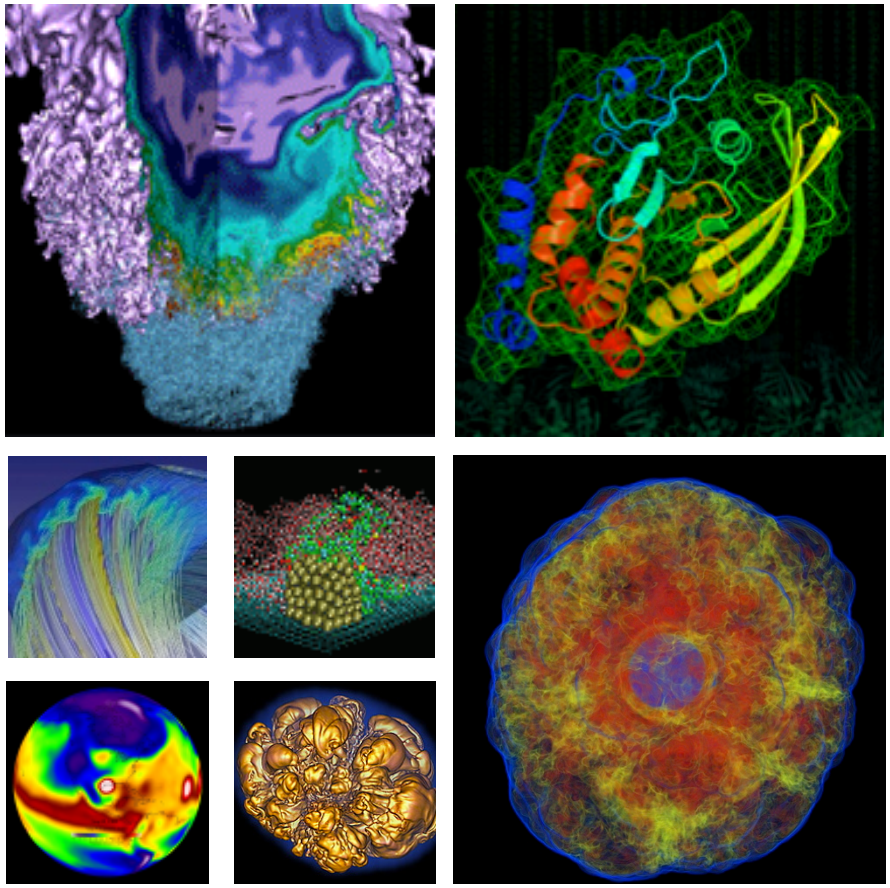
NEWT Tutorial
NUG 2013



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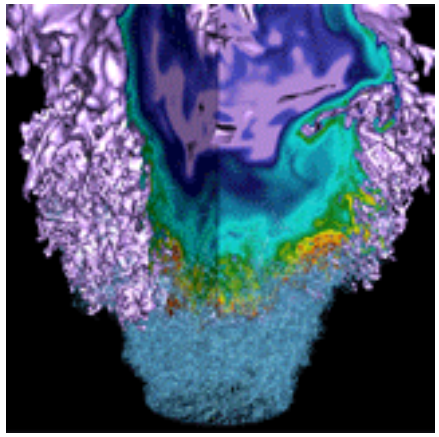
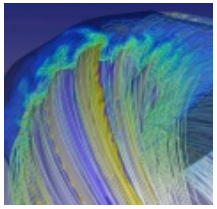
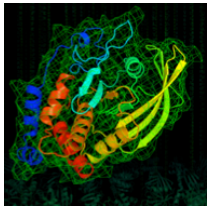
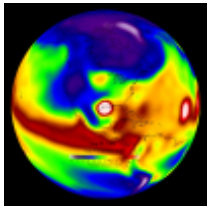
February 15, 2013

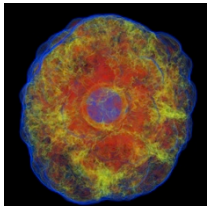
Introduction

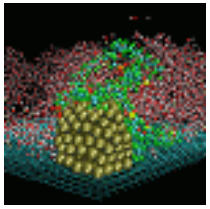










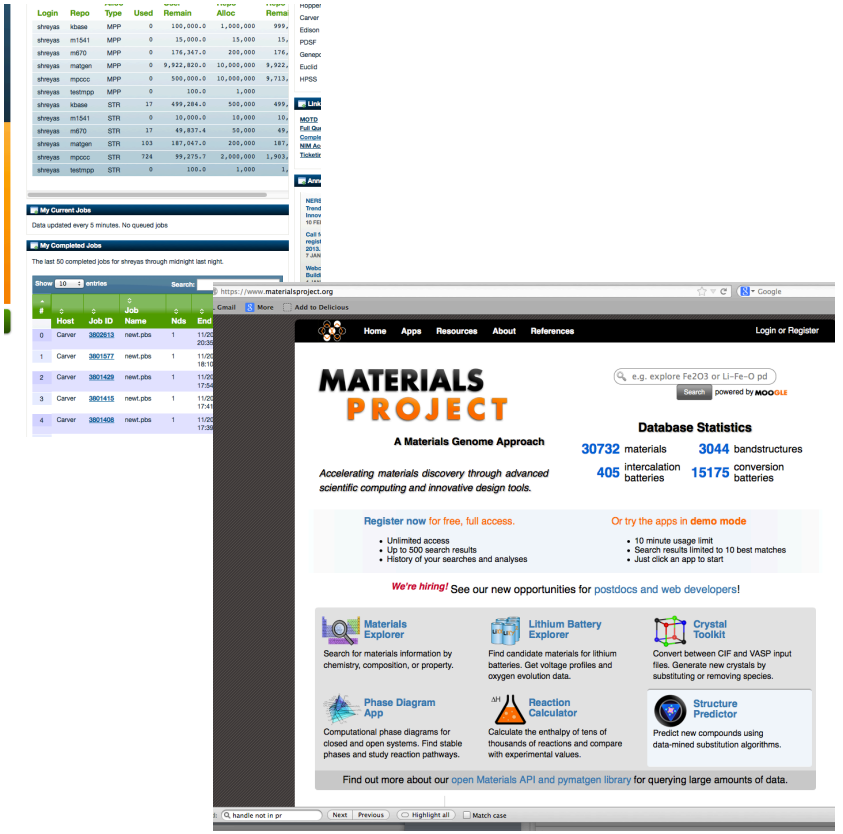


Science on the Web

- **Increasing demand for access to NERSC via the web**

We now have

- **Several Science Gateways**
- **"My NERSC" web interface**
- **NERSC Mobile App**



What this tutorial is about

- Building your own web interface aka “Science Gateway” to NERSC
- How to use a Web API to access NERSC
- Using Javascript/HTML5 to access jobs, files, NIM, interactive commands, custom data stores, system information etc.

NEWT = Nice and Easy Web Toolkit

- Harnessing the power of this little guy

Web APIs

- Making a service available over an http URL
- When you query the URL in conjunction with a command and parameters, you get back structured data
- Web APIs ubiquitous in the commercial world

Try it now

- **Simple API examples:**
  - Twitter API

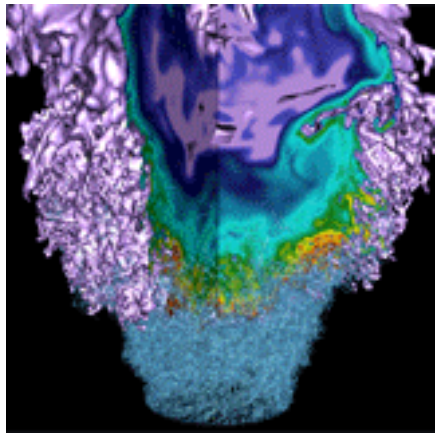
    http://search.twitter.com/search.json?q=nersc
  - NEWT

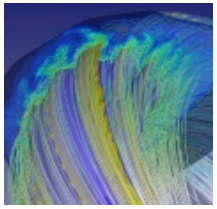
    https://newt.nersc.gov/newt/status/

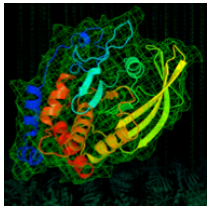
- **Notice that we query a URL and get back structured data.**

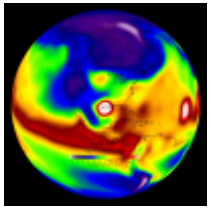
- **To learn more about APIs**
  - http://www.programmableweb.com/

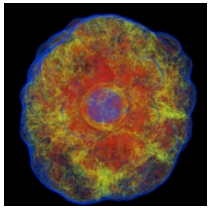
Getting Started with NEWT

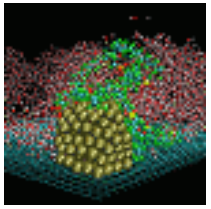












The 1-minute intro to REST APIs

- **Use HTTP verbs in conjunction with URLs**
  - GET, POST, PUT, DELETE
- **Verb + URL + parameters = function call**
- **Return structured data**
- **For instance:**

VERB	RESOURCE	DESCRIPTION
POST	/queue/R	Submits POST data to queue on R; returns job id
GET	/file/R/path/	Returns directory listing for /path/ on R
GET	/account/user/U	Returns user account info for U
DELETE	/queue/R/id	Deletes jobs from Queue

REST Examples

- **In Firefox:**
  - https://newt.nersc.gov/examples/rest.html

GET /queue/hopper

GET /file/carver/etc/motd

POST /command/carver

- BODY: executable="ps aux"

JSON

- **NEWT returns data in JSON (JavaScript Object Notation) format**
- **Nested key-value pair structure**

Eg.

```
{"status": "OK",
"output":{"text": "Welcome to NEWT",
          "version": "0.3.0"},
"error": ""}
```

Note: JSON is native JavaScript

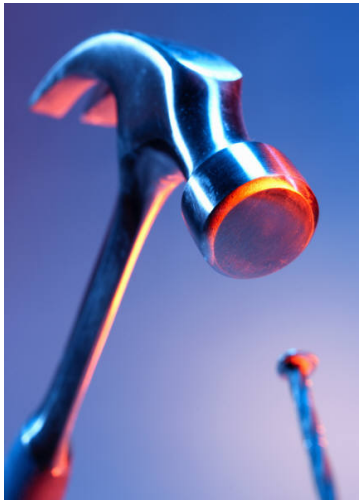
The /project connection

- **It is almost trivial to wire up your project directory to make it accessible over the web**
- **Create a file in your www directory**
  - mkdir /global/project/projectdir/<yourproj>/www
  - cd /global/project/projectdir/<yourproj>/www
  - vi index.html

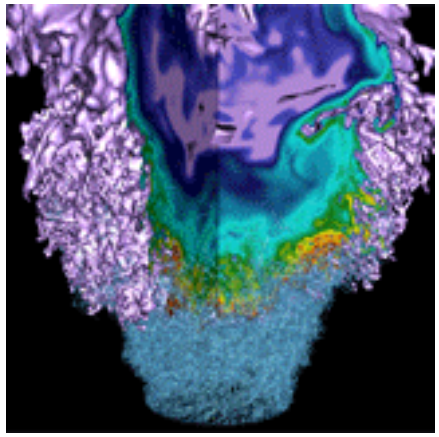
  <html>Hello World</html>
- **Make sure all the above files and directories are world readable**
  - chmod 775 /global/project/projectdir/<yourproj>/ etc.
- **Voila:**
  - http://portal.nersc.gov/project/<yourproj>/

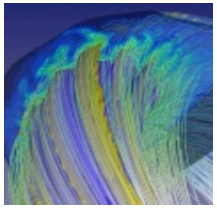
What You Need

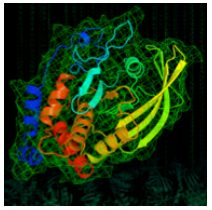
- **Access to a web server**
  - You can use your project space on portal-auth.nersc.gov
- **Some basic HTML, JavaScript and jQuery**
- **A text editor**
- **Let's build an app!**

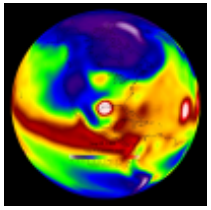


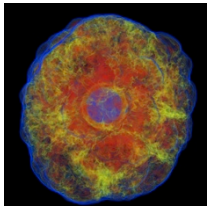
Live Tutorial

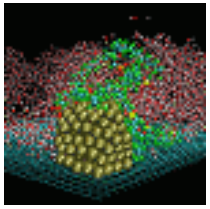












NEWT Tutorial

- http://newt.nersc.gov/tutorial/

- **Follow along online**
- **Feel free to tinker with examples in your own project directory**

newt.js

- **JavaScript Library to wrap NEWT calls**
- **By simply including newt.js in your file you will get a login bar that allows you to login with your NERSC password.**
- **$.newt_ajax() allows you to call NEWT directly in JS**

```
$.newt_ajax({
    "type": "GET",
    "url": "/status/hopper",
    "success": function(data) {
        alert(data.status);
    }
 });
```

Complete Example

- https://newt.nersc.gov/tutorial/tutorial.html
  - View source

We've covered

- **Auth**
- **Files**
- **Commands**

Other interesting parts of the API

- **Submit Batch Jobs directly through NEWT**
- **Persistent Store**
  - Store JSON objects in the NEWT storage
- **Access to NIM info**
  - Information about Users, Repos etc.
- **System Status**

API Docs

- https://newt.nersc.gov/api

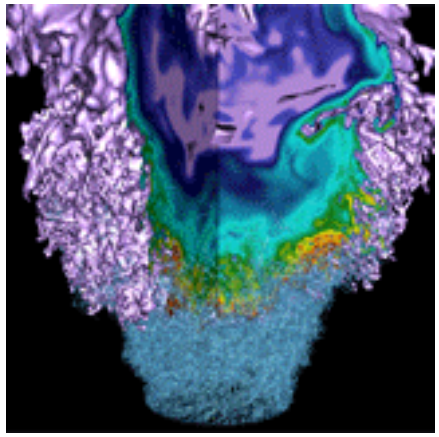
Play with the API directly

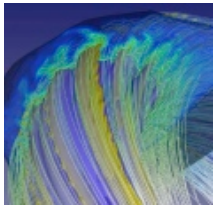
- https://newt.nersc.gov/examples/rest.html

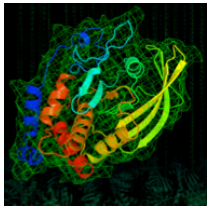
Demos

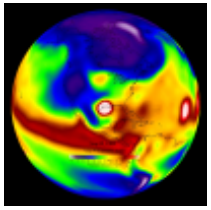
- **NERSC Mobile**
  - https://m.nersc.gov
- **ALS Portal Demo**
  - http://portal.nersc.gov/project/als/jack-area/
- **NERSC Online VASP Application**
  - https://portal-auth.nersc.gov/nova
- **Simple NEWT examples**
  - https://newt.nersc.gov/examples/

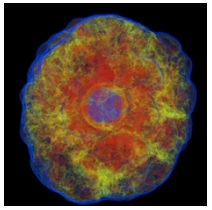
Conclusion

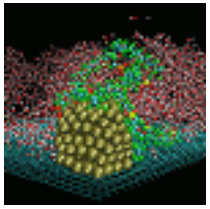












In the Near Future …

- **HTC Task Support**
  - via AMQP
- **Single sign-on**
  - integration across NERSC web platforms
- **Increased NIM functionality**

- **We are also open to user suggestions. Tell us what you want out of a NERSC API.**

Last Slide!

- **Web interfaces to your data and computing greatly enhance the impact of your work.**
- **NEWT makes it easy to build custom web applications to do this**

- **We are happy to work with you to make this happen**
- **Please let us know if you are doing something interesting with NEWT**
- **Contact us:**
  - Shreyas Cholia (scholia@lbl.gov)
  - David Skinner (deskinner@lbl.gov)

National Energy Research Scientific Computing Center