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Introduction

This document describes the portions of the \texttt{xquery\_ast\_yqgm\_conversion} library, which is responsible for the conversion of AST nodes related to full-text search extensions to YQGM.

**FTContainsExpr**

AST

\[
\text{FTContainsExpr} \rightarrow \text{AST} \rightarrow \text{FTContainsExpr}
\]

YQGM

The \texttt{FTContainsExpr} gets converted as follows:

```
fn:declare-function(FTContainsExpr($searchContext, $rootSelection)) {
  $options := ()
  return some $searchContext in $searchContext satisfies
  let $tokens := fts:tokenize($options, $searchContext, "false")
  let $stokensNum := 0
  let $allMatches := toExpr($rootSelection)
  return some $match in $allMatches/match satisfies
  fn:count($match/string-exclude) eq 0
}
```

The \texttt{$searchContext} and \texttt{$rootSelection} arguments are taken from the \texttt{FTContainsExpr} object.

One can consider that the \texttt{toExpr()} function above is a second-level function, accepting the \texttt{$rootSelection} argument. As a result, the \texttt{$options}, \texttt{$tokens}, and \texttt{$stokensNum} variables are visible for the expression returned by \texttt{toExpr()}. This is used, for example, when an \texttt{FTMatchOption} is converted. It creates a new \texttt{$options} variable and a new tokenized stream \texttt{$tokens} variable. Thus, these can be used in nested expressions.
Similarly, FTStringSelection replaces thebrokerNum variable.
Scored FLWOR For and Let Clauses

The For and Let clauses allow only the use of FTContainsExpr as a scoring expression.

The value of the score variable is computed using the following function.

```
declare function FTScoreExprtoYQGM($searchContext, $rootSelection) {
    let $options := ()
    for $searchContext in $searchContext
        let $tokens := fts:tokenizeWithTf($options, $searchContext, "false")
    let $stokensNum := 0
    let $allMatches := toExpr($rootSelection)
    let $scores :=
        let $matches := $allMatches/match[fn:count(./stringExclude) eq 0]
        if (fn:count($matches) gt 0) then
            for $m at $p in $matches
                return fn:sum($m/stringInclude/position/@tf)
        else 0
    return fn:max($scores)
}
```

The $searchContext and $rootSelection arguments are taken from the FTContainsExpr object.

The notes about toExpr() in FTContainsExpr apply for FTScoreExpr too.
Each FTSelection is converted to a function expression `texquery:ApplyXXX()` as is specified in the TeXQuery semantics.
Each match option is converted to an XML element that is pushed back to the
$options variable and the search context node is emboldened and stored in
$tokens.

AST for Full-Text Search

None of the FTContainsExpr/FTScoreExpr/FTSelection/FTMatchOption AST
objects is directly converted to YQGM. Instead, each of them is converted to a

XQuery Expr, which is then converted to YQGM. Only FTContainsExpr/FTScoreExpr have a createYQGM function as every other
XQuery expression. Internally, they converted the root FTSelection to an Expr
as every other XQuery expression. FTSelections have a createYQGM function that first
converts the root FTSelection to an Expr and then call for YQGM conversion of the latter Expr object. For more
details, see the sections on FTContainsExpr and FTScoreExpr for more details.

By default, all FTSelections process FTMatchOptions using the helper AST
node CreateTeXQueryContextSelection and the pushMatchOption method that adds
the FTMatchOption to the options list. The CreateTeXQueryContextSelection is
converted to a FLWOR statement that sets the $options and $tokens
variables and returns the YQGM expression corresponding to the nested
FTMatchOptions.