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](http://search.twitter.com/search.json?q=nersc)
  - NEWT
    [https://newt.nersc.gov/newt/status/](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/](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:

<table>
<thead>
<tr>
<th>VERB</th>
<th>RESOURCE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST</td>
<td>/queue/R</td>
<td>Submits POST data to queue on R; returns job id</td>
</tr>
<tr>
<td>GET</td>
<td>/file/R/path/</td>
<td>Returns directory listing for /path/ on R</td>
</tr>
<tr>
<td>GET</td>
<td>/account/user/U</td>
<td>Returns user account info for U</td>
</tr>
<tr>
<td>DELETE</td>
<td>/queue/R/id</td>
<td>Deletes jobs from Queue</td>
</tr>
</tbody>
</table>
REST Examples

• In Firefox:
  – [https://newt.nersc.gov/examples/rest.html](https://newt.nersc.gov/examples/rest.html)

GET /queue/hopper

GET /file/carver/etc/motd

POST /command/carver
  • BODY: executable="ps aux"
• 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!
NEWT Tutorial

• [http://newt.nersc.gov/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

```javascript
$.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](https://newt.nersc.gov/api)

Play with the API directly

- [https://newt.nersc.gov/examples/rest.html](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.
• 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

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