Recognizing Data Types

ORACLE Academy

What Will I Learn?

In this lesson, you will learn how to:

- Define data type and explain why it is needed
- List and describe categories of data types
- Give examples of scalar, composite, and large object (LOB) data types
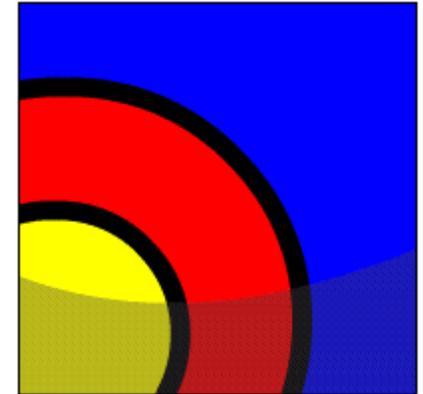
💡 Why Learn It?

Every constant, variable, and parameter has a data type (or type) that specifies for what type and size of data it can be used, plus how it is stored.

PL/SQL provides a variety of predefined data types. For instance, you can choose from integer, floating point, character, Boolean, date, collection, and LOB types.

This lesson introduces the basic types that are used frequently in PL/SQL programs.
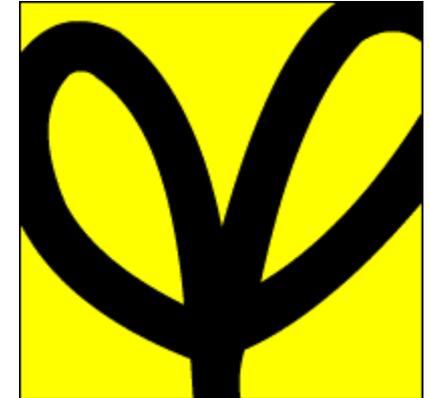
Tell Me/Show Me

PL/SQL Data Types

- A data type specifies a storage format, constraints, and a valid range of values.
- PL/SQL supports five categories of data type:
  - Scalar: Holds a single value.
  - Composite: Contains internal elements that are either scalar (record) or composite (record and table).
  - Large object (LOB): Holds values, called locators that specify the location of large objects (such as graphic images) that are stored out of line.
  - Reference: Holds values, called pointers that point to a storage location.
  - Object: Is a schema object with a name, attributes, and methods. An object data type is similar to the class mechanism supported by C++ and Java.

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Tell Me/Show Me

Scalar Data Types

- Hold a single value

- Have no internal components

- Can be classified into four categories:

  – Character

  – Number

  – Date

  – Boolean

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Tell Me/Show Me

Scalar Data Types: Character (or String)

CHAR [(*maximum_length*)]	Base type for fixed-length character data up to 32,767 bytes. If you do not specify a *maximum_length*, the default length is set to 1.
VARCHAR2 (*maximum_length*)	Base type for variable-length character data up to 32,767 bytes. There is no default size for VARCHAR2 variables and constants.
LONG	Character data of variable length (a bigger version of the VARCHAR2 data type).
LONG RAW	Raw binary data of variable length (not interpreted by PL/SQL).

Tell Me/Show Me

Scalar Data Types: Number

NUMBER [(*precision, scale*)]	Number having precision *p* and scale *s*. The precision *p* can range from 1 to 38. The scale *s* can range from –84 to 127.
BINARY_INTEGER	Base type for signed integers between -2,147,483,647 and 2,147,483,647.
PLS_INTEGER	Base type for signed integers between -2,147,483,647 and 2,147,483,647. PLS_INTEGER and BINARY_INTEGER values require less storage and are faster than NUMBER values.
BINARY_FLOAT BINARY_DOUBLE	New data types introduced in Oracle Database 10*g*. They represent a floating-point number in the IEEE 754 format. BINARY_FLOAT requires 5 bytes to store the value and BINARY_DOUBLE requires 9 bytes.

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Scalar Data Types: Date

DATE	Base type for dates and times. DATE values include the time of day in seconds since midnight. The range for dates is between 4712 B.C. and A.D. 9999.
TIMESTAMP	The TIMESTAMP data type, which extends the DATE data type, stores the year, month, day, hour, minute, second, and fraction of seconds.
TIMESTAMP WITH TIME ZONE	The TIMESTAMP WITH TIME ZONE data type, which extends the TIMESTAMP data type, includes a time-zone displacement—that is, the difference (in hours and minutes) between local time and Coordinated Universal Time (UTC), formerly known as Greenwich Mean Time.

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Scalar Data Types: Date (continued)

TIMESTAMP WITH LOCAL TIME ZONE	This data type differs from TIMESTAMP WITH TIME ZONE in that when you insert a value into a database column, the value is normalized to the database time zone, and the time-zone displacement is not stored in the column. When you retrieve the value, the Oracle server returns the value in your local session time zone.
INTERVAL YEAR TO MONTH	You use the INTERVAL YEAR TO MONTH data type to store and manipulate intervals of years and months.
INTERVAL DAY TO SECOND	You use the INTERVAL DAY TO SECOND data type to store and manipulate intervals of days, hours, minutes, and seconds.

Tell Me/Show Me

Scalar Data Types: Boolean

BOOLEAN	Base type that stores one of the three possible values used for logical calculations: TRUE, FALSE, or NULL.

Tell Me/Show Me

Composite Data Types

A scalar type has no internal components. A composite type has internal components that can be manipulated individually.

Composite data types include the following:

- TABLE
- RECORD
- NESTED TABLE
- VARRAY

TABLE and RECORD data types are covered later in this course.

Tell Me/Show Me

Composite Data Types (continued)

PL/SQL Record Structure

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PL/SQL table structure

1	SMITH
2	JONES
3	NANCY
4	TIM

↑ PLS_INTEGER   ↑ VARCHAR2
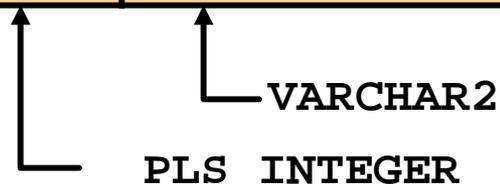
PL/SQL table structure

|	
1	5000
2	2345
3	12
4	3456

↑ PLS_INTEGER   ↑ NUMBER
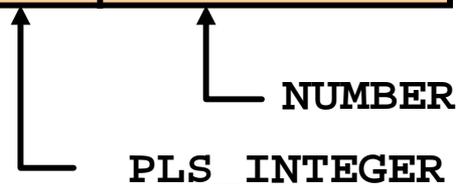
Tell Me/Show Me

LOB Data Type

- Large objects (`LOBs`) are meant to store a large amount of data.

- A database column can be of the `LOB` category.

- There are several categories of `LOB` data types:
  - Character large object (`CLOB`)
  - Binary large object (`BLOB`)
  - Binary file (`BFILE`)
  - National language character large object (`NCLOB`)

- `LOB` data types enable you to store blocks of unstructured data up to 4 gigabytes in size.

- `LOB` data types enable efficient, random, piece-wise access to the data and can be attributes of an object type.

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`LOB` Data Type (continued)

Book (`CLOB`)

Photo (`BLOB`)

Movie (`BFILE`)
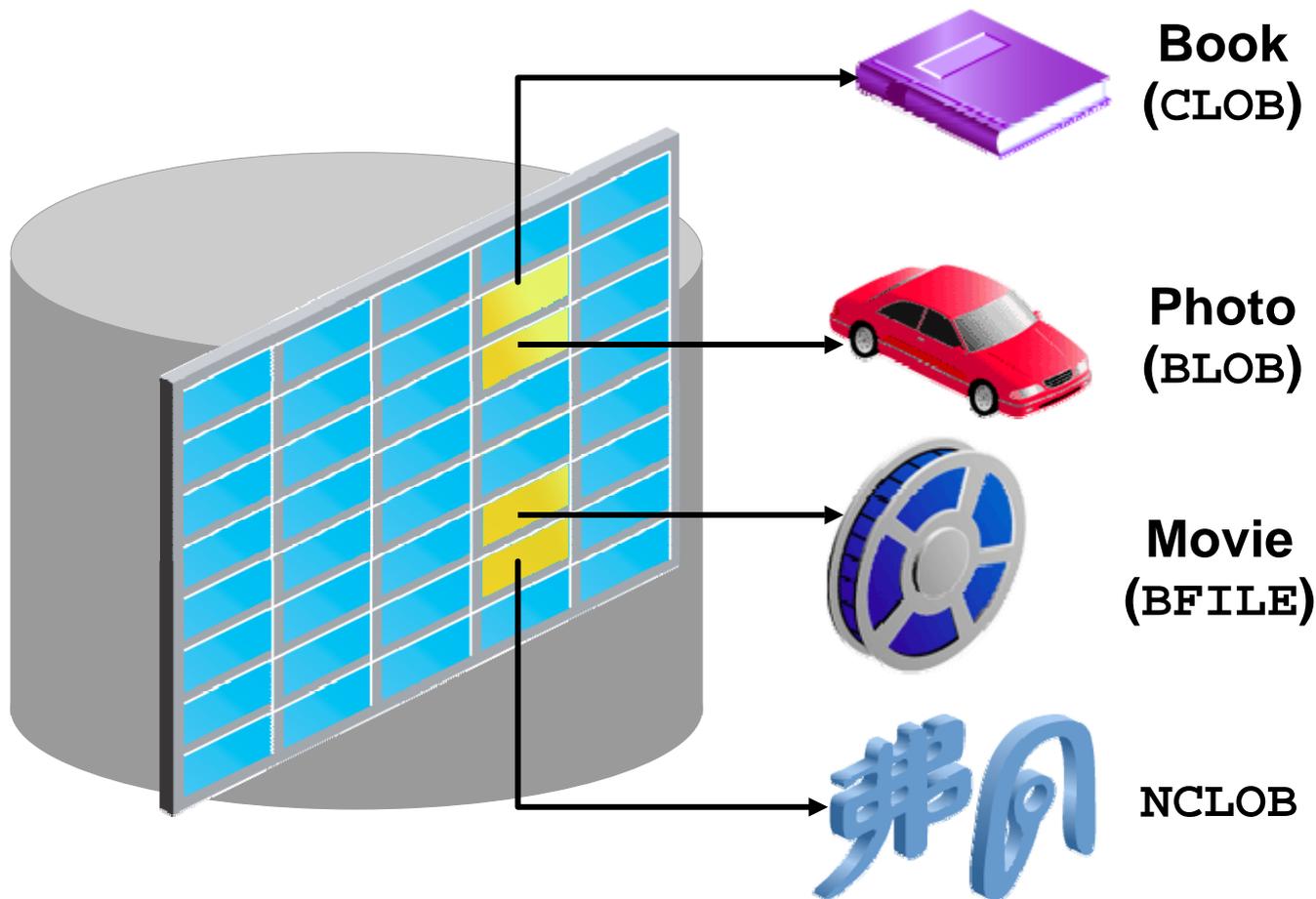
`NCLOB`

Tell Me / Show Me

Terminology

Key terms used in this lesson include:

Scalar

Composite

LOB

Reference

Object

CLOB

BLOB

BFILE

NCLOB
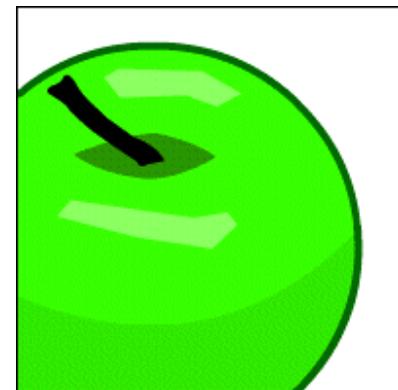
Summary

In this lesson, you have learned how to:

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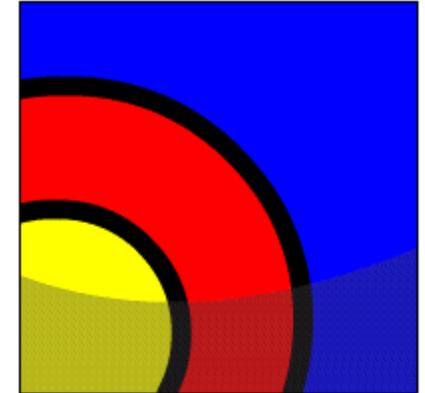
Try It/Solve It

This practice covers the following topics:

- Defining data type and explaining why it is needed

- Listing and describing categories of data types

- Giving examples of scalar, composite, and large object (LOB) data types