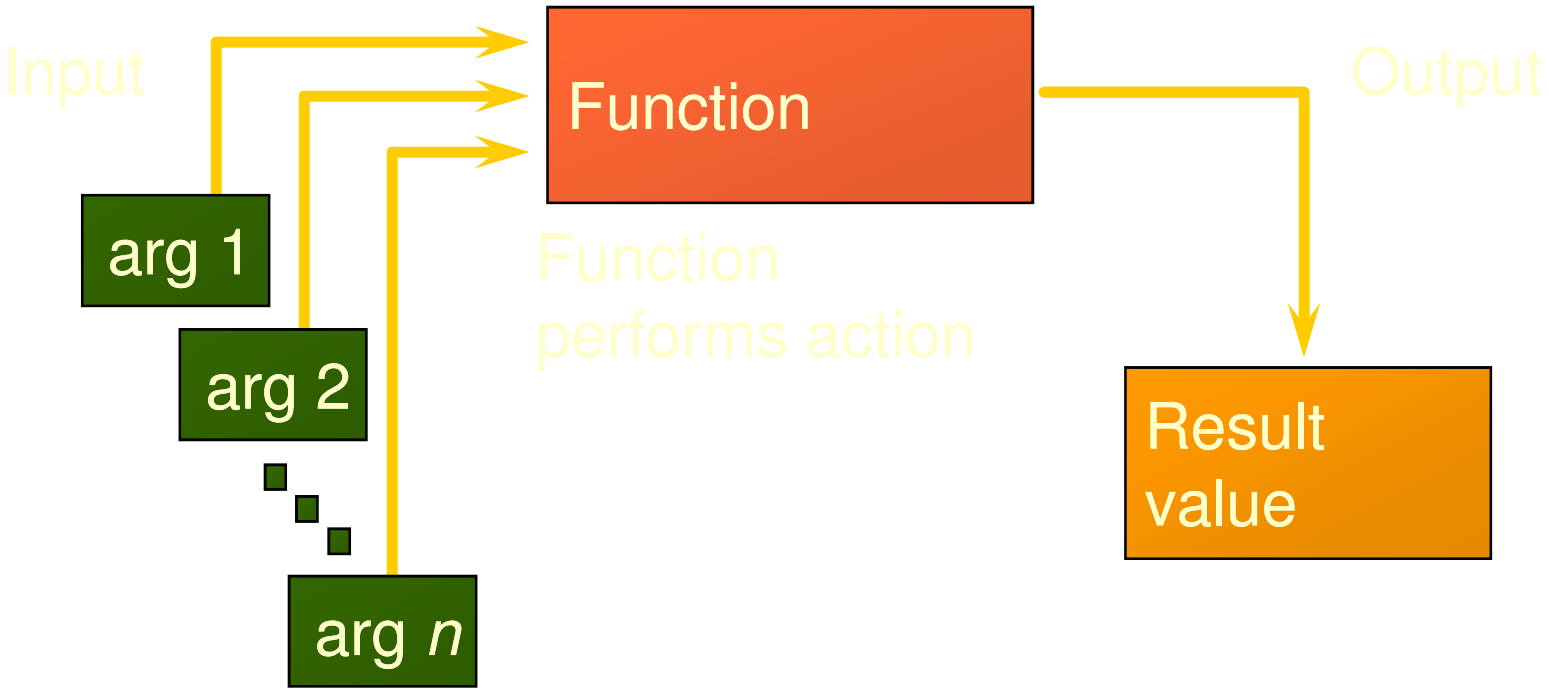
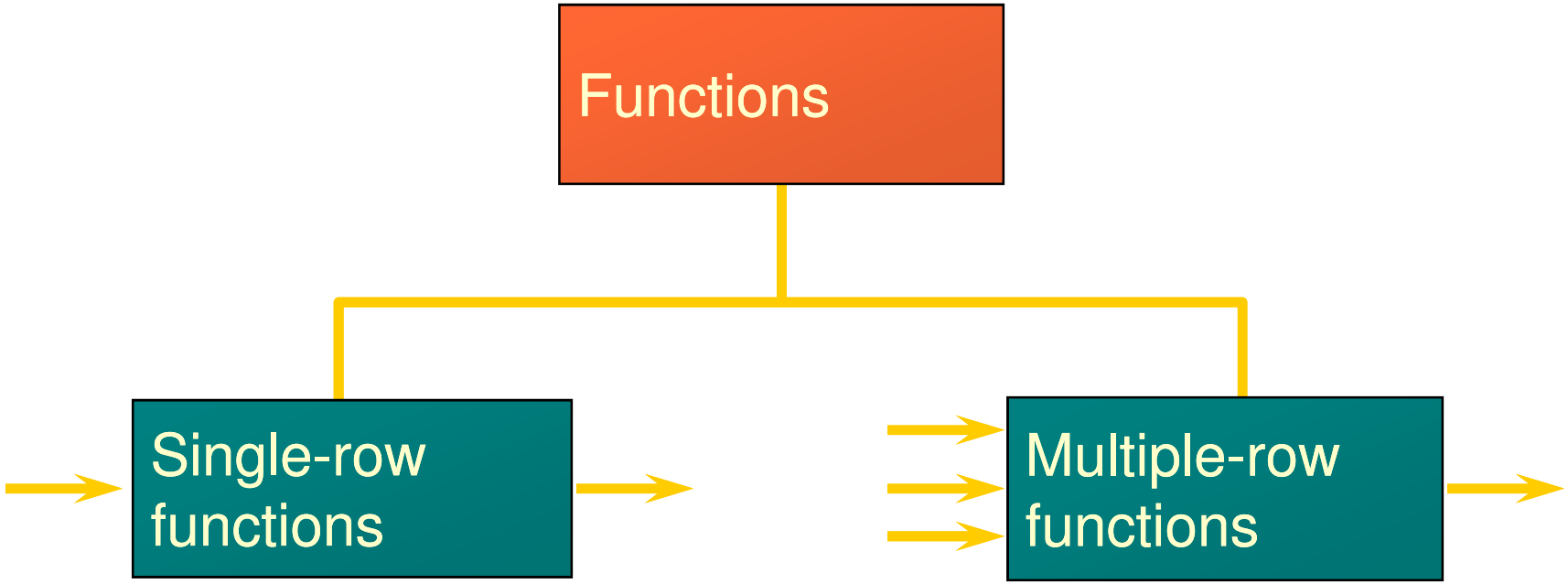
Single-Row Functions

SQL Functions



Two Types of SQL Functions

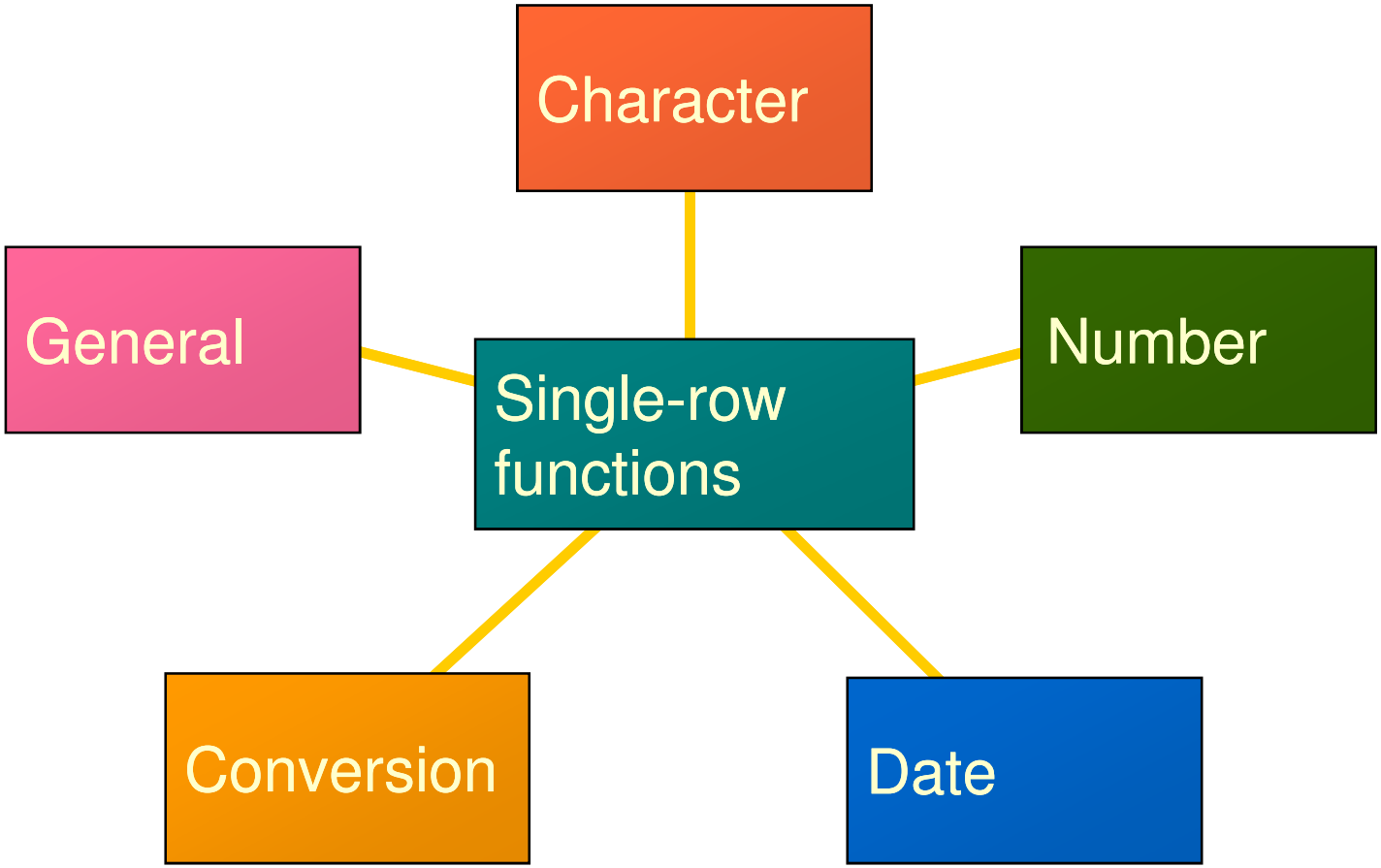


Single-Row Functions

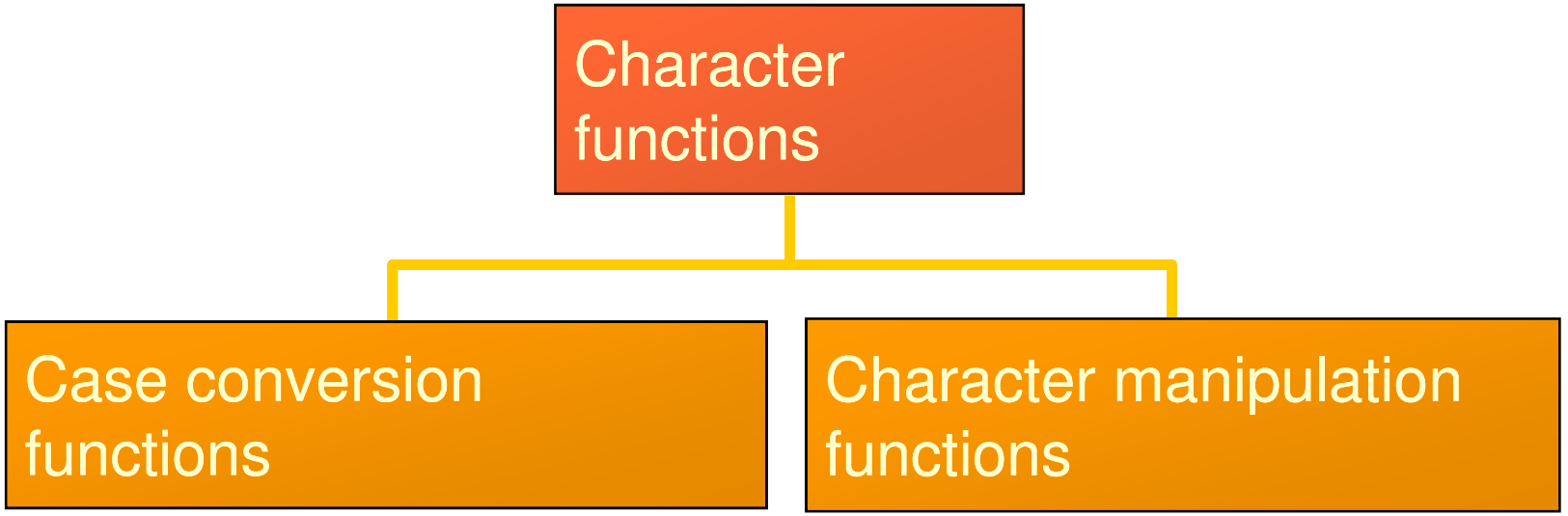
- Manipulate data items
- Accept arguments and return one value
- Act on each row returned
- Return one result per row
- May modify the datatype
- Can be nested

```
function_name (column|expression, [arg1, arg2,...])
```

Single-Row Functions



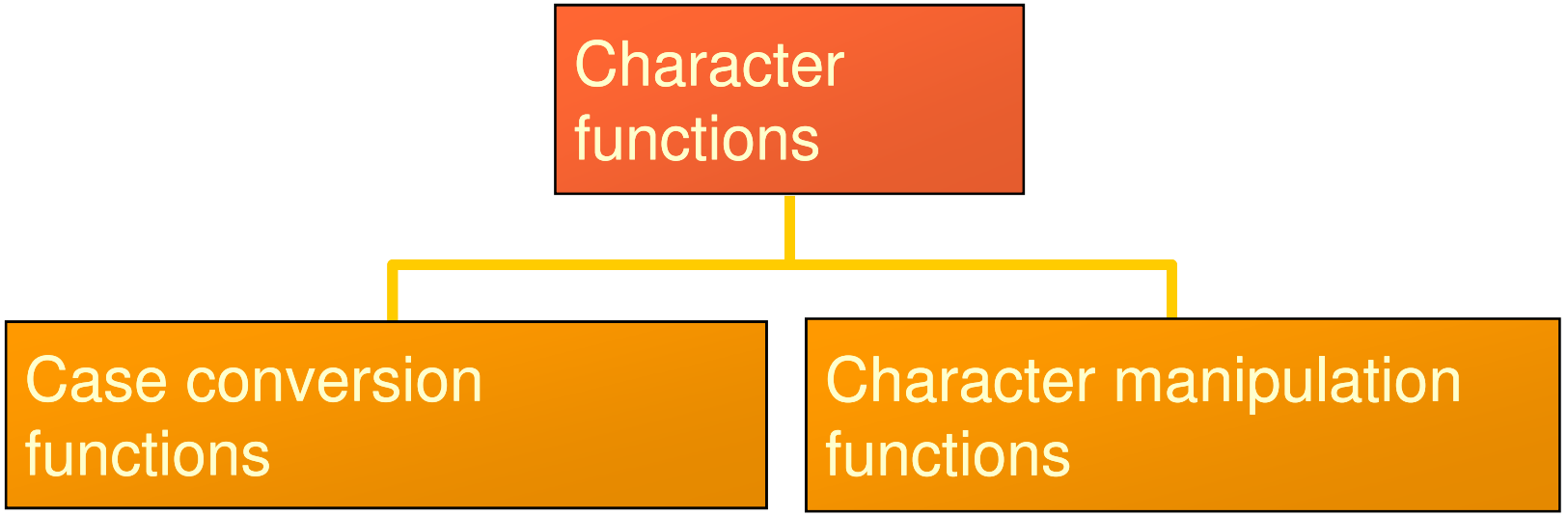
Character Functions



LOWER
UPPER
INITCAP

CONCAT
SUBSTR
LENGTH
INSTR
LPAD
TRIM

Character Functions



LOWER
UPPER
INITCAP

CONCAT
SUBSTR
LENGTH
INSTR
LPAD
TRIM

Case Conversion Functions

- Convert case for character strings

Function	Result
LOWER('SQL Course')	sql course
UPPER('SQL Course')	SQL COURSE
INITCAP('SQL Course')	Sql Course

Using Case Conversion Functions

- Display the employee number, name, and department number for employee Blake.

```
SQL> SELECT   empno, ename, deptno
  2  FROM     emp
  3  WHERE    ename = 'blake';
no rows selected
```

```
SQL> SELECT   empno, ename, deptno
  2  FROM     emp
  3  WHERE    ename = UPPER('blake');
```

```
     EMPNO ENAME          DEPTNO
---------- ---------- ----------
      7698 BLAKE              30
```

Character Manipulation Functions

- Manipulate character strings

Function	Result
CONCAT('Good', 'String')	GoodString
SUBSTR('String',1,3)	Str
LENGTH('String')	6
INSTR('String', 'r')	3
LPAD(sal,10,'*')	******5000
TRIM('S' FROM 'SSMITH')	MITH

Using the Character Manipulation Functions

```
SQL> SELECT ename, CONCAT (ename, job), LENGTH(ename),
  2         INSTR(ename, 'A')
  3 FROM    emp
  4 WHERE   SUBSTR(job,1,5) = 'SALES';
```

ENAME	CONCAT(ENAME,JOB)	LENGTH(ENAME)	INSTR(ENAME,'A')
MARTIN	MARTINSALESMAN	6	2
ALLEN	ALLENSALESMAN	5	1
TURNER	TURNERSALESMAN	6	0
WARD	WARDSALESMAN	4	2

Number Functions

- ROUND: Rounds value to specified decimal

  ROUND(45.926, 2) → 45.93

- TRUNC: Truncates value to specifie decimal

  TRUNC(45.926, 2) → 45.92

- MOD: Returns remainder of division

  MOD(1600, 300) → 100

Using the ROUND Function

```
SQL> SELECT ROUND(45.923,2), ROUND(45.923,0),
  2         ROUND(45.923,-1)
  3  FROM    DUAL;
```

```
ROUND(45.923,2) ROUND(45.923,0) ROUND(45.923,-1)
--------------- --------------- ----------------
          45.92              46               50
```

Using the TRUNC Function

```
SQL> SELECT TRUNC(45.923,2), TRUNC(45.923),
  2         TRUNC(45.923,-1)
  3  FROM   DUAL;
```

```
TRUNC(45.923,2) TRUNC(45.923) TRUNC(45.923,-1)
--------------- --------------- ---------------
          45.92              45              40
```

Using the MOD Function

- Calculate the remainder of the ratio of salary to commission for all employees whose job title is salesman.

```
SQL> SELECT   ename, sal, comm, MOD(sal, comm)
  2  FROM     emp
  3  WHERE    job = 'SALESMAN';
```

```
ENAME                SAL       COMM MOD(SAL,COMM)
---------- --------- --------- --------------
MARTIN            1250      1400           1250
ALLEN             1600       300            100
TURNER            1500         0           1500
WARD              1250       500            250
```

Working with Dates

- Oracle stores dates in an internal numeric format: century, year, month, day, hours, minutes, seconds.
- The default date format is DD-MON-YY.
- SYSDATE is a function returning date and time.
- DUAL is a dummy table used to view SYSDATE.

Arithmetic with Dates

- Add or subtract a number to or from a date for a resultant *date* value.
- Subtract two dates to find the *number* of days between those dates.
- Add *hours* to a date by dividing the number of hours by 24.

Using Arithmetic Operators with Dates

```
SQL> SELECT ename, (SYSDATE-hiredate)/7 WEEKS
  2  FROM   emp
  3  WHERE  deptno = 10;
```

```
ENAME           WEEKS
---------- ----------
KING        830.93709
CLARK       853.93709
MILLER      821.36566
```

Date Functions

Function	Description
MONTHS_BETWEEN	Number of months between two dates
ADD_MONTHS	Add calendar months to date
NEXT_DAY	Next day of the date specified
LAST_DAY	Last day of the month
ROUND	Round date
TRUNC	Truncate date

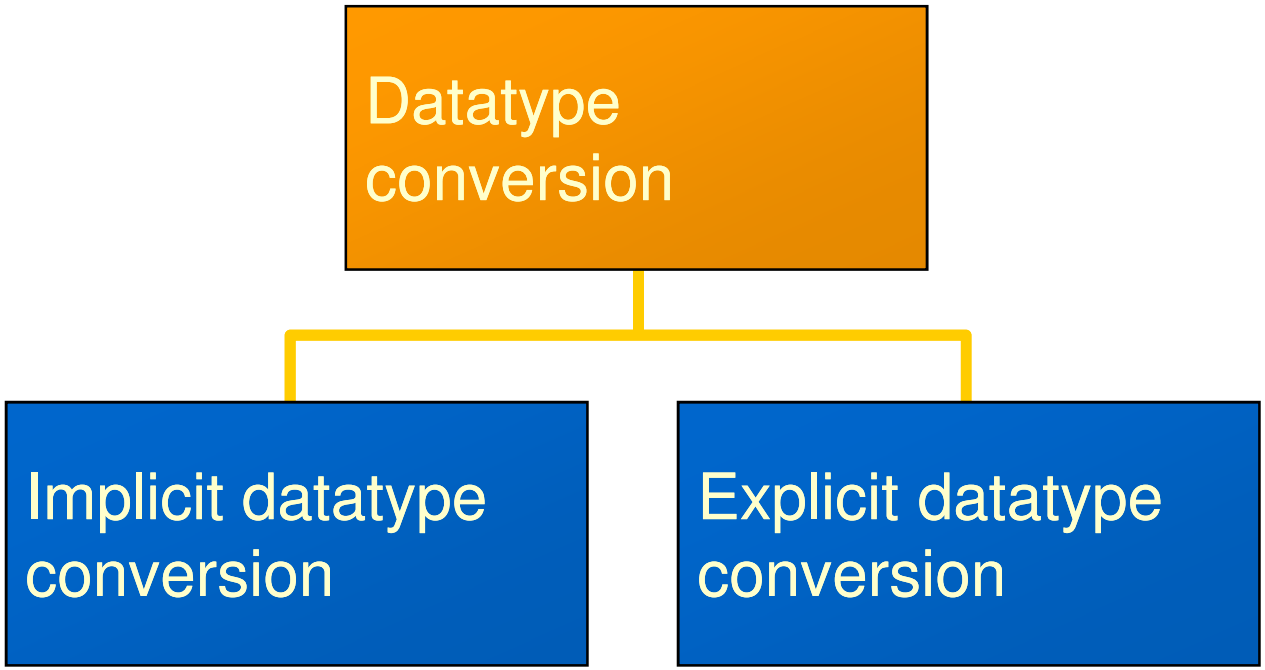
Using Date Functions

- MONTHS_BETWEEN ('01-SEP-95','11-JAN-94')
  → 19.6774194
- ADD_MONTHS ('11-JAN-94',6) → '11-JUL-94'
- NEXT_DAY ('01-SEP-95','FRIDAY') → '08-SEP-95'
- LAST_DAY('01-SEP-95') → '30-SEP-95'

Using Date Functions

- ROUND('25-JUL-95','MONTH') → 01-AUG-95
- ROUND('25-JUL-95','YEAR') → 01-JAN-96
- TRUNC('25-JUL-95','MONTH') → 01-JUL-95
- TRUNC('25-JUL-95','YEAR') → 01-JAN-95

Conversion Functions



Implicit Datatype Conversion

- For assignments, the Oracle Server can automatically convert the following:

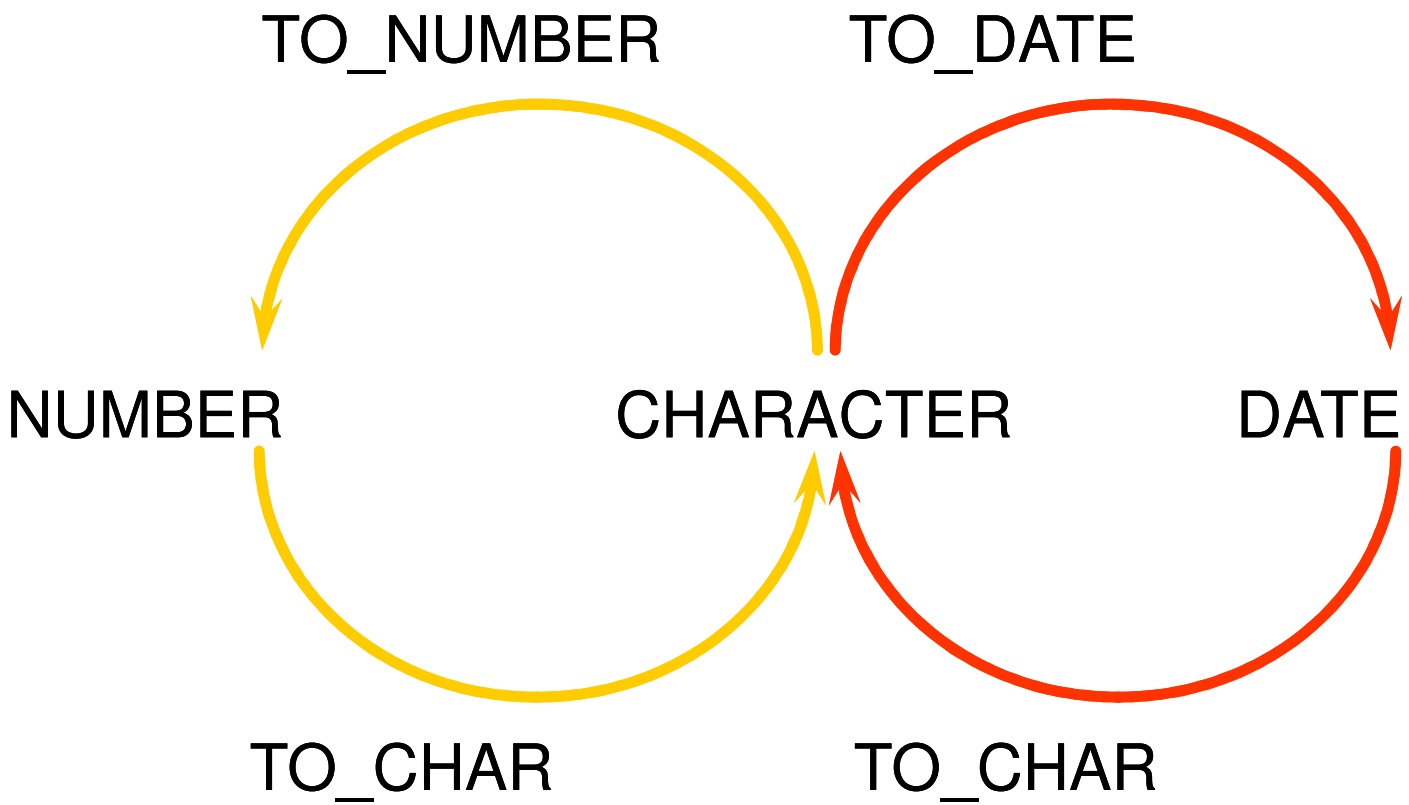
From	To
VARCHAR2 or CHAR	NUMBER
VARCHAR2 or CHAR	DATE
NUMBER	VARCHAR2
DATE	VARCHAR2

Implicit Datatype Conversion

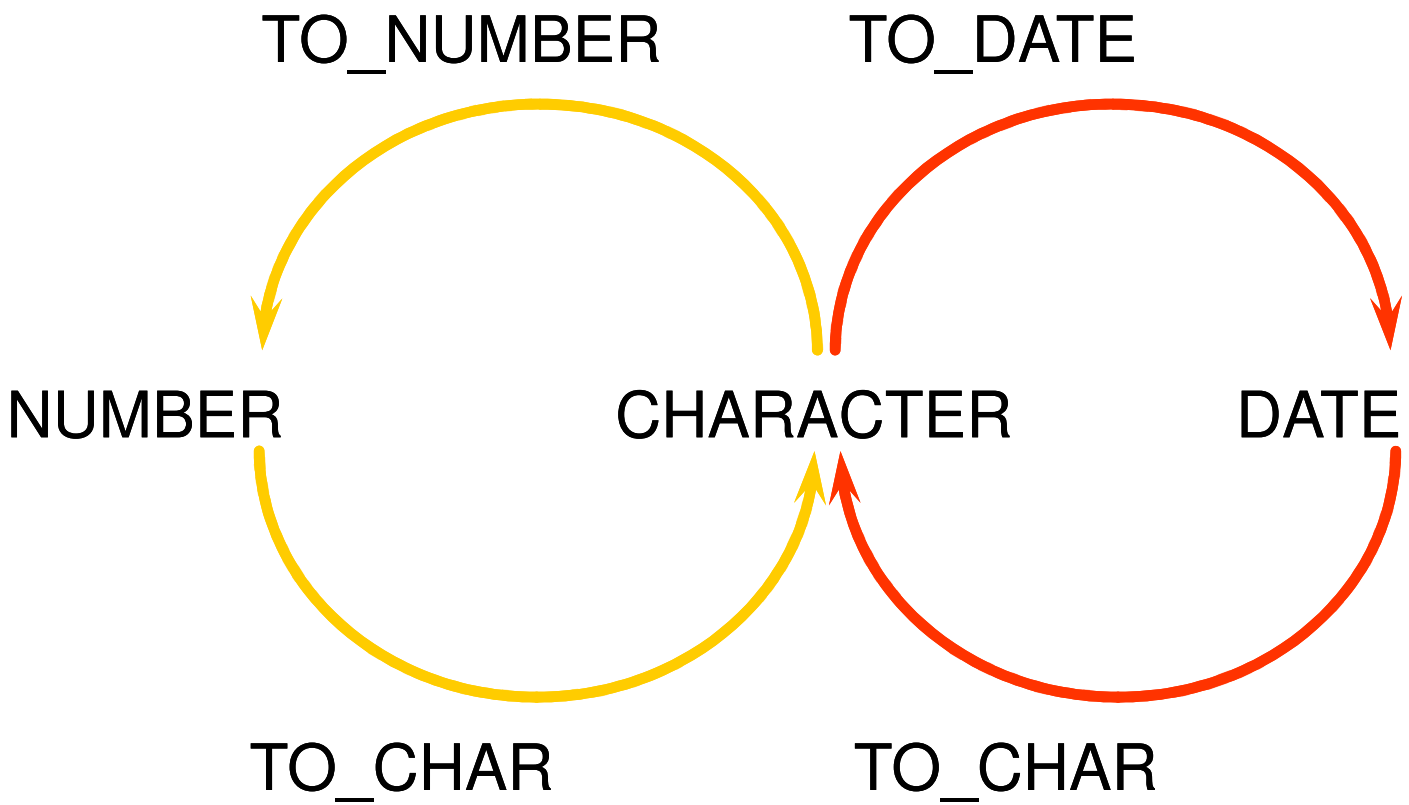
- For expression evaluation, the Oracle Server can automatically convert the following:

From	To
VARCHAR2 or CHAR	NUMBER
VARCHAR2 or CHAR	DATE

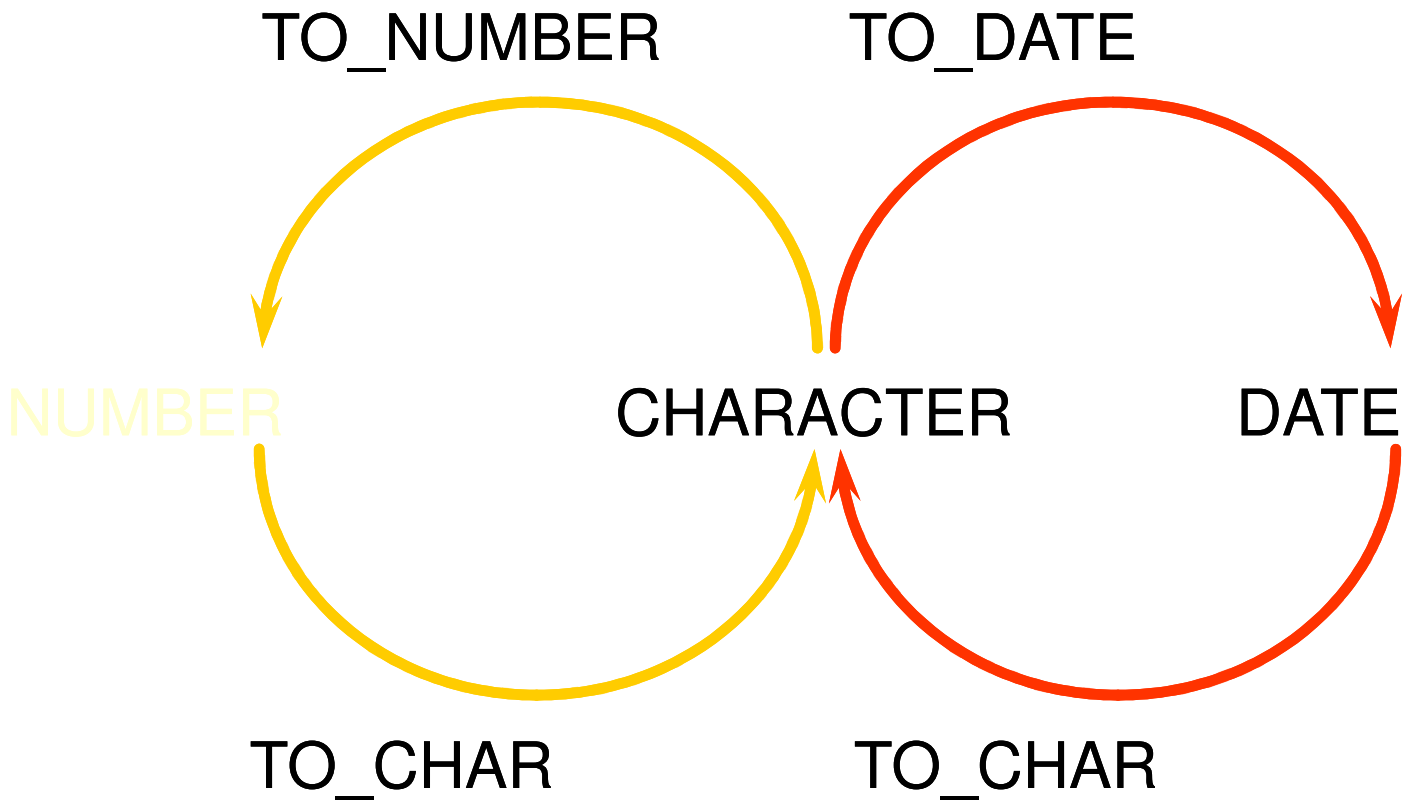
Explicit Datatype Conversion



Explicit Datatype Conversion



Explicit Datatype Conversion



TO_CHAR Function with Dates

```
TO_CHAR(date, 'fmt')
```

- The format model:
  - Must be enclosed in single quotation marks and is case sensitive
  - Can include any valid date format element
  - Has an *fm* element to remove padded blanks or suppress leading zeros
  - Is separated from the date value by a comma

Elements of Date Format Model

YYYY	Full year in numbers
YEAR	Year spelled out
MM	Two-digit value for month
MONTH	Full name of the month
DY	Three-letter abbreviation of the day of the week
DAY	Full name of the day

Elements of Date Format Model

- Time elements format the time portion of the date.

HH24:MI:SS AM	15:45:32 PM

- Add character strings by enclosing them in double quotation marks.

DD "of" MONTH	12 of OCTOBER

- Number suffixes spell out numbers.

ddspth	fourteenth

Using TO_CHAR Function with Dates

```
SQL> SELECT ename,
  2         TO_CHAR(hiredate, 'fmDD Month YYYY') HIREDATE
  3  FROM   emp;
```

```
ENAME      HIREDATE
---------- ------------------
KING       17 November 1981
BLAKE      1 May 1981
CLARK      9 June 1981
JONES      2 April 1981
MARTIN     28 September 1981
ALLEN      20 February 1981
...
14 rows selected.
```

TO_CHAR Function with Numbers

```
TO_CHAR(number, 'fmt')
```

- Use these formats with the TO_CHAR function to display a number value as a character:

9	Represents a number
0	Forces a zero to be displayed
$	Places a floating dollar sign
L	Uses the floating local currency symbol
.	Prints a decimal point
,	Prints a thousand indicator

Using TO_CHAR Function with Numbers

```
SQL> SELECT   TO_CHAR(sal,'$99,999') SALARY
  2  FROM     emp
  3  WHERE    ename = 'SCOTT';
```

```
SALARY
---------
  $3,000
```

TO_NUMBER and TO_DATE Functions

– Convert a character string to a number format using the TO_NUMBER function

```
TO_NUMBER(char[, 'fmt'])
```

- Convert a character string to a date format using the TO_DATE function

```
TO_DATE(char[, 'fmt'])
```

RR Date Format

Current Year	Specified Date	RR Format	YY Format
1995	27-OCT-95	1995	1995
1995	27-OCT-17	2017	1917
2001	27-OCT-17	2017	2017
2001	27-OCT-95	1995	2095

		If the specified two-digit year is:	
		0–49	50–99
If two digits of the current year are:	0–49	The return date is in the current century	The return date is in the century before the current one
	50–99	The return date is in the century after the current one	The return date is in the current century

NVL Function

- Converts null to an actual value
  - Datatypes that can be used are date, character, and number.
  - Datatypes must match
    - NVL(comm,0)
    - NVL(hiredate,'01-JAN-97')
    - NVL(job,'No Job Yet')

Using the NVL Function

```
SQL> SELECT ename, sal, comm, (sal*12)+NVL(comm,0)
  2  FROM   emp;
```

```
ENAME                SAL       COMM (SAL*12)+NVL(COMM,0)
---------- --------- --------- --------------------
KING                5000                      60000
BLAKE               2850                      34200
CLARK               2450                      29400
JONES               2975                      35700
MARTIN              1250       1400           16400
ALLEN               1600        300           19500
...
14 rows selected.
```

DECODE Function

- Facilitates conditional inquiries by doing the work of a CASE or IF-THEN-ELSE statement

```
DECODE(col/expression, search1, result1
                       [, search2, result2,...,]
                       [, default])
```

Using the DECODE Function

```
SQL> SELECT job, sal,
  2         DECODE(job, 'ANALYST', SAL*1.1,
  3                     'CLERK',   SAL*1.15,
  4                     'MANAGER', SAL*1.20,
  5                                SAL)
  6                REVISED_SALARY
  7  FROM    emp;
```

```
JOB                 SAL REVISED_SALARY
--------- ---------- ---------------
PRESIDENT         5000            5000
MANAGER           2850            3420
MANAGER           2450            2940
...
14 rows selected.
```

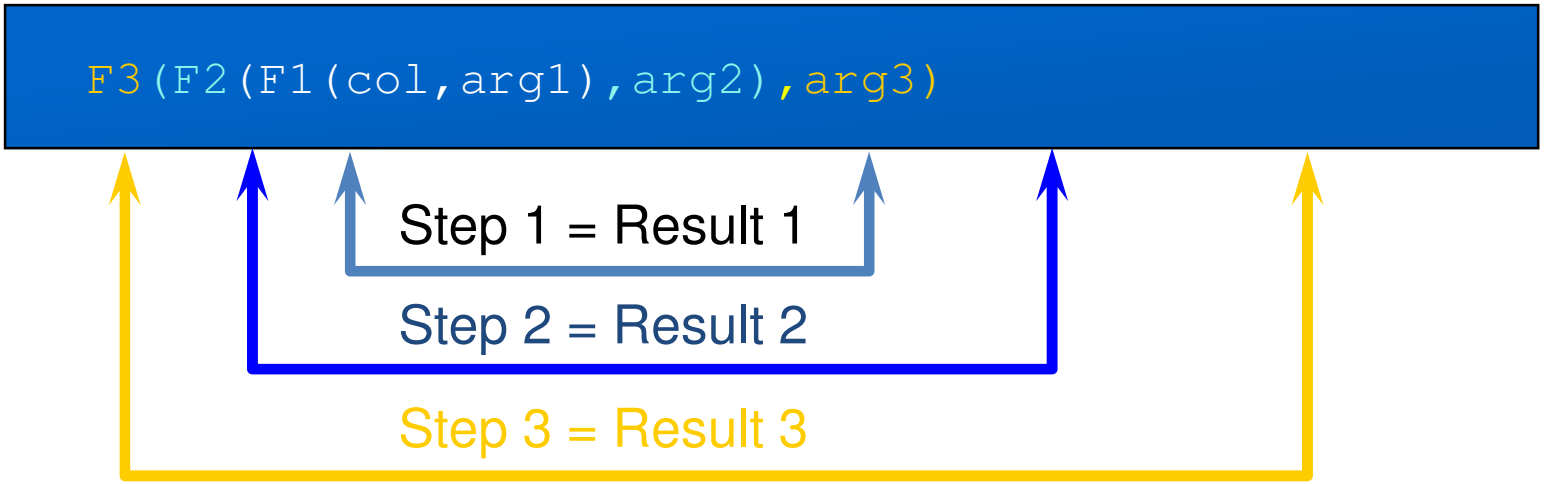
Using the DECODE Function

- Display the applicable tax rate for each employee in department 30.

```
SQL> SELECT ename, sal,
  2         DECODE(TRUNC(sal/1000, 0),
  3                              0, 0.00,
  4                              1, 0.09,
  5                              2, 0.20,
  6                              3, 0.30,
  7                              4, 0.40,
  8                              5, 0.42,
  9                              6, 0.44,
 10                                 0.45) TAX_RATE
 11  FROM    emp
 12  WHERE   deptno = 30;
```

Nesting Functions

- Single-row functions can be nested to any level.
- Nested functions are evaluated from deepest level to the least-deep level.



Nesting Functions

```
SQL> SELECT   ename,
  2           NVL(TO_CHAR(mgr),'No Manager')
  3  FROM     emp
  4  WHERE    mgr IS NULL;
```

```
ENAME      NVL(TO_CHAR(MGR),'NOMANAGER')
---------- -----------------------------
KING       No Manager
```