Installing Gadget-2 and running the galaxy collision program

First presentation for the Scientific Modelling Computer Lab

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March 28, 2020

Beginning the work with Gadget-2

https://astrobites.org/2011/04/02/installing-and-running-gadget-2/

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Necessary packages:

- GNU Scientific Library (GSL),
- fast Fourier transform (FFTW),
- and the Gadget 2.0.7,

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Necessary packages:

- GNU Scientific Library (GSL),
- fast Fourier transform (FFTW),
- and the Gadget 2.0.7,
- Message Passing Interface (MPI): mpich-3.3.2 (https://www.mpich.org/static/downloads/3.3.2/mpich-3.3.2-installguide.pdf)

Running an MPI program, the Gadget directory

```
marika@Otletesgep:~/Gadget$ mpiexec -n 4 ./mpich-3.3.2/examples/cpi
Process 0 of 4 is on Otletesgep
Process 2 of 4 is on Otletesgep
Process 3 of 4 is on Otletesgep
Process 1 of 4 is on Otletesgep
pi is approximately 3.1415926544231239, Error is 0.0000000008333307
wall clock time = 0.000269
marika@Otletesgep:~/Gadget$
```

Figure: Test running: calculation of pi.

```
marika@Otletesgep:~/Gadget$ ls
fftw-2.1.5          gadgetviewer-1.0.10      gtk+-2.0.0          mpich-install
fftw-2.1.5.tar      gadgetviewer-1.0.10.tar  gtk+-2.0.0.tar.gz
Gadget-2.0.7        gsl-1.9                  mpich-3.3.2
gadget-2.0.7.tar    gsl-1.9.tar              mpich-3.3.2.tar.gz
marika@Otletesgep:~/Gadget$
```

Figure: Gadget directory.

Running the galaxy collision

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Running the galaxy collision

`https://astrobites.org/2011/04/02/installing-and-running-gadget-2/`

- galaxy directory
- adequate directory path in *galaxy.param*
- run the command

```
marika@Otletesgep:~/Gadget/Gadget-2.0.7/Gadget2$ mpirun -np 2 ./Gadget2 ./parameterfiles/galaxy.param

This is Gadget, version `2.0'.

Running on 2 processors.

Allocated 25 MByte communication buffer per processor.

Communication buffer has room for 504122 particles in gravity computation
Communication buffer has room for 204800 particles in density computation
Communication buffer has room for 163840 particles in hydro computation
Communication buffer has room for 163840 particles in domain decomposition


Hubble (internal units) = 0.1
G (internal units) = 43007.1
UnitMass_in_g = 1.989e+43
UnitTime_in_s = 3.08568e+16
UnitVelocity_in_cm_per_s = 100000
UnitDensity_in_cgs = 6.76991e-22
UnitEnergy_in_cgs = 1.989e+53


Allocated 2.91824 MByte for particle storage. 68


reading file `/home/marika/Gadget/Gadget-2.0.7/ICs/galaxy_littleendian.dat' on task=0 (contains 60000 particles.)
distributing this file to tasks 0-1
Type 0 (gas):          0  (tot=     0000000000) masstab=0
Type 1 (halo):     40000  (tot=     0000040000) masstab=0.00104634
Type 2 (disk):     20000  (tot=     0000020000) masstab=0.00023252
Type 3 (bulge):        0  (tot=     0000000000) masstab=0
Type 4 (stars):        0  (tot=     0000000000) masstab=0
Type 5 (bndry):        0  (tot=     0000000000) masstab=0

reading done.
Total number of particles :  0000060000

allocated 0.0762939 Mbyte for ngb search.

Allocated 3.30359 MByte for BH-tree. 64
```

Figure: Running the galaxy collision test command.

```
tree is done.
force computation done.

Begin Step 2018, Time: 2.99854, Systemstep: 0.001464
domain decomposition...
NTopleaves= 260
work-load balance=1.28243   memory-balance=1.4686
exchange of 0000000141 particles
domain decomposition done.
begin Peano-Hilbert order...
Peano-Hilbert done.
Start force computation...
Tree construction.
Tree construction done.
Begin tree force.
tree is done.
force computation done.

writing snapshot file...
done with snapshot.

There is no valid time for a further snapshot file.

Begin Step 2019, Time: 3, Systemstep: 0.00146484
domain decomposition...
NTopleaves= 260
work-load balance=1.28136   memory-balance=1.46837
exchange of 0000000181 particles
domain decomposition done.
begin Peano-Hilbert order...
Peano-Hilbert done.
Start force computation...
Tree construction.
Tree construction done.
Begin tree force.
tree is done.
force computation done.

writing snapshot file...
done with snapshot.
marika@Otletesgep:~/Gadget/Gadget-2.0.7/Gadget2$
```

Figure: The end of the output of running the galaxy collision.

Running the galaxy collision

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- galaxy directory
- adequate directory path in *galaxy.param*
- run the command

```
marika@Otletesgep:~/Gadget/Gadget-2.0.7/Gadget2/galaxy$ l
cpu.txt                 restart.0      snapshot_000  snapshot_004  timings.txt
energy.txt              restart.0.bak  snapshot_001  snapshot_005
info.txt                restart.1      snapshot_002  snapshot_006
parameters-usedvalues   restart.1.bak  snapshot_003  snapshot_007
marika@Otletesgep:~/Gadget/Gadget-2.0.7/Gadget2/galaxy$
```

Figure: The galaxy directory with the resulted files.

Following steps

- see the snapshots (installing gatgetviewer `https://github.com/jchelly/gadgetviewer`)
- make a video about the collision
- start another task