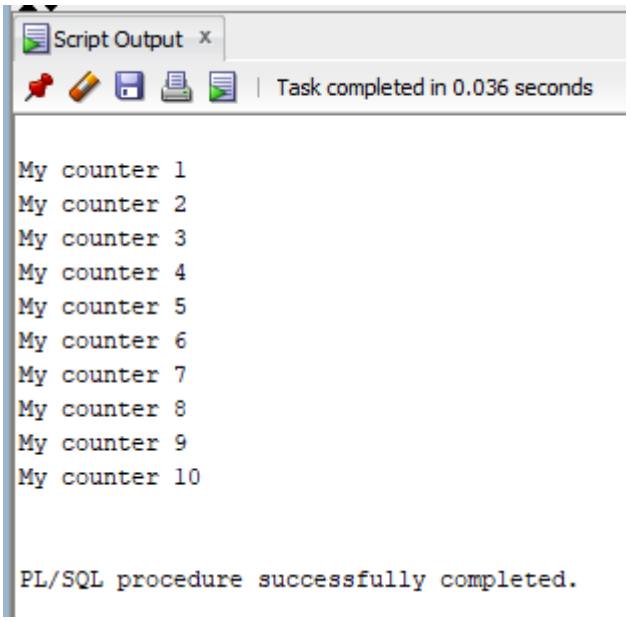
For Loops:

Example:

```
set serveroutput on;
begin
for i in 1..10 loop
 dbms_output.put_line('My counter '||i);
 end loop;
end;
```




```
set serveroutput on;

declare

v_start number(2):=1;
v_end number(2):=15;

begin
 for i in v_start..v_end loop
 dbms_output.put_line('Counter: '||i);
 end loop;
end;
```

```
PL/SQL procedure successfully completed.

Counter: 1
Counter: 2
Counter: 3
Counter: 4
Counter: 5
Counter: 6
Counter: 7
Counter: 8
Counter: 9
Counter: 10
Counter: 11
Counter: 12
```

Nested Loops:

```
set serveroutput on;

declare
v_inner number(2):=1;
begin
 <<outer_loop>>
 for v_outer in 1..4 loop
 dbms_output.put_line('Outer Count: '||v_outer);
 v_inner:=1;
 <<inner_loop>>
 loop
 v_inner := v_inner+1;
 dbms_output.put_line('Inner Count: '||v_inner);
 exit when v_inner*v_outer>=15;
 end loop;
 end loop;
end;
```

```
Outer Count: 1
Inner Count: 2
Inner Count: 3
Inner Count: 4
Inner Count: 5
Inner Count: 6
Inner Count: 7
Inner Count: 8
```

```
Inner Count: 9
Inner Count: 10
Inner Count: 11
Inner Count: 12
Inner Count: 13
Inner Count: 14
Inner Count: 15
Outer Count: 2
Inner Count: 2
Inner Count: 3
Inner Count: 4
Inner Count: 5
Inner Count: 6
Inner Count: 7
Inner Count: 8
Outer Count: 3
Inner Count: 2
Inner Count: 3
Inner Count: 4
Inner Count: 5
Outer Count: 4
Inner Count: 2
Inner Count: 3
Inner Count: 4
```

```
PL/SQL procedure successfully completed.
```

```
set serveroutput on;
declare
v_inner number(2):=1;
begin
for s in 1..10 loop
 dbms_output.put_line('Outer Value: '||s);
 v_inner:=1;
 while v_inner*s <15 loop
  v_inner:=v_inner+1;
  continue when mod(v_inner*s,3)=0;
  dbms_output.put_line('Inner Value: '||v_inner);
  end loop;
 end loop;
end;
```

```
Outer Value: 1
Inner Value: 2
Inner Value: 4
Inner Value: 5
Inner Value: 7
```

```
Inner Value: 8
Inner Value: 10
Inner Value: 11
Inner Value: 13
Inner Value: 14
Outer Value: 2
Inner Value: 2
Inner Value: 4
Inner Value: 5
Inner Value: 7
Inner Value: 8
Outer Value: 3
Outer Value: 4
Inner Value: 2
Inner Value: 4
Outer Value: 5
Inner Value: 2
Outer Value: 6
Outer Value: 7
Inner Value: 2
Outer Value: 8
Inner Value: 2
Outer Value: 9
Outer Value: 10
Inner Value: 2


PL/SQL procedure successfully completed.
```

```
set serveroutput on;
declare
v_searchnum number:=22;
is_prime boolean:=true;
s number:=2;

begin
<<start_point>>
 if v_searchnum mod s=0 then
 dbms_output.put_line('Not Prime Number');

 is_prime:=false;
 goto end_point;
 end if;
 s:=s+1;

 if s=v_searchnum then
 goto prime_point;
 end if;
```

```
goto start_point;

<<prime_point>>
if is_prime then
dbms_output.put_line('It is a Prime Number');
end if;
<<end_point>>
dbms_output.put_line('Check Complete');
end;
```

```
*Action:
Not Prime Number
Check Complete


PL/SQL procedure successfully completed.
```

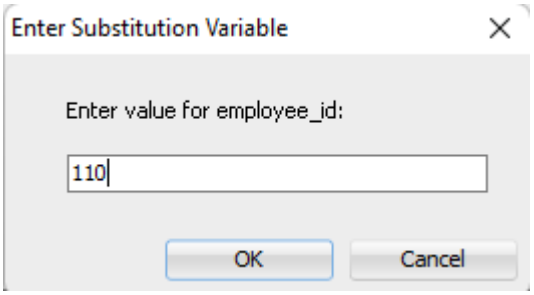
To work on database:

```
set serveroutput on;
declare
v_empname VARCHAR2(50);
v_empsalary number(10);
begin
select last_name,salary into v_empname,v_empsalary from hr.employees where
employee_id=100;
dbms_output.put_line('The Salary of '||v_empname||'is: '||v_empsalary);
End;
```

```
The Salary of Kingis: 24000


PL/SQL procedure successfully completed.
```

To get input from user

```
select last_name,salary into v_empname,v_empsalary from hr.employees where
employee_id=&employee_id;
```




```
The Salary of Chenis: 8200


PL/SQL procedure successfully completed.
```

DML Operations:
Insert,update,delete,modify.

Queries as follows:

--- to create table copy

```
create table employee_copy as select * from hr.employees;
begin
for s in 120..125 loop
insert into employee_copy(employee_id,first_name,last_name,email,hire_date,job_id,salary)
values
(&employee_id,'&first_name','&last_name','&email',sysdate,'&job_id',&salary);
end loop;
end;
```

Script Output × Query Result ×

SQL | All Rows Fetched: 7 in 0.006 seconds

	EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID
1	121	Adam	Fripp	AFRIPP	650.123.2234	10-APR-05	ST_MAN	8200	(null)	100	50
2	121	mahesh	vaithi	mahesh@gmail.com	(null)	21-DEC-23	IT_PROG	10000	(null)	(null)	(null)
3	121	mahesh	vaithi	mahesh@gmail.com	(null)	21-DEC-23	IT_PROG	10000	(null)	(null)	(null)
4	121	mahesh	vaithi	mahesh@gmail.com	(null)	21-DEC-23	IT_PROG	10000	(null)	(null)	(null)
5	121	mahesh	vaithi	mahesh@gmail.com	(null)	21-DEC-23	IT_PROG	10000	(null)	(null)	(null)
6	121	mahesh	vaithi	mahesh@gmail.com	(null)	21-DEC-23	IT_PROG	10000	(null)	(null)	(null)
7	121	mahesh	vaithi	mahesh@gmail.com	(null)	21-DEC-23	IT_PROG	10000	(null)	(null)	(null)

--to drop that value

```
delete from employee_copy where employee_id=121;
```

```
*Action:

7 rows deleted.
```

Sequence in PLSQL:

```
create sequence seq_empid start with 80 increment by 1;
```

To create sequence

```
begin
for s in 1..10 loop
insert into emp(employee_id,first_name,last_name,email,hire_date,job_id,salary) values
(seq_empid.nextval,'&first_name','&last_name','&email',sysdate,'&job_id',&salary);
end loop;
end;
```

```
select * from emp;
```

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID
81	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
82	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
83	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
84	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
85	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
86	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
87	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
88	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)
89	mahesh	vaithi	mahes...	(null)	21-DEC-23	WEB_DEV	20000	(null)	(null)	(null)

Here the employee id from 81 to 89

– records in plsql:

```
declare
r_emp emp%rowtype;

begin
select * into r_emp from emp where employee_id=120;

dbms_output.put_line('The Name from the Record: '||r_emp.first_name||'
'||r_emp.last_name);

end;
```

```
*Action:
The Name from the Record: Matthew Weiss


PL/SQL procedure successfully completed.
```

--- record type in plsql

```
declare
type typ_emp is record (first_name varchar(50),last_name varchar(30),salary
number(10),hire_date date);
r_emp typ_emp;
begin

select first_name,last_name,salary,hire_date into r_emp from emp where
employee_id='120';
dbms_output.put_line(r_emp.first_name||' '||r_emp.last_name||' is earning '||r_emp.salary||'
per year'||' hired at '||r_emp.hire_date);
End;
```

```
Matthew Weiss is earning 8000 per year hired at 18-JUL-04


PL/SQL procedure successfully completed.
```

--- easy dml with records

```
create table retired_emp as select * from hr.employees where 1 = 2;

select * from retired_emp;

declare
r_emp emp%rowtype;
begin
 select * into r_emp from emp where employee_id=104;
 r_emp.salary:=100;
 r_emp.commission_pct:=0;
 --- insert into retired_emp values r_emp;
 update retired_emp set row=r_emp where employee_id=104;

end;
```

--- select * from retired_emp;

Script Output | Query Result

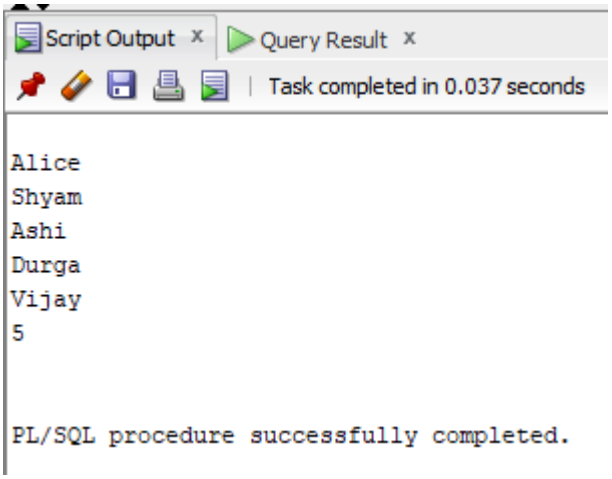
SQL | All Rows Fetched: 1 in 0.001 seconds

	EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID
1	104	Bruce	Ernst	BERNST	590.423.4568	21-MAY-07	IT_PROG	100	0	103	60

--- v arrays

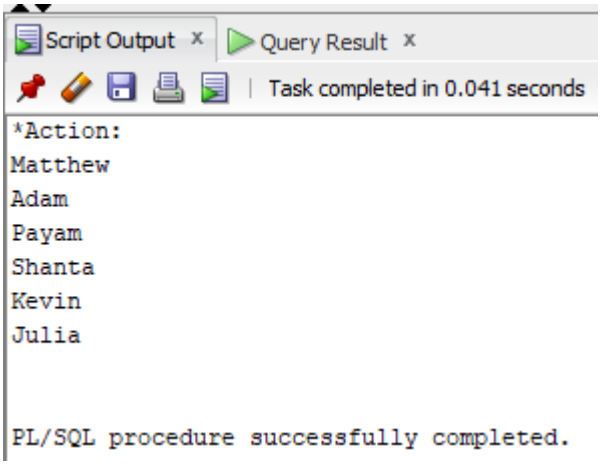
```
declare
type emp_list is varray(5) of varchar(50);

emp emp_list;

begin

emp :=emp_list('Alice','Shyam','Ashi','Durga','Vijay');

for i in 1..5 loop
if emp.exists(i) then
dbms_output.put_line(emp(i));
```

```
end if;

end loop;
dbms_output.put_line(emp.limit());
end;
```



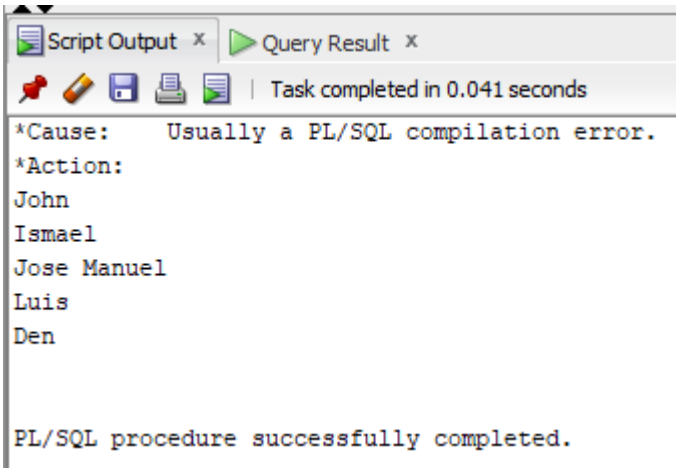
--- v arrays

```
declare
type emp_list is varray(15) of varchar(50);

empl emp_list :=emp_list();

idx number:=1;

begin
for i in 120..125 loop
empl.extend;
select first_name into empl(idx) from emp where employee_id=i;
idx:=idx+1;

end loop;

for x in 1..empl.count() loop
dbms_output.put_line(empl(x));
end loop;

end;
```



--- nested tables

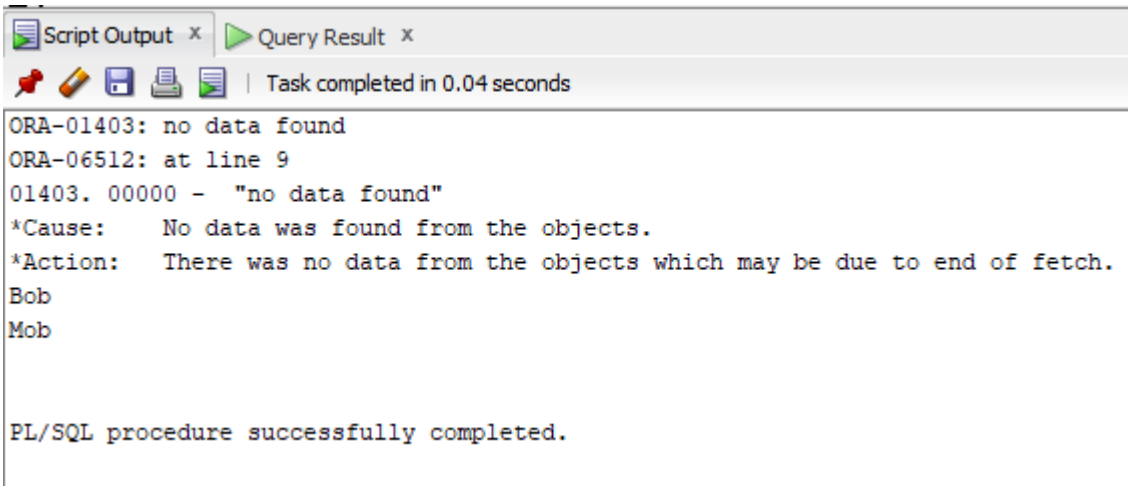
```
declare

type e_lst is table of varchar(50);
emps e_lst:=e_lst();
idx pls_integer:=1;

begin
for x in 110..114 loop
emps.extend;
select first_name into emps(idx) from emp where employee_id=x;
idx:=idx+1;
end loop;

for i in 1..emps.count() loop
dbms_output.put_line(emps(i));
end loop;
end;
```



--- associative array

```
declare

type elist is table of emp.first_name%type index by pls_integer;

emps elist;

begin
for x in 130..134 loop
select first_name into emps(x) from emp where employee_id=x and department_id=60;

end loop;

for s in 1..emps.count() loop
dbms_output.put_line(emps(s));
end loop;
end;
```

```
declare

type elist is table of emp.first_name%type index by pls_integer;

emps elist;
idx pls_integer;
begin
emps(100):='Bob';
emps(102):='Mob';
idx:=emps.first();
---select first_name into emps(x) from emp where employee_id=x and department_id=60;
while idx is not null loop
dbms_output.put_line(emps(idx));
idx:=emps.next(idx);
end loop;
end;
```

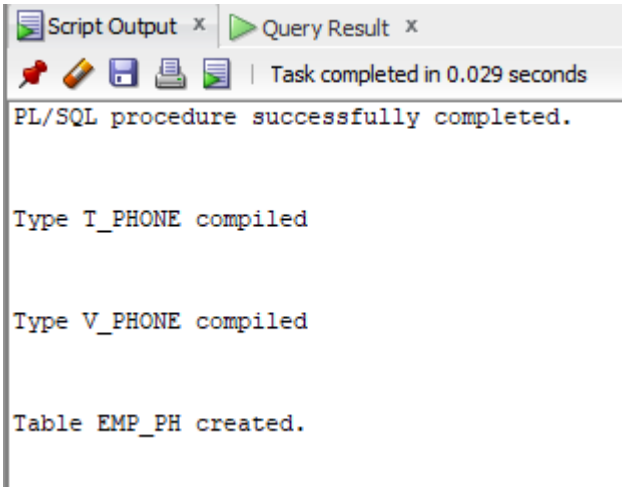


---

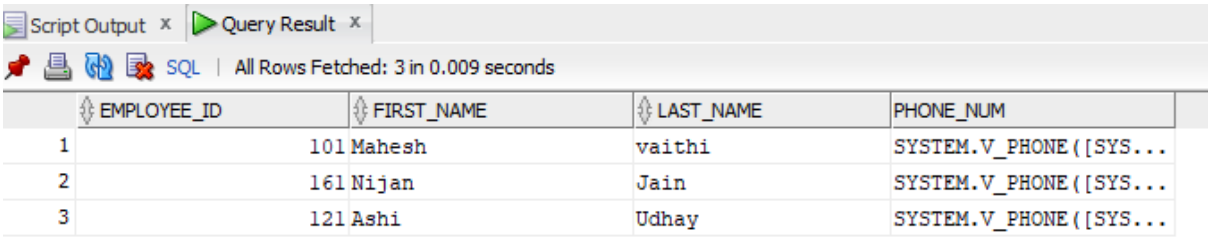
create or replace type t_phone as object(ph_type varchar(20),ph_no varchar(30));

create or replace type v_phone as varray(3) of t_phone;

create table emp_ph(employee_id number,first_name varchar(30),last_name varchar(30),phone_num v_phone);



select * from emp_ph;



	EMPLOYEE_ID	FIRST_NAME	LAST_NAME	PHONE_NUM
1	101	Mahesh	vaithi	SYSTEM.V_PHONE([SYS...
2	161	Nijan	Jain	SYSTEM.V_PHONE([SYS...
3	121	Ashi	Udhay	SYSTEM.V_PHONE([SYS...

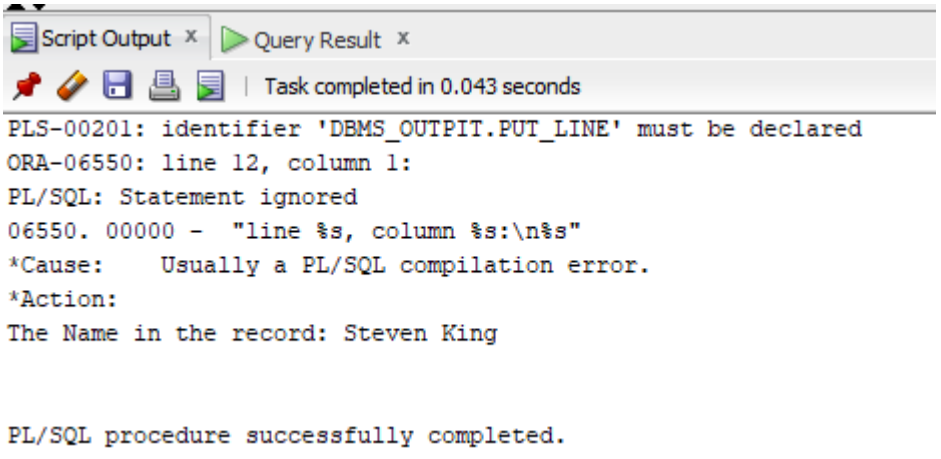
Cursor and its Types:

```
 declare
cursor c_emps is select first_name,last_name from emp;
fname emp.first_name%type;
lname emp.last_name%type;
begin
open c_emps;
fetch c_emps into fname,lname;
dbms_output.put_line('The Name in the record: '||fname||' '||lname);
close c_emps;
end;
```

```
*Cause:    Usually a PL/SQL compilation error.
*Action:
The Name in the record: Steven King


PL/SQL procedure successfully completed.
```

--- using cursor with records

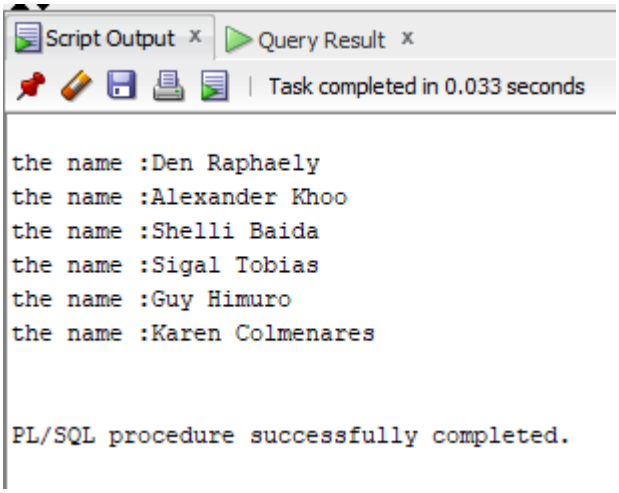
```
declare

type t_emp is record(fname emp.first_name%type,lname emp.last_name%type);
v_emp t_emp;
cursor c_emp is select first_name,last_name from emp;

begin
open c_emp;

fetch c_emp into v_emp;

dbms_output.put_line('The Name in the record: '||v_emp.fname||' '||v_emp.lname);
close c_emp;
end;
```



--- loops in cursor

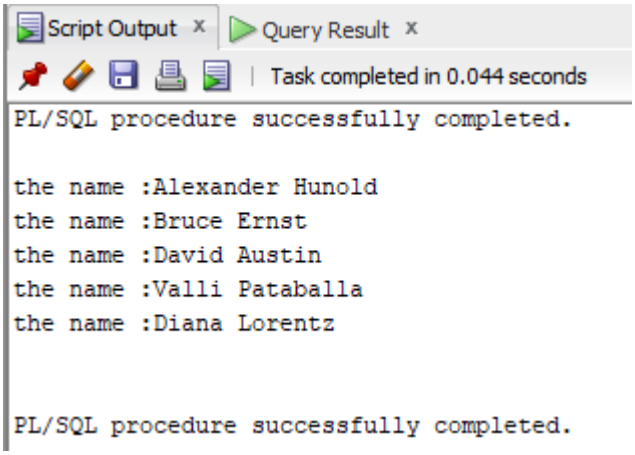
```
declare
cursor c_emp is select first_name,last_name from emp where department_id=30;
v_emp c_emp%rowtype;

begin
open c_emp;
loop
```

```
fetch c_emp into v_emp;
exit when c_emp%notfound;
dbms_output.put_line('the name :'||v_emp.first_name||' '||v_emp.last_name);
end loop;
close c_emp;
end;
```



--- for loops in cursor

```
declare
cursor c_emp is select first_name,last_name from emp where department_id=60;


begin

for i in c_emp loop
dbms_output.put_line('the name :'||i.first_name||' '||i.last_name);
end loop;

end;
```

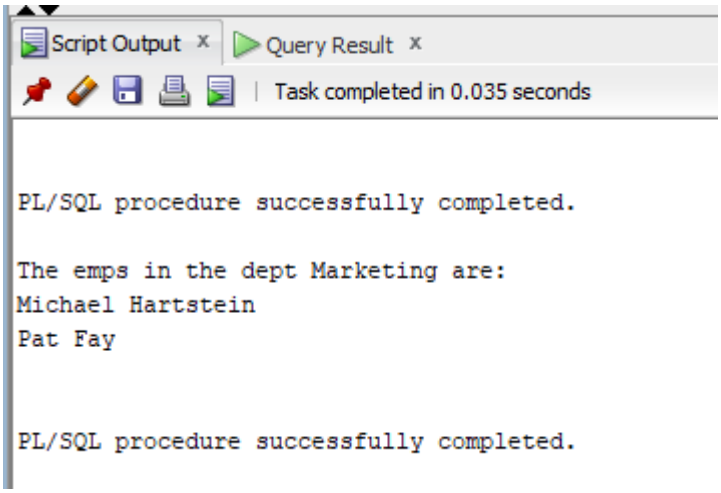


--- cursor with parameters
declare
cursor c_emp (dept_id number) is select first_name,last_name,department_name from emp join dept using (department_id) where department_id=dept_id;

v_emp c_emp%rowtype;

begin
open c_emp(:dept_id);
fetch c_emp into v_emp;
dbms_output.put_line('The emps in the dept '||v_emp.department_name||' are: ');
close c_emp;

open c_emp(:dept_id);
loop
fetch c_emp into v_emp;
exit when c_emp%notfound;
dbms_output.put_line(v_emp.first_name||' '||v_emp.last_name);
end loop;
close c_emp;
end;

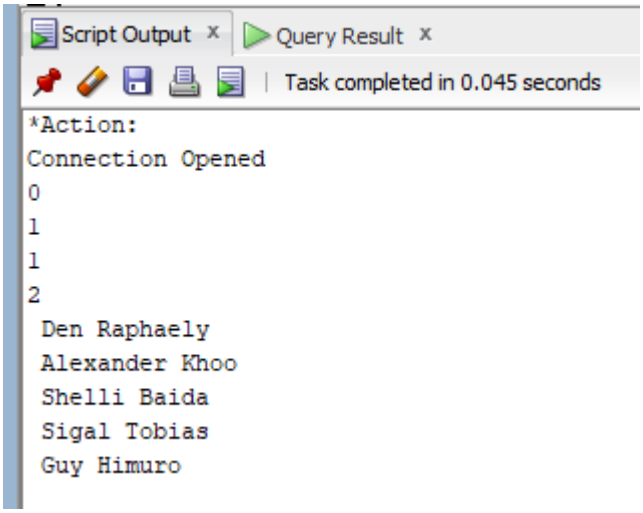


--- cursor with parameters
declare
cursor c_emp (dept_id number) is select first_name,last_name,department_name from emp join dept using (department_id) where department_id=dept_id;

v_emp c_emp%rowtype;

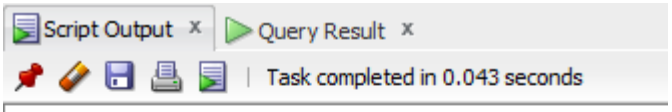
begin
open c_emp(:dept_id);

```
fetch c_emp into v_emp;
dbms_output.put_line('The emps in the dept '||v_emp.department_name||' are: ');
close c_emp;

open c_emp(:dept_id2);
loop
fetch c_emp into v_emp;
exit when c_emp%notfound;
dbms_output.put_line(v_emp.first_name||' '||v_emp.last_name);
end loop;
close c_emp;
end;



--- cursor attribute types

declare
cursor c_emps is select * from emp where department_id=30;

v_emps c_emps%rowtype;

begin
if not c_emps%isopen then
open c_emps;
dbms_output.put_line('Connection Opened');
end if;
dbms_output.put_line(c_emps%rowcount);
fetch c_emps into v_emps;
dbms_output.put_line(c_emps%rowcount);
dbms_output.put_line(c_emps%rowcount);
fetch c_emps into v_emps;
dbms_output.put_line(c_emps%rowcount);
close c_emps;

open c_emps;
loop
fetch c_emps into v_emps;
exit when c_emps%notfound or c_emps%rowcount>5;
dbms_output.put_line(' '||v_emps.first_name||' '||v_emps.last_name);
end loop;
close c_emps;
end;
```



--- Reference cursor

```
declare
type t_emps is ref cursor return emp%rowtype;

rc_emps t_emps;

r_emps emp%rowtype;
begin

open rc_emps for select * from retired_emp;

loop
fetch rc_emps into r_emps;
exit when rc_emps%notfound;
dbms_output.put_line(r_emps.first_name||' '||r_emps.last_name);
end loop;
close rc_emps;
dbms_output.put_line('----------------------------');
open rc_emps for select * from emp;

loop
fetch rc_emps into r_emps;
exit when rc_emps%notfound;
dbms_output.put_line(r_emps.first_name||' '||r_emps.last_name);
end loop;
close rc_emps;
end;
```




```
PL/SQL procedure successfully completed.

Bruce Ernst
----------------------------
Steven King
Neena Kochhar
Lex De Haan
Alexander Hunold
Bruce Ernst
David Austin
```

--- exceptions in plsql

```
declare
fname varchar(30);
begin
select first_name into fname from emp where employee_id=40;

dbms_output.put_line('Updated');

exception
when no_data_found then
dbms_output.put_line('There is No Id in the table');
end;
```

```
There is No Id in the table


PL/SQL procedure successfully completed.
```

--- Non Predefined Exceptions

```
begin
update emp set email = null where employee_id=100;
pragma exception_init(cannot_update_to_null,-01407);
exception
when cannot_update_to_null then
dbms_output.put_line('You cannot update the value');
end;
```

```
pragma exception_init(cannot_update_to_null,-01407);
exception
when cannot_update_to_null then
dbms_output.put_line('You cannot update the value');
end;
Error report -
ORA-06550: line 3, column 23:
PLS-00109: unknown exception name 'CANNOT_UPDATE_TO_NULL' in PRAGMA EXCEPTION_INIT
06550. 00000 -  "line %s, column %s:\n%s"
*Cause:    Usually a PL/SQL compilation error.
*Action:
```

---- user defined exception

declare

too_high_salary exception;

v_sal pls_integer;

begin
select salary into v_sal from emp where employee_id=100;
if v_sal>20000 then
raise too_high_salary;

end if;
dbms_output.put_line('The Salary is Acceptable Range');
exception
when too_high_salary then
dbms_output.put_line('The Salary is Too High');
end;

```
The Salary is Too High


PL/SQL procedure successfully completed.
```

---- user defined exception

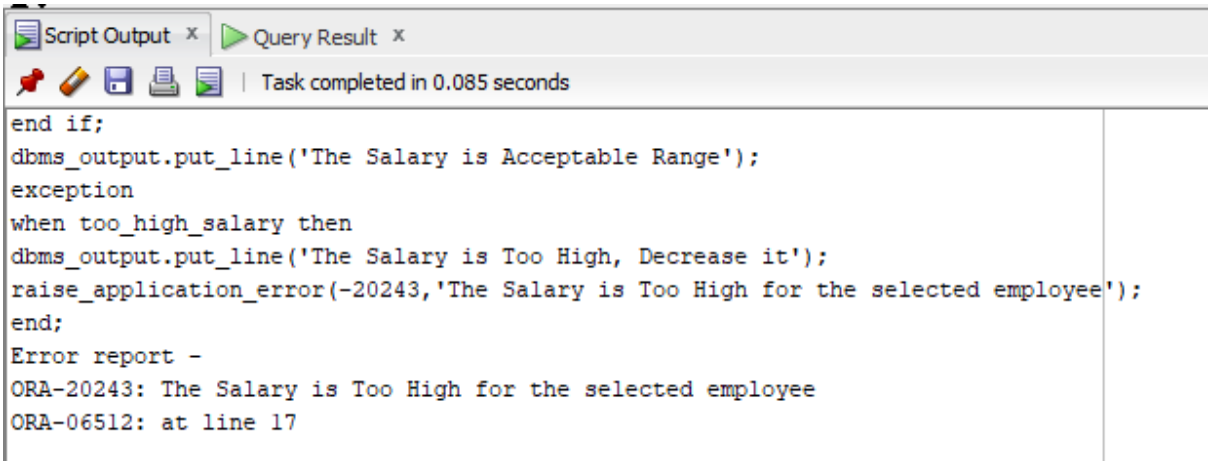
declare

too_high_salary exception;

v_sal pls_integer;

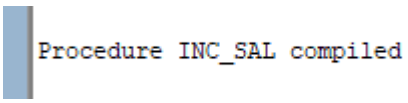
begin
select salary into v_sal from emp where employee_id=100;
if v_sal>20000 then
raise too_high_salary;

```
end if;
dbms_output.put_line('The Salary is Acceptable Range');
exception
when too_high_salary then
dbms_output.put_line('The Salary is Too High, Decrease it');
raise_application_error(-20243,'The Salary is Too High for the selected employee');
end;
```

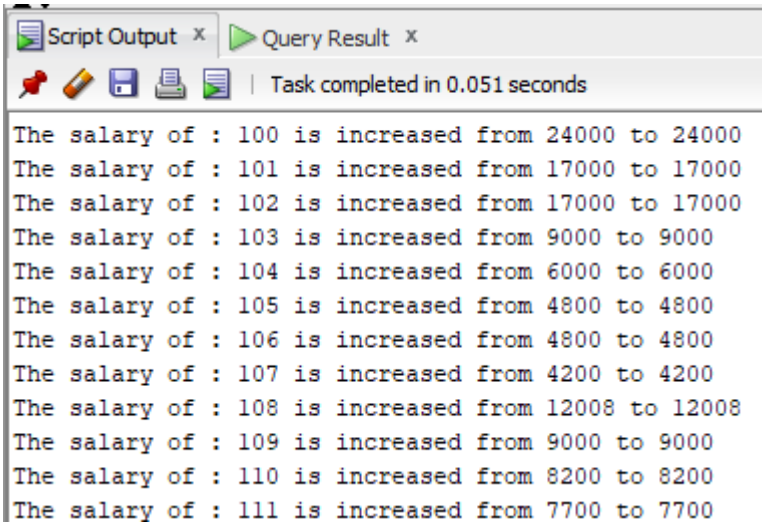


STORED PROCEDURES in PLSQL:

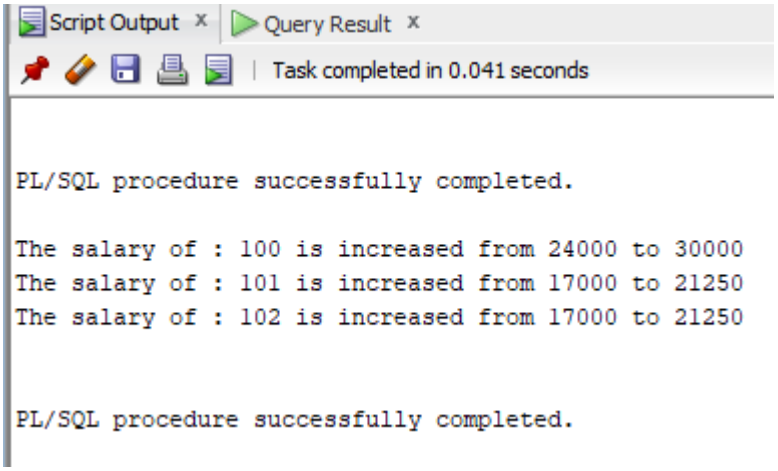
```
--- stored Procedures

create procedure inc_sal as
   cursor c_emps is select * from emp for update;
   v_salary_increase pls_integer:= 1.10;
   v_old_salary pls_integer;
begin
   for r_emp in c_emps loop
     v_old_salary := r_emp.salary;
     r_emp.salary := r_emp.salary*v_salary_increase + r_emp.salary *
nvl(r_emp.commission_pct,0);
     update emp set row = r_emp where current of c_emps;
     dbms_output.put_line('The salary of : '|| r_emp.employee_id
                    || ' is increased from '||v_old_salary||' to '||r_emp.salary);
   end loop;
end;
```



execute inc_sal;




```
create procedure incsal(v_salary_increase in number,v_department_id pls_integer) as
   cursor c_emps is select * from emp where department_id=v_department_id for update;
   ---v_salary_increase pls_integer:= 1.10;
   v_old_salary pls_integer;
begin
   for r_emp in c_emps loop
     v_old_salary := r_emp.salary;
     r_emp.salary := r_emp.salary*v_salary_increase + r_emp.salary *
nvl(r_emp.commission_pct,0);
     update emp set row = r_emp where current of c_emps;
     dbms_output.put_line('The salary of : '|| r_emp.employee_id
                    || ' is increased from '||v_old_salary||' to '||r_emp.salary);
   end loop;
end;
--- execute the procedure

begin
incsal(1.25,90);
end;
```



```
create procedure inc_sal_affected(v_salary_increase in number,v_department_id
pls_integer,v_affected_emp out number) as
   cursor c_emps is select * from emp where department_id=v_department_id for update;
   ---v_salary_increase pls_integer:= 1.10;
   v_old_salary pls_integer;
   v_sal_inc number:=0;
begin
   v_affected_emp:=0;
   for r_emp in c_emps loop
     v_old_salary := r_emp.salary;
     r_emp.salary := r_emp.salary*v_salary_increase + r_emp.salary *
nvl(r_emp.commission_pct,0);
     update emp set row = r_emp where current of c_emps;
     dbms_output.put_line('The salary of : '|| r_emp.employee_id
                    || ' is increased from '||v_old_salary||' to '||r_emp.salary);
   v_affected_emp:=v_affected_emp+1;
   v_sal_inc:=v_sal_inc+v_salary_increase+nvl(r_emp.commission_pct,0);
   end loop;
   v_salary_increase:=v_sal_inc/v_affected_emp;
end;
```

```
create procedure add_jobs(job_id varchar2,job_title varchar2,min_sal number default
1000,max_sal number default null) is

begin

insert into jobs values(job_id,job_title,min_sal,max_sal);
print('The Job :'||job_title||' is inserted..');

End;
```

```
--- functions in PLSQL

create function getsal(dept_id department_id%type) return number as
avg_sal number;
begin
return
select avg(salary) into avg_sal from emp where department_id=dept_id;
return avg_sal;

end getsal;
```