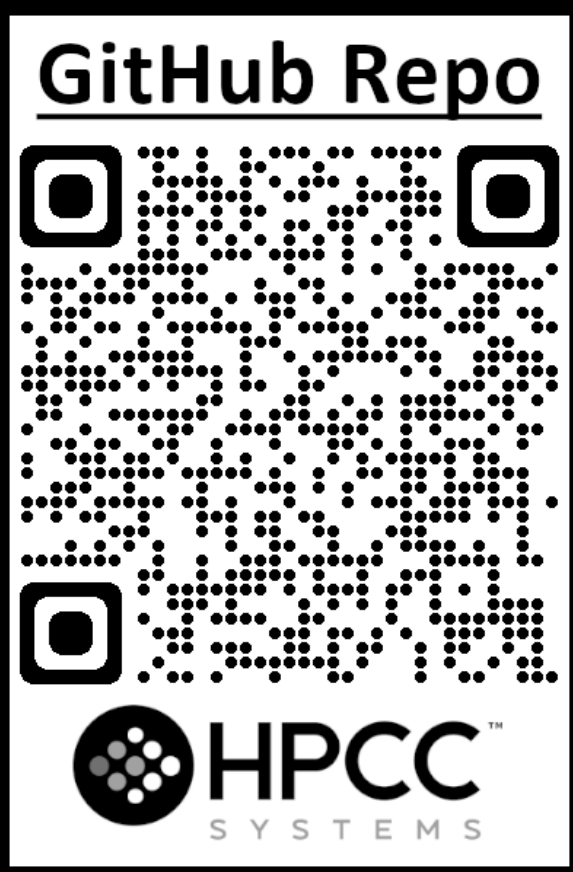
HPCC SYSTEMS

ODSC

Data for Social Good
Find Your Paradise!

GitHub Repo



HPCC SYSTEMS

NOVEMBER 2023

Bob Foreman
Software Engineering Lead
LexisNexis Risk Solutions

The Workshop Challenge!

Find Your Paradise!

Have you ever thought about building an application that can help people find places to live that maximize their quality of life and happiness?

The goal of this workshop challenge is to examine and analyze numerous datasets across different categories and make correlations with the data, using the HPCC Systems platform.

After analyzing, the participants will be asked to design an interface to query this data and assign it a scoring system, then deliver it to the user via ROXIE and or Visualization and show the user where they should most likely want to live. Users should be given choices in an easy-to-use form that when submitted will generate a unique set of scores based on locations (Example: By State).

The Challenge!

Find Your Paradise!

Every person's definition of what make them happy can vary depending on several factors. To this challenge, we have narrowed these factors to four (4) categories:

- Crime
- Environment (Weather)
- Health
- Education

Crime – A dataset by US State with crimes between 2018-2021 is provided. Data points can include the number of crimes by State and Violent Crimes by State.

Climate – A dataset of Storm Data in the US over the last 10 years will be provided. Data Points can include number of storms by State, also injuries and fatalities due to a weather incident.

Health – A mortality rate by State from 1980 to 2020 dataset will be provided. Data points can include total mortality and/or average mortality by year and State.

Education – A dataset of the number of public and private schools by State will be provided. Data points include total school by State and percentage of Private Schools available to the Total Schools by State. Also, enrollment and student-to-teacher ratio can be a factor.

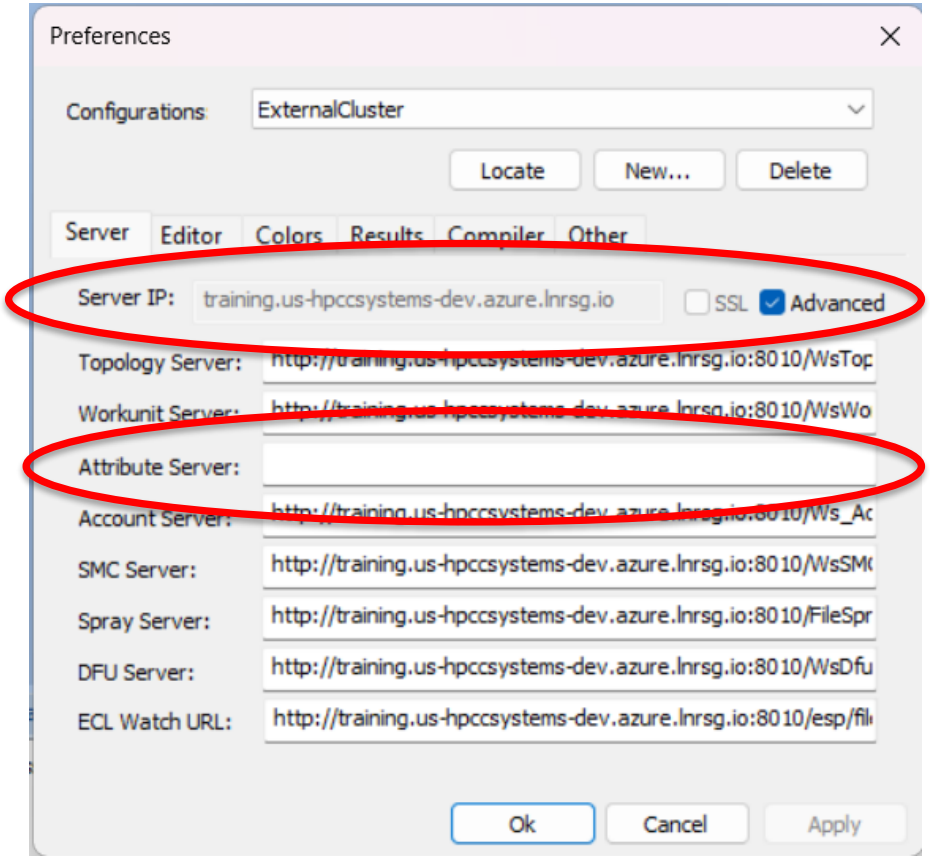
The Playing Field!

HPCC Cluster ECL Watch:

http://training.us-hpccsystems-dev.azure.lnrsg.io:8010/

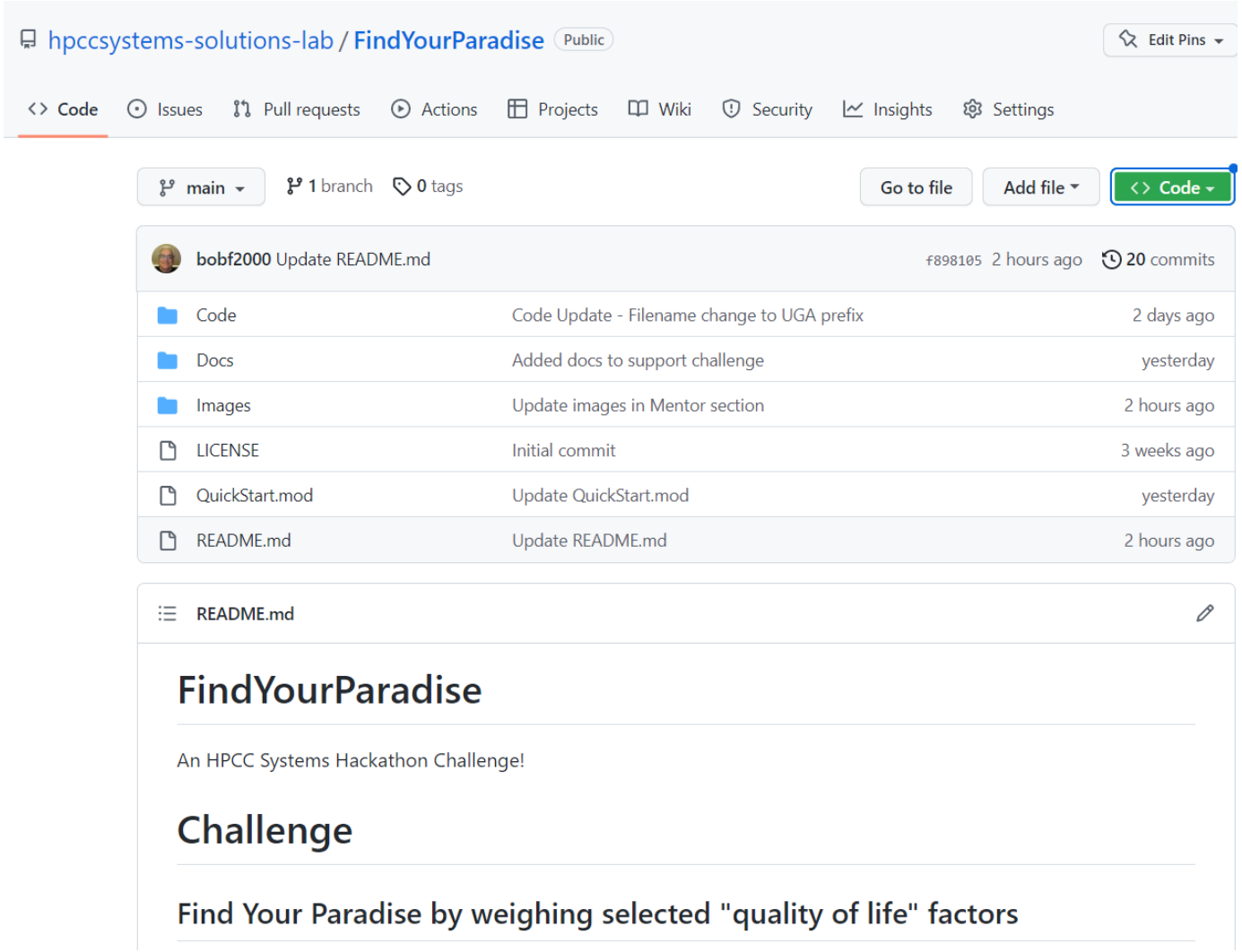
```
"configurations": [
    {
        "name": "External",
        "type": "ecl",
        "request": "launch",
        "protocol": "http",
        "serverAddress": "training.us-hpccsystems-dev.azure.lnrsg.io",
        "port": 8010,
        "path": "",
        "targetCluster": "thor",
        "rejectUnauthorized": true,
        "resultLimit": 100,
        "timeoutSecs": 60,
        "user": "YourNameHere",
        "password": ""
    },
```

{} launch.json ×



The Repo!

https://github.com/hpccsystems-solutions-lab/FindYourParadise



The Resources!

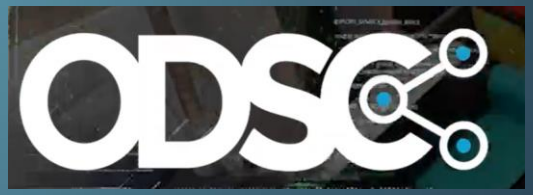
Learn ECL Portal:
https://hpccsystems-solutions-lab.github.io

ECL documentation
https://cdn.hpccsystems.com/releases/CE-Candidate-9.4.4/docs/EN_US/ECLLanguageReference_EN_US-9.4.4-1.pdf

Visualization document
https://cdn.hpccsystems.com/releases/CE-Candidate-9.4.4/docs/EN_US/VisualizingECL_EN_US-9.4.4-1.pdf

Standard Library
https://cdn.hpccsystems.com/releases/CE-Candidate-9.4.4/docs/EN_US/ECLStandardLibraryReference_EN_US-9.4.4-1.pdf

Machine Learning
https://hpccsystems.com/download/free-modules/machine-learning-library



Education

Education

Public Schools:

This dataset was downloaded from:

https://hifld-geoplatform.opendata.arcgis.com/datasets/87376bdb0cb3490cbda39935626f6604_0

Provided by the Homeland Infrastructure Foundation-Level Data (HIFLD) without a license and for Public Use.

More information about the data can be found here:

https://hifld-geoplatform.opendata.arcgis.com/datasets/geoplatform::public-schools/about

Private Schools:

This dataset, taken from the US Department of Homeland Security, contains information on all private schools with attributes regarding their geographical distribution.

License: Public Domain

https://hifld-geoplatform.opendata.arcgis.com/datasets/0dfe37d2a68545a699b999804354dacf_0

HPCC SYSTEMS

Education

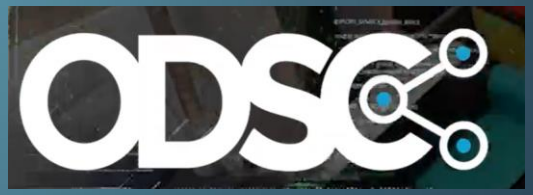
Step 1: Combine Public and Private and mark each record accordingly.
BWR_BuildSchools

Step 2: Create new All_Schools File
File_AllSchools
BWR_BrowseAllSchoolsData

Step 3: Analyze All Schools
BWR_AnalyzeSchools

Step 4: Build Education Rankings by State
BWR_BuildEducationScores

HPCC SYSTEMS



Crime

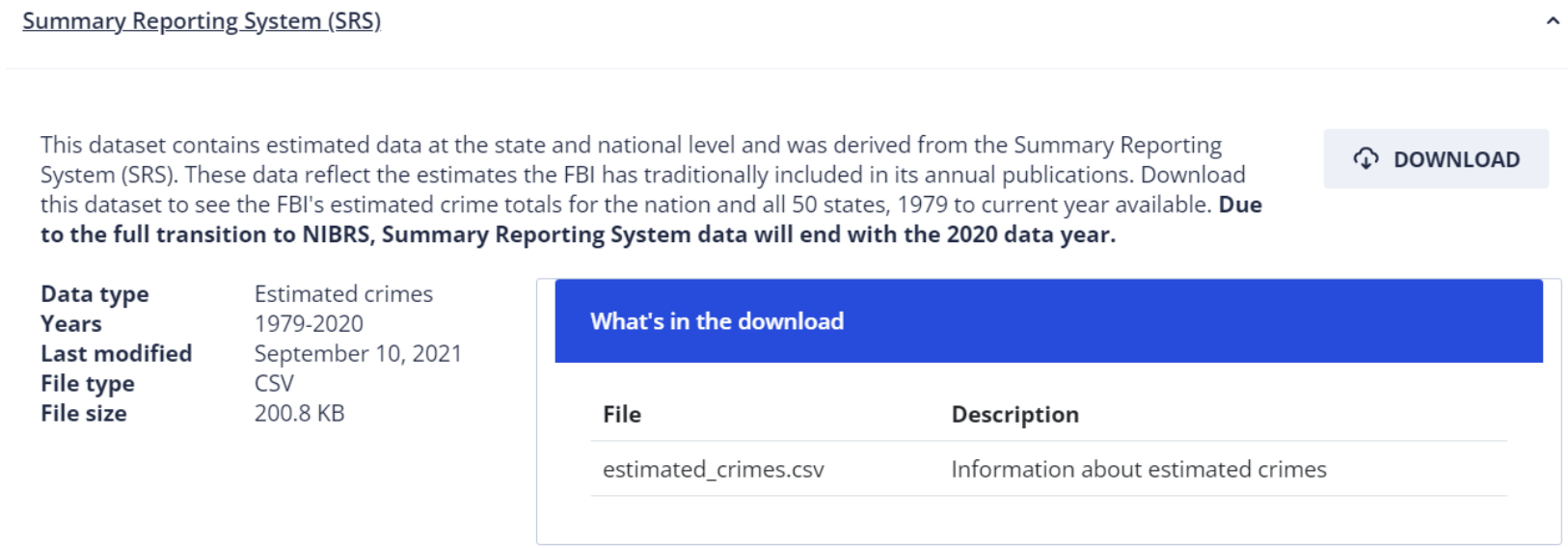
Crime Data (see File_Crimes.ecl)

Estimated Crimes 1979-2020:

This dataset was downloaded from the Crime Data Explorer:

https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/downloads#nibrs-downloads

It contains estimated data at the state and national level and was derived from the Summary Reporting System (SRS). This dataset reflects the estimates the FBI has traditionally included in its annual publications. See the FBI's estimated crime totals for the nation and all 50 states, 1979 to 2020.



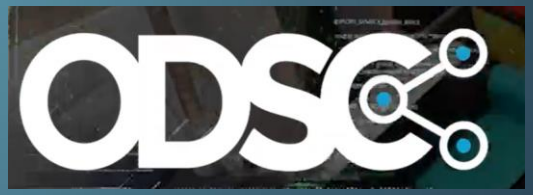
Crime

Step 1: Aggregate Crime By Year and generate ratios by population.
BWR_AnalyzeCrime

Step 2: Generate scoring for Paradise Service
BWR_BuildCrimeScores

Generate Rankings
Example shows Violent Crime and Property Crimes

HPCC SYSTEMS



Health (Mortality)

Health (Mortality) - File_Mortality

Mortality By County (1980-2014):

Originally from the Institute for Health Metrics and Evaluation

https://www.kaggle.com/datasets/IHME/us-countylevel-mortality

Grouped by County FIPS, Category – 5-year increments or all years.

Mortality By State,Race, and Gender (1990-2019):

Source: Institute for Health Metrics and Evaluation

https://ghdx.healthdata.org/record/ihme-data/united-states-life-expectancy-by-state-white-black-hispanic-race-ethnicity-1990-2019

Estimates were produced for mortality rates, life expectancy, and population at the state level in the United States, and by racial/ethnic group, for each year between 1990-2019. These estimates were produced using population and deaths data from the National Center for Health Statistics.

Health

Step 1: Add State information to County Mortality Dataset.

Step 2: Grab the State aggregates for scoring

Step 3: CrossTab Mortality aggregates by State – and get averages!

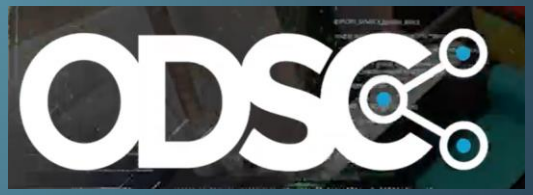
File_StateFIPS **- Lookup table used in JOIN**

BWR_AnalyzeHealth

Step 4: Build Mortality Scores for Paradise Ranking

BWR_BuildHealthScore

HPCC SYSTEMS



Weather

Weather

Storm Events (2018-2022):

The Storm Events Database contains the records used to create the official NOAA Storm Data publication, documenting:

- The occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce;
- Rare, unusual, weather phenomena that generate media attention, such as snow flurries in South Florida or the San Diego coastal area; and
- Other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occur in connection with another event.

The database currently contains data from January 1950 to October 2022, as entered by NOAA's National Weather Service (NWS).

https://www.ncdc.noaa.gov/stormevents/

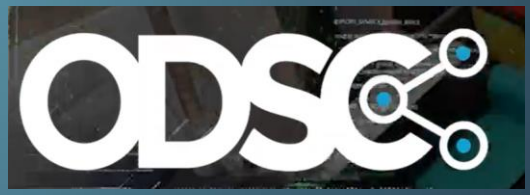
Weather

Step 1: Combine Yearly Weather Datasets into a single Superfile.
File_Weather

Step 2: Sequence Records and add State Code
Step 3: Cross-Tab by State, Weather Event Count
Step 4: Create a Severity Code for Scoring
Step 5: Combing Events, Injuries and Fatalities for Scoring
File_StateFIPS
BWR_AnalyzeWeather

Step 6: Build Weather Score Ranking by State
BWR_BuildWeatherScores

HPCC SYSTEMS



Composite Scores

Building a Composite Dataset

Step 1: Combine Scores from all Categories into a single recordset.

Step 2: Output to a file for indexing.

Step 3: Build the INDEX

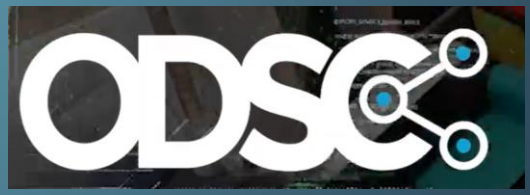
File_Composite

BWR_BuildCompositeScores

Step 4: Build the INDEX

BWR_BuildIndex

HPCC SYSTEMS



Data Delivery (ROXIE or Visualization)

Creating an HTHOR/ROXIE query

Step 1: Determine from your Index what are your Paradise parameters?

iParadise

Step 2: Write the Query! Calculate Paradise Scores based on User input.

FindURParadiseSvc

Step 3: Test with HTHOR first. Set Target, Compile, Publish and Test

Step 4: Publish to ROXIE. Set Target, Compile, Publish and Test!

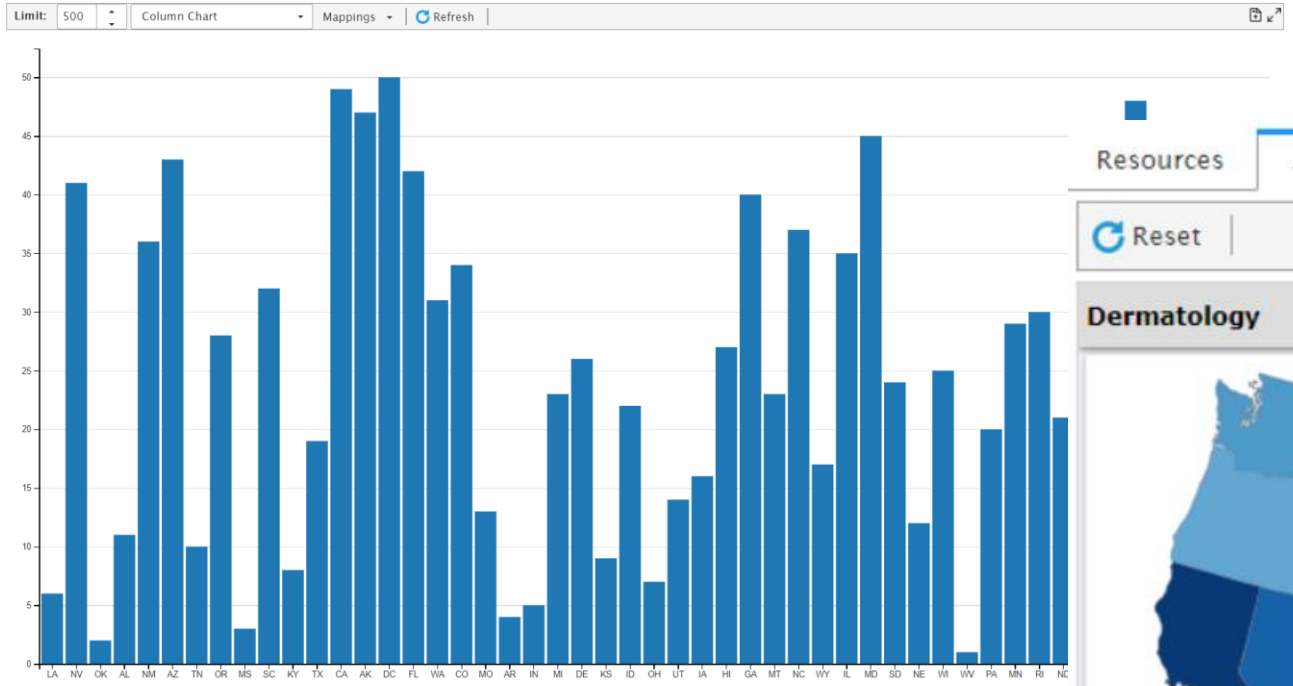
Alternate Delivery: Visualization

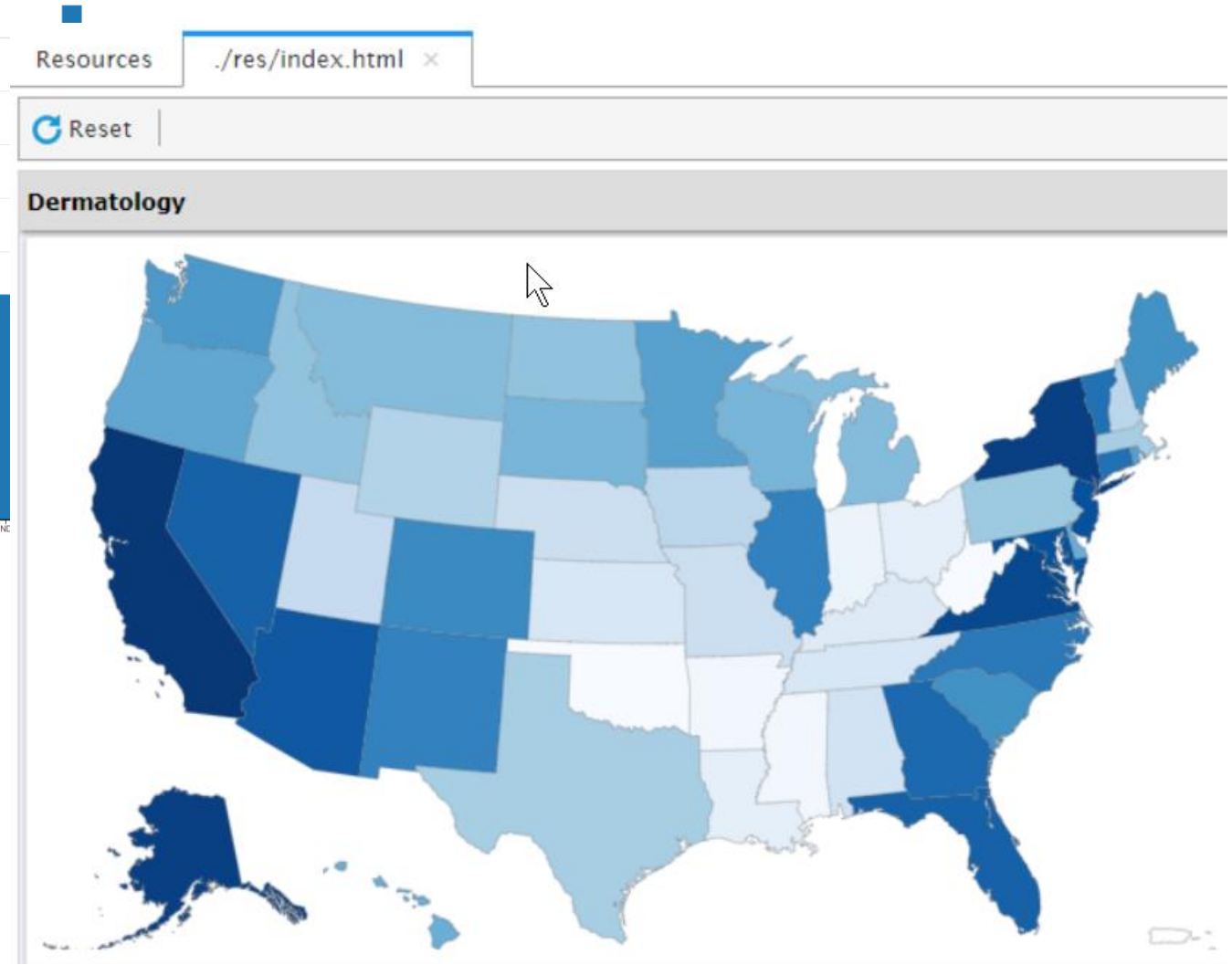
HPCC Systems provides built-in Visualization of your output data in a variety of charts and graphs. You can visualize your data in three ways:

- Using the Chart Tool in the ECL Playground.
- Accessing the Visualize tab in all ECL workunits
- Using the Resources tab in conjunction with the ECL Visualizer bundle.

Installing:
ecl bundle install https://github.com/hpcc-systems/Visualizer.git

Visualization Examples:





HPCC SYSTEMS

Get in Touch

Robert.Foreman@lexisnexisrisk.com

GitHub Repo

HPCC
SYSTEMS