



Safe Haven Challenge



MARCH 2024

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RVCE Hack Challenge 2024!

Safe Haven!

Many travelers find themselves on occasion in a strange land and a strange city, sometimes without their control. Without knowing the risks and dangers in that area, sometimes a tourist can be suddenly be in a dangerous situation.

What can we do as developers to help prevent this?

This year's challenge will analyze different social factors by area such as poverty, unemployment, and many other factors to assess the risk for the traveler in a strange land.

The goal of the challenge is to answer two questions:

1. Analysis of social factors in an area (unemployment, education, poverty, and population) and identify it as a "Hot Spot".
2. Provide additional information to the traveler to help find safe have resources in their area (fire and police stations, hospitals, churches, food banks, etc.)

The Data!

City and County Data has been collected from all 50 US states and organized into a simple dataset to use as your source. In addition, many public datasets have also been gathered and cleaned to help get you started.

These datasets include:

Education

Unemployment

Poverty

Population

Crime

Police

Fire Stations

Hospitals

Places of Worship

Food Banks

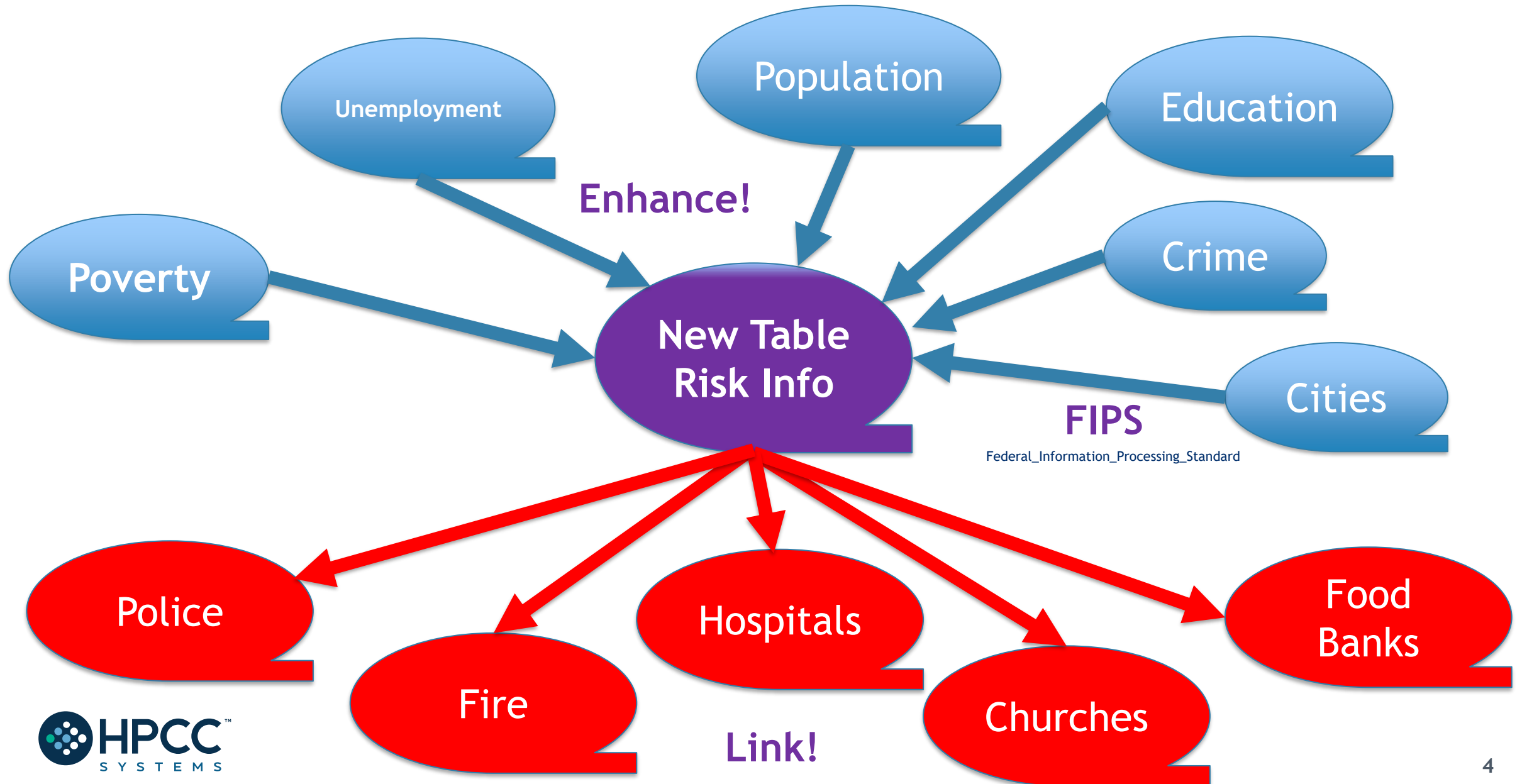
Reference Datasets:

A **Cities** dataset with related FIPS and Zip Codes (used for linking the above datasets to a new “Risk” dataset)

Unemployment Rates (Not really used in this challenge but interesting data!)

You are not limited to using these datasets! Extra credit will be rewarded by linking in other pertinent data!

Data Flow



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": ""  
  },  
]
```

Preferences

Configurations: ExternalCluster

Locate New... Delete

Server Editor Colors Results Compiler Other

Server IP: training.us-hpccsystems-dev.azure.lnrsg.io ☐ SSL ☒ Advanced

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

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

Attribute Server:

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

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

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

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

ECL Watch URL: http://training.us-hpccsystems-dev.azure.lnrsg.io:8010/esp/file

Ok Cancel Apply

The Repo!

<https://github.com/hpccsystems-solutions-lab/SafeHavenChallenge>

The screenshot displays the GitHub repository page for **SafeHavenChallenge**, which is a public repository. The repository is currently on the **main** branch, with 1 branch and 0 tags. The repository was last updated by **bobf2000** with the commit message "Final Code Update".

The repository structure is as follows:

File/Folder	Commit Message
Code	Final Code Update
Images	ReadMe and Images up
LICENSE	Initial commit
README.md	ReadMe and Images up

The repository is licensed under the **Apache-2.0 license**. The **README** file is highlighted.

The **Code** button is circled in red, and a red arrow points from it to the **Download ZIP** button, which is also circled in red.



Examples and Tips

Delivering your Results!

Create a Core Dataset that aggregates your analysis:

```
1  // Let's create a core "risk" file that the county code (FIPS) and the primary city.
2  // We can extra ct this data from the Cities file.
3  IMPORT $;
4  CityDS := $.File_AllData.City_DS;
5  Crime  := $.File_AllData.CrimeDS;
6
7  //CityDS(county_fips = 5035); Test to verify data accuracy for the crime score
8
9
10 // Declare our core RECORD:
11 RiskRec := RECORD
12     STRING45 city;
13     STRING2  state_id;
14     STRING20 state_name;
15     UNSIGNED3 county_fips;
16     STRING30 county_name;
17 END;
18
19 BaseInfo := PROJECT(CityDS,RiskRec);
20 OUTPUT(BaseInfo,NAMED('BaseData'));
21
22 RiskPlusRec := RECORD
23     BaseInfo;
24     EducationScore := 0;
25     PovertyScore   := 0;
26     PopulationScore := 0;
27     CrimeScore     := 0;
28     Total          := 0;
29 END;
30
31 RiskTbl := TABLE(BaseInfo,RiskPlusRec);
32 OUTPUT(RiskTbl,NAMED('BuildTable'));
```


Delivering your Results!

Create a Core Dataset that aggregates your analysis:

```
34 //Let's add a Crime Score!
35
36 CrimeRec := RECORD
37   CrimeRate := TRUNCATE((INTEGER)Crime.crime_rate_per_100000);
38   Crime.fips_st;
39   fips_cty := (INTEGER)Crime.fips_cty;
40   Fips := Crime.fips_st + INTFORMAT(Crime.fips_cty,3,1);
41   END;
42
43 CrimeTbl := TABLE(Crime, CrimeRec);
44 OUTPUT(CrimeTbl, NAMED('BuildCrimeTable'));
45
46 JoinCrime := JOIN(CrimeTbl, RiskTbl,
47   LEFT.fips = (STRING5)RIGHT.county_fips,
48   TRANSFORM(RiskPlusRec,
49     SELF.CrimeScore := LEFT.crimerate,
50     SELF := RIGHT),
51   RIGHT OUTER);
52
53 OUTPUT(SORT(JoinCrime, -CrimeScore), NAMED('AddedCrimeScore'));
54
55 //Now go out and get the others! Good like with your challenge!
56 //After you complete the other scores, make sure to OUTPUT to a file and then create a DATASET so
57 //that you can reference and deliver it to the judges.
58
59
```

Delivering your Results!

Extracting Data using our STRING library:

Submit ▼ Target:

```
1  IMPORT $,STD;
2
3  UNEMP      := $.File_AllData.unemp_byCountyDS;
4  EDU        := $.File_AllData.EducationDS;
5  POVTY      := $.File_AllData.pov_estimatesDS;
6
7
8  //Add Poverty Percentage ages 0-17 for FIPS area:
9  POVTBL := TABLE(POVTY((STD.Str.Find(attribute, 'PCTPOV017_2021',1) <> 0)),
10                  {Fips_Code,attribute,value});
11  OUTPUT(SORT(POVTBL,-value),NAMED('PovertyPct0to17'));
12
13  //Add Unemployment Rate for area:
14  CT_UNEMP := TABLE(UNEMP((STD.Str.Find(attribute, 'Unemployment_rate',1) <> 0)),
15                  {Fips_Code,cnt := ROUND(AVE(GROUP,value),2)},Fips_Code);
16  OUTPUT(SORT(CT_UNEMP,-cnt),NAMED('UNEMP_Rate'));
17
18  EDU_CT_FIPS := TABLE(EDU((STD.Str.Find(attribute, 'Percent of adults with less than a high school diploma',1) <> 0)),
19                  {Fips_Code,tot := ROUND(AVE(GROUP,value),2)},fips_code);
20  OUTPUT(SORT(EDU_CT_FIPS,-tot),NAMED('NoHighSch'));
21
```



Data Delivery (Roxie and Visualization)

Delivering your Results!

Step 1 - Clean, Declare and Build your Indexes (Churches):

```
1  IMPORT $,STD;
2  //This file is used to demonstrate how to "clean" a raw dataset (Churches) and create an index to be used in a ROXIE service
3  Churches := $.File_AllData.ChurchDS;
4  Cities   := $.File_AllData.City_DS;
5
6
7  //First, determine what fields you want to clean:
8  CleanChurchRec := RECORD
9      STRING70 name;
10     STRING35 street;
11     STRING22 city;
12     STRING2  state;
13     UNSIGNED3 zip;
14     UNSIGNED1 affiliation;
15     UNSIGNED3 PrimaryFIPS; //New - will be added from Cities DS
16 END;
17 //PROJECT is used to transform one data record to another.
18 CleanChurch := PROJECT Churches, TRANSFORM(CleanChurchRec,
19     SELF.name           := STD.STR.ToUpperCase(LEFT.name),
20     SELF.street         := STD.STR.ToUpperCase(LEFT.street),
21     SELF.city           := STD.STR.ToUpperCase(LEFT.city),
22     SELF.State          := STD.STR.ToUpperCase(LEFT.state),
23     SELF.zip            := LEFT.zip,
24     SELF.affiliation     := LEFT.affiliation,
25     SELF.PrimaryFIPS    := 0));
```


Delivering your Results!

Step 1 - Clean, Declare and Build your Indexes (Churches):

```
26 //JOIN is used to combine data from different datasets
27 CleanChurchFIPS := JOIN(CleanChurch,Cities,
28     LEFT.city = STD.STR.ToUpperCase(RIGHT.city) AND
29     LEFT.state = RIGHT.state_id,
30     TRANSFORM(CleanChurchRec,
31         SELF.PrimaryFIPS := (UNSIGNED3)RIGHT.county_fips,
32         SELF := LEFT),LEFT OUTER,LOOKUP);
33 //Write out the new file and then define it using DATASET
34 WriteChurches := OUTPUT(CleanChurchFIPS,, '~SAFE::OUT::Churches',OVERWRITE);
35 CleanChurchesDS := DATASET('~SAFE::OUT::Churches',CleanChurchRec,FLAT);
36
37 //Declare and Build Indexes (special datasets that can be used in the ROXIE data delivery cluster
38 CleanChurchIDX := INDEX(CleanChurchesDS,{city,state},{CleanChurchesDS}, '~SAFE::IDX::Church::CityPay');
39 CleanChurchFIPSIDX := INDEX(CleanChurchesDS,{PrimaryFIPS},{CleanChurchesDS}, '~SAFE::IDX::Church::FIPSPay');
40 BuildChurchIDX := BUILD(CleanChurchIDX,OVERWRITE);
41 BuildChurchFIPSIDX := BUILD(CleanChurchFIPSIDX,OVERWRITE);
42
43 //SEQUENTIAL is similar to OUTPUT, but executes the actions in sequence instead of the default parallel actions of the HPCC
44 SEQUENTIAL(WriteChurches,BuildChurchIDX,BuildChurchFIPSIDX);
45
```


Delivering your Results!

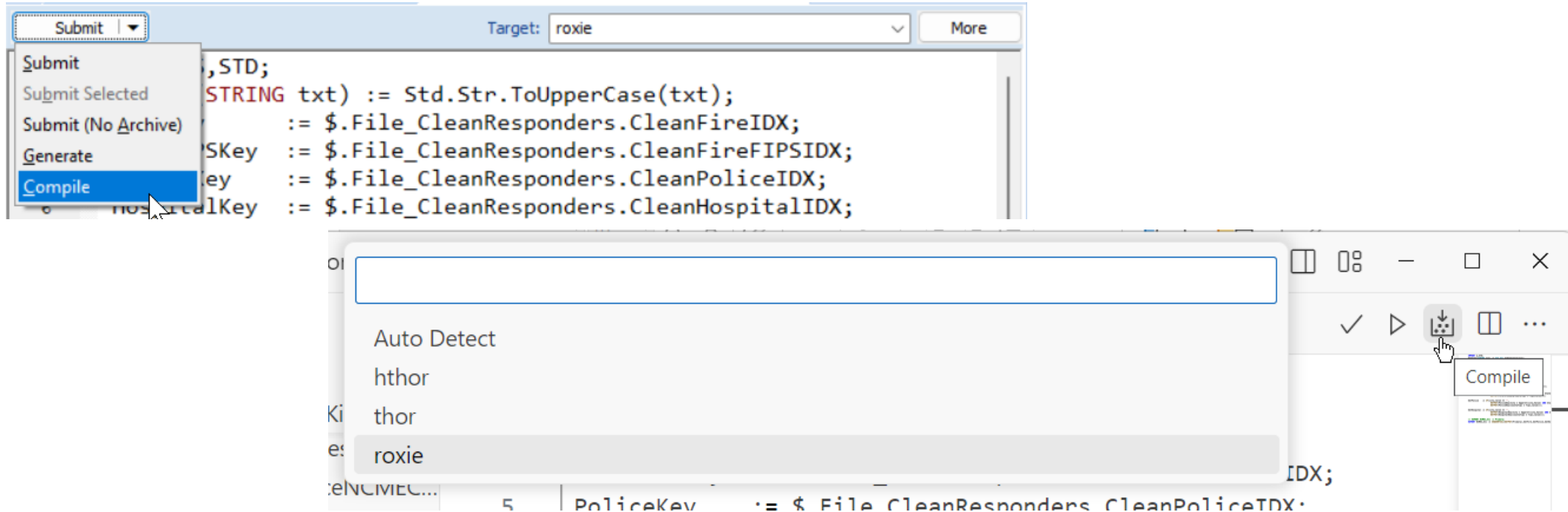
Step 2 - Design and Write Your Query:

```
1  IMPORT $,STD;
2  UpperIt(STRING txt) := Std.Str.ToUpperCase(txt);
3  //These INDEXes are created (built) in BWR_CleanChurches
4  CleanChurchRec := RECORD
5      STRING70 name;
6      STRING35 street;
7      STRING22 city;
8      STRING2 state;
9      UNSIGNED3 zip;
10     UNSIGNED1 affiliation;
11     UNSIGNED3 PrimaryFIPS; //New - will be added from Cities DS
12 END;
13 CleanChurchesDS := DATASET('~SAFE::OUT::Churches',CleanChurchRec,FLAT);
14 CleanChurchIDX := INDEX(CleanChurchesDS,{city,state},{CleanChurchesDS},'~SAFE::IDX::Church::CityPay');
15 CleanChurchFIPSIDX := INDEX(CleanChurchesDS,{PrimaryFIPS},{CleanChurchesDS},'~SAFE::IDX::Church::FIPSPay');
16
17 /* To Publish your Query:
18 1. Change Target to ROXIE
19 2. Compile ONLY
20 3. Open ECL Watch and select the Publish tab to publish your query
21 4. Test and demonstarte using: http://training.us-hpccsystems-dev.azure.lnrsg.io:8002
22
23 */
24 EXPORT Safe_Svc(FipsVal,STRING22 CityVal,STRING2 StateVal) := FUNCTION
25 MyChurch := IF(FipsVal = 0,
26     OUTPUT(CleanChurchIDX(City=UpperIt(CityVal),State=UpperIt(StateVal))),
27     OUTPUT(CleanChurchFIPSIDX(PrimaryFIPS=FipsVal)));
28 RETURN MyChurch;
29 END;
30
```

I

Delivering your Results!

Step 3 - Deploy(Publish) and then Test Your Query:



Delivering your Results!

Step 3 - Deploy(Publish) and then Test Your Query:

ie | Publish | Z.A.P | Worker Logs

Job Name: DEMO.Safe_Svc

Remote Dali:

Source Process:

Comment:

Priority: None

Allow Foreign Files: ☒

Update Super Files: ☐

Submit

Completed

Delivering your Results!

Step 3 - Deploy(Publish) and then Test Your Query:

The screenshot shows the HPCC Systems web interface in a browser. The address bar displays the URL `training.us-hpccsystems-dev.azure.lnrsg.io:8002`, with a red arrow pointing to it. The browser's bookmark bar includes 'Corporate Bookmarks', 'System Dashboard...', 'Home Page | HPCC...', 'ECL Watch Training 2', 'ECL Watch | 160', and 'Eventbrite'. The HPCC Systems header includes 'View', 'Frame', and 'Log Out' links. The main interface is divided into a left sidebar and a right main panel. The sidebar, titled 'Active Queries', shows a tree structure under 'Targets' with 'hthor' expanded, containing 'demo.safe_svc' (highlighted with a red arrow), 'thor', 'roxie', and 'thor_roxie'. The main panel displays the 'hthor' query configuration for 'demo.safe_svc', set to 'Dynamic Form'. Below this, the 'DEMO_SAFE_SVCREQUEST' form is visible, containing input fields for 'cityval:', 'fipsval:', and 'stateval:'. A red arrow points to the 'Submit' button at the bottom of the form. The bottom of the main panel includes a dropdown for 'Output Tables', a dropdown for 'FORM POST', and buttons for 'Submit' and 'Clear All'.

Delivering your Results!

Step 3 - Deploy(Publish) and then Test Your Query:

demo.safe svc Response

Dataset: Result 1

	city	state	name	street	zip	affiliation	primaryfips
1	ATLANTA	GA	100 PEOPLE OF FAITH ATLANTA GEORGIA INC	1949 MERCEDES CT NE	30345	3	13121
2	ATLANTA	GA	4 POINTES CHURCH OF ATLANTA INCORPORATED	1151 HAMMOND DR NE STE 240	30346	3	13121
3	ATLANTA	GA	A J FREEMAN JR MINISTRIES	PO BOX 50547	30302	3	13121
4	ATLANTA	GA	ABUNDANT GRACE COMMUNITY CHURCH OF ATLANTA INC	743 VIRGINIA AVE NE	30306	3	13121
5	ATLANTA	GA	ABUNDANT LIFE CHURCH OF GOD IN CHRIST	79 MCDDONGH BLVD SE	30315	9	13121
6	ATLANTA	GA	ABUNDANT LIFE CHURCH OF GOD IN CHRIST	PO BOX 17596	30316	9	13121
7	ATLANTA	GA	ABUNDANT LOVE UNITARIAN UNIVERSALIST	PO BOX 11372	30310	3	13121
8	ATLANTA	GA	ACTION MINISTRIES INC	1700 CENTURY CIRCLE NE NO 200	30345	3	13121
9	ATLANTA	GA	ADELPHOS FELLOWSHIP CHURCH INC	310 SPRINGDALE DR NE	30305	3	13121
10	ATLANTA	GA	AGAPE CHRISTIAN TRAINING CENTER	215 LAKEWOOD WAY SW	30315	3	13121
11	ATLANTA	GA	AGAPE DELIVERANCE MINISTRIES	791 MAGNOLIA WAY NW APT 1332	30314	3	13121
12	ATLANTA	GA	AGAPE TEMPLE WHERE JESUS BREAKS EVERY FETTER OF ATLANTA GEORGIA INC	845 HARWELL ST NW	30314	3	13121
13	ATLANTA	GA	AHAVA EARLY LEARNING CENTER INC	600 PEACHTREE BATTLE AVE NW	30327	3	13121
14	ATLANTA	GA	ALL NATIONS UNITED GOSPEL	751 FAIRBURN RD SW APT 5221	30331	3	13121
15	ATLANTA	GA	ALL NEEDS MET MINISTRIES INC	PO BOX 491708	30349	3	13121
16	ATLANTA	GA	ALL SAINTS ANGLICAN CHURCH ATLANTA	PO BOX 366491	30336	3	13121
17	ATLANTA	GA	ALLIANCE FOR CHRISTIAN MEDIA	2715 PEACHTREE RD NE	30305	3	13121
18	ATLANTA	GA	ALLIANCE OF DIVINE LOVE INC	2060 OLD GEORGIAN TER NW	30318	9	13121
19	ATLANTA	GA	ALLIANCE OF DIVINE LOVE INC	3014 WHISPERING HILLS CT	30341	9	13121
20	ATLANTA	GA	ALLIANCE OF DIVINE LOVE INC	3750 PEACHTREE RD NE APT 410	30319	9	13121
21	ATLANTA	GA	ALOC INC	2936 BLUESTONE DR SW	30331	3	13121
22	ATLANTA	GA	ALPHA & OMEGA HOLISTIC INTERNATIONAL OUTREACH APOSTOLIC	369 MCDANIEL ST SW APT 2711	30313	3	13121
23	ATLANTA	GA	ALPHARETTA CHURCH OF RELIGIOUS SCIENCE	100 HANNOVER PARK RD STE 160	30350	9	13121
24	ATLANTA	GA	AMAZED INC	1643 MT VERNON RD	30338	3	13121
25	ATLANTA	GA	AMBASSADORS FOR CHRIST NATIONAL MINISTRIES INC	2870 PHARR COURT SOUTH NW APT 710	30305	3	13121
26	ATLANTA	GA	AMERICAN ACADEMY OF RELIGION INC	825 HOUSTON MILL RD NE STE 300	30329	3	13121
27	ATLANTA	GA	AMERICAN BAPTIST HISTORICAL SOCIETY	3001 MERCER UNIVERSITY DR	30341	9	13121
28	ATLANTA	GA	ANCIENT MYSTICAL ORDER OF ROSAE CRUCIS	3600 DEKALB TECH PKY SUITE 115	30340	9	13121
29	ATLANTA	GA	ANCIENT MYSTICAL ORDER OF ROSAE CRUCIS	3600 DEKALB TECH PKY SUITE 115	30340	9	13121
30	ATLANTA	GA	ANCIENT MYSTICAL ORDER OF ROSAE CRUCIS	3600 DEKALB TECH PKY SUITE 115	30340	9	13121
31	ATLANTA	GA	ANGELICAN EPISCOPAL CHURCH OF NANCY	409 N STRATFORD RD NE	30309	9	13121

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>

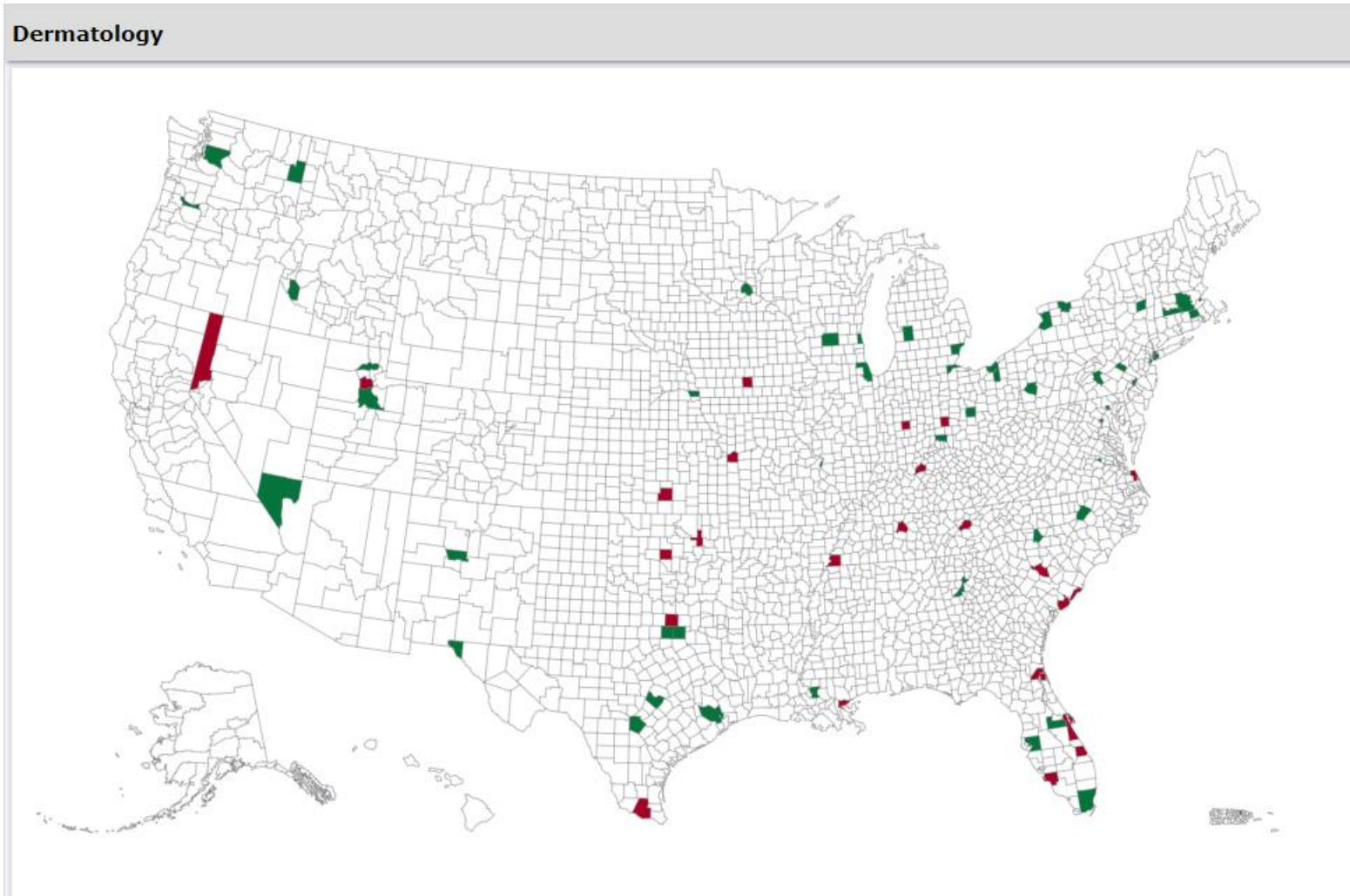
<https://hpccsystems.com/resources/visualizing-ecl-and-sharing-your-results-the-hpcc-systems-visualizer/>

<https://github.com/hpcc-systems/Visualizer>

Visualization Examples:

```
1  IMPORT $,Visualizer;  
2  
3  Cities := $.File_AllData.City_DS;  
4  
5  //Build Table  
6  DensityTbl := TABLE(Cities,{(INTEGER)county_fips,(INTEGER)density});  
7  
8  OUTPUT(DensityTbl,NAMED('DenFIPS'));  
9  
10 Visualizer.Choropleth.USCounties('Fips_demo',,'DenFIPS', , , DATASET(['paletteID', 'Default;t']), Visualizer.KeyValueDef));  
11  
12
```

Visualization Examples:



Final Thoughts

- ✓ Since your solution is the key part to this challenge you can use `#OPTION('obfuscateOutput', TRUE);` at the start of your code to hide it from being viewed on ECL Watchpage. If you decide to use `#OPTION` make sure to remove it from the WUID that you shared with the judges. When `obfuscateOutput` set to true, details are removed from the generated workunit, including ECL code, estimates of record size, and number of records.
- ✓ If you want to write the result to a file, make sure the file name starts with your team's name for uniqueness purpose.
- ✓ Make sure the query names are unique and easy to identify. Do not use generic names like test, mentors, or roxie. We suggest adding your team's name as well. General names will result in other teams overwriting your files, queries, and results
- ✓ We encourage team play so teams that help answer questions in Slack will be considered favorably in judging.
- ✓ Direct emails and direct messages to judges asking for support will be *ignored* and it won't work in team's favor
- ✓ We also encourage students to leverage our community forum and/or StackOverflow for ECL coding related questions. Please make sure to tag your questions with *hpcc-ecl*.

The Resources!

Challenge Wiki Page:

<https://wiki.hpccsystems.com/display/hpcc/R.V.+College+of+Engineering+Hack+Challenge+March+2024>

Learn ECL Academy

<https://hpccsystems-solutions-lab.github.io>

ECL Training containing six short videos

https://www.youtube.com/watch?time_continue=192&v=Lk78BCcTM-0

ECL Documentation

http://cdn.hpccsystems.com/releases/CE-Candidate-9.4.30/docs/EN_US/ECLLanguageReference_EN_US-9.4.30-1.pdf

Visualization Document

https://cdn.hpccsystems.com/releases/CE-Candidate-9.4.30/docs/EN_US/VisualizingECL_EN_US-9.4.30-1.pdf

Standard Library

https://cdn.hpccsystems.com/releases/CE-Candidate-9.4.30/docs/EN_US/ECLStandardLibraryReference_EN_US-9.4.30-1.pdf

Machine Learning

<https://hpccsystems.com/download/free-modules/machine-learning-library>

Good Luck to all Participants!

