



Science Gateways for Large Data Applications

Data Analysis on Ranger
October 23-24



Two Examples Developed at Cornell

- High Resolution Daily Temperature and Precipitation Data for the Northeast United States
- Massive Pulsar Surveys using the Arecibo L-band Feed Array (ALFA), Cornell



High Resolution Climate Data

High Resolution Daily Temperature and Precipitation Data for the Northeast United States

<http://compag.tc.cornell.edu/sciencegateway/>

Data were developed by the [Northeast Regional Climate Center](#) (NRCC) and are updated daily. The data are accessible as an XML stream via Web Services.

The database that houses these data and the Web Services that provide access to these data are hosted by the [Cornell Center for Advanced Computing](#) (CAC) and funded through the [Computational Agriculture Initiative](#).



High Resolution Climate Data

- Specify date and region, get data on:
 - Daily Minimum Temperature
 - Units: degrees Centigrade
 - Date Range: 7/2/2004--yesterday
 - Daily Maximum Temperature
 - Units: degrees Centigrade
 - Date Range: 7/2/2004--yesterday
 - Daily Total Precipitation
 - Units: millimeters
 - Date Range: 7/2/2004--2 days ago



High Resolution Climate Data

Retrieve data using Web Services:

- [GetDEMOneLocation](#)

request data for one spatial location for one or more days

- [GetDemData](#)

request data for an area defined by a latitude/longitude box for one or more days

- <http://compag.tc.cornell.edu/NRCC/service1.asmx>



Example A: GetDEMOneLocation

```
emacs@WYNTON
File Edit Options Buffers Tools Python Help
import SOAPpy
url = 'http://compag.tc.cornell.edu/NRCC/service1.asmx?'
ws = SOAPpy.WSDL.Proxy(url + '?WSDL')

#Example 1
startDate = '7/4/2007';
endDate = '7/5/2007';
variable = 'maxt';
lat = '42.45';
long = '-76.45';

print "=", ws.GetDEMOneLocation(weatherStartDate=startDate,weatherEndDate=en
sdDate,weatherVariable=variable,latitude=lat,longitude=long);

#Example 2
startDate = '6/25/2006';
endDate = '6/30/2006';
variable = 'prec';
lat = '42.06';
long = '-75.55';

print "=", ws.GetDEMOneLocation(weatherStartDate=startDate,weatherEndDate=en
sdDate,weatherVariable=variable,latitude=lat,longitude=long);

--\-- GetDEMOneLocation.py All L18 (Python)-----
```

```
emacs@WYNTON
File Edit Options Buffers Tools Help
use SOAP::Lite;

my $ws = SOAP::Lite
-> uri('http://tempuri.org/')
-> on_action( sub { join '/', 'http://tempuri.org', $_[1]; } )
-> proxy('http://compag.tc.cornell.edu/NRCC/service1.asmx');

#Example 1
$startDate = '7/4/2007';
$endDate = '7/5/2007';
$variable = 'maxt';
$lat = '42.45';
$long = '-76.45';

print "=", $ws->GetDEMOneLocation(
SOAP::Data->name(weatherStartDate => $startDate)->type(string),
SOAP::Data->name(weatherEndDate => $endDate)->type(string),
SOAP::Data->name(weatherVariable => $variable)->type(string),
SOAP::Data->name(latitude => $lat)->type(string),
SOAP::Data->name(longitude => $long)->type(string)->result,"\n";

#Example 2
$startDate = '6/25/2006';
$endDate = '6/30/2006';
$variable = 'prec';
$lat = '42.06';
$long = '-75.55';

print "=", $ws->GetDEMOneLocation(
SOAP::Data->name(weatherStartDate => $startDate)->type(string),
SOAP::Data->name(weatherEndDate => $endDate)->type(string),
SOAP::Data->name(weatherVariable => $variable)->type(string),
SOAP::Data->name(latitude => $lat)->type(string),
SOAP::Data->name(longitude => $long)->type(string)->result,"\n";

--\-- GetDEMOneLocation.pl Top L14 (Perl)-----
```



Example B: GetDEMData

```
emacs@WYNTON
File Edit Options Buffers Tools Python Help

import SOAPpy
url = 'http://compag.tc.cornell.edu/NRCC/service1.asmx'
ws = SOAPpy.WSDL.Proxy(url + '?WSDL')

#Example 1
startDate = '7/4/2006'
endDate = '7/5/2006'
variable = 'maxt'
southLat = '42.40'
northLat = '42.50'
westLong = '-76.50'
eastLong = '-76.40'

print "=", ws.GetDEMData(weatherStartDate=startDate,weatherEndDate=endDate,weatherVariable=variable,northLatitude=northLat,southLatitude=southLat,eastLongitude=eastLong,westLongitude=westLong);

#Example 2
startDate = '6/25/2006'
endDate = '6/30/2006'
variable = 'prec'
southLat = '42.00'
northLat = '42.10'
westLong = '-75.50'
eastLong = '-75.40'

print "=", ws.GetDEMData(weatherStartDate=startDate,weatherEndDate=endDate,weatherVariable=variable,northLatitude=northLat,southLatitude=southLat,eastLongitude=eastLong,westLongitude=westLong);

--\-- GetDEMData.py All L24 (Python)-----
(No changes need to be saved)
```

```
emacs@WYNTON
File Edit Options Buffers Tools Help

use SOAP::Lite;

my $ws = SOAP::Lite
-> uri('http://tempuri.org/')
-> on_action( sub { join '/', 'http://tempuri.org', $_[1]; } )
-> proxy('http://compag.tc.cornell.edu/NRCC/service1.asmx');

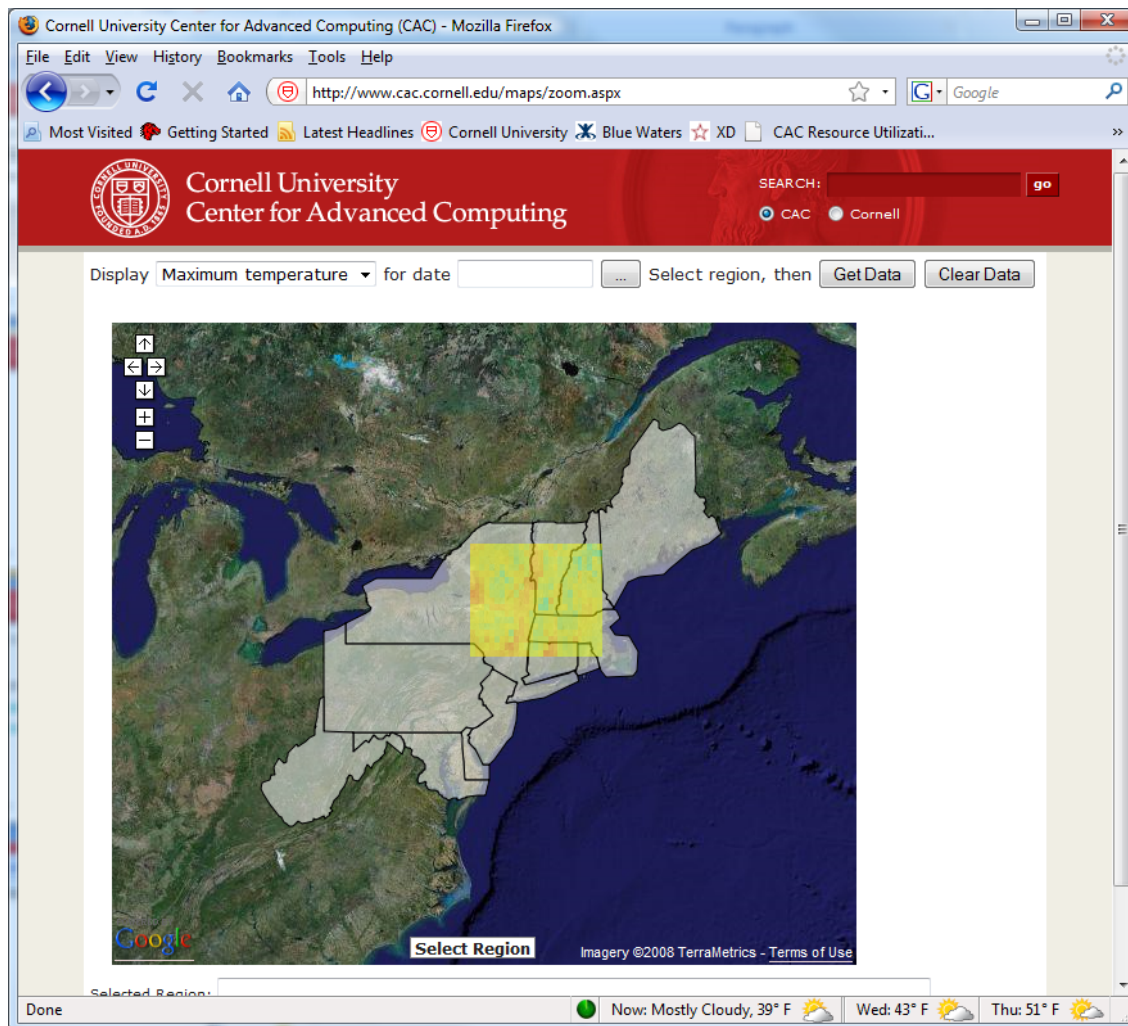
#Example 1
$startDate = '7/4/2006';
$endDate = '7/5/2006';
$variable = 'maxt';
$southLat = '42.40';
$northLat = '42.50';
$westLong = '-76.50';
$eastLong = '-76.40';

print "=", $ws->GetDEMData (
    SOAP::Data->name(weatherStartDate => $startDate)->type(string),
    SOAP::Data->name(weatherEndDate => $endDate)->type(string),
    SOAP::Data->name(weatherVariable => $variable)->type(string),
    SOAP::Data->name(northLatitude => $northLat)->type(string),
    SOAP::Data->name(southLatitude => $southLat)->type(string),
    SOAP::Data->name(westLongitude => $westLong)->type(string),
    SOAP::Data->name(eastLongitude => $eastLong)->type(string)->result, "\n";

#Example 2
$startDate = '6/25/2006';
$endDate = '6/30/2006';
$variable = 'prec';
$southLat = '42.00';
$northLat = '42.10';
$westLong = '-75.50';
$eastLong = '-75.40';

print "=", $ws->GetDEMData (
    SOAP::Data->name(weatherStartDate => $startDate)->type(string),
    SOAP::Data->name(weatherEndDate => $endDate)->type(string),
    SOAP::Data->name(weatherVariable => $variable)->type(string),
    SOAP::Data->name(northLatitude => $northLat)->type(string),
    SOAP::Data->name(southLatitude => $southLat)->type(string),
    SOAP::Data->name(westLongitude => $westLong)->type(string),
    SOAP::Data->name(eastLongitude => $eastLong)->type(string)->result, "\n";

--\-- GetDEMData.pl All L34 (Perl)-----
```





Massive Pulsar Surveys

Massive Pulsar Surveys using the Arecibo L-band Feed Array (ALFA)

<http://arecibo.tc.cornell.edu/legacypulsardata/>

<http://www.cac.cornell.edu/about/studies/Arecibo.pdf>



Massive Pulsar Surveys

Collect raw data



Arecibo Observatory

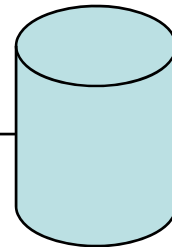
Mail portable hard
disks to CAC



Rhodes Hall, CU

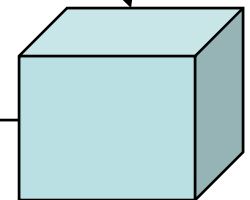
Load on
server

Astronomers perform
standard pulsar search
processing, producing
data plots and data
products



CAC database

Filter out
noise



CAC Servers



Massive Pulsar Surveys

The portal contains:

- Links to 'plots' of pulsar search information, power spectrum and histogram of pulsar amplitudes
- Downloads for dataproducts and the raw data files using an ftp client.



Massive Pulsar Surveys

B1957+20

Filename	MJD	Duration (s)	Sample Time (us)	No. Channels	Channel Bandwidth (kHz)	FileSize (GB)	DataPlots	RawDataFile
B1957+20.52396.016	52396.3875810185	430.08	102.4	256	390.625	1.998	Plots	Data and Dataproducts
B1957+20.52396.017	52396.3875810185	430.08	102.4	256	390.625	0.005	Plots	Data and Dataproducts
B1957+20.52397.028	52397.4342939815	600.064	102.4	256	390.625	1.998	Plots	Data and Dataproducts
B1957+20.52397.029	52397.4342939815	600.064	102.4	256	390.625	0.796	Plots	Data and Dataproducts