253

OWA_PATTERN

The OWA_PATTERN package provides an interface to locate text patterns within strings and replace the matched string with another string.

> **See Also:**
>
> For more information about implementation of this package, see the following:
>
> - *Oracle Fusion Middleware Administrator's Guide for Oracle HTTP Server*
> - *Oracle Fusion Middleware User's Guide for mod_plsql*

The chapter contains the following topics:

- Types
- Operational Notes
- Summary of OWA_PATTERN Subprograms

OWA_PATTERN Types

You can use a pattern as both an input and output parameter. Because of this, you can pass the same regular expression to `OWA_PATTERN` function calls, and it only has to be parsed once.

- `OWA_PATTERN.PATTERN`

OWA_PATTERN Operational Notes

The OWA_PATTERN subprograms are overloaded. Specifically, there are six versions of `MATCH`, and four each of `AMATCH` and `CHANGE`.

The subprograms use the following parameters:

- `line` - This is the target to be examined for a match. It can be more than one line of text or a owa_text.multi_line datatype.
- `pat` - This is the pattern that the subprograms attempt to locate in line. The pattern can contain regular expressions. In the owa_pattern.change function and procedure, this parameter is called `from_str`.
- `flags` - This specifies whether the search is case-sensitive or if substitutions are done globally.

Use regular expressions with the subprograms in this package. You Specify a regular expression by creating the string you want to match interspersed with various wildcard tokens and quantifiers.

- Wildcards
- Quantifiers

- Flags

OWA_PATTERN Wildcards

Wildcard tokens match something other than themselves.

Table 253-1 ***Wildcard tokens recognized by OWA_PATTERN package***

Token	Description
^	Matches newline or the beginning of the target
$	Matches newline or the end of the target
\n	Matches newline
.	Matches any character except newline
\t	Matches tab
\d	Matches digits [0-9]
\D	Matches non-digits [not 0-9]
\w	Matches word characters (0-9, a-z, A-Z, or _)
\W	Matches non-word characters (not 0-9, a-z, A-Z, or _)
\s	Matches whitespace characters (blank, tab, or newline).
\S	Matches non-whitespace characters (not blank, tab, or newline)
\b	Matches "word" boundaries (between \w and \W)
\x<HEX>	Matches the value in the current character set of the two hexadecimal digits
\<OCT>	Matches the value in the current character set of the two or three octal digits
\	Followed by any character not covered by another case matches that character
&	Applies only to CHANGE. This causes the string that matched the regular expression to be included in the string that replaces it. This differs from the other tokens in that it specifies how a target is changed rather than how it is matched. This is explained further under CHANGE Functions and Procedures .

OWA_PATTERN Quantifiers

Any tokens except & can have their meaning extended by any of the following quantifiers. You can also apply these quantifiers to literals.

Table 253-2 Quantifiers

Quantifier	Description
?	0 or 1 occurrence(s)
*	0 or more occurrences
+	1 or more occurrence(s)
{n}	Exactly *n* occurrences
(n,}	At least *n* occurrences
{n,m}	At least *n*, but not more than *m*, occurrences

OWA_PATTERN Flags

In addition to targets and regular expressions, the `OWA_PATTERN` functions and procedures use flags to affect how they are interpreted.

Table 253-3 Flags

Flag	Description
`i`	This indicates a case-insensitive search.
`g`	This applies only to CHANGE. It indicates a global replace. That is, all portions of the target that match the regular expression are replaced.

Summary of OWA_PATTERN Subprograms

This table lists the OWA_PATTERN subprograms and briefly describes them.

Table 253-4 OWA_PATTERN Package Subprograms

Subprogram	Description
AMATCH Function	Determines if a string contains the specified pattern. It lets you specify where in the string the match has to occur
CHANGE Functions and Procedures	Replaces a pattern within a string. If you call it as a function it returns the number of times the regular expression was found and replaced
GETPAT Procedure	Generates a pattern datatype from a `VARCHAR2` type
MATCH Function	Determines if a string contains the specified pattern

AMATCH Function

This function specifies if a pattern occurs in a particular location in a string.

There are four versions to this function:

- The first and second versions of the function do not save the matched tokens (these are saved in the `backrefs` parameters in the third and fourth versions). The difference between the first and second versions is the `pat` parameter, which can be a `VARCHAR2` or a pattern datatype.
- The third and fourth versions of the function save the matched tokens in the `backrefs` parameter. The difference between the third and fourth versions is the `pat` parameter, which can be a VARCHAR2 or a pattern datatype.

> **Note:**
>
> If multiple overlapping strings match the regular expression, this function takes the longest match.

Syntax

```
OWA_PATTERN.AMATCH(
   line           IN       VARCHAR2,
   from_loc       IN       INTEGER,
   pat            IN       VARCHAR2,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN INTEGER;

OWA_PATTERN.AMATCH(
   line           IN       VARCHAR2,
   from_loc       IN       INTEGER,
   pat            IN OUT   PATTERN,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN INTEGER;

OWA_PATTERN.AMATCH(
   line           IN       VARCHAR2
   from_loc       IN       INTEGER
   pat            in       varchar2
   backrefs       OUT      owa_text.vc_arr
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN INTEGER;

OWA_PATTERN.AMATCH(
   line           IN       VARCHAR2
   from_loc       IN       INTEGER
   pat            IN OUT   PATTERN
   backrefs       OUT      owa_text.vc_arr
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN INTEGER;
```

Parameters

Table 253-5 AMATCH Function Parameters

Parameter	Description
`line`	The text to search in.
from_loc	The location (in number of characters) in `line` where the search is to begin.
`pat`	The string to match. It can contain regular expressions. This can be either a `VARCHAR2` or a pattern. If it is a pattern, the output value of this parameter is the pattern matched.
backrefs	The text that is matched. Each token that is matched is placed in a cell in the `OWA_TEXT.VC_ARR DATA TYPE` PL/SQL table.
flags	Whether or not the search is case-sensitive. If the value of this parameter is "i", the search is case-insensitive. Otherwise the search is case-sensitive.

Return Values

The index of the character after the end of the match, counting from the beginning of `line`. If there was no match, the function returns `0`.

CHANGE Functions and Procedures

This function or procedure searches and replaces a string or `multi_line` datatype. If multiple overlapping strings match the regular expression, this subprogram takes the longest match.

Syntax

```
OWA_PATTERN.CHANGE(
   line           IN OUT    VARCHAR2,
   from_str       IN        VARCHAR2,
   to_str         IN        VARCHAR2,
   flags          IN        VARCHAR2   DEFAULT NULL)
 RETURN INTEGER;

OWA_PATTERN.CHANGE(
   line           IN OUT   VARCHAR2,
   from_str       IN       VARCHAR2,
   to_str         IN       VARCHAR2,
   flags          IN       VARCHAR2   DEFAULT NULL);

owa_pattern.change(
   mline          IN OUT   owa_text.multi_line,
   from_str       IN       VARCHAR2,
   to_str         IN       VARCHAR2,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN INTEGER;

OWA_PATTERN.CHANGE(
   mline          IN OUT   owa_text.multi_line,
   from_str       IN       VARCHAR2,
   to_str         IN       VARCHAR2,
   flags          IN       VARCHAR2   DEFAULT NULL);
```

Parameters

Table 253-6 CHANGE Procedure Parameters

Parameter	Description
`line`	The text to search in. The output value of this parameter is the altered string.
mline	The text to search in. This is a `owa_text.multi_line datatype`. The output value of this parameter is the altered string.
`from_str`	The regular expression to replace.
to_str	The substitution pattern.
flags	Whether or not the search is case-sensitive, and whether or not changes are to be made globally. If "`i`" is specified, the search is case-insensitive. If "`g`" is specified, changes are made to all matches. Otherwise, the function stops after the first substitution is made.

Return Values

As a function, it returns the number of substitutions made. If the flag "g" is not used, this number can only be 0 or 1 and only the first match is replaced. The flag "g" specifies to replace all matches with the regular expression.

Examples

```
OWA_PATTERN.CHANGE('Cats in pajamas', 'C.+in', '& red ')
```

The regular expression matches the substring "`Cats in`". It then replaces this string with "& red". The ampersand character "`&`" indicates "`Cats in`" because that is what matched the regular expression. Thus, this procedure replaces the string "`Cats in pajamas`" with "`Cats in red`" If you call this as a function instead of a procedure, the value returned is 1, indicating that a single substitution has been made.

Example 2:

```
CREATE OR REPLACE PROCEDURE test_pattern as theline VARCHAR2(256);
num_found     INTEGER;
   BEGIN
       theline := 'what is the goal?';
       num_found := OWA_PATTERN.CHANGE(theline, 'goal', 'idea', 'g');
       HTP.PRINT(num_found); -- num_found is 1
       HTP.PRINT(theline); -- theline is 'what is the idea?'
   END;
/
SHOW ERRORS
```

GETPAT Procedure

This procedure converts a VARCHAR2 string into an `OWA_PATTERN.PATTERN DATA TYPE`.

Syntax

```
OWA_PATTERN.GETPAT(
   arg      IN          VARCHAR2,
   pat      IN OUT      pattern);
```

Parameters

Table 253-7 GETPAT Procedure Parameters

Parameter	Description
`arg`	The string to convert.
pat	the `OWA_PATTERN.PATTERN DATA TYPE` initialized with `arg`.

MATCH Function

This function determines if a string contains the specified pattern. The pattern can contain regular expressions. If multiple overlapping strings can match the regular expression, this function takes the longest match.

Syntax

```
owa_pattern.match(
   line           IN       VARCHAR2,
   pat            IN       VARCHAR2,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN BOOLEAN;

owa_pattern.match(
```

```
   line           IN       VARCHAR2,
   pat            IN OUT   PATTERN,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN BOOLEAN;

owa_pattern.match(
   line           IN       VARCHAR2,
   pat            IN       VARCHAR2,
   backrefs       OUT      owa_text.vc_arr,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN BOOLEAN;

OWA_PATTERN.MATCH(
   line           IN       VARCHAR2,
   pat            IN OUT   PATTERN,
   backrefs       OUT      owa_text.vc_arr,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN BOOLEAN;

owa_pattern.match(
   mline          IN       owa_text.multi_line,
   pat            IN       VARCHAR2,
   rlist          OUT      owa_text.row_list,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN BOOLEAN;

OWA_PATTERN.MATCH(
   mline          IN       owa_text.multi_line,
   pat            IN OUT   pattern,
   rlist          OUT      owa_text.row_list,
   flags          IN       VARCHAR2   DEFAULT NULL)
 RETURN BOOLEAN;
```

Parameters

Table 253-8 MATCH Function Parameters

Parameter	Description
line	The line to search in.
mline	The text to search in. This is a owa_text.multi_line datatype..
pat	The pattern to match. This is either a VARCHAR2 or a OWA_PATTERN.PATTERN DATA TYPE. It is a pattern, the output value of this parameter is the pattern matched.
backrefs	The text that is matched. Each token that is matched is placed in a cell in the OWA_TEXT.VC_ARR DATA TYPE PL/SQL table. This parameter is a row_list that holds each string in the target that was matched by a sequence of tokens in the regular expression.
rlist	An output parameter containing a list of matches.
flags	Whether or not the search is case-sensitive. If the value of this parameter is "i", the search is case-insensitive. Otherwise the search is case-sensitive.

Return Values

TRUE if a match was found, FALSE otherwise.

Examples

KAZOO is the target where it is searching for the zoo.* regular expression. The period indicates any character other than newline, and the asterisk matches 0 or more of the preceding characters. In this case, it matches any character other than the newline.

Therefore, this regular expression specifies that a matching target consists of zoo, followed by any set of characters neither ending in nor including a newline (which does not match the period). The i flag indicates to ignore case in the search. In this case, the function returns TRUE, which indicates that a match had been found.

```
boolean foundMatch;
foundMatch := owa_pattern.match('KAZOO', 'zoo.*', 'i');
```

The following example searches for the string "goal" followed by any number of characters in sometext. If found,

```
sometext  VARCHAR2(256);
pat       VARCHAR2(256);

sometext    := 'what is the goal?'
pat         := 'goal.*';
IF OWA_PATTERN.MATCH(sometext, pat)
   THEN
      HTP.PRINT('Match found');
   ELSE
     HTP.PRINT('Match not found');
END IF;
```

Operational Notes

- The regular expression in this function can be either a VARCHAR2 or an OWA_PATTERN.PATTERN DATA TYPE. Create AN OWA_PATTERN.PATTERN DATA TYPE from a string using the OWA_PATTERN.GETPAT procedure.
- Create a MULTI_LINE DATA TYPE from a long string using the OWA_TEXT.STREAM2MULTI procedure. If a multi_line is used, the rlist parameter specifies a list of chunks where matches were found.
- If the line is a string and not a multi_line, you can add an optional output parameter called backrefs. This parameter is a row_list that holds each string in the target that was matched by a sequence of tokens in the regular expression.