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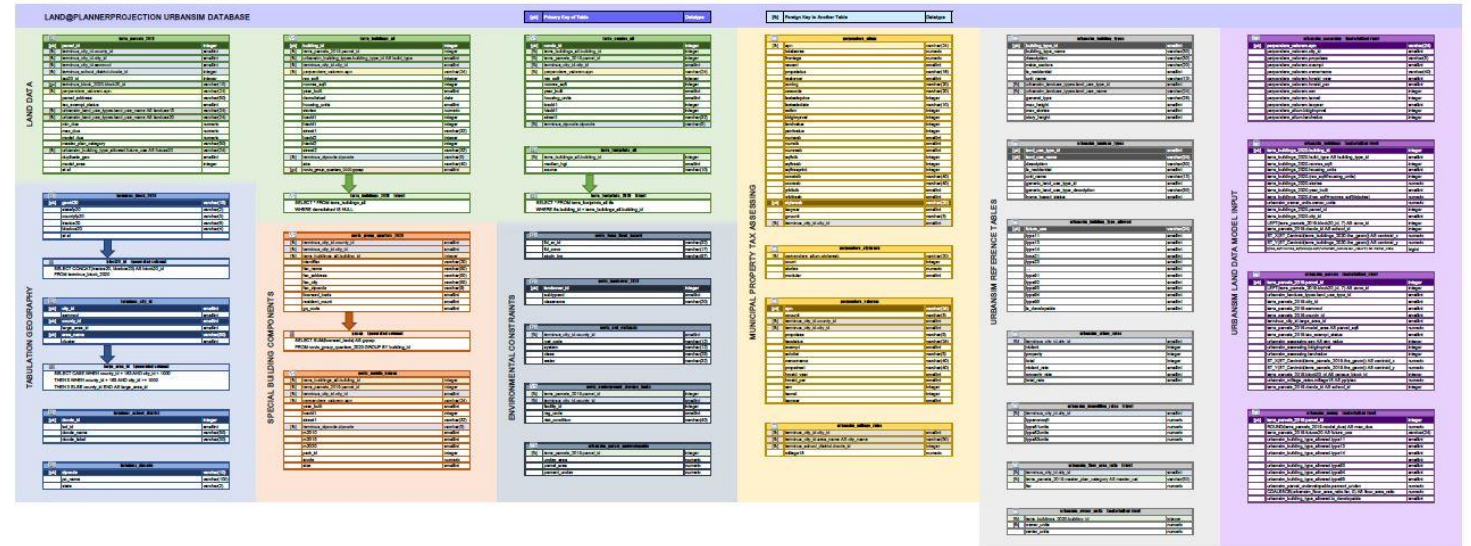
PostGIS and GISquirrel and PostgreSQL.. Oh My!



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The Why and How we got started

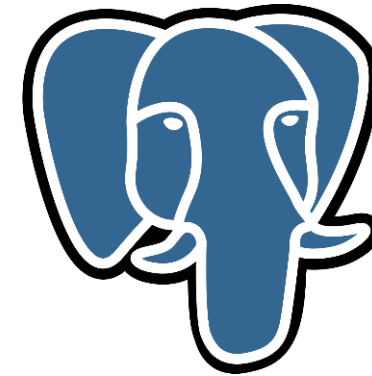
- 2050 Forecast data was scattered
- Needed better analysis and performance
- SQL Server not performing for us
- Reliable/low cost
- Centralize forecast data



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What is ?

- **PostgreSQL**
 - **Open source**
 - **Similar to Microsoft SQL Server**
 - **Uses common data types (String, Integer, etc.)**
 - **Allows for powerful indexing – GiST**
 - **Easy to extend into other tools like python**
- **PostGIS**
 - **Open source extension for PostgreSQL**
 - **Allows for spatial data to be stored and queried**
 - **Functions**
 - **Supports common spatial references – we use
NAD_1983_HARN_StatePlane_Michigan_South_FIPS_2113_Feet_Intl**
- **GISquirrel**
 - **ArcMap add on**
 - **Use and edit layers from the database in a more relatable way.**
 - **Has free trial**



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```
SELECT p.*
FROM terra_parcels_2019 p
      join terra_buildings_2020 b
on p.parcel_id = b.parcel_id
where b.build_type in (81, 82, 83, 84)
```

terra_buildings_all

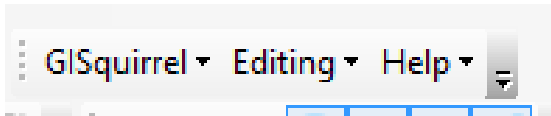
column	type
gid	integer = nextval('gisad.ter...')
the_geom	geometry(Point,2898)
building_id	integer
parcel_id	integer
build_type	smallint
city_id	smallint
apn	varchar(24)
res_sqft	integer
nonres_sqft	integer
year_built	smallint
demolished	timestamp
housing_units	smallint
stories	double precision

terra_parcels_2019

column	type
gid	integer = nextval('gisad.ter...')
the_geom	geometry(MultiPolygon,2898)
parcel_id	integer
county_id	smallint
city_id	smallint
semmcd	smallint
dcode_id	integer
taz10_id	integer
taz20_id	integer
block10_id	varchar(10)
block20_id	varchar(10)
apn	varchar(24)
parcel_address	varchar(50)

	gid	the_geom	parcel_id	county_id	city_id	semmcd	dcode_id	taz10_id	taz20_id	block10_id	block20_id	apn
1	1275502	0106000020520B000001000000010300000001000000000000006059...	1345553	163	1020	1020	82160	19106	<null>	5649001010	5649001003	71 142 99 002
2	1820491	0106000020520B0000010000000103000000010000001500000090F4...	1438527	163	1170	1170	82160	16311	<null>	5858001021	5858001007	80 023 99 000
3	1820491	0106000020520B0000010000000103000000010000001500000090F4...	1438527	163	1170	1170	82160	16311	<null>	5858001021	5858001007	80 023 99 000
4	1820491	0106000020520B0000010000000103000000010000001500000090F4...	1438527	163	1170	1170	82160	16311	<null>	5858001021	5858001007	80 023 99 000
5	1496668	0106000020520B0000010000000103000000010000001200000010B4...	1412741	163	1180	1180	81070	15007	<null>	5894002001	5894021001	81 071 99 000
6	65282	0106000020520B0000010000000103000000010000001D000000A0D1...	5006374	115	5010	5010	58030	53202	<null>	8335003018	8335004017	02 102 002 15
7	65282	0106000020520B0000010000000103000000010000001D000000A0D1...	5006374	115	5010	5010	58030	53202	<null>	8335003018	8335004017	02 102 002 15
8	59753	0106000020520B0000010000000103000000010000000500000048F9...	5006395	115	5010	5010	58030	53202	<null>	8335003041	8335003013	02 102 027 00

create index on table USING GIST (*the_geom*);



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Import Layers

Layer Details

Layer: parks

Import: All features

Spatial reference: NAD_1983_HARN_StatePlane_Michigan_South_FIPS_2113_Feet_Intl [2898]

Database

Database connection file: Y:\Staff\Misiuk\GIS\postgis\... irrel\land_postgis_gisad.asq

Feature Class

Name: parks

Editing group:

Table Details

New table schema: public

New table name: parks

Id column: gid

Geometry column: the_geom

Lookup table schema: gisad

OK Cancel

Select By Location

Select features from one or more target layers based on their relation to the features in the source layer.

Selection method: select features from

Target layer(s):

- land.terra_buildings_all
- land.emp_working
- land.nonres_spatial
- parks
- land.parks_2022

Only show selectable layers in this list

Source layer: land.parks_2022

Use selected features (0 features selected)

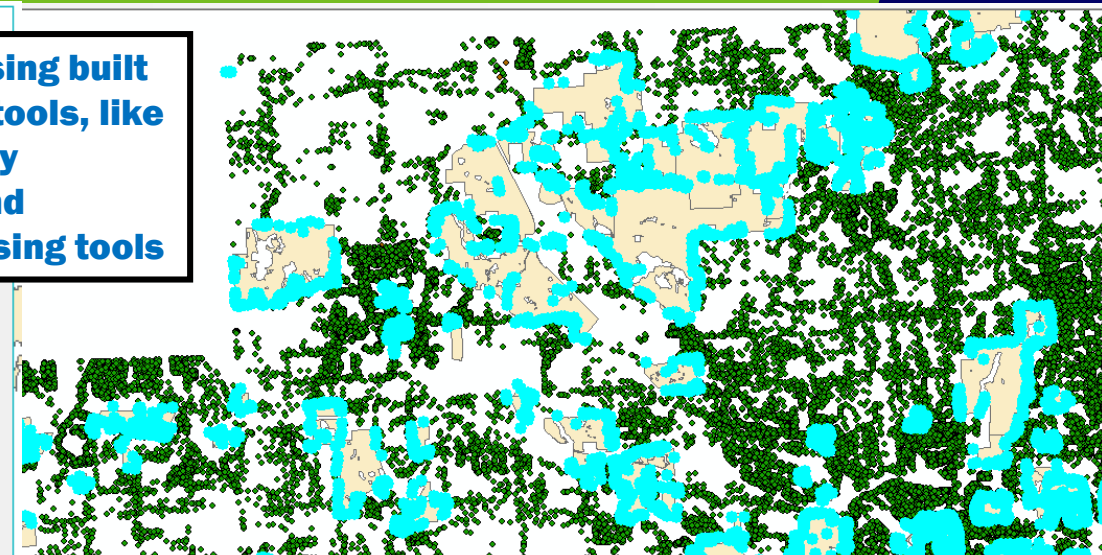
Spatial selection method for target layer feature(s): are within a distance of the source layer feature

Apply a search distance

500 Feet

About select by location OK Apply Close

Analysis using built in ArcMap tools, like selecting by location and geoprocessing tools



Table

land.terra_buildings_all

gid*	SHAPE	building_id*	parcel_id*	build_type*	city_id*	apn*	res_sqft	nonres_sqft	year_built	demolished	hc
17	Point	3171139	3251905	81	3110	23-07-15-226-006	1101	0	1960	<Null>	
51	Point	3183201	3245233	81	3110	23-07-06-201-002	2200	0	1995	<Null>	
84	Point	3182554	3244924	81	3110	23-07-06-101-015	2567	0	2005	<Null>	
86	Point	3182738	3245382	81	3110	23-07-06-228-044	3063	0	1993	<Null>	
87	Point	3182746	3245380	81	3110	23-07-06-228-042	3068	0	1992	<Null>	
90	Point	3183065	3245316	81	3110	23-07-06-226-018	1926	0	1986	<Null>	
123	Point	3186781	3267657	81	3135	24-04-29-276-012	2065	0	1972	<Null>	
124	Point	3187298	3268312	81	3135	24-04-33-176-006	1604	0	1989	<Null>	
126	Point	3187865	3267498	81	3135	24-04-28-252-014	3052	0	1974	<Null>	
128	Point	3187897	3265444	81	3135	24-04-16-349-014	2149	0	2006	<Null>	
129	Point	3187947	3267672	81	3135	24-04-29-278-004	1725	0	1966	<Null>	
130	Point	3188579	3267400	81	3135	24-04-28-177-010	2513	0	1969	<Null>	
133	Point	3188810	3266348	81	3135	24-04-21-400-026	1573	0	1994	<Null>	
135	Point	3188874	3266225	81	3135	24-04-21-350-009	3341	0	2004	<Null>	
138	Point	3189306	3266463	61	3135	24-04-22-100-008	0	7500	1992	<Null>	
140	Point	3199311	3169260	83	3015	14-01-35-180-029	4140	0	1947	<Null>	
147	Point	3189795	3267104	83	3135	24-04-27-151-012	8600	0	1966	<Null>	
157	Point	3192305	3271952	81	3100	27-01-35-352-001	3787	0	1880	<Null>	

(269356 out of 1717640 Selected)

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Break?

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How do we use each?

- **Setup**
 - **Linux server**
 - **PostgreSQL v13**
 - **PostGIS v3**
 - **ArcMap 10.8.1**
- **Data Structure**
 - **One database with one schema**
- **Connections**
- **Use in Enterprise**

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Demos

- **GISquirrel**
 - **Import data**
 - **Editing**
- **Postgres and PostGIS overview in PyCharm**
- **Publish query layer in ArcGIS Pro**

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Workflow Example – Nonresidential Development Data

- **Quick history**
- **Data originally housed in MS Access going back 20 years**
- **Annual development reports were always static pdfs**
- **Provided input to forecast using exports**

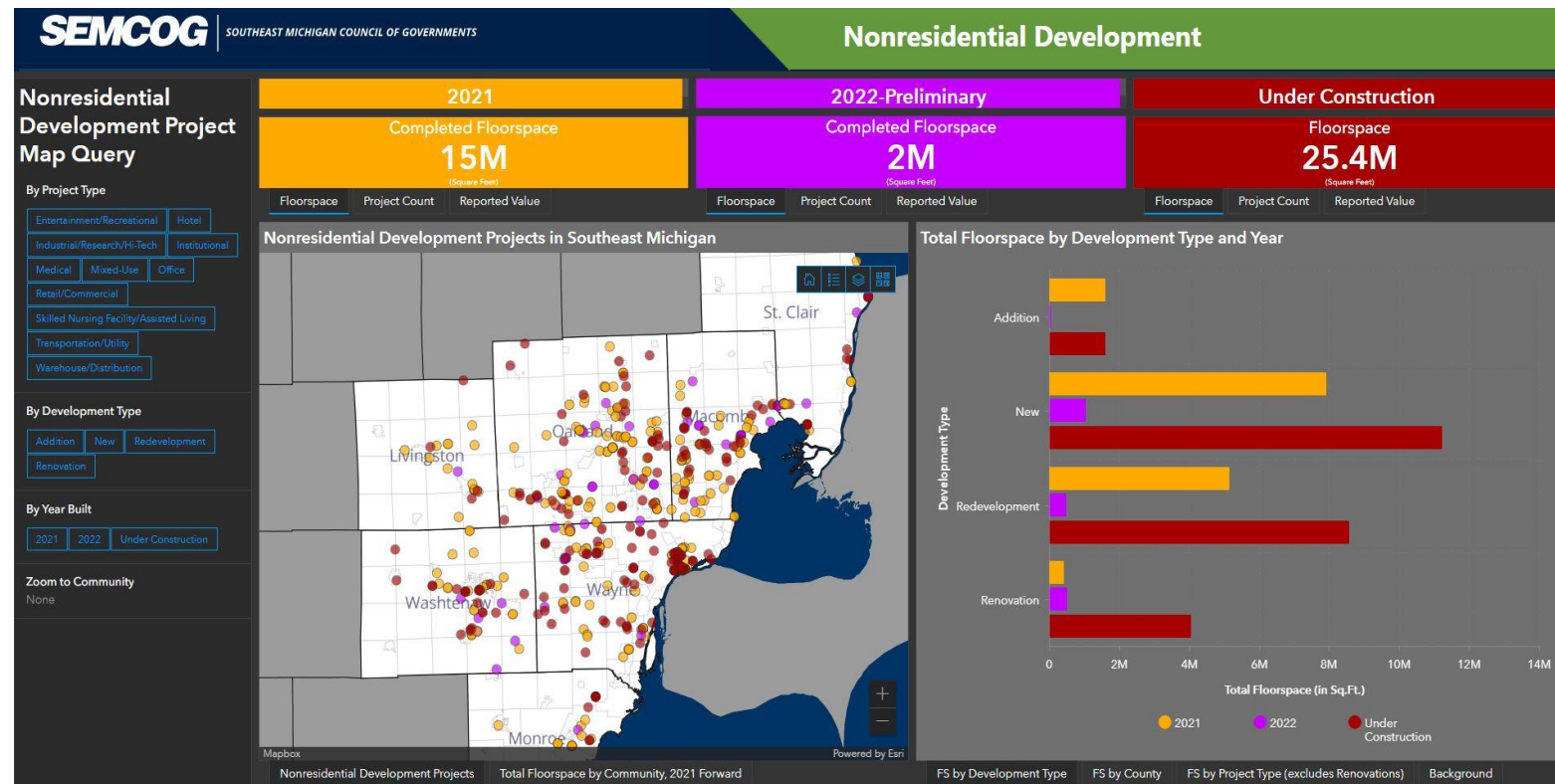
RecordID	entry_date	last_review	data_source	city_id	FCode	facility_name	full_address	year_built	nonres_sqft	Constructor	EstimatedCc	SCode	DCode	parcel_id
373	9/7/2018	5/18/2021	CDB	5	1	Ford Motor Co. - DPS Book Depository Bldg.	2231 Dalzelle S	9999	245,000			2		3
575	1/26/2021		CDB	2295	1	Flint Development Spec Bldg B - old Ford Wixom	no address ava	9999	166,400	\$15,969,290		3	4	24672
586	3/26/2021		Canton Twp	1020	5	Culver's Restaurant	45001 Ford Rd.	9999	4,107	\$1,570,000		3	1	14300
569	9/18/2020	4/19/2021		1025	1	Ford Motor Company - Rouge Dearborn Manufact	3001 Miller Ave	9999	500,000	\$700,000,000		2	1	10466
558	9/9/2020	5/20/2021	CMDLeads	1105	4	Willow Metropark Office	23200 S. Huron	9999	6,000	\$2,000,000		3	1	13556
557	9/9/2020	5/20/2021	CMDLeads	3110	5	Tevdoski Commercial Bldg.	49535 Hayes Rc	9999	11,500	\$3,500,000		3	1	32563
556	9/9/2020	5/20/2021		5	9	Northpoint Development LLC Speculative Wareh	9501 Conner St	9999	682,000	\$47,000,000		3	4	83818
555	9/9/2020	5/18/2021	CDB	5	9	Amazon Processing Center	State Fairgrou	9999	3,800,000			2	1	83852
549	9/9/2020	5/20/2021	Sterling Height	3115	5	Van Dyke Plaza New Retail Bldg. 2	35372 Van Dyke	9999	5,560	\$976,892		2	1	33135
576	1/26/2021		CDB	2295	1	Flint Development Spec Bldg C - old Ford Wixom	no address ava	9999	273,420	\$26,239,923		3	4	24672
592	3/26/2021	5/18/2021	CountyAlliance	6090	1	10137 Marine City Hwy Spec Industrial Bldg.	10137 Marine C	9999	24,000			2	1	60544
604	4/7/2021	4/19/2021	MonroeCo	5050	1	Ford Motor Co BTS	8335 N. Telegra	9999	1,026,000	\$25,821,035		2	1	50245
602	4/6/2021		CMDLeads	2295	6	Grand River Avenue Hotel	49850 Grand Riv	9999	48,560	\$9,000,000		3	1	24851
600	4/6/2021		CDB	1020	9	Amazon Distribution Hub	Michigan Ave.	9999	183,130			3	1	
599	4/6/2021		CDB	1145	9	Amazon	9075 N. Hagger	9999	430,000			3	3	12914
597	3/28/2021			5	3	Racquet Up Detroit	6530 W OUTER	9999	19,000	\$6,500,000		2	1	83783
595	3/26/2021	5/18/2021	CountyAlliance	6040	5	Cabana Blue	Blue Horsesho	9999	4,624	\$500,000		2	1	60352
582	3/26/2021	5/20/2021	Wayne	1205	8	Grewal Trucking Terminal	no address ava	9999	124,581	\$700,000		3	1	12293
593	3/26/2021	5/18/2021	CountyAlliance	6090	1	10139 Marine City Hwy Spec Industrial Bldg.	10139 Marine C	9999	20,000			2	1	60544
583	3/26/2021		Wayne	1205	9	GISC Grow Facility	no address ava	9999	6,000	\$300,000		3	1	12291
591	3/26/2021	5/18/2021	CountyAlliance	6090	1	10135 Marine City Hwy Spec Industrial Bldg	10135 Marine C	9999	12,800			2	1	60544
590	3/26/2021			6135	1	U.S. Farathane	2100 Dove St	9999	30,000	\$14,500,000		3	3	
589	3/26/2021	5/18/2021	CMDLeads	6150	1	Magna Manufacturing/Electric Vehicle Structures	1811 S. Range F	9999	345,000	\$70,000,000		2	1	60203
588	3/26/2021	5/18/2021		6135	5	Port Huron Country Style Marketplace	310 Huron Ave	9999	32,262	\$3,700,000		2	3	
587	3/26/2021		Canton Twp	1020	9	Canton Township Storage Bldg.	4847 Sheldon R	9999	6,150	\$540,775		3	2	
538	8/27/2020	5/20/2021	CMDLeads	7040	11	Greek Oak Industrial Dr Office/Warehouse Bldg	Green Oak Indu	9999	14,463	\$6,000,000		3	1	70875
594	3/26/2021		CountyAlliance	6135	12	Wrigley Center	318 Grand Rive	9999	0	\$14,400,000		2	3	
410	9/14/2017	5/19/2021	CMDLeads	2010	2	Islamic Association of Greater Detroit	879 W. Auburn	9999	53,526	\$17,500,000		2	2	
544	9/2/2020		Frenchtown Tw	5050	3	Memory Lane Drive-in Theater Concessions	6501 N. MONR	9999	2,812	\$293,404		1	1	50257
458	5/11/2018	5/19/2021	Orion Twp	2190	5	Orion Village Crossing	S. Baldwin Rd.	9999	19,074			2	1	23385
454	5/11/2018	5/18/2021	Orion Twp	2190	5	Silver Spruce	3901 S. Lapeer	9999	21,374			2	4	23380
449	3/6/2018	5/19/2021	Troy	2270	6	Home 2 Suites Extended Stay Hotel	1035 Wilshire	9999	58,240	\$10,000,000		2	1	24640
428	9/13/2016	5/20/2021	CDB	5	4	Book Tower	1265 Washingto	9999	260,000			2	3	
423	8/4/2016	5/20/2021	Taylor	1185	2	Wayne County Community College - Downriver	21000 Northlin	9999	45,000	\$15,000,000		3	1	12983
466	5/15/2018	5/19/2021	Ypsilanti Twp	4135	6	Hampton Inn & Suites	515 James L. H	9999	55,300			2	1	41313
415	9/18/2017	5/20/2021	CMDLeads	2240	7	Beaumont Center for Children's Medicine	3822 W. 13 Mile	9999	70,000	\$40,000,000		3	4	21715
490	5/24/2018	5/19/2021	Pleasant Ridge	2210	5	400 E. 10 Mile Rd.	400 E. 10 Mile F	9999	19,750			2	3	

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Workflow Example – Nonresidential Development Data

“Perfect Timing”

- **Desire to present data in an interactive, “real-time” way using ArcGIS Dashboards**
- **Forecast data now in PostgreSQL. Made perfect sense to transition**



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Analysis

- **Query demo**
- **Undevelopable**

```
SELECT r.gid, r.fename, AVG(b.year_built)
FROM terminus_roads_v17 r,
     terra_buildings_all b
WHERE st_intersects(st_buffer(r.the_geom, 1000),
                    b.the_geom)
GROUP BY r.gid, r.fename
```

Extras

- **Ogr2ogr**
- **Pg_tileserv**

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Key Takeaway

For very low cost, using these three tools in conjunction with ArcGIS Desktop and Enterprise, you can serve your internal and external stakeholders with a powerful back end that is fast, flexible, and easy to maintain.

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Q and A

Contact Information



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