

University of Toronto **Engineering**



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Module 9 – Parallel Python

Running on the SciNet HPC using the pypar module



Module 9 – Parallel Python

We will use the pypar module for our parallel programming

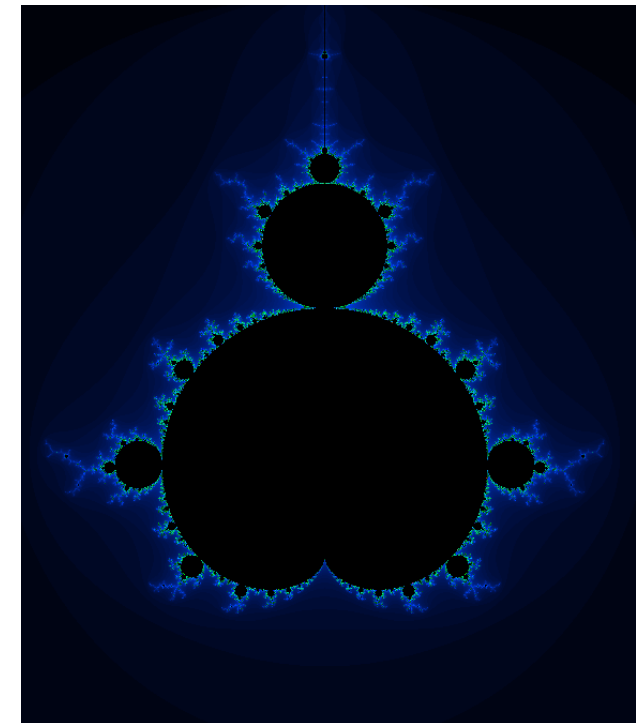
- First we need to install it:
 - *module load gcc intel python openmpi*
 - *export PYTHONPATH=\${PYTHONPATH}:\${HOME}/lib/python2.X/site-packages/*
 - *mkdir \${HOME}/lib*
 - *mkdir \${HOME}/lib/python2.7*
 - *mkdir \${HOME}/lib/python2.7/site-packages/*
 - *wget https://pypar.googlecode.com/files/pypar-2.1.5_108.tgz*
 - *tar -xzf pypar-2.1.5_108.tgz*
 - *python pypar_2.1.5_108/source/setup.py install --prefix=\$HOME*
 - *cd pypar_2.1.5_108/source/*
 - *python compile_pypar_locally.py*
 - *export PYTHONPATH=\${PYTHONPATH}:\${pwd}*



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Let's try an example: rendering a Mandelbrot fractal

- The Mandelbrot set is the set of complex numbers
- We'll use mobaxterm for this
 - `cd pypar_2.1.5_108/demos/mandelbrot_example`
 - `python compile_mandelbrot_c_extensions.py`
 - `python mandel_sequential.py`
 - `display mandel.ppm`
- Now try it in parallel!
 - `python mandel_parallel_cyclic.py`
 - `display mandel.ppm`
 - *Note the time difference!*



$$Z_{n+1} = Z_n^2 + C$$



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Let's write our own:

```
import pypar  
print 'I am proc %d of %d on node %s' % (pypar.rank(), pypar.size(), pypar.get_processor_name())  
pypar.finalize()
```

Run it with `mpirun -np 8 race.py`



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Message passing is where MPI gets its name!

sendrecv.py

```
import pypar

if pypar.rank()==0:
    pypar.send("Hello!",1);

if pypar.rank()==1:
    print(pypar.receive(0))

pypar.finalize()
```

circle.py

```
import pypar

pypar.send("Hello from {0}".format(pypar.rank()), (pypar.rank()+1)%pypar.size())

print("{0} got message {1}".format(pypar.rank(), pypar.receive((pypar.rank()-1)%pypar.size())))

pypar.finalize()
```



Thanks!

Questions?

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