

## Role Of Mysql In Research Methodology And Business Analytics

Dr K.Suryanarayana <sup>a</sup>, Dr. S.Thamraiselvi <sup>b</sup> and Mr. D.Ckahradhar <sup>c</sup>

<sup>a</sup>Associate Professor, Dept.of Mgt., Scineces,R.V.R & J.C.Collegeof Engineering,Guntur,AP,India ,(ORCID:0000-0002-7752-203X)

<sup>b</sup> Associate Professor, Department of Business Administration, Cauvery college for women, Annaimalainagar, Tiruhirapalli -620018.

<sup>c</sup> Assistant Professor, Department of Management Scineces, R.V.R & J.C. College of Engineering, Chowdavaram,Guntur-19.

**Article History:** Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 28 April 2021

**Abstract:** In business there are many unanswered questions which has to be addressed like the increase in price, change in colour etc., of a product effect the sales, in order to address them the organizations has to conduct research. In this paper the role of MySQL which is a database tool is explored in research methodology by conducting research and there by answering the questions of industry. MySQL is a structured query language which has the tools like creation, manipulation and control the role of these tools in research methodology and analysis of data in various functional areas is presented in this paper.

**Keywords:** MySQL, Structured Query language, research methodology, DDL, DCL, DML,

### 01. Introduction

**Research** is a process of systematic inquiry that entails collection of data; documentation of critical information; and analysis and interpretation of that data/information, in accordance with suitable methodologies set by specific professional fields and academic disciplines. In this article the role of MySQL is discussed in research.

#### Objectives of the study

1. Understanding the types of Research and their role in Business.
2. Analyzing the various types of MySQL commands related to Business Research.
3. Role of MySQL in Research Methodology

#### Research Methodology

The data can be collected in two ways that is primary and secondary data, the primary data consists of collecting data directly from customers through questionnaire, interviews, observation and other methods. The other type of data collection is secondary data, in this method the data is collected through journals, magazines and other types of sources. In this research secondary data is considered for the study.

The data is collected through secondary sources like journals, magazines, online resources available etc.,

#### **Types of Research**

Most research can be divided into three different categories; exploratory, **descriptive** and causal. Each serves a different end purpose and can only be used in certain ways.

#### **Exploratory research**

Exploratory research is defined as a research used to investigate a problem which is not clearly defined. It is conducted to have a better understanding of the existing problem, but will not provide conclusive results. For such a research, a researcher starts with a general idea and uses this research as a medium to identify issues, that can be the focus for future research.

For example: Consider a scenario where a juice bar owner feels that increasing the variety of juices will enable increase in customers, however he is not sure and needs more

#### **Descriptive Research**

Descriptive research is defined as a research method that describes the characteristics of the population or phenomenon that is being studied. This methodology focuses more on the “what” of the research subject rather than the “why” of the research subject.

In other words, descriptive research primarily focuses on describing the nature of a demographic segment, without focusing on “why” a certain phenomenon occurs. In other words, it “describes” the subject of the research, without covering “why” it happens.

For example, an apparel brand that wants to understand the fashion purchasing trends among New York buyers

will conduct a demographic survey of this region, gather population data and then conduct descriptive research on this demographic segment.

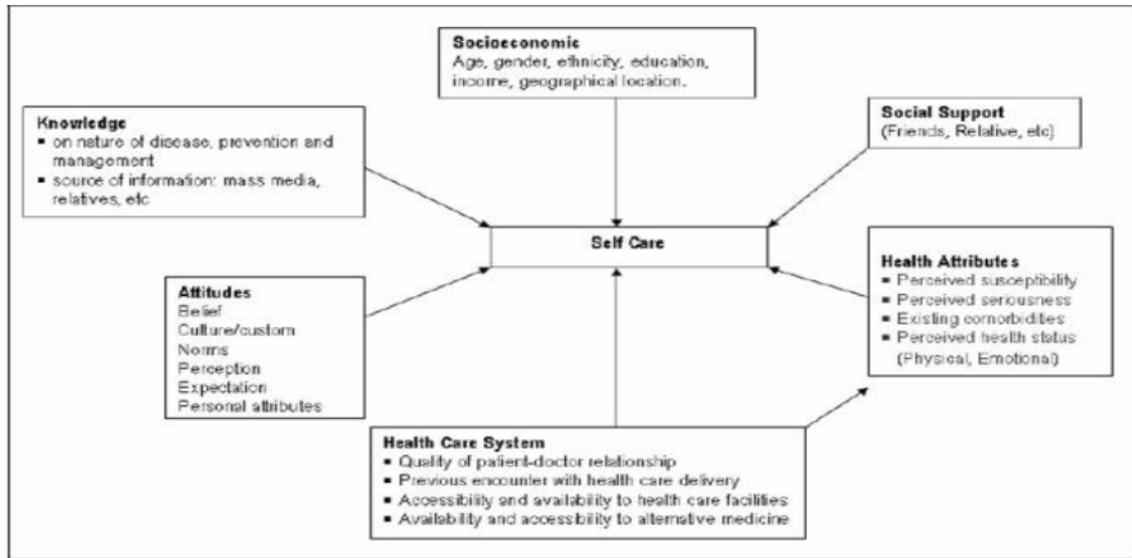
**Causal Research**

Causal research falls under the category of conclusive research, because of its attempt to reveal a cause and effect relationship between two variables. Like descriptive research, this form of research attempts to prove an idea put forward by an individual or organization. However, it significantly differs on both its methods and its purpose. Where descriptive research is broad in scope, attempting to better define any opinion, attitude, or behaviour held by a particular group. Data from the research will be collected and analyzed using primary and secondary data

**Data Analysis Process** Data Analysis Process is nothing but gathering information by using proper application or tool which allows you to explore the data and find a pattern in it. Based on that, you can take decisions, or you can get ultimate conclusions. Data Analysis consists of the following phases:

Data Requirement Gathering	Data Collection	Data
Cleaning		
Data Analysis	Data Interpretation	Data
Visualization		

**Developing a conceptual framework for Data Collection**



**Business analytics**

Business analytics is the process of collecting, sorting, processing, and studying business data, and using statistical models.

**Data for Business Analytics**

**Business analytics** utilizes big **data**, statistical **analysis**, and **data** visualization to implement organization changes. Predictive **analytics** is an important aspect of this work as it involves available **data** to create statistical models. These models can be used to predict outcomes and inform decision making. Conduct **data** mining (explore **data** to find new patterns and relationships) Complete statistical **analysis** and quantitative **analysis** to explain why certain results occur. Test previous decisions using A/B testing and multivariate testing. Make **use** of predictive modeling and predictive **analytics** to forecast future results.

**Business Analytics in Functional areas**

**Finance** BA is of utmost importance to the finance sector. Data Scientists are in high demand in investment banking, portfolio management, financial planning, budgeting, forecasting, etc. **For example:** *Companies these days have a large amount of financial data. Use of intelligent Business Analytics tools can help use this data to determine the products' prices. Also, on the basis of historical information Business Analysts can study the trends on the performance of a particular stock and advise the client on whether to retain it or sell it.*

**Marketing** Studying buying patterns of consumer behavior, analyzing trends, help in identifying the target audience, employing advertising techniques that can appeal to the consumers, forecast supply requirements, etc. **For example:** *Use Business Analytics to gauge the*

**HR analytics** is the process of collecting and analyzing Human Resource (HR) data in order to improve an organization's workforce performance. ... HR analytics provides data-backed insight on what is working well

and what is not so that organizations can make improvements and plan more effectively for the future.

**CRM Business Analytics** helps one analyse the key performance indicators, which further helps in decision making and make strategies to boost the relationship with the consumers. The demographics, and data about other socio-economic factors, purchasing patterns, lifestyle, etc., are of prime importance to the CRM department. **For example:** The company wants to improve its service in a particular geographical segment. With data analytics, one can predict the customer's preferences in that particular segment, what appeals to them, and accordingly improve relations with customers.

### **The Future of Business Analytics – Predictive and Behavioral Analytics**

The future of the evolution of business analytics is bright as we look to these unprecedented features:

**Real-time analytics:** Real-time analytics are data collected and reported on in-the-moment, or in *real-time*. An example of this might be that an ecommerce store owner could witness a sale coming through the owner's website as it happens.

**Big data:** With huge chunks of historical data available in conjunction with real-time cloud data drawn from a tremendous user base, big data is groundbreaking in its ability to move the evolution of business analytics forward.

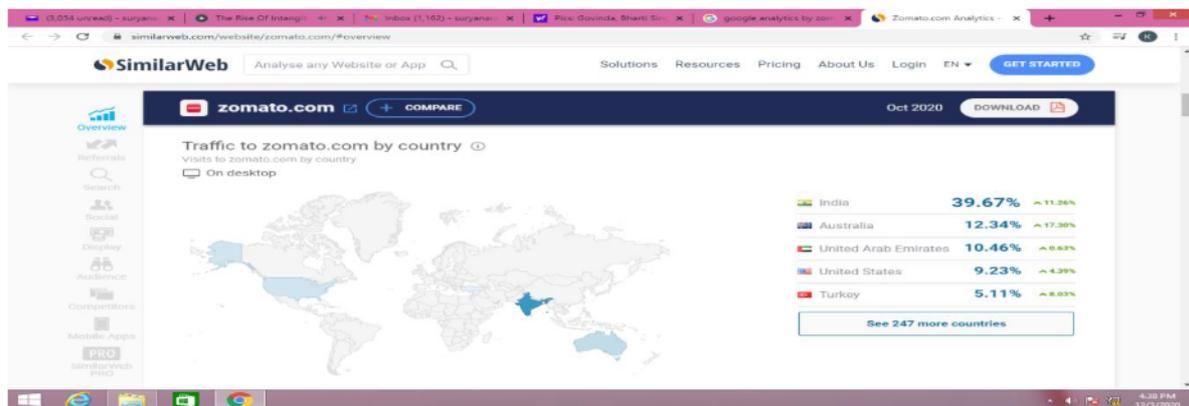
**Predictive analytics:** Based on past trends, predictive analytics looks to big data collected over time to predict future actions.

### **Operational reporting**

This means information was gathered and saved, but typically housed in informational silos that weren't easily shared company-wide. for example, a handwritten ledger that analyzed the company's daily reports. Operational reporting resulted in very little integration and low to zero historical data. Organizationally speaking, the challenge of sharing information was great. The bigger the business, the more challenging the data collection process.

### **Applications of Business Analytics -Zomota**

Source : zomota.com



### **Data Storage and Retrieval through SQL**

SQL has become a requirement for most data science jobs that include: data analyst, BI (Business Intelligence) developer, programmer, database programmer. SQL will let you communicate with the database and work with your data.

SQL can be used with all application programming languages like PHP, Java. You can create your own data visualizations by integrating SQL in the application or get data from the database. Databases have evolved over the years, as Big Data has become the talk of the town and data used in our daily lives, NoSQL databases are becoming popular. Learning SQL will help you build a strong foundation in databases and help to understand when to use structured databases and when to use NoSQL databases and appreciate their differences.

### A Sample Relational Database

customer-id	customer-name	customer-street	customer-city
192-83-7465	Johnson	12 Alma St.	Palo Alto
019-28-3746	Smith	4 North St.	Rye
677-89-9011	Hayes	3 Main St.	Harrison
182-73-6091	Turner	123 Putnam Ave.	Stamford
321-12-3123	Jones	100 Main St.	Harrison
336-66-9999	Lindsay	175 Park Ave.	Pittsfield
019-28-3746	Smith	72 North St.	Rye

(a) The customer table

account-number	balance
A-101	500
A-215	700
A-102	400
A-305	350
A-201	900
A-217	750
A-222	700

(b) The account table

customer-id	account-number
192-83-7465	A-101
192-83-7465	A-201
019-28-3746	A-215
677-89-9011	A-102
182-73-6091	A-305
321-12-3123	A-217
336-66-9999	A-222
019-28-3746	A-201

(c) The depositor table

Relate multiple tables using Primary and Foreign Keys. Each row in a relational database is identified uniquely by a *Primary Key (PK)*. You can refer to another table using a *Foreign Key (FK)*. For example:

Empno (PK)	Ename	Job	Deptno (FK)
101	A	Salesman	10
102	B	Manager	10
103	c	Manager	20

Deptno (PK)	dname	loc
10	Sales	Chicago
20	Sales	Chicago
30	Finance	New York



Relational databases can be accessed using **Structured Query Language or SQL**. Every database will support ANSI SQL that is the standard SQL but also will have its own syntax to facilitate in some operations. In this tutorial, you will learn ANSI SQL so that you can work with all databases. ANSI SQL can be divided into **five** sections. I will name them all but here only two sections that are relevant **Data Retrieval** and **Data**

#### Manipulation Language(DML)

- 1.Data Retrieval:
  - Select.
- 2.Data Manipulation Language (DML):
  - Insert, Update, Delete , Merge
- 3.Data Definition Language (DDL):
  - Create, Alter, Drop, Rename
- 4.Data Control Language (DCL):
  - Grant, Revoke.
- 5.Transaction Control:
  - Commit, Rollback

There different vendors available for RDBMS. Most common and most used ones are:

- Oracle (Oracle Corporation)
- Microsoft SQL Server(Microsoft)
- MySQL (Oracle Corporation)
- PostgreSQL (PostgreSQL Global Development Group)
- SQLite (Developed by D. Richard Hipp )

#### SQL and Data Reporting

The following sample database schema:

Consider a database with two tables named **emp** that holds employee data and **dept** table that holds records about departments.

The **emp** table has employee number (empno), employee name (ename), salary (sal), commission (comm), job name (job), manager id (mgr), hire date (hiredate) and, department number (deptno). As Manager is also an employee and will have an employee number, mgr is from one of the empno whose job is "MANAGER". The **dept** table has department no (deptno), department name (dname) and location of the department (loc).

**Employee table**

Empno (PK)	Ename	job	Mgr	hiredate	sal	comm	Deptno (FK)
7369	SMITH	CLERK	7902	17-DEC-80	800		20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81	1250	500	30
7566	JONES	MANAGER	7839	02-APR-81	2975		20
7654	BLAKE	MANAGER	7839	01-MAY-81	2850		30

**Department table**

Deptno (PK)	dname	loc
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO



Source: Datacamp.com

### Retrieving Data Using SELECT Statement

A SELECT statement retrieves information from the database. Using a SELECT statement, you can do the following:

- 1. Projection:**The projection capability in SQL to choose the columns in a table that you want to be returned by your query. You can choose as few or as many columns in the table as you require.
- 2. Selection:**The selection capability in SQL to choose the rows in a table that you want to be returned by a query. *Y*
- 3. Joining:**The join capability in SQL to bring together data that is stored in different tables by creating a link between them.

**To select all attributes and all rows from table \* operator is used:**

```
SELECT *
FROM employee;
The output will be:
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	800	20	
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81	1250	500	30
7566	JONES	MANAGER	7839	02-APR-81	2975	20	
7698	BLAKE	MANAGER	7839	01-MAY-81	2850	30	

This can also create an expression using +,-,/,\* operators on the date and number data to generate required data. For example, you are asked to find out 20% of the salary of all employees. The query will be as follows:

```
SELECT ename, sal*(20/100)
FROM employee;
Output:
```

ENAME	SAL*(20/100)
SMITH	160
ALLEN	320
WARD	250
JONES	595
BLAKE	570

**Column Aliases and Concatenation**

In above outputs, that the column name is the same as the database field or the expression you select. Sometimes, while generating reports you want to give your own names to headers. This can be done using **aliases**.

```
SELECT ename AS "Emp Name", sal*(20/100) as "20% of Salary"
```

```
FROM employee;
```

Output:

Emp Name	20% of Salary
SMITH	160
ALLEN	320
WARD	250
JONES	595
BLAKE	570

Eliminate such rows by using the DISTINCT keyword in the SELECT clause.

```
SELECT distinct ename, deptno, job
```

```
FROM employee;
```

DEPTNO
30
20

**Conditional Operators**

Operator	Meaning
=	Equal to
!= OR <>	Not equal to
>	Greater than
>=	Greater than and Equal to
<	Less than
<=	Less than and Equal to
BETWEEN..AND	Allows to define range <i>BETWEEN 100 AND 500</i>
IN(value1, value2,..)	Match to any of the items in list
IS NULL	Return
LIKE	Match given pattern

**Logical Conditional Operators**

Operator	Meaning
AND	Return TRUE if all conditions are TRUE
OR	Return TRUE if any one of the conditions is TRUE
NOT	Returns TRUE if condition is FALSE



Source : datacamp.com

```
SELECT ename
```

```
FROM employee
```

```
WHERE job='MANAGER' AND deptno=30;
```

```
ENAME
```

```
-----
```

```
BLAKE
```

Make complex conditions using all three AND, OR and NOT operators. The precedence is:

- 1.NOT
- 2.AND
- 3.OR

Find all employees whose job is not CLERK and belong to department 20:

```
SELECT ename, job
```

```
from employee
```

```
WHERE NOT job='SALESMAN' AND sal>800;
ENAME   JOB
-----
JONES   MANAGER
BLAKE   MANAGER
```

**LIKE:**

LIKE uses two wildcards: percentage % and underscore \_ to represent the number of characters in the pattern.

SELECT \*

FROM employee

WHERE ename LIKE 'B%';

```
EMPNO ENAME   JOB          MGR HIREDATE    SAL   COMM  DEPTNO
-----
7698 BLAKE   MANAGER     7839 01-MAY-81 2850   30
```

**IN(value1,value2, value3,..):**

The IN() function can take one, two or multiple values and allows you to match a column to the given values in parentheses in the WHERE clause:

SELECT ename, job, hiredate

FROM employee

WHERE job IN ('CLERK','SALESMAN');

```
ENAME   JOB      HIREDATE
-----
SMITH   CLERK    17-DEC-80
ALLEN   SALESMAN 20-FEB-81
WARD    SALESMAN 22-FEB-81
```

Also use a **SELECT** statement in IN() that will return some values. For example:

SELECT ename, job, hiredate

FROM employee

WHERE deptno IN (select deptno FROM department WHERE loc='CHICAGO');

```
ENAME   JOB      HIREDATE
-----
ALLEN   SALESMAN 20-FEB-81
WARD    SALESMAN 22-FEB-81
BLAKE   MANAGER  01-MAY-81
```

**IS NULL:**

**IS NULL** is used to check for NULL values in a given attribute. For example, find all employees who don't have commission:

SELECT ename, job, sal

FROM employee

WHERE comm IS NULL;

```
ENAME   JOB      SAL
-----
SMITH   CLERK    800
JONES   MANAGER  2975
BLAKE   MANAGER  2850
```

If you want to get names of employees who earned a commission then you will use **IS NOT NULL:**

SELECT ename, job, sal, comm

FROM employee

WHERE comm IS NOT NULL;

```
ENAME   JOB      SAL   COMM
-----
ALLEN   SALESMAN 1600  300
WARD    SALESMAN 1250  500
```

To filter results on using date columns you have to use default date format. If some other format is to be used, date functions need to be applied which you will see later in this tutorial. Find all employees who were hired after 21 February 1981:

(Here Oracle default date format is used)

SELECT ename, job, sal, comm

FROM employee

```
WHERE hiredate>'21-FEB-81';
ENAME  JOB      SAL  COMM
-----
WARD   SALESMAN 1250  500
JONES  MANAGER  2975
BLAKE  MANAGER  2850
```

Order your results **ascending (ASC)** or **Descending (DESC)** by any attribute or multiple attributes of the table. You can also order by aliases that you specify in SELECT clause:

```
SELECT ename, job, sal, comm
FROM employee
WHERE hiredate>'21-FEB-81'
ORDER BY sal desc;
ENAME  JOB      SAL  COMM
-----
JONES  MANAGER  2975
BLAKE  MANAGER  2850
WARD   SALESMAN 1250  500
```

Specify multiple columns in ORDER BY clause that will execute in order of the columns specified. For example, sort employees first by their deptno in ascending order and then names in descending:

```
SELECT ename, job, sal, comm, deptno
FROM employee
WHERE hiredate>'21-FEB-81'
ORDER BY deptno ASC, ename DESC;
ENAME  JOB      SAL  COMM  DEPTNO
-----
JONES  MANAGER  2975      20
WARD   SALESMAN 1250  500   30
BLAKE  MANAGER  2850      30
```

Count all employees whose name start with 'A':

```
SELECT count(ename)
FROM employee
WHERE ename LIKE 'A%';

Output:

COUNT(ENAME)
-----
1
```

Find total salary, average salary, minimum salary and maximum salary in table employee:

```
SELECT sum(sal) as "TOTAL SAL", avg(sal) as "AVG SAL", min(sal) as "MIN SAL", max(sal) as "MAX SAL"
FROM employee;

TOTAL SAL  AVG SAL  MIN SAL  MAX SAL
-----
9475      1895      800      2975
```

Also calculate **Variance** and **Standard Deviation** of values using following functions:

For Oracle and MySQL	MS SQL SERVER
SELECT STDDEV(column_name) FROM table_name;	SELECT STDEV(column_name) FROM table_name;
SELECT VARIANCE(column_name) FROM table_name;	SELECT VAR(column_name) FROM table_name;

Cartesian product operation also called as **Cross Join** multiplies two tables to form a relation that consists of all possible pairs of tuples from two tables. If one relation say, R has *I* tuples with *M* number of attributes and other relation say S has *J* tuples *N* attributes cartesian product will have **IxJ** tuples with **M+N** attributes. A cartesian product can be formed using the SQL complaint CROSS JOIN as well.

```
SELECT empno, ename, dname
```

```

FROM employee, department;

OR

SELECT empno, ename, dname
FROM employee CROSS JOIN department;
  EMPNO  ENAME  DNAME
  -----
  7369    SMITH  ACCOUNTING
  7499    ALLEN  ACCOUNTING
  7521    WARD   ACCOUNTING
  7566    JONES  ACCOUNTING
  7698    BLAKE  ACCOUNTING
  7369    SMITH  RESEARCH
  7499    ALLEN  RESEARCH
  7521    WARD   RESEARCH
  7566    JONES  RESEARCH
  7698    BLAKE  RESEARCH
  7369    SMITH  SALES

  EMPNO  ENAME  DNAME
  -----
  7499    ALLEN  SALES
  7521    WARD   SALES
  7566    JONES  SALES
  7698    BLAKE  SALES
    
```

**Findings:**

The following are the findings of the paper

1. It was found that reserach methodology analysis can be done by the MySQL commands apart from the existitng packages like SPSS.
2. MySQL consists of commands like standard deviation, correlation, varionce and other commands useful for the research methodology.
3. The data collected through research can be stored in the columns and it can be retrieved depending on the requirement, the above said commands can be used on the data collected for the purpose of research methodology.
4. It was also found that the data collected cane be stored in data marts and data warehouses and can be analyzed in various ways using MySQL commnads.

**Suggestions:**

The Myql used in this article is helpful in storing the huge amount of data in the form of data warehouse, data mart, big data etc., whereas other packages may not support huge data again it has to be stored in databases like MySQL.

One of the advantage of MySQL when compared to other packages is that the time taken for rertieval of data is minimized because the data and the commands are in the same location, but where as the packages like SPSS requires seperate data management techniques.

There are several commands in MySQL which are helpful for research methodology like standard deviation, varaiance and correlation. The researcher will be at an advantageous position when using MySQL.

**Conclusion**

In the present trend information technology is playing a crucial role in business and is generating huge data when the businnesses are done online, keeping this in view the tools like MySQL has to be used to get insights into the business.

**References:**

- 1.1.Introduction to Oracle 10g-SQL Lecture by Tanveer Zahid Khan (Senior Assistant Professor, Department of Computer Science, Bahria University)
- 2.[https://docs.oracle.com/cd/B19306\\_01/server.102/b14200/operators005.html](https://docs.oracle.com/cd/B19306_01/server.102/b14200/operators005.html)
- 3.[https://en.wikipedia.org/wiki/Set\\_operations\\_\(SQL\)#EXCEPT\\_operator](https://en.wikipedia.org/wiki/Set_operations_(SQL)#EXCEPT_operator)
- 4.[https://www.w3schools.com/sql/sql\\_datatypes.asp](https://www.w3schools.com/sql/sql_datatypes.asp)
- 5.[https://docs.oracle.com/cd/B28359\\_01/server.111/b28318/datatype.htm#CNCPT012](https://docs.oracle.com/cd/B28359_01/server.111/b28318/datatype.htm#CNCPT012)