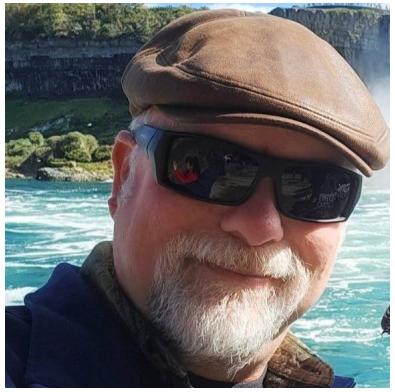

NIAGARA
SUMMIT
2026
SEAMLESS CONNECTIVITY,
POWERFUL INTELLIGENCE
TRIDIUM

Building Tomorrow : HTML5 UX Development and API Integration



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Agenda

- What are Web APIs?
- Niagara APIs
- API Integration Examples
- HTML User Interface Examples

What are Web APIs?

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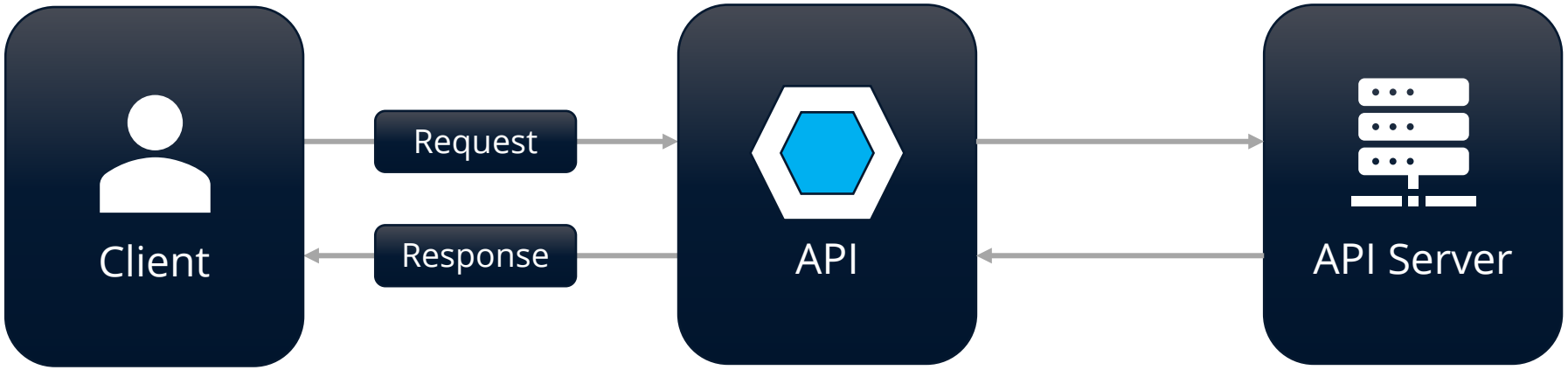
Application Programming Interface (API)

- Well-defined tools that allow software applications to communicate and interact with each other.
- Introduced in the early 2000s and leveraged by companies such as Salesforce, eBay, Amazon, etc.
- Used in social media applications such as Facebook, LinkedIn, etc.
- Since ~2010 used widely in the IoT industry to connect everyday devices such as thermostats, audio visual equipment, cameras, and sensors to the cloud.

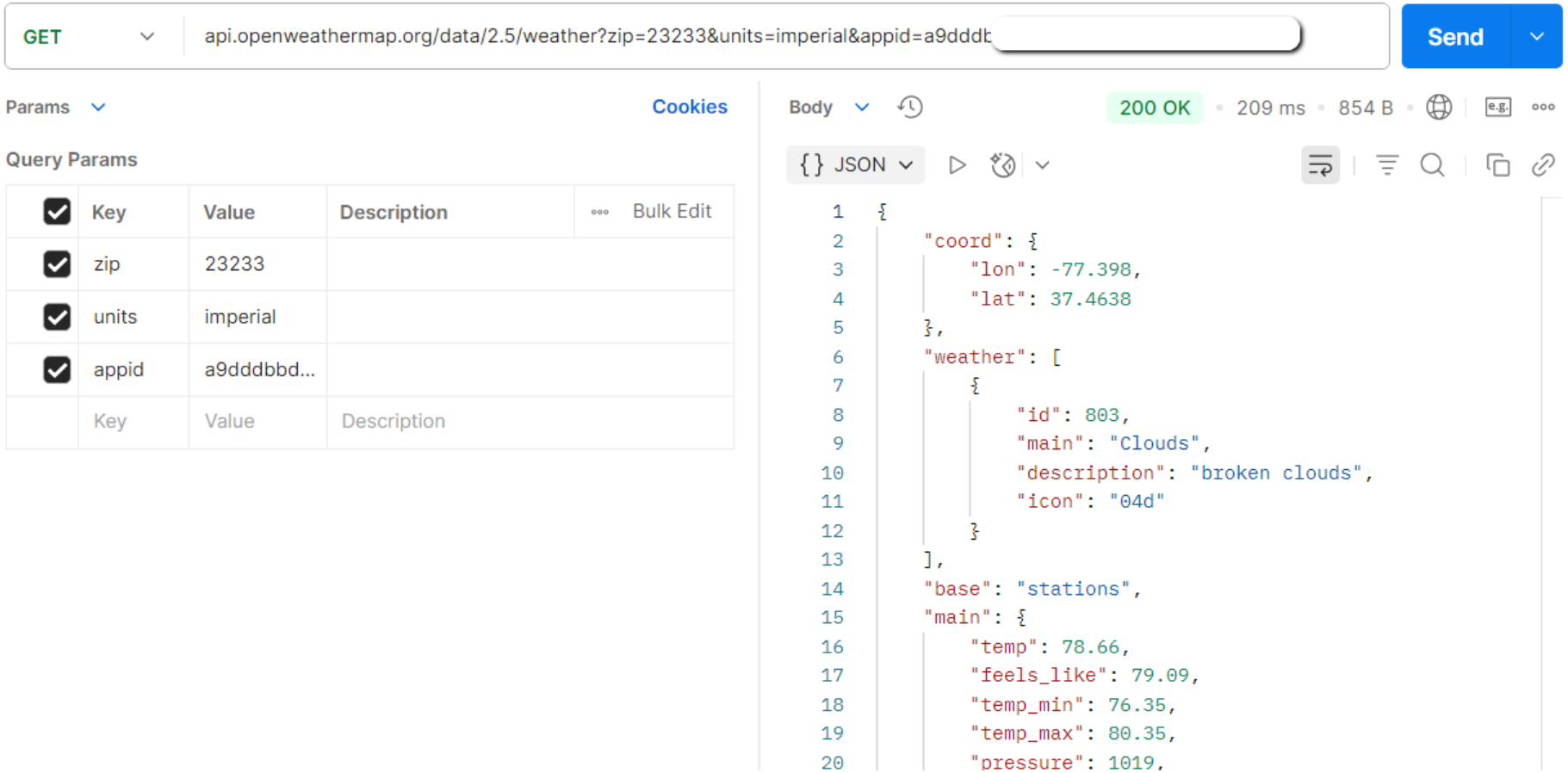


API Types

- **Simple Object Access Protocol (SOAP)** – client and server exchange messages using XML
- **Remote Procedure Calls (RPC)** – client calls a software function, and the server sends the output back to the client.
- **Representational State Transfer (REST)** – the most popular and flexible APIs used today. The client and server exchange data using HTTP.
- **WebSocket** – two-way communication between client and server that uses JSON objects, making it more efficient than REST.

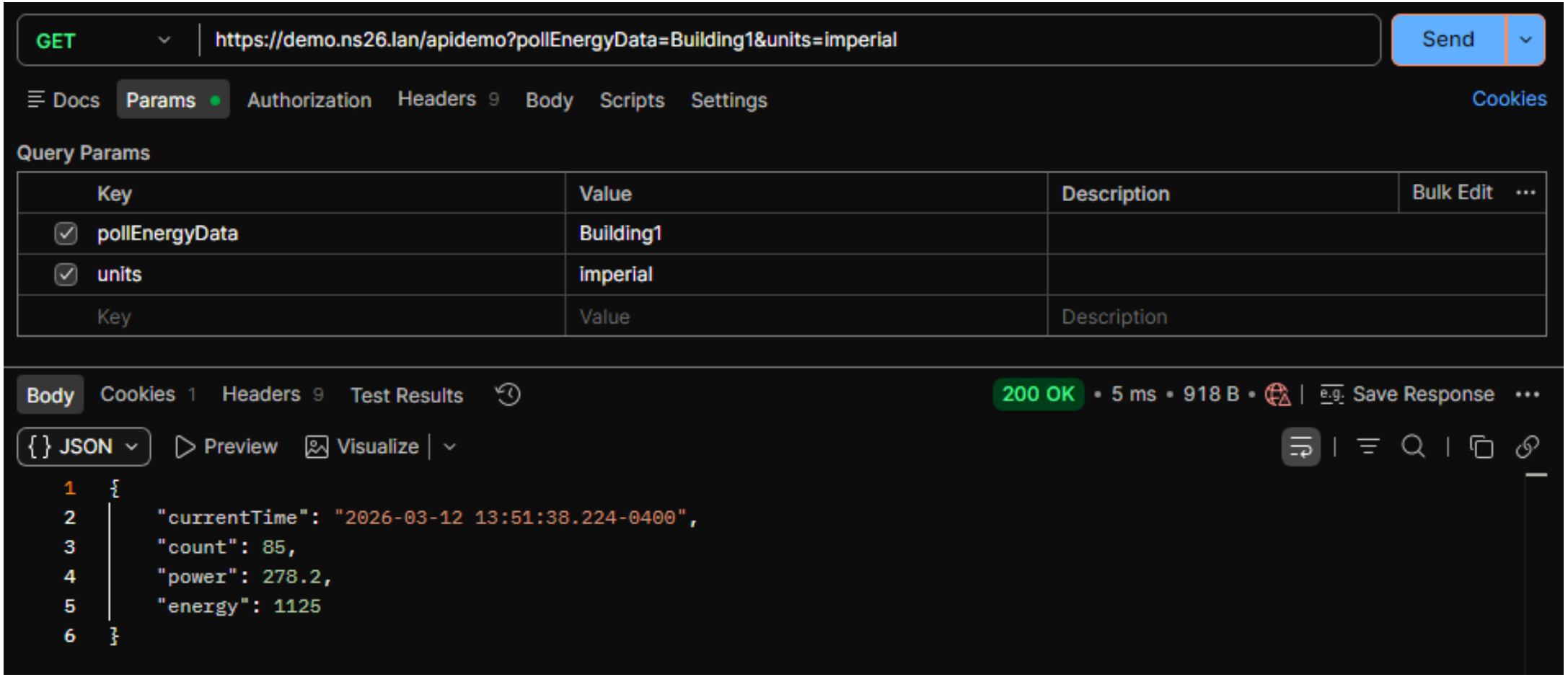
Hypertext Transfer Protocol (HTTP)

- Enables communication between clients and servers over a network.
- Client sends a request, and the server replies with a response.



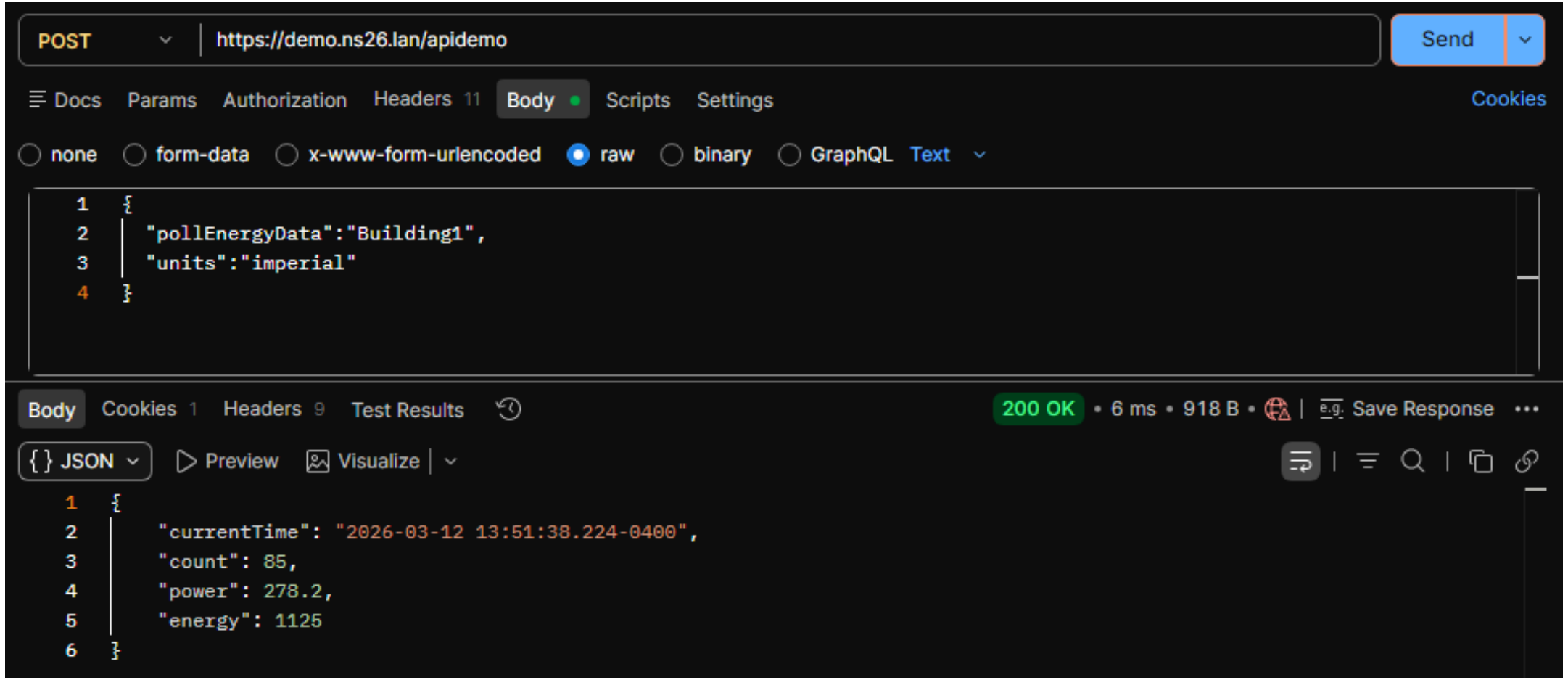
HTTP GET

- GET is used to request data with parameters encoded in the URL as key value pairs.



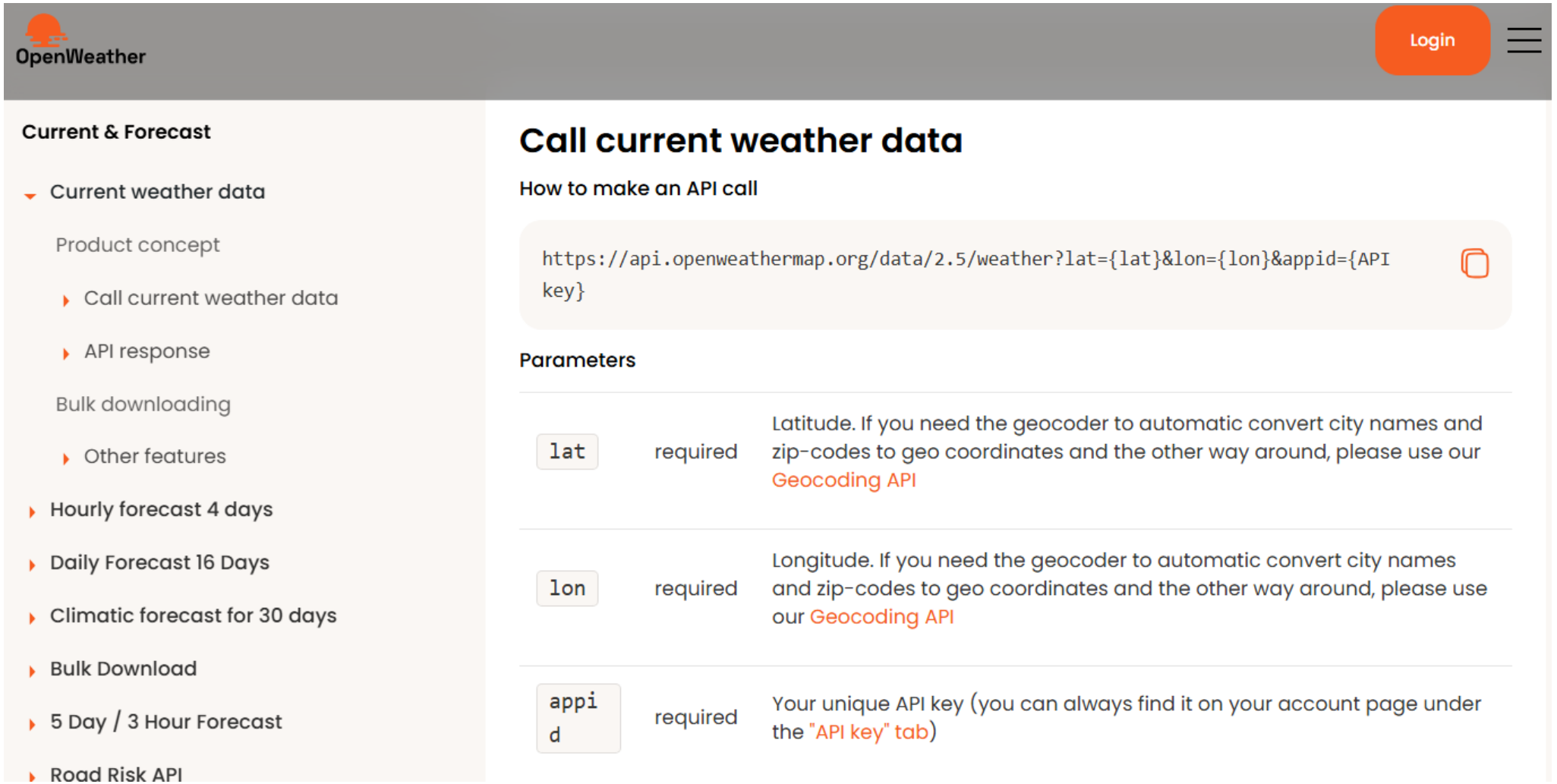
HTTP POST

- POST is used to send data to a server to create or update a resource with data stored in the request body.



API Documentation Example

https://openweathermap.org/current?collection=current_forecast



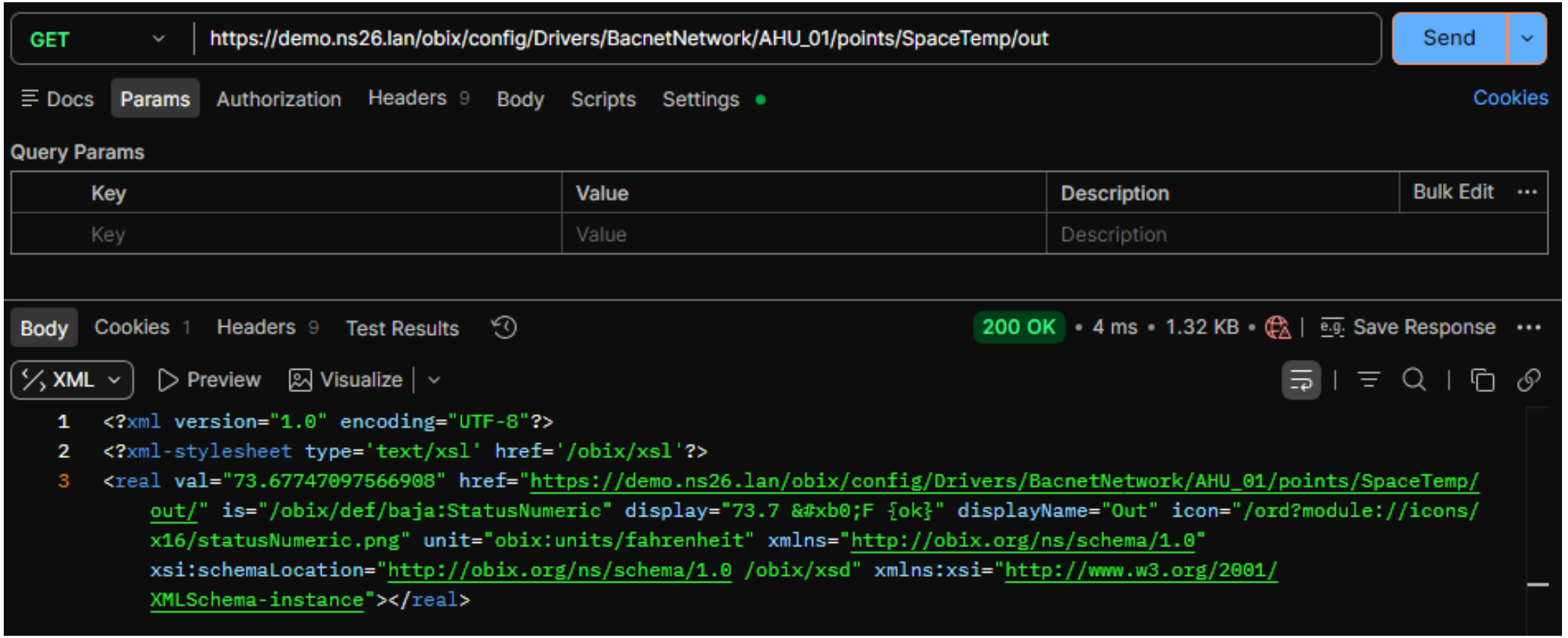
Niagara APIs

Niagara – API Data Access

- oBIX
- Niagara Analytics web API
- Json Toolkit Json Schema
- HTTP Client driver String Servlet
- Custom Servlet
- Niagara Cloud Suite (NCS) using Niagara Data Service (NDS)
  tomorrow @1pm – Cloudy with a Chance of Disruption session

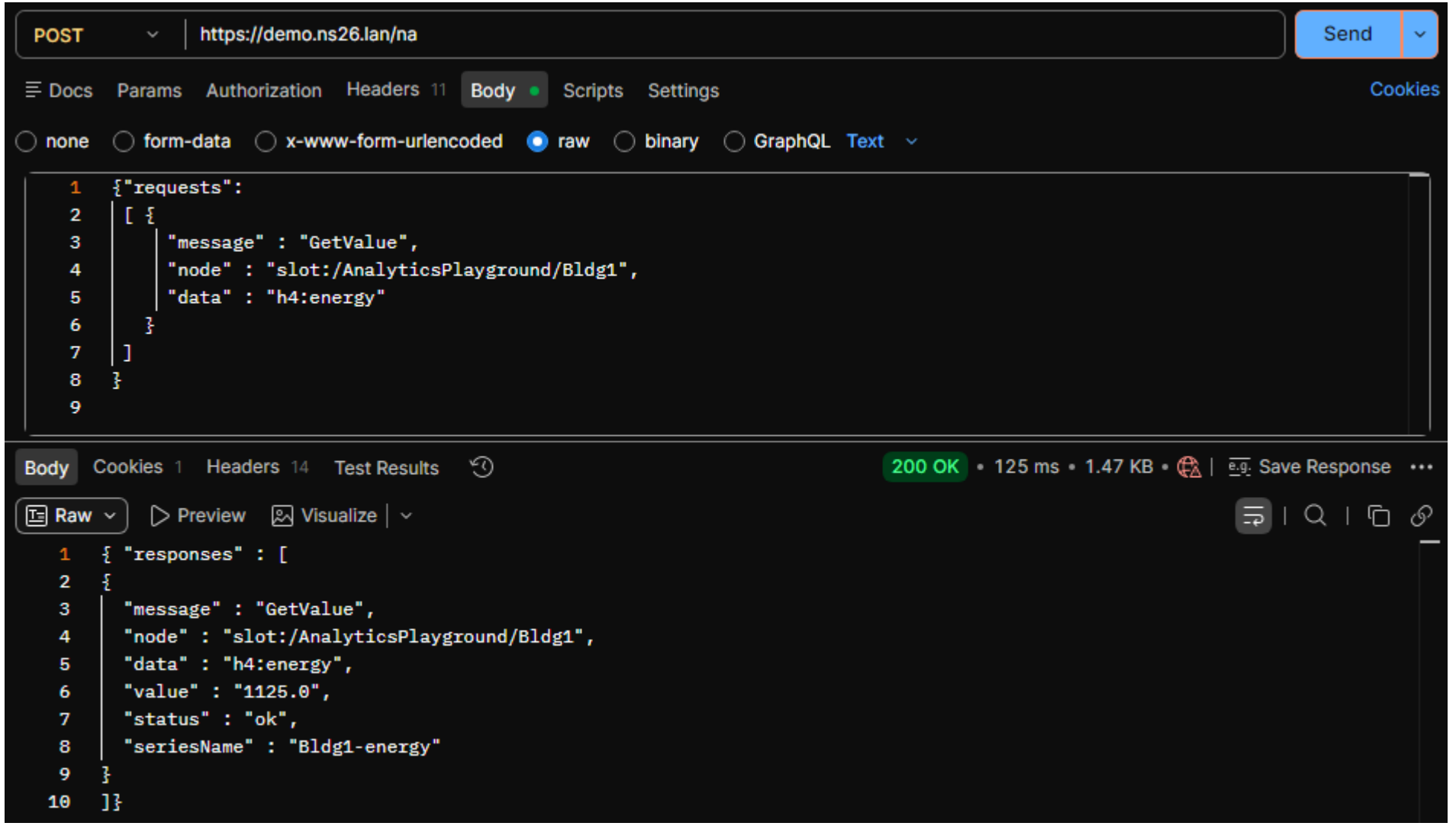
oBix – HTTP GET Example

- Used to read/write live control points, subscribe to alarm events, or query history data.



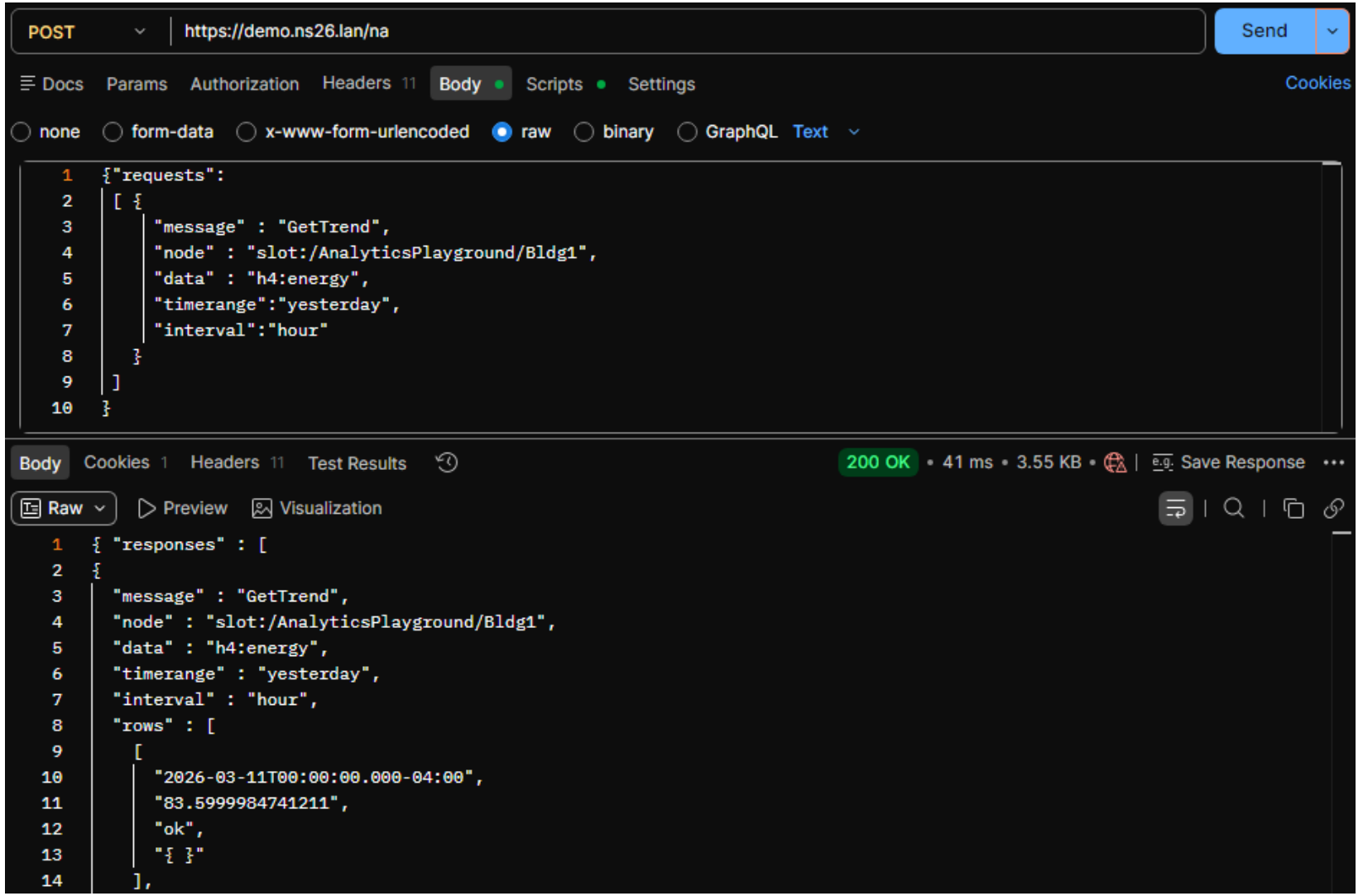
Niagara Analytics – Value Request

- Used to read control point values from the station.



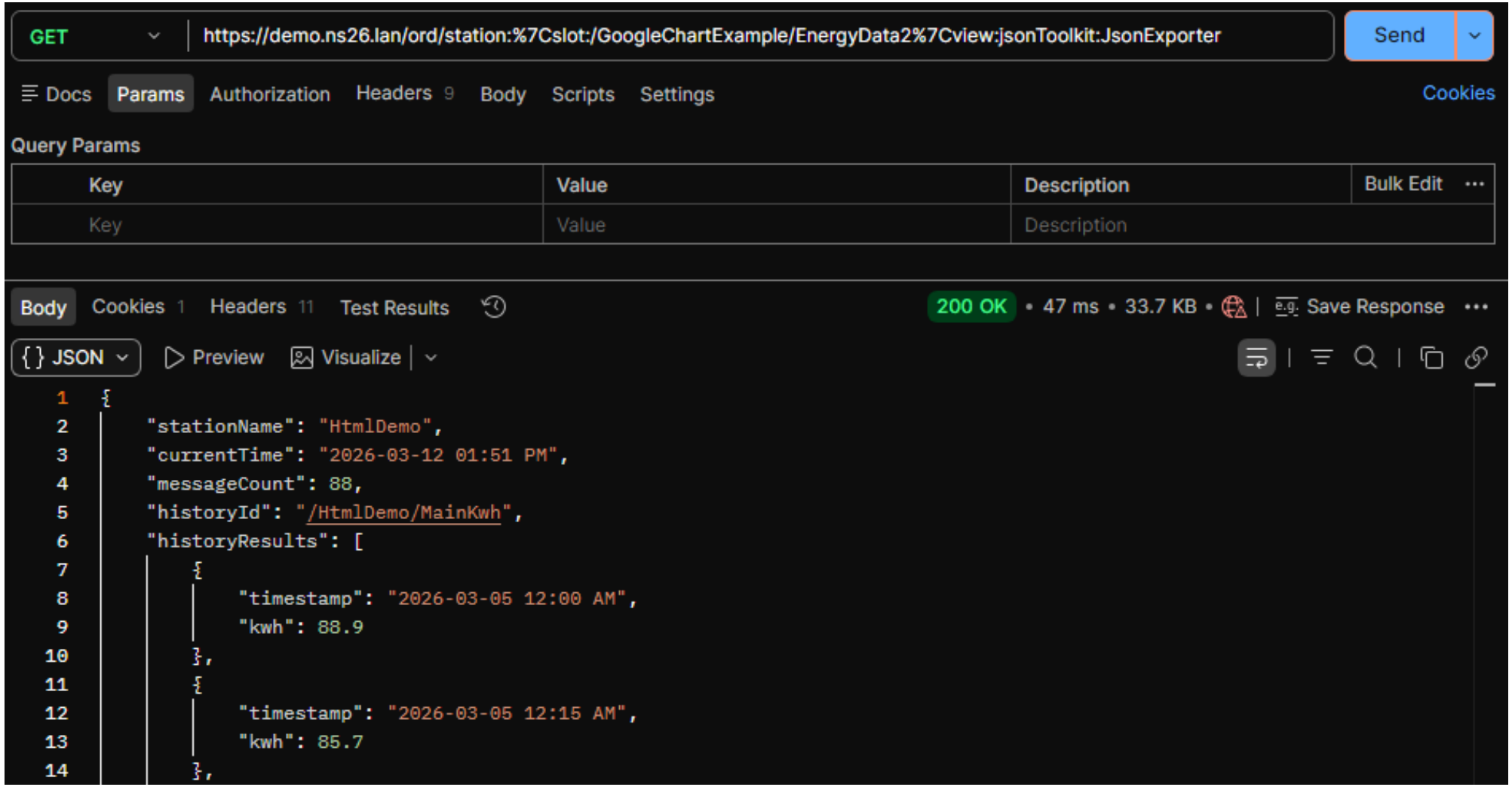
Niagara Analytics – Trend Request

- Used to query history data from the station.

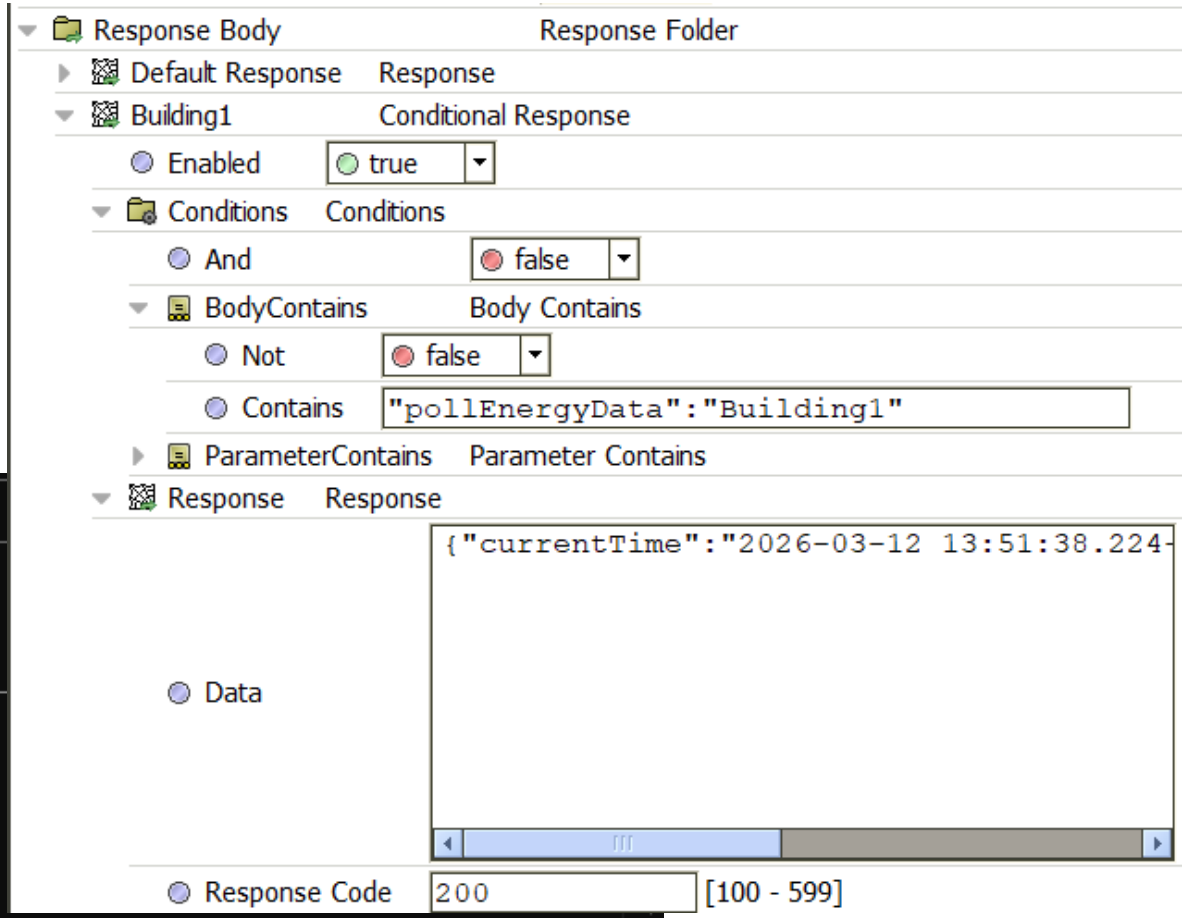


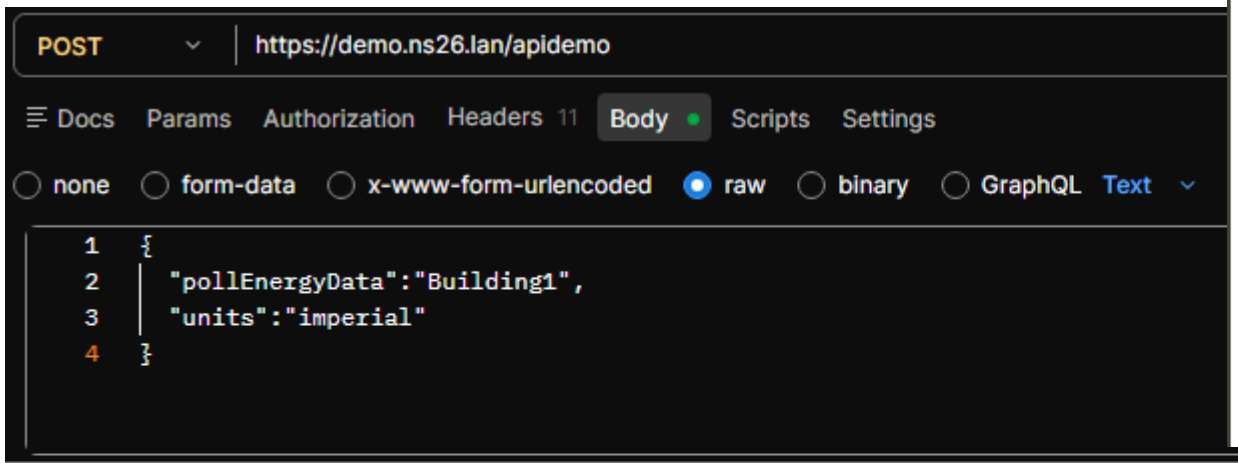
JSON Toolkit – Schema Exporter

- API response returns the schema output as JSON.



HTTP String Servlet





API Integration Examples

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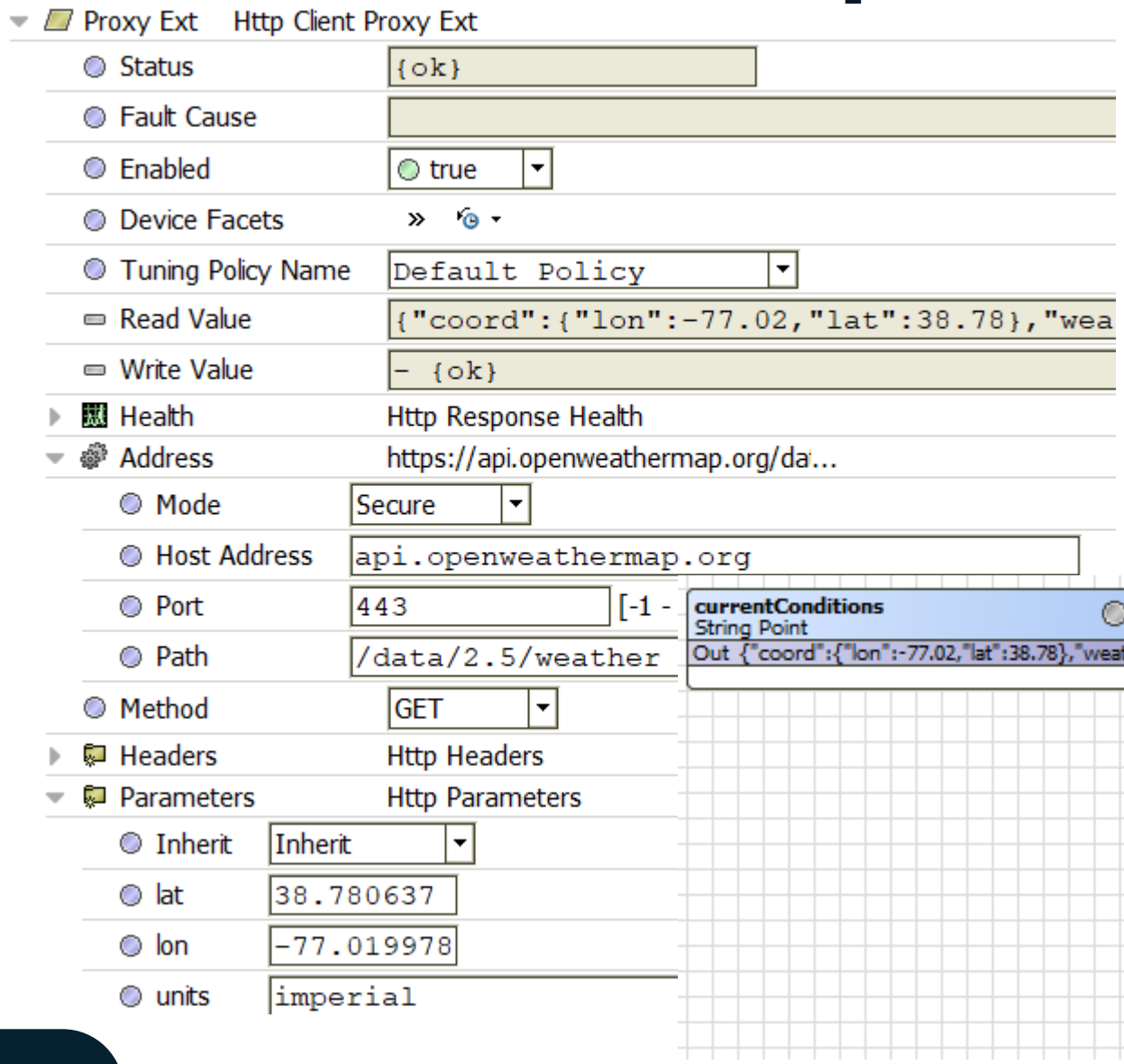
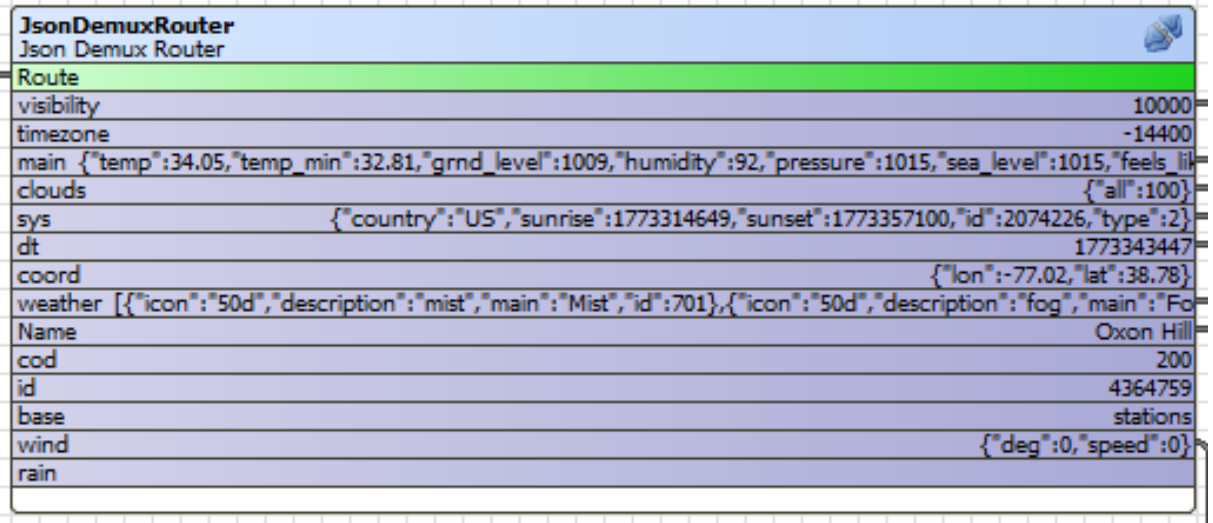
HTTP Client – openweathermap.org





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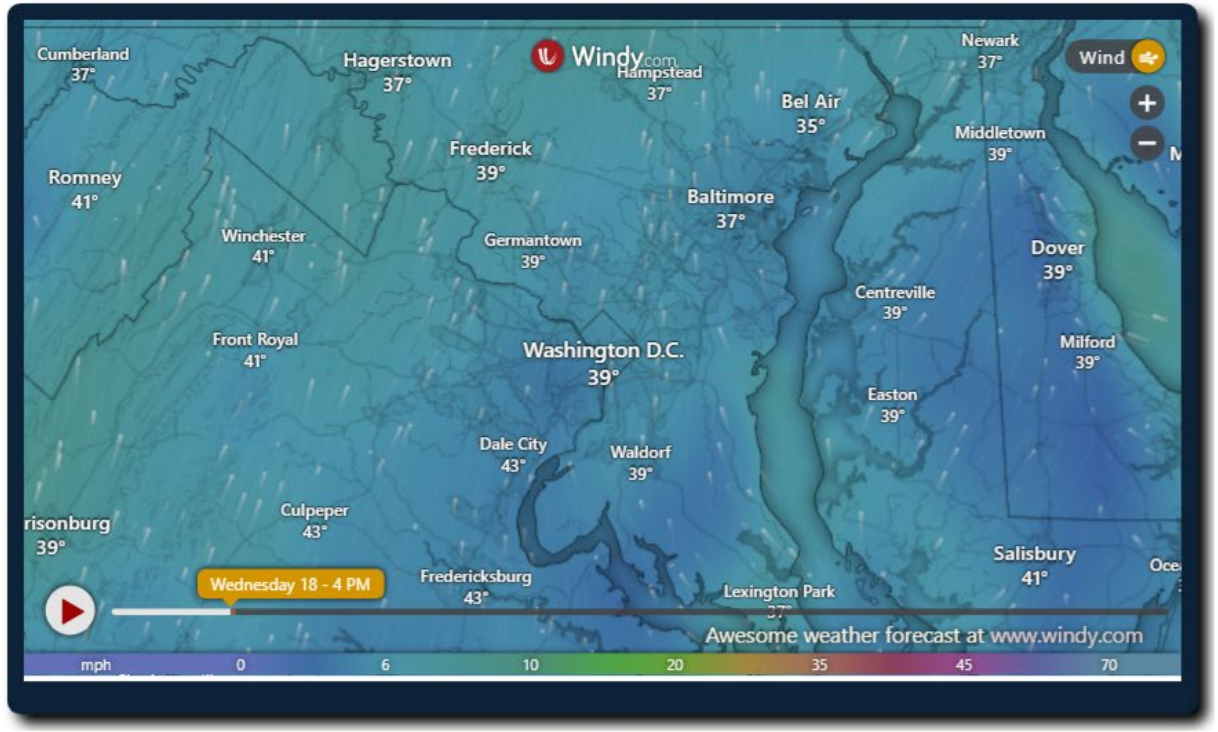
HTTP Client – openweathermap.org

Current Conditions

Summary	Mostly Cloudy
Temperature	40.8 °F
Feels Like	34.1 °F
Humidity	37 %RH
Dew Point	17.8 °F
Pressure	30.39 in Hg
Wind Direction	S
Wind Speed	11.5 mph
Wind Gust	0.0 mph
Visibility	6.21 mile
Cloud Cover	40 %
Observed	18-Mar-26 3:25 PM

7:14 AM — 11.89 hr — 7:17 PM

Washington, District of Columbia



Today's Forecast

Summary	Mostly Cloudy
Low	28.3 °F
High	41.2 °F
Precip Chance	0 %

Thursday Forecast

Summary	Overcast
Low	32.0 °F
High	53.7 °F
Precip Chance	0 %

Friday Forecast

Summary	Light Rain
Low	43.2 °F
High	65.2 °F
Precip Chance	0 %

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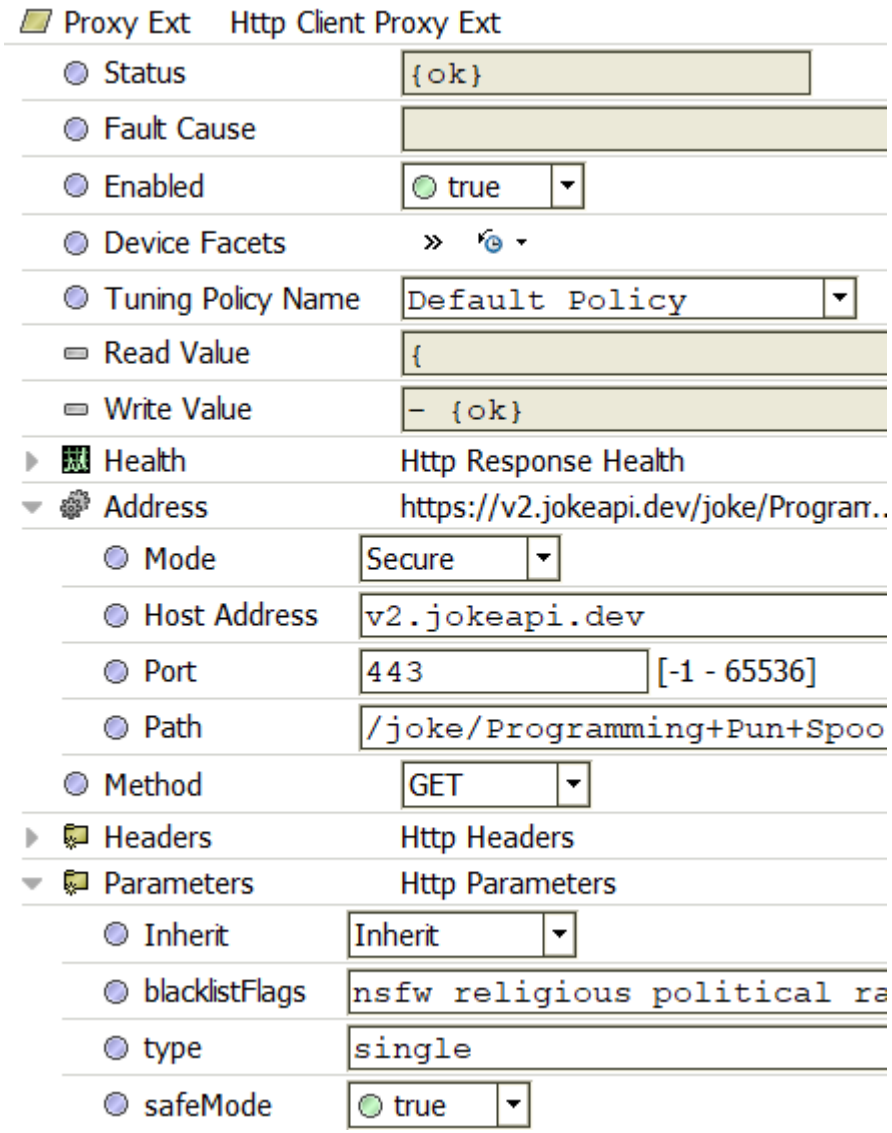
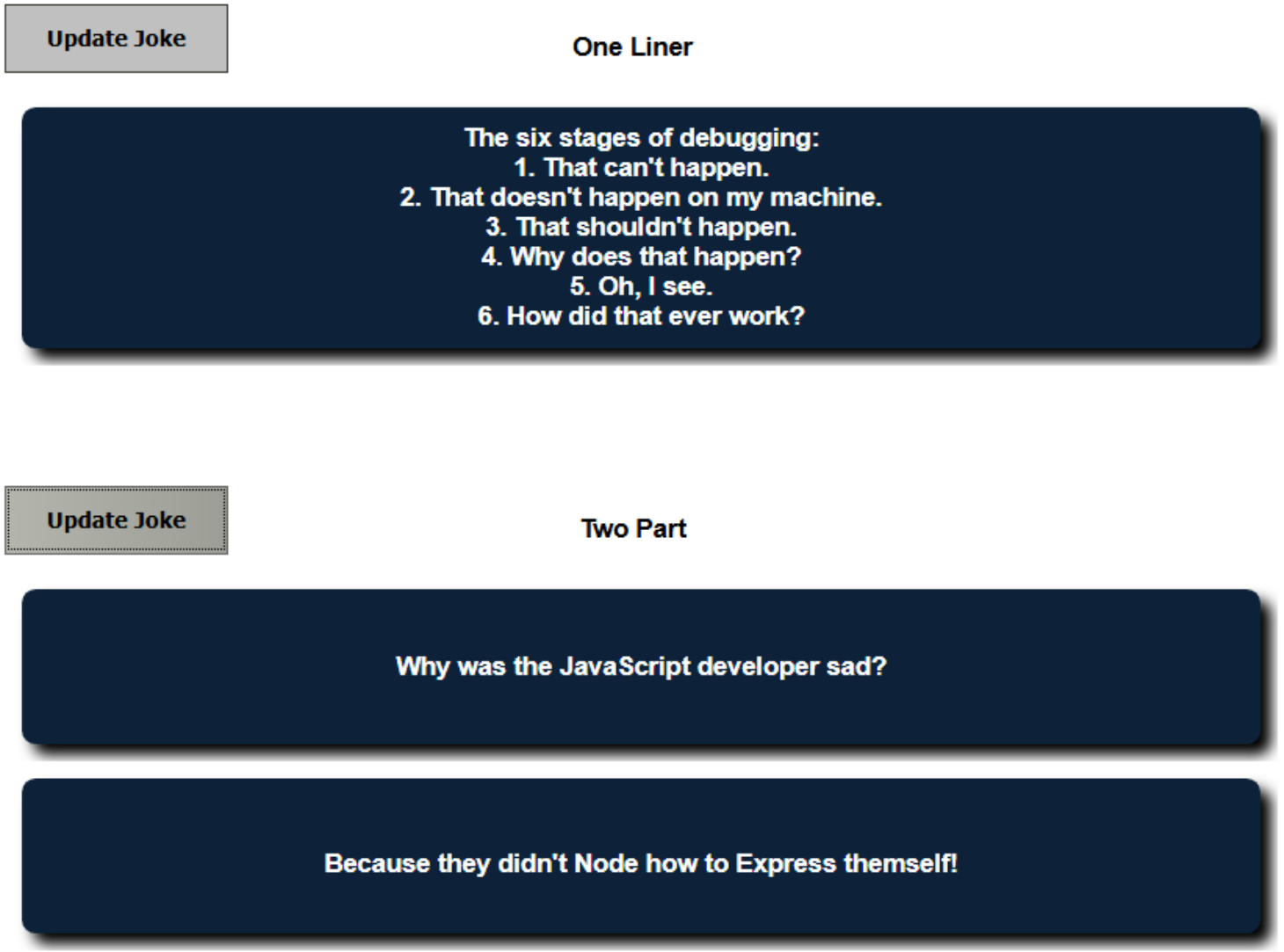
HTTP Client – v2.jokeapi.dev



HTTP Client – v2.jokeapi.dev



credits to https://v2.jokeapi.dev/

Working with HTML files in Niagara

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Serving HTML from the Station's File Space

- Files can be edited by anyone with write access, without any source control or changelogs.
- Files are not versioned, so they cannot easily be upgraded or distributed to multiple stations.
- Files are not relativized, so not easily used as views on components.
- The HTML5 profile automatically provides the latest API improvements.
- HTML files bypass the profile, so they are more vulnerable to breaking when upgrading Niagara versions.

Accessing HTML Files

- The file servlet provides access to files under the station's shared file space.

  https://bldg1f1.ns24.lan/file/index.html

- The file ORD scheme with the File Download View.

  https://bldg1f1.ns24.lan/ord/file:^index.html|view:web:FileDownloadView

noSnoop

- The Niagara web server snoops content being served and potentially modifies the HTML or CSS content such as replacing module ORD schemes with module servlet requests.
- Snooping can be disabled in HTML by adding syntax to the top of the file.

```
<!-- @noSnoop -->
```

- Snooping can be disabled in CSS by adding syntax to the top of the file.

```
/* @noSnoop */
```

Using JavaScript Libraries

- When serving HTML content from the station's file system it may be necessary to load JavaScript libraries such as BajaScript, d3, jQuery, underscore and others.
- RequireJS from https://requirejs.org uses the Asynchronous Module Definition (AMD) method of loading JavaScript code, which is a modular script loader and will likely improve the speed and quality of your code.
- RequireJS can be loaded in an HTML page using script tags.

```
<script src="/requirejs/config.js"></script>
<script src="/module/js/com/tridium/js/ext/require/require.js"></script>
```

local:|module://docDeveloper/doc/requirejs.html

Example HTML File

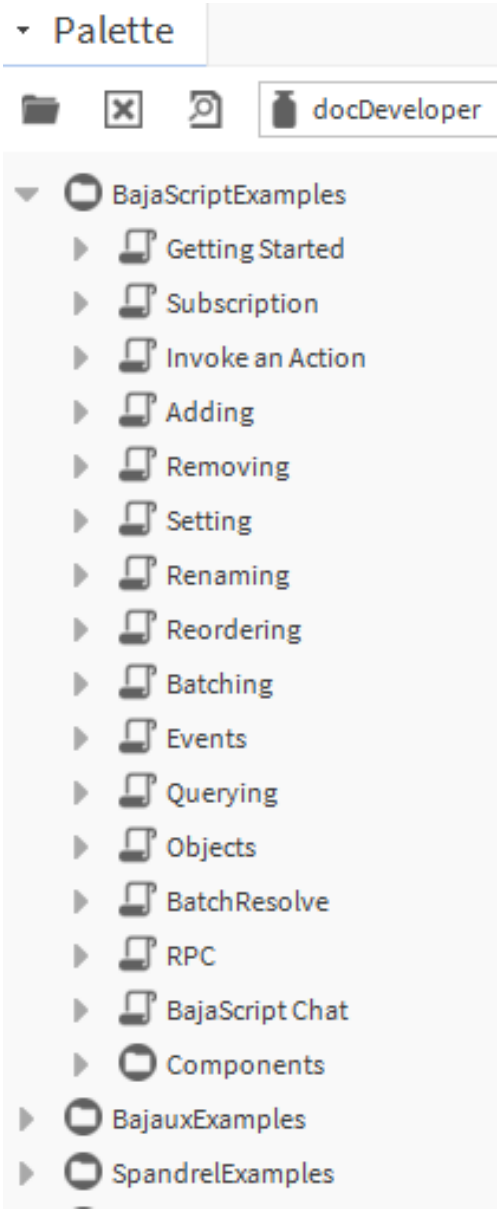
```
<!DOCTYPE html>
<!-- @noSnoop -->
<html>
<head>
  <title>This is a BajaScript test page</title>
  <script type='text/javascript'  src='/requirejs/config.js'></script>
  <script type='text/javascript'  src='/module/js/com/tridium/js/ext/require/require.min.js?'></script>
</head>
<body>
  <h1>BajaScript test page!</h1>
  <script>
    require(["baja!"], function (baja) {
      baja.Ord.make('station:|slot:/').get()
        .then((station) => {
          alert('Station name: ' + station.get('stationName'));
        });
    });
  </script>
</body>
</html>
```

BajaScript

- A framework for building web applications which includes JavaScript APIs for getting data from the station

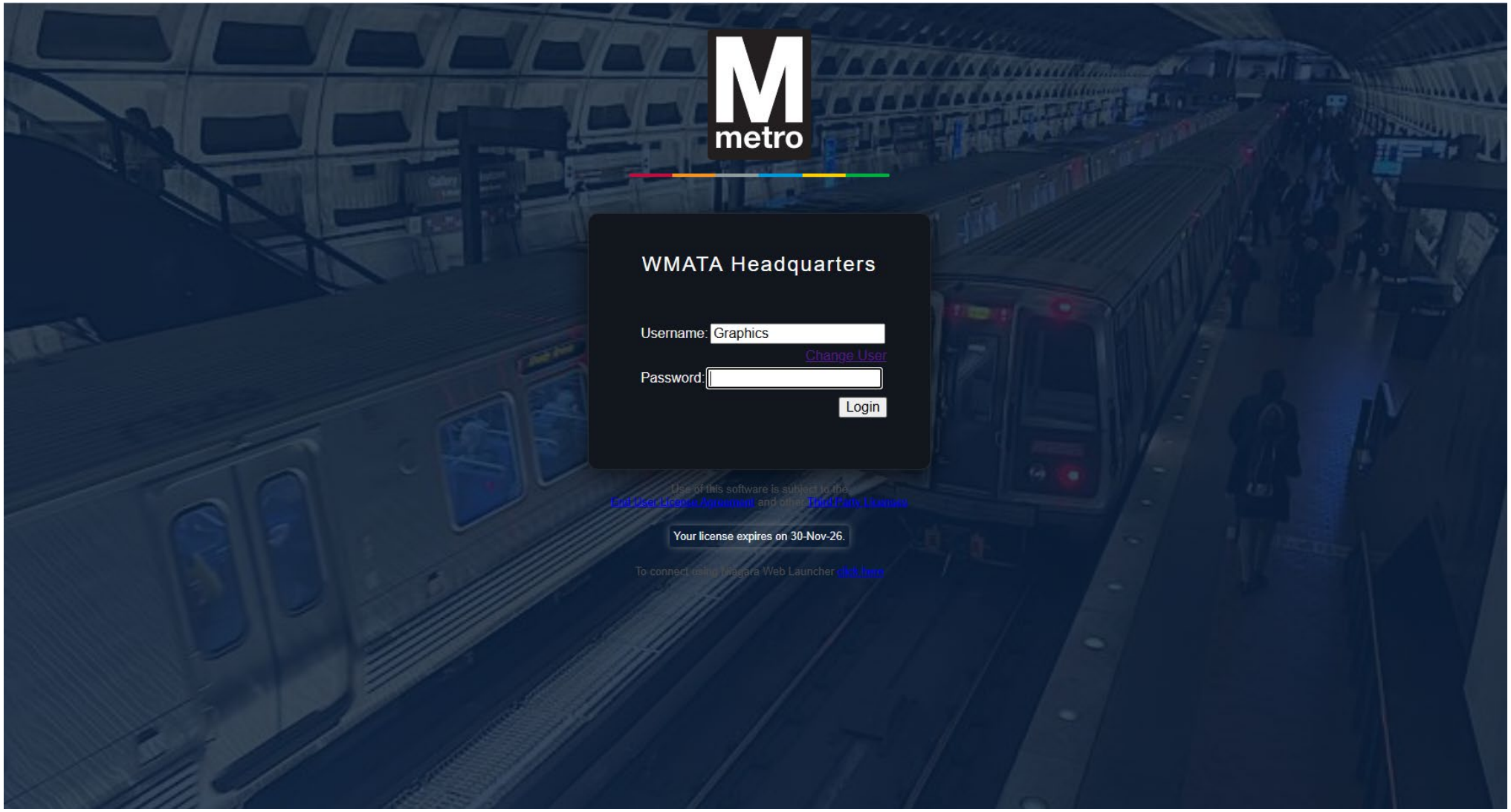
  local:|module://docDeveloper/doc/jsdoc/bajaScript-ux/index.html
- Getting started with BajaScript tutorial

  local:|module://docDeveloper/doc/jsdoc/bajaScript-ux/tutorial-gettingStarted.html
- The docDeveloper palette includes examples



HTML User Interface Examples

Custom Login Screen



Fleet Dashboard

Rail Map


Rail Operations
Live Train Positions
Live · 21:20:48
TRAINS 89
CARS 608
AVG DWELL 1s
HOLDING 0
INCIDENTS 0
OUTAGES 33
21:20:52
TUE 03/24/2026
ALL
RED
BLUE
ORANGE
GREEN
YELLOW
SILVER
Updated 21:20:48
TRAINS 84
ARRIVALS
STATS
ALERTS
OUTAGES 33
BL G05 #118 · Ckt 1403 6 ▶ T1
BL G05 #267 · Ckt 2575 6 ▶ T1
BL G05 #285 · Ckt 2566 6 ◀ T2
BL G05 #436 · Ckt 969 8 ▶ T1
BL G05 #442 · Ckt 2472 6 ▶ T1
BL G05 #464 · Ckt 1060 6 ▶ T1
BL G05 #489 · Ckt 2422 6 ▶ T1
BL J03 #077 · Ckt 1618 6 ◀ T2
BL J03 #109 · Ckt 2744 6 ◀ T2
BL J03 #164 · Ckt 1225 8 ◀ T2
BL J03 #292 · Ckt 2678 8 ◀ T2
BL J03 #431 · Ckt 2603 6 ◀ T2
BL J03 #467 · Ckt 1323 8 ◀ T2
GR E10 #008 · Ckt 2183 8 ▶ T1
GR E10 #025 · Ckt 1796 8 ▶ T1
GR E10 #038 · Ckt 2229 6 ▶ T1
GR E10 #069 · Ckt 1834 8 ▶ T1
Wheaton
Grosvenor-Strathmore
Forest Glen
Medical Center
Silver Spring
Bethesda
Takoma
Greenbelt
College Park-U of Md
Hyattsville Crossing
West Hyattsville
Friendship Heights
Fort Totten
Tenleytown-AU
Van Ness-UDC
Cleveland Park
Georgia Ave-Petworth
Brookland-CUA
Columbia Heights
Woodley Park-Zoo/Adams Morgan
Rhode Island Ave-Brentwood
U Street/African-Amer Civil War Memorial/Cardozo
Shaw-Howard U
Dupont Circle
Mt Vernon Sq/7th St-Convention Center
Gallery Place
Chinatown
Judiciary Square
Archives-Navy Memorial-Penn Quarter
Smithsonian
L'Enfant Plaza
Federal Center SW
Federal Triangle
Stadium-Armory
Potomac Ave
Waterfront
Navy Yard-Ballpark
New Carrollton
Landover
Cheverly
Deanwood
Minnesota Ave
Benning Road
Capitol Heights
Addison Road-Seat Pleasant
Morgan Boulevard
Downtown Largo
Innovation Center
Dulles International Airport
Herndon
Reston Town Center
Wiehle-Reston East
Spring Hill
McLean
Greensboro
West Falls Church
Dunn Loring-Merrifield
Vienna/Fairfax-GMU
East Falls Church
Rosslyn
Court House
Clarendon
Virginia Square-GMU
Ballston-MU
Arlington Cemetery
Pentagon
Pentagon City
Crystal City
Ronald Reagan Washington National Airport
Anacostia
Congress Heights
Southern Avenue
Naylor Road
Suitland
Branch Ave
Potomac Yard
Braddock Road
King St-Old Town
Eisenhower Avenue
Huntington
Van Dorn Street
Franconia-Springfield

Train Line View

Subscriber Pattern

```
// One reusable function handles every HttpClient subscription.
// It covers both the initial value on load AND live updates.

function subToOrd(ord, cb) {
    var sub = new baja.Subscriber();

    // Called every time the 'out' slot changes (new poll result)
    sub.attach('changed', function(prop) {
        if (prop.getName() === 'out') {
            var v = this.get('out');
            if (v) cb( parseJSON(v.toString()) );
        }
    });

    // Also grab the current value immediately on subscribe
    baja.Ord.make(ord).get({ subscriber: sub })
        .then(function(comp) {
            var v = comp.get('out');
            if (v) cb( parseJSON(v.toString()) );
        })
        .catch(function(err) {
            console.error('[WMATA] Failed to connect:', ord, err);
            setStatus(false); // flip the status indicator to offline
        });
}
```

ORD Declaration

```
// These look just like any other component ORD.
// The HttpClient sitting at this path has an 'out' slot
// that holds the last API response as a BString.

// Weather — two separate HttpClient components
var ORD_CURRENT  = 'station:|slot:/Examples/Weather/CurrentWeather';
var ORD_FORECAST = 'station:|slot:/Examples/Weather/ForecastWeather';

// WMATA — seven HttpClient components, all subscribed the same way
var ORD_TRAINS    = 'station:|slot:/Examples/WMATA/LiveTrainPositions';
var ORD_STATIONS  = 'station:|slot:/Examples/WMATA/StationInformation';
var ORD_PREDICT   = 'station:|slot:/Examples/WMATA/StationPredictions';
var ORD_INCIDENTS = 'station:|slot:/Examples/WMATA/Incidents';
var ORD_ELEVATOR  = 'station:|slot:/Examples/WMATA/EscalatorElevator';
```

parseJSON Helper

```
// HttpClient stores the response body as a Niagara BString, not a JS object.
// You must call .toString() first, then JSON.parse().
//
// BUT — some stations prepend status text before the JSON body.
// This helper skips any leading non-JSON characters defensively.

function parseJSON(val) {
    if (!val) return null;
    if (typeof val === 'object') return val; // already parsed

    try {
        var s = val.toString().trim();

        // Find the first '{' or '[' — the actual start of JSON
        var i = Math.min(
            s.indexOf('{') >= 0 ? s.indexOf('{') : Infinity,
            s.indexOf('[') >= 0 ? s.indexOf('[') : Infinity
        );

        return i < Infinity ? JSON.parse(s.substring(i)) : null;
    } catch(e) {
        return null; // bad response — fail silently, keep last good state
    }
}
```

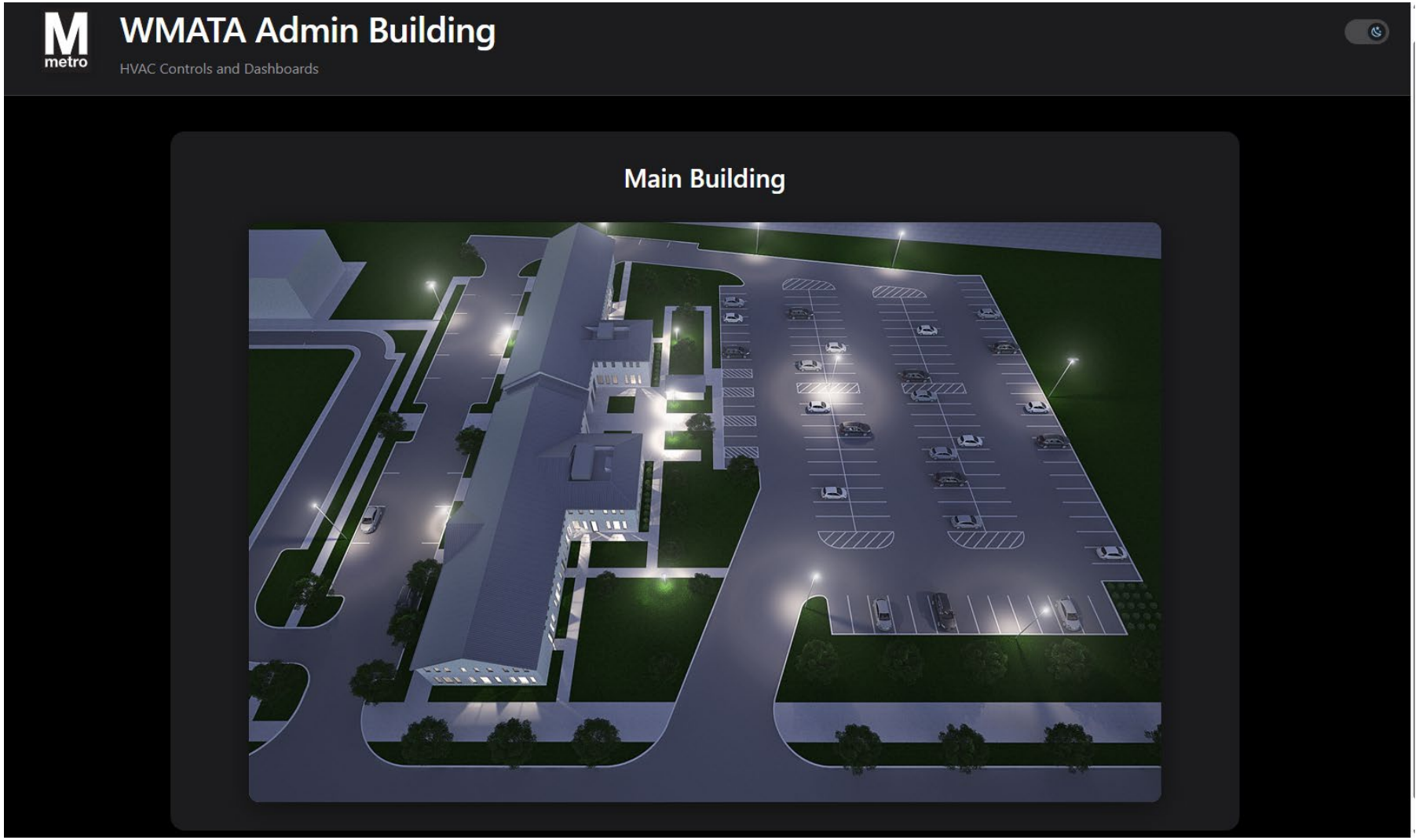
Icon Mapping for Condition Codes

```
// OpenWeatherMap returns a numeric condition code.
// Map it to your icon file set — no external icon library needed.

function iconFile(code, isNight) {
    if (code >= 200 && code < 300) return 'weather-lightning-rainy.svg';
    if (code >= 300 && code < 400) return 'weather-rainy.svg';
    if (code >= 500 && code < 502) return 'weather-rainy.svg';
    if (code >= 502 && code < 600) return 'weather-pouring.svg';
    if (code >= 600 && code < 700) return 'weather-snowy.svg';
    if (code >= 700 && code < 800) return 'weather-fog.svg';
    if (code === 800) return isNight ? 'weather-night.svg' : 'weather-
sunny.svg';
    if (code === 801) return isNight ? 'weather-night-partly-cloudy.svg'
                                     : 'weather-partly-cloudy.svg';
    return 'weather-cloudy.svg';
}

// Usage — determine night from the API's own sunrise/sunset values:
var isNight = (c.dt > c.sys.sunset || c.dt < c.sys.sunrise);
img.src = '/file/icons/' + iconFile(c.weather[0].id, isNight);
```

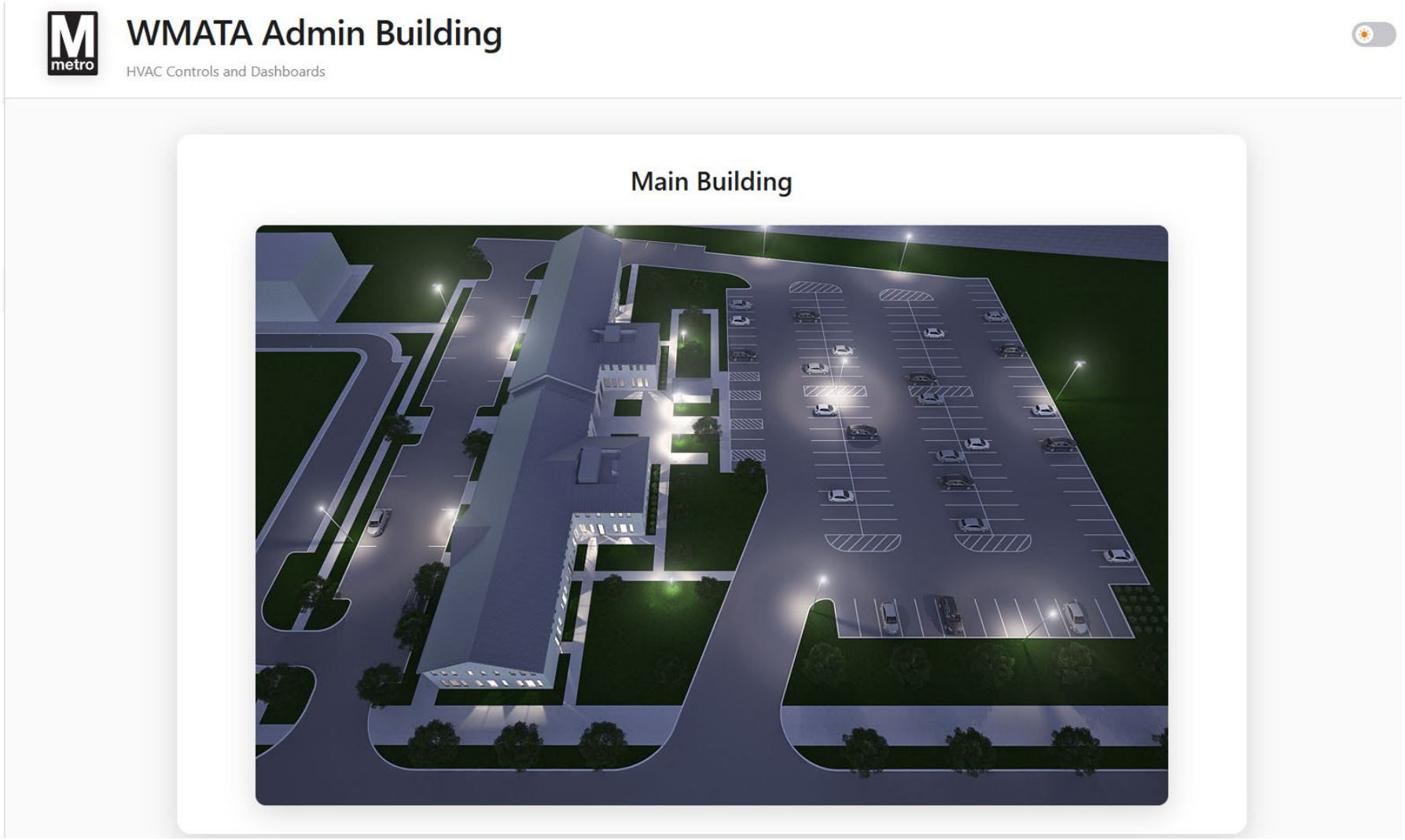
Light/Dark Mode – CSS Variable Cascade

```
// Toggle button handler — state persists across page reloads
document.getElementById('themeToggle').addEventListener('click', function() {
    document.body.classList.toggle('light');
    localStorage.setItem('theme',
        document.body.classList.contains('light') ? 'light' : 'dark'
    );
});

// On load — restore user's last preference
if (localStorage.getItem('theme') === 'light') {
    document.body.classList.add('light');
}
```

Light/Dark Mode – Graphics



Light/Dark Mode – Graphics



Questions