WHY
HOW
WHEN
WHAT IS SQL

- structured query language
- used for a lot more than querying
- we will focus on reporting
CONNECTING

- user name
- password
- ip / domain / localhost
- port (5432 maybe)
- database name (often ‘evergreen’)
- there are a lot of SQL clients
Connecting with PSQL
CONNECTING WITH RAZORSQ
## 2 Dimensional Arrays

### AKA Tables

<table>
<thead>
<tr>
<th>id</th>
<th>parent_ou</th>
<th>ou_type</th>
<th>ill_address</th>
<th>holds_address</th>
<th>mailing_address</th>
<th>billing_address</th>
<th>shortname</th>
<th>name</th>
<th>email</th>
<th>phone</th>
<th>opac_visible</th>
<th>fiscal_calendar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>null</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>MI</td>
<td>MISKATONIC</td>
<td><a href="mailto:deep@one.net">deep@one.net</a></td>
<td>t</td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>HG</td>
<td>HOGWARTS</td>
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<td>null</td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>UU</td>
<td>UNSEEN UNIVERSITY</td>
<td><a href="mailto:monkeyboy@turtle.infinity">monkeyboy@turtle.infinity</a></td>
<td>t</td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>MT</td>
<td>MINAS TIRITH</td>
<td><a href="mailto:reference@white.tree">reference@white.tree</a></td>
<td>333-111-1234</td>
<td>t</td>
<td>t</td>
</tr>
</tbody>
</table>
**STRUCTURE**

* DATABASE
  * SCHEMA
  * TABLES
  * VIEWS
  * INDEXES
  * TRIGGERS
  * CONSTRAINTS
  * FUNCTIONS
  * SEQUENCES
  * USERS
  * ROLES
select * from actor.org_unit;

select * from actor.org_unit;

SQL TIME!
select * from actor.org_unit;

<table>
<thead>
<tr>
<th>ou_type</th>
<th>ill_address</th>
<th>holds_address</th>
<th>mailing_address</th>
<th>billing_address</th>
<th>shortcode</th>
<th>name</th>
<th>email</th>
<th>phone</th>
<th>opac_visible</th>
<th>fiscal_calendar</th>
</tr>
</thead>
<tbody>
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<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>ACL</td>
<td>Anderson County Lib...</td>
<td></td>
<td></td>
<td>t</td>
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</tr>
<tr>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<td>UCCL</td>
<td>Union County Lib...</td>
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</tr>
<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>Calhoun County ... calho...</td>
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<tr>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>BCL</td>
<td>Beaufort County ... notice...843-...</td>
<td></td>
<td></td>
<td>t</td>
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</tr>
<tr>
<td>1</td>
<td>3</td>
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<td>3</td>
<td>3</td>
<td>SC LEADS</td>
<td>SC LEADS</td>
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<td></td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>FCL</td>
<td>Fairfield County ...</td>
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<td>t</td>
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<td>2</td>
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<td>3</td>
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<td>YCL</td>
<td>York County Lib... circul...</td>
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<td></td>
<td>t</td>
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<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>CHE</td>
<td>Chesterfield Cour... librar...</td>
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<td></td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>89</td>
<td>74</td>
<td>88</td>
<td>73</td>
<td>ACL-BEL</td>
<td>Anderson - Belt... belton...864-...</td>
<td></td>
<td></td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>89</td>
<td>74</td>
<td>88</td>
<td>73</td>
<td>DCL</td>
<td>Dorchester Coun... dorch...</td>
<td></td>
<td></td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>89</td>
<td>74</td>
<td>88</td>
<td>73</td>
<td>KCL</td>
<td>Kershaw County ...</td>
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</tr>
<tr>
<td>3</td>
<td>89</td>
<td>74</td>
<td>88</td>
<td>73</td>
<td>AHJ</td>
<td>Allendale-Hamp...</td>
<td></td>
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<td>t</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>89</td>
<td>74</td>
<td>88</td>
<td>73</td>
<td>WCL</td>
<td>Williamsburg Co...</td>
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<tr>
<td>3</td>
<td>89</td>
<td>74</td>
<td>88</td>
<td>73</td>
<td>COL</td>
<td>Colleton</td>
<td></td>
<td></td>
<td>t</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>92</td>
<td>91</td>
<td>93</td>
<td>ACL-BKM</td>
<td>Anderson - Boo... book...864-...</td>
<td></td>
<td></td>
<td>t</td>
<td>1</td>
</tr>
</tbody>
</table>
select * from actor.org_unit ;
select * from actor.org_unit ;
select shortname, mailing_address from actor.org_unit;
### SELECTING COLUMNS

```sql
SELECT shortname, mailing_address from actor.org_unit;
```

<table>
<thead>
<tr>
<th>shortname</th>
<th>mailing_address</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLO</td>
<td></td>
</tr>
<tr>
<td>SCSL</td>
<td>3</td>
</tr>
<tr>
<td>ACL</td>
<td></td>
</tr>
<tr>
<td>UCCL</td>
<td>2</td>
</tr>
<tr>
<td>CAL</td>
<td></td>
</tr>
<tr>
<td>BCL</td>
<td>4</td>
</tr>
<tr>
<td>SC LENDS</td>
<td>3</td>
</tr>
<tr>
<td>FCL</td>
<td></td>
</tr>
<tr>
<td>YCL</td>
<td></td>
</tr>
<tr>
<td>CHE</td>
<td></td>
</tr>
<tr>
<td>ACL-BEL</td>
<td>88</td>
</tr>
<tr>
<td>DCL</td>
<td></td>
</tr>
<tr>
<td>KCL</td>
<td></td>
</tr>
<tr>
<td>AHJ</td>
<td></td>
</tr>
<tr>
<td>WCL</td>
<td></td>
</tr>
<tr>
<td>COL</td>
<td></td>
</tr>
<tr>
<td>ACL-BKM</td>
<td>91</td>
</tr>
<tr>
<td>KCL-OVF</td>
<td></td>
</tr>
</tbody>
</table>
```
select aou.shortname, aoa.street1, aoa.city, aoa.post_code
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address;
select aou.shortname, aoa.street1, aoa.city, aoa.post_code
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address;
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as "zip code"
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
order by 1;
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as "zip code"
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
order by 1;
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as “zip code”
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
where aou.shortname ilike ‘%ycl%’
order by 1;

<table>
<thead>
<tr>
<th>shortname</th>
<th>street</th>
<th>city</th>
<th>zip code</th>
</tr>
</thead>
<tbody>
<tr>
<td>YCL-BK</td>
<td>138 East Black Street</td>
<td>Rock Hill</td>
<td>29730</td>
</tr>
<tr>
<td>YCL-CL</td>
<td>107 Knox Street</td>
<td>Clover</td>
<td>29710</td>
</tr>
<tr>
<td>YCL-FM</td>
<td>1818 2nd Baxter Crossing</td>
<td>Fort Mill</td>
<td>29708</td>
</tr>
<tr>
<td>YCL-LW</td>
<td>185 Blucher Circle</td>
<td>Lake Wylie</td>
<td>29710</td>
</tr>
<tr>
<td>YCL-RH</td>
<td>138 East Black Street</td>
<td>Rock Hill</td>
<td>29730</td>
</tr>
<tr>
<td>YCL-YK</td>
<td>21 East Liberty Street</td>
<td>York</td>
<td>29745</td>
</tr>
</tbody>
</table>

EVALUATIONS
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as "zip code"
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
where aou.shortname ilike '%ycl%' and aoa.street1 like '%East%'
order by 1;
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as “zip code”
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
where aou.shortname ilike ‘%ycl%’ or aoa.street1 like ‘%East%’
order by 1;

<table>
<thead>
<tr>
<th>shortname</th>
<th>street</th>
<th>city</th>
<th>zip code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLO-LC</td>
<td>221 East Main Street</td>
<td>Lake City</td>
<td>29560</td>
</tr>
<tr>
<td>FLO-PA</td>
<td>100 East Main Street</td>
<td>Pamplico</td>
<td>29583</td>
</tr>
<tr>
<td>UCCL</td>
<td>300 East South Street</td>
<td>Union</td>
<td>29379</td>
</tr>
<tr>
<td>UCCL-C</td>
<td>300 East South Street</td>
<td>Union</td>
<td>29379</td>
</tr>
<tr>
<td>YCL-BK</td>
<td>138 East Black Street</td>
<td>Rock Hill</td>
<td>29730</td>
</tr>
<tr>
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<td>29730</td>
</tr>
<tr>
<td>YCL-YK</td>
<td>21 East Liberty Street</td>
<td>York</td>
<td>29745</td>
</tr>
</tbody>
</table>

‘OR’ LESS RESTRICTIVE
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as "zip code"
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
where aou.shortname ilike '%ycl%' and
(aoa.street1 like '%East%' or aoa.city = 'Clover')
order by 1;

<table>
<thead>
<tr>
<th>shortname</th>
<th>street</th>
<th>city</th>
<th>zip code</th>
</tr>
</thead>
<tbody>
<tr>
<td>YCL-BK</td>
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<td>29730</td>
</tr>
<tr>
<td>YCL-CL</td>
<td>107 Knox Street</td>
<td>Clover</td>
<td>29710</td>
</tr>
<tr>
<td>YCL-RH</td>
<td>138 East Black Street</td>
<td>Rock Hill</td>
<td>29730</td>
</tr>
<tr>
<td>YCL-YK</td>
<td>21 East Liberty Street</td>
<td>York</td>
<td>29745</td>
</tr>
</tbody>
</table>
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as "zip code"
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
where aou.shortname ilike '%ycl%' and aoa.post_code > 29720
order by 1;
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as "zip code"
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
where aou.shortname ilike '%ycl%' and aoa.post_code > 29720
order by 1;

USE =, !=, >=, >, <, <=
select aou.shortname, aoa.street1 as street, aoa.city, aoa.post_code as "zip code"
from actor.org_unit aou
join actor.org_address aoa on aoa.id = aou.mailing_address
where aou.shortname ilike '%ycl%' and aoa.post_code > '29720'
order by 1;

<table>
<thead>
<tr>
<th>shortname</th>
<th>street</th>
<th>city</th>
<th>zip code</th>
</tr>
</thead>
<tbody>
<tr>
<td>YCL-BK</td>
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</tr>
<tr>
<td>YCL-YK</td>
<td>21 East Liberty Street</td>
<td>York</td>
<td>29745</td>
</tr>
</tbody>
</table>
CONGRATULATIONS!
SELECT *
SELECT COLUMNS
FROM
AS
JOIN
ORDER BY
WHERE
AND
OR
()
=, !=, >, <, >=, <=
LIKE
ILIKE
""
DON’T DO THIS!!!!!!!!!

```sql
select * 
from actor.usr au 
join action.hold_request ahr on ahr.usr = au.id 
join action.circulation ac on ac.usr = au.id 
join asset.copy acop on acop.id = ac.id 
join asset.call_number call on call.id = acopy.call_number 
join biblio.record_entry bre on bre.id = call.record 
join metabib.real_full_rec rfr on rfr.record = bre.id 
;
```
select *
from actor.usr au
join action.hold_request ahr on ahr.usr = au.id
join action.circulation ac on ac.usr = au.id
;
select au.id, ahr.*
from actor.usr au
join action.hold_request ahr on ahr.usr = au.id
where au.usrname = 'rogan.hamby'
limit 10;
RESERVED TERMS.

SELECT
FROM
AS
JOIN
ORDER BY
WHERE
AND
OR
LIKE
ILIKE
BETTER TERMS.

SHORT FORM OF A TABLE
E.G. BIBLIO.RECORD_ENTRY BRE

SOMETHING DESCRIPTIVE
E.G. PARENT ORG UNIT BECOMES PARENT

ARBITRARY ASSIGNMENTS
E.G. A, B, PEEL, STEED
COUNT OF PATRONS IN GROUP AND HOLDS THIS YEAR

```
select count(usr.id), extract(month from holds.request_time)
from actor.usr usr
join action.hold_request holds on holds.usr = usr.id
where date(holds.request_time) >= '2014-01-01'
and usr.profile in (199,204,289,195)
group by 2
order by 2 asc
;```
select count(usr.id), extract(month from holds.request_time)
from actor.usr usr
join action.hold_request holds on holds.usr = usr.id
where date(holds.request_time) >= '2014-01-01'
and usr.profile in (199,204,289,195)
group by 2
order by 2 asc
;

<table>
<thead>
<tr>
<th>count</th>
<th>date_part</th>
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<tbody>
<tr>
<td>633</td>
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</tr>
<tr>
<td>582</td>
<td>2</td>
</tr>
<tr>
<td>133</td>
<td>3</td>
</tr>
</tbody>
</table>
select count(usr.id), holds.h_count
from actor.usr usr
join (select count(h.id) as h_count, usr.id as h_usr
    from action.hold_request h
    join actor.usr usr on usr.id = h.usr
    group by 2) holds on holds.h_usr = usr.id
where usr.profile in (199,204,289,195)
group by 2
order by 2 asc;
select count(usr.id), holds.h_count
from actor.usr usr
left join (select count(h.id) as h_count, usr.id as h_usr
    from action.hold_request h
    join actor.usr usr on usr.id = h.usr
    group by 2) holds on holds.h_usr = usr.id
where usr.profile in (199, 204, 289, 195)
group by 2
order by 2 asc;
OUTER JOINS
LEFT JOIN AMERICAN.RIGHTS ON AMERICAN.RIGHTS = NSA.PROGRAMS

SUBQUERIES / IN LISTS

COUNT()

DATE()
select count(usr.id), holds.h_count
from actor.usr usr
left join (select count(h.id) as h_count, usr.id as h_usr
    from action.hold_request h
    join actor.usr usr on usr.id = h.usr
    group by 2) holds on holds.h_usr = usr.id
where usr.profile in (199, 204, 289, 195)
group by 2
order by 2 asc;
CONGRATULATIONS!
SELECT COUNT(acirc.id), ac.barcode AS copy_barcode, acl.NAME AS "shelving location",
acn.label AS "call number", msr.title, MAX(acirc.xact_start) AS "last circulation"
FROM asset.COPY ac
JOIN asset.copy_location acl ON ac.LOCATION = acl.id
LEFT JOIN ACTION.circulation acirc ON acirc.target_copy = ac.id
JOIN asset.call_number acn ON acn.id = ac.call_number
JOIN reporter.materialized_simple_record msr ON msr.id = acn.record
JOIN actor.org_unit child ON child.id = ac.circ_lib
JOIN actor.org_unit parent ON parent.id = child.parent_ou
WHERE acl.NAME ILIKE '%adult video cassette%
AND date(ac.create_date) <= NOW() - INTERVAL '3 years'
AND child.shortname = 'YCL-RH'
AND ac.deleted = FALSE
GROUP BY 2, 3, 4, 5
HAVING MAX(acirc.xact_start) < NOW() - INTERVAL '3 years'
ORDER BY 4;
SELECT SUM(fm_copies.cont) AS "fm copies", SUM(fm_circs.cont) AS "fm circs", SUM(rh_copies.cont) AS "rh copies", SUM(rh_circs.cont) AS "rh circs", SUM(good_copies.cont) AS "still circulating", COUNT(ac.id) AS "cont", bre.id AS "bib" FROM reporter.materialized_simple_record msr JOIN biblio.record_entry bre ON bre.id = msr.id LEFT JOIN ACTION.circulation circ ON circ.target_copy = ac.id LEFT JOIN actor.org_unit org ON ac.circ_lib = org.id LEFT JOIN asset.COPY ac ON ac.call_number = call.id LEFT JOIN asset.call_number call ON call.record = bre.id JOIN biblio.record_entry bre ON bre.id = msr.id WHERE msr.author ILIKE '%patterson, james%' AND circ_org.shortname = 'YCL' AND ac.circ_modifier != 'RENTAL' JOIN actor.org_unit circ_org ON circ_org.id = org1.parent_ou JOIN actor.org_unit org1 ON ac.circ_lib = org1.id LEFT JOIN asset.COPY ac ON ac.call_number = call.id LEFT JOIN asset.call_number call ON call.record = bre.id JOIN biblio.record_entry bre ON bre.id = msr.id FROM reporter.materialized_simple_record msr WHERE msr.author ILIKE '%patterson, james%' AND circ_org.shortname = 'YCL-LW' AND ac.circ_modifier != 'RENTAL' LEFT JOIN ACTION.circulation circ ON circ.target_copy = ac.id WHERE msr.author LIKE 'Spatterson, jame/year' AND org.shortname = 'YCL-LW' AND ac.circ_modifier = 'RENTAL' GROUP BY 2 ORDER BY 20 DESC