



Compressor Documentation

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CONTENTS

1	Preamble	1
2	List of functions	3
3	Contents	5
3.1	Index field compression	5
3.2	Object serialize/compression	6
4	Index	11

PREAMBLE

Compressor enables fields compression for arrays/pyTrees.

This module is part of Cassiopee, a free open-source pre- and post-processor for CFD simulations.

To use the module with the Compressor array interface:

```
import Compressor
```

To use the module with the CGNS/Python interface:

```
import Compressor.PyTree as Compressor
```


LIST OF FUNCTIONS

– Index field compression

<code>Compressor.deltaIndex(index, ref)</code>	Return the delta between index and ref.
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– Object serializer/compression

<code>Compressor.pack(a[, method])</code>	Serialize or compress a.
<code>Compressor.unpack(a[, method])</code>	Deserialize or decompress a.

– CGNS Zones/tree compression

<code>Compressor.PyTree.compressCartesian(t[, ...])</code>	For Cartesian grids, replace Grid Coordinates with a UserDefined CartesianData node.
<code>Compressor.PyTree.uncompressCartesian(t)</code>	For Cartesian grids, recreate Grid Coordinates from compressed zones.
<code>Compressor.PyTree.compressCellN(t)</code>	Compress cellN on 2 bits.
<code>Compressor.PyTree.compressCoords(t[, tol, ctype])</code>	Compress coordinates with a relative tolerance.
<code>Compressor.PyTree.compressFields(t[, tol, ctype])</code>	Compress fields with a relative tolerance.
<code>Compressor.PyTree.compressElements(t)</code>	Compress Element connectivity.
<code>Compressor.PyTree.uncompressAll(t)</code>	Uncompress all compressed data.

CONTENTS

3.1 Index field compression

Compressor.**deltaIndex**(*a, ref*)

Compress a list of indices using delta algorithm. The return Delta contains the number of added indices in *a* when compared to *ref*, the list of added indices, the number of suppressed indices, the list of suppressed indices.

Parameters

- **a** (numpy of ints) – input indices
- **ref** (numpy) – compared indices

Returns list of added indices, the number of suppressed indices, list of suppressed indices

Return type (numpy, int, numpy)

- Compression by delta (numpy):

```
# - deltaIndex -
import numpy
import Compressor

# Liste des indexes de reference
indRef = numpy.array([1,2,3,4,5], dtype='int32')

# Liste des indexes a comparer a la reference
index = numpy.array([1,2,3,4], dtype='int32')

delta = Compressor.deltaIndex(index, indRef)
print(delta)
```

3.2 Object serialize/compression

Compressor.**pack**(a)

Serialize/compress a python object a. For now, this is only a general interface to pickle module.

Parameters a (python object) – any python object

Returns serialized stream

- Object serialization (numpy):

```
# - pack -
import Compressor
import Generator.PyTree as G
a = G.cart((0,0,0), (1,1,1), (1000,100,100))
b = Compressor.pack(a)
```

Compressor.**unpack**(a)

Deserialize/decompress a serialized stream b. For now, this is only a general interface to pickle module.

Parameters a (serialized stream) – a serialized stream as produced by pack

Returns python object

- Object deserialization (numpy):

```
# - unpack -
import Compressor
import Generator.PyTree as G
a = G.cart((0,0,0), (1,1,1), (1000,100,100))
b = Compressor.pack(a)
c = Compressor.unpack(b)
```

Compressor.PyTree.**compressCartesian**(a)

Compress zones if they are regular Cartesian grids. Create a CartesianData node containing the 6 floats corresponding to first point and steps in 3 directions.

Exists also as an in-place version (`_compressCartesian`) which modifies a and returns None.

Parameters a ([zone, list of zones, base, pyTree]) – input data

Returns identical to input

- Cartesian compression (pyTree):

```
# - compressCartesian (pyTree) -
import Compressor.PyTree as Compressor
import Generator.PyTree as G
import Converter.Internal as Internal

a = G.cart((0,0,0), (1,1,1), (10,10,10))
Compressor._compressCartesian(a)
Internal.printTree(a)
```

Compressor.PyTree.**uncompressCartesian**(a)

Uncompress zones that has been compressed with compressCartesian. Exists also as an in-place version (_uncompressCartesian) which modifies a and returns None.

Parameters a ([zone, list of zones, base, pyTree]) – input data

Returns identical to input

- Cartesian uncompression (pyTree):

```
# - uncompressCartesian (pyTree) -
import Compressor.PyTree as Compressor
import Generator.PyTree as G
import Converter.Internal as Internal

a = G.cart((0,0,0), (1,1,1), (10,10,10))
Compressor._compressCartesian(a)

Compressor._uncompressCartesian(a)
Internal.printTree(a)
```

Compressor.PyTree.**compressCellN**(a)

Compress cellN fields (valued 0,1,2).

Exists also as an in-place version (_compressCellN) which modifies a and returns None.

Parameters a ([zone, list of zones, base, pyTree]) – input data

Returns identical to input

- CellN compression (pyTree):

```
# - compressCellN (pyTree) -
import Compressor.PyTree as Compressor
import Generator.PyTree as G
import Converter.PyTree as C
import Converter.Internal as Internal

a = G.cart((0,0,0), (1,1,1), (10,11,12))
C._initVars(a, '{centers:cellN}=1.')
Compressor._compressCellN(a)
Compressor._uncompressAll(a)
Internal.printTree(a)
C.convertPyTree2File(a, 'out.cgns')
```

Compressor.PyTree.**compressCoords**(a, tol=1.e-8, ctype=0)

Compress zone coordinates with sz library with a relative tolerance tol.

Exists also as an in-place version (`_compressCoords`) which modifies a and returns None.

Parameters

- **a** ([zone, list of zones, base, pyTree]) – input data
- **tol** (float) – control relative error on output
- **ctype** (0 (sz), 1 (zfp)) – compression algorithm

Returns identical to input

- Coordinates compression (pyTree):

```
# - compressCoords (pyTree) -
import Compressor.PyTree as Compressor
import Generator.PyTree as G
import Converter.PyTree as C
import Converter.Internal as Internal

a = G.cart((0,0,0), (1,1,1), (5,3,4))
Compressor._compressCoords(a, tol=1.e-7, ctype=0)
Compressor._uncompressAll(a)
Internal.printTree(a)
C.convertPyTree2File(a, 'out.cgns')
```

Compressor.PyTree.**compressFields**(a, tol=1.e-8)

Compress zone fields with sz library with a relative tolerance tol.

Exists also as an in-place version (`_compressFields`) which modifies `a` and returns `None`.

Parameters

- `a` ([zone, list of zones, base, pyTree]) – input data
- `tol` (float) – control relative error on output
- `ctype` (0 (sz), 1 (zfp)) – compression algorithm

Returns identical to input

- Field compression (pyTree):

```
# - compressFields (pyTree) -
import Compressor.PyTree as Compressor
import Generator.PyTree as G
import Converter.PyTree as C
import Converter.Internal as Internal

a = G.cart((0,0,0), (1,1,1), (10,10,10))
C._initVars(a, '{F}={CoordinateX}')
C._initVars(a, '{centers:G}={centers:CoordinateY}')
Compressor._compressFields(a, tol=1.e-6, ctype=0)
Compressor._uncompressAll(a)
Internal.printTree(a)
C.convertPyTree2File(a, 'out.cgns')
```

`Compressor.PyTree.compressElements(a)`
Compress zone elements (connectivity).

Exists also as an in-place version (`_compressElements`) which modifies `a` and returns `None`.

Parameters `a` ([zone, list of zones, base, pyTree]) – input data

Returns identical to input

- Element compression (pyTree):

```
# - compressElements (pyTree) -
import Compressor.PyTree as Compressor
import Generator.PyTree as G
import Converter.PyTree as C
import Converter.Internal as Internal
```

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```
a = G.cartHexa((0,0,0), (1,1,1), (25,23,24))
Compressor._compressElements(a)
Internal.printTree(a)
Compressor._uncompressAll(a)
Internal.printTree(a)
C.convertPyTree2File(a, 'out.cgns')
```

`Compressor.PyTree.uncompressAll(a, tol=1.e-8)`

Uncompress zones compressed with the previous compressors.

Exists also as an in-place version (`_uncompressAll`) which modifies `a` and returns `None`.

Parameters `a` ([zone, list of zones, base, pyTree]) – input data

Returns identical to input

- Zone decompression (pyTree):

```
# - uncompressAll (pyTree) -
import Compressor.PyTree as Compressor
import Generator.PyTree as G
import Converter.PyTree as C

a = G.cart((0,0,0), (1,1,1), (10,10,10))
C._initVars(a, '{F}={CoordinateX}')
C._initVars(a, '{centers:G}={centers:CoordinateY}')
Compressor._compressCoords(a, tol=1.e-6)
Compressor._compressFields(a, tol=1.e-6)
Compressor._uncompressAll(a)
C.convertPyTree2File(a, 'out.cgns')
```

CHAPTER
FOUR

INDEX

- genindex
- modindex
- search