Database Concepts Assignment 4 – Part D

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Notes

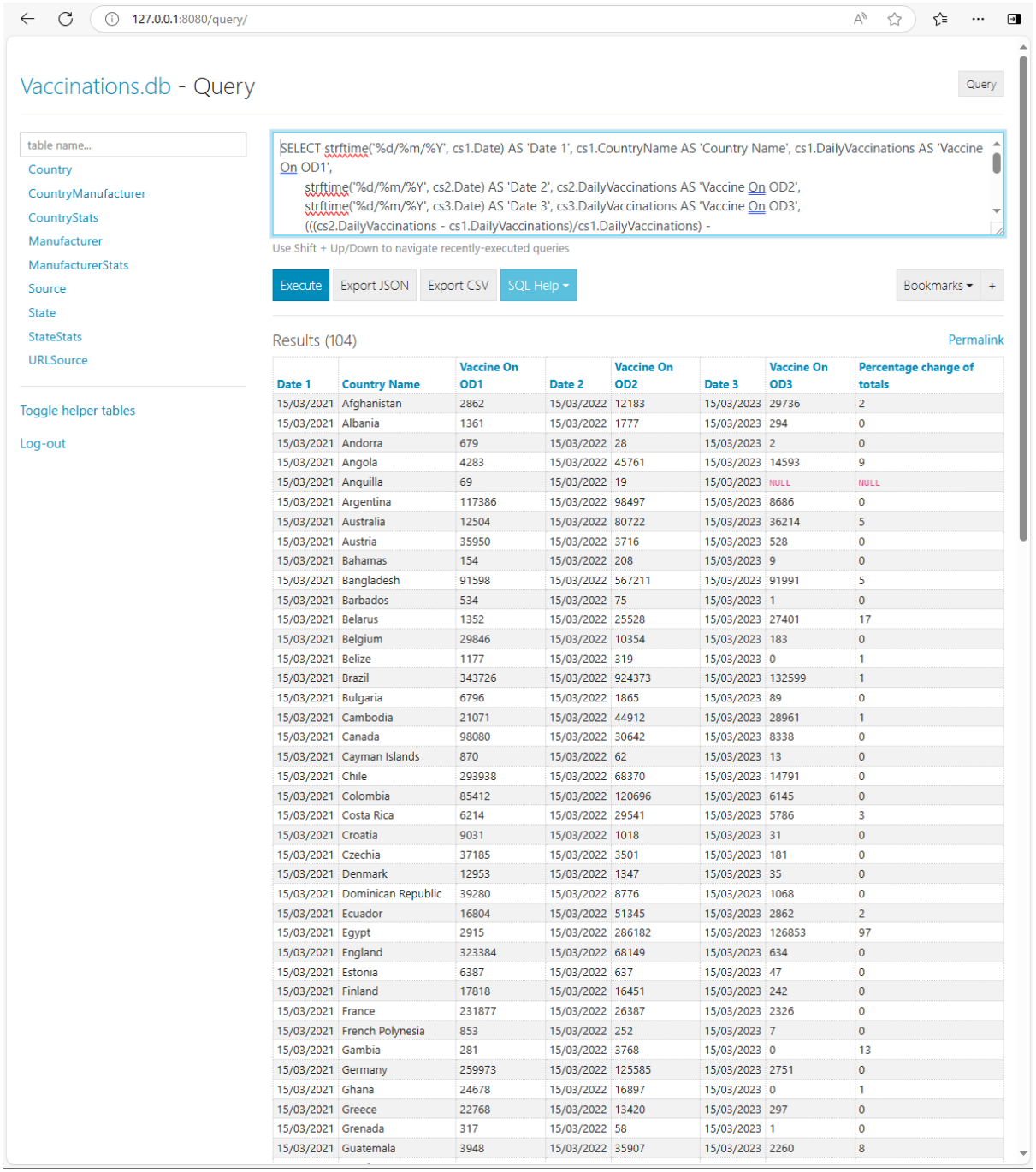
The following visualisations were created in the programming language R.

D.1

Query

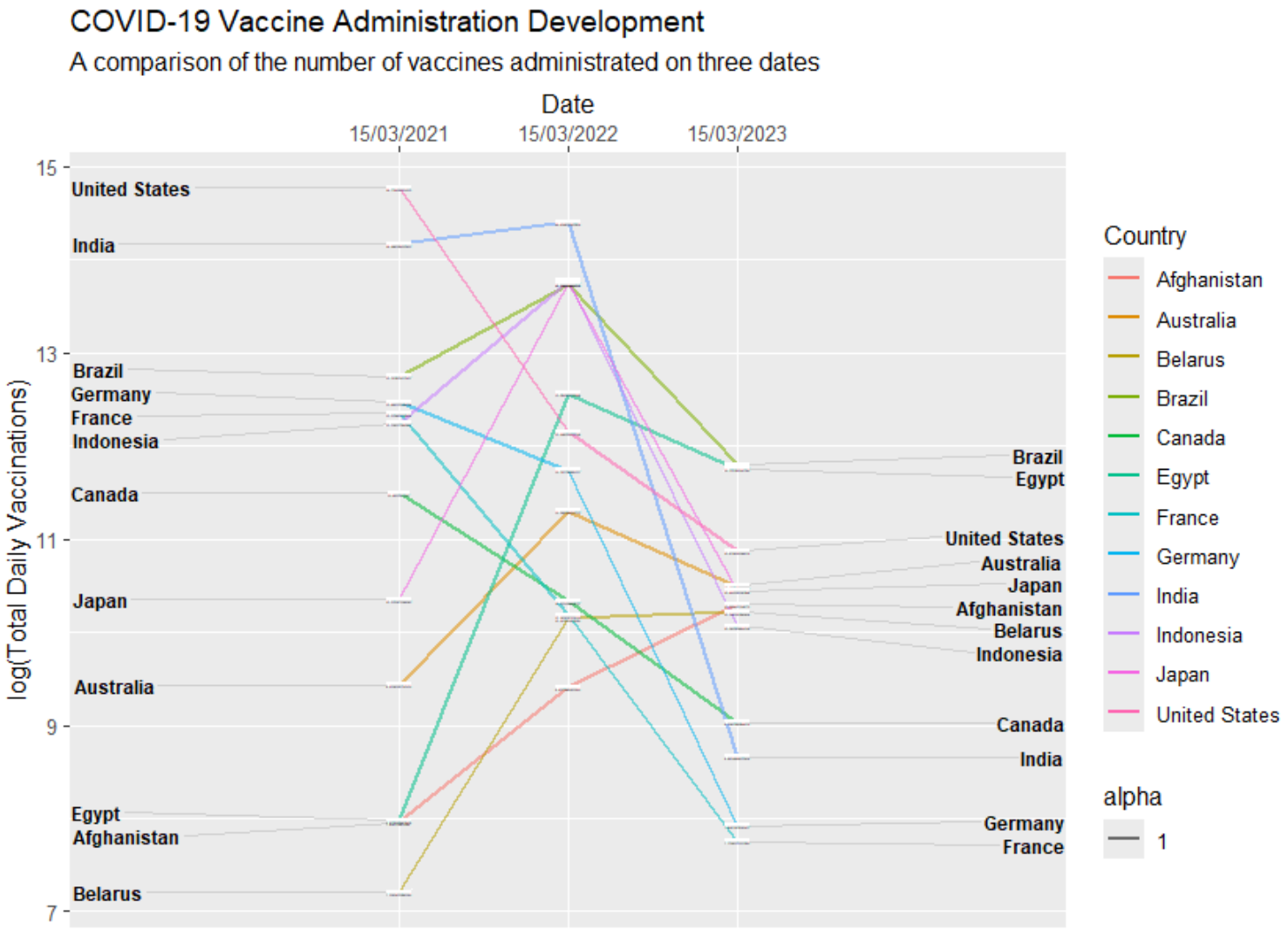
```
SELECT strftime('%d/%m/%Y', cs1.Date) AS 'Date 1', cs1.CountryName AS 'Country Name', cs1.DailyVaccinations AS 'Vaccine On OD1',
       strftime('%d/%m/%Y', cs2.Date) AS 'Date 2', cs2.DailyVaccinations AS 'Vaccine On OD2',
       strftime('%d/%m/%Y', cs3.Date) AS 'Date 3', cs3.DailyVaccinations AS 'Vaccine On OD3',
       (((cs2.DailyVaccinations - cs1.DailyVaccinations)/cs1.DailyVaccinations) -
        ((cs3.DailyVaccinations - cs2.DailyVaccinations)/cs2.DailyVaccinations)) AS 'Percentage change of totals'
FROM CountryStats AS cs1
     JOIN CountryStats AS cs2 ON cs1.CountryName = cs2.CountryName
     JOIN CountryStats AS cs3 ON cs2.CountryName = cs3.CountryName
WHERE cs1.Date = '2021-03-15' AND cs1.AgeRange = '0+'
      AND cs2.Date = '2022-03-15' AND cs2.AgeRange = '0+'
      AND cs3.Date = '2023-03-15' AND cs3.AgeRange = '0+';
```

Snapshot



Date 1	Country Name	Vaccine On OD1	Date 2	Vaccine On OD2	Date 3	Vaccine On OD3	Percentage change of totals
15/03/2021	Afghanistan	2862	15/03/2022	12183	15/03/2023	29736	2
15/03/2021	Albania	1361	15/03/2022	1777	15/03/2023	294	0
15/03/2021	Andorra	679	15/03/2022	28	15/03/2023	2	0
15/03/2021	Angola	4283	15/03/2022	45761	15/03/2023	14593	9
15/03/2021	Anguilla	69	15/03/2022	19	15/03/2023	NULL	NULL
15/03/2021	Argentina	117386	15/03/2022	98497	15/03/2023	8686	0
15/03/2021	Australia	12504	15/03/2022	80722	15/03/2023	36214	5
15/03/2021	Austria	35950	15/03/2022	3716	15/03/2023	528	0
15/03/2021	Bahamas	154	15/03/2022	208	15/03/2023	9	0
15/03/2021	Bangladesh	91598	15/03/2022	567211	15/03/2023	91991	5
15/03/2021	Barbados	534	15/03/2022	75	15/03/2023	1	0
15/03/2021	Belarus	1352	15/03/2022	25528	15/03/2023	27401	17
15/03/2021	Belgium	29846	15/03/2022	10354	15/03/2023	183	0
15/03/2021	Belize	1177	15/03/2022	319	15/03/2023	0	1
15/03/2021	Brazil	343726	15/03/2022	924373	15/03/2023	132599	1
15/03/2021	Bulgaria	6796	15/03/2022	1865	15/03/2023	89	0
15/03/2021	Cambodia	21071	15/03/2022	44912	15/03/2023	28961	1
15/03/2021	Canada	98080	15/03/2022	30642	15/03/2023	8338	0
15/03/2021	Cayman Islands	870	15/03/2022	62	15/03/2023	13	0
15/03/2021	Chile	293938	15/03/2022	68370	15/03/2023	14791	0
15/03/2021	Colombia	85412	15/03/2022	120696	15/03/2023	6145	0
15/03/2021	Costa Rica	6214	15/03/2022	29541	15/03/2023	5786	3
15/03/2021	Croatia	9031	15/03/2022	1018	15/03/2023	31	0
15/03/2021	Czechia	37185	15/03/2022	3501	15/03/2023	181	0
15/03/2021	Denmark	12953	15/03/2022	1347	15/03/2023	35	0
15/03/2021	Dominican Republic	39280	15/03/2022	8776	15/03/2023	1068	0
15/03/2021	Ecuador	16804	15/03/2022	51345	15/03/2023	2862	2
15/03/2021	Egypt	2915	15/03/2022	286182	15/03/2023	126853	97
15/03/2021	England	323384	15/03/2022	68149	15/03/2023	634	0
15/03/2021	Estonia	6387	15/03/2022	637	15/03/2023	47	0
15/03/2021	Finland	17818	15/03/2022	16451	15/03/2023	242	0
15/03/2021	France	231877	15/03/2022	26387	15/03/2023	2326	0
15/03/2021	French Polynesia	853	15/03/2022	252	15/03/2023	7	0
15/03/2021	Gambia	281	15/03/2022	3768	15/03/2023	0	13
15/03/2021	Germany	259973	15/03/2022	125585	15/03/2023	2751	0
15/03/2021	Ghana	24678	15/03/2022	16897	15/03/2023	0	1
15/03/2021	Greece	22768	15/03/2022	13420	15/03/2023	297	0
15/03/2021	Grenada	317	15/03/2022	58	15/03/2023	1	0
15/03/2021	Guatemala	3948	15/03/2022	35907	15/03/2023	2260	8

Visualisation

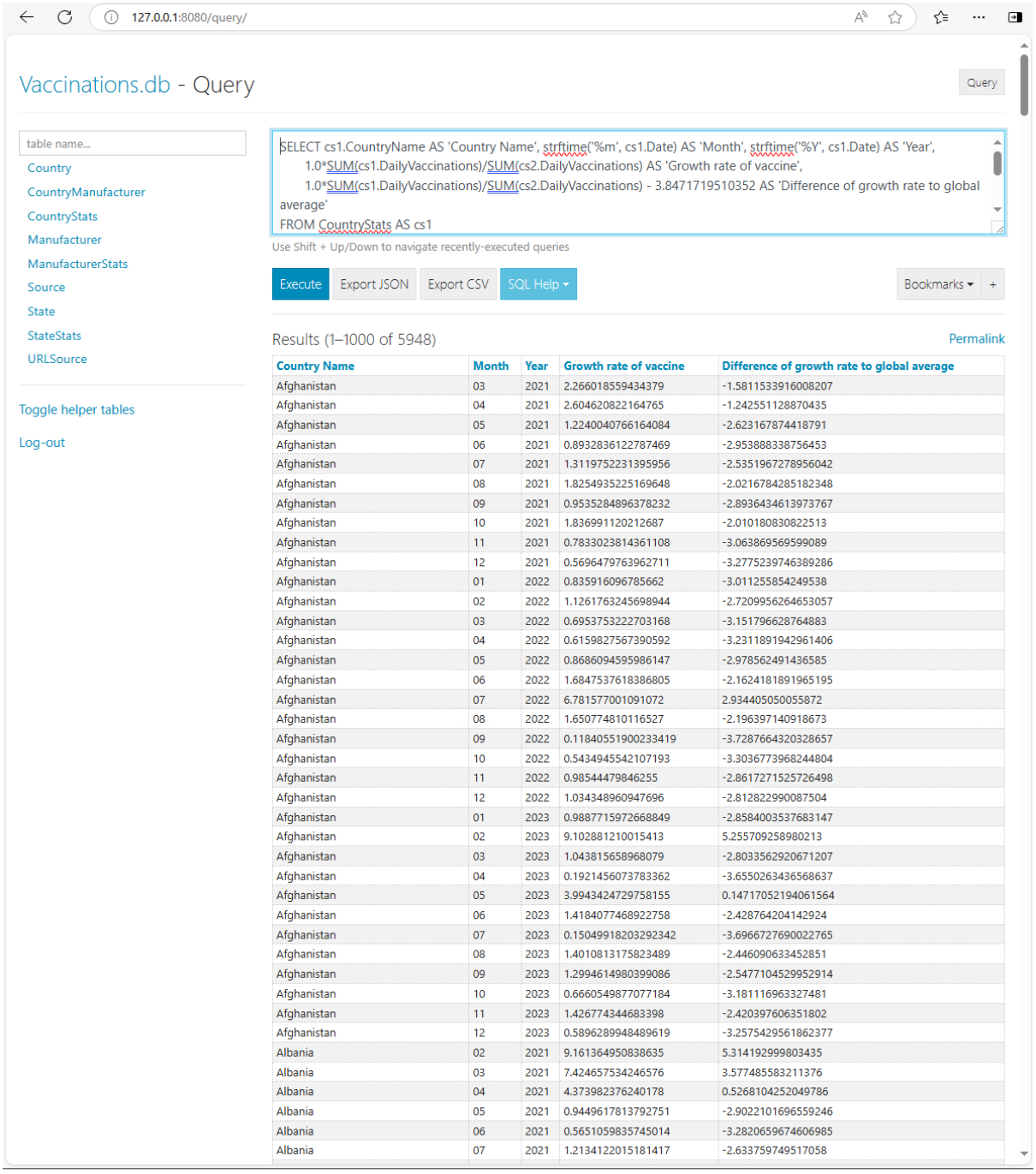


D.2

Query (See Note next page)

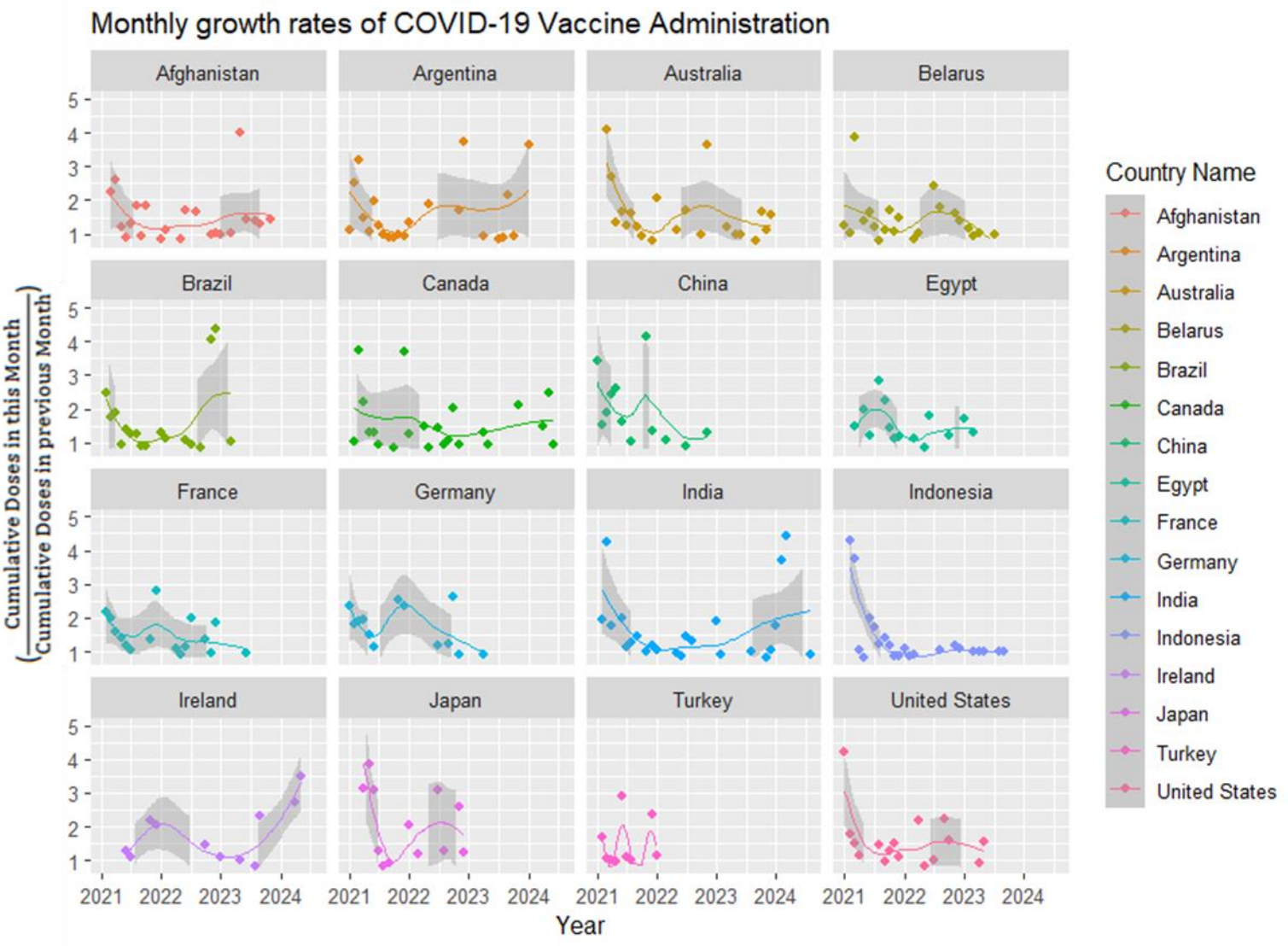
```
SELECT cs1.CountryName AS 'Country Name', strftime('%m', cs1.Date) AS 'Month', strftime('%Y', cs1.Date) AS 'Year',
       1.0*SUM(cs1.DailyVaccinations)/SUM(cs2.DailyVaccinations) AS 'Growth rate of vaccine',
       1.0*SUM(cs1.DailyVaccinations)/SUM(cs2.DailyVaccinations) - 3.8471719510352 AS 'Difference of growth rate to global average'
FROM CountryStats AS cs1
     JOIN CountryStats AS cs2 ON cs1.CountryName = cs2.CountryName
WHERE cs1.AgeRange='0+' AND cs2.AgeRange = '0+'
      AND strftime('%m/%Y', cs1.Date) = strftime('%m/%Y', DATE(cs2.Date, '+30 days'))
GROUP BY cs1.CountryName, strftime('%m', cs1.Date), strftime('%Y', cs1.Date)
ORDER BY cs1.CountryName, cs1.Date;
```

Snapshot



Country Name	Month	Year	Growth rate of vaccine	Difference of growth rate to global average
Afghanistan	03	2021	2.266018559434379	-1.5811533916008207
Afghanistan	04	2021	2.604620822164765	-1.242551128870435
Afghanistan	05	2021	1.2240040766164084	-2.623167874418791
Afghanistan	06	2021	0.8932836122787469	-2.953888338756453
Afghanistan	07	2021	1.3119752231395956	-2.5351967278956042
Afghanistan	08	2021	1.8254935225169648	-2.0216784285182348
Afghanistan	09	2021	0.9535284896378232	-2.8936434613973767
Afghanistan	10	2021	1.836991120212687	-2.010180830822513
Afghanistan	11	2021	0.7833023814361108	-3.063869569599089
Afghanistan	12	2021	0.5696479763962711	-3.2775239746389286
Afghanistan	01	2022	0.835916096785662	-3.011255854249538
Afghanistan	02	2022	1.1261763245698944	-2.7209956264653057
Afghanistan	03	2022	0.6953753222703168	-3.151796628764883
Afghanistan	04	2022	0.6159827567390592	-3.2311891942961406
Afghanistan	05	2022	0.8686094595986147	-2.978562491436585
Afghanistan	06	2022	1.6847537618386805	-2.1624181891965195
Afghanistan	07	2022	6.781577001091072	2.934405050055872
Afghanistan	08	2022	1.650774810116527	-2.196397140918673
Afghanistan	09	2022	0.11840551900233419	-3.7287664320328657
Afghanistan	10	2022	0.5434945542107193	-3.3036773968244804
Afghanistan	11	2022	0.98544479846255	-2.8617271525726498
Afghanistan	12	2022	1.034348960947696	-2.812822990087504
Afghanistan	01	2023	0.9887715972668849	-2.8584003537683147
Afghanistan	02	2023	9.102881210015413	5.255709258980213
Afghanistan	03	2023	1.043815658968079	-2.8033562920671207
Afghanistan	04	2023	0.1921456073783362	-3.6550263436568637
Afghanistan	05	2023	3.9943424729758155	0.14717052194061564
Afghanistan	06	2023	1.4184077468922758	-2.428764204142924
Afghanistan	07	2023	0.15049918203292342	-3.6966727690022765
Afghanistan	08	2023	1.4010813175823489	-2.446090633452851
Afghanistan	09	2023	1.2994614980399086	-2.5477104529952914
Afghanistan	10	2023	0.6660549877077184	-3.181116963327481
Afghanistan	11	2023	1.426774344683398	-2.420397606351802
Afghanistan	12	2023	0.5896289948489619	-3.2575429561862377
Albania	02	2021	9.161364950838635	5.314192999803435
Albania	03	2021	7.424657534246576	3.577485583211376
Albania	04	2021	4.373982376240178	0.5268104252049786
Albania	05	2021	0.9449617813792751	-2.9022101696559246
Albania	06	2021	0.5651059835745014	-3.2820659674606985
Albania	07	2021	1.2134122015181417	-2.633759749517058

Visualisation



Note: The query used to generate the global monthly cumulative average of 3.8471719510352 that was inserted into the above query is as follows:

```
SELECT `Country Name`, Month, Year, AVG(Growth) AS A FROM
(SELECT cs1.CountryName AS 'Country Name', strftime('%m', cs1.Date) AS 'Month', strftime('%Y', cs1.Date) AS 'Year',
       1.0*SUM(cs1.DailyVaccinations)/SUM(cs2.DailyVaccinations) AS 'Growth', SUM(cs1.DailyVaccinations),
       SUM(cs2.DailyVaccinations), strftime('%m', cs2.Date), strftime('%Y', cs2.Date)
FROM CountryStats AS cs1 JOIN CountryStats AS cs2 ON cs1.CountryName = cs2.CountryName
WHERE cs1.AgeRange='0+' AND cs2.AgeRange = '0+' AND strftime('%m/%Y', cs1.Date) = strftime('%m/%Y', DATE(cs2.Date, '+30 days'))
GROUP BY cs1.CountryName, strftime('%m', cs1.Date), strftime('%Y', cs1.Date)
ORDER BY cs1.CountryName, cs1.Date);
```

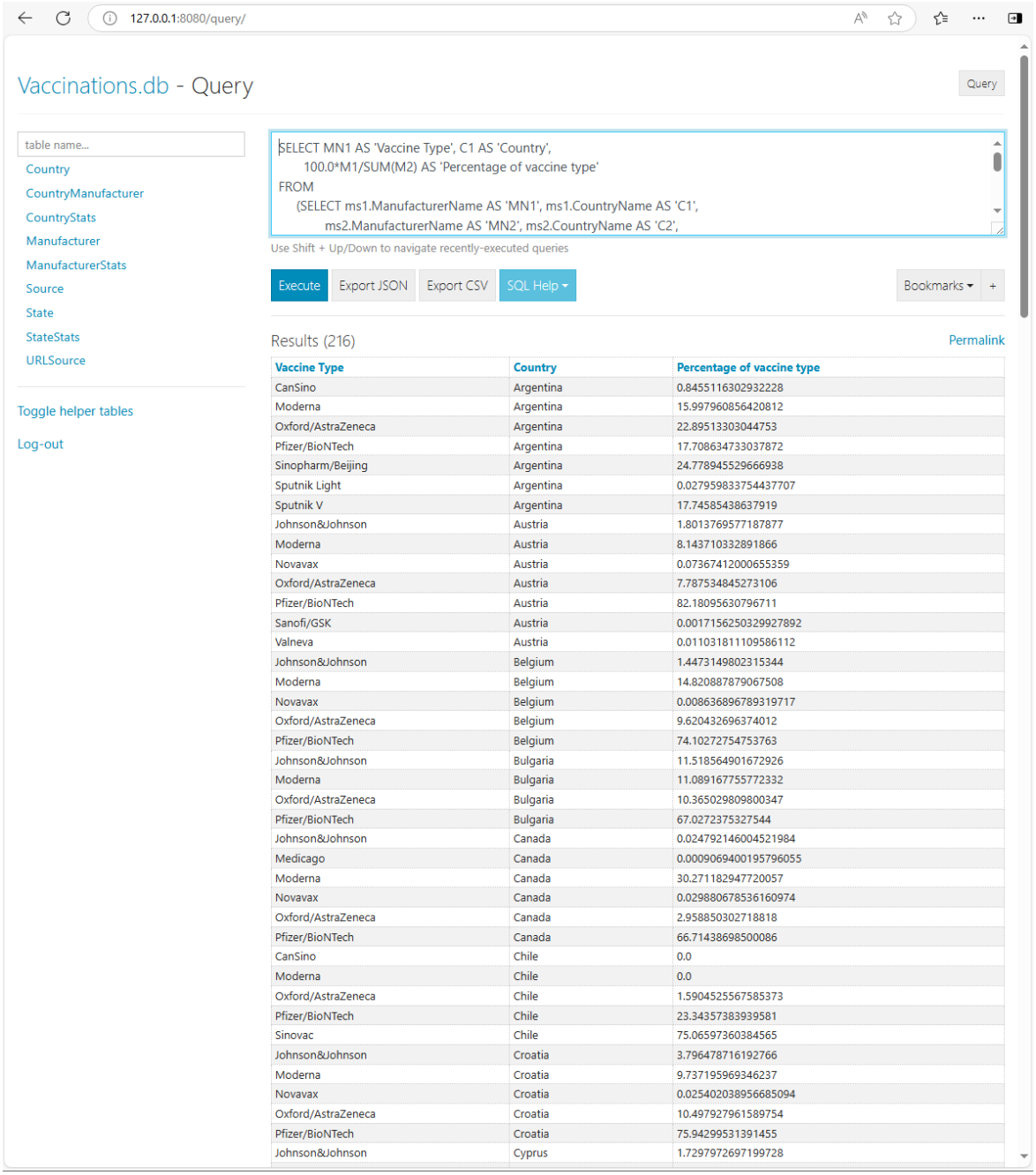
The full single query was too computationally expensive to run even with a 32GB PC, so I had to stick with this compromise unfortunately.

D.3

Query

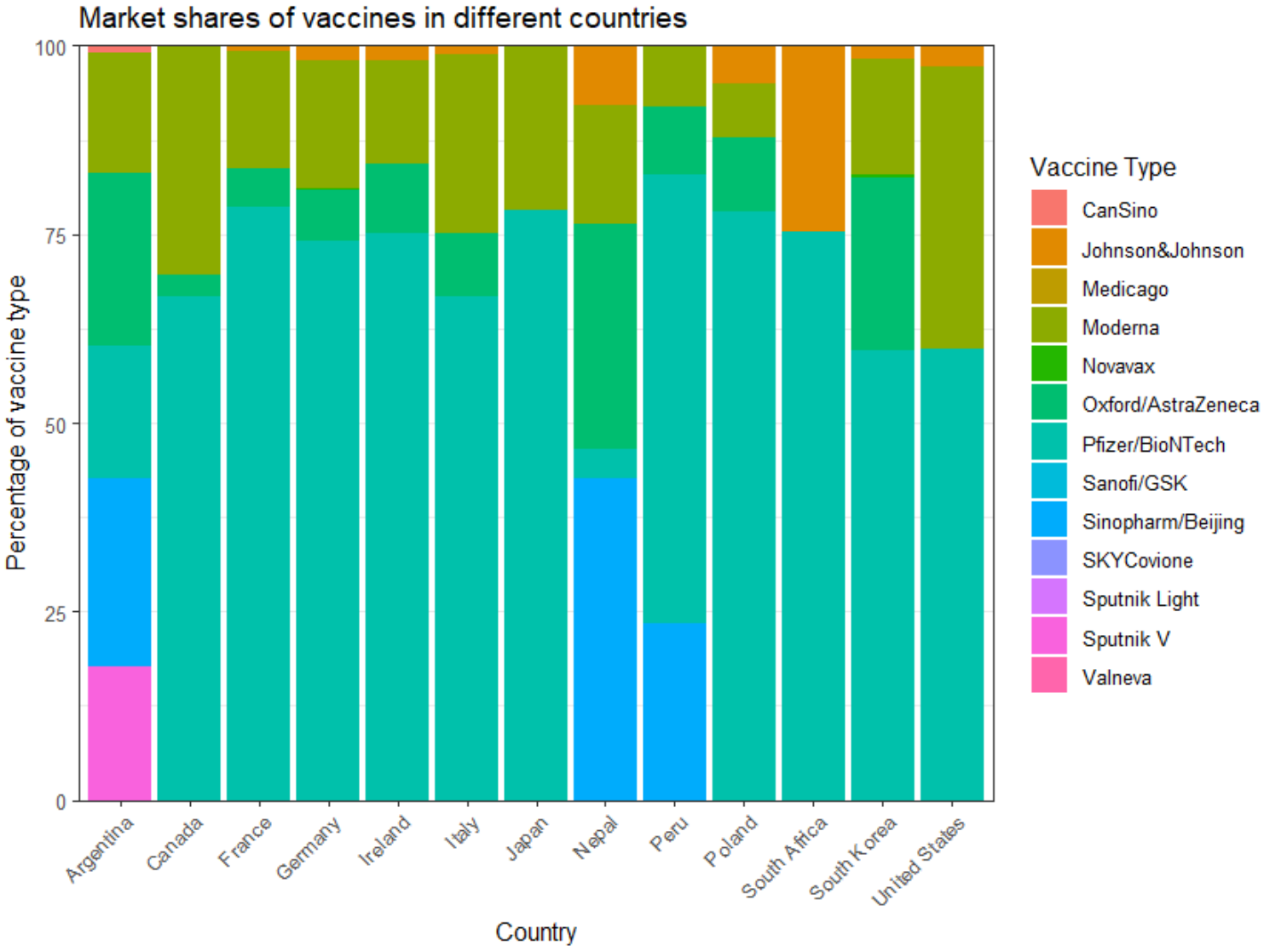
```
SELECT MN1 AS 'Vaccine Type', C1 AS 'Country',
       100.0*M1/SUM(M2) AS 'Percentage of vaccine type'
FROM
     (SELECT ms1.ManufacturerName AS 'MN1', ms1.CountryName AS 'C1',
             ms2.ManufacturerName AS 'MN2', ms2.CountryName AS 'C2',
             MAX(ms1.TotalVaccinations) AS M1, MAX(ms2.TotalVaccinations) AS M2
      FROM ManufacturerStats AS ms1
           JOIN ManufacturerStats AS ms2 ON ms1.CountryName = ms2.CountryName
      GROUP BY ms1.ManufacturerName, ms1.CountryName,
               ms2.ManufacturerName, ms2.CountryName
      ORDER BY ms1.CountryName)
GROUP BY MN1, C1
ORDER BY C1;
```

Snapshot



Vaccine Type	Country	Percentage of vaccine type
CanSino	Argentina	0.8455116302932228
Moderna	Argentina	15.997960856420812
Oxford/AstraZeneca	Argentina	22.89513303044753
Pfizer/BioNTech	Argentina	17.708634733037872
Sinopharm/Beijing	Argentina	24.778945529666938
Sputnik Light	Argentina	0.027959833754437707
Sputnik V	Argentina	17.74585438637919
Johnson&Johnson	Austria	1.8013769577187877
Moderna	Austria	8.143710332891866
Novavax	Austria	0.07367412000655359
Oxford/AstraZeneca	Austria	7.787534845273106
Pfizer/BioNTech	Austria	82.18095630796711
Sanofi/GSK	Austria	0.0017156250329927892
Valneva	Austria	0.011031811109586112
Johnson&Johnson	Belgium	1.4473149802315344
Moderna	Belgium	14.820887879067508
Novavax	Belgium	0.008636896789319717
Oxford/AstraZeneca	Belgium	9.620432696374012
Pfizer/BioNTech	Belgium	74.10272754753763
Johnson&Johnson	Bulgaria	11.518564901672926
Moderna	Bulgaria	11.089167755772332
Oxford/AstraZeneca	Bulgaria	10.365029809800347
Pfizer/BioNTech	Bulgaria	67.0272375327544
Johnson&Johnson	Canada	0.024792146004521984
Medicago	Canada	0.0009069400195796055
Moderna	Canada	30.271182947720057
Novavax	Canada	0.029880678536160974
Oxford/AstraZeneca	Canada	2.958850302718818
Pfizer/BioNTech	Canada	66.71438698500086
CanSino	Chile	0.0
Moderna	Chile	0.0
Oxford/AstraZeneca	Chile	1.5904525567585373
Pfizer/BioNTech	Chile	23.34357383939581
Sinovac	Chile	75.06597360384565
Johnson&Johnson	Croatia	3.796478716192766
Moderna	Croatia	9.737195969346237
Novavax	Croatia	0.025402038956685094
Oxford/AstraZeneca	Croatia	10.497927961589754
Pfizer/BioNTech	Croatia	75.94299531391455
Johnson&Johnson	Cyprus	1.7297972697199728

Visualisation

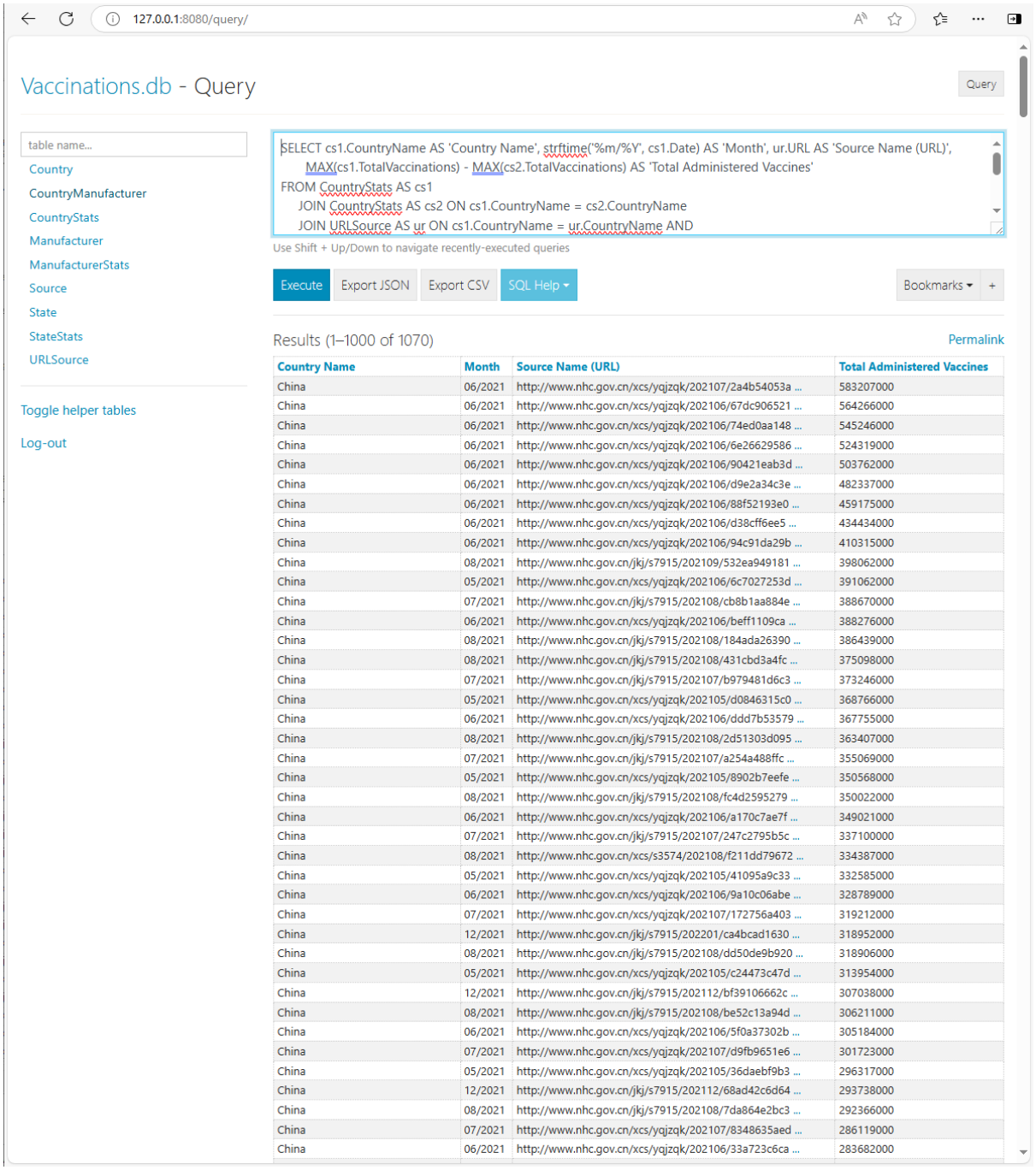


D.4

Query

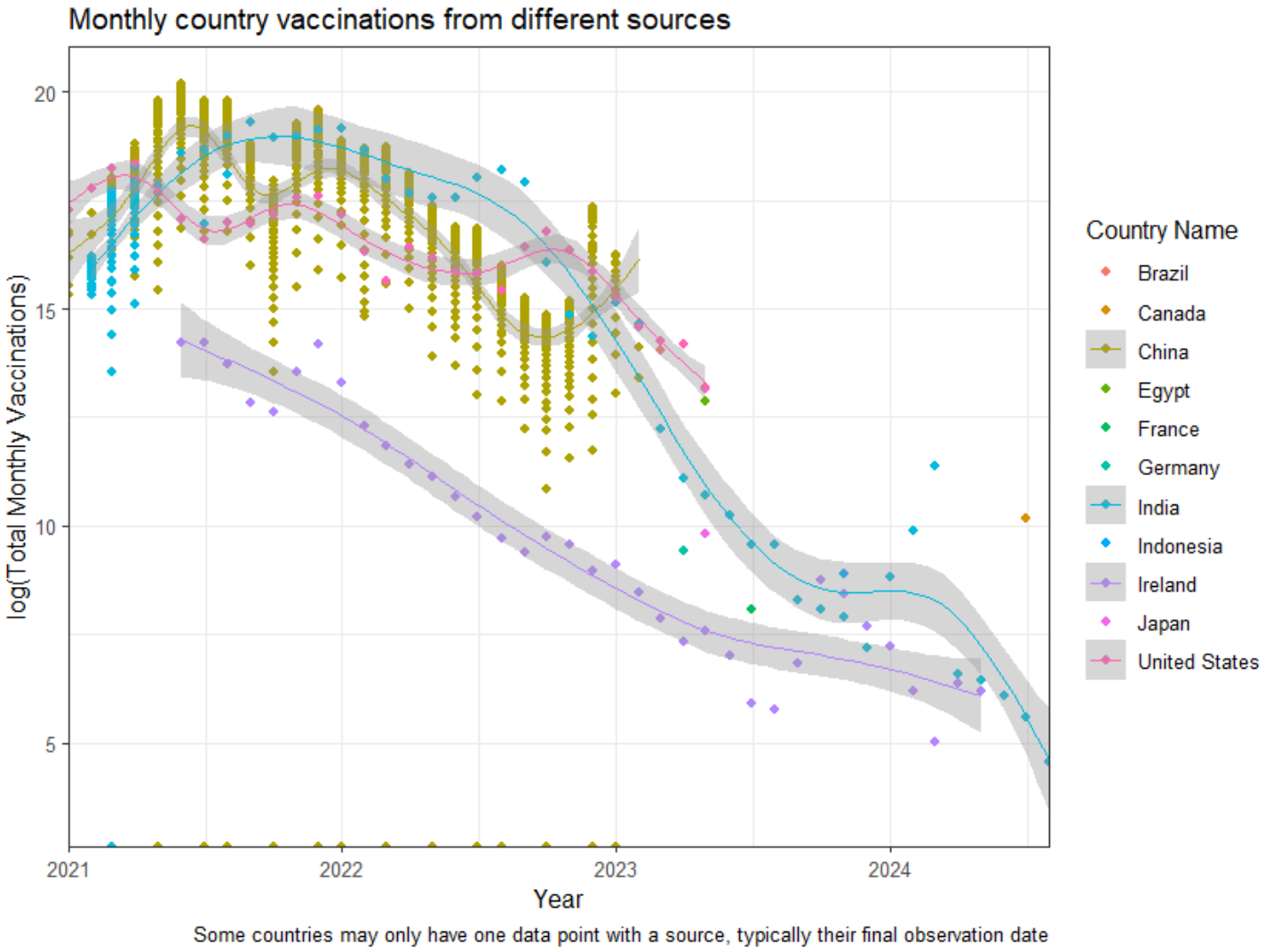
```
SELECT cs1.CountryName AS 'Country Name', strftime('%m/%Y', cs1.Date) AS 'Month', ur.URL AS 'Source Name (URL)',
       MAX(cs1.TotalVaccinations) - MAX(cs2.TotalVaccinations) AS 'Total Administered Vaccines'
FROM CountryStats AS cs1
     JOIN CountryStats AS cs2 ON cs1.CountryName = cs2.CountryName
     JOIN URLSource AS ur ON cs1.CountryName = ur.CountryName AND
                             cs1.Date = ur.Date AND
                             cs1.AgeRange = ur.AgeRange
WHERE cs1.AgeRange='0+' AND cs2.AgeRange = '0+'
      AND strftime('%m/%Y', cs1.Date) = strftime('%m/%Y', DATE(cs2.Date, '+30 days'))
GROUP BY cs1.CountryName, strftime('%m/%Y', cs1.Date), ur.URL
ORDER BY `Total Administered Vaccines` DESC;
```

Snapshot



Country Name	Month	Source Name (URL)	Total Administered Vaccines
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202107/2a4b54053a ...	583207000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/67dc906521 ...	564266000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/74ed0aa148 ...	545246000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/6e26629586 ...	524319000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/90421eab3d ...	503762000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/d9e2a34c3e ...	482337000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/88f52193e0 ...	459175000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/d38cff6ee5 ...	434434000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/94c91da29b ...	410315000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202109/532ea949181 ...	398062000
China	05/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/6c7027253d ...	391062000
China	07/2021	http://www.nhc.gov.cn/jkj/s7915/202108/cb8b1aa884e ...	388670000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/beff1109ca ...	388276000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202108/184ada26390 ...	386439000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202108/431cbd3a4fc ...	375098000
China	07/2021	http://www.nhc.gov.cn/jkj/s7915/202107/b979481d6c3 ...	373246000
China	05/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202105/d0846315c0 ...	368766000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/ddd7b53579 ...	367755000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202108/2d51303d095 ...	363407000
China	07/2021	http://www.nhc.gov.cn/jkj/s7915/202107/a254a488ffc ...	355069000
China	05/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202105/8902b7eefe ...	350568000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202108/fc4d2595279 ...	350022000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/a170c7ae7f ...	349021000
China	07/2021	http://www.nhc.gov.cn/jkj/s7915/202107/247c2795b5c ...	337100000
China	08/2021	http://www.nhc.gov.cn/xcs/s3574/202108/f211dd79672 ...	334387000
China	05/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202105/41095a9c33 ...	332585000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/9a10c06abe ...	328789000
China	07/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202107/172756a403 ...	319212000
China	12/2021	http://www.nhc.gov.cn/jkj/s7915/202201/ca4bcad1630 ...	318952000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202108/dd50de9b920 ...	318906000
China	05/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202105/c24473c47d ...	313954000
China	12/2021	http://www.nhc.gov.cn/jkj/s7915/202112/bf39106662c ...	307038000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202108/be52c13a94d ...	306211000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/5f0a37302b ...	305184000
China	07/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202107/d9fb9651e6 ...	301723000
China	05/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202105/36daebf9b3 ...	296317000
China	12/2021	http://www.nhc.gov.cn/jkj/s7915/202112/68ad42c6d64 ...	293738000
China	08/2021	http://www.nhc.gov.cn/jkj/s7915/202108/7da864e2bc3 ...	292366000
China	07/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202107/8348635aed ...	286119000
China	06/2021	http://www.nhc.gov.cn/xcs/yqjzqk/202106/33a723c6ca ...	283682000

Visualisation

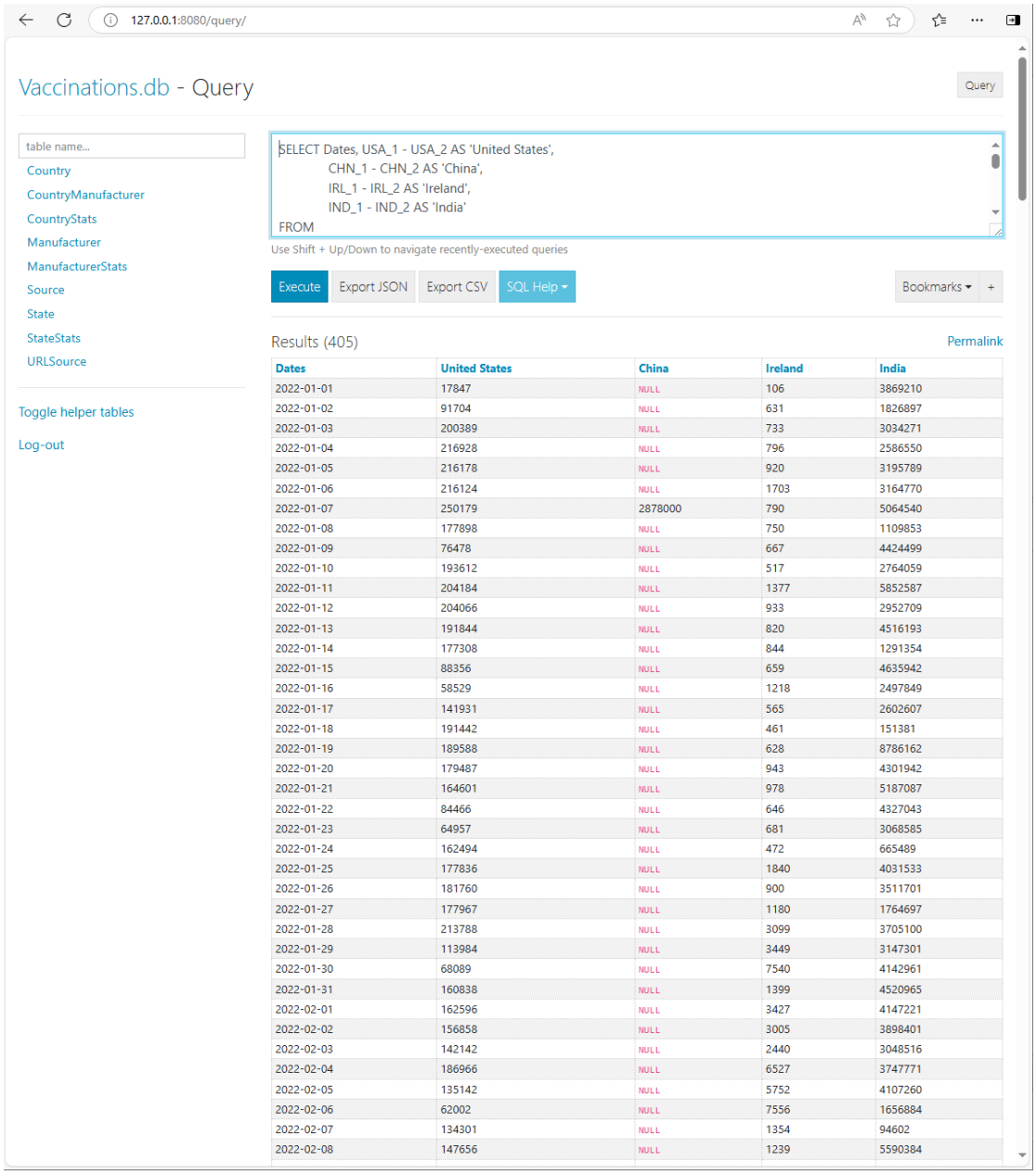


D.5 (ISYS1055)

Query

```
SELECT Dates, USA_1 - USA_2 AS 'United States',
              CHN_1 - CHN_2 AS 'China',
              IRL_1 - IRL_2 AS 'Ireland',
              IND_1 - IND_2 AS 'India'
FROM
     (SELECT cs1.Date AS 'Dates', cs1.PeopleFullyVaccinated AS 'USA_1', cs11.PeopleFullyVaccinated AS 'USA_2',
                                  cs2.PeopleFullyVaccinated AS 'CHN_1', cs22.PeopleFullyVaccinated AS 'CHN_2',
                                  cs3.PeopleFullyVaccinated AS 'IRL_1', cs33.PeopleFullyVaccinated AS 'IRL_2',
                                  cs4.PeopleFullyVaccinated AS 'IND_1', cs44.PeopleFullyVaccinated AS 'IND_2'
      FROM CountryStats AS cs1 JOIN CountryStats AS cs2 ON cs1.Date = cs2.Date
                               JOIN CountryStats AS cs3 ON cs2.Date = cs3.Date
                               JOIN CountryStats AS cs4 ON cs3.Date = cs4.Date
                               JOIN CountryStats AS cs44 ON cs4.CountryName = cs44.CountryName
                               JOIN CountryStats AS cs33 ON cs44.Date = cs33.Date
                               JOIN CountryStats AS cs22 ON cs22.Date = cs33.Date
                               JOIN CountryStats AS cs11 ON cs11.Date = cs22.Date
      WHERE cs1.CountryName = 'United States' AND cs2.CountryName = 'China' AND cs3.CountryName = 'Ireland' AND cs4.CountryName = 'India'
            AND strftime('%Y', cs1.Date) BETWEEN '2022' AND '2023' AND cs4.Date = DATE(cs44.Date, '+1 days')
            AND cs33.CountryName = 'Ireland' AND cs22.CountryName = 'China' AND cs11.CountryName = 'United States'
      GROUP BY cs1.Date);
```

Snapshot



Dates	United States	China	Ireland	India
2022-01-01	17847	NULL	106	3869210
2022-01-02	91704	NULL	631	1826897
2022-01-03	200389	NULL	733	3034271
2022-01-04	216928	NULL	796	2586550
2022-01-05	216178	NULL	920	3195789
2022-01-06	216124	NULL	1703	3164770
2022-01-07	250179	2878000	790	5064540
2022-01-08	177898	NULL	750	1109853
2022-01-09	76478	NULL	667	4424499
2022-01-10	193612	NULL	517	2764059
2022-01-11	204184	NULL	1377	5852587
2022-01-12	204066	NULL	933	2952709
2022-01-13	191844	NULL	820	4516193
2022-01-14	177308	NULL	844	1291354
2022-01-15	88356	NULL	659	4635942
2022-01-16	58529	NULL	1218	2497849
2022-01-17	141931	NULL	565	2602607
2022-01-18	191442	NULL	461	151381
2022-01-19	189588	NULL	628	8786162
2022-01-20	179487	NULL	943	4301942
2022-01-21	164601	NULL	978	5187087
2022-01-22	84466	NULL	646	4327043
2022-01-23	64957	NULL	681	3068585
2022-01-24	162494	NULL	472	665489
2022-01-25	177836	NULL	1840	4031533
2022-01-26	181760	NULL	900	3511701
2022-01-27	177967	NULL	1180	1764697
2022-01-28	213788	NULL	3099	3705100
2022-01-29	113984	NULL	3449	3147301
2022-01-30	68089	NULL	7540	4142961
2022-01-31	160838	NULL	1399	4520965
2022-02-01	162596	NULL	3427	4147221
2022-02-02	156858	NULL	3005	3898401
2022-02-03	142142	NULL	2440	3048516
2022-02-04	186966	NULL	6527	3747771
2022-02-05	135142	NULL	5752	4107260
2022-02-06	62002	NULL	7556	1656884
2022-02-07	134301	NULL	1354	94602
2022-02-08	147656	NULL	1239	5590384

Visualisation