GPULib with IDL 8.0

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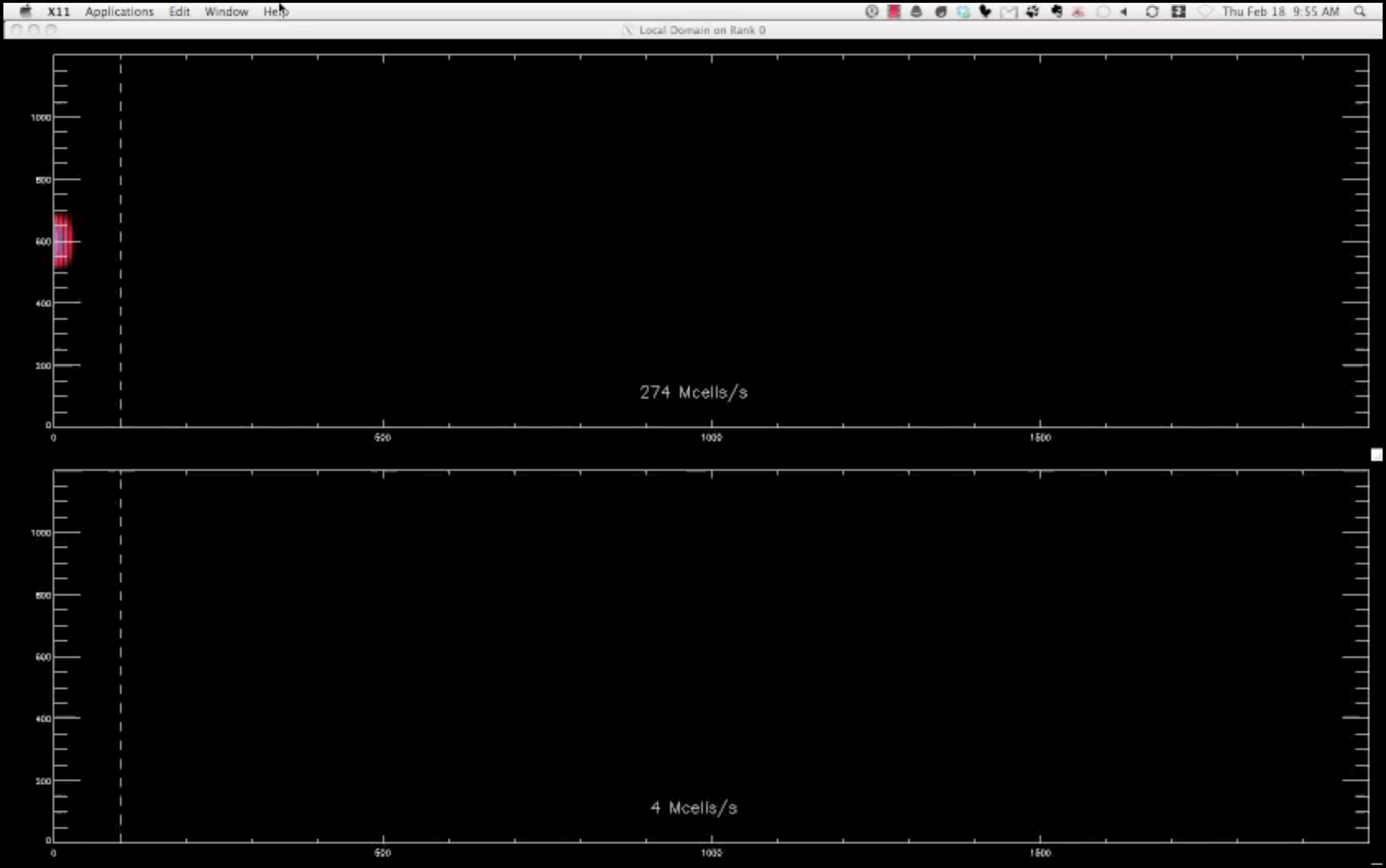
Outline

1. What is GPULib?
2. Using operator overloading with GPULib
3. Other new GPULib features
4. More operator overloading


X11
Applications
Edit
Window
Help
Thu Feb 18 9:55 AM
Local Domain on Rank 0
1000
800
600
400
200
0
0
500
1000
1500
274 Mcells/s
1000
800
600
400
200
0
0
500
1000
1500
4 Mcells/s

```
tmp1 = gpuMake_array(…)
tmp2 = gpuMake_array(…)
rho = gpuMake_array(…)

gpuMult, x, x, tmp1
gpuMult, y, y, tmp2
gpuAdd, tmp1, tmp2, tmp1
gpuSqrt, tmp1, rho

gpuFree, tmp1
gpuFree, tmp2
```

```
rho = gpuSqrt(gpuAdd(gpuMult(x, x), $
                     gpuMult(y, y))
```

```
tmp1 = gpuMake_array(…)
tmp2 = gpuMake_array(…)
rho = gpuMake_array(…)

rho = gpuSqrt( $
        gpuAdd( $
          gpuMult(x, x, LHS=tmp1), $
          gpuMult(y, y, LHS=tmp2), $
          LHS=tmp1), $
        LHS=rho)

gpuFree, tmp1
gpuFree, tmp2
```

```
rho = gpuSqrt(x * x + y * y)
```

10000 iterations with 1000000 element arrays

CPU calculation:	144.8 secs
Procedure forms:	7.3 secs
Function forms:	15.4 secs
Function forms with LHS:	7.2 secs
Operator forms:	15.4 secs

CPU calculations performed on a 2.40GHz Core2 Duo
GPU calculations performed on a NVIDIA Tesla C1060

```
IDL> x = randomu(seed, 10)
IDL> x_gpu = gpuPutarr(x)
IDL> help, x, x_gpu
X               FLOAT     = Array[10]
X_GPU           GPUFLOAT  = Array[10]
IDL> print, x_gpu
     0.507024     0.966179    0.0294637
     0.638232     0.758752     0.102476
     0.405151     0.404657     0.151935
     0.785828
```

```
IDL> x = gpuFindgen(20)
IDL> v = x.view[5:11]
IDL> help, v
V               GPUFLOAT  = Array[7]
IDL> print, v
      5.00000      6.00000      7.00000
      8.00000      9.00000      10.0000
      11.0000
```

structures

↓

objects

```
function gpuvariable::_overloadPlus, left, right
  compile_opt strictarr

  return, gpuAdd(left, right)
end
```

Compatibility issues

- customers with various IDL versions IDL 6.4+
- make your own IDL_Object class!
- then your code will work pre- and post-IDL 8.0 (well, no operator overloading before 8.0, of course)

HDF5 classes

```
h = mg_h5(file_which('h5_test.h5'))
group = h['images']
d = h['2D int array']

e = group['eskimo']
plot, e[*, 400]
ct = group['eskimo_palette']
tvlct, transpose(ct[*])
tv, e[*], order=1
```

http://bit.ly/mg_h5_routines

RDL (Data Access Protocol in IDL)

```
url = 'http://wavelet.txcorp.com:8080/' $
       + 'opendap/data/hdf5/' $
       + 'a6_electrons_10.h5'
dap = txdap_new(url)
var = dap['group']
contour, var[*]
```

Questions?

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