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2022-07-DSI-WDX
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Vehicle Carriers at Port

- An Analysis

ships.csv

Column Name	Order	Datatype	Constraints	Name	Description of Field	Is Sensitive?
[lrno]	1	INT	Primary	Lloyd's Register #	Registery # of vessel. Unique seven- digit number.	No
[vesselname]	2	VARCHAR	Foreign Key	Vessel Name	Name of registered vessel.	No
[owner]	3	INT	Candidate	Vessel Owner	Ship's registered company/owner. Legal entity responsible for the working and living conditions of the seafarers working on board the vessel.	No
[shipmanager]	4	INT	Candidate	Vessel Manager	ISM manager/Ship Management Company The vessel may be managed in-house or by a third party.	No
[operator]	5	INT	Candidate	Vessel Operator	Entity responsible vessel voyage (ie navigation, cruising speed, est. ETAs).	No
[flag]	6	INT	Candidate	Country of reg. vessel	Country of reg. vessel	No
[dwt]	7	DECIMAL	Foreign Key	Dead-weight-tonnage	Dead-weight-tonnage	No
[loa]	8	DECIMAL	Foreign Key	Length-over-all	Length-over-all	No
[breadth]	9	DECIMAL	Foreign Key	Ship's width	Ship's width	No
[depth]	10	DECIMAL	Foreign Key	Depth of vessel	Ship's measurement from the top of the keel to the top of the deck beam; from the LOA's center	No
[statdecode]	11	VARCHAR	Foreign Key	Type	Vessel type	No

callid.csv

Column Name	Order	Datatype	Constraints	Name	Description of Field	Is Sensitive?
[callid]	1	INT	Candidate	Port-of-call	Port of Call; will commonly be referred to as "Last port of call/Next port of ca	No
[lrno]	2	INT	Primary	Lloyd's Register #	Registery # of vessel. Unique seven- digit number.	No
[arrdate]	3	DATE	Foreign	Arrival date	Arrival date to next port of call.	No
[saildate]	4	DATE	Foreign	Departure date	Departure date to next port of call.	No
[portname]	5	VARCHAR	Candidate	Port-of-call name	Port-of-call name	No
[countryname]	6	VARCHAR	Candidate	Port's country name	Port's country name	No
[priorportname]	7	VARCHAR	Candidate	Previous port name	Previous port name	No
[priorcountryname]	8	VARCHAR	Candidate	Previous port country	Previous port country	No
[movetype]	9	VARCHAR	Foreign	Port event	Vessel action at port (ie arrival, departure, removal, port-to-port)	No
[datecreated]	10	TIMESTAMP	Foreign	Logged entry	Logged entry at port of call	No

Its important to know what the data states, and what the data *is expected* to state.
A simple, aka "Dumb dictionary", was made for ease of reference and determine if the provided datasets had sufficient and/or relevant information.

"Calls.csv"

[callid]
- Port of Call; will commonly be referred to as "Last port of call/Next port of call"

[lrno]
- **More accurately its **IMO #**
- Lloyd's Register – Classification Society – currently known as S&P Global
- **This # does NOT change regardless of modifications to the vessel's name, owner, and/or flag state.

**IMO – International Maritime Organization*

[arrdate]
Arrival date

[saildate]
Departure date

[portname]
Port name

[countryname]
Country name

[priorportname]
Previous port of entry

[priorcountryname]
Country of last entry

[movetype]
- Vessel action at port (ie arrival, departure, removal, port-to-port)
- Port event

[datecreated]
Logged entry

"Ships.csv"

[lrno]
- **More accurately its **IMO #**
- Lloyd's Register – Classification Society – currently known as S&P Global
- **This # does NOT change regardless of modifications to the vessel's name, owner, and/or flag state.

[vesselname]
Name of registered vessel.

[owner]
- Ship's registered company/owner.
- Legal entity responsible for the working and living conditions of the seafarers working on board the vessel.

[shipmanager]
- ISM manager/Ship Management Company
  - The vessel may be managed in-house *or* by a third party
- 3 legally involved, responsible, and audible departments:
  - 1) Technical 2) Personnel 3) ISM (Safety, Security, and MLC Compliance)

**MLC - Maritime Labor Compliance*
**ISM – International Safety Management*

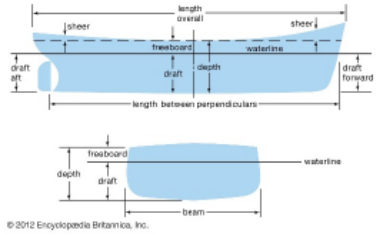
[operator]
- Entity responsible vessel voyage (ie navigation, cruising speed, est. ETAs)
- May require issuance of a *demurrage* to vessel owner.
- Entity may be onboard or remote.

[flag]
Country of registry

[dwt]
Dead-weight-tonnage

[loa]
Length-over-all

[breadth]
Ship's width

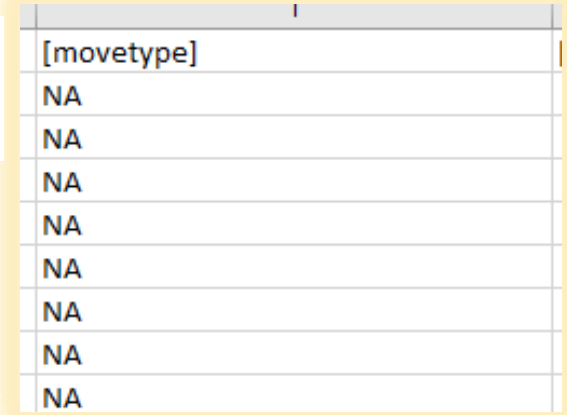
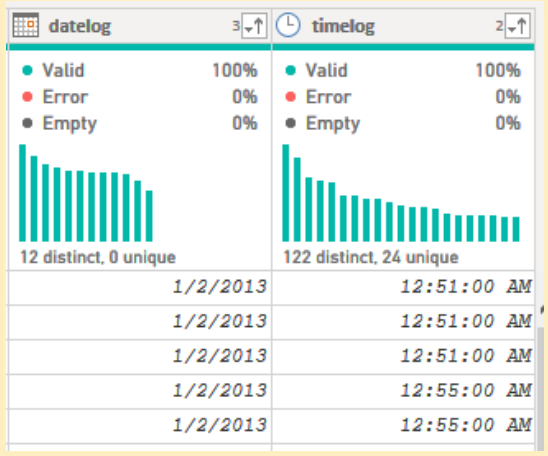


[depth]
Ship's measurement from the top of the keel to the top of the deck beam; from the LOA's center

- **Car carriers:** Those which transport cars exclusively. They are also called Pure Car Carriers (PCC).
- **Pure car/truck carrier** (PCTC): The ones that transport trucks as well as cars.

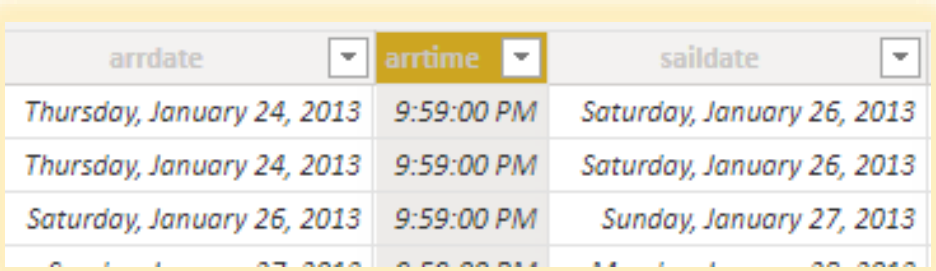
Trimming the fat…

Do the provided values of each variable meet parameters that would enable further analysis?

Expected parameters	Provided data values	Findings:
[movetype] • Vessel action at port (ie arrival, departure, removal, port-to-port) • Port event		**[movetype]** Lacks sufficient entries nor provides a description of vessel action at port.
[datecreated] Logged entry		**[datecreated]** Migration or query timestamp. Irrelevant data.

Trimming the fat…

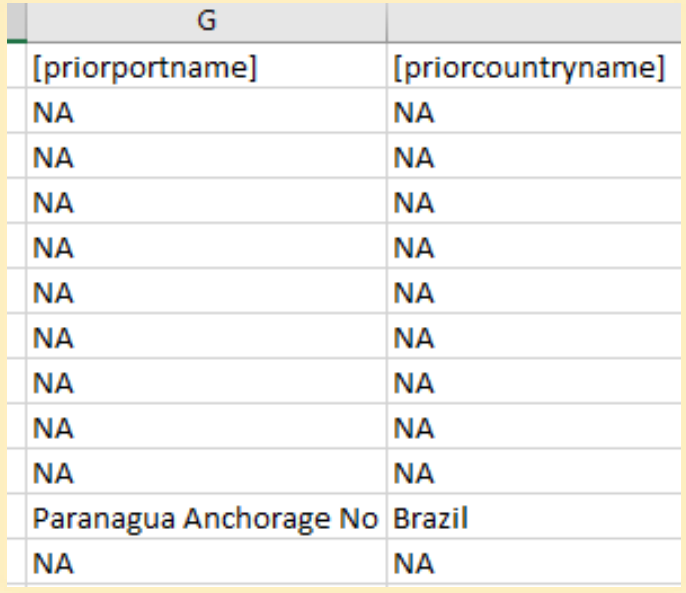
(cont…)

Expected parameters	Provided data values	Findings:
[statdecode] Decoded value indicates "vessel type"	[statdecode] Vehicles Carrier Vehicles Carrier Vehicles Carrier Vehicles Carrier Vehicles Carrier	**[statdecode]** Only 1 value type entered. As all ships are "vehicle carriers" this column will be omitted.
[arrdate] Arrival date **[saildate]** Departure date		**[arrtime]** **[Saildate]** does not contain a time value. **[arrdate]**'s **time value** will be omitted for *data consistency*.

arrdate	arrtime	saildate
Thursday, January 24, 2013	9:59:00 PM	Saturday, January 26, 2013
Thursday, January 24, 2013	9:59:00 PM	Saturday, January 26, 2013
Saturday, January 26, 2013	9:59:00 PM	Sunday, January 27, 2013

Trimming the fat…

(cont…)

Expected parameters	Provided data variable(s)	Findings:
[priorportname] **[priorportcountry]**		**[priorportname]** **[priorportcountry]** Insufficient data. No supporting dataset.

- After determining **[irno]** (ship's registry number) was to be the for each table; it is necessary to ensure *each* ship # (and its related data) exists in *both* tables.
    - Initial tool to "probe" for variances and other inconsistencies:
        - **Excel**
            - Primary excel functions utilized were *conditional formatting* and *advanced filters* for dataset(s) comparison.

The following *IRNO*s (Ship #) do not exist in 'Ships.csv'.

	A	B	C	D	E	F	G	H	I	J	K
	[lrno]	[vesselname]	[owner]	[shipmanager]	[operator	[flag]	[dwt]	[loa]	[breadth]	[depth]	[statdecode]
	8608080	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	8204250	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	8320767	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	8321345	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	8612316	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	8718706	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	8916267	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9053505	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9075711	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9082324	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9110107	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9122930	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9138513	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9153563	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9176216	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9177026	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
	9181560	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA

102 affected entries

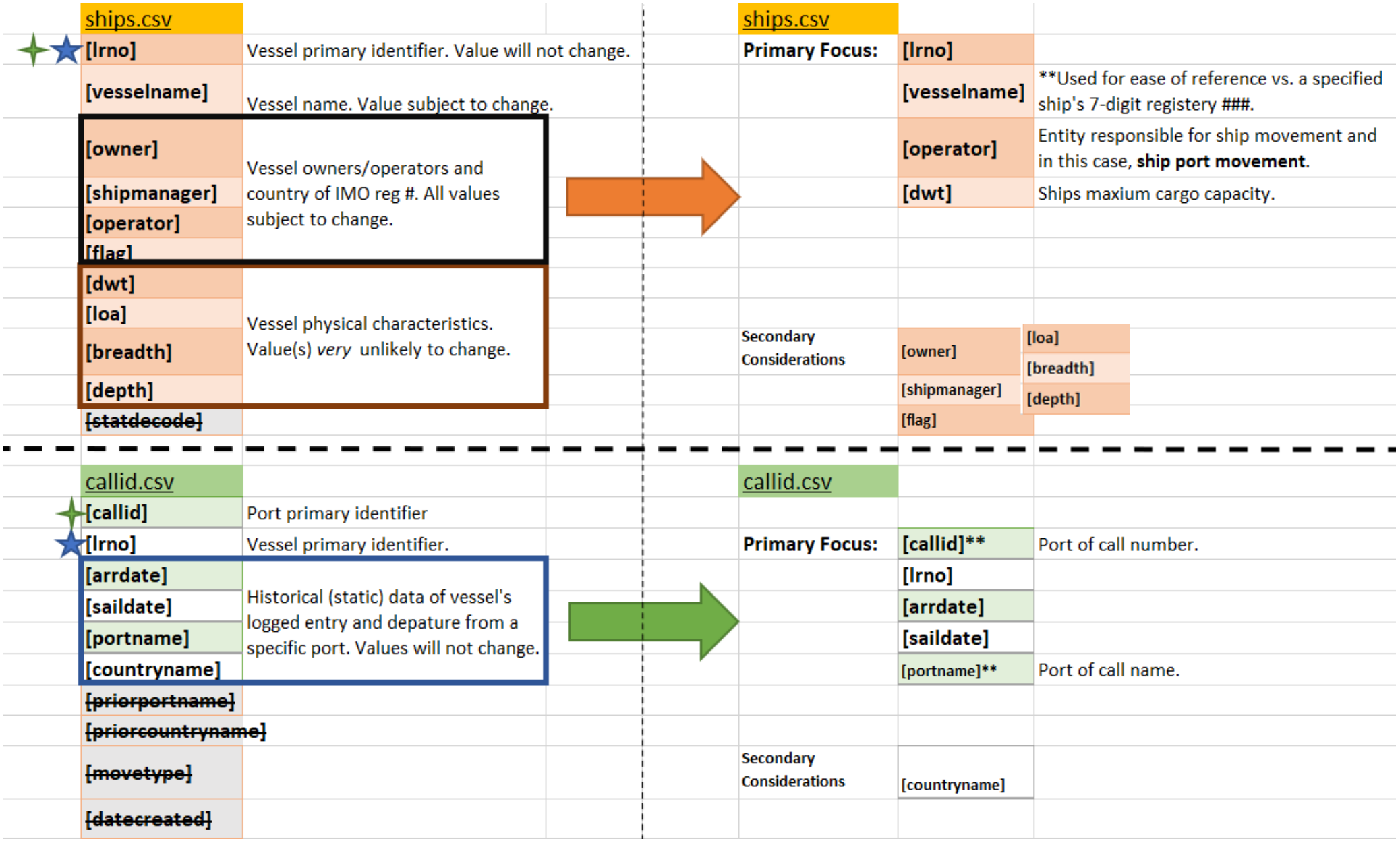
The following IRNOs (Ship #) do not exist in 'Calls.csv'.

	A	B	C	D	E	F	G	H	I	J
1	[callid]	[lrno]	[arrdate]	[saildate]	[portname	[countryna	[priorporti	[priorcoun	[movetype	[datecreated]
2	NO DATA	8905165	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
3	NO DATA	8018168	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
4	NO DATA	9706994	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
5	NO DATA	8017671	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
6	NO DATA	7917563	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
7	NO DATA	9702443	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
8	NO DATA	9039573	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
9	NO DATA	8204951	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
10	NO DATA	8505355	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
11	NO DATA	8708244	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
12	NO DATA	8131128	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
13										

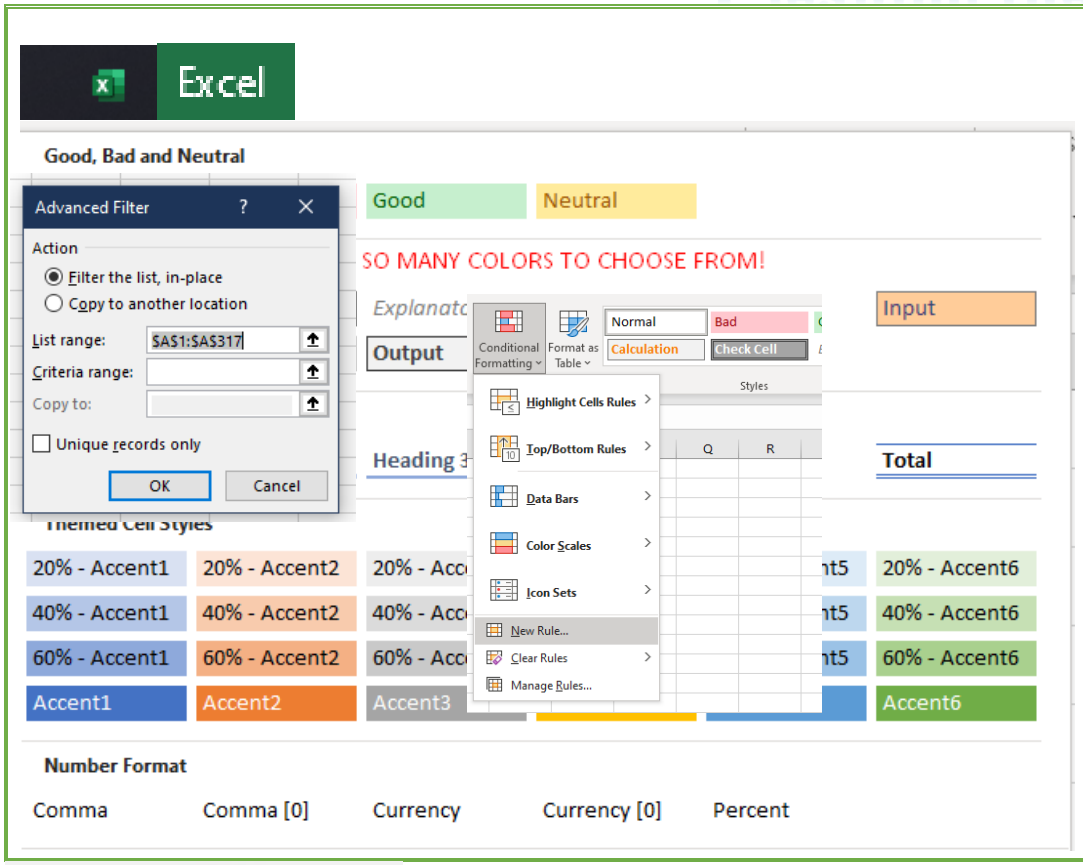
11 affected entries

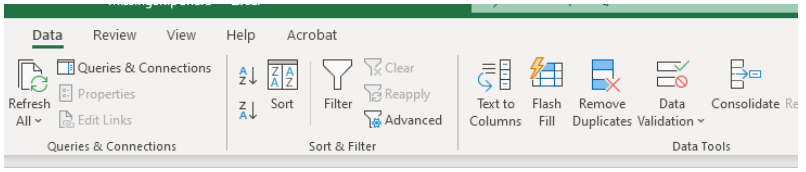
Cursory analysis of datasets.

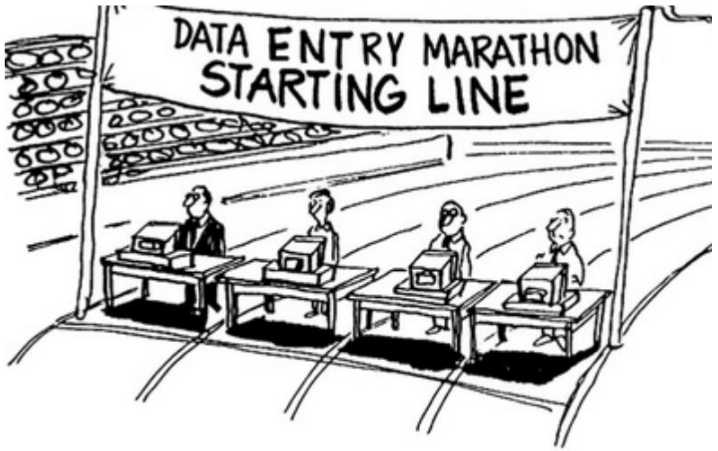
Deliberating the “importance” of provided values.
What does the data say at a macroscopic level?



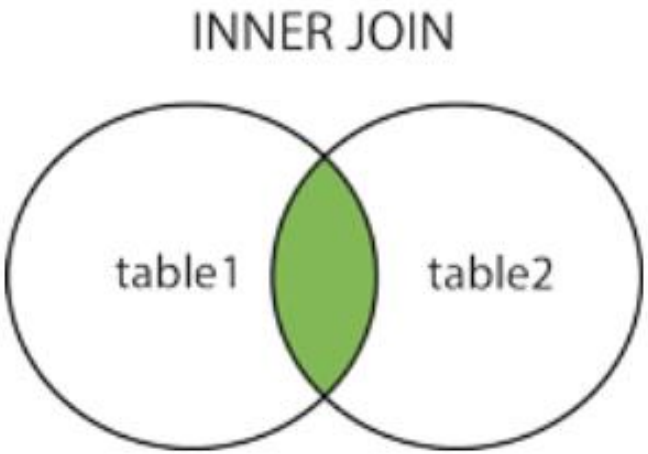
Cleaning the Datasets







Microsoft SQL Server




```sql
SELECT
    Calls.lrno,
    callid,
    portname,
    countryname,
    arridate,
    saildate
FROM
    Calls
    INNER JOIN
    Ships
        ON Ships.lrno = Calls.lrno
```

Summary of prepped datasets/sample sizes (*Unique Values*)

ships.csv

Total values removed or modified: 430

callid.csv

Total values removed or modified: 657,427

Total Vehicle Carriers:	316
Total Owners:	214
Total Management Entities:	44
Total Operators:	33
# of Registered Nations:	6

Vessel Cargo Capacity (metric tons)

Smallest Vessel:	974
Largest Vessel:	44,080

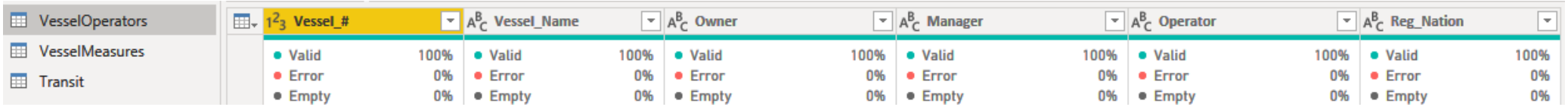
Total Ports:	1,534
Total Logged Entries:	119,146
Logbook Start date:	11/22/2012
Logbook End Date	6/28/2015
Total Time:	2 years, 7 months, 7 days

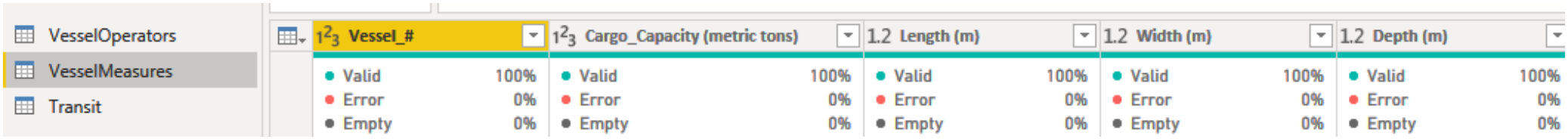
https://www.timeanddate.com/date/duration.html

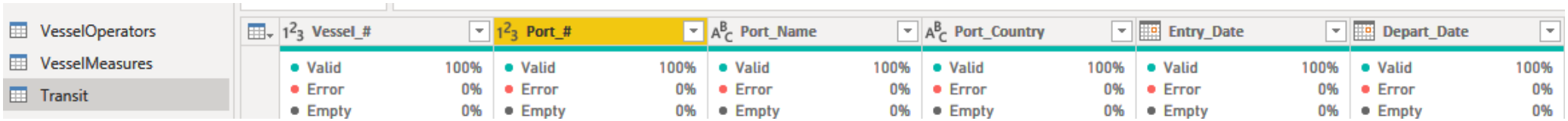
```
13
14  ---Create new tables with inputted values using Inner Join
15  USE
16      GDTAutoMvt
17  -- Create Vessel Operator Table
18  CREATE TABLE
19      #VesselOperators(vessel_# INT, ship_name varchar(250), ship_owner varchar(250), ship_manager varchar(250), reg_nation varchar(250))
20  -- Create Vessel Dimension Table
21  CREATE TABLE
22      #VesselMeasure(vessel_# INT, capacity decimal, loa decimal, breadth decimal, depth decimal)
23  -- Create Vessel Transit Table
24  CREATE TABLE
25      #Transit(vessel_# INT, port_# INT, port_name geography, port_country geography, entry_date date, depart_date date)
26
```

**Not successful inputting values from INNER JOIN queries into new tables (3).
But used the above as a template for PowerBI.

3 New Tables Created



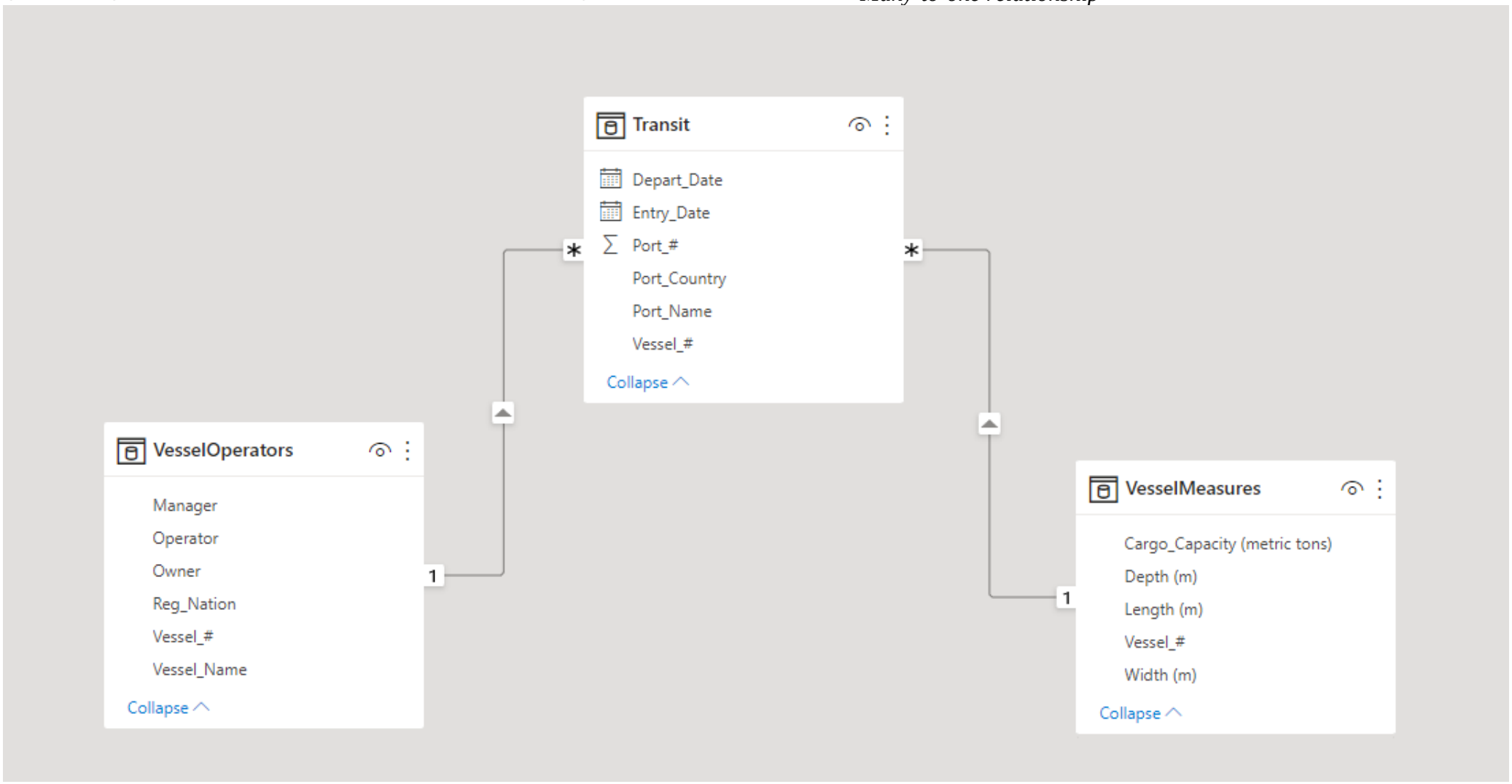




Manage relationships

Active	From: Table (Column)	To: Table (Column)
☑	Transit (Vessel_#)	VesselMeasures (Vessel_#)
☑	Transit (Vessel_#)	VesselOperators (Vessel_#)

Many-to-one relationship



Analytic Focus –
A Vessel's Dwell Time

Vessel dwell time is a function of:

- The number of containers or tonnage to be loaded and unloaded
- Terminal resources available (e.g. cranes per berth and vessel)
- The efficiency with which those resources are employed

Vessel Dwell Time | Bureau of Transportation Statistics (dot.gov)

Cargo Capacity
While not indicative of the ship's cargo manifest at port; it does reflect vessel size and potential cargo to offload at its port of call.
Operator
This entity is responsible for the vessel logistics (including cargo) and transit operations.

```
1  Dwell_Time = DATEDIFF(Transit[Entry_Date],Transit[Depart_Date],DAY)
```

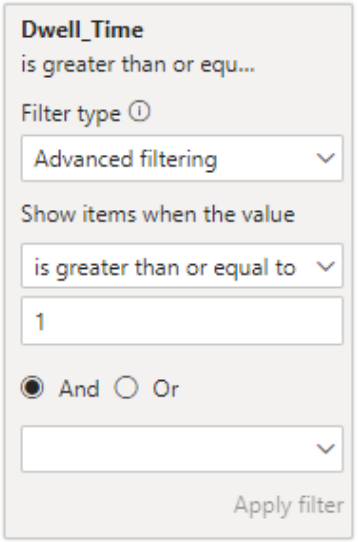
With this analytic focus we need to ensure that we have measurable values:

Logged vessel activity will require a value ABOVE (0) Days of a Vessel's Dwell Time at its port of call.

These results, for example, will be omitted.

Vessel_#	Port_#	Port_Name	Port_Country	Entry_Date	Depart_Date	Dwell_Time
9325439	35277942	NA	NA	Tuesday, January 1, 2013	Tuesday, January 1, 2013	0
8708907	35280050	NA	NA	Tuesday, January 1, 2013	Tuesday, January 1, 2013	0
9338694	35277934	NA	NA	Tuesday, January 1, 2013	Tuesday, January 1, 2013	0
9432907	35290862	NA	NA	Tuesday, January 1, 2013	Tuesday, January 1, 2013	0
8709121	35281988	NA	NA	Tuesday, January 1, 2013	Tuesday, January 1, 2013	0
9531739	35290900	NA	NA	Tuesday, January 1, 2013	Tuesday, January 1, 2013	0
9318462	35283882	NA	NA	Tuesday, January 1, 2013	Tuesday, January 1, 2013	0
8517279	35306086	NA	NA	Wednesday, January 2, 2013	Wednesday, January 2, 2013	0
9114177	35304453	NA	NA	Wednesday, January 2, 2013	Wednesday, January 2, 2013	0
8313324	35297562	NA	NA	Wednesday, January 2, 2013	Wednesday, January 2, 2013	0
9391593	35301140	NA	NA	Wednesday, January 2, 2013	Wednesday, January 2, 2013	0
9272888	35302897	NA	NA	Wednesday, January 2, 2013	Wednesday, January 2, 2013	0
9367607	35302912	NA	NA	Wednesday, January 2, 2013	Wednesday, January 2, 2013	0

Using Advanced Filtering when visuals are applied.

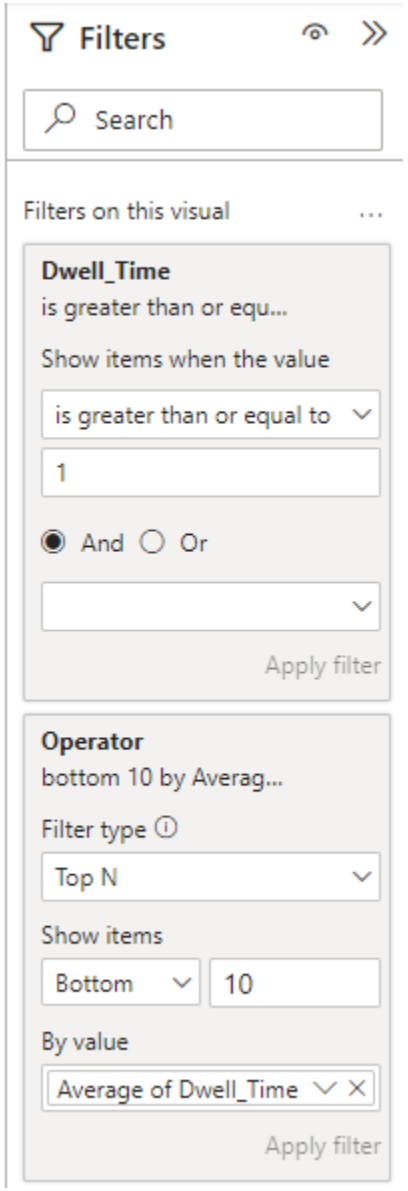


Vessel Operator

DWELL_TIME BY OPERATOR

TOP PERFORMERS

Operator	Dwell_Time
Zodiac Maritime Ltd	53
Zim Integrated Shipping	149
Vroon BV	162
Laeisz F Schiffahrts mbH & Co	164
Norwegian Car Carriers AS	175
American Roll-on Roll-off	226
Hyuga Kaiun YK	300
Gram & Co AS	540
Neptune Lines Shipping	695
Nissan Motor Car Carrier	890



…and just in case those Top Performing Operators only completed a handful of port transits.

```
Count of Port_Name total for Operator =
CALCULATE(
     COUNTA('Transit'[Port_Name]),
     ALLSELECTED('VesselOperators'[Operator]))
```

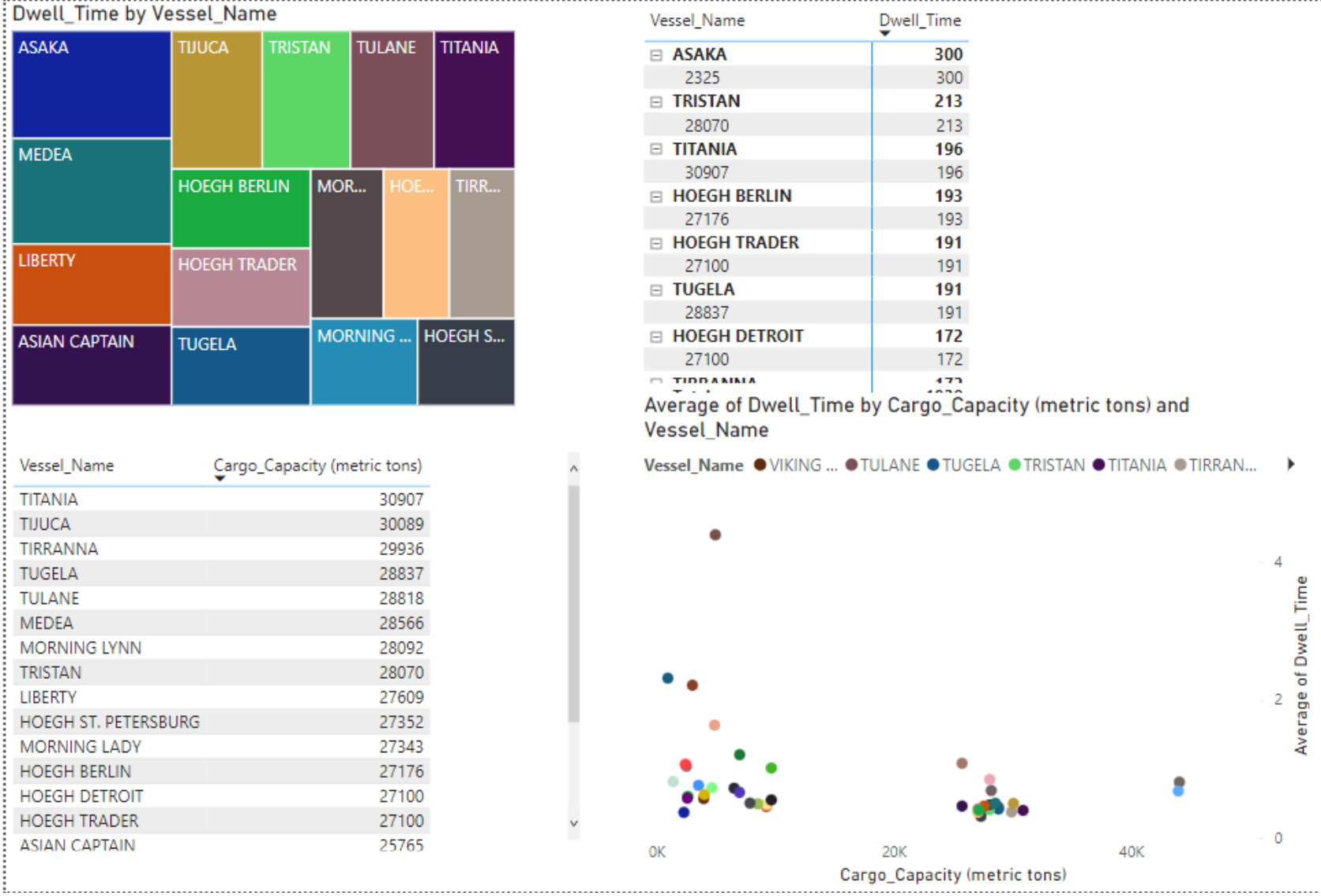
Operator	Zodiac Maritime
Port_Name	9701140 **Total**
Bristol	1
Brunswick	4
Busan New Port	1
Colombo	1
Colombo Inner Anchorage	1
Colombo Outer Anchorage	2
Colombo Southern Anchorage	2
Daesan Anchorage No 2	2
Dagukou North Anchorage	1
Dagukou Quarantine Anchorage	1
Dagukou South Anchorage	1
Dammam	1

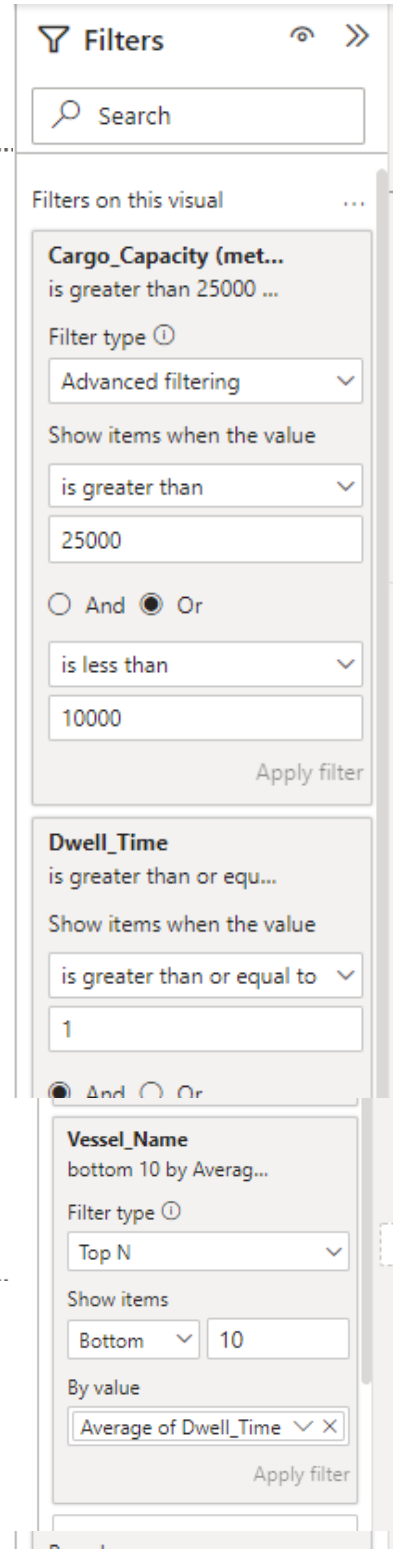
"#1 Ranked" Zodiac Maritime operated just a *single* vessel during this recorded timeframe.

While Nissan Motor Car Carrier operated 5 vessels.

Operator	Nissan Motor Car Carrier				
Port_Name	9185047	9372315	9505900	9509401	9554200
Zeebrugge			1		1
Yura		1			
Yokosuka Anchorage	1	4		4	1
Yokosuka	3	5		7	3
Yokohama Anchorage	11	14	1	19	6
Yokohama	16	18	1	21	5
Yokkaichi Anchorage	1				
Yokkaichi	2				
Yalova Anchorage			2		
Xiuyu Anchorage No 2			1		
Xiamen No 1 Anchorage			1		2
Xiamen			1		1

Vessel Cargo Capacity





There appears to be no correlation
between a vessel's cargo capacity and its dwell time at port.
**Further data is needed – specifically each vessel's itemized cargo manifest.