALTER TYPE person

ADD MEMBER FUNCTION print\_name RETURN STRING CASCADE;

CREATE OR REPLACE TYPE BODY person AS

MEMBER FUNCTION print\_name RETURN STRING IS

BEGIN

RETURN CONCAT(CONCAT(CONCAT(first\_name, ', '), CONCAT(middle\_initial, ', ')), last\_name);

END print\_name;

END;

SELECT p.print\_name() FROM person\_table p;