CYBERINFRASTRUCTURE INTEGRATION RESEARCH CENTER

PERVASIVE TECHNOLOGY INSTITUTE

Project 3 – Support NASA Satellite data

March 10th 2022

Suresh Marru

Final Presentations

- Will skip mid-term recorded presentations
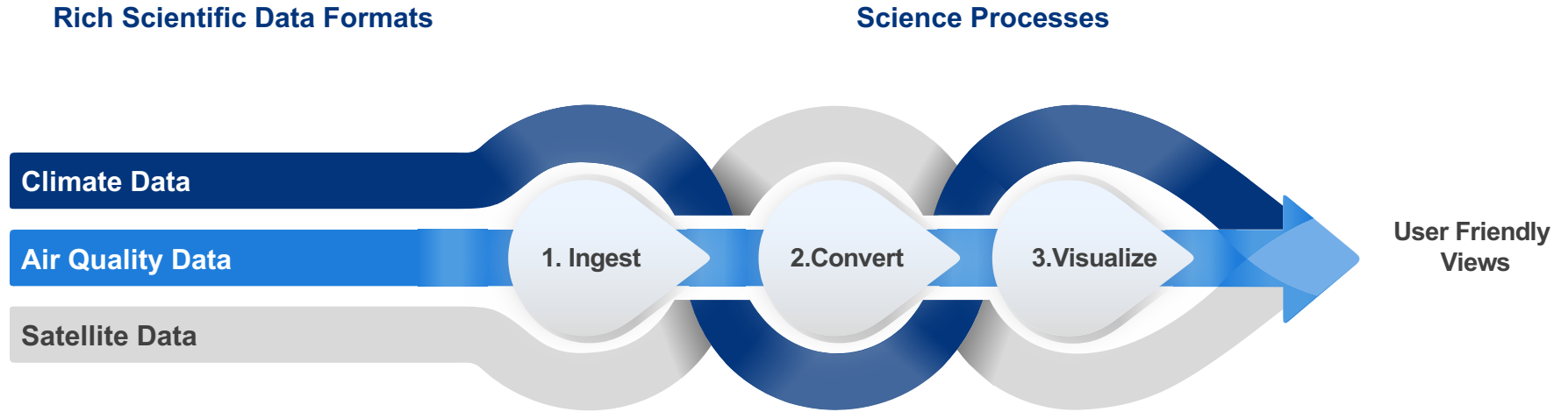- Will focus on Project 3 and Final presentations

Project 3 Due April 4th

- Complete the CI/CD pipeline to Automatically deploy on Jetstream VM's based triggered by a code commit.
- In addition to National Weather Service Radar, add support for NASA MERRA 2 Satellite Data
- Data ingest will add download data from an authenticated source.
- Convert data into cloud-friendly formats
- Store intermediate data sets
- UI should retain radar visualization plus add in satellite visualization.

Project 3 Step 1

- f you have not already done so, containerize each of your microservices using Docker.
- Establish CI/CD systems for each of your microservices, including tests.
  - You should be able to trigger builds and live deployments through GitHub commits to your "dev" and "release" code branches for each service.
- Use Kubernetes to manage the deployments of your containers
- Deploy your system on Jetstream2 using the OpenStack API
  - You can use Exosphere to get started, but need to graduate from it.
  - You should also automate/script the creation and management of your VMs and deployments of Kubernetes. A tool like Terraform from HashiCorp may be useful but isn't required.

Project 3 Data sets: NASA Earth Data - https://urs.earthdata.nasa.gov/

Rich Scientific Data Formats

Science Processes

Climate Data

Air Quality Data

Satellite Data

1. Ingest

2. Convert

3. Visualize
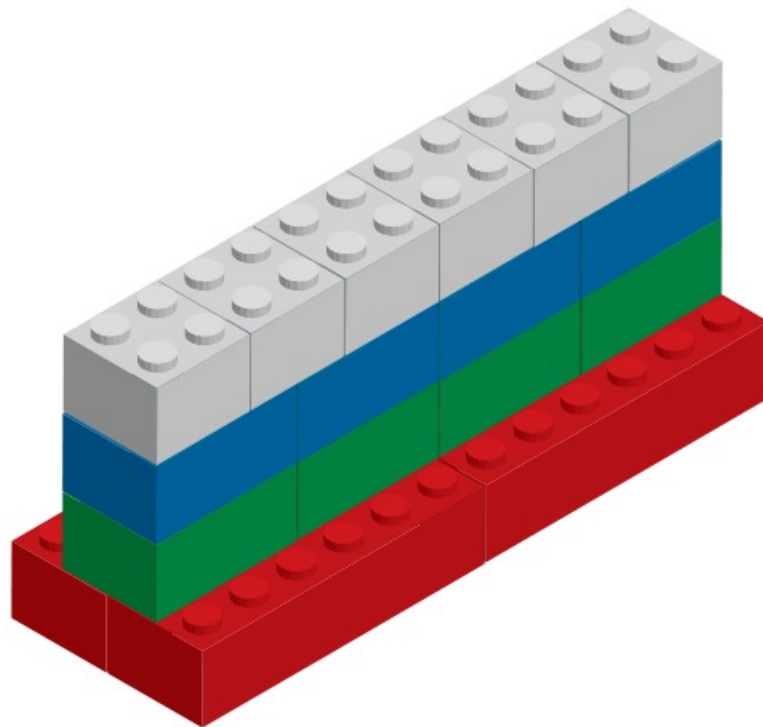
User Friendly Views

01   Add support for NASA MERRA 2
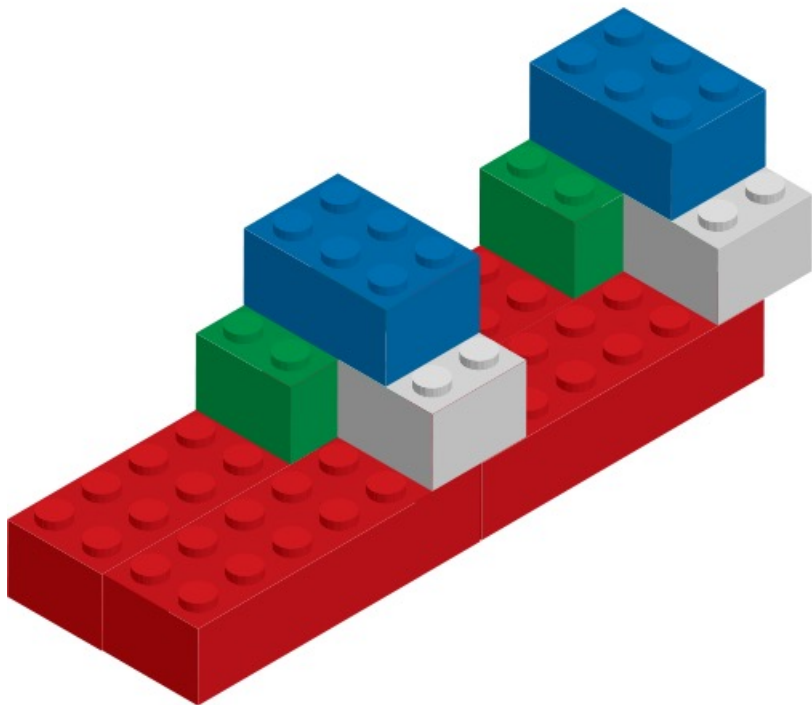
02   Add new Data Converters

03   Cache converted Data

04   Visualize Converted Data

Data Assimilation or Reanalysis

The Modern-Era Retrospective Analysis for Research and Applications – MERRA Version 2

Data type	MERRA-2 dates	Source
Conventional		
Raob, pibal, and dropsonde	1 Jan 1980–present	See Rienecker et al. (2011)
AIREP, PIREP, ASDAR, and MDCRS aircraft	1 Jan 1980–present	NCEP, ECMWF, and JMA
PAOB	1 Jan 1980–17 Aug 2010	BoM
Surface land	1 Jan 1980–present	NCEP
Surface ship and buoy	1 Jan 1980–present	ICOADS
Ground-based remotely sensed		
Wind profiler	14 May 1992–present	UCAR and NCEP
NEXRAD VAD wind	16 Jun 1997–present	NCEP
Satellite-derived wind		
GMS, MTSAT, and Himawari atmospheric motion vector	1 Jan 1980–present	NCEP and JMA
Meteosat atmospheric motion vector	1 Jan 1980–present	NCEP and EUMETSAT
GOES atmospheric motion vector	1 Jan 1980–present	NCEP
AVHRR atmospheric motion vector	**1 Oct 1982–present**	**CIMSS**
SSM/I surface wind speed	9 Jul 1987–4 Nov 2009	RSS
ERS-1 surface wind vector	5 Aug 1991–21 May 1996	ESA
ERS-2 surface wind vector	19 Mar 1996–29 Mar 2011	ESA
QuikSCAT surface wind vector	19 Jul 1999–22 Nov 2009	JPL
MODIS atmospheric motion vector	2 Jul 2002–present	CIMSS and NCEP
SSMIS surface wind speed	**23 Oct 2003–29 Oct 2013**	**RSS**
WindSat surface wind vector	**13 Aug 2007–4 Aug 2012**	**NCEP**
ASCAT surface wind vector	**15 Sep 2008–present**	**NCEP**
Satellite retrieved		
SBUV and SBUV/2 ozone	1 Jan 1980–31 Sep 2004	NASA GES DISC
SSM/I rain rate	9 Jul 1987–16 Sep 2009	NASA GES DISC
TMI rain rate	1 Jan 1998–8 Apr 2015	NASA GES DISC
MLS temperature	**13 Aug 2004–present**	**NASA GES DISC**
MLS ozone	**1 Oct 2004–present**	**NASA GES DISC**
OMI total column ozone	**1 Oct 2004–present**	**NASA GES DISC**
Radio occultation		
GPSRO bending angle	**14 July 2004–present**	**NCAR and NCEP**
Satellite radiance		
TOVS	1 Jan 1980–10 Oct 2006	NCAR and NESDIS
SSM/I	9 Jul 1987–4 Nov 2009	RSS
ATOVS (*NOAA-15*, *NOAA-16*, *NOAA-17*, and *NOAA-18*)	21 Jul 1998–present	NESDIS
GOES sounder (*GOES-8*, *GOES-10*, *GOES-11*, and *GOES-12* low resolution)	24 Apr 2001–31 Mar 2007	NCEP and NESDIS
AMSU-A (*Aqua*)	1 Sep 2002–present	NASA GES DISC
AIRS	1 Sep 2002–present	NASA GES DISC
GOES sounder (*GOES-11*, *GOES-12*, *GOES-13*, and *GOES-15* full resolution)	**1 Apr 2007–present**	**NESDIS**
ATOVS (*NOAA-19*, *MetOp-A*, and *MetOp-B*)	**21 May 2007–present**	**NESDIS**
IASI	**17 Sep 2008–present**	**NESDIS**
ATMS	**16 Nov 2011–present**	**NESDIS**
SEVIRI	**15 Feb 2012–present**	**NESDIS**
CrIS	**7 Apr 2012–present**	**NESDIS**

MERRA 2 Data Sources

https://disc.gsfc.nasa.gov/datasets/M2I3NPASM_5.12.4/summary

Data Converters

https://github.com/NASA-IMPACT/cloud-optimized-data-pipelines

https://pangeo-forge.readthedocs.io/en/latest/

https://github.com/orgs/stactools-packages/repositories

Data Visualization Reference Example

https://github.com/NASA-IMPACT/covid-dashboard