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# **pypuppetdbquery Documentation**

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## pypuppetdbquery

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A port of [Erik Dalén](#)'s PuppetDB Query language to Python. This module is designed to be paired with [pypuppetdb](#) but does not depend on it directly.

This module is a Python implementation of the query language also implemented in [puppet-puppetdbquery](#) (in Ruby) and [node-puppetdbquery](#) (in JavaScript/NodeJS).

Please see the [pypuppetdbquery documentation](#) courtesy of [Read the Docs](#) and [Sphinx](#).

### 1.1 Installation

You can install this package from source or from PyPi.

```
$ pip install pypuppetdbquery
```

```
$ git clone https://github.com/bootc/pypuppetdbquery
$ python setup.py install
```

If you wish to hack on it clone the repository but after that run:

```
$ pip install -r requirements.txt
$ pip install -r requirements-dev.txt
```

This will install all the runtime requirements of [pypuppetdbquery](#) and the dependencies for the test suite and generation of documentation.

### 1.2 Usage Example

```
import pypuppetdb
import pypuppetdbquery

pdb = pypuppetdb.connect()

pdb_ast = pypuppetdbquery.parse(
    '(processorcount=4 or processorcount=8) and kernel=Linux')

for node in pdb.nodes(query=pdb_ast):
    print(node)
```

For further examples, see the [Examples](#) section of the [pypuppetdbquery documentation](#).

## 1.3 License

This project is licensed under the Apache License Version 2.0.

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## API Documentation

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All the user-facing components of this package are intended to be found in the [pypuppetdbquery package](#) documentation. The other sub-modules and the test suite are documented here for completeness.

### 2.1 pypuppetdbquery package

This Python package contains a port of [Erik Dalén](#)'s PuppetDB Query language to Python.

All the user-facing components of this package are intended to be found in this module itself rather than any of the sub-modules.

`pypuppetdbquery.parse(s, json=True, mode='nodes', lex_options=None, yacc_options=None)`

Parse a PuppetDBQuery-style query and transform it into a PuppetDB “AST” query.

This function is intended to be the primary entry point for this package. It wraps up all the various components of this package into an easy to consume format. The output of this function is designed to be passed directly into `pypuppetdb`.

For examples of the query syntax see [puppet-puppetdbquery](#) and [node-puppetdbquery](#) by [Erik Dalén](#).

#### Parameters

- **s** (*str*) – The query to parse and transform
- **mode** (*str*) – The PuppetDB endpoint being queried
- **json** (*bool*) – Whether to JSON-encode the PuppetDB AST result
- **lex\_options** (*dict*) – Options passed to `ply.lex.lex()`
- **yacc\_options** (*dict*) – Options passed to `ply.yacc.yacc()`

`pypuppetdbquery.query_fact_contents(pdb, s, facts=None, raw=False, lex_options=None, yacc_options=None)`

Helper to query PuppetDB for fact contents (i.e. within structured facts) on nodes matching a query string.

Adjusts the query to return only those structured fact keys requested in the function call.

The facts listed in the *facts* list are run through the query parser and treated as “identifier paths”. This means the same rules apply as for within the query language, e.g. `foo.bar` or `foo.*` or even `foo.~"bar.*"`.

If *raw* is *False* (the default), the return value is a `dict` with node names as keys containing a `dict` of flattened fact paths to fact values. If *True* it returns raw query output: a list of dictionaries (see the [PuppetDB fact-contents documentation](#)).

---

**Note:** This function can only be used to search deeply within structured facts. It cannot return a whole structured fact, only individual elements within—but you can return all the elements within a structured fact if you want by using a regex match.

---

#### Parameters

- **pdb** (*pypuppetdb.api.BaseAPI*) – pypuppetdb connection to query from
- **s** (*str*) – The query string (may be empty to query all nodes)
- **facts** (*Sequence*) – List of fact paths to search for
- **raw** (*bool*) – Whether to skip post-processing the facts into a dict structure grouped by node
- **lex\_options** (*dict*) – Options passed to `ply.lex.lex()`
- **yacc\_options** (*dict*) – Options passed to `ply.yacc.yacc()`

```
pypuppetdbquery.query_facts(pdb, s, facts=None, raw=False, lex_options=None,
                             yacc_options=None)
```

Helper to query PuppetDB for facts on nodes matching a query string.

Adjusts the query to return only those facts requested in the function call.

The fact names included in *facts* may be names or regular expressions. If the string starts and ends with `/`, it is considered a regular expression (e.g. `/^lsb/`).

If *raw* is *False* (the default), the return value is a dict with node names as keys containing a dict of fact names to fact values. If *True* it returns raw `pypuppetdb.types.Fact` objects as `pypuppetdb.api.BaseAPI.nodes()` does.

---

**Note:** This function can return only full facts, not elements of structured facts. For example, only the whole `os` fact may be returned but not the `os.family` key within the larger structured fact. If you need to do this, look at `query_fact_contents()`.

---

#### Parameters

- **pdb** (*pypuppetdb.api.BaseAPI*) – pypuppetdb connection to query from
- **s** (*str*) – The query string (may be empty to query all nodes)
- **facts** (*Sequence*) – List of fact names to search for
- **raw** (*bool*) – Whether to skip post-processing the facts into a dict structure
- **lex\_options** (*dict*) – Options passed to `ply.lex.lex()`
- **yacc\_options** (*dict*) – Options passed to `ply.yacc.yacc()`

## 2.2 pypuppetdbquery.ast module

Abstract Syntax Tree (AST) for the PuppetDBQuery language. These simple classes are used by the `pypuppetdbquery.parser.Parser` in order to represent the parsed syntax tree.

```
class pypuppetdbquery.ast.AndExpression(left, right)
    Bases: pypuppetdbquery.ast.BinaryExpression
```

```
class pypuppetdbquery.ast.BinaryExpression (left, right)
    Bases: pypuppetdbquery.ast.Node

class pypuppetdbquery.ast.BlockExpression (expression)
    Bases: pypuppetdbquery.ast.UnaryExpression

class pypuppetdbquery.ast.Comparison (operator, left, right)
    Bases: pypuppetdbquery.ast.Expression

class pypuppetdbquery.ast.Date (value)
    Bases: pypuppetdbquery.ast.Literal

class pypuppetdbquery.ast.Expression
    Bases: pypuppetdbquery.ast.Node

class pypuppetdbquery.ast.Identifier (name)
    Bases: pypuppetdbquery.ast.Node

class pypuppetdbquery.ast.IdentifierPath (components)
    Bases: pypuppetdbquery.ast.Node

class pypuppetdbquery.ast.Literal (value)
    Bases: pypuppetdbquery.ast.Node

class pypuppetdbquery.ast.Node
    Bases: object

class pypuppetdbquery.ast.NotExpression (expression)
    Bases: pypuppetdbquery.ast.UnaryExpression

class pypuppetdbquery.ast.OrExpression (left, right)
    Bases: pypuppetdbquery.ast.BinaryExpression

class pypuppetdbquery.ast.ParenthesizedExpression (expression)
    Bases: pypuppetdbquery.ast.UnaryExpression

class pypuppetdbquery.ast.Query (expression)
    Bases: pypuppetdbquery.ast.Node

class pypuppetdbquery.ast.RegexIdentifier (name)
    Bases: pypuppetdbquery.ast.Identifier

class pypuppetdbquery.ast.RegexNodeMatch (value)
    Bases: pypuppetdbquery.ast.Expression

class pypuppetdbquery.ast.Resource (res_type, title, exported, parameters=None)
    Bases: pypuppetdbquery.ast.Expression

class pypuppetdbquery.ast.Subquery (endpoint, expression)
    Bases: pypuppetdbquery.ast.Node

class pypuppetdbquery.ast.UnaryExpression (expression)
    Bases: pypuppetdbquery.ast.Node
```

## 2.3 pypuppetdbquery.evaluator module

```
class pypuppetdbquery.evaluator.Evaluator
    Bases: object

    Converts a pypuppetdbquery.ast Abstract Syntax Tree into a PuppetDB native AST query.
```

**DECAMEL\_RE** = `re.compile('(?!^)([A-Z]+)')`

Regular expression used when converting CamelCase class names to underscore\_separated names.

**evaluate** (*ast*, *mode*='nodes')

Process a parsed PuppetDBQuery AST and return a PuppetDB AST.

The resulting PuppetDB AST is a native Python list. It will need converting to JSON (using `json.dumps()`) before it can be used with PuppetDB.

#### Parameters

- **ast** (`pypuppetdbquery.ast.Query`) – Root of the AST to evaluate
- **mode** (*str*) – PuppetDB endpoint to target

**Returns** PuppetDB AST

**Return type** list

## 2.4 pypuppetdbquery.lexer module

**exception** `pypuppetdbquery.lexer.LexException` (*message*, *position*)

Bases: `Exception`

Raised for errors encountered during lexing.

Such errors may include unknown tokens or unexpected EOF, for example. The position of the lexer when the error was encountered (the index into the input string) is stored in the *position* attribute.

**class** `pypuppetdbquery.lexer.Lexer` (\*\**kwargs*)

Bases: `object`

Lexer for the PuppetDBQuery language.

This class uses `ply.lex.lex()` to implement the lexer (or tokenizer). It is used by `pypuppetdbquery.parser.Parser` in order to process queries.

The arguments to the constructor are passed directly to `ply.lex.lex()`.

---

**Note:** Many of the docstrings in this class are used by `ply.lex` to build the lexer. These strings are not particularly useful for generating documentation from, so the built documentation for this class may not be very useful.

---

**input** (*s*)

Reset and supply input to the lexer.

Tokens then need to be obtained using `token()` or the iterator interface provided by this class.

**next** ()

Implementation of `iterator.next()`.

Return the next item from the container. If there are no further items, raise the `StopIteration` exception.

**t\_asterisk** = `'\\*'`

**t\_at** = `'@'`

**t\_boolean** (*t*)  
true/false

```
t_DOT = '\\.'  
t_EQUALS = '='  
t_EXPORTED = '@@'  
t_FLOAT (t)  
    -?d+.d+  
t_GREATERTHAN = '>'  
t_GREATERTHANEQ = '>='  
t_HASH = '#'  
t_LBRACE = '{'  
t_LBRACK = '\\['  
t_LESSTHAN = '<'  
t_LESSTHANEQ = '<='  
t_LPAREN = '\\('  
t_MATCH = '~'  
t_NOTEQUALS = '!='  
t_NOTMATCH = '!~'  
t_NUMBER (t)  
    -?d+  
t_RBRACE = '}'  
t_RBRACK = '\\]'  
t_RPAREN = '\\)'  
t_STRING_bareword (t)  
    [-w_:]+  
t_STRING_double_quoted (t)  
    "(\\.\\.\\^\\")*"  
t_STRING_single_quoted (t)  
    '\\.\\.\\^\\')*'  
t_error (t)  
t_ignore = '\\t\\n\\r\\x0c\\x0b'  
t_keyword (t)  
    notlandlor  
token ()  
    Obtain one token from the input.  
tokens = ('LPAREN', 'RPAREN', 'LBRACK', 'RBRACK', 'LBRACE', 'RBRACE', 'EQUALS', 'NOTEQUALS', 'MAT
```

List of token names handled by the lexer.

## 2.5 pypuppetdbquery.parser module

**exception** `pypuppetdbquery.parser.ParseException` (*message*, *position*)

Bases: `Exception`

Raised for errors encountered during parsing.

The position of the lexer when the error was encountered (the index into the input string) is stored in the *position* attribute.

**class** `pypuppetdbquery.parser.Parser` (*lex\_options=None*, *yacc\_options=None*)

Bases: `object`

Parser for the PuppetDBQuery language.

This class uses `ply.yacc.yacc()` to implement the parser. In concert with `pypuppetdbquery.lexer.Lexer`, it produces an Abstract Syntax Tree (AST) as declared in `pypuppetdbquery.ast`.

### Parameters

- **lex\_options** (*dict*) – Passed as keyword arguments to `pypuppetdbquery.lexer.Lexer`
- **yacc\_options** (*dict*) – Passed as keyword arguments to `ply.yacc.yacc()`

---

**Note:** Many of the docstrings in this class are used by `ply.yacc` to build the parser. These strings are not particularly useful for generating documentation from, so the built documentation for this class may not be very useful.

---

**p\_block\_expr** (*p*)

block\_expr : LBRACE expr RBRACE

**p\_boolean** (*p*)

boolean : BOOLEAN

**p\_comparison\_expr** (*p*)

comparison\_expr : identifier\_path comparison\_op literal

**p\_comparison\_op** (*p*)

comparison\_op [MATCH]

NOTMATCH

EQUALS

NOTEQUALS

GREATERTHAN

GREATERTHANEQ

LESSTHAN

LESSTHANEQ

**p\_empty** (*p*)

empty :

**p\_error** (*p*)

**p\_expr** (*p*)

expr [resource\_expr]

```

        comparison_expr
        subquery

p_expr_and(p)
    expr : expr AND expr

p_expr_identifier_path(p)
    expr : identifier_path

p_expr_not(p)
    expr : NOT expr

p_expr_or(p)
    expr : expr OR expr

p_expr_parenthesized(p)
    expr : LPAREN expr RPAREN

p_float(p)
    float : FLOAT

p_identifier(p)
    identifier [string]
        integer

p_identifier_path(p)
    identifier_path : identifier

p_identifier_path_nested(p)
    identifier_path : identifier_path DOT identifier

p_identifier_regexp(p)
    identifier : MATCH string

p_identifier_wild(p)
    identifier : ASTERISK

p_integer(p)
    integer : NUMBER

p_literal(p)
    literal [boolean]
        string
        integer
        float

p_literal_date(p)
    literal : AT string

p_query(p)
    query [expr]
        empty

p_resource_expr(p)
    resource_expr : string LBRACK identifier RBRACK

p_resource_expr_exported(p)
    resource_expr : EXPORTED string LBRACK identifier RBRACK

```

**p\_resource\_expr\_exported\_param**(*p*)  
resource\_expr : EXPORTED string LBRACK identifier RBRACK block\_expr

**p\_resource\_expr\_param**(*p*)  
resource\_expr : string LBRACK identifier RBRACK block\_expr

**p\_string**(*p*)  
string : STRING

**p\_subquery\_block**(*p*)  
subquery : HASH string block\_expr

**p\_subquery\_comparison**(*p*)  
subquery : HASH string DOT comparison\_expr

**parse**(*text*, *debug*=0)  
Parse the input string and return an AST.

#### Parameters

- **text** (*str*) – The query to parse
- **debug** (*bool*) – Output detailed information during the parsing process

**Returns** An Abstract Syntax Tree

**Return type** *pypuppetdbquery.ast.Query*

**precedence** = (('left', 'OR'), ('left', 'AND'), ('left', 'EQUALS', 'MATCH', 'LESSTHAN', 'GREATERTHAN'), ('right', 'MATCH'))  
Precedence rules in lowest to highest order

**start** = 'query'  
Non-terminal to use as the starting grammar symbol

## 2.6 Test Suite

**class** test\_frontend.**TestFrontendParse**(*methodName*='runTest')

Bases: unittest.case.TestCase

Test cases targetting *pypuppetdbquery.parse()*.

**test\_empty\_queries**()

**test\_simple\_json**()

**test\_simple\_raw**()

**class** test\_frontend.**TestFrontendQueryFactContents**(*methodName*='runTest')

Bases: unittest.case.TestCase

Test cases targetting *pypuppetdbquery.query\_fact\_contents()*.

**test\_raw\_output**()

**test\_with\_query\_and\_facts\_list**()

**test\_without\_either**()

**test\_without\_query**()

**class** test\_frontend.**TestFrontendQueryFacts**(*methodName*='runTest')

Bases: unittest.case.TestCase

Test cases targetting *pypuppetdbquery.query\_facts()*.



```
test_query_facts_in_raw_mode()
test_query_facts_with_facts_list_only()
test_query_facts_with_query_and_facts_list()
test_query_facts_with_query_and_facts_list_regex()
test_query_facts_without_query_or_facts()
class test_integration.TestIntegration(methodName='runTest')
    Bases: unittest.case.TestCase
    Test cases for the integrated combination of pypuppetdbquery.lexer.Lexer,
    pypuppetdbquery.parser.Parser, and pypuppetdbquery.evaluator.Evaluator.

    setUp()
    test_boolean_values()
    test_capitalize_class_names()
    test_dates_in_queries()
    test_does_not_wrap_subquery_with_mode_none()
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```

```
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test_structured_facts()
test_structured_facts_with_array_component()
test_structured_facts_with_match_operator()
test_structured_facts_with_wildcard_operator()

class test_lexer.TestLexer(methodName='runTest')
    Bases: unittest.case.TestCase
    Test cases for pypuppetdbquery.lexer.Lexer.
    setUp()
    test_all_tokens()
    test_empty_queries()
    test_invalid_input()

class test_parser.TestParster(methodName='runTest')
    Bases: unittest.case.TestCase
    Test cases for pypuppetdbquery.parser.Parser.
    setUp()
    test_boolean_values()
    test_dates_in_queries()
    test_double_quoted_strings()
    test_empty_queries()
    test_float_values()
    test_invalid_input()
    test_invalid_input_eof()
    test_logical_operators()
    test_negate_expression()
    test_node_subqueries()
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    test_resource_queries_with_type_title_and_parameters()
    test_single_string_expressions()
```

```
test_structured_facts_with_wildcard_operator()
```



---

## Examples

---

Basic query for nodes using pypuppetdb:

```
import pypuppetdb
import pypuppetdbquery

pdb = pypuppetdb.connect()

pdb_ast = pypuppetdbquery.parse(
    '(processorcount=4 or processorcount=8) and kernel=Linux')

for node in pdb.nodes(query=pdb_ast):
    print(node)
```

Obtain named facts from nodes matching a query (using pypuppetdb):

```
import pypuppetdb
import pypuppetdbquery

pdb = pypuppetdb.connect()

node_facts = pypuppetdbquery.query_facts(
    pdb,
    '(processorcount=4 or processorcount=8) and kernel=Linux',
    ['^lsb/', 'architecture'])

for node in node_facts:
    facts = node_facts[node]
    print(node, facts)
```

Obtain selected structured fact values from nodes matching a query (using pypuppetdb):

```
import pypuppetdb
import pypuppetdbquery

pdb = pypuppetdb.connect()

node_facts = pypuppetdbquery.query_fact_contents(
    pdb,
    '(processorcount=4 or processorcount=8) and kernel=Linux',
    ['system_uptime.days', 'os.lsb.~"dist.*"'])

for node in node_facts:
    facts = node_facts[node]
    print(node, facts)
```

--

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