



SQL-Mongo Project – Spatial Data of US Wildfires

BUAN 6320

Contents

Data Model	4
Assumptions/Notes About Data Entities and Relationships.....	4
Entity-Relationship Diagram	6
Physical Database	7
Assumptions/Notes About Data Set	7
Screen shot of Physical Database objects.....	7
Data in the Database.....	12
SQL Queries.....	13
Query 1.....	13
Question.....	13
Notes/Comments About SQL Query and Results (Include # of Rows in Result).....	13
Translation	13
Screen Shot of SQL Query and Results.....	13
Query 2.....	14
Question.....	14
Notes/Comments About SQL Query and Results (Include # of Rows in Result).....	14
Translation	14
Screen Shot of SQL Query and Results.....	14
Query 3.....	15
Question.....	15
Notes/Comments About SQL Query and Results (Include # of Rows in Result).....	15
Translation	15
Screen Shot of SQL Query and Results.....	15
Query 4.....	16
Question.....	16
Notes/Comments About SQL Query and Results (Include # of Rows in Result).....	16
Translation	16
Screen Shot of SQL Query and Results.....	16
Query 5.....	17
Question.....	17
Notes/Comments About SQL Query and Results (Include # of Rows in Result).....	17
Translation	17

Screen Shot of SQL Query and Results.....	17
Query 6.....	18
Question.....	18
Notes/Comments About SQL Query and Results (Include # of Rows in Result).....	18
Translation	18
Screen Shot of SQL Query and Results.....	18
Data Review for MongoDB.....	19
Physical Mongo Database	19
Assumptions/Notes About Data Set	19
Screen shot of Physical Database objects (Database, Collections and Attributes)	19
Data in the Database.....	21
MongoDB Queries/Code.....	22
Query 1.....	22
Question.....	22
Notes/Comments About MongoDB Query/Code and Results (Include # of Documents in Result) ...	22
Translation	22
Screen Shot of MongoDB Query/Code and Results.....	22
Query 2.....	23
Question.....	23
Notes/Comments About MongoDB Query/Code and Results (Include # of Documents in Result) ...	23
Translation	23
Screen Shot of MongoDB Query/Code and Results.....	23
Query 3.....	24
Question.....	24
Notes/Comments About MongoDB Query/Code and Results (Include # of Documents in Result) ...	24
Translation	24
Screen Shot of MongoDB Query/Code and Results.....	24
Query 4.....	25
Question.....	25
Notes/Comments About MongoDB Query/Code and Results (Include # of Documents in Result) ...	25
Translation	25
Screen Shot of MongoDB Query/Code and Results.....	25
Query 5.....	26

Question.....	26
Notes/Comments About MongoDB Query/Code and Results (Include # of Documents in Result) ...	26
Translation	26
Screen Shot of MongoDB Query/Code and Results.....	27
Query 6.....	28
Question.....	28
Notes/Comments About MongoDB Query/Code and Results (Include # of Documents in Result) ...	28
Translation	28
Screen Shot of MongoDB Query/Code and Results.....	28

Data Model

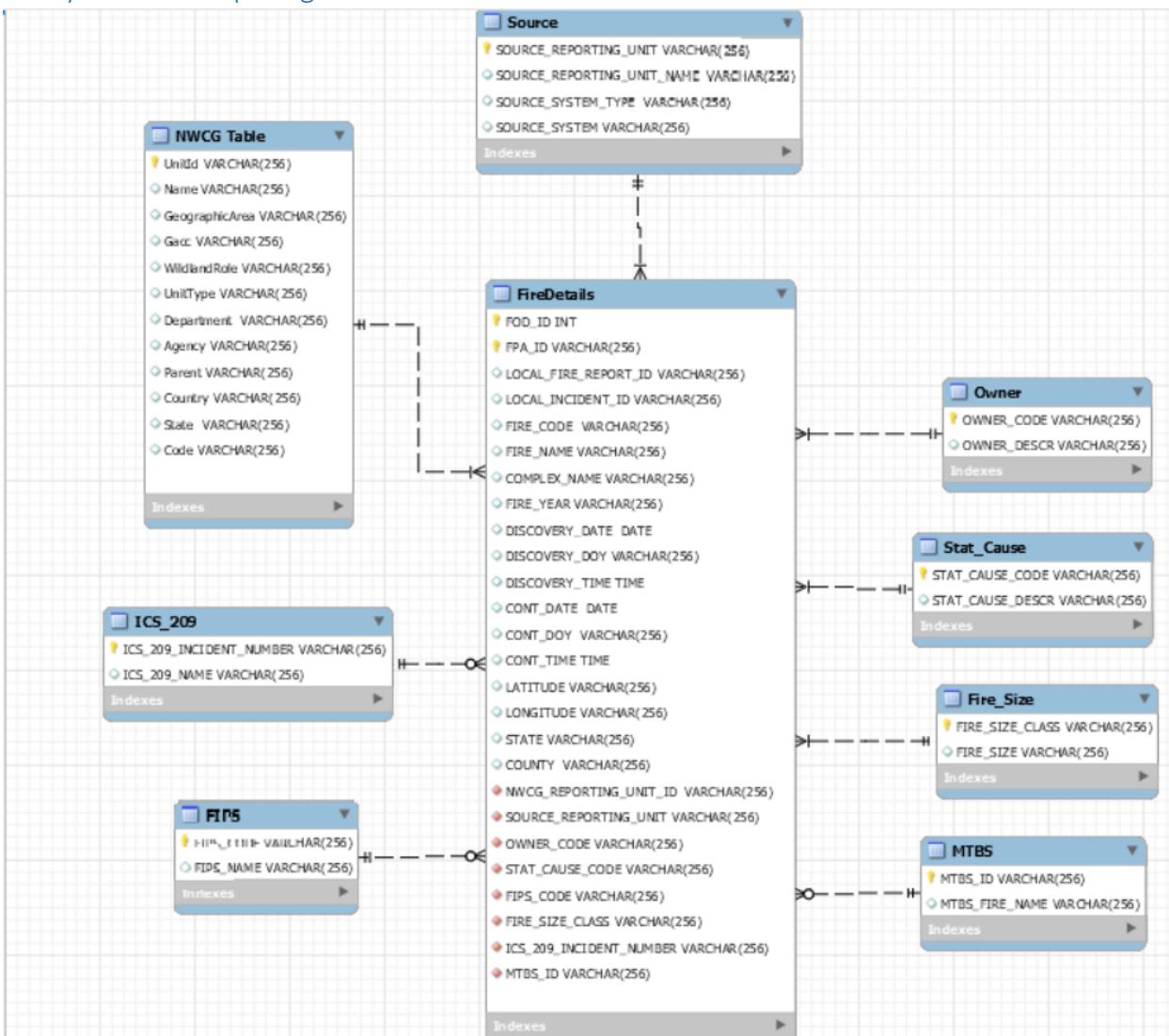
Assumptions/Notes About Data Entities and Relationships

1. A fire originating will have a single source and each fire will have a fire report and a single unit may report multiple fires.
2. Each fire may be reported by the NWGC agency and an agency unit may report one to many fires.
3. Each fire will have a statistical cause and each statistical cause denote the cause of one to many fires.
4. Each fire will have an origin and owner of the land or property from where the fire originated, and each property may have one to many instances of fire.
5. Each fire is classified based on size and each fire class may represent one to many fires.
6. Each fire may or may not have an mtbs id and each mtbs id may denote zero to many fires.
7. Each fire may or may not have an incident number from the secondary ICS209 report and each report may denote zero to many fires.
8. Each fire may have a FIPS state/county code and zero to many fires may occur in each state or county.
9. Each NWCG reporting unit or source reporting unit may be located near a forest and hence therefore represents a forest.
10. Each forest may have one to many fires.

Reasons for 3NF:

1. To eliminate any undesirable data anomalies that may be present in the data.
2. To reduce the need for restructuring over time.
3. To make the data model more informative.
4. To make the data model neutral to different kinds of query.
5. To ensure referential integrity.
6. To make sure there are no transitive functional dependencies between any column in table which satisfies the condition of 3NF.

Entity-Relationship Diagram



Physical Database

Assumptions/Notes About Data Set

1. All records on fire data are contained in Fire Details table
2. All records on NWCG reporting agency are kept on NWCG table
3. NWGC agency and its individual units generates the fire report for the fires originating.
4. Fire report is generated by the source reporting unit indicating the source of the fire.
5. Owner table contains the data about primary owner or entity responsible for managing the land at the point of origin of the fire at the time of the incident.
6. Stat cause table contains the data about statistical cause of fire.
7. Fire size table contains the data about the size of the fire.
8. MTBS table contains the data about the burn severity of caused by the fire.
9. ICS table contains the fire id and fire number of the secondary ICS_209 fire report.
10. FIPS table contains data about the federal information process standards.

Screen shot of Physical Database objects

Fires Table:

The screenshot shows the Oracle SQL Developer interface with the following details:

- Schema:** tpas_tod
- Table:** fires
- Object Info:** Shows the columns of the fires table.
- Query Grid:** Displays the first 22 rows of the fires table.
- Action Output:** Shows the history of actions taken on the table, including selecting from nwcg, owner, and stat_cause.

FOD_ID	FPA_ID	LOCAL_FIRE_REPORT_ID	LOCAL INCIDENT ID	FIRE_CODE	FIRE_NAME	COMPLEX_NAME	FIRE_YEAR	DISCOVERY_DATE	DISCOVERY_DY	DISCOVERY_TIME	CONT_DATE	CONT_DY	CONT_TIME	LATITUDE	LONGITUDE	STATE	COUNTY	NWCG REPORTING_U	NIT_ID	SOURCE_REPORTING_UNIT	OWNER_CODE	STAT_CAUSE_CODE	FIPS_CODE	
1	FS-1418826	1	PNP-47	B8K	FOUNTAIN	HULL	2005	2453403.5	33	1300														
2	FS-1418835	13	13	AAC0	PIGEON	HULL	2006	2453437.5	183	945														
3	FS-1418835	27	021	A32W	ROCK	HULL	2004	2453156.5	182	1921														
4	FS-1418845	43	6	HULL	DEER	HULL	2004	2453184.5	180	1600														
5	FS-1418847	44	7	HULL	STEVENOT	HULL	2004	2453184.5	180	1600														
6	FS-1418849	54	8	HULL	HIDDEN	HULL	2004	2453186.5	182	1800														
7	FS-1418851	58	9	HULL	FORK	HULL	2004	2453187.5	183	1800														
8	FS-1418854	3	02	BK5X	SLATE	HULL	2005	2453437.5	67	1300														
9	FS-1418856	5	03	BLPO	SHASTA	HULL	2005	2453444.5	74	1200														
fires 22																								
Action Output																								
27	13:17:03	select * from nwcg	5507 row(s) returned	0.00003 sec / 0.00003...																				
28	19:17:47	select * from Owner	16 row(s) returned	0.00036 sec / 0.000...																				
29	19:17:59	select * from Source	7130 row(s) returned	0.00077 sec / 0.0053...																				
30	19:18:13	select * from Stat_cause	13 row(s) returned	0.00038 sec / 0.000...																				
31	19:18:58	select * from fires	1880465 row(s) returned	0.0014 sec / 7.857 sec																				

FIPS Table

The screenshot shows the Oracle SQL Developer interface with a query window titled "Query 1". The code entered is:

```

1 select *
2 from FIPS

```

The results grid displays the following data:

FIPS_CODE	FIPS_NAME
17	El Dorado
3	Alpine
5	Amador
27	Lincoln
17	Deschutes
21	Buncombe
113	Macon
27	Caldwell
11	Avery
9	Converse
69	Wheeler
57	Leavenworth
33	Sheridan
27	Grays Harbor
53	Lincoln
89	Sanders
49	Utah

Below the results grid, the status bar shows "FIPS 14" and "Read Only". The "Action Output" section shows the following log entries:

Time	Action	Response	Duration / Fetch Time
18:49:00	DROP TABLE 'ipa_fod'.sources	0 row(s) affected	0.001 sec
20 18:49:01	DROP TABLE 'ipa_fod'.Stat_cause	0 row(s) affected	0.017 sec
21 18:50:08	DROP TABLE 'ipa_fod'.fires	0 row(s) affected	0.024 sec
22 19:01:56	select * from fires	1880465 row(s) returned	0.0015 sec / 7.918 sec
23 19:16:40	select * from FIPS	2695 row(s) returned	0.0012 sec / 0.00078...

The status bar at the bottom left says "Query Completed".

Fire Size Table

The screenshot shows the Oracle SQL Developer interface with a query window titled "Query 1". The code entered is:

```

1 select *
2 from Fire_size

```

The results grid displays the following data:

FIRE_SIZE	FIRE_SIZE_CLASS
0.8	B
1	B
6	B
0.2	A
16823	C
1700	C
2.5	B
10	C
8.2	B
0.6	B
50.3	C
125	D
25	C
3	B
5	B
0.5	B
0.3	B

Below the results grid, the status bar shows "Fire_size 15" and "Read Only". The "Action Output" section shows the following log entries:

Time	Action	Response	Duration / Fetch Time
18:49:01	DROP TABLE 'ipa_fod'.Stat_cause	0 row(s) affected	0.001 sec
21 18:50:08	DROP TABLE 'ipa_fod'.fires	0 row(s) affected	0.024 sec
22 19:01:56	select * from fires	1880465 row(s) returned	0.0015 sec / 7.918 sec
23 19:16:40	select * from FIPS	2695 row(s) returned	0.0012 sec / 0.00078...
24 19:16:56	select * from Fire_size	13637 row(s) returned	0.0017 sec / 0.0095 s...

The status bar at the bottom left says "Query Completed".

ICS Table

The screenshot shows the Oracle SQL Developer interface with the following details:

- Toolbar:** Includes icons for file operations, schema navigation, and search.
- Left Panel (Administration -> Schemas):**
 - Tables: FIPS, fires, Fire_size, ICS, MTBS, nwrg, Owner.
 - Object Info: FIRE_SIZE, FIRE_SIZE_CLASS.
- Query Editor:**

```
1 select *
2 from ICS
```
- Result Grid:** Displays the results of the query:

ICS_209 INCIDENT NUMBER	ICS_209 NAME
NC-NCS-050201401	Austin Creek
CA-LPF-1353	CHIMINEAS
AZ-TNF-105	THREE FIRE COMPLEX
CA-SQF-1857	NINE
AZ-TNF-136	Oak
AZ-TNF-139	Greenback
AZ-TNF-140	SALOME
AZ-TNF-?	Two Bar
NM-SNF-027	Mesa Camino
LA-KIF-050004	Box
MT-CNF-073	SAWMILL GULCH
MT-TNF-073	CAMP 32
LA-KIF-050004	East Taylor
LA-KIF-05012	Mother's Day
MT-CNF-1-045	PAGET
LA-KIF-	Coochie Brake
CA-SQF-2233	WISHON
- Action Output:**

Time	Action	Response	Duration / Fetch Time
22 19:09:00	select * from fires	0 rows(s) selected	0.000 sec / 0.000 sec
22 19:09:56	select * from FIPS	1880465 row(s) returned	0.0015 sec / 7.918 sec
23 19:16:40	select * from Fire_size	2695 row(s) returned	0.0012 sec / 0.00078...
24 19:16:56	select * from ICS	13637 row(s) returned	0.0017 sec / 0.0095 s...
25 19:17:06	select * from MTBS	23314 row(s) returned	0.00084 sec / 0.013...

MTBS Table

The screenshot shows the Oracle SQL Developer interface with the following details:

- Toolbar:** Includes icons for file operations, schema navigation, and search.
- Left Panel (Administration -> Schemas):**
 - Tables: FIPS, fires, Fire_size, ICS, MTBS, nwrg, Owner.
 - Object Info: MTBS_ID, MTBS_FIRE_NAME.
- Query Editor:**

```
1 select *
2 from MTBS
```
- Result Grid:** Displays the results of the query:

MTBS_ID	MTBS_FIRE_NAME
F5-0417-18-20050715	SUMMIT
Az3372311127120050621	THREE FIRE COMPLEX (THREE)
F5-0417-023-20050721	SLINKARD 2
CA36695111052020050716	OAK
AZ38933111052020050716	TWO BAR
MT45315105636420050404	SAWMILL GULCH
MT498544115165020050807	CAMP 32
CO37023102525420050725	CARRIZO COMPLEX
NM33647106851120050582	FORK WFL
MT4544510569120050822	ERICKSON SPRING
CO3816010503620050796	MASON
MO3764409188620050330	FREEMAN
OR45820111805320050813	BURNT CABIN
SD4421510341420050708	RICO
WY4434710418220050723	CEMENT
MO3685609111220050311	WOLF MTN
- Action Output:**

Time	Action	Response	Duration / Fetch Time
22 19:16:40	select * from fires	0 rows(s) selected	0.000 sec / 0.000 sec
23 19:16:40	select * from FIPS	2695 row(s) returned	0.0012 sec / 0.00078...
24 19:16:56	select * from Fire_size	13637 row(s) returned	0.0017 sec / 0.0095 s...
25 19:17:06	select * from ICS	23314 row(s) returned	0.00084 sec / 0.013...
26 19:17:19	select * from MTBS	10481 row(s) returned	0.00077 sec / 0.0064...

NWCG Table

The screenshot shows the pgAdmin III interface with the following details:

- Schemas:** Administration, Schemas, Query 1.
- Table:** nwcg.
- Query:**

```

1 select *
2 from nwcg
    
```

- Result Grid:** Shows the structure and data of the nwcg table. The columns include OBJECTID, UnitId, GeographicArea, Gacc, WildlandRole, UnitType, Department, Agency, Parent, Country, State, Code, and Name. The data grid lists 19 rows of incident host geographic information for various organizations like USAKACC, USAF, and USCG.
- Action Output:** Displays the execution history of the query, showing the time, action, response, and duration for each step.

Owner Table

The screenshot shows the pgAdmin III interface with the following details:

- Schemas:** Administration, Schemas, Query 1.
- Table:** Owner.
- Query:**

```

1 select *
2 from Owner
    
```

- Result Grid:** Shows the structure and data of the Owner table. The columns include OWNER_CODE and OWNER_DESCR. The data grid lists 15 rows of owner codes and their descriptions.
- Action Output:** Displays the execution history of the query, showing the time, action, response, and duration for each step.

Source Table

The screenshot shows the Oracle SQL Developer interface with a dark theme. The left sidebar displays the schema tree under 'Administration' with 'Source' selected. The main area contains a query editor with the following code:

```

1 select *
2 from Source

```

The results grid shows data from the 'Source' table:

SOURCE_REPORTING_UNIT	SOURCE_REPORTING_UNIT_NAME	SOURCE_SYSTEM_TYPE	SOURCE_SYSTEM
0514	Shasta-Trinity National Forest	FED	FS-FIRESTAT
0308	Lincoln National Forest	FED	FS-FIRESTAT
0601	Deschutes National Forest	FED	FS-FIRESTAT
0811	National Forests in North Carolina	FED	FS-FIRESTAT
0206	Medicine Bow-Routt National Forest	FED	FS-FIRESTAT
0614	Umatilla National Forest	FED	FS-FIRESTAT
0212	Pike San Isabel National Forest	FED	FS-FIRESTAT
0607	Ochoco National Forest	FED	FS-FIRESTAT
0602	Fremont-Winema National Forest	FED	FS-FIRESTAT
0202	Bighorn National Forest	FED	FS-FIRESTAT
0114	Kootenai National Forest	FED	FS-FIRESTAT
0305	Umpqua National Forest	FED	FS-FIRESTAT
0307	Kabob National Forest	FED	FS-FIRESTAT
0510	Six Rivers National Forest	FED	FS-FIRESTAT
0305	Coronado National Forest	FED	FS-FIRESTAT
0501	Angeles National Forest	FED	FS-FIRESTAT
0203	Black Hills National Forest	FED	FS-FIRESTAT
0504	Sierra National Forest	FED	FS-FIRESTAT

The 'Action Output' section shows the history of the query execution:

Time	Action	Response	Duration / Fetch Time
26 19:17:19	select * from MTBS	10481 row(s) returned	0.0007 sec / 0.0064...
27 19:17:35	select * from nwcg	5867 row(s) returned	0.00073 sec / 0.0088...
28 19:17:47	select * from Owner	16 row(s) returned	0.00036 sec / 0.000...
29 19:17:59	select * from Source	7130 row(s) returned	0.00077 sec / 0.0053...

Stat_Cause Table

The screenshot shows the Oracle SQL Developer interface with a dark theme. The left sidebar displays the schema tree under 'Administration' with 'Stat_Cause' selected. The main area contains a query editor with the following code:

```

1 select *
2 from Stat_cause

```

The results grid shows data from the 'Stat_cause' table:

STAT_CAUSE_CODE	STAT_CAUSE_DESCR
9	Miscellaneous
1	Lightning
5	Debris Burning
4	Campfire
2	Equipment Use
7	Arson
8	Children
6	Railroad
3	Smoking
11	Powerline
12	Structure
10	Fireworks
13	Missing/Undefined

The 'Action Output' section shows the history of the query execution:

Time	Action	Response	Duration / Fetch Time
26 19:17:19	select * from MTBS	10481 row(s) returned	0.0007 sec / 0.0064...
27 19:17:35	select * from nwcg	5867 row(s) returned	0.00073 sec / 0.0088...
28 19:17:47	select * from Owner	16 row(s) returned	0.00036 sec / 0.000...
29 19:17:59	select * from Source	7130 row(s) returned	0.00077 sec / 0.0053...
30 19:18:13	select * from Stat_cause	13 row(s) returned	0.00038 sec / 0.000...

Data in the Database

Table Name	Primary Key	Foreign Key	# of Rows in Table
FireDetails	<ul style="list-style-type: none"> • FOD_INT • FPA_ID 	<ul style="list-style-type: none"> • NWCG_REPORTING_UNIT_ID • SOURCE_REPORTING_UNIT • OWNER_CODE • STAT_CAUSE_CODE • FIPS_CODE • FIRE_SIZE_CLASS • ICS_209 INCIDENT_N UMBER • MTBS_ID 	1880465
NWCG Table	UnitId		5867
Source	SOURCE_REPORTING_UNIT		7130
Owner	OWNER_CODE		16
Stat_Cause	STAT_CAUSE_CODE		13
Fire_Size	FIRE_SIZE_CLASS		13637
MTBS	MTBS_ID		10481
FIPS	FIPS_CODE		2695
ICS_209	ICS_209 INCIDENT_NUMB ER		23314

SQL Queries

Query 1

Question 1:

A leading beverage company has announced a billion-dollar fund for removing debris from forests, rivers and mountains in the US. All states are interested. Which state has the least chance to win a share of the fund?

Assumptions

The state with fires caused by debris burning is the least, will have the least chance of winning the fund.

Translation

Select the state where the cause of fire due to Debris Burning is the least

Cleanup

```
Select STATE, COUNT (*) from fires table inner join Stat_cause where STAT_CAUSE_DESCR = 'Debris Burning' GROUP BY STATE ORDER BY FIRE_BY_DEBRIS
```

Screen Shot of SQL Query and Results

The screenshot shows the Oracle SQL Developer interface. The left sidebar displays the schema structure under 'Administration' > 'Schemas'. The 'Stat_cause' table is selected, showing its columns: STAT_CAUSE_CODE (bigint(20)) and STAT_CAUSE_DESCR (text). The main area contains the following SQL query:

```
1 • SELECT f.STATE
2   FROM fires f inner join Stat_cause sc
3  WHERE sc.STAT_CAUSE_DESCR = 'Debris Burning'
4  GROUP BY f.STATE
5  ORDER BY count(*)
6  LIMIT 1;
```

The results pane shows a single row in the 'Result Grid' table:

STATE
DC

Below the results, the 'Action Output' section shows the query execution details:

Action	Time	Response	Duration / Fetch Time
1 18:37:43	SELECT f.STATE FROM fires f inner join Stat_cause sc WHERE sc.STAT_CAUSE_DESCR = 'Debris Burning'	1 row(s) returned	1.966 sec / 0.000008...

Result

DC state has the least chance of fire caused by Debris Burning, and hence has the least chance of winning the fund. (Rows returned:1)

Query 2

Question 2:

One of the reporting agencies has suggested that children be banned from its forests unless there is one adult for every 3 children in a group visiting a forest. Name 3 forests where this would be the least appropriate.

Assumptions

In forests where children are the likely cause of fire, the forest with least number of fires is safer for children to be accompanied by an adult, and hence considered least appropriate. We have considered the Source_reporting_unit_name as the forest name(agencies, wildlife refuge etc) in our dataset.

Translation

Select the forest (SOURCE_REPORTING_UNIT_NAME) where the ban for children to be accompanied with the adults is least appropriate

Cleanup

Select three SOURCE_REPORTING_UNIT_NAME (forest names) where STAT_CAUSE_DESCR = 'Children' and count of fires are least.

Screen Shot of SQL Query and Results

The screenshot shows the SQL Server Management Studio interface. The left pane displays the Object Explorer with the schema 'tpa_tod' selected. The right pane shows a query window with the following SQL code:

```
1 select s.SOURCE_REPORTING_UNIT_NAME as forest_name, count(*) as count_of_fires
2   from fires as f
3  left join Stat_cause as sc on f.STAT_CAUSE_CODE = sc.STAT_CAUSE_CODE
4  Left join Source as s on f.SOURCE_REPORTING_UNIT = s.SOURCE_REPORTING_UNIT
5 where sc.STAT_CAUSE_DESCR = 'Children'
6 group by s.SOURCE_REPORTING_UNIT_NAME
7 order by count_of_fires asc
8 limit 3;
9
```

The results grid shows the following data:

forest_name	count_of_fires
Salmon-Challis National Forest	1
Hoosier National Forest	1
Lewisburg District	1

The bottom pane shows the Action Output window with the following log entries:

Action	Response	Duration / Fetch Time
select * from Source	7130 row(s) returned	0.0011 sec / 0.0086 s...
select count(SOURCE_REPORTING_UNIT_NAME) from Source	1 row(s) returned	0.0048 sec / 0.00001...
select count(SOURCE_REPORTING_UNIT) from Source	1 row(s) returned	0.0031 sec / 0.00001...
select s.SOURCE_REPORTING_UNIT_NAME as forest_name, count(*) as count_of_fires from fir...	3 row(s) returned	62.504 sec / 0.0000...

Result

Rows returned are 3. These are the three forests in which the ban is least appropriate.

Query 3

Question 3:

One advocacy group says human actions and not Nature is to blame for most wildfires. Write a query that supports this statement

Assumptions

Natural causes of fire ('Lightning', 'Structure') and Human Causes ('Debris Burning', 'Campfire', 'Equipment Use', 'Arson', 'Children', 'Railroad', 'Smoking', 'Powerline', 'Fireworks')

Translation

Select different causes with respective fire counts

Cleanup

Select count (*), STAT_CAUSE_DESCR from fires table inner join Stat_cause where STAT_CAUSE_DESCR = ('Lightning', 'Structure')

Union

Select count (*), STAT_CAUSE_DESCR from fires table inner join Stat_cause where STAT_CAUSE_DESCR = ('Debris Burning', 'Campfire', 'Equipment Use', 'Arson', 'Children', 'Railroad', 'Smoking', 'Powerline', 'Fireworks')

Screen Shot of SQL Query and Results

The screenshot shows the SSMS interface with a query window containing the following T-SQL code:

```
1   select 'Nature' as Cause, SUM(total_fire) AS count_of_Fires
2   from (select count(*) as total_fire, sc.STAT_CAUSE_DESCR
3   from fires f inner join Stat_cause sc
4   on f.STAT_CAUSE_CODE = sc.STAT_CAUSE_CODE
5   where sc.STAT_CAUSE_DESCR in ('Lightning', 'Structure')
6   group by sc.STAT_CAUSE_DESCR
7   order by total_fire Desc) SRC
8
9 UNION
10
11 select 'Man-made', SUM(total_fire)
12 FROM
13 (SELECT COUNT(*) AS total_fire,sc.STAT_CAUSE_DESCR
14 from fires f inner join Stat_cause sc
15 on f.STAT_CAUSE_CODE = sc.STAT_CAUSE_CODE
16 where sc.STAT_CAUSE_DESCR in ('Debris Burning','Campfire', 'Equipment Use', 'Arson','Children','Railroad','Smoking','Powerline',
17 group by sc.STAT_CAUSE_DESCR
18 order by total_fire Desc) SRC;
```

The results grid shows the following data:

Cause	count_of_Fires
Nature	282864
Man-made	1107673

Below the results grid, the Action Output pane shows the query execution details:

Action	Time	Response	Duration / Fetch Time
1	20:18:43	select 'Nature' as Cause, SUM(total_fire) AS count_of_Fires from (select count(*) as total_fire,...	2 row(s) returned 4.011 sec / 0.000008...

Result

Rows returned are 2. Results show that, the human actions are to be blamed for most wildfires (11,87,673)

Query 4

Question 6:

What were the forests that had no fires that lasted more than two days?

Assumptions

We have considered the Source_reporting_unit_name (agencies, wildlife refuge etc) as the forest name in our dataset.

Translation

Select the forests where the fire was discovered and controlled in no more than 2 days

Cleanup

```
Select SOURCE_REPORTING_UNIT_NAME from source table inner join fire where (CONT_DOY - DISCOVERY_DOY) <=2
```

Screen Shot of SQL Query and Results

The screenshot shows the SSMS interface with a query window containing the following SQL code:

```
1 select distinct sc.SOURCE_REPORTING_UNIT_NAME
2   from Source sc inner join fires f
3     on sc.SOURCE_REPORTING_UNIT = f.SOURCE_REPORTING_UNIT
4   where (f.CONT_DOY - f.DISCOVERY_DOY) <=2
5   order by sc.SOURCE_REPORTING_UNIT_NAME
```

The results grid displays a list of forest names:

SOURCE_REPORTING_UNIT_NAME
Acadia National Park
Ace Basin National Wildlife Refuge
AFC Bay Minette
AFC Birmingham
AFC Brown
AFC Dadeville
AFC East Central Region
AFC Florence
AFC Huntsville
AFC Montgomery
AFC Northeastern Region
AFC Northern Region
AFC Northwestern Region
AFC Ozark
AFC Selma
AFC Southeastern Region
AFC Southwestern Region
AFC Tuscaloosa

The Action Output pane shows the execution log:

Time	Action	Response	Duration / Fetch Time
21:32:22	select distinct sc.SOURCE_REPORTING_UNIT_NAME from Source sc inner join fires f on sc.S...	Error Code: 1054. Unknown column 'f.SOURCE_REPO...	0.00012 sec
21:32:45	select distinct sc.SOURCE_REPORTING_UNIT_NAME from Source sc inner join fires f on sc.S...	1694 row(s) returned	656.111 sec / 0.0007...

Result

Rows returned are 1694. The returned rows have the forest names in which the fire was discovered and contained within two days.

Query 5

Question 4:

What are the bottom two unit types that reported wildfires in each county in the US?

Assumptions

We have considered the Source_reporting_unit_name as the forest name in our dataset.

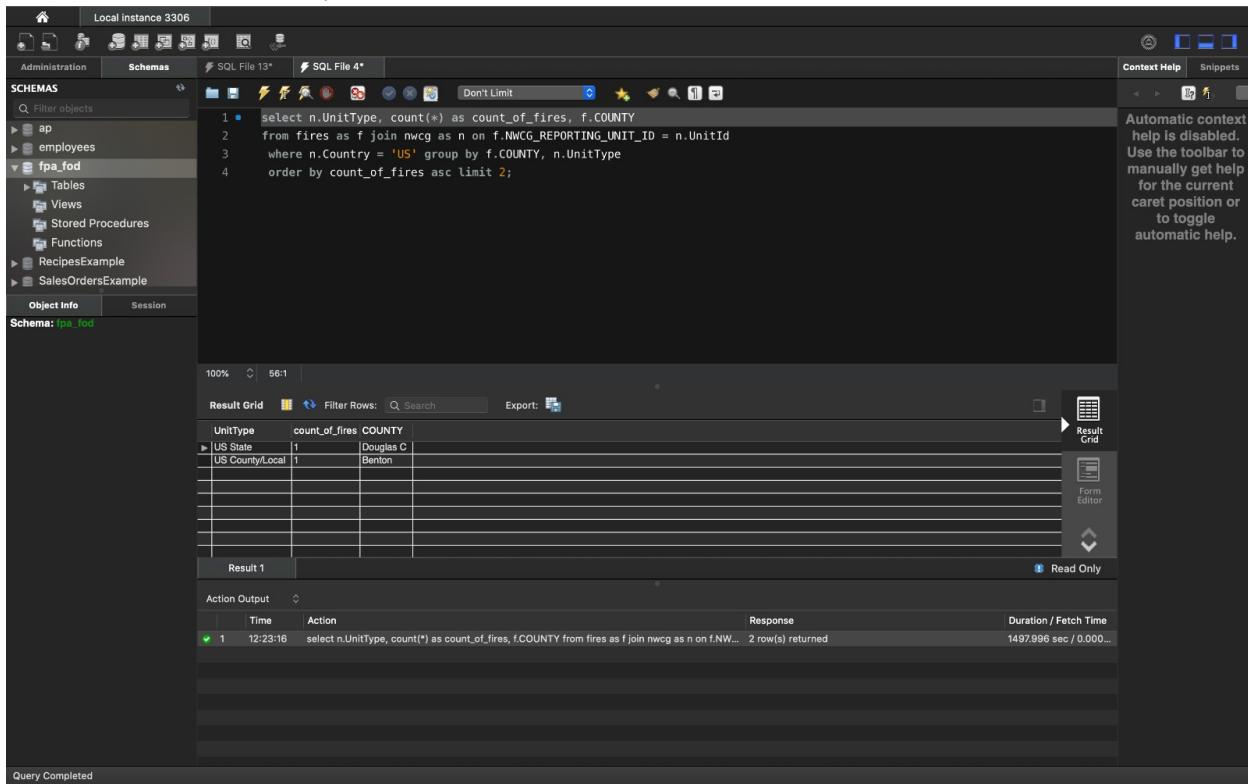
Translation

Select the bottom 2 underperforming unit types which reported the least number of fires in each county in US

Cleanup

Select UnitType, Count, County from fires join nwcg where county = US and order by count.

Screen Shot of SQL Query and Results



The screenshot shows the SSMS interface with a query window open. The query is:`1 select n.UnitType, count(*) as count_of_fires, f.COUNTY
2 From fires as f join nwcg as n on f.NWCG_REPORTING_UNIT_ID = n.UnitId
3 where n.County = 'US' group by f.COUNTY, n.UnitType
4 order by count_of_fires asc limit 2;`

The results grid shows the following data:

UnitType	count_of_fires	COUNTY
US State	1	Douglas C
US County/Local	1	Benton

Below the results, the Action Output pane shows the executed query and its duration.

Result

Rows returned are 2. These are the most underperforming unit types.

Query 6

Question 8:

Which forest had the least number of fires?

Assumptions

We have considered the Source_reporting_unit_name (agencies, wildlife refuge etc) as the forest name in our dataset.

Translation

Select the forest which has least number of fires.

Cleanup

```
SELECT COUNT(FOD-ID), SOURCE_REPORTING_UNIT_NAME from fires tables group by SOURCE_REPORTING_UNIT_NAME
```

Screen Shot of SQL Query and Results

The screenshot shows the SSMS interface with the following details:

- Toolbar:** Includes icons for Home, Local Instance 3306, File, Edit, Tools, View, and Help.
- Object Explorer:** Shows the schema tree under "Administration" with "SCHEMAS" expanded, showing "ap", "employees", and "fpa_fod". "fpa_fod" is selected.
- Query Editor:** Displays the following T-SQL query:

```
1 SELECT COUNT(*) AS TOTAL_FIRES, sc.SOURCE_REPORTING_UNIT_NAME
2 FROM fires f inner join Source sc
3 on f.SOURCE_REPORTING_UNIT = sc.SOURCE_REPORTING_UNIT
4 where sc.SOURCE_REPORTING_UNIT_NAME LIKE '%Forest%'
5 group by sc.SOURCE_REPORTING_UNIT_NAME
6 order by TOTAL_FIRES
7 LIMIT 4
```
- Result Grid:** Shows the results of the query:

TOTAL_FIRES	SOURCE_REPORTING_UNIT_NAME
1	Black Forest Fire Reserve Protection District
1	OAHU FOREST NWPC
1	Wyoming State Forestry (CPC Area)
1	Oregon Department of Forestry State Headquarter
- Status Bar:** Shows "Query Completed".

Result

Rows returned are 4. These are the forests with least number of fires.

Data Review for MongoDB

Physical Mongo Database

Assumptions/Notes About Data Set

1. All records on fire details are contained in fires document.
2. All records on NWCG reporting agency are kept on NWCG document

Screen shot of Physical Database objects (Database, Collections and Attributes)

The screenshot shows the MongoDB Compass interface. On the left, the sidebar displays the connection information: HOST localhost:27017, CLUSTER Standalone, and EDITION MongoDB 4.2.1 Community. It also lists databases: admin, config, tpa_fod, local, and system. The tpa_fod database is expanded, showing collections: Fires and NWCG. At the top, there are tabs for '4 DBS' and '3 COLLECTIONS'. A 'CREATE COLLECTION' button is visible. The main pane shows a table of collections with the following data:

Collection Name	Documents	Avg. Document Size	Total Document Size	Num. Indexes	Total Index Size	Properties
Fires	1,880,465	935.0 B	1.8 GB	1	18.8 MB	
NWCG	5,867	301.9 B	1.8 MB	1	69.6 KB	

Fires Document

fpa_fod.Fires

Documents Aggregations Schema Explain Plan Indexes Validation

INSERT DOCUMENT VIEW LIST TABLE

Displaying documents 1 - 20 of 1880465

```
_id: ObjectId("5ded84e79ad9cd5fd5ab4d3d")
OBJECTID: 3
FOD_ID: 3
FPA_ID: "FS-141832"
SOURCE_SYSTEM_TYPE: "FED"
SOURCE_SYSTEM: "FS-FIRESTAT"
NWCG_REPORTING_AGENCY: "FS"
NWCG_REPORTING_UNIT_ID: "USCAENF"
NWCG_REPORTING_UNIT_NAME: "Eldorado National Forest"
SOURCE_REPORTING_UNIT: 503
SOURCE_REPORTING_UNIT_NAME: "Eldorado National Forest"
LOCAL_FIRE_REPORT_ID: 27
LOCAL_INCIDENT_ID: 21
FIRE_CODE: "A32W"
FIRE_NAME: "SLACK"
ICS_209_INCIDENT_NUMBER: ""
ICS_209_NAME: ""
FIRE_YEAR: 2004
MTBS_FIRE_NAME: ""
COMPLEX_NAME: ""
FIRE_YEAR: 2004
DISCOVERY_DATE: 2453156.5
DISCOVERY_DOY: 152
DISCOVERY_TIME: 1921
STAT_CAUSE_CODE: 5
```

Show 15 more fields

```
_id: ObjectId("5ded84e79ad9cd5fd5ab4d3e")
OBJECTID: 2
FOD_ID: 2
FPA_ID: "FS-141827"
SOURCE_SYSTEM_TYPE: "FED"
SOURCE_SYSTEM: "FS-FIRESTAT"
NWCG_REPORTING_AGENCY: "FS"
NWCG_REPORTING_UNIT_ID: "USCAENF"
NWCG_REPORTING_UNIT_NAME: "Eldorado National Forest"
SOURCE_REPORTING_UNIT: 503
SOURCE_REPORTING_UNIT_NAME: "Eldorado National Forest"
LOCAL_FIRE_REPORT_ID: 13
LOCAL_INCIDENT_ID: 13
FIRE_CODE: "AACB"
FIRE_NAME: "Hyperion"
```

NWCG Document

fpa_fod.NWCG

Documents Aggregations Schema Explain Plan Indexes Validation

INSERT DOCUMENT VIEW LIST TABLE

Displaying documents 1 - 20 of 5867

```
_id: ObjectId("5ded855811f231276dc7f7ef")
OBJECTID: 2
UnitId: "USAKECX"
GeographicArea: "AK"
Gacc: "USAKACC"
WildlandRole: "Incident Host Geographic"
UnityType: "US County/Local"
Department: "AK"
Agency: "CAL"
Parent: ""
Country: "US"
State: "AK"
Code: "CERX"
Name: "Central Emergency Services"
```

```
_id: ObjectId("5ded855811f231276dc7f7f0")
OBJECTID: 1
UnitId: "USAKCAN"
GeographicArea: "AK"
Gacc: "USAKACC"
WildlandRole: "Resource Provider Only"
UnityType: "Non-Government"
Department: "NG"
Agency: "NG"
Parent: ""
Country: "US"
State: "AK"
Code: "CAN"
Name: "Calista Regional Native Corporation"
```

```
_id: ObjectId("5ded855811f231276dc7f7f1")
OBJECTID: 3
UnitId: "USAKCFFX"
GeographicArea: "AK"
Gacc: "USAKACC"
WildlandRole: "Incident Host Geographic"
UnityType: "US County/Local"
Department: "AK"
Agency: "CAL"
Parent: ""
Country: "US"
```

Data in the Database

Collection Name	Relationships With Other Collections (if any)	# of Documents in Collection
Fires		1880465
NWCG		5867

MongoDB Queries/Code

Query 1

Question 1:

A leading beverage company has announced a billion-dollar fund for removing debris from forests, rivers and mountains in the US. All states are interested. Which state has the least chance to win a share of the fund?

Assumptions

The state with fires caused by debris burning is the least, will have the least chance of winning the fund.

Translation

Select the state where the cause of fire due to Debris Burning is the least

Cleanup

Match stat_cause_descr with 'debris burning' and group by state, sort by ascending order, limit to 1.

Screen Shot of MongoDB Query/Code and Results

```
Last login: Sun Dec 8 18:33:02 on ttys006
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/H7288050.
[~] ➜  curl -s https://www.mongodb.org/static/pgp/server-4.2.asc | gpg --keyid-format=long --import > ./key
MongoDB shell version v4.2.1
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "_id" : UUID"bbc83acb-4sec-459c-a484-94862109ae78" }
MongoDB server version: 4.2.1
Server has startup warnings:
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
---
Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).
The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.
To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---

> use fpa_fod
switched to db fpa_fod
> db.Fires.aggregate([{$match : { STAT_CAUSE_DESCR: "Debris Burning" } },{$group: {_id:"$STATE", count:{$sum:1}}},{$sort:{count:1}},{$limit:1},{$project:{_id:1}}];
{ "_id" : "DC" }
```

Result

DC state has the least chance of fire caused by Debris Burning, and hence has the least chance of winning the fund.

Query 2

Question 2:

One of the reporting agencies has suggested that children be banned from its forests unless there is one adult for every 3 children in a group visiting a forest. Name 3 forests where this would be the least appropriate.

Assumptions

In forests where children are the likely cause of fire, the forest with least number of fires is safer for children to be accompanied by an adult, and hence considered least appropriate. We have considered the Source_reporting_unit_name as the forest name in our dataset.

Translation

In forests where children are the likely cause of fire, the forest with least number of fires is safer for children to be accompanied by an adult, and hence considered least appropriate. We have considered the Source_reporting_unit_name as the forest name in our dataset.

Cleanup

Match STAT_CAUSE_DESCR = 'Children', group by Source_reporting_unit_name and display first 3 forest names.

Screen Shot of MongoDB Query/Code and Results

```
Last login: Sun Dec  8 21:06:40 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) Rohitashvas-MacBook-Pro:~ sumitjijo$ mongo
MongoDB shell version v4.2.1
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("c8b82b0b-4a91-40b5-a9c5-fc3f7e8a66d4") }
MongoDB server version: 4.2.1
Server has startup warnings:
2019-12-08T17:08:45.346-0600 I CONTROL [initandlisten]
2019-12-08T17:08:45.346-0600 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2019-12-08T17:08:45.346-0600 I CONTROL [initandlisten] **             Read and write access to data and configuration is unrestricted.
2019-12-08T17:08:45.346-0600 I CONTROL [initandlisten]

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To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
____

> use fpa_fod
switched to db fpa_fod
> db.FIRST.aggregate([{$match : { STAT_CAUSE_DESCR: "Children" } },{$group: {_id:"$SOURCE_REPORTING_UNIT_NAME", count:{$sum:1}}},{$sort:{_id:1, count:1}},{$limit:3}])
{ "_id" : "Quitman", "count" : 1 }
{ "_id" : "Pueblo County", "count" : 1 }
{ "_id" : "OPERATIONS SALEM", "count" : 1 }
> █
```

Result

These are the three forests in which the ban is least appropriate.

Query 3

Question 3:

One advocacy group says human actions and not Nature is to blame for most wildfires. Write a query that supports this statement.

Assumptions

Natural causes of fire ('Lightning', 'Structure') and Human Causes ('Debris Burning', 'Campfire', 'Equipment Use', 'Arson', 'Children', 'Railroad', 'Smoking', 'Powerline', 'Fireworks')

Translation

Select different causes with respective fire counts

Cleanup

Match stat_cause_descr with lighting or structure as natural cause of fire, default cause of fire as human and count no of fires.

Screen Shot of MongoDB Query/Code and Results

```
Last login: Sun Dec 8 19:48:09 on ttys008
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/H7288050.
[~] ➜ mongod --version
MongoDB shell version v4.2.1
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "_id" : UUID"9474852a-65e8-4b9a-9a0a-115bc32a1663" }
MongoDB server version: 4.2.1
Server has startup warnings:
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] **             Read and write access to data and configuration is unrestricted.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
---
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To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---

> use fpa_fod
switched to db fpa_fod
> db.Fires.aggregate([
...   {$match:{STAT_CAUSE_DESCR:{$nin:["Miscellaneous","Missing/Undefined"]}}},
...   {
...     $project:
...       {
...         "STAT_CAUSE_DESCR": 1,
...         "summary": {
...           $switch:
...             {
...               branches: [
...                 { case: { $eq: [ '$STAT_CAUSE_DESCR', "Lightning" ]}, then: "Nature" },
...                 { case: { $eq: [ '$STAT_CAUSE_DESCR', "Structure" ]}, then: "Nature" },
...                 default: "Human"
...               ]
...             }
...         },
...         "$group:{_id:$summary, count: {$sum:1 }}"
...       }
...   }
... ])
{ "_id" : "Human", "count" : 1187673 }
{ "_id" : "Nature", "count" : 282264 }
> █
```

Result

Results show that, the human actions are to be blamed for most wildfires (11,87,673)

Query 4

Question 4:

What are the bottom two unit types that reported wildfires in each county in the US?

Assumptions

We have considered the Source_reporting_unit_name(agencies, wildlife refuge etc) as the forest name in our dataset.

Translation

Select the bottom 2 underperforming unit types which reported the least number of fires in each county in US

Cleanup

Project the Source_system_type, count the fires, sort by ascending, display the 1st two

Screen Shot of MongoDB Query/Code and Results

```
Last login: Sun Dec  8 17:37:10 on ttys000
mo
The default interactive shell is now zsh.
To update your shell, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) Rohitashvas-MacBook-Pro:~ sumitjgj@o$ mongo
MongoDB shell version v4.2.1
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("3cd0c3e7-d7ca-4d2a-8c0f-4c6cf894e5f") }
MongoDB server version: '4.2.1'
Server has startup warnings:
2019-12-08T17:08:45.346+0400 I CONTROL [initandlisten]
2019-12-08T17:08:45.346+0400 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2019-12-08T17:08:45.346+0400 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2019-12-08T17:08:45.346+0400 I CONTROL [initandlisten]
---
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improvements and to suggest MongoDB products and deployment options to you.
To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---

> use fpa_fod
switched to db fpa_fod
> db.Fires.aggregate([{$group: {"_id": "$SOURCE_SYSTEM_TYPE", "count": {$sum: 1}}, {"$sort: {"count": 1}}, {"$limit: 2}, {"$project: {"_id: 1}}];
{ "_id" : "INTERAGCY" }
{ "_id" : "FED" }
> █
```

Result

These are the most underperforming unit types.

Query 5

Question 5:

How many wildfires were not reported by more than one unit/agency?

Assumptions

We have considered the Source_reporting_unit_name (agencies, wildlife refuge etc) as the forest name in our dataset.

Translation

Select the fires names that were not reported by any source_reporting_unit/agency

Cleanup

Project fire name, where the fire was not reported by any of the source_reporting_unit/agency

Screen Shot of MongoDB Query/Code and Results

```
Last login: Sun Dec  8 21:58:52 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run 'chsh -s /bin/zsh'.
For more details, please visit https://support.apple.com/kb/HT208950.
(base) Rohitashvans-MacBook-Pro:~ sumitjajao$ mongo
MongoDB shell version v4.2.1
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("3a1fc645-c31f-473b-a533-2235b8a57f02") }
MongoDB server version: 4.2.1
Server has startup errors:
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] **          Read and write access to data and configuration is unrestricted.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
---
Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).
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improvements and to suggest MongoDB products and deployment options to you.
To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---

> use fpa_fod
switched to db fpa_fod
> db.Fires.aggregate([
... {$project:{FIRE_NAME : "$FIRE_NAME"}, SOURCE_REPORTING_UNIT:"$SOURCE_REPORTING_UNIT"}, 
... {$group:{_id : "$FIRE_NAME", 
... No_of_Units:{$sum:_id}}, 
... $match:{No_of_Units:{$lt:1}}}
... ]
{
  "_id": "FY2000-DECATUR-108", "No_of_Units": 1
}
{
  "_id": "FOUR EAST", "No_of_Units": 1
}
{
  "_id": "I-10 MM 285", "No_of_Units": 1
}
{
  "_id": "MUNSEL GREEK", "No_of_Units": 1
}
{
  "_id": "NORTHERN CALIFORNIA", "No_of_Units": 1
}
{
  "_id": "S1A127", "No_of_Units": 1
}
{
  "_id": "1K BLOCK ANNIE MOSES", "No_of_Units": 1
}
{
  "_id": "WILCKX19", "No_of_Units": 1
}
{
  "_id": "CEDAR VALLEY CHURCH", "No_of_Units": 1
}
{
  "_id": "LAKE OLEAN", "No_of_Units": 1
}
{
  "_id": "GS CHIMNEY STAGE RD", "No_of_Units": 1
}
{
  "_id": "KOWLER, T", "No_of_Units": 1
}
{
  "_id": "36/BLUE FISH", "No_of_Units": 1
}
{
  "_id": "KNOTSLANDI", "No_of_Units": 1
}
{
  "_id": "MANNIN MILL", "No_of_Units": 1
}
{
  "_id": "BEEAR", "No_of_Units": 1
}
{
  "_id": "MUTUAL AID DONLEY CO. JA RANCH", "No_of_Units": 1
}
{
  "_id": "RICK HOLLOW", "No_of_Units": 1
}
{
  "_id": "FRENCHMANS BAR", "No_of_Units": 1
}
Type 'it' for more
> ||
```

```

Last login: Sun Dec  8 22:03:35 on ttys000
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.

(base) Rohitashvsa-MacBook-Pro:~ sumitjajo$ mongo
MongoDB shell version v4.2.1
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID"62d4e68-d953-4830-b3c6-7bf638adfd5c" }
MongoDB server version: 4.2.1
Server has startup warnings:
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]

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improvements and to suggest MongoDB products and deployment options to you.

To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---

> use fpa_fod
switched to db fpa_fod
> db.Fires.aggregate([
...   {
...     $group: {
...       _id: "$FIRE_NAME",
...       No_of_units: { $sum: 1 },
...       $match: { No_of_units: { $lte: 1 } }
...     }.toArray().length;
...   }
... ],
{
  $group: {
    _id: "$FIRE_NAME",
    count: { $sum: 1 }
  }
}
)
405118
> 

```

Result

4,05,118 wildfires were not reported by more than one agency/unit.

Query 6

Question 8:

Which forest had the least number of fires?

Assumptions

We have considered the Source_reporting_unit_name (agencies, wildlife refuge etc) as the forest name in our dataset

Translation

Select the forest which has least number of fires.

Cleanup

Groupby Source_reporting_unit_name, where fire count =1, in ascending order

Screen Shot of MongoDB Query/Code and Results

```
Last login: Sun Dec  8 21:08:35 on ttys000
The default interactive shell is now zsh.
To update your account to use the new shell, run 'chsh -s /bin/zsh'.
For more details, please visit https://support.apple.com/kb/HT208950.
(base) Rohitashvas-MacBook-Pro:~ sumitjajao$ mongo
MongoDB shell version v4.2.1
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("bf22910-242b-4af1-ac5-43ee8863829d") }
MongoDB server version: 4.2.1
Server has startup errors
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten] **          Read and write access to data and configuration is unrestricted.
2019-12-08T17:08:45.346+0000 I CONTROL [initandlisten]
---
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To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---

> use fpa_fod
switched to db fpa_fod
> db.Fires.aggregate([{$group: {_id:"$SOURCE_REPORTING_UNIT_NAME", count:{$sum:1}},{$sort:{count:1}},{$limit:1},{$project:{_id:1}}}, {"_id": "Sanborn County"}])
> db.Fires.aggregate([{$group: {_id:"$SOURCE_REPORTING_UNIT_NAME", count:{$sum:1}},{$sort:{count:1}}}, {"_id": "BENTON LAKE WMD", "count": 1}, {"_id": "COUNCIL GROVE FIRE DEPT", "count": 1}, {"_id": "OVERFLOW NWR", "count": 1}, {"_id": "San Marcos Fire Protection Department", "count": 1}, {"_id": "Essex Junctn Fire Department", "count": 1}, {"_id": "Port Mansfield Volunteer Fire Department", "count": 1}, {"_id": "Marathon VFD & Fire Refuge", "count": 1}, {"_id": "ST. CATHERINE CREEK NATIONAL WILDLIFE REFUGE", "count": 1}, {"_id": "PICTURED ROCKS NATIONAL LAKESHORE", "count": 1}, {"_id": "CENTERVILLE VFD", "count": 1}, {"_id": "MTN LONGLEAF NWR", "count": 1}, {"_id": "Sheffield VFD & EMS", "count": 1}, {"_id": "Sagamore Hill National Historic Site", "count": 1}, {"_id": "Marathon VFD", "count": 1}, {"_id": "CENTERVILLE FD", "count": 1}, {"_id": "Southwest Highway 115 Fire Protection District", "count": 1}, {"_id": "Moran Rural VFD", "count": 1}, {"_id": "COLE CAMP CITY & RFD", "count": 1}, {"_id": "Cowpens National Battlefield", "count": 1}
Type "it" for more
> it
[{"_id": "Garfield Township Fire Department", "count": 1}, {"_id": "Colonial National Historical Park", "count": 1}, {"_id": "Pleasant Township Fire Department", "count": 1}, {"_id": "Roosevelt/Vanderbilt National Historic Site", "count": 1}, {"_id": "Arizona - Tucson District", "count": 1}, {"_id": "Brockton Fire Department", "count": 1}, {"_id": "Sharon Fire Department", "count": 1}, {"_id": "Melissa VFD", "count": 1}, {"_id": "Logan County Fire Department #1", "count": 1}]
```

Result

Above are the forests with least number of fires.