

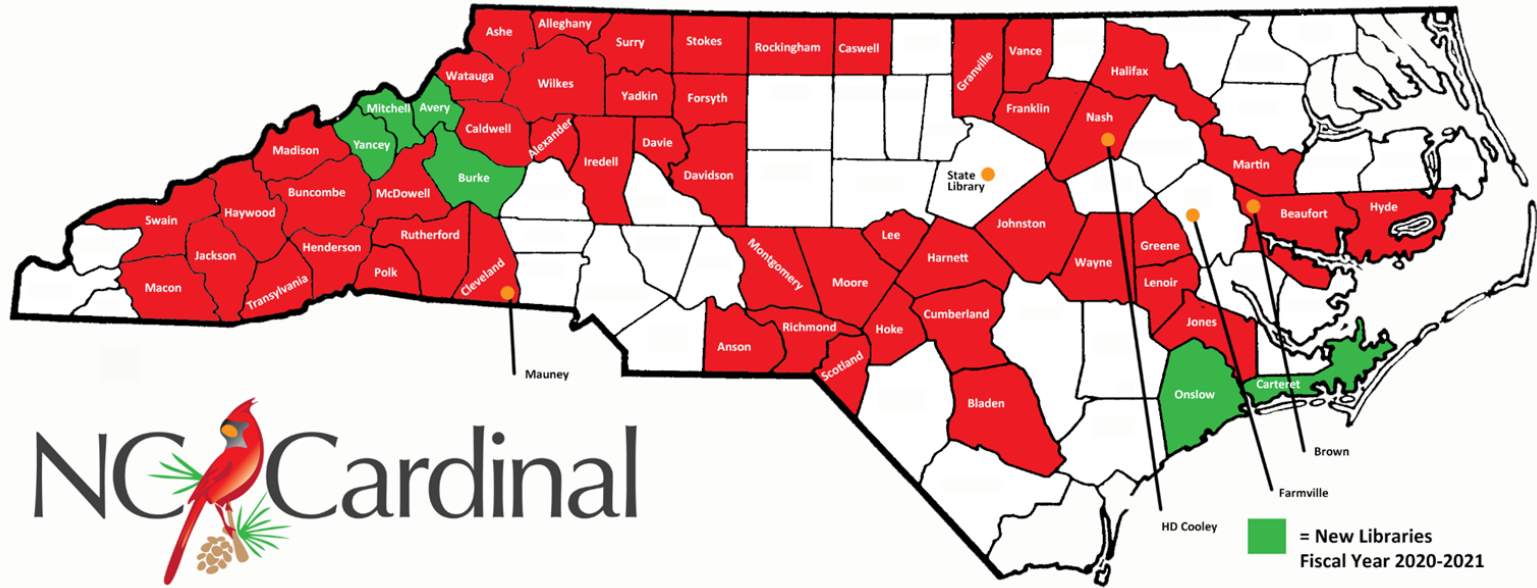


NC Research.
Library Support.
Talking Books.

Resource Sharing Using Geolocation in North Carolina

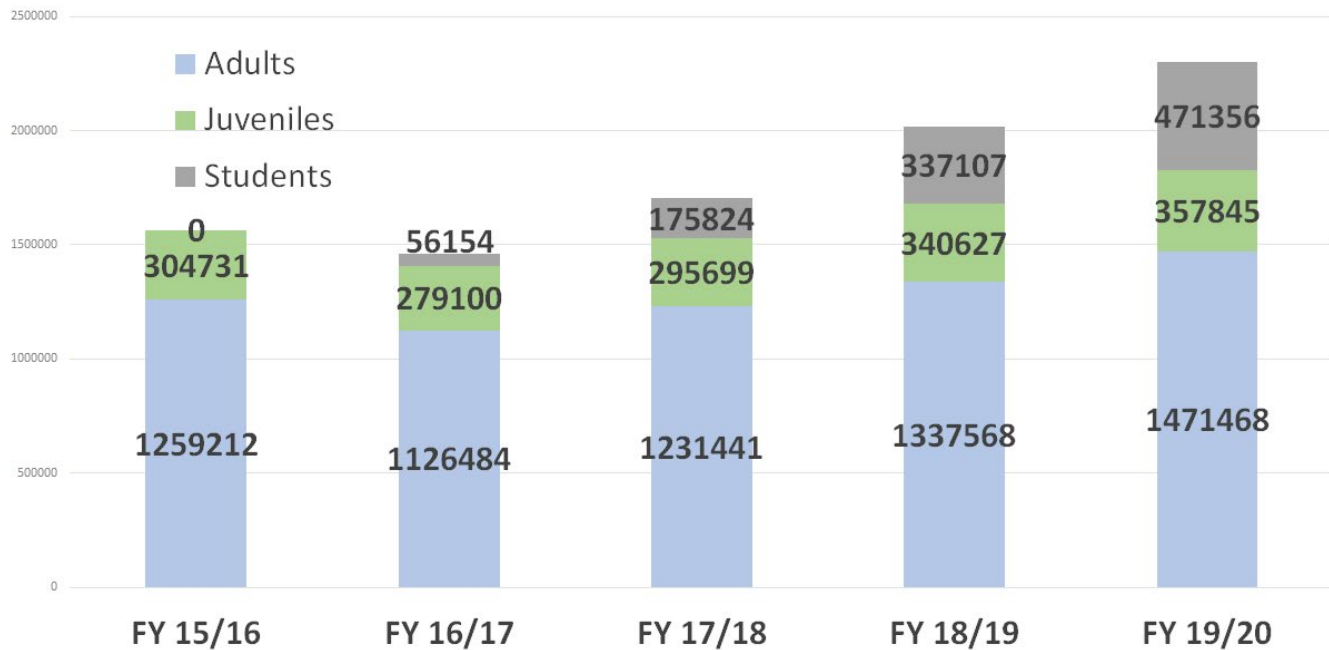
Shipping from the mountains to the sea

NC Cardinal Overview



55 Counties, 4 municipalities, 7 Special Libraries

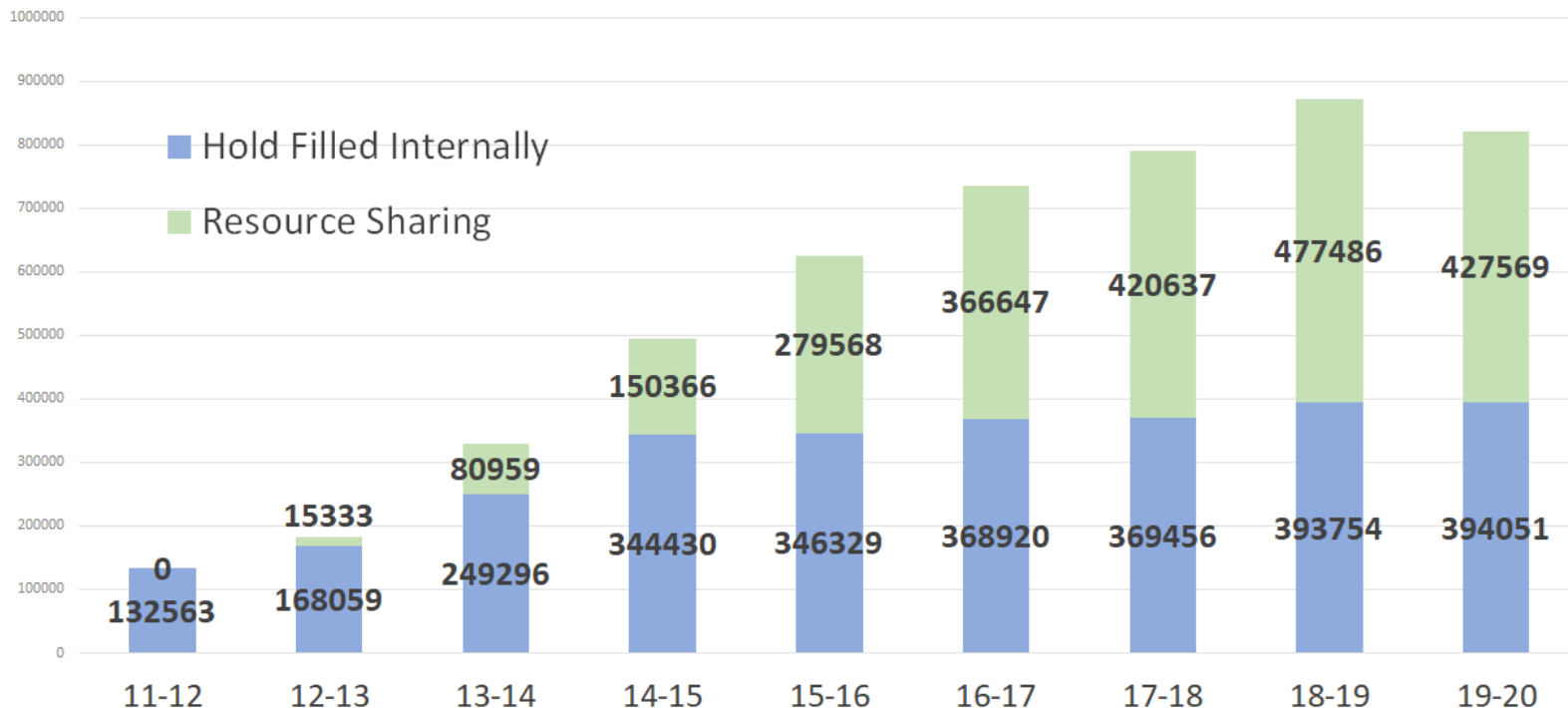
NC Cardinal Overview



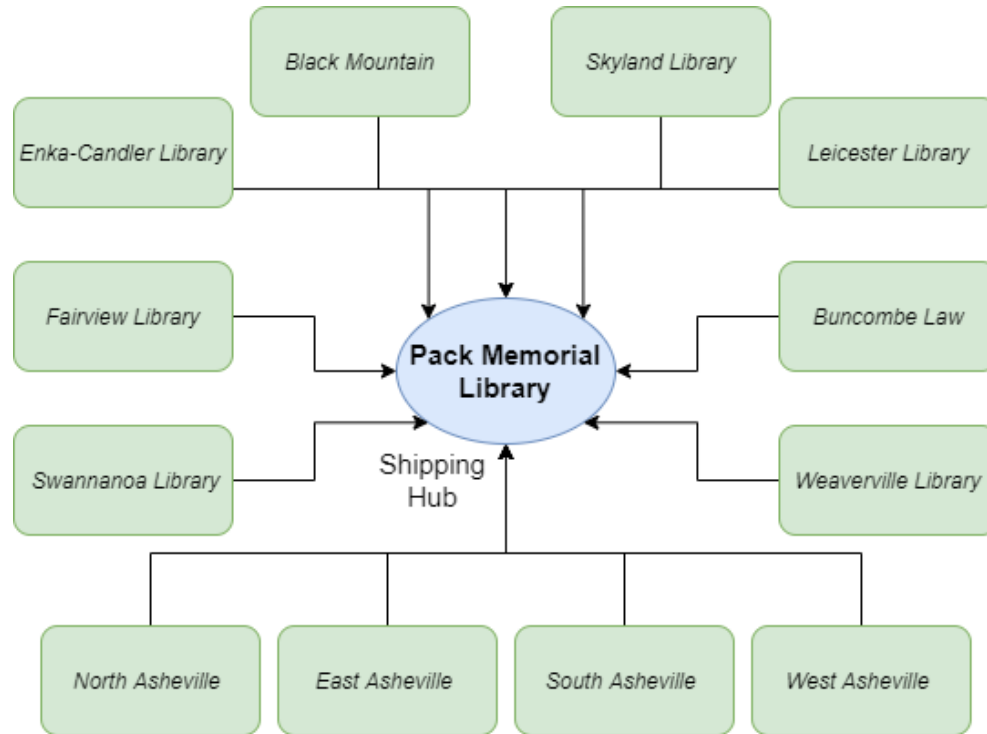
Population Breakdown

System	Active Patrons
Buncombe County Library System	193589
Forsyth County Public Library	177137
Cumberland County Library System	144778
Davidson County Public Library	126371
Sandhill Regional Library System	91778
Iredell County Public Library	89622
Johnston County Affiliated Libraries	82005
Appalachian Regional Library	81711
Harnett County Library System	76405

NC Cardinal Resource Sharing



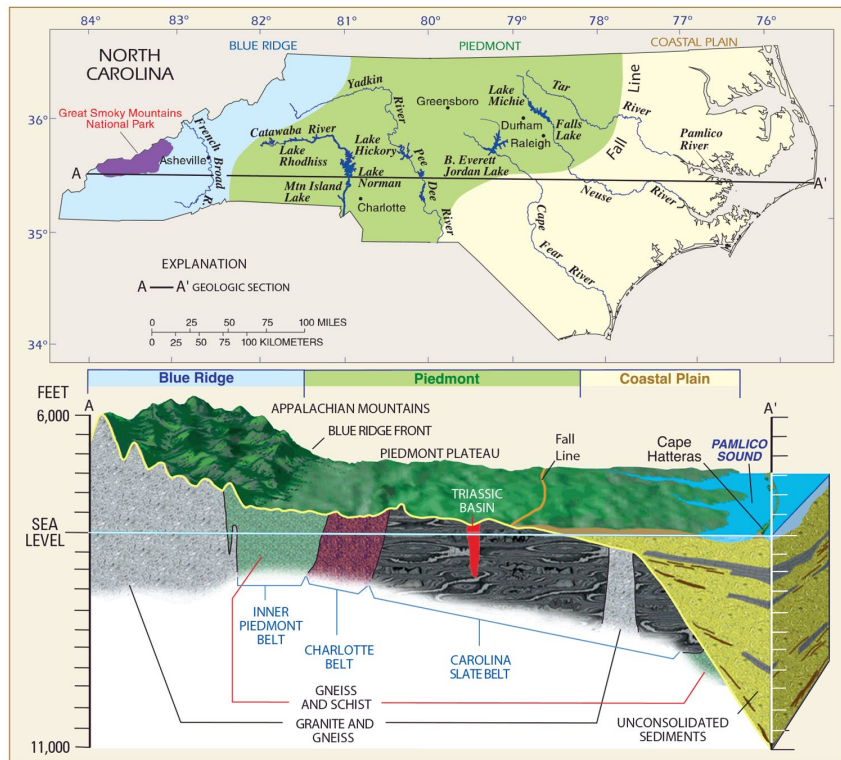
Shipping Hubs



Library Branches

Buncombe County Example
Material arrives at Pack Memorial library before being shipped to other branches in the system.

North Carolina Geography



N.C. Fact Sheet

Length

503 miles

Width

150 miles

Height

6,684 feet - 0 feet

Major Rivers

- Chowan
- Roanoke
- Tar
- Neuse
- Cape Fear

Diagram by USGS

North Carolina Geography: West NC



Wilkes County



Asheville, Buncombe County

Photo by Michael Tracey (public domain)

North Carolina Geography: West NC

Highway 321 leaving Boone



Photos from Google Maps



Interstate 40 leaving Asheville

North Carolina Geography: West NC



Photo by California State Department of Transportation

That's gotta hurt!

North Carolina Geography: Central NC



Winston-Salem, Forsyth County



Fayetteville, Cumberland County



North Carolina Geography: Central NC



Map by NCDOT

North Carolina Geography: Eastern NC



Intercoastal waterway, Onslow County



Morehead City, Carteret County

Photo by James Willamor

<https://creativecommons.org/licenses/by-sa/4.0/>

North Carolina Geography: Eastern NC



Photo by The National Oceanic Atmospheric Administration

Look out below!

The North Carolina Division of Aviation/ABC Television Stations, DRONE VIDEO: I-40 completely flooded after Florence (2018, Sept 18) <https://www.youtube.com/watch?v=j4nXX0f28Kk>

North Carolina Geography: Outer Banks



Jockey's Ridge, Dare County

photo by Zach Rudisin

<https://creativecommons.org/licenses/by-sa/3.0/>



Ocracoke, Hyde County

photo by Vbofficial (public domain)

North Carolina Geography: Outer Banks

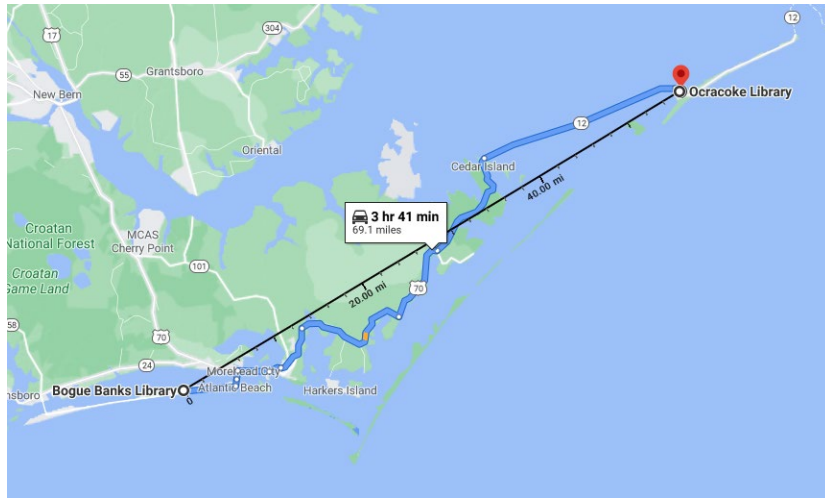


North Carolina Geography: Outer Banks



Geographical Conundrums of North Carolina

The Island Conundrum Carteret County



Crow flies 55 miles
Truck drives 69 miles
and requires boat

The Mountain Conundrum Buncombe County



Crow flies 5 miles
Truck drives 14 miles

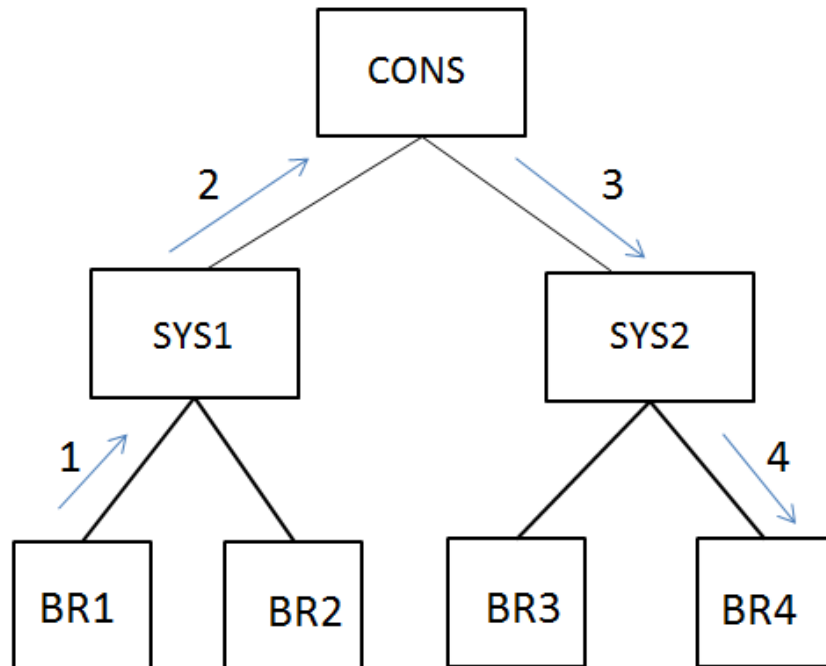
Mid-way Questions

Pilot Mountain, Yadkin & Surry Counties

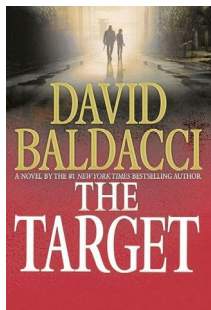


Photo by Christopher Ziemnowicz, <https://creativecommons.org/licenses/by/3.0/>

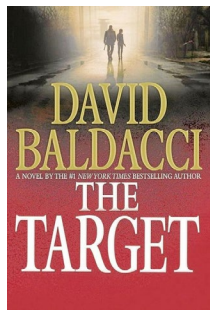
Hold Targeter Overview



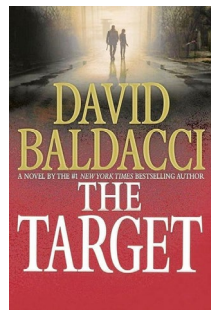
Hold Targeter Issue



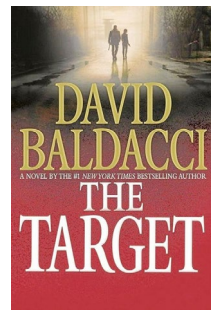
1 mile



5 miles



25 miles



250 miles



Proof of Concept Overview

actor.org_unit_shipping_hub_distance

- + id: primary key
- + orig_hub: actor.org_unit
- + dest_hub: actor.org_unit
- + distance: int

actor.org_unit

- + shipping_hub_ou: actor.org_unit

actor.org_unit_address

- + longitude: numeric
- + latitude: numeric

OpenILS::Application::VicinityCalculator

- build_distance_matrix
- set_coords
- get_all_hubs
- get_hub_from_ou
- get_distance_between_shipping_hubs

OpenILS::Utils::VicinityCalculator::Matrix

- hub_matrix
- distance_between_hubs
- get_target_hubs
- get_hub_from_ou

OpenILS::Utils::VicinityCalculator

- calculate_distance_matrix
- get_addr_from_ou
- get_coord_from_ou
- get_all_hubs
- get_coord_from_address
- set_coord_for_ou
- set_coord_for_addr
- vicinity_between_coord
- _geo_request
- vicinity_between_coords
- vicinity_between_ou
- vicinity_between_hub

Vicinity Calculator
Calls the API to retrieve Longitude/Latitude and calculate driving directions

Vicinity Matrix
Contains the distance between pickup library and shipping hubs of target copies

API Connection

 Bing maps | Dev Center

My account ▾

Data sources ▾

Announcements

Contacts & Info

Hello Marshall,

Sign out


My keys

Click [here](#) to create a new key.

Click [here](#) to download complete list of keys.

View Specific Key:



Application name	Key details	Enable Preview for All Keys 
City Limits Analyzer	<p>Key: Show key</p> <p>Application Uri:</p> <p>Key type: Basic / Windows Application</p> <p>Created date: 01/12/2021</p> <p>Expiration date: None</p> <p>Key Status: Enabled</p> <p>Security Enabled: No</p>	<p>Update</p> <p>Copy key</p> <p>Usage Report</p> <p>Enable Security</p> <p>Enable Preview <input type="checkbox"/></p>
EG Org Prox Calc	<p>Key: Show key</p> <p>Application Uri:</p> <p>Key type: Basic / Dev/Test</p> <p>Created date: 02/04/2020</p> <p>Expiration date: None</p> <p>Key Status: Blocked - Key has exceeded the Terms of Use limits</p>	<p>Update</p> <p>Copy key</p> <p>Usage Report</p>



API Connection

```
<open-ils.vicinity-calculator>
  <keepalive>3</keepalive>
  <stateless>1</stateless>
  <language>perl</language>
  <implementation>OpenILS::Application::VicinityCalculator</implementation>
  <max_requests>5</max_requests>
  <unix_config>
    <unix_sock>open-ils.vicinity-calculator_unix.sock</unix_sock>
    <unix_pid>open-ils.vicinity-calculator_unix.pid</unix_pid>
    <max_requests>100</max_requests>
    <unix_log>open-ils.vicinity-calculator_unix.log</unix_log>
    <min_children>1</min_children>
    <max_children>15</max_children>
    <min_spare_children>1</min_spare_children>
    <max_spare_children>5</max_spare_children>
  </unix_config>
  <app_settings>
    <key>[REDACTED]</key>
  </app_settings>
</open-ils.vicinity-calculator>
```


Assigning Shipping Hubs

Org Unit Configuration x Library details: Example Branch 6 x

Not secure | 192.168.56.102/eg/opac/library/BR6

Apps prod dev next Basecamp h. HelpSpot SQL Migrations Email newdev EG 192.168.56.101 eg16-NotYourHigh... Base ball. As view... h. Modify Portal Temp... North Carolina Map... Tattle Tale Reportin... Other bookmarks

EVERGREEN® My Account

Link 1 Link 2 Link 3 Link 4 Link 5

Search the Catalog [Advanced Search](#) [Browse the Catalog](#)

Search: Type: Keyword Format: All Formats Library: Example Consortium Search All Libraries


Example Branch 6

Contact information

Email address: br6@example.com
Telephone: (555) 555-0276

Mailing address

625 Academy St NE
Gainesville
GA
US
30601



A map showing the location of Brenau University and surrounding streets. The map includes labels for Green St NE, Academy St NE, Brenau Ave, Brenau University, and Northeast G. A scale bar indicates 500 feet and 91.44 meters. The map is credited to Bing and Microsoft Corporation.

Geolocating Shipping Hubs

Organizational Unit Shipping Hub Distance Configuration

Entries in this table contain the distance in miles between shipping locations. Shipping hubs are configured from the Organizational Units page. These numbers are used for sorting hold targets during inter-library lending. Entries can be created manually or calculated using the free Bing Maps API if a key has been set up in the opensrf core config file. **Running the API will remove any existing data from this table.**

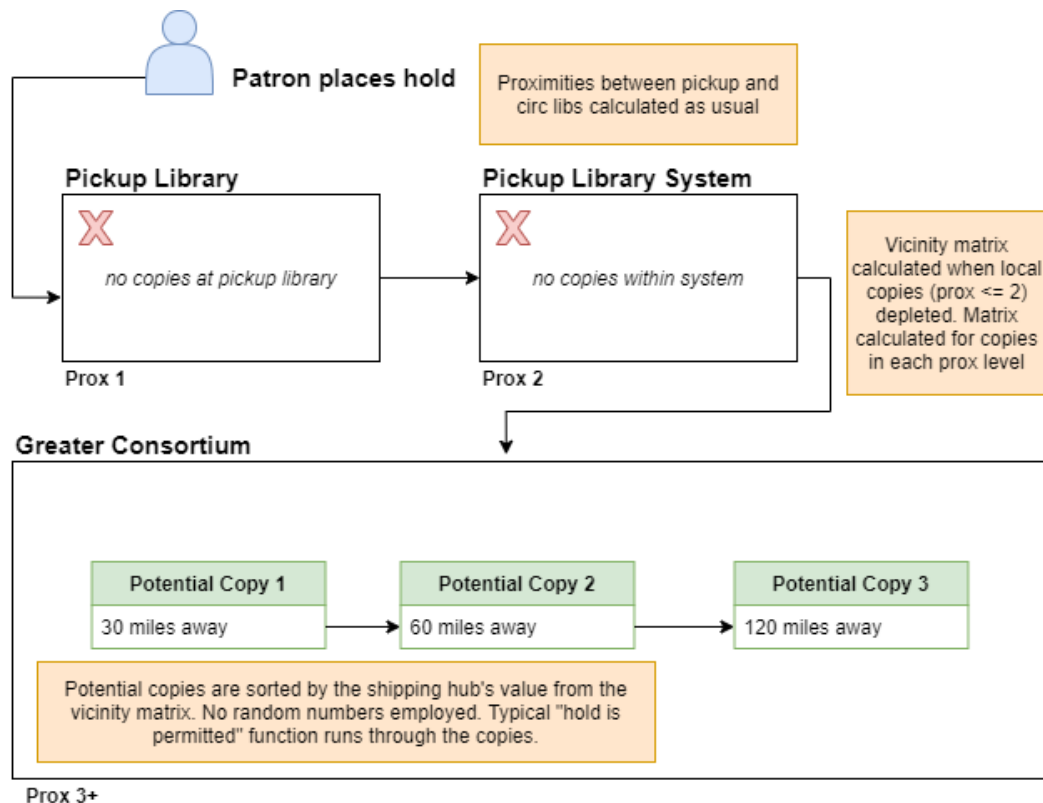
Calculate with API

New Organizational Unit Shipping Hub Distance Apply Translations

0 selected

<input checked="" type="checkbox"/>	#	id	Origin Hub	Destination Hub	Distance
Nothing to Display					

Hold Targeting



Testing & Auditing

auditor.hold_request_cardinal_history

+audit_id : PRIMARY KEY
+audit_time : timestamp with time zone
+id : integer
+pickup_lib : integer
+request_lib : integer
+current_shelf_lib : integer
+usr : integer
+requestor : integer
+request_time : timestamp with time zone
+last_update_time : timestamp with time zone
+fulfilled : boolean
+potential_copies : bigint
+minimum_proximity : numeric
+minimum_vicinity : numeric
+current_copy_id : bigint
+current_copy_proximity : numeric
+current_copy_vicinity : numeric
+current_copy_lib : integer
+current_copy_hold_policy : integer

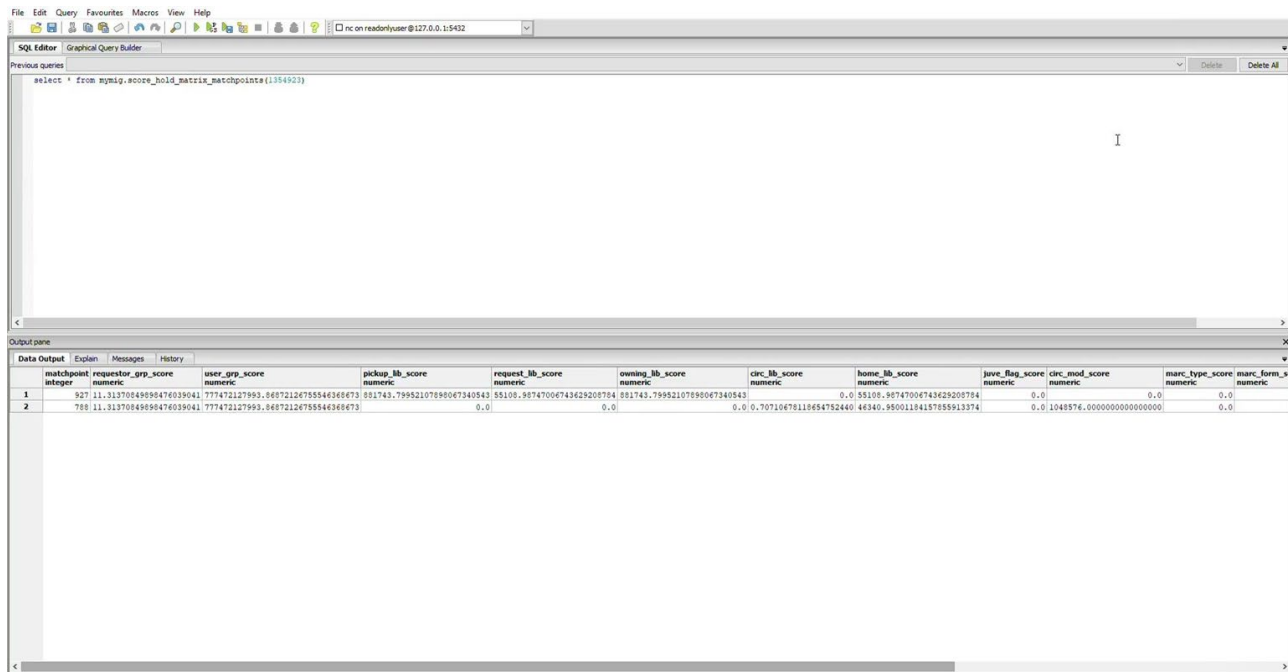
Extras table queried when
hold is recorded into auditor

auditor.hold_request_cardinal_extras

+audit_id : PRIMARY KEY
+id : integer
+last_update_time : timestamp with time zone
+potential_copies : bigint
+minimum_proximity : numeric
+minimum_vicinity : numeric
+current_copy_proximity : numeric
+current_copy_vicinity : numeric
+current_copy_hold_policy : integer

Testing & Auditing

```
select * from score_hold_matrix_matchpoints(hold_id)
```



The screenshot shows a SQL Editor window with a menu bar (File, Edit, Query, Favourites, Macros, View, Help) and a toolbar. The query editor contains the SQL statement: `select * from mysig.score_hold_matrix_matchpoints(1354923)`. The output pane at the bottom displays the results of the query as a table with 12 columns and 2 rows of data.

	matchpoint	requestor_grp_score	user_grp_score	pickup_lb_score	request_lb_score	owning_lb_score	circ_lb_score	home_lb_score	juve_flag_score	circ_mod_score	marc_type_score	marc_form_s
	integer	numeric	numeric	numeric	numeric	numeric	numeric	numeric	numeric	numeric	numeric	numeric
1	927	11.313705646996476039041	777472127993.06572126795546365673	881743.799521076980067340543	55108.96747006743629200784	881743.799521076980067340543	0.0	95108.96747006743629200784	0.0	0.0	0.0	0.0
2	788	11.313705646996476039041	777472127993.06572126795546365673	0.0	0.0	0.0	0.70710678118454752440	48365.98001194157655913374	0.0	1048576.0000000000000000	0.0	0.0

Future concerns with Resource Sharing

- Zip code surcharge & shipping information support
- Frequency of calculating routes
- Support for other geolocation services
- Systems dependent on other systems
- Distance based hold policies



Flooding in Duplin County, Photo by USDA

Photo by MobiusDaXter, <https://creativecommons.org/licenses/by-sa/3.0/>

Questions?

