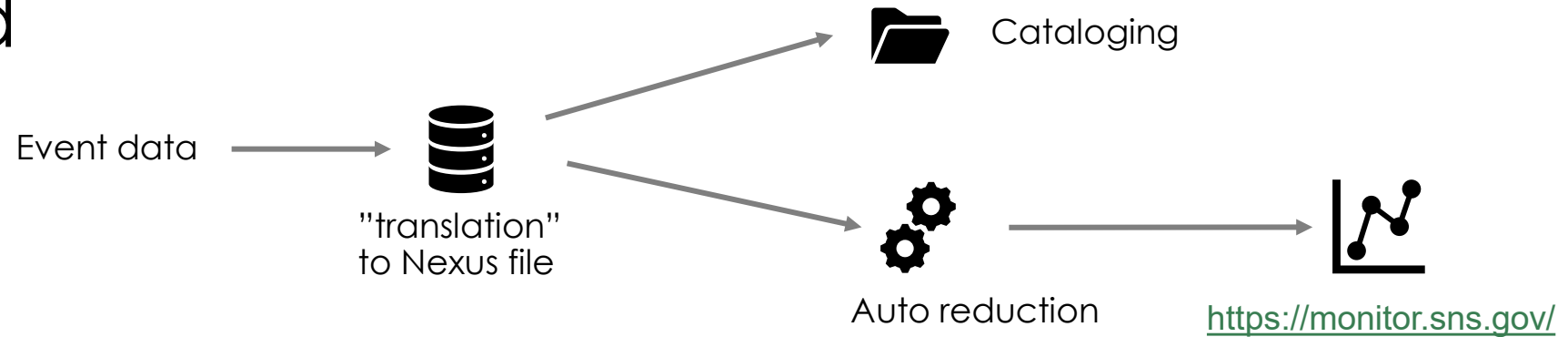


WebMon – overview and recent work

Marie Backman
June 5, 2024

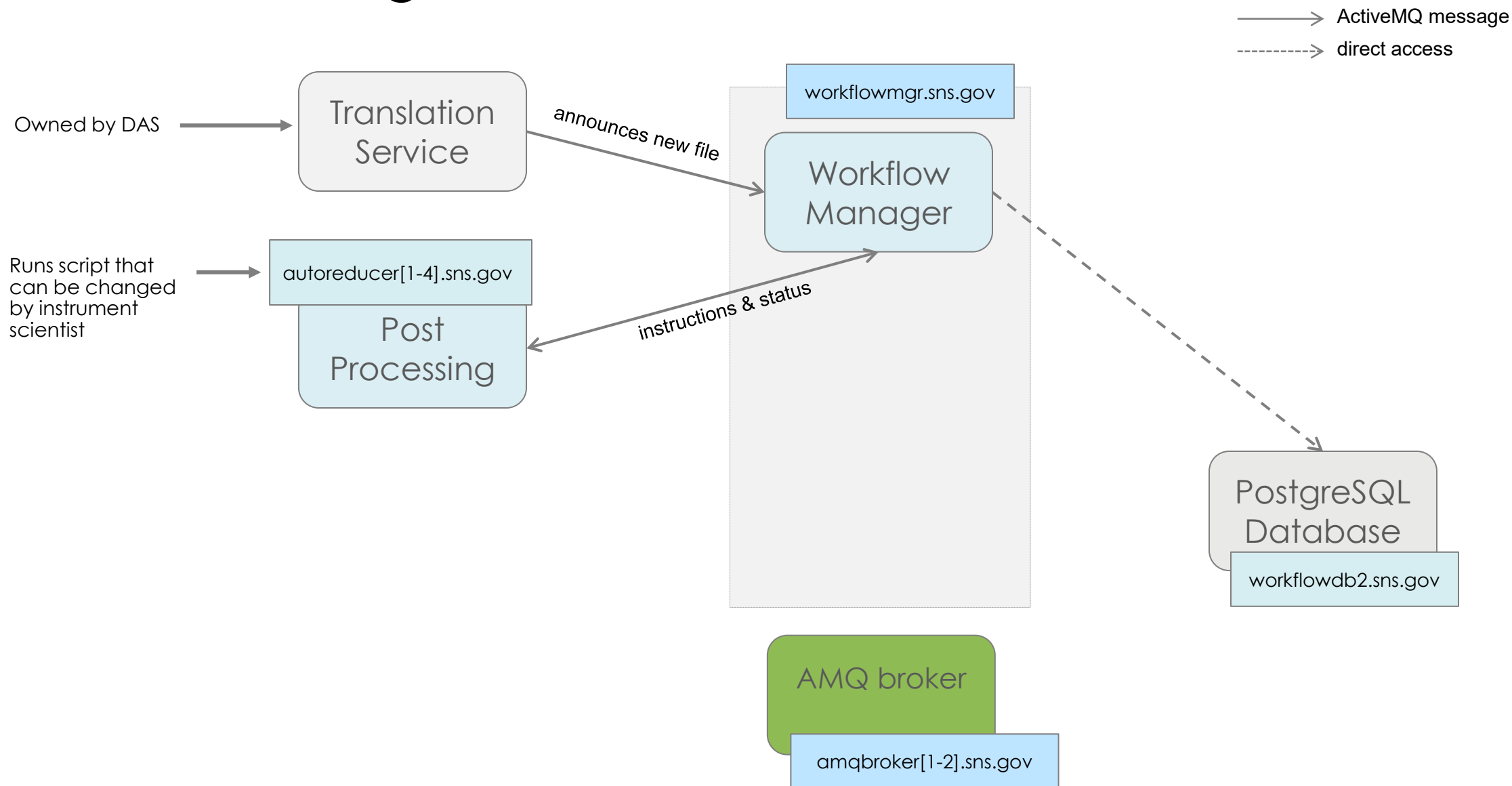
ORNL is managed by UT-Battelle LLC for the US Department of Energy

Background

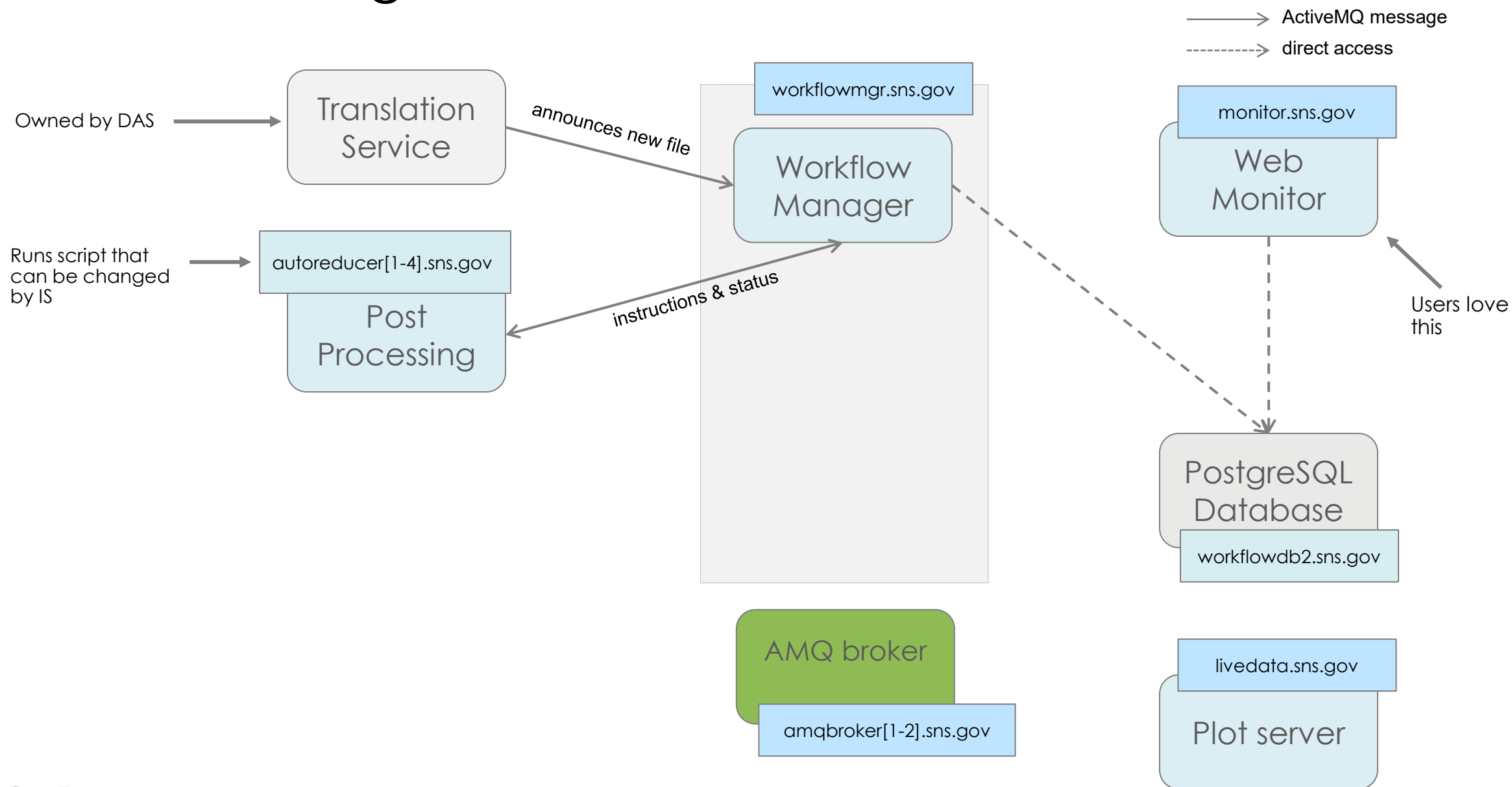


- Originally, “translation” to Nexus files was done after a run completed and took a lot of time
- Around 2012, the ADARA project changed everything to event streaming
 - “Translation” now starts at the beginning of the run
- As part of that effort, the automated reduction workflow was created
 - The web monitor was initially a diagnostics tool for developers but quickly became popular

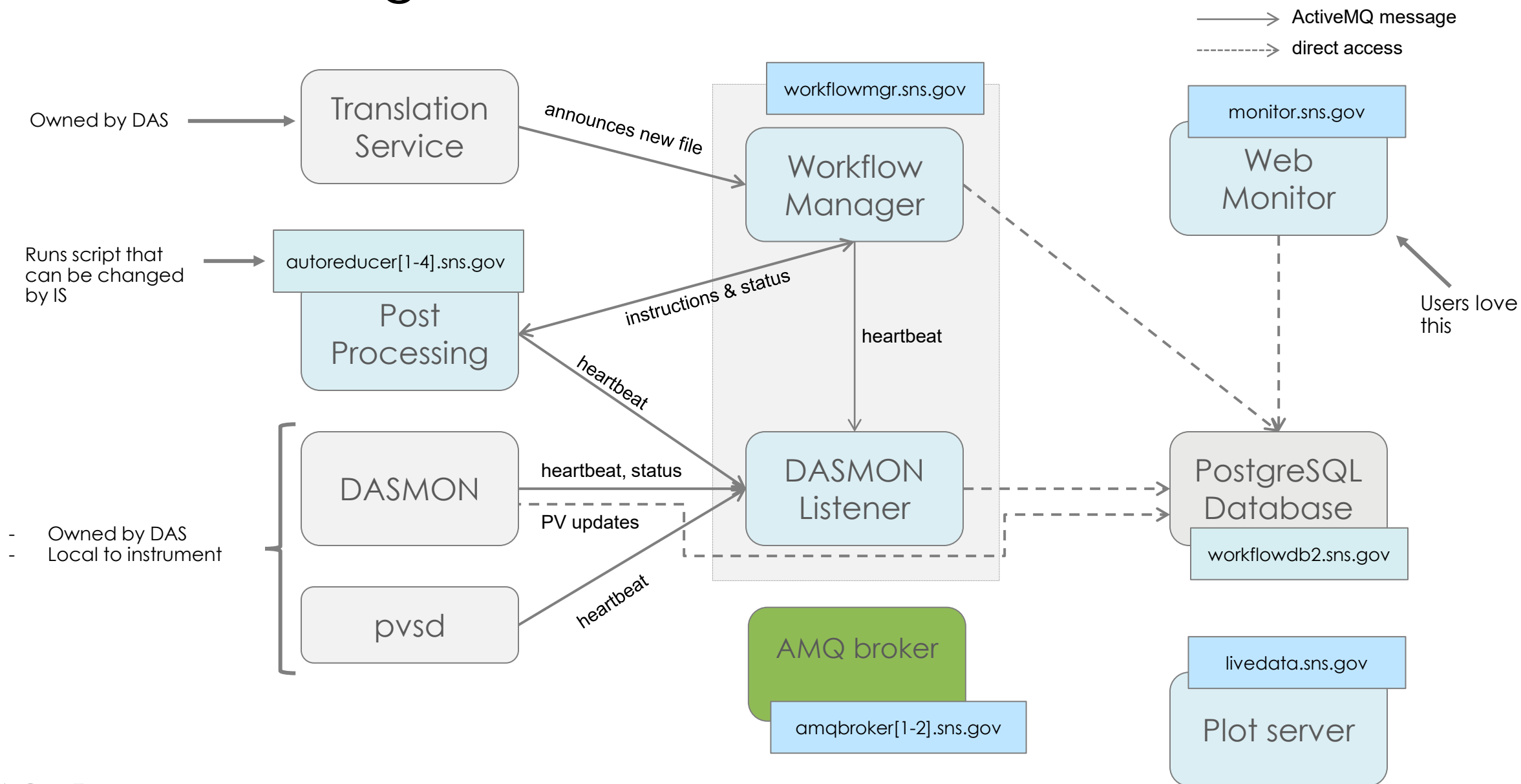
Post-Processing Architecture



Post-Processing Architecture



Post-Processing Architecture



Web monitor – monitor.sns.gov

- User-facing part of WebMon

Instrument Status

home > dashboard dashboard | extended dashboard | la

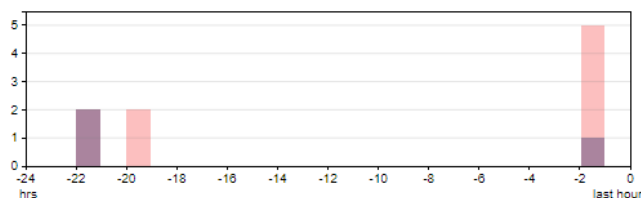
Central systems: Workflow

List of instruments:

Instrument	Status	Instrument	Status
ARCS	Stopped	HYS	Stopped
BL0	–	MANDI	Recording
BSS	Recording	NOM	Recording
CG1D	–	NOW4	–
CG2	Stopped	PG3	Recording
CG3	Stopped	REF_L	Stopped
CNCS	Recording	REF_M	Recording
CORELLI	Recording	SEQ	Recording
EQSANS	Stopped	SNAP	Recording
HB2A	–	TOPAZ	Recording
HB2B	Recording	USANS	Recording
HB2C	Stopped	VIS	Stopped
HB3A	–	VULCAN	Recording

HB2C IPTS-32242

home > hb2c > ipts-32242 live monitoring: status | runs | PVs



Last run: 1355250 from IPTS-7776 created on June 4, 2024, 10:25 a.m.

List of HB2C runs for IPTS-32242:

Show: 50

Search:

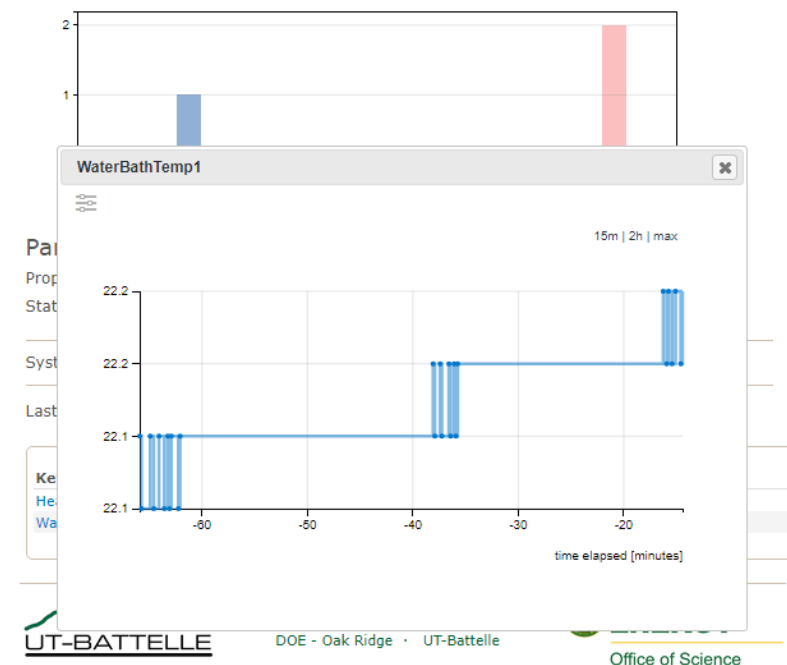
Run	Created on	Status
1342078	Apr 30, 2024, 10:38 a.m.	complete
1342077	Apr 30, 2024, 10:37 a.m.	complete
1342076	Apr 30, 2024, 10:37 a.m.	complete
1342075	Apr 30, 2024, 10:36 a.m.	complete
1342074	Apr 30, 2024, 10:36 a.m.	complete
1342073	Apr 30, 2024, 10:36 a.m.	complete
1342072	Apr 30, 2024, 10:35 a.m.	complete
1342071	Apr 30, 2024, 10:35 a.m.	complete
1342070	Apr 30, 2024, 10:34 a.m.	complete

Guest User | login

CG3 Process Variables

home > cg3 > monitor

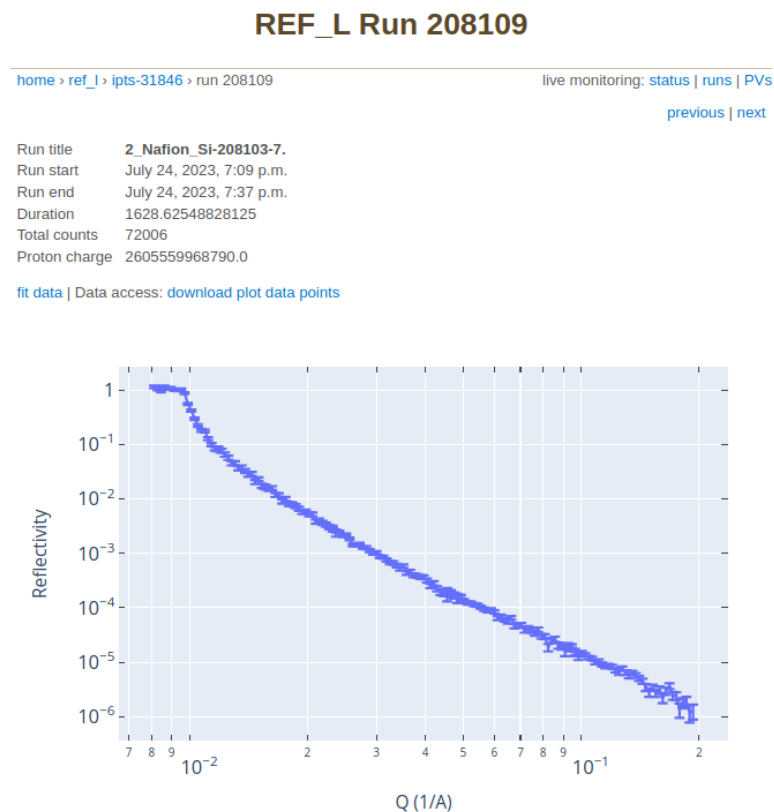
live monitoring: status | runs | PVs



Web monitor – monitor.sns.gov

Rerun cataloging and reduction

Configure autoreduction (IS only)



CNCS Configuration

home > cncs > configuration

Configuring the automated reduction

Instrument team members can use this page to generate a new automated reduction script.

- Click the submit button to create a new automated reduction script.
- Click the reset to populate the form with default values.
- The `reduce_CNCS.py` will automatically be overwritten once you click the submit button.

List of parameters for CNCS reduction template:

Raw vanadium	/SNS/CNCS/PTS-28950/nexus/CNCS_449014.nxs.h5		
Processed vanadium	van_449014.nxs		
Output directory			
Vanadium integration	min 49501.0	max 50501.0	
Motor names	omega		
Temperature names	SampleTemp,sampletemp,SensorB,SensorA,temp5,temp8,sensor0r		
Grouping file	powder ▾		
Create elastic nxspe	<input type="checkbox"/>		
Create MD nxs	<input type="checkbox"/>		
Energy in meV	<input type="checkbox"/>		
Energy binning	E _{min} -1.0	E _{step} 0.005	E _{max} 0.95
TOF offset	t ₀	Auto-fit t ₀ to get E=0 at elastic peak <input type="checkbox"/>	
Time independent bck	min	max	Perform TIB <input checked="" type="checkbox"/>
UB matrix	a 4.54	b 4.54	c 11.862
	alpha 90.0	beta 90.0	gamma 120.0
	u_vector -0.1019, -0.01	v_vector 1.0000, 0.018	
Masked Bank	Masked Tube	Masked Pixel	
		124-128	
		1-4	
36-50			
<input type="submit"/> <input type="reset"/>			

Latest post-processing log entries for CNCS:
No recent changes

Technologies

- ActiveMQ Classic message broker
- Python clients using the STOMP messaging protocol
 - Workflow manager
 - Dasmon listener
 - Autoreducer
- 2 Django apps
 - Web monitor (monitor.sns.gov)
 - Live Data Server (livedata.sns.gov)
- 2 PostgreSQL databases (workflowdb2.sns.gov and livedata.sns.gov)

Autoreducers / post-processing agent

- Repo: https://github.com/neutrons/post_processing_agent
- Postprocessing tasks it handles:
 - Cataloging of raw data in ONCat (<https://oncat.ornl.gov/>)
 - Users can download their data from ONCat
 - **Autoreduction**
 - **Runs instrument-specific data reduction script**
 - **Publishes plots to Live Data Server**
 - Cataloging of reduced data in ONCat
 - Adjusting parameters in the autoreduction scripts (available to instrument scientists)
- 4 instances running on autoreducer[1-4].sns.gov

Testing strategy

- Unit tests
- System tests part of CI and for local development
 - System of 11 docker containers for message broker, clients, DB, web server etc.
 - https://github.com/neutrons/data_workflow/blob/next/docker-compose.yml
- Developer test environment in CADES – webmon-test.ornl.gov
 - <https://code.ornl.gov/sns-hfir-scse/infrastructure/neutrons-test-environment>
- <https://data-workflow.readthedocs.io/en/latest/developer/index.html>

RHEL 7 – RHEL 9 upgrade

- The SNS/HFIR servers were running Red Hat Enterprise Linux 7 (RHEL 7) (EOL: 2024-06-30)
- Neutrons Data Project responsibility: port our (mainly data reduction) software from RHEL 7 to RHEL 9
- Python 2 is not distributed with RHEL 9
- Why not containerize everything?
 - Growing tech debt
 - Cyber security!

Porting Post-Processing Agent

- Removed obsolete code
- Added integration tests with containerized ActiveMQ broker and agent
- Migrated from Python 2.7 to Python 3.9 (RHEL 9 default Python version)
- Still distributed as RPM (RPM Package Manager)

Porting Live Data Server

- Serves plots to monitor.sns.gov
- Production instance used Apache HTTP Server, but initial work had been done in the test environment to move to Nginx and containerize Live Data Server
- Migrated from Python 2.7 + Django 1.9 to Python 3.6 + Django 2.0
 - Story in the backlog to move to latest Python, Django and PostgreSQL
- Tested new RHEL 9 production with WebMon test environment
- Purged old data to shrink PostgreSQL DB from 1.4 TB to 550 GB

Migration from ActiveMQ Classic to ActiveMQ Artemis

- Main difference was message addressing and routing
- Classic has queues (point-to-point) and topics (publish-subscribe)
- Artemis only has queues and uses addresses to achieve different routing mechanisms.
 - Multicast routing: all subscribers to the address get their own queue
 - Anycast routing: only one queue for the address that all consumers subscribe to
- <https://activemq.apache.org/components/artemis/migration-documentation/>

Thank you!