

Final Project: Gosnell's Fusion Festival 2022

Introduction

The data of this project is derived from the City of Gosnells.

[https://www.gosnells.wa.gov.au/Lifestyle/Leisure Activities/Major Events/Fusion](https://www.gosnells.wa.gov.au/Lifestyle/Leisure%20Activities/Major%20Events/Fusion)



Fusion Food and Culture Festival 2022 – More of what you love

Fusion Food and Culture Festival is a new level of festival in city of Gosnells – celebrating the sights, sounds and tastes of the multicultural community over two magical nights at Mills Park, Beckenham. Fusion Festival is hold on Friday 11 and Saturday 12 November from 16.00-21.00, offers a captivating combination of live performances across two stages, roving entertainment, a Global Village, thrilling carnival rides and sideshow attractions, youth and children’s activities, delicious food from a wide range of countries and cultures, an interactive art installation and much more.

The festival has main activities which are 1. Amazing Attractions, 2. Children and Youth Activities, 3. Music stage 4. Sensory safe space 5. Traditional foods. Let us Discover the wonderful programs of Fusion Festival 2022 below.



Extraordinary Entertainment

This year's Fusion Festival will feature more of the multicultural entertainment you love across two vibrant stages, as well as a Global...



Sensory Safe Space

Visit the Sensory Safe Space for a moment of calm among the excitement.



String Symphony

Become a puppeteer with an enchanting interactive art installation.



Amazing Attractions

We're bringing even more attractions to this year's Fusion Festival, to delight and engage visitors of all ages.



Children and Youth Activities

The Youth Zone and Kids' Zone will have a range of fabulous activities and entertainment for young people.

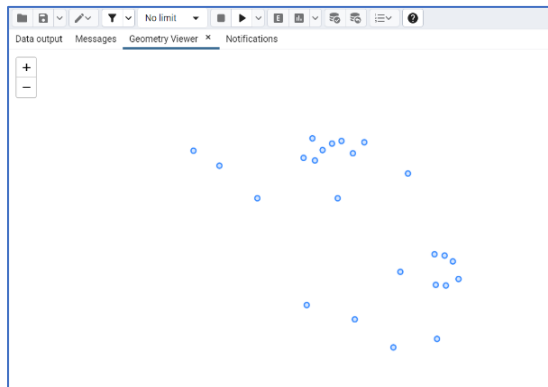
Spatial Databases: Final Project

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Data

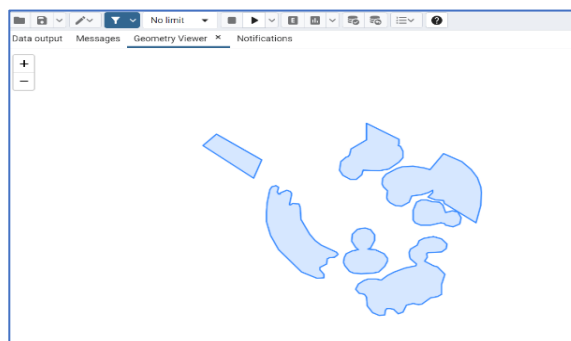
The data consists of points of 'Facility' such as toilets, first aid, water station, security with columns 'opening/closing time', name, description and zone_id.

boothid integer	geom geometry	name character varying (254)	detail character varying (254)	zoneid integer	deptid integer	opentime time without time zone	closetime time without time zone
100002	0101000020EE7...	Toilet	The festival provides L...	1000	5	16:00:00	21:00:00
100003	0101000020EE7...	Toilet	The festival provides L...	1000	5	16:00:00	21:00:00
100004	0101000020EE7...	Toilet	The festival provides L...	1000	5	16:00:00	21:00:00
100005	0101000020EE7...	Toilet	The festival provides L...	1000	5	16:00:00	21:00:00
100006	0101000020EE7...	Toilet	The festival provides L...	1000	5	16:00:00	21:00:00
100007	0101000020EE7...	Toilet	The festival provides L...	1000	5	16:00:00	21:00:00
100008	0101000020EE7...	Info Kiosk	Presenting information...	1000	5	16:00:00	21:00:00
100009	0101000020EE7...	Parent's room	Offering a safe, private...	1000	5	16:00:00	21:00:00
100010	0101000020EE7...	Parent's room	Offering a safe, private...	1000	5	16:00:00	21:00:00
100011	0101000020EE7...	Water station	Supplying potable wat...	1000	1	16:00:00	21:00:00
100012	0101000020EE7...	First aid	There are officers at th...	1000	2	16:00:00	21:00:00
100014	0101000020EE7...	Lost and found	The service staff at the...	1000	5	16:00:00	21:00:00
100013	0101000020EE7...	Fire truck	Since there are many el...	1000	3	16:00:00	21:00:00
100015	0101000020EE7...	Fire truck	Since there are many el...	1000	3	16:00:00	21:00:00
100016	0101000020EE7...	Security booth	Coordinating with local...	1000	4	16:00:00	21:00:00
100017	0101000020EE7...	Security booth	Coordinating with local...	1000	4	16:00:00	21:00:00
100018	0101000020EE7...	Security booth	Coordinating with local...	1000	4	16:00:00	21:00:00
100019	0101000020EE7...	Security booth	Coordinating with local...	1000	4	16:00:00	21:00:00
100020	0101000020EE7...	Parking lot	Parking space is locate...	1000	5	16:00:00	21:00:00
100021	0101000020EE7...	Security booth	Coordinating with local...	1000	4	16:00:00	21:00:00
100022	0101000020EE7...	Water station	Supplying potable wat...	1000	1	16:00:00	21:00:00



'Activitytype' table is polygon with geometry data which consists of Road, Festival_area and festival zones. For festival zones Children, Youth activities, viva stage, fusion stage, sensory safe space, amazing attractions, traditional food.

zonetypeid [PK] integer	geom geometry	zonetype character varying (254)	detail character varying (254)
1001	0106000020EE7...	Children Activities	The Kids' Zone at this y...
1002	0106000020EE7...	Youth Activities	The Youth Zone at Fusi...
2001	0106000020EE7...	Viva Stage	Viva stage will be held ...
2002	0106000020EE7...	Fusion Stage	Fusion Food and Cultur...
3001	0106000020EE7...	Sensory Safe Space	The Sensory Safe Spac...
4001	0106000020EE7...	Amazing Attractions	In addition to the capti...
5001	0106000020EE7...	Traditional Food	Over 15 food vendors o...



Moreover, there are additional table which related to festival organization such as Employee, Employer, Department, Activity and Food trucks.

zoneid integer	boothnumber [PK] integer	name character varying	startdate date	enddate date	detail character varying	deptid integer
5001	500101	Belgian Frites, Be...	2022-11-11	2022-11-11	rites are tradition...	6
5001	500102	Crepe, France	2022-11-11	2022-12-11	An authentic, thin...	6
5001	500103	Vada pav, India	2022-11-11	2022-12-11	A bun stuffed wit...	6
5001	500104	Beef/Pork Jerky, ...	2022-11-11	2022-12-11	The Malaysian b...	6
5001	500105	Taco, Mexico City...	2022-11-11	2022-11-11	Taco with beef, s...	6
5001	500106	Kebab, Istanbul, ...	2022-11-11	2022-12-11	This mighty-meat...	6
5001	500107	Balut, Philippines	2022-12-11	2022-12-11	Balut is fertilized ...	6
5001	500108	Italian Margherit...	2022-12-11	2022-12-11	the Italian Margh...	6
5001	500109	Chinese Yangzho...	2022-11-11	2022-11-11	If you're looking f...	6
5001	500110	Korean Bibimbap	2022-11-11	2022-11-11	It is flavorful, feat...	6
5001	500111	Thai Pad Thai	2022-11-11	2022-11-11	This recipe comb...	6
5001	500112	Scottish Scones	2022-11-11	2022-11-11	The crunchy, flak...	6
5001	500113	Norwegian Meat...	2022-12-11	2022-12-11	These meatballs ...	6
5001	500114	Portuguese Cald...	2022-12-11	2022-12-11	This particular so...	6
5001	500115	Vietnamese Pho	2022-12-11	2022-12-11	Vietnamese pho i...	6

boothnumber [PK] integer	zoneid integer	name character varying	entrancefee money	departmentid integer	startdate date	enddate date	opentime time without	closetime time without	detail character varying
100101	1001	Miniature Kids Wo...	\$2.00	5	2022-11-11	2022-12-11	16:00:00	20:00:00	Visit the miniature Kids ...
100102	1001	The Dough	\$2.00	5	2022-11-11	2022-12-11	16:00:00	20:00:00	Be creative with play do...
100103	1001	Eco Fairy Tales	\$1.00	5	2022-11-11	2022-12-11	16:00:00	20:00:00	Meet the Eco fairies and...
100104	1001	Fun Circus	\$3.00	5	2022-11-11	2022-12-11	16:00:00	20:00:00	Join in the circus fun wi...
100105	1001	Sparkle station	\$1.00	5	2022-11-11	2022-12-11	16:00:00	20:00:00	Get a glitter tattoo at th...
100106	1001	Giant bubbles	\$1.00	5	2022-11-11	2022-12-11	16:00:00	20:00:00	Have-a-go at making glia...
100201	1002	Dodgeball game	\$3.00	5	2022-11-11	2022-12-11	16:00:00	21:00:00	Challenge your mates to...
100202	1002	Arcade games	\$1.00	5	2022-11-11	2022-12-11	16:00:00	21:00:00	Test your skills on the ar...
100203	1002	The Nomad Wand...	\$4.00	5	2022-11-11	2022-12-11	16:00:00	21:00:00	Check out The Nomad ...
100204	1002	Chill Space	\$0.00	5	2022-11-11	2022-12-11	16:00:00	21:00:00	Kick back and relax in th...
100205	1002	Photo booth	\$5.00	5	2022-11-11	2022-12-11	16:00:00	21:00:00	Dress up, grab some pro...
100206	1002	Youth Zone DJ	\$4.00	5	2022-11-11	2022-12-11	16:00:00	21:00:00	Enjoy the sweet sounds ...
200101	2001	Reggae, Latin and ...	\$5.00	5	2022-11-11	2022-11-11	17:35:00	18:00:00	Reggae, Latin and funk L...
200102	2001	Ukrainian dance	\$5.00	5	2022-11-11	2022-11-11	18:20:00	18:45:00	Ukrainian dance by Rozt...
200103	2001	Rock band	\$5.00	5	2022-11-11	2022-11-11	18:35:00	21:45:00	Rockabilly band Velvet ...
200104	2001	Western Australia ...	\$5.00	5	2022-11-11	2022-11-11	19:20:00	19:30:00	Western Australia rock f...
200105	2001	Japanese beats	\$5.00	5	2022-11-11	2022-11-11	20:25:00	20:40:00	Powerful beats of Taiko ...
200106	2001	Latin world music	\$5.00	5	2022-12-11	2022-12-11	17:25:00	17:45:00	Latin world music by Al...
200107	2001	Traditional Maori p...	\$5.00	5	2022-12-11	2022-12-11	18:30:00	18:50:00	Traditional Maori perfor...
200108	2001	Salty sea shanty s...	\$5.00	5	2022-12-11	2022-12-11	18:30:00	18:40:00	Salty sea shanty sounds...
200109	2001	Indie-rock, reggae ...	\$5.00	5	2022-12-11	2022-12-11	19:20:00	20:20:00	Indie-rock, reggae and R...

There are 5 data types in this databases; text, character varying, integer, money, time without timezone, date.

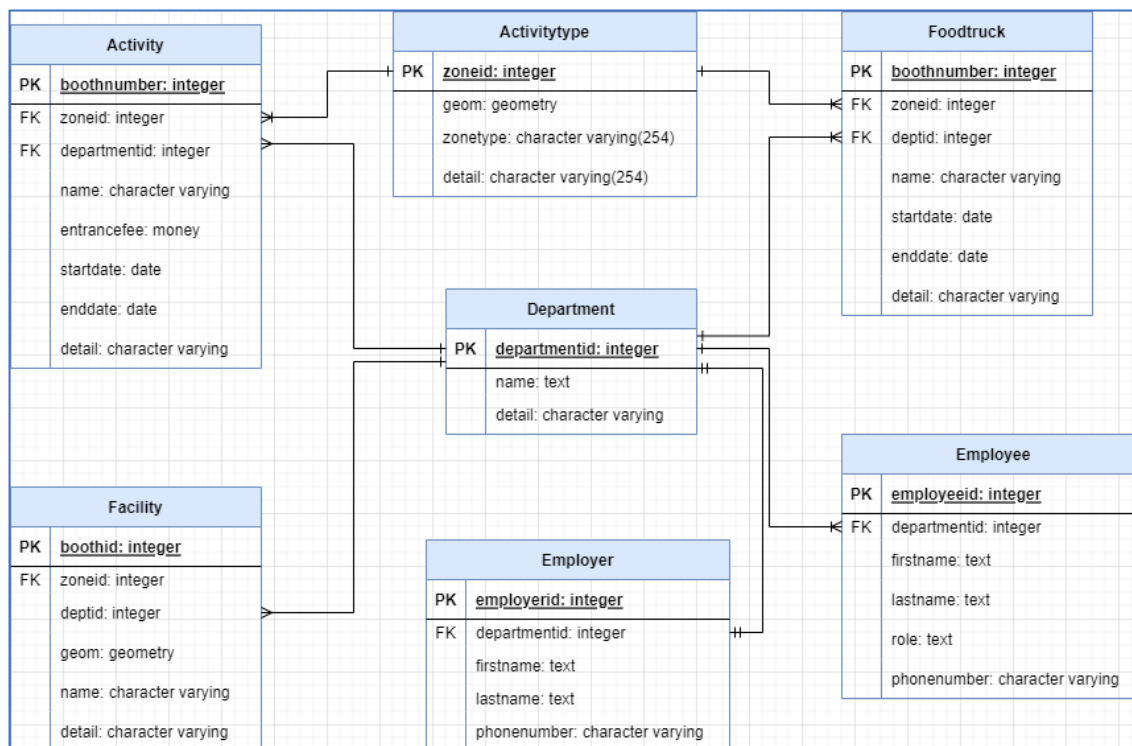
Preparing databases

Import tables: the first step is importing the csv tables into empty columns which data type is already set in PgAdmin.

Define constraints: After importing csv tables, primary and foreign keys are defined on each table.

The screenshot shows the PgAdmin interface for defining foreign keys. On the left, the 'Foreign Key' tab is active, showing a table with columns 'Name', 'Columns', and 'Referenced Table'. Two foreign keys are listed: 'departmentid_fkey' and 'zoneid_fkey'. The 'Columns' tab is also visible, showing the 'Columns' table with columns 'Name', 'Data type', 'Length/Precision', 'Scale', 'Not NULL?', and 'Primary key?'. The 'Columns' table shows three columns: 'boothnumber' (integer), 'zoneid' (integer), and 'name' (character varying).

Generate an entity relationship diagram: I create a physical model by <https://www.diagrams.net/> that illustrates how “entities” also concept relate to each other also data type and keys within a festival model. The model below indicates that Fusion Food and Culture Festival is organized by many departments of Gosnell city and each department has 1 manager and many employees. Each activity is grouped by activities type which 1 activity type can have many activities of foods inside the zone. Moreover, facilities are arranged in the area for facilitate visitors such as toilets, kiosk info, security booth and first aid. These facilities are taken care by many departments.



Spatial query

4.1. Area:

Since the festival organizer needs to arrange the location and zone, so planning areas in each zone is the first task to do. In this case, I use spatial query `ST_Area(geometry g1)`; this function returns the area of a polygonal geometry. From the result the largest area is Amazing Attractions 9711.55 square meters and the smallest zone is Youth Activities 2343.20 square meters.

The first screenshot shows a SQL query editor with the following query:

```
1 SELECT DISTINCT zonetype, "Activitytype".detail, st_area(geom) AS area
2 FROM "Activitytype"
3 INNER JOIN "Activity" ON "Activitytype".zonetypeid = "Activity".zoneid
4 ORDER BY area ASC;
```

The result table shows the following data:

zonetype	detail	area
1 Youth Activities	The Youth Zone at Fusion Food...	2343.20114564...
2 Sensory Safe ...	The Sensory Safe Space will ...	2670.69668214...
3 Viva Stage	Viva stage will be held Reggae...	3276.86658100...
4 Fusion Stage	Fusion Food and Culture Festiv...	5116.68936062...
5 Children ...	The Kids' Zone at this year's ...	8818.86939448...
6 Amazing ...	In addition to the captivating ...	9711.55717383...

The second screenshot shows a SQL query editor with the following query:

```
1 SELECT DISTINCT zoneid, zonetype, st_area(geom) AS area
2 FROM "Foodtruck"
3 INNER JOIN "Activitytype" ON "Foodtruck".zoneid = "Activitytype".zonetypeid;
```

The result table shows the following data:

zoneid	zonetype	area
1 5001	Traditional Food	7796.28422379...

4.2. Perimeter: The manager of each zone activity needs to know about the perimeter, so they can prepare the booth's decorations such as string light to know how long to wrap them around the booth. I use spatial query `ST_Perimeter(geometry g1)`; this function returns the 2D perimeter of the geometry. The longest perimeter is Children Activities zone 519.83 meters and the shortest is Youth Activities 205.08 meters.

The first screenshot shows a SQL query editor with the following query:

```
1 SELECT DISTINCT zonetype, st_perimeter(geom) AS perimeter
2
3 FROM "Activitytype"
4
5 INNER JOIN "Activity" ON "Activitytype".zonetypeid = "Activity".zoneid
6
7 ORDER BY perimeter ASC;
```

The result table shows the following data:

zonetype	perimeter
1 Youth Activities	205.084445311...
2 Sensory Safe ...	237.873522348...
3 Viva Stage	263.425167504...
4 Fusion Stage	313.362504638...
5 Amazing ...	485.361471851...
6 Children ...	519.834821515...

The second screenshot shows a SQL query editor with the following query:

```
1 SELECT DISTINCT zonetype, st_perimeter(geom) AS perimeter
2
3 FROM "Foodtruck"
4
5 INNER JOIN "Activitytype" ON "Foodtruck".zoneid = "Activitytype".zonetypeid
6
7 ORDER BY perimeter ASC;
```

The result table shows the following data:

zonetype	perimeter
additional Food	459.497942447...

4.3. Distance:

Festival facilities are another important part of the event. Visitors are not only provided fun activities at the events, but also must also be able to access facilities, such as toilets, parking and first aid stations. In this case, I will check the location of toilets within a distance that people in each activity zones can reach quickly. I use a spatial function of **ST_Distance(geometry g1, geometry g2)**; it returns the minimum (planar) distance between two geometries, in projected units. In distance less than 50 meters, people in every zone can reach to toilets or every activity type is located near toilets.

```

1 SELECT DISTINCT act.*
2
3 FROM "Activitytype" AS act,
4
5     (SELECT geom FROM "Facility" WHERE name = 'Toilet') AS z
6
7 WHERE st_distance(act.geom, z.geom) <50;

```

zonestypeid	geom	zonestype	detail
1 1001	0106000020EE7...	Children ...	The Kids' Zone ...
2 1002	0106000020EE7...	Youth Activities	The Youth Zone ...
3 2001	0106000020EE7...	Viva Stage	Viva stage will ...
4 2002	0106000020EE7...	Fusion Stage	Fusion Food an...
5 3001	0106000020EE7...	Sensory Safe ...	The Sensory Saf...
6 4001	0106000020EE7...	Amazing ...	In addition to t...
7 5001	0106000020EE7...	Traditional Food	Over 15 food ...

4.4. Buffer:

For organizing the festival perfectly, the organizer must consider the safety of the participants. Therefore, first aid stations must be covered at every place of the event and must take into account the distance. As an organizer, I need to calculate the buffer distance to make sure that people can access quickly. In this case, I consider a buffer distance of 50 meters from the first aid center by using **ST_Buffer(geometry g1, radius_of_buffer)**.

To visualize the geographical buffer layer, we can query it through "Create a Virtual Layer" in QGIS. From the result, the red rings are radius of buffer from the first aid stations.

The screenshot shows a QGIS interface with a festival map on the left and a 'Create a Virtual Layer' dialog on the right. The map displays various festival zones and facilities, with red circles indicating a 50-meter buffer around first aid stations. The dialog shows the query: 'SELECT zoneid, st_buffer(geometry, 50) AS buffer FROM "Facility" WHERE name = "First aid"'. The 'Embedded layers' table lists 'Facility' with the source 'rid=32750 type=Point table="public"."Facility" (geom)'. The 'Query' field contains the SQL query: '1 SELECT zoneid, st_buffer(geometry, 50) AS buffer 2 FROM "Facility" 3 WHERE name = "First aid"'. The 'Layer name' is 'virtual_layer'.

4.5. Intersect:

After knowing the radius of buffers from the previous query, as a organizer I would like to find out that which activity zones are intersected with the first aid buffer in within 20 meters. Therefore, I create a sub-query of buffer and intersect by using `ST_Intersect(geometry g1, geometry g2)`. The result returns table showing Children and Youth activity where intersect with the buffer.

```
1 SELECT f.buffer AS geometry, a.zonetype, detail
2 FROM "Activitytype" AS a,
3      (SELECT zoneid, st_buffer(geom,20) AS buffer FROM "Facility" WHERE name ='First aid') AS f
4 WHERE st_intersects(a.geom, f.buffer);
```

Execute 2 rows, 0.001 seconds Create a view Clear

geometry	zonetype	detail
103000020EE7...	Children ...	The Kids' Zone ...
103000020EE7...	Youth Activities	The Youth Zone ...