Wikipedia Data Crunch

Using Big Data Tools to
Analyze Our Collective Curiosity

by Sean Horner

Analytics Data Used

- **Clickstream Data**
  https://meta.wikimedia.org/wiki/Research:Wikipedia_clickstream
  - Data Explanation: https://dumps.wikimedia.org/other/clickstream/readme.html

- **Pageview Data**
  https://wikitech.wikimedia.org/wiki/Analytics/Data_Lake/Traffic/Pageviews
  - Data Explanation: https://dumps.wikimedia.org/other/pageviews/readme.html

- **Revision History**
  https://wikitech.wikimedia.org/wiki/Analytics/Data_Lake/Edits/Mediawiki_history_dumps#Technical_Documentation
  - Data Explanation: https://dumps.wikimedia.org/other/mediawiki_history/readme.html

Question 1:

Which English wikipedia article got the most traffic on October 20, 2020?

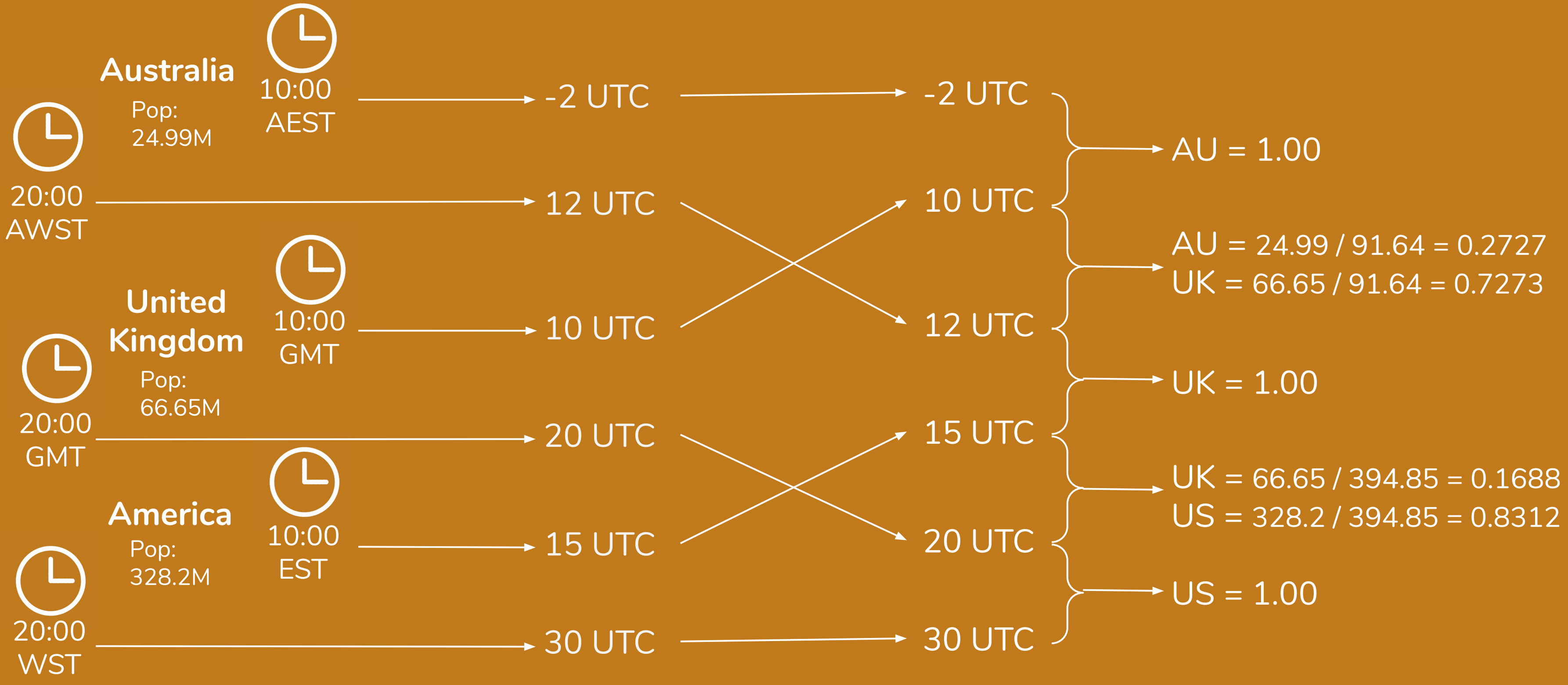
Methodology

1. Gather pageview data for the given time span.
2. Aggregate pageviews for each page.
3. Determine non-trivial highest traffic page.

Assumptions

- Use the time span for which the three anglophone countries may be using Wikipedia on 10/20/2020.
    - This span is discussed in the next slide.

- Wikipedia's landing page (Main Page), Special: Search, and Hyphen-Minus are considered trivial in pageview ranking.
    - For a discussion on why hyphen-minus appears at the top of the pageview rankings, check here: https://www.reddit.com/r/wikipedia/comments/fnwfop/aside_from_the_main_page_the_most_viewed_page_on/



Australia

Pop:
24.99M

10:00
AEST

20:00
AWST

United Kingdom

Pop:
66.65M

10:00
GMT

20:00
GMT

America

Pop:
328.2M

10:00
EST

20:00
WST

-2 UTC

12 UTC

10 UTC

20 UTC

15 UTC

30 UTC

-2 UTC

10 UTC

12 UTC

15 UTC

20 UTC

30 UTC

AU = 1.00

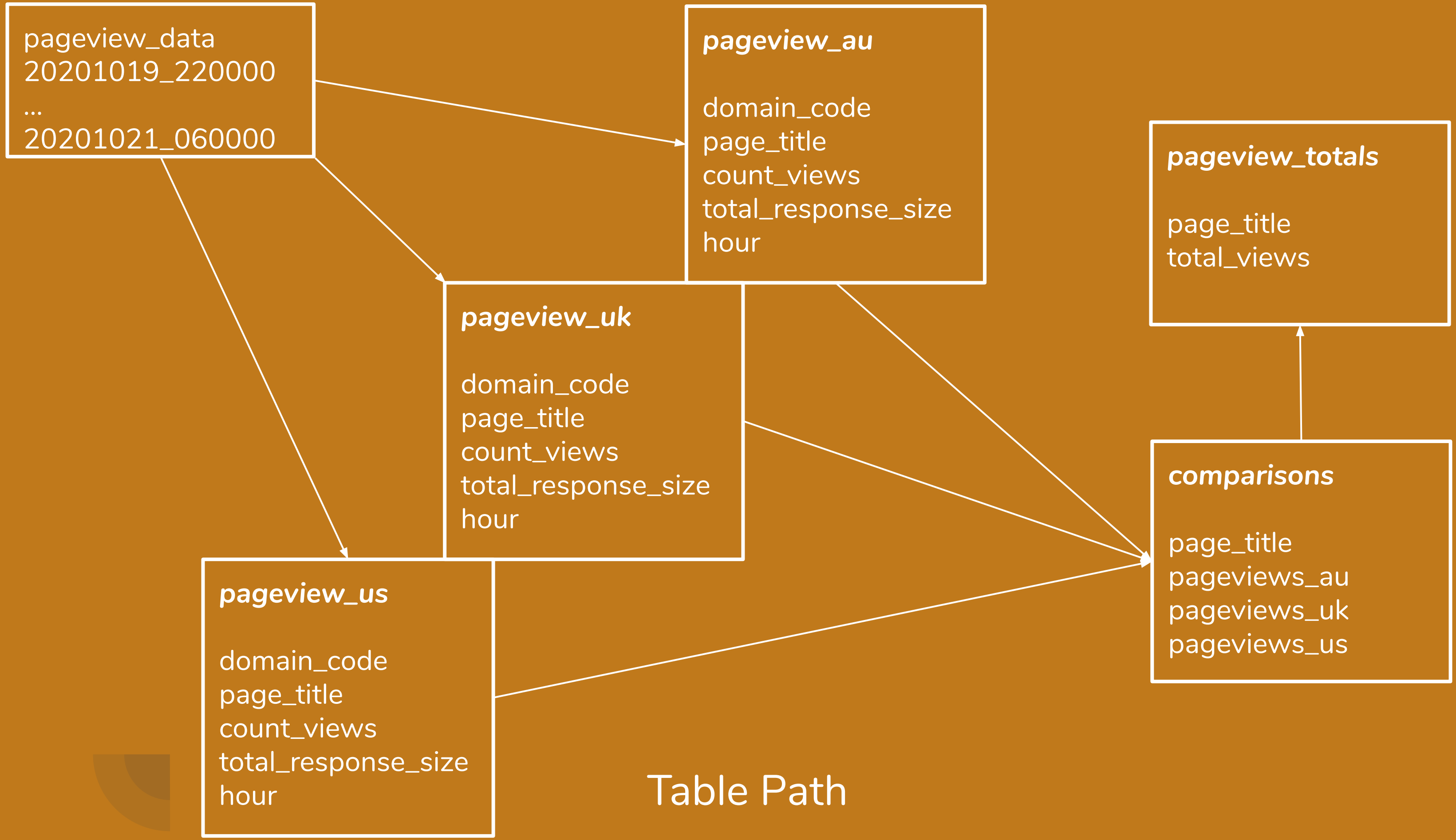
AU = 24.99 / 91.64 = 0.2727
UK = 66.65 / 91.64 = 0.7273

UK = 1.00

UK = 66.65 / 394.85 = 0.1688
US = 328.2 / 394.85 = 0.8312

US = 1.00

Time zone conversion into timeline of 10/20/2020 in UTC.



pageview_data
20201019_220000
...
20201021_060000

pageview_au

domain_code
page_title
count_views
total_response_size
hour

pageview_uk

domain_code
page_title
count_views
total_response_size
hour

pageview_us

domain_code
page_title
count_views
total_response_size
hour

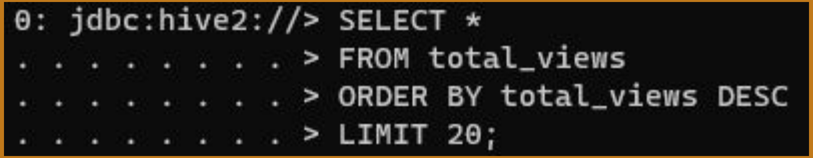
comparisons

page_title
pageviews_au
pageviews_uk
pageviews_us

pageview_totals

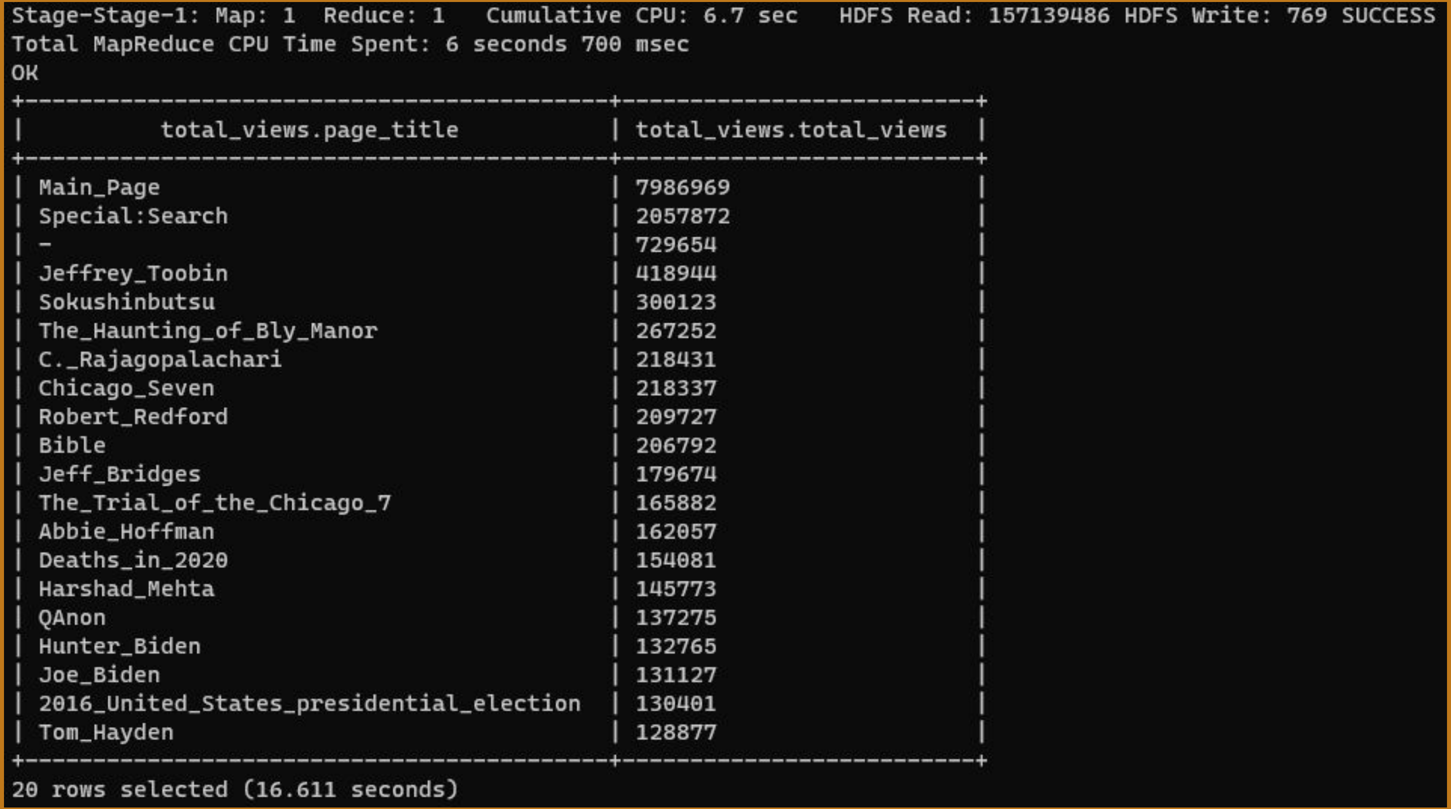
page_title
total_views

Table Path



```
0: jdbc:hive2://> SELECT *
. . . . . . . . > FROM total_views
. . . . . . . . > ORDER BY total_views DESC
. . . . . . . . > LIMIT 20;
```

SQL Query



```
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 6.7 sec   HDFS Read: 157139486 HDFS Write: 769 SUCCESS
Total MapReduce CPU Time Spent: 6 seconds 700 msec
OK
+-------------------------------------------+--------------------------+
|          total_views.page_title           | total_views.total_views  |
+-------------------------------------------+--------------------------+
| Main_Page                                 | 7986969                  |
| Special:Search                            | 2057872                  |
| -                                         | 729654                   |
| Jeffrey_Toobin                            | 418944                   |
| Sokushinbutsu                             | 300123                   |
| The_Haunting_of_Bly_Manor                 | 267252                   |
| C._Rajagopalachari                        | 218431                   |
| Chicago_Seven                             | 218337                   |
| Robert_Redford                            | 209727                   |
| Bible                                     | 206792                   |
| Jeff_Bridges                              | 179674                   |
| The_Trial_of_the_Chicago_7                | 165882                   |
| Abbie_Hoffman                             | 162057                   |
| Deaths_in_2020                            | 154081                   |
| Harshad_Mehta                             | 145773                   |
| QAnon                                     | 137275                   |
| Hunter_Biden                              | 132765                   |
| Joe_Biden                                 | 131127                   |
| 2016_United_States_presidential_election  | 130401                   |
| Tom_Hayden                                | 128877                   |
+-------------------------------------------+--------------------------+
20 rows selected (16.611 seconds)
```

Query results

Question 2:

What English wikipedia article has the largest fraction of its readers follow an internal link to another wikipedia article?

Methodology

1. Determine the number of linked views for each page (internal and external).

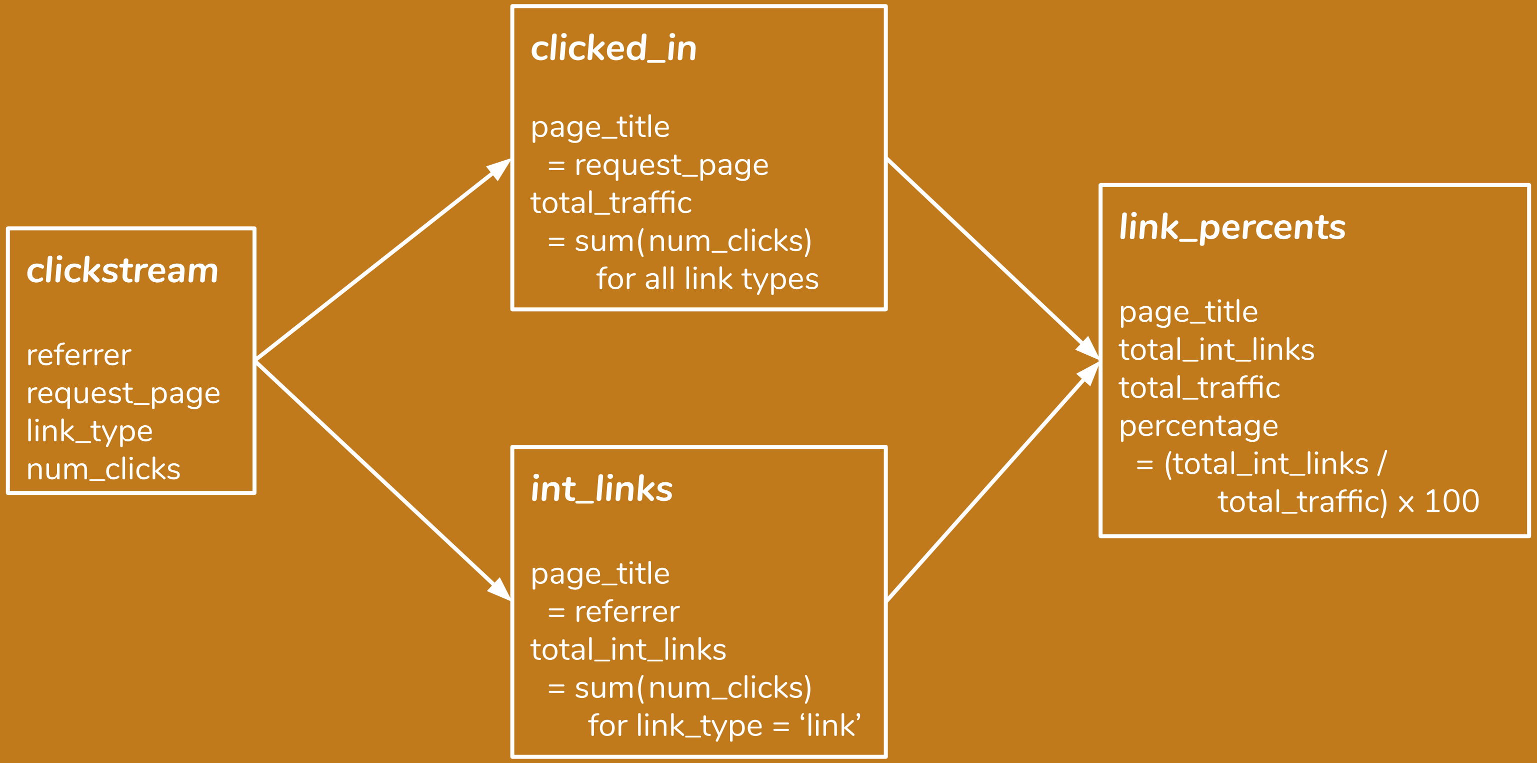
2. Determine the number of internal links that a page spawns.

3. Divide number of internal links by total linked views.

Assumptions

- Some pages receive fewer linked views than the number of link clicks they generate. This could be because one viewer is clicking on multiple links in a page, or it could be incompleteness of the data.
    - For analysis purposes anything with a ratio higher than 300% (i.e. three link clicks for every viewer) will be discarded.
    - A better analysis methodology would be to gather historic pageview data for the time period covered in the clickstream data, but here we'll work with the data given.

- Since very low numbers of total traffic will cause artificially high ratios, only pages with more than 3000 total traffic links will be considered.



clickstream

referrer
request_page
link_type
num_clicks

clicked_in

page_title
  = request_page
total_traffic
  = sum(num_clicks)
      for all link types

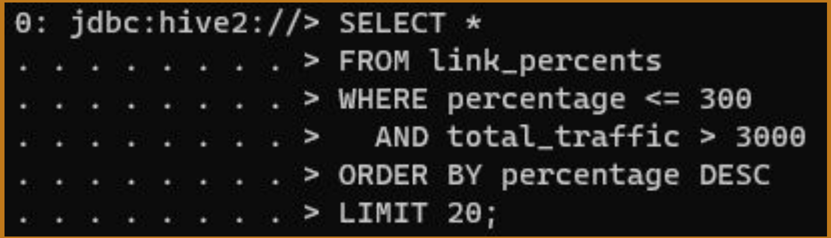
int_links

page_title
  = referrer
total_int_links
  = sum(num_clicks)
      for link_type = 'link'

link_percents

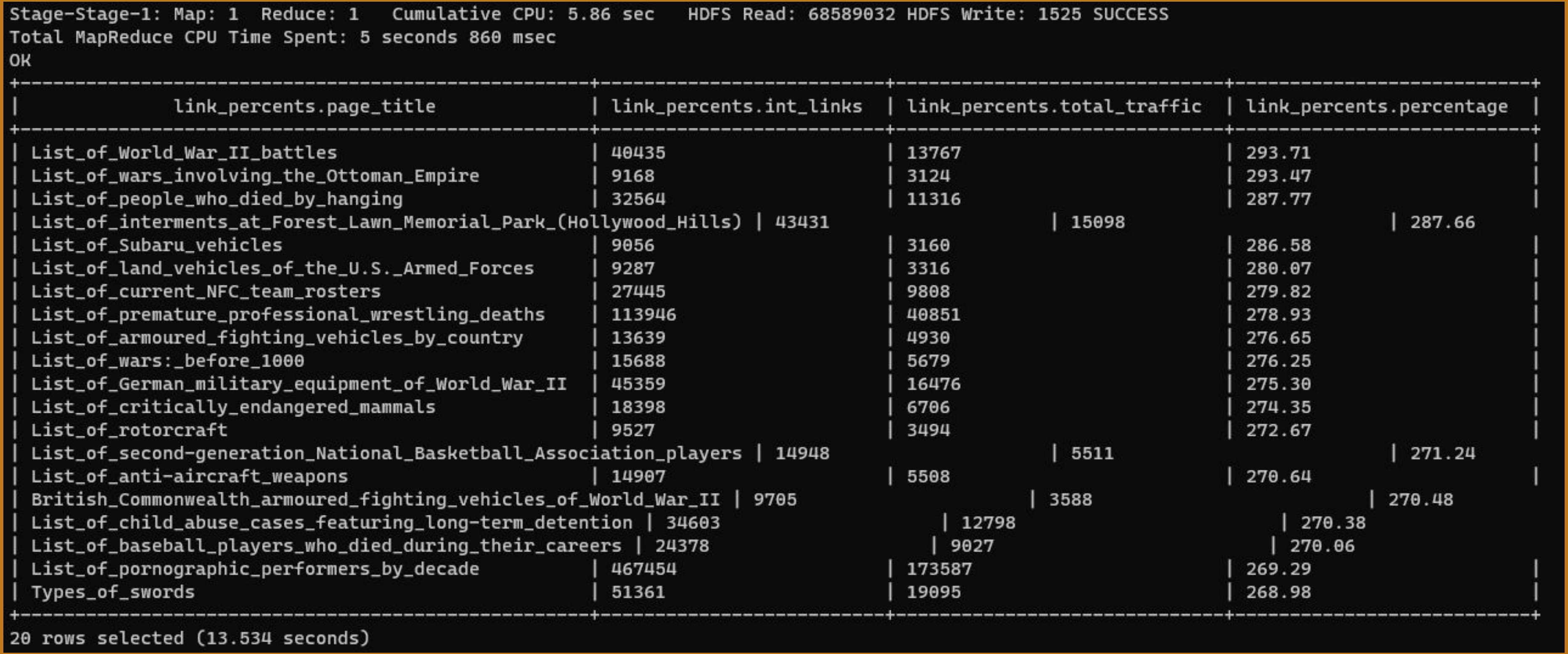
page_title
total_int_links
total_traffic
percentage
  = (total_int_links /
      total_traffic) x 100

Table Path



```
0: jdbc:hive2://> SELECT *
. . . . . . . . > FROM link_percents
. . . . . . . . > WHERE percentage <= 300
. . . . . . . . >   AND total_traffic > 3000
. . . . . . . . > ORDER BY percentage DESC
. . . . . . . . > LIMIT 20;
```

SQL Query



```
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 5.86 sec   HDFS Read: 68589032 HDFS Write: 1525 SUCCESS
Total MapReduce CPU Time Spent: 5 seconds 860 msec
OK
+----------------------------------------------------+--------------------------+------------------------------+---------------------------+
|              link_percents.page_title              | link_percents.int_links  | link_percents.total_traffic  | link_percents.percentage  |
+----------------------------------------------------+--------------------------+------------------------------+---------------------------+
| List_of_World_War_II_battles                       | 40435                    | 13767                        | 293.71                    |
| List_of_wars_involving_the_Ottoman_Empire          | 9168                     | 3124                         | 293.47                    |
| List_of_people_who_died_by_hanging                 | 32564                    | 11316                        | 287.77                    |
| List_of_interments_at_Forest_Lawn_Memorial_Park_(Hollywood_Hills) | 43431                    | 15098                        | 287.66
| List_of_Subaru_vehicles                            | 9056                     | 3160                         | 286.58                    |
| List_of_land_vehicles_of_the_U.S._Armed_Forces     | 9287                     | 3316                         | 280.07                    |
| List_of_current_NFC_team_rosters                   | 27445                    | 9808                         | 279.82                    |
| List_of_premature_professional_wrestling_deaths    | 113946                   | 40851                        | 278.93                    |
| List_of_armoured_fighting_vehicles_by_country      | 13639                    | 4930                         | 276.65                    |
| List_of_wars:_before_1000                          | 15688                    | 5679                         | 276.25                    |
| List_of_German_military_equipment_of_World_War_II  | 45359                    | 16476                        | 275.30                    |
| List_of_critically_endangered_mammals              | 18398                    | 6706                         | 274.35                    |
| List_of_rotorcraft                                 | 9527                     | 3494                         | 272.67                    |
| List_of_second-generation_National_Basketball_Association_players | 14948                    | 5511                         | 271.24
| List_of_anti-aircraft_weapons                      | 14907                    | 5508                         | 270.64                    |
| British_Commonwealth_armoured_fighting_vehicles_of_World_War_II | 9705                     | 3588                         | 270.48
| List_of_child_abuse_cases_featuring_long-term_detention | 34603                    | 12798                        | 270.38
| List_of_baseball_players_who_died_during_their_careers | 24378                    | 9027                         | 270.06
| List_of_pornographic_performers_by_decade          | 467454                   | 173587                       | 269.29                    |
| Types_of_swords                                    | 51361                    | 19095                        | 268.98                    |
+----------------------------------------------------+--------------------------+------------------------------+---------------------------+
20 rows selected (13.534 seconds)
```

Query results

Question 3:

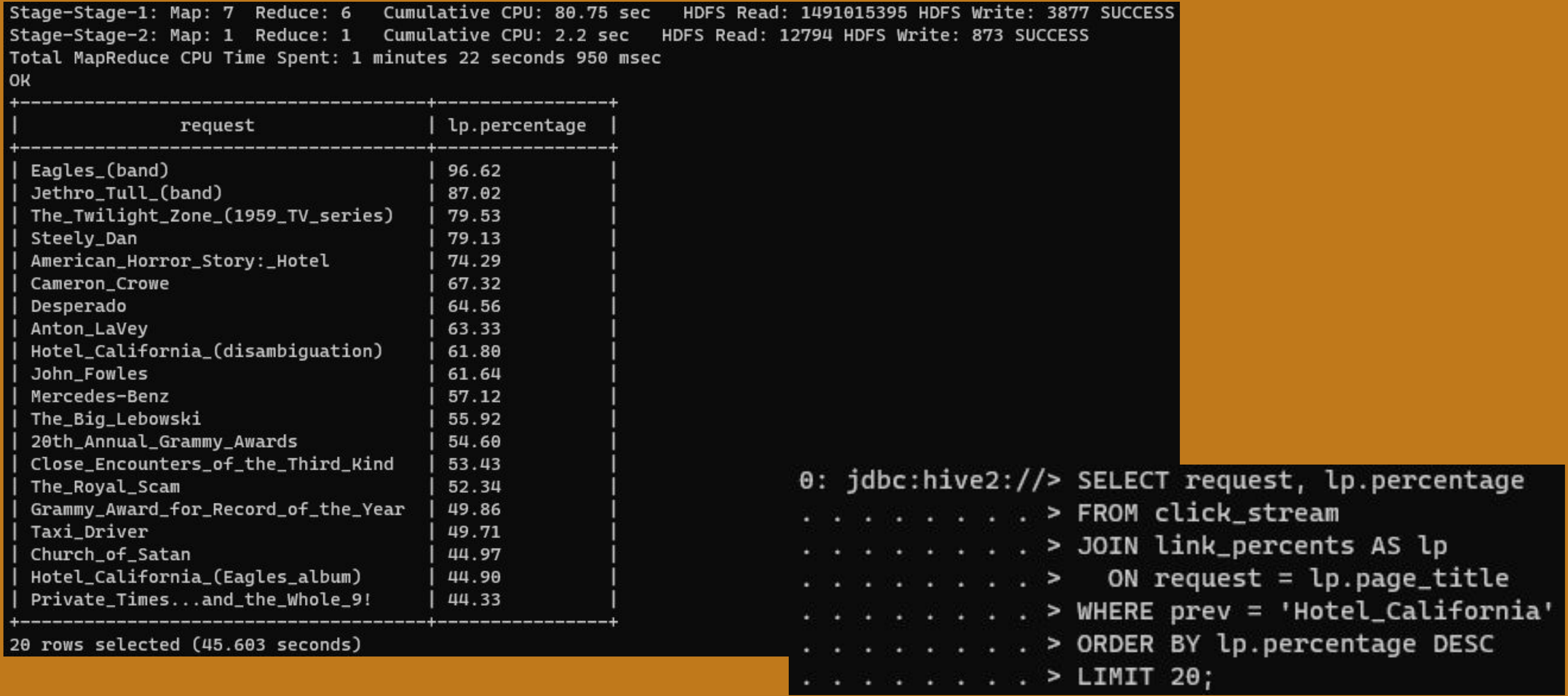
What series of wikipedia articles, starting with Hotel California, keeps the largest fraction of its readers clicking on internal links?

Methodology

1. Gather all pages linked to from the “home page”.
2. Join the click_stream table to the link_percentages table.
3. Order the linked pages by their percentage of internal links.
4. Make the top page our new “home page”.
5. Repeat.

Assumptions

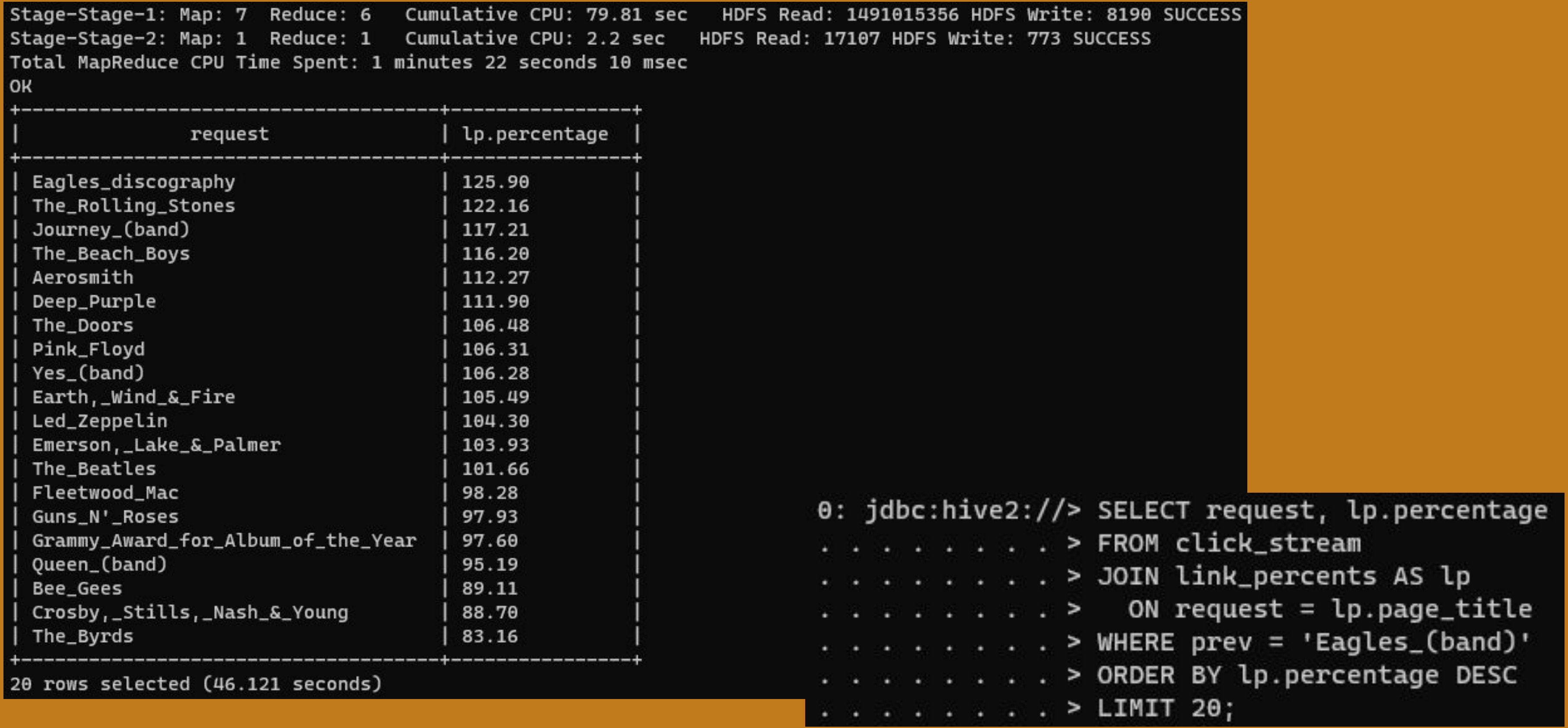
- Again, low total traffic will result in artificially high link to viewer ratios, but by ordering the results by their link percentage and limiting the query to the first 20 results we should avoid any trivially high-ratio pages.



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 80.75 sec   HDFS Read: 1491015395 HDFS Write: 3877 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.2 sec   HDFS Read: 12794 HDFS Write: 873 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 22 seconds 950 msec
OK
+---------------------------------------+-----------------+
|                request                | lp.percentage  |
+---------------------------------------+-----------------+
| Eagles_(band)                         | 96.62           |
| Jethro_Tull_(band)                    | 87.02           |
| The_Twilight_Zone_(1959_TV_series)    | 79.53           |
| Steely_Dan                            | 79.13           |
| American_Horror_Story:_Hotel          | 74.29           |
| Cameron_Crowe                         | 67.32           |
| Desperado                             | 64.56           |
| Anton_LaVey                           | 63.33           |
| Hotel_California_(disambiguation)     | 61.80           |
| John_Fowles                           | 61.64           |
| Mercedes-Benz                         | 57.12           |
| The_Big_Lebowski                      | 55.92           |
| 20th_Annual_Grammy_Awards             | 54.60           |
| Close_Encounters_of_the_Third_Kind    | 53.43           |
| The_Royal_Scam                        | 52.34           |
| Grammy_Award_for_Record_of_the_Year   | 49.86           |
| Taxi_Driver                           | 49.71           |
| Church_of_Satan                       | 44.97           |
| Hotel_California_(Eagles_album)       | 44.90           |
| Private_Times...and_the_Whole_9!      | 44.33           |
+---------------------------------------+-----------------+
20 rows selected (45.603 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Hotel_California'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

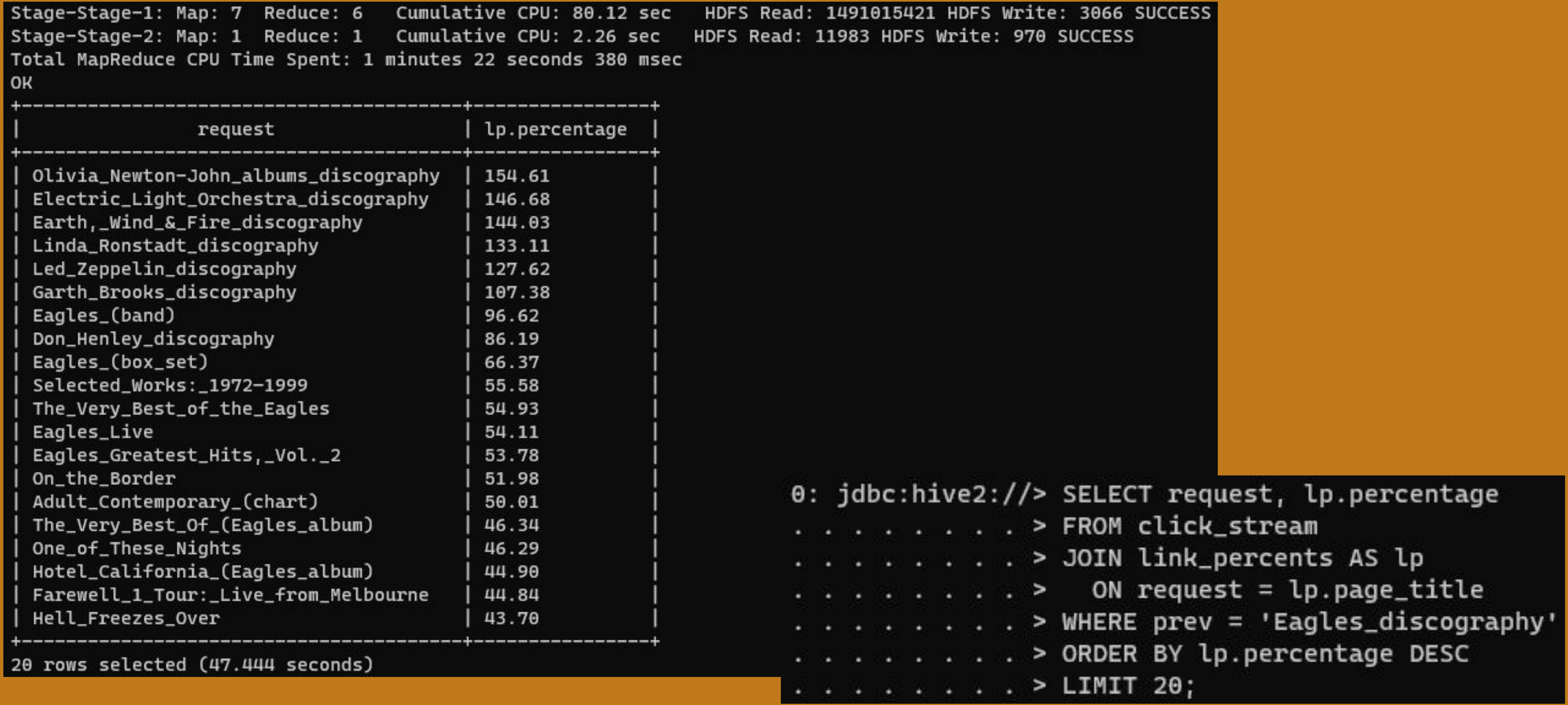
Step 1: Hotel_California



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 79.81 sec   HDFS Read: 1491015356 HDFS Write: 8190 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.2 sec   HDFS Read: 17107 HDFS Write: 773 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 22 seconds 10 msec
OK
+-------------------------------------+----------------+
|               request               | lp.percentage  |
+-------------------------------------+----------------+
| Eagles_discography                  | 125.90         |
| The_Rolling_Stones                  | 122.16         |
| Journey_(band)                      | 117.21         |
| The_Beach_Boys                      | 116.20         |
| Aerosmith                           | 112.27         |
| Deep_Purple                         | 111.90         |
| The_Doors                           | 106.48         |
| Pink_Floyd                          | 106.31         |
| Yes_(band)                          | 106.28         |
| Earth,_Wind_&_Fire                  | 105.49         |
| Led_Zeppelin                        | 104.30         |
| Emerson,_Lake_&_Palmer              | 103.93         |
| The_Beatles                         | 101.66         |
| Fleetwood_Mac                       | 98.28          |
| Guns_N'_Roses                       | 97.93          |
| Grammy_Award_for_Album_of_the_Year  | 97.60          |
| Queen_(band)                        | 95.19          |
| Bee_Gees                            | 89.11          |
| Crosby,_Stills,_Nash_&_Young        | 88.70          |
| The_Byrds                           | 83.16          |
+-------------------------------------+----------------+
20 rows selected (46.121 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Eagles_(band)'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

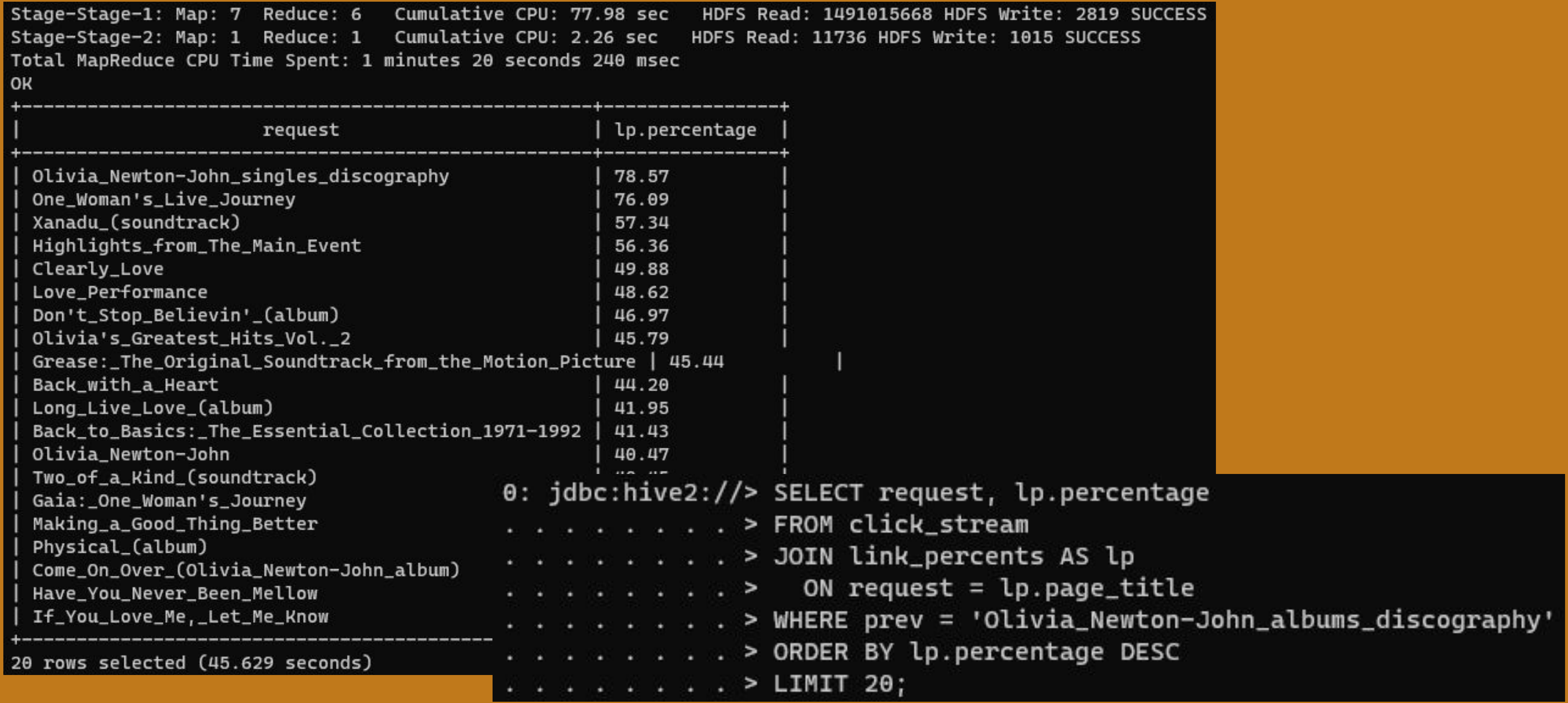
Step 2: Eagles_(band)



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 80.12 sec   HDFS Read: 1491015421 HDFS Write: 3066 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.26 sec   HDFS Read: 11983 HDFS Write: 970 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 22 seconds 380 msec
OK
+------------------------------------------+-----------------+
|                 request                  | lp.percentage   |
+------------------------------------------+-----------------+
| Olivia_Newton-John_albums_discography    | 154.61          |
| Electric_Light_Orchestra_discography     | 146.68          |
| Earth,_Wind_&_Fire_discography           | 144.03          |
| Linda_Ronstadt_discography               | 133.11          |
| Led_Zeppelin_discography                 | 127.62          |
| Garth_Brooks_discography                 | 107.38          |
| Eagles_(band)                            | 96.62           |
| Don_Henley_discography                   | 86.19           |
| Eagles_(box_set)                         | 66.37           |
| Selected_Works:_1972-1999                | 55.58           |
| The_Very_Best_of_the_Eagles              | 54.93           |
| Eagles_Live                              | 54.11           |
| Eagles_Greatest_Hits,_Vol._2             | 53.78           |
| On_the_Border                            | 51.98           |
| Adult_Contemporary_(chart)               | 50.01           |
| The_Very_Best_Of_(Eagles_album)          | 46.34           |
| One_of_These_Nights                      | 46.29           |
| Hotel_California_(Eagles_album)          | 44.90           |
| Farewell_1_Tour:_Live_from_Melbourne     | 44.84           |
| Hell_Freezes_Over                        | 43.70           |
+------------------------------------------+-----------------+
20 rows selected (47.444 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Eagles_discography'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

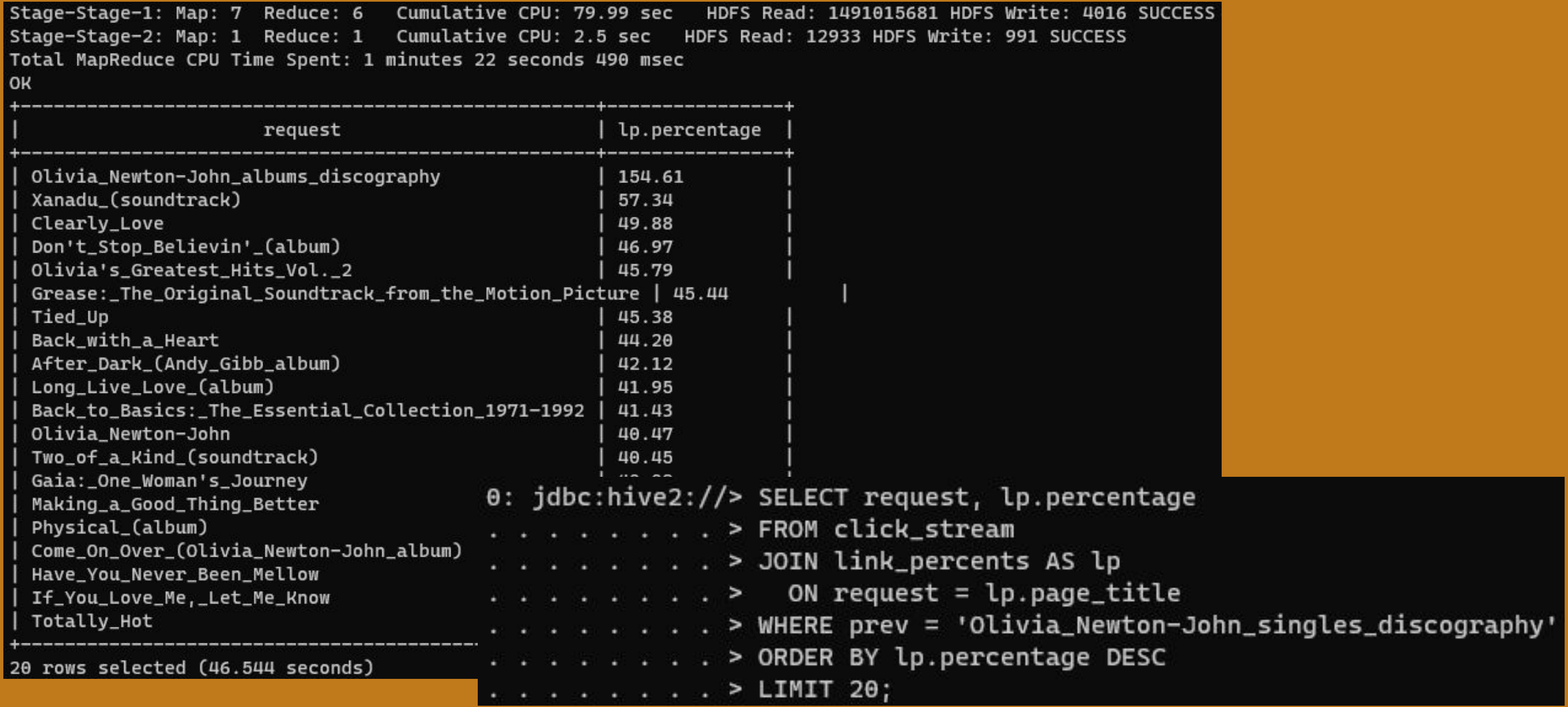
Step 3: Eagles_discography



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 77.98 sec   HDFS Read: 1491015668 HDFS Write: 2819 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.26 sec   HDFS Read: 11736 HDFS Write: 1015 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 20 seconds 240 msec
OK
+-----------------------------------------------------+---------------+
|                       request                       | lp.percentage |
+-----------------------------------------------------+---------------+
| Olivia_Newton-John_singles_discography              | 78.57         |
| One_Woman's_Live_Journey                            | 76.09         |
| Xanadu_(soundtrack)                                 | 57.34         |
| Highlights_from_The_Main_Event                      | 56.36         |
| Clearly_Love                                        | 49.88         |
| Love_Performance                                    | 48.62         |
| Don't_Stop_Believin'_(album)                        | 46.97         |
| Olivia's_Greatest_Hits_Vol._2                       | 45.79         |
| Grease:_The_Original_Soundtrack_from_the_Motion_Picture | 45.44         |
| Back_with_a_Heart                                   | 44.20         |
| Long_Live_Love_(album)                              | 41.95         |
| Back_to_Basics:_The_Essential_Collection_1971-1992  | 41.43         |
| Olivia_Newton-John                                  | 40.47         |
| Two_of_a_Kind_(soundtrack)
| Gaia:_One_Woman's_Journey
| Making_a_Good_Thing_Better
| Physical_(album)
| Come_On_Over_(Olivia_Newton-John_album)
| Have_You_Never_Been_Mellow
| If_You_Love_Me,_Let_Me_Know
+------------------------------------------
20 rows selected (45.629 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Olivia_Newton-John_albums_discography'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

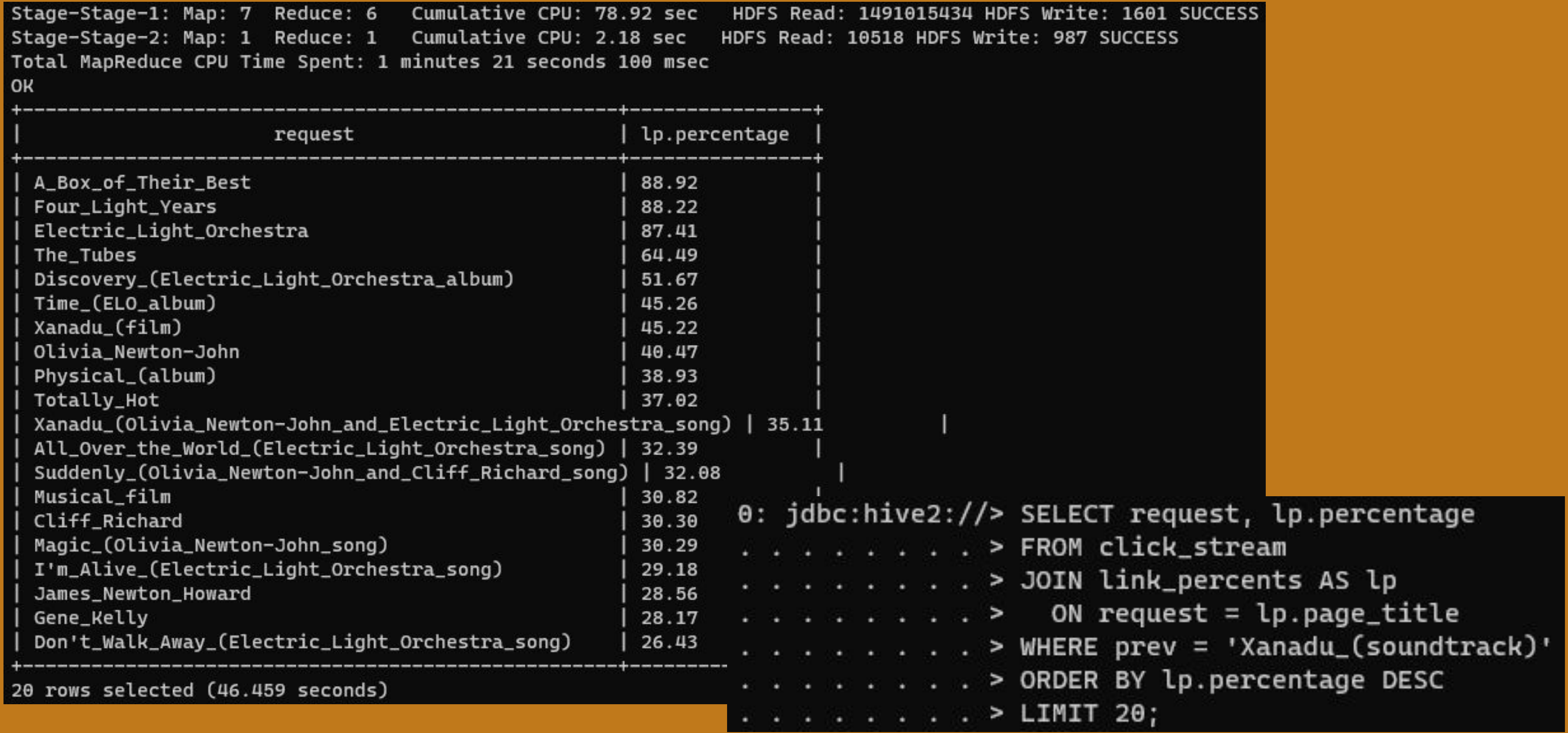
Step 4: Olivia_Newton-John_albums_discography



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 79.99 sec   HDFS Read: 1491015681 HDFS Write: 4016 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.5 sec   HDFS Read: 12933 HDFS Write: 991 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 22 seconds 490 msec
OK
+-----------------------------------------------------+----------------+
|                       request                       | lp.percentage  |
+-----------------------------------------------------+----------------+
| Olivia_Newton-John_albums_discography               | 154.61         |
| Xanadu_(soundtrack)                                 | 57.34          |
| Clearly_Love                                        | 49.88          |
| Don't_Stop_Believin'_(album)                        | 46.97          |
| Olivia's_Greatest_Hits_Vol._2                       | 45.79          |
| Grease:_The_Original_Soundtrack_from_the_Motion_Picture | 45.44          |
| Tied_Up                                             | 45.38          |
| Back_with_a_Heart                                   | 44.20          |
| After_Dark_(Andy_Gibb_album)                        | 42.12          |
| Long_Live_Love_(album)                              | 41.95          |
| Back_to_Basics:_The_Essential_Collection_1971-1992  | 41.43          |
| Olivia_Newton-John                                  | 40.47          |
| Two_of_a_Kind_(soundtrack)                          | 40.45          |
| Gaia:_One_Woman's_Journey
| Making_a_Good_Thing_Better
| Physical_(album)
| Come_On_Over_(Olivia_Newton-John_album)
| Have_You_Never_Been_Mellow
| If_You_Love_Me,_Let_Me_Know
| Totally_Hot
+-------------------------------------------
20 rows selected (46.544 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Olivia_Newton-John_singles_discography'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

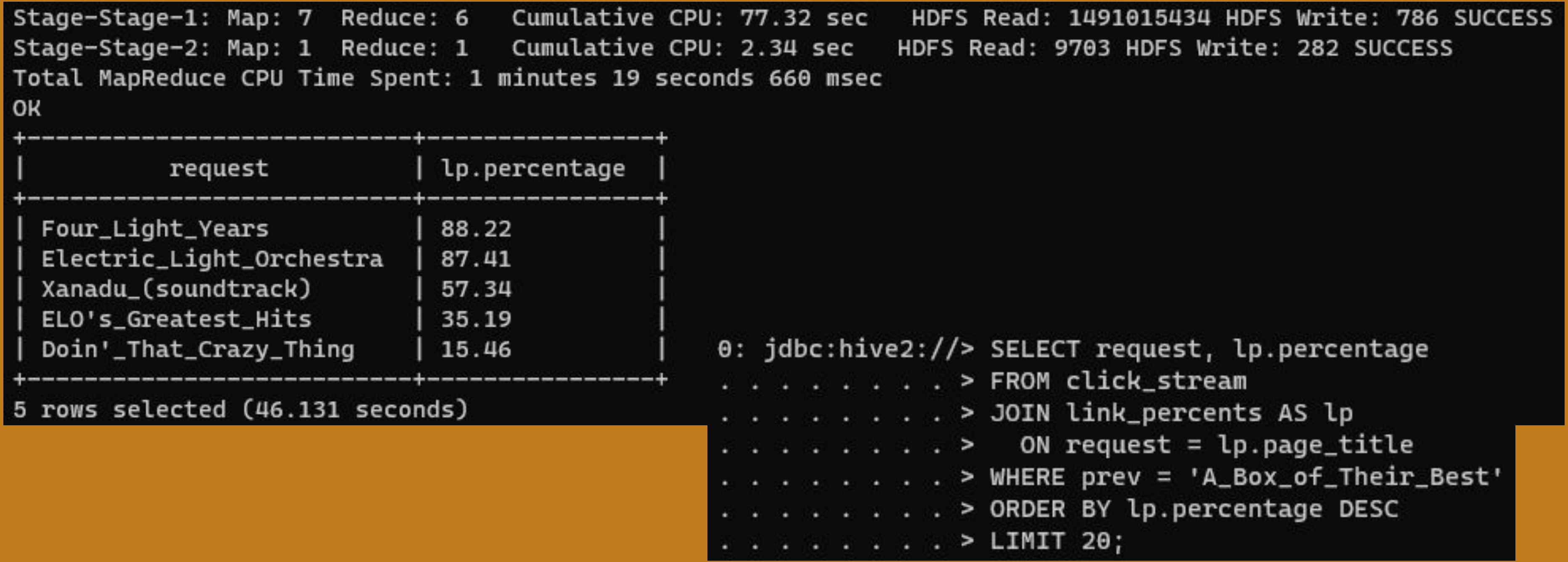
Step 5: Olivia_Newton-John_singles_discography



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 78.92 sec   HDFS Read: 1491015434 HDFS Write: 1601 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.18 sec   HDFS Read: 10518 HDFS Write: 987 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 21 seconds 100 msec
OK
+----------------------------------------------------+----------------+
|                      request                       | lp.percentage  |
+----------------------------------------------------+----------------+
| A_Box_of_Their_Best                                | 88.92          |
| Four_Light_Years                                   | 88.22          |
| Electric_Light_Orchestra                           | 87.41          |
| The_Tubes                                          | 64.49          |
| Discovery_(Electric_Light_Orchestra_album)         | 51.67          |
| Time_(ELO_album)                                   | 45.26          |
| Xanadu_(film)                                      | 45.22          |
| Olivia_Newton-John                                 | 40.47          |
| Physical_(album)                                   | 38.93          |
| Totally_Hot                                        | 37.02          |
| Xanadu_(Olivia_Newton-John_and_Electric_Light_Orchestra_song) | 35.11          |
| All_Over_the_World_(Electric_Light_Orchestra_song) | 32.39          |
| Suddenly_(Olivia_Newton-John_and_Cliff_Richard_song) | 32.08          |
| Musical_film                                       | 30.82
| Cliff_Richard                                      | 30.30
| Magic_(Olivia_Newton-John_song)                    | 30.29
| I'm_Alive_(Electric_Light_Orchestra_song)          | 29.18
| James_Newton_Howard                                | 28.56
| Gene_Kelly                                         | 28.17
| Don't_Walk_Away_(Electric_Light_Orchestra_song)    | 26.43
+----------------------------------------------------+---------
20 rows selected (46.459 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Xanadu_(soundtrack)'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

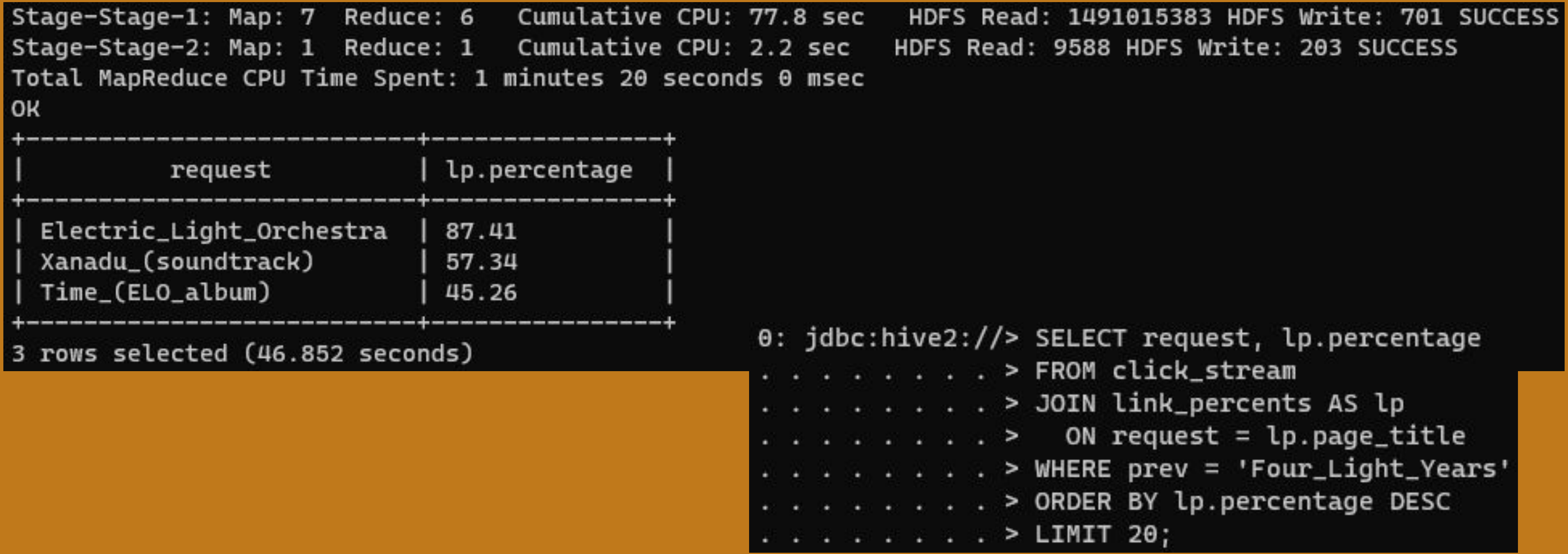
Step 6: Xanadu_(soundtrack)



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 77.32 sec   HDFS Read: 1491015434 HDFS Write: 786 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.34 sec   HDFS Read: 9703 HDFS Write: 282 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 19 seconds 660 msec
OK
+----------------------------+-----------------+
|          request           | lp.percentage   |
+----------------------------+-----------------+
| Four_Light_Years           | 88.22           |
| Electric_Light_Orchestra   | 87.41           |
| Xanadu_(soundtrack)        | 57.34           |
| ELO's_Greatest_Hits        | 35.19           |
| Doin'_That_Crazy_Thing     | 15.46           |
+----------------------------+-----------------+
5 rows selected (46.131 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'A_Box_of_Their_Best'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

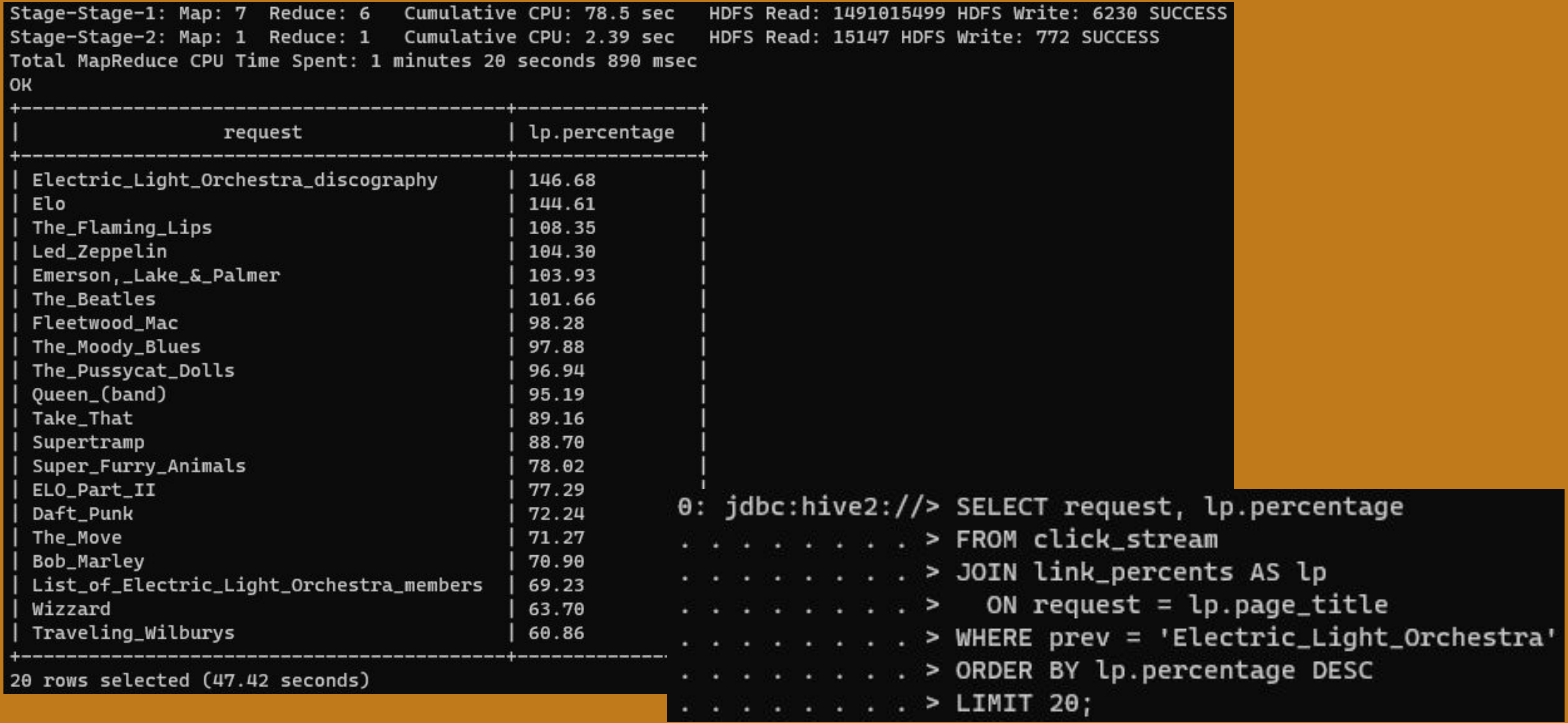
Step 7: A_Box_of_Their_Best



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 77.8 sec   HDFS Read: 1491015383 HDFS Write: 701 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.2 sec   HDFS Read: 9588 HDFS Write: 203 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 20 seconds 0 msec
OK
+----------------------------+-----------------+
|          request           | lp.percentage   |
+----------------------------+-----------------+
| Electric_Light_Orchestra   | 87.41           |
| Xanadu_(soundtrack)        | 57.34           |
| Time_(ELO_album)           | 45.26           |
+----------------------------+-----------------+
3 rows selected (46.852 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Four_Light_Years'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

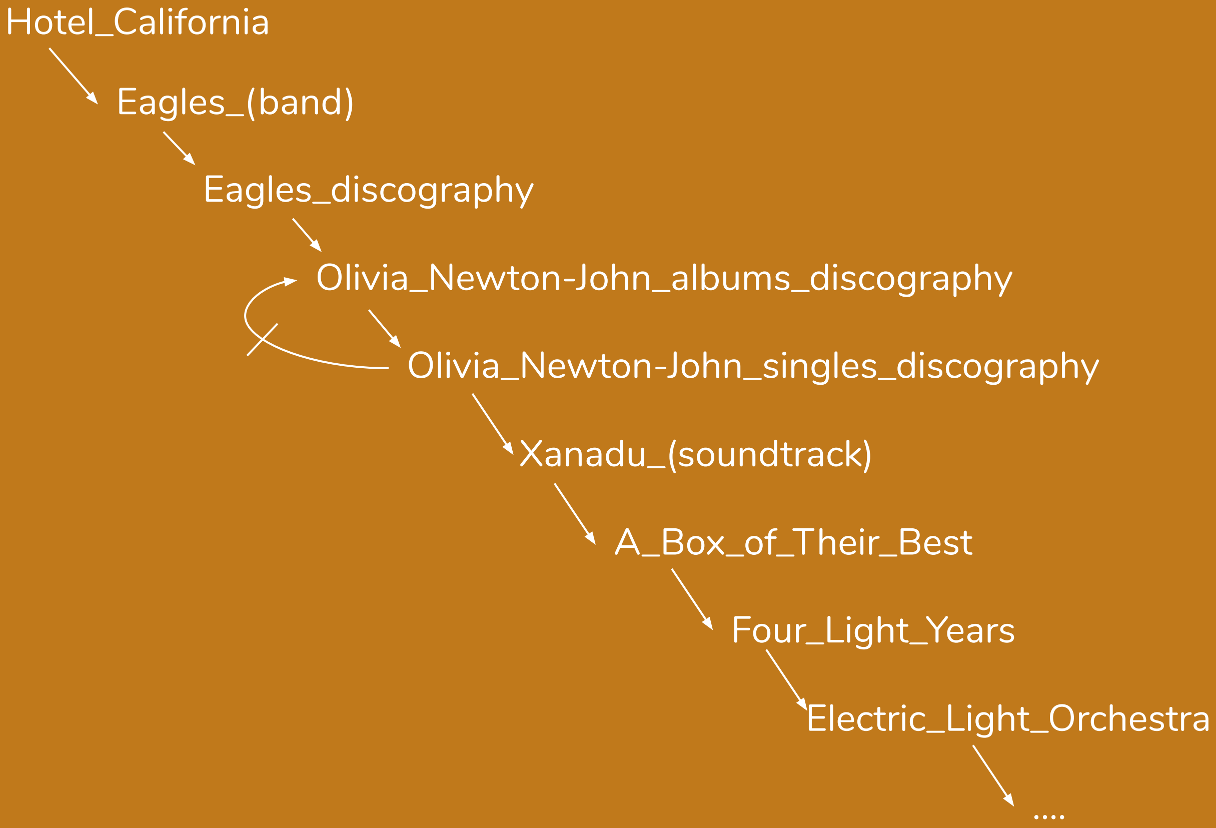
Step 8: Four_Light_Years



```
Stage-Stage-1: Map: 7  Reduce: 6   Cumulative CPU: 78.5 sec   HDFS Read: 1491015499 HDFS Write: 6230 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.39 sec   HDFS Read: 15147 HDFS Write: 772 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 20 seconds 890 msec
OK
+------------------------------------------+----------------+
|                 request                  | lp.percentage  |
+------------------------------------------+----------------+
| Electric_Light_Orchestra_discography     | 146.68         |
| Elo                                      | 144.61         |
| The_Flaming_Lips                         | 108.35         |
| Led_Zeppelin                             | 104.30         |
| Emerson,_Lake_&_Palmer                   | 103.93         |
| The_Beatles                              | 101.66         |
| Fleetwood_Mac                            | 98.28          |
| The_Moody_Blues                          | 97.88          |
| The_Pussycat_Dolls                       | 96.94          |
| Queen_(band)                             | 95.19          |
| Take_That                                | 89.16          |
| Supertramp                               | 88.70          |
| Super_Furry_Animals                      | 78.02          |
| ELO_Part_II                              | 77.29
| Daft_Punk                                | 72.24
| The_Move                                 | 71.27
| Bob_Marley                               | 70.90
| List_of_Electric_Light_Orchestra_members | 69.23
| Wizzard                                  | 63.70
| Traveling_Wilburys                       | 60.86
+------------------------------------------+-------------
20 rows selected (47.42 seconds)
```

```
0: jdbc:hive2://> SELECT request, lp.percentage
. . . . . . . . > FROM click_stream
. . . . . . . . > JOIN link_percents AS lp
. . . . . . . . >   ON request = lp.page_title
. . . . . . . . > WHERE prev = 'Electric_Light_Orchestra'
. . . . . . . . > ORDER BY lp.percentage DESC
. . . . . . . . > LIMIT 20;
```

Step 9: Electric_Light_Orchestra



Hotel_California

Eagles_(band)

Eagles_discography

Olivia_Newton-John_albums_discography

Olivia_Newton-John_singles_discography

Xanadu_(soundtrack)

A_Box_of_Their_Best

Four_Light_Years

Electric_Light_Orchestra

....

Final Path

Question 4:

Find an example of an English wikipedia article that is relatively more popular in the UK.
Find the same for the US and Australia.

Methodology

1. Determine appropriate internet activity times for each country.

2. Translate those times into UTC.

3. Determine how to split traffic in overlapping time spans.

4. Create temporary tables for each country to hold data for given time spans. Include traffic split weights.

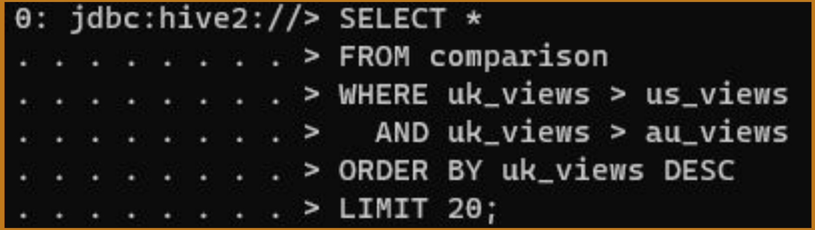
5. Multiply logged pageviews by weighted fractions and compare.

Assumptions

- People are most likely not using Wikipedia first thing in the morning or last thing at night → 10:00 AM - 8:00 PM (10:00 - 20:00).

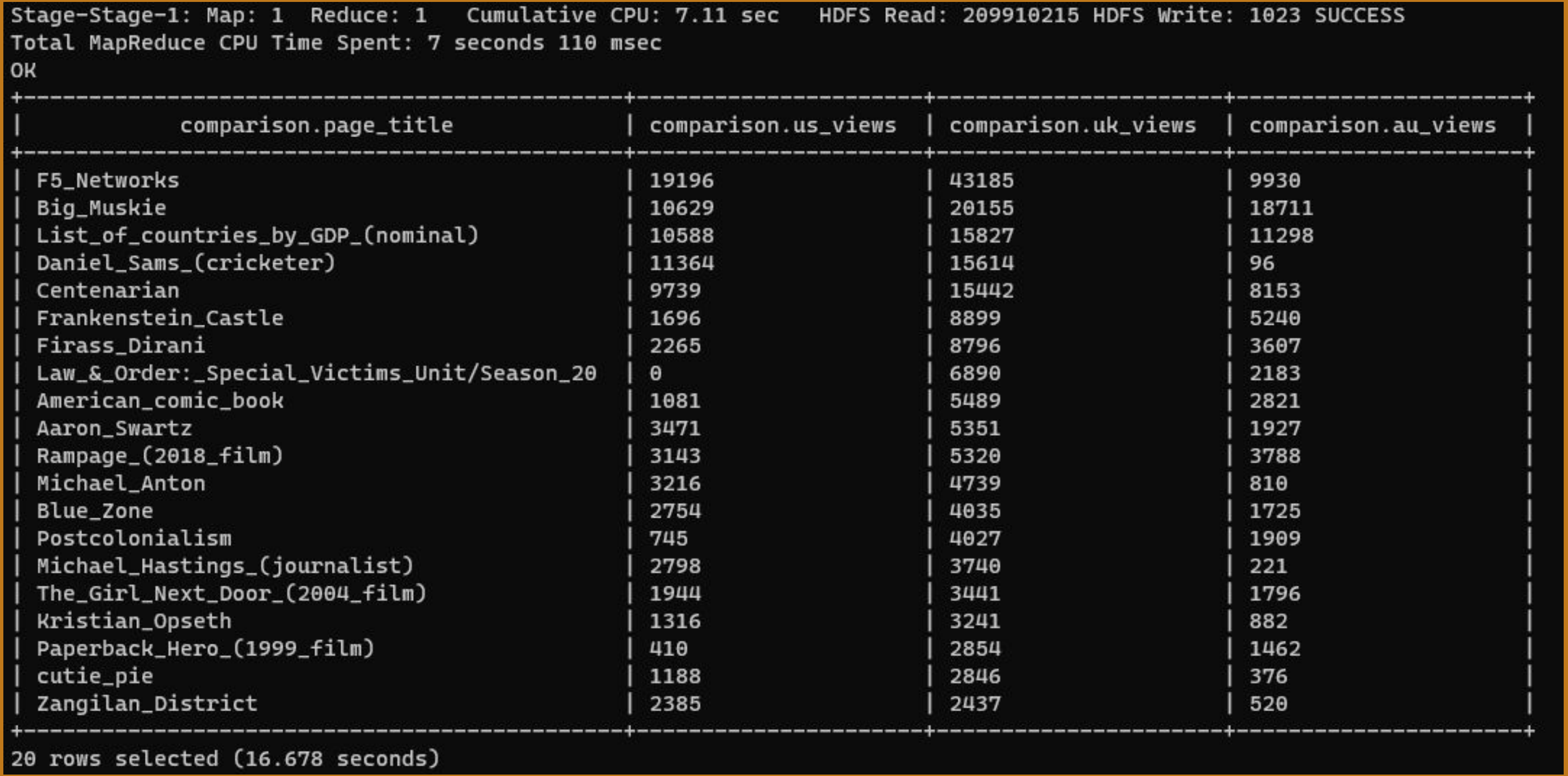
- In time periods where there is an overlap between the countries: split traffic based on ratio of populations.

- For the US and Australia (which span multiple time zones) “start” traffic at 10:00 AM in the earliest time zone and end it at 20:00 (8:00 PM) in the latest time zone.



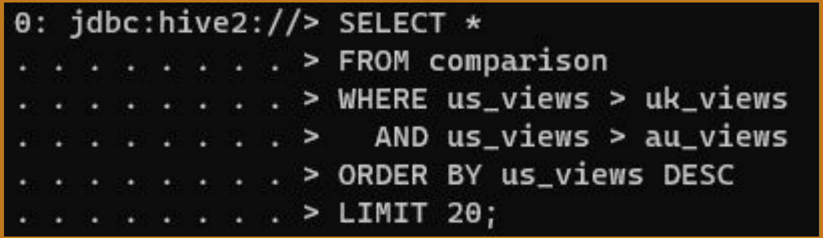
```
0: jdbc:hive2://> SELECT *
. . . . . . . . > FROM comparison
. . . . . . . . > WHERE uk_views > us_views
. . . . . . . . >   AND uk_views > au_views
. . . . . . . . > ORDER BY uk_views DESC
. . . . . . . . > LIMIT 20;
```

First SQL Statement: Popular in the UK



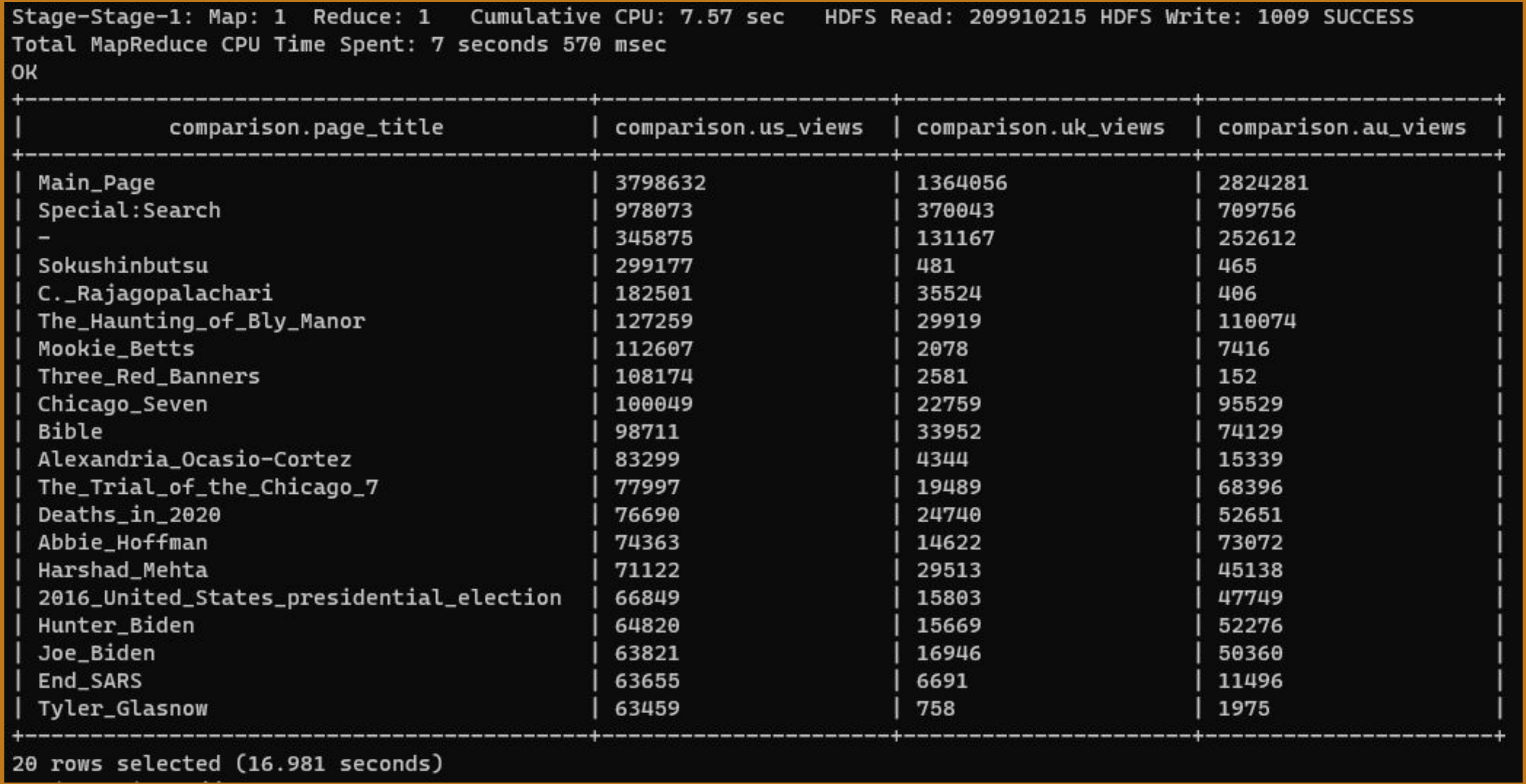
```
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 7.11 sec   HDFS Read: 209910215 HDFS Write: 1023 SUCCESS
Total MapReduce CPU Time Spent: 7 seconds 110 msec
OK
+----------------------------------------------+----------------------+----------------------+----------------------+
|             comparison.page_title             | comparison.us_views  | comparison.uk_views  | comparison.au_views  |
+----------------------------------------------+----------------------+----------------------+----------------------+
| F5_Networks                                  | 19196                | 43185                | 9930                 |
| Big_Muskie                                   | 10629                | 20155                | 18711                |
| List_of_countries_by_GDP_(nominal)           | 10588                | 15827                | 11298                |
| Daniel_Sams_(cricketer)                      | 11364                | 15614                | 96                   |
| Centenarian                                  | 9739                 | 15442                | 8153                 |
| Frankenstein_Castle                          | 1696                 | 8899                 | 5240                 |
| Firass_Dirani                                | 2265                 | 8796                 | 3607                 |
| Law_&_Order:_Special_Victims_Unit/Season_20  | 0                    | 6890                 | 2183                 |
| American_comic_book                          | 1081                 | 5489                 | 2821                 |
| Aaron_Swartz                                 | 3471                 | 5351                 | 1927                 |
| Rampage_(2018_film)                          | 3143                 | 5320                 | 3788                 |
| Michael_Anton                                | 3216                 | 4739                 | 810                  |
| Blue_Zone                                    | 2754                 | 4035                 | 1725                 |
| Postcolonialism                              | 745                  | 4027                 | 1909                 |
| Michael_Hastings_(journalist)                | 2798                 | 3740                 | 221                  |
| The_Girl_Next_Door_(2004_film)               | 1944                 | 3441                 | 1796                 |
| Kristian_Opseth                              | 1316                 | 3241                 | 882                  |
| Paperback_Hero_(1999_film)                   | 410                  | 2854                 | 1462                 |
| cutie_pie                                    | 1188                 | 2846                 | 376                  |
| Zangilan_District                            | 2385                 | 2437                 | 520                  |
+----------------------------------------------+----------------------+----------------------+----------------------+
20 rows selected (16.678 seconds)
```

First Results: More popular in the UK



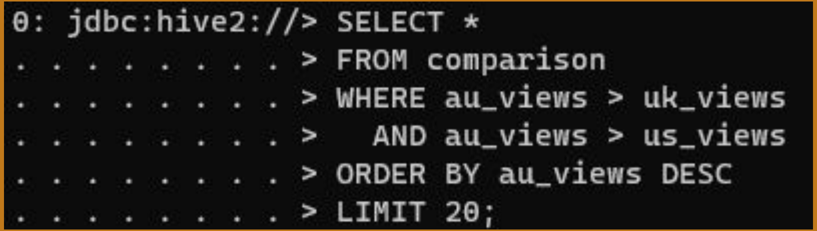
```
0: jdbc:hive2://> SELECT *
. . . . . . . . > FROM comparison
. . . . . . . . > WHERE us_views > uk_views
. . . . . . . . >   AND us_views > au_views
. . . . . . . . > ORDER BY us_views DESC
. . . . . . . . > LIMIT 20;
```

Second SQL Statement: Popular in the US



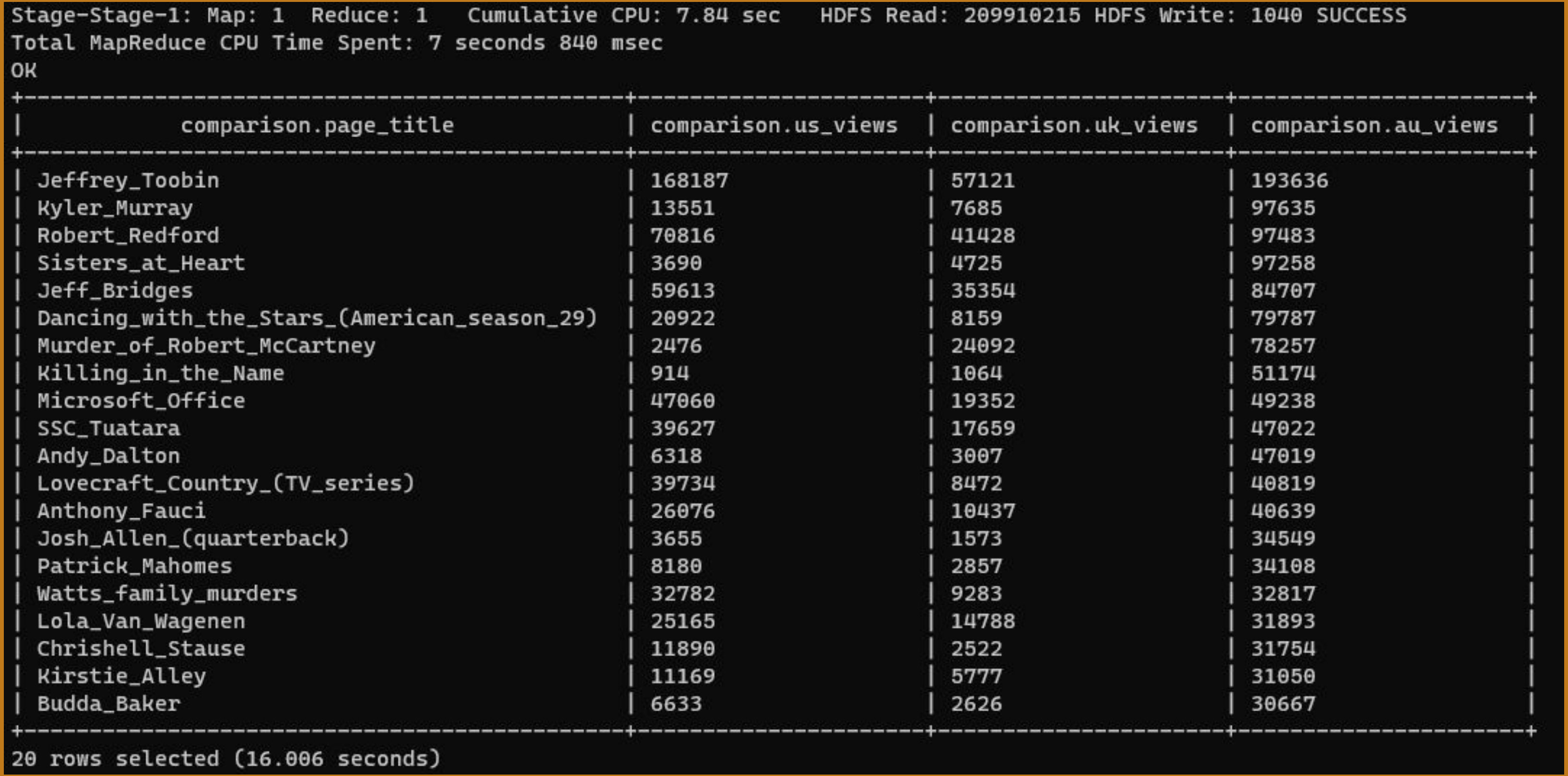
```
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 7.57 sec   HDFS Read: 209910215 HDFS Write: 1009 SUCCESS
Total MapReduce CPU Time Spent: 7 seconds 570 msec
OK
+-------------------------------------------+----------------------+----------------------+----------------------+
|           comparison.page_title           | comparison.us_views  | comparison.uk_views  | comparison.au_views  |
+-------------------------------------------+----------------------+----------------------+----------------------+
| Main_Page                                 | 3798632              | 1364056              | 2824281              |
| Special:Search                            | 978073               | 370043               | 709756               |
| -                                         | 345875               | 131167               | 252612               |
| Sokushinbutsu                             | 299177               | 481                  | 465                  |
| C._Rajagopalachari                        | 182501               | 35524                | 406                  |
| The_Haunting_of_Bly_Manor                 | 127259               | 29919                | 110074               |
| Mookie_Betts                              | 112607               | 2078                 | 7416                 |
| Three_Red_Banners                         | 108174               | 2581                 | 152                  |
| Chicago_Seven                             | 100049               | 22759                | 95529                |
| Bible                                     | 98711                | 33952                | 74129                |
| Alexandria_Ocasio-Cortez                  | 83299                | 4344                 | 15339                |
| The_Trial_of_the_Chicago_7                | 77997                | 19489                | 68396                |
| Deaths_in_2020                            | 76690                | 24740                | 52651                |
| Abbie_Hoffman                             | 74363                | 14622                | 73072                |
| Harshad_Mehta                             | 71122                | 29513                | 45138                |
| 2016_United_States_presidential_election  | 66849                | 15803                | 47749                |
| Hunter_Biden                              | 64820                | 15669                | 52276                |
| Joe_Biden                                 | 63821                | 16946                | 50360                |
| End_SARS                                  | 63655                | 6691                 | 11496                |
| Tyler_Glasnow                             | 63459                | 758                  | 1975                 |
+-------------------------------------------+----------------------+----------------------+----------------------+
20 rows selected (16.981 seconds)
```

Second Results: More popular in the US



```
0: jdbc:hive2://> SELECT *
. . . . . . . . > FROM comparison
. . . . . . . . > WHERE au_views > uk_views
. . . . . . . . >   AND au_views > us_views
. . . . . . . . > ORDER BY au_views DESC
. . . . . . . . > LIMIT 20;
```

Third SQL Statement: Popular in Australia



```
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 7.84 sec   HDFS Read: 209910215 HDFS Write: 1040 SUCCESS
Total MapReduce CPU Time Spent: 7 seconds 840 msec
OK
+----------------------------------------------+-----------------------+-----------------------+-----------------------+
|             comparison.page_title            | comparison.us_views   | comparison.uk_views   | comparison.au_views   |
+----------------------------------------------+-----------------------+-----------------------+-----------------------+
| Jeffrey_Toobin                               | 168187                | 57121                 | 193636                |
| Kyler_Murray                                 | 13551                 | 7685                  | 97635                 |
| Robert_Redford                               | 70816                 | 41428                 | 97483                 |
| Sisters_at_Heart                             | 3690                  | 4725                  | 97258                 |
| Jeff_Bridges                                 | 59613                 | 35354                 | 84707                 |
| Dancing_with_the_Stars_(American_season_29)  | 20922                 | 8159                  | 79787                 |
| Murder_of_Robert_McCartney                   | 2476                  | 24092                 | 78257                 |
| Killing_in_the_Name                          | 914                   | 1064                  | 51174                 |
| Microsoft_Office                             | 47060                 | 19352                 | 49238                 |
| SSC_Tuatara                                  | 39627                 | 17659                 | 47022                 |
| Andy_Dalton                                  | 6318                  | 3007                  | 47019                 |
| Lovecraft_Country_(TV_series)                | 39734                 | 8472                  | 40819                 |
| Anthony_Fauci                                | 26076                 | 10437                 | 40639                 |
| Josh_Allen_(quarterback)                     | 3655                  | 1573                  | 34549                 |
| Patrick_Mahomes                              | 8180                  | 2857                  | 34108                 |
| Watts_family_murders                         | 32782                 | 9283                  | 32817                 |
| Lola_Van_Wagenen                             | 25165                 | 14788                 | 31893                 |
| Chrishell_Stause                             | 11890                 | 2522                  | 31754                 |
| Kirstie_Alley                                | 11169                 | 5777                  | 31050                 |
| Budda_Baker                                  | 6633                  | 2626                  | 30667                 |
+----------------------------------------------+-----------------------+-----------------------+-----------------------+
20 rows selected (16.006 seconds)
```

Third Results: More popular in Australia

Question 5:

How many users will see the average vandalized wikipedia page before the offending edit is reversed?

Methodology

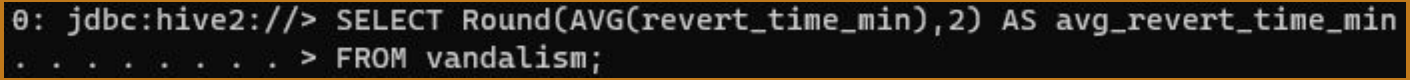
1. Collect pertinent subset of data from the massive revision data file (i.e. page_title, revision_seconds_to_identity_revert) and the total pageviews aggregation.

2. Transform the gathered data into necessary data format: average revert time in minutes, average number of pageviews per minute.

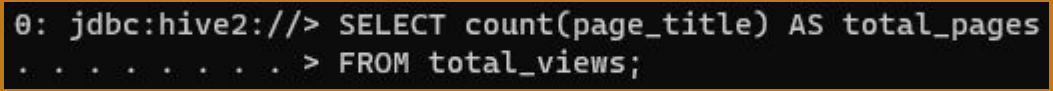
Assumptions

- Average view per page per minute is calculated by summing total_views of all pages in enwiki and dividing by the number of minutes represented (i.e. 32 hours = 1920 minutes).

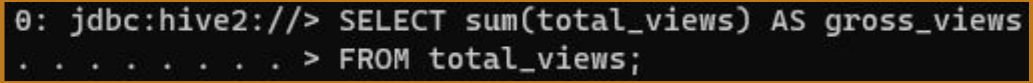
- In a more thorough analysis, we would match up page_title from the pageviews data and the page_title from our revision data for a better data match.



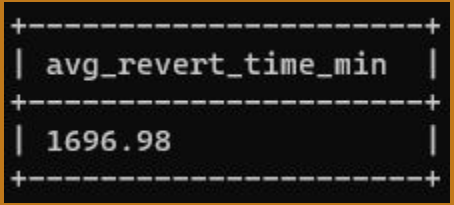
```
0: jdbc:hive2://> SELECT Round(AVG(revert_time_min),2) AS avg_revert_time_min
. . . . . . . . > FROM vandalism;
```



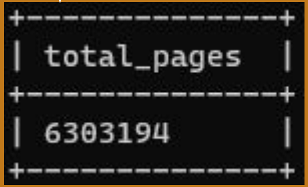
```
0: jdbc:hive2://> SELECT count(page_title) AS total_pages
. . . . . . . . > FROM total_views;
```



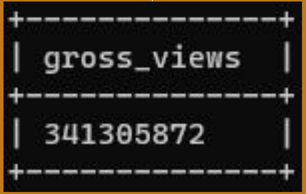
```
0: jdbc:hive2://> SELECT sum(total_views) AS gross_views
. . . . . . . . > FROM total_views;
```



```
+----------------------+
| avg_revert_time_min  |
+----------------------+
| 1696.98              |
+----------------------+
```



```
+--------------+
| total_pages  |
+--------------+
| 6303194      |
+--------------+
```



```
+--------------+
| gross_views  |
+--------------+
| 341305872    |
+--------------+
```

total_time
32 hours x 60 min =
1920

[(gross_views/total_pages) / mins in dataset] x avg_revert_time_min

[(341305872 / 6303194) / 1920] * 1696.98 =

~48 views before reversion.

Data Calculations

Question 6:

Run an analysis you find interesting on the wikipedia datasets we're using.

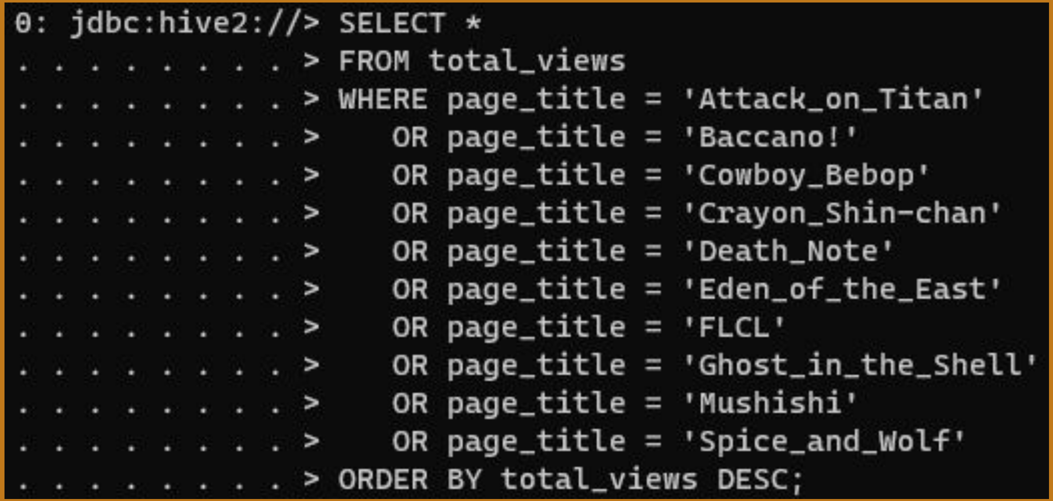
My Selection:

Which of my favorite 10 animes has the highest view total?

Methodology

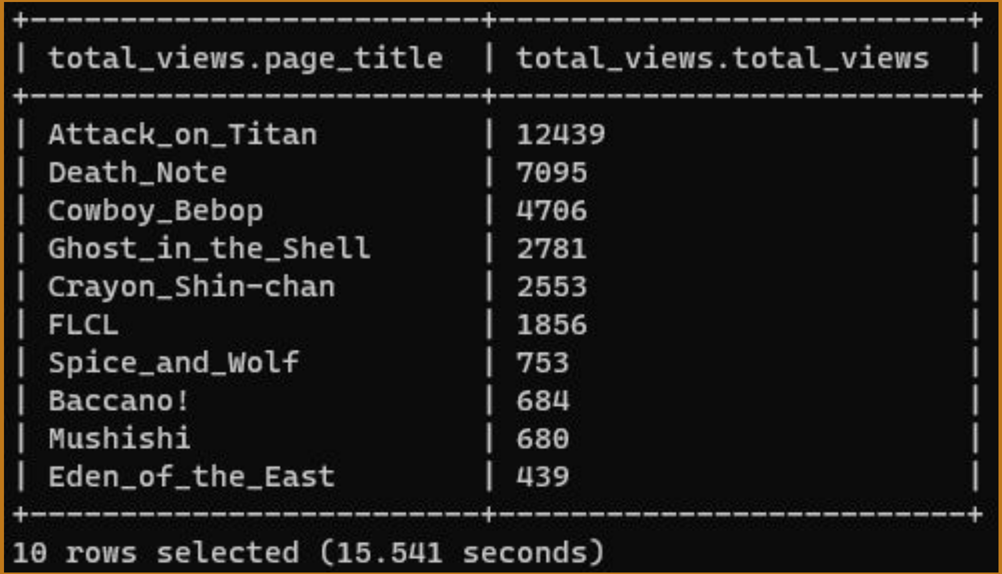
Similar to question one, I’ll check and compare the total pageviews of 10 of my favorite anime shows, which are:

1. Attack on Titan
2. Baccano!
3. Cowboy Bebop
4. Crayon Shin-chan
5. Death Note
6. Eden of the East
7. FLCL
8. Ghost in the Shell
9. Mushishi
10. Spice and Wolf



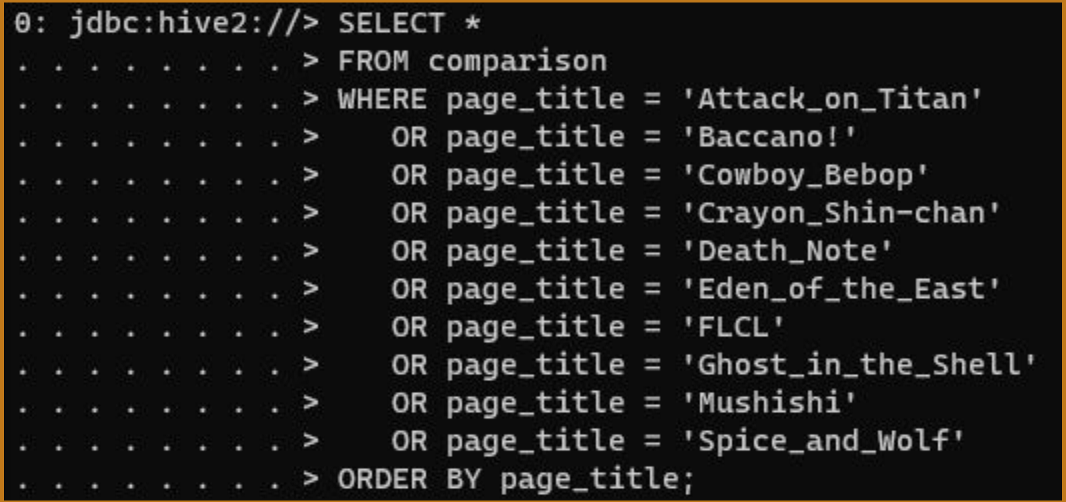
```
0: jdbc:hive2://> SELECT *
. . . . . . . . > FROM total_views
. . . . . . . . > WHERE page_title = 'Attack_on_Titan'
. . . . . . . . >    OR page_title = 'Baccano!'
. . . . . . . . >    OR page_title = 'Cowboy_Bebop'
. . . . . . . . >    OR page_title = 'Crayon_Shin-chan'
. . . . . . . . >    OR page_title = 'Death_Note'
. . . . . . . . >    OR page_title = 'Eden_of_the_East'
. . . . . . . . >    OR page_title = 'FLCL'
. . . . . . . . >    OR page_title = 'Ghost_in_the_Shell'
. . . . . . . . >    OR page_title = 'Mushishi'
. . . . . . . . >    OR page_title = 'Spice_and_Wolf'
. . . . . . . . > ORDER BY total_views DESC;
```

Compound SQL Query



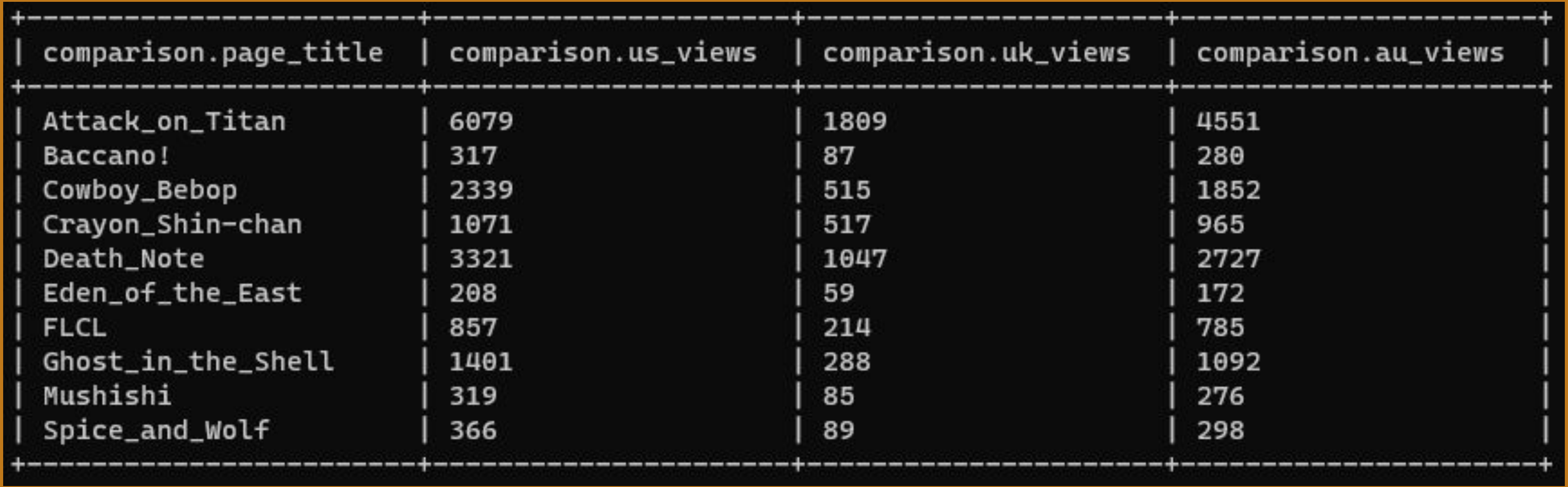
```
+-------------------------+---------------------------+
| total_views.page_title  | total_views.total_views   |
+-------------------------+---------------------------+
| Attack_on_Titan         | 12439                     |
| Death_Note              | 7095                      |
| Cowboy_Bebop            | 4706                      |
| Ghost_in_the_Shell      | 2781                      |
| Crayon_Shin-chan        | 2553                      |
| FLCL                    | 1856                      |
| Spice_and_Wolf          | 753                       |
| Baccano!                | 684                       |
| Mushishi                | 680                       |
| Eden_of_the_East        | 439                       |
+-------------------------+---------------------------+
10 rows selected (15.541 seconds)
```

Results



```
0: jdbc:hive2://> SELECT *
. . . . . . . . > FROM comparison
. . . . . . . . > WHERE page_title = 'Attack_on_Titan'
. . . . . . . . >    OR page_title = 'Baccano!'
. . . . . . . . >    OR page_title = 'Cowboy_Bebop'
. . . . . . . . >    OR page_title = 'Crayon_Shin-chan'
. . . . . . . . >    OR page_title = 'Death_Note'
. . . . . . . . >    OR page_title = 'Eden_of_the_East'
. . . . . . . . >    OR page_title = 'FLCL'
. . . . . . . . >    OR page_title = 'Ghost_in_the_Shell'
. . . . . . . . >    OR page_title = 'Mushishi'
. . . . . . . . >    OR page_title = 'Spice_and_Wolf'
. . . . . . . . > ORDER BY page_title;
```

Compound SQL Query



```
+------------------------+----------------------+----------------------+----------------------+
| comparison.page_title  | comparison.us_views  | comparison.uk_views  | comparison.au_views  |
+------------------------+----------------------+----------------------+----------------------+
| Attack_on_Titan        | 6079                 | 1809                 | 4551                 |
| Baccano!               | 317                  | 87                   | 280                  |
| Cowboy_Bebop           | 2339                 | 515                  | 1852                 |
| Crayon_Shin-chan       | 1071                 | 517                  | 965                  |
| Death_Note             | 3321                 | 1047                 | 2727                 |
| Eden_of_the_East       | 208                  | 59                   | 172                  |
| FLCL                   | 857                  | 214                  | 785                  |
| Ghost_in_the_Shell     | 1401                 | 288                  | 1092                 |
| Mushishi               | 319                  | 85                   | 276                  |
| Spice_and_Wolf         | 366                  | 89                   | 298                  |
+------------------------+----------------------+----------------------+----------------------+
```

Results

Github Repository

https://github.com/sean-horner/revature_project_1.git

Questions?