Update of the CERSER TeraScan Cataloguing System and the TeraScan Image Processing Scripts

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Introduction

Dixon-Patterson Hall which houses the TeraScan System

E.V. Wilkins Center that houses the CERSER serverv
Goals

- CERSER Script Failures
- Modify/Develop TeraScan Script
- Rewrite CERSER Processing Script
What is TeraScan?

- Purpose
- Satellite Data Reception
- Satellite Frequency
  - L-Band
  - Wavelength Range (1 - 2 GHz)
TeraScan

- 6 Different Channels/Bandwidths:
  - Channel 1 (visible) - Cloud cover and surface features during the day
  - Channel 2 (Infrared) - Low cloud/fog and fire detection
  - Channel 3 (Infrared) - Upper-level water Vapor
  - Channel 4 (Thermal Infrared) - Surface or cloud top temperature
  - Channel 5 (Thermal Infrared) - Surface or cloud top temperature and low-level water vapor
  - Channel 6 (Thermal Infrared) - Carbon dioxide band: Cloud detection
TeraScan

- Software platform on TeraScan: RedHat Linux
- Graphical User Interface (GUI’s)
  - TeraVision
  - TeraMaster
Data Processing in TeraScan

- Configuration Directory
  - batch.ingest
  - gvarin
  - gvar.local
- GOES VARIOUS Format
  (GVAR) data
TeraScan Modification Script

```
[jridgeway@ecsu-goes-east configproc]$ pwd
/opt/terascan/pass/configproc
[jridgeway@ecsu-goes-east configproc]$ 
```
Data Processing in TeraScan

```
$PASSDDIR/configproc/gvar.local

[Remap]
active: yes
function: simple_remap
output_files: Remap
scrub_age_hours: 480
{
  [GoesWest_CONUS]
  cover_area: GoesWest_CONUS
  cover_percent: 90
  sensor_resolution: yes
  input_directory: products/tdf/whole_pass/gvar
  input_files: 20*.gvar
  remap_variables: gvar_ch*
  output_template: %yyyy.%mmdd.%hhmm.%satel.gvar
  save_directory: products/tdf/Local/gvar/level1
  save_files: 20???.?????.?????.*.gvar

  [GoesEast_CONUS]
  cover_area: GoesEast_CONUS
  cover_percent: 90
  sensor_resolution: yes
  input_directory: products/tdf/whole_pass/gvar
  input_files: 20*.gvar
  remap_variables: gvar_ch*
  output_template: %yyyy.%mmdd.%hhmm.%satel.gvar
  save_directory: products/tdf/Local/gvar/level1
  save_files: 20???.?????.?????.*.gvar
}```
Area Of Interest

● Terminal
  ○ login to TeraScan Server
  ○ launchpad

● TeraMaster
  ○ create an area of interest (AOI) or Master
  ○ save AOI
Modifying Configuration File

- Script
  - `configproc`
  - `function`
  - `parameters`
- TeraVision
TeraMaster Modifications

[ GoesEast-Local ]
active: yes
cover_area: practiceMaster2
cover_percent: 90
sensor_resolution: yes
input_directory: products/tdf/whole_pass/gvar
input_files: 20*.goes-13.gvar
remap_variables: gvar_ch*
output_template: %yyyy.%mmdd.%hhmm.%satel.gvar
save_directory: products/tdf/Local/gvar/level1
save_files: 20??.*.????.*.gvar
TeraVision Images
TeraVision Images
CERSER Server Script Failures

- Update of the database
  - GOES data
- Directory Permissions
  - Picture Archives Directory
Server Side Script

- Languages used:
  - PHP
  - MySQL
  - HTML
- First used Active Server Page (ASP)
  - Was rewritten when switched from Windows to Macintosh
phpMyAdmin

- Introduction
- Project Use
ImageMagick

- Introduction
- Project Use
ICal

- Introduction
- Project Use
Parse Title to Database

- Title being used for database
- 36 characters
- "substr" a PHP function

```php
//CHECK and Process GOES Satellite Info
if (substr($satName, 15, 4) == 'goes') {
    $sat = substr($satName, 15, 7);
    $cnvrtDate = substr($satName, 5, 2) . '/' . substr($satName, 7, 2) . '/' . substr($satName, 0, 4);
    $cnvrtTime = substr($satName, 10, 4) . 'Z';
    if (substr($satName, 30, 1) == '1')
        $product = 'Channel 1 Visible 0.52-0.72 mm';
    else if (substr($satName, 30, 1) == '2')
        $product = 'Channel 2 Infrared 3.78-4.03 mm';
    else if (substr($satName, 30, 1) == '3')
        $product = 'Channel 3 Vapor 6.47-7.02 mm';
    else if (substr($satName, 30, 1) == '4')
        $product = 'Channel 4 Upper Vapor 10.2-11.2 mm';
    else if (substr($satName, 30, 1) == 's')
        $product = 'Sea Surface Temperature';
}
```
Parse Title to Database

2014.0305.1531.goes-13.gvar_ch1.tiff

<table>
<thead>
<tr>
<th>Characters</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>Year</td>
</tr>
<tr>
<td>6-7</td>
<td>Month</td>
</tr>
<tr>
<td>8-9</td>
<td>Day</td>
</tr>
<tr>
<td>11-14</td>
<td>Time(Z)</td>
</tr>
<tr>
<td>16-22</td>
<td>Satellite Name</td>
</tr>
<tr>
<td>24-31</td>
<td>Product (band)</td>
</tr>
<tr>
<td>32-36</td>
<td>File Extension (.tiff)</td>
</tr>
</tbody>
</table>
Checking for GOES Image

"IF" statement looks for "goes" starting at position 15.

2014.0305.1531.goes-13.gvar_ch1.tiff

```java
67 //CHECK and Process GOES Satellite Info
68 if (substr($satName, 15, 4) == 'goes')
```
Storing Satellite Name

Parsing the satellite name

2014.0305.1531.goes-13.gvar_ch1.tiff

70  $sat= substr($satName, 15, 7);
Storing Reformatted Date

Parse and reformat the date into month/day/year

2014.0305.1531.goes-13.gvar_ch1.tiff

```php
$cnvrtDate = substr($satName, 5, 2).'/'.substr($satName, 7, 2).'/'.substr($satName, 0, 4);
```
Storing Time

Parsing the Greenwich Mean Time (GMT)

2014.0305.1531.goes-13.gvar_ch1.tiff

```
$cnvrtTime = substr($satName, 10, 4) . 'Z'.
```
Storing the Product

Parsing the product from the image title

```c
if (substr ($satName, 30, 1)=='1')
    $product='Channel 1 Visible 0.52-0.72 &181;m' ;
else if (substr($satName, 30, 1)=='2')
    $product='Channel 2 Infrared 3.78-4.03 &181;m' ;
else if (substr($satName, 30, 1)=='3')
    $product='Channel 3 Vapor 6.47-7.02 &181;m' ;
else if (substr($satName, 30, 1)=='4')
    $product='Channel 4 Upper Vapor 10.2-11.2 &181;m' ;
else if (substr($satName, 30, 1)=='5')
    $product='Channel 5 Thermal IR 11.5-12.5 &181;m' ;
else if (substr($satName, 30, 1)=='6')
    $product='Channel 6 Thermal IR 12.9-13.7 &181;m' ;
else if (substr($satName, 30, 1)=='s')
    $product='Sea Surface Temperature' ;
```
## Parse Product to Database

### Products

<table>
<thead>
<tr>
<th>Option</th>
<th>Text String</th>
</tr>
</thead>
<tbody>
<tr>
<td>“1”</td>
<td>Channel 1 Visible 0.52-0.72 μm</td>
</tr>
<tr>
<td>“2”</td>
<td>Channel 2 Infrared 3.78-4.03 μm</td>
</tr>
<tr>
<td>“3”</td>
<td>Channel 3 Vapor 6.47-7.02 μm</td>
</tr>
<tr>
<td>“4”</td>
<td>Channel 4 Upper Vapor 10.2-11.2 μm</td>
</tr>
<tr>
<td>“5”</td>
<td>Channel 5 Thermal IR 11.5-12.5 μm</td>
</tr>
<tr>
<td>“6”</td>
<td>Channel 6 Thermal IR 12.9-13.7 μm</td>
</tr>
<tr>
<td>“S”</td>
<td>Sea Surface Temperature</td>
</tr>
</tbody>
</table>
Inserting Record into Database

- MySQL Query

```php
//Perform Insert Record Query
$query = "INSERT INTO images (imgDate, time, satellite, product, description, event) VALUES ('' . $cnvrtDate . '' , '' . $cnvrtTime . '' , '' . $sat . '' , '' . $product . '' , '' , 0)";

//Perform Query and place result into $result for troubleshooting
$result = mysql_query($query);
```
Resize/Rename/Copy IMG

- ImageMagick
  - Converted TIFF files to JPEG format
  - Resized images
  - Copy images into four directories:
    - Actual
    - Medium
    - Low
    - Thumbnail
Resize/Rename/Copy IMG

- Renaming image:
  - $lastID as variable
  - “mysql_insert_id()” PHP function
- Use $lastID to rename the new file

```php
116  //Obtain ID Number for this record
117  $lastID = mysql_insert_id();
```
START IMAGEMAGICK CONVERSIONS

$imageMagick = 'C:\Applications\ImageMagick-6.6.7\bin\convert.exe';

COPY original file and rename using lastID variable

$newfile = 'Actual/' . $lastID . '.tiff';

TESTING ONLY

if (!copy($orgFile, $newfile))
    echo "failed to copy $file...\n<br><br>";

$cnvrt = '/opt/local/bin/convert ' . $orgFile . ' Actual/' . $lastID . '.TIFF';
exec($cnvrt);

$cnvrt = '/opt/local/bin/convert ' . $orgFile . ' medium/' . $lastID . '.jpg';
exec($cnvrt);

$cnvrt = '/opt/local/bin/convert ' . $orgFile . ' -resize 50% low/' . $lastID . '.jpg';
exec($cnvrt);

$cnvrt = "$/opt/local/bin/convert -size 120x120 " . $orgFile . " -thumbnail 120x120^
-gravity center -extent 120x120 'thumbs/' . $lastID . '.jpg";"
exec($cnvrt);

DELETE Original File

echo "<br><br>DELETING ORIGINAL FILE<br><br>".$orgFile."<br><br>";
unlink($orgFile);
Results

• Images are able to process
• Permissions were changed:
  o Images can be modified for database
• Parsing of title is successful
• Resizing, Renaming, and Copying of images is still successful.
Conclusion

• Able to use GUI’s to modify/develop script in TeraScan
• Production of images, even though they are low in resolution
• Daily Automated Process was not completed
  o To process and finalize images to send from TeraScan server to CERSER server
• Images from TeraScan are reduced in size
• PHP is still a functioning language to process TeraScan produced images.
Future Work

• To accomplish a daily automated process of images from the TeraScan server to the CERSER server.
• To increase the image size of the pictures in the script and have a script that will connect from the TeraScan server to the CERSER server.
• Add channels to TeraScan software
• Rewrite script to add the NOAA satellite information.
• When other channels are added to the GOES.
Acknowledgements

• Dr. Linda Hayden
• Andrew Brumfield
• Seaspace
Demonstration

- http://cerser.ecsu.edu/
Questions?