Web Mapping Application for Operative Fire and Water Services

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MODIS

- MODIS is a sensor carried on both the Terra and Aqua satellites.
- It allows to obtain images in the morning (Terra) and in the afternoon (Aqua) for any distinct location.
- Its data spatial resolution are between 250 meters to 1 kilometer.
Introduction

Motivation

- Fire is an important ecosystem process affecting land cover change
- MODIS Sensor increases the ability to monitor fires from space
- Archive/Catalog connector has to be built.

NASA Models

Source: http://www.nasa.gov/topics/earth/features/fiery-past

Monthly Global Fire Activity
MODIS Data Products

- There are 44 MODIS data sets divided into 4 levels.

- MODIS data products are like a biological food web.

- Calibration and Geolocation.
Source: http://modis-atmos.gsfc.nasa.gov/products_flow.html

MODIS Data Work Flow
Design

- Data Layer
- Service Layer
- Front End Layer
System Workflow
System Workflow

Client → WEB-GIS
System Workflow
System Workflow

WEB-GIS

Client

Archive Connector

NASA Archive Catalog
(unprocessed data)

HTTP/FTP Request
Selected area
of interest

JSON Request

HTTP/FTP Response
Metadata about the matched files

Parsed metadata about the matched files

JSON Response
System Workflow

WEB-GIS

Client

Fetcher

Archive
Connector

HTTP/FTP
Request
Response
metadata about
the matched files

HTTP/JSON
Request
Response
JSON Response
parsed metadata
about the matched files

Data

NASA
Archive
Catalog
(unprocessed data)

Services

HTTP/FTP
Request
Response
matched files

HTTP/FTP
Request
Response
files to be downloaded
and processed
System Workflow
System Workflow
System Workflow
System Workflow

Web-GIS

Client

HTTP/JSON Request

JSON Request

Selected area of interest

HTTP/FTP Request

Download Request

WEB-GIS

Services

Fetcher

HTTP/FTP Request

Download Request

JSON Response

Metadata about the matched files

HTTP/FTP Response

Processed files

Connector

Process Chain

Saves the processed file back to the user

Pickup Folder

Checks the pickup folder periodically

Sends the file to be processed and exposed

Data

NASA Archive Catalog (unprocessed data)

Downloads the elected files to the selected destination

NASA Archive Catalog (unprocessed data)

Process Chain

GeoDB for processed MODIS products

References
Fetching Process

Source: http://www.celeryproject.org/

Celery Architecture
Conclusion

Results

- Web-based modules for the retrieval, processing and exposing of satellite-based crisis information to the process chain is built.
- Archive Connector maps the user input parameters to NASA-MODIS Data Archive.
- Fetcher module uses the Distributed Task Queue allowing the download process for multiple files to be executed asynchronously.
Limitations and Future Work

Limitations

- MODIS is an optical sensor and not a passive-microwave one.
- Cloud coverage leads to an average annual global unmapped area of 43%.
- The MODIS active fire product will only detect fires that are burning at the time of satellite overpass.

Future Work

- HDF files should be distributed across many machines in a cluster or cloud, which will result in a faster processing of the files.
- The tool should be able to fetch/retrieve HDF files from multiple archives depending on the availability of the archive servers.
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References


