Examples

```
>>> is_datetime64_any_dtype(str)
False
>>> is_datetime64_any_dtype(int)
False
>>> is_datetime64_any_dtype(np.datetime64)  # can be tz-naive
True
>>> is_datetime64_any_dtype(DatetimeTZDtype("ns", "US/Eastern"))
True
>>> is_datetime64_any_dtype(np.array(['a', 'b']))
False
>>> is_datetime64_any_dtype(np.array([1, 2]))
False
>>> is_datetime64_any_dtype(np.array([], dtype=np.datetime64))
True
>>> is_datetime64_any_dtype(pd.DatetimeIndex([1, 2, 3],
                            dtype=np.datetime64))
True
```

pandas.api.types.is_datetime64_dtype

`pandas.api.types.`**`is_datetime64_dtype`**(*arr_or_dtype*) → bool

Check whether an array-like or dtype is of the datetime64 dtype.

Parameters

arr_or_dtype [array-like] The array-like or dtype to check.

Returns

boolean Whether or not the array-like or dtype is of the datetime64 dtype.

Examples

```
>>> is_datetime64_dtype(object)
False
>>> is_datetime64_dtype(np.datetime64)
True
>>> is_datetime64_dtype(np.array([], dtype=int))
False
>>> is_datetime64_dtype(np.array([], dtype=np.datetime64))
True
>>> is_datetime64_dtype([1, 2, 3])
False
```

pandas.api.types.is_datetime64_ns_dtype

`pandas.api.types.`**`is_datetime64_ns_dtype`**`(`*arr_or_dtype*`)` → bool

Check whether the provided array or dtype is of the datetime64[ns] dtype.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of the datetime64[ns] dtype.

Examples

```
>>> is_datetime64_ns_dtype(str)
False
>>> is_datetime64_ns_dtype(int)
False
>>> is_datetime64_ns_dtype(np.datetime64)  # no unit
False
>>> is_datetime64_ns_dtype(DatetimeTZDtype("ns", "US/Eastern"))
True
>>> is_datetime64_ns_dtype(np.array(['a', 'b']))
False
>>> is_datetime64_ns_dtype(np.array([1, 2]))
False
>>> is_datetime64_ns_dtype(np.array([], dtype=np.datetime64))  # no unit
False
>>> is_datetime64_ns_dtype(np.array([],
                           dtype="datetime64[ps]"))  # wrong unit
False
>>> is_datetime64_ns_dtype(pd.DatetimeIndex([1, 2, 3],
                           dtype=np.datetime64))  # has 'ns' unit
True
```

pandas.api.types.is_datetime64tz_dtype

`pandas.api.types.`**`is_datetime64tz_dtype`**`(`*arr_or_dtype*`)` → bool

Check whether an array-like or dtype is of a DatetimeTZDtype dtype.

Parameters

arr_or_dtype [array-like] The array-like or dtype to check.

Returns

boolean Whether or not the array-like or dtype is of a DatetimeTZDtype dtype.

Examples

```
>>> is_datetime64tz_dtype(object)
False
>>> is_datetime64tz_dtype([1, 2, 3])
False
>>> is_datetime64tz_dtype(pd.DatetimeIndex([1, 2, 3]))  # tz-naive
False
>>> is_datetime64tz_dtype(pd.DatetimeIndex([1, 2, 3], tz="US/Eastern"))
True
```

```
>>> dtype = DatetimeTZDtype("ns", tz="US/Eastern")
>>> s = pd.Series([], dtype=dtype)
>>> is_datetime64tz_dtype(dtype)
True
>>> is_datetime64tz_dtype(s)
True
```

pandas.api.types.is_extension_type

`pandas.api.types.`**`is_extension_type`**`(`*arr*`)` → bool

Check whether an array-like is of a pandas extension class instance.

Deprecated since version 1.0.0: Use `is_extension_array_dtype` instead.

Extension classes include categoricals, pandas sparse objects (i.e. classes represented within the pandas library and not ones external to it like scipy sparse matrices), and datetime-like arrays.

Parameters

arr [array-like] The array-like to check.

Returns

boolean Whether or not the array-like is of a pandas extension class instance.

Examples

```
>>> is_extension_type([1, 2, 3])
False
>>> is_extension_type(np.array([1, 2, 3]))
False
>>>
>>> cat = pd.Categorical([1, 2, 3])
>>>
>>> is_extension_type(cat)
True
>>> is_extension_type(pd.Series(cat))
True
>>> is_extension_type(pd.arrays.SparseArray([1, 2, 3]))
True
>>> from scipy.sparse import bsr_matrix
>>> is_extension_type(bsr_matrix([1, 2, 3]))
False
>>> is_extension_type(pd.DatetimeIndex([1, 2, 3]))
False
```

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```
>>> is_extension_type(pd.DatetimeIndex([1, 2, 3], tz="US/Eastern"))
True
>>>
>>> dtype = DatetimeTZDtype("ns", tz="US/Eastern")
>>> s = pd.Series([], dtype=dtype)
>>> is_extension_type(s)
True
```

pandas.api.types.is_extension_array_dtype

pandas.api.types.**is_extension_array_dtype**(*arr_or_dtype*) → bool

Check if an object is a pandas extension array type.

See the *Use Guide* for more.

Parameters

arr_or_dtype [object] For array-like input, the `.dtype` attribute will be extracted.

Returns

bool Whether the *arr_or_dtype* is an extension array type.

Notes

This checks whether an object implements the pandas extension array interface. In pandas, this includes:

- Categorical
- Sparse
- Interval
- Period
- DatetimeArray
- TimedeltaArray

Third-party libraries may implement arrays or types satisfying this interface as well.

Examples

```
>>> from pandas.api.types import is_extension_array_dtype
>>> arr = pd.Categorical(['a', 'b'])
>>> is_extension_array_dtype(arr)
True
>>> is_extension_array_dtype(arr.dtype)
True
```

```
>>> arr = np.array(['a', 'b'])
>>> is_extension_array_dtype(arr.dtype)
False
```

pandas.api.types.is_float_dtype

pandas.api.types.**is_float_dtype**(*arr_or_dtype*) → bool

Check whether the provided array or dtype is of a float dtype.

This function is internal and should not be exposed in the public API.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of a float dtype.

Examples

```
>>> is_float_dtype(str)
False
>>> is_float_dtype(int)
False
>>> is_float_dtype(float)
True
>>> is_float_dtype(np.array(['a', 'b']))
False
>>> is_float_dtype(pd.Series([1, 2]))
False
>>> is_float_dtype(pd.Index([1, 2.]))
True
```

pandas.api.types.is_int64_dtype

pandas.api.types.**is_int64_dtype**(*arr_or_dtype*) → bool

Check whether the provided array or dtype is of the int64 dtype.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of the int64 dtype.

Notes

Depending on system architecture, the return value of *is_int64_dtype(int)* will be True if the OS uses 64-bit integers and False if the OS uses 32-bit integers.

Examples

```
>>> is_int64_dtype(str)
False
>>> is_int64_dtype(np.int32)
False
>>> is_int64_dtype(np.int64)
True
>>> is_int64_dtype('int8')
False
>>> is_int64_dtype('Int8')
False
>>> is_int64_dtype(pd.Int64Dtype)
True
>>> is_int64_dtype(float)
False
>>> is_int64_dtype(np.uint64)  # unsigned
False
>>> is_int64_dtype(np.array(['a', 'b']))
False
>>> is_int64_dtype(np.array([1, 2], dtype=np.int64))
True
>>> is_int64_dtype(pd.Index([1, 2.]))  # float
False
>>> is_int64_dtype(np.array([1, 2], dtype=np.uint32))  # unsigned
False
```

pandas.api.types.is_integer_dtype

pandas.api.types.**is_integer_dtype**(*arr_or_dtype*) → bool

Check whether the provided array or dtype is of an integer dtype.

Unlike in *in_any_int_dtype*, timedelta64 instances will return False.

Changed in version 0.24.0: The nullable Integer dtypes (e.g. pandas.Int64Dtype) are also considered as integer by this function.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of an integer dtype and not an instance of timedelta64.

Examples

```
>>> is_integer_dtype(str)
False
>>> is_integer_dtype(int)
True
>>> is_integer_dtype(float)
False
>>> is_integer_dtype(np.uint64)
True
>>> is_integer_dtype('int8')
```

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```
True
>>> is_integer_dtype('Int8')
True
>>> is_integer_dtype(pd.Int8Dtype)
True
>>> is_integer_dtype(np.datetime64)
False
>>> is_integer_dtype(np.timedelta64)
False
>>> is_integer_dtype(np.array(['a', 'b']))
False
>>> is_integer_dtype(pd.Series([1, 2]))
True
>>> is_integer_dtype(np.array([], dtype=np.timedelta64))
False
>>> is_integer_dtype(pd.Index([1, 2.]))  # float
False
```

pandas.api.types.is_interval_dtype

pandas.api.types.**is_interval_dtype**(*arr_or_dtype*) → bool

Check whether an array-like or dtype is of the Interval dtype.

Parameters

arr_or_dtype [array-like] The array-like or dtype to check.

Returns

boolean Whether or not the array-like or dtype is of the Interval dtype.

Examples

```
>>> is_interval_dtype(object)
False
>>> is_interval_dtype(IntervalDtype())
True
>>> is_interval_dtype([1, 2, 3])
False
>>>
>>> interval = pd.Interval(1, 2, closed="right")
>>> is_interval_dtype(interval)
False
>>> is_interval_dtype(pd.IntervalIndex([interval]))
True
```

pandas.api.types.is_numeric_dtype

pandas.api.types.**is_numeric_dtype**(*arr_or_dtype*) → bool

Check whether the provided array or dtype is of a numeric dtype.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of a numeric dtype.

Examples

```
>>> is_numeric_dtype(str)
False
>>> is_numeric_dtype(int)
True
>>> is_numeric_dtype(float)
True
>>> is_numeric_dtype(np.uint64)
True
>>> is_numeric_dtype(np.datetime64)
False
>>> is_numeric_dtype(np.timedelta64)
False
>>> is_numeric_dtype(np.array(['a', 'b']))
False
>>> is_numeric_dtype(pd.Series([1, 2]))
True
>>> is_numeric_dtype(pd.Index([1, 2.]))
True
>>> is_numeric_dtype(np.array([], dtype=np.timedelta64))
False
```

pandas.api.types.is_object_dtype

pandas.api.types.**is_object_dtype**(*arr_or_dtype*) → bool

Check whether an array-like or dtype is of the object dtype.

Parameters

arr_or_dtype [array-like] The array-like or dtype to check.

Returns

boolean Whether or not the array-like or dtype is of the object dtype.

Examples

```
>>> is_object_dtype(object)
True
>>> is_object_dtype(int)
False
>>> is_object_dtype(np.array([], dtype=object))
True
>>> is_object_dtype(np.array([], dtype=int))
False
>>> is_object_dtype([1, 2, 3])
False
```

pandas.api.types.is_period_dtype

pandas.api.types.**is_period_dtype**(*arr_or_dtype*) → bool

Check whether an array-like or dtype is of the Period dtype.

Parameters

arr_or_dtype [array-like] The array-like or dtype to check.

Returns

boolean Whether or not the array-like or dtype is of the Period dtype.

Examples

```
>>> is_period_dtype(object)
False
>>> is_period_dtype(PeriodDtype(freq="D"))
True
>>> is_period_dtype([1, 2, 3])
False
>>> is_period_dtype(pd.Period("2017-01-01"))
False
>>> is_period_dtype(pd.PeriodIndex([], freq="A"))
True
```

pandas.api.types.is_signed_integer_dtype

pandas.api.types.**is_signed_integer_dtype**(*arr_or_dtype*) → bool

Check whether the provided array or dtype is of a signed integer dtype.

Unlike in *in_any_int_dtype*, timedelta64 instances will return False.

Changed in version 0.24.0: The nullable Integer dtypes (e.g. pandas.Int64Dtype) are also considered as integer by this function.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of a signed integer dtype and not an instance of timedelta64.

Examples

```
>>> is_signed_integer_dtype(str)
False
>>> is_signed_integer_dtype(int)
True
>>> is_signed_integer_dtype(float)
False
>>> is_signed_integer_dtype(np.uint64)  # unsigned
False
>>> is_signed_integer_dtype('int8')
True
>>> is_signed_integer_dtype('Int8')
True
>>> is_signed_dtype(pd.Int8Dtype)
True
>>> is_signed_integer_dtype(np.datetime64)
False
>>> is_signed_integer_dtype(np.timedelta64)
False
>>> is_signed_integer_dtype(np.array(['a', 'b']))
False
>>> is_signed_integer_dtype(pd.Series([1, 2]))
True
>>> is_signed_integer_dtype(np.array([], dtype=np.timedelta64))
False
>>> is_signed_integer_dtype(pd.Index([1, 2.]))  # float
False
>>> is_signed_integer_dtype(np.array([1, 2], dtype=np.uint32))  # unsigned
False
```

pandas.api.types.is_string_dtype

`pandas.api.types.is_string_dtype(arr_or_dtype) → bool`

Check whether the provided array or dtype is of the string dtype.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of the string dtype.

Examples

```
>>> is_string_dtype(str)
True
>>> is_string_dtype(object)
True
>>> is_string_dtype(int)
False
>>>
>>> is_string_dtype(np.array(['a', 'b']))
True
```

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```
>>> is_string_dtype(pd.Series([1, 2]))
False
```

pandas.api.types.is_timedelta64_dtype

pandas.api.types.**is_timedelta64_dtype**(*arr_or_dtype*) → bool

Check whether an array-like or dtype is of the timedelta64 dtype.

Parameters

arr_or_dtype [array-like] The array-like or dtype to check.

Returns

boolean Whether or not the array-like or dtype is of the timedelta64 dtype.

Examples

```
>>> is_timedelta64_dtype(object)
False
>>> is_timedelta64_dtype(np.timedelta64)
True
>>> is_timedelta64_dtype([1, 2, 3])
False
>>> is_timedelta64_dtype(pd.Series([], dtype="timedelta64[ns]"))
True
>>> is_timedelta64_dtype('0 days')
False
```

pandas.api.types.is_timedelta64_ns_dtype

pandas.api.types.**is_timedelta64_ns_dtype**(*arr_or_dtype*) → bool

Check whether the provided array or dtype is of the timedelta64[ns] dtype.

This is a very specific dtype, so generic ones like *np.timedelta64* will return False if passed into this function.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of the timedelta64[ns] dtype.

Examples

```
>>> is_timedelta64_ns_dtype(np.dtype('m8[ns]'))
True
>>> is_timedelta64_ns_dtype(np.dtype('m8[ps]'))  # Wrong frequency
False
>>> is_timedelta64_ns_dtype(np.array([1, 2], dtype='m8[ns]'))
True
>>> is_timedelta64_ns_dtype(np.array([1, 2], dtype=np.timedelta64))
False
```

pandas.api.types.is_unsigned_integer_dtype

pandas.api.types.**is_unsigned_integer_dtype**(*arr_or_dtype*) → bool

Check whether the provided array or dtype is of an unsigned integer dtype.

Changed in version 0.24.0: The nullable Integer dtypes (e.g. pandas.UInt64Dtype) are also considered as integer by this function.

Parameters

arr_or_dtype [array-like] The array or dtype to check.

Returns

boolean Whether or not the array or dtype is of an unsigned integer dtype.

Examples

```
>>> is_unsigned_integer_dtype(str)
False
>>> is_unsigned_integer_dtype(int)  # signed
False
>>> is_unsigned_integer_dtype(float)
False
>>> is_unsigned_integer_dtype(np.uint64)
True
>>> is_unsigned_integer_dtype('uint8')
True
>>> is_unsigned_integer_dtype('UInt8')
True
>>> is_unsigned_integer_dtype(pd.UInt8Dtype)
True
>>> is_unsigned_integer_dtype(np.array(['a', 'b']))
False
>>> is_unsigned_integer_dtype(pd.Series([1, 2]))  # signed
False
>>> is_unsigned_integer_dtype(pd.Index([1, 2.]))  # float
False
>>> is_unsigned_integer_dtype(np.array([1, 2], dtype=np.uint32))
True
```

pandas.api.types.is_sparse

pandas.api.types.**is_sparse**(*arr*) → bool

Check whether an array-like is a 1-D pandas sparse array.

Check that the one-dimensional array-like is a pandas sparse array. Returns True if it is a pandas sparse array, not another type of sparse array.

Parameters

arr [array-like] Array-like to check.

Returns

bool Whether or not the array-like is a pandas sparse array.

Examples

Returns *True* if the parameter is a 1-D pandas sparse array.

```
>>> is_sparse(pd.arrays.SparseArray([0, 0, 1, 0]))
True
>>> is_sparse(pd.Series(pd.arrays.SparseArray([0, 0, 1, 0])))
True
```

Returns *False* if the parameter is not sparse.

```
>>> is_sparse(np.array([0, 0, 1, 0]))
False
>>> is_sparse(pd.Series([0, 1, 0, 0]))
False
```

Returns *False* if the parameter is not a pandas sparse array.

```
>>> from scipy.sparse import bsr_matrix
>>> is_sparse(bsr_matrix([0, 1, 0, 0]))
False
```

Returns *False* if the parameter has more than one dimension.

Iterable introspection

api.types.is_dict_like(obj)	Check if the object is dict-like.
api.types.is_file_like(obj)	Check if the object is a file-like object.
api.types.is_list_like()	Check if the object is list-like.
api.types.is_named_tuple(obj)	Check if the object is a named tuple.
api.types.is_iterator(obj)	Check if the object is an iterator.

pandas.api.types.is_dict_like

pandas.api.types.**is_dict_like**(*obj*) → bool

Check if the object is dict-like.

Parameters

obj [The object to check]

Returns

is_dict_like [bool] Whether *obj* has dict-like properties.

Examples

```
>>> is_dict_like({1: 2})
True
>>> is_dict_like([1, 2, 3])
False
>>> is_dict_like(dict)
False
>>> is_dict_like(dict())
True
```

pandas.api.types.is_file_like

`pandas.api.types.`**`is_file_like`**`(`*obj*`)` → bool

Check if the object is a file-like object.

For objects to be considered file-like, they must be an iterator AND have either a *read* and/or *write* method as an attribute.

Note: file-like objects must be iterable, but iterable objects need not be file-like.

Parameters

obj [The object to check]

Returns

is_file_like [bool] Whether *obj* has file-like properties.

Examples

```
>>> buffer(StringIO("data"))
>>> is_file_like(buffer)
True
>>> is_file_like([1, 2, 3])
False
```

pandas.api.types.is_list_like

`pandas.api.types.`**`is_list_like`**`()`

Check if the object is list-like.

Objects that are considered list-like are for example Python lists, tuples, sets, NumPy arrays, and Pandas Series.

Strings and datetime objects, however, are not considered list-like.

Parameters

obj [object] Object to check.

allow_sets [bool, default True] If this parameter is False, sets will not be considered list-like.

New in version 0.24.0.

Returns

bool Whether *obj* has list-like properties.

Examples

```
>>> is_list_like([1, 2, 3])
True
>>> is_list_like({1, 2, 3})
True
>>> is_list_like(datetime(2017, 1, 1))
False
>>> is_list_like("foo")
False
>>> is_list_like(1)
False
>>> is_list_like(np.array([2]))
True
>>> is_list_like(np.array(2)))
False
```

pandas.api.types.is_named_tuple

pandas.api.types.**is_named_tuple**(*obj*) → bool

Check if the object is a named tuple.

Parameters

obj [The object to check]

Returns

is_named_tuple [bool] Whether *obj* is a named tuple.

Examples

```
>>> Point = namedtuple("Point", ["x", "y"])
>>> p = Point(1, 2)
>>>
>>> is_named_tuple(p)
True
>>> is_named_tuple((1, 2))
False
```

pandas.api.types.is_iterator

pandas.api.types.**is_iterator**(*obj*) → bool

Check if the object is an iterator.

For example, lists are considered iterators but not strings or datetime objects.

Parameters

obj [The object to check]

Returns

is_iter [bool] Whether *obj* is an iterator.

Examples

```
>>> is_iterator([1, 2, 3])
True
>>> is_iterator(datetime(2017, 1, 1))
False
>>> is_iterator("foo")
False
>>> is_iterator(1)
False
```

Scalar introspection

api.types.is_bool()	**Returns**
api.types.is_categorical(arr)	Check whether an array-like is a Categorical instance.
api.types.is_complex()	**Returns**
api.types.is_float()	**Returns**
api.types.is_hashable(obj)	Return True if hash(obj) will succeed, False otherwise.
api.types.is_integer()	**Returns**
api.types.is_interval()	
api.types.is_number(obj)	Check if the object is a number.
api.types.is_re(obj)	Check if the object is a regex pattern instance.
api.types.is_re_compilable(obj)	Check if the object can be compiled into a regex pattern instance.
api.types.is_scalar()	**Parameters**

pandas.api.types.is_bool

pandas.api.types.**is_bool**()

Returns

bool

pandas.api.types.is_categorical

pandas.api.types.**is_categorical**(*arr*) → bool

Check whether an array-like is a Categorical instance.

Parameters

arr [array-like] The array-like to check.

Returns

boolean Whether or not the array-like is of a Categorical instance.

Examples

```
>>> is_categorical([1, 2, 3])
False
```

Categoricals, Series Categoricals, and CategoricalIndex will return True.

```
>>> cat = pd.Categorical([1, 2, 3])
>>> is_categorical(cat)
True
>>> is_categorical(pd.Series(cat))
True
>>> is_categorical(pd.CategoricalIndex([1, 2, 3]))
True
```

pandas.api.types.is_complex

pandas.api.types.**is_complex**()

Returns

bool

pandas.api.types.is_float

pandas.api.types.**is_float**()

Returns

bool

pandas.api.types.is_hashable

pandas.api.types.**is_hashable**(*obj*) → bool

Return True if hash(obj) will succeed, False otherwise.

Some types will pass a test against collections.abc.Hashable but fail when they are actually hashed with hash().

Distinguish between these and other types by trying the call to hash() and seeing if they raise TypeError.

Returns

bool

Examples

```
>>> a = ([],)
>>> isinstance(a, collections.abc.Hashable)
True
>>> is_hashable(a)
False
```

pandas.api.types.is_integer

pandas.api.types.**is_integer**()

Returns

bool

pandas.api.types.is_interval

pandas.api.types.**is_interval**()

pandas.api.types.is_number

pandas.api.types.**is_number**(*obj*) → bool

Check if the object is a number.

Returns True when the object is a number, and False if is not.

Parameters

obj [any type] The object to check if is a number.

Returns

is_number [bool] Whether *obj* is a number or not.

See also:

api.types.is_integer Checks a subgroup of numbers.

Examples

```
>>> pd.api.types.is_number(1)
True
>>> pd.api.types.is_number(7.15)
True
```

Booleans are valid because they are int subclass.

```
>>> pd.api.types.is_number(False)
True
```

```
>>> pd.api.types.is_number("foo")
False
>>> pd.api.types.is_number("5")
False
```

pandas.api.types.is_re

pandas.api.types.**is_re**(*obj*) → bool

Check if the object is a regex pattern instance.

Parameters

obj [The object to check]

Returns

is_regex [bool] Whether *obj* is a regex pattern.

Examples

```
>>> is_re(re.compile(".*"))
True
>>> is_re("foo")
False
```

pandas.api.types.is_re_compilable

pandas.api.types.**is_re_compilable**(*obj*) → bool

Check if the object can be compiled into a regex pattern instance.

Parameters

obj [The object to check]

Returns

is_regex_compilable [bool] Whether *obj* can be compiled as a regex pattern.

Examples

```
>>> is_re_compilable(".*")
True
>>> is_re_compilable(1)
False
```

pandas.api.types.is_scalar

pandas.api.types.**is_scalar**()

Parameters

val [object] This includes:

- numpy array scalar (e.g. np.int64)
- Python builtin numerics
- Python builtin byte arrays and strings
- None
- datetime.datetime
- datetime.timedelta

- Period
- decimal.Decimal
- Interval
- DateOffset
- Fraction
- Number.

Returns

bool Return True if given object is scalar.

Examples

```
>>> dt = datetime.datetime(2018, 10, 3)
>>> pd.api.types.is_scalar(dt)
True
```

```
>>> pd.api.types.is_scalar([2, 3])
False
```

```
>>> pd.api.types.is_scalar({0: 1, 2: 3})
False
```

```
>>> pd.api.types.is_scalar((0, 2))
False
```

pandas supports PEP 3141 numbers:

```
>>> from fractions import Fraction
>>> pd.api.types.is_scalar(Fraction(3, 5))
True
```

3.16 Extensions

These are primarily intended for library authors looking to extend pandas objects.

api.extensions.register_extension_dtype(cls)	Register an ExtensionType with pandas as class decorator.
api.extensions.register_dataframe_accessor(name)	Register a custom accessor on DataFrame objects.
api.extensions.register_series_accessor(name)	Register a custom accessor on Series objects.
api.extensions.register_index_accessor(name)	Register a custom accessor on Index objects.
api.extensions.ExtensionDtype()	A custom data type, to be paired with an ExtensionArray.

3.16.1 pandas.api.extensions.register_extension_dtype

pandas.api.extensions.**register_extension_dtype**(*cls: Type[pandas.core.dtypes.base.ExtensionDtype]*) → Type[pandas.core.dtypes.base.ExtensionDtype]

Register an ExtensionType with pandas as class decorator.

New in version 0.24.0.

This enables operations like `.astype(name)` for the name of the ExtensionDtype.

Returns

callable A class decorator.

Examples

```
>>> from pandas.api.extensions import register_extension_dtype
>>> from pandas.api.extensions import ExtensionDtype
>>> @register_extension_dtype
... class MyExtensionDtype(ExtensionDtype):
...     pass
```

3.16.2 pandas.api.extensions.register_dataframe_accessor

pandas.api.extensions.**register_dataframe_accessor**(*name*)

Register a custom accessor on DataFrame objects.

Parameters

name [str] Name under which the accessor should be registered. A warning is issued if this name conflicts with a preexisting attribute.

Returns

callable A class decorator.

See also:

register_series_accessor, ***register_index_accessor***

Notes

When accessed, your accessor will be initialized with the pandas object the user is interacting with. So the signature must be

```
def __init__(self, pandas_object):  # noqa: E999
    ...
```

For consistency with pandas methods, you should raise an `AttributeError` if the data passed to your accessor has an incorrect dtype.

```
>>> pd.Series(['a', 'b']).dt
Traceback (most recent call last):
...
AttributeError: Can only use .dt accessor with datetimelike values
```

Examples

In your library code:

```
import pandas as pd

@pd.api.extensions.register_dataframe_accessor("geo")
class GeoAccessor:
    def __init__(self, pandas_obj):
        self._obj = pandas_obj

    @property
    def center(self):
        # return the geographic center point of this DataFrame
        lat = self._obj.latitude
        lon = self._obj.longitude
        return (float(lon.mean()), float(lat.mean()))

    def plot(self):
        # plot this array's data on a map, e.g., using Cartopy
        pass
```

Back in an interactive IPython session:

```
>>> ds = pd.DataFrame({'longitude': np.linspace(0, 10),
...                    'latitude': np.linspace(0, 20)})
>>> ds.geo.center
(5.0, 10.0)
>>> ds.geo.plot()
# plots data on a map
```

3.16.3 pandas.api.extensions.register_series_accessor

pandas.api.extensions.**register_series_accessor**(*name*)

Register a custom accessor on Series objects.

Parameters

name [str] Name under which the accessor should be registered. A warning is issued if this name conflicts with a preexisting attribute.

Returns

callable A class decorator.

See also:

register_dataframe_accessor, ***register_index_accessor***

Notes

When accessed, your accessor will be initialized with the pandas object the user is interacting with. So the signature must be

```
def __init__(self, pandas_object):  # noqa: E999
    ...
```

For consistency with pandas methods, you should raise an `AttributeError` if the data passed to your accessor has an incorrect dtype.

```
>>> pd.Series(['a', 'b']).dt
Traceback (most recent call last):
...
AttributeError: Can only use .dt accessor with datetimelike values
```

Examples

In your library code:

```
import pandas as pd

@pd.api.extensions.register_dataframe_accessor("geo")
class GeoAccessor:
    def __init__(self, pandas_obj):
        self._obj = pandas_obj

    @property
    def center(self):
        # return the geographic center point of this DataFrame
        lat = self._obj.latitude
        lon = self._obj.longitude
        return (float(lon.mean()), float(lat.mean()))

    def plot(self):
        # plot this array's data on a map, e.g., using Cartopy
        pass
```

Back in an interactive IPython session:

```
>>> ds = pd.DataFrame({'longitude': np.linspace(0, 10),
...                    'latitude': np.linspace(0, 20)})
>>> ds.geo.center
(5.0, 10.0)
>>> ds.geo.plot()
# plots data on a map
```

3.16.4 pandas.api.extensions.register_index_accessor

pandas.api.extensions.**register_index_accessor**(*name*)

Register a custom accessor on Index objects.

Parameters

name [str] Name under which the accessor should be registered. A warning is issued if this name conflicts with a preexisting attribute.

Returns

callable A class decorator.

See also:

register_dataframe_accessor, ***register_series_accessor***

Notes

When accessed, your accessor will be initialized with the pandas object the user is interacting with. So the signature must be

```
def __init__(self, pandas_object):  # noqa: E999
    ...
```

For consistency with pandas methods, you should raise an AttributeError if the data passed to your accessor has an incorrect dtype.

```
>>> pd.Series(['a', 'b']).dt
Traceback (most recent call last):
...
AttributeError: Can only use .dt accessor with datetimelike values
```

Examples

In your library code:

```
import pandas as pd

@pd.api.extensions.register_dataframe_accessor("geo")
class GeoAccessor:
    def __init__(self, pandas_obj):
        self._obj = pandas_obj

    @property
    def center(self):
        # return the geographic center point of this DataFrame
        lat = self._obj.latitude
        lon = self._obj.longitude
        return (float(lon.mean()), float(lat.mean()))

    def plot(self):
        # plot this array's data on a map, e.g., using Cartopy
        pass
```

Back in an interactive IPython session:

```
>>> ds = pd.DataFrame({'longitude': np.linspace(0, 10),
...                    'latitude': np.linspace(0, 20)})
>>> ds.geo.center
(5.0, 10.0)
>>> ds.geo.plot()
# plots data on a map
```

3.16.5 pandas.api.extensions.ExtensionDtype

class `pandas.api.extensions.`**`ExtensionDtype`**

A custom data type, to be paired with an ExtensionArray.

New in version 0.23.0.

See also:

`extensions.register_extension_dtype`
`extensions.ExtensionArray`

Notes

The interface includes the following abstract methods that must be implemented by subclasses:

- type
- name
- construct_from_string

The following attributes influence the behavior of the dtype in pandas operations

- _is_numeric
- _is_boolean

Optionally one can override construct_array_type for construction with the name of this dtype via the Registry. See `extensions.register_extension_dtype()`.

- construct_array_type

The *na_value* class attribute can be used to set the default NA value for this type. `numpy.nan` is used by default.

ExtensionDtypes are required to be hashable. The base class provides a default implementation, which relies on the `_metadata` class attribute. `_metadata` should be a tuple containing the strings that define your data type. For example, with `PeriodDtype` that's the `freq` attribute.

If you have a parametrized dtype you should set the ``_metadata`` class property.

Ideally, the attributes in `_metadata` will match the parameters to your `ExtensionDtype.__init__` (if any). If any of the attributes in `_metadata` don't implement the standard `__eq__` or `__hash__`, the default implementations here will not work.

Changed in version 0.24.0: Added `_metadata`, `__hash__`, and changed the default definition of `__eq__`.

For interaction with Apache Arrow (pyarrow), a `__from_arrow__` method can be implemented: this method receives a pyarrow Array or ChunkedArray as only argument and is expected to return the appropriate pandas ExtensionArray for this dtype and the passed values:

```
class ExtensionDtype:

    def __from_arrow__(
        self, array: pyarrow.Array/ChunkedArray
    ) -> ExtensionArray:
        ...
```