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OWLAPY¹: Representation of OWL objects in python.

1 OWLAPY

placeholder

2 owlapy

2.1 Subpackages

owlapy.class_expression

https://www.w3.org/TR/owl2-syntax/#Class_Expressions ClassExpression :=
owl_class.py: Class nary_boolean_expression.py: ObjectIntersectionOf, ObjectUnionOf
class_expression.py: ObjectComplementOf

¹ <https://github.com/dice-group/owlapy>

restriction.py: ObjectOneOf, ObjectSomeValuesFrom, ObjectAllValuesFrom, ObjectHas-
Value, ObjectHasSelf, ObjectMinCardinality, ObjectMaxCardinality, ObjectExactCardinality, Data-
SomeValuesFrom, DataAllValuesFrom, DataHasValue, DataMinCardinality, DataMaxCardinality,
DataExactCardinality

Submodules

`owlapy.class_expression.class_expression`

Module Contents

Classes

<i>OWLClassExpression</i>	An OWL 2 Class Expression (https://www.w3.org/TR/owl2-syntax/#Class_Expressions)
<i>OWLAnonymousClassExpression</i>	A Class Expression which is not a named Class.
<i>OWLBooleanClassExpression</i>	Represent an anonymous boolean class expression.
<i>OWLObjectComplementOf</i>	Represents an ObjectComplementOf class expression in the OWL 2 Specification.

class `owlapy.class_expression.class_expression.OWLClassExpression`

Bases: `owlapy.data_ranges.OWLPropertyRange`

An OWL 2 Class Expression (https://www.w3.org/TR/owl2-syntax/#Class_Expressions)

__slots__ = ()

abstract `is_owl_thing()` → bool

Determines if this expression is the built in class owl:Thing. This method does not determine if the class is equivalent to owl:Thing.

Returns

Thing.

Return type

True if this expression is owl

abstract `is_owl_nothing()` → bool

Determines if this expression is the built in class owl:Nothing. This method does not determine if the class is equivalent to owl:Nothing.

abstract `get_object_complement_of()` → *OWLObjectComplementOf*

Gets the object complement of this class expression.

Returns

A class expression that is the complement of this class expression.

abstract `get_nnf()` → *OWLClassExpression*

Gets the negation normal form of the complement of this expression.

Returns

A expression that represents the NNF of the complement of this expression.

```

class owlapy.class_expression.class_expression.OWLAnonymousClassExpression
    Bases: OWLClassExpression
    A Class Expression which is not a named Class.

    is_owl_nothing () → bool
        Determines if this expression is the built in class owl:Nothing. This method does not determine if the class
        is equivalent to owl:Nothing.

    is_owl_thing () → bool
        Determines if this expression is the built in class owl:Thing. This method does not determine if the class is
        equivalent to owl:Thing.

        Returns
            Thing.

        Return type
            True if this expression is owl

    get_object_complement_of () → OWLObjectComplementOf
        Gets the object complement of this class expression.

        Returns
            A class expression that is the complement of this class expression.

    get_nnf () → OWLClassExpression
        Gets the negation normal form of the complement of this expression.

        Returns
            A expression that represents the NNF of the complement of this expression.

class owlapy.class_expression.class_expression.OWLBooleanClassExpression
    Bases: OWLAnonymousClassExpression
    Represent an anonymous boolean class expression.

    __slots__ = ()

class owlapy.class_expression.class_expression.OWLObjectComplementOf (
    op: OWLClassExpression)
    Bases: OWLBooleanClassExpression, owlapy.meta_classes.HasOperands[OWLClassExpression]
    Represents an ObjectComplementOf class expression in the OWL 2 Specification.

    __slots__ = '_operand'

    type_index: Final = 3003

    get_operand () → OWLClassExpression

        Returns
            The wrapped expression.

    operands () → Iterable[OWLClassExpression]
        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

        Returns
            The operands.

```

```

__repr__()
    Return repr(self).

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

```

`owlapy.class_expression.nary_boolean_expression`

Module Contents

Classes

<code>OWLNaryBooleanClassExpression</code>	OWLNaryBooleanClassExpression.
<code>OWLObjectUnionOf</code>	Represents an ObjectUnionOf class expression in the OWL 2 Specification.
<code>OWLObjectIntersectionOf</code>	Represents an OWLObjectIntersectionOf class expression in the OWL 2 Specification.

```

class owlapy.class_expression.nary_boolean_expression.
    OWLNaryBooleanClassExpression (
        operands: Iterable[owlapy.class_expression.class_expression.OWLClassExpression])
    Bases: owlapy.class_expression.class_expression.OWLBooleanClassExpression,
            owlapy.meta_classes.HasOperands[owlapy.class_expression.class_expression.
            OWLClassExpression]
    OWLNaryBooleanClassExpression.
    __slots__ = ()
    operands () → Iterable[owlapy.class_expression.class_expression.OWLClassExpression]
        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.
        Returns
            The operands.
    __repr__()
        Return repr(self).
    __eq__(other)
        Return self==value.
    __hash__()
        Return hash(self).

class owlapy.class_expression.nary_boolean_expression.OWLObjectUnionOf (
    operands: Iterable[owlapy.class_expression.class_expression.OWLClassExpression])
    Bases: OWLNaryBooleanClassExpression
    Represents an ObjectUnionOf class expression in the OWL 2 Specification.
    __slots__ = '_operands'

```

```

    type_index: Final = 3002

class owlapy.class_expression.nary_boolean_expression.
    OWLObjectIntersectionOf (
        operands: Iterable[owlapy.class_expression.class_expression.OWLClassExpression])
    Bases: OWLNaryBooleanClassExpression
    Represents an OWLObjectIntersectionOf class expression in the OWL 2 Specification.
    __slots__ = '_operands'

    type_index: Final = 3001

```

```
owlapy.class_expression.owl_class
```

Module Contents

Classes

<i>OWLClass</i>	An OWL 2 named Class
-----------------	----------------------

```

class owlapy.class_expression.owl_class.OWLClass (iri: owlapy.iri.IRI | str)
    Bases: owlapy.class_expression.class_expression.OWLClassExpression, owlapy.
            owl_object.OWLEntity
    An OWL 2 named Class
    property str
    property reminder: str
        The reminder of the IRI
    __slots__ = ('_iri', '_is_nothing', '_is_thing')
    type_index: Final = 1001
    get_iri () → owlapy.iri.IRI
        Gets the IRI of this object.
        Returns
            The IRI of this object.
    is_owl_thing () → bool
        Determines if this expression is the built in class owl:Thing. This method does not determine if the class is
        equivalent to owl:Thing.
        Returns
            Thing.
        Return type
            True if this expression is owl
    is_owl_nothing () → bool
        Determines if this expression is the built in class owl:Nothing. This method does not determine if the class
        is equivalent to owl:Nothing.

```

get_object_complement_of()

→ *owlapy.class_expression.class_expression.OWLObjectComplementOf*

Gets the object complement of this class expression.

Returns

A class expression that is the complement of this class expression.

get_nnf() → *OWLClass*

Gets the negation normal form of the complement of this expression.

Returns

A expression that represents the NNF of the complement of this expression.

owlapy.class_expression.restriction

Module Contents

Classes

<i>OWLRestriction</i>	Represents an Object Property Restriction or Data Property Restriction in the OWL 2 specification.
<i>OWLObjectRestriction</i>	Represents a Data Property Restriction in the OWL 2 specification.
<i>OWLHasValueRestriction</i>	Represents a Object Property Restriction in the OWL 2 specification.
<i>OWLQuantifiedRestriction</i>	OWLHasValueRestriction.
<i>OWLQuantifiedObjectRestriction</i>	Represents a quantified restriction.
<i>OWLObjectSomeValuesFrom</i>	Represents a quantified object restriction.
<i>OWLObjectAllValuesFrom</i>	Represents an ObjectSomeValuesFrom class expression in the OWL 2 Specification.
<i>OWLCardinalityRestriction</i>	Represents an ObjectAllValuesFrom class expression in the OWL 2 Specification.
<i>OWLObjectCardinalityRestriction</i>	Base interface for owl min and max cardinality restriction.
<i>OWLObjectMinCardinality</i>	Represents Object Property Cardinality Restrictions in the OWL 2 specification.
<i>OWLObjectMaxCardinality</i>	Represents a ObjectMinCardinality restriction in the OWL 2 Specification.
<i>OWLObjectExactCardinality</i>	Represents a ObjectMaxCardinality restriction in the OWL 2 Specification.
<i>OWLObjectHasSelf</i>	Represents an ObjectExactCardinality restriction in the OWL 2 Specification.
<i>OWLQuantifiedDataRestriction</i>	Represents an ObjectHasSelf class expression in the OWL 2 Specification.
<i>OWLObjectDataRestriction</i>	Represents a quantified data restriction.
<i>OWLObjectDataAllValuesFrom</i>	Represents DataAllValuesFrom class expressions in the OWL 2 Specification.
<i>OWLObjectDataCardinalityRestriction</i>	Represents Data Property Cardinality Restrictions in the OWL 2 specification.
<i>OWLObjectDataExactCardinality</i>	Represents DataExactCardinality restrictions in the OWL 2 Specification.
<i>OWLObjectDataMaxCardinality</i>	Represents DataMaxCardinality restrictions in the OWL 2 Specification.
<i>OWLObjectDataMinCardinality</i>	Represents DataMinCardinality restrictions in the OWL 2 Specification.
<i>OWLObjectDataSomeValuesFrom</i>	Represents DataSomeValuesFrom restriction in the OWL 2 Specification.
<i>OWLObjectDataHasValue</i>	Represents DataHasValue restrictions in the OWL 2 Specification.
<i>OWLObjectOneOf</i>	Represents an ObjectOneOf class expression in the OWL 2 Specification.
<i>OWLObjectDataOneOf</i>	Represents DataOneOf in the OWL 2 Specification.
<i>OWLObjectHasValue</i>	Represents an ObjectHasValue class expression in the OWL 2 Specification.
<i>OWLObjectDatatypeRestriction</i>	Represents a DatatypeRestriction data range in the OWL 2 Specification.
<i>OWLObjectFacetRestriction</i>	A facet restriction is used to restrict a particular datatype.

Attributes

Literals

`owlapy.class_expression.restriction.Literals`

class `owlapy.class_expression.restriction.OWLRestriction`

Bases: `owlapy.class_expression.class_expression.OWLAnonymousClassExpression`

Represents an Object Property Restriction or Data Property Restriction in the OWL 2 specification.

__slots__ = ()

abstract `get_property()` → `owlapy.owl_property.OWLPropertyExpression`

Returns

Property being restricted.

is_data_restriction() → bool

Determines if this is a data restriction.

Returns

True if this is a data restriction.

is_object_restriction() → bool

Determines if this is an object restriction.

Returns

True if this is an object restriction.

class `owlapy.class_expression.restriction.OWLDataRestriction`

Bases: `OWLRestriction`

Represents a Data Property Restriction in the OWL 2 specification.

__slots__ = ()

is_data_restriction() → bool

Determines if this is a data restriction.

Returns

True if this is a data restriction.

class `owlapy.class_expression.restriction.OWLObjectRestriction`

Bases: `OWLRestriction`

Represents a Object Property Restriction in the OWL 2 specification.

__slots__ = ()

is_object_restriction() → bool

Determines if this is an object restriction.

Returns

True if this is an object restriction.

abstract `get_property()` → *owlapy.owl_property.OWLObjectPropertyExpression*

Returns

Property being restricted.

class `owlapy.class_expression.restriction.OWLHasValueRestriction` (*value: _T*)

Bases: `Generic[_T]`, *OWLRestriction*, *owlapy.meta_classes.HasFiller[_T]*

OWLHasValueRestriction.

Parameters

_T – The value type.

__slots__ = ()

__eq__ (*other*)

Return self==value.

__hash__ ()

Return hash(self).

get_filler () → *_T*

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns

the value

class `owlapy.class_expression.restriction.OWLQuantifiedRestriction`

Bases: `Generic[_T]`, *OWLRestriction*, *owlapy.meta_classes.HasFiller[_T]*

Represents a quantified restriction.

Parameters

_T – value type

__slots__ = ()

class `owlapy.class_expression.restriction.OWLQuantifiedObjectRestriction` (
filler: owlapy.class_expression.class_expression.OWLClassExpression)

Bases: *OWLQuantifiedRestriction*[*owlapy.class_expression.class_expression.OWLClassExpression*], *OWLObjectRestriction*

Represents a quantified object restriction.

__slots__ = ()

get_filler () → *owlapy.class_expression.class_expression.OWLClassExpression*

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns

the value

class `owlapy.class_expression.restriction.OWLObjectSomeValuesFrom` (
property: owlapy.owl_property.OWLObjectPropertyExpression,

filler: owlapy.class_expression.class_expression.OWLClassExpression)

Bases: *OWLQuantifiedObjectRestriction*

Represents an ObjectSomeValuesFrom class expression in the OWL 2 Specification.

```

__slots__ = ('_property', '_filler')

type_index: Final = 3005

__repr__ ()
    Return repr(self).

__eq__ (other)
    Return self==value.

__hash__ ()
    Return hash(self).

get_property () → owlapy.owl_property.OWLObjectPropertyExpression

```

Returns

Property being restricted.

```

class owlapy.class_expression.restriction.OWLObjectAllValuesFrom (
    property: owlapy.owl_property.OWLObjectPropertyExpression,
    filler: owlapy.class_expression.class_expression.OWLClassExpression)

```

Bases: *OWLQuantifiedObjectRestriction*

Represents an ObjectAllValuesFrom class expression in the OWL 2 Specification.

```

__slots__ = ('_property', '_filler')

type_index: Final = 3006

__repr__ ()
    Return repr(self).

__eq__ (other)
    Return self==value.

__hash__ ()
    Return hash(self).

get_property () → owlapy.owl_property.OWLObjectPropertyExpression

```

Returns

Property being restricted.

```

class owlapy.class_expression.restriction.OWLCardinalityRestriction (
    cardinality: int, filler: _F)

Bases: Generic[_F], OWLQuantifiedRestriction[_F], owlapy.meta_classes.
HasCardinality

```

Base interface for owl min and max cardinality restriction.

Parameters

_F – Type of filler.

```

__slots__ = ()

get_cardinality () → int
    Gets the cardinality of a restriction.

```

Returns

The cardinality. A non-negative integer.

get_filler() → *_F*

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns

the value

```
class owlapy.class_expression.restriction.OwlObjectCardinalityRestriction(  
    cardinality: int, property: owlapy.owl_property.OwlObjectPropertyExpression,  
    filler: owlapy.class_expression.class_expression.OwlClassExpression)
```

Bases: *OwlCardinalityRestriction[owlapy.class_expression.class_expression.OwlClassExpression]*, *OwlQuantifiedObjectRestriction*

Represents Object Property Cardinality Restrictions in the OWL 2 specification.

__slots__ = ()

get_property() → *owlapy.owl_property.OwlObjectPropertyExpression*

Returns

Property being restricted.

__repr__()

Return repr(self).

__eq__(*other*)

Return self==value.

__hash__()

Return hash(self).

```
class owlapy.class_expression.restriction.OwlObjectMinCardinality(  
    cardinality: int, property: owlapy.owl_property.OwlObjectPropertyExpression,  
    filler: owlapy.class_expression.class_expression.OwlClassExpression)
```

Bases: *OwlObjectCardinalityRestriction*

Represents a ObjectMinCardinality restriction in the OWL 2 Specification.

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3008

```
class owlapy.class_expression.restriction.OwlObjectMaxCardinality(  
    cardinality: int, property: owlapy.owl_property.OwlObjectPropertyExpression,  
    filler: owlapy.class_expression.class_expression.OwlClassExpression)
```

Bases: *OwlObjectCardinalityRestriction*

Represents a ObjectMaxCardinality restriction in the OWL 2 Specification.

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3010

```
class owlapy.class_expression.restriction.OwlObjectExactCardinality(  
    cardinality: int, property: owlapy.owl_property.OwlObjectPropertyExpression,  
    filler: owlapy.class_expression.class_expression.OwlClassExpression)
```

Bases: *OwlObjectCardinalityRestriction*

Represents an ObjectExactCardinality restriction in the OWL 2 Specification.

```

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3009

as_intersection_of_min_max()
    → owlapy.class_expression.nary_boolean_expression.OWLObjectIntersectionOf
    Obtains an equivalent form that is a conjunction of a min cardinality and max cardinality restriction.

    Returns
        The semantically equivalent but structurally simpler form ( $= 1 \text{ R C}$ )  $\Rightarrow 1 \text{ R C}$  and  $\leq 1 \text{ R C}$ .

```

```

class owlapy.class_expression.restriction.OWLObjectHasSelf(
    property: owlapy.owl_property.OWLObjectPropertyExpression)
    Bases: OWLObjectRestriction
    Represents an ObjectHasSelf class expression in the OWL 2 Specification.

    __slots__ = '_property'

    type_index: Final = 3011

    get_property() → owlapy.owl_property.OWLObjectPropertyExpression

    Returns
        Property being restricted.

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

    __repr__()
        Return repr(self).

```

```

class owlapy.class_expression.restriction.OWLQuantifiedDataRestriction(
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLQuantifiedRestriction[owlapy.data_ranges.OWLDataRange], OWLDataRestriction
    Represents a quantified data restriction.

    __slots__ = ()

    get_filler() → owlapy.data_ranges.OWLDataRange
        Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of
        a data restriction this will be a constant (data value). For quantified restriction this will be a class expression
        or a data range.

    Returns
        the value

```

```

class owlapy.class_expression.restriction.OWLDataAllValuesFrom(
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLQuantifiedDataRestriction
    Represents DataAllValuesFrom class expressions in the OWL 2 Specification.

    __slots__ = '_property'

```

```

type_index: Final = 3013

__repr__()
    Return repr(self).

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

get_property() → owlapy.owl_property.OWLDataPropertyExpression

    Returns
        Property being restricted.

```

class owlapy.class_expression.restriction.OWLDataCardinalityRestriction(
cardinality: int, property: owlapy.owl_property.OWLDataPropertyExpression,
filler: owlapy.data_ranges.OWLDataRange)
Bases: *OWLCardinalityRestriction[owlapy.data_ranges.OWLDataRange], OWLQuantifiedDataRestriction, OWLDataRestriction*

Represents Data Property Cardinality Restrictions in the OWL 2 specification.

```

__slots__ = ()

get_property() → owlapy.owl_property.OWLDataPropertyExpression

    Returns
        Property being restricted.

__repr__()
    Return repr(self).

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

```

class owlapy.class_expression.restriction.OWLDataExactCardinality(
cardinality: int, property: owlapy.owl_property.OWLDataPropertyExpression,
filler: owlapy.data_ranges.OWLDataRange)
Bases: *OWLDataCardinalityRestriction*

Represents DataExactCardinality restrictions in the OWL 2 Specification.

```

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3016

as_intersection_of_min_max()
    → owlapy.class_expression.nary_boolean_expression.OWLObjectIntersectionOf

    Obtains an equivalent form that is a conjunction of a min cardinality and max cardinality restriction.

    Returns
        The semantically equivalent but structurally simpler form (= 1 R D) = >= 1 R D and <= 1 R D.

```

```

class owlapy.class_expression.restriction.OWLDataMaxCardinality (cardinality: int,
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLDataCardinalityRestriction
    Represents DataMaxCardinality restrictions in the OWL 2 Specification.
    __slots__ = ('_cardinality', '_filler', '_property')
    type_index: Final = 3017

class owlapy.class_expression.restriction.OWLDataMinCardinality (cardinality: int,
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLDataCardinalityRestriction
    Represents DataMinCardinality restrictions in the OWL 2 Specification.
    __slots__ = ('_cardinality', '_filler', '_property')
    type_index: Final = 3015

class owlapy.class_expression.restriction.OWLDataSomeValuesFrom (
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLQuantifiedDataRestriction
    Represents a DataSomeValuesFrom restriction in the OWL 2 Specification.
    __slots__ = '_property'
    type_index: Final = 3012

    __repr__ ()
        Return repr(self).

    __eq__ (other)
        Return self==value.

    __hash__ ()
        Return hash(self).

    get_property () → owlapy.owl_property.OWLDataPropertyExpression

    Returns
        Property being restricted.

class owlapy.class_expression.restriction.OWLDataHasValue (
    property: owlapy.owl_property.OWLDataPropertyExpression,
    value: owlapy.owl_literal.OWLLiteral)
    Bases: OWLHasValueRestriction[owlapy.owl_literal.OWLLiteral], OWLDataRestriction
    Represents DataHasValue restrictions in the OWL 2 Specification.
    __slots__ = '_property'
    type_index: Final = 3014

```

__repr__()

Return repr(self).

__eq__() (*other*)

Return self==value.

__hash__()

Return hash(self).

as_some_values_from() → *owlapy.class_expression.class_expression.OWLClassExpression*

A convenience method that obtains this restriction as an existential restriction with a nominal filler.

Returns

The existential equivalent of this value restriction. $\text{simp}(\text{HasValue}(p\ a)) = \text{some}(p\ \{a\})$.

get_property() → *owlapy.owl_property.OWLDataPropertyExpression*

Returns

Property being restricted.

class owlapy.class_expression.restriction.**OWLObjectOneOf**(

values: owlapy.owl_individual.OWLIndividual | Iterable[owlapy.owl_individual.OWLIndividual])

Bases: *owlapy.class_expression.class_expression.OWLAnonymousClassExpression, owlapy.meta_classes.HasOperands[owlapy.owl_individual.OWLIndividual]*

Represents an ObjectOneOf class expression in the OWL 2 Specification.

__slots__ = **'_values'**

type_index: Final = 3004

individuals() → *Iterable[owlapy.owl_individual.OWLIndividual]*

Gets the individuals that are in the oneOf. These individuals represent the exact instances (extension) of this class expression.

Returns

The individuals that are the values of this {@code ObjectOneOf} class expression.

operands() → *Iterable[owlapy.owl_individual.OWLIndividual]*

Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

Returns

The operands.

as_object_union_of() → *owlapy.class_expression.class_expression.OWLClassExpression*

Simplifies this enumeration to a union of singleton nominals.

Returns

This enumeration in a more standard DL form. $\text{simp}(\{a\}) = \{a\}$ $\text{simp}(\{a_0, \dots, \{a_n\}) = \text{unionOf}(\{a_0\}, \dots, \{a_n\})$

__hash__()

Return hash(self).

__eq__() (*other*)

Return self==value.

__repr__()

Return repr(self).

```

class owlapy.class_expression.restriction.OWLDataOneOf (
    values: owlapy.owl_literal.OWLLiteral | Iterable[owlapy.owl_literal.OWLLiteral])
    Bases: owlapy.data_ranges.OWLDataRange, owlapy.meta_classes.
    HasOperands[owlapy.owl_literal.OWLLiteral]
    Represents DataOneOf in the OWL 2 Specification.
    type_index: Final = 4003
    values () → Iterable[owlapy.owl_literal.OWLLiteral]
        Gets the values that are in the oneOf.
        Returns
            The values of this { @code DataOneOf } class expression.
    operands () → Iterable[owlapy.owl_literal.OWLLiteral]
        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.
        Returns
            The operands.
    __hash__ ()
        Return hash(self).
    __eq__ (other)
        Return self==value.
    __repr__ ()
        Return repr(self).

class owlapy.class_expression.restriction.OWLObjectHasValue (
    property: owlapy.owl_property.OWLObjectPropertyExpression,
    individual: owlapy.owl_individual.OWLIndividual)
    Bases: OWLHasValueRestriction[owlapy.owl_individual.OWLIndividual], OWLObject-
    Restriction
    Represents an ObjectHasValue class expression in the OWL 2 Specification.
    __slots__ = ('_property', '_v')
    type_index: Final = 3007
    get_property () → owlapy.owl_property.OWLObjectPropertyExpression
        Returns
            Property being restricted.
    as_some_values_from () → owlapy.class_expression.class_expression.OWLClassExpression
        A convenience method that obtains this restriction as an existential restriction with a nominal filler.
        Returns
            The existential equivalent of this value restriction.  $\text{simp}(\text{HasValue}(p\ a)) = \text{some}(p\ \{a\})$ .
    __repr__ ()
        Return repr(self).

class owlapy.class_expression.restriction.OWLDatatypeRestriction (
    type_: owlapy.types.OWLDatatype,
    facet_restrictions: OWLFacetRestriction | Iterable[OWLFacetRestriction])

```


Bases: *owlapy.data_ranges.OWLDataRange*

Represents a DatatypeRestriction data range in the OWL 2 Specification.

__slots__ = ('_type', '_facet_restrictions')

type_index: Final = 4006

get_datatype() → *owlapy.types.OWLDatatype*

get_facet_restrictions() → Sequence[*OWLFacetRestriction*]

__eq__(other)

Return self==value.

__hash__()

Return hash(self).

__repr__()

Return repr(self).

class owlapy.class_expression.restriction.**OWLFacetRestriction**(
 facet: owlapy.vocab.OWLFacet, literal: Literals)

Bases: *owlapy.owlobject.OWLObject*

A facet restriction is used to restrict a particular datatype.

__slots__ = ('_facet', '_literal')

type_index: Final = 4007

get_facet() → *owlapy.vocab.OWLFacet*

get_facet_value() → *owlapy.owl_literal.OWLLiteral*

__eq__(other)

Return self==value.

__hash__()

Return hash(self).

__repr__()

Return repr(self).

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<i>OWLClass</i>	An OWL 2 named Class
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<i>OWLObjectIntersectionOf</i>	Represents an OWLObjectIntersectionOf class expression in the OWL 2 Specification.
<i>OWLRestriction</i>	Represents an Object Property Restriction or Data Property Restriction in the OWL 2 specification.
<i>OWLQuantifiedRestriction</i>	Represents a quantified restriction.
<i>OWLQuantifiedObjectRestriction</i>	Represents a quantified object restriction.
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<i>OWLHasValueRestriction</i>	OWLHasValueRestriction.
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<i>OWLCardinalityRestriction</i>	Base interface for owl min and max cardinality restriction.
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<i>OWLObjectOneOf</i>	Represents an ObjectOneOf class expression in the OWL 2 Specification.
<i>OWLRDFVocabulary</i>	Enumerations for OWL/RDF vocabulary.

Attributes

<i>OWLThing</i>
<i>OWLNothing</i>

class owlapy.class_expression.**OWLClassExpression**

Bases: *owlapy.data_ranges.OWLPropertyRange*

An OWL 2 Class Expression (https://www.w3.org/TR/owl2-syntax/#Class_Expressions)

__slots__ = ()

abstract is_owl_thing() → bool

Determines if this expression is the built in class owl:Thing. This method does not determine if the class is equivalent to owl:Thing.

Returns

Thing.

Return type

True if this expression is owl

abstract is_owl_nothing() → bool

Determines if this expression is the built in class owl:Nothing. This method does not determine if the class is equivalent to owl:Nothing.

abstract get_object_complement_of() → *OWLObjectComplementOf*

Gets the object complement of this class expression.

Returns

A class expression that is the complement of this class expression.

abstract get_nnf() → *OWLClassExpression*

Gets the negation normal form of the complement of this expression.

Returns

A expression that represents the NNF of the complement of this expression.

class owlapy.class_expression.**OWLAnonymousClassExpression**

Bases: *OWLClassExpression*

A Class Expression which is not a named Class.

is_owl_nothing() → bool

Determines if this expression is the built in class owl:Nothing. This method does not determine if the class is equivalent to owl:Nothing.

is_owl_thing() → bool
 Determines if this expression is the built in class owl:Thing. This method does not determine if the class is equivalent to owl:Thing.

Returns
 Thing.

Return type
 True if this expression is owl

get_object_complement_of() → *OWLObjectComplementOf*
 Gets the object complement of this class expression.

Returns
 A class expression that is the complement of this class expression.

get_nnf() → *OWLClassExpression*
 Gets the negation normal form of the complement of this expression.

Returns
 A expression that represents the NNF of the complement of this expression.

class owlapy.class_expression.OWLBooleanClassExpression
 Bases: *OWLAnonymousClassExpression*
 Represent an anonymous boolean class expression.

__slots__ = ()

class owlapy.class_expression.OWLObjectComplementOf(*op: OWLClassExpression*)
 Bases: *OWLBooleanClassExpression*, *owlapy.meta_classes.HasOperands[OWLClassExpression]*
 Represents an ObjectComplementOf class expression in the OWL 2 Specification.

__slots__ = '_operand'

type_index: Final = 3003

get_operand() → *OWLClassExpression*

Returns
 The wrapped expression.

operands() → Iterable[*OWLClassExpression*]
 Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

Returns
 The operands.

__repr__()
 Return repr(self).

__eq__(other)
 Return self==value.

__hash__()
 Return hash(self).

```

class owlapy.class_expression.OWLClass (iri: owlapy.iri.IRI | str)
    Bases: owlapy.class_expression.class_expression.OWLClassExpression, owlapy.
            owlobject.OWLEntity
    An OWL 2 named Class

    property str

    property reminder: str
        The reminder of the IRI

    __slots__ = ('_iri', '_is_nothing', '_is_thing')

    type_index: Final = 1001

    get_iri () → owlapy.iri.IRI
        Gets the IRI of this object.

        Returns
            The IRI of this object.

    is_owl_thing () → bool
        Determines if this expression is the built in class owl:Thing. This method does not determine if the class is
        equivalent to owl:Thing.

        Returns
            Thing.

        Return type
            True if this expression is owl

    is_owl_nothing () → bool
        Determines if this expression is the built in class owl:Nothing. This method does not determine if the class
        is equivalent to owl:Nothing.

    get_object_complement_of ()
        → owlapy.class_expression.class_expression.OWLObjectComplementOf
        Gets the object complement of this class expression.

        Returns
            A class expression that is the complement of this class expression.

    get_nnf () → OWLClass
        Gets the negation normal form of the complement of this expression.

        Returns
            A expression that represents the NNF of the complement of this expression.

class owlapy.class_expression.OWLNaryBooleanClassExpression (
    operands: Iterable[owlapy.class_expression.class_expression.OWLClassExpression])
    Bases: owlapy.class_expression.class_expression.OWLBooleanClassExpression,
            owlapy.meta_classes.HasOperands[owlapy.class_expression.class_expression.
            OWLClassExpression]
    OWLNaryBooleanClassExpression.

    __slots__ = ()

```

operands () → Iterable[*owlapy.class_expression.class_expression.OWLClassExpression*]

Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

Returns

The operands.

__repr__ ()

Return repr(self).

__eq__ (other)

Return self==value.

__hash__ ()

Return hash(self).

class owlapy.class_expression.OWLObjectUnionOf (
 operands: Iterable[*owlapy.class_expression.class_expression.OWLClassExpression*])

Bases: *OWLNaryBooleanClassExpression*

Represents an ObjectUnionOf class expression in the OWL 2 Specification.

__slots__ = '_operands'

type_index: Final = 3002

class owlapy.class_expression.OWLObjectIntersectionOf (
 operands: Iterable[*owlapy.class_expression.class_expression.OWLClassExpression*])

Bases: *OWLNaryBooleanClassExpression*

Represents an OWLObjectIntersectionOf class expression in the OWL 2 Specification.

__slots__ = '_operands'

type_index: Final = 3001

class owlapy.class_expression.OWLRestriction

Bases: *owlapy.class_expression.class_expression.OWLAnonymousClassExpression*

Represents an Object Property Restriction or Data Property Restriction in the OWL 2 specification.

__slots__ = ()

abstract get_property () → *owlapy.owl_property.OWLPropertyExpression*

Returns

Property being restricted.

is_data_restriction () → bool

Determines if this is a data restriction.

Returns

True if this is a data restriction.

is_object_restriction () → bool

Determines if this is an object restriction.

Returns

True if this is an object restriction.

```

class owlapy.class_expression.OWLQuantifiedRestriction
    Bases: Generic[_T], OWLRestriction, owlapy.meta_classes.HasFiller[_T]
    Represents a quantified restriction.

    Parameters
        _T – value type

    __slots__ = ()

class owlapy.class_expression.OWLQuantifiedObjectRestriction(
    filler: owlapy.class_expression.class_expression.OWLClassExpression)
    Bases: OWLQuantifiedRestriction[owlapy.class_expression.class_expression.
        OWLClassExpression], OWLObjectRestriction
    Represents a quantified object restriction.

    __slots__ = ()

    get_filler() → owlapy.class_expression.class_expression.OWLClassExpression
        Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of
        a data restriction this will be a constant (data value). For quantified restriction this will be a class expression
        or a data range.

    Returns
        the value

class owlapy.class_expression.OWLObjectRestriction
    Bases: OWLRestriction
    Represents a Object Property Restriction in the OWL 2 specification.

    __slots__ = ()

    is_object_restriction() → bool
        Determines if this is an object restriction.

    Returns
        True if this is an object restriction.

    abstract get_property() → owlapy.owl_property.OWLObjectPropertyExpression
        Returns
            Property being restricted.

class owlapy.class_expression.OWLHasValueRestriction(value: _T)
    Bases: Generic[_T], OWLRestriction, owlapy.meta_classes.HasFiller[_T]
    OWLHasValueRestriction.

    Parameters
        _T – The value type.

    __slots__ = ()

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

```

get_filler() → *T*

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns

the value

class owlapy.class_expression.OWLDataRestriction

Bases: *OWLRestriction*

Represents a Data Property Restriction in the OWL 2 specification.

__slots__ = ()

is_data_restriction() → bool

Determines if this is a data restriction.

Returns

True if this is a data restriction.

class owlapy.class_expression.OWLCardinalityRestriction(*cardinality: int, filler: F*)

Bases: *Generic[F]*, *OWLQuantifiedRestriction[F]*, *owlapy.meta_classes.HasCardinality*

Base interface for owl min and max cardinality restriction.

Parameters

F – Type of filler.

__slots__ = ()

get_cardinality() → int

Gets the cardinality of a restriction.

Returns

The cardinality. A non-negative integer.

get_filler() → *F*

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns

the value

class owlapy.class_expression.OWLObjectCardinalityRestriction(*cardinality: int, property: owlapy.owl_property.OWLObjectPropertyExpression, filler: owlapy.class_expression.class_expression.OWLClassExpression*)

Bases: *OWLCardinalityRestriction[owlapy.class_expression.class_expression.OWLClassExpression]*, *OWLQuantifiedObjectRestriction*

Represents Object Property Cardinality Restrictions in the OWL 2 specification.

__slots__ = ()

get_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

Returns

Property being restricted.


```

__repr__()
    Return repr(self).

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

class owlapy.class_expression.OWLObjectHasSelf(
    property: owlapy.owl_property.OWLObjectPropertyExpression)
    Bases: OWLObjectRestriction
    Represents an ObjectHasSelf class expression in the OWL 2 Specification.

    __slots__ = '_property'

    type_index: Final = 3011

    get_property() → owlapy.owl_property.OWLObjectPropertyExpression

        Returns
            Property being restricted.

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

    __repr__()
        Return repr(self).

class owlapy.class_expression.OWLDataOneOf(
    values: owlapy.owl_literal.OWLLiteral | Iterable[owlapy.owl_literal.OWLLiteral])
    Bases: owlapy.data_ranges.OWLDataRange, owlapy.meta_classes.HasOperands[owlapy.owl_literal.OWLLiteral]
    Represents DataOneOf in the OWL 2 Specification.

    type_index: Final = 4003

    values() → Iterable[owlapy.owl_literal.OWLLiteral]
        Gets the values that are in the oneOf.

        Returns
            The values of this {@code DataOneOf} class expression.

    operands() → Iterable[owlapy.owl_literal.OWLLiteral]
        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

        Returns
            The operands.

    __hash__()
        Return hash(self).

    __eq__(other)
        Return self==value.

```

```

__repr__()
    Return repr(self).

class owlapy.class_expression.OWLQuantifiedDataRestriction(
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLQuantifiedRestriction[owlapy.data_ranges.OWLDataRange], OWLDataRe-
        striction
    Represents a quantified data restriction.

    __slots__ = ()

    get_filler() → owlapy.data_ranges.OWLDataRange
        Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of
        a data restriction this will be a constant (data value). For quantified restriction this will be a class expression
        or a data range.

        Returns
            the value

class owlapy.class_expression.OWLDataCardinalityRestriction(cardinality: int,
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLCardinalityRestriction[owlapy.data_ranges.OWLDataRange], OWLQuantifiedDataRestriction, OWLDataRestriction
    Represents Data Property Cardinality Restrictions in the OWL 2 specification.

    __slots__ = ()

    get_property() → owlapy.owl_property.OWLDataPropertyExpression
        Returns
            Property being restricted.

    __repr__()
        Return repr(self).

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

class owlapy.class_expression.OWLObjectSomeValuesFrom(
    property: owlapy.owl_property.OWLObjectPropertyExpression,
    filler: owlapy.class_expression.class_expression.OWLClassExpression)
    Bases: OWLQuantifiedObjectRestriction
    Represents an ObjectSomeValuesFrom class expression in the OWL 2 Specification.

    __slots__ = ('_property', '_filler')

    type_index: Final = 3005

    __repr__()
        Return repr(self).

    __eq__(other)
        Return self==value.

```

__hash__()
Return hash(self).

get_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

Returns
Property being restricted.

class owlapy.class_expression.**OWLObjectAllValuesFrom**(
 property: owlapy.owl_property.OWLObjectPropertyExpression,
 filler: owlapy.class_expression.class_expression.OWLClassExpression)

Bases: *OWLQuantifiedObjectRestriction*

Represents an ObjectAllValuesFrom class expression in the OWL 2 Specification.

__slots__ = ('_property', '_filler')

type_index: Final = 3006

__repr__()
Return repr(self).

__eq__(other)
Return self==value.

__hash__()
Return hash(self).

get_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

Returns
Property being restricted.

class owlapy.class_expression.**OWLObjectHasValue**(
 property: owlapy.owl_property.OWLObjectPropertyExpression,
 individual: owlapy.owl_individual.OWLIndividual)

Bases: *OWLHasValueRestriction[owlapy.owl_individual.OWLIndividual], OWLObjectRestriction*

Represents an ObjectHasValue class expression in the OWL 2 Specification.

__slots__ = ('_property', '_v')

type_index: Final = 3007

get_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

Returns
Property being restricted.

as_some_values_from() → *owlapy.class_expression.class_expression.OWLClassExpression*
A convenience method that obtains this restriction as an existential restriction with a nominal filler.

Returns
The existential equivalent of this value restriction. $\text{simp}(\text{HasValue}(p\ a)) = \text{some}(p\ \{a\})$.

__repr__()
Return repr(self).

```

class owlapy.class_expression.OWLDatatypeRestriction(
    type_: owlapy.types.OWLDatatype,
    facet_restrictions: OWLFacetRestriction | Iterable[OWLFacetRestriction])
    Bases: owlapy.data_ranges.OWLDataRange
    Represents a DatatypeRestriction data range in the OWL 2 Specification.
    __slots__ = ('_type', '_facet_restrictions')
    type_index: Final = 4006
    get_datatype() → owlapy.types.OWLDatatype
    get_facet_restrictions() → Sequence[OWLFacetRestriction]
    __eq__(other)
        Return self==value.
    __hash__()
        Return hash(self).
    __repr__()
        Return repr(self).

class owlapy.class_expression.OWLFacet(remainder: str, symbolic_form: str,
    operator: Callable[[_X, _X], bool])
    Bases: _Vocabulary, enum.Enum
    Enumerations for OWL facets.
    property symbolic_form
    property operator
    MIN_INCLUSIVE: Final = ('minInclusive', '>=')
    MIN_EXCLUSIVE: Final = ('minExclusive', '>')
    MAX_INCLUSIVE: Final = ('maxInclusive', '<=')
    MAX_EXCLUSIVE: Final = ('maxExclusive', '<')
    LENGTH: Final = ('length', 'length')
    MIN_LENGTH: Final = ('minLength', 'minLength')
    MAX_LENGTH: Final = ('maxLength', 'maxLength')
    PATTERN: Final = ('pattern', 'pattern')
    TOTAL_DIGITS: Final = ('totalDigits', 'totalDigits')
    FRACTION_DIGITS: Final = ('fractionDigits', 'fractionDigits')
    static from_str(name: str) → OWLFacet

class owlapy.class_expression.OWLFacetRestriction(facet: owlapy.vocab.OWLFacet,
    literal: Literals)
    Bases: owlapy.owlobject.OWLObject
    A facet restriction is used to restrict a particular datatype.

```

```

__slots__ = ('_facet', '_literal')

type_index: Final = 4007

get_facet() → owlapy.vocab.OWLFacet

get_facet_value() → owlapy.owl_literal.OWLLiteral

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

__repr__()
    Return repr(self).

class owlapy.class_expression.OWLObjectMinCardinality(cardinality: int,
    property: owlapy.owl_property.OWLObjectPropertyExpression,
    filler: owlapy.class_expression.class_expression.OWLClassExpression)
    Bases: OWLObjectCardinalityRestriction
    Represents a ObjectMinCardinality restriction in the OWL 2 Specification.
    __slots__ = ('_cardinality', '_filler', '_property')
    type_index: Final = 3008

class owlapy.class_expression.OWLObjectMaxCardinality(cardinality: int,
    property: owlapy.owl_property.OWLObjectPropertyExpression,
    filler: owlapy.class_expression.class_expression.OWLClassExpression)
    Bases: OWLObjectCardinalityRestriction
    Represents a ObjectMaxCardinality restriction in the OWL 2 Specification.
    __slots__ = ('_cardinality', '_filler', '_property')
    type_index: Final = 3010

class owlapy.class_expression.OWLObjectExactCardinality(cardinality: int,
    property: owlapy.owl_property.OWLObjectPropertyExpression,
    filler: owlapy.class_expression.class_expression.OWLClassExpression)
    Bases: OWLObjectCardinalityRestriction
    Represents an ObjectExactCardinality restriction in the OWL 2 Specification.
    __slots__ = ('_cardinality', '_filler', '_property')
    type_index: Final = 3009

    as_intersection_of_min_max()
        → owlapy.class_expression.nary_boolean_expression.OWLObjectIntersectionOf
        Obtains an equivalent form that is a conjunction of a min cardinality and max cardinality restriction.

    Returns
        The semantically equivalent but structurally simpler form ( $= 1 \text{ R C}$ )  $=> 1 \text{ R C}$  and  $<= 1 \text{ R C}$ .

```

```
class owlapy.class_expression.OWLDataSomeValuesFrom(
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
```

Bases: *OWLQuantifiedDataRestriction*

Represents a DataSomeValuesFrom restriction in the OWL 2 Specification.

```
__slots__ = '_property'
```

```
type_index: Final = 3012
```

```
__repr__()
```

Return repr(self).

```
__eq__(other)
```

Return self==value.

```
__hash__()
```

Return hash(self).

```
get_property() → owlapy.owl_property.OWLDataPropertyExpression
```

Returns

Property being restricted.

```
class owlapy.class_expression.OWLDataAllValuesFrom(
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
```

Bases: *OWLQuantifiedDataRestriction*

Represents DataAllValuesFrom class expressions in the OWL 2 Specification.

```
__slots__ = '_property'
```

```
type_index: Final = 3013
```

```
__repr__()
```

Return repr(self).

```
__eq__(other)
```

Return self==value.

```
__hash__()
```

Return hash(self).

```
get_property() → owlapy.owl_property.OWLDataPropertyExpression
```

Returns

Property being restricted.

```
class owlapy.class_expression.OWLDataHasValue(
    property: owlapy.owl_property.OWLDataPropertyExpression,
    value: owlapy.owl_literal.OWLLiteral)
```

Bases: *OWLHasValueRestriction*[*owlapy.owl_literal.OWLLiteral*], *OWLDataRestriction*

Represents DataHasValue restrictions in the OWL 2 Specification.

```
__slots__ = '_property'
```

```

type_index: Final = 3014

__repr__()
    Return repr(self).

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

as_some_values_from() → owlapy.class_expression.class_expression.OWLClassExpression
    A convenience method that obtains this restriction as an existential restriction with a nominal filler.

    Returns
        The existential equivalent of this value restriction.  $\text{simp}(\text{HasValue}(p\ a)) = \text{some}(p\ \{a\})$ .

get_property() → owlapy.owl_property.OWLDataPropertyExpression

    Returns
        Property being restricted.

class owlapy.class_expression.OWLDataMinCardinality(cardinality: int,
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLDataCardinalityRestriction
    Represents DataMinCardinality restrictions in the OWL 2 Specification.

    __slots__ = ('_cardinality', '_filler', '_property')

    type_index: Final = 3015

class owlapy.class_expression.OWLDataMaxCardinality(cardinality: int,
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLDataCardinalityRestriction
    Represents DataMaxCardinality restrictions in the OWL 2 Specification.

    __slots__ = ('_cardinality', '_filler', '_property')

    type_index: Final = 3017

class owlapy.class_expression.OWLDataExactCardinality(cardinality: int,
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
    Bases: OWLDataCardinalityRestriction
    Represents DataExactCardinality restrictions in the OWL 2 Specification.

    __slots__ = ('_cardinality', '_filler', '_property')

    type_index: Final = 3016

as_intersection_of_min_max()
    → owlapy.class_expression.nary_boolean_expression.OWLObjectIntersectionOf
    Obtains an equivalent form that is a conjunction of a min cardinality and max cardinality restriction.

    Returns
        The semantically equivalent but structurally simpler form  $(= 1\ R\ D) = \geq 1\ R\ D$  and  $\leq 1\ R\ D$ .

```

```

class owlapy.class_expression.OWLObjectOneOf (
    values: owlapy.owl_individual.OWLIndividual | Iterable[owlapy.owl_individual.OWLIndividual])
    Bases: owlapy.class_expression.class_expression.OWLAnonymousClassExpression,
    owlapy.meta_classes.HasOperands[owlapy.owl_individual.OWLIndividual]
    Represents an ObjectOneOf class expression in the OWL 2 Specification.
    __slots__ = '_values'
    type_index: Final = 3004

    individuals () → Iterable[owlapy.owl_individual.OWLIndividual]
        Gets the individuals that are in the oneOf. These individuals represent the exact instances (extension) of this
        class expression.

        Returns
            The individuals that are the values of this {@code ObjectOneOf} class expression.

    operands () → Iterable[owlapy.owl_individual.OWLIndividual]
        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

        Returns
            The operands.

    as_object_union_of () → owlapy.class_expression.class_expression.OWLClassExpression
        Simplifies this enumeration to a union of singleton nominals.

        Returns
            This enumeration in a more standard DL form.  $\text{simp}(\{a\}) = \{a\}$   $\text{simp}(\{a_0, \dots, \{a_n\}) = \text{unionOf}(\{a_0\}, \dots, \{a_n\})$ 

    __hash__ ()
        Return hash(self).

    __eq__ (other)
        Return self==value.

    __repr__ ()
        Return repr(self).

class owlapy.class_expression.OWL RDFVocabulary (
    namespace: owlapy.namespaces.Namespaces, remainder: str)
    Bases: _Vocabulary, enum.Enum
    Enumerations for OWL/RDF vocabulary.

    OWL_THING = ()

    OWL_NOthing = ()

    OWL_CLASS = ()

    OWL_NAMED_INDIVIDUAL = ()

    OWL_TOP_OBJECT_PROPERTY = ()

    OWL_BOTTOM_OBJECT_PROPERTY = ()

    OWL_TOP_DATA_PROPERTY = ()

```



```
OWL_BOTTOM_DATA_PROPERTY = ()
```

```
RDFS_LITERAL = ()
```

```
owlapy.class_expression.OWLThing: Final
```

```
owlapy.class_expression.OWLNothing: Final
```

owlapy.data_ranges

https://www.w3.org/TR/owl2-syntax/#Data_Ranges

DataRange := Datatype | DataIntersectionOf | DataUnionOf | DataComplementOf | DataOneOf | DatatypeRestriction

Package Contents

Classes

<i>OWLObject</i>	Base interface for OWL objects
<i>OWLEntity</i>	Represents Entities in the OWL 2 Specification.
<i>HasOperands</i>	An interface to objects that have a collection of operands.
<i>IRI</i>	An IRI, consisting of a namespace and a remainder.
<i>OWLPropertyRange</i>	OWL Objects that can be the ranges of properties.
<i>OWLDataRange</i>	Represents a DataRange in the OWL 2 Specification.
<i>OWLDataComplementOf</i>	Represents DataComplementOf in the OWL 2 Specification.
<i>OWLNaryDataRange</i>	OWLNaryDataRange.
<i>OWLDataUnionOf</i>	Represents a DataUnionOf data range in the OWL 2 Specification.
<i>OWLDataIntersectionOf</i>	Represents DataIntersectionOf in the OWL 2 Specification.

```
class owlapy.data_ranges.OWLObject
```

Base interface for OWL objects

```
__slots__ = ()
```

```
abstract __eq__(other)
```

Return self==value.

```
abstract __hash__()
```

Return hash(self).

```
abstract __repr__()
```

Return repr(self).

```
is_anonymous() → bool
```

```
class owlapy.data_ranges.OWLEntity
```

Bases: OWLNamedObject

Represents Entities in the OWL 2 Specification.

```

__slots__ = ()

to_string_id() → str

is_anonymous() → bool

```

class owlapy.data_ranges.**HasOperands**

Bases: `Generic[_T]`

An interface to objects that have a collection of operands.

Parameters

_T – Operand type.

```

__slots__ = ()

```

abstract operands() → `Iterable[_T]`

Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

Returns

The operands.

class owlapy.data_ranges.**IRI** (*namespace: str | owlapy.namespaces.Namespaces, remainder: str*)

Bases: `owlapy.owl_annotation.OWLAnnotationSubject`, `owlapy.owl_annotation.OWLAnnotationValue`

An IRI, consisting of a namespace and a remainder.

property str: str

Returns: The string that specifies the IRI.

property reminder: str

Returns: The string corresponding to the reminder of the IRI.

```

__slots__ = ('_namespace', '_remainder', '__weakref__')

```

type_index: Final = 0

static create (*namespace: owlapy.namespaces.Namespaces, remainder: str*) → *IRI*

static create (*namespace: str, remainder: str*) → *IRI*

static create (*string: str*) → *IRI*

__repr__()

Return repr(self).

__eq__ (*other*)

Return self==value.

__hash__()

Return hash(self).

is_nothing()

Determines if this IRI is equal to the IRI that owl:Nothing is named with.

Returns

True if this IRI is equal to <<http://www.w3.org/2002/07/owl#Nothing>> and otherwise False.

is_thing()

Determines if this IRI is equal to the IRI that owl:Thing is named with.

Returns

True if this IRI is equal to <<http://www.w3.org/2002/07/owl#Thing>> and otherwise False.

is_reserved_vocabulary() → bool

Determines if this IRI is in the reserved vocabulary. An IRI is in the reserved vocabulary if it starts with <<http://www.w3.org/1999/02/22-rdf-syntax-ns#>> or <<http://www.w3.org/2000/01/rdf-schema#>> or <<http://www.w3.org/2001/XMLSchema#>> or <<http://www.w3.org/2002/07/owl#>>.

Returns

True if the IRI is in the reserved vocabulary, otherwise False.

as_iri() → *IRI*

Returns

if the value is an IRI, return it. Return None otherwise.

as_str() → str

CD: Should be deprecated. :returns: The string that specifies the IRI.

get_short_form() → str

Gets the short form.

Returns

A string that represents the short form.

get_namespace() → str

Returns

The namespace as string.

get_remainder() → str

Returns

The remainder (coincident with NCName usually) for this IRI.

class owlapy.data_ranges.OWLPropertyRange

Bases: *owlapy.owlobject.OWLObject*

OWL Objects that can be the ranges of properties.

class owlapy.data_ranges.OWLDataRange

Bases: *OWLPropertyRange*

Represents a DataRange in the OWL 2 Specification.

class owlapy.data_ranges.OWLDataComplementOf (*data_range: OWLDataRange*)

Bases: *OWLDataRange*

Represents DataComplementOf in the OWL 2 Specification.

type_index: Final = 4002

get_data_range() → *OWLDataRange*

Returns

The wrapped data range.

```

__repr__()
    Return repr(self).

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

class owlapy.data_ranges.OWLNaryDataRange (operands: Iterable[OWLDataRange])
    Bases: OWLDataRange, owlapy.meta_classes.HasOperands[OWLDataRange]
    OWLNaryDataRange.

    __slots__ = ()

    operands() → Iterable[OWLDataRange]
        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

        Returns
            The operands.

    __repr__()
        Return repr(self).

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

class owlapy.data_ranges.OWLDataUnionOf (operands: Iterable[OWLDataRange])
    Bases: OWLNaryDataRange
    Represents a DataUnionOf data range in the OWL 2 Specification.

    __slots__ = '_operands'

    type_index: Final = 4005

class owlapy.data_ranges.OWLDataIntersectionOf (operands: Iterable[OWLDataRange])
    Bases: OWLNaryDataRange
    Represents DataIntersectionOf in the OWL 2 Specification.

    __slots__ = '_operands'

    type_index: Final = 4004

```

owlapy.entities

Entities are the fundamental building blocks of OWL 2 ontologies, and they define the vocabulary — the named terms — of an ontology. In logic, the set of entities is usually said to constitute the signature of an ontology.

Classes, datatypes, object properties, data properties, annotation properties, and named individuals are entities, and they are all uniquely identified by an IR.

`owlapy.model`

Submodules

`owlapy.model.providers`

OWL Datatype restriction constructors.

Module Contents

Functions

<code>OWLDatatypeMaxExclusiveRestriction(...)</code>	Create a max exclusive restriction.
<code>OWLDatatypeMinExclusiveRestriction(...)</code>	Create a min exclusive restriction.
<code>OWLDatatypeMaxInclusiveRestriction(...)</code>	Create a max inclusive restriction.
<code>OWLDatatypeMinInclusiveRestriction(...)</code>	Create a min inclusive restriction.
<code>OWLDatatypeMinMaxExclusiveRestriction(...)</code>	Create a min-max exclusive restriction.
<code>OWLDatatypeMinMaxInclusiveRestriction(...)</code>	Create a min-max inclusive restriction.

Attributes

<code>Restriction_Literals</code>

`owlapy.model.providers.Restriction_Literals`

`owlapy.model.providers.OWLDatatypeMaxExclusiveRestriction (`
 `max_: Restriction_Literals) → owlapy.class_expression.OWLDatatypeRestriction`
 Create a max exclusive restriction.

`owlapy.model.providers.OWLDatatypeMinExclusiveRestriction (`
 `min_: Restriction_Literals) → owlapy.class_expression.OWLDatatypeRestriction`
 Create a min exclusive restriction.

`owlapy.model.providers.OWLDatatypeMaxInclusiveRestriction (`
 `max_: Restriction_Literals) → owlapy.class_expression.OWLDatatypeRestriction`
 Create a max inclusive restriction.

`owlapy.model.providers.OWLDatatypeMinInclusiveRestriction (`
 `min_: Restriction_Literals) → owlapy.class_expression.OWLDatatypeRestriction`
 Create a min inclusive restriction.

`owlapy.model.providers.OWLDatatypeMinMaxExclusiveRestriction (`
 `min_: Restriction_Literals, max_: Restriction_Literals)`
 `→ owlapy.class_expression.OWLDatatypeRestriction`
 Create a min-max exclusive restriction.

```
owlapy.model.providers.OWLDataTypeMinMaxInclusiveRestriction (
    min_: Restriction_Literals, max_: Restriction_Literals)
    → owlapy.class_expression.OWLDataTypeRestriction
```

Create a min-max inclusive restriction.

Package Contents

Classes

<i>OWLRDFVocabulary</i>	Enumerations for OWL/RDF vocabulary.
<i>XSDVocabulary</i>	Enumerations for XSD vocabulary.
<i>OWLFacet</i>	Enumerations for OWL facets.
<i>OWLObject</i>	Base interface for OWL objects
<i>OWLEntity</i>	Represents Entities in the OWL 2 Specification.
<i>OWLAnnotationObject</i>	A marker interface for the values (objects) of annotations.
<i>OWLAnnotationSubject</i>	A marker interface for annotation subjects, which can either be IRIs or anonymous individuals
<i>OWLAnnotationValue</i>	A marker interface for annotation values, which can either be an IRI (URI), Literal or Anonymous Individual.
<i>IRI</i>	An IRI, consisting of a namespace and a remainder.
<i>HasIndex</i>	Interface for types with an index; this is used to group objects by type when sorting.
<i>HasIRI</i>	Simple class to access the IRI.
<i>HasOperands</i>	An interface to objects that have a collection of operands.
<i>HasFiller</i>	An interface to objects that have a filler.
<i>HasCardinality</i>	An interface to objects that have a cardinality.
<i>OWLClassExpression</i>	An OWL 2 Class Expression (https://www.w3.org/TR/owl2-syntax/#Class_Expressions)
<i>OWLNaryBooleanClassExpression</i>	OWLNaryBooleanClassExpression.
<i>OWLObjectIntersectionOf</i>	Represents an OWLObjectIntersectionOf class expression in the OWL 2 Specification.
<i>OWLObjectUnionOf</i>	Represents an ObjectUnionOf class expression in the OWL 2 Specification.
<i>OWLObjectComplementOf</i>	Represents an ObjectComplementOf class expression in the OWL 2 Specification.
<i>OWLClass</i>	An OWL 2 named Class
<i>OWLPropertyRange</i>	OWL Objects that can be the ranges of properties.
<i>OWLDataRange</i>	Represents a DataRange in the OWL 2 Specification.
<i>OWLObjectPropertyExpression</i>	A high level interface to describe different types of object properties.
<i>OWLProperty</i>	A marker interface for properties that aren't expression i.e. named properties. By definition, properties
<i>OWLPropertyExpression</i>	Represents a property or possibly the inverse of a property.
<i>OWLDataPropertyExpression</i>	A high level interface to describe different types of data properties.
<i>OWLDataProperty</i>	Represents a Data Property in the OWL 2 Specification.
<i>OWLObjectProperty</i>	Represents an Object Property in the OWL 2 Specification.

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Table 2 – continued from previous page

<i>OWLRestriction</i>	Represents an Object Property Restriction or Data Property Restriction in the OWL 2 specification.
<i>OWLObjectAllValuesFrom</i>	Represents an ObjectAllValuesFrom class expression in the OWL 2 Specification.
<i>OWLObjectSomeValuesFrom</i>	Represents an ObjectSomeValuesFrom class expression in the OWL 2 Specification.
<i>OWLQuantifiedRestriction</i>	Represents a quantified restriction.
<i>OWLQuantifiedObjectRestriction</i>	Represents a quantified object restriction.
<i>OWLObjectRestriction</i>	Represents a Object Property Restriction in the OWL 2 specification.
<i>OWLHasValueRestriction</i>	OWLHasValueRestriction.
<i>OWLDataRestriction</i>	Represents a Data Property Restriction in the OWL 2 specification.
<i>OWLCardinalityRestriction</i>	Base interface for owl min and max cardinality restriction.
<i>OWLObjectMinCardinality</i>	Represents a ObjectMinCardinality restriction in the OWL 2 Specification.
<i>OWLObjectCardinalityRestriction</i>	Represents Object Property Cardinality Restrictions in the OWL 2 specification.
<i>OWLDataAllValuesFrom</i>	Represents DataAllValuesFrom class expressions in the OWL 2 Specification.
<i>OWLObjectHasSelf</i>	Represents an ObjectHasSelf class expression in the OWL 2 Specification.
<i>OWLObjectMaxCardinality</i>	Represents a ObjectMaxCardinality restriction in the OWL 2 Specification.
<i>OWLObjectExactCardinality</i>	Represents an ObjectExactCardinality restriction in the OWL 2 Specification.
<i>OWLDataExactCardinality</i>	Represents DataExactCardinality restrictions in the OWL 2 Specification.
<i>OWLDataMinCardinality</i>	Represents DataMinCardinality restrictions in the OWL 2 Specification.
<i>OWLDataMaxCardinality</i>	Represents DataMaxCardinality restrictions in the OWL 2 Specification.
<i>OWLDataSomeValuesFrom</i>	Represents a DataSomeValuesFrom restriction in the OWL 2 Specification.
<i>OWLDataHasValue</i>	Represents DataHasValue restrictions in the OWL 2 Specification.
<i>OWLDataOneOf</i>	Represents DataOneOf in the OWL 2 Specification.
<i>OWLQuantifiedDataRestriction</i>	Represents a quantified data restriction.
<i>OWLDataCardinalityRestriction</i>	Represents Data Property Cardinality Restrictions in the OWL 2 specification.
<i>OWLNamedIndividual</i>	Represents a Named Individual in the OWL 2 Specification.
<i>OWLIndividual</i>	Represents a named or anonymous individual.
<i>OWLEquivalentClassesAxiom</i>	Represents an EquivalentClasses axiom in the OWL 2 Specification.
<i>OWLClassAxiom</i>	The base interface for class axioms.
<i>OWLDataPropertyDomainAxiom</i>	Represents a DataPropertyDomain axiom in the OWL 2 Specification.
<i>OWLAxiom</i>	Represents Axioms in the OWL 2 Specification.
<i>OWLDataPropertyRangeAxiom</i>	Represents a DataPropertyRange axiom in the OWL 2 Specification.

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Table 2 – continued from previous page

<i>OWLObjectPropertyDomainAxiom</i>	Represents a ObjectPropertyDomain axiom in the OWL 2 Specification.
<i>OWLObjectPropertyRangeAxiom</i>	Represents a ObjectPropertyRange axiom in the OWL 2 Specification.
<i>OWLDatatype</i>	Represents a Datatype (named data range) in the OWL 2 Specification.
<i>OWLLiteral</i>	Represents a Literal in the OWL 2 Specification.
<i>OWLOntologyID</i>	An object that identifies an ontology. Since OWL 2, ontologies do not have to have an ontology IRI, or if they
<i>OWLImportsDeclaration</i>	Represents an import statement in an ontology.
<i>OWLOntology</i>	Represents an OWL 2 Ontology in the OWL 2 specification.
<i>OWLOntologyChange</i>	Represents an ontology change.
<i>AddImport</i>	Represents an ontology change where an import statement is added to an ontology.
<i>OWLOntologyManager</i>	An OWLOntologyManager manages a set of ontologies. It is the main point for creating, loading and accessing
<i>OWLReasoner</i>	An OWLReasoner reasons over a set of axioms (the set of reasoner axioms) that is based on the imports closure of

Functions

<i>MOVE(*args)</i>	"Move" an imported class to the current module by setting the classes <code>__module__</code> attribute.
--------------------	--

Attributes

<i>OWLThing</i>
<i>OWLNothing</i>
<i>Literals</i>
<i>OWLTopObjectProperty</i>
<i>OWLBottomObjectProperty</i>
<i>OWLTopDataProperty</i>
<i>OWLBottomDataProperty</i>
<i>DoubleOWLDatatype</i>
<i>IntegerOWLDatatype</i>
<i>BooleanOWLDatatype</i>
<i>StringOWLDatatype</i>
<i>DateOWLDatatype</i>
<i>DateTimeOWLDatatype</i>
<i>DurationOWLDatatype</i>
<i>TopOWLDatatype</i>
<i>NUMERIC_DATATYPES</i>
<i>TIME_DATATYPES</i>

```
class owlapy.model.OWLRDFVocabulary (namespace: owlapy.namespaces.Namespaces,  
    remainder: str)  
    Bases: _Vocabulary, enum.Enum  
    Enumerations for OWL/RDF vocabulary.  
    OWL_THING = ()  
    OWL_NOTHING = ()  
    OWL_CLASS = ()  
    OWL_NAMED_INDIVIDUAL = ()  
    OWL_TOP_OBJECT_PROPERTY = ()  
    OWL_BOTTOM_OBJECT_PROPERTY = ()
```

```

OWL_TOP_DATA_PROPERTY = ()

OWL_BOTTOM_DATA_PROPERTY = ()

RDFS_LITERAL = ()

class owlapy.model.XSDVocabulary(remainder: str)
    Bases: _Vocabulary, enum.Enum
    Enumerations for XSD vocabulary.
    DECIMAL: Final = 'decimal'
    INTEGER: Final = 'integer'
    LONG: Final = 'long'
    DOUBLE: Final = 'double'
    FLOAT: Final = 'float'
    BOOLEAN: Final = 'boolean'
    STRING: Final = 'string'
    DATE: Final = 'date'
    DATE_TIME: Final = 'dateTime'
    DATE_TIME_STAMP: Final = 'dateTimeStamp'
    DURATION: Final = 'duration'

class owlapy.model.OWLFacet(remainder: str, symbolic_form: str,
    operator: Callable[[_X, _X], bool])
    Bases: _Vocabulary, enum.Enum
    Enumerations for OWL facets.
    property symbolic_form
    property operator
    MIN_INCLUSIVE: Final = ('minInclusive', '>=')
    MIN_EXCLUSIVE: Final = ('minExclusive', '>')
    MAX_INCLUSIVE: Final = ('maxInclusive', '<=')
    MAX_EXCLUSIVE: Final = ('maxExclusive', '<')
    LENGTH: Final = ('length', 'length')
    MIN_LENGTH: Final = ('minLength', 'minLength')
    MAX_LENGTH: Final = ('maxLength', 'maxLength')
    PATTERN: Final = ('pattern', 'pattern')
    TOTAL_DIGITS: Final = ('totalDigits', 'totalDigits')

```

```
FRACTION_DIGITS: Final = ('fractionDigits', 'fractionDigits')
```

```
static from_str(name: str) → OWLFacet
```

```
owlapy.model.MOVE(*args)
```

“Move” an imported class to the current module by setting the classes `__module__` attribute.

This is useful for documentation purposes to hide internal packages in sphinx.

Parameters

args – List of classes to move.

```
class owlapy.model.OWLObject
```

Base interface for OWL objects

```
__slots__ = ()
```

```
abstract __eq__(other)
```

Return self==value.

```
abstract __hash__()
```

Return hash(self).

```
abstract __repr__()
```

Return repr(self).

```
is_anonymous() → bool
```

```
class owlapy.model.OWLEntity
```

Bases: *OWLNamedObject*

Represents Entities in the OWL 2 Specification.

```
__slots__ = ()
```

```
to_string_id() → str
```

```
is_anonymous() → bool
```

```
class owlapy.model.OWLAnnotationObject
```

Bases: *owlapy.owlobject.OWLObject*

A marker interface for the values (objects) of annotations.

```
__slots__ = ()
```

```
as_iri() → IRI | None
```

Returns

if the value is an IRI, return it. Return None otherwise.

```
as_anonymous_individual()
```

Returns

if the value is an anonymous, return it. Return None otherwise.

```
class owlapy.model.OWLAnnotationSubject
```

Bases: *OWLAnnotationObject*

A marker interface for annotation subjects, which can either be IRIs or anonymous individuals

```

__slots__ = ()

class owlapy.model.OWLAnnotationValue
    Bases: OWLAnnotationObject

    A marker interface for annotation values, which can either be an IRI (URI), Literal or Anonymous Individual.

    __slots__ = ()

    is_literal() → bool

        Returns
            true if the annotation value is a literal

    as_literal() → OWLLiteral | None

        Returns
            if the value is a literal, returns it. Return None otherwise

class owlapy.model.IRI (namespace: str | owlapy.namespaces.Namespaces, remainder: str)
    Bases: owlapy.owl_annotation.OWLAnnotationSubject, owlapy.owl_annotation.OWLAnnotationValue

    An IRI, consisting of a namespace and a remainder.

    property str: str
        Returns: The string that specifies the IRI.

    property reminder: str
        Returns: The string corresponding to the reminder of the IRI.

    __slots__ = ('_namespace', '_remainder', '__weakref__')

    type_index: Final = 0

    static create (namespace: owlapy.namespaces.Namespaces, remainder: str) → IRI
    static create (namespace: str, remainder: str) → IRI
    static create (string: str) → IRI

    __repr__()
        Return repr(self).

    __eq__ (other)
        Return self==value.

    __hash__()
        Return hash(self).

    is_nothing()
        Determines if this IRI is equal to the IRI that owl:Nothing is named with.

        Returns
            True if this IRI is equal to <http://www.w3.org/2002/07/owl#Nothing> and otherwise False.

    is_thing()
        Determines if this IRI is equal to the IRI that owl:Thing is named with.

        Returns
            True if this IRI is equal to <http://www.w3.org/2002/07/owl#Thing> and otherwise False.

```

is_reserved_vocabulary () → bool

Determines if this IRI is in the reserved vocabulary. An IRI is in the reserved vocabulary if it starts with <http://www.w3.org/1999/02/22-rdf-syntax-ns#> or <http://www.w3.org/2000/01/rdf-schema#> or <http://www.w3.org/2001/XMLSchema#> or <http://www.w3.org/2002/07/owl#>.

Returns

True if the IRI is in the reserved vocabulary, otherwise False.

as_iri () → *IRI*

Returns

if the value is an IRI, return it. Return None otherwise.

as_str () → str

CD: Should be deprecated. :returns: The string that specifies the IRI.

get_short_form () → str

Gets the short form.

Returns

A string that represents the short form.

get_namespace () → str

Returns

The namespace as string.

get_remainder () → str

Returns

The remainder (coincident with NCName usually) for this IRI.

class owlapy.model.**HasIndex**

Bases: Protocol

Interface for types with an index; this is used to group objects by type when sorting.

type_index: ClassVar[int]

__eq__ (other)

Return self==value.

class owlapy.model.**HasIRI**

Simple class to access the IRI.

__slots__ = ()

abstract get_iri () → *IRI*

Gets the IRI of this object.

Returns

The IRI of this object.

class owlapy.model.**HasOperands**

Bases: Generic[_T]

An interface to objects that have a collection of operands.

Parameters

_T – Operand type.

```

__slots__ = ()

abstract operands() → Iterable[_T]
    Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

    Returns
        The operands.

```

class owlapy.model.HasFiller

Bases: Generic[_T]

An interface to objects that have a filler.

Parameters
 _T – Filler type.

```

__slots__ = ()

abstract get_filler() → _T
    Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

    Returns
        the value

```

class owlapy.model.HasCardinality

An interface to objects that have a cardinality.

```

__slots__ = ()

abstract get_cardinality() → int
    Gets the cardinality of a restriction.

    Returns
        The cardinality. A non-negative integer.

```

class owlapy.model.OWLClassExpression

Bases: *owlapy.data_ranges.OWLPropertyRange*

An OWL 2 Class Expression (https://www.w3.org/TR/owl2-syntax/#Class_Expressions)

```

__slots__ = ()

abstract is_owl_thing() → bool
    Determines if this expression is the built in class owl:Thing. This method does not determine if the class is equivalent to owl:Thing.

    Returns
        Thing.

    Return type
        True if this expression is owl

abstract is_owl_nothing() → bool
    Determines if this expression is the built in class owl:Nothing. This method does not determine if the class is equivalent to owl:Nothing.

```

```

abstract get_object_complement_of () → OWLObjectComplementOf
    Gets the object complement of this class expression.

    Returns
        A class expression that is the complement of this class expression.

abstract get_nnf () → OWLClassExpression
    Gets the negation normal form of the complement of this expression.

    Returns
        A expression that represents the NNF of the complement of this expression.

class owlapy.model.OWLNaryBooleanClassExpression (
    operands: Iterable[owlapy.class_expression.class_expression.OWLClassExpression])
    Bases: owlapy.class_expression.class_expression.OWLBooleanClassExpression,
    owlapy.meta_classes.HasOperands[owlapy.class_expression.class_expression.OWLClassExpression]
    OWLNaryBooleanClassExpression.

    __slots__ = ()

    operands () → Iterable[owlapy.class_expression.class_expression.OWLClassExpression]
        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

        Returns
            The operands.

    __repr__ ()
        Return repr(self).

    __eq__ (other)
        Return self==value.

    __hash__ ()
        Return hash(self).

class owlapy.model.OWLObjectIntersectionOf (
    operands: Iterable[owlapy.class_expression.class_expression.OWLClassExpression])
    Bases: OWLNaryBooleanClassExpression
    Represents an OWLObjectIntersectionOf class expression in the OWL 2 Specification.

    __slots__ = '_operands'

    type_index: Final = 3001

class owlapy.model.OWLObjectUnionOf (
    operands: Iterable[owlapy.class_expression.class_expression.OWLClassExpression])
    Bases: OWLNaryBooleanClassExpression
    Represents an ObjectUnionOf class expression in the OWL 2 Specification.

    __slots__ = '_operands'

    type_index: Final = 3002

```

```

class owlapy.model.OLObjectComplementOf (op: OWLClassExpression)
    Bases:                                OWLBooleanClassExpression,          owlapy.meta_classes.
                                           HasOperands[OWLClassExpression]

    Represents an ObjectComplementOf class expression in the OWL 2 Specification.

    __slots__ = '_operand'

    type_index: Final = 3003

    get_operand () → OWLClassExpression

        Returns
            The wrapped expression.

    operands () → Iterable[OWLClassExpression]

        Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

        Returns
            The operands.

    __repr__ ()
        Return repr(self).

    __eq__ (other)
        Return self==value.

    __hash__ ()
        Return hash(self).

owlapy.model.OWLThing: Final

owlapy.model.OWLNothing: Final

class owlapy.model.OWLClass (iri: owlapy.iri.IRI | str)
    Bases:  owlapy.class_expression.class_expression.OWLClassExpression, owlapy.
           owlobject.OWLEntity

    An OWL 2 named Class

    property str

    property reminder: str
        The reminder of the IRI

    __slots__ = ('_iri', '_is_nothing', '_is_thing')

    type_index: Final = 1001

    get_iri () → owlapy.iri.IRI

        Gets the IRI of this object.

        Returns
            The IRI of this object.

    is_owl_thing () → bool

        Determines if this expression is the built in class owl:Thing. This method does not determine if the class is
        equivalent to owl:Thing.

        Returns
            Thing.

```


Return type

True if this expression is owl

is_owl_nothing() → bool

Determines if this expression is the built in class owl:Nothing. This method does not determine if the class is equivalent to owl:Nothing.

get_object_complement_of()

→ *owlapy.class_expression.class_expression.OWLObjectComplementOf*

Gets the object complement of this class expression.

Returns

A class expression that is the complement of this class expression.

get_nnf() → *OWLClass*

Gets the negation normal form of the complement of this expression.

Returns

A expression that represents the NNF of the complement of this expression.

class owlapy.model.OWLPropertyRange

Bases: *owlapy.owlobject.OWLObject*

OWL Objects that can be the ranges of properties.

class owlapy.model.OWLDataRange

Bases: *OWLPropertyRange*

Represents a DataRange in the OWL 2 Specification.

class owlapy.model.OWLObjectPropertyExpression

Bases: *OWLPropertyExpression*

A high level interface to describe different types of object properties.

__slots__ = ()

abstract get_inverse_property() → *OWLObjectPropertyExpression*

Obtains the property that corresponds to the inverse of this property.

Returns

The inverse of this property. Note that this property will not necessarily be in the simplest form.

abstract get_named_property() → *OWLObjectProperty*

Get the named object property used in this property expression.

Returns

P if this expression is either inv(P) or P.

is_object_property_expression() → bool

Returns

True if this is an object property.

class owlapy.model.OWLProperty

Bases: *OWLPropertyExpression, owlapy.owlobject.OWLEntity*

A marker interface for properties that aren't expression i.e. named properties. By definition, properties are either data properties or object properties.

__slots__ = ()

```

class owlapy.model.OWLPropertyExpression
    Bases: owlapy.owlobject.OWLObject
    Represents a property or possibly the inverse of a property.
    __slots__ = ()
    is_data_property_expression () → bool
        Returns
            True if this is a data property.
    is_object_property_expression () → bool
        Returns
            True if this is an object property.
    is_owl_top_object_property () → bool
        Determines if this is the owl:topObjectProperty.
        Returns
            topObjectProperty.
        Return type
            True if this property is the owl
    is_owl_top_data_property () → bool
        Determines if this is the owl:topDataProperty.
        Returns
            topDataProperty.
        Return type
            True if this property is the owl

class owlapy.model.OWLDataPropertyExpression
    Bases: OWLPropertyExpression
    A high level interface to describe different types of data properties.
    __slots__ = ()
    is_data_property_expression ()
        Returns
            True if this is a data property.

class owlapy.model.OWLDataProperty (iri: owlapy.iri.IRI)
    Bases: OWLDataPropertyExpression, OWLProperty
    Represents a Data Property in the OWL 2 Specification.
    __slots__ = '_iri'
    type_index: Final = 1004
    get_iri () → owlapy.iri.IRI
        Gets the IRI of this object.
        Returns
            The IRI of this object.

```

is_owl_top_data_property () → bool

Determines if this is the owl:topDataProperty.

Returns

topDataProperty.

Return type

True if this property is the owl

class owlapy.model.OWLObjectProperty (iri: owlapy.iri.IRI | str)

Bases: *OWLObjectPropertyExpression*, *OWLProperty*

Represents an Object Property in the OWL 2 Specification.

property str: str

property iri: str

__slots__ = '_iri'

type_index: Final = 1002

get_named_property () → *OWLObjectProperty*

Get the named object property used in this property expression.

Returns

P if this expression is either inv(P) or P.

get_inverse_property () → *OWLObjectInverseOf*

Obtains the property that corresponds to the inverse of this property.

Returns

The inverse of this property. Note that this property will not necessarily be in the simplest form.

get_iri () → owlapy.iri.IRI

Gets the IRI of this object.

Returns

The IRI of this object.

is_owl_top_object_property () → bool

Determines if this is the owl:topObjectProperty.

Returns

topObjectProperty.

Return type

True if this property is the owl

class owlapy.model.OWLRestriction

Bases: *owlapy.class_expression.class_expression.OWLAnonymousClassExpression*

Represents an Object Property Restriction or Data Property Restriction in the OWL 2 specification.

__slots__ = ()

abstract get_property () → owlapy.owl_property.OWLPropertyExpression

Returns

Property being restricted.

is_data_restriction() → bool
Determines if this is a data restriction.

Returns
True if this is a data restriction.

is_object_restriction() → bool
Determines if this is an object restriction.

Returns
True if this is an object restriction.

```
class owlapy.model.OwlObjectAllValuesFrom(  
    property: owlapy.owl_property.OwlObjectPropertyExpression,  
    filler: owlapy.class_expression.class_expression.OwlClassExpression)
```

Bases: *OwlQuantifiedObjectRestriction*

Represents an ObjectAllValuesFrom class expression in the OWL 2 Specification.

```
__slots__ = ('_property', '_filler')
```

```
type_index: Final = 3006
```

```
__repr__()  
    Return repr(self).
```

```
__eq__(other)  
    Return self==value.
```

```
__hash__()  
    Return hash(self).
```

```
get_property() → owlapy.owl_property.OwlObjectPropertyExpression
```

Returns
Property being restricted.

```
class owlapy.model.OwlObjectSomeValuesFrom(  
    property: owlapy.owl_property.OwlObjectPropertyExpression,  
    filler: owlapy.class_expression.class_expression.OwlClassExpression)
```

Bases: *OwlQuantifiedObjectRestriction*

Represents an ObjectSomeValuesFrom class expression in the OWL 2 Specification.

```
__slots__ = ('_property', '_filler')
```

```
type_index: Final = 3005
```

```
__repr__()  
    Return repr(self).
```

```
__eq__(other)  
    Return self==value.
```

```
__hash__()  
    Return hash(self).
```

```
get_property() → owlapy.owl_property.OwlObjectPropertyExpression
```

Returns
Property being restricted.

```

class owlapy.model.OWLQuantifiedRestriction
    Bases: Generic[_T], OWLRestriction, owlapy.meta_classes.HasFiller[_T]
    Represents a quantified restriction.

    Parameters
        _T – value type

    __slots__ = ()

class owlapy.model.OWLQuantifiedObjectRestriction(
    filler: owlapy.class_expression.class_expression.OWLClassExpression)
    Bases: OWLQuantifiedRestriction[owlapy.class_expression.class_expression.
        OWLClassExpression], OWLObjectRestriction
    Represents a quantified object restriction.

    __slots__ = ()

    get_filler() → owlapy.class_expression.class_expression.OWLClassExpression
        Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of
        a data restriction this will be a constant (data value). For quantified restriction this will be a class expression
        or a data range.

    Returns
        the value

class owlapy.model.OWLObjectRestriction
    Bases: OWLRestriction
    Represents a Object Property Restriction in the OWL 2 specification.

    __slots__ = ()

    is_object_restriction() → bool
        Determines if this is an object restriction.

    Returns
        True if this is an object restriction.

    abstract get_property() → owlapy.owl_property.OWLObjectPropertyExpression

    Returns
        Property being restricted.

class owlapy.model.OWLHasValueRestriction(value: _T)
    Bases: Generic[_T], OWLRestriction, owlapy.meta_classes.HasFiller[_T]
    OWLHasValueRestriction.

    Parameters
        _T – The value type.

    __slots__ = ()

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

```

get_filler() → *_T*

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns
the value

class owlapy.model.OWLDataRestriction

Bases: *OWLRestriction*

Represents a Data Property Restriction in the OWL 2 specification.

__slots__ = ()

is_data_restriction() → bool

Determines if this is a data restriction.

Returns
True if this is a data restriction.

class owlapy.model.OWLCardinalityRestriction(*cardinality: int, filler: _F*)

Bases: *Generic[_F]*, *OWLQuantifiedRestriction[_F]*, *owlapy.meta_classes.HasCardinality*

Base interface for owl min and max cardinality restriction.

Parameters
_F – Type of filler.

__slots__ = ()

get_cardinality() → int

Gets the cardinality of a restriction.

Returns
The cardinality. A non-negative integer.

get_filler() → *_F*

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns
the value

class owlapy.model.OWLObjectMinCardinality(*cardinality: int, property: owlapy.owl_property.OWLObjectPropertyExpression, filler: owlapy.class_expression.class_expression.OWLClassExpression*)

Bases: *OWLObjectCardinalityRestriction*

Represents a ObjectMinCardinality restriction in the OWL 2 Specification.

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3008

class owlapy.model.OWLObjectCardinalityRestriction(*cardinality: int, property: owlapy.owl_property.OWLObjectPropertyExpression, filler: owlapy.class_expression.class_expression.OWLClassExpression*)

Bases: *OWLCardinalityRestriction*[*owlapy.class_expression.class_expression.OWLClassExpression*], *OWLQuantifiedObjectRestriction*

Represents Object Property Cardinality Restrictions in the OWL 2 specification.

__slots__ = ()

get_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

Returns

Property being restricted.

__repr__()

Return repr(self).

__eq__(*other*)

Return self==value.

__hash__()

Return hash(self).

```
class owlapy.model.OWLDataAllValuesFrom(  
    property: owlapy.owl_property.OWLDataPropertyExpression,  
    filler: owlapy.data_ranges.OWLDataRange)
```

Bases: *OWLQuantifiedDataRestriction*

Represents DataAllValuesFrom class expressions in the OWL 2 Specification.

__slots__ = '_property'

type_index: Final = 3013

__repr__()

Return repr(self).

__eq__(*other*)

Return self==value.

__hash__()

Return hash(self).

get_property() → *owlapy.owl_property.OWLDataPropertyExpression*

Returns

Property being restricted.

```
class owlapy.model.OWLObjectHasSelf(  
    property: owlapy.owl_property.OWLObjectPropertyExpression)
```

Bases: *OWLObjectRestriction*

Represents an ObjectHasSelf class expression in the OWL 2 Specification.

__slots__ = '_property'

type_index: Final = 3011

get_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

Returns

Property being restricted.

```

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

__repr__()
    Return repr(self).

```

class owlapy.model.OwlObjectMaxCardinality (cardinality: int,
property: owlapy.owl_property.OwlObjectPropertyExpression,
filler: owlapy.class_expression.class_expression.OwlClassExpression)

Bases: OwlObjectCardinalityRestriction

Represents a ObjectMaxCardinality restriction in the OWL 2 Specification.

```

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3010

```

class owlapy.model.OwlObjectExactCardinality (cardinality: int,
property: owlapy.owl_property.OwlObjectPropertyExpression,
filler: owlapy.class_expression.class_expression.OwlClassExpression)

Bases: OwlObjectCardinalityRestriction

Represents an ObjectExactCardinality restriction in the OWL 2 Specification.

```

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3009

```

as_intersection_of_min_max()
→ owlapy.class_expression.nary_boolean_expression.OwlObjectIntersectionOf

Obtains an equivalent form that is a conjunction of a min cardinality and max cardinality restriction.

Returns
The semantically equivalent but structurally simpler form ($= 1 \text{ R C}$) $\Rightarrow 1 \text{ R C}$ and $\leq 1 \text{ R C}$.

class owlapy.model.OwlDataExactCardinality (cardinality: int,
property: owlapy.owl_property.OwlDataPropertyExpression,
filler: owlapy.data_ranges.OwlDataRange)

Bases: OwlDataCardinalityRestriction

Represents DataExactCardinality restrictions in the OWL 2 Specification.

```

__slots__ = ('_cardinality', '_filler', '_property')

type_index: Final = 3016

```

as_intersection_of_min_max()
→ owlapy.class_expression.nary_boolean_expression.OwlObjectIntersectionOf

Obtains an equivalent form that is a conjunction of a min cardinality and max cardinality restriction.

Returns
The semantically equivalent but structurally simpler form ($= 1 \text{ R D}$) $\Rightarrow 1 \text{ R D}$ and $\leq 1 \text{ R D}$.

class owlapy.model.OwlDataMinCardinality (cardinality: int,
property: owlapy.owl_property.OwlDataPropertyExpression,
filler: owlapy.data_ranges.OwlDataRange)


```

Bases: OWLDataCardinalityRestriction
Represents DataMinCardinality restrictions in the OWL 2 Specification.
__slots__ = ('_cardinality', '_filler', '_property')
type_index: Final = 3015

class owlapy.model.OWLDataMaxCardinality(cardinality: int,
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_ranges.OWLDataRange)
Bases: OWLDataCardinalityRestriction
Represents DataMaxCardinality restrictions in the OWL 2 Specification.
__slots__ = ('_cardinality', '_filler', '_property')
type_index: Final = 3017

class owlapy.model.OWLDataSomeValuesFrom(
    property: owlapy.owl_property.OWLDataPropertyExpression,
    filler: owlapy.data_range.OWLDataRange)
Bases: OWLQuantifiedDataRestriction
Represents a DataSomeValuesFrom restriction in the OWL 2 Specification.
__slots__ = '_property'
type_index: Final = 3012

__repr__()
    Return repr(self).

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

get_property() → owlapy.owl_property.OWLDataPropertyExpression

    Returns
    Property being restricted.

class owlapy.model.OWLDataHasValue(
    property: owlapy.owl_property.OWLDataPropertyExpression,
    value: owlapy.owl_literal.OWLLiteral)
Bases: OWLHasValueRestriction[owlapy.owl_literal.OWLLiteral], OWLDataRestriction
Represents DataHasValue restrictions in the OWL 2 Specification.
__slots__ = '_property'
type_index: Final = 3014

__repr__()
    Return repr(self).

```

```

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

as_some_values_from() → owlapy.class_expression.class_expression.OWLClassExpression
    A convenience method that obtains this restriction as an existential restriction with a nominal filler.

    Returns
        The existential equivalent of this value restriction.  $\text{simp}(\text{HasValue}(p\ a)) = \text{some}(p\ \{a\})$ .

get_property() → owlapy.owl_property.OWLDataPropertyExpression

    Returns
        Property being restricted.

```

class owlapy.model.OWLDataOneOf (
 values: owlapy.owl_literal.OWLLiteral | Iterable[owlapy.owl_literal.OWLLiteral])

Bases: owlapy.data_ranges.OWLDataRange, owlapy.meta_classes.HasOperands[owlapy.owl_literal.OWLLiteral]

Represents DataOneOf in the OWL 2 Specification.

type_index: Final = 4003

values() → Iterable[owlapy.owl_literal.OWLLiteral]

Gets the values that are in the oneOf.

Returns

The values of this {`@code DataOneOf`} class expression.

operands() → Iterable[owlapy.owl_literal.OWLLiteral]

Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

Returns

The operands.

```

__hash__()
    Return hash(self).

__eq__(other)
    Return self==value.

__repr__()
    Return repr(self).

```

class owlapy.model.OWLQuantifiedDataRestriction (
 filler: owlapy.data_ranges.OWLDataRange)

Bases: OWLQuantifiedRestriction[owlapy.data_ranges.OWLDataRange], OWLDataRestriction

Represents a quantified data restriction.

__slots__ = ()

get_filler() → owlapy.data_ranges.OWLDataRange

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns

the value

```
class owlapy.model.OWLDataCardinalityRestriction (cardinality: int,  
    property: owlapy.owl_property.OWLDataPropertyExpression,  
    filler: owlapy.data_ranges.OWLDataRange)
```

Bases: *OWLCardinalityRestriction*[*owlapy.data_ranges.OWLDataRange*], *OWLQuantifiedDataRestriction*, *OWLDataRestriction*

Represents Data Property Cardinality Restrictions in the OWL 2 specification.

```
__slots__ = ()
```

```
get_property () → owlapy.owl_property.OWLDataPropertyExpression
```

Returns

Property being restricted.

```
__repr__ ()
```

Return repr(self).

```
__eq__ (other)
```

Return self==value.

```
__hash__ ()
```

Return hash(self).

```
class owlapy.model.OWLNamedIndividual (iri: owlapy.iri.IRI | str)
```

Bases: *OWLIndividual*, *owlapy.owlobject.OWLEntity*

Represents a Named Individual in the OWL 2 Specification.

```
property iri
```

```
property str
```

```
__slots__ = '_iri'
```

```
type_index: Final = 1005
```

```
get_iri () → owlapy.iri.IRI
```

Gets the IRI of this object.

Returns

The IRI of this object.

```
class owlapy.model.OWLIndividual
```

Bases: *owlapy.owlobject.OWLObject*

Represents a named or anonymous individual.

```
__slots__ = ()
```

```
class owlapy.model.OWLEquivalentClassesAxiom (  
    class_expressions: List[owlapy.class_expression.OWLClassExpression],  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLNaryClassAxiom*

Represents an EquivalentClasses axiom in the OWL 2 Specification.

```
__slots__ = ()
```

```

contains_named_equivalent_class() → bool

contains_owl_nothing() → bool

contains_owl_thing() → bool

named_classes() → Iterable[owlapy.class_expression.OWLClass]

class owlapy.model.OWLClassAxiom(annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLLogicalAxiom
    The base interface for class axioms.

    __slots__ = ()

class owlapy.model.OWLDataPropertyDomainAxiom(
    property_: owlapy.owl_property.OWLDataPropertyExpression,
    domain: owlapy.class_expression.OWLClassExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyDomainAxiom[owlapy.owl_property.OWLDataPropertyExpression]
    Represents a DataPropertyDomain axiom in the OWL 2 Specification.

    __slots__ = ()

class owlapy.model.OWLClassAxiom(annotations: Iterable[OWLAnnotation] | None = None)
    Bases: owlapy.owl_object.OWLObject
    Represents Axioms in the OWL 2 Specification.

    An OWL ontology contains a set of axioms. These axioms can be annotation axioms, declaration axioms, imports
    axioms or logical axioms.

    __slots__ = '_annotations'

    annotations() → List[OWLAnnotation] | None

    is_annotated() → bool

    is_logical_axiom() → bool

    is_annotation_axiom() → bool

class owlapy.model.OWLDataPropertyRangeAxiom(
    property_: owlapy.owl_property.OWLDataPropertyExpression,
    range_: owlapy.types.OWLDataRange, annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyRangeAxiom[owlapy.owl_property.OWLDataPropertyExpression,
    owlapy.types.OWLDataRange]
    Represents a DataPropertyRange axiom in the OWL 2 Specification.

    __slots__ = ()

class owlapy.model.OWLObjectPropertyDomainAxiom(
    property_: owlapy.owl_property.OWLObjectPropertyExpression,
    domain: owlapy.class_expression.OWLClassExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyDomainAxiom[owlapy.owl_property.OWLObjectPropertyExpression]
    Represents a ObjectPropertyDomain axiom in the OWL 2 Specification.

```

```

__slots__ = ()

class owlapy.model.OwlObjectPropertyRangeAxiom (
    property_: owlapy.owl_property.OwlObjectPropertyExpression,
    range_: owlapy.class_expression.OwlClassExpression,
    annotations: Iterable[OwlAnnotation] | None = None)

Bases: OwlPropertyRangeAxiom[owlapy.owl_property.OwlObjectPropertyExpression,
owlapy.class_expression.OwlClassExpression]

Represents a ObjectPropertyRange axiom in the OWL 2 Specification.

__slots__ = ()

class owlapy.model.OwlDatatype (iri: owlapy.iri.IRI | owlapy.meta_classes.HasIRI)

Bases: owlapy.owl_object.OwlEntity, owlapy.data_ranges.OwlDataRange

Represents a Datatype (named data range) in the OWL 2 Specification.

__slots__ = '_iri'

type_index: Final = 4001

get_iri () → owlapy.iri.IRI
    Gets the IRI of this object.

    Returns
        The IRI of this object.

class owlapy.model.OwlLiteral

Bases: owlapy.owl_annotation.OwlAnnotationValue

Represents a Literal in the OWL 2 Specification.

__slots__ = ()

type_index: Final = 4008

get_literal () → str
    Gets the lexical value of this literal. Note that the language tag is not included.

    Returns
        The lexical value of this literal.

is_boolean () → bool
    Whether this literal is typed as boolean.

parse_boolean () → bool
    Parses the lexical value of this literal into a bool. The lexical value of this literal should be in the lexical space
    of the boolean datatype ("http://www.w3.org/2001/XMLSchema#boolean").

    Returns
        A bool value that is represented by this literal.

is_double () → bool
    Whether this literal is typed as double.

parse_double () → float
    Parses the lexical value of this literal into a double. The lexical value of this literal should be in the lexical
    space of the double datatype ("http://www.w3.org/2001/XMLSchema#double").

```

Returns

A double value that is represented by this literal.

is_integer () → bool

Whether this literal is typed as integer.

parse_integer () → int

Parses the lexical value of this literal into an integer. The lexical value of this literal should be in the lexical space of the integer datatype ("<http://www.w3.org/2001/XMLSchema#integer>").

Returns

An integer value that is represented by this literal.

is_string () → bool

Whether this literal is typed as string.

parse_string () → str

Parses the lexical value of this literal into a string. The lexical value of this literal should be in the lexical space of the string datatype ("<http://www.w3.org/2001/XMLSchema#string>").

Returns

A string value that is represented by this literal.

is_date () → bool

Whether this literal is typed as date.

parse_date () → datetime.date

Parses the lexical value of this literal into a date. The lexical value of this literal should be in the lexical space of the date datatype ("<http://www.w3.org/2001/XMLSchema#date>").

Returns

A date value that is represented by this literal.

is_datetime () → bool

Whether this literal is typed as dateTime.

parse_datetime () → datetime.datetime

Parses the lexical value of this literal into a datetime. The lexical value of this literal should be in the lexical space of the dateTime datatype ("<http://www.w3.org/2001/XMLSchema#dateTime>").

Returns

A datetime value that is represented by this literal.

is_duration () → bool

Whether this literal is typed as duration.

parse_duration () → pandas.Timedelta

Parses the lexical value of this literal into a Timedelta. The lexical value of this literal should be in the lexical space of the duration datatype ("<http://www.w3.org/2001/XMLSchema#duration>").

Returns

A Timedelta value that is represented by this literal.

is_literal () → bool

Returns

true if the annotation value is a literal

as_literal () → *OWLLiteral*

Returns

if the value is a literal, returns it. Return None otherwise

to_python () → Literals

abstract get_datatype () → *owlapy.types.OWLDatatype*

Gets the OWLDatatype which types this literal.

Returns

The OWLDatatype that types this literal.

`owlapy.model.Literals`

class `owlapy.model.OwlOntologyID` (*ontology_iri: owlapy.iri.IRI* | None = None,
 version_iri: owlapy.iri.IRI | None = None)

An object that identifies an ontology. Since OWL 2, ontologies do not have to have an ontology IRI, or if they have an ontology IRI then they can optionally also have a version IRI. Instances of this OwlOntologyID class bundle identifying information of an ontology together. If an ontology doesn't have an ontology IRI then we say that it is "anonymous".

__slots__ = ('_ontology_iri', '_version_iri')

get_ontology_iri () → *owlapy.iri.IRI* | None

Gets the ontology IRI.

Returns

Ontology IRI. If the ontology is anonymous, it will return None.

get_version_iri () → *owlapy.iri.IRI* | None

Gets the version IRI.

Returns

Version IRI or None.

get_default_document_iri () → *owlapy.iri.IRI* | None

Gets the IRI which is used as a default for the document that contain a representation of an ontology with this ID. This will be the version IRI if there is an ontology IRI and version IRI, else it will be the ontology IRI if there is an ontology IRI but no version IRI, else it will be None if there is no ontology IRI. See Ontology Documents in the OWL 2 Structural Specification.

Returns

the IRI that can be used as a default for an ontology document, or None.

is_anonymous () → bool

__repr__ ()

Return repr(self).

__eq__ (*other*)

Return self==value.

class `owlapy.model.OwlImportsDeclaration` (*import_iri: owlapy.iri.IRI*)

Bases: *owlapy.meta_classes.HasIRI*

Represents an import statement in an ontology.

__slots__ = '_iri'

get_iri () → *owlapy.iri.IRI*

Gets the import IRI.

Returns

The import IRI that points to the ontology to be imported. The imported ontology might have this IRI as its ontology IRI but this is not mandated. For example, an ontology with a non-resolvable ontology IRI can be deployed at a resolvable URL.

class *owlapy.model.OWLOntology*

Bases: *owlapy.owlobject.OWLObject*

Represents an OWL 2 Ontology in the OWL 2 specification.

An OWLOntology consists of a possibly empty set of OWLAxioms and a possibly empty set of OWLAnnotations. An ontology can have an ontology IRI which can be used to identify the ontology. If it has an ontology IRI then it may also have an ontology version IRI. Since OWL 2, an ontology need not have an ontology IRI. (See the OWL 2 Structural Specification).

An ontology cannot be modified directly. Changes must be applied via its OWLOntologyManager.

__slots__ = ()

type_index: **Final** = 1

abstract classes_in_signature () → Iterable[*owlapy.class_expression.OWLClass*]

Gets the classes in the signature of this object.

Returns

Classes in the signature of this object.

abstract data_properties_in_signature ()

→ Iterable[*owlapy.owl_property.OWLDataProperty*]

Get the data properties that are in the signature of this object.

Returns

Data properties that are in the signature of this object.

abstract object_properties_in_signature ()

→ Iterable[*owlapy.owl_property.OWLObjectProperty*]

A convenience method that obtains the object properties that are in the signature of this object.

Returns

Object properties that are in the signature of this object.

abstract individuals_in_signature ()

→ Iterable[*owlapy.owl_individual.OWLNamedIndividual*]

A convenience method that obtains the individuals that are in the signature of this object.

Returns

Individuals that are in the signature of this object.

abstract equivalent_classes_axioms (c: *owlapy.class_expression.OWLClass*)

→ Iterable[*owlapy.owl_axiom.OWLEquivalentClassesAxiom*]

Gets all of the equivalent axioms in this ontology that contain the specified class as an operand.

Parameters

c – The class for which the EquivalentClasses axioms should be retrieved.

Returns

EquivalentClasses axioms contained in this ontology.

abstract general_class_axioms () → Iterable[*owlapy.owl_axiom.OWLClassAxiom*]

Get the general class axioms of this ontology. This includes SubClass axioms with a complex class expression

as the sub class and EquivalentClass axioms and DisjointClass axioms with only complex class expressions.

Returns

General class axioms contained in this ontology.

abstract data_property_domain_axioms (*property: owlapy.owl_property.OWLDataProperty*)
→ Iterable[*owlapy.owl_axiom.OWLDataPropertyDomainAxiom*]

Gets the OWLDataPropertyDomainAxiom objects where the property is equal to the specified property.

Parameters

property – The property which is equal to the property of the retrieved axioms.

Returns

The axioms matching the search.

abstract data_property_range_axioms (*property: owlapy.owl_property.OWLDataProperty*)
→ Iterable[*owlapy.owl_axiom.OWLDataPropertyRangeAxiom*]

Gets the OWLDataPropertyRangeAxiom objects where the property is equal to the specified property.

Parameters

property – The property which is equal to the property of the retrieved axioms.

Returns

The axioms matching the search.

abstract object_property_domain_axioms (*property: owlapy.owl_property.OWLObjectProperty*)
→ Iterable[*owlapy.owl_axiom.OWLObjectPropertyDomainAxiom*]

Gets the OWLObjectPropertyDomainAxiom objects where the property is equal to the specified property.

Parameters

property – The property which is equal to the property of the retrieved axioms.

Returns

The axioms matching the search.

abstract object_property_range_axioms (*property: owlapy.owl_property.OWLObjectProperty*)
→ Iterable[*owlapy.owl_axiom.OWLObjectPropertyRangeAxiom*]

Gets the OWLObjectPropertyRangeAxiom objects where the property is equal to the specified property.

Parameters

property – The property which is equal to the property of the retrieved axioms.

Returns

The axioms matching the search.

abstract get_owl_ontology_manager () → *_M*

Gets the manager that manages this ontology.

abstract get_ontology_id () → *OWLOntologyID*

Gets the OWLOntologyID belonging to this object.

Returns

The OWLOntologyID.

is_anonymous () → bool

Check whether this ontology does contain an IRI or not.

class owlapy.model.OwlOntologyChange (ontology: OwlOntology)

Represents an ontology change.

__slots__ = ()

get_ontology () → OwlOntology

Gets the ontology that the change is/was applied to.

Returns

The ontology that the change is applicable to.

class owlapy.model.AddImport (ontology: OwlOntology,
import_declaration: OwlImportsDeclaration)

Bases: OwlOntologyChange

Represents an ontology change where an import statement is added to an ontology.

__slots__ = ('_ont', '_declaration')

get_import_declaration () → OwlImportsDeclaration

Gets the import declaration that the change pertains to.

Returns

The import declaration.

class owlapy.model.OwlOntologyManager

An OwlOntologyManager manages a set of ontologies. It is the main point for creating, loading and accessing ontologies.

abstract create_ontology (iri: owlapy.iri.IRI) → OwlOntology

Creates a new (empty) ontology that has the specified ontology IRI (and no version IRI).

Parameters

iri – The IRI of the ontology to be created.

Returns

The newly created ontology, or if an ontology with the specified IRI already exists then this existing ontology will be returned.

abstract load_ontology (iri: owlapy.iri.IRI) → OwlOntology

Loads an ontology that is assumed to have the specified ontology IRI as its IRI or version IRI. The ontology IRI will be mapped to an ontology document IRI.

Parameters

iri – The IRI that identifies the ontology. It is expected that the ontology will also have this IRI (although the OWL API should tolerate situations where this is not the case).

Returns

The OwlOntology representation of the ontology that was loaded.

abstract apply_change (change: OwlOntologyChange)

A convenience method that applies just one change to an ontology. When this method is used through an OwlOntologyManager implementation, the instance used should be the one that the ontology returns through the get_owl_ontology_manager() call.

Parameters

change – The change to be applied.

Raises

ChangeApplied.UNSUCCESSFULLY – if the change was not applied successfully.

abstract add_axiom (*ontology*: *OWLOntology*, *axiom*: *owlapy.owl_axiom.OWLXiom*)

A convenience method that adds a single axiom to an ontology.

Parameters

- **ontology** – The ontology to add the axiom to.
- **axiom** – The axiom to be added.

abstract remove_axiom (*ontology*: *OWLOntology*, *axiom*: *owlapy.owl_axiom.OWLXiom*)

A convenience method that removes a single axiom from an ontology.

Parameters

- **ontology** – The ontology to remove the axiom from.
- **axiom** – The axiom to be removed.

abstract save_ontology (*ontology*: *OWLOntology*, *document_iri*: *owlapy.iri.IRI*)

Saves the specified ontology, using the specified document IRI to determine where/how the ontology should be saved.

Parameters

- **ontology** – The ontology to be saved.
- **document_iri** – The document IRI where the ontology should be saved to.

class owlapy.model.OWLReasoner (*ontology*: *OWLOntology*)

An OWLReasoner reasons over a set of axioms (the set of reasoner axioms) that is based on the imports closure of a particular ontology - the “root” ontology.

__slots__ = ()

abstract data_property_domains (*pe*: *owlapy.owl_property.OWLDataProperty*,
direct: *bool* = *False*) → *Iterable*[*owlapy.class_expression.OWLClassExpression*]

Gets the class expressions that are the direct or indirect domains of this property with respect to the imports closure of the root ontology.

Parameters

- **pe** – The property expression whose domains are to be retrieved.
- **direct** – Specifies if the direct domains should be retrieved (True), or if all domains should be retrieved (False).

Returns

Let $N = \text{equivalent_classes}(\text{DataSomeValuesFrom}(\text{pe} \text{ rdfs:Literal}))$. If *direct* is True: then if N is not empty then the return value is N , else the return value is the result of $\text{super_classes}(\text{DataSomeValuesFrom}(\text{pe} \text{ rdfs:Literal}), \text{true})$. If *direct* is False: then the result of $\text{super_classes}(\text{DataSomeValuesFrom}(\text{pe} \text{ rdfs:Literal}), \text{false})$ together with N if N is non-empty. (Note, *rdfs:Literal* is the top datatype).

abstract object_property_domains (*pe*: *owlapy.owl_property.OWLObjectProperty*,
direct: *bool* = *False*) → *Iterable*[*owlapy.class_expression.OWLClassExpression*]

Gets the class expressions that are the direct or indirect domains of this property with respect to the imports closure of the root ontology.

Parameters

- **pe** – The property expression whose domains are to be retrieved.
- **direct** – Specifies if the direct domains should be retrieved (True), or if all domains should be retrieved (False).

Returns

Let $N = \text{equivalent_classes}(\text{ObjectSomeValuesFrom}(\text{pe owl:Thing}))$. If **direct** is True: then if N is not empty then the return value is N , else the return value is the result of $\text{super_classes}(\text{ObjectSomeValuesFrom}(\text{pe owl:Thing}), \text{true})$. If **direct** is False: then the result of $\text{super_classes}(\text{ObjectSomeValuesFrom}(\text{pe owl:Thing}), \text{false})$ together with N if N is non-empty.

abstract object_property_ranges (*pe: owlapy.owl_property.OWLObjectProperty*,
direct: bool = False) $\rightarrow \text{Iterable}[\text{owlapy.class_expression.OWLClassExpression}]$

Gets the class expressions that are the direct or indirect ranges of this property with respect to the imports closure of the root ontology.

Parameters

- **pe** – The property expression whose ranges are to be retrieved.
- **direct** – Specifies if the direct ranges should be retrieved (True), or if all ranges should be retrieved (False).

Returns

Let $N = \text{equivalent_classes}(\text{ObjectSomeValuesFrom}(\text{ObjectInverseOf}(\text{pe}) \text{owl:Thing}))$. If **direct** is True: then if N is not empty then the return value is N , else the return value is the result of $\text{super_classes}(\text{ObjectSomeValuesFrom}(\text{ObjectInverseOf}(\text{pe}) \text{owl:Thing}), \text{true})$. If **direct** is False: then the result of $\text{super_classes}(\text{ObjectSomeValuesFrom}(\text{ObjectInverseOf}(\text{pe}) \text{owl:Thing}), \text{false})$ together with N if N is non-empty.

abstract equivalent_classes (*ce: owlapy.class_expression.OWLClassExpression*,
only_named: bool = True) $\rightarrow \text{Iterable}[\text{owlapy.class_expression.OWLClassExpression}]$

Gets the class expressions that are equivalent to the specified class expression with respect to the set of reasoner axioms.

Parameters

- **ce** – The class expression whose equivalent classes are to be retrieved.
- **only_named** – Whether to only retrieve named equivalent classes or also complex class expressions.

Returns

All class expressions C where the root ontology imports closure entails $\text{EquivalentClasses}(ce\ C)$. If ce is not a class name (i.e. it is an anonymous class expression) and there are no such classes C then there will be no result. If ce is unsatisfiable with respect to the set of reasoner axioms then owl:Nothing , i.e. the bottom node, will be returned.

abstract disjoint_classes (*ce: owlapy.class_expression.OWLClassExpression*,
only_named: bool = True) $\rightarrow \text{Iterable}[\text{owlapy.class_expression.OWLClassExpression}]$

Gets the class expressions that are disjoint with specified class expression with respect to the set of reasoner axioms.

Parameters

- **ce** – The class expression whose disjoint classes are to be retrieved.

- **only_named** – Whether to only retrieve named disjoint classes or also complex class expressions.

Returns

All class expressions D where the set of reasoner axioms entails `EquivalentClasses(D ObjectComplementOf(ce))` or `StrictSubClassOf(D ObjectComplementOf(ce))`.

abstract different_individuals (*ind: owlapy.owl_individual.OWLNamedIndividual*)
→ `Iterable[owlapy.owl_individual.OWLNamedIndividual]`

Gets the individuals that are different from the specified individual with respect to the set of reasoner axioms.

Parameters

ind – The individual whose different individuals are to be retrieved.

Returns

All individuals x where the set of reasoner axioms entails `DifferentIndividuals(ind x)`.

abstract same_individuals (*ind: owlapy.owl_individual.OWLNamedIndividual*)
→ `Iterable[owlapy.owl_individual.OWLNamedIndividual]`

Gets the individuals that are the same as the specified individual with respect to the set of reasoner axioms.

Parameters

ind – The individual whose same individuals are to be retrieved.

Returns

All individuals x where the root ontology imports closure entails `SameIndividual(ind x)`.

abstract equivalent_object_properties (*op: owlapy.owl_property.OWLObjectPropertyExpression*)
→ `Iterable[owlapy.owl_property.OWLObjectPropertyExpression]`

Gets the simplified object properties that are equivalent to the specified object property with respect to the set of reasoner axioms.

Parameters

op – The object property whose equivalent object properties are to be retrieved.

Returns

All simplified object properties e where the root ontology imports closure entails `EquivalentObjectProperties(op e)`. If op is unsatisfiable with respect to the set of reasoner axioms then `owl:bottomDataProperty` will be returned.

abstract equivalent_data_properties (*dp: owlapy.owl_property.OWLDataProperty*)
→ `Iterable[owlapy.owl_property.OWLDataProperty]`

Gets the data properties that are equivalent to the specified data property with respect to the set of reasoner axioms.

Parameters

dp – The data property whose equivalent data properties are to be retrieved.

Returns

All data properties e where the root ontology imports closure entails `EquivalentDataProperties(dp e)`. If dp is unsatisfiable with respect to the set of reasoner axioms then `owl:bottomDataProperty` will be returned.

abstract data_property_values (*ind: owlapy.owl_individual.OWLNamedIndividual*,
pe: owlapy.owl_property.OWLDataProperty, *direct: bool = True*)
→ `Iterable[owlapy.owl_literal.OWLLiteral]`

Gets the data property values for the specified individual and data property expression.

Parameters

- **ind** – The individual that is the subject of the data property values.
- **pe** – The data property expression whose values are to be retrieved for the specified individual.
- **direct** – Specifies if the direct values should be retrieved (True), or if all values should be retrieved (False), so that sub properties are taken into account.

Returns

A set of OWLLiterals containing literals such that for each literal *l* in the set, the set of reasoner axioms entails `DataPropertyAssertion(pe ind l)`.

abstract object_property_values (*ind*: *owlapy.owl_individual.OWLNamedIndividual*,
pe: *owlapy.owl_property.OWLObjectPropertyExpression*, *direct*: *bool = True*)
→ *Iterable[owlapy.owl_individual.OWLNamedIndividual]*

Gets the object property values for the specified individual and object property expression.

Parameters

- **ind** – The individual that is the subject of the object property values.
- **pe** – The object property expression whose values are to be retrieved for the specified individual.
- **direct** – Specifies if the direct values should be retrieved (True), or if all values should be retrieved (False), so that sub properties are taken into account.

Returns

The named individuals such that for each individual *j*, the set of reasoner axioms entails `ObjectPropertyAssertion(pe ind j)`.

abstract flush () → *None*

Flushes any changes stored in the buffer, which causes the reasoner to take into consideration the changes the current root ontology specified by the changes.

abstract instances (*ce*: *owlapy.class_expression.OWLClassExpression*, *direct*: *bool = False*)
→ *Iterable[owlapy.owl_individual.OWLNamedIndividual]*

Gets the individuals which are instances of the specified class expression.

Parameters

- **ce** – The class expression whose instances are to be retrieved.
- **direct** – Specifies if the direct instances should be retrieved (True), or if all instances should be retrieved (False).

Returns

If *direct* is True, each named individual *j* where the set of reasoner axioms entails `DirectClassAssertion(ce, j)`. If *direct* is False, each named individual *j* where the set of reasoner axioms entails `ClassAssertion(ce, j)`. If *ce* is unsatisfiable with respect to the set of reasoner axioms then nothing returned.

abstract sub_classes (*ce*: *owlapy.class_expression.OWLClassExpression*, *direct*: *bool = False*,
only_named: *bool = True*) → *Iterable[owlapy.class_expression.OWLClassExpression]*

Gets the set of named classes that are the strict (potentially direct) subclasses of the specified class expression with respect to the reasoner axioms.

Parameters

- **ce** – The class expression whose strict (direct) subclasses are to be retrieved.
- **direct** – Specifies if the direct subclasses should be retrieved (True) or if the all subclasses (descendant) classes should be retrieved (False).

- **only_named** – Whether to only retrieve named sub-classes or also complex class expressions.

Returns

If **direct** is True, each class C where reasoner axioms entails `DirectSubClassOf(C, ce)`. If **direct** is False, each class C where reasoner axioms entails `StrictSubClassOf(C, ce)`. If **ce** is equivalent to `owl:Nothing` then nothing will be returned.

abstract disjoint_object_properties (

op: owlapy.owl_property.OWLObjectPropertyExpression)

→ `Iterable[owlapy.owl_property.OWLObjectPropertyExpression]`

Gets the simplified object properties that are disjoint with the specified object property with respect to the set of reasoner axioms.

Parameters

op – The object property whose disjoint object properties are to be retrieved.

Returns

All simplified object properties **e** where the root ontology imports closure entails `EquivalentObjectProperties(e ObjectPropertyComplementOf(op))` or `StrictSubObjectPropertyOf(e ObjectPropertyComplementOf(op))`.

abstract disjoint_data_properties (*dp: owlapy.owl_property.OWLDataProperty*)

→ `Iterable[owlapy.owl_property.OWLDataProperty]`

Gets the data properties that are disjoint with the specified data property with respect to the set of reasoner axioms.

Parameters

dp – The data property whose disjoint data properties are to be retrieved.

Returns

All data properties **e** where the root ontology imports closure entails `EquivalentDataProperties(e DataPropertyComplementOf(dp))` or `StrictSubDataPropertyOf(e DataPropertyComplementOf(dp))`.

abstract sub_data_properties (*dp: owlapy.owl_property.OWLDataProperty*,

direct: bool = False) → `Iterable[owlapy.owl_property.OWLDataProperty]`

Gets the set of named data properties that are the strict (potentially direct) subproperties of the specified data property expression with respect to the imports closure of the root ontology.

Parameters

- **dp** – The data property whose strict (direct) subproperties are to be retrieved.
- **direct** – Specifies if the direct subproperties should be retrieved (True) or if the all subproperties (descendants) should be retrieved (False).

Returns

If **direct** is True, each property P where the set of reasoner axioms entails `DirectSubDataPropertyOf(P, pe)`. If **direct** is False, each property P where the set of reasoner axioms entails `StrictSubDataPropertyOf(P, pe)`. If **pe** is equivalent to `owl:bottomDataProperty` then nothing will be returned.

abstract super_data_properties (*dp: owlapy.owl_property.OWLDataProperty*,

direct: bool = False) → `Iterable[owlapy.owl_property.OWLDataProperty]`

Gets the stream of data properties that are the strict (potentially direct) super properties of the specified data property with respect to the imports closure of the root ontology.

Parameters

- **dp** (`OWLDataProperty`) – The data property whose super properties are to be retrieved.

- **direct** (*bool*) – Specifies if the direct super properties should be retrieved (True) or if the all super properties (ancestors) should be retrieved (False).

Returns

Iterable of super properties.

abstract sub_object_properties (*op: owlapy.owl_property.OWLObjectPropertyExpression, direct: bool = False*) → *Iterable[owlapy.owl_property.OWLObjectPropertyExpression]*

Gets the stream of simplified object property expressions that are the strict (potentially direct) subproperties of the specified object property expression with respect to the imports closure of the root ontology.

Parameters

- **op** – The object property expression whose strict (direct) subproperties are to be retrieved.
- **direct** – Specifies if the direct subproperties should be retrieved (True) or if the all subproperties (descendants) should be retrieved (False).

Returns

If direct is True, simplified object property expressions, such that for each simplified object property expression, P, the set of reasoner axioms entails *DirectSubObjectPropertyOf*(P, pe). If direct is False, simplified object property expressions, such that for each simplified object property expression, P, the set of reasoner axioms entails *StrictSubObjectPropertyOf*(P, pe). If pe is equivalent to owl:bottomObjectProperty then nothing will be returned.

abstract super_object_properties (*op: owlapy.owl_property.OWLObjectPropertyExpression, direct: bool = False*) → *Iterable[owlapy.owl_property.OWLObjectPropertyExpression]*

Gets the stream of object properties that are the strict (potentially direct) super properties of the specified object property with respect to the imports closure of the root ontology.

Parameters

- **op** (*OWLObjectPropertyExpression*) – The object property expression whose super properties are to be retrieved.
- **direct** (*bool*) – Specifies if the direct super properties should be retrieved (True) or if the all super properties (ancestors) should be retrieved (False).

Returns

Iterable of super properties.

abstract types (*ind: owlapy.owl_individual.OWLNamedIndividual, direct: bool = False*) → *Iterable[owlapy.class_expression.OWLClass]*

Gets the named classes which are (potentially direct) types of the specified named individual.

Parameters

- **ind** – The individual whose types are to be retrieved.
- **direct** – Specifies if the direct types should be retrieved (True), or if all types should be retrieved (False).

Returns

If direct is True, each named class C where the set of reasoner axioms entails *DirectClassAssertion*(C, ind). If direct is False, each named class C where the set of reasoner axioms entails *ClassAssertion*(C, ind).

abstract get_root_ontology () → *OWLOntology*

Gets the “root” ontology that is loaded into this reasoner. The reasoner takes into account the axioms in this ontology and its import’s closure.

abstract is_isolated()

Return True if this reasoner is using an isolated ontology.

abstract is_using_triplestore()

Return True if this reasoner is using a triplestore to retrieve instances.

abstract super_classes (*ce: owlapy.class_expression.OWLClassExpression, direct: bool = False, only_named: bool = True*) \rightarrow Iterable[*owlapy.class_expression.OWLClassExpression*]

Gets the stream of named classes that are the strict (potentially direct) super classes of the specified class expression with respect to the imports closure of the root ontology.

Parameters

- **ce** – The class expression whose strict (direct) super classes are to be retrieved.
- **direct** – Specifies if the direct super classes should be retrieved (True) or if the all super classes (ancestors) classes should be retrieved (False).
- **only_named** – Whether to only retrieve named super classes or also complex class expressions.

Returns

If direct is True, each class C where the set of reasoner axioms entails DirectSubClassOf(ce, C). If direct is False, each class C where set of reasoner axioms entails StrictSubClassOf(ce, C). If ce is equivalent to owl:Thing then nothing will be returned.

owlapy.model.OWLTopObjectProperty: Final

owlapy.model.OWLBottomObjectProperty: Final

owlapy.model.OWLTopDataProperty: Final

owlapy.model.OWLBottomDataProperty: Final

owlapy.model.DoubleOWLDatatype: Final

owlapy.model.IntegerOWLDatatype: Final

owlapy.model.BooleanOWLDatatype: Final

owlapy.model.StringOWLDatatype: Final

owlapy.model.DateOWLDatatype: Final

owlapy.model.DateTimeOWLDatatype: Final

owlapy.model.DurationOWLDatatype: Final

owlapy.model.TopOWLDatatype: Final

owlapy.model.NUMERIC_DATATYPES: Final[Set[owlapy.types.OWLDatatype]]

owlapy.model.TIME_DATATYPES: Final[Set[owlapy.types.OWLDatatype]]

`owlapy.owl2sparql`

OWL-to-SPARQL converter.

Submodules

`owlapy.owl2sparql.converter`

Format converter.

Module Contents

Classes

<i>VariablesMapping</i>	Helper class for owl-to-sparql conversion.
<i>Owl2SparqlConverter</i>	Convert owl (owlapy model class expressions) to SPARQL.

Functions

<i>peek</i> (x)	Peek the last element of an array.
<i>owl_expression_to_sparql</i> (\rightarrow str)	Convert an OWL Class Expression (https://www.w3.org/TR/owl2-syntax/#Class_Expressions) into a SPARQL query

Attributes

<i>converter</i>

`owlapy.owl2sparql.converter.peek(x)`

Peek the last element of an array.

Returns

The last element `arr[-1]`.

class `owlapy.owl2sparql.converter.VariablesMapping`

Helper class for owl-to-sparql conversion.

__slots__ = ('class_cnt', 'prop_cnt', 'ind_cnt', 'dict')

get_variable (*e*: `owlapy.model.OWLEntity`) \rightarrow str

new_individual_variable () \rightarrow str

```

new_property_variable () → str

__contains__ (item: owlapy.model.OWLEntity) → bool

__getitem__ (item: owlapy.model.OWLEntity) → str

class owlapy.owl2sparql.converter.Owl2SparqlConverter
    Convert owl (owlapy model class expressions) to SPARQL.

    property modal_depth

    property current_variable

    __slots__ = ('ce', 'sparql', 'variables', 'parent', 'parent_var',
        'properties', 'variable_entities', 'cnt', ...)

    ce: owlapy.model.OWLClassExpression

    sparql: List[str]

    variables: List[str]

    parent: List[owlapy.model.OWLClassExpression]

    parent_var: List[str]

    variable_entities: Set[owlapy.model.OWLEntity]

    properties: Dict[int, List[owlapy.model.OWLEntity]]

    mapping: VariablesMapping

    grouping_vars: Dict[owlapy.model.OWLClassExpression, Set[str]]

    having_conditions: Dict[owlapy.model.OWLClassExpression, Set[str]]

    cnt: int

    convert (root_variable: str, ce: owlapy.model.OWLClassExpression, named_individuals: bool = False)
        Used to convert owl class expression to SPARQL syntax.

        Parameters

        • root_variable (str) – Root variable name that will be used in SPARQL query.

        • ce (OWLClassExpression) – The owl class expression to convert.

        • named_individuals (bool) – If ‘True’ return only entities that are instances of
            owl:NamedIndividual.

        Returns
            The SPARQL query.

        Return type
            list[str]

    abstract render (e)

    stack_variable (var)

    stack_parent (parent: owlapy.model.OWLClassExpression)

```

abstract process (*ce: owlapy.model.OWLClassExpression*)

new_count_var () → str

append_triple (*subject, predicate, object_*)

append (*frag*)

triple (*subject, predicate, object_*)

as_query (*root_variable: str, ce: owlapy.model.OWLClassExpression, count: bool = False,*
values: Iterable[owlapy.model.OWLNamedIndividual] | None = None,
named_individuals: bool = False) → str

root variable: the variable that will be projected ce: the class expression to be transformed to a SPARQL query count: True, counts the results ; False, projects the individuals values: positive or negative examples from a class expression problem named_individuals: if set to True, the generated SPARQL query will return only entities that are instances of owl:NamedIndividual

owlapy.owl2sparql.converter.**converter**

owlapy.owl2sparql.converter.**owl_expression_to_sparql** (*root_variable: str = '?x',*
expression: owlapy.model.OWLClassExpression = None,
values: Iterable[owlapy.model.OWLNamedIndividual] | None = None,
named_individuals: bool = False) → str

Convert an OWL Class Expression (https://www.w3.org/TR/owl2-syntax/#Class_Expressions) into a SPARQL query root variable: the variable that will be projected expression: the class expression to be transformed to a SPARQL query

values: positive or negative examples from a class expression problem. Unclear named_individuals: if set to True, the generated SPARQL query will return only entities that are instances of owl:NamedIndividual

2.2 Submodules

owlapy.has

Module Contents

Classes

HasIndex

Interface for types with an index; this is used to group objects by type when sorting.

class owlapy.has.**HasIndex**

Bases: Protocol

Interface for types with an index; this is used to group objects by type when sorting.

type_index: ClassVar[int]

__eq__ (*other*)

Return self==value.

owlapy.iri

Module Contents

Classes

<i>IRI</i>	An IRI, consisting of a namespace and a remainder.
------------	--

```
class owlapy.iri.IRI (namespace: str | owlapy.namespaces.Namespaces, remainder: str)
    Bases: owlapy.owl_annotation.OWLAnnotationSubject, owlapy.owl_annotation.
            OWLAnnotationValue
    An IRI, consisting of a namespace and a remainder.
    property str: str
        Returns: The string that specifies the IRI.
    property reminder: str
        Returns: The string corresponding to the reminder of the IRI.
    __slots__ = ('_namespace', '_remainder', '__weakref__')
    type_index: Final = 0

    static create (namespace: owlapy.namespaces.Namespaces, remainder: str) → IRI
    static create (namespace: str, remainder: str) → IRI
    static create (string: str) → IRI

    __repr__ ()
        Return repr(self).
    __eq__ (other)
        Return self==value.
    __hash__ ()
        Return hash(self).
    is_nothing ()
        Determines if this IRI is equal to the IRI that owl:Nothing is named with.
        Returns
            True if this IRI is equal to <http://www.w3.org/2002/07/owl#Nothing> and otherwise False.
    is_thing ()
        Determines if this IRI is equal to the IRI that owl:Thing is named with.
        Returns
            True if this IRI is equal to <http://www.w3.org/2002/07/owl#Thing> and otherwise False.
    is_reserved_vocabulary () → bool
        Determines if this IRI is in the reserved vocabulary. An IRI is in the reserved vocabulary if it starts with
        <http://www.w3.org/1999/02/22-rdf-syntax-ns#> or <http://www.w3.org/2000/01/rdf-schema#> or <http://www.w3.org/2001/XMLSchema#> or <http://www.w3.org/2002/07/owl#>.
        Returns
            True if the IRI is in the reserved vocabulary, otherwise False.
```

as_iri () → *IRI*

Returns

if the value is an IRI, return it. Return None otherwise.

as_str () → str

CD: Should be deprecated. :returns: The string that specifies the IRI.

get_short_form () → str

Gets the short form.

Returns

A string that represents the short form.

get_namespace () → str

Returns

The namespace as string.

get_remainder () → str

Returns

The remainder (coincident with NCName usually) for this IRI.

owlapy.meta_classes

Module Contents

Classes

<i>HasIRI</i>	Simple class to access the IRI.
<i>HasOperands</i>	An interface to objects that have a collection of operands.
<i>HasFiller</i>	An interface to objects that have a filler.
<i>HasCardinality</i>	An interface to objects that have a cardinality.

class owlapy.meta_classes.**HasIRI**

Simple class to access the IRI.

__slots__ = ()

abstract **get_iri** () → *IRI*

Gets the IRI of this object.

Returns

The IRI of this object.

class owlapy.meta_classes.**HasOperands**

Bases: Generic[_T]

An interface to objects that have a collection of operands.

Parameters

_T – Operand type.

__slots__ = ()

abstract operands () → Iterable[_T]

Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

Returns

The operands.

class owlapy.meta_classes.**HasFiller**

Bases: Generic[_T]

An interface to objects that have a filler.

Parameters

_T – Filler type.

__slots__ = ()

abstract get_filler () → _T

Gets the filler for this restriction. In the case of an object restriction this will be an individual, in the case of a data restriction this will be a constant (data value). For quantified restriction this will be a class expression or a data range.

Returns

the value

class owlapy.meta_classes.**HasCardinality**

An interface to objects that have a cardinality.

__slots__ = ()

abstract get_cardinality () → int

Gets the cardinality of a restriction.

Returns

The cardinality. A non-negative integer.

owlapy.namespaces

Namespaces.

Module Contents

Classes

Namespaces

A Namespace and its prefix.

Attributes

<i>OWL</i>
<i>RDFS</i>
<i>RDF</i>
<i>XSD</i>

class owlapy.namespaces.Namespaces (*prefix: str, ns: str*)

A Namespace and its prefix.

property ns: str

property prefix: str

__slots__ = ('_prefix', '_ns')

__repr__()

Return repr(self).

__hash__()

Return hash(self).

__eq__(*other*)

Return self==value.

owlapy.namespaces.OWL: **Final**

owlapy.namespaces.RDFS: **Final**

owlapy.namespaces.RDF: **Final**

owlapy.namespaces.XSD: **Final**

owlapy.owl_annotation

Module Contents

Classes

<i>OWLAnnotationObject</i>	A marker interface for the values (objects) of annotations.
<i>OWLAnnotationSubject</i>	A marker interface for annotation subjects, which can either be IRIs or anonymous individuals
<i>OWLAnnotationValue</i>	A marker interface for annotation values, which can either be an IRI (URI), Literal or Anonymous Individual.


```

class owlapy.owl_annotation.OWLAnnotationObject
    Bases: owlapy.owlobject.OWLObject
    A marker interface for the values (objects) of annotations.
    __slots__ = ()
    as_iri() → IRI | None
        Returns
            if the value is an IRI, return it. Return None otherwise.
    as_anonymous_individual()
        Returns
            if the value is an anonymous, return it. Return None otherwise.
class owlapy.owl_annotation.OWLAnnotationSubject
    Bases: OWLAnnotationObject
    A marker interface for annotation subjects, which can either be IRIs or anonymous individuals
    __slots__ = ()
class owlapy.owl_annotation.OWLAnnotationValue
    Bases: OWLAnnotationObject
    A marker interface for annotation values, which can either be an IRI (URI), Literal or Anonymous Individual.
    __slots__ = ()
    is_literal() → bool
        Returns
            true if the annotation value is a literal
    as_literal() → OWLLiteral | None
        Returns
            if the value is a literal, returns it. Return None otherwise

```

`owlapy.owl_axiom`

Module Contents

Classes

<i>OWLAxiom</i>	Represents Axioms in the OWL 2 Specification.
<i>OWLLogicalAxiom</i>	A base interface of all axioms that affect the logical meaning of an ontology. This excludes declaration axioms
<i>OWLPropertyAxiom</i>	The base interface for property axioms.
<i>OWLObjectPropertyAxiom</i>	The base interface for object property axioms.
<i>OWLDataPropertyAxiom</i>	The base interface for data property axioms.
<i>OWLIndividualAxiom</i>	The base interface for individual axioms.
<i>OWLClassAxiom</i>	The base interface for class axioms.

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Table 3 – continued from previous page

<i>OWLDeclarationAxiom</i>	Represents a Declaration axiom in the OWL 2 Specification. A declaration axiom declares an entity in an ontology.
<i>OWLDatatypeDefinitionAxiom</i>	Represents a DatatypeDefinition axiom in the OWL 2 Specification.
<i>OWLHasKeyAxiom</i>	Represents a HasKey axiom in the OWL 2 Specification.
<i>OWLNaryAxiom</i>	Represents an axiom that contains two or more operands that could also be represented with multiple pairwise
<i>OWLNaryClassAxiom</i>	Represents an axiom that contains two or more operands that could also be represented with
<i>OWLEquivalentClassesAxiom</i>	Represents an EquivalentClasses axiom in the OWL 2 Specification.
<i>OWLDisjointClassesAxiom</i>	Represents a DisjointClasses axiom in the OWL 2 Specification.
<i>OWLNaryIndividualAxiom</i>	Represents an axiom that contains two or more operands that could also be represented with
<i>OWLDifferentIndividualsAxiom</i>	Represents a DifferentIndividuals axiom in the OWL 2 Specification.
<i>OWLSameIndividualAxiom</i>	Represents a SameIndividual axiom in the OWL 2 Specification.
<i>OWLNaryPropertyAxiom</i>	Represents an axiom that contains two or more operands that could also be represented with
<i>OWLEquivalentObjectPropertiesAxiom</i>	Represents EquivalentObjectProperties axioms in the OWL 2 Specification.
<i>OWLDisjointObjectPropertiesAxiom</i>	Represents DisjointObjectProperties axioms in the OWL 2 Specification.
<i>OWLInverseObjectPropertiesAxiom</i>	Represents InverseObjectProperties axioms in the OWL 2 Specification.
<i>OWLEquivalentDataPropertiesAxiom</i>	Represents EquivalentDataProperties axioms in the OWL 2 Specification.
<i>OWLDisjointDataPropertiesAxiom</i>	Represents DisjointDataProperties axioms in the OWL 2 Specification.
<i>OWLSubClassOfAxiom</i>	Represents an SubClassOf axiom in the OWL 2 Specification.
<i>OWLDisjointUnionAxiom</i>	Represents a DisjointUnion axiom in the OWL 2 Specification.
<i>OWLClassAssertionAxiom</i>	Represents ClassAssertion axioms in the OWL 2 Specification.
<i>OWLAnnotationProperty</i>	Represents an AnnotationProperty in the OWL 2 specification.
<i>OWLAnnotation</i>	Annotations are used in the various types of annotation axioms, which bind annotations to their subjects
<i>OWLAnnotationAxiom</i>	A super interface for annotation axioms.
<i>OWLAnnotationAssertionAxiom</i>	Represents AnnotationAssertion axioms in the OWL 2 specification.
<i>OWLSubAnnotationPropertyOfAxiom</i>	Represents an SubAnnotationPropertyOf axiom in the OWL 2 specification.
<i>OWLAnnotationPropertyDomainAxiom</i>	Represents an AnnotationPropertyDomain axiom in the OWL 2 specification.
<i>OWLAnnotationPropertyRangeAxiom</i>	Represents an AnnotationPropertyRange axiom in the OWL 2 specification.
<i>OWLSubPropertyAxiom</i>	Base interface for object and data sub-property axioms.

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Table 3 – continued from previous page

<i>OWLSubObjectPropertyOfAxiom</i>	Represents a SubObjectPropertyOf axiom in the OWL 2 specification.
<i>OWLSubDataPropertyOfAxiom</i>	Represents a SubDataPropertyOf axiom in the OWL 2 specification.
<i>OWLPropertyAssertionAxiom</i>	Represents a PropertyAssertion axiom in the OWL 2 specification.
<i>OWLObjectPropertyAssertionAxiom</i>	Represents an ObjectPropertyAssertion axiom in the OWL 2 specification.
<i>OWLNegativeObjectPropertyAssertionAxiom</i>	Represents a NegativeObjectPropertyAssertion axiom in the OWL 2 specification.
<i>OWLDataPropertyAssertionAxiom</i>	Represents an DataPropertyAssertion axiom in the OWL 2 specification.
<i>OWLNegativeDataPropertyAssertionAxiom</i>	Represents an NegativeDataPropertyAssertion axiom in the OWL 2 specification.
<i>OWLUnaryPropertyAxiom</i>	Unary property axiom.
<i>OWLObjectPropertyCharacteristicAxiom</i>	Base interface for functional object property axiom.
<i>OWLFunctionalObjectPropertyAxiom</i>	Represents FunctionalObjectProperty axioms in the OWL 2 specification.
<i>OWLAsymmetricObjectPropertyAxiom</i>	Represents AsymmetricObjectProperty axioms in the OWL 2 specification.
<i>OWLInverseFunctionalObjectPropertyAxiom</i>	Represents InverseFunctionalObjectProperty axioms in the OWL 2 specification.
<i>OWLIrreflexiveObjectPropertyAxiom</i>	Represents IrreflexiveObjectProperty axioms in the OWL 2 specification.
<i>OWLReflexiveObjectPropertyAxiom</i>	Represents ReflexiveObjectProperty axioms in the OWL 2 specification.
<i>OWLSymmetricObjectPropertyAxiom</i>	Represents SymmetricObjectProperty axioms in the OWL 2 specification.
<i>OWLTransitiveObjectPropertyAxiom</i>	Represents TransitiveObjectProperty axioms in the OWL 2 specification.
<i>OWLDataPropertyCharacteristicAxiom</i>	Base interface for Functional data property axiom.
<i>OWLFunctionalDataPropertyAxiom</i>	Represents FunctionalDataProperty axioms in the OWL 2 specification.
<i>OWLPropertyDomainAxiom</i>	Represents ObjectPropertyDomain axioms in the OWL 2 specification.
<i>OWLPropertyRangeAxiom</i>	Represents ObjectPropertyRange axioms in the OWL 2 specification.
<i>OWLObjectPropertyDomainAxiom</i>	Represents a ObjectPropertyDomain axiom in the OWL 2 Specification.
<i>OWLDataPropertyDomainAxiom</i>	Represents a DataPropertyDomain axiom in the OWL 2 Specification.
<i>OWLObjectPropertyRangeAxiom</i>	Represents a ObjectPropertyRange axiom in the OWL 2 Specification.
<i>OWLDataPropertyRangeAxiom</i>	Represents a DataPropertyRange axiom in the OWL 2 Specification.

class owlapy.owl_axiom.**OWLAxiom** (annotations: Iterable[OWLAnnotation] | None = None)

Bases: owlapy.owl_object.OWLObject

Represents Axioms in the OWL 2 Specification.

An OWL ontology contains a set of axioms. These axioms can be annotation axioms, declaration axioms, imports axioms or logical axioms.

```

__slots__ = '_annotations'

annotations() → List[OWLAnnotation] | None

is_annotated() → bool

is_logical_axiom() → bool

is_annotation_axiom() → bool

class owlapy.owl_axiom.OWLLogicalAxiom(
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLAxiom

    A base interface of all axioms that affect the logical meaning of an ontology. This excludes declaration axioms
    (including imports declarations) and annotation axioms.

    __slots__ = ()

    is_logical_axiom() → bool

class owlapy.owl_axiom.OWLPropertyAxiom(
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLLogicalAxiom

    The base interface for property axioms.

    __slots__ = ()

class owlapy.owl_axiom.OWLObjectPropertyAxiom(
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyAxiom

    The base interface for object property axioms.

    __slots__ = ()

class owlapy.owl_axiom.OWLDataPropertyAxiom(
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyAxiom

    The base interface for data property axioms.

    __slots__ = ()

class owlapy.owl_axiom.OWLIndividualAxiom(
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLLogicalAxiom

    The base interface for individual axioms.

    __slots__ = ()

class owlapy.owl_axiom.OWLClassAxiom(annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLLogicalAxiom

    The base interface for class axioms.

    __slots__ = ()

```

```
class owlapy.owl_axiom.OWLDeclarationAxiom (entity: owlapy.owlobject.OWLEntity,
      annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLAxiom*

Represents a Declaration axiom in the OWL 2 Specification. A declaration axiom declares an entity in an ontology. It doesn't affect the logical meaning of the ontology.

```
__slots__ = '_entity'
```

```
get_entity() → owlapy.owlobject.OWLEntity
```

```
__eq__(other)
```

Return self==value.

```
__hash__()
```

Return hash(self).

```
__repr__()
```

Return repr(self).

```
class owlapy.owl_axiom.OWLDatatypeDefinitionAxiom (
      datatype: owlapy.types.OWLDatatype, datarange: owlapy.types.OWLDataRange,
      annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLLogicalAxiom*

Represents a DatatypeDefinition axiom in the OWL 2 Specification.

```
__slots__ = ('_datatype', '_datarange')
```

```
get_datatype() → owlapy.types.OWLDatatype
```

```
get_datarange() → owlapy.types.OWLDataRange
```

```
__eq__(other)
```

Return self==value.

```
__hash__()
```

Return hash(self).

```
__repr__()
```

Return repr(self).

```
class owlapy.owl_axiom.OWLHasKeyAxiom (
      class_expression: owlapy.class_expression.OWLClassExpression,
      property_expressions: List[owlapy.owl_property.OWLPropertyExpression],
      annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLLogicalAxiom*, *owlapy.meta_classes.HasOperands[owlapy.owl_property.OWLPropertyExpression]*

Represents a HasKey axiom in the OWL 2 Specification.

```
__slots__ = ('_class_expression', '_property_expressions')
```

```
get_class_expression() → owlapy.class_expression.OWLClassExpression
```

```
get_property_expressions() → List[owlapy.owl_property.OWLPropertyExpression]
```

operands () → Iterable[owlapy.owl_property.OWLPropertyExpression]

Gets the operands - e.g., the individuals in a sameAs axiom, or the classes in an equivalent classes axiom.

Returns

The operands.

__eq__ (other)

Return self==value.

__hash__ ()

Return hash(self).

__repr__ ()

Return repr(self).

class owlapy.owl_axiom.OWLNaryAxiom (annotations: Iterable[OWLAnnotation] | None = None)

Bases: Generic[_C], OWLAxiom

Represents an axiom that contains two or more operands that could also be represented with multiple pairwise axioms.

Parameters

_C – Class of contained objects.

__slots__ = ()

abstract as_pairwise_axioms () → Iterable[OWLNaryAxiom[_C]]

class owlapy.owl_axiom.OWLNaryClassAxiom (

class_expressions: List[owlapy.class_expression.OWLClassExpression],

annotations: Iterable[OWLAnnotation] | None = None)

Bases: OWLClassAxiom, OWLNaryAxiom[owlapy.class_expression.OWLClassExpression]

Represents an axiom that contains two or more operands that could also be represented with multiple pairwise axioms.

__slots__ = '_class_expressions'

class_expressions () → Iterable[owlapy.class_expression.OWLClassExpression]

Gets all of the top level class expressions that appear in this axiom.

Returns

Sorted stream of class expressions that appear in the axiom.

as_pairwise_axioms () → Iterable[OWLNaryClassAxiom]

Gets this axiom as a set of pairwise axioms; if the axiom contains only two operands, the axiom itself is returned unchanged, including its annotations.

Returns

This axiom as a set of pairwise axioms.

__eq__ (other)

Return self==value.

__hash__ ()

Return hash(self).

__repr__ ()

Return repr(self).

```

class owlapy.owl_axiom.OWLEquivalentClassesAxiom (
    class_expressions: List[owlapy.class_expression.OWLClassExpression],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLNaryClassAxiom
    Represents an EquivalentClasses axiom in the OWL 2 Specification.
    __slots__ = ()
    contains_named_equivalent_class () → bool
    contains_owl_nothing () → bool
    contains_owl_thing () → bool
    named_classes () → Iterable[owlapy.class_expression.OWLClass]

class owlapy.owl_axiom.OWLDisjointClassesAxiom (
    class_expressions: List[owlapy.class_expression.OWLClassExpression],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLNaryClassAxiom
    Represents a DisjointClasses axiom in the OWL 2 Specification.
    __slots__ = ()

class owlapy.owl_axiom.OWLNaryIndividualAxiom (
    individuals: List[owlapy.owl_individual.OWLIndividual],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLIndividualAxiom, OWLNaryAxiom[owlapy.owl_individual.OWLIndividual]
    Represents an axiom that contains two or more operands that could also be represented with multiple pairwise
    individual axioms.
    __slots__ = '_individuals'
    individuals () → Iterable[owlapy.owl_individual.OWLIndividual]
        Get the individuals.
        Returns
            Generator containing the individuals.
    as_pairwise_axioms () → Iterable[OWLNaryIndividualAxiom]
    __eq__ (other)
        Return self==value.
    __hash__ ()
        Return hash(self).
    __repr__ ()
        Return repr(self).

class owlapy.owl_axiom.OWLDifferentIndividualsAxiom (
    individuals: List[owlapy.owl_individual.OWLIndividual],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLNaryIndividualAxiom
    Represents a DifferentIndividuals axiom in the OWL 2 Specification.

```

```

__slots__ = ()

class owlapy.owl_axiom.OWLSameIndividualAxiom(
    individuals: List[owlapy.owl_individual.OWLIndividual],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLNaryIndividualAxiom
    Represents a SameIndividual axiom in the OWL 2 Specification.
    __slots__ = ()

class owlapy.owl_axiom.OWLNaryPropertyAxiom(properties: List[_P],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: Generic[_P], OWLPropertyAxiom, OWLNaryAxiom[_P]
    Represents an axiom that contains two or more operands that could also be represented with multiple pairwise
    property axioms.
    __slots__ = '_properties'

    properties() → Iterable[_P]
        Get all the properties that appear in the axiom.

        Returns
        Generator containing the properties.

    as_pairwise_axioms() → Iterable[OWLNaryPropertyAxiom]

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

    __repr__()
        Return repr(self).

class owlapy.owl_axiom.OWLEquivalentObjectPropertiesAxiom(
    properties: List[owlapy.owl_property.OWLObjectPropertyExpression],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLNaryPropertyAxiom[owlapy.owl_property.OWLObjectPropertyExpression],
    OWLObjectPropertyAxiom
    Represents EquivalentObjectProperties axioms in the OWL 2 Specification.
    __slots__ = ()

class owlapy.owl_axiom.OWLDisjointObjectPropertiesAxiom(
    properties: List[owlapy.owl_property.OWLObjectPropertyExpression],
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLNaryPropertyAxiom[owlapy.owl_property.OWLObjectPropertyExpression],
    OWLObjectPropertyAxiom
    Represents DisjointObjectProperties axioms in the OWL 2 Specification.
    __slots__ = ()

class owlapy.owl_axiom.OWLInverseObjectPropertiesAxiom(
    first: owlapy.owl_property.OWLObjectPropertyExpression,
    second: owlapy.owl_property.OWLObjectPropertyExpression,
    annotations: Iterable[OWLAnnotation] | None = None)

```


Bases: *OWLNaryPropertyAxiom*[*owlapy.owl_property.OWLObjectPropertyExpression*],
OWLObjectPropertyAxiom

Represents InverseObjectProperties axioms in the OWL 2 Specification.

__slots__ = ('_first', '_second')

get_first_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

get_second_property() → *owlapy.owl_property.OWLObjectPropertyExpression*

__repr__()

Return repr(self).

class *owlapy.owl_axiom.OWLEquivalentDataPropertiesAxiom*(
 properties: List[*owlapy.owl_property.OWLDataPropertyExpression*],
 annotations: Iterable[*OWLAnnotation*] | None = None)

Bases: *OWLNaryPropertyAxiom*[*owlapy.owl_property.OWLDataPropertyExpression*],
OWLDataPropertyAxiom

Represents EquivalentDataProperties axioms in the OWL 2 Specification.

__slots__ = ()

class *owlapy.owl_axiom.OWLDisjointDataPropertiesAxiom*(
 properties: List[*owlapy.owl_property.OWLDataPropertyExpression*],
 annotations: Iterable[*OWLAnnotation*] | None = None)

Bases: *OWLNaryPropertyAxiom*[*owlapy.owl_property.OWLDataPropertyExpression*],
OWLDataPropertyAxiom

Represents DisjointDataProperties axioms in the OWL 2 Specification.

__slots__ = ()

class *owlapy.owl_axiom.OWLSubClassOfAxiom*(
 sub_class: *owlapy.class_expression.OWLClassExpression*,
 super_class: *owlapy.class_expression.OWLClassExpression*,
 annotations: Iterable[*OWLAnnotation*] | None = None)

Bases: *OWLClassAxiom*

Represents an SubClassOf axiom in the OWL 2 Specification.

__slots__ = ('_sub_class', '_super_class')

get_sub_class() → *owlapy.class_expression.OWLClassExpression*

get_super_class() → *owlapy.class_expression.OWLClassExpression*

__eq__(*other*)

Return self==value.

__hash__()

Return hash(self).

__repr__()

Return repr(self).

```
class owlapy.owl_axiom.OWLDisjointUnionAxiom(cls_: owlapy.class_expression.OWLClass,
      class_expressions: List[owlapy.class_expression.OWLClassExpression],
      annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLClassAxiom*

Represents a DisjointUnion axiom in the OWL 2 Specification.

```
__slots__ = ('_cls', '_class_expressions')
```

```
get_owl_class() → owlapy.class_expression.OWLClass
```

```
get_class_expressions() → Iterable[owlapy.class_expression.OWLClassExpression]
```

```
get_owl_equivalent_classes_axiom() → OWLEquivalentClassesAxiom
```

```
get_owl_disjoint_classes_axiom() → OWLDisjointClassesAxiom
```

```
__eq__(other)
```

Return self==value.

```
__hash__()
```

Return hash(self).

```
__repr__()
```

Return repr(self).

```
class owlapy.owl_axiom.OWLClassAssertionAxiom(
      individual: owlapy.owl_individual.OWLIndividual,
      class_expression: owlapy.class_expression.OWLClassExpression,
      annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLIndividualAxiom*

Represents ClassAssertion axioms in the OWL 2 Specification.

```
__slots__ = ('_individual', '_class_expression')
```

```
get_individual() → owlapy.owl_individual.OWLIndividual
```

```
get_class_expression() → owlapy.class_expression.OWLClassExpression
```

```
__eq__(other)
```

Return self==value.

```
__hash__()
```

Return hash(self).

```
__repr__()
```

Return repr(self).

```
class owlapy.owl_axiom.OWLAnnotationProperty(iri: owlapy.iri.IRI)
```

Bases: *owlapy.owl_property.OWLProperty*

Represents an AnnotationProperty in the OWL 2 specification.

```
__slots__ = '_iri'
```

```
get_iri() → owlapy.iri.IRI
```

Gets the IRI of this object.

Returns

The IRI of this object.

```

class owlapy.owl_axiom.OWLAnnotation (property: OWLAnnotationProperty,
    value: owlapy.owl_annotation.OWLAnnotationValue)
    Bases: owlapy.owl_object.OWLObject

    Annotations are used in the various types of annotation axioms, which bind annotations to their subjects (i.e. axioms or declarations).

    __slots__ = ('_property', '_value')

    get_property () → OWLAnnotationProperty
        Gets the property that this annotation acts along.

        Returns
            The annotation property.

    get_value () → owlapy.owl_annotation.OWLAnnotationValue
        Gets the annotation value. The type of value will depend upon the type of the annotation e.g. whether the annotation is an OWLLiteral, an IRI or an OWLAnonymousIndividual.

        Returns
            The annotation value.

    __eq__ (other)
        Return self==value.

    __hash__ ()
        Return hash(self).

    __repr__ ()
        Return repr(self).

class owlapy.owl_axiom.OWLAnnotationAxiom (
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLAxiom

    A super interface for annotation axioms.

    __slots__ = ()

    is_annotation_axiom () → bool

class owlapy.owl_axiom.OWLAnnotationAssertionAxiom (
    subject: owlapy.owl_annotation.OWLAnnotationSubject, annotation: OWLAnnotation)
    Bases: OWLAnnotationAxiom

    Represents AnnotationAssertion axioms in the OWL 2 specification.

    __slots__ = ('_subject', '_annotation')

    get_subject () → owlapy.owl_annotation.OWLAnnotationSubject
        Gets the subject of this object.

        Returns
            The subject.

    get_property () → OWLAnnotationProperty
        Gets the property.

        Returns
            The property.

```

get_value() → *owlapy.owl_annotation.OWLAnnotationValue*

Gets the annotation value. This is either an IRI, an OWLAnonymousIndividual or an OWLLiteral.

Returns

The annotation value.

__eq__(other)

Return self==value.

__hash__()

Return hash(self).

__repr__()

Return repr(self).

```
class owlapy.owl_axiom.OWLSubAnnotationPropertyOfAxiom(  
    sub_property: OWLAnnotationProperty, super_property: OWLAnnotationProperty,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLAnnotationAxiom*

Represents an SubAnnotationPropertyOf axiom in the OWL 2 specification.

__slots__ = ('_sub_property', '_super_property')

get_sub_property() → *OWLAnnotationProperty*

get_super_property() → *OWLAnnotationProperty*

__eq__(other)

Return self==value.

__hash__()

Return hash(self).

__repr__()

Return repr(self).

```
class owlapy.owl_axiom.OWLAnnotationPropertyDomainAxiom(  
    property_: OWLAnnotationProperty, domain: owlapy.iri.IRI,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLAnnotationAxiom*

Represents an AnnotationPropertyDomain axiom in the OWL 2 specification.

__slots__ = ('_property', '_domain')

get_property() → *OWLAnnotationProperty*

get_domain() → *owlapy.iri.IRI*

__eq__(other)

Return self==value.

__hash__()

Return hash(self).

__repr__()

Return repr(self).

```

class owlapy.owl_axiom.OWLAnnotationPropertyRangeAxiom (
    property_: OWLAnnotationProperty, range_: owlapy.iri.IRI,
    annotations: Iterable[OWLAnnotation] | None = None)
Bases: OWLAnnotationAxiom
Represents an AnnotationPropertyRange axiom in the OWL 2 specification.
__slots__ = ('_property', '_range')
get_property () → OWLAnnotationProperty
get_range () → owlapy.iri.IRI
__eq__ (other)
    Return self==value.
__hash__ ()
    Return hash(self).
__repr__ ()
    Return repr(self).

class owlapy.owl_axiom.OWLSubPropertyAxiom (sub_property: _P, super_property: _P,
    annotations: Iterable[OWLAnnotation] | None = None)
Bases: Generic[_P], OWLPropertyAxiom
Base interface for object and data sub-property axioms.
__slots__ = ('_sub_property', '_super_property')
get_sub_property () → _P
get_super_property () → _P
__eq__ (other)
    Return self==value.
__hash__ ()
    Return hash(self).
__repr__ ()
    Return repr(self).

class owlapy.owl_axiom.OWLSubObjectPropertyOfAxiom (
    sub_property: owlapy.owl_property.OWLObjectPropertyExpression,
    super_property: owlapy.owl_property.OWLObjectPropertyExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
Bases: OWLSubPropertyAxiom[owlapy.owl_property.OWLObjectPropertyExpression],
    OWLObjectPropertyAxiom
Represents a SubObjectPropertyOf axiom in the OWL 2 specification.
__slots__ = ()

class owlapy.owl_axiom.OWLSubDataPropertyOfAxiom (
    sub_property: owlapy.owl_property.OWLDataPropertyExpression,
    super_property: owlapy.owl_property.OWLDataPropertyExpression,
    annotations: Iterable[OWLAnnotation] | None = None)

```

Bases: `OWLSubPropertyAxiom[owlapy.owl_property.OWLDataPropertyExpression], OWLDataPropertyAxiom`

Represents a SubDataPropertyOf axiom in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLPropertyAssertionAxiom(  
    subject: owlapy.owl_individual.OWLIndividual, property_: _P, object_: _C,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: `Generic[_P, _C], OWLIndividualAxiom`

Represents a PropertyAssertion axiom in the OWL 2 specification.

`__slots__ = ('_subject', '_property', '_object')`

`get_subject() → owlapy.owl_individual.OWLIndividual`

`get_property() → _P`

`get_object() → _C`

`__eq__ (other)`

Return self==value.

`__hash__()`

Return hash(self).

`__repr__()`

Return repr(self).

```
class owlapy.owl_axiom.OWLObjectPropertyAssertionAxiom(  
    subject: owlapy.owl_individual.OWLIndividual,  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    object_: owlapy.owl_individual.OWLIndividual,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: `OWLPropertyAssertionAxiom[owlapy.owl_property.OWLObjectPropertyExpression, owlapy.owl_individual.OWLIndividual]`

Represents an ObjectPropertyAssertion axiom in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLNegativeObjectPropertyAssertionAxiom(  
    subject: owlapy.owl_individual.OWLIndividual,  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    object_: owlapy.owl_individual.OWLIndividual,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: `OWLPropertyAssertionAxiom[owlapy.owl_property.OWLObjectPropertyExpression, owlapy.owl_individual.OWLIndividual]`

Represents a NegativeObjectPropertyAssertion axiom in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLDataPropertyAssertionAxiom(  
    subject: owlapy.owl_individual.OWLIndividual,  
    property_: owlapy.owl_property.OWLDataPropertyExpression,  
    object_: owlapy.owl_literal.OWLLiteral, annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLPropertyAssertionAxiom*[owlapy.owl_property.OWLDataPropertyExpression, owlapy.owl_literal.OWLLiteral]

Represents an DataPropertyAssertion axiom in the OWL 2 specification.

__slots__ = ()

```
class owlapy.owl_axiom.OWLNegativeDataPropertyAssertionAxiom(  
    subject: owlapy.owl_individual.OWLIndividual,  
    property_: owlapy.owl_property.OWLDataPropertyExpression,  
    object_: owlapy.owl_literal.OWLLiteral, annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLPropertyAssertionAxiom*[owlapy.owl_property.OWLDataPropertyExpression, owlapy.owl_literal.OWLLiteral]

Represents an NegativeDataPropertyAssertion axiom in the OWL 2 specification.

__slots__ = ()

```
class owlapy.owl_axiom.OWLUnaryPropertyAxiom(property_: _P,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *Generic*[_P], *OWLPropertyAxiom*

Unary property axiom.

__slots__ = '_property'

get_property() → _P

```
class owlapy.owl_axiom.OWLObjectPropertyCharacteristicAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)  
  
Bases: OWLUnaryPropertyAxiom[owlapy.owl_property.OWLObjectPropertyExpression],  
    OWLObjectPropertyAxiom
```

Base interface for functional object property axiom.

__slots__ = ()

__eq__(other)

Return self==value.

__hash__()

Return hash(self).

__repr__()

Return repr(self).

```
class owlapy.owl_axiom.OWLFunctionalObjectPropertyAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLObjectPropertyCharacteristicAxiom*

Represents FunctionalObjectProperty axioms in the OWL 2 specification.

__slots__ = ()

```
class owlapy.owl_axiom.OWLAsymmetricObjectPropertyAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLObjectPropertyCharacteristicAxiom*

Represents AsymmetricObjectProperty axioms in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLInverseFunctionalObjectPropertyAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLObjectPropertyCharacteristicAxiom*

Represents InverseFunctionalObjectProperty axioms in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLIrreflexiveObjectPropertyAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLObjectPropertyCharacteristicAxiom*

Represents IrreflexiveObjectProperty axioms in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLReflexiveObjectPropertyAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLObjectPropertyCharacteristicAxiom*

Represents ReflexiveObjectProperty axioms in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLSymmetricObjectPropertyAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLObjectPropertyCharacteristicAxiom*

Represents SymmetricObjectProperty axioms in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLTransitiveObjectPropertyAxiom(  
    property_: owlapy.owl_property.OWLObjectPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLObjectPropertyCharacteristicAxiom*

Represents TransitiveObjectProperty axioms in the OWL 2 specification.

`__slots__ = ()`

```
class owlapy.owl_axiom.OWLDataPropertyCharacteristicAxiom(  
    property_: owlapy.owl_property.OWLDataPropertyExpression,  
    annotations: Iterable[OWLAnnotation] | None = None)
```

Bases: *OWLUnaryPropertyAxiom*[*owlapy.owl_property.OWLDataPropertyExpression*],
OWLDataPropertyAxiom

Base interface for Functional data property axiom.

`__slots__ = ()`


```

__eq__(other)
    Return self==value.

__hash__()
    Return hash(self).

__repr__()
    Return repr(self).

class owlapy.owl_axiom.OWLFunctionalDataPropertyAxiom(
    property_: owlapy.owl_property.OWLDataPropertyExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLDataPropertyCharacteristicAxiom
    Represents FunctionalDataProperty axioms in the OWL 2 specification.

    __slots__ = ()

class owlapy.owl_axiom.OWLPropertyDomainAxiom(property_: _P,
    domain: owlapy.class_expression.OWLClassExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: Generic[_P], OWLUnaryPropertyAxiom[_P]
    Represents ObjectPropertyDomain axioms in the OWL 2 specification.

    __slots__ = '_domain'

    get_domain() → owlapy.class_expression.OWLClassExpression

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

    __repr__()
        Return repr(self).

class owlapy.owl_axiom.OWLPropertyRangeAxiom(property_: _P, range_: _R,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: Generic[_P, _R], OWLUnaryPropertyAxiom[_P]
    Represents ObjectPropertyRange axioms in the OWL 2 specification.

    __slots__ = '_range'

    get_range() → _R

    __eq__(other)
        Return self==value.

    __hash__()
        Return hash(self).

    __repr__()
        Return repr(self).

```

```

class owlapy.owl_axiom.OWLObjectPropertyDomainAxiom(
    property_: owlapy.owl_property.OWLObjectPropertyExpression,
    domain: owlapy.class_expression.OWLClassExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyDomainAxiom[owlapy.owl_property.OWLObjectPropertyExpression]
    Represents a ObjectPropertyDomain axiom in the OWL 2 Specification.
    __slots__ = ()

class owlapy.owl_axiom.OWLDataPropertyDomainAxiom(
    property_: owlapy.owl_property.OWLDataPropertyExpression,
    domain: owlapy.class_expression.OWLClassExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyDomainAxiom[owlapy.owl_property.OWLDataPropertyExpression]
    Represents a DataPropertyDomain axiom in the OWL 2 Specification.
    __slots__ = ()

class owlapy.owl_axiom.OWLObjectPropertyRangeAxiom(
    property_: owlapy.owl_property.OWLObjectPropertyExpression,
    range_: owlapy.class_expression.OWLClassExpression,
    annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyRangeAxiom[owlapy.owl_property.OWLObjectPropertyExpression,
    owlapy.class_expression.OWLClassExpression]
    Represents a ObjectPropertyRange axiom in the OWL 2 Specification.
    __slots__ = ()

class owlapy.owl_axiom.OWLDataPropertyRangeAxiom(
    property_: owlapy.owl_property.OWLDataPropertyExpression,
    range_: owlapy.types.OWLDataRange, annotations: Iterable[OWLAnnotation] | None = None)
    Bases: OWLPropertyRangeAxiom[owlapy.owl_property.OWLDataPropertyExpression,
    owlapy.types.OWLDataRange]
    Represents a DataPropertyRange axiom in the OWL 2 Specification.
    __slots__ = ()

```

owlapy.owl_individual

Module Contents

Classes

<i>OWLIndividual</i>	Represents a named or anonymous individual.
<i>OWLNamedIndividual</i>	Represents a Named Individual in the OWL 2 Specification.

```

class owlapy.owl_individual.OWLIndividual
    Bases: owlapy.owl_object.OWLObject
    Represents a named or anonymous individual.

```

```

__slots__ = ()

class owlapy.owl_individual.OWLNamedIndividual (iri: owlapy.iri.IRI | str)
    Bases: OWLIndividual, owlapy.owlobject.OWLEntity
    Represents a Named Individual in the OWL 2 Specification.

    property iri

    property str

    __slots__ = '_iri'

    type_index: Final = 1005

    get_iri () → owlapy.iri.IRI
        Gets the IRI of this object.

        Returns
            The IRI of this object.

```

owlapy.owl_literal

Module Contents

Classes

<i>OWLLiteral</i>	Represents a Literal in the OWL 2 Specification.
-------------------	--

Attributes

<i>Literals</i>
<i>OWLTopObjectProperty</i>
<i>OWLBottomObjectProperty</i>
<i>OWLTopDataProperty</i>
<i>OWLBottomDataProperty</i>
<i>DoubleOWLDatatype</i>
<i>IntegerOWLDatatype</i>
<i>BooleanOWLDatatype</i>
<i>StringOWLDatatype</i>
<i>DateOWLDatatype</i>
<i>DateTimeOWLDatatype</i>
<i>DurationOWLDatatype</i>
<i>TopOWLDatatype</i>
<i>NUMERIC_DATATYPES</i>
<i>TIME_DATATYPES</i>

owlapy.owl_literal.**Literals**

class owlapy.owl_literal.**OWLLiteral**

Bases: *owlapy.owl_annotation.OWLAnnotationValue*

Represents a Literal in the OWL 2 Specification.

__slots__ = ()

type_index: **Final** = 4008

get_literal() → str

Gets the lexical value of this literal. Note that the language tag is not included.

Returns

The lexical value of this literal.

is_boolean() → bool

Whether this literal is typed as boolean.

parse_boolean() → bool

Parses the lexical value of this literal into a bool. The lexical value of this literal should be in the lexical space of the boolean datatype ("<http://www.w3.org/2001/XMLSchema#boolean>").

Returns

A bool value that is represented by this literal.

is_double() → bool

Whether this literal is typed as double.

parse_double() → float

Parses the lexical value of this literal into a double. The lexical value of this literal should be in the lexical space of the double datatype ("<http://www.w3.org/2001/XMLSchema#double>").

Returns

A double value that is represented by this literal.

is_integer() → bool

Whether this literal is typed as integer.

parse_integer() → int

Parses the lexical value of this literal into an integer. The lexical value of this literal should be in the lexical space of the integer datatype ("<http://www.w3.org/2001/XMLSchema#integer>").

Returns

An integer value that is represented by this literal.

is_string() → bool

Whether this literal is typed as string.

parse_string() → str

Parses the lexical value of this literal into a string. The lexical value of this literal should be in the lexical space of the string datatype ("<http://www.w3.org/2001/XMLSchema#string>").

Returns

A string value that is represented by this literal.

is_date() → bool

Whether this literal is typed as date.

parse_date() → datetime.date

Parses the lexical value of this literal into a date. The lexical value of this literal should be in the lexical space of the date datatype ("<http://www.w3.org/2001/XMLSchema#date>").

Returns

A date value that is represented by this literal.

is_datetime() → bool

Whether this literal is typed as dateTime.

parse_datetime() → datetime.datetime

Parses the lexical value of this literal into a datetime. The lexical value of this literal should be in the lexical space of the dateTime datatype ("<http://www.w3.org/2001/XMLSchema#dateTime>").

Returns

A datetime value that is represented by this literal.

is_duration() → bool

Whether this literal is typed as duration.

parse_duration() → pandas.Timedelta

Parses the lexical value of this literal into a Timedelta. The lexical value of this literal should be in the lexical space of the duration datatype ("http://www.w3.org/2001/XMLSchema#duration").

Returns

A Timedelta value that is represented by this literal.

is_literal() → bool

Returns

true if the annotation value is a literal

as_literal() → *OWLLiteral*

Returns

if the value is a literal, returns it. Return None otherwise

to_python() → Literals

abstract get_datatype() → *owlapy.types.OWLDatatype*

Gets the OWLDatatype which types this literal.

Returns

The OWLDatatype that types this literal.

owlapy.owl_literal.OWLTopObjectProperty: Final

owlapy.owl_literal.OWLBottomObjectProperty: Final

owlapy.owl_literal.OWLTopDataProperty: Final

owlapy.owl_literal.OWLBottomDataProperty: Final

owlapy.owl_literal.DoubleOWLDatatype: Final

owlapy.owl_literal.IntegerOWLDatatype: Final

owlapy.owl_literal.BooleanOWLDatatype: Final

owlapy.owl_literal.StringOWLDatatype: Final

owlapy.owl_literal.DateOWLDatatype: Final

owlapy.owl_literal.DateTimeOWLDatatype: Final

owlapy.owl_literal.DurationOWLDatatype: Final

owlapy.owl_literal.TopOWLDatatype: Final

owlapy.owl_literal.NUMERIC_DATATYPES: Final[Set[*owlapy.types.OWLDatatype*]]

owlapy.owl_literal.TIME_DATATYPES: Final[Set[*owlapy.types.OWLDatatype*]]

`owlapy.owl_property`

Module Contents

Classes

<i>OWLPropertyExpression</i>	Represents a property or possibly the inverse of a property.
<i>OWLObjectPropertyExpression</i>	A high level interface to describe different types of object properties.
<i>OWLDataPropertyExpression</i>	A high level interface to describe different types of data properties.
<i>OWLProperty</i>	A marker interface for properties that aren't expression i.e. named properties. By definition, properties
<i>OWLObjectProperty</i>	Represents an Object Property in the OWL 2 Specification.
<i>OWLObjectInverseOf</i>	Represents the inverse of a property expression (ObjectInverseOf). This can be used to refer to the inverse of
<i>OWLDataProperty</i>	Represents a Data Property in the OWL 2 Specification.

class `owlapy.owl_property.OWLPropertyExpression`

Bases: `owlapy.owl_object.OWLObject`

Represents a property or possibly the inverse of a property.

__slots__ = ()

is_data_property_expression() → bool

Returns

True if this is a data property.

is_object_property_expression() → bool

Returns

True if this is an object property.

is_owl_top_object_property() → bool

Determines if this is the owl:topObjectProperty.

Returns

topObjectProperty.

Return type

True if this property is the owl

is_owl_top_data_property() → bool

Determines if this is the owl:topDataProperty.

Returns

topDataProperty.

Return type

True if this property is the owl

```
class owlapy.owl_property.OWLObjectPropertyExpression
```

Bases: *OWLPropertyExpression*

A high level interface to describe different types of object properties.

```
__slots__ = ()
```

```
abstract get_inverse_property() → OWLObjectPropertyExpression
```

Obtains the property that corresponds to the inverse of this property.

Returns

The inverse of this property. Note that this property will not necessarily be in the simplest form.

```
abstract get_named_property() → OWLObjectProperty
```

Get the named object property used in this property expression.

Returns

P if this expression is either inv(P) or P.

```
is_object_property_expression() → bool
```

Returns

True if this is an object property.

```
class owlapy.owl_property.OWLDataPropertyExpression
```

Bases: *OWLPropertyExpression*

A high level interface to describe different types of data properties.

```
__slots__ = ()
```

```
is_data_property_expression()
```

Returns

True if this is a data property.

```
class owlapy.owl_property.OWLProperty
```

Bases: *OWLPropertyExpression*, *owlapy.owl_object.OWLEntity*

A marker interface for properties that aren't expression i.e. named properties. By definition, properties are either data properties or object properties.

```
__slots__ = ()
```

```
class owlapy.owl_property.OWLObjectProperty(iri: owlapy.iri.IRI | str)
```

Bases: *OWLObjectPropertyExpression*, *OWLProperty*

Represents an Object Property in the OWL 2 Specification.

```
property str: str
```

```
property iri: str
```

```
__slots__ = '_iri'
```

```
type_index: Final = 1002
```

```
get_named_property() → OWLObjectProperty
```

Get the named object property used in this property expression.

Returns

P if this expression is either inv(P) or P.

get_inverse_property () → *OWLObjectInverseOf*

Obtains the property that corresponds to the inverse of this property.

Returns

The inverse of this property. Note that this property will not necessarily be in the simplest form.

get_iri () → *owlapy.iri.IRI*

Gets the IRI of this object.

Returns

The IRI of this object.

is_owl_top_object_property () → bool

Determines if this is the owl:topObjectProperty.

Returns

topObjectProperty.

Return type

True if this property is the owl

class owlapy.owl_property.OWLObjectInverseOf (property: *OWLObjectProperty*)

Bases: *OWLObjectPropertyExpression*

Represents the inverse of a property expression (ObjectInverseOf). This can be used to refer to the inverse of a property, without actually naming the property. For example, consider the property hasPart, the inverse property of hasPart (isPartOf) can be referred to using this interface inverseOf(hasPart), which can be used in restrictions e.g. inverseOf(hasPart) some Car refers to the set of things that are part of at least one car.

__slots__ = '_inverse_property'

type_index: Final = 1003

get_inverse () → *OWLObjectProperty*

Gets the property expression that this is the inverse of.

Returns

The object property expression such that this object property expression is an inverse of it.

get_inverse_property () → *OWLObjectProperty*

Obtains the property that corresponds to the inverse of this property.

Returns

The inverse of this property. Note that this property will not necessarily be in the simplest form.

get_named_property () → *OWLObjectProperty*

Get the named object property used in this property expression.

Returns

P if this expression is either inv(P) or P.

__repr__ ()

Return repr(self).

__eq__ (other)

Return self==value.

__hash__ ()

Return hash(self).

class owlapy.owl_property.OWLObjectProperty (iri: owlapy.iri.IRI)

Bases: OWLObjectPropertyExpression, OWLObjectProperty

Represents a Data Property in the OWL 2 Specification.

__slots__ = '_iri'

type_index: Final = 1004

get_iri () → owlapy.iri.IRI

Gets the IRI of this object.

Returns

The IRI of this object.

is_owl_top_data_property () → bool

Determines if this is the owl:topDataProperty.

Returns

topDataProperty.

Return type

True if this property is the owl

owlapy.owlobject

Module Contents

Classes

<i>OWLObject</i>	Base interface for OWL objects
<i>OWLObjectRenderer</i>	Abstract class with a render method to render an OWL Object into a string.
<i>OWLObjectParser</i>	Abstract class with a parse method to parse a string to an OWL Object.
<i>OWLNamedObject</i>	Represents a named object for example, class, property, ontology etc. - i.e. anything that has an
<i>OWLEntity</i>	Represents Entities in the OWL 2 Specification.

class owlapy.owlobject.OWLObject

Base interface for OWL objects

__slots__ = ()

abstract **__eq__** (other)

Return self==value.

abstract **__hash__** ()

Return hash(self).

abstract **__repr__** ()

Return repr(self).

is_anonymous () → bool

```
class owlapy.owlobject.OWLObjectRenderer
```

Abstract class with a render method to render an OWL Object into a string.

```
abstract set_short_form_provider (short_form_provider) → None
```

Configure a short form provider that shortens the OWL objects during rendering.

Parameters

short_form_provider – Short form provider.

```
abstract render (o: OWLObject) → str
```

Render OWL Object to string.

Parameters

o – OWL Object.

Returns

String rendition of OWL object.

```
class owlapy.owlobject.OWLObjectParser
```

Abstract class with a parse method to parse a string to an OWL Object.

```
abstract parse_expression (expression_str: str) → OWLObject
```

Parse a string to an OWL Object.

Parameters

expression_str (*str*) – Expression string.

Returns

The OWL Object which is represented by the string.

```
class owlapy.owlobject.OWLNamedObject
```

Bases: *OWLObject*, *owlapy.meta_classes.HasIRI*

Represents a named object for example, class, property, ontology etc. - i.e. anything that has an IRI as its name.

```
__slots__ = ()
```

```
__eq__ (other)
```

Return self==value.

```
__lt__ (other)
```

Return self<value.

```
__hash__ ()
```

Return hash(self).

```
__repr__ ()
```

Return repr(self).

```
class owlapy.owlobject.OWLEntity
```

Bases: *OWLNamedObject*

Represents Entities in the OWL 2 Specification.

```
__slots__ = ()
```

```
to_string_id () → str
```

```
is_anonymous () → bool
```

owlapy.parser

String to OWL parsers.

Module Contents

Classes

<i>ManchesterOWLSyntaxParser</i>	Manchester Syntax parser to parse strings to OWLClassExpressions.
<i>DLSyntaxParser</i>	Description Logic Syntax parser to parse strings to OWLClassExpressions.

Functions

<i>dl_to_owl_expression</i> (dl_expression)
<i>manchester_to_owl_expression</i> (manchester_ex

Attributes

<i>MANCHESTER_GRAMMAR</i>
<i>DL_GRAMMAR</i>
<i>DLparser</i>
<i>ManchesterParser</i>

owlapy.parser.**MANCHESTER_GRAMMAR**

```
class owlapy.parser.ManchesterOWLSyntaxParser(  
    namespace: str | owlapy.namespaces.Namespaces | None = None, grammar=None)  
    Bases: parsimonious.nodes.NodeVisitor, owlapy.owlobject.OWLObjectParser  
    Manchester Syntax parser to parse strings to OWLClassExpressions. Following: https://www.w3.org/TR/owl2-manchester-syntax.  
    slots = ('ns', 'grammar')  
    ns: str | owlapy.namespaces.Namespaces | None  
    parse_expression(expression_str: str) → owlapy.model.OWLClassExpression  
        Parse a string to an OWL Object.
```

Parameters

expression_str (*str*) – Expression string.

Returns

The OWL Object which is represented by the string.

visit_union (*node, children*) → *owlapy.model.OWLClassExpression*

visit_intersection (*node, children*) → *owlapy.model.OWLClassExpression*

visit_primary (*node, children*) → *owlapy.model.OWLClassExpression*

visit_some_only_res (*node, children*) → *owlapy.model.OWLQuantifiedObjectRestriction*

visit_cardinality_res (*node, children*) → *owlapy.model.OWLObjectCardinalityRestriction*

visit_value_res (*node, children*) → *owlapy.class_expression.OWLObjectHasValue*

visit_has_self (*node, children*) → *owlapy.model.OWLObjectHasSelf*

visit_object_property (*node, children*) → *owlapy.model.OWLObjectPropertyExpression*

visit_class_expression (*node, children*) → *owlapy.model.OWLClassExpression*

visit_individual_list (*node, children*) → *owlapy.class_expression.OWLObjectOneOf*

visit_data_primary (*node, children*) → *owlapy.model.OWLDataRange*

visit_data_some_only_res (*node, children*) → *owlapy.model.OWLQuantifiedDataRestriction*

visit_data_cardinality_res (*node, children*) → *owlapy.model.OWLDataCardinalityRestriction*

visit_data_value_res (*node, children*) → *owlapy.model.OWLDataHasValue*

visit_data_union (*node, children*) → *owlapy.model.OWLDataRange*

visit_data_intersection (*node, children*) → *owlapy.model.OWLDataRange*

visit_literal_list (*node, children*) → *owlapy.model.OWLDataOneOf*

visit_data_parentheses (*node, children*) → *owlapy.model.OWLDataRange*

visit_datatype_restriction (*node, children*)
→ *owlapy.class_expression.OWLDatatypeRestriction*

visit_facet_restrictions (*node, children*)
→ *List[owlapy.class_expression.OWLFacetRestriction]*

visit_facet_restriction (*node, children*) → *owlapy.class_expression.OWLFacetRestriction*

visit_literal (*node, children*) → *owlapy.model.OWLLiteral*

visit_typed_literal (*node, children*) → *owlapy.model.OWLLiteral*

abstract_visit_string_literal_language (*node, children*)

visit_string_literal_no_language (*node, children*) → *owlapy.model.OWLLiteral*

visit_quoted_string (*node, children*) → *str*

visit_float_literal (*node, children*) → *owlapy.model.OWLLiteral*

```

visit_decimal_literal (node, children) → owlapy.model.OWLLiteral
visit_integer_literal (node, children) → owlapy.model.OWLLiteral
visit_boolean_literal (node, children) → owlapy.model.OWLLiteral
visit_datetime_literal (node, children) → owlapy.model.OWLLiteral
visit_duration_literal (node, children) → owlapy.model.OWLLiteral
visit_date_literal (node, children) → owlapy.model.OWLLiteral
visit_non_negative_integer (node, children) → int
visit_datatype_iri (node, children) → str
visit_datatype (node, children) → owlapy.model.OWLDatatype
visit_facet (node, children) → owlapy.vocab.OWLFacet
visit_class_iri (node, children) → owlapy.model.OWLClass
visit_individual_iri (node, children) → owlapy.model.OWLNamedIndividual
visit_object_property_iri (node, children) → owlapy.model.OWLObjectProperty
visit_data_property_iri (node, children) → owlapy.model.OWLDataProperty
visit_iri (node, children) → owlapy.model.IRI
visit_full_iri (node, children) → owlapy.model.IRI
abstract visit_abbreviated_iri (node, children)
visit_simple_iri (node, children) → owlapy.model.IRI
visit_parentheses (node, children) → owlapy.model.OWLClassExpression
generic_visit (node, children)

```

Default visitor method

Parameters

- **node** – The node we’re visiting
- **visited_children** – The results of visiting the children of that node, in a list

I’m not sure there’s an implementation of this that makes sense across all (or even most) use cases, so we leave it to subclasses to implement for now.

```
owlapy.parser.DL_GRAMMAR
```

```

class owlapy.parser.DLSyntaxParser (
    namespace: str | owlapy.namespaces.Namespaces | None = None, grammar=None)
    Bases: parsimonious.nodes.NodeVisitor, owlapy.owlobject.OWLObjectParser
    Description Logic Syntax parser to parse strings to OWLClassExpressions.
    slots = ('ns', 'grammar')
    ns: str | owlapy.namespaces.Namespaces | None

```

parse_expression (*expression_str*: *str*) → *owlapy.model.OWLClassExpression*

Parse a string to an OWL Object.

Parameters

expression_str (*str*) – Expression string.

Returns

The OWL Object which is represented by the string.

visit_union (*node*, *children*) → *owlapy.model.OWLClassExpression*

visit_intersection (*node*, *children*) → *owlapy.model.OWLClassExpression*

visit_primary (*node*, *children*) → *owlapy.model.OWLClassExpression*

visit_some_only_res (*node*, *children*) → *owlapy.model.OWLQuantifiedObjectRestriction*

visit_cardinality_res (*node*, *children*) → *owlapy.model.OWLObjectCardinalityRestriction*

visit_value_res (*node*, *children*) → *owlapy.class_expression.OWLObjectHasValue*

visit_has_self (*node*, *children*) → *owlapy.model.OWLObjectHasSelf*

visit_object_property (*node*, *children*) → *owlapy.model.OWLObjectPropertyExpression*

visit_class_expression (*node*, *children*) → *owlapy.model.OWLClassExpression*

visit_individual_list (*node*, *children*) → *owlapy.class_expression.OWLObjectOneOf*

visit_data_primary (*node*, *children*) → *owlapy.model.OWLDataRange*

visit_data_some_only_res (*node*, *children*) → *owlapy.model.OWLQuantifiedDataRestriction*

visit_data_cardinality_res (*node*, *children*) → *owlapy.model.OWLDataCardinalityRestriction*

visit_data_value_res (*node*, *children*) → *owlapy.model.OWLDataHasValue*

visit_data_union (*node*, *children*) → *owlapy.model.OWLDataRange*

visit_data_intersection (*node*, *children*) → *owlapy.model.OWLDataRange*

visit_literal_list (*node*, *children*) → *owlapy.model.OWLDataOneOf*

visit_data_parentheses (*node*, *children*) → *owlapy.model.OWLDataRange*

visit_datatype_restriction (*node*, *children*)
→ *owlapy.class_expression.OWLDatatypeRestriction*

visit_facet_restrictions (*node*, *children*)
→ List[*owlapy.class_expression.OWLFacetRestriction*]

visit_facet_restriction (*node*, *children*) → *owlapy.class_expression.OWLFacetRestriction*

visit_literal (*node*, *children*) → *owlapy.model.OWLLiteral*

visit_typed_literal (*node*, *children*) → *owlapy.model.OWLLiteral*

abstract_visit_string_literal_language (*node*, *children*)

visit_string_literal_no_language (*node*, *children*) → *owlapy.model.OWLLiteral*

visit_quoted_string (*node, children*) → str
visit_float_literal (*node, children*) → *owlapy.model.OWLLiteral*
visit_decimal_literal (*node, children*) → *owlapy.model.OWLLiteral*
visit_integer_literal (*node, children*) → *owlapy.model.OWLLiteral*
visit_boolean_literal (*node, children*) → *owlapy.model.OWLLiteral*
visit_datetime_literal (*node, children*) → *owlapy.model.OWLLiteral*
visit_duration_literal (*node, children*) → *owlapy.model.OWLLiteral*
visit_date_literal (*node, children*) → *owlapy.model.OWLLiteral*
visit_non_negative_integer (*node, children*) → int
visit_datatype_iri (*node, children*) → str
visit_datatype (*node, children*) → *owlapy.model.OWLDatatype*
visit_facet (*node, children*) → *owlapy.vocab.OWLFacet*
visit_class_iri (*node, children*) → *owlapy.model.OWLClass*
visit_individual_iri (*node, children*) → *owlapy.model.OWLNamedIndividual*
visit_object_property_iri (*node, children*) → *owlapy.model.OWLObjectProperty*
visit_data_property_iri (*node, children*) → *owlapy.model.OWLDataProperty*
visit_iri (*node, children*) → *owlapy.model.IRI*
visit_full_iri (*node, children*) → *owlapy.model.IRI*
abstract visit_abbreviated_iri (*node, children*)
visit_simple_iri (*node, children*) → *owlapy.model.IRI*
visit_parentheses (*node, children*) → *owlapy.model.OWLClassExpression*
generic_visit (*node, children*)

Default visitor method

Parameters

- **node** – The node we’re visiting
- **visited_children** – The results of visiting the children of that node, in a list

I’m not sure there’s an implementation of this that makes sense across all (or even most) use cases, so we leave it to subclasses to implement for now.

`owlapy.parser.DLparser`

`owlapy.parser.ManchesterParser`

`owlapy.parser.dl_to_owl_expression` (*dl_expression: str*)

`owlapy.parser.manchester_to_owl_expression` (*manchester_expression: str*)

owlapy.render

Renderers for different syntax.

Module Contents

Classes

<i>DLSyntaxObjectRenderer</i>	DL Syntax renderer for OWL Objects.
<i>ManchesterOWLSyntaxOWLObjectRenderer</i>	Manchester Syntax renderer for OWL Objects

Functions

<i>owl_expression_to_dl</i> (\rightarrow str)
<i>owl_expression_to_manchester</i> (\rightarrow str)

Attributes

<i>DLrenderer</i>
<i>ManchesterRenderer</i>

```
class owlapy.render.DLSyntaxObjectRenderer (
    short_form_provider: Callable[[owlapy.model.OWLEntity], str] = _simple_short_form_provider)
    Bases: owlapy.owlobject.OWLObjectRenderer
    DL Syntax renderer for OWL Objects.
    __slots__ = '_sfp'
    set_short_form_provider (short_form_provider: Callable[[owlapy.model.OWLEntity], str])
         $\rightarrow$  None
        Configure a short form provider that shortens the OWL objects during rendering.

        Parameters
            short_form_provider – Short form provider.

    render (o: owlapy.model.OWLObject)  $\rightarrow$  str
        Render OWL Object to string.

        Parameters
            o – OWL Object.

        Returns
            String rendition of OWL object.
```

```
class owlapy.render.ManchesterOWLSyntaxOWLObjectRenderer (
    short_form_provider: Callable[[owlapy.model.OWLEntity], str] = _simple_short_form_provider,
    no_render_thing=False)
```

Bases: *owlapy.owlobject.OWLObjectRenderer*

Manchester Syntax renderer for OWL Objects

```
__slots__ = ('_sfp', '_no_render_thing')
```

```
set_short_form_provider (short_form_provider: Callable[[owlapy.model.OWLEntity], str])
    → None
```

Configure a short form provider that shortens the OWL objects during rendering.

Parameters

short_form_provider – Short form provider.

```
render (o: owlapy.model.OWLObject) → str
```

Render OWL Object to string.

Parameters

o – OWL Object.

Returns

String rendition of OWL object.

```
owlapy.render.DLrenderer
```

```
owlapy.render.ManchesterRenderer
```

```
owlapy.render.owl_expression_to_dl (o: owlapy.model.OWLObject) → str
```

```
owlapy.render.owl_expression_to_manchester (o: owlapy.model.OWLObject) → str
```

owlapy.types

Module Contents

Classes

<i>OWLDatatype</i>	Represents a Datatype (named data range) in the OWL 2 Specification.
--------------------	--

```
class owlapy.types.OWLDatatype (iri: owlapy.iri.IRI | owlapy.meta_classes.HasIRI)
```

Bases: *owlapy.owlobject.OWLEntity*, *owlapy.data_ranges.OWLDataRange*

Represents a Datatype (named data range) in the OWL 2 Specification.

```
__slots__ = '_iri'
```

```
type_index: Final = 4001
```

```
get_iri () → owlapy.iri.IRI
```

Gets the IRI of this object.

Returns

The IRI of this object.

owlapy.util

Owlapy utils.

Module Contents

Classes

<i>OrderedOWLObject</i>	Holder of OWL Objects that can be used for Python sorted.
<i>NNF</i>	This class contains functions to transform a Class Expression into Negation Normal Form.
<i>TopLevelCNF</i>	This class contains functions to transform a class expression into Top-Level Conjunctive Normal Form.
<i>TopLevelDNF</i>	This class contains functions to transform a class expression into Top-Level Disjunctive Normal Form.
<i>LRUCache</i>	Constants shares by all lru cache instances.

Functions

<i>combine_nary_expressions(...)</i>	Shortens an OWLClassExpression or OWLDataRange by combining all nested nary expressions of the same type.
<i>iter_count</i> (→ int)	Count the number of elements in an iterable.
<i>as_index</i> (→ owlapy.has.HasIndex)	Cast OWL Object to HasIndex.

class owlapy.util.**OrderedOWLObject** (*o: _HasIndex*)

Holder of OWL Objects that can be used for Python sorted.

The Ordering is dependent on the `type_index` of the impl. classes recursively followed by all components of the OWL Object.

o

OWL object.

__slots__ = ('o', '_chain')

o: **_HasIndex**

__lt__ (*other*)

Return self<value.

__eq__ (*other*)

Return self==value.

class owlapy.util.**NNF**

This class contains functions to transform a Class Expression into Negation Normal Form.

abstract **get_class_nnf** (*ce: owlapy.model.OWLClassExpression, negated: bool = False*)
→ *owlapy.model.OWLClassExpression*

Convert a Class Expression to Negation Normal Form. Operands will be sorted.

Parameters

- **ce** – Class Expression.
- **negated** – Whether the result should be negated.

Returns

Class Expression in Negation Normal Form.

class owlapy.util.**TopLevelCNF**

This class contains functions to transform a class expression into Top-Level Conjunctive Normal Form.

get_top_level_cnf (*ce: owlapy.model.OWLClassExpression*) → *owlapy.model.OWLClassExpression*

Convert a class expression into Top-Level Conjunctive Normal Form. Operands will be sorted.

Parameters

ce – Class Expression.

Returns

Class Expression in Top-Level Conjunctive Normal Form.

class owlapy.util.**TopLevelDNF**

This class contains functions to transform a class expression into Top-Level Disjunctive Normal Form.

get_top_level_dnf (*ce: owlapy.model.OWLClassExpression*) → *owlapy.model.OWLClassExpression*

Convert a class expression into Top-Level Disjunctive Normal Form. Operands will be sorted.

Parameters

ce – Class Expression.

Returns

Class Expression in Top-Level Disjunctive Normal Form.

owlapy.util.combine_nary_expressions (*ce: owlapy.model.OWLClassExpression*)
→ *owlapy.model.OWLClassExpression*

owlapy.util.combine_nary_expressions (*ce: owlapy.model.OWLDataRange*)
→ *owlapy.model.OWLDataRange*

Shortens an OWLClassExpression or OWLDataRange by combining all nested nary expressions of the same type. Operands will be sorted.

E.g. OWLObjectUnionOf(A, OWLObjectUnionOf(C, B)) -> OWLObjectUnionOf(A, B, C).

owlapy.util.iter_count (*i: Iterable*) → int

Count the number of elements in an iterable.

owlapy.util.as_index (*o: owlapy.model.OWLObject*) → *owlapy.has.HasIndex*

Cast OWL Object to HasIndex.

class owlapy.util.**LRUCache** (*maxsize: int | None = None*)

Bases: Generic[_K, _V]

Constants shares by all lru cache instances.

Adapted from functools.lru_cache.

sentinel

Unique object used to signal cache misses.

PREV

Name for the link field 0.

NEXT

Name for the link field 1.

KEY

Name for the link field 2.

RESULT

Name for the link field 3.

sentinel

__contains__ (*item*: *_K*) → bool

__getitem__ (*item*: *_K*) → *_V*

__setitem__ (*key*: *_K*, *value*: *_V*)

cache_info ()

Report cache statistics.

cache_clear ()

Clear the cache and cache statistics.

owlapy.vocab

Enumerations.

Module Contents**Classes**

<i>OWLRFDFVocabulary</i>	Enumerations for OWL/RDF vocabulary.
<i>XSDVocabulary</i>	Enumerations for XSD vocabulary.
<i>OWLFacet</i>	Enumerations for OWL facets.

class owlapy.vocab.**OWLRFDFVocabulary** (*namespace*: *owlapy.namespaces.Namespaces*,
remainder: *str*)

Bases: *_Vocabulary*, *enum.Enum*

Enumerations for OWL/RDF vocabulary.

OWL_THING = ()

OWL_NOTHING = ()

OWL_CLASS = ()

OWL_NAMED_INDIVIDUAL = ()

OWL_TOP_OBJECT_PROPERTY = ()

OWL_BOTTOM_OBJECT_PROPERTY = ()

OWL_TOP_DATA_PROPERTY = ()

```

OWL_BOTTOM_DATA_PROPERTY = ()

RDFS_LITERAL = ()

class owlapy.vocab.XSDVocabulary(remainder: str)
    Bases: _Vocabulary, enum.Enum
    Enumerations for XSD vocabulary.
    DECIMAL: Final = 'decimal'
    INTEGER: Final = 'integer'
    LONG: Final = 'long'
    DOUBLE: Final = 'double'
    FLOAT: Final = 'float'
    BOOLEAN: Final = 'boolean'
    STRING: Final = 'string'
    DATE: Final = 'date'
    DATE_TIME: Final = 'dateTime'
    DATE_TIME_STAMP: Final = 'dateTimeStamp'
    DURATION: Final = 'duration'

class owlapy.vocab.OWLFacet(remainder: str, symbolic_form: str,
    operator: Callable[[_X, _X], bool])
    Bases: _Vocabulary, enum.Enum
    Enumerations for OWL facets.
    property symbolic_form
    property operator
    MIN_INCLUSIVE: Final = ('minInclusive', '>=')
    MIN_EXCLUSIVE: Final = ('minExclusive', '>')
    MAX_INCLUSIVE: Final = ('maxInclusive', '<=')
    MAX_EXCLUSIVE: Final = ('maxExclusive', '<')
    LENGTH: Final = ('length', 'length')
    MIN_LENGTH: Final = ('minLength', 'minLength')
    MAX_LENGTH: Final = ('maxLength', 'maxLength')
    PATTERN: Final = ('pattern', 'pattern')
    TOTAL_DIGITS: Final = ('totalDigits', 'totalDigits')
    FRACTION_DIGITS: Final = ('fractionDigits', 'fractionDigits')
    static from_str(name: str) → OWLFacet

```

2.3 Package Contents

```
owlapy.__version__ = '0.1.3'
```

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