BlueTides

Introduction

These files are the BlueTides Friend-of-friend (FOF) Catalogue.
For brieviaty, we include only the following particle types:

- 4 : Star particles

- 5 : Blackhole Particles

- FOFGroups : FOF groups

0 (Gas) and 1(Dark Matter) are not included.
The container format of these files is BigFile, which was developed for massively parallel IO of BlueTides on BlueWaters. See install for installation.

Redshifts

Here is a list of included redshift and the file size. The entire directory can be mirrored with lftp or curl.

z	path	Ngroup	size
17.00	PIG_027	000293340	0.17 GB
16.00	PIG_030	000827451	0.48 GB
15.00	PIG_035	002201578	1.30 GB
14.00	PIG_037	005332371	3.16 GB
13.00	PIG_040	011959804	7.32 GB
12.00	PIG_044	024740312	15.68 GB
11.00	PIG_048	047488084	30.60 GB
10.00	PIG_054	083453094	55.55 GB
09.00	PIG_066	135386676	93.27 GB
08.00	PIG_086	200062344	155.11 GB

Units

Units are in MP-Gadget internal units :

- Distance : h^{-1}Kpc

- Velocity : $a^{-1} \cdot \text{km/s}$

- Mass : $10^{10}h^{-1}M_\odot$

Useful Constants in this unit:

- Gravity Constant $G = 47003.1$

- Hubble Constant $H = 0.1$

- Speed of light $C = 3 \times 10^5$

Columns

In bigfile a column is represented by a BigBlock. Common blocks are

1. For particles

   ```
   4/Mass, 4/Position, 4/Velocity,
   5/Mass, 5/Position, 5/Velocity,
   4/StarFormationTime,
   5/BlackholeMass, 5/BlackholeAccretionRate
   ```

2. For FOFGroup

   ```
   FOFGroups/OffsetByType
   FOFGroups/LengthByType
   FOFGroups/MassByType
   FOFGroups/Mass
   FOFGroups/StarFormationRate
   FOFGroups/BlackholeAccretionRate
   FOFGroups/MassCenterPosition
   FOFGroups/MassCenterVelocity
   ```

Install

To install bigfile, clone the repository and use standard python *setup.py*.

```
git clone https://github.com/rainwoodman/bigfile
(cd bigfile; python setup.py install --user)
```

> **Warning**
> Installing bigfile depends on Cython and numpy.

Example

Once a bigfile is opened, access it is similar to a numpy structure array, except slicing is always required (similar to `pyfits` or `h5py`). In other words, to read from the file, use `block[start:end]`, where `start` and `end` are the start and end offsets of the range to be read.

The jump table for accessing the corresponding particle attributes of a halo are stored in `FOFGroups/LengthByType` and `FOFGroups/OffsetByType`.

```
python
>>> from bigfile import BigFile
>>> p037 = BigFile('PIG_037')
>>> print p037['header'].attrs.keys
['BoxSize', 'HubbleParam', 'MassTable', 'NumFOFGroupsTotal',
        'NumPartInGroupTotal', 'Omega0', 'OmegaLambda', 'Time']
>>> print p037['header'].attrs['Time'][0]
0.0666666663633
>>> print p037.blocks

>>> print p037['FOFGroups/Mass'].size
5332371
>>> print p037['FOFGroups/MassByType'][:1]
[[ 0.96118915  4.94944572  0.          0.          0.00673234  0.    ]]
>>> sel = slice(p037['FOFGroups/OffsetByType'][0][4],
        p037['FOFGroups/OffsetByType'][0][4] + p037['FOFGroups/LengthByType
>>> print p037['4/Mass'][sel].sum()
0.00673234
>>> print p037['FOFGroups/MassByType'][0][4]
0.00673234
```

Issues

There shall be many issues. Please file a bug report at

https://github.com/bluetides-project/bluetides-datarelease/issues/new
```
```