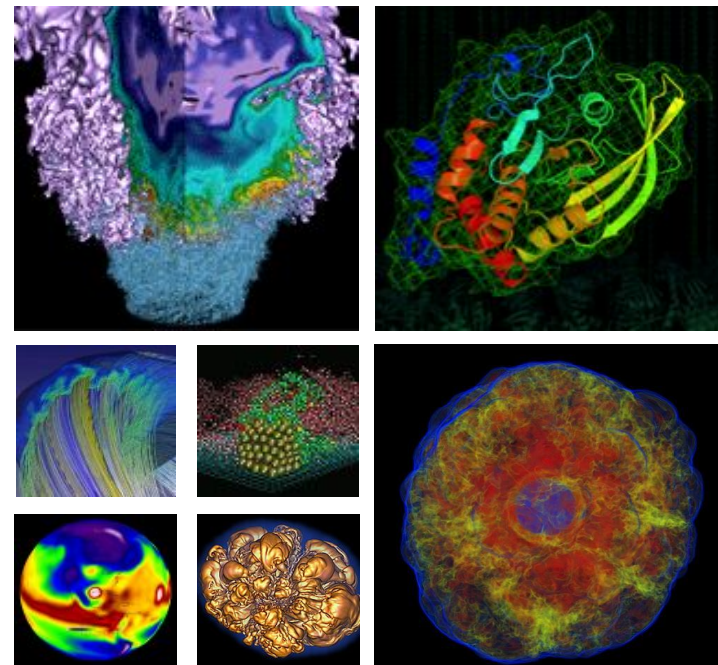


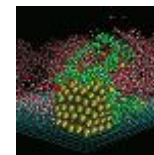
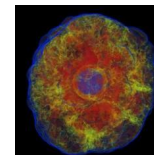
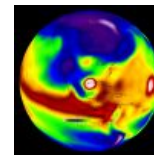
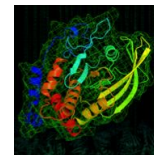
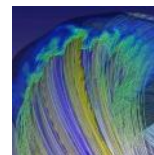
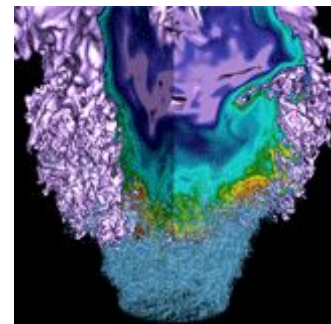
Crayport to HPE DCE Migration: Bidirectional Incident Management for ServiceNow and HPE DCE



John Gann, Daniel Gens

Cray User Group, May 2022

NERSC \leftrightarrow Crayport Integration



Overview



- ServiceNow: NERSC internal ITSM system + User Helpdesk
- Communication with Cray by email or phone:
 - Delays, errors, manual data entry, increased MTTR
- Constant interactions between NERSC and Cray engineers

1,670 cases opened

~640 engineer hours saved

6,098 case updates synced

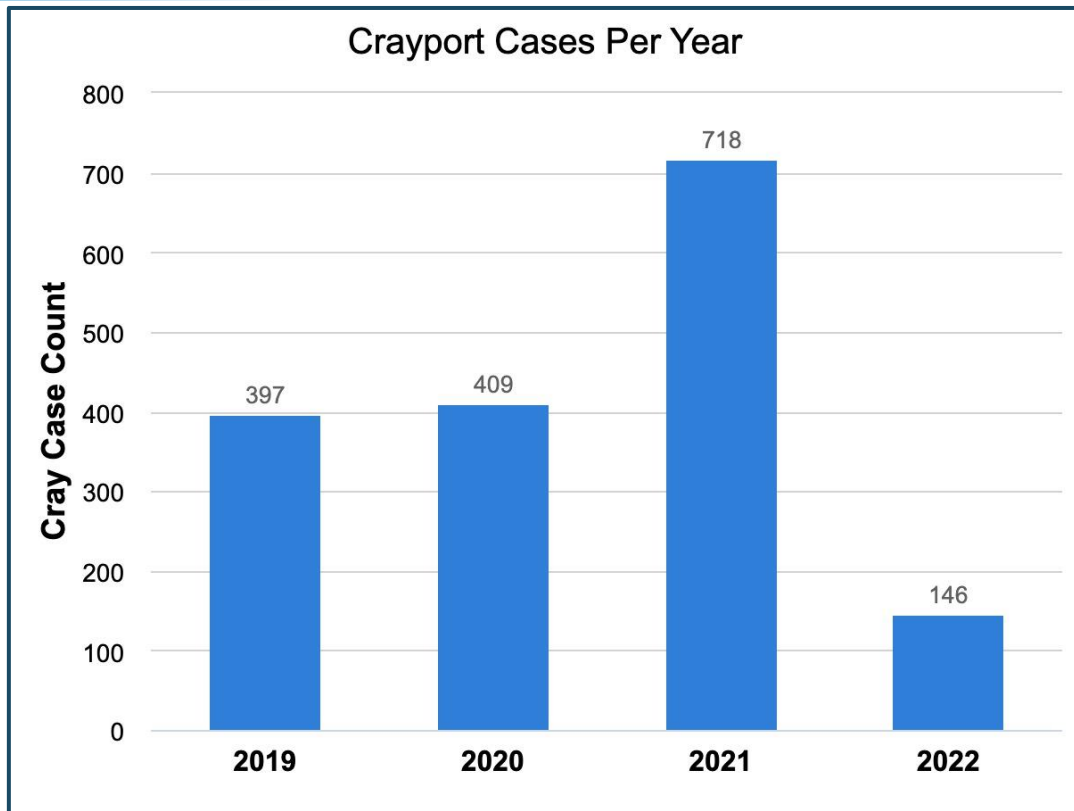
1. Autonomous secure workflow
2. Reduced data entry errors
3. Reduced latency for joint troubleshooting
4. Improved tracking for hardware and software problems
5. Consolidated UI - NERSC “one stop shop” for Cray cases
6. Increased reporting granularity for NERSC

- **For new issues:**
 - Opening new Cray cases from ServiceNow
 - Linking existing cases to ServiceNow records
- **For ongoing issues:**
 - Case details automatically synced between 2 platforms:
 - Priority, title, description
 - Comments
- **For closed issues:**
 - Issue state and resolution notes synced

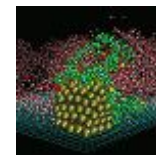
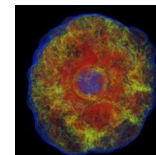
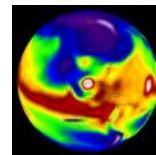
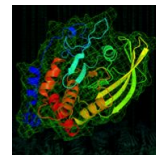
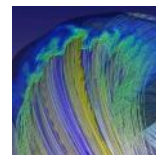
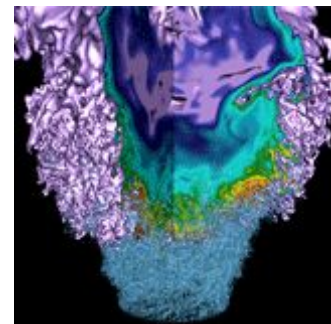
Crayport Retirement



- Feb 2019 - NERSC <> Crayport integration in production
- Feb 26, 2022 - HPE Digital Customer Experience (DCE) replaces Crayport



GSEM - API engine for HPE Digital Customer Experience



GSEM vs Crayport API



- Crayport API replaced by GSEM engine
- What's different:
 - Increased security
 - More complex data flows
 - REST-based (Crayport) -> queue-based (GSEM)

GSEM Security Requirements

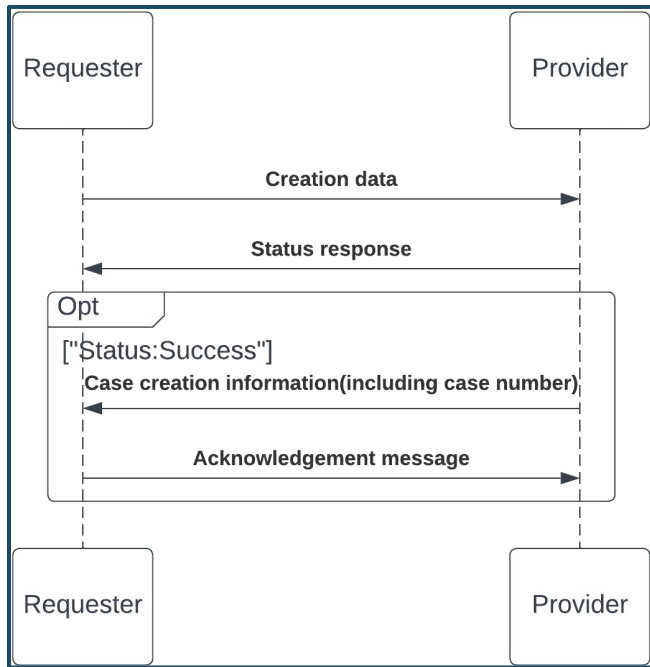


- *Crayport*: Basic authentication + Token verification
- *GSEM*: Connections authorized only after SSL registration with HPE
 - Certificate must be issued by HPE-approved CA
 - Every request must be signed with registered SSL certificate

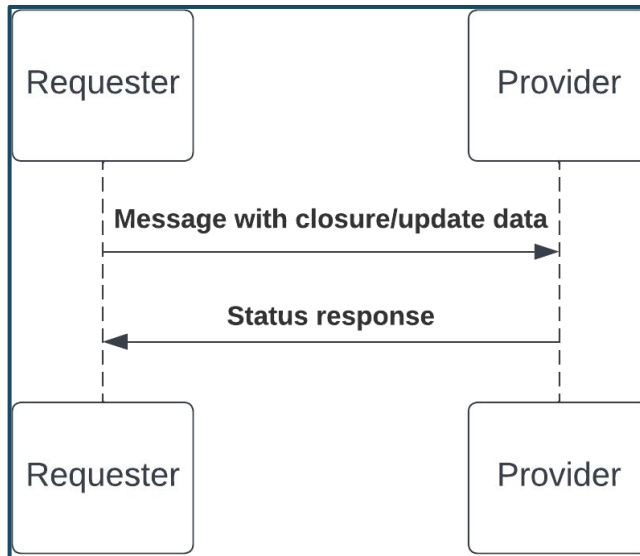
Data flow - Sequence diagrams



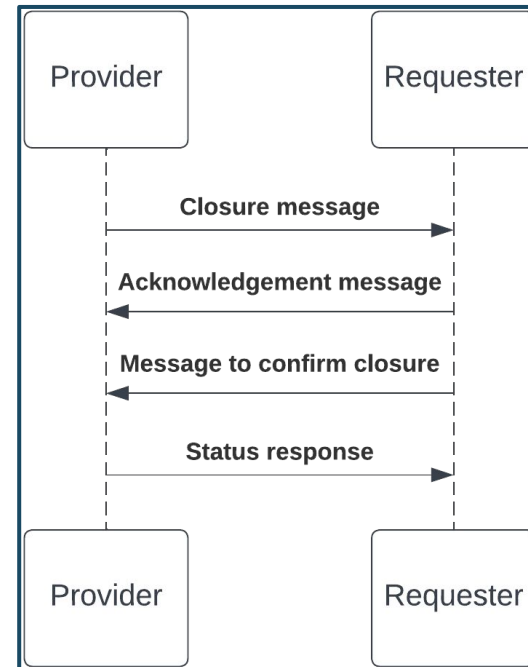
Opening a new case:



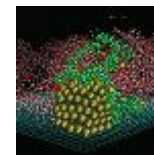
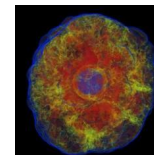
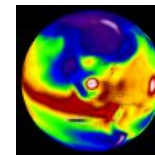
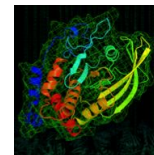
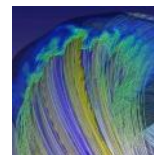
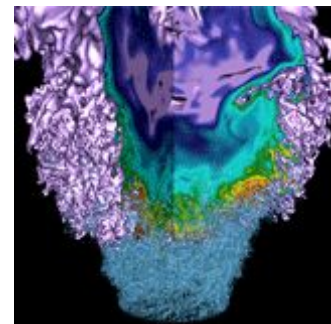
NERSC closing/updating a case:



HPE closing a case:



NERSC <> GSEM Integration



- **For new issues:**
 - Opening new HPE cases from ServiceNow
- **For ongoing issues:**
 - Case state changes pushed and tracked in ServiceNow
 - Case comments automatically synced between 2 platforms
 - New or updated Onsite Tasks and/or Part Orders pushed and tracked with detailed updates, including state, ETA
- **For closed issues:**
 - Issue state and resolution notes synced
 - Case closure initiated by NERSC in ServiceNow or by HPE in HPE DCE

Architecture Overview



Hybrid approach to satisfy HPE security requirements

- Frontend configuration and user interface served via ServiceNow - lightweight and familiar
- Backend functionality split between ServiceNow and a local middleware server

Frontend - NERSC Incident



One-time critical issues or alerts

< Incident - INC0180415 Update & Exit Save & Stay **Open HPE Case** Resolve Incident

Number	INC0180415	Opened	2022-02-02 13:52:59
* User	Operator, NERSC (oper: [search] [grid] [info])	Opened by	Lalli, Basil (bdlalli) [info]
* Resource type	Computational Systems	Updated by	jstife
Resource	Perlmutter [search] [grid] [warning] [info]	Updated	2022-02-05 19:11:24
* Category	Software	* Contact method	Staff Initiated
Subcategory	-- None --	Assigned group	Perlmutter Admin [search] [info]
State	Awaiting Vendor	Assigned to	[search]
Major Issue	<input type="checkbox"/>	* Staff Owner	Lalli, Basil (bdlalli) [search] [info]
Impact	2 - Medium	Watch list	[lock] [share]
Urgency	2 - Medium	Internal Watch list (private info)	[lock] [share]
Priority	3 - Moderate	Share with NERSC Projects	[lock]
* Title	Perlmutter nid001072, nid001073 -- compute nodes down, unresponsive [lightbulb] [document]		

Frontend - NERSC Problem



< ≡ Problem - PRB0040532 [Pencil] [Line graph] [More] [Update] **Open HPE Case** ↑

Number	PRB0040532	State	Open
* Category	General	Opened	2021-11-23 07:04:39
Subcategory	-- None --	Opened by	Botts, James (jfbotts) ⓘ
Configuration item	Perlmutter [Q] [Grid] [Warning] ⓘ	Closed	
Priority	3 - Moderate	Closed by	
Known error	<input type="checkbox"/>	Assigned group	CSG POC [Q] ⓘ
Vendor case		Assigned to	[Q]
Internal Watch list (private info)	[Lock] [User]		
* Title	perlmutter compute nodes get stuck in completing trying to delete a job_container directory that has alre [Lightbulb] [Print]		

Ongoing/repeated issues or bugs

Frontend - New HPE Case



New case submission form in ServiceNow:

Shows case info before submission to GSEM

API

New HPE Case

* System Parent

Priority

* Title

* Description

Permutter `nid001072` and its partner `nid001073` are down at 13:46 PST. Nodes went down at the same time but were running different jobs at the time.

```
./getbdalli@permutter-mgr:~> ./getinfo.sh nid001072
```

NID: nid001072, XNAME: x1000c2s2b0n0

Sinfo Information:
#####

TIMESTAMP	HOSTNAMES	STATE	COMMENT	REASON
2022-02-02T13:46:11	<code>nid001072</code>	down*	Baselined	Not responding

Frontend - Existing HPE Case



Existing case form:

Shows case form in ServiceNow
after submission to GSEM API

< ☰ HPE Case - 5320917429 📎 📈 ⋮ Update View in HPE DCE Portal Close

HPE Case Number	5320917429	Opened	2022-04-08 18:36:53
System	Perlmutter ⓘ	Opened by	Gens, Daniel (dygens) ⓘ
State	New	Parent	INC0180415 ⓘ
Priority	Medium ▾	Reference ID	INC0180415_2
Active	<input checked="" type="checkbox"/>	Has Onsite Task	<input type="checkbox"/>
		Has Part Order	<input type="checkbox"/>

* Title ⓘ 📄

Description

./getbdlalli@perlmutter-mgr:-> ./getinfo.sh nid001072

NID: nid001072, XNAME: x1000c2s2b0n0

Sinfo Information:

TIMESTAMP	HOSTNAMES	STATE	COMMENT	REASON
2022-02-02T13:46:11	nid001072	down*	Baselined	Not responding

Additional comments (Customer visible)

All comments will be uploaded to this case's record in HPE DCE Portal.

- Outgoing transactions
 - Submitted to local server backend via HTTP POST messages
 - Covers case submission, outgoing case updates, NERSC-initiated case closure with resolution notes
- Incoming transactions
 - Custom REST API endpoint in ServiceNow
 - Processes and acknowledges incoming HTTP POST messages from GSEM engine
 - Covers incoming case updates, part order and onsite task updates, HPE-initiated case closure with resolution notes

- Deployed in NERSC internal network
- Performs two functions:
 - SSL Certificate validation - not possible directly from ServiceNow
 - JSON format translation

Alternate approach: GSEM Queue



- Alternative to inbound HTTP: GSEM Queue
- Our original design: Much more complex than final version
- Good option to be aware of depending on your infrastructure

Current status



- Our code has been completed and tested
- Currently waiting for local EULA approval
- Move to production upon approval
- Plan to release all components as open source



Thank You



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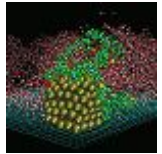
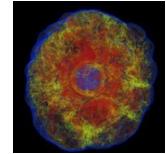
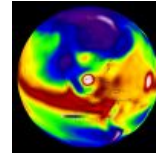
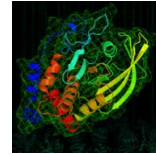
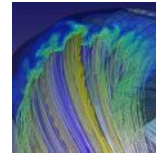
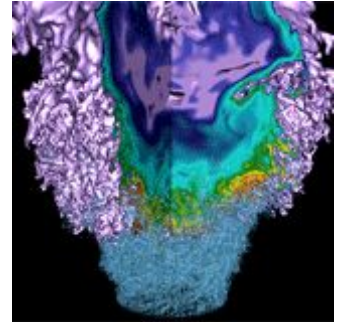
Contact Information



John Gann, jgann@lbl.gov

Daniel Gens, dygens@lbl.gov

Q&A

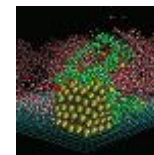
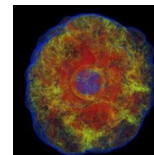
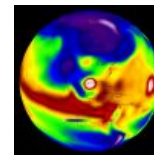
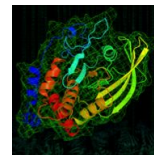
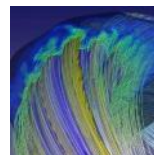
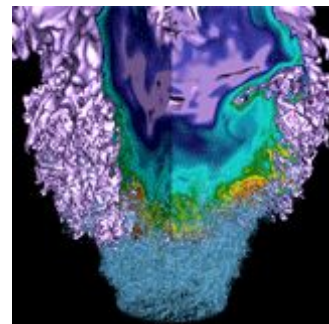


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Intro to NERSC

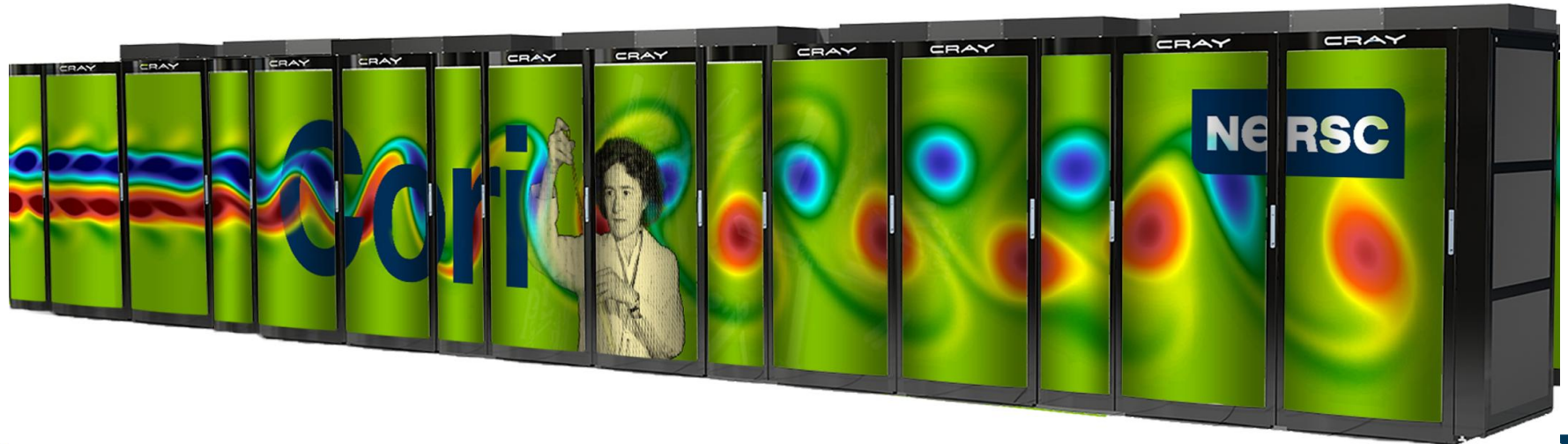


- NERSC is the mission HPC facility for the DOE Office of Science
- ~8,000 annual users
- ~1,850 Institutions and National Labs
- 2015 Nobel Prize in Physics supported by NERSC systems and data archive

Cori: XC-40



- 2,388 Intel Xeon "Haswell" processor nodes
- 9,688 Intel Xeon Phi "Knight's Landing" processor nodes
- 1.8 PB Cray DataWarp Burst Buffer
- 28 PB Lustre Filesystem



Perlmutter: Shasta



- 3x to 4x Cori, Larger and more complex
- AMD CPU only nodes and GPU Nodes
- Slingshot interconnect
- All Flash Lustre Filesystem
- Designed for large scale simulation and data analysis from experimental facilities

