Group No. 12

ID: 6712143, Name: Soe Phone Pyae

ID: 6612054, Name: Win Yu Maung

ID: 6611968, Name: Thant Zin Min

CSX3006 Database Systems: Worksheet 3

**Part I’s Instruction: Type your answers in Blue.** Refer to the **COVID19** Database in this worksheet and write relational algebra expressions **and resulted relations** **(tables)** of the following 8 queries.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| The **DailyCase** relation   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Date** | **Country** | **NewCases** | **NewDeaths** | **NewRecovered** | | 7/26/2020 | Belgium | 299 | 0 | 13 | | 7/26/2020 | Brazil | 24578 | 555 | 27554 | | 7/26/2020 | Canada | 319 | 5 | 0 | | 7/26/2020 | Chile | 2198 | 92 | 1926 | | 7/26/2020 | Colombia | 0 | 0 | 0 | | 7/26/2020 | France | 0 | 0 | 0 | | 7/26/2020 | Germany | 389 | 0 | 136 | | 7/26/2020 | India | 49981 | 711 | 31995 | | 7/26/2020 | Iran | 2333 | 216 | 1894 | | 7/26/2020 | Italy | 254 | 5 | 126 | | 7/26/2020 | Mexico | 5480 | 1035 | 6403 | | 7/26/2020 | Peru | 0 | 0 | 8427 | | 7/26/2020 | Russia | 5741 | 77 | 3108 | | 7/26/2020 | South Africa | 11233 | 114 | 2023 | | 7/26/2020 | USA | 54953 | 470 | 18449 | | 7/27/2020 | Belgium | 402 | 1 | 14 | | 7/27/2020 | Brazil | 23284 | 614 | 33728 | | 7/27/2020 | Canada | 682 | 11 | 0 | | 7/27/2020 | Chile | 2133 | 75 | 1859 | | 7/27/2020 | Colombia | 16306 | 508 | 11494 | | 7/27/2020 | France | 2551 | 17 | 267 | | 7/27/2020 | Germany | 445 | 1 | 259 | | 7/27/2020 | India | 44457 | 637 | 33598 | | 7/27/2020 | Iran | 2434 | 212 | 1931 | | 7/27/2020 | Italy | 168 | 5 | 147 | | 7/27/2020 | Mexico | 4973 | 342 | 8588 | | 7/27/2020 | Peru | 13756 | 575 | 4697 | | 7/27/2020 | Russia | 5607 | 85 | 3077 | | 7/27/2020 | South Africa | 7096 | 298 | 9848 | | 7/27/2020 | USA | 56336 | 1076 | 27941 |   The **CaseSummary** relation   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Country** | **TotalCases** | **TotalDeaths** | **TotalRecovered** | **TotalTests** | | USA | 5032179 | 162804 | 2576668 | 63139605 | | Brazil | 2917562 | 98644 | 2047660 | 13206188 | | Mexico | 462690 | 50517 | 308848 | 1056915 | | India | 2025409 | 41638 | 1377384 | 22149351 | | Italy | 249204 | 35187 | 201323 | 7099713 | | France | 195633 | 30312 | 82460 | 3992206 | | Peru | 455409 | 20424 | 310337 | 2493429 | | Iran | 320117 | 17976 | 277463 | 2612763 | | Russia | 871894 | 14606 | 676357 | 29716907 | | Colombia | 357710 | 11939 | 192355 | 1801835 | | Chile | 366671 | 9889 | 340168 | 1760615 | | Belgium | 71158 | 9859 | 17661 | 1767120 | | South Africa | 538184 | 9604 | 387316 | 3149807 | | **Germany** | **215210** | **9252** | **196200** | **8586648** | | Canada | 118561 | 8966 | 103106 | 4319172 |   The **Country** relation   |  |  |  |  | | --- | --- | --- | --- | | **Country** | **Continent** | **WHORegion** | **Population** | | Belgium | Europe | Europe | 331198130 | | Brazil | South America | Americas | 212710692 | | Canada | North America | Americas | 129066160 | | Chile | South America | Americas | 1381344997 | | Colombia | South America | Americas | 60452568 | | France | Europe | Europe | 65288306 | | Germany | Europe | Europe | 33016319 | | India | Asia | South-East Asia | 84097623 | | Iran | Asia | Eastern Mediterranean | 145940924 | | Italy | Europe | Europe | 50936262 | | Mexico | North America | Americas | 19132514 | | Peru | South America | Americas | 11594739 | | Russia | Europe | Europe | 59381566 | | South Africa | Africa | Africa | 83811260 | | USA | North America | Americas | 37775022 | |

Fig. 1. The COVID19 Database (top 15 countries data on 26-27/7/2020)

1. Use set intersection operation to retrieve continent(s) that has both new cases and new deaths on 7/26/2020.

RELATION ALGEBRA EXPRESSION:

NewCaseData Π\_Continent (σ\_NewCases > 0 ^ Date = 7/26/2020 (DailyCase ⨝ Country))

NewDeathData Π\_Continent (σ\_NewDeaths > 0 ^ Date = 7/26/2020 (DailyCase ⨝ Country))

NewCaseData ∩ NewDeathData

OUTPUT RELATIONS:

|  |
| --- |
| Continent |
| South America |
| North America |
| Asia |
| Europe |
| Africa |

1. Use Natural-join operation to countries’ name in South America that have new recovered cases or new cases on 7/26/2020.

RELATION ALGEBRA EXPRESSION:

Π\_Country (σ\_Continent='South America' ∧ Date='7/26/2020' ∧ (NewRecovered > 0 ∨ NewCases > 0) (DailyCase ⨝ Country))

OUTPUT RELATIONS:

|  |
| --- |
| Country |
| Brazil |
| Chile |
| Peru |

1. Use Theta-join operation to retrieve countries’ name that has population more than Iran but has total tests less than Iran.

RELATION ALGEBRA EXPRESSION:

IranTotalTest ⟵ Π\_TotalTests(σ\_country = ‘Iran’ (CaseSummary))

IranPopulation ⟵ Π Population(σ\_country = ‘Iran’ (Country))

FilteredData ⟵ Country ⨝\_(Population > IranPopulation ∧ TotalTests < IranTotalTest) CaseSummary

Π\_Country (FilteredData)

OUTPUT RELATIONS:

|  |
| --- |
| Country |
| Chille |
| Begium |

1. Use Division operation to retrieve all countries whose total deaths during 26-27 July 2020 equals to Germany.

RELATION ALGEBRA EXPRESSION:

Temp1 Π\_Country,TotalDeaths(CaseSummary)

Temp2 Π\_TotalDeaths(σ\_Country = ‘Germany’ (CaseSummary))

Temp1 Temp2

OUTPUT RELATIONS:

|  |
| --- |
| Country |
| Germany |

1. Use Aggregation operation to calculate total number of new cases, new deaths and new recovered cases on 26-27 of July 2020.

RELATION ALGEBRA EXPRESSION: 𝓖 sum(NewCases), sum(NewDeaths), sum(NewRecovered) (DailyCase)

OUTPUT RELATIONS:

|  |  |  |
| --- | --- | --- |
| Sum (NewCases) | Sum (NewDeaths) | Sum (NewRecovered) |
| 338,388 | 7737 | 239,502 |

1. Use Aggregation operation to calculate minimum, maximum and average values of total deaths in each WHORegion.

RELATION ALGEBRA EXPRESSION: WHORegion 𝓖 min(TotalDeaths), max(TotalDeaths), avg(TotalDeaths) (CaseSummary ⋈ Country)

OUTPUT RELATIONS:

|  |  |  |  |
| --- | --- | --- | --- |
| WHORegion | Min(TotalDeaths) | Max(TotalDeaths) | Avg(TotalDeaths) |
| Europe | 9,252 | 35,187 | **19843.2** |
| Americas | 8,966 | 162,804 | **51883.286** |
| South-East Asia | 41638 | 41638 | **41638** |
| Eastern Mediterranean | 17976 | 17976 | **17976** |
| Africa | 9604 | 9604 | **9604** |

1. Use Aggregation operation to retrieve the WHORegion with highest average total deaths.

RELATION ALGEBRA EXPRESSION:

V1 ← WHORegion 𝓖 avg(TotalDeaths) as Average Total Deaths (Contry ⋈ CaseSummary)

V2 ← 𝓖 max(Average Total Deaths) (V1)

Π\_WHORegion(σ\_Average Total Deaths = V2 (V1))

OUTPUT RELATIONS:

|  |
| --- |
| WHORegion |
| Americas |

1. Count number of countries in each continent whose total deaths are greater than 20,000.

RELATION ALGEBRA EXPRESSION:

Continents 𝓖 count(Country) (CaseSummary ⋈ \_TotalDeaths > 20,000 Country)

OUTPUT RELATIONS:

|  |  |
| --- | --- |
| Continent | Count (Country) |
| Europe | 2 |
| South America | 2 |
| North America | 2 |
| Asia | 1 |
| Africa | 0 |