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Miniworld; a slice of the World

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# Introduction

According to the book Fundamentals of database systems, “A database represents some aspect of the real world, sometimes called the miniworld or the universe of discourse. Changes to the miniworld are reflected in the database (Elmasri and Shamkant).” Ram and Sudha mention that it is important to use some constraints when defining the miniworld since they help to ensure that the structure and content of the miniworld are correctly introduced in the database (Ram and Sudha). There are several constraints mentioned, but most semantics models include entities, attributes, and relationships. An entity is a concept that is used to represent an object or concept of the real world. At the same time entities have attributes such as names, id, addresses, etc. Lastly, entities can form relationships with other entities on the miniworld (Elmasri and Shamkant 2.1.1). In this paper, I will provide a miniworld representation for Zealot Industries Inc. This should help to illustrate the concepts previously mentioned.

# Problem definition

Zealot Industries Inc is a manufacturing firm that employs more than two thousand employees. The problem that Zealot Industries Inc is facing is that the company has been expanding rapidly. Its expansion has surpassed the initial expectations of when it was founded. Because of this, its systems won’t keep up with the increasing expansion of the company (Foster and Godbole).

# General description:

* Zealot Industries Inc is organized into different departments, and each department will have several employees. Each department needs a name, a number that identifies it, and an employee that manages it.
* Each employee works for a department and works for a specific position. Multiple employees can work in the same position. Each employee has a compensation package that includes basic salary and benefits. Each employee is classified based on its salary.
* An employee profile needs employment history, education history, and dependents information.
* The database needs to store the employee's name, SSN, address, salary, gender, and birth date. To keep a level of organization each employee will have a supervisor.
* A project must have at least one employee, and a project can have many employees. Each project is managed by a department. A project must have a name, number, and location.

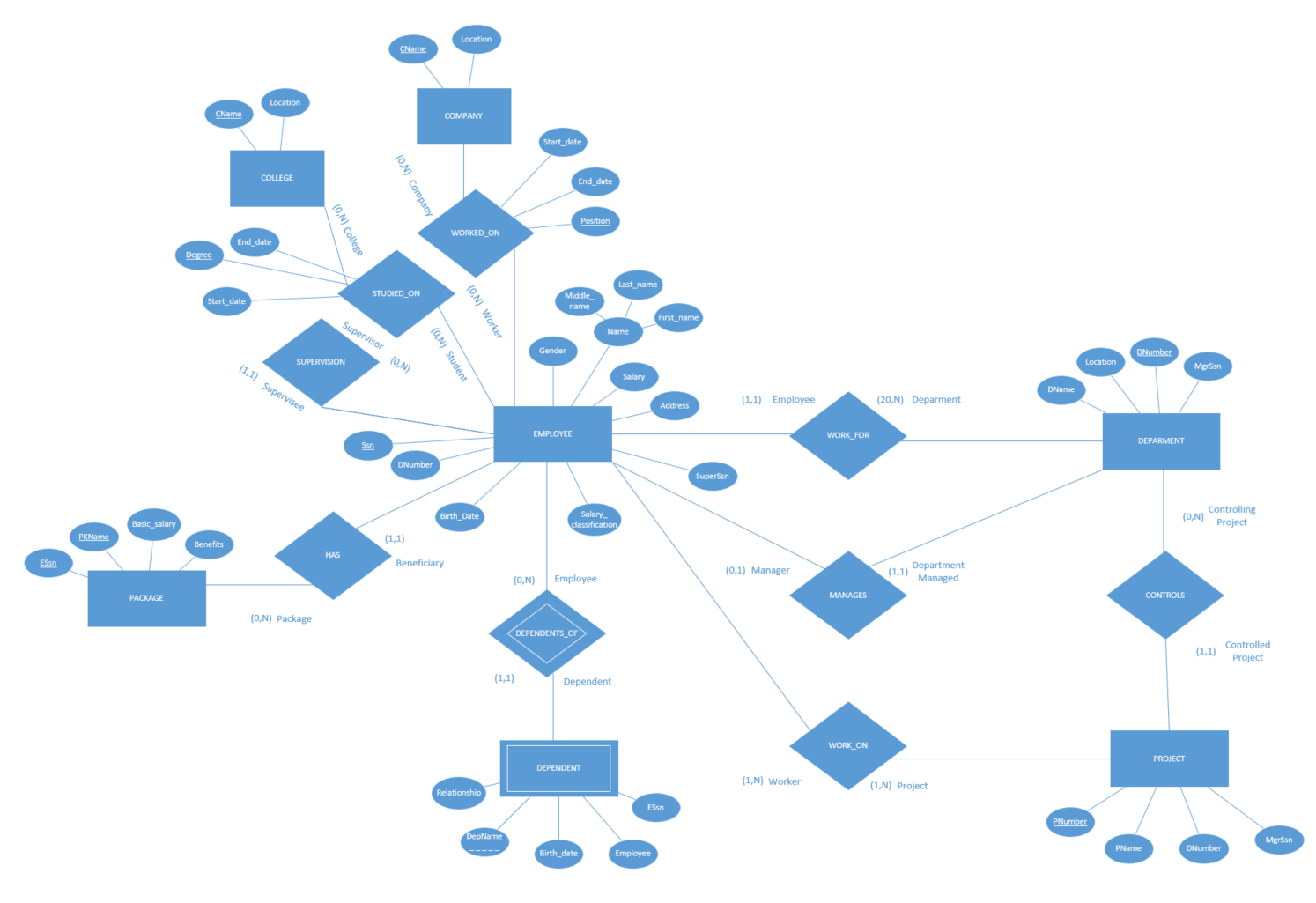
# Entities

* Entity type DEPARTMENT with attributes DName, Location, DNumber, and MgrSsn. Dnumber will be the Primary key.
* Entity type PROJECT with attributes PName, PNumber, MgrSsn, DNumber. PNumber will be the Primary key.
* Entity type EMPLOYEE with attributes Name, Ssn, Salary, Gender, Address, DNumber, SuperSsn, Birth \_date, and Salary\_classification. Name will be a composite attribute. It will be composed of First\_name, Last\_name, and Middle\_name. Ssn can be used as Primary key.
* Entity type STUDIED\_ON with attributes CName, SSsn, Degree, Start\_date, End\_date. CName, Degree, and SSsn will form a composite primary key.
* Entity type WORKED\_ON with attributes CName, WSsn, Position, Start\_date, End\_date. CName, Position, and WSsn will form a composite primary key.
* Entity type PACKAGE with attributes PKName, ESsn, Basic\_salary, and Benefits. Name and ESsn will form a composite primary key.
* Entity type COLLEGE with attributes CName, and Location. CName will be the primary key.
* Entity type COMPANY with attributes CName, and Location. CName will be the primary key.
* Entity type WORK\_ON with attributes ESsn, and PNumber. ESsn and PNumber will form a composite primary key.

# Weak entities

* Weak entity type DEPENDENT with attributes Relationship, Employee, Birth\_date, DepName, ESsn. Name can serve as the partial key

# ERD



# Relationships

• WORK\_FOR is a relationship between the DEPARTMENT and EMPLOYEE. The relationship is 1:N meaning that a department can have many employees, and an employee can work only in one department.

• DEPENDENTS\_OF is a relationship between the EMPLOYEE and DEPENDENT. This relationship is the identifying relationship for the weak entity DEPENDENT. The participation of EMPLOYEE is partial because it can exist without a DEPENDENT, and the participation of DEPENDENT is total since it cannot exist without an EMPLOYEE. This relationship is 1:N because an employee can have many dependents, but a dependent can be related to at most one employee.

• WORK\_ON is a relationship between PROJECT and EMPLOYEE. The relationship is M:N because multiple employees can work in a project and an employee can be assigned to more than one project.

• CONTROLS is a relationship between DEPARTMENT and PROJECT. This relationship is a 1:N this means that a department can control several projects and a project can belong to only one department.

• MANAGES is a relationship between DEPARTMENT and EMPLOYEE. This relationship is a 1:1 this means that a department can have at most one manager and an employee can manage at most one department.

• HAS is a relationship between PACKAGE and EMPLOYEE. This relationship is a 1:N. This means that a package can have several employees who are assigned to it, and that an employee can have at most one package.

• SUPERVISION is a relationship between EMPLOYEE (working as a supervisor) and EMPLOYEE. This relationship is 1:N meaning that an employee can have at most one supervisor, but a supervisor can supervise several employees.

• STUDIED\_ON is a relationship between EMPLOYEE and COLLEGE. This relationship is M:N because an employee may have gone to several colleges and several employees may have gone to the same college.

• WORKED\_ON is a relationship between EMPLOYEE and COMPANY. This relationship is M:N because an employee may have worked in several companies and several employees may have worked for the same company.

# Schema diagram

# Oracle’s Diagram

# Mapping ER

I created ten relations on my database, seven to represent ER entities and three to represent M:N relationships. The relations are EMPLOYEE, DEPARTMENT, PROJECT, DEPENDENT, COLLEGE, COMPANY, PACKAGE\_ , WORK\_ON, WORKED\_ON, and STUDIED ON (Appendix A [Figure 1.A](#Figure1a)).

On the relation EMPLOYEE using SQL commands I did add 11 attributes/columns; Ssn, Last\_name, Middle\_name, First\_name, Birth\_Date, Salary\_classification, Address, Gender, Salary, SuperSsn, and Dnumber (Appendix B [Figure 2.B](#figure2b)). I used Ssn as the primary key. Then I added two foreign keys using Oracle’s GUI interface. The first foreign key is SuperSsn which references Ssn on the EMPLOYEE relation. This foreign key is used to map the relationship SUPERVISION (1:N). The second one is Dnumber which references Dnumber on the DEPARTMENT relation. This foreign key is used to map the relationship WORK\_FOR (1:N) (Appendix B [Figure 3.B](#figure3b)) .

On the relation DEPARTMENT using SQL commands I added 4 attributes/columns; DName, Location, DNumber, and MgrSsn (Appendix C [Figure 4.C](#figure4c)). I used Dnumber as the primary key. I also added a foreign key MgrSsn which references Ssn on the EMPLOYEE relation. This foreign key is used to map the relationship MANAGES (1:1). The foreign key was created using Oracle’s GUI interface (Appendix C [Figure 5.C](#figure5c)).

On the relation PROJECT using SQL commands I did add 4 attributes/columns; PName, PNumber, DNumber, and MgrSsn (Appendix D [Figure 6.D](#figure6d)). I used Pnumber as the primary key. I also added two foreign keys. The first one is MgrSsn which references MgrSsn on the DEPARMENT relation. The second one is DNumber which references DNumber on the DEPARMENT relation. This foreign key is used to map the relationship CONTROLS (1:N). For some reason, oracle did not let me create the foreign key MgrSsn using Oracle’s GUI interface, so I did create it with a SQL command. The foreign key Dnumber was added using Oracle’s GUI interface (Appendix D [Figure 7.D](#figure7d), [Figure 8.D](#figure8d)). Figure 7.D makes it seem like the foreign key MgrSsn was also added using Oracle’s GUI interface, but it did only show up after I added it with a SQL command.

On the relation DEPENDENT using SQL commands I added five attributes/columns; DepName, ESsn, Relationship, Birth\_Date, and Employee (Appendix E [Figure 9.E](#figure9e)). I used a composite primary key formed with DepName and ESsn. I also added the foreign key Essn which references Ssn on the EMPLOYEE relation. This foreign key is used to map the relationship DEPENDENTS\_OF (1:N). The foreign key was created along with the relation using a SQL command (Appendix E [Figure 9.E](#figure9e)).

On the relation COLLEGE using SQL commands I added two attributes/columns; CName and Location. I did use CName as the primary key (Appendix F [Figure 10.F](#figure10f)).

On the relation COMPANY using SQL commands I added two attributes/columns; CName and Location. I did use CName as the primary key (Appendix G [Figure 11.G](#figure11g)).

On the relation STUDIED\_ON using SQL commands I added five attributes/columns; CName, Degree, SSsn, Start\_date, and End\_date (Appendix I [Figure 13.I](#figure13i)). I did use a composite primary key formed with CName, Degree, and SSsn. I also did add two foreign keys. The first one is SSsn which references Ssn on the EMPLOYEE relation. The second one is CName which references CName on the COLLEGE relation. These two foreign keys are used to map the relationship STUDIED\_ON (M:N). The foreign keys were created along with the relation using SQL commands (Appendix I [Figure 13.I](#figure13i)).

On the relation WORKED\_ON using SQL commands I added five attributes/columns; CName, Position, WSsn, Start\_date, and End\_date (Appendix J [Figure 14.J](#figure14j)). I used a composite primary key formed with CName, Position, and WSsn. I also added two foreign keys. The first one is WSsn which references Ssn on the EMPLOYEE relation. The second one is CName which references the COMPANY relation. These two foreign keys are used to map the relationship WORKED\_ON (M:N). The foreign keys were created along with the relation using SQL commands (Appendix J [Figure 14.J](#figure14j)).

On the relation WORK\_ON using SQL commands I added two attributes/columns; ESsn, and PNumber (Appendix K [Figure 15.K](#figure15k)). I used a composite primary key formed with ESsn and PNumber. I also added two foreign keys. The first one is ESsn which references Ssn on the EMPLOYEE relation. The second one is PNumber which references PNumber on the PROJECT relation. These two foreign keys are used to map the relationship WORK\_ON (M:N). The foreign keys were created along with the relation using SQL commands (Appendix K [Figure 15.K](#figure15k)).

On the relation PACKAGE\_ using SQL commands I added four attributes/columns; PKName, ESsn, Basic\_salary, and benefits (Appendix H [Figure 12.H](#figure12h)). I used a composite primary key formed with PKName and ESsn. I also added the foreign key ESsn which references Ssn on the EMPLOYEE relation. This foreign key is used to map the relationship HAS (1:N). The foreign key was created along with the relation using a SQL command (Appendix H [Figure 12.H](#figure12h)).

# Populating/views

In total I added seventy-nine new tuples to my database. Ten to the EMPLOYEE relation([A.1 F.16.1](#figure16)), five to the DEPARTMENT relation([A.2 F.17.2](#figure17)), seven to the COLLEGE relation([A.3 F.18.3](#figure18)), eight to the DEPENDENT relation([A.4 F.19.4](#figure19)), ten to the PACKAGE\_ relation([A.5 F.20.5](#figure20)), seven to the COMPANY relation([A.6 F.21.6](#figure21)), ten to the PROJECT relation([A.7 F.22.7](#figure22)), five to the STUDIED\_ON relation([A.8 F.23.8](#figure23)), seven to the WORKED\_ON relation([A.9 F.24.9](#figure24)), and ten to the WORK\_ON relation([A.10 F.25.10](#figure25)).

The first view I created was FAMILY. This view gathers information from the relations EMPLOYEE, DEPARTMENT and DEPENDENT. It presents first\_name renamed as worker\_name, last\_name, dname renamed as manages, depname renamed as child\_name, and relationship. The view shows the name and last name of each employee that manages a department. In addition, it shows the names of the employee’s dependents and the type of relationship it has with them (Appendix 11 [Figure 26.11](#figure26)).

The second view I created was DEPT\_INFO. This view gathers information from the relations EMPLOYEE and DEPARTMENT. It presents dname renamed as department, COUNT(\*) renamed as number\_of\_employees, and SUM(Salary) renamed as total\_salary. The view shows the name of each department, the number of employees that work on it, and the total sum of the salaries from the employees who work in each department (Appendix 12 [Figure 27.12](#figure27)).

The third view I created was PROJECT\_INFO. This view gathers information from the relations PROJECT renamed as E, DEPARTMENT renamed as DM, and EMPLOYEE renamed as D. The relations were renamed to avoid ambiguity between attributes. It presents pname renamed as project\_name, dname renamed as controlled\_by, first\_name renamed as managed\_by and location renamed as located\_at. The view shows the name of each project, the department that manages, who is the manager and where the project is located (Appendix 13 [Figure 28.13](#figure28)).

The fourth view I created was EMPLOYEE\_EDUCATION. This view gathers information from the relations EMPLOYEE and STUDIED\_ON. It presents first\_name renamed as employee\_name, degree, cname renamed as college, start\_date renamed as began, and end\_date renamed as finished. This view shows the names of the employees that have gone to college, the degree that they got, the college’s name, and the date in which they started and finished their education at that college (Appendix 14 [Figure 29.14](#figure29)).

The fifth view I created was EMPLOYEE\_WORKHIS. This view gathers information from the relations EMPLOYEE, and WORKED\_ON. It presents first\_name renamed as employee\_name, position, cname renamed as company, start\_date renamed as began, and end\_date renamed as finished. This view shows the names of the employees that have previous work experience, it shows the position they had on their previous work, the company’s name, and the date in which they started and finished working on each company (Appendix 15 [Figure 30.15](#figure30)).

The sixth view I created was WORK\_ON1. This view gathers information from the relations EMPLOYEE renamed as E, PACKAGE\_, and DEPARTMENT renamed as EM. The relations EMPLOYEE and DEPARTMENT were renamed to avoid ambiguity between attributes. It presents first\_name renamed as employee\_name, dname renamed as department\_name, location, and pkname renamed as package\_name. This view shows the name of each employee, the department they work on, the department’s location, and the name of the benefits package they have (Appendix 16 [Figure 31.16](#figure31)).

# Hadoop/Warehouse

I added a total of ten relations to my Oracle’s data warehouse; FactFinal\_College([X23.23](#figureX23)), FactFinal\_Company([Y24.24](#figureY24)), FactFinal\_Department([Z25.25](#figureZ25)), FactFinal\_Dependent([AA26.26](#figureAA26)), FactFinal\_Employee([AB27.27](#figureAB27)), FactFinal\_Package([AC28.28](#figureAC28)), FactFinal\_Project([AD29.29](#figureAD29)), FactFinal\_Studied\_on([AE30.30](#figureAE30)), FactFinal\_Work\_on([AF31.31](#figureAF31)), FactFinal\_Worked\_on([AG32.32](#figureAG32)).

I added a total of ten relations to Hadoop; College ([A1.1](#figureA1)), Company ([B2.2](#figureB2)), Department ([C3.3](#figureC3)), Dependent ([D4.4](#figureD4)), Employee ([E5.5](#figureE5)), Package ([F6.6](#figureF6)), Project ([G7.7](#figureG7)), Studied\_on ([H8.8](#figureH8)), Worked\_on ([I9.9](#figureI9)), and Work\_on ([J10.10](#figureJ10)). I also created eleven graphs to help interpret the data I have on my relations. Seven of those graphs are based solely on the Employee relation, while the rest are based on a combination of the employee and package relations. This was possible due to a joint query ([R18.18](#figureR18)).

The first graph is a bar graph which shows the salary of each employee. This was created by using the salary on the y-axis and the employee’s name on the x-axis ([K11.11](#figureK11)).

The second graph is a bar graph which shows what department each employee belongs to. This was created by using the department number on the y-axis and the employee’s name of the x-axis ([L12.12](#figureL12)).

The third graph is a pie graph which shows the different classifications of salaries and the volume of each slide corresponds to the salary of each employee. Each slide has a different color for each employee ([M13.13](#figureM13)).

The fourth graph is a scatter plot graph which shows the salary of each employee, and the department in which they work. This was created by having the salary on the y-axis, the department number on the x-axis, and each employee is differentiated by a unique color. The size of each dot is proportional to the salary of each employee ([N14.14](#figureN14)).

The fifth graph is a bar graph that shows the salary of each employee, and separates employees based on gender. This was created by having the salary on the y-axis and the gender on the x-axis. Each employee has a unique color. This graph shows that on average women earn more than men ([O15.15](#figureO15)).

The sixth graph is a bar graph that shows the salaries per department while separating them by gender. This was created by having the salaries on the y-axis and the gender on the x-axis. This graph shows that men earn more than women in department 4, but that women earn more than men in department 1. It also shows that women earn more on average ([P16.16](#figureP16)).

The seventh graph is a bar graph that shows the basic salary that corresponds to each benefit package. This was created by having the basic salary on the y-axis and the package name on the x-axis ([Q17.17](#figureQ17)).

The eighth graph is a bar graph that shows the salary of each employee and the basic salary of each employee. This was created by having the salary on the y-axis and the employee’s name on the x-axis. Each employee has a unique color. This graph shows how an employee’s salary compares to its basic salary (minimum set by benefits package) ([S19.19](#figureS19)).

The ninth graph is a bar graph that shows the salary of each employee while grouping employees based on the benefits package they have. This was created by having the salary on the y-axis and the package’s name on the x-axis. The graph shows that even employees that have a basic benefits package can have higher or equal salaries than employees that have ‘better’ benefits packages ([T20.20](#figureT20)).

The tenth graph is a bar graph that shows the basic salary of each employee while groping employees by gender. This was created by having salary on the y-axis and gender on the x-axis. Each employee has a unique color. This graph shows that while women have a higher salary average, men have a higher average basic salary ([U21.21](#figureU21)).

The last graph is a bar graph that shows the salary of each employee while groping employees by the department they work for. This was created by having the salary on the y-axis and the department number on the x-axis. This graph shows that department 2 is the only department that does not have an employee that makes more than $40,000 a year ([V22.22](#figureV22)).

# Summary

To summarize the miniworld is a part of the real world. When defining the miniworld is important to use some constraints like entities, attributes, and relationships to make sure that the structure of the miniworld is represented correctly in the database (Ram and Sudha). The miniworld could be a school, a hospital, etc. On this occasion, the miniworld was the company Zealot Industries Inc. Zealot Industries Inc requested my help to create a miniworld description of their company hoping that it could help their systems to keep up with the increasing growth of the company. At the end I had to create ten relations on my database, seven to represent ER entities and three to represent M:N relationships. Each of them with their corresponding attributes and relationships. Other relationships such as 1:1 relationships were represented by simply adding foreign keys to the relations.

I believe that, if Zealot Industries Inc follows the miniworld or description, I provided for the company’s systems, there could not be any problems if the company continues growing at the rate it is doing it right now.

Credit is given to Elmasri and Shamkant since I based my structure on their design and used the names, they provided for entities, attributes, and relationships since I considered they were appropriate for the miniworld description of Zealot Industries Inc.

# Appendices:

1. [All relations](#Figure1a)
2. [Employee relation](#figure2b)
3. [Department relation](#figure4c)
4. [Project relation](#figure6d)
5. [Dependent relation](#figure9e)
6. [College relation](#figure10f)
7. [Company relation](#figure11g)
8. [Package\_ relation](#figure12h)
9. [Studied\_on relation](#figure13i)
10. [Worked\_on relation](#figure14j)
11. [Work\_on relation](#figure15k)

Appendix A [↑](#Start)

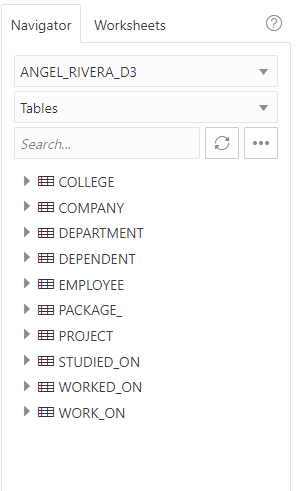


Figure 1.A

Appendix B [↑](#Start)

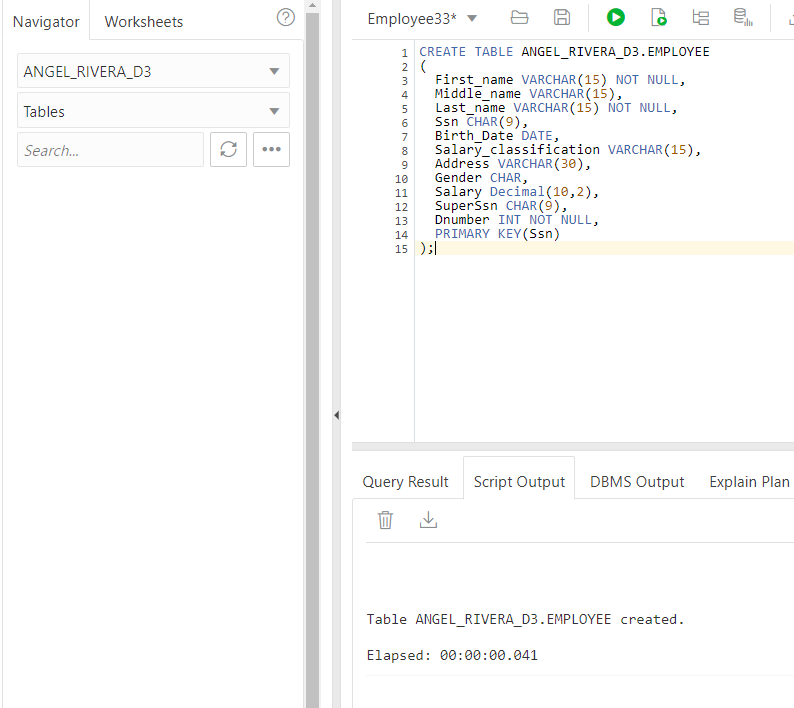


Figure 2.B

CREATE TABLE ANGEL\_RIVERA\_D3.EMPLOYEE

(

First\_name VARCHAR(15) NOT NULL,

Middle\_name VARCHAR(15),

Last\_name VARCHAR(15) NOT NULL,

Ssn CHAR(9),

Birth\_Date DATE,

Salary\_classification VARCHAR(15),

Address VARCHAR(30),

Gender CHAR,

Salary Decimal(10,2),

SuperSsn CHAR(9),

Dnumber INT NOT NULL,

PRIMARY KEY(Ssn)

);

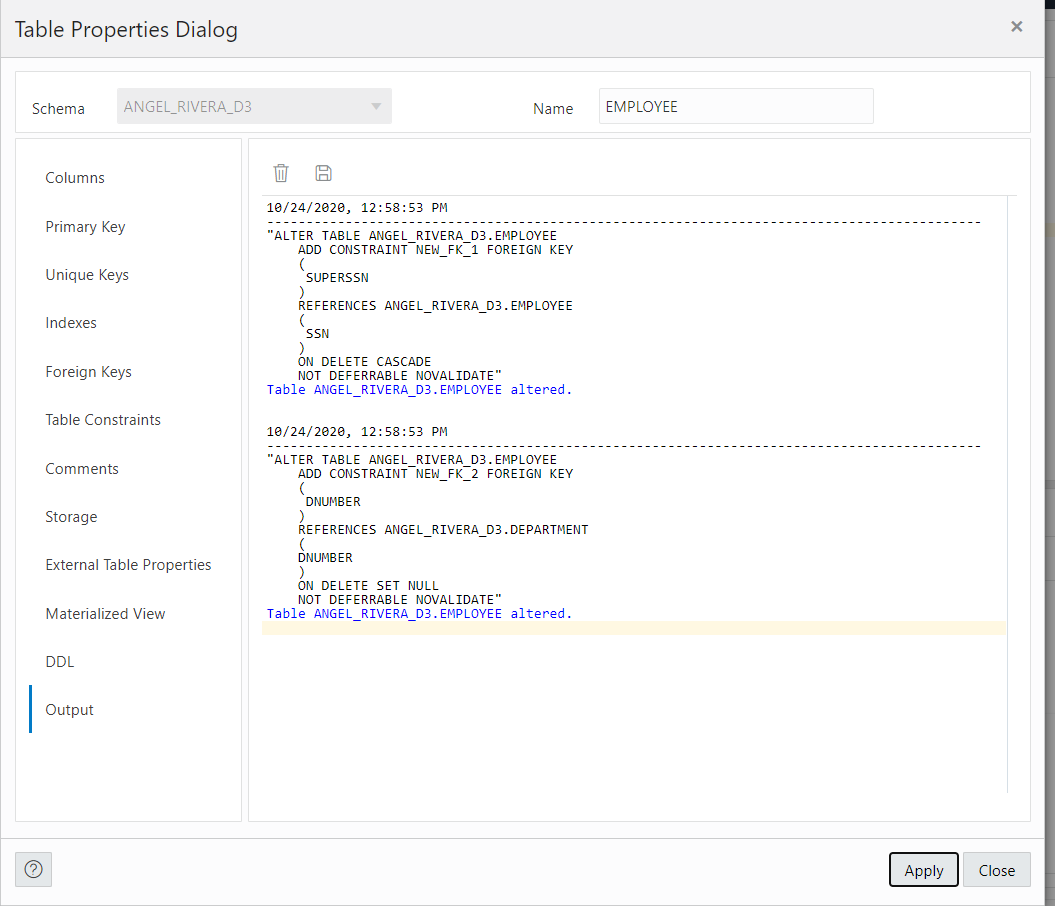


Figure 3.B

Appendix C [↑](#Start)

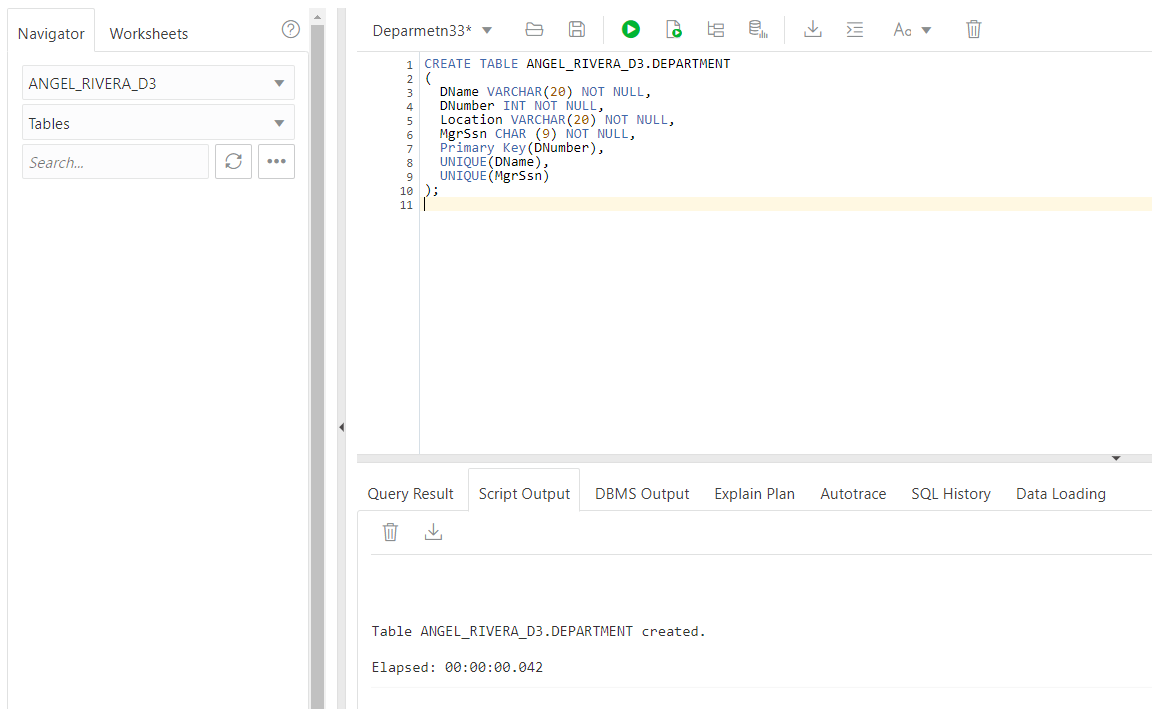


Figure 4.C

CREATE TABLE ANGEL\_RIVERA\_D3.DEPARTMENT

(

DName VARCHAR(20) NOT NULL,

DNumber INT NOT NULL,

Location VARCHAR(20) NOT NULL,

MgrSsn CHAR (9) NOT NULL,

Primary Key(DNumber),

UNIQUE(DName),

UNIQUE(MgrSsn),

FOREIGN KEY (MgrSsn) REFERENCES ANGEL\_RIVERA\_D3.EMPLOYEE (Ssn) ON DELETE SET NULL

);

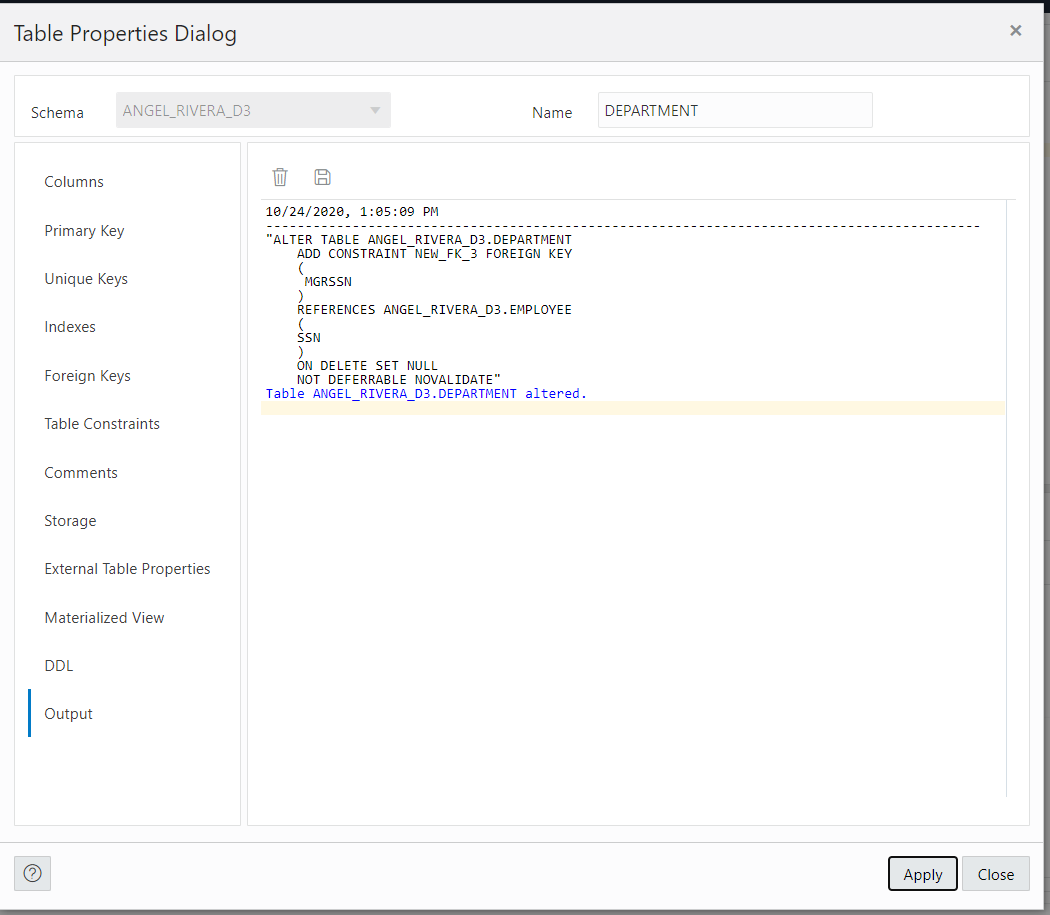


Figure 5.C

Appendix D [↑](#Start)

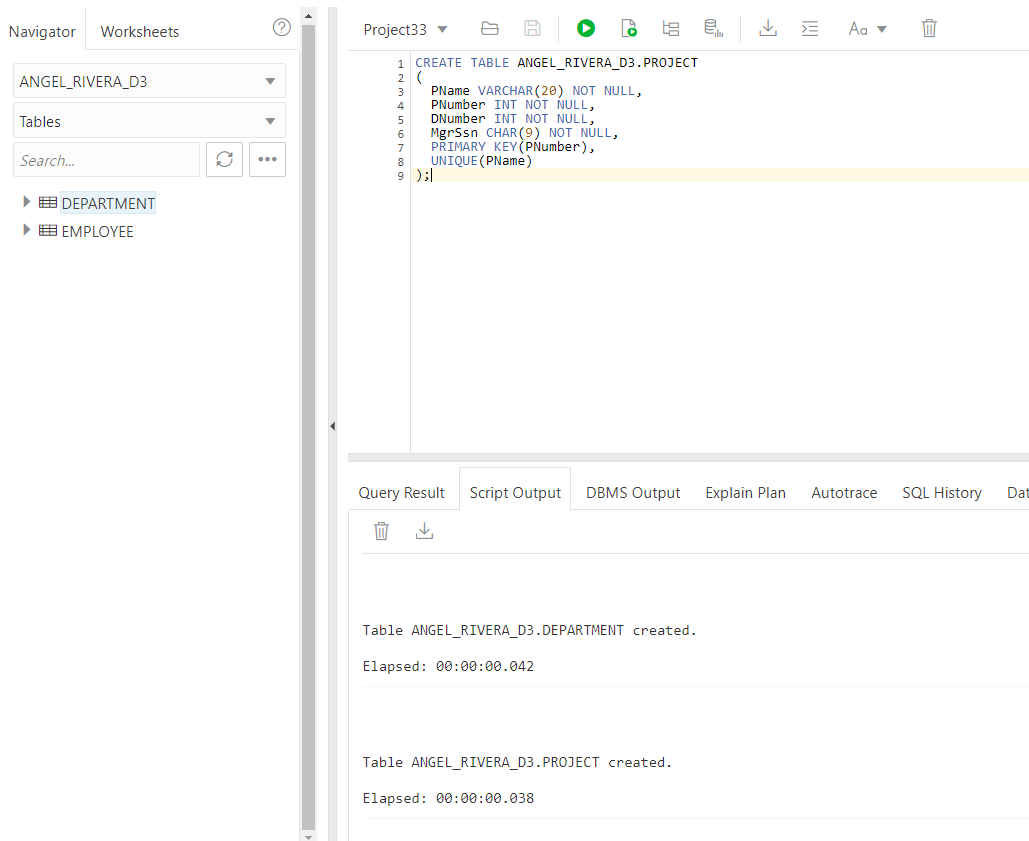


Figure 6.D

CREATE TABLE ANGEL\_RIVERA\_D3.PROJECT

(

PName VARCHAR(20) NOT NULL,

PNumber INT NOT NULL,

DNumber INT NOT NULL,

MgrSsn CHAR(9) NOT NULL,

PRIMARY KEY(PNumber),

UNIQUE(PName)

);



Figure 7.D

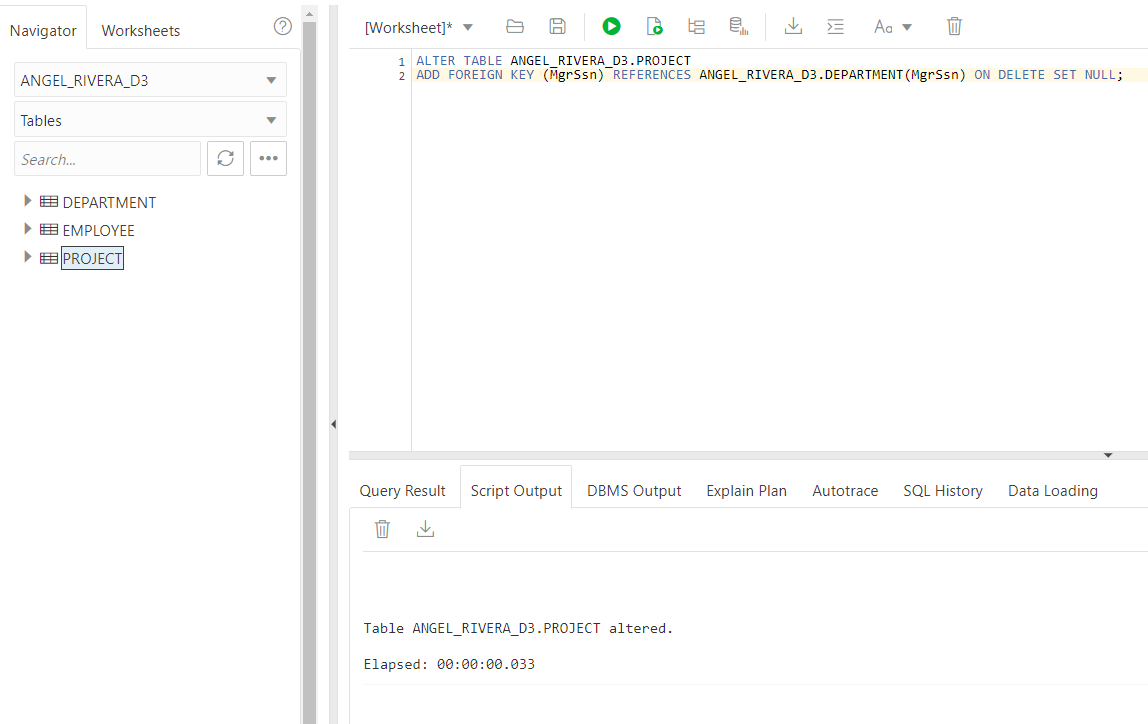


Figure 8.D

ALTER TABLE ANGEL\_RIVERA\_D3.PROJECT

ADD FOREIGN KEY (MgrSsn) REFERENCES ANGEL\_RIVERA\_D3.DEPARTMENT(MgrSsn) ON DELETE SET NULL;

Appendix E [↑](#Start)

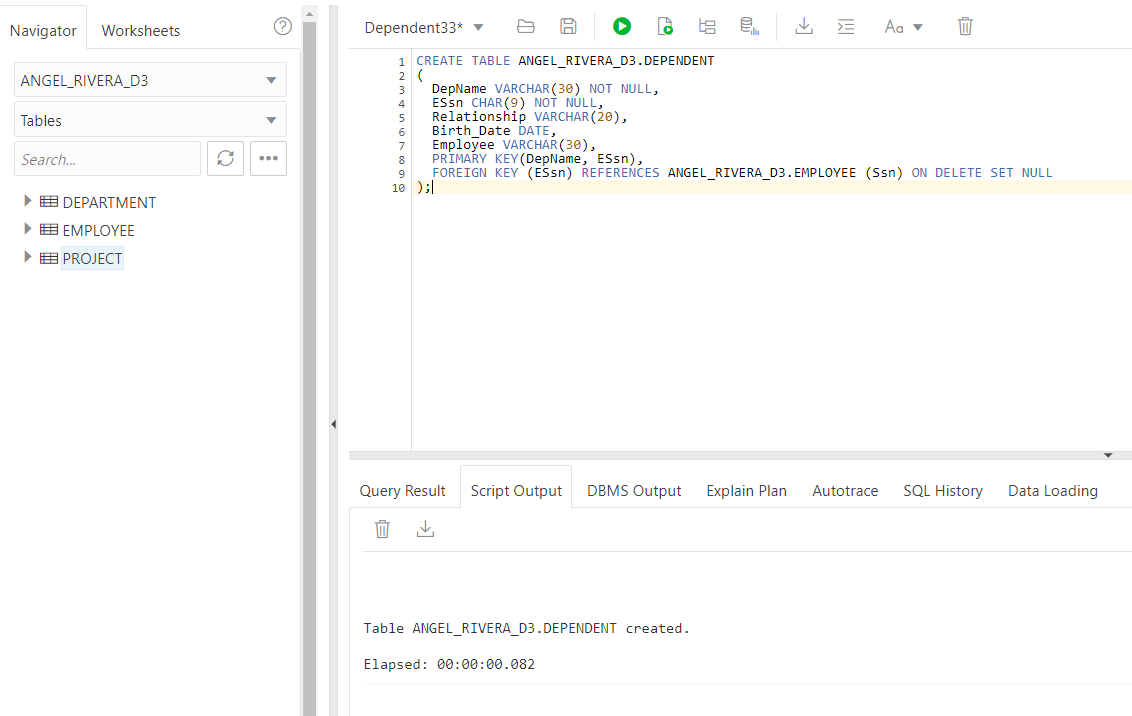


Figure 9.E

CREATE TABLE ANGEL\_RIVERA\_D3.DEPENDENT

(

DepName VARCHAR(30) NOT NULL,

ESsn CHAR(9) NOT NULL,

Relationship VARCHAR(20),

Birth\_Date DATE,

Employee VARCHAR(30),

PRIMARY KEY(DepName, ESsn),

FOREIGN KEY (ESsn) REFERENCES ANGEL\_RIVERA\_D3.EMPLOYEE (Ssn) ON DELETE SET NULL

);

Appendix F [↑](#Start)

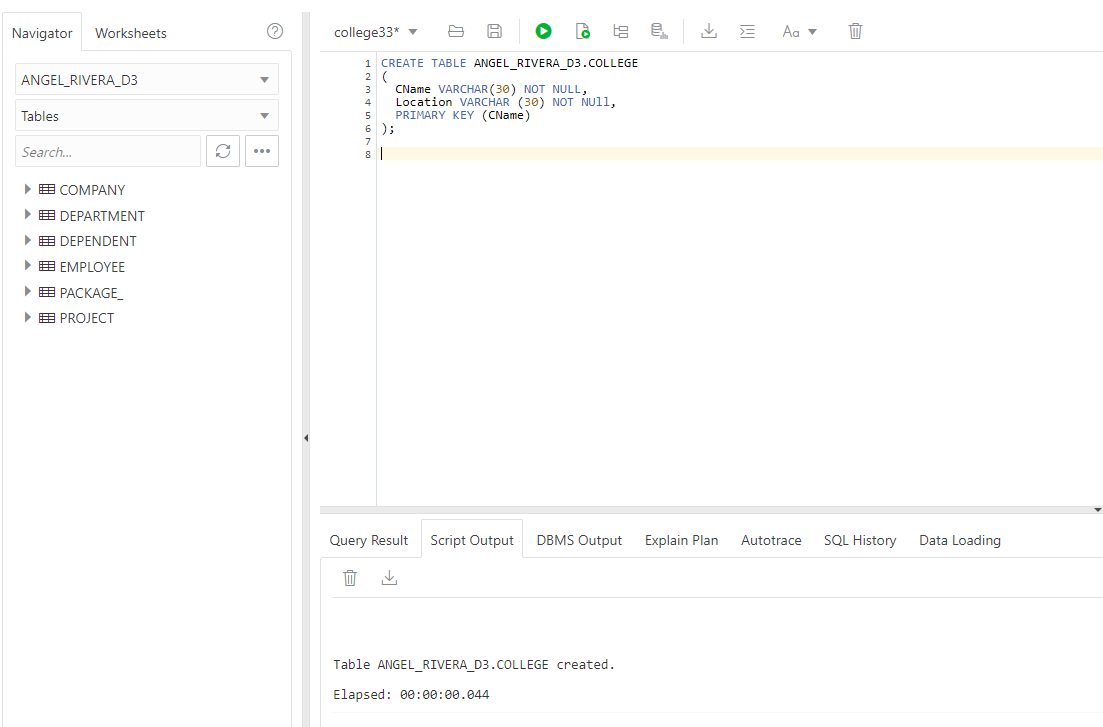


Figure 10.F

CREATE TABLE ANGEL\_RIVERA\_D3.COLLEGE

(

CName VARCHAR(30) NOT NULL,

Location VARCHAR (30) NOT NULL,

PRIMARY KEY (CName)

);

Appendix G [↑](#Start)

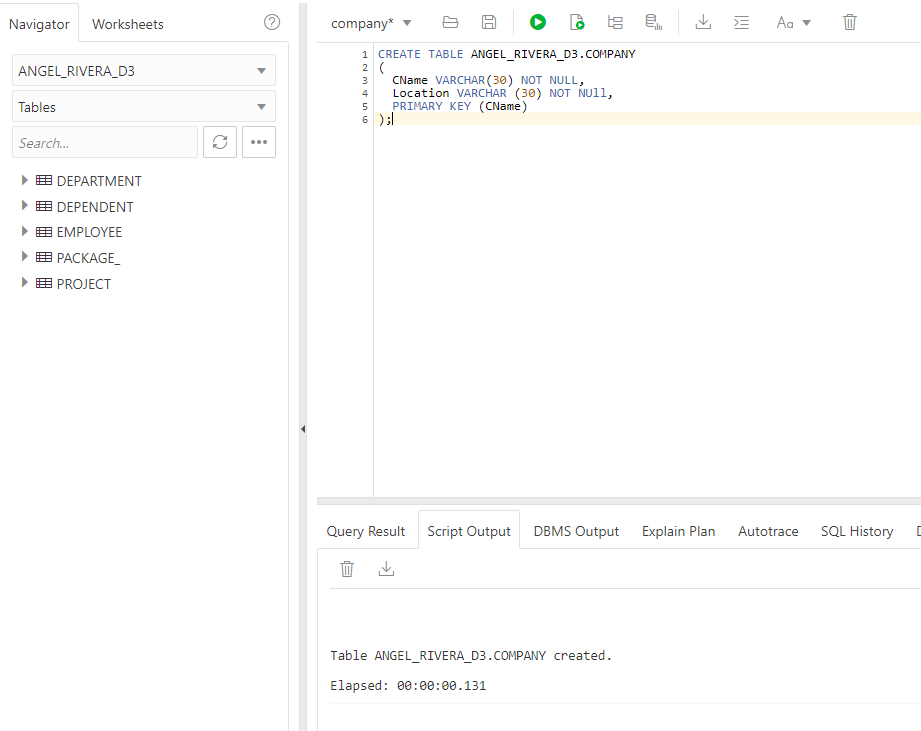


Figure 11.G

CREATE TABLE ANGEL\_RIVERA\_D3.COMPANY

(

CName VARCHAR(30) NOT NULL,

Location VARCHAR (30) NOT NULL,

PRIMARY KEY (CName)

);

Appendix H [↑](#Start)

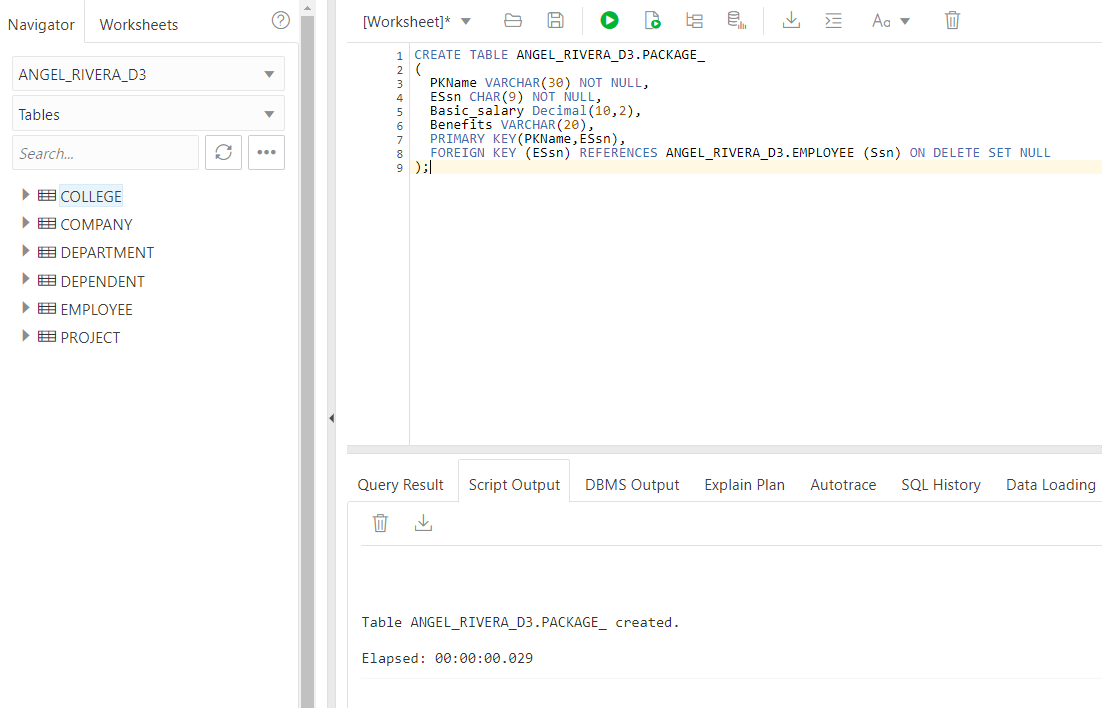


Figure 12.H

CREATE TABLE ANGEL\_RIVERA\_D3.PACKAGE\_

(

PKName VARCHAR(30) NOT NULL,

ESsn CHAR(9) NOT NULL,

Basic\_salary Decimal(10,2),

Benefits VARCHAR(20),

PRIMARY KEY(PKName, ESsn),

FOREIGN KEY (ESsn) REFERENCES ANGEL\_RIVERA\_D3.EMPLOYEE (Ssn) ON DELETE SET NULL

);

Appendix I [↑](#Start)

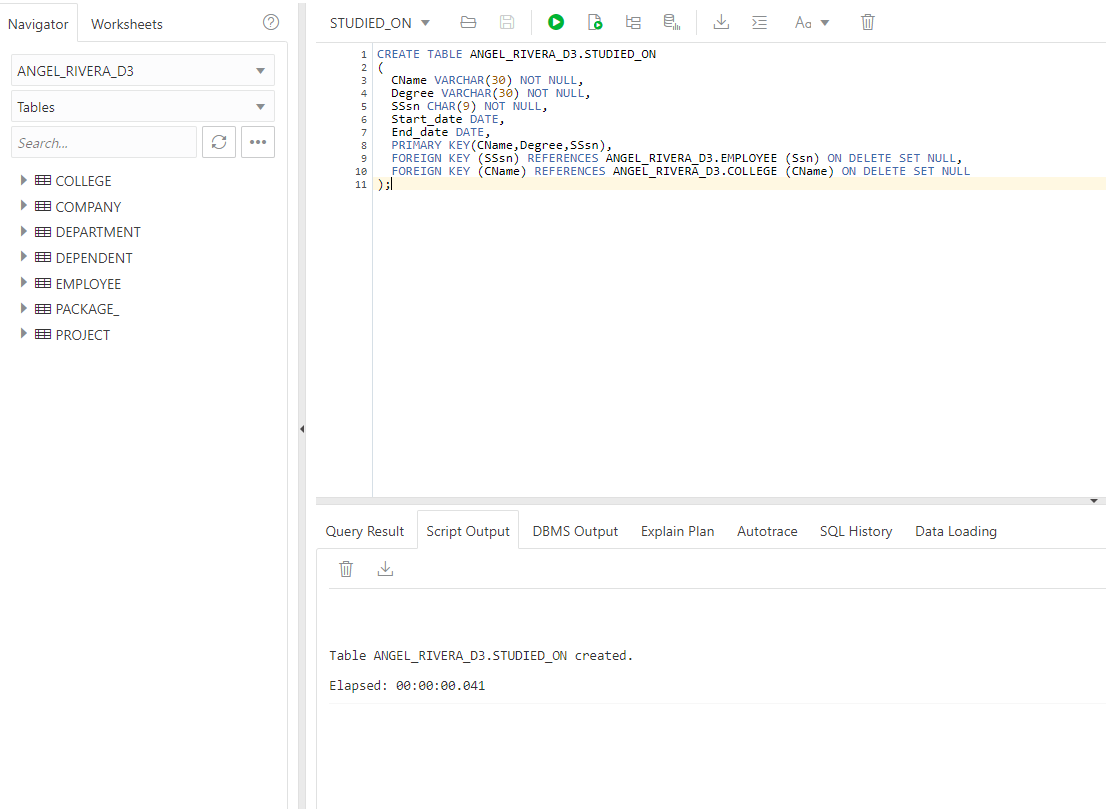


Figure 13.I

CREATE TABLE ANGEL\_RIVERA\_D3.STUDIED\_ON

(

CName VARCHAR(30) NOT NULL,

Degree VARCHAR(30) NOT NULL,

SSsn CHAR(9) NOT NULL,

Start\_date DATE,

End\_date DATE,

PRIMARY KEY(CName, Degree, SSsn),

FOREIGN KEY (SSsn) REFERENCES ANGEL\_RIVERA\_D3.EMPLOYEE (Ssn) ON DELETE SET NULL,

FOREIGN KEY (CName) REFERENCES ANGEL\_RIVERA\_D3.COLLEGE (CName) ON DELETE SET NULL

);

Appendix J [↑](#Start)

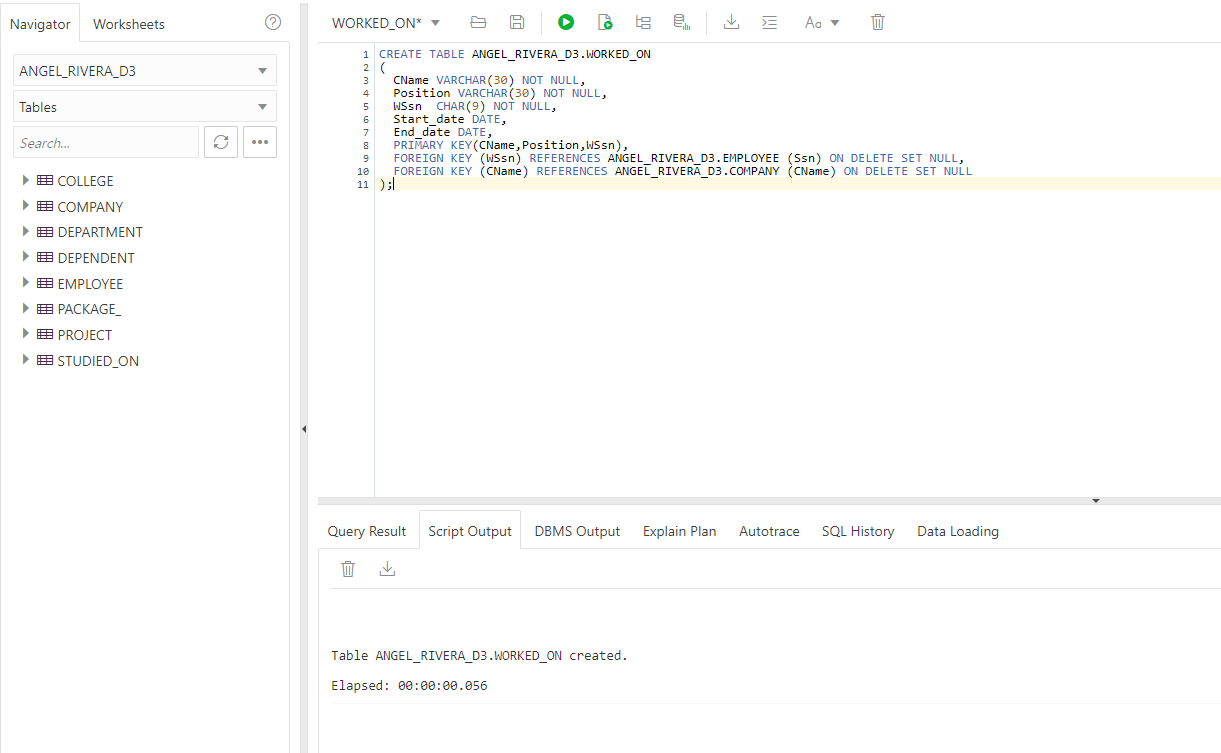


Figure 14.J

CREATE TABLE ANGEL\_RIVERA\_D3.WORKED\_ON

(

CName VARCHAR(30) NOT NULL,

Position VARCHAR(30) NOT NULL,

WSsn CHAR(9) NOT NULL,

Start\_date DATE,

End\_date DATE,

PRIMARY KEY(CName , Position, WSsn),

FOREIGN KEY (WSsn) REFERENCES ANGEL\_RIVERA\_D3.EMPLOYEE (Ssn) ON DELETE SET NULL,

FOREIGN KEY (CName) REFERENCES ANGEL\_RIVERA\_D3.COMPANY (CName) ON DELETE SET NULL

);

Appendix K [↑](#Start)

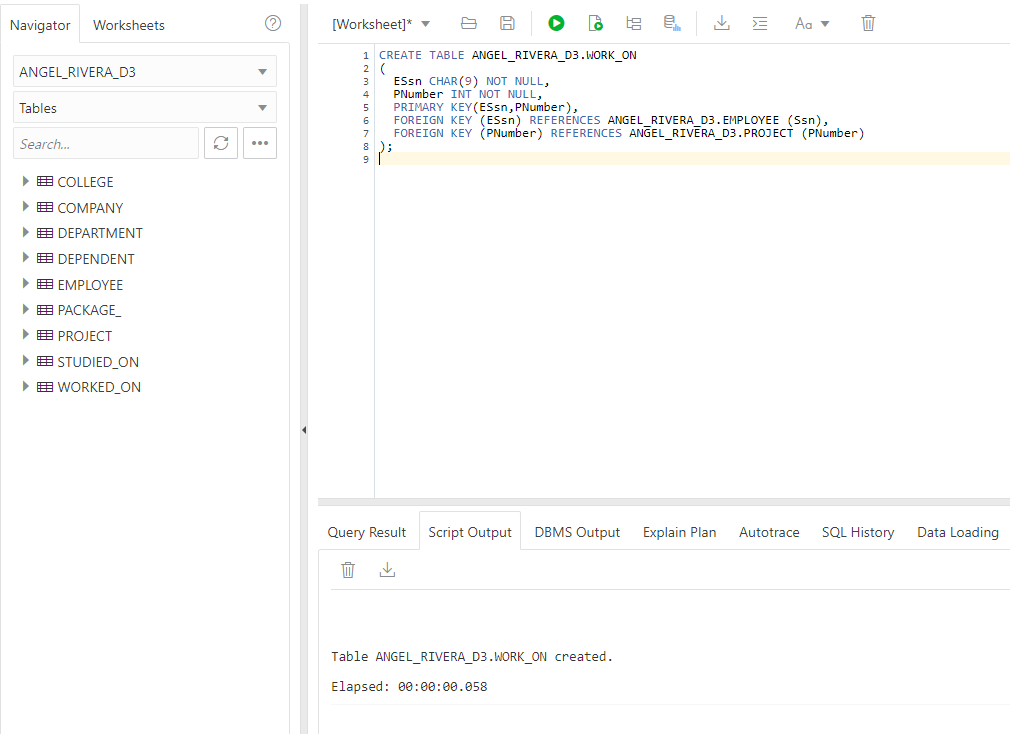


Figure 15.K

CREATE TABLE ANGEL\_RIVERA\_D3.WORK\_ON

(

ESsn CHAR(9) NOT NULL,

PNumber INT NOT NULL,

PRIMARY KEY(ESsn, PNumber),

FOREIGN KEY (ESsn) REFERENCES ANGEL\_RIVERA\_D3.EMPLOYEE (Ssn),

FOREIGN KEY (PNumber) REFERENCES ANGEL\_RIVERA\_D3.PROJECT (PNumber)

);

# Appendices- Insert-views

1. [Populate EMPLOYEE relation](#figure16)
2. [Populate DEPARTMENT relation](#figure17)
3. [Populate COLLEGE relation](#figure18)
4. [Populate DEPENDENT relation](#figure19)
5. [Populate PACKAGE\_ relation](#figure20)
6. [Populate COMPANY relation](#figure21)
7. [Populate PROJECT relation](#figure22)
8. [Populate STUDIED\_ON relation](#figure23)
9. [Populate WORKED\_ON relation](#figure24)
10. [Populate WORK\_ON relation](#figure25)
11. [FAMILY view](#figure26)
12. [DEPT\_INFO view](#figure27)
13. [PROJECT\_INFO view](#figure28)
14. [EMPLOYEE\_EDUCATION view](#figure29)
15. [EMPLOYEE\_WORKHIS view](#figure30)
16. [WORK\_ON1 view](#figure31)

Appendix 1 [↑](#home2)

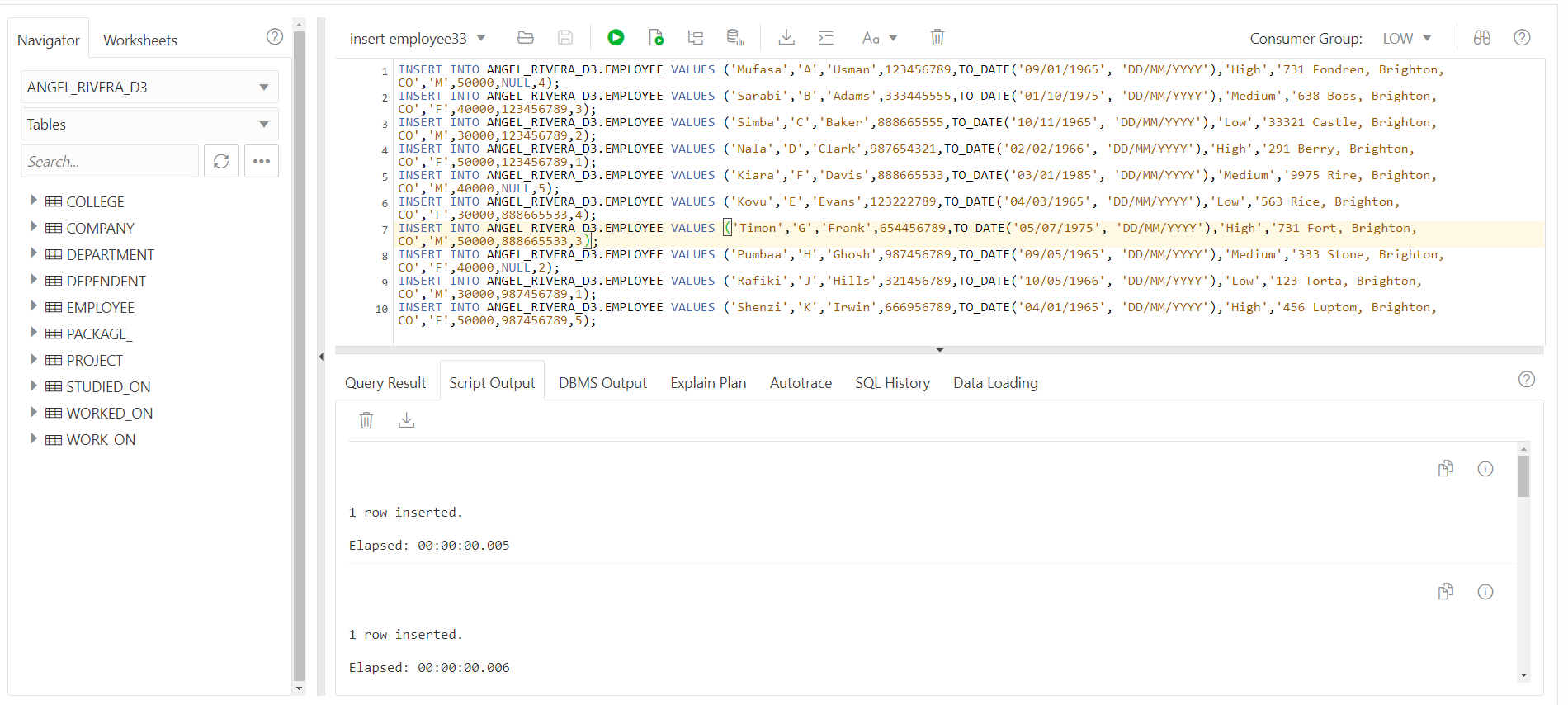


Figure 16.1

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Mufasa','A','Usman',123456789,TO\_DATE('09/01/1965', 'DD/MM/YYYY'),'High','731 Fondren, Brighton, CO','M',50000,NULL,4);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Sarabi','B','Adams',333445555,TO\_DATE('01/10/1975', 'DD/MM/YYYY'),'Medium','638 Boss, Brighton, CO','F',40000,123456789,3);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Simba','C','Baker',888665555,TO\_DATE('10/11/1965', 'DD/MM/YYYY'),'Low','33321 Castle, Brighton, CO','M',30000,123456789,2);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Nala','D','Clark',987654321,TO\_DATE('02/02/1966', 'DD/MM/YYYY'),'High','291 Berry, Brighton, CO','F',50000,123456789,1);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Kiara','F','Davis',888665533,TO\_DATE('03/01/1985', 'DD/MM/YYYY'),'Medium','9975 Rire, Brighton, CO','M',40000,NULL,5);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Kovu','E','Evans',123222789,TO\_DATE('04/03/1965', 'DD/MM/YYYY'),'Low','563 Rice, Brighton, CO','F',30000,888665533,4);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Timon','G','Frank',654456789,TO\_DATE('05/07/1975', 'DD/MM/YYYY'),'High','731 Fort, Brighton, CO','M',50000,888665533,3);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Pumbaa','H','Ghosh',987456789,TO\_DATE('09/05/1965', 'DD/MM/YYYY'),'Medium','333 Stone, Brighton, CO','F',40000,NULL,2);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Rafiki','J','Hills',321456789,TO\_DATE('10/05/1966', 'DD/MM/YYYY'),'Low','123 Torta, Brighton, CO','M',30000,987456789,1);

INSERT INTO ANGEL\_RIVERA\_D3.EMPLOYEE VALUES ('Shenzi','K','Irwin',666956789,TO\_DATE('04/01/1965', 'DD/MM/YYYY'),'High','456 Luptom, Brighton, CO','F',50000,987456789,5);

Appendix 2 [↑](#home2)

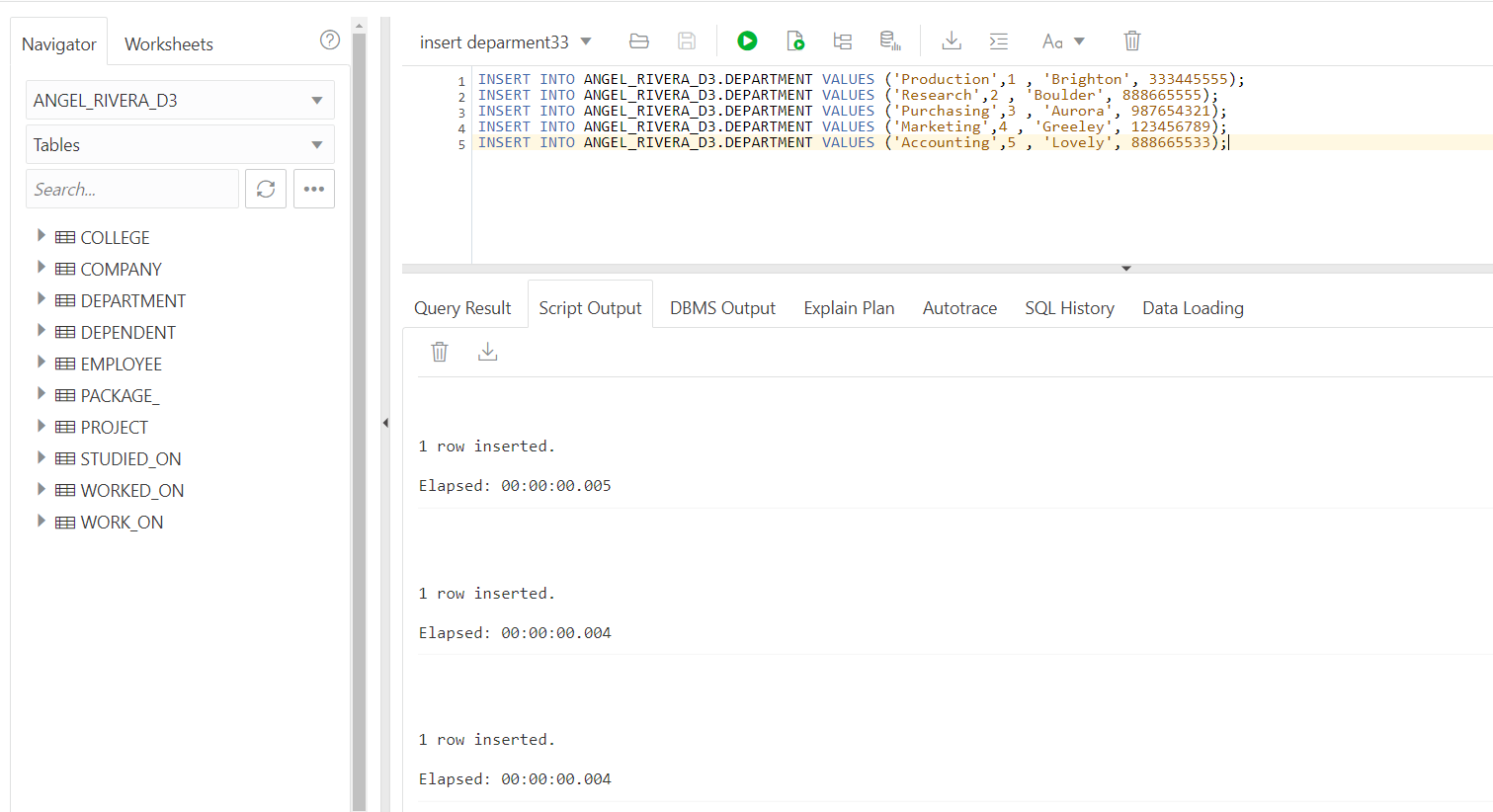


Figure 17.2

INSERT INTO ANGEL\_RIVERA\_D3.DEPARTMENT VALUES ('Production',1 , 'Brighton', 333445555);

INSERT INTO ANGEL\_RIVERA\_D3.DEPARTMENT VALUES ('Research',2 , 'Boulder', 888665555);

INSERT INTO ANGEL\_RIVERA\_D3.DEPARTMENT VALUES ('Purchasing',3 , 'Aurora', 987654321);

INSERT INTO ANGEL\_RIVERA\_D3.DEPARTMENT VALUES ('Marketing',4 , 'Greeley', 123456789);

INSERT INTO ANGEL\_RIVERA\_D3.DEPARTMENT VALUES ('Accounting',5 , 'Lovely', 888665533);

Appendix 3 [↑](#home2)

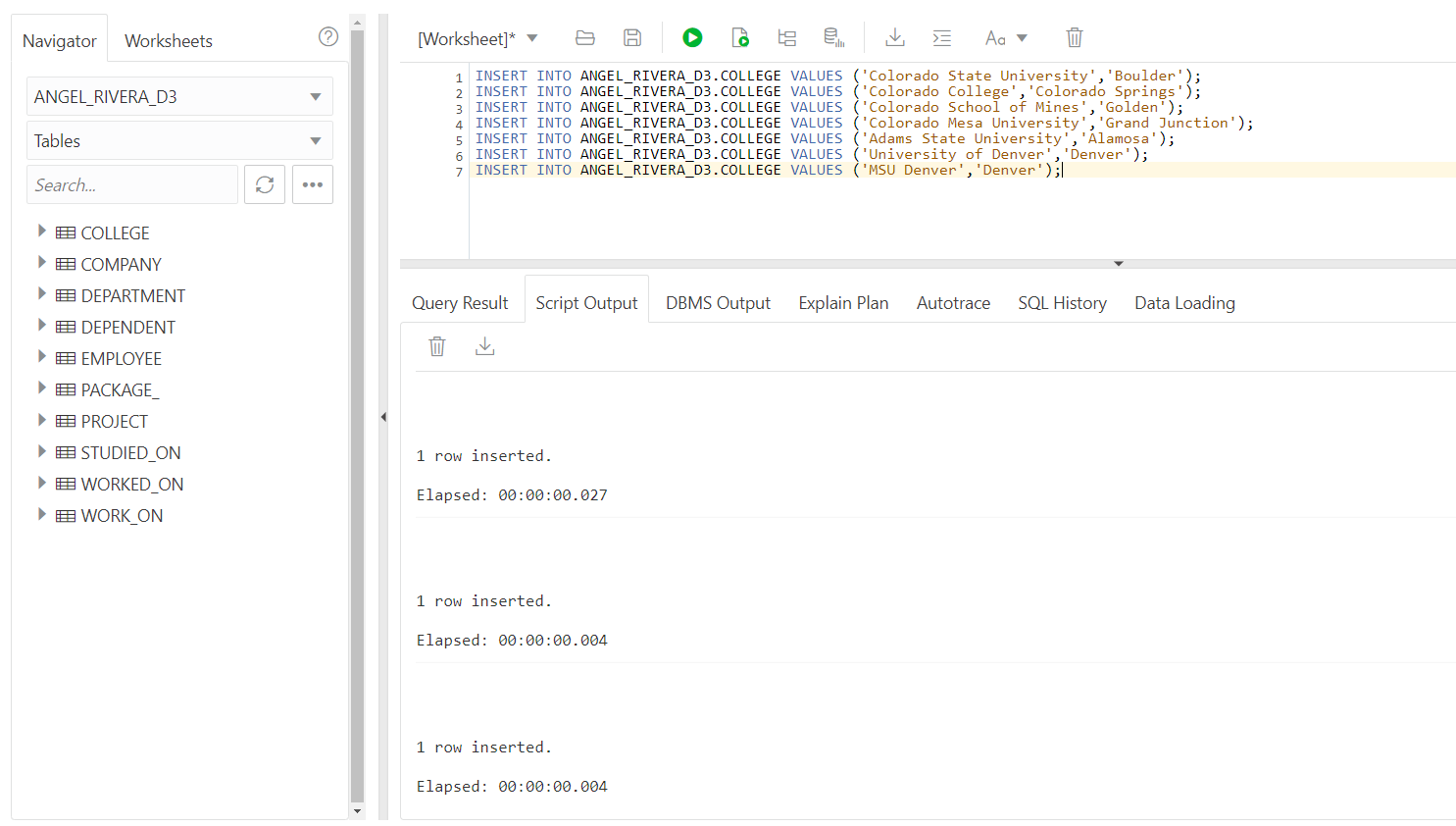


Figure 18.3

INSERT INTO ANGEL\_RIVERA\_D3.COLLEGE VALUES ('Colorado State University','Boulder');

INSERT INTO ANGEL\_RIVERA\_D3.COLLEGE VALUES ('Colorado College','Colorado Springs');

INSERT INTO ANGEL\_RIVERA\_D3.COLLEGE VALUES ('Colorado School of Mines','Golden');

INSERT INTO ANGEL\_RIVERA\_D3.COLLEGE VALUES ('Colorado Mesa University','Grand Junction');

INSERT INTO ANGEL\_RIVERA\_D3.COLLEGE VALUES ('Adams State University','Alamosa');

INSERT INTO ANGEL\_RIVERA\_D3.COLLEGE VALUES ('University of Denver','Denver');

INSERT INTO ANGEL\_RIVERA\_D3.COLLEGE VALUES ('MSU Denver','Denver');

Appendix 4 [↑](#home2)

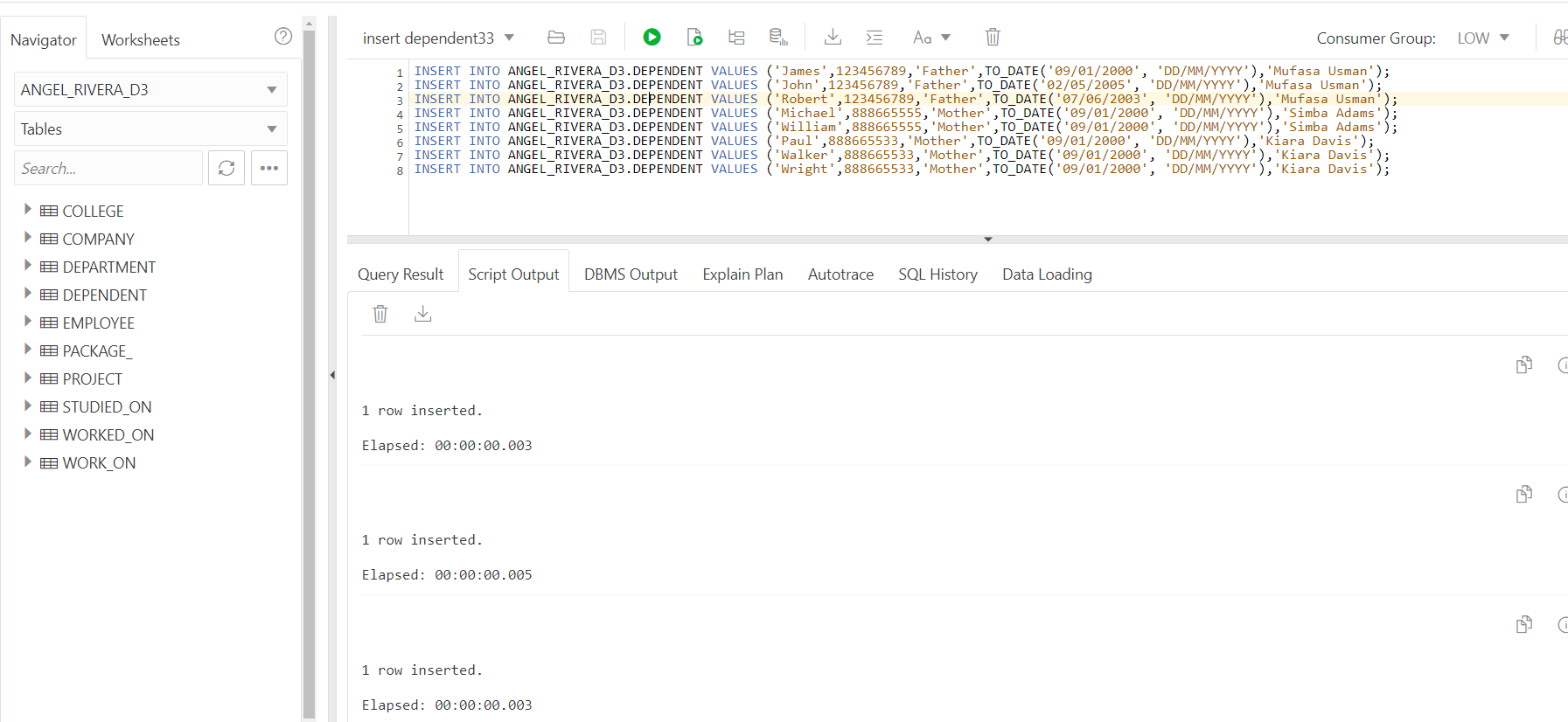


Figure 19.4

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('James',123456789,'Father',TO\_DATE('09/01/2000', 'DD/MM/YYYY'),'Mufasa Usman');

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('John',123456789,'Father',TO\_DATE('02/05/2005', 'DD/MM/YYYY'),'Mufasa Usman');

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('Robert',123456789,'Father',TO\_DATE('07/06/2003', 'DD/MM/YYYY'),'Mufasa Usman');

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('Michael',888665555,'Mother',TO\_DATE('09/01/2000', 'DD/MM/YYYY'),'Simba Adams');

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('William',888665555,'Mother',TO\_DATE('09/01/2000', 'DD/MM/YYYY'),'Simba Adams');

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('Paul',888665533,'Mother',TO\_DATE('09/01/2000', 'DD/MM/YYYY'),'Kiara Davis');

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('Walker',888665533,'Mother',TO\_DATE('09/01/2000', 'DD/MM/YYYY'),'Kiara Davis');

INSERT INTO ANGEL\_RIVERA\_D3.DEPENDENT VALUES ('Wright',888665533,'Mother',TO\_DATE('09/01/2000', 'DD/MM/YYYY'),'Kiara Davis');

Appendix 5 [↑](#home2)

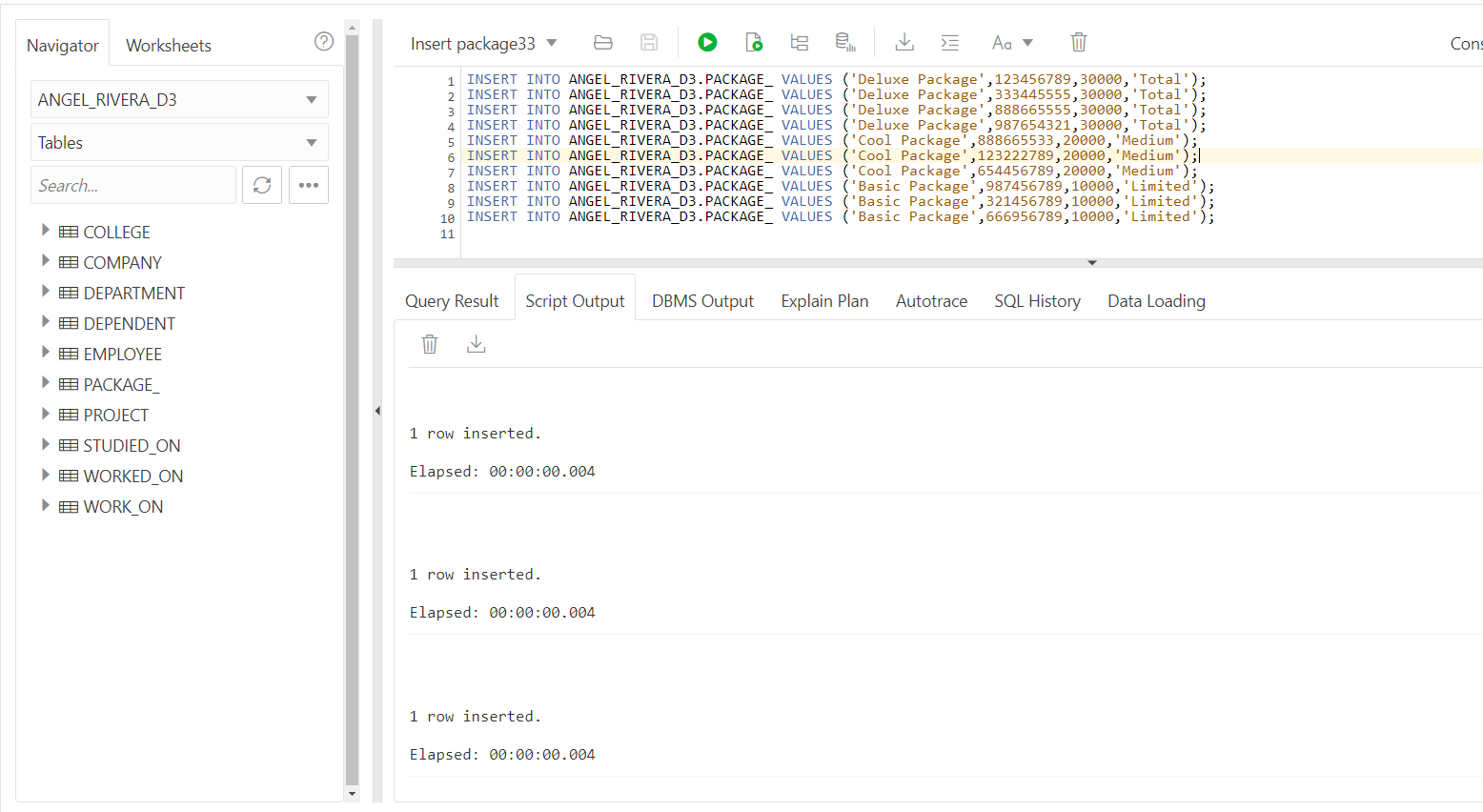


Figure 20.5

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Deluxe Package',123456789,30000,'Total');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Deluxe Package',333445555,30000,'Total');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Deluxe Package',888665555,30000,'Total');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Deluxe Package',987654321,30000,'Total');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Cool Package',888665533,20000,'Medium');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Cool Package',123222789,20000,'Medium');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Cool Package',654456789,20000,'Medium');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Basic Package',987456789,10000,'Limited');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Basic Package',321456789,10000,'Limited');

INSERT INTO ANGEL\_RIVERA\_D3.PACKAGE\_ VALUES ('Basic Package',666956789,10000,'Limited');

Appendix 6 [↑](#home2)

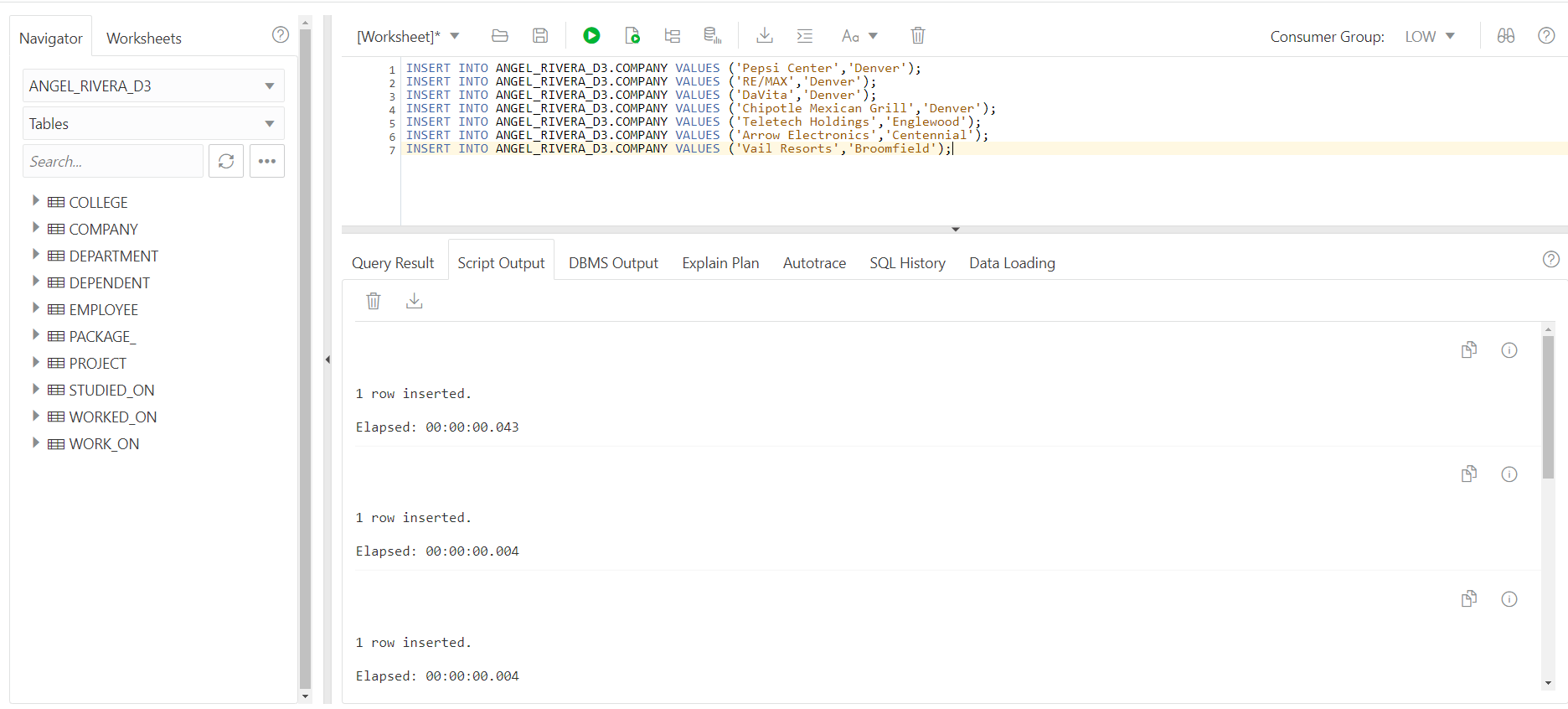


Figure 21.6

INSERT INTO ANGEL\_RIVERA\_D3.COMPANY VALUES ('Pepsi Center','Denver');

INSERT INTO ANGEL\_RIVERA\_D3.COMPANY VALUES ('RE/MAX','Denver');

INSERT INTO ANGEL\_RIVERA\_D3.COMPANY VALUES ('DaVita','Denver');

INSERT INTO ANGEL\_RIVERA\_D3.COMPANY VALUES ('Chipotle Mexican Grill','Denver');

INSERT INTO ANGEL\_RIVERA\_D3.COMPANY VALUES ('Teletech Holdings','Englewood');

INSERT INTO ANGEL\_RIVERA\_D3.COMPANY VALUES ('Arrow Electronics','Centennial');

INSERT INTO ANGEL\_RIVERA\_D3.COMPANY VALUES ('Vail Resorts','Broomfield');

Appendix 7 [↑](#home2)

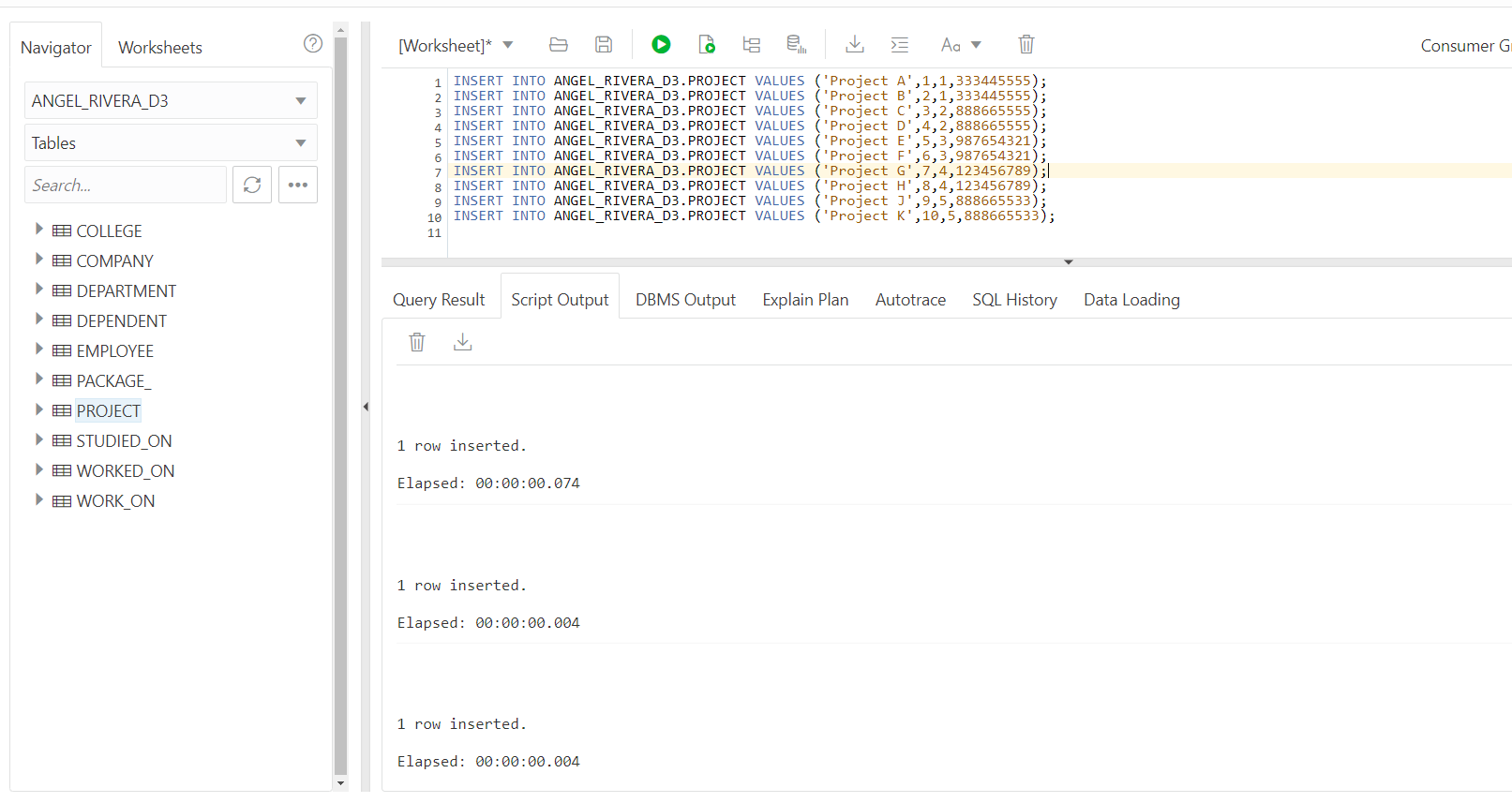


Figure 22.7

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project A',1,1,333445555);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project B',2,1,333445555);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project C',3,2,888665555);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project D',4,2,888665555);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project E',5,3,987654321);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project F',6,3,987654321);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project G',7,4,123456789);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project H',8,4,123456789);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project J',9,5,888665533);

INSERT INTO ANGEL\_RIVERA\_D3.PROJECT VALUES ('Project K',10,5,888665533);

Appendix 8 [↑](#home2)

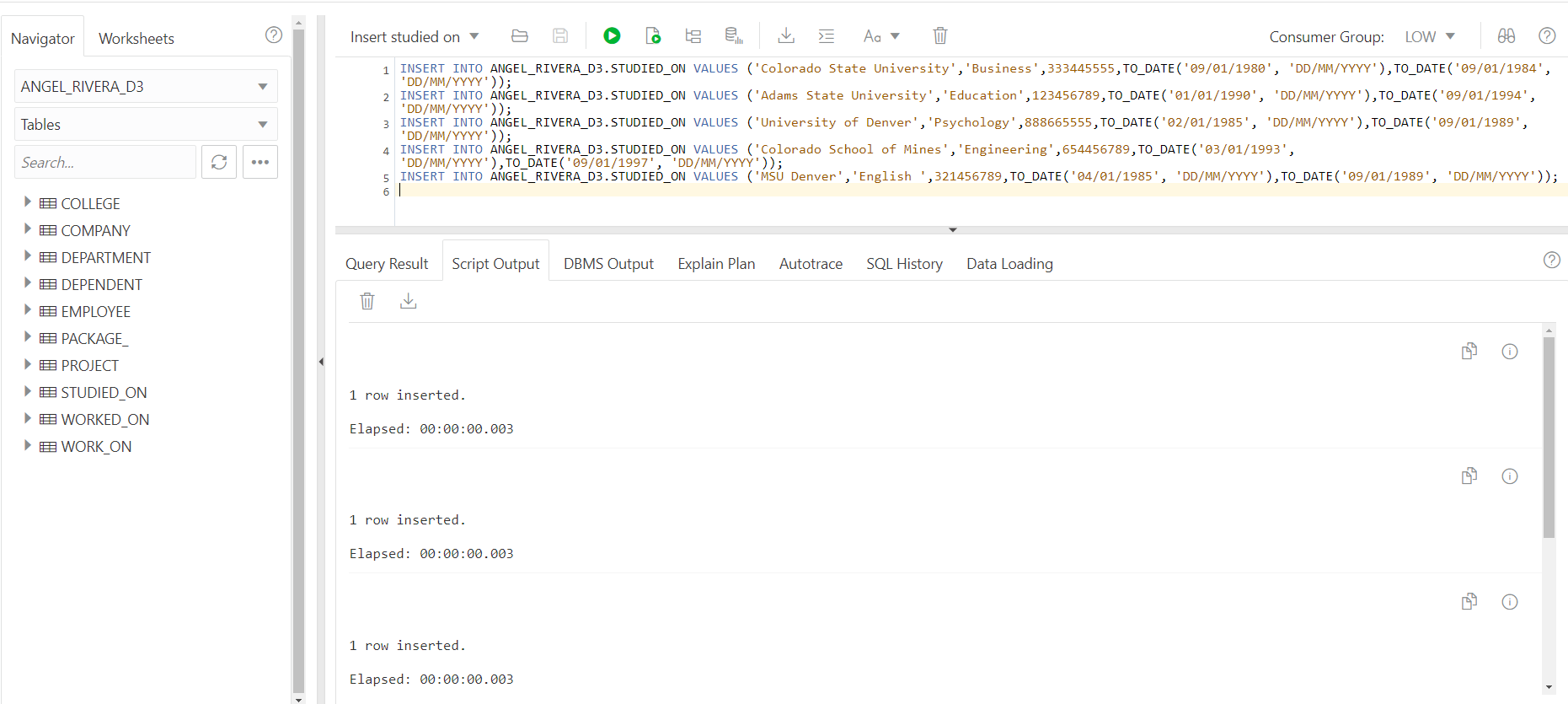


Figure 23.8

INSERT INTO ANGEL\_RIVERA\_D3.STUDIED\_ON VALUES ('Colorado State University','Business',333445555,TO\_DATE('09/01/1980', 'DD/MM/YYYY'),TO\_DATE('09/01/1984', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.STUDIED\_ON VALUES ('Adams State University','Education',123456789,TO\_DATE('01/01/1990', 'DD/MM/YYYY'),TO\_DATE('09/01/1994', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.STUDIED\_ON VALUES ('University of Denver','Psychology',888665555,TO\_DATE('02/01/1985', 'DD/MM/YYYY'),TO\_DATE('09/01/1989', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.STUDIED\_ON VALUES ('Colorado School of Mines','Engineering',654456789,TO\_DATE('03/01/1993', 'DD/MM/YYYY'),TO\_DATE('09/01/1997', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.STUDIED\_ON VALUES ('MSU Denver','English ',321456789,TO\_DATE('04/01/1985', 'DD/MM/YYYY'),TO\_DATE('09/01/1989', 'DD/MM/YYYY'));

Appendix 9 [↑](#home2)



Figure 24.9

INSERT INTO ANGEL\_RIVERA\_D3.WORKED\_ON VALUES ('Pepsi Center','Manager',888665555,TO\_DATE('09/01/1980', 'DD/MM/YYYY'),TO\_DATE('09/01/1984', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.WORKED\_ON VALUES ('DaVita','Secretary',123222789,TO\_DATE('01/01/1990', 'DD/MM/YYYY'),TO\_DATE('09/01/1994', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.WORKED\_ON VALUES ('RE/MAX','Manager',654456789,TO\_DATE('03/01/1993', 'DD/MM/YYYY'),TO\_DATE('09/01/1997', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.WORKED\_ON VALUES ('Teletech Holdings','Service',987654321,TO\_DATE('04/01/1985', 'DD/MM/YYYY'),TO\_DATE('09/01/1989', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.WORKED\_ON VALUES ('Arrow Electronics','Janitor',333445555,TO\_DATE('09/01/1980', 'DD/MM/YYYY'),TO\_DATE('09/01/1984', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.WORKED\_ON VALUES ('Vail Resorts','Janitor',666956789,TO\_DATE('01/01/1990', 'DD/MM/YYYY'),TO\_DATE('09/01/1994', 'DD/MM/YYYY'));

INSERT INTO ANGEL\_RIVERA\_D3.WORKED\_ON VALUES ('Chipotle Mexican Grill','Service',123456789,TO\_DATE('01/01/1990', 'DD/MM/YYYY'),TO\_DATE('09/01/1994', 'DD/MM/YYYY'));

Appendix 10 [↑](#home2)

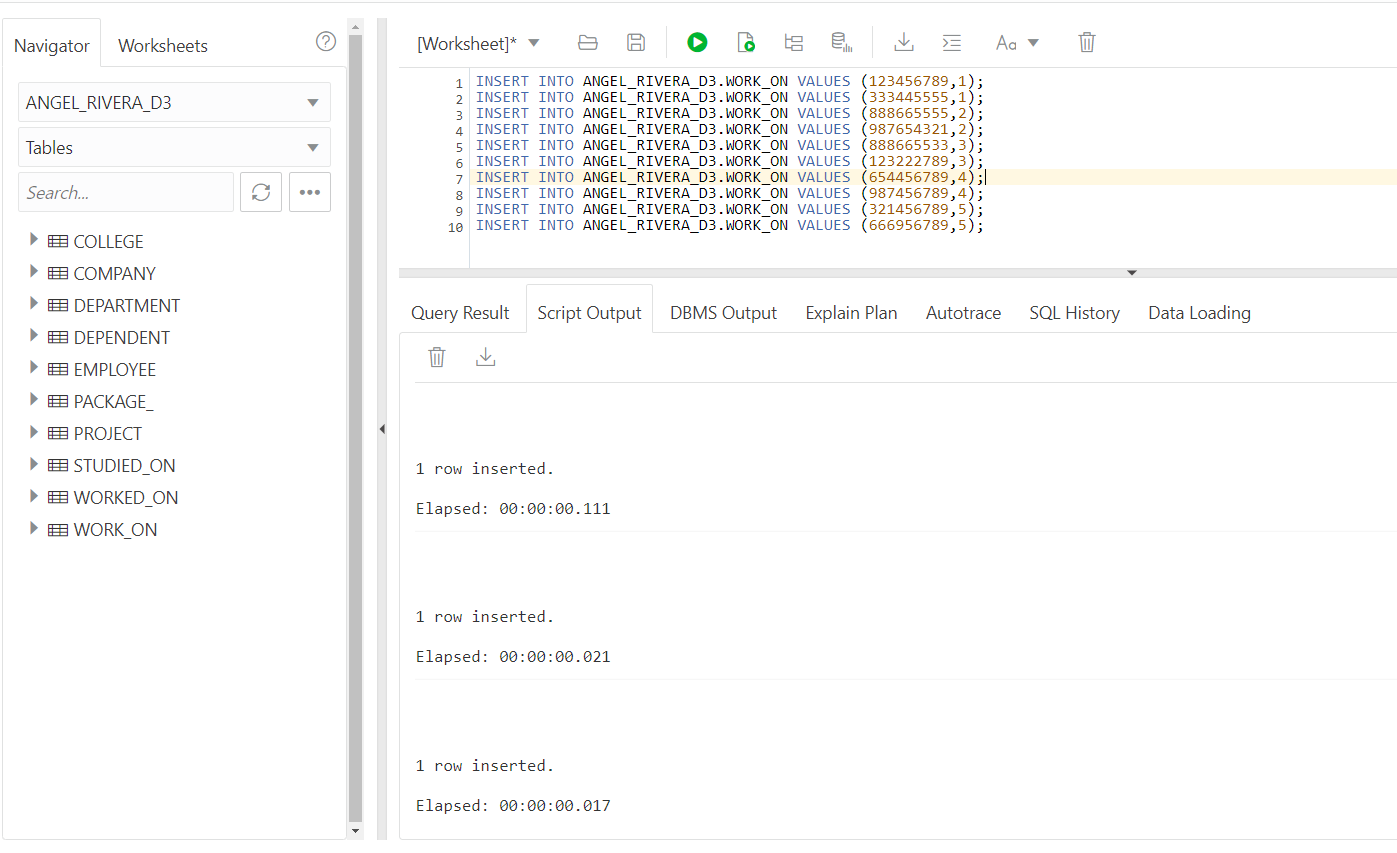


Figure 25.10

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (123456789,1);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (333445555,1);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (888665555,2);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (987654321,2);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (888665533,3);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (123222789,3);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (654456789,4);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (987456789,4);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (321456789,5);

INSERT INTO ANGEL\_RIVERA\_D3.WORK\_ON VALUES (666956789,5);

Appendix 11 [↑](#home2)

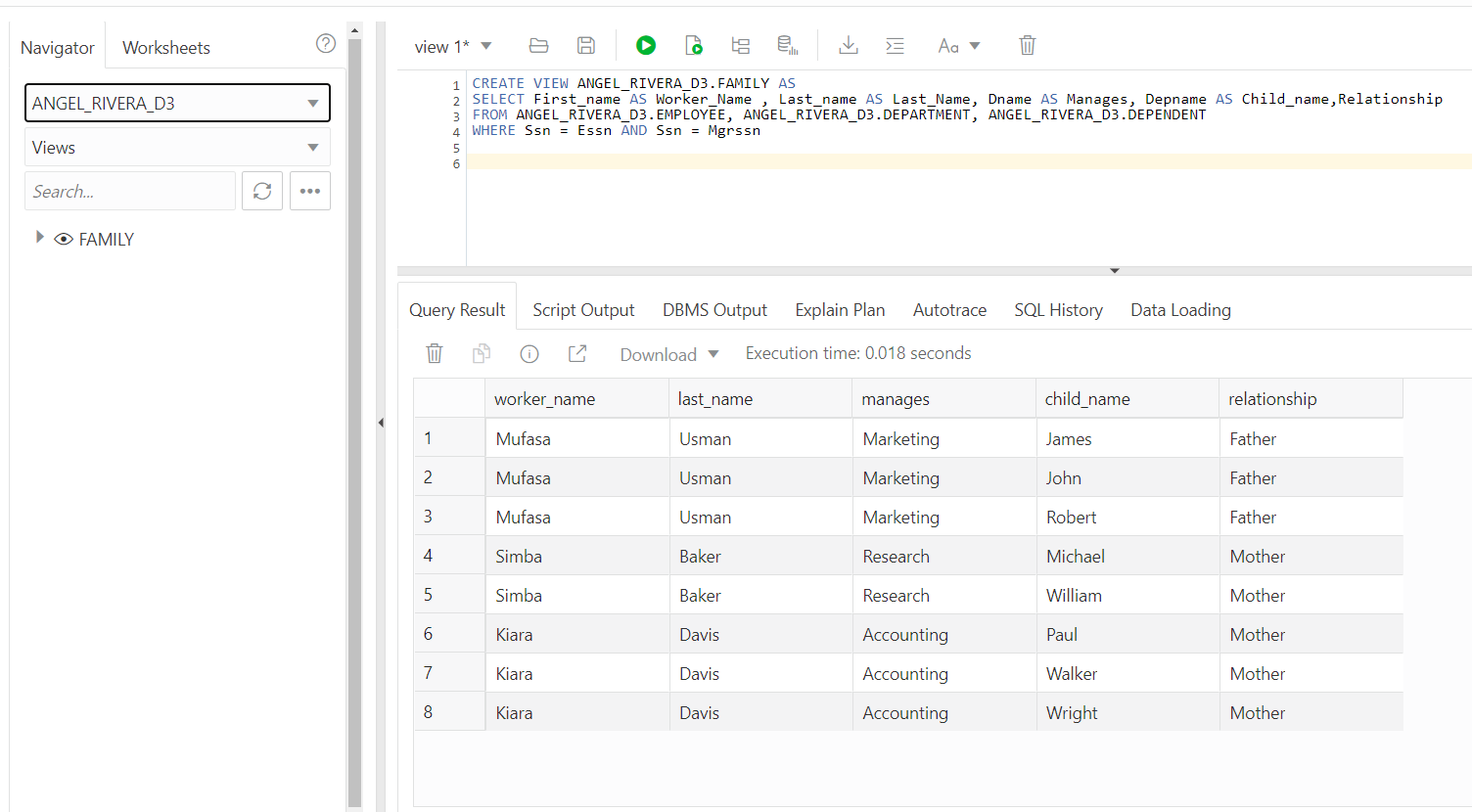


Figure 26.11

CREATE VIEW ANGEL\_RIVERA\_D3.FAMILY AS

SELECT First\_name AS Worker\_Name , Last\_name AS Last\_Name, Dname AS Manages, Depname AS Child\_name,Relationship

FROM ANGEL\_RIVERA\_D3.EMPLOYEE, ANGEL\_RIVERA\_D3.DEPARTMENT, ANGEL\_RIVERA\_D3.DEPENDENT

WHERE Ssn = Essn AND Ssn = Mgrssn

Appendix 12 [↑](#home2)



Figure 27.12

CREATE VIEW ANGEL\_RIVERA\_D3.DEPT\_INFO AS

SELECT Dname AS Department, COUNT(\*) AS Number\_of\_employees, SUM(Salary) As Total\_sal

FROM ANGEL\_RIVERA\_D3.EMPLOYEE E, ANGEL\_RIVERA\_D3.DEPARTMENT D

WHERE D.Dnumber=E.Dnumber

GROUP BY Dname

Appendix 13 [↑](#home2)

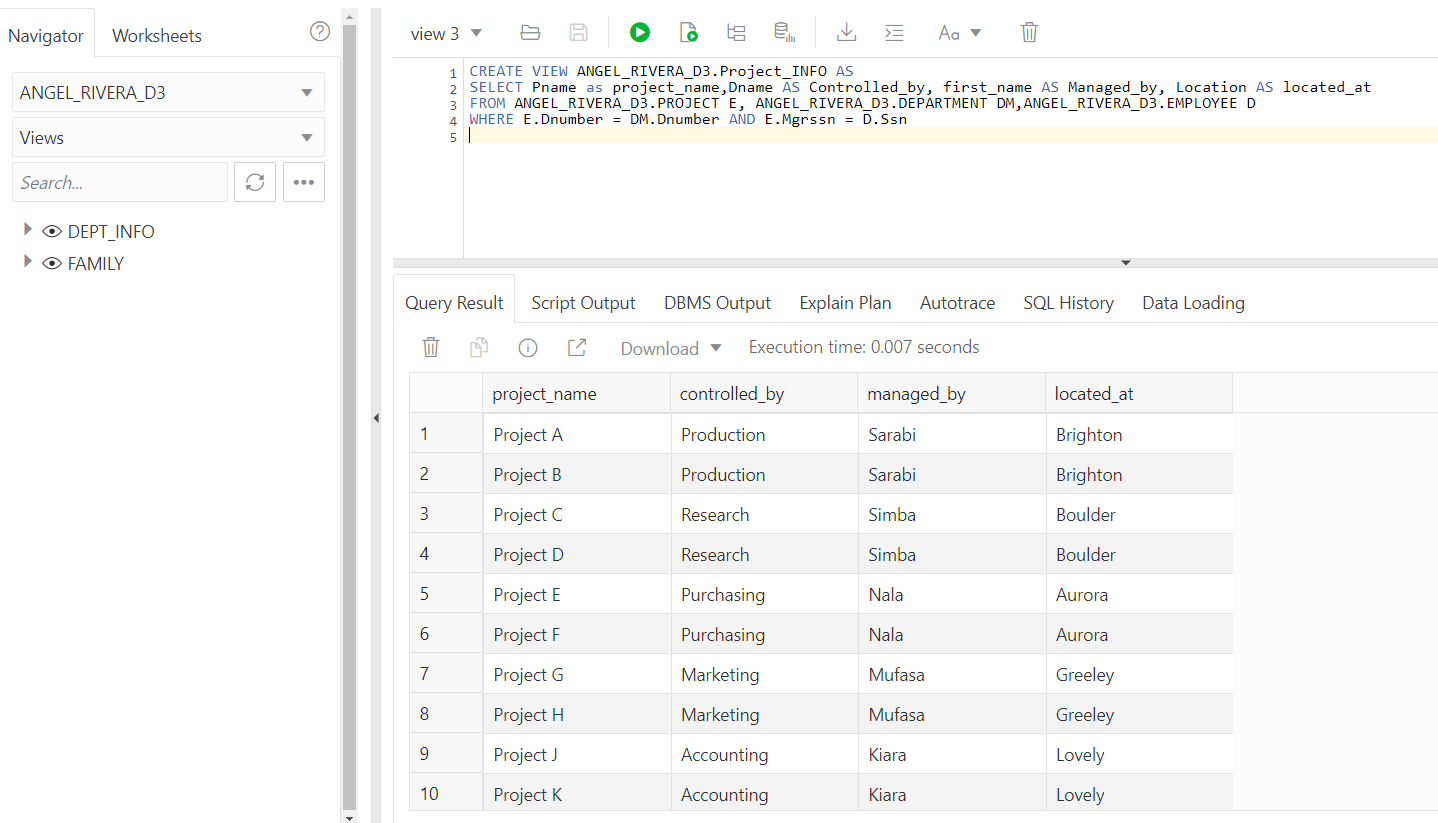


Figure 28.13

CREATE VIEW ANGEL\_RIVERA\_D3.Project\_INFO AS

SELECT Pname as project\_name, Dname AS Controlled\_by, first\_name AS Managed\_by, Location AS located\_at

FROM ANGEL\_RIVERA\_D3.PROJECT E, ANGEL\_RIVERA\_D3.DEPARTMENT DM,ANGEL\_RIVERA\_D3.EMPLOYEE D

WHERE E.Dnumber = DM.Dnumber AND E.Mgrssn = D.Ssn

Appendix 14 [↑](#home2)

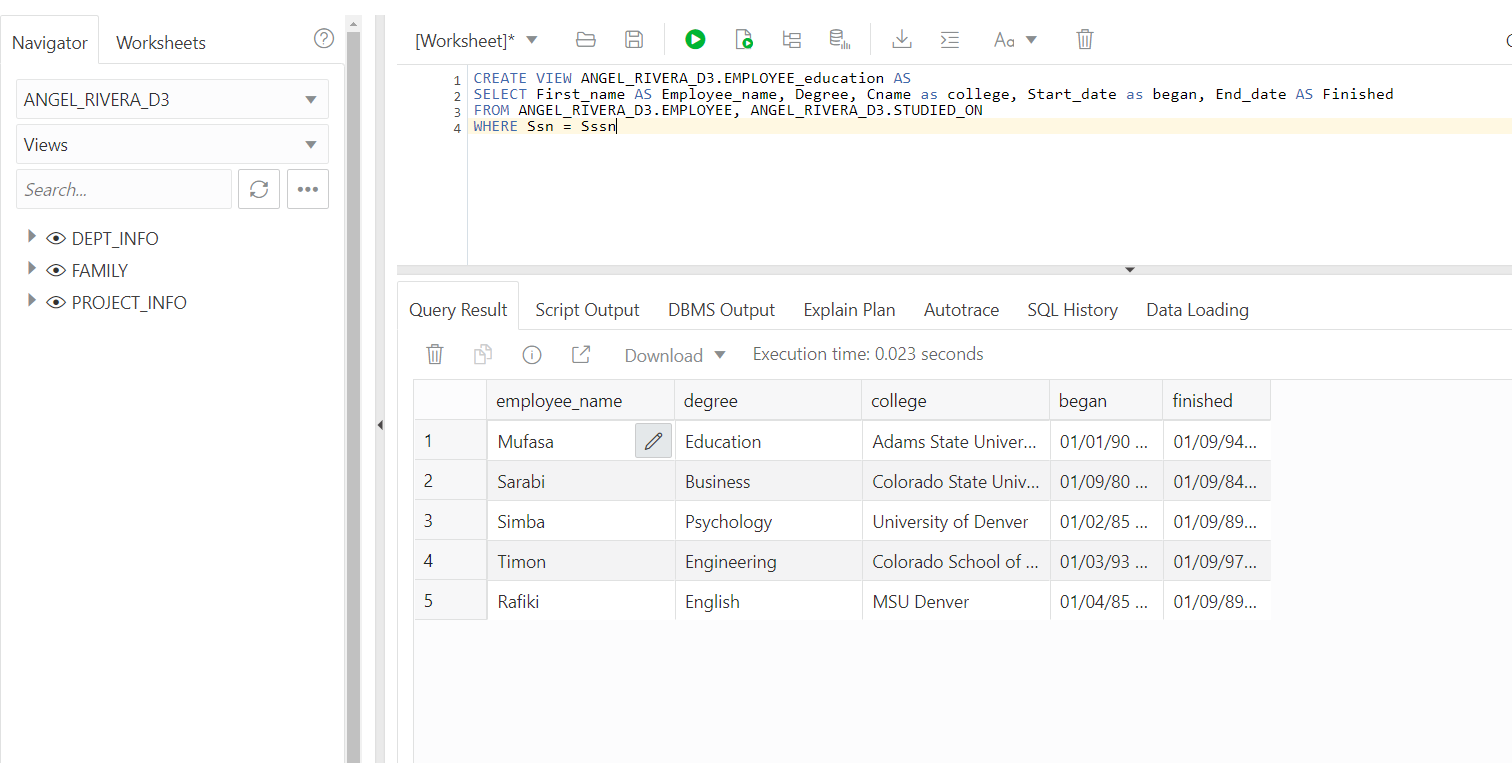


Figure 29.14

CREATE VIEW ANGEL\_RIVERA\_D3.EMPLOYEE\_education AS

SELECT First\_name AS Employee\_name, Degree, Cname as college, Start\_date as began, End\_date AS Finished

FROM ANGEL\_RIVERA\_D3.EMPLOYEE, ANGEL\_RIVERA\_D3.STUDIED\_ON

WHERE Ssn = SSsn

Appendix 15 [↑](#home2)

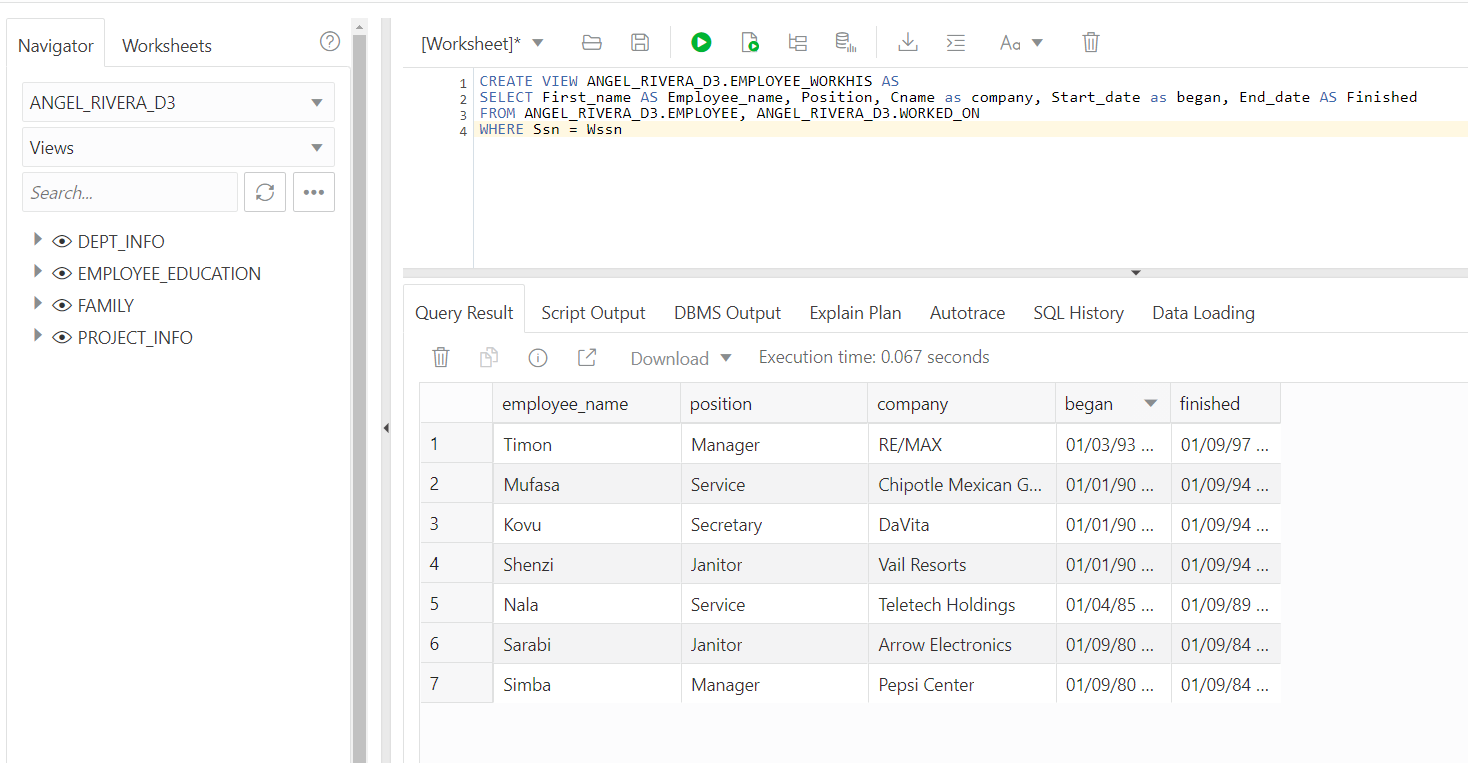


Figure 30.15

CREATE VIEW ANGEL\_RIVERA\_D3.EMPLOYEE\_WORKHIS AS

SELECT First\_name AS Employee\_name, Position, Cname as company, Start\_date as began, End\_date AS Finished

FROM ANGEL\_RIVERA\_D3.EMPLOYEE, ANGEL\_RIVERA\_D3.WORKED\_ON

WHERE Ssn = WSsn

Appendix 16 [↑](#home2)

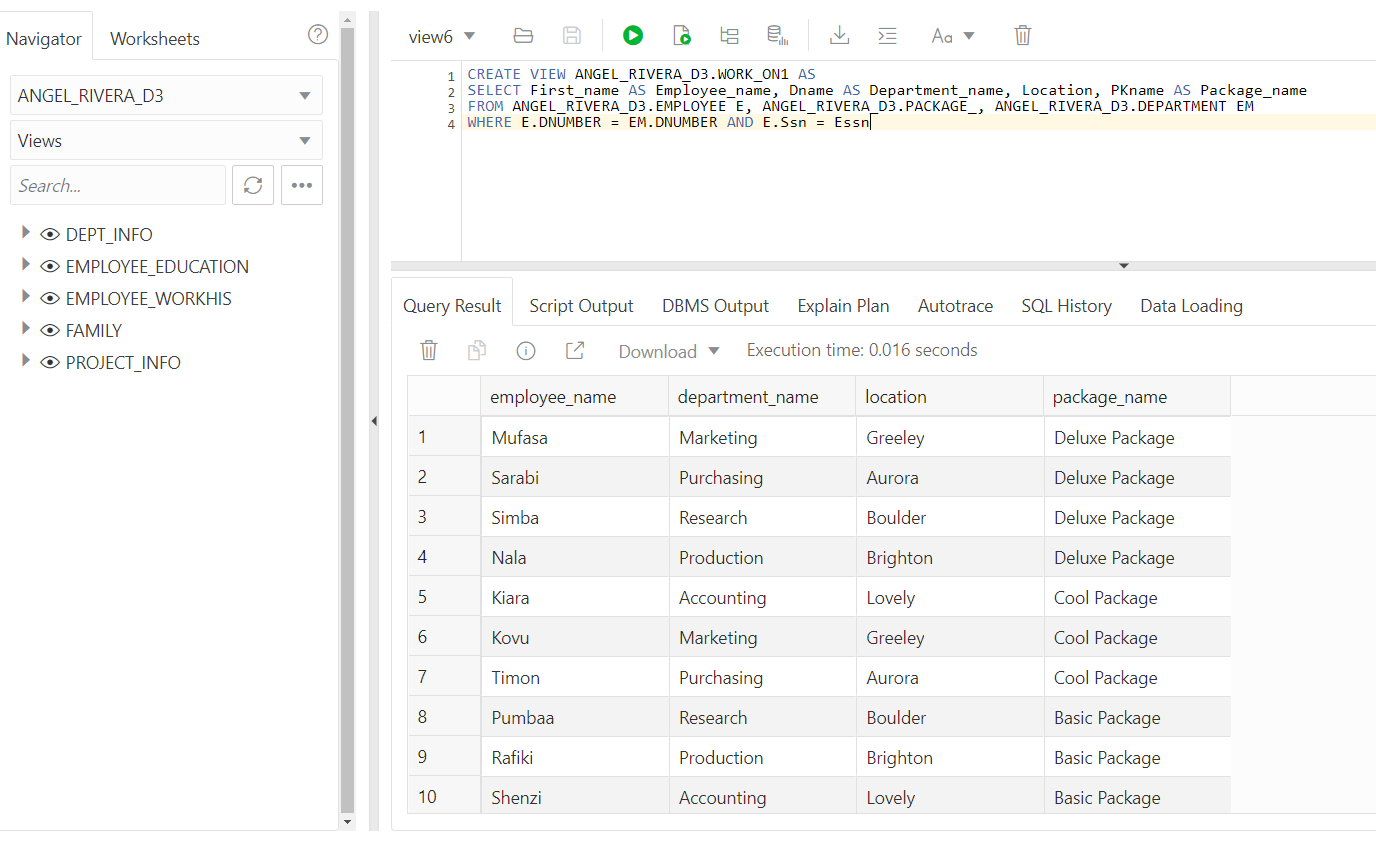


Figure 31.16

CREATE VIEW ANGEL\_RIVERA\_D3.WORK\_ON1 AS

SELECT First\_name AS Employee\_name, Dname AS Department\_name, Location, PKname AS Package\_level

FROM ANGEL\_RIVERA\_D3.EMPLOYEE E, ANGEL\_RIVERA\_D3.PACKAGE\_, ANGEL\_RIVERA\_D3.DEPARTMENT EM

WHERE E.DNUMBER = EM.DNUMBER AND E.Ssn = Essn

# Appendixes Hadoop/Warehouse

1. [College](#figureA1)
2. [Company](#figureB2)
3. [Department](#figureC3)
4. [Dependent](#figureD4)
5. [Employee](#figureE5)
6. [Package](#figureF6)
7. [Project](#figureG7)
8. [Studied\_on](#figureH8)
9. [Worked\_on](#figureI9)
10. [Work\_on](#figureJ10)
11. [Salary\_Employee](#figureK11)
12. [Deparment\_employee](#figureL12)
13. [SalaryClassification\_Salary](#figureM13)
14. [Salary\_Department\_employee](#figureN14)
15. [Salary\_gender\_employee](#figureO15)
16. [Salary\_gender\_department](#figureP16)
17. [BSalary\_package](#figureQ17)
18. [Joint-Query](#figureR18)
19. [BSalaryVsSalary](#figureS19)
20. [Employee\_package\_salary](#figureT20)
21. [BSalary\_gender\_employee](#figureU21)
22. [Department\_salary\_employee](#figureV22)
23. [FactFinal\_College](#figureX23)
24. [FactFinal\_Company](#figureY24)
25. [FactFinal\_Department](#figureZ25)
26. [FactFinal\_Dependent](#figureAA26)
27. [FactFinal\_Employee](#figureAB27)
28. [FactFinal\_Package](#figureAC28)
29. [FactFinal\_Project](#figureAD29)
30. [FactFinal\_Studied\_on](#figureAE30)
31. [FactFinal\_Work\_on](#figureAF31)
32. [FactFinal\_Worked\_on](#figureAG32)

Appendix A1 [↑](#home3)

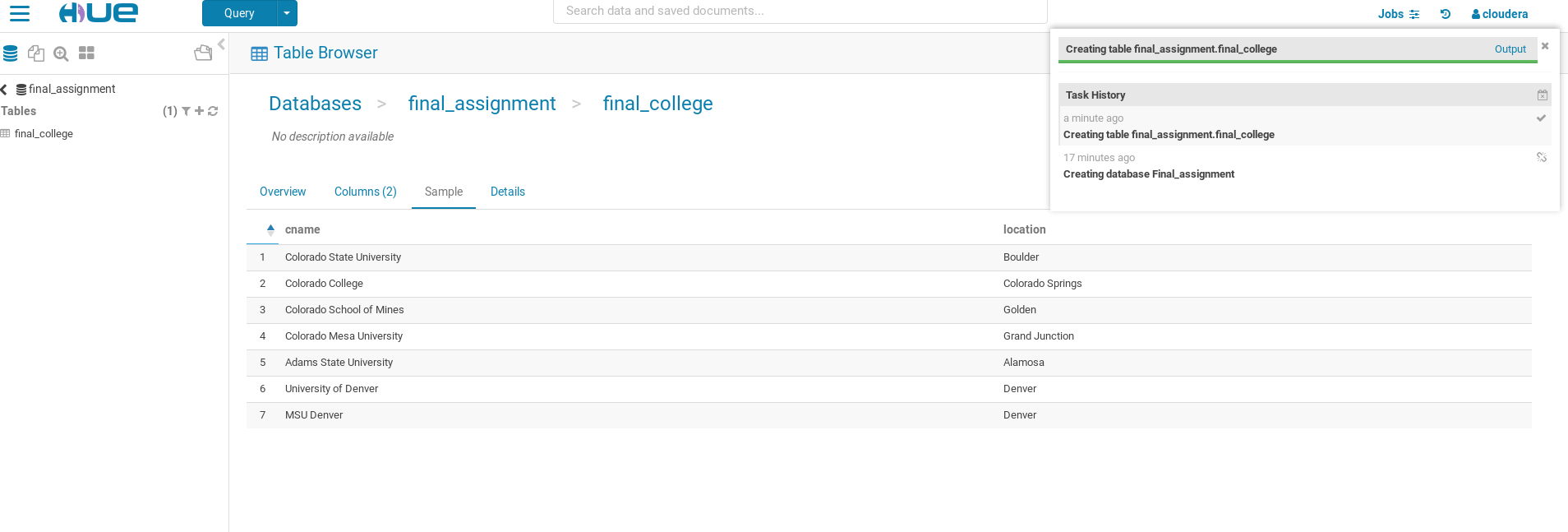


Figure A1.1

Appendix B2 [↑](#home3)

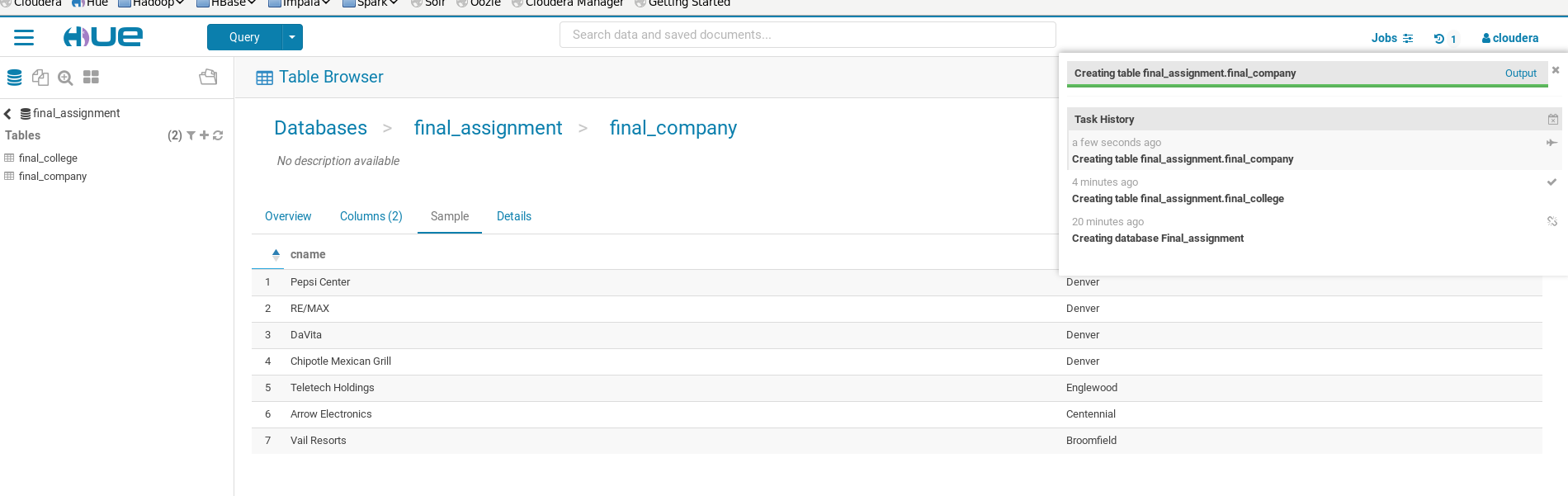


Figure B2.2

Appendix C3 [↑](#home3)

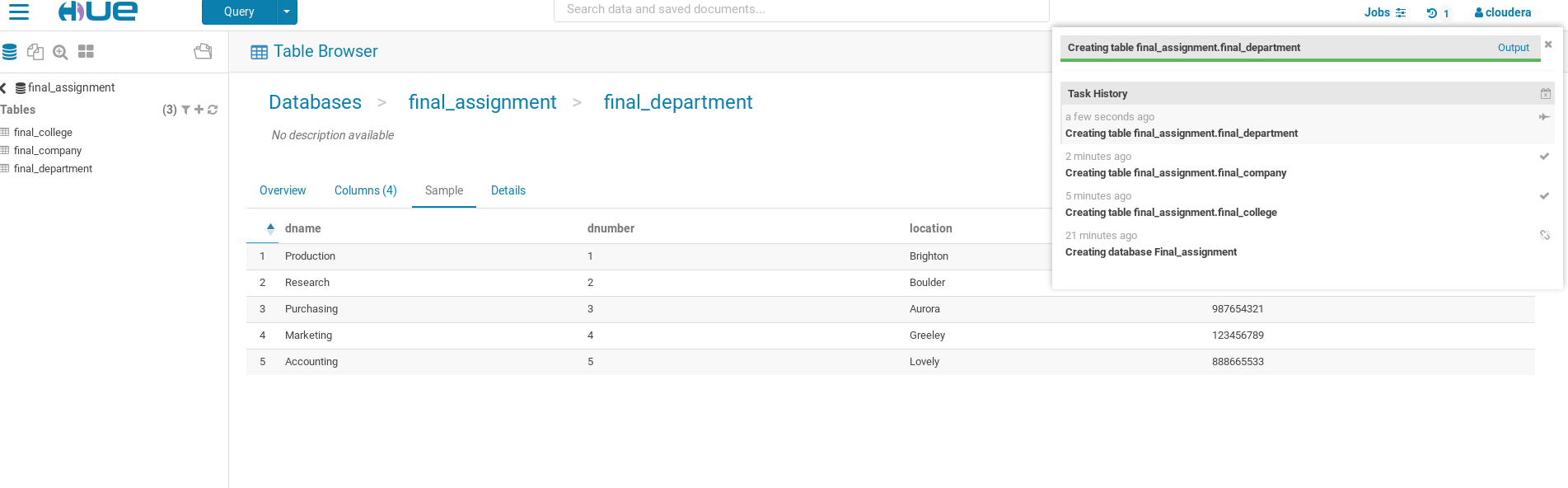


Figure C3.3

Appendix D4 [↑](#home3)

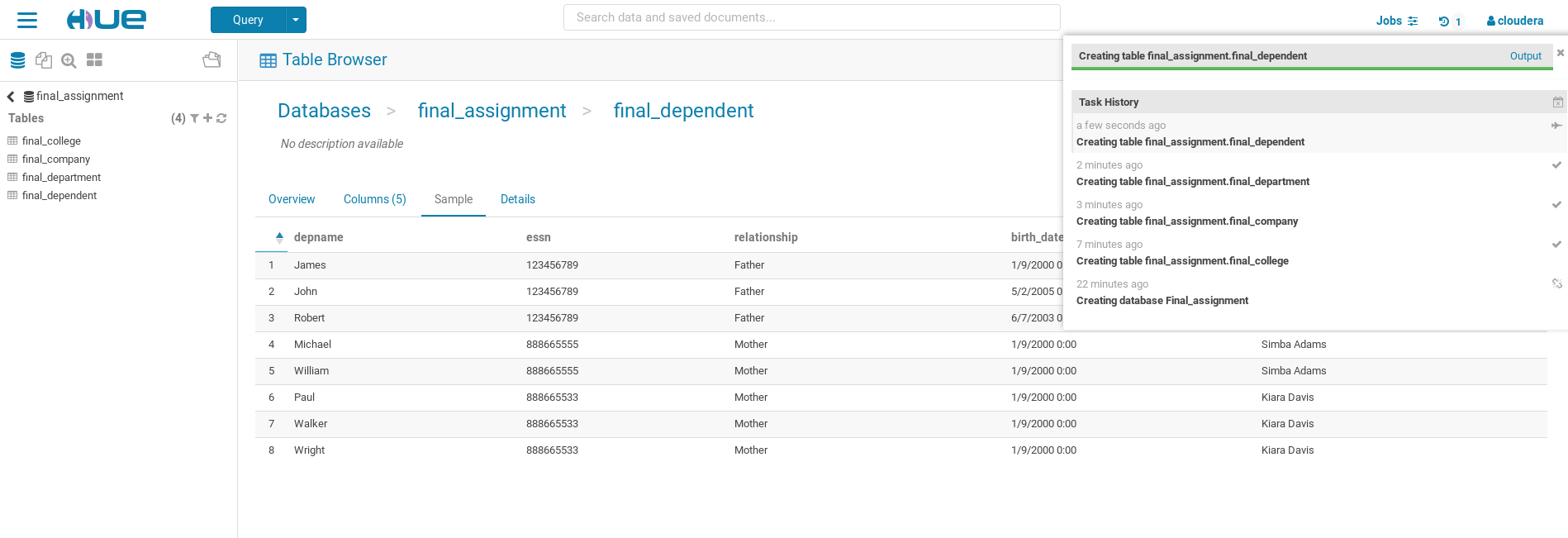


Figure D4.4

Appendix E5 [↑](#home3)

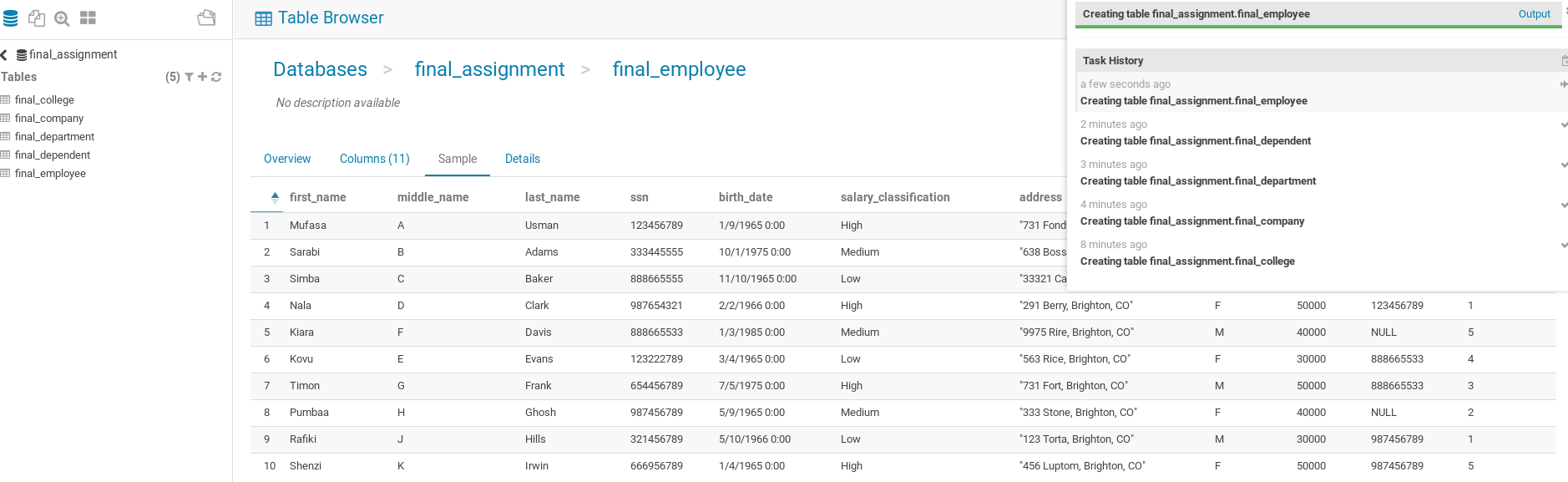


Figure E5.5

Appendix F6 [↑](#home3)

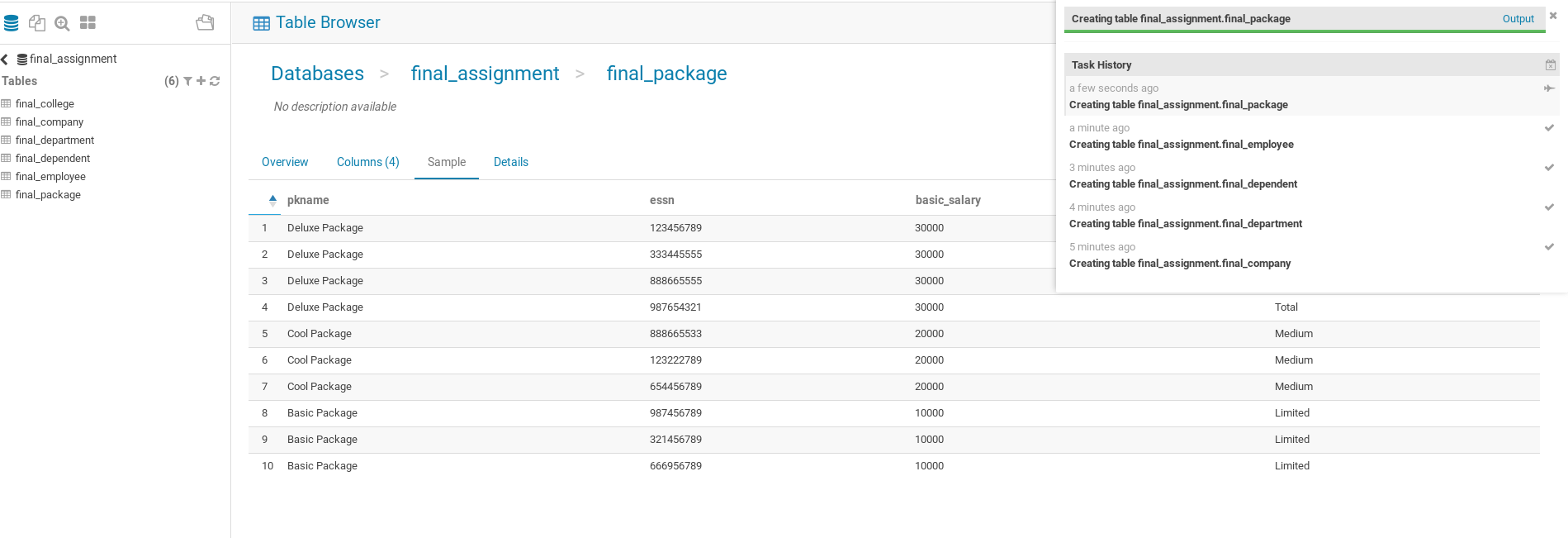


Figure F6.6

Appendix G7 [↑](#home3)

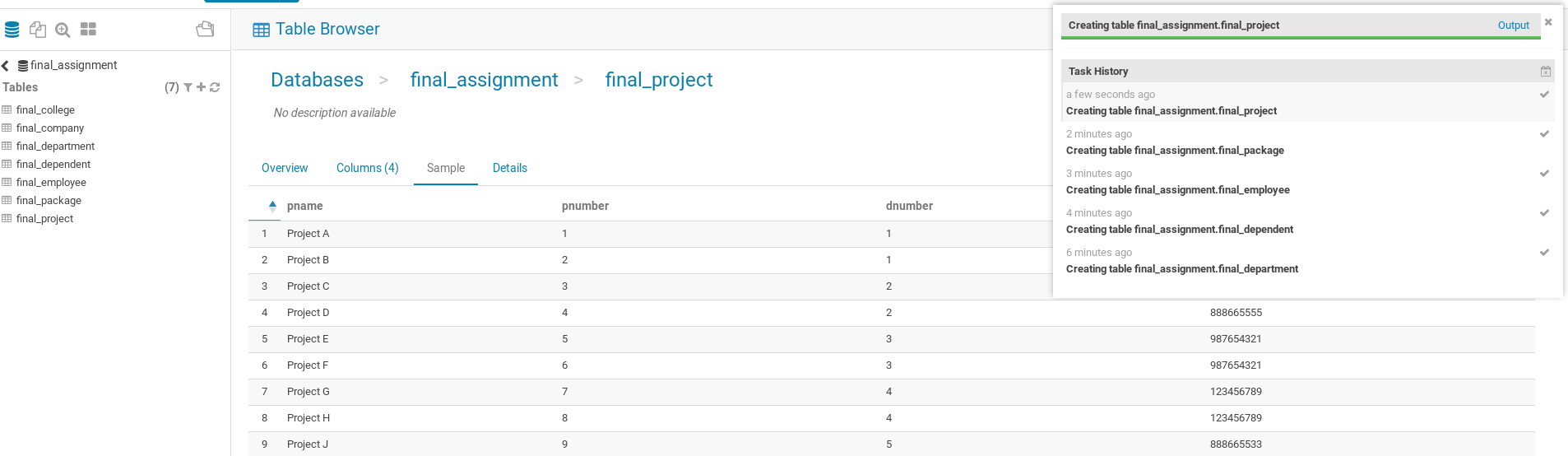


Figure G7.7

Appendix H8 [↑](#home3)

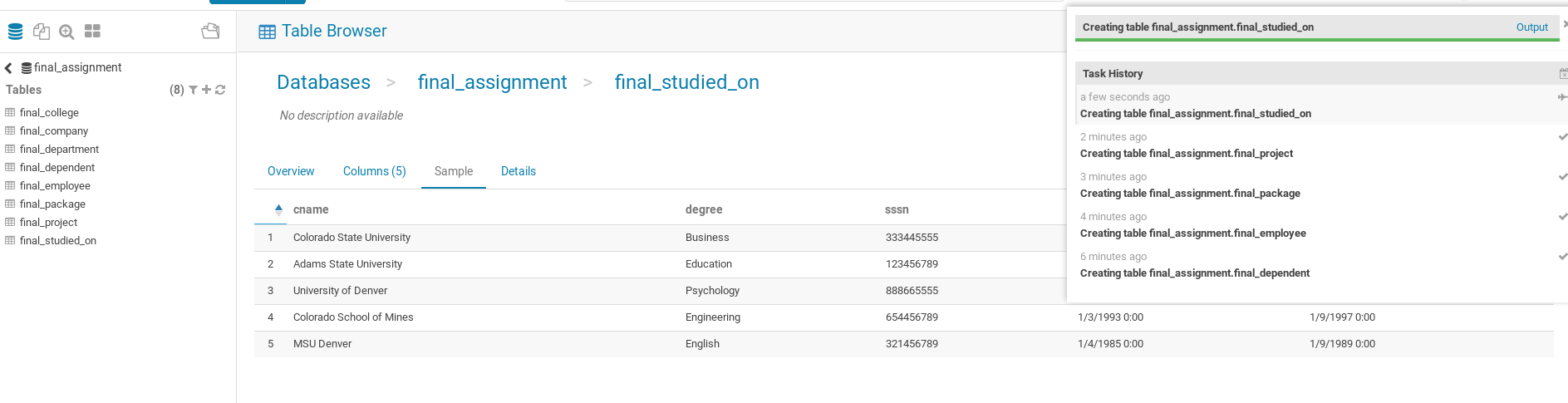


Figure H8.8

Appendix I9 [↑](#home3)

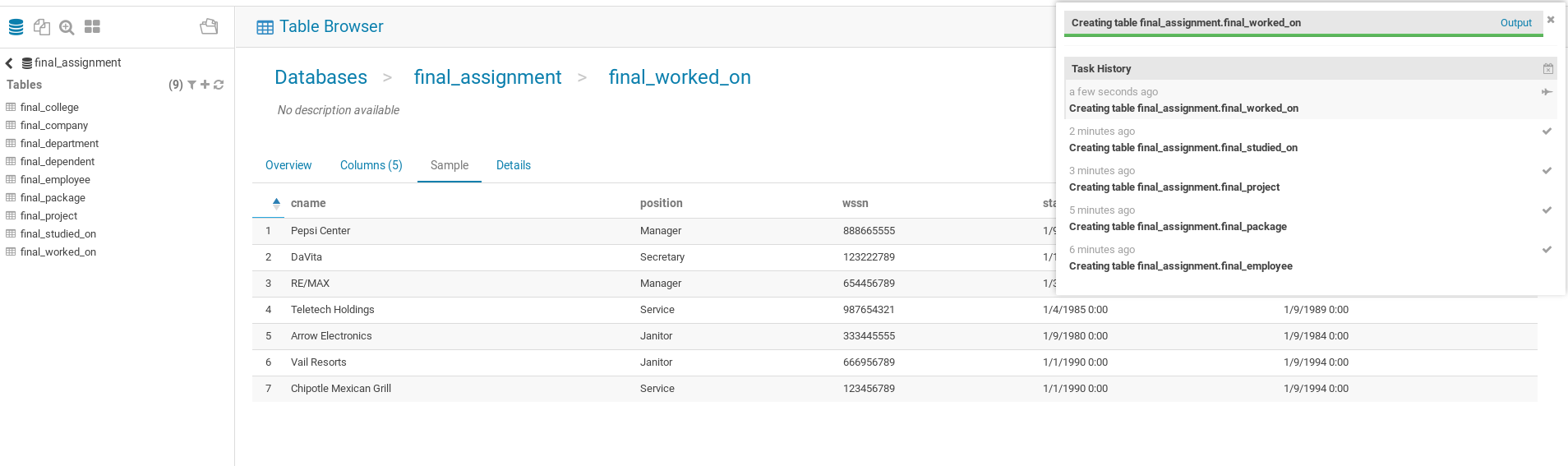


Figure I9.9

Appendix J10 [↑](#home3)

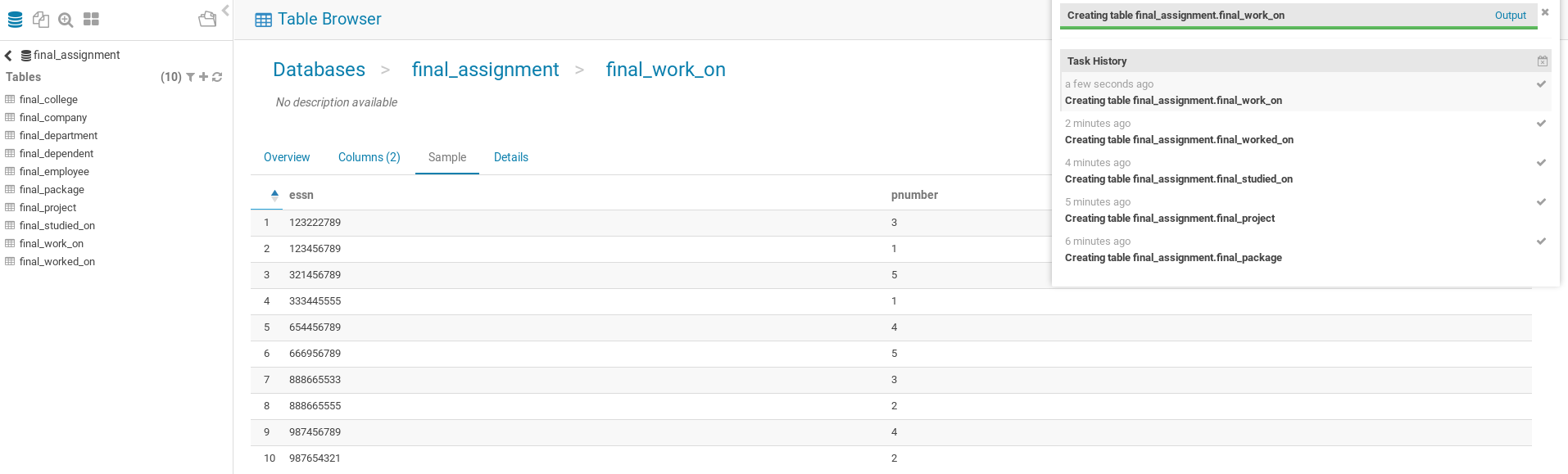


Figure J10.10

Appendix K11 [↑](#home3)

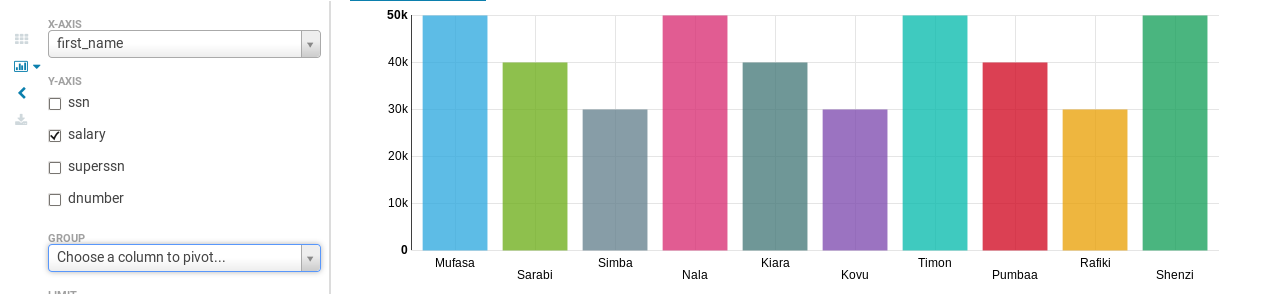


Figure K11.11

Appendix L12 [↑](#home3)

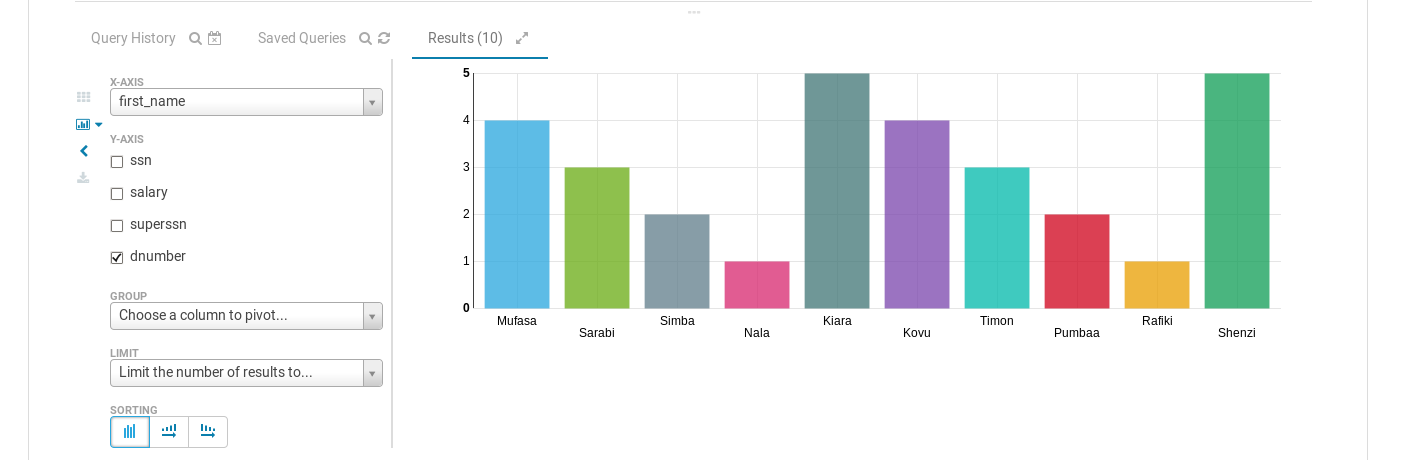


Figure L12.12

Appendix M13 [↑](#home3)

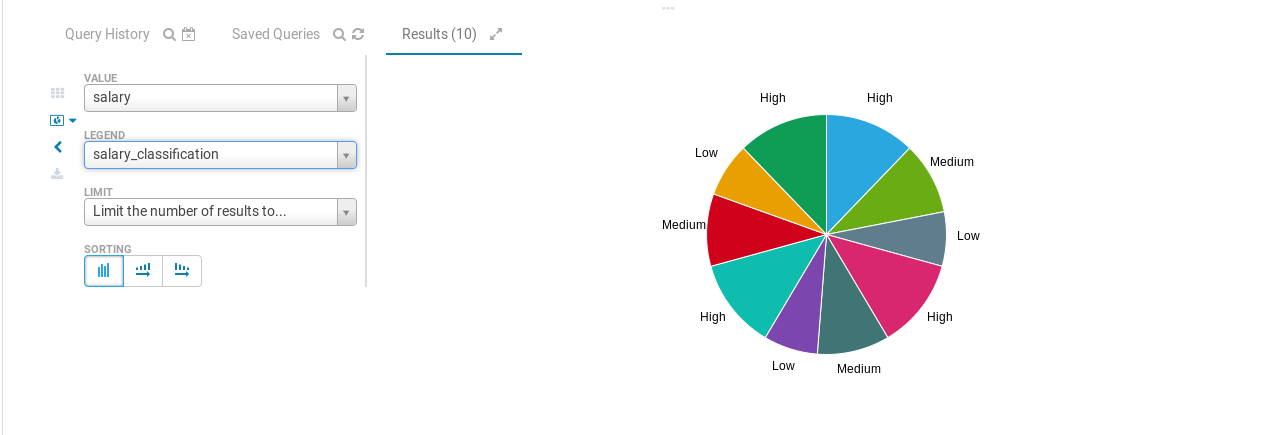


Figure M13.13

Appendix N14 [↑](#home3)

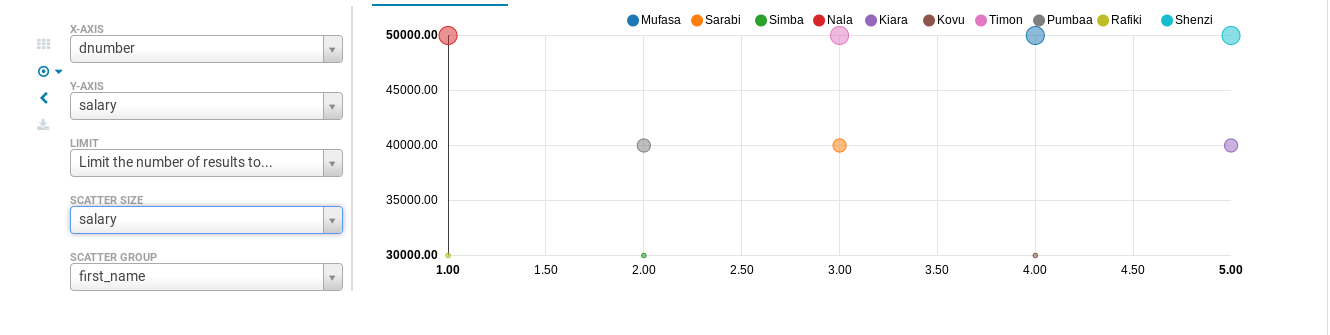


Figure N14.14

Appendix O15 [↑](#home3)

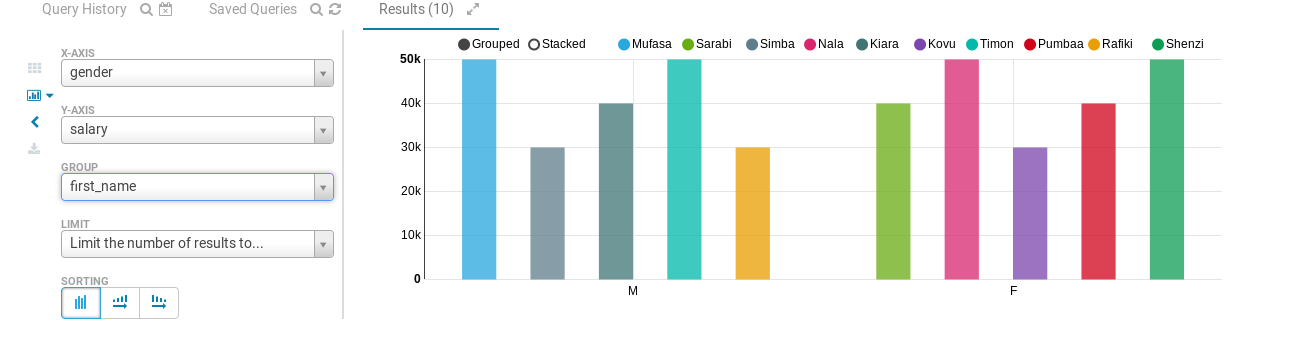


Figure O15.15

Appendix P16 [↑](#home3)

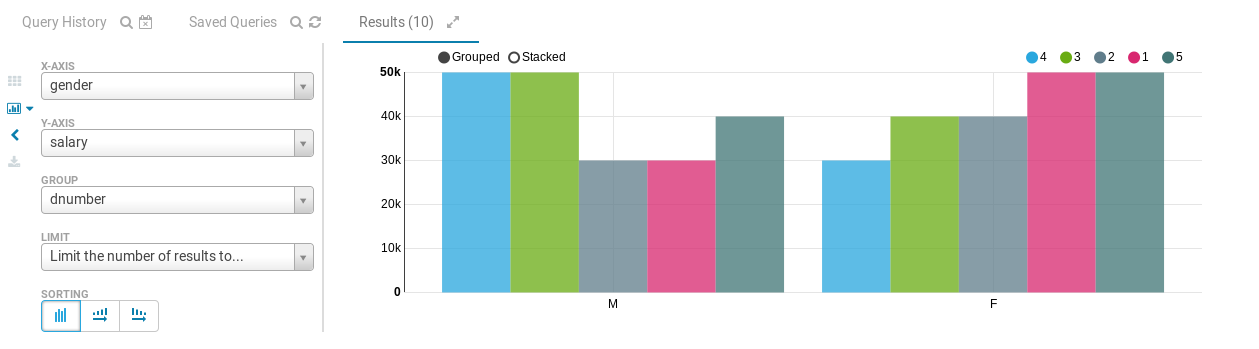


Figure P16.16

Appendix Q17 [↑](#home3)



Figure Q17.17

Appendix R18 [↑](#home3)

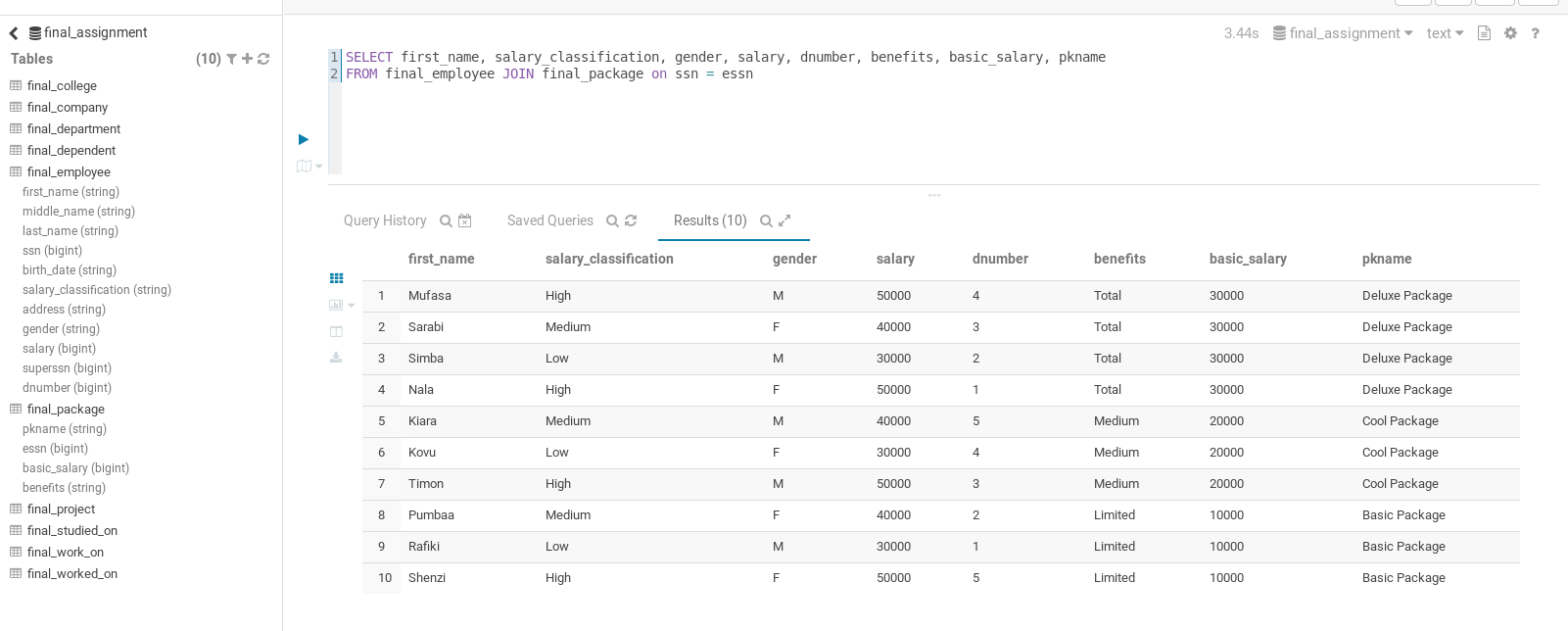


Figure R18.18

Appendix S19 [↑](#home3)

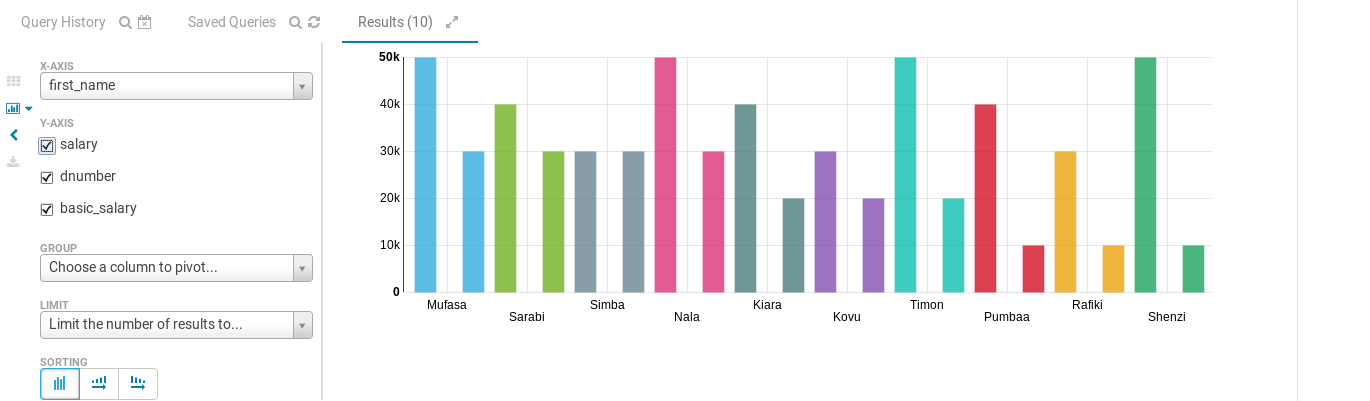


Figure S19.19

Appendix T20 [↑](#home3)

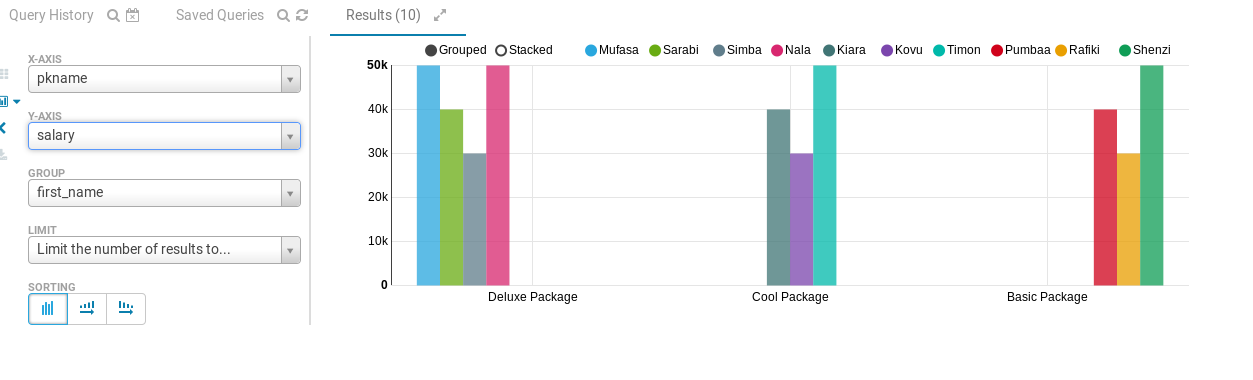


Figure T20.20

Appendix U21 [↑](#home3)

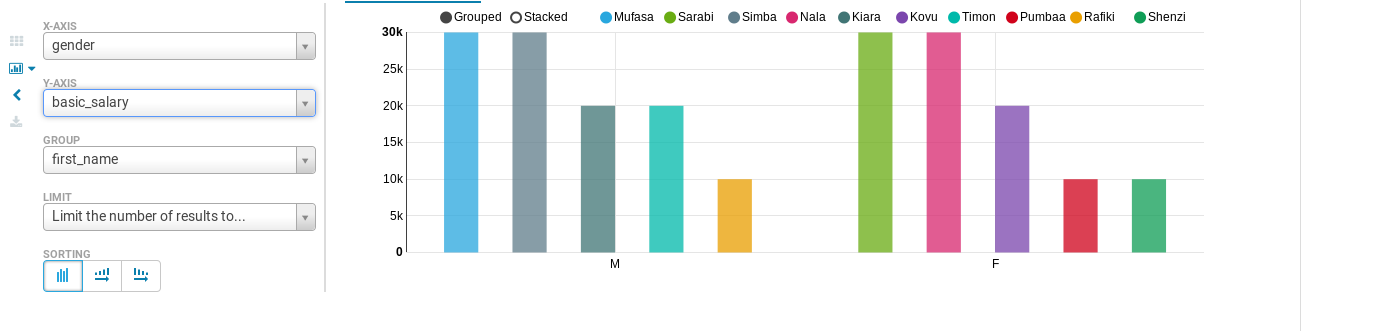


Figure U21.21

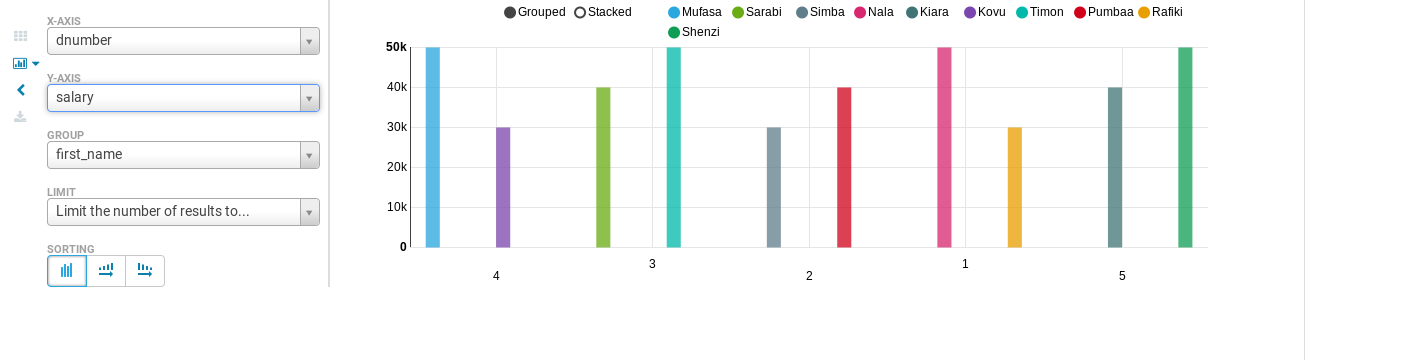
Appendix V22 [↑](#home3)

Figure V22.22

Appendix X23 [↑](#home3)

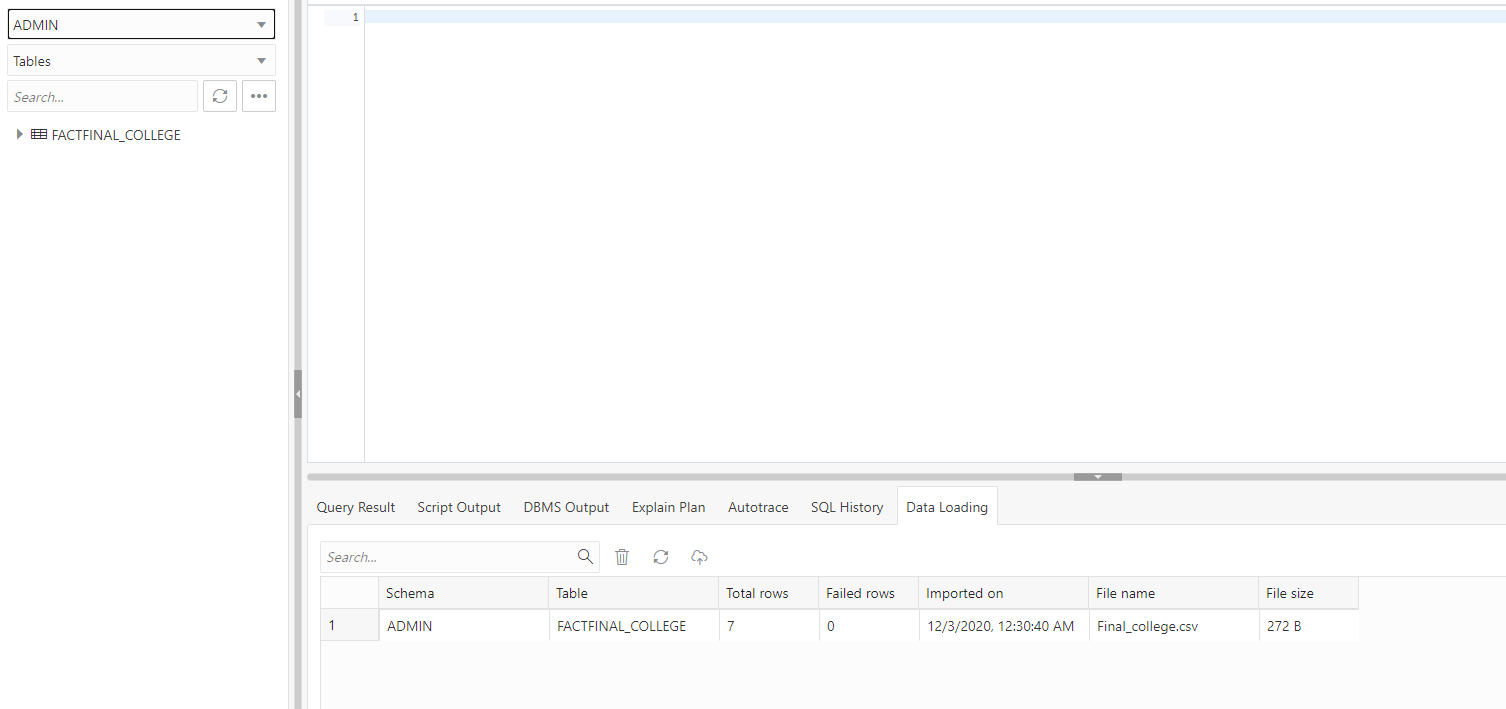


Figure X23.23

Appendix Y24 [↑](#home3)

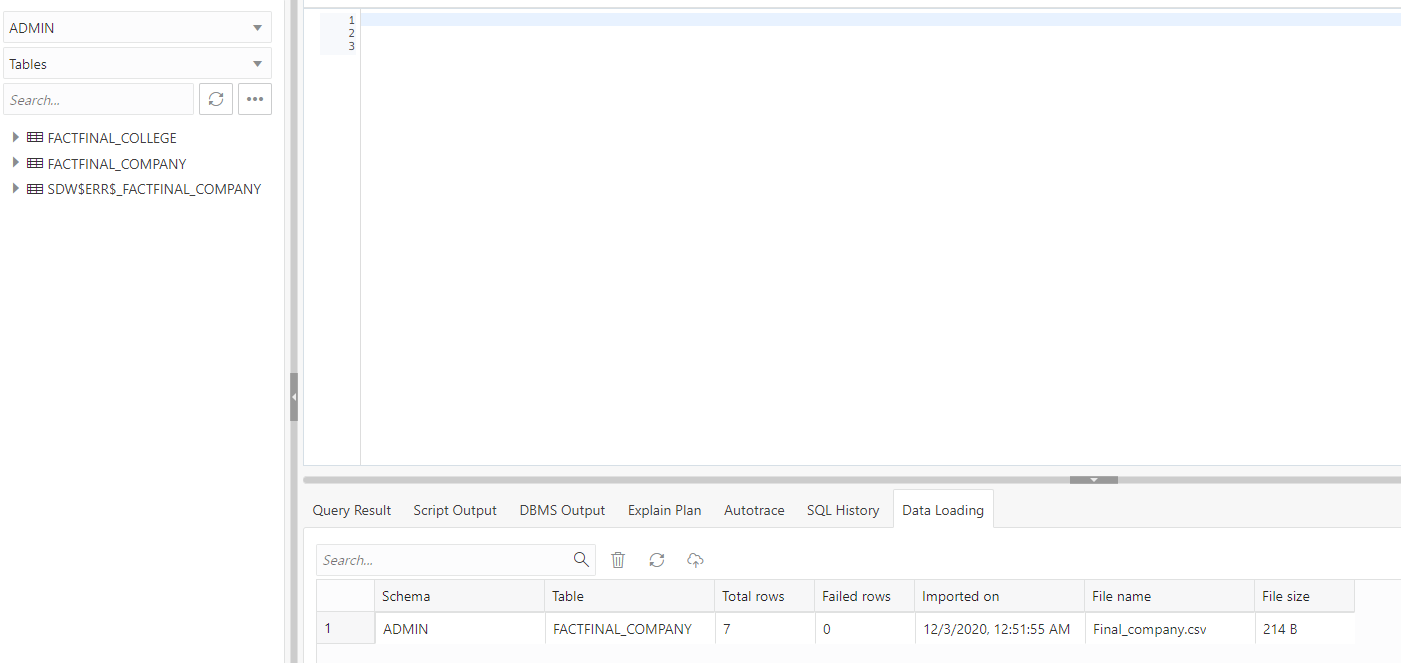


Figure Y24.24

Appendix Z25 [↑](#home3)

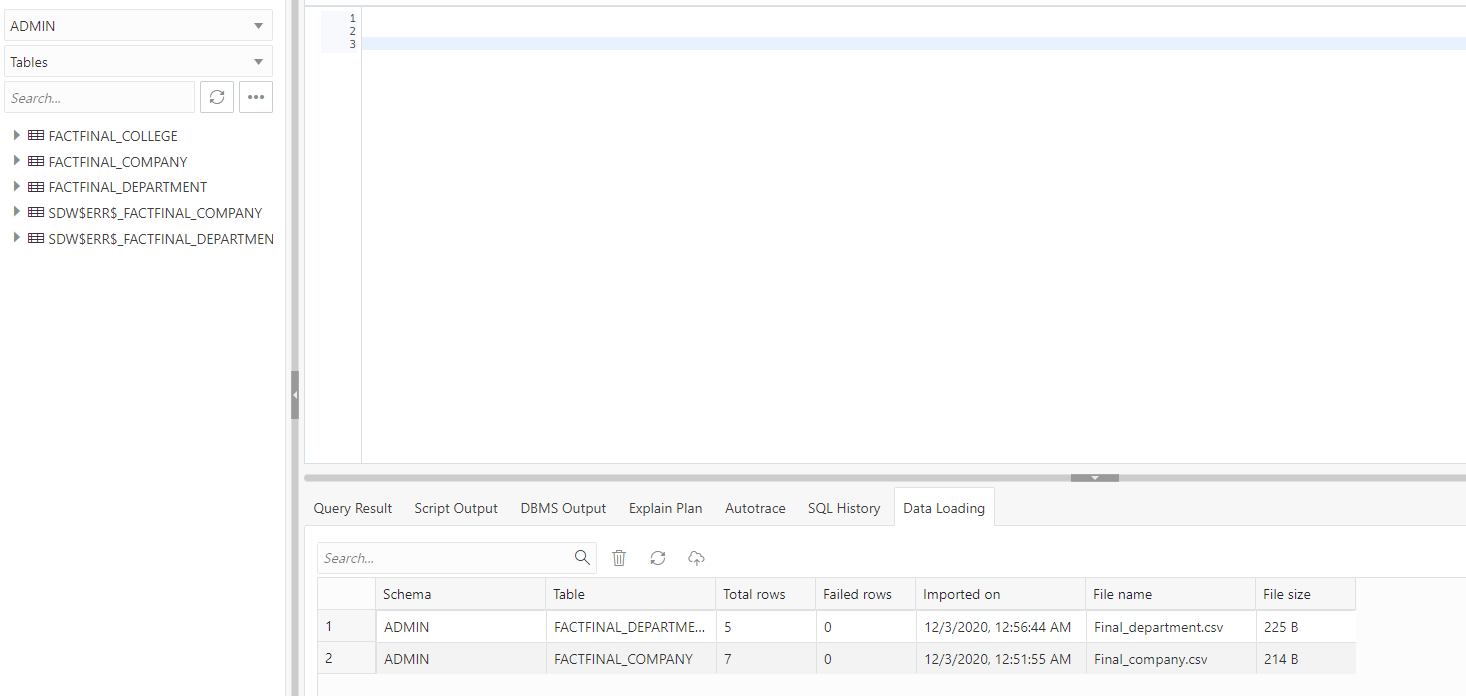


Figure Z25.25

Appendix AA26 [↑](#home3)

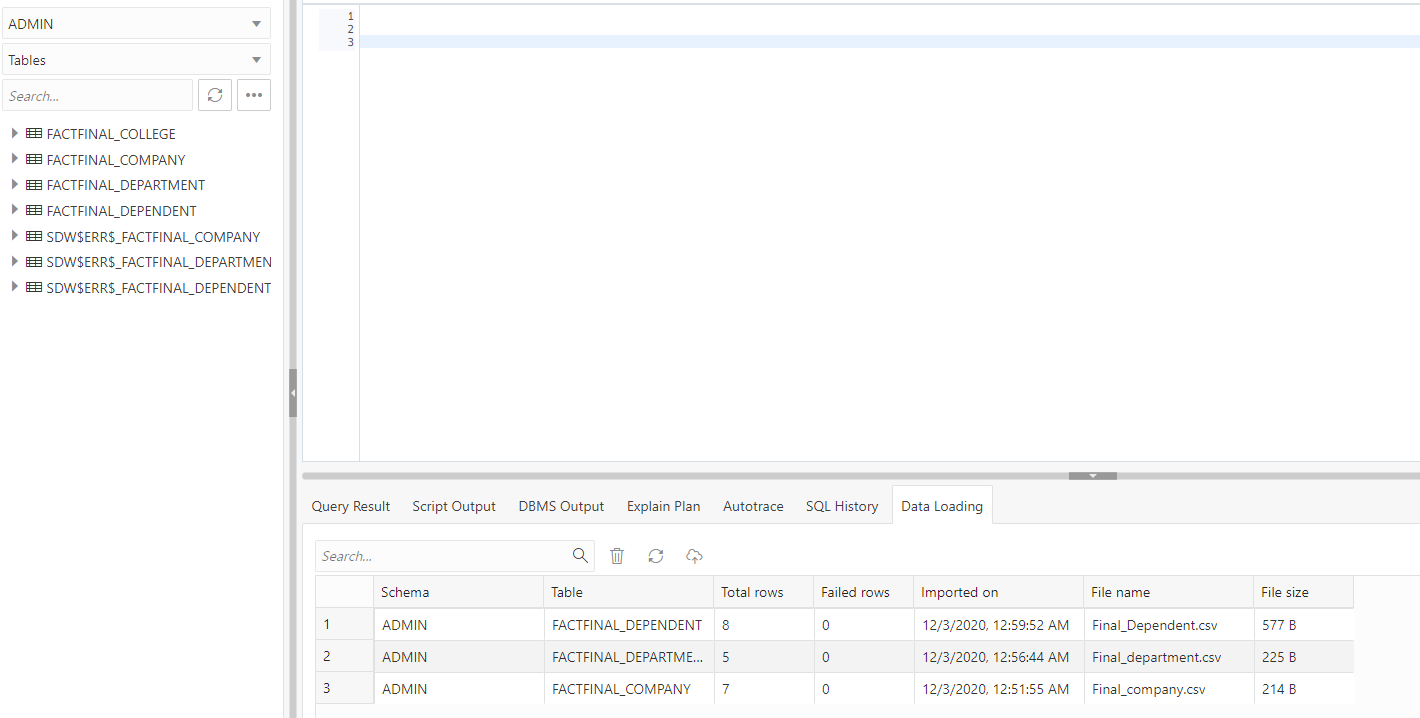


Figure AA26.26

Appendix AB27 [↑](#home3)

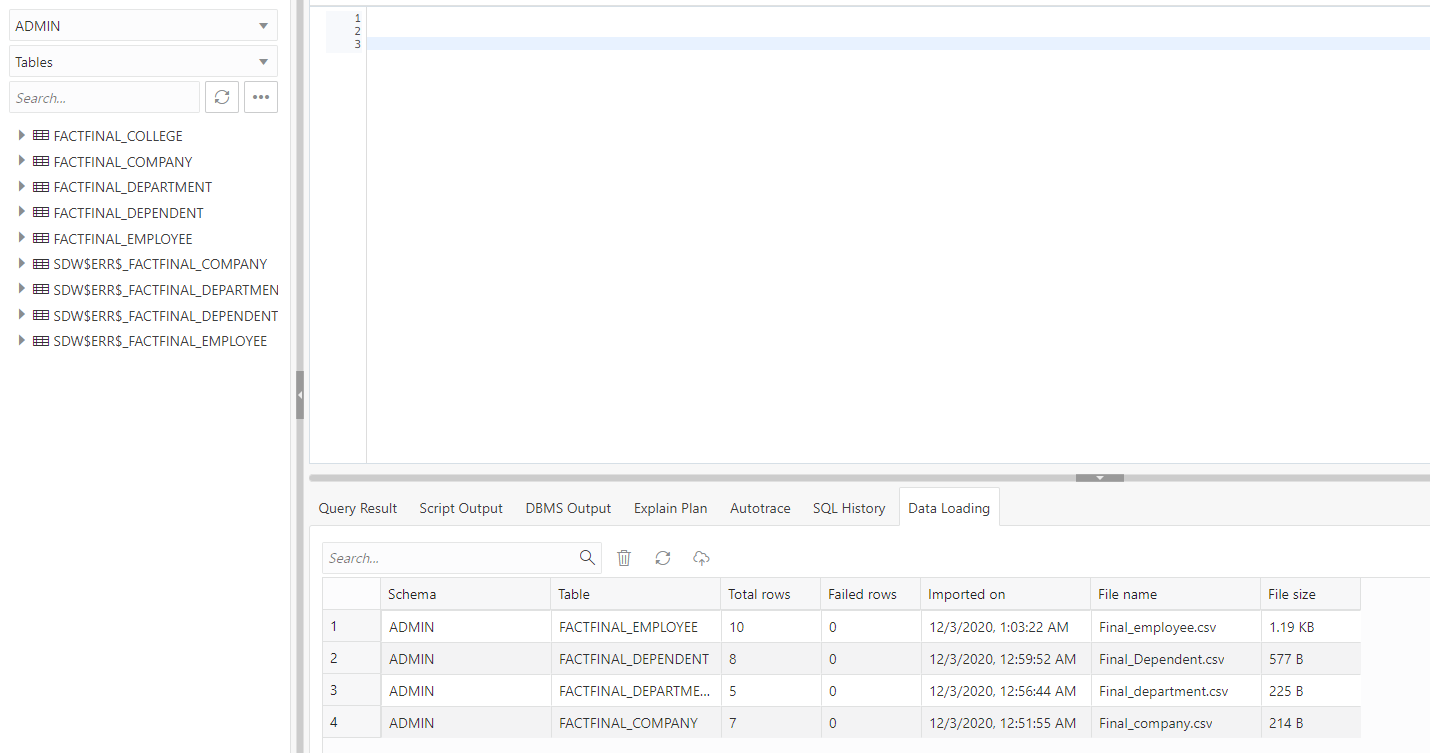


Figure AB27.27

Appendix AC28 [↑](#home3)

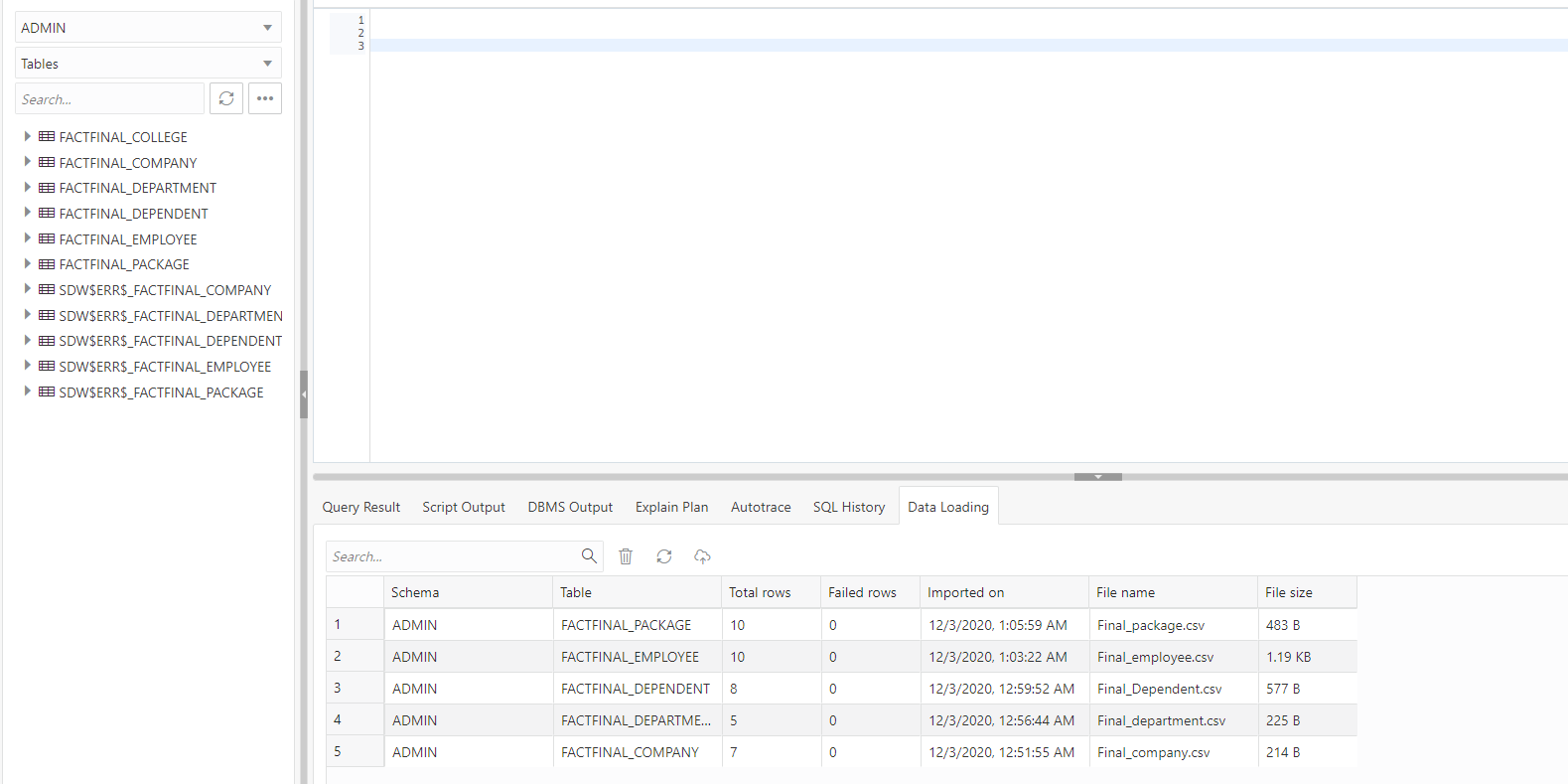


Figure AC28.28

Appendix AD29 [↑](#home3)

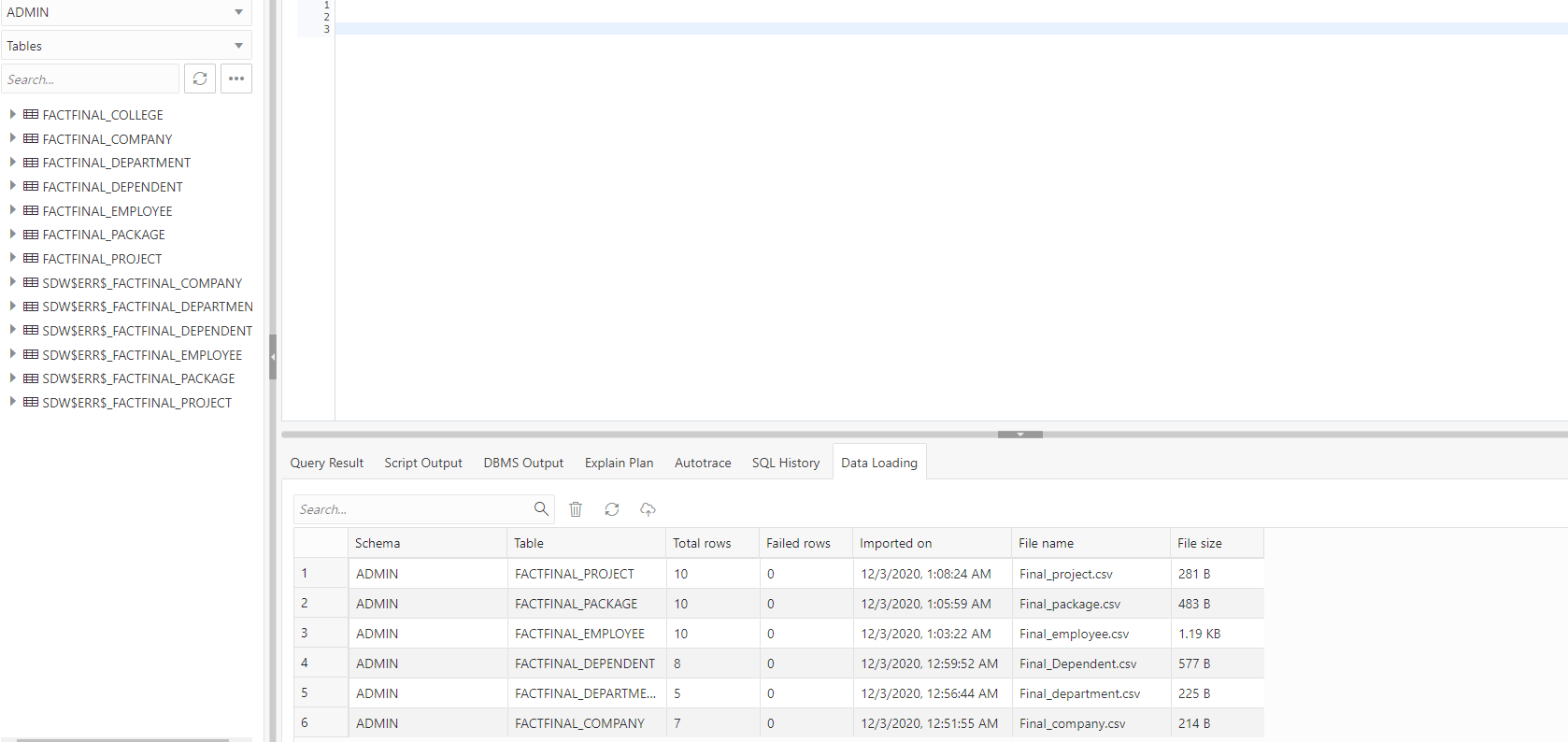


Figure AD29.29

Appendix AE30 [↑](#home3)

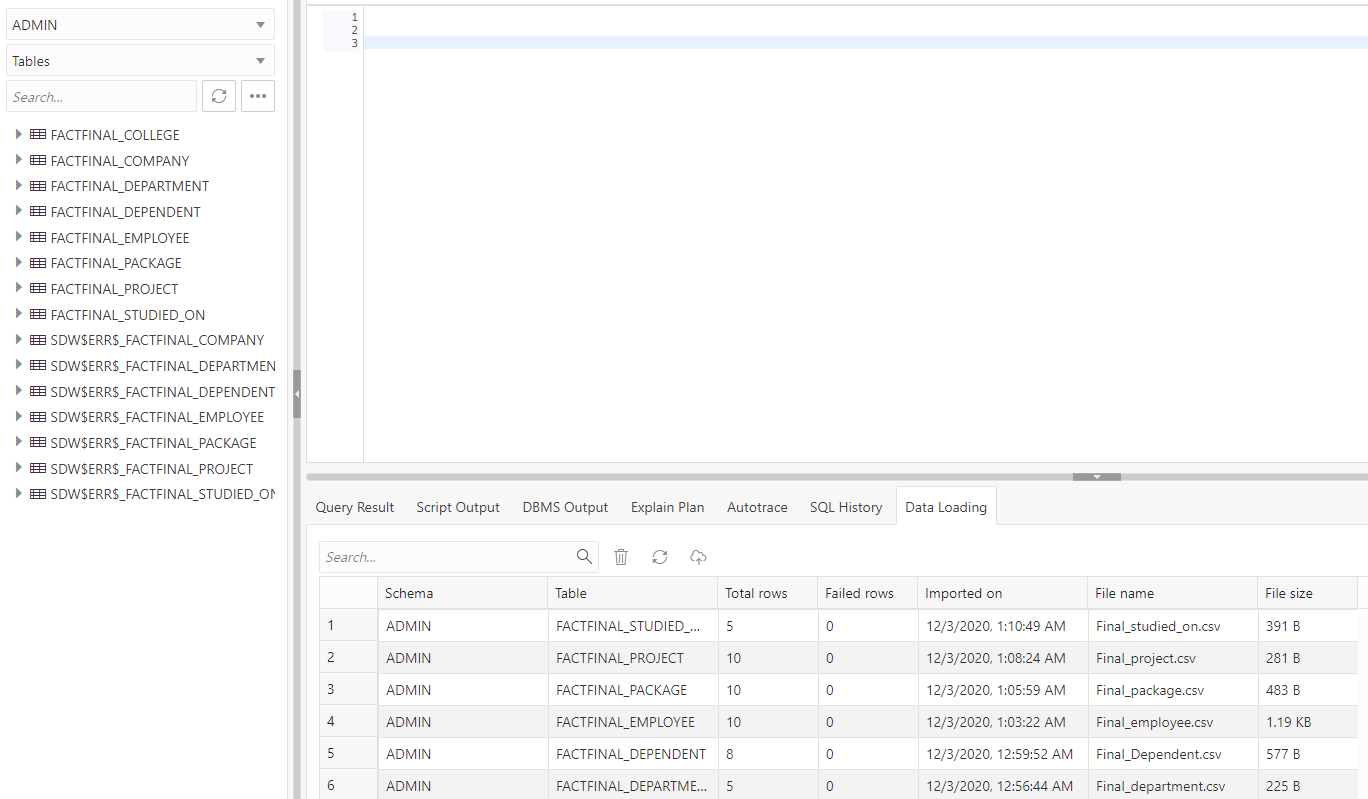


Figure AE30.30

Appendix AF31 [↑](#home3)

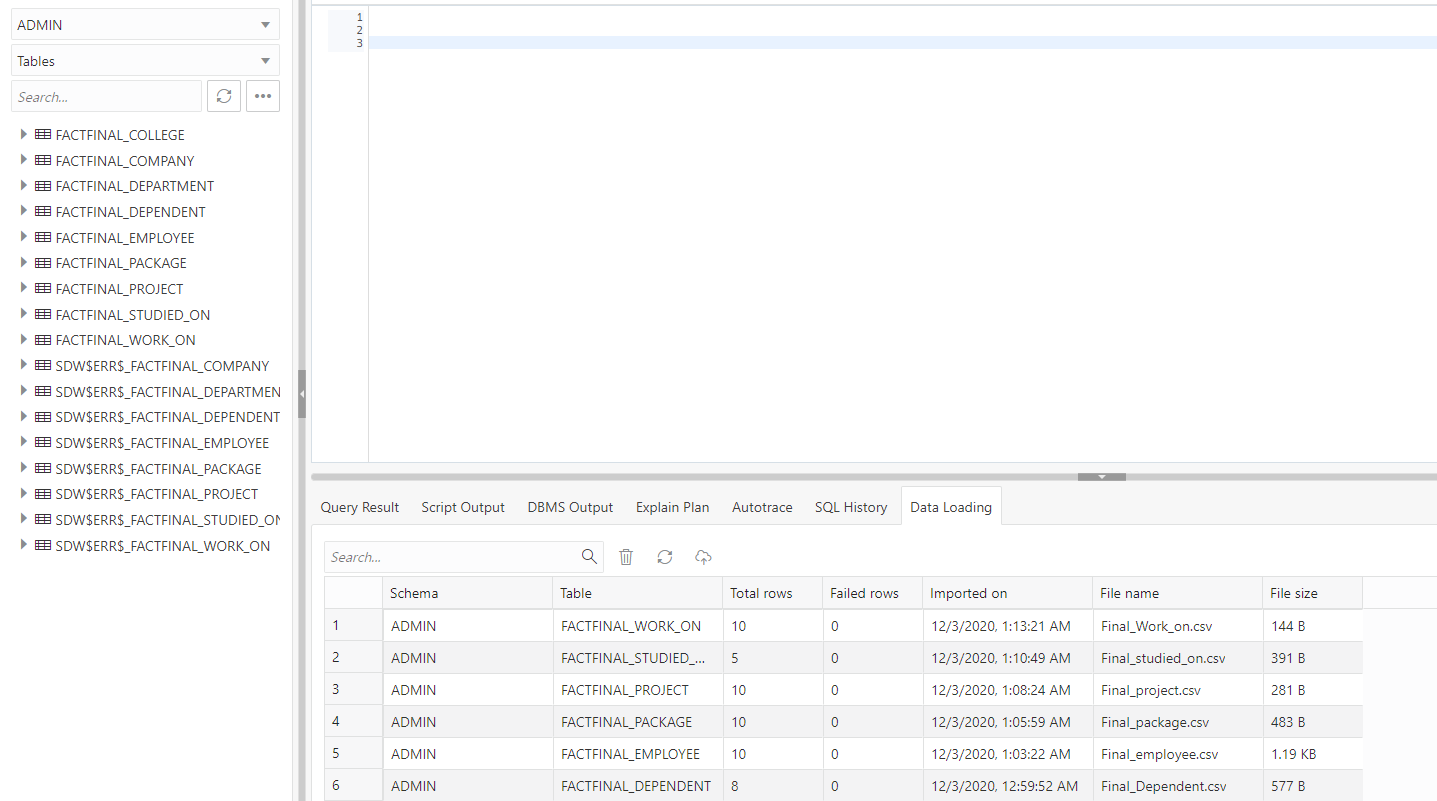


Figure AF31.31

Appendix AG32 [↑](#home3)

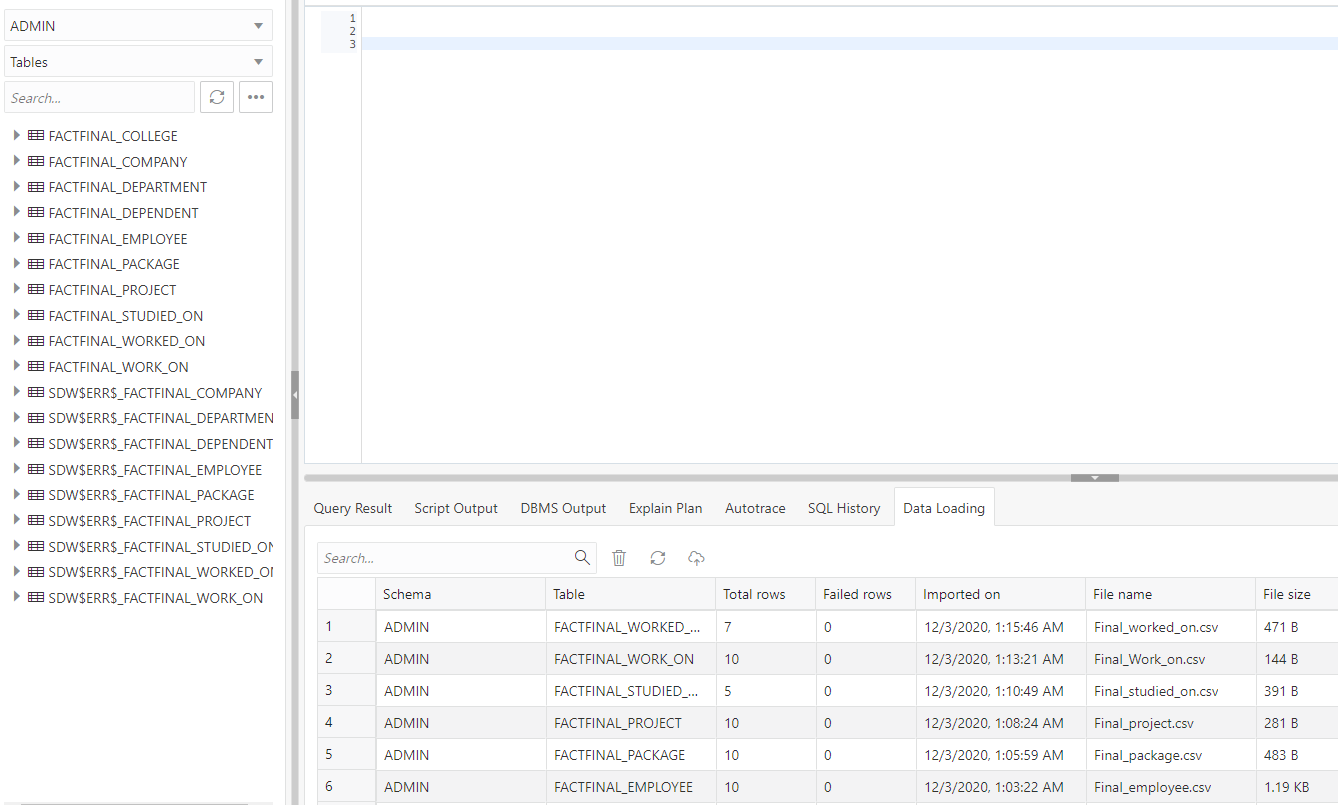


Figure AG32.32

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