Six Degrees of Kevin Bacon

Introduction - Six Degrees of Kevin Bacon is a game based on the "six degrees of separation" concept, which posits that any two people on Earth are six or fewer acquaintance links apart. Movie buffs challenge each other to find the shortest path between an arbitrary actor and prolific actor Kevin Bacon. It rests on the assumption that anyone involved in the film industry can be linked through their film roles to Bacon within six steps. The analysis of social networks can be a computationally intensive task, especially when dealing with large volumes of data. It is also a challenging problem to devise a correct methodology to infer an informative social network structure. Here, we will analyze a social network of actors and actresses that co-participated in movies. We will do some simple descriptive analysis, and in the end try to relate an actor/actress's position in the social network with the success of the movies in which they participate.

Rules & Notes - Please take your time to read the following points:

1. The submission deadline will be set for the 30th of May at 23:59h.
2. It is acceptable that you **discuss** with your colleagues different approaches to solve each step of the problem set, but the assignment is individual. That is, you are responsible for writing your own code, and analyzing the results. Clear cases of cheating will be penalized with 0 points in this assignment.
3. After review of your submission files, and before a mark is attributed, you might be called to orally defend your submission.
4. You will be scored first and foremost by the number of correct answers, secondly by the logic used in trying to approach each step of the problem set.
5. You can add as many cells as you like to answer the questions.
6. It is also important you clearly indicate what your final answer to each question is when you are using multiple cells (for example you can use `print("My final anwser is:")` before your answer or use cell comments).
7. Consider skipping questions that you are stuck on, and get back to them later.
8. Expect computations to take a few minutes to finish in some of the steps.
9. It is recommended you read the whole assignment before starting.
10. You can make use of caching or persisting your RDDs or Dataframes, this may speed up performance. You do not need to cache every dataframe, but usually you want to do this at least once after the data has been imported.
11. If you have trouble with graphframes in databricks (specifically the import statement) you need to make sure the graphframes package is installed on the cluster you are running. If you click home on the left, then click on the graphframes library which you loaded in Lab 11 you can install the package on your cluster (check the graphframes checkbox and click install)
12. Be careful, you must not 'Publish' this notebook in databricks.
13. **IMPORTANT** It is expected you have developed skills beyond writing SQL queries. Any question where you directly write a SQL query (by for example creating a temporary view and then using spark.sql to pass the query) will receive a 25% penalty. Using the spark syntax (for example dataframe.select("*").where("conditions")) is acceptable and does not incur this penalty.
14. **Questions** – Any questions about this assignment should be posted in the Forum@Moodle. Questions by e-mail will not be answered. The lab will run at the normal time. During this period you can ask any questions you have about the exam (we can't provide you the actual answers of course, but there may be helpful tips if you are stuck on any of the steps). As such, it is probably useful to attempt the assignment before the scheduled lab.
15. **Delivery** - To fulfil this activity you will have to upload the following materials to Moodle:

- An exported IPython notebook. From the menu at the top, select 'File', then 'Export', then 'IPython Notebook', to download the notebook. The notebook should be solved (have results displayed), but should contain all necessary code so that when the notebook is run in databricks it should also replicate these results. This means that all data downloading and processing should be done in this notebook. It is also important you clearly indicate where your final answer to each question is when you are using multiple cells (for example you can us `print("My final answer is:")` before your answer or use cell comments).
- A PDF version of your code and answers. There are a couple of ways you can do this. You can convert the downloaded IPython Notebook to pdf (check out nbconvert if you have Jupyter notebook), or you can just copy your code and answers into a word file and save as pdf, or finally you can take screenshots of each page of the notebook and put them into a word file and save it as pdf. It is important that all code and aswers are visible in this pdf.
- You will also need to provide a signed statement of authorship, which is available on Moodle.

Data Sources and Description

We will use data from IMDB. You can download raw datafiles from https://datasets.imdbws.com (https://datasets.imdbws.com). Note that the files are tab delimited (.tsv) You can find a description of the each datafile in https://www.imdb.com/interfaces/ (https://www.imdb.com/interfaces/)

Questions

Data loading and preperation

Review the file descriptions and load the necessary data onto your databricks cluser and into spark dataframes or rdds. You will need to use shell commands to download the data, unzip the data, load the data into spark. Note that the data might require parsing and preprocessing to be ready for the questions below.

Hints You can use `gunzip` to unzip the .tz files. The data files will then be tab seperated (.tsv), which you can load into a dataframe using the tab seperated option instead of the comma seperated option we have typically used in class: `.option("sep","\t")`

In [3]:
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%sh wget https://datasets.imdbws.com/name.basics.tsv.gz
%sh
gunzip name.basics.tsv.gz
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--2020-05-31 14:07:15--  https://datasets.imdbws.com/name.basics.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.37, 13.224.13.54,
13.224.13.26, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.37|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 197672123 (189M) [binary/octet-stream]
Saving to: ‘name.basics.tsv.gz’

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11550K .......... .......... .......... .......... ..........  6%  254M 2s
11600K .......... .......... .......... .......... ..........  6%  289M 2s
11650K .......... .......... .......... .......... ..........  6%  125M 2s
11700K .......... .......... .......... .......... ..........  6%  148M 2s
11750K .......... .......... .......... .......... ..........  6%  143M 2s
11800K .......... .......... .......... .......... ..........  6%  151M 2s
11850K .......... .......... .......... .......... ..........  6%  128M 2s
11900K .......... .......... .......... .......... ..........  6%  143M 2s
11950K .......... .......... .......... .......... ..........  6%  244M 2s
12000K .......... .......... .......... .......... ..........  6%  183M 2s
12050K .......... .......... .......... .......... ..........  6%  169M 2s
12100K .......... .......... .......... .......... ..........  6%  193M 2s
12150K .......... .......... .......... .......... ..........  6%  194M 2s
12200K .......... .......... .......... .......... ..........  6%  205M 2s
12250K .......... .......... .......... .......... ..........  6%  165M 2s
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12300K .......... .......... .......... .......... ..........  6%  147M 2s
12350K .......... .......... .......... .......... ..........  6%  182M 2s
12400K .......... .......... .......... .......... ..........  6%  135M 2s
12450K .......... .......... .......... .......... ..........  6%  115M 2s
12500K .......... .......... .......... .......... ..........  6%  141M 2s
12550K .......... .......... .......... .......... ..........  6%  145M 2s
12600K .......... .......... .......... .......... ..........  6%  222M 2s
12650K .......... .......... .......... .......... ..........  6%  129M 2s
12700K .......... .......... .......... .......... ..........  6%  232M 2s
12750K .......... .......... .......... .......... ..........  6%  192M 2s
12800K .......... .......... .......... .......... ..........  6%  178M 2s
12850K .......... .......... .......... .......... ..........  6%  191M 2s
12900K .......... .......... .......... .......... ..........  6%  188M 2s
12950K .......... .......... .......... .......... ..........  6%  165M 2s
13000K .......... .......... .......... .......... ..........  6%  174M 2s
13050K .......... .......... .......... .......... ..........  6%  108M 2s
13100K .......... .......... .......... .......... ..........  6%  151M 2s
13150K .......... .......... .......... .......... ..........  6%  149M 2s
13200K .......... .......... .......... .......... ..........  6%  147M 2s
13250K .......... .......... .......... .......... ..........  6%  128M 2s
13300K .......... .......... .......... .......... ..........  6%  165M 2s
13350K .......... .......... .......... .......... ..........  6% 69.7M 2s
13400K .......... .......... .......... .......... ..........  6% 76.1M 2s
13450K .......... .......... .......... .......... ..........  6% 96.1M 2s
13500K .......... .......... .......... .......... ..........  7%  116M 2s
13550K .......... .......... .......... .......... ..........  7% 98.8M 2s
13600K .......... .......... .......... .......... ..........  7%  105M 2s
13650K .......... .......... .......... .......... ..........  7% 95.1M 2s
13700K .......... .......... .......... .......... ..........  7%  131M 2s
13750K .......... .......... .......... .......... ..........  7% 80.8M 2s
13800K .......... .......... .......... .......... ..........  7% 93.3M 2s
13850K .......... .......... .......... .......... ..........  7% 97.2M 2s
13900K .......... .......... .......... .......... ..........  7%  155M 2s
13950K .......... .......... .......... .......... ..........  7%  150M 2s
14000K .......... .......... .......... .......... ..........  7%  134M 2s
14050K .......... .......... .......... .......... ..........  7%  137M 2s
14100K .......... .......... .......... .......... ..........  7%  114M 2s
14150K .......... .......... .......... .......... ..........  7% 69.6M 2s
14200K .......... .......... .......... .......... ..........  7% 93.4M 2s
14250K .......... .......... .......... .......... ..........  7%  124M 2s
14300K .......... .......... .......... .......... ..........  7%  120M 2s
14350K .......... .......... .......... .......... ..........  7%  153M 2s
14400K .......... .......... .......... .......... ..........  7%  115M 2s
14450K .......... .......... .......... .......... ..........  7%  139M 2s
14500K .......... .......... .......... .......... ..........  7%  145M 2s
14550K .......... .......... .......... .......... ..........  7%  125M 2s
14600K .......... .......... .......... .......... ..........  7%  141M 2s
14650K .......... .......... .......... .......... ..........  7%  131M 2s
14700K .......... .......... .......... .......... ..........  7%  142M 2s
14750K .......... .......... .......... .......... ..........  7%  152M 2s
14800K .......... .......... .......... .......... ..........  7%  141M 2s
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 14850K .......... .......... .......... .......... ..........  7%  115M 2s
 14900K .......... .......... .......... .......... ..........  7%  139M 2s
 14950K .......... .......... .......... .......... ..........  7%  133M 2s
 15000K .......... .......... .......... .......... ..........  7%  148M 2s
 15050K .......... .......... .......... .......... ..........  7%  121M 2s
 15100K .......... .......... .......... .......... ..........  7%  159M 2s
 15150K .......... .......... .......... .......... ..........  7%  120M 2s
 15200K .......... .......... .......... .......... ..........  7% 87.6M 2s
 15250K .......... .......... .......... .......... ..........  7%  138M 2s
 15300K .......... .......... .......... .......... ..........  7%  111M 2s
 15350K .......... .......... .......... .......... ..........  7%  138M 2s
 15400K .......... .......... .......... .......... ..........  8% 96.6M 2s
 15450K .......... .......... .......... .......... ..........  8%  122M 2s
 15500K .......... .......... .......... .......... ..........  8%  149M 2s
 15550K .......... .......... .......... .......... ..........  8%  138M 2s
 15600K .......... .......... .......... .......... ..........  8% 99.0M 2s
 15650K .......... .......... .......... .......... ..........  8%  126M 2s
 15700K .......... .......... .......... .......... ..........  8%  141M 2s
 15750K .......... .......... .......... .......... ..........  8%  125M 2s
 15800K .......... .......... .......... .......... ..........  8%  140M 2s
 15850K .......... .......... .......... .......... ..........  8%  125M 2s
 15900K .......... .......... .......... .......... ..........  8%  122M 2s
 15950K .......... .......... .......... .......... ..........  8%  196M 2s
 16000K .......... .......... .......... .......... ..........  8%  136M 2s
 16050K .......... .......... .......... .......... ..........  8%  124M 2s
 16100K .......... .......... .......... .......... ..........  8%  116M 2s
 16150K .......... .......... .......... .......... ..........  8%  124M 2s

*** WARNING: skipped 244036 bytes of output ***

176750K .......... .......... .......... .......... .......... 91%  146M 0s
176800K .......... .......... .......... .......... .......... 91%  208M 0s
176850K .......... .......... .......... .......... .......... 91%  205M 0s
176900K .......... .......... .......... .......... .......... 91%  193M 0s
176950K .......... .......... .......... .......... .......... 91%  169M 0s
177000K .......... .......... .......... .......... .......... 91%  242M 0s
177050K .......... .......... .......... .......... .......... 91% 96.7M 0s
177100K .......... .......... .......... .......... .......... 91%  130M 0s
177150K .......... .......... .......... .......... .......... 91%  146M 0s
177200K .......... .......... .......... .......... .......... 91%  119M 0s
177250K .......... .......... .......... .......... .......... 91%  141M 0s
177300K .......... .......... .......... .......... .......... 91%  165M 0s
177350K .......... .......... .......... .......... .......... 91%  185M 0s
177400K .......... .......... .......... .......... .......... 91%  178M 0s
177450K .......... .......... .......... .......... .......... 91%  170M 0s
177500K .......... .......... .......... .......... .......... 91%  233M 0s
177550K .......... .......... .......... .......... .......... 92%  244M 0s
177600K .......... .......... .......... .......... .......... 92%  291M 0s
177650K .......... .......... .......... .......... .......... 92%  291M 0s
177700K .......... .......... .......... .......... .......... 92%  267M 0s
177750K .......... .......... .......... .......... .......... 92%  111M 0s
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177800K .......... .......... .......... .......... .......... 92% 82.4M 0s
177850K .......... .......... .......... .......... .......... 92%  132M 0s
177900K .......... .......... .......... .......... .......... 92%  117M 0s
177950K .......... .......... .......... .......... .......... 92%  152M 0s
178000K .......... .......... .......... .......... .......... 92%  149M 0s
178050K .......... .......... .......... .......... .......... 92%  148M 0s
178100K .......... .......... .......... .......... .......... 92%  146M 0s
178150K .......... .......... .......... .......... .......... 92%  132M 0s
178200K .......... .......... .......... .......... .......... 92%  149M 0s
178250K .......... .......... .......... .......... .......... 92%  202M 0s
178300K .......... .......... .......... .......... .......... 92%  109M 0s
178350K .......... .......... .......... .......... .......... 92%  266M 0s
178400K .......... .......... .......... .......... .......... 92%  167M 0s
178450K .......... .......... .......... .......... .......... 92%  167M 0s
178500K .......... .......... .......... .......... .......... 92%  180M 0s
178550K .......... .......... .......... .......... .......... 92%  182M 0s
178600K .......... .......... .......... .......... .......... 92%  167M 0s
178650K .......... .......... .......... .......... .......... 92%  167M 0s
178700K .......... .......... .......... .......... .......... 92%  231M 0s
178750K .......... .......... .......... .......... .......... 92%  168M 0s
178800K .......... .......... .......... .......... .......... 92%  245M 0s
178850K .......... .......... .......... .......... .......... 92%  289M 0s
178900K .......... .......... .......... .......... .......... 92%  225M 0s
178950K .......... .......... .......... .......... .......... 92%  296M 0s
179000K .......... .......... .......... .......... .......... 92%  197M 0s
179050K .......... .......... .......... .......... .......... 92%  137M 0s
179100K .......... .......... .......... .......... .......... 92%  111M 0s
179150K .......... .......... .......... .......... .......... 92%  117M 0s
179200K .......... .......... .......... .......... .......... 92%  137M 0s
179250K .......... .......... .......... .......... .......... 92%  173M 0s
179300K .......... .......... .......... .......... .......... 92%  160M 0s
179350K .......... .......... .......... .......... .......... 92%  173M 0s
179400K .......... .......... .......... .......... .......... 92%  138M 0s
179450K .......... .......... .......... .......... .......... 92%  153M 0s
179500K .......... .......... .......... .......... .......... 93%  138M 0s
179550K .......... .......... .......... .......... .......... 93%  204M 0s
179600K .......... .......... .......... .......... .......... 93%  189M 0s
179650K .......... .......... .......... .......... .......... 93%  171M 0s
179700K .......... .......... .......... .......... .......... 93%  125M 0s
179750K .......... .......... .......... .......... .......... 93%  187M 0s
179800K .......... .......... .......... .......... .......... 93%  155M 0s
179850K .......... .......... .......... .......... .......... 93%  169M 0s
179900K .......... .......... .......... .......... .......... 93%  138M 0s
179950K .......... .......... .......... .......... .......... 93%  152M 0s
180000K .......... .......... .......... .......... .......... 93%  162M 0s
180050K .......... .......... .......... .......... .......... 93%  158M 0s
180100K .......... .......... .......... .......... .......... 93%  158M 0s
180150K .......... .......... .......... .......... .......... 93%  182M 0s
180200K .......... .......... .......... .......... .......... 93%  181M 0s
180250K .......... .......... .......... .......... .......... 93%  161M 0s
180300K .......... .......... .......... .......... .......... 93%  122M 0s
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180350K .......... .......... .......... .......... .......... 93%  155M 0s
180400K .......... .......... .......... .......... .......... 93%  143M 0s
180450K .......... .......... .......... .......... .......... 93%  110M 0s
180500K .......... .......... .......... .......... .......... 93%  127M 0s
180550K .......... .......... .......... .......... .......... 93%  116M 0s
180600K .......... .......... .......... .......... .......... 93%  103M 0s
180650K .......... .......... .......... .......... .......... 93% 98.1M 0s
180700K .......... .......... .......... .......... .......... 93% 89.4M 0s
180750K .......... .......... .......... .......... .......... 93% 72.8M 0s
180800K .......... .......... .......... .......... .......... 93%  118M 0s
180850K .......... .......... .......... .......... .......... 93%  123M 0s
180900K .......... .......... .......... .......... .......... 93%  104M 0s
180950K .......... .......... .......... .......... .......... 93%  169M 0s
181000K .......... .......... .......... .......... .......... 93%  108M 0s
181050K .......... .......... .......... .......... .......... 93%  154M 0s
181100K .......... .......... .......... .......... .......... 93%  157M 0s
181150K .......... .......... .......... .......... .......... 93%  185M 0s
181200K .......... .......... .......... .......... .......... 93%  157M 0s
181250K .......... .......... .......... .......... .......... 93%  156M 0s
181300K .......... .......... .......... .......... .......... 93%  145M 0s
181350K .......... .......... .......... .......... .......... 93%  187M 0s
181400K .......... .......... .......... .......... .......... 93%  160M 0s
181450K .......... .......... .......... .......... .......... 94%  189M 0s
181500K .......... .......... .......... .......... .......... 94%  155M 0s
181550K .......... .......... .......... .......... .......... 94%  188M 0s
181600K .......... .......... .......... .......... .......... 94%  191M 0s
181650K .......... .......... .......... .......... .......... 94%  194M 0s
181700K .......... .......... .......... .......... .......... 94%  167M 0s
181750K .......... .......... .......... .......... .......... 94%  171M 0s
181800K .......... .......... .......... .......... .......... 94%  191M 0s
181850K .......... .......... .......... .......... .......... 94%  193M 0s
181900K .......... .......... .......... .......... .......... 94%  161M 0s
181950K .......... .......... .......... .......... .......... 94%  189M 0s
182000K .......... .......... .......... .......... .......... 94%  168M 0s
182050K .......... .......... .......... .......... .......... 94%  154M 0s
182100K .......... .......... .......... .......... .......... 94%  161M 0s
182150K .......... .......... .......... .......... .......... 94%  203M 0s
182200K .......... .......... .......... .......... .......... 94%  281M 0s
182250K .......... .......... .......... .......... .......... 94%  241M 0s
182300K .......... .......... .......... .......... .......... 94%  164M 0s
182350K .......... .......... .......... .......... .......... 94%  282M 0s
182400K .......... .......... .......... .......... .......... 94%  256M 0s
182450K .......... .......... .......... .......... .......... 94%  290M 0s
182500K .......... .......... .......... .......... .......... 94%  270M 0s
182550K .......... .......... .......... .......... .......... 94%  267M 0s
182600K .......... .......... .......... .......... .......... 94%  270M 0s
182650K .......... .......... .......... .......... .......... 94%  283M 0s
182700K .......... .......... .......... .......... .......... 94%  142M 0s
182750K .......... .......... .......... .......... .......... 94%  182M 0s
182800K .......... .......... .......... .......... .......... 94%  185M 0s
182850K .......... .......... .......... .......... .......... 94%  294M 0s
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182900K .......... .......... .......... .......... .......... 94% 63.6M 0s
182950K .......... .......... .......... .......... .......... 94%  137M 0s
183000K .......... .......... .......... .......... .......... 94%  152M 0s
183050K .......... .......... .......... .......... .......... 94%  142M 0s
183100K .......... .......... .......... .......... .......... 94%  127M 0s
183150K .......... .......... .......... .......... .......... 94%  152M 0s
183200K .......... .......... .......... .......... .......... 94%  107M 0s
183250K .......... .......... .......... .......... .......... 94%  180M 0s
183300K .......... .......... .......... .......... .......... 94%  116M 0s
183350K .......... .......... .......... .......... .......... 95% 64.9M 0s
183400K .......... .......... .......... .......... .......... 95%  137M 0s
183450K .......... .......... .......... .......... .......... 95%  126M 0s
183500K .......... .......... .......... .......... .......... 95% 99.6M 0s
183550K .......... .......... .......... .......... .......... 95%  136M 0s
183600K .......... .......... .......... .......... .......... 95%  122M 0s
183650K .......... .......... .......... .......... .......... 95%  103M 0s
183700K .......... .......... .......... .......... .......... 95%  100M 0s
183750K .......... .......... .......... .......... .......... 95% 51.5M 0s
183800K .......... .......... .......... .......... .......... 95%  132M 0s
183850K .......... .......... .......... .......... .......... 95%  149M 0s
183900K .......... .......... .......... .......... .......... 95%  124M 0s
183950K .......... .......... .......... .......... .......... 95%  160M 0s
184000K .......... .......... .......... .......... .......... 95%  113M 0s
184050K .......... .......... .......... .......... .......... 95% 73.3M 0s
184100K .......... .......... .......... .......... .......... 95%  108M 0s
184150K .......... .......... .......... .......... .......... 95%  148M 0s
184200K .......... .......... .......... .......... .......... 95%  132M 0s
184250K .......... .......... .......... .......... .......... 95% 73.3M 0s
184300K .......... .......... .......... .......... .......... 95%  101M 0s
184350K .......... .......... .......... .......... .......... 95%  148M 0s
184400K .......... .......... .......... .......... .......... 95%  155M 0s
184450K .......... .......... .......... .......... .......... 95%  149M 0s
184500K .......... .......... .......... .......... .......... 95%  144M 0s
184550K .......... .......... .......... .......... .......... 95%  148M 0s
184600K .......... .......... .......... .......... .......... 95%  147M 0s
184650K .......... .......... .......... .......... .......... 95%  152M 0s
184700K .......... .......... .......... .......... .......... 95%  128M 0s
184750K .......... .......... .......... .......... .......... 95%  145M 0s
184800K .......... .......... .......... .......... .......... 95%  153M 0s
184850K .......... .......... .......... .......... .......... 95%  159M 0s
184900K .......... .......... .......... .......... .......... 95%  138M 0s
184950K .......... .......... .......... .......... .......... 95%  160M 0s
185000K .......... .......... .......... .......... .......... 95%  109M 0s
185050K .......... .......... .......... .......... .......... 95%  126M 0s
185100K .......... .......... .......... .......... .......... 95%  102M 0s
185150K .......... .......... .......... .......... .......... 95%  126M 0s
185200K .......... .......... .......... .......... .......... 95%  103M 0s
185250K .......... .......... .......... .......... .......... 95%  169M 0s
185300K .......... .......... .......... .......... .......... 96% 96.0M 0s
185350K .......... .......... .......... .......... .......... 96%  143M 0s
185400K .......... .......... .......... .......... .......... 96%  135M 0s
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185450K .......... .......... .......... .......... .......... 96%  156M 0s
185500K .......... .......... .......... .......... .......... 96%  131M 0s
185550K .......... .......... .......... .......... .......... 96%  158M 0s
185600K .......... .......... .......... .......... .......... 96%  154M 0s
185650K .......... .......... .......... .......... .......... 96%  114M 0s
185700K .......... .......... .......... .......... .......... 96% 99.0M 0s
185750K .......... .......... .......... .......... .......... 96%  139M 0s
185800K .......... .......... .......... .......... .......... 96%  155M 0s
185850K .......... .......... .......... .......... .......... 96%  134M 0s
185900K .......... .......... .......... .......... .......... 96%  114M 0s
185950K .......... .......... .......... .......... .......... 96% 99.0M 0s
186000K .......... .......... .......... .......... .......... 96% 69.8M 0s
186050K .......... .......... .......... .......... .......... 96% 83.6M 0s
186100K .......... .......... .......... .......... .......... 96% 67.3M 0s
186150K .......... .......... .......... .......... .......... 96% 89.8M 0s
186200K .......... .......... .......... .......... .......... 96%  104M 0s
186250K .......... .......... .......... .......... .......... 96%  175M 0s
186300K .......... .......... .......... .......... .......... 96%  148M 0s
186350K .......... .......... .......... .......... .......... 96%  153M 0s
186400K .......... .......... .......... .......... .......... 96%  182M 0s
186450K .......... .......... .......... .......... .......... 96%  181M 0s
186500K .......... .......... .......... .......... .......... 96% 59.6M 0s
186550K .......... .......... .......... .......... .......... 96% 93.3M 0s
186600K .......... .......... .......... .......... .......... 96%  115M 0s
186650K .......... .......... .......... .......... .......... 96%  176M 0s
186700K .......... .......... .......... .......... .......... 96%  141M 0s
186750K .......... .......... .......... .......... .......... 96%  175M 0s
186800K .......... .......... .......... .......... .......... 96% 87.3M 0s
186850K .......... .......... .......... .......... .......... 96% 71.6M 0s
186900K .......... .......... .......... .......... .......... 96%  113M 0s
186950K .......... .......... .......... .......... .......... 96%  183M 0s
187000K .......... .......... .......... .......... .......... 96% 39.8M 0s
187050K .......... .......... .......... .......... .......... 96%  172M 0s
187100K .......... .......... .......... .......... .......... 96%  136M 0s
187150K .......... .......... .......... .......... .......... 96%  183M 0s
187200K .......... .......... .......... .......... .......... 97%  179M 0s
187250K .......... .......... .......... .......... .......... 97%  183M 0s
187300K .......... .......... .......... .......... .......... 97%  254M 0s
187350K .......... .......... .......... .......... .......... 97%  289M 0s
187400K .......... .......... .......... .......... .......... 97%  128M 0s
187450K .......... .......... .......... .......... .......... 97%  172M 0s
187500K .......... .......... .......... .......... .......... 97%  111M 0s
187550K .......... .......... .......... .......... .......... 97%  171M 0s
187600K .......... .......... .......... .......... .......... 97%  158M 0s
187650K .......... .......... .......... .......... .......... 97%  204M 0s
187700K .......... .......... .......... .......... .......... 97%  261M 0s
187750K .......... .......... .......... .......... .......... 97%  266M 0s
187800K .......... .......... .......... .......... .......... 97%  295M 0s
187850K .......... .......... .......... .......... .......... 97%  291M 0s
187900K .......... .......... .......... .......... .......... 97% 88.0M 0s
187950K .......... .......... .......... .......... .......... 97%  112M 0s
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188000K .......... .......... .......... .......... .......... 97%  189M 0s
188050K .......... .......... .......... .......... .......... 97%  112M 0s
188100K .......... .......... .......... .......... .......... 97%  151M 0s
188150K .......... .......... .......... .......... .......... 97%  179M 0s
188200K .......... .......... .......... .......... .......... 97%  173M 0s
188250K .......... .......... .......... .......... .......... 97%  179M 0s
188300K .......... .......... .......... .......... .......... 97%  144M 0s
188350K .......... .......... .......... .......... .......... 97%  179M 0s
188400K .......... .......... .......... .......... .......... 97%  174M 0s
188450K .......... .......... .......... .......... .......... 97%  191M 0s
188500K .......... .......... .......... .......... .......... 97%  145M 0s
188550K .......... .......... .......... .......... .......... 97%  175M 0s
188600K .......... .......... .......... .......... .......... 97%  177M 0s
188650K .......... .......... .......... .......... .......... 97%  101M 0s
188700K .......... .......... .......... .......... .......... 97% 87.1M 0s
188750K .......... .......... .......... .......... .......... 97%  126M 0s
188800K .......... .......... .......... .......... .......... 97%  172M 0s
188850K .......... .......... .......... .......... .......... 97%  158M 0s
188900K .......... .......... .......... .......... .......... 97%  115M 0s
188950K .......... .......... .......... .......... .......... 97%  158M 0s
189000K .......... .......... .......... .......... .......... 97%  182M 0s
189050K .......... .......... .......... .......... .......... 97% 98.4M 0s
189100K .......... .......... .......... .......... .......... 97% 80.5M 0s
189150K .......... .......... .......... .......... .......... 98% 72.9M 0s
189200K .......... .......... .......... .......... .......... 98% 95.3M 0s
189250K .......... .......... .......... .......... .......... 98%  170M 0s
189300K .......... .......... .......... .......... .......... 98%  164M 0s
189350K .......... .......... .......... .......... .......... 98%  174M 0s
189400K .......... .......... .......... .......... .......... 98%  183M 0s
189450K .......... .......... .......... .......... .......... 98%  192M 0s
189500K .......... .......... .......... .......... .......... 98%  144M 0s
189550K .......... .......... .......... .......... .......... 98%  169M 0s
189600K .......... .......... .......... .......... .......... 98%  174M 0s
189650K .......... .......... .......... .......... .......... 98%  184M 0s
189700K .......... .......... .......... .......... .......... 98% 80.6M 0s
189750K .......... .......... .......... .......... .......... 98%  177M 0s
189800K .......... .......... .......... .......... .......... 98%  154M 0s
189850K .......... .......... .......... .......... .......... 98%  180M 0s
189900K .......... .......... .......... .......... .......... 98%  118M 0s
189950K .......... .......... .......... .......... .......... 98%  153M 0s
190000K .......... .......... .......... .......... .......... 98%  171M 0s
190050K .......... .......... .......... .......... .......... 98%  121M 0s
190100K .......... .......... .......... .......... .......... 98%  160M 0s
190150K .......... .......... .......... .......... .......... 98% 39.5M 0s
190200K .......... .......... .......... .......... .......... 98% 44.5M 0s
190250K .......... .......... .......... .......... .......... 98% 45.1M 0s
190300K .......... .......... .......... .......... .......... 98% 31.5M 0s
190350K .......... .......... .......... .......... .......... 98% 55.0M 0s
190400K .......... .......... .......... .......... .......... 98%  100M 0s
190450K .......... .......... .......... .......... .......... 98% 89.1M 0s
190500K .......... .......... .......... .......... .......... 98% 84.5M 0s
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190550K .......... .......... .......... .......... .......... 98% 95.5M 0s
190600K .......... .......... .......... .......... .......... 98%  109M 0s
190650K .......... .......... .......... .......... .......... 98%  108M 0s
190700K .......... .......... .......... .......... .......... 98%  149M 0s
190750K .......... .......... .......... .......... .......... 98%  180M 0s
190800K .......... .......... .......... .......... .......... 98%  165M 0s
190850K .......... .......... .......... .......... .......... 98%  182M 0s
190900K .......... .......... .......... .......... .......... 98%  157M 0s
190950K .......... .......... .......... .......... .......... 98%  183M 0s
191000K .......... .......... .......... .......... .......... 98%  177M 0s
191050K .......... .......... .......... .......... .......... 98%  158M 0s
191100K .......... .......... .......... .......... .......... 99%  133M 0s
191150K .......... .......... .......... .......... .......... 99%  179M 0s
191200K .......... .......... .......... .......... .......... 99% 97.3M 0s
191250K .......... .......... .......... .......... .......... 99%  108M 0s
191300K .......... .......... .......... .......... .......... 99%  159M 0s
191350K .......... .......... .......... .......... .......... 99%  180M 0s
191400K .......... .......... .......... .......... .......... 99%  183M 0s
191450K .......... .......... .......... .......... .......... 99%  182M 0s
191500K .......... .......... .......... .......... .......... 99%  146M 0s
191550K .......... .......... .......... .......... .......... 99%  182M 0s
191600K .......... .......... .......... .......... .......... 99%  184M 0s
191650K .......... .......... .......... .......... .......... 99%  182M 0s
191700K .......... .......... .......... .......... .......... 99%  166M 0s
191750K .......... .......... .......... .......... .......... 99%  180M 0s
191800K .......... .......... .......... .......... .......... 99%  184M 0s
191850K .......... .......... .......... .......... .......... 99%  166M 0s
191900K .......... .......... .......... .......... .......... 99%  119M 0s
191950K .......... .......... .......... .......... .......... 99%  176M 0s
192000K .......... .......... .......... .......... .......... 99%  156M 0s
192050K .......... .......... .......... .......... .......... 99%  104M 0s
192100K .......... .......... .......... .......... .......... 99% 92.9M 0s
192150K .......... .......... .......... .......... .......... 99%  152M 0s
192200K .......... .......... .......... .......... .......... 99%  170M 0s
192250K .......... .......... .......... .......... .......... 99%  175M 0s
192300K .......... .......... .......... .......... .......... 99%  152M 0s
192350K .......... .......... .......... .......... .......... 99%  182M 0s
192400K .......... .......... .......... .......... .......... 99%  186M 0s
192450K .......... .......... .......... .......... .......... 99%  167M 0s
192500K .......... .......... .......... .......... .......... 99%  161M 0s
192550K .......... .......... .......... .......... .......... 99%  187M 0s
192600K .......... .......... .......... .......... .......... 99%  173M 0s
192650K .......... .......... .......... .......... .......... 99%  182M 0s
192700K .......... .......... .......... .......... .......... 99%  148M 0s
192750K .......... .......... .......... .......... .......... 99%  183M 0s
192800K .......... .......... .......... .......... .......... 99%  185M 0s
192850K .......... .......... .......... .......... .......... 99%  149M 0s
192900K .......... .......... .......... .......... .......... 99%  166M 0s
192950K .......... .......... .......... .......... .......... 99%  181M 0s
193000K .......... .......... .......... ........             100%  159M=1.9s
```

```
2020-05-31 14:07:17 (98.0 MB/s) - ‘name.basics.tsv.gz’ saved [197672123/197672123]

/bin/bash: line 1: fg: no job control
gzip: name.basics.tsv already exists;   not overwritten
```

In [4]:
```
names_basics = spark.read.option("sep", "\t").csv('file:/databricks/driver/name.basics.tsv', header=True, inferSchema = True)
names_basics.cache()
names_basics.show(3)
```

```
+---------+--------------+---------+---------+------------------+--------------
-----+
   nconst|    primaryName|birthYear|deathYear|   primaryProfession|      knownForTi
tles|
+---------+--------------+---------+---------+------------------+--------------
-----+
nm0000001|   Fred Astaire|     1899|     1987|soundtrack,actor,...|tt0053137,tt0050
4...|
nm0000002|  Lauren Bacall|     1924|     2014|  actress,soundtrack|tt0117057,tt0071
8...|
nm0000003|Brigitte Bardot|     1934|       \N|actress,soundtrac...|tt0054452,tt0059
9...|
+---------+--------------+---------+---------+------------------+--------------
-----+
only showing top 3 rows
```

In [5]:
```
%sh wget https://datasets.imdbws.com/title.akas.tsv.gz
%sh
gunzip title.akas.tsv.gz
```

```
--2020-05-31 14:07:46--  https://datasets.imdbws.com/title.akas.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.32, 13.224.13.37,
13.224.13.54, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.32|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 192780293 (184M) [binary/octet-stream]
Saving to: ‘title.akas.tsv.gz’

     0K .......... .......... .......... .......... ..........  0% 4.57M 40s
    50K .......... .......... .......... .......... ..........  0% 8.24M 31s
   100K .......... .......... .......... .......... ..........  0% 13.3M 25s
   150K .......... .......... .......... .......... ..........  0% 16.0M 22s
   200K .......... .......... .......... .......... ..........  0% 3.53M 28s
   250K .......... .......... .......... .......... ..........  0% 37.9M 24s
   300K .......... .......... .......... .......... ..........  0% 38.2M 21s
   350K .......... .......... .......... .......... ..........  0% 35.0M 19s
   400K .......... .......... .......... .......... ..........  0% 40.0M 18s
   450K .......... .......... .......... .......... ..........  0% 14.9M 17s
   500K .......... .......... .......... .......... ..........  0% 34.2M 16s
   550K .......... .......... .......... .......... ..........  0% 32.4M 15s
   600K .......... .......... .......... .......... ..........  0% 37.5M 14s
   650K .......... .......... .......... .......... ..........  0% 37.2M 14s
   700K .......... .......... .......... .......... ..........  0% 15.4M 14s
   750K .......... .......... .......... .......... ..........  0% 31.3M 13s
   800K .......... .......... .......... .......... ..........  0% 37.8M 13s
   850K .......... .......... .......... .......... ..........  0% 33.4M 12s
   900K .......... .......... .......... .......... ..........  0% 34.7M 12s
   950K .......... .......... .......... .......... ..........  0% 31.9M 12s
  1000K .......... .......... .......... .......... ..........  0% 35.7M 11s
  1050K .......... .......... .......... .......... ..........  0% 36.0M 11s
  1100K .......... .......... .......... .......... ..........  0% 33.6M 11s
  1150K .......... .......... .......... .......... ..........  0% 31.2M 10s
  1200K .......... .......... .......... .......... ..........  0% 36.7M 10s
  1250K .......... .......... .......... .......... ..........  0% 34.3M 10s
  1300K .......... .......... .......... .......... ..........  0% 35.0M 10s
  1350K .......... .......... .......... .......... ..........  0% 33.7M 10s
  1400K .......... .......... .......... .......... ..........  0% 39.1M 10s
  1450K .......... .......... .......... .......... ..........  0% 37.1M 9s
  1500K .......... .......... .......... .......... ..........  0% 36.8M 9s
  1550K .......... .......... .......... .......... ..........  0% 33.5M 9s
  1600K .......... .......... .......... .......... ..........  0% 37.8M 9s
  1650K .......... .......... .......... .......... ..........  0% 37.6M 9s
  1700K .......... .......... .......... .......... ..........  0% 38.0M 9s
  1750K .......... .......... .......... .......... ..........  0% 31.0M 9s
  1800K .......... .......... .......... .......... ..........  0% 37.7M 9s
  1850K .......... .......... .......... .......... ..........  1% 37.8M 8s
  1900K .......... .......... .......... .......... ..........  1% 39.5M 8s
  1950K .......... .......... .......... .......... ..........  1% 31.4M 8s
  2000K .......... .......... .......... .......... ..........  1% 37.0M 8s
  2050K .......... .......... .......... .......... ..........  1% 37.1M 8s
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2100K .......... .......... .......... .......... ..........  1% 38.6M 8s
2150K .......... .......... .......... .......... ..........  1% 33.2M 8s
2200K .......... .......... .......... .......... ..........  1% 33.9M 8s
2250K .......... .......... .......... .......... ..........  1% 33.1M 8s
2300K .......... .......... .......... .......... ..........  1% 34.1M 8s
2350K .......... .......... .......... .......... ..........  1% 29.8M 8s
2400K .......... .......... .......... .......... ..........  1% 34.3M 8s
2450K .......... .......... .......... .......... ..........  1% 35.9M 8s
2500K .......... .......... .......... .......... ..........  1% 37.8M 8s
2550K .......... .......... .......... .......... ..........  1% 32.6M 8s
2600K .......... .......... .......... .......... ..........  1% 49.4M 7s
2650K .......... .......... .......... .......... ..........  1% 33.7M 7s
2700K .......... .......... .......... .......... ..........  1%  156M 7s
2750K .......... .......... .......... .......... ..........  1%  101M 7s
2800K .......... .......... .......... .......... ..........  1% 38.4M 7s
2850K .......... .......... .......... .......... ..........  1% 35.0M 7s
2900K .......... .......... .......... .......... ..........  1% 39.9M 7s
2950K .......... .......... .......... .......... ..........  1% 34.3M 7s
3000K .......... .......... .......... .......... ..........  1% 36.2M 7s
3050K .......... .......... .......... .......... ..........  1% 80.2M 7s
3100K .......... .......... .......... .......... ..........  1%  201M 7s
3150K .......... .......... .......... .......... ..........  1%  161M 7s
3200K .......... .......... .......... .......... ..........  1% 46.5M 7s
3250K .......... .......... .......... .......... ..........  1% 33.7M 7s
3300K .......... .......... .......... .......... ..........  1% 35.6M 7s
3350K .......... .......... .......... .......... ..........  1% 32.3M 7s
3400K .......... .......... .......... .......... ..........  1% 36.4M 7s
3450K .......... .......... .......... .......... ..........  1% 33.3M 7s
3500K .......... .......... .......... .......... ..........  1% 38.8M 7s
3550K .......... .......... .......... .......... ..........  1% 31.9M 7s
3600K .......... .......... .......... .......... ..........  1% 38.8M 7s
3650K .......... .......... .......... .......... ..........  1%  104M 6s
3700K .......... .......... .......... .......... ..........  1% 33.8M 6s
3750K .......... .......... .......... .......... ..........  2% 43.4M 6s
3800K .......... .......... .......... .......... ..........  2%  176M 6s
3850K .......... .......... .......... .......... ..........  2%  195M 6s
3900K .......... .......... .......... .......... ..........  2% 42.5M 6s
3950K .......... .......... .......... .......... ..........  2% 28.9M 6s
4000K .......... .......... .......... .......... ..........  2% 34.3M 6s
4050K .......... .......... .......... .......... ..........  2% 33.4M 6s
4100K .......... .......... .......... .......... ..........  2% 34.6M 6s
4150K .......... .......... .......... .......... ..........  2% 31.6M 6s
4200K .......... .......... .......... .......... ..........  2% 49.0M 6s
4250K .......... .......... .......... .......... ..........  2% 37.6M 6s
4300K .......... .......... .......... .......... ..........  2% 51.4M 6s
4350K .......... .......... .......... .......... ..........  2%  143M 6s
4400K .......... .......... .......... .......... ..........  2% 53.2M 6s
4450K .......... .......... .......... .......... ..........  2% 34.5M 6s
4500K .......... .......... .......... .......... ..........  2% 30.8M 6s
4550K .......... .......... .......... .......... ..........  2% 28.7M 6s
4600K .......... .......... .......... .......... ..........  2% 34.1M 6s
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4650K .......... .......... .......... .......... ..........  2% 65.3M 6s
4700K .......... .......... .......... .......... ..........  2% 78.8M 6s
4750K .......... .......... .......... .......... ..........  2% 28.9M 6s
4800K .......... .......... .......... .......... ..........  2% 33.1M 6s
4850K .......... .......... .......... .......... ..........  2% 32.4M 6s
4900K .......... .......... .......... .......... ..........  2% 42.3M 6s
4950K .......... .......... .......... .......... ..........  2% 49.3M 6s
5000K .......... .......... .......... .......... ..........  2% 36.0M 6s
5050K .......... .......... .......... .......... ..........  2% 33.4M 6s
5100K .......... .......... .......... .......... ..........  2% 33.3M 6s
5150K .......... .......... .......... .......... ..........  2% 51.5M 6s
5200K .......... .......... .......... .......... ..........  2% 32.8M 6s
5250K .......... .......... .......... .......... ..........  2% 36.2M 6s
5300K .......... .......... .......... .......... ..........  2% 48.4M 6s
5350K .......... .......... .......... .......... ..........  2% 39.1M 6s
5400K .......... .......... .......... .......... ..........  2% 35.2M 6s
5450K .......... .......... .......... .......... ..........  2% 52.2M 6s
5500K .......... .......... .......... .......... ..........  2% 34.9M 6s
5550K .......... .......... .......... .......... ..........  2% 52.8M 6s
5600K .......... .......... .......... .......... ..........  3% 31.9M 6s
5650K .......... .......... .......... .......... ..........  3% 93.6M 6s
5700K .......... .......... .......... .......... ..........  3%  190M 6s
5750K .......... .......... .......... .......... ..........  3% 39.9M 6s
5800K .......... .......... .......... .......... ..........  3% 32.7M 6s
5850K .......... .......... .......... .......... ..........  3% 35.5M 6s
5900K .......... .......... .......... .......... ..........  3% 36.3M 6s
5950K .......... .......... .......... .......... ..........  3% 29.8M 6s
6000K .......... .......... .......... .......... ..........  3% 31.8M 6s
6050K .......... .......... .......... .......... ..........  3% 48.2M 6s
6100K .......... .......... .......... .......... ..........  3% 33.9M 6s
6150K .......... .......... .......... .......... ..........  3% 36.8M 6s
6200K .......... .......... .......... .......... ..........  3% 44.5M 6s
6250K .......... .......... .......... .......... ..........  3% 49.2M 6s
6300K .......... .......... .......... .......... ..........  3% 82.2M 6s
6350K .......... .......... .......... .......... ..........  3% 35.2M 6s
6400K .......... .......... .......... .......... ..........  3%  161M 5s
6450K .......... .......... .......... .......... ..........  3%  145M 5s
6500K .......... .......... .......... .......... ..........  3%  121M 5s
6550K .......... .......... .......... .......... ..........  3%  139M 5s
6600K .......... .......... .......... .......... ..........  3%  155M 5s
6650K .......... .......... .......... .......... ..........  3%  164M 5s
6700K .......... .......... .......... .......... ..........  3%  124M 5s
6750K .......... .......... .......... .......... ..........  3%  122M 5s
6800K .......... .......... .......... .......... ..........  3%  147M 5s
6850K .......... .......... .......... .......... ..........  3%  152M 5s
6900K .......... .......... .......... .......... ..........  3%  161M 5s
6950K .......... .......... .......... .......... ..........  3%  135M 5s
7000K .......... .......... .......... .......... ..........  3%  158M 5s
7050K .......... .......... .......... .......... ..........  3%  164M 5s
7100K .......... .......... .......... .......... ..........  3%  152M 5s
7150K .......... .......... .......... .......... ..........  3%  120M 5s
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7200K .......... .......... .......... .......... ..........  3%  154M 5s
7250K .......... .......... .......... .......... ..........  3% 33.4M 5s
7300K .......... .......... .......... .......... ..........  3%  101M 5s
7350K .......... .......... .......... .......... ..........  3%  109M 5s
7400K .......... .......... .......... .......... ..........  3%  130M 5s
7450K .......... .......... .......... .......... ..........  3% 33.0M 5s
7500K .......... .......... .......... .......... ..........  4%  113M 5s
7550K .......... .......... .......... .......... ..........  4% 92.6M 5s
7600K .......... .......... .......... .......... ..........  4%  153M 5s
7650K .......... .......... .......... .......... ..........  4% 86.1M 5s
7700K .......... .......... .......... .......... ..........  4% 78.3M 5s
7750K .......... .......... .......... .......... ..........  4% 73.6M 5s
7800K .......... .......... .......... .......... ..........  4%  146M 5s
7850K .......... .......... .......... .......... ..........  4% 94.6M 5s
7900K .......... .......... .......... .......... ..........  4% 24.3M 5s
7950K .......... .......... .......... .......... ..........  4% 89.3M 5s
8000K .......... .......... .......... .......... ..........  4%  109M 5s
8050K .......... .......... .......... .......... ..........  4% 80.3M 5s
8100K .......... .......... .......... .......... ..........  4%  142M 5s
8150K .......... .......... .......... .......... ..........  4% 98.9M 5s
8200K .......... .......... .......... .......... ..........  4% 74.0M 5s
8250K .......... .......... .......... .......... ..........  4% 79.1M 5s
8300K .......... .......... .......... .......... ..........  4%  144M 5s
8350K .......... .......... .......... .......... ..........  4% 67.1M 5s
8400K .......... .......... .......... .......... ..........  4%  100M 5s
8450K .......... .......... .......... .......... ..........  4% 72.0M 5s
8500K .......... .......... .......... .......... ..........  4% 86.7M 5s
8550K .......... .......... .......... .......... ..........  4%  134M 5s
8600K .......... .......... .......... .......... ..........  4% 86.8M 5s
8650K .......... .......... .......... .......... ..........  4% 75.8M 5s
8700K .......... .......... .......... .......... ..........  4% 79.6M 4s
8750K .......... .......... .......... .......... ..........  4% 78.0M 4s
8800K .......... .......... .......... .......... ..........  4%  145M 4s
8850K .......... .......... .......... .......... ..........  4% 99.3M 4s
8900K .......... .......... .......... .......... ..........  4% 90.8M 4s
8950K .......... .......... .......... .......... ..........  4% 81.9M 4s
9000K .......... .......... .......... .......... ..........  4%  148M 4s
9050K .......... .......... .......... .......... ..........  4% 93.0M 4s
9100K .......... .......... .......... .......... ..........  4% 97.8M 4s
9150K .......... .......... .......... .......... ..........  4% 75.3M 4s
9200K .......... .......... .......... .......... ..........  4% 94.4M 4s
9250K .......... .......... .......... .......... ..........  4%  146M 4s
9300K .......... .......... .......... .......... ..........  4%  106M 4s
9350K .......... .......... .......... .......... ..........  4% 83.1M 4s
9400K .......... .......... .......... .......... ..........  5% 90.5M 4s
9450K .......... .......... .......... .......... ..........  5%  147M 4s
9500K .......... .......... .......... .......... ..........  5%  103M 4s
9550K .......... .......... .......... .......... ..........  5% 81.4M 4s
9600K .......... .......... .......... .......... ..........  5% 74.8M 4s
9650K .......... .......... .......... .......... ..........  5% 94.1M 4s
9700K .......... .......... .......... .......... ..........  5% 95.1M 4s
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 9750K .......... .......... .......... .......... ..........  5%  224M 4s
 9800K .......... .......... .......... .......... ..........  5% 84.2M 4s
 9850K .......... .......... .......... .......... ..........  5%  105M 4s
 9900K .......... .......... .......... .......... ..........  5%  106M 4s
 9950K .......... .......... .......... .......... ..........  5% 88.1M 4s
10000K .......... .......... .......... .......... ..........  5%  155M 4s
10050K .......... .......... .......... .......... ..........  5%  116M 4s
10100K .......... .......... .......... .......... ..........  5%  115M 4s
10150K .......... .......... .......... .......... ..........  5% 95.7M 4s
10200K .......... .......... .......... .......... ..........  5%  117M 4s
10250K .......... .......... .......... .......... ..........  5%  155M 4s
10300K .......... .......... .......... .......... ..........  5%  109M 4s
10350K .......... .......... .......... .......... ..........  5% 95.0M 4s
10400K .......... .......... .......... .......... ..........  5%  106M 4s
10450K .......... .......... .......... .......... ..........  5%  162M 4s
10500K .......... .......... .......... .......... ..........  5%  120M 4s
10550K .......... .......... .......... .......... ..........  5%  103M 4s
10600K .......... .......... .......... .......... ..........  5%  105M 4s
10650K .......... .......... .......... .......... ..........  5%  108M 4s
10700K .......... .......... .......... .......... ..........  5%  108M 4s
10750K .......... .......... .......... .......... ..........  5%  101M 4s
10800K .......... .......... .......... .......... ..........  5%  148M 4s
10850K .......... .......... .......... .......... ..........  5%  111M 4s
10900K .......... .......... .......... .......... ..........  5%  105M 4s
10950K .......... .......... .......... .......... ..........  5%  104M 4s
11000K .......... .......... .......... .......... ..........  5%  104M 4s
11050K .......... .......... .......... .......... ..........  5%  113M 4s
11100K .......... .......... .......... .......... ..........  5%  154M 4s
11150K .......... .......... .......... .......... ..........  5%  100M 4s
11200K .......... .......... .......... .......... ..........  5%  112M 4s
11250K .......... .......... .......... .......... ..........  6%  111M 4s
11300K .......... .......... .......... .......... ..........  6%  112M 4s
11350K .......... .......... .......... .......... ..........  6%  101M 4s
11400K .......... .......... .......... .......... ..........  6%  110M 4s
11450K .......... .......... .......... .......... ..........  6%  113M 4s
11500K .......... .......... .......... .......... ..........  6%  114M 4s
11550K .......... .......... .......... .......... ..........  6% 90.2M 4s
11600K .......... .......... .......... .......... ..........  6%  111M 4s
11650K .......... .......... .......... .......... ..........  6%  110M 4s
11700K .......... .......... .......... .......... ..........  6%  109M 4s
11750K .......... .......... .......... .......... ..........  6%  106M 4s
11800K .......... .......... .......... .......... ..........  6%  117M 4s
11850K .......... .......... .......... .......... ..........  6%  106M 4s
11900K .......... .......... .......... .......... ..........  6%  113M 4s
11950K .......... .......... .......... .......... ..........  6% 99.2M 4s
12000K .......... .......... .......... .......... ..........  6%  111M 4s
12050K .......... .......... .......... .......... ..........  6%  114M 4s
12100K .......... .......... .......... .......... ..........  6%  113M 4s
12150K .......... .......... .......... .......... ..........  6%  101M 4s
12200K .......... .......... .......... .......... ..........  6% 86.0M 4s
12250K .......... .......... .......... .......... ..........  6% 97.9M 4s
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12300K .......... .......... .......... .......... ..........  6%  112M 4s
12350K .......... .......... .......... .......... ..........  6%  100M 4s
12400K .......... .......... .......... .......... ..........  6%  106M 4s
12450K .......... .......... .......... .......... ..........  6% 80.3M 4s
12500K .......... .......... .......... .......... ..........  6%  100M 4s
12550K .......... .......... .......... .......... ..........  6%  120M 4s
12600K .......... .......... .......... .......... ..........  6%  130M 4s
12650K .......... .......... .......... .......... ..........  6%  105M 4s
12700K .......... .......... .......... .......... ..........  6%  120M 4s
12750K .......... .......... .......... .......... ..........  6% 87.9M 4s
12800K .......... .......... .......... .......... ..........  6%  120M 4s
12850K .......... .......... .......... .......... ..........  6%  124M 3s
12900K .......... .......... .......... .......... ..........  6%  120M 3s
12950K .......... .......... .......... .......... ..........  6%  121M 3s
13000K .......... .......... .......... .......... ..........  6%  132M 3s
13050K .......... .......... .......... .......... ..........  6%  114M 3s
13100K .......... .......... .......... .......... ..........  6%  126M 3s
13150K .......... .......... .......... .......... ..........  7%  121M 3s
13200K .......... .......... .......... .......... ..........  7%  125M 3s
13250K .......... .......... .......... .......... ..........  7%  129M 3s
13300K .......... .......... .......... .......... ..........  7%  140M 3s
13350K .......... .......... .......... .......... ..........  7% 69.6M 3s
13400K .......... .......... .......... .......... ..........  7%  135M 3s
13450K .......... .......... .......... .......... ..........  7% 84.5M 3s
13500K .......... .......... .......... .......... ..........  7% 70.0M 3s
13550K .......... .......... .......... .......... ..........  7%  101M 3s
13600K .......... .......... .......... .......... ..........  7%  175M 3s
13650K .......... .......... .......... .......... ..........  7%  164M 3s
13700K .......... .......... .......... .......... ..........  7%  294M 3s
13750K .......... .......... .......... .......... ..........  7%  156M 3s
13800K .......... .......... .......... .......... ..........  7%  181M 3s
13850K .......... .......... .......... .......... ..........  7%  190M 3s
13900K .......... .......... .......... .......... ..........  7%  161M 3s
13950K .......... .......... .......... .......... ..........  7%  192M 3s
14000K .......... .......... .......... .......... ..........  7%  186M 3s
14050K .......... .......... .......... .......... ..........  7%  158M 3s
14100K .......... .......... .......... .......... ..........  7%  255M 3s
14150K .......... .......... .......... .......... ..........  7% 93.4M 3s
14200K .......... .......... .......... .......... ..........  7%  219M 3s
14250K .......... .......... .......... .......... ..........  7%  167M 3s
14300K .......... .......... .......... .......... ..........  7%  167M 3s
14350K .......... .......... .......... .......... ..........  7%  150M 3s
14400K .......... .......... .......... .......... ..........  7%  249M 3s
14450K .......... .......... .......... .......... ..........  7%  134M 3s
14500K .......... .......... .......... .......... ..........  7%  157M 3s
14550K .......... .......... .......... .......... ..........  7%  149M 3s
14600K .......... .......... .......... .......... ..........  7%  142M 3s
14650K .......... .......... .......... .......... ..........  7%  165M 3s
14700K .......... .......... .......... .......... ..........  7%  245M 3s
14750K .......... .......... .......... .......... ..........  7%  147M 3s
14800K .......... .......... .......... .......... ..........  7% 72.3M 3s
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 14850K .......... .......... .......... .......... ..........  7%  118M 3s
 14900K .......... .......... .......... .......... ..........  7%  183M 3s
 14950K .......... .......... .......... .......... ..........  7%  101M 3s
 15000K .......... .......... .......... .......... ..........  7%  115M 3s
 15050K .......... .......... .......... .......... ..........  8%  112M 3s
 15100K .......... .......... .......... .......... ..........  8%  117M 3s
 15150K .......... .......... .......... .......... ..........  8% 79.8M 3s
 15200K .......... .......... .......... .......... ..........  8% 86.1M 3s
 15250K .......... .......... .......... .......... ..........  8% 93.7M 3s
 15300K .......... .......... .......... .......... ..........  8%  181M 3s
 15350K .......... .......... .......... .......... ..........  8%  130M 3s
 15400K .......... .......... .......... .......... ..........  8%  116M 3s
 15450K .......... .......... .......... .......... ..........  8% 95.5M 3s
 15500K .......... .......... .......... .......... ..........  8% 95.5M 3s
 15550K .......... .......... .......... .......... ..........  8%  153M 3s
 15600K .......... .......... .......... .......... ..........  8%  179M 3s
 15650K .......... .......... .......... .......... ..........  8% 99.5M 3s
 15700K .......... .......... .......... .......... ..........  8%  175M 3s
 15750K .......... .......... .......... .......... ..........  8% 66.9M 3s
 15800K .......... .......... .......... .......... ..........  8%  184M 3s
 15850K .......... .......... .......... .......... ..........  8%  187M 3s
 15900K .......... .......... .......... .......... ..........  8%  191M 3s
 15950K .......... .......... .......... .......... ..........  8% 85.0M 3s
 16000K .......... .......... .......... .......... ..........  8%  184M 3s
 16050K .......... .......... .......... .......... ..........  8% 80.0M 3s
 16100K .......... .......... .......... .......... ..........  8%  182M 3s
 16150K .......... .......... .......... .......... ..........  8%  167M 3s

*** WARNING: skipped 236740 bytes of output ***

171950K .......... .......... .......... .......... .......... 91% 90.9M 0s
172000K .......... .......... .......... .......... .......... 91% 80.7M 0s
172050K .......... .......... .......... .......... .......... 91% 84.3M 0s
172100K .......... .......... .......... .......... .......... 91%  101M 0s
172150K .......... .......... .......... .......... .......... 91%  101M 0s
172200K .......... .......... .......... .......... .......... 91%  159M 0s
172250K .......... .......... .......... .......... .......... 91%  137M 0s
172300K .......... .......... .......... .......... .......... 91%  164M 0s
172350K .......... .......... .......... .......... .......... 91%  154M 0s
172400K .......... .......... .......... .......... .......... 91%  163M 0s
172450K .......... .......... .......... .......... .......... 91%  140M 0s
172500K .......... .......... .......... .......... .......... 91%  158M 0s
172550K .......... .......... .......... .......... .......... 91%  118M 0s
172600K .......... .......... .......... .......... .......... 91% 91.3M 0s
172650K .......... .......... .......... .......... .......... 91% 78.4M 0s
172700K .......... .......... .......... .......... .......... 91% 57.9M 0s
172750K .......... .......... .......... .......... .......... 91% 95.0M 0s
172800K .......... .......... .......... .......... .......... 91%  137M 0s
172850K .......... .......... .......... .......... .......... 91% 76.4M 0s
172900K .......... .......... .......... .......... .......... 91%  115M 0s
172950K .......... .......... .......... .......... .......... 91%  106M 0s
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173000K .......... .......... .......... .......... .......... 91%  138M 0s
173050K .......... .......... .......... .......... .......... 91%  139M 0s
173100K .......... .......... .......... .......... .......... 91%  166M 0s
173150K .......... .......... .......... .......... .......... 91%  167M 0s
173200K .......... .......... .......... .......... .......... 92%  151M 0s
173250K .......... .......... .......... .......... .......... 92%  138M 0s
173300K .......... .......... .......... .......... .......... 92%  158M 0s
173350K .......... .......... .......... .......... .......... 92%  163M 0s
173400K .......... .......... .......... .......... .......... 92%  162M 0s
173450K .......... .......... .......... .......... .......... 92%  129M 0s
173500K .......... .......... .......... .......... .......... 92%  158M 0s
173550K .......... .......... .......... .......... .......... 92%  156M 0s
173600K .......... .......... .......... .......... .......... 92% 80.0M 0s
173650K .......... .......... .......... .......... .......... 92% 79.7M 0s
173700K .......... .......... .......... .......... .......... 92% 96.6M 0s
173750K .......... .......... .......... .......... .......... 92% 92.9M 0s
173800K .......... .......... .......... .......... .......... 92% 76.5M 0s
173850K .......... .......... .......... .......... .......... 92%  102M 0s
173900K .......... .......... .......... .......... .......... 92%  154M 0s
173950K .......... .......... .......... .......... .......... 92%  141M 0s
174000K .......... .......... .......... .......... .......... 92%  166M 0s
174050K .......... .......... .......... .......... .......... 92%  107M 0s
174100K .......... .......... .......... .......... .......... 92%  160M 0s
174150K .......... .......... .......... .......... .......... 92%  148M 0s
174200K .......... .......... .......... .......... .......... 92%  128M 0s
174250K .......... .......... .......... .......... .......... 92%  140M 0s
174300K .......... .......... .......... .......... .......... 92%  149M 0s
174350K .......... .......... .......... .......... .......... 92%  168M 0s
174400K .......... .......... .......... .......... .......... 92%  163M 0s
174450K .......... .......... .......... .......... .......... 92%  121M 0s
174500K .......... .......... .......... .......... .......... 92%  155M 0s
174550K .......... .......... .......... .......... .......... 92% 87.6M 0s
174600K .......... .......... .......... .......... .......... 92% 81.2M 0s
174650K .......... .......... .......... .......... .......... 92% 79.1M 0s
174700K .......... .......... .......... .......... .......... 92% 85.7M 0s
174750K .......... .......... .......... .......... .......... 92% 98.3M 0s
174800K .......... .......... .......... .......... .......... 92%  107M 0s
174850K .......... .......... .......... .......... .......... 92% 92.6M 0s
174900K .......... .......... .......... .......... .......... 92%  101M 0s
174950K .......... .......... .......... .......... .......... 92% 92.5M 0s
175000K .......... .......... .......... .......... .......... 92%  154M 0s
175050K .......... .......... .......... .......... .......... 93% 70.5M 0s
175100K .......... .......... .......... .......... .......... 93%  118M 0s
175150K .......... .......... .......... .......... .......... 93%  163M 0s
175200K .......... .......... .......... .......... .......... 93%  162M 0s
175250K .......... .......... .......... .......... .......... 93%  139M 0s
175300K .......... .......... .......... .......... .......... 93%  133M 0s
175350K .......... .......... .......... .......... .......... 93%  151M 0s
175400K .......... .......... .......... .......... .......... 93%  127M 0s
175450K .......... .......... .......... .......... .......... 93%  137M 0s
175500K .......... .......... .......... .......... .......... 93% 77.9M 0s
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175550K .......... .......... .......... .......... .......... 93% 84.8M 0s
175600K .......... .......... .......... .......... .......... 93%  114M 0s
175650K .......... .......... .......... .......... .......... 93% 89.0M 0s
175700K .......... .......... .......... .......... .......... 93% 95.2M 0s
175750K .......... .......... .......... .......... .......... 93% 86.8M 0s
175800K .......... .......... .......... .......... .......... 93%  131M 0s
175850K .......... .......... .......... .......... .......... 93%  134M 0s
175900K .......... .......... .......... .......... .......... 93%  117M 0s
175950K .......... .......... .......... .......... .......... 93%  165M 0s
176000K .......... .......... .......... .......... .......... 93%  145M 0s
176050K .......... .......... .......... .......... .......... 93% 91.1M 0s
176100K .......... .......... .......... .......... .......... 93%  108M 0s
176150K .......... .......... .......... .......... .......... 93%  134M 0s
176200K .......... .......... .......... .......... .......... 93%  153M 0s
176250K .......... .......... .......... .......... .......... 93%  140M 0s
176300K .......... .......... .......... .......... .......... 93%  146M 0s
176350K .......... .......... .......... .......... .......... 93%  157M 0s
176400K .......... .......... .......... .......... .......... 93%  164M 0s
176450K .......... .......... .......... .......... .......... 93%  128M 0s
176500K .......... .......... .......... .......... .......... 93%  100M 0s
176550K .......... .......... .......... .......... .......... 93% 96.4M 0s
176600K .......... .......... .......... .......... .......... 93% 87.2M 0s
176650K .......... .......... .......... .......... .......... 93% 77.9M 0s
176700K .......... .......... .......... .......... .......... 93% 87.1M 0s
176750K .......... .......... .......... .......... .......... 93%  165M 0s
176800K .......... .......... .......... .......... .......... 93%  101M 0s
176850K .......... .......... .......... .......... .......... 93%  138M 0s
176900K .......... .......... .......... .......... .......... 93%  162M 0s
176950K .......... .......... .......... .......... .......... 94% 90.2M 0s
177000K .......... .......... .......... .......... .......... 94%  131M 0s
177050K .......... .......... .......... .......... .......... 94%  135M 0s
177100K .......... .......... .......... .......... .......... 94% 81.3M 0s
177150K .......... .......... .......... .......... .......... 94%  161M 0s
177200K .......... .......... .......... .......... .......... 94%  144M 0s
177250K .......... .......... .......... .......... .......... 94%  139M 0s
177300K .......... .......... .......... .......... .......... 94%  133M 0s
177350K .......... .......... .......... .......... .......... 94%  165M 0s
177400K .......... .......... .......... .......... .......... 94%  155M 0s
177450K .......... .......... .......... .......... .......... 94%  146M 0s
177500K .......... .......... .......... .......... .......... 94%  162M 0s
177550K .......... .......... .......... .......... .......... 94%  110M 0s
177600K .......... .......... .......... .......... .......... 94% 94.0M 0s
177650K .......... .......... .......... .......... .......... 94% 75.8M 0s
177700K .......... .......... .......... .......... .......... 94% 92.6M 0s
177750K .......... .......... .......... .......... .......... 94%  106M 0s
177800K .......... .......... .......... .......... .......... 94% 84.0M 0s
177850K .......... .......... .......... .......... .......... 94% 68.5M 0s
177900K .......... .......... .......... .......... .......... 94%  161M 0s
177950K .......... .......... .......... .......... .......... 94% 89.2M 0s
178000K .......... .......... .......... .......... .......... 94%  115M 0s
178050K .......... .......... .......... .......... .......... 94% 83.1M 0s
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178100K .......... .......... .......... .......... .......... 94% 96.8M 0s
178150K .......... .......... .......... .......... .......... 94%  140M 0s
178200K .......... .......... .......... .......... .......... 94%  156M 0s
178250K .......... .......... .......... .......... .......... 94%  137M 0s
178300K .......... .......... .......... .......... .......... 94%  160M 0s
178350K .......... .......... .......... .......... .......... 94%  166M 0s
178400K .......... .......... .......... .......... .......... 94%  163M 0s
178450K .......... .......... .......... .......... .......... 94% 53.4M 0s
178500K .......... .......... .......... .......... .......... 94% 58.8M 0s
178550K .......... .......... .......... .......... .......... 94% 93.1M 0s
178600K .......... .......... .......... .......... .......... 94%  108M 0s
178650K .......... .......... .......... .......... .......... 94% 81.5M 0s
178700K .......... .......... .......... .......... .......... 94%  123M 0s
178750K .......... .......... .......... .......... .......... 94%  162M 0s
178800K .......... .......... .......... .......... .......... 95%  164M 0s
178850K .......... .......... .......... .......... .......... 95%  137M 0s
178900K .......... .......... .......... .......... .......... 95% 87.5M 0s
178950K .......... .......... .......... .......... .......... 95%  112M 0s
179000K .......... .......... .......... .......... .......... 95%  108M 0s
179050K .......... .......... .......... .......... .......... 95%  103M 0s
179100K .......... .......... .......... .......... .......... 95%  119M 0s
179150K .......... .......... .......... .......... .......... 95%  151M 0s
179200K .......... .......... .......... .......... .......... 95%  137M 0s
179250K .......... .......... .......... .......... .......... 95%  139M 0s
179300K .......... .......... .......... .......... .......... 95%  156M 0s
179350K .......... .......... .......... .......... .......... 95%  153M 0s
179400K .......... .......... .......... .......... .......... 95%  154M 0s
179450K .......... .......... .......... .......... .......... 95%  123M 0s
179500K .......... .......... .......... .......... .......... 95% 78.3M 0s
179550K .......... .......... .......... .......... .......... 95% 79.2M 0s
179600K .......... .......... .......... .......... .......... 95%  120M 0s
179650K .......... .......... .......... .......... .......... 95% 93.2M 0s
179700K .......... .......... .......... .......... .......... 95%  109M 0s
179750K .......... .......... .......... .......... .......... 95%  150M 0s
179800K .......... .......... .......... .......... .......... 95%  159M 0s
179850K .......... .......... .......... .......... .......... 95%  114M 0s
179900K .......... .......... .......... .......... .......... 95%  148M 0s
179950K .......... .......... .......... .......... .......... 95% 69.8M 0s
180000K .......... .......... .......... .......... .......... 95%  110M 0s
180050K .......... .......... .......... .......... .......... 95% 77.4M 0s
180100K .......... .......... .......... .......... .......... 95%  153M 0s
180150K .......... .......... .......... .......... .......... 95%  154M 0s
180200K .......... .......... .......... .......... .......... 95%  121M 0s
180250K .......... .......... .......... .......... .......... 95%  139M 0s
180300K .......... .......... .......... .......... .......... 95%  124M 0s
180350K .......... .......... .......... .......... .......... 95%  151M 0s
180400K .......... .......... .......... .......... .......... 95%  119M 0s
180450K .......... .......... .......... .......... .......... 95% 84.7M 0s
180500K .......... .......... .......... .......... .......... 95% 93.1M 0s
180550K .......... .......... .......... .......... .......... 95% 80.8M 0s
180600K .......... .......... .......... .......... .......... 95%  103M 0s
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180650K .......... .......... .......... .......... .......... 95% 67.2M 0s
180700K .......... .......... .......... .......... .......... 96% 81.5M 0s
180750K .......... .......... .......... .......... .......... 96%  155M 0s
180800K .......... .......... .......... .......... .......... 96%  164M 0s
180850K .......... .......... .......... .......... .......... 96% 83.9M 0s
180900K .......... .......... .......... .......... .......... 96% 76.2M 0s
180950K .......... .......... .......... .......... .......... 96%  113M 0s
181000K .......... .......... .......... .......... .......... 96% 78.5M 0s
181050K .......... .......... .......... .......... .......... 96%  131M 0s
181100K .......... .......... .......... .......... .......... 96%  146M 0s
181150K .......... .......... .......... .......... .......... 96%  127M 0s
181200K .......... .......... .......... .......... .......... 96%  162M 0s
181250K .......... .......... .......... .......... .......... 96%  140M 0s
181300K .......... .......... .......... .......... .......... 96%  147M 0s
181350K .......... .......... .......... .......... .......... 96%  133M 0s
181400K .......... .......... .......... .......... .......... 96% 87.2M 0s
181450K .......... .......... .......... .......... .......... 96% 65.6M 0s
181500K .......... .......... .......... .......... .......... 96%  103M 0s
181550K .......... .......... .......... .......... .......... 96% 90.3M 0s
181600K .......... .......... .......... .......... .......... 96%  117M 0s
181650K .......... .......... .......... .......... .......... 96%  109M 0s
181700K .......... .......... .......... .......... .......... 96%  123M 0s
181750K .......... .......... .......... .......... .......... 96%  150M 0s
181800K .......... .......... .......... .......... .......... 96% 77.0M 0s
181850K .......... .......... .......... .......... .......... 96%  115M 0s
181900K .......... .......... .......... .......... .......... 96%  140M 0s
181950K .......... .......... .......... .......... .......... 96%  150M 0s
182000K .......... .......... .......... .......... .......... 96%  164M 0s
182050K .......... .......... .......... .......... .......... 96%  109M 0s
182100K .......... .......... .......... .......... .......... 96%  165M 0s
182150K .......... .......... .......... .......... .......... 96%  159M 0s
182200K .......... .......... .......... .......... .......... 96%  159M 0s
182250K .......... .......... .......... .......... .......... 96% 97.3M 0s
182300K .......... .......... .......... .......... .......... 96%  164M 0s
182350K .......... .......... .......... .......... .......... 96%  139M 0s
182400K .......... .......... .......... .......... .......... 96%  112M 0s
182450K .......... .......... .......... .......... .......... 96% 79.6M 0s
182500K .......... .......... .......... .......... .......... 96% 88.5M 0s
182550K .......... .......... .......... .......... .......... 96%  118M 0s
182600K .......... .......... .......... .......... .......... 97% 88.0M 0s
182650K .......... .......... .......... .......... .......... 97%  110M 0s
182700K .......... .......... .......... .......... .......... 97%  172M 0s
182750K .......... .......... .......... .......... .......... 97%  125M 0s
182800K .......... .......... .......... .......... .......... 97%  150M 0s
182850K .......... .......... .......... .......... .......... 97%  110M 0s
182900K .......... .......... .......... .......... .......... 97% 60.5M 0s
182950K .......... .......... .......... .......... .......... 97% 97.4M 0s
183000K .......... .......... .......... .......... .......... 97%  148M 0s
183050K .......... .......... .......... .......... .......... 97%  135M 0s
183100K .......... .......... .......... .......... .......... 97%  164M 0s
183150K .......... .......... .......... .......... .......... 97%  153M 0s
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183200K .......... .......... .......... .......... .......... 97%  138M 0s
183250K .......... .......... .......... .......... .......... 97%  120M 0s
183300K .......... .......... .......... .......... .......... 97%  132M 0s
183350K .......... .......... .......... .......... .......... 97%  153M 0s
183400K .......... .......... .......... .......... .......... 97%  151M 0s
183450K .......... .......... .......... .......... .......... 97% 66.3M 0s
183500K .......... .......... .......... .......... .......... 97%  114M 0s
183550K .......... .......... .......... .......... .......... 97% 77.2M 0s
183600K .......... .......... .......... .......... .......... 97% 73.1M 0s
183650K .......... .......... .......... .......... .......... 97% 19.3M 0s
183700K .......... .......... .......... .......... .......... 97% 32.5M 0s
183750K .......... .......... .......... .......... .......... 97% 44.6M 0s
183800K .......... .......... .......... .......... .......... 97% 31.6M 0s
183850K .......... .......... .......... .......... .......... 97% 9.97M 0s
183900K .......... .......... .......... .......... .......... 97% 61.4M 0s
183950K .......... .......... .......... .......... .......... 97%  162M 0s
184000K .......... .......... .......... .......... .......... 97%  165M 0s
184050K .......... .......... .......... .......... .......... 97%  110M 0s
184100K .......... .......... .......... .......... .......... 97%  166M 0s
184150K .......... .......... .......... .......... .......... 97%  156M 0s
184200K .......... .......... .......... .......... .......... 97%  152M 0s
184250K .......... .......... .......... .......... .......... 97%  138M 0s
184300K .......... .......... .......... .......... .......... 97%  166M 0s
184350K .......... .......... .......... .......... .......... 97%  149M 0s
184400K .......... .......... .......... .......... .......... 97%  111M 0s
184450K .......... .......... .......... .......... .......... 98%  107M 0s
184500K .......... .......... .......... .......... .......... 98%  155M 0s
184550K .......... .......... .......... .......... .......... 98%  155M 0s
184600K .......... .......... .......... .......... .......... 98%  152M 0s
184650K .......... .......... .......... .......... .......... 98%  142M 0s
184700K .......... .......... .......... .......... .......... 98%  132M 0s
184750K .......... .......... .......... .......... .......... 98%  122M 0s
184800K .......... .......... .......... .......... .......... 98%  165M 0s
184850K .......... .......... .......... .......... .......... 98%  127M 0s
184900K .......... .......... .......... .......... .......... 98%  156M 0s
184950K .......... .......... .......... .......... .......... 98%  156M 0s
185000K .......... .......... .......... .......... .......... 98% 61.7M 0s
185050K .......... .......... .......... .......... .......... 98% 80.4M 0s
185100K .......... .......... .......... .......... .......... 98%  145M 0s
185150K .......... .......... .......... .......... .......... 98%  154M 0s
185200K .......... .......... .......... .......... .......... 98%  166M 0s
185250K .......... .......... .......... .......... .......... 98%  130M 0s
185300K .......... .......... .......... .......... .......... 98%  155M 0s
185350K .......... .......... .......... .......... .......... 98%  155M 0s
185400K .......... .......... .......... .......... .......... 98%  149M 0s
185450K .......... .......... .......... .......... .......... 98%  140M 0s
185500K .......... .......... .......... .......... .......... 98%  154M 0s
185550K .......... .......... .......... .......... .......... 98%  168M 0s
185600K .......... .......... .......... .......... .......... 98% 73.5M 0s
185650K .......... .......... .......... .......... .......... 98%  141M 0s
185700K .......... .......... .......... .......... .......... 98%  157M 0s
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185750K .......... .......... .......... .......... .......... 98%  156M 0s
185800K .......... .......... .......... .......... .......... 98%  153M 0s
185850K .......... .......... .......... .......... .......... 98%  140M 0s
185900K .......... .......... .......... .......... .......... 98%  160M 0s
185950K .......... .......... .......... .......... .......... 98%  166M 0s
186000K .......... .......... .......... .......... .......... 98%  166M 0s
186050K .......... .......... .......... .......... .......... 98%  138M 0s
186100K .......... .......... .......... .......... .......... 98%  139M 0s
186150K .......... .......... .......... .......... .......... 98% 94.5M 0s
186200K .......... .......... .......... .......... .......... 98% 82.3M 0s
186250K .......... .......... .......... .......... .......... 98% 79.1M 0s
186300K .......... .......... .......... .......... .......... 98%  122M 0s
186350K .......... .......... .......... .......... .......... 99% 77.5M 0s
186400K .......... .......... .......... .......... .......... 99% 88.4M 0s
186450K .......... .......... .......... .......... .......... 99%  142M 0s
186500K .......... .......... .......... .......... .......... 99%  153M 0s
186550K .......... .......... .......... .......... .......... 99%  155M 0s
186600K .......... .......... .......... .......... .......... 99%  146M 0s
186650K .......... .......... .......... .......... .......... 99% 39.7M 0s
186700K .......... .......... .......... .......... .......... 99%  118M 0s
186750K .......... .......... .......... .......... .......... 99% 93.6M 0s
186800K .......... .......... .......... .......... .......... 99%  163M 0s
186850K .......... .......... .......... .......... .......... 99%  122M 0s
186900K .......... .......... .......... .......... .......... 99%  152M 0s
186950K .......... .......... .......... .......... .......... 99%  164M 0s
187000K .......... .......... .......... .......... .......... 99%  153M 0s
187050K .......... .......... .......... .......... .......... 99%  139M 0s
187100K .......... .......... .......... .......... .......... 99% 87.8M 0s
187150K .......... .......... .......... .......... .......... 99%  127M 0s
187200K .......... .......... .......... .......... .......... 99% 85.3M 0s
187250K .......... .......... .......... .......... .......... 99%  111M 0s
187300K .......... .......... .......... .......... .......... 99% 75.7M 0s
187350K .......... .......... .......... .......... .......... 99%  125M 0s
187400K .......... .......... .......... .......... .......... 99%  121M 0s
187450K .......... .......... .......... .......... .......... 99%  114M 0s
187500K .......... .......... .......... .......... .......... 99%  128M 0s
187550K .......... .......... .......... .......... .......... 99%  163M 0s
187600K .......... .......... .......... .......... .......... 99%  157M 0s
187650K .......... .......... .......... .......... .......... 99%  139M 0s
187700K .......... .......... .......... .......... .......... 99%  159M 0s
187750K .......... .......... .......... .......... .......... 99%  155M 0s
187800K .......... .......... .......... .......... .......... 99%  128M 0s
187850K .......... .......... .......... .......... .......... 99%  144M 0s
187900K .......... .......... .......... .......... .......... 99%  168M 0s
187950K .......... .......... .......... .......... .......... 99%  153M 0s
188000K .......... .......... .......... .......... .......... 99%  161M 0s
188050K .......... .......... .......... .......... .......... 99%  141M 0s
188100K .......... .......... .......... .......... .......... 99%  160M 0s
188150K .......... .......... .......... .......... .......... 99%  154M 0s
188200K .......... .......... .......... .......... .......... 99%  136M 0s
188250K .......... ..                                          100%  121M=1.8s
```

```
2020-05-31 14:07:48 (103 MB/s) - ‘title.akas.tsv.gz’ saved [192780293/192780293]

/bin/bash: line 1: fg: no job control
```

In [6]:
```
title_akas = spark.read.option("sep", "\t").csv('file:/databricks/driver/title.akas.tsv', header=True, inferSchema = True)
title_akas.cache()
title_akas.show(3)
```

```
+---------+--------+--------------------+------+--------+-----------+-------------+---------------+
  titleId|ordering|               title|region|language|      types|   attributes|isOriginalTitle|
+---------+--------+--------------------+------+--------+-----------+-------------+---------------+
tt0000001|       1|          Карменсіта|    UA|      \N|imdbDisplay|           \N|              0|
tt0000001|       2|          Carmencita|    DE|      \N|         \N|literal title|              0|
tt0000001|       3|Carmencita - span...|    HU|      \N|imdbDisplay|           \N|              0|
+---------+--------+--------------------+------+--------+-----------+-------------+---------------+
only showing top 3 rows
```

In [7]:
```
%sh wget https://datasets.imdbws.com/title.basics.tsv.gz
%sh
gunzip title.basics.tsv.gz
```

```
--2020-05-31 14:08:56--  https://datasets.imdbws.com/title.basics.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.37, 13.224.13.54,
13.224.13.26, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.37|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 121814992 (116M) [binary/octet-stream]
Saving to: ‘title.basics.tsv.gz’

     0K ..........  ..........  ..........  ..........  ..........  0% 5.02M 23s
    50K ..........  ..........  ..........  ..........  ..........  0% 9.36M 18s
   100K ..........  ..........  ..........  ..........  ..........  0% 13.1M 15s
   150K ..........  ..........  ..........  ..........  ..........  0% 19.1M 13s
   200K ..........  ..........  ..........  ..........  ..........  0% 16.4M 12s
   250K ..........  ..........  ..........  ..........  ..........  0% 31.5M 10s
   300K ..........  ..........  ..........  ..........  ..........  0% 36.4M 9s
   350K ..........  ..........  ..........  ..........  ..........  0% 21.3M 9s
   400K ..........  ..........  ..........  ..........  ..........  0% 46.9M 8s
   450K ..........  ..........  ..........  ..........  ..........  0% 35.4M 8s
   500K ..........  ..........  ..........  ..........  ..........  0% 55.5M 7s
   550K ..........  ..........  ..........  ..........  ..........  0% 51.1M 7s
   600K ..........  ..........  ..........  ..........  ..........  0% 54.6M 6s
   650K ..........  ..........  ..........  ..........  ..........  0% 59.6M 6s
   700K ..........  ..........  ..........  ..........  ..........  0% 33.5M 6s
   750K ..........  ..........  ..........  ..........  ..........  0% 47.8M 6s
   800K ..........  ..........  ..........  ..........  ..........  0%  138M 5s
   850K ..........  ..........  ..........  ..........  ..........  0%  136M 5s
   900K ..........  ..........  ..........  ..........  ..........  0%  183M 5s
   950K ..........  ..........  ..........  ..........  ..........  0%  116M 5s
  1000K ..........  ..........  ..........  ..........  ..........  0%  101M 4s
  1050K ..........  ..........  ..........  ..........  ..........  0% 77.9M 4s
  1100K ..........  ..........  ..........  ..........  ..........  0% 89.2M 4s
  1150K ..........  ..........  ..........  ..........  ..........  1% 77.7M 4s
  1200K ..........  ..........  ..........  ..........  ..........  1%  103M 4s
  1250K ..........  ..........  ..........  ..........  ..........  1%  138M 4s
  1300K ..........  ..........  ..........  ..........  ..........  1% 90.9M 4s
  1350K ..........  ..........  ..........  ..........  ..........  1%  103M 4s
  1400K ..........  ..........  ..........  ..........  ..........  1% 78.6M 4s
  1450K ..........  ..........  ..........  ..........  ..........  1%  156M 3s
  1500K ..........  ..........  ..........  ..........  ..........  1%  141M 3s
  1550K ..........  ..........  ..........  ..........  ..........  1%  135M 3s
  1600K ..........  ..........  ..........  ..........  ..........  1%  126M 3s
  1650K ..........  ..........  ..........  ..........  ..........  1%  149M 3s
  1700K ..........  ..........  ..........  ..........  ..........  1%  281M 3s
  1750K ..........  ..........  ..........  ..........  ..........  1%  177M 3s
  1800K ..........  ..........  ..........  ..........  ..........  1%  106M 3s
  1850K ..........  ..........  ..........  ..........  ..........  1%  185M 3s
  1900K ..........  ..........  ..........  ..........  ..........  1%  125M 3s
  1950K ..........  ..........  ..........  ..........  ..........  1%  129M 3s
  2000K ..........  ..........  ..........  ..........  ..........  1%  156M 3s
  2050K ..........  ..........  ..........  ..........  ..........  1%  174M 3s
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2100K .......... .......... .......... .......... ..........  1%  270M 3s
2150K .......... .......... .......... .......... ..........  1%  206M 3s
2200K .......... .......... .......... .......... ..........  1%  187M 3s
2250K .......... .......... .......... .......... ..........  1%  243M 2s
2300K .......... .......... .......... .......... ..........  1%  200M 2s
2350K .......... .......... .......... .......... ..........  2%  179M 2s
2400K .......... .......... .......... .......... ..........  2%  214M 2s
2450K .......... .......... .......... .......... ..........  2%  192M 2s
2500K .......... .......... .......... .......... ..........  2%  200M 2s
2550K .......... .......... .......... .......... ..........  2%  170M 2s
2600K .......... .......... .......... .......... ..........  2%  195M 2s
2650K .......... .......... .......... .......... ..........  2%  168M 2s
2700K .......... .......... .......... .......... ..........  2%  172M 2s
2750K .......... .......... .......... .......... ..........  2%  162M 2s
2800K .......... .......... .......... .......... ..........  2%  202M 2s
2850K .......... .......... .......... .......... ..........  2%  206M 2s
2900K .......... .......... .......... .......... ..........  2%  199M 2s
2950K .......... .......... .......... .......... ..........  2%  237M 2s
3000K .......... .......... .......... .......... ..........  2%  309M 2s
3050K .......... .......... .......... .......... ..........  2%  191M 2s
3100K .......... .......... .......... .......... ..........  2%  302M 2s
3150K .......... .......... .......... .......... ..........  2%  179M 2s
3200K .......... .......... .......... .......... ..........  2%  232M 2s
3250K .......... .......... .......... .......... ..........  2%  241M 2s
3300K .......... .......... .......... .......... ..........  2%  196M 2s
3350K .......... .......... .......... .......... ..........  2%  276M 2s
3400K .......... .......... .......... .......... ..........  2% 81.4M 2s
3450K .......... .......... .......... .......... ..........  2%  133M 2s
3500K .......... .......... .......... .......... ..........  2%  147M 2s
3550K .......... .......... .......... .......... ..........  3%  120M 2s
3600K .......... .......... .......... .......... ..........  3%  153M 2s
3650K .......... .......... .......... .......... ..........  3%  153M 2s
3700K .......... .......... .......... .......... ..........  3%  117M 2s
3750K .......... .......... .......... .......... ..........  3% 78.6M 2s
3800K .......... .......... .......... .......... ..........  3%  154M 2s
3850K .......... .......... .......... .......... ..........  3%  179M 2s
3900K .......... .......... .......... .......... ..........  3% 94.7M 2s
3950K .......... .......... .......... .......... ..........  3%  127M 2s
4000K .......... .......... .......... .......... ..........  3%  108M 2s
4050K .......... .......... .......... .......... ..........  3%  137M 2s
4100K .......... .......... .......... .......... ..........  3%  148M 2s
4150K .......... .......... .......... .......... ..........  3%  127M 2s
4200K .......... .......... .......... .......... ..........  3%  164M 2s
4250K .......... .......... .......... .......... ..........  3%  140M 2s
4300K .......... .......... .......... .......... ..........  3%  136M 2s
4350K .......... .......... .......... .......... ..........  3%  129M 2s
4400K .......... .......... .......... .......... ..........  3%  146M 2s
4450K .......... .......... .......... .......... ..........  3%  147M 2s
4500K .......... .......... .......... .......... ..........  3%  142M 2s
4550K .......... .......... .......... .......... ..........  3%  137M 2s
4600K .......... .......... .......... .......... ..........  3%  149M 2s
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4650K .......... .......... .......... .......... ..........  3%  145M 2s
4700K .......... .......... .......... .......... ..........  3%  127M 2s
4750K .......... .......... .......... .......... ..........  4% 89.2M 2s
4800K .......... .......... .......... .......... ..........  4%  191M 2s
4850K .......... .......... .......... .......... ..........  4%  131M 2s
4900K .......... .......... .......... .......... ..........  4%  160M 2s
4950K .......... .......... .......... .......... ..........  4%  141M 2s
5000K .......... .......... .......... .......... ..........  4%  162M 2s
5050K .......... .......... .......... .......... ..........  4%  146M 1s
5100K .......... .......... .......... .......... ..........  4%  171M 1s
5150K .......... .......... .......... .......... ..........  4%  145M 1s
5200K .......... .......... .......... .......... ..........  4%  147M 1s
5250K .......... .......... .......... .......... ..........  4%  140M 1s
5300K .......... .......... .......... .......... ..........  4%  182M 1s
5350K .......... .......... .......... .......... ..........  4%  150M 1s
5400K .......... .......... .......... .......... ..........  4%  149M 1s
5450K .......... .......... .......... .......... ..........  4%  160M 1s
5500K .......... .......... .......... .......... ..........  4%  147M 1s
5550K .......... .......... .......... .......... ..........  4%  147M 1s
5600K .......... .......... .......... .......... ..........  4%  148M 1s
5650K .......... .......... .......... .......... ..........  4%  178M 1s
5700K .......... .......... .......... .......... ..........  4% 96.2M 1s
5750K .......... .......... .......... .......... ..........  4%  124M 1s
5800K .......... .......... .......... .......... ..........  4%  159M 1s
5850K .......... .......... .......... .......... ..........  4%  129M 1s
5900K .......... .......... .......... .......... ..........  5%  140M 1s
5950K .......... .......... .......... .......... ..........  5% 81.6M 1s
6000K .......... .......... .......... .......... ..........  5%  141M 1s
6050K .......... .......... .......... .......... ..........  5%  143M 1s
6100K .......... .......... .......... .......... ..........  5% 99.8M 1s
6150K .......... .......... .......... .......... ..........  5%  157M 1s
6200K .......... .......... .......... .......... ..........  5% 95.3M 1s
6250K .......... .......... .......... .......... ..........  5%  128M 1s
6300K .......... .......... .......... .......... ..........  5%  136M 1s
6350K .......... .......... .......... .......... ..........  5% 73.8M 1s
6400K .......... .......... .......... .......... ..........  5%  149M 1s
6450K .......... .......... .......... .......... ..........  5%  119M 1s
6500K .......... .......... .......... .......... ..........  5%  141M 1s
6550K .......... .......... .......... .......... ..........  5%  115M 1s
6600K .......... .......... .......... .......... ..........  5%  125M 1s
6650K .......... .......... .......... .......... ..........  5%  154M 1s
6700K .......... .......... .......... .......... ..........  5%  126M 1s
6750K .......... .......... .......... .......... ..........  5%  105M 1s
6800K .......... .......... .......... .......... ..........  5%  149M 1s
6850K .......... .......... .......... .......... ..........  5%  155M 1s
6900K .......... .......... .......... .......... ..........  5%  147M 1s
6950K .......... .......... .......... .......... ..........  5%  127M 1s
7000K .......... .......... .......... .......... ..........  5%  154M 1s
7050K .......... .......... .......... .......... ..........  5%  148M 1s
7100K .......... .......... .......... .......... ..........  6%  142M 1s
7150K .......... .......... .......... .......... ..........  6%  121M 1s
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7200K .......... .......... .......... .......... ..........  6%  149M 1s
7250K .......... .......... .......... .......... ..........  6%  152M 1s
7300K .......... .......... .......... .......... ..........  6%  147M 1s
7350K .......... .......... .......... .......... ..........  6%  136M 1s
7400K .......... .......... .......... .......... ..........  6%  146M 1s
7450K .......... .......... .......... .......... ..........  6%  156M 1s
7500K .......... .......... .......... .......... ..........  6%  140M 1s
7550K .......... .......... .......... .......... ..........  6%  127M 1s
7600K .......... .......... .......... .......... ..........  6%  154M 1s
7650K .......... .......... .......... .......... ..........  6%  139M 1s
7700K .......... .......... .......... .......... ..........  6%  132M 1s
7750K .......... .......... .......... .......... ..........  6%  142M 1s
7800K .......... .......... .......... .......... ..........  6%  133M 1s
7850K .......... .......... .......... .......... ..........  6%  125M 1s
7900K .......... .......... .......... .......... ..........  6%  146M 1s
7950K .......... .......... .......... .......... ..........  6%  109M 1s
8000K .......... .......... .......... .......... ..........  6% 99.8M 1s
8050K .......... .......... .......... .......... ..........  6% 91.8M 1s
8100K .......... .......... .......... .......... ..........  6%  142M 1s
8150K .......... .......... .......... .......... ..........  6%  122M 1s
8200K .......... .......... .......... .......... ..........  6%  144M 1s
8250K .......... .......... .......... .......... ..........  6%  137M 1s
8300K .......... .......... .......... .......... ..........  7%  158M 1s
8350K .......... .......... .......... .......... ..........  7% 93.2M 1s
8400K .......... .......... .......... .......... ..........  7%  148M 1s
8450K .......... .......... .......... .......... ..........  7%  134M 1s
8500K .......... .......... .......... .......... ..........  7%  122M 1s
8550K .......... .......... .......... .......... ..........  7%  124M 1s
8600K .......... .......... .......... .......... ..........  7%  140M 1s
8650K .......... .......... .......... .......... ..........  7%  124M 1s
8700K .......... .......... .......... .......... ..........  7%  126M 1s
8750K .......... .......... .......... .......... ..........  7%  124M 1s
8800K .......... .......... .......... .......... ..........  7%  174M 1s
8850K .......... .......... .......... .......... ..........  7% 85.9M 1s
8900K .......... .......... .......... .......... ..........  7%  154M 1s
8950K .......... .......... .......... .......... ..........  7%  103M 1s
9000K .......... .......... .......... .......... ..........  7%  130M 1s
9050K .......... .......... .......... .......... ..........  7%  157M 1s
9100K .......... .......... .......... .......... ..........  7% 99.6M 1s
9150K .......... .......... .......... .......... ..........  7%  127M 1s
9200K .......... .......... .......... .......... ..........  7%  158M 1s
9250K .......... .......... .......... .......... ..........  7%  154M 1s
9300K .......... .......... .......... .......... ..........  7%  157M 1s
9350K .......... .......... .......... .......... ..........  7% 54.7M 1s
9400K .......... .......... .......... .......... ..........  7% 49.7M 1s
9450K .......... .......... .......... .......... ..........  7% 86.1M 1s
9500K .......... .......... .......... .......... ..........  8%  132M 1s
9550K .......... .......... .......... .......... ..........  8%  112M 1s
9600K .......... .......... .......... .......... ..........  8% 89.7M 1s
9650K .......... .......... .......... .......... ..........  8%  110M 1s
9700K .......... .......... .......... .......... ..........  8%  138M 1s
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 9750K .......... .......... .......... .......... ..........  8%  149M 1s
 9800K .......... .......... .......... .......... ..........  8% 73.9M 1s
 9850K .......... .......... .......... .......... ..........  8%  192M 1s
 9900K .......... .......... .......... .......... ..........  8% 84.9M 1s
 9950K .......... .......... .......... .......... ..........  8% 97.6M 1s
10000K .......... .......... .......... .......... ..........  8%  163M 1s
10050K .......... .......... .......... .......... ..........  8%  143M 1s
10100K .......... .......... .......... .......... ..........  8% 73.9M 1s
10150K .......... .......... .......... .......... ..........  8% 95.8M 1s
10200K .......... .......... .......... .......... ..........  8%  198M 1s
10250K .......... .......... .......... .......... ..........  8%  190M 1s
10300K .......... .......... .......... .......... ..........  8%  193M 1s
10350K .......... .......... .......... .......... ..........  8%  209M 1s
10400K .......... .......... .......... .......... ..........  8%  285M 1s
10450K .......... .......... .......... .......... ..........  8%  272M 1s
10500K .......... .......... .......... .......... ..........  8%  305M 1s
10550K .......... .......... .......... .......... ..........  8%  153M 1s
10600K .......... .......... .......... .......... ..........  8%  269M 1s
10650K .......... .......... .......... .......... ..........  8%  275M 1s
10700K .......... .......... .......... .......... ..........  9%  232M 1s
10750K .......... .......... .......... .......... ..........  9%  129M 1s
10800K .......... .......... .......... .......... ..........  9%  299M 1s
10850K .......... .......... .......... .......... ..........  9%  272M 1s
10900K .......... .......... .......... .......... ..........  9%  203M 1s
10950K .......... .......... .......... .......... ..........  9%  171M 1s
11000K .......... .......... .......... .......... ..........  9% 7.16M 1s
11050K .......... .......... .......... .......... ..........  9% 42.5M 1s
11100K .......... .......... .......... .......... ..........  9% 26.4M 1s
11150K .......... .......... .......... .......... ..........  9%  108M 1s
11200K .......... .......... .......... .......... ..........  9%  165M 1s
11250K .......... .......... .......... .......... ..........  9%  154M 1s
11300K .......... .......... .......... .......... ..........  9%  161M 1s
11350K .......... .......... .......... .......... ..........  9%  139M 1s
11400K .......... .......... .......... .......... ..........  9%  158M 1s
11450K .......... .......... .......... .......... ..........  9%  141M 1s
11500K .......... .......... .......... .......... ..........  9%  161M 1s
11550K .......... .......... .......... .......... ..........  9%  131M 1s
11600K .......... .......... .......... .......... ..........  9%  161M 1s
11650K .......... .......... .......... .......... ..........  9%  140M 1s
11700K .......... .......... .......... .......... ..........  9%  161M 1s
11750K .......... .......... .......... .......... ..........  9%  104M 1s
11800K .......... .......... .......... .......... ..........  9%  162M 1s
11850K .......... .......... .......... .......... .......... 10%  112M 1s
11900K .......... .......... .......... .......... .......... 10%  112M 1s
11950K .......... .......... .......... .......... .......... 10%  130M 1s
12000K .......... .......... .......... .......... .......... 10%  133M 1s
12050K .......... .......... .......... .......... .......... 10% 47.4M 1s
12100K .......... .......... .......... .......... .......... 10% 82.8M 1s
12150K .......... .......... .......... .......... .......... 10% 68.1M 1s
12200K .......... .......... .......... .......... .......... 10% 88.6M 1s
12250K .......... .......... .......... .......... .......... 10% 90.2M 1s
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12300K .......... .......... .......... .......... .......... 10%  103M 1s
12350K .......... .......... .......... .......... .......... 10%  135M 1s
12400K .......... .......... .......... .......... .......... 10%  164M 1s
12450K .......... .......... .......... .......... .......... 10%  144M 1s
12500K .......... .......... .......... .......... .......... 10%  159M 1s
12550K .......... .......... .......... .......... .......... 10%  144M 1s
12600K .......... .......... .......... .......... .......... 10% 91.3M 1s
12650K .......... .......... .......... .......... .......... 10%  149M 1s
12700K .......... .......... .......... .......... .......... 10%  167M 1s
12750K .......... .......... .......... .......... .......... 10%  140M 1s
12800K .......... .......... .......... .......... .......... 10%  147M 1s
12850K .......... .......... .......... .......... .......... 10%  162M 1s
12900K .......... .......... .......... .......... .......... 10%  157M 1s
12950K .......... .......... .......... .......... .......... 10%  136M 1s
13000K .......... .......... .......... .......... .......... 10%  159M 1s
13050K .......... .......... .......... .......... .......... 11% 64.9M 1s
13100K .......... .......... .......... .......... .......... 11% 68.8M 1s
13150K .......... .......... .......... .......... .......... 11% 75.9M 1s
13200K .......... .......... .......... .......... .......... 11% 70.6M 1s
13250K .......... .......... .......... .......... .......... 11% 68.5M 1s
13300K .......... .......... .......... .......... .......... 11% 93.0M 1s
13350K .......... .......... .......... .......... .......... 11%  139M 1s
13400K .......... .......... .......... .......... .......... 11% 93.8M 1s
13450K .......... .......... .......... .......... .......... 11% 67.7M 1s
13500K .......... .......... .......... .......... .......... 11% 44.3M 1s
13550K .......... .......... .......... .......... .......... 11% 32.1M 1s
13600K .......... .......... .......... .......... .......... 11% 87.8M 1s
13650K .......... .......... .......... .......... .......... 11%  159M 1s
13700K .......... .......... .......... .......... .......... 11%  142M 1s
13750K .......... .......... .......... .......... .......... 11%  135M 1s
13800K .......... .......... .......... .......... .......... 11%  156M 1s
13850K .......... .......... .......... .......... .......... 11%  154M 1s
13900K .......... .......... .......... .......... .......... 11%  123M 1s
13950K .......... .......... .......... .......... .......... 11%  127M 1s
14000K .......... .......... .......... .......... .......... 11%  161M 1s
14050K .......... .......... .......... .......... .......... 11%  139M 1s
14100K .......... .......... .......... .......... .......... 11%  150M 1s
14150K .......... .......... .......... .......... .......... 11%  124M 1s
14200K .......... .......... .......... .......... .......... 11%  157M 1s
14250K .......... .......... .......... .......... .......... 12%  139M 1s
14300K .......... .......... .......... .......... .......... 12%  145M 1s
14350K .......... .......... .......... .......... .......... 12%  110M 1s
14400K .......... .......... .......... .......... .......... 12%  160M 1s
14450K .......... .......... .......... .......... .......... 12%  158M 1s
14500K .......... .......... .......... .......... .......... 12%  147M 1s
14550K .......... .......... .......... .......... .......... 12%  133M 1s
14600K .......... .......... .......... .......... .......... 12%  109M 1s
14650K .......... .......... .......... .......... .......... 12%  144M 1s
14700K .......... .......... .......... .......... .......... 12%  126M 1s
14750K .......... .......... .......... .......... .......... 12%  138M 1s
14800K .......... .......... .......... .......... .......... 12% 75.5M 1s
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 14850K .......... .......... .......... .......... .......... 12%  160M 1s
 14900K .......... .......... .......... .......... .......... 12%  154M 1s
 14950K .......... .......... .......... .......... .......... 12% 79.3M 1s
 15000K .......... .......... .......... .......... .......... 12%  167M 1s
 15050K .......... .......... .......... .......... .......... 12%  104M 1s
 15100K .......... .......... .......... .......... .......... 12%  155M 1s
 15150K .......... .......... .......... .......... .......... 12%  137M 1s
 15200K .......... .......... .......... .......... .......... 12%  149M 1s
 15250K .......... .......... .......... .......... .......... 12% 77.4M 1s
 15300K .......... .......... .......... .......... .......... 12% 73.1M 1s
 15350K .......... .......... .......... .......... .......... 12% 78.0M 1s
 15400K .......... .......... .......... .......... .......... 12%  194M 1s
 15450K .......... .......... .......... .......... .......... 13%  276M 1s
 15500K .......... .......... .......... .......... .......... 13%  296M 1s
 15550K .......... .......... .......... .......... .......... 13% 89.7M 1s
 15600K .......... .......... .......... .......... .......... 13% 68.8M 1s
 15650K .......... .......... .......... .......... .......... 13% 87.2M 1s
 15700K .......... .......... .......... .......... .......... 13% 66.7M 1s
 15750K .......... .......... .......... .......... .......... 13% 81.7M 1s
 15800K .......... .......... .......... .......... .......... 13% 90.8M 1s
 15850K .......... .......... .......... .......... .......... 13%  104M 1s
 15900K .......... .......... .......... .......... .......... 13%  155M 1s
 15950K .......... .......... .......... .......... .......... 13%  201M 1s
 16000K .......... .......... .......... .......... .......... 13%  302M 1s
 16050K .......... .......... .......... .......... .......... 13%  300M 1s
 16100K .......... .......... .......... .......... .......... 13%  274M 1s
 16150K .......... .......... .......... .......... .......... 13%  121M 1s

*** WARNING: skipped 131404 bytes of output ***

102650K .......... .......... .......... .......... .......... 86%  158M 0s
102700K .......... .......... .......... .......... .......... 86%  166M 0s
102750K .......... .......... .......... .......... .......... 86%  194M 0s
102800K .......... .......... .......... .......... .......... 86%  167M 0s
102850K .......... .......... .......... .......... .......... 86%  173M 0s
102900K .......... .......... .......... .......... .......... 86%  177M 0s
102950K .......... .......... .......... .......... .......... 86%  175M 0s
103000K .......... .......... .......... .......... .......... 86%  181M 0s
103050K .......... .......... .......... .......... .......... 86%  134M 0s
103100K .......... .......... .......... .......... .......... 86%  163M 0s
103150K .......... .......... .......... .......... .......... 86%  185M 0s
103200K .......... .......... .......... .......... .......... 86%  180M 0s
103250K .......... .......... .......... .......... .......... 86%  169M 0s
103300K .......... .......... .......... .......... .......... 86%  190M 0s
103350K .......... .......... .......... .......... .......... 86%  182M 0s
103400K .......... .......... .......... .......... .......... 86%  181M 0s
103450K .......... .......... .......... .......... .......... 87%  159M 0s
103500K .......... .......... .......... .......... .......... 87%  171M 0s
103550K .......... .......... .......... .......... .......... 87%  195M 0s
103600K .......... .......... .......... .......... .......... 87%  191M 0s
103650K .......... .......... .......... .......... .......... 87%  155M 0s
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103700K .......... .......... .......... .......... .......... 87%  167M 0s
103750K .......... .......... .......... .......... .......... 87%  157M 0s
103800K .......... .......... .......... .......... .......... 87%  194M 0s
103850K .......... .......... .......... .......... .......... 87%  137M 0s
103900K .......... .......... .......... .......... .......... 87%  168M 0s
103950K .......... .......... .......... .......... .......... 87%  174M 0s
104000K .......... .......... .......... .......... .......... 87%  184M 0s
104050K .......... .......... .......... .......... .......... 87%  148M 0s
104100K .......... .......... .......... .......... .......... 87%  184M 0s
104150K .......... .......... .......... .......... .......... 87%  112M 0s
104200K .......... .......... .......... .......... .......... 87%  177M 0s
104250K .......... .......... .......... .......... .......... 87%  140M 0s
104300K .......... .......... .......... .......... .......... 87%  167M 0s
104350K .......... .......... .......... .......... .......... 87%  163M 0s
104400K .......... .......... .......... .......... .......... 87%  175M 0s
104450K .......... .......... .......... .......... .......... 87%  161M 0s
104500K .......... .......... .......... .......... .......... 87%  183M 0s
104550K .......... .......... .......... .......... .......... 87%  188M 0s
104600K .......... .......... .......... .......... .......... 87%  180M 0s
104650K .......... .......... .......... .......... .......... 88%  155M 0s
104700K .......... .......... .......... .......... .......... 88%  187M 0s
104750K .......... .......... .......... .......... .......... 88%  179M 0s
104800K .......... .......... .......... .......... .......... 88%  192M 0s
104850K .......... .......... .......... .......... .......... 88%  164M 0s
104900K .......... .......... .......... .......... .......... 88%  169M 0s
104950K .......... .......... .......... .......... .......... 88%  171M 0s
105000K .......... .......... .......... .......... .......... 88%  134M 0s
105050K .......... .......... .......... .......... .......... 88%  150M 0s
105100K .......... .......... .......... .......... .......... 88%  154M 0s
105150K .......... .......... .......... .......... .......... 88%  166M 0s
105200K .......... .......... .......... .......... .......... 88%  161M 0s
105250K .......... .......... .......... .......... .......... 88%  161M 0s
105300K .......... .......... .......... .......... .......... 88%  157M 0s
105350K .......... .......... .......... .......... .......... 88%  161M 0s
105400K .......... .......... .......... .......... .......... 88%  184M 0s
105450K .......... .......... .......... .......... .......... 88%  146M 0s
105500K .......... .......... .......... .......... .......... 88%  165M 0s
105550K .......... .......... .......... .......... .......... 88%  133M 0s
105600K .......... .......... .......... .......... .......... 88%  184M 0s
105650K .......... .......... .......... .......... .......... 88%  158M 0s
105700K .......... .......... .......... .......... .......... 88%  170M 0s
105750K .......... .......... .......... .......... .......... 88%  179M 0s
105800K .......... .......... .......... .......... .......... 88%  182M 0s
105850K .......... .......... .......... .......... .......... 89%  157M 0s
105900K .......... .......... .......... .......... .......... 89%  181M 0s
105950K .......... .......... .......... .......... .......... 89%  191M 0s
106000K .......... .......... .......... .......... .......... 89%  187M 0s
106050K .......... .......... .......... .......... .......... 89%  174M 0s
106100K .......... .......... .......... .......... .......... 89%  187M 0s
106150K .......... .......... .......... .......... .......... 89%  176M 0s
106200K .......... .......... .......... .......... .......... 89%  169M 0s
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106250K .......... .......... .......... .......... .......... 89%  138M 0s
106300K .......... .......... .......... .......... .......... 89%  161M 0s
106350K .......... .......... .......... .......... .......... 89%  178M 0s
106400K .......... .......... .......... .......... .......... 89%  173M 0s
106450K .......... .......... .......... .......... .......... 89%  163M 0s
106500K .......... .......... .......... .......... .......... 89%  176M 0s
106550K .......... .......... .......... .......... .......... 89%  192M 0s
106600K .......... .......... .......... .......... .......... 89%  187M 0s
106650K .......... .......... .......... .......... .......... 89%  141M 0s
106700K .......... .......... .......... .......... .......... 89%  179M 0s
106750K .......... .......... .......... .......... .......... 89%  167M 0s
106800K .......... .......... .......... .......... .......... 89%  171M 0s
106850K .......... .......... .......... .......... .......... 89%  155M 0s
106900K .......... .......... .......... .......... .......... 89%  171M 0s
106950K .......... .......... .......... .......... .......... 89%  178M 0s
107000K .......... .......... .......... .......... .......... 89%  167M 0s
107050K .......... .......... .......... .......... .......... 90%  152M 0s
107100K .......... .......... .......... .......... .......... 90%  183M 0s
107150K .......... .......... .......... .......... .......... 90%  191M 0s
107200K .......... .......... .......... .......... .......... 90%  188M 0s
107250K .......... .......... .......... .......... .......... 90%  171M 0s
107300K .......... .......... .......... .......... .......... 90%  187M 0s
107350K .......... .......... .......... .......... .......... 90%  192M 0s
107400K .......... .......... .......... .......... .......... 90%  173M 0s
107450K .......... .......... .......... .......... .......... 90%  152M 0s
107500K .......... .......... .......... .......... .......... 90%  186M 0s
107550K .......... .......... .......... .......... .......... 90%  188M 0s
107600K .......... .......... .......... .......... .......... 90%  188M 0s
107650K .......... .......... .......... .......... .......... 90%  152M 0s
107700K .......... .......... .......... .......... .......... 90%  170M 0s
107750K .......... .......... .......... .......... .......... 90%  190M 0s
107800K .......... .......... .......... .......... .......... 90%  176M 0s
107850K .......... .......... .......... .......... .......... 90%  137M 0s
107900K .......... .......... .......... .......... .......... 90%  176M 0s
107950K .......... .......... .......... .......... .......... 90%  189M 0s
108000K .......... .......... .......... .......... .......... 90%  193M 0s
108050K .......... .......... .......... .......... .......... 90%  162M 0s
108100K .......... .......... .......... .......... .......... 90%  181M 0s
108150K .......... .......... .......... .......... .......... 90%  174M 0s
108200K .......... .......... .......... .......... .......... 90%  189M 0s
108250K .......... .......... .......... .......... .......... 91%  144M 0s
108300K .......... .......... .......... .......... .......... 91%  151M 0s
108350K .......... .......... .......... .......... .......... 91%  182M 0s
108400K .......... .......... .......... .......... .......... 91%  180M 0s
108450K .......... .......... .......... .......... .......... 91%  166M 0s
108500K .......... .......... .......... .......... .......... 91%  191M 0s
108550K .......... .......... .......... .......... .......... 91%  194M 0s
108600K .......... .......... .......... .......... .......... 91%  180M 0s
108650K .......... .......... .......... .......... .......... 91%  150M 0s
108700K .......... .......... .......... .......... .......... 91%  188M 0s
108750K .......... .......... .......... .......... .......... 91%  175M 0s
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108800K .......... .......... .......... .......... .......... 91%  196M 0s
108850K .......... .......... .......... .......... .......... 91%  174M 0s
108900K .......... .......... .......... .......... .......... 91%  174M 0s
108950K .......... .......... .......... .......... .......... 91%  192M 0s
109000K .......... .......... .......... .......... .......... 91%  185M 0s
109050K .......... .......... .......... .......... .......... 91%  147M 0s
109100K .......... .......... .......... .......... .......... 91%  183M 0s
109150K .......... .......... .......... .......... .......... 91%  192M 0s
109200K .......... .......... .......... .......... .......... 91%  191M 0s
109250K .......... .......... .......... .......... .......... 91%  168M 0s
109300K .......... .......... .......... .......... .......... 91%  182M 0s
109350K .......... .......... .......... .......... .......... 91%  170M 0s
109400K .......... .......... .......... .......... .......... 92%  168M 0s
109450K .......... .......... .......... .......... .......... 92%  134M 0s
109500K .......... .......... .......... .......... .......... 92%  177M 0s
109550K .......... .......... .......... .......... .......... 92%  186M 0s
109600K .......... .......... .......... .......... .......... 92%  161M 0s
109650K .......... .......... .......... .......... .......... 92%  166M 0s
109700K .......... .......... .......... .......... .......... 92%  166M 0s
109750K .......... .......... .......... .......... .......... 92%  172M 0s
109800K .......... .......... .......... .......... .......... 92%  190M 0s
109850K .......... .......... .......... .......... .......... 92%  151M 0s
109900K .......... .......... .......... .......... .......... 92%  193M 0s
109950K .......... .......... .......... .......... .......... 92%  186M 0s
110000K .......... .......... .......... .......... .......... 92%  199M 0s
110050K .......... .......... .......... .......... .......... 92%  167M 0s
110100K .......... .......... .......... .......... .......... 92%  186M 0s
110150K .......... .......... .......... .......... .......... 92%  187M 0s
110200K .......... .......... .......... .......... .......... 92%  185M 0s
110250K .......... .......... .......... .......... .......... 92%  153M 0s
110300K .......... .......... .......... .......... .......... 92%  182M 0s
110350K .......... .......... .......... .......... .......... 92%  179M 0s
110400K .......... .......... .......... .......... .......... 92%  181M 0s
110450K .......... .......... .......... .......... .......... 92%  160M 0s
110500K .......... .......... .......... .......... .......... 92%  181M 0s
110550K .......... .......... .......... .......... .......... 92%  191M 0s
110600K .......... .......... .......... .......... .......... 93%  172M 0s
110650K .......... .......... .......... .......... .......... 93%  144M 0s
110700K .......... .......... .......... .......... .......... 93%  175M 0s
110750K .......... .......... .......... .......... .......... 93%  168M 0s
110800K .......... .......... .......... .......... .......... 93%  175M 0s
110850K .......... .......... .......... .......... .......... 93%  135M 0s
110900K .......... .......... .......... .......... .......... 93%  190M 0s
110950K .......... .......... .......... .......... .......... 93%  170M 0s
111000K .......... .......... .......... .......... .......... 93%  167M 0s
111050K .......... .......... .......... .......... .......... 93%  142M 0s
111100K .......... .......... .......... .......... .......... 93%  187M 0s
111150K .......... .......... .......... .......... .......... 93%  168M 0s
111200K .......... .......... .......... .......... .......... 93%  194M 0s
111250K .......... .......... .......... .......... .......... 93%  172M 0s
111300K .......... .......... .......... .......... .......... 93%  183M 0s
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111350K .......... .......... .......... .......... .......... 93%  185M 0s
111400K .......... .......... .......... .......... .......... 93%  183M 0s
111450K .......... .......... .......... .......... .......... 93%  148M 0s
111500K .......... .......... .......... .......... .......... 93%  181M 0s
111550K .......... .......... .......... .......... .......... 93%  192M 0s
111600K .......... .......... .......... .......... .......... 93%  182M 0s
111650K .......... .......... .......... .......... .......... 93%  181M 0s
111700K .......... .......... .......... .......... .......... 93%  183M 0s
111750K .......... .......... .......... .......... .......... 93%  186M 0s
111800K .......... .......... .......... .......... .......... 94%  185M 0s
111850K .......... .......... .......... .......... .......... 94%  156M 0s
111900K .......... .......... .......... .......... .......... 94%  178M 0s
111950K .......... .......... .......... .......... .......... 94%  176M 0s
112000K .......... .......... .......... .......... .......... 94%  176M 0s
112050K .......... .......... .......... .......... .......... 94%  170M 0s
112100K .......... .......... .......... .......... .......... 94%  175M 0s
112150K .......... .......... .......... .......... .......... 94%  168M 0s
112200K .......... .......... .......... .......... .......... 94%  173M 0s
112250K .......... .......... .......... .......... .......... 94%  143M 0s
112300K .......... .......... .......... .......... .......... 94%  159M 0s
112350K .......... .......... .......... .......... .......... 94%  168M 0s
112400K .......... .......... .......... .......... .......... 94%  165M 0s
112450K .......... .......... .......... .......... .......... 94%  162M 0s
112500K .......... .......... .......... .......... .......... 94%  189M 0s
112550K .......... .......... .......... .......... .......... 94%  187M 0s
112600K .......... .......... .......... .......... .......... 94%  173M 0s
112650K .......... .......... .......... .......... .......... 94%  157M 0s
112700K .......... .......... .......... .......... .......... 94%  190M 0s
112750K .......... .......... .......... .......... .......... 94%  190M 0s
112800K .......... .......... .......... .......... .......... 94%  193M 0s
112850K .......... .......... .......... .......... .......... 94%  163M 0s
112900K .......... .......... .......... .......... .......... 94%  171M 0s
112950K .......... .......... .......... .......... .......... 94%  190M 0s
113000K .......... .......... .......... .......... .......... 95%  178M 0s
113050K .......... .......... .......... .......... .......... 95%  159M 0s
113100K .......... .......... .......... .......... .......... 95%  183M 0s
113150K .......... .......... .......... .......... .......... 95%  178M 0s
113200K .......... .......... .......... .......... .......... 95%  183M 0s
113250K .......... .......... .......... .......... .......... 95%  171M 0s
113300K .......... .......... .......... .......... .......... 95%  173M 0s
113350K .......... .......... .......... .......... .......... 95%  190M 0s
113400K .......... .......... .......... .......... .......... 95%  189M 0s
113450K .......... .......... .......... .......... .......... 95%  157M 0s
113500K .......... .......... .......... .......... .......... 95%  180M 0s
113550K .......... .......... .......... .......... .......... 95%  182M 0s
113600K .......... .......... .......... .......... .......... 95%  186M 0s
113650K .......... .......... .......... .......... .......... 95%  142M 0s
113700K .......... .......... .......... .......... .......... 95%  169M 0s
113750K .......... .......... .......... .......... .......... 95%  175M 0s
113800K .......... .......... .......... .......... .......... 95%  165M 0s
113850K .......... .......... .......... .......... .......... 95%  144M 0s
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113900K .......... .......... .......... .......... .......... 95%  183M 0s
113950K .......... .......... .......... .......... .......... 95%  185M 0s
114000K .......... .......... .......... .......... .......... 95%  177M 0s
114050K .......... .......... .......... .......... .......... 95%  162M 0s
114100K .......... .......... .......... .......... .......... 95%  174M 0s
114150K .......... .......... .......... .......... .......... 95%  189M 0s
114200K .......... .......... .......... .......... .......... 96%  181M 0s
114250K .......... .......... .......... .......... .......... 96%  154M 0s
114300K .......... .......... .......... .......... .......... 96%  179M 0s
114350K .......... .......... .......... .......... .......... 96%  188M 0s
114400K .......... .......... .......... .......... .......... 96%  174M 0s
114450K .......... .......... .......... .......... .......... 96%  177M 0s
114500K .......... .......... .......... .......... .......... 96%  173M 0s
114550K .......... .......... .......... .......... .......... 96%  178M 0s
114600K .......... .......... .......... .......... .......... 96%  177M 0s
114650K .......... .......... .......... .......... .......... 96%  148M 0s
114700K .......... .......... .......... .......... .......... 96%  168M 0s
114750K .......... .......... .......... .......... .......... 96%  186M 0s
114800K .......... .......... .......... .......... .......... 96%  178M 0s
114850K .......... .......... .......... .......... .......... 96%  149M 0s
114900K .......... .......... .......... .......... .......... 96%  174M 0s
114950K .......... .......... .......... .......... .......... 96%  176M 0s
115000K .......... .......... .......... .......... .......... 96%  160M 0s
115050K .......... .......... .......... .......... .......... 96%  138M 0s
115100K .......... .......... .......... .......... .......... 96%  155M 0s
115150K .......... .......... .......... .......... .......... 96%  173M 0s
115200K .......... .......... .......... .......... .......... 96%  185M 0s
115250K .......... .......... .......... .......... .......... 96%  167M 0s
115300K .......... .......... .......... .......... .......... 96%  178M 0s
115350K .......... .......... .......... .......... .......... 97%  195M 0s
115400K .......... .......... .......... .......... .......... 97%  183M 0s
115450K .......... .......... .......... .......... .......... 97%  149M 0s
115500K .......... .......... .......... .......... .......... 97%  186M 0s
115550K .......... .......... .......... .......... .......... 97%  187M 0s
115600K .......... .......... .......... .......... .......... 97%  189M 0s
115650K .......... .......... .......... .......... .......... 97%  180M 0s
115700K .......... .......... .......... .......... .......... 97%  178M 0s
115750K .......... .......... .......... .......... .......... 97%  184M 0s
115800K .......... .......... .......... .......... .......... 97%  193M 0s
115850K .......... .......... .......... .......... .......... 97%  147M 0s
115900K .......... .......... .......... .......... .......... 97%  189M 0s
115950K .......... .......... .......... .......... .......... 97%  183M 0s
116000K .......... .......... .......... .......... .......... 97%  178M 0s
116050K .......... .......... .......... .......... .......... 97%  166M 0s
116100K .......... .......... .......... .......... .......... 97%  157M 0s
116150K .......... .......... .......... .......... .......... 97%  168M 0s
116200K .......... .......... .......... .......... .......... 97%  154M 0s
116250K .......... .......... .......... .......... .......... 97%  143M 0s
116300K .......... .......... .......... .......... .......... 97%  174M 0s
116350K .......... .......... .......... .......... .......... 97%  163M 0s
116400K .......... .......... .......... .......... .......... 97%  167M 0s
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116450K .......... .......... .......... .......... .......... 97%  156M 0s
116500K .......... .......... .......... .......... .......... 97%  207M 0s
116550K .......... .......... .......... .......... .......... 98%  153M 0s
116600K .......... .......... .......... .......... .......... 98%  188M 0s
116650K .......... .......... .......... .......... .......... 98%  183M 0s
116700K .......... .......... .......... .......... .......... 98%  191M 0s
116750K .......... .......... .......... .......... .......... 98%  176M 0s
116800K .......... .......... .......... .......... .......... 98%  181M 0s
116850K .......... .......... .......... .......... .......... 98%  189M 0s
116900K .......... .......... .......... .......... .......... 98%  181M 0s
116950K .......... .......... .......... .......... .......... 98%  150M 0s
117000K .......... .......... .......... .......... .......... 98%  194M 0s
117050K .......... .......... .......... .......... .......... 98%  183M 0s
117100K .......... .......... .......... .......... .......... 98%  190M 0s
117150K .......... .......... .......... .......... .......... 98%  145M 0s
117200K .......... .......... .......... .......... .......... 98%  166M 0s
117250K .......... .......... .......... .......... .......... 98%  175M 0s
117300K .......... .......... .......... .......... .......... 98%  194M 0s
117350K .......... .......... .......... .......... .......... 98%  153M 0s
117400K .......... .......... .......... .......... .......... 98%  184M 0s
117450K .......... .......... .......... .......... .......... 98%  180M 0s
117500K .......... .......... .......... .......... .......... 98%  169M 0s
117550K .......... .......... .......... .......... .......... 98%  136M 0s
117600K .......... .......... .......... .......... .......... 98%  150M 0s
117650K .......... .......... .......... .......... .......... 98%  160M 0s
117700K .......... .......... .......... .......... .......... 98%  160M 0s
117750K .......... .......... .......... .......... .......... 99%  137M 0s
117800K .......... .......... .......... .......... .......... 99%  179M 0s
117850K .......... .......... .......... .......... .......... 99%  185M 0s
117900K .......... .......... .......... .......... .......... 99%  183M 0s
117950K .......... .......... .......... .......... .......... 99%  169M 0s
118000K .......... .......... .......... .......... .......... 99%  193M 0s
118050K .......... .......... .......... .......... .......... 99%  178M 0s
118100K .......... .......... .......... .......... .......... 99%  188M 0s
118150K .......... .......... .......... .......... .......... 99%  162M 0s
118200K .......... .......... .......... .......... .......... 99%  170M 0s
118250K .......... .......... .......... .......... .......... 99%  188M 0s
118300K .......... .......... .......... .......... .......... 99%  189M 0s
118350K .......... .......... .......... .......... .......... 99%  164M 0s
118400K .......... .......... .......... .......... .......... 99%  188M 0s
118450K .......... .......... .......... .......... .......... 99%  186M 0s
118500K .......... .......... .......... .......... .......... 99%  177M 0s
118550K .......... .......... .......... .......... .......... 99%  154M 0s
118600K .......... .......... .......... .......... .......... 99%  192M 0s
118650K .......... .......... .......... .......... .......... 99%  187M 0s
118700K .......... .......... .......... .......... .......... 99%  187M 0s
118750K .......... .......... .......... .......... .......... 99%  164M 0s
118800K .......... .......... .......... .......... .......... 99%  184M 0s
118850K .......... .......... .......... .......... .......... 99%  182M 0s
118900K .......... .......... .......... .......... .......... 99%  171M 0s
118950K .........                                               100% 89.2M=0.8s
```

```
2020-05-31 14:08:57 (139 MB/s) - ‘title.basics.tsv.gz’ saved [121814992/121814992]

/bin/bash: line 1: fg: no job control
```

In [8]:
```
title_basics = spark.read.option("sep", "\t").csv('file:/databricks/driver/title.basics.tsv', header=True, inferSchema = True)
title_basics.cache()
title_basics.show(3)
```

```
+---------+---------+--------------------+--------------------+-------+---------+---
-----+-------------+--------------------+
   tconst|titleType|        primaryTitle|       originalTitle|isAdult|startYear|end
Year|runtimeMinutes|              genres|
+---------+---------+--------------------+--------------------+-------+---------+---
-----+-------------+--------------------+
tt0000001|    short|           Carmencita|           Carmencita|      0|     1894|
\N|             1|   Documentary,Short|
tt0000002|    short|Le clown et ses c...|Le clown et ses c...|      0|     1892|
\N|             5|     Animation,Short|
tt0000003|    short|      Pauvre Pierrot|      Pauvre Pierrot|      0|     1892|
\N|             4|Animation,Comedy,...|
+---------+---------+--------------------+--------------------+-------+---------+---
-----+-------------+--------------------+
only showing top 3 rows
```

In [9]:
```
%sh wget https://datasets.imdbws.com/title.crew.tsv.gz
%sh
gunzip title.crew.tsv.gz
```

```
--2020-05-31 14:09:25--  https://datasets.imdbws.com/title.crew.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.32, 13.224.13.37,
13.224.13.54, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.32|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 48431137 (46M) [binary/octet-stream]
Saving to: ‘title.crew.tsv.gz’

     0K ..........  ..........  ..........  ..........  ..........   0% 4.52M 10s
    50K ..........  ..........  ..........  ..........  ..........   0% 9.49M 8s
   100K ..........  ..........  ..........  ..........  ..........   0% 15.5M 6s
   150K ..........  ..........  ..........  ..........  ..........   0% 13.5M 5s
   200K ..........  ..........  ..........  ..........  ..........   0% 22.2M 5s
   250K ..........  ..........  ..........  ..........  ..........   0% 26.9M 4s
   300K ..........  ..........  ..........  ..........  ..........   0% 27.3M 4s
   350K ..........  ..........  ..........  ..........  ..........   0% 26.0M 4s
   400K ..........  ..........  ..........  ..........  ..........   0% 33.5M 3s
   450K ..........  ..........  ..........  ..........  ..........   1% 35.9M 3s
   500K ..........  ..........  ..........  ..........  ..........   1% 35.6M 3s
   550K ..........  ..........  ..........  ..........  ..........   1% 30.8M 3s
   600K ..........  ..........  ..........  ..........  ..........   1% 35.0M 3s
   650K ..........  ..........  ..........  ..........  ..........   1% 30.3M 3s
   700K ..........  ..........  ..........  ..........  ..........   1% 34.2M 3s
   750K ..........  ..........  ..........  ..........  ..........   1% 31.0M 2s
   800K ..........  ..........  ..........  ..........  ..........   1% 30.3M 2s
   850K ..........  ..........  ..........  ..........  ..........   1% 32.9M 2s
   900K ..........  ..........  ..........  ..........  ..........   2% 36.8M 2s
   950K ..........  ..........  ..........  ..........  ..........   2% 29.5M 2s
  1000K ..........  ..........  ..........  ..........  ..........   2% 37.8M 2s
  1050K ..........  ..........  ..........  ..........  ..........   2% 36.2M 2s
  1100K ..........  ..........  ..........  ..........  ..........   2% 36.1M 2s
  1150K ..........  ..........  ..........  ..........  ..........   2% 30.2M 2s
  1200K ..........  ..........  ..........  ..........  ..........   2% 36.4M 2s
  1250K ..........  ..........  ..........  ..........  ..........   2% 34.7M 2s
  1300K ..........  ..........  ..........  ..........  ..........   2% 35.6M 2s
  1350K ..........  ..........  ..........  ..........  ..........   2% 31.0M 2s
  1400K ..........  ..........  ..........  ..........  ..........   3% 36.0M 2s
  1450K ..........  ..........  ..........  ..........  ..........   3% 37.0M 2s
  1500K ..........  ..........  ..........  ..........  ..........   3% 22.2M 2s
  1550K ..........  ..........  ..........  ..........  ..........   3% 30.3M 2s
  1600K ..........  ..........  ..........  ..........  ..........   3% 36.4M 2s
  1650K ..........  ..........  ..........  ..........  ..........   3% 36.9M 2s
  1700K ..........  ..........  ..........  ..........  ..........   3% 35.1M 2s
  1750K ..........  ..........  ..........  ..........  ..........   3% 31.6M 2s
  1800K ..........  ..........  ..........  ..........  ..........   3% 36.5M 2s
  1850K ..........  ..........  ..........  ..........  ..........   4% 36.2M 2s
  1900K ..........  ..........  ..........  ..........  ..........   4% 32.7M 2s
  1950K ..........  ..........  ..........  ..........  ..........   4% 31.3M 2s
  2000K ..........  ..........  ..........  ..........  ..........   4% 35.3M 2s
  2050K ..........  ..........  ..........  ..........  ..........   4% 32.9M 2s
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2100K .......... .......... .......... .......... ..........  4% 34.3M 2s
2150K .......... .......... .......... .......... ..........  4% 58.0M 2s
2200K .......... .......... .......... .......... ..........  4% 33.2M 2s
2250K .......... .......... .......... .......... ..........  4% 87.6M 2s
2300K .......... .......... .......... .......... ..........  4% 33.2M 2s
2350K .......... .......... .......... .......... ..........  5% 31.6M 2s
2400K .......... .......... .......... .......... ..........  5% 48.7M 2s
2450K .......... .......... .......... .......... ..........  5% 42.5M 2s
2500K .......... .......... .......... .......... ..........  5% 46.5M 2s
2550K .......... .......... .......... .......... ..........  5%  174M 2s
2600K .......... .......... .......... .......... ..........  5% 92.5M 2s
2650K .......... .......... .......... .......... ..........  5% 35.7M 2s
2700K .......... .......... .......... .......... ..........  5% 36.0M 2s
2750K .......... .......... .......... .......... ..........  5% 32.9M 2s
2800K .......... .......... .......... .......... ..........  6% 37.1M 2s
2850K .......... .......... .......... .......... ..........  6% 34.4M 2s
2900K .......... .......... .......... .......... ..........  6% 32.7M 2s
2950K .......... .......... .......... .......... ..........  6% 30.9M 1s
3000K .......... .......... .......... .......... ..........  6% 60.0M 1s
3050K .......... .......... .......... .......... ..........  6% 41.3M 1s
3100K .......... .......... .......... .......... ..........  6% 29.2M 1s
3150K .......... .......... .......... .......... ..........  6% 32.6M 1s
3200K .......... .......... .......... .......... ..........  6%  184M 1s
3250K .......... .......... .......... .......... ..........  6% 26.7M 1s
3300K .......... .......... .......... .......... ..........  7% 38.4M 1s
3350K .......... .......... .......... .......... ..........  7%  184M 1s
3400K .......... .......... .......... .......... ..........  7% 27.9M 1s
3450K .......... .......... .......... .......... ..........  7% 33.1M 1s
3500K .......... .......... .......... .......... ..........  7% 38.4M 1s
3550K .......... .......... .......... .......... ..........  7% 68.6M 1s
3600K .......... .......... .......... .......... ..........  7% 52.1M 1s
3650K .......... .......... .......... .......... ..........  7% 34.1M 1s
3700K .......... .......... .......... .......... ..........  7% 35.5M 1s
3750K .......... .......... .......... .......... ..........  8% 34.3M 1s
3800K .......... .......... .......... .......... ..........  8% 60.1M 1s
3850K .......... .......... .......... .......... ..........  8% 35.3M 1s
3900K .......... .......... .......... .......... ..........  8% 29.6M 1s
3950K .......... .......... .......... .......... ..........  8% 35.0M 1s
4000K .......... .......... .......... .......... ..........  8% 47.0M 1s
4050K .......... .......... .......... .......... ..........  8% 60.8M 1s
4100K .......... .......... .......... .......... ..........  8%  187M 1s
4150K .......... .......... .......... .......... ..........  8% 59.0M 1s
4200K .......... .......... .......... .......... ..........  8% 37.7M 1s
4250K .......... .......... .......... .......... ..........  9% 29.2M 1s
4300K .......... .......... .......... .......... ..........  9% 37.3M 1s
4350K .......... .......... .......... .......... ..........  9% 37.1M 1s
4400K .......... .......... .......... .......... ..........  9% 37.0M 1s
4450K .......... .......... .......... .......... ..........  9% 29.5M 1s
4500K .......... .......... .......... .......... ..........  9% 36.5M 1s
4550K .......... .......... .......... .......... ..........  9% 30.8M 1s
4600K .......... .......... .......... .......... ..........  9% 36.4M 1s
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4650K .......... .......... .......... .......... ..........  9% 34.3M 1s
4700K .......... .......... .......... .......... .......... 10% 66.4M 1s
4750K .......... .......... .......... .......... .......... 10% 54.2M 1s
4800K .......... .......... .......... .......... .......... 10% 36.7M 1s
4850K .......... .......... .......... .......... .......... 10% 31.3M 1s
4900K .......... .......... .......... .......... .......... 10% 44.2M 1s
4950K .......... .......... .......... .......... .......... 10% 34.8M 1s
5000K .......... .......... .......... .......... .......... 10%  145M 1s
5050K .......... .......... .......... .......... .......... 10% 54.0M 1s
5100K .......... .......... .......... .......... .......... 10% 36.7M 1s
5150K .......... .......... .......... .......... .......... 10% 36.6M 1s
5200K .......... .......... .......... .......... .......... 11% 37.4M 1s
5250K .......... .......... .......... .......... .......... 11% 33.4M 1s
5300K .......... .......... .......... .......... .......... 11% 34.5M 1s
5350K .......... .......... .......... .......... .......... 11% 46.7M 1s
5400K .......... .......... .......... .......... .......... 11% 34.9M 1s
5450K .......... .......... .......... .......... .......... 11% 63.0M 1s
5500K .......... .......... .......... .......... .......... 11%  170M 1s
5550K .......... .......... .......... .......... .......... 11% 59.0M 1s
5600K .......... .......... .......... .......... .......... 11% 35.7M 1s
5650K .......... .......... .......... .......... .......... 12% 30.0M 1s
5700K .......... .......... .......... .......... .......... 12% 32.8M 1s
5750K .......... .......... .......... .......... .......... 12% 35.8M 1s
5800K .......... .......... .......... .......... .......... 12% 38.3M 1s
5850K .......... .......... .......... .......... .......... 12% 31.3M 1s
5900K .......... .......... .......... .......... .......... 12% 5.79M 1s
5950K .......... .......... .......... .......... .......... 12% 36.3M 1s
6000K .......... .......... .......... .......... .......... 12% 75.9M 1s
6050K .......... .......... .......... .......... .......... 12%  158M 1s
6100K .......... .......... .......... .......... .......... 13% 33.6M 1s
6150K .......... .......... .......... .......... .......... 13% 35.4M 1s
6200K .......... .......... .......... .......... .......... 13% 36.1M 1s
6250K .......... .......... .......... .......... .......... 13% 29.1M 1s
6300K .......... .......... .......... .......... .......... 13% 35.6M 1s
6350K .......... .......... .......... .......... .......... 13% 33.3M 1s
6400K .......... .......... .......... .......... .......... 13% 35.8M 1s
6450K .......... .......... .......... .......... .......... 13% 42.4M 1s
6500K .......... .......... .......... .......... .......... 13% 43.9M 1s
6550K .......... .......... .......... .......... .......... 13% 45.3M 1s
6600K .......... .......... .......... .......... .......... 14% 45.3M 1s
6650K .......... .......... .......... .......... .......... 14% 28.7M 1s
6700K .......... .......... .......... .......... .......... 14% 36.2M 1s
6750K .......... .......... .......... .......... .......... 14% 89.3M 1s
6800K .......... .......... .......... .......... .......... 14% 16.4M 1s
6850K .......... .......... .......... .......... .......... 14% 31.6M 1s
6900K .......... .......... .......... .......... .......... 14% 42.2M 1s
6950K .......... .......... .......... .......... .......... 14% 44.0M 1s
7000K .......... .......... .......... .......... .......... 14% 43.4M 1s
7050K .......... .......... .......... .......... .......... 15% 33.4M 1s
7100K .......... .......... .......... .......... .......... 15% 51.0M 1s
7150K .......... .......... .......... .......... .......... 15% 52.3M 1s
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7200K .......... .......... .......... .......... .......... 15% 41.7M 1s
7250K .......... .......... .......... .......... .......... 15% 32.2M 1s
7300K .......... .......... .......... .......... .......... 15% 35.8M 1s
7350K .......... .......... .......... .......... .......... 15% 43.4M 1s
7400K .......... .......... .......... .......... .......... 15%  193M 1s
7450K .......... .......... .......... .......... .......... 15% 74.9M 1s
7500K .......... .......... .......... .......... .......... 15% 36.5M 1s
7550K .......... .......... .......... .......... .......... 16% 36.5M 1s
7600K .......... .......... .......... .......... .......... 16% 35.1M 1s
7650K .......... .......... .......... .......... .......... 16% 30.0M 1s
7700K .......... .......... .......... .......... .......... 16% 37.5M 1s
7750K .......... .......... .......... .......... .......... 16% 41.1M 1s
7800K .......... .......... .......... .......... .......... 16%  182M 1s
7850K .......... .......... .......... .......... .......... 16% 33.0M 1s
7900K .......... .......... .......... .......... .......... 16% 34.1M 1s
7950K .......... .......... .......... .......... .......... 16% 36.8M 1s
8000K .......... .......... .......... .......... .......... 17% 24.9M 1s
8050K .......... .......... .......... .......... .......... 17% 34.5M 1s
8100K .......... .......... .......... .......... .......... 17% 34.9M 1s
8150K .......... .......... .......... .......... .......... 17% 35.9M 1s
8200K .......... .......... .......... .......... .......... 17% 89.6M 1s
8250K .......... .......... .......... .......... .......... 17%  164M 1s
8300K .......... .......... .......... .......... .......... 17% 51.6M 1s
8350K .......... .......... .......... .......... .......... 17% 38.4M 1s
8400K .......... .......... .......... .......... .......... 17% 36.9M 1s
8450K .......... .......... .......... .......... .......... 17% 29.9M 1s
8500K .......... .......... .......... .......... .......... 18% 35.9M 1s
8550K .......... .......... .......... .......... .......... 18% 38.7M 1s
8600K .......... .......... .......... .......... .......... 18% 34.9M 1s
8650K .......... .......... .......... .......... .......... 18% 30.2M 1s
8700K .......... .......... .......... .......... .......... 18% 41.1M 1s
8750K .......... .......... .......... .......... .......... 18% 37.2M 1s
8800K .......... .......... .......... .......... .......... 18% 41.9M 1s
8850K .......... .......... .......... .......... .......... 18% 42.2M 1s
8900K .......... .......... .......... .......... .......... 18% 46.7M 1s
8950K .......... .......... .......... .......... .......... 19% 32.7M 1s
9000K .......... .......... .......... .......... .......... 19% 49.7M 1s
9050K .......... .......... .......... .......... .......... 19% 35.0M 1s
9100K .......... .......... .......... .......... .......... 19% 38.4M 1s
9150K .......... .......... .......... .......... .......... 19% 84.0M 1s
9200K .......... .......... .......... .......... .......... 19% 50.5M 1s
9250K .......... .......... .......... .......... .......... 19% 28.5M 1s
9300K .......... .......... .......... .......... .......... 19% 39.1M 1s
9350K .......... .......... .......... .......... .......... 19% 86.2M 1s
9400K .......... .......... .......... .......... .......... 19% 50.6M 1s
9450K .......... .......... .......... .......... .......... 20% 26.7M 1s
9500K .......... .......... .......... .......... .......... 20% 31.8M 1s
9550K .......... .......... .......... .......... .......... 20% 29.3M 1s
9600K .......... .......... .......... .......... .......... 20% 80.0M 1s
9650K .......... .......... .......... .......... .......... 20% 65.1M 1s
9700K .......... .......... .......... .......... .......... 20% 31.1M 1s
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 9750K ..... ..... ..... ..... ..... 20% 30.1M 1s
 9800K ..... ..... ..... ..... ..... 20% 30.6M 1s
 9850K ..... ..... ..... ..... ..... 20% 27.3M 1s
 9900K ..... ..... ..... ..... ..... 21% 64.7M 1s
 9950K ..... ..... ..... ..... ..... 21% 42.9M 1s
10000K ..... ..... ..... ..... ..... 21% 29.7M 1s
10050K ..... ..... ..... ..... ..... 21% 30.3M 1s
10100K ..... ..... ..... ..... ..... 21% 32.0M 1s
10150K ..... ..... ..... ..... ..... 21% 92.2M 1s
10200K ..... ..... ..... ..... ..... 21%  186M 1s
10250K ..... ..... ..... ..... ..... 21% 41.7M 1s
10300K ..... ..... ..... ..... ..... 21% 30.7M 1s
10350K ..... ..... ..... ..... ..... 21% 34.2M 1s
10400K ..... ..... ..... ..... ..... 22% 34.1M 1s
10450K ..... ..... ..... ..... ..... 22% 28.9M 1s
10500K ..... ..... ..... ..... ..... 22% 45.0M 1s
10550K ..... ..... ..... ..... ..... 22% 41.0M 1s
10600K ..... ..... ..... ..... ..... 22% 43.3M 1s
10650K ..... ..... ..... ..... ..... 22% 30.4M 1s
10700K ..... ..... ..... ..... ..... 22% 57.8M 1s
10750K ..... ..... ..... ..... ..... 22% 86.2M 1s
10800K ..... ..... ..... ..... ..... 22% 84.8M 1s
10850K ..... ..... ..... ..... ..... 23%  178M 1s
10900K ..... ..... ..... ..... ..... 23% 53.2M 1s
10950K ..... ..... ..... ..... ..... 23% 32.3M 1s
11000K ..... ..... ..... ..... ..... 23% 32.9M 1s
11050K ..... ..... ..... ..... ..... 23% 30.8M 1s
11100K ..... ..... ..... ..... ..... 23% 30.3M 1s
11150K ..... ..... ..... ..... ..... 23% 33.1M 1s
11200K ..... ..... ..... ..... ..... 23% 43.3M 1s
11250K ..... ..... ..... ..... ..... 23% 29.7M 1s
11300K ..... ..... ..... ..... ..... 23% 32.6M 1s
11350K ..... ..... ..... ..... ..... 24%  132M 1s
11400K ..... ..... ..... ..... ..... 24%  196M 1s
11450K ..... ..... ..... ..... ..... 24% 37.3M 1s
11500K ..... ..... ..... ..... ..... 24% 32.3M 1s
11550K ..... ..... ..... ..... ..... 24% 36.9M 1s
11600K ..... ..... ..... ..... ..... 24% 35.3M 1s
11650K ..... ..... ..... ..... ..... 24% 28.0M 1s
11700K ..... ..... ..... ..... ..... 24%  109M 1s
11750K ..... ..... ..... ..... ..... 24% 66.1M 1s
11800K ..... ..... ..... ..... ..... 25% 34.3M 1s
11850K ..... ..... ..... ..... ..... 25% 28.5M 1s
11900K ..... ..... ..... ..... ..... 25% 32.6M 1s
11950K ..... ..... ..... ..... ..... 25% 34.3M 1s
12000K ..... ..... ..... ..... ..... 25% 32.9M 1s
12050K ..... ..... ..... ..... ..... 25% 31.8M 1s
12100K ..... ..... ..... ..... ..... 25%  183M 1s
12150K ..... ..... ..... ..... ..... 25% 68.3M 1s
12200K ..... ..... ..... ..... ..... 25% 33.4M 1s
12250K ..... ..... ..... ..... ..... 26% 27.1M 1s
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12300K .......... .......... .......... .......... .......... 26% 34.7M 1s
12350K .......... .......... .......... .......... .......... 26% 35.1M 1s
12400K .......... .......... .......... .......... .......... 26% 33.3M 1s
12450K .......... .......... .......... .......... .......... 26% 56.8M 1s
12500K .......... .......... .......... .......... .......... 26% 51.7M 1s
12550K .......... .......... .......... .......... .......... 26% 35.1M 1s
12600K .......... .......... .......... .......... .......... 26% 33.0M 1s
12650K .......... .......... .......... .......... .......... 26% 36.6M 1s
12700K .......... .......... .......... .......... .......... 26% 33.6M 1s
12750K .......... .......... .......... .......... .......... 27% 36.4M 1s
12800K .......... .......... .......... .......... .......... 27% 55.7M 1s
12850K .......... .......... .......... .......... .......... 27% 51.1M 1s
12900K .......... .......... .......... .......... .......... 27% 36.6M 1s
12950K .......... .......... .......... .......... .......... 27% 55.1M 1s
13000K .......... .......... .......... .......... .......... 27%  198M 1s
13050K .......... .......... .......... .......... .......... 27% 38.3M 1s
13100K .......... .......... .......... .......... .......... 27% 32.4M 1s
13150K .......... .......... .......... .......... .......... 27% 35.3M 1s
13200K .......... .......... .......... .......... .......... 28% 34.5M 1s
13250K .......... .......... .......... .......... .......... 28% 30.7M 1s
13300K .......... .......... .......... .......... .......... 28% 44.4M 1s
13350K .......... .......... .......... .......... .......... 28% 79.7M 1s
13400K .......... .......... .......... .......... .......... 28% 76.0M 1s
13450K .......... .......... .......... .......... .......... 28% 31.3M 1s
13500K .......... .......... .......... .......... .......... 28% 36.4M 1s
13550K .......... .......... .......... .......... .......... 28% 33.5M 1s
13600K .......... .......... .......... .......... .......... 28% 34.4M 1s
13650K .......... .......... .......... .......... .......... 28% 64.4M 1s
13700K .......... .......... .......... .......... .......... 29% 30.7M 1s
13750K .......... .......... .......... .......... .......... 29% 34.0M 1s
13800K .......... .......... .......... .......... .......... 29% 44.8M 1s
13850K .......... .......... .......... .......... .......... 29% 53.5M 1s
13900K .......... .......... .......... .......... .......... 29%  198M 1s
13950K .......... .......... .......... .......... .......... 29% 44.2M 1s
14000K .......... .......... .......... .......... .......... 29% 31.8M 1s
14050K .......... .......... .......... .......... .......... 29% 30.4M 1s
14100K .......... .......... .......... .......... .......... 29% 32.3M 1s
14150K .......... .......... .......... .......... .......... 30% 34.3M 1s
14200K .......... .......... .......... .......... .......... 30% 62.0M 1s
14250K .......... .......... .......... .......... .......... 30% 31.1M 1s
14300K .......... .......... .......... .......... .......... 30% 41.4M 1s
14350K .......... .......... .......... .......... .......... 30% 34.2M 1s
14400K .......... .......... .......... .......... .......... 30% 81.4M 1s
14450K .......... .......... .......... .......... .......... 30% 27.6M 1s
14500K .......... .......... .......... .......... .......... 30% 50.2M 1s
14550K .......... .......... .......... .......... .......... 30% 76.6M 1s
14600K .......... .......... .......... .......... .......... 30% 32.2M 1s
14650K .......... .......... .......... .......... .......... 31% 28.3M 1s
14700K .......... .......... .......... .......... .......... 31% 68.0M 1s
14750K .......... .......... .......... .......... .......... 31%  159M 1s
14800K .......... .......... .......... .......... .......... 31% 50.8M 1s
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14850K .......... .......... .......... .......... .......... 31% 9.56M 1s
14900K .......... .......... .......... .......... .......... 31%  142M 1s
14950K .......... .......... .......... .......... .......... 31%  147M 1s
15000K .......... .......... .......... .......... .......... 31%  269M 1s
15050K .......... .......... .......... .......... .......... 31% 99.1M 1s
15100K .......... .......... .......... .......... .......... 32%  178M 1s
15150K .......... .......... .......... .......... .......... 32%  178M 1s
15200K .......... .......... .......... .......... .......... 32%  158M 1s
15250K .......... .......... .......... .......... .......... 32%  159M 1s
15300K .......... .......... .......... .......... .......... 32%  159M 1s
15350K .......... .......... .......... .......... .......... 32%  148M 1s
15400K .......... .......... .......... .......... .......... 32%  168M 1s
15450K .......... .......... .......... .......... .......... 32%  147M 1s
15500K .......... .......... .......... .......... .......... 32%  141M 1s
15550K .......... .......... .......... .......... .......... 32%  175M 1s
15600K .......... .......... .......... .......... .......... 33%  187M 1s
15650K .......... .......... .......... .......... .......... 33%  165M 1s
15700K .......... .......... .......... .......... .......... 33%  186M 1s
15750K .......... .......... .......... .......... .......... 33%  174M 1s
15800K .......... .......... .......... .......... .......... 33%  178M 1s
15850K .......... .......... .......... .......... .......... 33%  151M 1s
15900K .......... .......... .......... .......... .......... 33%  175M 1s
15950K .......... .......... .......... .......... .......... 33%  185M 1s
16000K .......... .......... .......... .......... .......... 33% 20.2M 1s
16050K .......... .......... .......... .......... .......... 34%  158M 1s
16100K .......... .......... .......... .......... .......... 34%  305M 1s
16150K .......... .......... .......... .......... .......... 34% 78.4M 1s

*** WARNING: skipped 22420 bytes of output ***

30950K .......... .......... .......... .......... .......... 65%  160M 0s
31000K .......... .......... .......... .......... .......... 65%  148M 0s
31050K .......... .......... .......... .......... .......... 65%  111M 0s
31100K .......... .......... .......... .......... .......... 65%  143M 0s
31150K .......... .......... .......... .......... .......... 65%  155M 0s
31200K .......... .......... .......... .......... .......... 66%  126M 0s
31250K .......... .......... .......... .......... .......... 66%  104M 0s
31300K .......... .......... .......... .......... .......... 66%  151M 0s
31350K .......... .......... .......... .......... .......... 66%  158M 0s
31400K .......... .......... .......... .......... .......... 66%  153M 0s
31450K .......... .......... .......... .......... .......... 66%  131M 0s
31500K .......... .......... .......... .......... .......... 66%  141M 0s
31550K .......... .......... .......... .......... .......... 66%  145M 0s
31600K .......... .......... .......... .......... .......... 66%  146M 0s
31650K .......... .......... .......... .......... .......... 67%  132M 0s
31700K .......... .......... .......... .......... .......... 67%  153M 0s
31750K .......... .......... .......... .......... .......... 67%  160M 0s
31800K .......... .......... .......... .......... .......... 67%  126M 0s
31850K .......... .......... .......... .......... .......... 67%  125M 0s
31900K .......... .......... .......... .......... .......... 67%  157M 0s
31950K .......... .......... .......... .......... .......... 67% 99.6M 0s
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32000K .......... .......... .......... .......... .......... 67%  155M 0s
32050K .......... .......... .......... .......... .......... 67%  137M 0s
32100K .......... .......... .......... .......... .......... 67%  128M 0s
32150K .......... .......... .......... .......... .......... 68%  155M 0s
32200K .......... .......... .......... .......... .......... 68%  106M 0s
32250K .......... .......... .......... .......... .......... 68%  114M 0s
32300K .......... .......... .......... .......... .......... 68%  163M 0s
32350K .......... .......... .......... .......... .......... 68%  130M 0s
32400K .......... .......... .......... .......... .......... 68%  182M 0s
32450K .......... .......... .......... .......... .......... 68%  103M 0s
32500K .......... .......... .......... .......... .......... 68%  139M 0s
32550K .......... .......... .......... .......... .......... 68%  178M 0s
32600K .......... .......... .......... .......... .......... 69%  144M 0s
32650K .......... .......... .......... .......... .......... 69%  147M 0s
32700K .......... .......... .......... .......... .......... 69%  164M 0s
32750K .......... .......... .......... .......... .......... 69%  125M 0s
32800K .......... .......... .......... .......... .......... 69%  141M 0s
32850K .......... .......... .......... .......... .......... 69%  122M 0s
32900K .......... .......... .......... .......... .......... 69%  143M 0s
32950K .......... .......... .......... .......... .......... 69% 99.2M 0s
33000K .......... .......... .......... .......... .......... 69%  129M 0s
33050K .......... .......... .......... .......... .......... 69%  119M 0s
33100K .......... .......... .......... .......... .......... 70%  145M 0s
33150K .......... .......... .......... .......... .......... 70%  107M 0s
33200K .......... .......... .......... .......... .......... 70%  141M 0s
33250K .......... .......... .......... .......... .......... 70%  107M 0s
33300K .......... .......... .......... .......... .......... 70%  148M 0s
33350K .......... .......... .......... .......... .......... 70%  148M 0s
33400K .......... .......... .......... .......... .......... 70%  120M 0s
33450K .......... .......... .......... .......... .......... 70%  143M 0s
33500K .......... .......... .......... .......... .......... 70%  114M 0s
33550K .......... .......... .......... .......... .......... 71%  145M 0s
33600K .......... .......... .......... .......... .......... 71%  161M 0s
33650K .......... .......... .......... .......... .......... 71%  125M 0s
33700K .......... .......... .......... .......... .......... 71%  154M 0s
33750K .......... .......... .......... .......... .......... 71% 99.7M 0s
33800K .......... .......... .......... .......... .......... 71%  136M 0s
33850K .......... .......... .......... .......... .......... 71%  105M 0s
33900K .......... .......... .......... .......... .......... 71%  119M 0s
33950K .......... .......... .......... .......... .......... 71%  118M 0s
34000K .......... .......... .......... .......... .......... 71%  127M 0s
34050K .......... .......... .......... .......... .......... 72%  114M 0s
34100K .......... .......... .......... .......... .......... 72%  136M 0s
34150K .......... .......... .......... .......... .......... 72%  140M 0s
34200K .......... .......... .......... .......... .......... 72%  125M 0s
34250K .......... .......... .......... .......... .......... 72%  109M 0s
34300K .......... .......... .......... .......... .......... 72%  132M 0s
34350K .......... .......... .......... .......... .......... 72%  147M 0s
34400K .......... .......... .......... .......... .......... 72% 91.6M 0s
34450K .......... .......... .......... .......... .......... 72%  116M 0s
34500K .......... .......... .......... .......... .......... 73%  106M 0s
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34550K .......... .......... .......... .......... .......... 73%  139M 0s
34600K .......... .......... .......... .......... .......... 73%  121M 0s
34650K .......... .......... .......... .......... .......... 73% 99.1M 0s
34700K .......... .......... .......... .......... .......... 73%  142M 0s
34750K .......... .......... .......... .......... .......... 73%  132M 0s
34800K .......... .......... .......... .......... .......... 73%  134M 0s
34850K .......... .......... .......... .......... .......... 73%  117M 0s
34900K .......... .......... .......... .......... .......... 73%  149M 0s
34950K .......... .......... .......... .......... .......... 74%  136M 0s
35000K .......... .......... .......... .......... .......... 74%  109M 0s
35050K .......... .......... .......... .......... .......... 74%  130M 0s
35100K .......... .......... .......... .......... .......... 74% 96.2M 0s
35150K .......... .......... .......... .......... .......... 74%  127M 0s
35200K .......... .......... .......... .......... .......... 74%  184M 0s
35250K .......... .......... .......... .......... .......... 74%  101M 0s
35300K .......... .......... .......... .......... .......... 74%  111M 0s
35350K .......... .......... .......... .......... .......... 74%  129M 0s
35400K .......... .......... .......... .......... .......... 74%  134M 0s
35450K .......... .......... .......... .......... .......... 75% 98.6M 0s
35500K .......... .......... .......... .......... .......... 75%  149M 0s
35550K .......... .......... .......... .......... .......... 75%  111M 0s
35600K .......... .......... .......... .......... .......... 75%  149M 0s
35650K .......... .......... .......... .......... .......... 75% 80.3M 0s
35700K .......... .......... .......... .......... .......... 75%  150M 0s
35750K .......... .......... .......... .......... .......... 75%  104M 0s
35800K .......... .......... .......... .......... .......... 75%  148M 0s
35850K .......... .......... .......... .......... .......... 75%  124M 0s
35900K .......... .......... .......... .......... .......... 76%  149M 0s
35950K .......... .......... .......... .......... .......... 76% 71.9M 0s
36000K .......... .......... .......... .......... .......... 76% 71.4M 0s
36050K .......... .......... .......... .......... .......... 76%  100M 0s
36100K .......... .......... .......... .......... .......... 76% 82.3M 0s
36150K .......... .......... .......... .......... .......... 76%  113M 0s
36200K .......... .......... .......... .......... .......... 76%  142M 0s
36250K .......... .......... .......... .......... .......... 76%  120M 0s
36300K .......... .......... .......... .......... .......... 76% 76.8M 0s
36350K .......... .......... .......... .......... .......... 76% 78.6M 0s
36400K .......... .......... .......... .......... .......... 77%  146M 0s
36450K .......... .......... .......... .......... .......... 77% 78.7M 0s
36500K .......... .......... .......... .......... .......... 77%  147M 0s
36550K .......... .......... .......... .......... .......... 77%  101M 0s
36600K .......... .......... .......... .......... .......... 77%  150M 0s
36650K .......... .......... .......... .......... .......... 77%  134M 0s
36700K .......... .......... .......... .......... .......... 77%  146M 0s
36750K .......... .......... .......... .......... .......... 77% 92.0M 0s
36800K .......... .......... .......... .......... .......... 77%  106M 0s
36850K .......... .......... .......... .......... .......... 78%  141M 0s
36900K .......... .......... .......... .......... .......... 78%  269M 0s
36950K .......... .......... .......... .......... .......... 78%  310M 0s
37000K .......... .......... .......... .......... .......... 78%  265M 0s
37050K .......... .......... .......... .......... .......... 78%  247M 0s
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37100K .......... .......... .......... .......... .......... 78%  275M 0s
37150K .......... .......... .......... .......... .......... 78%  281M 0s
37200K .......... .......... .......... .......... .......... 78%  267M 0s
37250K .......... .......... .......... .......... .......... 78% 99.1M 0s
37300K .......... .......... .......... .......... .......... 78%  264M 0s
37350K .......... .......... .......... .......... .......... 79%  279M 0s
37400K .......... .......... .......... .......... .......... 79%  279M 0s
37450K .......... .......... .......... .......... .......... 79% 93.8M 0s
37500K .......... .......... .......... .......... .......... 79%  296M 0s
37550K .......... .......... .......... .......... .......... 79%  144M 0s
37600K .......... .......... .......... .......... .......... 79%  228M 0s
37650K .......... .......... .......... .......... .......... 79%  278M 0s
37700K .......... .......... .......... .......... .......... 79%  280M 0s
37750K .......... .......... .......... .......... .......... 79%  149M 0s
37800K .......... .......... .......... .......... .......... 80%  277M 0s
37850K .......... .......... .......... .......... .......... 80%  215M 0s
37900K .......... .......... .......... .......... .......... 80%  248M 0s
37950K .......... .......... .......... .......... .......... 80%  164M 0s
38000K .......... .......... .......... .......... .......... 80%  302M 0s
38050K .......... .......... .......... .......... .......... 80%  249M 0s
38100K .......... .......... .......... .......... .......... 80%  275M 0s
38150K .......... .......... .......... .......... .......... 80%  272M 0s
38200K .......... .......... .......... .......... .......... 80%  301M 0s
38250K .......... .......... .......... .......... .......... 80%  225M 0s
38300K .......... .......... .......... .......... .......... 81%  309M 0s
38350K .......... .......... .......... .......... .......... 81% 83.1M 0s
38400K .......... .......... .......... .......... .......... 81%  140M 0s
38450K .......... .......... .......... .......... .......... 81%  177M 0s
38500K .......... .......... .......... .......... .......... 81%  281M 0s
38550K .......... .......... .......... .......... .......... 81%  278M 0s
38600K .......... .......... .......... .......... .......... 81%  275M 0s
38650K .......... .......... .......... .......... .......... 81%  237M 0s
38700K .......... .......... .......... .......... .......... 81%  289M 0s
38750K .......... .......... .......... .......... .......... 82%  307M 0s
38800K .......... .......... .......... .......... .......... 82%  286M 0s
38850K .......... .......... .......... .......... .......... 82%  260M 0s
38900K .......... .......... .......... .......... .......... 82% 82.4M 0s
38950K .......... .......... .......... .......... .......... 82%  152M 0s
39000K .......... .......... .......... .......... .......... 82%  151M 0s
39050K .......... .......... .......... .......... .......... 82% 85.9M 0s
39100K .......... .......... .......... .......... .......... 82%  118M 0s
39150K .......... .......... .......... .......... .......... 82%  177M 0s
39200K .......... .......... .......... .......... .......... 82%  162M 0s
39250K .......... .......... .......... .......... .......... 83%  179M 0s
39300K .......... .......... .......... .......... .......... 83%  175M 0s
39350K .......... .......... .......... .......... .......... 83%  145M 0s
39400K .......... .......... .......... .......... .......... 83%  166M 0s
39450K .......... .......... .......... .......... .......... 83%  116M 0s
39500K .......... .......... .......... .......... .......... 83%  165M 0s
39550K .......... .......... .......... .......... .......... 83%  180M 0s
39600K .......... .......... .......... .......... .......... 83%  161M 0s
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39650K ..... ..... ..... ..... ..... 83% 87.3M 0s
39700K ..... ..... ..... ..... ..... 84%  157M 0s
39750K ..... ..... ..... ..... ..... 84%  187M 0s
39800K ..... ..... ..... ..... ..... 84%  178M 0s
39850K ..... ..... ..... ..... ..... 84%  233M 0s
39900K ..... ..... ..... ..... ..... 84%  281M 0s
39950K ..... ..... ..... ..... ..... 84%  277M 0s
40000K ..... ..... ..... ..... ..... 84%  299M 0s
40050K ..... ..... ..... ..... ..... 84%  277M 0s
40100K ..... ..... ..... ..... ..... 84%  174M 0s
40150K ..... ..... ..... ..... ..... 84%  175M 0s
40200K ..... ..... ..... ..... ..... 85%  136M 0s
40250K ..... ..... ..... ..... ..... 85%  127M 0s
40300K ..... ..... ..... ..... ..... 85%  177M 0s
40350K ..... ..... ..... ..... ..... 85%  167M 0s
40400K ..... ..... ..... ..... ..... 85%  171M 0s
40450K ..... ..... ..... ..... ..... 85%  168M 0s
40500K ..... ..... ..... ..... ..... 85%  168M 0s
40550K ..... ..... ..... ..... ..... 85%  170M 0s
40600K ..... ..... ..... ..... ..... 85%  172M 0s
40650K ..... ..... ..... ..... ..... 86%  103M 0s
40700K ..... ..... ..... ..... ..... 86%  167M 0s
40750K ..... ..... ..... ..... ..... 86%  160M 0s
40800K ..... ..... ..... ..... ..... 86%  160M 0s
40850K ..... ..... ..... ..... ..... 86%  112M 0s
40900K ..... ..... ..... ..... ..... 86%  137M 0s
40950K ..... ..... ..... ..... ..... 86%  115M 0s
41000K ..... ..... ..... ..... ..... 86% 38.8M 0s
41050K ..... ..... ..... ..... ..... 86%  174M 0s
41100K ..... ..... ..... ..... ..... 87%  195M 0s
41150K ..... ..... ..... ..... ..... 87% 96.0M 0s
41200K ..... ..... ..... ..... ..... 87% 86.9M 0s
41250K ..... ..... ..... ..... ..... 87% 89.9M 0s
41300K ..... ..... ..... ..... ..... 87%  102M 0s
41350K ..... ..... ..... ..... ..... 87%  120M 0s
41400K ..... ..... ..... ..... ..... 87% 66.3M 0s
41450K ..... ..... ..... ..... ..... 87% 62.9M 0s
41500K ..... ..... ..... ..... ..... 87%  130M 0s
41550K ..... ..... ..... ..... ..... 87%  111M 0s
41600K ..... ..... ..... ..... ..... 88%  117M 0s
41650K ..... ..... ..... ..... ..... 88%  148M 0s
41700K ..... ..... ..... ..... ..... 88% 94.5M 0s
41750K ..... ..... ..... ..... ..... 88%  166M 0s
41800K ..... ..... ..... ..... ..... 88%  154M 0s
41850K ..... ..... ..... ..... ..... 88%  135M 0s
41900K ..... ..... ..... ..... ..... 88%  166M 0s
41950K ..... ..... ..... ..... ..... 88%  162M 0s
42000K ..... ..... ..... ..... ..... 88% 89.7M 0s
42050K ..... ..... ..... ..... ..... 89%  149M 0s
42100K ..... ..... ..... ..... ..... 89%  161M 0s
42150K ..... ..... ..... ..... ..... 89%  163M 0s
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42200K .......... .......... .......... .......... .......... 89%  160M 0s
42250K .......... .......... .......... .......... .......... 89%  131M 0s
42300K .......... .......... .......... .......... .......... 89%  161M 0s
42350K .......... .......... .......... .......... .......... 89%  113M 0s
42400K .......... .......... .......... .......... .......... 89%  162M 0s
42450K .......... .......... .......... .......... .......... 89%  162M 0s
42500K .......... .......... .......... .......... .......... 89%  158M 0s
42550K .......... .......... .......... .......... .......... 90%  139M 0s
42600K .......... .......... .......... .......... .......... 90%  161M 0s
42650K .......... .......... .......... .......... .......... 90% 69.2M 0s
42700K .......... .......... .......... .......... .......... 90%  156M 0s
42750K .......... .......... .......... .......... .......... 90%  117M 0s
42800K .......... .......... .......... .......... .......... 90%  163M 0s
42850K .......... .......... .......... .......... .......... 90%  125M 0s
42900K .......... .......... .......... .......... .......... 90%  153M 0s
42950K .......... .......... .......... .......... .......... 90%  157M 0s
43000K .......... .......... .......... .......... .......... 91%  144M 0s
43050K .......... .......... .......... .......... .......... 91% 81.1M 0s
43100K .......... .......... .......... .......... .......... 91% 62.4M 0s
43150K .......... .......... .......... .......... .......... 91% 97.9M 0s
43200K .......... .......... .......... .......... .......... 91%  144M 0s
43250K .......... .......... .......... .......... .......... 91%  151M 0s
43300K .......... .......... .......... .......... .......... 91% 68.8M 0s
43350K .......... .......... .......... .......... .......... 91%  120M 0s
43400K .......... .......... .......... .......... .......... 91%  127M 0s
43450K .......... .......... .......... .......... .......... 91%  103M 0s
43500K .......... .......... .......... .......... .......... 92%  139M 0s
43550K .......... .......... .......... .......... .......... 92%  128M 0s
43600K .......... .......... .......... .......... .......... 92%  101M 0s
43650K .......... .......... .......... .......... .......... 92%  124M 0s
43700K .......... .......... .......... .......... .......... 92%  128M 0s
43750K .......... .......... .......... .......... .......... 92%  128M 0s
43800K .......... .......... .......... .......... .......... 92%  145M 0s
43850K .......... .......... .......... .......... .......... 92%  132M 0s
43900K .......... .......... .......... .......... .......... 92%  129M 0s
43950K .......... .......... .......... .......... .......... 93%  136M 0s
44000K .......... .......... .......... .......... .......... 93% 61.8M 0s
44050K .......... .......... .......... .......... .......... 93% 33.4M 0s
44100K .......... .......... .......... .......... .......... 93%  147M 0s
44150K .......... .......... .......... .......... .......... 93%  140M 0s
44200K .......... .......... .......... .......... .......... 93%  137M 0s
44250K .......... .......... .......... .......... .......... 93%  129M 0s
44300K .......... .......... .......... .......... .......... 93%  152M 0s
44350K .......... .......... .......... .......... .......... 93%  110M 0s
44400K .......... .......... .......... .......... .......... 93%  144M 0s
44450K .......... .......... .......... .......... .......... 94%  130M 0s
44500K .......... .......... .......... .......... .......... 94%  132M 0s
44550K .......... .......... .......... .......... .......... 94%  156M 0s
44600K .......... .......... .......... .......... .......... 94%  159M 0s
44650K .......... .......... .......... .......... .......... 94%  118M 0s
44700K .......... .......... .......... .......... .......... 94%  145M 0s
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44750K .......... .......... .......... .......... .......... 94%  153M 0s
44800K .......... .......... .......... .......... .......... 94%  164M 0s
44850K .......... .......... .......... .......... .......... 94% 93.1M 0s
44900K .......... .......... .......... .......... .......... 95%  137M 0s
44950K .......... .......... .......... .......... .......... 95%  126M 0s
45000K .......... .......... .......... .......... .......... 95%  153M 0s
45050K .......... .......... .......... .......... .......... 95%  133M 0s
45100K .......... .......... .......... .......... .......... 95%  137M 0s
45150K .......... .......... .......... .......... .......... 95%  154M 0s
45200K .......... .......... .......... .......... .......... 95%  157M 0s
45250K .......... .......... .......... .......... .......... 95%  140M 0s
45300K .......... .......... .......... .......... .......... 95%  142M 0s
45350K .......... .......... .......... .......... .......... 95%  157M 0s
45400K .......... .......... .......... .......... .......... 96%  149M 0s
45450K .......... .......... .......... .......... .......... 96% 97.5M 0s
45500K .......... .......... .......... .......... .......... 96%  123M 0s
45550K .......... .......... .......... .......... .......... 96%  130M 0s
45600K .......... .......... .......... .......... .......... 96%  175M 0s
45650K .......... .......... .......... .......... .......... 96%  269M 0s
45700K .......... .......... .......... .......... .......... 96%  302M 0s
45750K .......... .......... .......... .......... .......... 96%  300M 0s
45800K .......... .......... .......... .......... .......... 96%  280M 0s
45850K .......... .......... .......... .......... .......... 97%  246M 0s
45900K .......... .......... .......... .......... .......... 97%  245M 0s
45950K .......... .......... .......... .......... .......... 97%  304M 0s
46000K .......... .......... .......... .......... .......... 97%  164M 0s
46050K .......... .......... .......... .......... .......... 97%  199M 0s
46100K .......... .......... .......... .......... .......... 97%  170M 0s
46150K .......... .......... .......... .......... .......... 97%  198M 0s
46200K .......... .......... .......... .......... .......... 97%  186M 0s
46250K .......... .......... .......... .......... .......... 97%  146M 0s
46300K .......... .......... .......... .......... .......... 97%  175M 0s
46350K .......... .......... .......... .......... .......... 98%  216M 0s
46400K .......... .......... .......... .......... .......... 98%  213M 0s
46450K .......... .......... .......... .......... .......... 98%  266M 0s
46500K .......... .......... .......... .......... .......... 98%  312M 0s
46550K .......... .......... .......... .......... .......... 98%  272M 0s
46600K .......... .......... .......... .......... .......... 98%  310M 0s
46650K .......... .......... .......... .......... .......... 98%  241M 0s
46700K .......... .......... .......... .......... .......... 98%  262M 0s
46750K .......... .......... .......... .......... .......... 98%  304M 0s
46800K .......... .......... .......... .......... .......... 99%  306M 0s
46850K .......... .......... .......... .......... .......... 99%  258M 0s
46900K .......... .......... .......... .......... .......... 99%  133M 0s
46950K .......... .......... .......... .......... .......... 99%  254M 0s
47000K .......... .......... .......... .......... .......... 99%  299M 0s
47050K .......... .......... .......... .......... .......... 99%  255M 0s
47100K .......... .......... .......... .......... .......... 99%  308M 0s
47150K .......... .......... .......... .......... .......... 99%  280M 0s
47200K .......... .......... .......... .......... .......... 99%  305M 0s
47250K .......... .......... .......... .......... ......    100%  272M=0.6s
```

```
2020-05-31 14:09:26 (72.6 MB/s) - ‘title.crew.tsv.gz’ saved [48431137/48431137]

/bin/bash: line 1: fg: no job control
```

In [10]:
```
title_crew = spark.read.option("sep", "\t").csv('file:/databricks/driver/title.crew.tsv', header=True, inferSchema = True)
title_crew.cache()
title_crew.show(3)
```

```
+---------+---------+-------+
   tconst|directors|writers|
+---------+---------+-------+
tt0000001|nm0005690|     \N|
tt0000002|nm0721526|     \N|
tt0000003|nm0721526|     \N|
+---------+---------+-------+
only showing top 3 rows
```

In [11]:
```
%sh wget https://datasets.imdbws.com/title.crew.tsv.gz
%sh
gunzip title.crew.tsv.gz
```

```
--2020-05-31 14:09:40--  https://datasets.imdbws.com/title.crew.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.26, 13.224.13.32,
13.224.13.37, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.26|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 48431137 (46M) [binary/octet-stream]
Saving to: ‘title.crew.tsv.gz’

     0K ..........  ..........  ..........  ..........  ..........  0% 5.38M 9s
    50K ..........  ..........  ..........  ..........  ..........  0% 11.3M 6s
   100K ..........  ..........  ..........  ..........  ..........  0% 17.7M 5s
   150K ..........  ..........  ..........  ..........  ..........  0% 23.3M 4s
   200K ..........  ..........  ..........  ..........  ..........  0% 18.3M 4s
   250K ..........  ..........  ..........  ..........  ..........  0% 32.3M 4s
   300K ..........  ..........  ..........  ..........  ..........  0% 34.2M 3s
   350K ..........  ..........  ..........  ..........  ..........  0% 31.9M 3s
   400K ..........  ..........  ..........  ..........  ..........  0% 32.1M 3s
   450K ..........  ..........  ..........  ..........  ..........  1% 36.2M 3s
   500K ..........  ..........  ..........  ..........  ..........  1% 33.1M 3s
   550K ..........  ..........  ..........  ..........  ..........  1% 32.0M 2s
   600K ..........  ..........  ..........  ..........  ..........  1% 28.2M 2s
   650K ..........  ..........  ..........  ..........  ..........  1% 34.1M 2s
   700K ..........  ..........  ..........  ..........  ..........  1% 31.8M 2s
   750K ..........  ..........  ..........  ..........  ..........  1% 30.3M 2s
   800K ..........  ..........  ..........  ..........  ..........  1% 34.4M 2s
   850K ..........  ..........  ..........  ..........  ..........  1% 34.8M 2s
   900K ..........  ..........  ..........  ..........  ..........  2% 38.9M 2s
   950K ..........  ..........  ..........  ..........  ..........  2% 36.9M 2s
  1000K ..........  ..........  ..........  ..........  ..........  2% 36.6M 2s
  1050K ..........  ..........  ..........  ..........  ..........  2% 39.4M 2s
  1100K ..........  ..........  ..........  ..........  ..........  2% 33.6M 2s
  1150K ..........  ..........  ..........  ..........  ..........  2% 32.8M 2s
  1200K ..........  ..........  ..........  ..........  ..........  2% 33.7M 2s
  1250K ..........  ..........  ..........  ..........  ..........  2% 34.6M 2s
  1300K ..........  ..........  ..........  ..........  ..........  2% 33.0M 2s
  1350K ..........  ..........  ..........  ..........  ..........  2% 36.3M 2s
  1400K ..........  ..........  ..........  ..........  ..........  3% 31.6M 2s
  1450K ..........  ..........  ..........  ..........  ..........  3% 34.1M 2s
  1500K ..........  ..........  ..........  ..........  ..........  3% 36.8M 2s
  1550K ..........  ..........  ..........  ..........  ..........  3% 32.0M 2s
  1600K ..........  ..........  ..........  ..........  ..........  3% 37.3M 2s
  1650K ..........  ..........  ..........  ..........  ..........  3% 33.9M 2s
  1700K ..........  ..........  ..........  ..........  ..........  3% 29.6M 2s
  1750K ..........  ..........  ..........  ..........  ..........  3% 27.4M 2s
  1800K ..........  ..........  ..........  ..........  ..........  3% 24.6M 2s
  1850K ..........  ..........  ..........  ..........  ..........  4% 27.2M 2s
  1900K ..........  ..........  ..........  ..........  ..........  4%  172M 2s
  1950K ..........  ..........  ..........  ..........  ..........  4% 27.2M 2s
  2000K ..........  ..........  ..........  ..........  ..........  4% 43.1M 2s
  2050K ..........  ..........  ..........  ..........  ..........  4% 45.0M 2s
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2100K .......... .......... .......... .......... ..........  4% 35.8M 2s
2150K .......... .......... .......... .......... ..........  4% 42.4M 2s
2200K .......... .......... .......... .......... ..........  4% 47.7M 2s
2250K .......... .......... .......... .......... ..........  4% 40.9M 2s
2300K .......... .......... .......... .......... ..........  4% 44.4M 2s
2350K .......... .......... .......... .......... ..........  5%  189M 2s
2400K .......... .......... .......... .......... ..........  5% 46.4M 1s
2450K .......... .......... .......... .......... ..........  5% 36.0M 1s
2500K .......... .......... .......... .......... ..........  5% 36.1M 1s
2550K .......... .......... .......... .......... ..........  5% 38.0M 1s
2600K .......... .......... .......... .......... ..........  5% 53.6M 1s
2650K .......... .......... .......... .......... ..........  5% 43.2M 1s
2700K .......... .......... .......... .......... ..........  5% 70.9M 1s
2750K .......... .......... .......... .......... ..........  5% 31.2M 1s
2800K .......... .......... .......... .......... ..........  6% 33.5M 1s
2850K .......... .......... .......... .......... ..........  6% 61.3M 1s
2900K .......... .......... .......... .......... ..........  6% 40.3M 1s
2950K .......... .......... .......... .......... ..........  6% 45.7M 1s
3000K .......... .......... .......... .......... ..........  6% 30.9M 1s
3050K .......... .......... .......... .......... ..........  6% 52.7M 1s
3100K .......... .......... .......... .......... ..........  6% 46.0M 1s
3150K .......... .......... .......... .......... ..........  6% 38.2M 1s
3200K .......... .......... .......... .......... ..........  6% 55.5M 1s
3250K .......... .......... .......... .......... ..........  6% 35.3M 1s
3300K .......... .......... .......... .......... ..........  7% 63.4M 1s
3350K .......... .......... .......... .......... ..........  7% 38.1M 1s
3400K .......... .......... .......... .......... ..........  7% 36.8M 1s
3450K .......... .......... .......... .......... ..........  7% 81.5M 1s
3500K .......... .......... .......... .......... ..........  7% 35.1M 1s
3550K .......... .......... .......... .......... ..........  7% 97.7M 1s
3600K .......... .......... .......... .......... ..........  7% 45.6M 1s
3650K .......... .......... .......... .......... ..........  7% 39.0M 1s
3700K .......... .......... .......... .......... ..........  7% 35.3M 1s
3750K .......... .......... .......... .......... ..........  8% 36.4M 1s
3800K .......... .......... .......... .......... ..........  8%  111M 1s
3850K .......... .......... .......... .......... ..........  8% 65.2M 1s
3900K .......... .......... .......... .......... ..........  8% 36.6M 1s
3950K .......... .......... .......... .......... ..........  8% 33.6M 1s
4000K .......... .......... .......... .......... ..........  8% 32.9M 1s
4050K .......... .......... .......... .......... ..........  8% 99.6M 1s
4100K .......... .......... .......... .......... ..........  8%  201M 1s
4150K .......... .......... .......... .......... ..........  8% 46.7M 1s
4200K .......... .......... .......... .......... ..........  8% 32.7M 1s
4250K .......... .......... .......... .......... ..........  9% 38.0M 1s
4300K .......... .......... .......... .......... ..........  9% 37.1M 1s
4350K .......... .......... .......... .......... ..........  9% 47.4M 1s
4400K .......... .......... .......... .......... ..........  9% 35.8M 1s
4450K .......... .......... .......... .......... ..........  9%  210M 1s
4500K .......... .......... .......... .......... ..........  9% 37.1M 1s
4550K .......... .......... .......... .......... ..........  9% 36.0M 1s
4600K .......... .......... .......... .......... ..........  9% 36.8M 1s
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4650K .......... .......... .......... .......... ..........  9% 45.7M 1s
4700K .......... .......... .......... .......... .......... 10%  103M 1s
4750K .......... .......... .......... .......... .......... 10% 32.7M 1s
4800K .......... .......... .......... .......... .......... 10% 30.5M 1s
4850K .......... .......... .......... .......... .......... 10% 33.3M 1s
4900K .......... .......... .......... .......... .......... 10% 50.3M 1s
4950K .......... .......... .......... .......... .......... 10% 93.7M 1s
5000K .......... .......... .......... .......... .......... 10% 29.7M 1s
5050K .......... .......... .......... .......... .......... 10% 38.0M 1s
5100K .......... .......... .......... .......... .......... 10% 53.6M 1s
5150K .......... .......... .......... .......... .......... 10%  102M 1s
5200K .......... .......... .......... .......... .......... 11% 36.1M 1s
5250K .......... .......... .......... .......... .......... 11% 41.3M 1s
5300K .......... .......... .......... .......... .......... 11% 83.7M 1s
5350K .......... .......... .......... .......... .......... 11% 36.1M 1s
5400K .......... .......... .......... .......... .......... 11% 41.7M 1s
5450K .......... .......... .......... .......... .......... 11% 45.2M 1s
5500K .......... .......... .......... .......... .......... 11% 40.5M 1s
5550K .......... .......... .......... .......... .......... 11% 34.6M 1s
5600K .......... .......... .......... .......... .......... 11% 57.9M 1s
5650K .......... .......... .......... .......... .......... 12% 37.3M 1s
5700K .......... .......... .......... .......... .......... 12% 91.1M 1s
5750K .......... .......... .......... .......... .......... 12% 43.7M 1s
5800K .......... .......... .......... .......... .......... 12% 33.5M 1s
5850K .......... .......... .......... .......... .......... 12% 65.1M 1s
5900K .......... .......... .......... .......... .......... 12% 44.0M 1s
5950K .......... .......... .......... .......... .......... 12% 35.4M 1s
6000K .......... .......... .......... .......... .......... 12%  143M 1s
6050K .......... .......... .......... .......... .......... 12% 35.6M 1s
6100K .......... .......... .......... .......... .......... 13% 36.2M 1s
6150K .......... .......... .......... .......... .......... 13% 73.1M 1s
6200K .......... .......... .......... .......... .......... 13% 31.9M 1s
6250K .......... .......... .......... .......... .......... 13% 48.8M 1s
6300K .......... .......... .......... .......... .......... 13%  203M 1s
6350K .......... .......... .......... .......... .......... 13% 38.9M 1s
6400K .......... .......... .......... .......... .......... 13% 34.8M 1s
6450K .......... .......... .......... .......... .......... 13% 29.3M 1s
6500K .......... .......... .......... .......... .......... 13% 40.4M 1s
6550K .......... .......... .......... .......... .......... 13% 82.0M 1s
6600K .......... .......... .......... .......... .......... 14% 44.2M 1s
6650K .......... .......... .......... .......... .......... 14% 37.5M 1s
6700K .......... .......... .......... .......... .......... 14% 47.7M 1s
6750K .......... .......... .......... .......... .......... 14% 34.5M 1s
6800K .......... .......... .......... .......... .......... 14% 92.4M 1s
6850K .......... .......... .......... .......... .......... 14% 37.3M 1s
6900K .......... .......... .......... .......... .......... 14% 48.6M 1s
6950K .......... .......... .......... .......... .......... 14%  215M 1s
7000K .......... .......... .......... .......... .......... 14% 34.0M 1s
7050K .......... .......... .......... .......... .......... 15% 32.8M 1s
7100K .......... .......... .......... .......... .......... 15% 37.6M 1s
7150K .......... .......... .......... .......... .......... 15% 72.0M 1s
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7200K .......... .......... .......... .......... .......... 15% 45.8M 1s
7250K .......... .......... .......... .......... .......... 15% 37.9M 1s
7300K .......... .......... .......... .......... .......... 15% 35.8M 1s
7350K .......... .......... .......... .......... .......... 15% 86.5M 1s
7400K .......... .......... .......... .......... .......... 15% 35.1M 1s
7450K .......... .......... .......... .......... .......... 15% 49.4M 1s
7500K .......... .......... .......... .......... .......... 15% 38.9M 1s
7550K .......... .......... .......... .......... .......... 16% 74.4M 1s
7600K .......... .......... .......... .......... .......... 16% 41.8M 1s
7650K .......... .......... .......... .......... .......... 16% 37.7M 1s
7700K .......... .......... .......... .......... .......... 16% 39.4M 1s
7750K .......... .......... .......... .......... .......... 16% 57.2M 1s
7800K .......... .......... .......... .......... .......... 16% 55.5M 1s
7850K .......... .......... .......... .......... .......... 16%  210M 1s
7900K .......... .......... .......... .......... .......... 16% 43.5M 1s
7950K .......... .......... .......... .......... .......... 16% 30.9M 1s
8000K .......... .......... .......... .......... .......... 17% 35.6M 1s
8050K .......... .......... .......... .......... .......... 17% 34.0M 1s
8100K .......... .......... .......... .......... .......... 17% 39.7M 1s
8150K .......... .......... .......... .......... .......... 17% 50.7M 1s
8200K .......... .......... .......... .......... .......... 17% 50.8M 1s
8250K .......... .......... .......... .......... .......... 17% 38.7M 1s
8300K .......... .......... .......... .......... .......... 17% 50.6M 1s
8350K .......... .......... .......... .......... .......... 17%  170M 1s
8400K .......... .......... .......... .......... .......... 17% 49.3M 1s
8450K .......... .......... .......... .......... .......... 17% 38.0M 1s
8500K .......... .......... .......... .......... .......... 18% 32.4M 1s
8550K .......... .......... .......... .......... .......... 18% 37.8M 1s
8600K .......... .......... .......... .......... .......... 18% 90.3M 1s
8650K .......... .......... .......... .......... .......... 18% 57.7M 1s
8700K .......... .......... .......... .......... .......... 18% 35.6M 1s
8750K .......... .......... .......... .......... .......... 18% 32.6M 1s
8800K .......... .......... .......... .......... .......... 18% 36.1M 1s
8850K .......... .......... .......... .......... .......... 18%  117M 1s
8900K .......... .......... .......... .......... .......... 18%  207M 1s
8950K .......... .......... .......... .......... .......... 19% 48.7M 1s
9000K .......... .......... .......... .......... .......... 19% 32.4M 1s
9050K .......... .......... .......... .......... .......... 19% 37.8M 1s
9100K .......... .......... .......... .......... .......... 19% 37.3M 1s
9150K .......... .......... .......... .......... .......... 19% 36.5M 1s
9200K .......... .......... .......... .......... .......... 19% 36.4M 1s
9250K .......... .......... .......... .......... .......... 19% 68.0M 1s
9300K .......... .......... .......... .......... .......... 19% 37.3M 1s
9350K .......... .......... .......... .......... .......... 19% 49.3M 1s
9400K .......... .......... .......... .......... .......... 19% 34.4M 1s
9450K .......... .......... .......... .......... .......... 20% 58.4M 1s
9500K .......... .......... .......... .......... .......... 20%  205M 1s
9550K .......... .......... .......... .......... .......... 20% 84.9M 1s
9600K .......... .......... .......... .......... .......... 20% 30.0M 1s
9650K .......... .......... .......... .......... .......... 20% 35.0M 1s
9700K .......... .......... .......... .......... .......... 20% 35.6M 1s
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 9750K .......... .......... .......... .......... .......... 20% 46.6M 1s
 9800K .......... .......... .......... .......... .......... 20% 35.0M 1s
 9850K .......... .......... .......... .......... .......... 20%  117M 1s
 9900K .......... .......... .......... .......... .......... 21%  207M 1s
 9950K .......... .......... .......... .......... .......... 21% 22.6M 1s
10000K .......... .......... .......... .......... .......... 21% 32.2M 1s
10050K .......... .......... .......... .......... .......... 21% 35.1M 1s
10100K .......... .......... .......... .......... .......... 21% 34.8M 1s
10150K .......... .......... .......... .......... .......... 21% 36.3M 1s
10200K .......... .......... .......... .......... .......... 21% 70.1M 1s
10250K .......... .......... .......... .......... .......... 21%  207M 1s
10300K .......... .......... .......... .......... .......... 21%  190M 1s
10350K .......... .......... .......... .......... .......... 21% 39.0M 1s
10400K .......... .......... .......... .......... .......... 22% 34.9M 1s
10450K .......... .......... .......... .......... .......... 22% 38.7M 1s
10500K .......... .......... .......... .......... .......... 22% 39.2M 1s
10550K .......... .......... .......... .......... .......... 22% 37.7M 1s
10600K .......... .......... .......... .......... .......... 22% 35.0M 1s
10650K .......... .......... .......... .......... .......... 22% 35.1M 1s
10700K .......... .......... .......... .......... .......... 22% 37.1M 1s
10750K .......... .......... .......... .......... .......... 22% 40.8M 1s
10800K .......... .......... .......... .......... .......... 22%  192M 1s
10850K .......... .......... .......... .......... .......... 23%  205M 1s
10900K .......... .......... .......... .......... .......... 23% 67.6M 1s
10950K .......... .......... .......... .......... .......... 23% 38.8M 1s
11000K .......... .......... .......... .......... .......... 23% 33.2M 1s
11050K .......... .......... .......... .......... .......... 23% 32.7M 1s
11100K .......... .......... .......... .......... .......... 23% 36.8M 1s
11150K .......... .......... .......... .......... .......... 23% 31.1M 1s
11200K .......... .......... .......... .......... .......... 23% 51.6M 1s
11250K .......... .......... .......... .......... .......... 23% 49.5M 1s
11300K .......... .......... .......... .......... .......... 23% 35.3M 1s
11350K .......... .......... .......... .......... .......... 24% 60.4M 1s
11400K .......... .......... .......... .......... .......... 24%  187M 1s
11450K .......... .......... .......... .......... .......... 24% 88.4M 1s
11500K .......... .......... .......... .......... .......... 24% 34.8M 1s
11550K .......... .......... .......... .......... .......... 24% 32.5M 1s
11600K .......... .......... .......... .......... .......... 24% 30.7M 1s
11650K .......... .......... .......... .......... .......... 24% 35.9M 1s
11700K .......... .......... .......... .......... .......... 24% 32.0M 1s
11750K .......... .......... .......... .......... .......... 24% 36.9M 1s
11800K .......... .......... .......... .......... .......... 25% 42.3M 1s
11850K .......... .......... .......... .......... .......... 25% 44.7M 1s
11900K .......... .......... .......... .......... .......... 25% 39.5M 1s
11950K .......... .......... .......... .......... .......... 25% 72.4M 1s
12000K .......... .......... .......... .......... .......... 25%  113M 1s
12050K .......... .......... .......... .......... .......... 25% 29.9M 1s
12100K .......... .......... .......... .......... .......... 25% 32.8M 1s
12150K .......... .......... .......... .......... .......... 25% 31.3M 1s
12200K .......... .......... .......... .......... .......... 25% 34.0M 1s
12250K .......... .......... .......... .......... .......... 26%  111M 1s
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12300K .......... .......... .......... .......... .......... 26% 18.7M 1s
12350K .......... .......... .......... .......... .......... 26% 31.6M 1s
12400K .......... .......... .......... .......... .......... 26% 38.8M 1s
12450K .......... .......... .......... .......... .......... 26% 59.1M 1s
12500K .......... .......... .......... .......... .......... 26%  203M 1s
12550K .......... .......... .......... .......... .......... 26%  210M 1s
12600K .......... .......... .......... .......... .......... 26% 38.5M 1s
12650K .......... .......... .......... .......... .......... 26% 33.1M 1s
12700K .......... .......... .......... .......... .......... 26% 36.6M 1s
12750K .......... .......... .......... .......... .......... 27% 33.3M 1s
12800K .......... .......... .......... .......... .......... 27% 31.2M 1s
12850K .......... .......... .......... .......... .......... 27% 34.2M 1s
12900K .......... .......... .......... .......... .......... 27% 37.1M 1s
12950K .......... .......... .......... .......... .......... 27% 57.3M 1s
13000K .......... .......... .......... .......... .......... 27% 82.8M 1s
13050K .......... .......... .......... .......... .......... 27% 33.2M 1s
13100K .......... .......... .......... .......... .......... 27% 44.6M 1s
13150K .......... .......... .......... .......... .......... 27% 46.1M 1s
13200K .......... .......... .......... .......... .......... 28% 52.6M 1s
13250K .......... .......... .......... .......... .......... 28% 7.55M 1s
13300K .......... .......... .......... .......... .......... 28% 89.0M 1s
13350K .......... .......... .......... .......... .......... 28% 34.3M 1s
13400K .......... .......... .......... .......... .......... 28% 31.2M 1s
13450K .......... .......... .......... .......... .......... 28% 48.4M 1s
13500K .......... .......... .......... .......... .......... 28% 69.7M 1s
13550K .......... .......... .......... .......... .......... 28% 33.7M 1s
13600K .......... .......... .......... .......... .......... 28% 36.5M 1s
13650K .......... .......... .......... .......... .......... 28% 46.6M 1s
13700K .......... .......... .......... .......... .......... 29% 49.2M 1s
13750K .......... .......... .......... .......... .......... 29% 44.6M 1s
13800K .......... .......... .......... .......... .......... 29% 51.2M 1s
13850K .......... .......... .......... .......... .......... 29%  213M 1s
13900K .......... .......... .......... .......... .......... 29% 66.4M 1s
13950K .......... .......... .......... .......... .......... 29% 32.8M 1s
14000K .......... .......... .......... .......... .......... 29% 33.3M 1s
14050K .......... .......... .......... .......... .......... 29% 36.0M 1s
14100K .......... .......... .......... .......... .......... 29%  144M 1s
14150K .......... .......... .......... .......... .......... 30%  178M 1s
14200K .......... .......... .......... .......... .......... 30%  128M 1s
14250K .......... .......... .......... .......... .......... 30%  191M 1s
14300K .......... .......... .......... .......... .......... 30%  317M 1s
14350K .......... .......... .......... .......... .......... 30%  264M 1s
14400K .......... .......... .......... .......... .......... 30%  127M 1s
14450K .......... .......... .......... .......... .......... 30%  141M 1s
14500K .......... .......... .......... .......... .......... 30%  171M 1s
14550K .......... .......... .......... .......... .......... 30%  173M 1s
14600K .......... .......... .......... .......... .......... 30%  137M 1s
14650K .......... .......... .......... .......... .......... 31%  313M 1s
14700K .......... .......... .......... .......... .......... 31%  296M 1s
14750K .......... .......... .......... .......... .......... 31% 98.4M 1s
14800K .......... .......... .......... .......... .......... 31% 24.3M 1s
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14850K .......... .......... .......... .......... .......... 31% 50.3M 1s
14900K .......... .......... .......... .......... .......... 31%  161M 1s
14950K .......... .......... .......... .......... .......... 31%  134M 1s
15000K .......... .......... .......... .......... .......... 31% 79.5M 1s
15050K .......... .......... .......... .......... .......... 31% 79.1M 1s
15100K .......... .......... .......... .......... .......... 32% 78.1M 1s
15150K .......... .......... .......... .......... .......... 32%  167M 1s
15200K .......... .......... .......... .......... .......... 32% 66.6M 1s
15250K .......... .......... .......... .......... .......... 32% 81.7M 1s
15300K .......... .......... .......... .......... .......... 32% 84.2M 1s
15350K .......... .......... .......... .......... .......... 32% 86.9M 1s
15400K .......... .......... .......... .......... .......... 32%  125M 1s
15450K .......... .......... .......... .......... .......... 32% 85.9M 1s
15500K .......... .......... .......... .......... .......... 32% 81.4M 1s
15550K .......... .......... .......... .......... .......... 32% 84.8M 1s
15600K .......... .......... .......... .......... .......... 33% 81.8M 1s
15650K .......... .......... .......... .......... .......... 33%  139M 1s
15700K .......... .......... .......... .......... .......... 33% 96.5M 1s
15750K .......... .......... .......... .......... .......... 33% 79.9M 1s
15800K .......... .......... .......... .......... .......... 33% 78.3M 1s
15850K .......... .......... .......... .......... .......... 33%  156M 1s
15900K .......... .......... .......... .......... .......... 33% 85.3M 1s
15950K .......... .......... .......... .......... .......... 33% 79.6M 1s
16000K .......... .......... .......... .......... .......... 33% 76.8M 1s
16050K .......... .......... .......... .......... .......... 34% 88.4M 1s
16100K .......... .......... .......... .......... .......... 34%  238M 1s
16150K .......... .......... .......... .......... .......... 34% 67.1M 1s

*** WARNING: skipped 22496 bytes of output ***

31000K .......... .......... .......... .......... .......... 65%  122M 0s
31050K .......... .......... .......... .......... .......... 65%  151M 0s
31100K .......... .......... .......... .......... .......... 65%  202M 0s
31150K .......... .......... .......... .......... .......... 65%  296M 0s
31200K .......... .......... .......... .......... .......... 66%  302M 0s
31250K .......... .......... .......... .......... .......... 66%  295M 0s
31300K .......... .......... .......... .......... .......... 66%  134M 0s
31350K .......... .......... .......... .......... .......... 66%  172M 0s
31400K .......... .......... .......... .......... .......... 66% 36.9M 0s
31450K .......... .......... .......... .......... .......... 66% 86.3M 0s
31500K .......... .......... .......... .......... .......... 66%  157M 0s
31550K .......... .......... .......... .......... .......... 66%  137M 0s
31600K .......... .......... .......... .......... .......... 66%  140M 0s
31650K .......... .......... .......... .......... .......... 67% 59.9M 0s
31700K .......... .......... .......... .......... .......... 67% 78.8M 0s
31750K .......... .......... .......... .......... .......... 67% 84.4M 0s
31800K .......... .......... .......... .......... .......... 67%  138M 0s
31850K .......... .......... .......... .......... .......... 67%  151M 0s
31900K .......... .......... .......... .......... .......... 67% 83.3M 0s
31950K .......... .......... .......... .......... .......... 67% 68.3M 0s
32000K .......... .......... .......... .......... .......... 67%  223M 0s
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32050K .......... .......... .......... .......... .......... 67%  283M 0s
32100K .......... .......... .......... .......... .......... 67%  317M 0s
32150K .......... .......... .......... .......... .......... 68%  297M 0s
32200K .......... .......... .......... .......... .......... 68%  251M 0s
32250K .......... .......... .......... .......... .......... 68%  277M 0s
32300K .......... .......... .......... .......... .......... 68%  329M 0s
32350K .......... .......... .......... .......... .......... 68%  223M 0s
32400K .......... .......... .......... .......... .......... 68% 78.0M 0s
32450K .......... .......... .......... .......... .......... 68%  111M 0s
32500K .......... .......... .......... .......... .......... 68%  147M 0s
32550K .......... .......... .......... .......... .......... 68%  152M 0s
32600K .......... .......... .......... .......... .......... 69%  137M 0s
32650K .......... .......... .......... .......... .......... 69%  166M 0s
32700K .......... .......... .......... .......... .......... 69%  158M 0s
32750K .......... .......... .......... .......... .......... 69%  136M 0s
32800K .......... .......... .......... .......... .......... 69%  148M 0s
32850K .......... .......... .......... .......... .......... 69%  317M 0s
32900K .......... .......... .......... .......... .......... 69%  331M 0s
32950K .......... .......... .......... .......... .......... 69% 69.8M 0s
33000K .......... .......... .......... .......... .......... 69%  137M 0s
33050K .......... .......... .......... .......... .......... 69%  153M 0s
33100K .......... .......... .......... .......... .......... 70%  156M 0s
33150K .......... .......... .......... .......... .......... 70% 68.0M 0s
33200K .......... .......... .......... .......... .......... 70%  105M 0s
33250K .......... .......... .......... .......... .......... 70%  192M 0s
33300K .......... .......... .......... .......... .......... 70%  328M 0s
33350K .......... .......... .......... .......... .......... 70%  299M 0s
33400K .......... .......... .......... .......... .......... 70% 99.1M 0s
33450K .......... .......... .......... .......... .......... 70%  144M 0s
33500K .......... .......... .......... .......... .......... 70% 92.7M 0s
33550K .......... .......... .......... .......... .......... 71%  140M 0s
33600K .......... .......... .......... .......... .......... 71%  139M 0s
33650K .......... .......... .......... .......... .......... 71%  166M 0s
33700K .......... .......... .......... .......... .......... 71%  160M 0s
33750K .......... .......... .......... .......... .......... 71% 80.0M 0s
33800K .......... .......... .......... .......... .......... 71% 62.4M 0s
33850K .......... .......... .......... .......... .......... 71% 59.3M 0s
33900K .......... .......... .......... .......... .......... 71% 72.3M 0s
33950K .......... .......... .......... .......... .......... 71% 76.7M 0s
34000K .......... .......... .......... .......... .......... 71% 72.5M 0s
34050K .......... .......... .......... .......... .......... 72%  184M 0s
34100K .......... .......... .......... .......... .......... 72%  321M 0s
34150K .......... .......... .......... .......... .......... 72%  330M 0s
34200K .......... .......... .......... .......... .......... 72%  262M 0s
34250K .......... .......... .......... .......... .......... 72%  326M 0s
34300K .......... .......... .......... .......... .......... 72%  288M 0s
34350K .......... .......... .......... .......... .......... 72%  287M 0s
34400K .......... .......... .......... .......... .......... 72%  217M 0s
34450K .......... .......... .......... .......... .......... 72%  315M 0s
34500K .......... .......... .......... .......... .......... 73%  282M 0s
34550K .......... .......... .......... .......... .......... 73%  265M 0s
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34600K .......... .......... .......... .......... .......... 73% 49.5M 0s
34650K .......... .......... .......... .......... .......... 73% 87.6M 0s
34700K .......... .......... .......... .......... .......... 73%  153M 0s
34750K .......... .......... .......... .......... .......... 73%  140M 0s
34800K .......... .......... .......... .......... .......... 73%  103M 0s
34850K .......... .......... .......... .......... .......... 73%  155M 0s
34900K .......... .......... .......... .......... .......... 73%  146M 0s
34950K .......... .......... .......... .......... .......... 74%  157M 0s
35000K .......... .......... .......... .......... .......... 74%  131M 0s
35050K .......... .......... .......... .......... .......... 74%  158M 0s
35100K .......... .......... .......... .......... .......... 74%  149M 0s
35150K .......... .......... .......... .......... .......... 74%  137M 0s
35200K .......... .......... .......... .......... .......... 74%  138M 0s
35250K .......... .......... .......... .......... .......... 74%  105M 0s
35300K .......... .......... .......... .......... .......... 74% 65.7M 0s
35350K .......... .......... .......... .......... .......... 74% 66.7M 0s
35400K .......... .......... .......... .......... .......... 74% 95.5M 0s
35450K .......... .......... .......... .......... .......... 75%  166M 0s
35500K .......... .......... .......... .......... .......... 75%  316M 0s
35550K .......... .......... .......... .......... .......... 75%  258M 0s
35600K .......... .......... .......... .......... .......... 75%  297M 0s
35650K .......... .......... .......... .......... .......... 75%  124M 0s
35700K .......... .......... .......... .......... .......... 75%  285M 0s
35750K .......... .......... .......... .......... .......... 75%  326M 0s
35800K .......... .......... .......... .......... .......... 75%  259M 0s
35850K .......... .......... .......... .......... .......... 75%  323M 0s
35900K .......... .......... .......... .......... .......... 76%  331M 0s
35950K .......... .......... .......... .......... .......... 76%  266M 0s
36000K .......... .......... .......... .......... .......... 76%  288M 0s
36050K .......... .......... .......... .......... .......... 76%  298M 0s
36100K .......... .......... .......... .......... .......... 76%  320M 0s
36150K .......... .......... .......... .......... .......... 76%  284M 0s
36200K .......... .......... .......... .......... .......... 76%  298M 0s
36250K .......... .......... .......... .......... .......... 76%  321M 0s
36300K .......... .......... .......... .......... .......... 76%  283M 0s
36350K .......... .......... .......... .......... .......... 76%  289M 0s
36400K .......... .......... .......... .......... .......... 77%  272M 0s
36450K .......... .......... .......... .......... .......... 77%  328M 0s
36500K .......... .......... .......... .......... .......... 77%  277M 0s
36550K .......... .......... .......... .......... .......... 77% 34.3M 0s
36600K .......... .......... .......... .......... .......... 77% 55.7M 0s
36650K .......... .......... .......... .......... .......... 77%  154M 0s
36700K .......... .......... .......... .......... .......... 77%  149M 0s
36750K .......... .......... .......... .......... .......... 77% 72.8M 0s
36800K .......... .......... .......... .......... .......... 77%  118M 0s
36850K .......... .......... .......... .......... .......... 78%  140M 0s
36900K .......... .......... .......... .......... .......... 78%  152M 0s
36950K .......... .......... .......... .......... .......... 78%  195M 0s
37000K .......... .......... .......... .......... .......... 78%  285M 0s
37050K .......... .......... .......... .......... .......... 78%  300M 0s
37100K .......... .......... .......... .......... .......... 78%  321M 0s
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37150K .......... .......... .......... .......... .......... 78%  260M 0s
37200K .......... .......... .......... .......... .......... 78%  297M 0s
37250K .......... .......... .......... .......... .......... 78%  327M 0s
37300K .......... .......... .......... .......... .......... 78%  290M 0s
37350K .......... .......... .......... .......... .......... 79%  305M 0s
37400K .......... .......... .......... .......... .......... 79%  140M 0s
37450K .......... .......... .......... .......... .......... 79%  123M 0s
37500K .......... .......... .......... .......... .......... 79%  179M 0s
37550K .......... .......... .......... .......... .......... 79%  124M 0s
37600K .......... .......... .......... .......... .......... 79%  165M 0s
37650K .......... .......... .......... .......... .......... 79% 44.3M 0s
37700K .......... .......... .......... .......... .......... 79%  101M 0s
37750K .......... .......... .......... .......... .......... 79%  134M 0s
37800K .......... .......... .......... .......... .......... 80%  135M 0s
37850K .......... .......... .......... .......... .......... 80%  148M 0s
37900K .......... .......... .......... .......... .......... 80%  298M 0s
37950K .......... .......... .......... .......... .......... 80%  280M 0s
38000K .......... .......... .......... .......... .......... 80%  294M 0s
38050K .......... .......... .......... .......... .......... 80%  282M 0s
38100K .......... .......... .......... .......... .......... 80%  336M 0s
38150K .......... .......... .......... .......... .......... 80%  324M 0s
38200K .......... .......... .......... .......... .......... 80%  264M 0s
38250K .......... .......... .......... .......... .......... 80%  287M 0s
38300K .......... .......... .......... .......... .......... 81%  329M 0s
38350K .......... .......... .......... .......... .......... 81% 56.8M 0s
38400K .......... .......... .......... .......... .......... 81% 70.3M 0s
38450K .......... .......... .......... .......... .......... 81% 69.9M 0s
38500K .......... .......... .......... .......... .......... 81% 66.7M 0s
38550K .......... .......... .......... .......... .......... 81% 68.8M 0s
38600K .......... .......... .......... .......... .......... 81%  114M 0s
38650K .......... .......... .......... .......... .......... 81%  138M 0s
38700K .......... .......... .......... .......... .......... 81%  226M 0s
38750K .......... .......... .......... .......... .......... 82%  201M 0s
38800K .......... .......... .......... .......... .......... 82%  196M 0s
38850K .......... .......... .......... .......... .......... 82%  223M 0s
38900K .......... .......... .......... .......... .......... 82%  216M 0s
38950K .......... .......... .......... .......... .......... 82%  218M 0s
39000K .......... .......... .......... .......... .......... 82%  196M 0s
39050K .......... .......... .......... .......... .......... 82%  212M 0s
39100K .......... .......... .......... .......... .......... 82%  215M 0s
39150K .......... .......... .......... .......... .......... 82% 91.0M 0s
39200K .......... .......... .......... .......... .......... 82%  154M 0s
39250K .......... .......... .......... .......... .......... 83%  129M 0s
39300K .......... .......... .......... .......... .......... 83%  143M 0s
39350K .......... .......... .......... .......... .......... 83% 39.8M 0s
39400K .......... .......... .......... .......... .......... 83%  135M 0s
39450K .......... .......... .......... .......... .......... 83%  148M 0s
39500K .......... .......... .......... .......... .......... 83%  157M 0s
39550K .......... .......... .......... .......... .......... 83%  133M 0s
39600K .......... .......... .......... .......... .......... 83%  145M 0s
39650K .......... .......... .......... .......... .......... 83%  150M 0s
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39700K .......... .......... .......... .......... .......... 84%  159M 0s
39750K .......... .......... .......... .......... .......... 84%  159M 0s
39800K .......... .......... .......... .......... .......... 84%  128M 0s
39850K .......... .......... .......... .......... .......... 84%  152M 0s
39900K .......... .......... .......... .......... .......... 84%  157M 0s
39950K .......... .......... .......... .......... .......... 84% 57.3M 0s
40000K .......... .......... .......... .......... .......... 84% 67.8M 0s
40050K .......... .......... .......... .......... .......... 84%  101M 0s
40100K .......... .......... .......... .......... .......... 84%  127M 0s
40150K .......... .......... .......... .......... .......... 84%  194M 0s
40200K .......... .......... .......... .......... .......... 85%  181M 0s
40250K .......... .......... .......... .......... .......... 85%  146M 0s
40300K .......... .......... .......... .......... .......... 85%  134M 0s
40350K .......... .......... .......... .......... .......... 85%  133M 0s
40400K .......... .......... .......... .......... .......... 85%  140M 0s
40450K .......... .......... .......... .......... .......... 85%  149M 0s
40500K .......... .......... .......... .......... .......... 85%  154M 0s
40550K .......... .......... .......... .......... .......... 85%  163M 0s
40600K .......... .......... .......... .......... .......... 85%  142M 0s
40650K .......... .......... .......... .......... .......... 86%  152M 0s
40700K .......... .......... .......... .......... .......... 86%  150M 0s
40750K .......... .......... .......... .......... .......... 86% 73.4M 0s
40800K .......... .......... .......... .......... .......... 86% 68.1M 0s
40850K .......... .......... .......... .......... .......... 86% 71.3M 0s
40900K .......... .......... .......... .......... .......... 86%  132M 0s
40950K .......... .......... .......... .......... .......... 86%  323M 0s
41000K .......... .......... .......... .......... .......... 86%  137M 0s
41050K .......... .......... .......... .......... .......... 86%  263M 0s
41100K .......... .......... .......... .......... .......... 87%  302M 0s
41150K .......... .......... .......... .......... .......... 87%  250M 0s
41200K .......... .......... .......... .......... .......... 87%  306M 0s
41250K .......... .......... .......... .......... .......... 87%  279M 0s
41300K .......... .......... .......... .......... .......... 87%  295M 0s
41350K .......... .......... .......... .......... .......... 87%  248M 0s
41400K .......... .......... .......... .......... .......... 87%  304M 0s
41450K .......... .......... .......... .......... .......... 87%  306M 0s
41500K .......... .......... .......... .......... .......... 87%  266M 0s
41550K .......... .......... .......... .......... .......... 87% 64.6M 0s
41600K .......... .......... .......... .......... .......... 88%  164M 0s
41650K .......... .......... .......... .......... .......... 88%  301M 0s
41700K .......... .......... .......... .......... .......... 88%  272M 0s
41750K .......... .......... .......... .......... .......... 88%  241M 0s
41800K .......... .......... .......... .......... .......... 88%  114M 0s
41850K .......... .......... .......... .......... .......... 88%  171M 0s
41900K .......... .......... .......... .......... .......... 88%  122M 0s
41950K .......... .......... .......... .......... .......... 88%  176M 0s
42000K .......... .......... .......... .......... .......... 88%  130M 0s
42050K .......... .......... .......... .......... .......... 89%  158M 0s
42100K .......... .......... .......... .......... .......... 89%  179M 0s
42150K .......... .......... .......... .......... .......... 89% 53.0M 0s
42200K .......... .......... .......... .......... .......... 89%  302M 0s
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42250K .......... .......... .......... .......... .......... 89%  306M 0s
42300K .......... .......... .......... .......... .......... 89%  313M 0s
42350K .......... .......... .......... .......... .......... 89%  273M 0s
42400K .......... .......... .......... .......... .......... 89%  266M 0s
42450K .......... .......... .......... .......... .......... 89%  291M 0s
42500K .......... .......... .......... .......... .......... 89%  283M 0s
42550K .......... .......... .......... .......... .......... 90%  254M 0s
42600K .......... .......... .......... .......... .......... 90%  309M 0s
42650K .......... .......... .......... .......... .......... 90%  299M 0s
42700K .......... .......... .......... .......... .......... 90%  267M 0s
42750K .......... .......... .......... .......... .......... 90%  271M 0s
42800K .......... .......... .......... .......... .......... 90%  276M 0s
42850K .......... .......... .......... .......... .......... 90%  309M 0s
42900K .......... .......... .......... .......... .......... 90%  304M 0s
42950K .......... .......... .......... .......... .......... 90%  249M 0s
43000K .......... .......... .......... .......... .......... 91%  290M 0s
43050K .......... .......... .......... .......... .......... 91% 46.6M 0s
43100K .......... .......... .......... .......... .......... 91% 72.3M 0s
43150K .......... .......... .......... .......... .......... 91% 67.3M 0s
43200K .......... .......... .......... .......... .......... 91% 56.3M 0s
43250K .......... .......... .......... .......... .......... 91% 70.4M 0s
43300K .......... .......... .......... .......... .......... 91% 72.6M 0s
43350K .......... .......... .......... .......... .......... 91%  123M 0s
43400K .......... .......... .......... .......... .......... 91%  159M 0s
43450K .......... .......... .......... .......... .......... 91%  162M 0s
43500K .......... .......... .......... .......... .......... 92%  156M 0s
43550K .......... .......... .......... .......... .......... 92%  144M 0s
43600K .......... .......... .......... .......... .......... 92% 74.3M 0s
43650K .......... .......... .......... .......... .......... 92%  129M 0s
43700K .......... .......... .......... .......... .......... 92%  109M 0s
43750K .......... .......... .......... .......... .......... 92%  103M 0s
43800K .......... .......... .......... .......... .......... 92%  126M 0s
43850K .......... .......... .......... .......... .......... 92%  189M 0s
43900K .......... .......... .......... .......... .......... 92%  117M 0s
43950K .......... .......... .......... .......... .......... 93%  163M 0s
44000K .......... .......... .......... .......... .......... 93%  129M 0s
44050K .......... .......... .......... .......... .......... 93%  246M 0s
44100K .......... .......... .......... .......... .......... 93%  276M 0s
44150K .......... .......... .......... .......... .......... 93%  231M 0s
44200K .......... .......... .......... .......... .......... 93%  294M 0s
44250K .......... .......... .......... .......... .......... 93%  300M 0s
44300K .......... .......... .......... .......... .......... 93%  302M 0s
44350K .......... .......... .......... .......... .......... 93%  251M 0s
44400K .......... .......... .......... .......... .......... 93%  232M 0s
44450K .......... .......... .......... .......... .......... 94%  267M 0s
44500K .......... .......... .......... .......... .......... 94%  291M 0s
44550K .......... .......... .......... .......... .......... 94%  252M 0s
44600K .......... .......... .......... .......... .......... 94%  306M 0s
44650K .......... .......... .......... .......... .......... 94% 45.7M 0s
44700K .......... .......... .......... .......... .......... 94% 71.8M 0s
44750K .......... .......... .......... .......... .......... 94%  145M 0s
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44800K .......... .......... .......... .......... .......... 94%  151M 0s
44850K .......... .......... .......... .......... .......... 94%  131M 0s
44900K .......... .......... .......... .......... .......... 95%  271M 0s
44950K .......... .......... .......... .......... .......... 95%  242M 0s
45000K .......... .......... .......... .......... .......... 95%  156M 0s
45050K .......... .......... .......... .......... .......... 95%  261M 0s
45100K .......... .......... .......... .......... .......... 95%  212M 0s
45150K .......... .......... .......... .......... .......... 95%  170M 0s
45200K .......... .......... .......... .......... .......... 95%  192M 0s
45250K .......... .......... .......... .......... .......... 95%  232M 0s
45300K .......... .......... .......... .......... .......... 95%  288M 0s
45350K .......... .......... .......... .......... .......... 95%  250M 0s
45400K .......... .......... .......... .......... .......... 96%  275M 0s
45450K .......... .......... .......... .......... .......... 96%  299M 0s
45500K .......... .......... .......... .......... .......... 96%  118M 0s
45550K .......... .......... .......... .......... .......... 96%  103M 0s
45600K .......... .......... .......... .......... .......... 96%  179M 0s
45650K .......... .......... .......... .......... .......... 96%  110M 0s
45700K .......... .......... .......... .......... .......... 96%  169M 0s
45750K .......... .......... .......... .......... .......... 96%  104M 0s
45800K .......... .......... .......... .......... .......... 96% 38.8M 0s
45850K .......... .......... .......... .......... .......... 97%  118M 0s
45900K .......... .......... .......... .......... .......... 97%  158M 0s
45950K .......... .......... .......... .......... .......... 97%  147M 0s
46000K .......... .......... .......... .......... .......... 97%  151M 0s
46050K .......... .......... .......... .......... .......... 97%  154M 0s
46100K .......... .......... .......... .......... .......... 97%  155M 0s
46150K .......... .......... .......... .......... .......... 97%  147M 0s
46200K .......... .......... .......... .......... .......... 97%  267M 0s
46250K .......... .......... .......... .......... .......... 97%  307M 0s
46300K .......... .......... .......... .......... .......... 97%  276M 0s
46350K .......... .......... .......... .......... .......... 98%  232M 0s
46400K .......... .......... .......... .......... .......... 98%  106M 0s
46450K .......... .......... .......... .......... .......... 98%  154M 0s
46500K .......... .......... .......... .......... .......... 98%  196M 0s
46550K .......... .......... .......... .......... .......... 98%  246M 0s
46600K .......... .......... .......... .......... .......... 98%  300M 0s
46650K .......... .......... .......... .......... .......... 98%  275M 0s
46700K .......... .......... .......... .......... .......... 98%  262M 0s
46750K .......... .......... .......... .......... .......... 98%  277M 0s
46800K .......... .......... .......... .......... .......... 99%  268M 0s
46850K .......... .......... .......... .......... .......... 99%  295M 0s
46900K .......... .......... .......... .......... .......... 99%  310M 0s
46950K .......... .......... .......... .......... .......... 99%  208M 0s
47000K .......... .......... .......... .......... .......... 99%  254M 0s
47050K .......... .......... .......... .......... .......... 99%  301M 0s
47100K .......... .......... .......... .......... .......... 99%  283M 0s
47150K .......... .......... .......... .......... .......... 99%  271M 0s
47200K .......... .......... .......... .......... .......... 99%  297M 0s
47250K .......... .......... .......... .......... ......    100%  252M=0.6s
```

```
2020-05-31 14:09:41 (78.9 MB/s) - ‘title.crew.tsv.gz’ saved [48431137/48431137]

/bin/bash: line 1: fg: no job control
gzip: title.crew.tsv already exists;    not overwritten
```

In [12]:
```
title_crew = spark.read.option("sep", "\t").csv('file:/databricks/driver/title.crew.tsv', header=True, inferSchema = True)
title_crew.cache()
title_crew.show(3)
```

```
+---------+---------+-------+
   tconst|directors|writers|
+---------+---------+-------+
tt0000001|nm0005690|     \N|
tt0000002|nm0721526|     \N|
tt0000003|nm0721526|     \N|
+---------+---------+-------+
only showing top 3 rows
```

In [13]:
```
%sh wget https://datasets.imdbws.com/title.episode.tsv.gz
%sh
gunzip title.episode.tsv.gz
```

```
--2020-05-31 14:09:51--  https://datasets.imdbws.com/title.episode.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.54, 13.224.13.26,
13.224.13.32, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.54|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 26597530 (25M) [binary/octet-stream]
Saving to: ‘title.episode.tsv.gz’

     0K ..........  ..........  ..........  ..........  ..........  0% 3.87M 7s
    50K ..........  ..........  ..........  ..........  ..........  0% 8.53M 5s
   100K ..........  ..........  ..........  ..........  ..........  0% 14.1M 4s
   150K ..........  ..........  ..........  ..........  ..........  0% 14.2M 3s
   200K ..........  ..........  ..........  ..........  ..........  0% 19.5M 3s
   250K ..........  ..........  ..........  ..........  ..........  1% 19.7M 3s
   300K ..........  ..........  ..........  ..........  ..........  1% 34.1M 2s
   350K ..........  ..........  ..........  ..........  ..........  1% 22.6M 2s
   400K ..........  ..........  ..........  ..........  ..........  1% 28.5M 2s
   450K ..........  ..........  ..........  ..........  ..........  1% 45.2M 2s
   500K ..........  ..........  ..........  ..........  ..........  2% 36.2M 2s
   550K ..........  ..........  ..........  ..........  ..........  2% 54.0M 2s
   600K ..........  ..........  ..........  ..........  ..........  2% 42.9M 2s
   650K ..........  ..........  ..........  ..........  ..........  2% 66.1M 1s
   700K ..........  ..........  ..........  ..........  ..........  2% 60.5M 1s
   750K ..........  ..........  ..........  ..........  ..........  3% 42.9M 1s
   800K ..........  ..........  ..........  ..........  ..........  3% 87.8M 1s
   850K ..........  ..........  ..........  ..........  ..........  3% 60.1M 1s
   900K ..........  ..........  ..........  ..........  ..........  3% 66.3M 1s
   950K ..........  ..........  ..........  ..........  ..........  3%  129M 1s
  1000K ..........  ..........  ..........  ..........  ..........  4% 61.6M 1s
  1050K ..........  ..........  ..........  ..........  ..........  4%  115M 1s
  1100K ..........  ..........  ..........  ..........  ..........  4% 62.7M 1s
  1150K ..........  ..........  ..........  ..........  ..........  4% 87.8M 1s
  1200K ..........  ..........  ..........  ..........  ..........  4%  201M 1s
  1250K ..........  ..........  ..........  ..........  ..........  5% 68.8M 1s
  1300K ..........  ..........  ..........  ..........  ..........  5%  108M 1s
  1350K ..........  ..........  ..........  ..........  ..........  5% 90.7M 1s
  1400K ..........  ..........  ..........  ..........  ..........  5%  154M 1s
  1450K ..........  ..........  ..........  ..........  ..........  5%  128M 1s
  1500K ..........  ..........  ..........  ..........  ..........  5% 86.6M 1s
  1550K ..........  ..........  ..........  ..........  ..........  6% 94.2M 1s
  1600K ..........  ..........  ..........  ..........  ..........  6%  101M 1s
  1650K ..........  ..........  ..........  ..........  ..........  6%  114M 1s
  1700K ..........  ..........  ..........  ..........  ..........  6%  182M 1s
  1750K ..........  ..........  ..........  ..........  ..........  6%  158M 1s
  1800K ..........  ..........  ..........  ..........  ..........  7%  118M 1s
  1850K ..........  ..........  ..........  ..........  ..........  7%  114M 1s
  1900K ..........  ..........  ..........  ..........  ..........  7%  120M 1s
  1950K ..........  ..........  ..........  ..........  ..........  7%  115M 1s
  2000K ..........  ..........  ..........  ..........  ..........  7%  137M 1s
  2050K ..........  ..........  ..........  ..........  ..........  8%  120M 1s
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2100K .......... .......... .......... .......... ..........  8%  110M 1s
2150K .......... .......... .......... .......... ..........  8%  126M 1s
2200K .......... .......... .......... .......... ..........  8%  135M 1s
2250K .......... .......... .......... .......... ..........  8%  120M 1s
2300K .......... .......... .......... .......... ..........  9%  123M 1s
2350K .......... .......... .......... .......... ..........  9%  130M 1s
2400K .......... .......... .......... .......... ..........  9%  193M 1s
2450K .......... .......... .......... .......... ..........  9%  193M 1s
2500K .......... .......... .......... .......... ..........  9%  141M 1s
2550K .......... .......... .......... .......... .......... 10%  157M 1s
2600K .......... .......... .......... .......... .......... 10%  188M 1s
2650K .......... .......... .......... .......... .......... 10%  135M 1s
2700K .......... .......... .......... .......... .......... 10%  189M 1s
2750K .......... .......... .......... .......... .......... 10%  165M 0s
2800K .......... .......... .......... .......... .......... 10%  300M 0s
2850K .......... .......... .......... .......... .......... 11%  179M 0s
2900K .......... .......... .......... .......... .......... 11%  225M 0s
2950K .......... .......... .......... .......... .......... 11%  250M 0s
3000K .......... .......... .......... .......... .......... 11%  218M 0s
3050K .......... .......... .......... .......... .......... 11%  301M 0s
3100K .......... .......... .......... .......... .......... 12%  203M 0s
3150K .......... .......... .......... .......... .......... 12%  212M 0s
3200K .......... .......... .......... .......... .......... 12%  201M 0s
3250K .......... .......... .......... .......... .......... 12%  206M 0s
3300K .......... .......... .......... .......... .......... 12%  177M 0s
3350K .......... .......... .......... .......... .......... 13%  179M 0s
3400K .......... .......... .......... .......... .......... 13%  203M 0s
3450K .......... .......... .......... .......... .......... 13%  183M 0s
3500K .......... .......... .......... .......... .......... 13%  175M 0s
3550K .......... .......... .......... .......... .......... 13%  156M 0s
3600K .......... .......... .......... .......... .......... 14%  205M 0s
3650K .......... .......... .......... .......... .......... 14% 15.5M 0s
3700K .......... .......... .......... .......... .......... 14% 37.0M 0s
3750K .......... .......... .......... .......... .......... 14% 32.9M 0s
3800K .......... .......... .......... .......... .......... 14% 32.5M 0s
3850K .......... .......... .......... .......... .......... 15%  105M 0s
3900K .......... .......... .......... .......... .......... 15%  108M 0s
3950K .......... .......... .......... .......... .......... 15%  140M 0s
4000K .......... .......... .......... .......... .......... 15%  145M 0s
4050K .......... .......... .......... .......... .......... 15%  107M 0s
4100K .......... .......... .......... .......... .......... 15%  121M 0s
4150K .......... .......... .......... .......... .......... 16%  105M 0s
4200K .......... .......... .......... .......... .......... 16%  124M 0s
4250K .......... .......... .......... .......... .......... 16%  137M 0s
4300K .......... .......... .......... .......... .......... 16%  147M 0s
4350K .......... .......... .......... .......... .......... 16%  123M 0s
4400K .......... .......... .......... .......... .......... 17%  159M 0s
4450K .......... .......... .......... .......... .......... 17%  101M 0s
4500K .......... .......... .......... .......... .......... 17% 93.2M 0s
4550K .......... .......... .......... .......... .......... 17% 92.9M 0s
4600K .......... .......... .......... .......... .......... 17%  155M 0s
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4650K .......... .......... .......... .......... .......... 18%  159M 0s
4700K .......... .......... .......... .......... .......... 18%  115M 0s
4750K .......... .......... .......... .......... .......... 18%  143M 0s
4800K .......... .......... .......... .......... .......... 18%  146M 0s
4850K .......... .......... .......... .......... .......... 18%  129M 0s
4900K .......... .......... .......... .......... .......... 19%  127M 0s
4950K .......... .......... .......... .......... .......... 19%  162M 0s
5000K .......... .......... .......... .......... .......... 19%  158M 0s
5050K .......... .......... .......... .......... .......... 19%  127M 0s
5100K .......... .......... .......... .......... .......... 19%  130M 0s
5150K .......... .......... .......... .......... .......... 20%  123M 0s
5200K .......... .......... .......... .......... .......... 20%  135M 0s
5250K .......... .......... .......... .......... .......... 20%  157M 0s
5300K .......... .......... .......... .......... .......... 20%  136M 0s
5350K .......... .......... .......... .......... .......... 20%  117M 0s
5400K .......... .......... .......... .......... .......... 20%  148M 0s
5450K .......... .......... .......... .......... .......... 21%  136M 0s
5500K .......... .......... .......... .......... .......... 21%  125M 0s
5550K .......... .......... .......... .......... .......... 21%  152M 0s
5600K .......... .......... .......... .......... .......... 21%  156M 0s
5650K .......... .......... .......... .......... .......... 21%  160M 0s
5700K .......... .......... .......... .......... .......... 22%  121M 0s
5750K .......... .......... .......... .......... .......... 22%  169M 0s
5800K .......... .......... .......... .......... .......... 22%  160M 0s
5850K .......... .......... .......... .......... .......... 22%  147M 0s
5900K .......... .......... .......... .......... .......... 22%  133M 0s
5950K .......... .......... .......... .......... .......... 23%  124M 0s
6000K .......... .......... .......... .......... .......... 23%  131M 0s
6050K .......... .......... .......... .......... .......... 23%  159M 0s
6100K .......... .......... .......... .......... .......... 23%  137M 0s
6150K .......... .......... .......... .......... .......... 23%  162M 0s
6200K .......... .......... .......... .......... .......... 24%  148M 0s
6250K .......... .......... .......... .......... .......... 24%  163M 0s
6300K .......... .......... .......... .......... .......... 24%  156M 0s
6350K .......... .......... .......... .......... .......... 24%  163M 0s
6400K .......... .......... .......... .......... .......... 24%  169M 0s
6450K .......... .......... .......... .......... .......... 25%  158M 0s
6500K .......... .......... .......... .......... .......... 25% 92.3M 0s
6550K .......... .......... .......... .......... .......... 25%  135M 0s
6600K .......... .......... .......... .......... .......... 25%  159M 0s
6650K .......... .......... .......... .......... .......... 25%  182M 0s
6700K .......... .......... .......... .......... .......... 25% 98.3M 0s
6750K .......... .......... .......... .......... .......... 26%  134M 0s
6800K .......... .......... .......... .......... .......... 26%  158M 0s
6850K .......... .......... .......... .......... .......... 26%  130M 0s
6900K .......... .......... .......... .......... .......... 26%  124M 0s
6950K .......... .......... .......... .......... .......... 26% 20.2M 0s
7000K .......... .......... .......... .......... .......... 27% 31.6M 0s
7050K .......... .......... .......... .......... .......... 27% 19.9M 0s
7100K .......... .......... .......... .......... .......... 27% 41.4M 0s
7150K .......... .......... .......... .......... .......... 27%  130M 0s
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7200K .......... .......... .......... .......... .......... 27%  144M 0s
7250K .......... .......... .......... .......... .......... 28% 78.8M 0s
7300K .......... .......... .......... .......... .......... 28% 30.6M 0s
7350K .......... .......... .......... .......... .......... 28%  153M 0s
7400K .......... .......... .......... .......... .......... 28%  158M 0s
7450K .......... .......... .......... .......... .......... 28%  146M 0s
7500K .......... .......... .......... .......... .......... 29%  143M 0s
7550K .......... .......... .......... .......... .......... 29%  150M 0s
7600K .......... .......... .......... .......... .......... 29%  145M 0s
7650K .......... .......... .......... .......... .......... 29%  149M 0s
7700K .......... .......... .......... .......... .......... 29%  137M 0s
7750K .......... .......... .......... .......... .......... 30%  119M 0s
7800K .......... .......... .......... .......... .......... 30%  161M 0s
7850K .......... .......... .......... .......... .......... 30%  155M 0s
7900K .......... .......... .......... .......... .......... 30%  144M 0s
7950K .......... .......... .......... .......... .......... 30%  160M 0s
8000K .......... .......... .......... .......... .......... 30%  154M 0s
8050K .......... .......... .......... .......... .......... 31%  140M 0s
8100K .......... .......... .......... .......... .......... 31%  119M 0s
8150K .......... .......... .......... .......... .......... 31%  162M 0s
8200K .......... .......... .......... .......... .......... 31%  157M 0s
8250K .......... .......... .......... .......... .......... 31%  157M 0s
8300K .......... .......... .......... .......... .......... 32%  135M 0s
8350K .......... .......... .......... .......... .......... 32%  192M 0s
8400K .......... .......... .......... .......... .......... 32%  278M 0s
8450K .......... .......... .......... .......... .......... 32%  296M 0s
8500K .......... .......... .......... .......... .......... 32%  236M 0s
8550K .......... .......... .......... .......... .......... 33%  267M 0s
8600K .......... .......... .......... .......... .......... 33%  313M 0s
8650K .......... .......... .......... .......... .......... 33%  281M 0s
8700K .......... .......... .......... .......... .......... 33%  127M 0s
8750K .......... .......... .......... .......... .......... 33%  215M 0s
8800K .......... .......... .......... .......... .......... 34%  194M 0s
8850K .......... .......... .......... .......... .......... 34%  314M 0s
8900K .......... .......... .......... .......... .......... 34%  219M 0s
8950K .......... .......... .......... .......... .......... 34%  286M 0s
9000K .......... .......... .......... .......... .......... 34%  312M 0s
9050K .......... .......... .......... .......... .......... 35%  281M 0s
9100K .......... .......... .......... .......... .......... 35%  283M 0s
9150K .......... .......... .......... .......... .......... 35%  317M 0s
9200K .......... .......... .......... .......... .......... 35%  281M 0s
9250K .......... .......... .......... .......... .......... 35%  288M 0s
9300K .......... .......... .......... .......... .......... 35%  237M 0s
9350K .......... .......... .......... .......... .......... 36%  134M 0s
9400K .......... .......... .......... .......... .......... 36%  302M 0s
9450K .......... .......... .......... .......... .......... 36%  175M 0s
9500K .......... .......... .......... .......... .......... 36%  240M 0s
9550K .......... .......... .......... .......... .......... 36%  286M 0s
9600K .......... .......... .......... .......... .......... 37%  274M 0s
9650K .......... .......... .......... .......... .......... 37%  298M 0s
9700K .......... .......... .......... .......... .......... 37% 10.3M 0s
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 9750K ..... ..... ..... ..... ..... 37% 86.0M 0s
 9800K ..... ..... ..... ..... ..... 37%  121M 0s
 9850K ..... ..... ..... ..... ..... 38% 90.1M 0s
 9900K ..... ..... ..... ..... ..... 38% 81.5M 0s
 9950K ..... ..... ..... ..... ..... 38%  152M 0s
10000K ..... ..... ..... ..... ..... 38%  154M 0s
10050K ..... ..... ..... ..... ..... 38%  174M 0s
10100K ..... ..... ..... ..... ..... 39%  122M 0s
10150K ..... ..... ..... ..... ..... 39%  156M 0s
10200K ..... ..... ..... ..... ..... 39%  284M 0s
10250K ..... ..... ..... ..... ..... 39%  278M 0s
10300K ..... ..... ..... ..... ..... 39%  277M 0s
10350K ..... ..... ..... ..... ..... 40%  306M 0s
10400K ..... ..... ..... ..... ..... 40%  276M 0s
10450K ..... ..... ..... ..... ..... 40% 11.2M 0s
10500K ..... ..... ..... ..... ..... 40% 65.1M 0s
10550K ..... ..... ..... ..... ..... 40% 85.1M 0s
10600K ..... ..... ..... ..... ..... 41% 84.2M 0s
10650K ..... ..... ..... ..... ..... 41%  118M 0s
10700K ..... ..... ..... ..... ..... 41% 82.6M 0s
10750K ..... ..... ..... ..... ..... 41% 91.2M 0s
10800K ..... ..... ..... ..... ..... 41% 85.0M 0s
10850K ..... ..... ..... ..... ..... 41% 94.6M 0s
10900K ..... ..... ..... ..... ..... 42% 83.9M 0s
10950K ..... ..... ..... ..... ..... 42% 88.6M 0s
11000K ..... ..... ..... ..... ..... 42%  115M 0s
11050K ..... ..... ..... ..... ..... 42%  119M 0s
11100K ..... ..... ..... ..... ..... 42%  274M 0s
11150K ..... ..... ..... ..... ..... 43%  299M 0s
11200K ..... ..... ..... ..... ..... 43%  269M 0s
11250K ..... ..... ..... ..... ..... 43%  268M 0s
11300K ..... ..... ..... ..... ..... 43%  244M 0s
11350K ..... ..... ..... ..... ..... 43%  272M 0s
11400K ..... ..... ..... ..... ..... 44%  297M 0s
11450K ..... ..... ..... ..... ..... 44%  307M 0s
11500K ..... ..... ..... ..... ..... 44%  250M 0s
11550K ..... ..... ..... ..... ..... 44%  117M 0s
11600K ..... ..... ..... ..... ..... 44%  145M 0s
11650K ..... ..... ..... ..... ..... 45% 53.5M 0s
11700K ..... ..... ..... ..... ..... 45% 84.7M 0s
11750K ..... ..... ..... ..... ..... 45%  160M 0s
11800K ..... ..... ..... ..... ..... 45%  156M 0s
11850K ..... ..... ..... ..... ..... 45%  161M 0s
11900K ..... ..... ..... ..... ..... 46%  101M 0s
11950K ..... ..... ..... ..... ..... 46%  160M 0s
12000K ..... ..... ..... ..... ..... 46%  154M 0s
12050K ..... ..... ..... ..... ..... 46%  161M 0s
12100K ..... ..... ..... ..... ..... 46% 53.3M 0s
12150K ..... ..... ..... ..... ..... 46% 95.8M 0s
12200K ..... ..... ..... ..... ..... 47%  166M 0s
12250K ..... ..... ..... ..... ..... 47%  196M 0s
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12300K .......... .......... .......... .......... .......... 47%  153M 0s
12350K .......... .......... .......... .......... .......... 47%  266M 0s
12400K .......... .......... .......... .......... .......... 47%  297M 0s
12450K .......... .......... .......... .......... .......... 48%  272M 0s
12500K .......... .......... .......... .......... .......... 48%  280M 0s
12550K .......... .......... .......... .......... .......... 48%  248M 0s
12600K .......... .......... .......... .......... .......... 48%  275M 0s
12650K .......... .......... .......... .......... .......... 48%  237M 0s
12700K .......... .......... .......... .......... .......... 49%  293M 0s
12750K .......... .......... .......... .......... .......... 49%  224M 0s
12800K .......... .......... .......... .......... .......... 49%  306M 0s
12850K .......... .......... .......... .......... .......... 49% 48.9M 0s
12900K .......... .......... .......... .......... .......... 49%  180M 0s
12950K .......... .......... .......... .......... .......... 50%  150M 0s
13000K .......... .......... .......... .......... .......... 50%  182M 0s
13050K .......... .......... .......... .......... .......... 50%  182M 0s
13100K .......... .......... .......... .......... .......... 50%  178M 0s
13150K .......... .......... .......... .......... .......... 50%  162M 0s
13200K .......... .......... .......... .......... .......... 51%  175M 0s
13250K .......... .......... .......... .......... .......... 51%  302M 0s
13300K .......... .......... .......... .......... .......... 51%  120M 0s
13350K .......... .......... .......... .......... .......... 51%  145M 0s
13400K .......... .......... .......... .......... .......... 51% 57.6M 0s
13450K .......... .......... .......... .......... .......... 51% 86.7M 0s
13500K .......... .......... .......... .......... .......... 52%  156M 0s
13550K .......... .......... .......... .......... .......... 52%  141M 0s
13600K .......... .......... .......... .......... .......... 52%  115M 0s
13650K .......... .......... .......... .......... .......... 52%  111M 0s
13700K .......... .......... .......... .......... .......... 52%  137M 0s
13750K .......... .......... .......... .......... .......... 53%  134M 0s
13800K .......... .......... .......... .......... .......... 53%  154M 0s
13850K .......... .......... .......... .......... .......... 53%  158M 0s
13900K .......... .......... .......... .......... .......... 53%  163M 0s
13950K .......... .......... .......... .......... .......... 53% 89.3M 0s
14000K .......... .......... .......... .......... .......... 54% 94.9M 0s
14050K .......... .......... .......... .......... .......... 54%  127M 0s
14100K .......... .......... .......... .......... .......... 54% 99.2M 0s
14150K .......... .......... .......... .......... .......... 54%  150M 0s
14200K .......... .......... .......... .......... .......... 54%  179M 0s
14250K .......... .......... .......... .......... .......... 55%  180M 0s
14300K .......... .......... .......... .......... .......... 55%  165M 0s
14350K .......... .......... .......... .......... .......... 55%  143M 0s
14400K .......... .......... .......... .......... .......... 55% 57.3M 0s
14450K .......... .......... .......... .......... .......... 55% 94.3M 0s
14500K .......... .......... .......... .......... .......... 56% 84.5M 0s
14550K .......... .......... .......... .......... .......... 56%  225M 0s
14600K .......... .......... .......... .......... .......... 56%  307M 0s
14650K .......... .......... .......... .......... .......... 56%  305M 0s
14700K .......... .......... .......... .......... .......... 56%  308M 0s
14750K .......... .......... .......... .......... .......... 56%  120M 0s
14800K .......... .......... .......... .......... .......... 57%  250M 0s
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14850K .......... .......... .......... .......... .......... 57%  253M 0s
14900K .......... .......... .......... .......... .......... 57%  315M 0s
14950K .......... .......... .......... .......... .......... 57%  251M 0s
15000K .......... .......... .......... .......... .......... 57%  301M 0s
15050K .......... .......... .......... .......... .......... 58%  211M 0s
15100K .......... .......... .......... .......... .......... 58% 71.1M 0s
15150K .......... .......... .......... .......... .......... 58%  147M 0s
15200K .......... .......... .......... .......... .......... 58% 89.7M 0s
15250K .......... .......... .......... .......... .......... 58% 87.8M 0s
15300K .......... .......... .......... .......... .......... 59%  161M 0s
15350K .......... .......... .......... .......... .......... 59%  107M 0s
15400K .......... .......... .......... .......... .......... 59%  184M 0s
15450K .......... .......... .......... .......... .......... 59%  154M 0s
15500K .......... .......... .......... .......... .......... 59%  174M 0s
15550K .......... .......... .......... .......... .......... 60% 87.7M 0s
15600K .......... .......... .......... .......... .......... 60%  105M 0s
15650K .......... .......... .......... .......... .......... 60%  156M 0s
15700K .......... .......... .......... .......... .......... 60%  160M 0s
15750K .......... .......... .......... .......... .......... 60%  136M 0s
15800K .......... .......... .......... .......... .......... 61%  268M 0s
15850K .......... .......... .......... .......... .......... 61%  300M 0s
15900K .......... .......... .......... .......... .......... 61%  303M 0s
15950K .......... .......... .......... .......... .......... 61%  271M 0s
16000K .......... .......... .......... .......... .......... 61%  298M 0s
16050K .......... .......... .......... .......... .......... 61%  266M 0s
16100K .......... .......... .......... .......... .......... 62%  277M 0s
16150K .......... .......... .......... .......... .......... 62%  111M 0s
16200K .......... .......... .......... .......... .......... 62%  297M 0s
16250K .......... .......... .......... .......... .......... 62%  135M 0s
16300K .......... .......... .......... .......... .......... 62%  133M 0s
16350K .......... .......... .......... .......... .......... 63%  272M 0s
16400K .......... .......... .......... .......... .......... 63%  315M 0s
16450K .......... .......... .......... .......... .......... 63%  299M 0s
16500K .......... .......... .......... .......... .......... 63%  271M 0s
16550K .......... .......... .......... .......... .......... 63%  225M 0s
16600K .......... .......... .......... .......... .......... 64%  274M 0s
16650K .......... .......... .......... .......... .......... 64%  313M 0s
16700K .......... .......... .......... .......... .......... 64%  295M 0s
16750K .......... .......... .......... .......... .......... 64%  112M 0s
16800K .......... .......... .......... .......... .......... 64%  153M 0s
16850K .......... .......... .......... .......... .......... 65%  155M 0s
16900K .......... .......... .......... .......... .......... 65%  192M 0s
16950K .......... .......... .......... .......... .......... 65%  146M 0s
17000K .......... .......... .......... .......... .......... 65%  115M 0s
17050K .......... .......... .......... .......... .......... 65% 76.3M 0s
17100K .......... .......... .......... .......... .......... 66% 48.4M 0s
17150K .......... .......... .......... .......... .......... 66%  158M 0s
17200K .......... .......... .......... .......... .......... 66%  190M 0s
17250K .......... .......... .......... .......... .......... 66%  187M 0s
17300K .......... .......... .......... .......... .......... 66%  212M 0s
17350K .......... .......... .......... .......... .......... 66%  174M 0s
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17400K .......... .......... .......... .......... .......... 67%  155M 0s
17450K .......... .......... .......... .......... .......... 67%  208M 0s
17500K .......... .......... .......... .......... .......... 67%  217M 0s
17550K .......... .......... .......... .......... .......... 67% 92.6M 0s
17600K .......... .......... .......... .......... .......... 67% 94.4M 0s
17650K .......... .......... .......... .......... .......... 68%  141M 0s
17700K .......... .......... .......... .......... .......... 68% 99.3M 0s
17750K .......... .......... .......... .......... .......... 68% 52.8M 0s
17800K .......... .......... .......... .......... .......... 68%  127M 0s
17850K .......... .......... .......... .......... .......... 68% 88.7M 0s
17900K .......... .......... .......... .......... .......... 69% 47.5M 0s
17950K .......... .......... .......... .......... .......... 69% 52.2M 0s
18000K .......... .......... .......... .......... .......... 69% 82.8M 0s
18050K .......... .......... .......... .......... .......... 69% 85.9M 0s
18100K .......... .......... .......... .......... .......... 69%  152M 0s
18150K .......... .......... .......... .......... .......... 70%  134M 0s
18200K .......... .......... .......... .......... .......... 70%  272M 0s
18250K .......... .......... .......... .......... .......... 70%  314M 0s
18300K .......... .......... .......... .......... .......... 70%  304M 0s
18350K .......... .......... .......... .......... .......... 70%  256M 0s
18400K .......... .......... .......... .......... .......... 71%  245M 0s
18450K .......... .......... .......... .......... .......... 71% 71.1M 0s
18500K .......... .......... .......... .......... .......... 71% 79.6M 0s
18550K .......... .......... .......... .......... .......... 71% 79.3M 0s
18600K .......... .......... .......... .......... .......... 71% 89.2M 0s
18650K .......... .......... .......... .......... .......... 71% 90.0M 0s
18700K .......... .......... .......... .......... .......... 72%  119M 0s
18750K .......... .......... .......... .......... .......... 72% 82.9M 0s
18800K .......... .......... .......... .......... .......... 72%  130M 0s
18850K .......... .......... .......... .......... .......... 72%  276M 0s
18900K .......... .......... .......... .......... .......... 72%  314M 0s
18950K .......... .......... .......... .......... .......... 73%  217M 0s
19000K .......... .......... .......... .......... .......... 73%  298M 0s
19050K .......... .......... .......... .......... .......... 73%  302M 0s
19100K .......... .......... .......... .......... .......... 73%  274M 0s
19150K .......... .......... .......... .......... .......... 73%  250M 0s
19200K .......... .......... .......... .......... .......... 74%  302M 0s
19250K .......... .......... .......... .......... .......... 74%  231M 0s
19300K .......... .......... .......... .......... .......... 74%  282M 0s
19350K .......... .......... .......... .......... .......... 74%  252M 0s
19400K .......... .......... .......... .......... .......... 74%  269M 0s
19450K .......... .......... .......... .......... .......... 75%  274M 0s
19500K .......... .......... .......... .......... .......... 75%  305M 0s
19550K .......... .......... .......... .......... .......... 75%  251M 0s
19600K .......... .......... .......... .......... .......... 75%  290M 0s
19650K .......... .......... .......... .......... .......... 75%  298M 0s
19700K .......... .......... .......... .......... .......... 76%  314M 0s
19750K .......... .......... .......... .......... .......... 76%  222M 0s
19800K .......... .......... .......... .......... .......... 76%  228M 0s
19850K .......... .......... .......... .......... .......... 76% 54.0M 0s
19900K .......... .......... .......... .......... .......... 76% 67.7M 0s
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19950K .......... .......... .......... .......... .......... 76%  144M 0s
20000K .......... .......... .......... .......... .......... 77%  173M 0s
20050K .......... .......... .......... .......... .......... 77%  180M 0s
20100K .......... .......... .......... .......... .......... 77%  180M 0s
20150K .......... .......... .......... .......... .......... 77%  117M 0s
20200K .......... .......... .......... .......... .......... 77%  158M 0s
20250K .......... .......... .......... .......... .......... 78%  207M 0s
20300K .......... .......... .......... .......... .......... 78%  305M 0s
20350K .......... .......... .......... .......... .......... 78%  186M 0s
20400K .......... .......... .......... .......... .......... 78%  124M 0s
20450K .......... .......... .......... .......... .......... 78%  160M 0s
20500K .......... .......... .......... .......... .......... 79%  204M 0s
20550K .......... .......... .......... .......... .......... 79%  158M 0s
20600K .......... .......... .......... .......... .......... 79%  206M 0s
20650K .......... .......... .......... .......... .......... 79%  190M 0s
20700K .......... .......... .......... .......... .......... 79%  208M 0s
20750K .......... .......... .......... .......... .......... 80% 52.4M 0s
20800K .......... .......... .......... .......... .......... 80% 97.9M 0s
20850K .......... .......... .......... .......... .......... 80% 90.7M 0s
20900K .......... .......... .......... .......... .......... 80%  122M 0s
20950K .......... .......... .......... .......... .......... 80% 81.2M 0s
21000K .......... .......... .......... .......... .......... 81%  303M 0s
21050K .......... .......... .......... .......... .......... 81%  317M 0s
21100K .......... .......... .......... .......... .......... 81%  183M 0s
21150K .......... .......... .......... .......... .......... 81%  165M 0s
21200K .......... .......... .......... .......... .......... 81%  193M 0s
21250K .......... .......... .......... .......... .......... 82%  181M 0s
21300K .......... .......... .......... .......... .......... 82%  163M 0s
21350K .......... .......... .......... .......... .......... 82%  173M 0s
21400K .......... .......... .......... .......... .......... 82%  192M 0s
21450K .......... .......... .......... .......... .......... 82%  180M 0s
21500K .......... .......... .......... .......... .......... 82%  166M 0s
21550K .......... .......... .......... .......... .......... 83% 55.0M 0s
21600K .......... .......... .......... .......... .......... 83%  138M 0s
21650K .......... .......... .......... .......... .......... 83%  146M 0s
21700K .......... .......... .......... .......... .......... 83%  309M 0s
21750K .......... .......... .......... .......... .......... 83%  256M 0s
21800K .......... .......... .......... .......... .......... 84%  313M 0s
21850K .......... .......... .......... .......... .......... 84%  275M 0s
21900K .......... .......... .......... .......... .......... 84%  282M 0s
21950K .......... .......... .......... .......... .......... 84%  285M 0s
22000K .......... .......... .......... .......... .......... 84%  309M 0s
22050K .......... .......... .......... .......... .......... 85%  319M 0s
22100K .......... .......... .......... .......... .......... 85%  304M 0s
22150K .......... .......... .......... .......... .......... 85%  116M 0s
22200K .......... .......... .......... .......... .......... 85%  169M 0s
22250K .......... .......... .......... .......... .......... 85%  163M 0s
22300K .......... .......... .......... .......... .......... 86% 46.1M 0s
22350K .......... .......... .......... .......... .......... 86%  154M 0s
22400K .......... .......... .......... .......... .......... 86%  170M 0s
22450K .......... .......... .......... .......... .......... 86%  310M 0s
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22500K .......... .......... .......... .......... .......... 86%  309M 0s
22550K .......... .......... .......... .......... .......... 87%  258M 0s
22600K .......... .......... .......... .......... .......... 87%  137M 0s
22650K .......... .......... .......... .......... .......... 87%  171M 0s
22700K .......... .......... .......... .......... .......... 87%  200M 0s
22750K .......... .......... .......... .......... .......... 87%  226M 0s
22800K .......... .......... .......... .......... .......... 87%  138M 0s
22850K .......... .......... .......... .......... .......... 88%  174M 0s
22900K .......... .......... .......... .......... .......... 88% 66.8M 0s
22950K .......... .......... .......... .......... .......... 88% 76.6M 0s
23000K .......... .......... .......... .......... .......... 88%  104M 0s
23050K .......... .......... .......... .......... .......... 88% 99.7M 0s
23100K .......... .......... .......... .......... .......... 89%  294M 0s
23150K .......... .......... .......... .......... .......... 89%  283M 0s
23200K .......... .......... .......... .......... .......... 89%  315M 0s
23250K .......... .......... .......... .......... .......... 89%  308M 0s
23300K .......... .......... .......... .......... .......... 89%  308M 0s
23350K .......... .......... .......... .......... .......... 90%  244M 0s
23400K .......... .......... .......... .......... .......... 90%  267M 0s
23450K .......... .......... .......... .......... .......... 90%  309M 0s
23500K .......... .......... .......... .......... .......... 90%  153M 0s
23550K .......... .......... .......... .......... .......... 90% 66.3M 0s
23600K .......... .......... .......... .......... .......... 91%  182M 0s
23650K .......... .......... .......... .......... .......... 91%  182M 0s
23700K .......... .......... .......... .......... .......... 91%  172M 0s
23750K .......... .......... .......... .......... .......... 91%  148M 0s
23800K .......... .......... .......... .......... .......... 91%  118M 0s
23850K .......... .......... .......... .......... .......... 92%  267M 0s
23900K .......... .......... .......... .......... .......... 92%  315M 0s
23950K .......... .......... .......... .......... .......... 92%  237M 0s
24000K .......... .......... .......... .......... .......... 92%  117M 0s
24050K .......... .......... .......... .......... .......... 92%  178M 0s
24100K .......... .......... .......... .......... .......... 92%  175M 0s
24150K .......... .......... .......... .......... .......... 93% 50.1M 0s
24200K .......... .......... .......... .......... .......... 93% 91.4M 0s
24250K .......... .......... .......... .......... .......... 93%  127M 0s
24300K .......... .......... .......... .......... .......... 93% 81.4M 0s
24350K .......... .......... .......... .......... .......... 93% 69.2M 0s
24400K .......... .......... .......... .......... .......... 94%  154M 0s
24450K .......... .......... .......... .......... .......... 94%  273M 0s
24500K .......... .......... .......... .......... .......... 94%  298M 0s
24550K .......... .......... .......... .......... .......... 94%  251M 0s
24600K .......... .......... .......... .......... .......... 94%  307M 0s
24650K .......... .......... .......... .......... .......... 95% 75.8M 0s
24700K .......... .......... .......... .......... .......... 95%  298M 0s
24750K .......... .......... .......... .......... .......... 95%  124M 0s
24800K .......... .......... .......... .......... .......... 95%  302M 0s
24850K .......... .......... .......... .......... .......... 95%  170M 0s
24900K .......... .......... .......... .......... .......... 96%  306M 0s
24950K .......... .......... .......... .......... .......... 96%  253M 0s
25000K .......... .......... .......... .......... .......... 96%  304M 0s
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 25050K .......... .......... .......... .......... .......... 96%  309M 0s
 25100K .......... .......... .......... .......... .......... 96%  306M 0s
 25150K .......... .......... .......... .......... .......... 97%  274M 0s
 25200K .......... .......... .......... .......... .......... 97%  251M 0s
 25250K .......... .......... .......... .......... .......... 97%  303M 0s
 25300K .......... .......... .......... .......... .......... 97%  309M 0s
 25350K .......... .......... .......... .......... .......... 97%  254M 0s
 25400K .......... .......... .......... .......... .......... 97%  297M 0s
 25450K .......... .......... .......... .......... .......... 98%  308M 0s
 25500K .......... .......... .......... .......... .......... 98%  272M 0s
 25550K .......... .......... .......... .......... .......... 98%  203M 0s
 25600K .......... .......... .......... .......... .......... 98% 53.2M 0s
 25650K .......... .......... .......... .......... .......... 98%  158M 0s
 25700K .......... .......... .......... .......... .......... 99%  157M 0s
 25750K .......... .......... .......... .......... .......... 99%  135M 0s
 25800K .......... .......... .......... .......... .......... 99%  166M 0s
 25850K .......... .......... .......... .......... .......... 99%  165M 0s
 25900K .......... .......... .......... .......... .......... 99%  158M 0s
 25950K .......... .......... ....                            100%  148M=0.2s

2020-05-31 14:09:51 (108 MB/s) - ‘title.episode.tsv.gz’ saved [26597530/26597530]

/bin/bash: line 1: fg: no job control
```

In [14]:
```
title_episode = spark.read.option("sep", "\t").csv('file:/databricks/driver/title.episode.tsv', header=True, inferSchema = True)
title_episode.cache()
title_episode.show(3)
```

```
+---------+------------+------------+-------------+
   tconst|parentTconst|seasonNumber|episodeNumber|
+---------+------------+------------+-------------+
tt0041951|   tt0041038|           1|            9|
tt0042816|   tt0989125|           1|           17|
tt0042889|   tt0989125|          \N|           \N|
+---------+------------+------------+-------------+
only showing top 3 rows
```

In [15]:
```
%sh wget https://datasets.imdbws.com/title.principals.tsv.gz
%sh
gunzip title.principals.tsv.gz
```

```
--2020-05-31 14:10:02--  https://datasets.imdbws.com/title.principals.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.26, 13.224.13.32,
13.224.13.37, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.26|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 323587283 (309M) [binary/octet-stream]
Saving to: ‘title.principals.tsv.gz’

     0K ..........  ..........  ..........  ..........  ..........  0% 3.74M 83s
    50K ..........  ..........  ..........  ..........  ..........  0% 7.82M 61s
   100K ..........  ..........  ..........  ..........  ..........  0% 13.3M 48s
   150K ..........  ..........  ..........  ..........  ..........  0% 12.2M 43s
   200K ..........  ..........  ..........  ..........  ..........  0% 17.5M 38s
   250K ..........  ..........  ..........  ..........  ..........  0% 27.8M 33s
   300K ..........  ..........  ..........  ..........  ..........  0% 21.2M 30s
   350K ..........  ..........  ..........  ..........  ..........  0% 25.0M 28s
   400K ..........  ..........  ..........  ..........  ..........  0% 39.9M 26s
   450K ..........  ..........  ..........  ..........  ..........  0% 27.6M 24s
   500K ..........  ..........  ..........  ..........  ..........  0% 45.5M 23s
   550K ..........  ..........  ..........  ..........  ..........  0% 37.0M 22s
   600K ..........  ..........  ..........  ..........  ..........  0% 61.1M 20s
   650K ..........  ..........  ..........  ..........  ..........  0% 54.5M 19s
   700K ..........  ..........  ..........  ..........  ..........  0% 38.9M 19s
   750K ..........  ..........  ..........  ..........  ..........  0% 76.3M 18s
   800K ..........  ..........  ..........  ..........  ..........  0% 53.8M 17s
   850K ..........  ..........  ..........  ..........  ..........  0% 87.2M 16s
   900K ..........  ..........  ..........  ..........  ..........  0% 59.0M 16s
   950K ..........  ..........  ..........  ..........  ..........  0% 57.7M 15s
  1000K ..........  ..........  ..........  ..........  ..........  0%  123M 14s
  1050K ..........  ..........  ..........  ..........  ..........  0% 70.5M 14s
  1100K ..........  ..........  ..........  ..........  ..........  0% 98.4M 14s
  1150K ..........  ..........  ..........  ..........  ..........  0% 62.9M 13s
  1200K ..........  ..........  ..........  ..........  ..........  0% 95.5M 13s
  1250K ..........  ..........  ..........  ..........  ..........  0%  128M 12s
  1300K ..........  ..........  ..........  ..........  ..........  0%  114M 12s
  1350K ..........  ..........  ..........  ..........  ..........  0% 69.1M 12s
  1400K ..........  ..........  ..........  ..........  ..........  0%  137M 11s
  1450K ..........  ..........  ..........  ..........  ..........  0%  255M 11s
  1500K ..........  ..........  ..........  ..........  ..........  0% 73.2M 11s
  1550K ..........  ..........  ..........  ..........  ..........  0%  117M 11s
  1600K ..........  ..........  ..........  ..........  ..........  0%  104M 10s
  1650K ..........  ..........  ..........  ..........  ..........  0%  134M 10s
  1700K ..........  ..........  ..........  ..........  ..........  0%  141M 10s
  1750K ..........  ..........  ..........  ..........  ..........  0%  137M 10s
  1800K ..........  ..........  ..........  ..........  ..........  0%  112M 9s
  1850K ..........  ..........  ..........  ..........  ..........  0%  149M 9s
  1900K ..........  ..........  ..........  ..........  ..........  0%  129M 9s
  1950K ..........  ..........  ..........  ..........  ..........  0%  238M 9s
  2000K ..........  ..........  ..........  ..........  ..........  0%  106M 9s
  2050K ..........  ..........  ..........  ..........  ..........  0%  159M 9s
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2100K .......... .......... .......... .......... ..........  0%  146M 8s
2150K .......... .......... .......... .......... ..........  0%  150M 8s
2200K .......... .......... .......... .......... ..........  0%  149M 8s
2250K .......... .......... .......... .......... ..........  0%  185M 8s
2300K .......... .......... .......... .......... ..........  0%  121M 8s
2350K .......... .......... .......... .......... ..........  0%  143M 8s
2400K .......... .......... .......... .......... ..........  0%  174M 8s
2450K .......... .......... .......... .......... ..........  0%  133M 8s
2500K .......... .......... .......... .......... ..........  0%  142M 7s
2550K .......... .......... .......... .......... ..........  0%  198M 7s
2600K .......... .......... .......... .......... ..........  0%  202M 7s
2650K .......... .......... .......... .......... ..........  0%  201M 7s
2700K .......... .......... .......... .......... ..........  0%  162M 7s
2750K .......... .......... .......... .......... ..........  0%  160M 7s
2800K .......... .......... .......... .......... ..........  0%  112M 7s
2850K .......... .......... .......... .......... ..........  0%  162M 7s
2900K .......... .......... .......... .......... ..........  0%  125M 7s
2950K .......... .......... .......... .......... ..........  0%  153M 7s
3000K .......... .......... .......... .......... ..........  0%  161M 7s
3050K .......... .......... .......... .......... ..........  0%  145M 6s
3100K .......... .......... .......... .......... ..........  0%  123M 6s
3150K .......... .......... .......... .......... ..........  1%  183M 6s
3200K .......... .......... .......... .......... ..........  1%  198M 6s
3250K .......... .......... .......... .......... ..........  1%  270M 6s
3300K .......... .......... .......... .......... ..........  1%  165M 6s
3350K .......... .......... .......... .......... ..........  1%  299M 6s
3400K .......... .......... .......... .......... ..........  1%  219M 6s
3450K .......... .......... .......... .......... ..........  1%  282M 6s
3500K .......... .......... .......... .......... ..........  1%  154M 6s
3550K .......... .......... .......... .......... ..........  1%  125M 6s
3600K .......... .......... .......... .......... ..........  1%  148M 6s
3650K .......... .......... .......... .......... ..........  1%  154M 6s
3700K .......... .......... .......... .......... ..........  1%  140M 6s
3750K .......... .......... .......... .......... ..........  1%  140M 6s
3800K .......... .......... .......... .......... ..........  1%  193M 6s
3850K .......... .......... .......... .......... ..........  1%  135M 5s
3900K .......... .......... .......... .......... ..........  1%  129M 5s
3950K .......... .......... .......... .......... ..........  1%  143M 5s
4000K .......... .......... .......... .......... ..........  1%  159M 5s
4050K .......... .......... .......... .......... ..........  1%  158M 5s
4100K .......... .......... .......... .......... ..........  1%  157M 5s
4150K .......... .......... .......... .......... ..........  1%  271M 5s
4200K .......... .......... .......... .......... ..........  1%  206M 5s
4250K .......... .......... .......... .......... ..........  1%  187M 5s
4300K .......... .......... .......... .......... ..........  1%  172M 5s
4350K .......... .......... .......... .......... ..........  1%  202M 5s
4400K .......... .......... .......... .......... ..........  1%  271M 5s
4450K .......... .......... .......... .......... ..........  1%  165M 5s
4500K .......... .......... .......... .......... ..........  1%  204M 5s
4550K .......... .......... .......... .......... ..........  1%  276M 5s
4600K .......... .......... .......... .......... ..........  1%  192M 5s
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4650K .......... .......... .......... .......... ..........  1%  296M 5s
4700K .......... .......... .......... .......... ..........  1% 84.4M 5s
4750K .......... .......... .......... .......... ..........  1%  150M 5s
4800K .......... .......... .......... .......... ..........  1%  149M 5s
4850K .......... .......... .......... .......... ..........  1%  158M 5s
4900K .......... .......... .......... .......... ..........  1%  139M 5s
4950K .......... .......... .......... .......... ..........  1%  155M 5s
5000K .......... .......... .......... .......... ..........  1%  154M 5s
5050K .......... .......... .......... .......... ..........  1%  136M 5s
5100K .......... .......... .......... .......... ..........  1%  125M 5s
5150K .......... .......... .......... .......... ..........  1%  157M 5s
5200K .......... .......... .......... .......... ..........  1%  221M 5s
5250K .......... .......... .......... .......... ..........  1%  264M 4s
5300K .......... .......... .......... .......... ..........  1% 78.8M 4s
5350K .......... .......... .......... .......... ..........  1%  153M 4s
5400K .......... .......... .......... .......... ..........  1%  155M 4s
5450K .......... .......... .......... .......... ..........  1%  159M 4s
5500K .......... .......... .......... .......... ..........  1%  130M 4s
5550K .......... .......... .......... .......... ..........  1%  156M 4s
5600K .......... .......... .......... .......... ..........  1%  184M 4s
5650K .......... .......... .......... .......... ..........  1%  127M 4s
5700K .......... .......... .......... .......... ..........  1%  132M 4s
5750K .......... .......... .......... .......... ..........  1%  186M 4s
5800K .......... .......... .......... .......... ..........  1%  134M 4s
5850K .......... .......... .......... .......... ..........  1%  156M 4s
5900K .......... .......... .......... .......... ..........  1%  123M 4s
5950K .......... .......... .......... .......... ..........  1%  142M 4s
6000K .......... .......... .......... .......... ..........  1%  151M 4s
6050K .......... .......... .......... .......... ..........  1%  158M 4s
6100K .......... .......... .......... .......... ..........  1%  137M 4s
6150K .......... .......... .......... .......... ..........  1%  157M 4s
6200K .......... .......... .......... .......... ..........  1%  158M 4s
6250K .......... .......... .......... .......... ..........  1%  139M 4s
6300K .......... .......... .......... .......... ..........  2%  123M 4s
6350K .......... .......... .......... .......... ..........  2%  156M 4s
6400K .......... .......... .......... .......... ..........  2%  158M 4s
6450K .......... .......... .......... .......... ..........  2%  155M 4s
6500K .......... .......... .......... .......... ..........  2%  181M 4s
6550K .......... .......... .......... .......... ..........  2%  258M 4s
6600K .......... .......... .......... .......... ..........  2%  230M 4s
6650K .......... .......... .......... .......... ..........  2%  279M 4s
6700K .......... .......... .......... .......... ..........  2%  229M 4s
6750K .......... .......... .......... .......... ..........  2%  195M 4s
6800K .......... .......... .......... .......... ..........  2%  263M 4s
6850K .......... .......... .......... .......... ..........  2%  272M 4s
6900K .......... .......... .......... .......... ..........  2%  183M 4s
6950K .......... .......... .......... .......... ..........  2%  216M 4s
7000K .......... .......... .......... .......... ..........  2%  261M 4s
7050K .......... .......... .......... .......... ..........  2%  215M 4s
7100K .......... .......... .......... .......... ..........  2%  123M 4s
7150K .......... .......... .......... .......... ..........  2%  107M 4s
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7200K .......... .......... .......... .......... ..........  2%  125M 4s
7250K .......... .......... .......... .......... ..........  2%  106M 4s
7300K .......... .......... .......... .......... ..........  2%  137M 4s
7350K .......... .......... .......... .......... ..........  2%  170M 4s
7400K .......... .......... .......... .......... ..........  2%  198M 4s
7450K .......... .......... .......... .......... ..........  2%  239M 4s
7500K .......... .......... .......... .......... ..........  2%  218M 4s
7550K .......... .......... .......... .......... ..........  2%  196M 4s
7600K .......... .......... .......... .......... ..........  2%  256M 4s
7650K .......... .......... .......... .......... ..........  2%  297M 4s
7700K .......... .......... .......... .......... ..........  2%  183M 4s
7750K .......... .......... .......... .......... ..........  2%  210M 4s
7800K .......... .......... .......... .......... ..........  2% 96.3M 4s
7850K .......... .......... .......... .......... ..........  2%  116M 4s
7900K .......... .......... .......... .......... ..........  2%  130M 4s
7950K .......... .......... .......... .......... ..........  2%  161M 4s
8000K .......... .......... .......... .......... ..........  2%  145M 4s
8050K .......... .......... .......... .......... ..........  2%  155M 4s
8100K .......... .......... .......... .......... ..........  2%  146M 4s
8150K .......... .......... .......... .......... ..........  2%  145M 4s
8200K .......... .......... .......... .......... ..........  2%  159M 4s
8250K .......... .......... .......... .......... ..........  2%  163M 4s
8300K .......... .......... .......... .......... ..........  2%  144M 4s
8350K .......... .......... .......... .......... ..........  2%  267M 4s
8400K .......... .......... .......... .......... ..........  2%  178M 3s
8450K .......... .......... .......... .......... ..........  2%  109M 3s
8500K .......... .......... .......... .......... ..........  2%  138M 3s
8550K .......... .......... .......... .......... ..........  2%  160M 3s
8600K .......... .......... .......... .......... ..........  2%  151M 3s
8650K .......... .......... .......... .......... ..........  2%  159M 3s
8700K .......... .......... .......... .......... ..........  2%  132M 3s
8750K .......... .......... .......... .......... ..........  2%  178M 3s
8800K .......... .......... .......... .......... ..........  2%  138M 3s
8850K .......... .......... .......... .......... ..........  2%  154M 3s
8900K .......... .......... .......... .......... ..........  2%  158M 3s
8950K .......... .......... .......... .......... ..........  2%  144M 3s
9000K .......... .......... .......... .......... ..........  2%  143M 3s
9050K .......... .......... .......... .......... ..........  2%  151M 3s
9100K .......... .......... .......... .......... ..........  2%  101M 3s
9150K .......... .......... .......... .......... ..........  2%  184M 3s
9200K .......... .......... .......... .......... ..........  2%  259M 3s
9250K .......... .......... .......... .......... ..........  2%  237M 3s
9300K .......... .......... .......... .......... ..........  2%  181M 3s
9350K .......... .......... .......... .......... ..........  2%  258M 3s
9400K .......... .......... .......... .......... ..........  2%  246M 3s
9450K .......... .......... .......... .......... ..........  3%  225M 3s
9500K .......... .......... .......... .......... ..........  3%  188M 3s
9550K .......... .......... .......... .......... ..........  3%  258M 3s
9600K .......... .......... .......... .......... ..........  3%  310M 3s
9650K .......... .......... .......... .......... ..........  3%  193M 3s
9700K .......... .......... .......... .......... ..........  3%  208M 3s
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 9750K .......... .......... .......... .......... ..........  3%  236M 3s
 9800K .......... .......... .......... .......... ..........  3% 92.8M 3s
 9850K .......... .......... .......... .......... ..........  3%  134M 3s
 9900K .......... .......... .......... .......... ..........  3%  138M 3s
 9950K .......... .......... .......... .......... ..........  3%  143M 3s
10000K .......... .......... .......... .......... ..........  3%  148M 3s
10050K .......... .......... .......... .......... ..........  3%  149M 3s
10100K .......... .......... .......... .......... ..........  3%  140M 3s
10150K .......... .......... .......... .......... ..........  3%  154M 3s
10200K .......... .......... .......... .......... ..........  3%  156M 3s
10250K .......... .......... .......... .......... ..........  3%  146M 3s
10300K .......... .......... .......... .......... ..........  3%  176M 3s
10350K .......... .......... .......... .......... ..........  3%  205M 3s
10400K .......... .......... .......... .......... ..........  3%  113M 3s
10450K .......... .......... .......... .......... ..........  3%  148M 3s
10500K .......... .......... .......... .......... ..........  3%  126M 3s
10550K .......... .......... .......... .......... ..........  3%  153M 3s
10600K .......... .......... .......... .......... ..........  3%  147M 3s
10650K .......... .......... .......... .......... ..........  3%  150M 3s
10700K .......... .......... .......... .......... ..........  3%  113M 3s
10750K .......... .......... .......... .......... ..........  3%  159M 3s
10800K .......... .......... .......... .......... ..........  3%  148M 3s
10850K .......... .......... .......... .......... ..........  3%  157M 3s
10900K .......... .......... .......... .......... ..........  3%  143M 3s
10950K .......... .......... .......... .......... ..........  3%  147M 3s
11000K .......... .......... .......... .......... ..........  3%  148M 3s
11050K .......... .......... .......... .......... ..........  3%  154M 3s
11100K .......... .......... .......... .......... ..........  3%  130M 3s
11150K .......... .......... .......... .......... ..........  3%  159M 3s
11200K .......... .......... .......... .......... ..........  3%  149M 3s
11250K .......... .......... .......... .......... ..........  3%  147M 3s
11300K .......... .......... .......... .......... ..........  3%  146M 3s
11350K .......... .......... .......... .......... ..........  3%  141M 3s
11400K .......... .......... .......... .......... ..........  3%  149M 3s
11450K .......... .......... .......... .......... ..........  3%  153M 3s
11500K .......... .......... .......... .......... ..........  3%  124M 3s
11550K .......... .......... .......... .......... ..........  3%  133M 3s
11600K .......... .......... .......... .......... ..........  3%  160M 3s
11650K .......... .......... .......... .......... ..........  3%  154M 3s
11700K .......... .......... .......... .......... ..........  3%  125M 3s
11750K .......... .......... .......... .......... ..........  3%  147M 3s
11800K .......... .......... .......... .......... ..........  3%  153M 3s
11850K .......... .......... .......... .......... ..........  3%  152M 3s
11900K .......... .......... .......... .......... ..........  3%  127M 3s
11950K .......... .......... .......... .......... ..........  3%  161M 3s
12000K .......... .......... .......... .......... ..........  3%  155M 3s
12050K .......... .......... .......... .......... ..........  3%  140M 3s
12100K .......... .......... .......... .......... ..........  3%  146M 3s
12150K .......... .......... .......... .......... ..........  3%  138M 3s
12200K .......... .......... .......... .......... ..........  3%  154M 3s
12250K .......... .......... .......... .......... ..........  3%  148M 3s
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12300K .......... .......... .......... .......... ..........  3%  137M 3s
12350K .......... .......... .......... .......... ..........  3%  134M 3s
12400K .......... .......... .......... .......... ..........  3%  160M 3s
12450K .......... .......... .......... .......... ..........  3%  148M 3s
12500K .......... .......... .......... .......... ..........  3%  146M 3s
12550K .......... .......... .......... .......... ..........  3%  152M 3s
12600K .......... .......... .......... .......... ..........  4%  157M 3s
12650K .......... .......... .......... .......... ..........  4%  147M 3s
12700K .......... .......... .......... .......... ..........  4%  128M 3s
12750K .......... .......... .......... .......... ..........  4%  146M 3s
12800K .......... .......... .......... .......... ..........  4%  182M 3s
12850K .......... .......... .......... .......... ..........  4%  137M 3s
12900K .......... .......... .......... .......... ..........  4%  140M 3s
12950K .......... .......... .......... .......... ..........  4%  154M 3s
13000K .......... .......... .......... .......... ..........  4%  139M 3s
13050K .......... .......... .......... .......... ..........  4%  136M 3s
13100K .......... .......... .......... .......... ..........  4%  127M 3s
13150K .......... .......... .......... .......... ..........  4%  154M 3s
13200K .......... .......... .......... .......... ..........  4%  148M 3s
13250K .......... .......... .......... .......... ..........  4%  160M 3s
13300K .......... .......... .......... .......... ..........  4%  146M 3s
13350K .......... .......... .......... .......... ..........  4%  142M 3s
13400K .......... .......... .......... .......... ..........  4%  194M 3s
13450K .......... .......... .......... .......... ..........  4%  247M 3s
13500K .......... .......... .......... .......... ..........  4%  163M 3s
13550K .......... .......... .......... .......... ..........  4%  197M 3s
13600K .......... .......... .......... .......... ..........  4% 88.6M 3s
13650K .......... .......... .......... .......... ..........  4%  160M 3s
13700K .......... .......... .......... .......... ..........  4%  135M 3s
13750K .......... .......... .......... .......... ..........  4%  141M 3s
13800K .......... .......... .......... .......... ..........  4%  140M 3s
13850K .......... .......... .......... .......... ..........  4%  149M 3s
13900K .......... .......... .......... .......... ..........  4%  135M 3s
13950K .......... .......... .......... .......... ..........  4%  149M 3s
14000K .......... .......... .......... .......... ..........  4%  154M 3s
14050K .......... .......... .......... .......... ..........  4%  153M 3s
14100K .......... .......... .......... .......... ..........  4%  143M 3s
14150K .......... .......... .......... .......... ..........  4%  144M 3s
14200K .......... .......... .......... .......... ..........  4%  162M 3s
14250K .......... .......... .......... .......... ..........  4%  147M 3s
14300K .......... .......... .......... .......... ..........  4%  130M 3s
14350K .......... .......... .......... .......... ..........  4%  148M 3s
14400K .......... .......... .......... .......... ..........  4%  152M 3s
14450K .......... .......... .......... .......... ..........  4%  145M 3s
14500K .......... .......... .......... .......... ..........  4%  132M 3s
14550K .......... .......... .......... .......... ..........  4%  126M 3s
14600K .......... .......... .......... .......... ..........  4%  156M 3s
14650K .......... .......... .......... .......... ..........  4%  152M 3s
14700K .......... .......... .......... .......... ..........  4%  123M 3s
14750K .......... .......... .......... .......... ..........  4%  191M 3s
14800K .......... .......... .......... .......... ..........  4%  135M 3s
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 14850K .......... .......... .......... .......... ..........  4%  153M 3s
 14900K .......... .......... .......... .......... ..........  4%  128M 3s
 14950K .......... .......... .......... .......... ..........  4%  159M 3s
 15000K .......... .......... .......... .......... ..........  4%  169M 3s
 15050K .......... .......... .......... .......... ..........  4%  140M 3s
 15100K .......... .......... .......... .......... ..........  4%  174M 3s
 15150K .......... .......... .......... .......... ..........  4%  155M 3s
 15200K .......... .......... .......... .......... ..........  4%  147M 3s
 15250K .......... .......... .......... .......... ..........  4%  150M 3s
 15300K .......... .......... .......... .......... ..........  4%  142M 3s
 15350K .......... .......... .......... .......... ..........  4%  159M 3s
 15400K .......... .......... .......... .......... ..........  4%  141M 3s
 15450K .......... .......... .......... .......... ..........  4%  144M 3s
 15500K .......... .......... .......... .......... ..........  4%  131M 3s
 15550K .......... .......... .......... .......... ..........  4%  168M 3s
 15600K .......... .......... .......... .......... ..........  4%  233M 3s
 15650K .......... .......... .......... .......... ..........  4%  189M 3s
 15700K .......... .......... .......... .......... ..........  4%  251M 3s
 15750K .......... .......... .......... .......... ..........  4%  239M 3s
 15800K .......... .......... .......... .......... ..........  5%  124M 3s
 15850K .......... .......... .......... .......... ..........  5%  261M 3s
 15900K .......... .......... .......... .......... ..........  5%  179M 3s
 15950K .......... .......... .......... .......... ..........  5%  295M 3s
 16000K .......... .......... .......... .......... ..........  5%  187M 3s
 16050K .......... .......... .......... .......... ..........  5%  185M 3s
 16100K .......... .......... .......... .......... ..........  5%  180M 3s
 16150K .......... .......... .......... .......... ..........  5%  247M 3s

*** WARNING: skipped 430920 bytes of output ***

299700K .......... .......... .......... .......... .......... 94%  141M 0s
299750K .......... .......... .......... .......... .......... 94% 95.1M 0s
299800K .......... .......... .......... .......... .......... 94%  134M 0s
299850K .......... .......... .......... .......... .......... 94%  171M 0s
299900K .......... .......... .......... .......... .......... 94%  185M 0s
299950K .......... .......... .......... .......... .......... 94%  133M 0s
300000K .......... .......... .......... .......... .......... 94% 98.0M 0s
300050K .......... .......... .......... .......... .......... 94%  110M 0s
300100K .......... .......... .......... .......... .......... 94%  109M 0s
300150K .......... .......... .......... .......... .......... 94%  119M 0s
300200K .......... .......... .......... .......... .......... 95%  139M 0s
300250K .......... .......... .......... .......... .......... 95%  172M 0s
300300K .......... .......... .......... .......... .......... 95%  187M 0s
300350K .......... .......... .......... .......... .......... 95%  192M 0s
300400K .......... .......... .......... .......... .......... 95%  191M 0s
300450K .......... .......... .......... .......... .......... 95%  153M 0s
300500K .......... .......... .......... .......... .......... 95%  111M 0s
300550K .......... .......... .......... .......... .......... 95%  115M 0s
300600K .......... .......... .......... .......... .......... 95% 98.6M 0s
300650K .......... .......... .......... .......... .......... 95%  121M 0s
300700K .......... .......... .......... .......... .......... 95% 99.0M 0s
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300750K .......... .......... .......... .......... .......... 95%  132M 0s
300800K .......... .......... .......... .......... .......... 95%  130M 0s
300850K .......... .......... .......... .......... .......... 95% 91.0M 0s
300900K .......... .......... .......... .......... .......... 95%  125M 0s
300950K .......... .......... .......... .......... .......... 95% 95.6M 0s
301000K .......... .......... .......... .......... .......... 95%  128M 0s
301050K .......... .......... .......... .......... .......... 95%  121M 0s
301100K .......... .......... .......... .......... .......... 95% 98.4M 0s
301150K .......... .......... .......... .......... .......... 95%  113M 0s
301200K .......... .......... .......... .......... .......... 95% 86.6M 0s
301250K .......... .......... .......... .......... .......... 95%  114M 0s
301300K .......... .......... .......... .......... .......... 95% 94.2M 0s
301350K .......... .......... .......... .......... .......... 95%  178M 0s
301400K .......... .......... .......... .......... .......... 95%  189M 0s
301450K .......... .......... .......... .......... .......... 95%  172M 0s
301500K .......... .......... .......... .......... .......... 95%  168M 0s
301550K .......... .......... .......... .......... .......... 95%  186M 0s
301600K .......... .......... .......... .......... .......... 95%  190M 0s
301650K .......... .......... .......... .......... .......... 95% 88.4M 0s
301700K .......... .......... .......... .......... .......... 95%  126M 0s
301750K .......... .......... .......... .......... .......... 95% 87.6M 0s
301800K .......... .......... .......... .......... .......... 95% 94.7M 0s
301850K .......... .......... .......... .......... .......... 95%  114M 0s
301900K .......... .......... .......... .......... .......... 95% 96.2M 0s
301950K .......... .......... .......... .......... .......... 95%  108M 0s
302000K .......... .......... .......... .......... .......... 95%  130M 0s
302050K .......... .......... .......... .......... .......... 95% 79.3M 0s
302100K .......... .......... .......... .......... .......... 95% 90.3M 0s
302150K .......... .......... .......... .......... .......... 95%  202M 0s
302200K .......... .......... .......... .......... .......... 95% 69.2M 0s
302250K .......... .......... .......... .......... .......... 95% 89.9M 0s
302300K .......... .......... .......... .......... .......... 95% 94.0M 0s
302350K .......... .......... .......... .......... .......... 95%  170M 0s
302400K .......... .......... .......... .......... .......... 95%  179M 0s
302450K .......... .......... .......... .......... .......... 95%  156M 0s
302500K .......... .......... .......... .......... .......... 95%  189M 0s
302550K .......... .......... .......... .......... .......... 95%  183M 0s
302600K .......... .......... .......... .......... .......... 95%  183M 0s
302650K .......... .......... .......... .......... .......... 95%  170M 0s
302700K .......... .......... .......... .......... .......... 95% 95.9M 0s
302750K .......... .......... .......... .......... .......... 95%  130M 0s
302800K .......... .......... .......... .......... .......... 95% 92.2M 0s
302850K .......... .......... .......... .......... .......... 95% 86.8M 0s
302900K .......... .......... .......... .......... .......... 95%  124M 0s
302950K .......... .......... .......... .......... .......... 95%  118M 0s
303000K .......... .......... .......... .......... .......... 95%  130M 0s
303050K .......... .......... .......... .......... .......... 95%  167M 0s
303100K .......... .......... .......... .......... .......... 95%  188M 0s
303150K .......... .......... .......... .......... .......... 95%  193M 0s
303200K .......... .......... .......... .......... .......... 95%  126M 0s
303250K .......... .......... .......... .......... .......... 95%  141M 0s
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303300K .......... .......... .......... .......... .......... 95%  118M 0s
303350K .......... .......... .......... .......... .......... 96%  184M 0s
303400K .......... .......... .......... .......... .......... 96%  127M 0s
303450K .......... .......... .......... .......... .......... 96%  167M 0s
303500K .......... .......... .......... .......... .......... 96%  184M 0s
303550K .......... .......... .......... .......... .......... 96%  177M 0s
303600K .......... .......... .......... .......... .......... 96%  125M 0s
303650K .......... .......... .......... .......... .......... 96%  152M 0s
303700K .......... .......... .......... .......... .......... 96%  193M 0s
303750K .......... .......... .......... .......... .......... 96%  188M 0s
303800K .......... .......... .......... .......... .......... 96%  186M 0s
303850K .......... .......... .......... .......... .......... 96%  168M 0s
303900K .......... .......... .......... .......... .......... 96%  194M 0s
303950K .......... .......... .......... .......... .......... 96%  186M 0s
304000K .......... .......... .......... .......... .......... 96%  182M 0s
304050K .......... .......... .......... .......... .......... 96% 76.8M 0s
304100K .......... .......... .......... .......... .......... 96%  128M 0s
304150K .......... .......... .......... .......... .......... 96% 90.0M 0s
304200K .......... .......... .......... .......... .......... 96%  129M 0s
304250K .......... .......... .......... .......... .......... 96%  101M 0s
304300K .......... .......... .......... .......... .......... 96%  125M 0s
304350K .......... .......... .......... .......... .......... 96%  120M 0s
304400K .......... .......... .......... .......... .......... 96%  189M 0s
304450K .......... .......... .......... .......... .......... 96%  153M 0s
304500K .......... .......... .......... .......... .......... 96%  190M 0s
304550K .......... .......... .......... .......... .......... 96%  100M 0s
304600K .......... .......... .......... .......... .......... 96% 93.6M 0s
304650K .......... .......... .......... .......... .......... 96% 90.8M 0s
304700K .......... .......... .......... .......... .......... 96%  125M 0s
304750K .......... .......... .......... .......... .......... 96%  192M 0s
304800K .......... .......... .......... .......... .......... 96%  191M 0s
304850K .......... .......... .......... .......... .......... 96% 88.9M 0s
304900K .......... .......... .......... .......... .......... 96% 91.5M 0s
304950K .......... .......... .......... .......... .......... 96%  128M 0s
305000K .......... .......... .......... .......... .......... 96%  189M 0s
305050K .......... .......... .......... .......... .......... 96%  173M 0s
305100K .......... .......... .......... .......... .......... 96%  194M 0s
305150K .......... .......... .......... .......... .......... 96%  196M 0s
305200K .......... .......... .......... .......... .......... 96% 78.4M 0s
305250K .......... .......... .......... .......... .......... 96%  104M 0s
305300K .......... .......... .......... .......... .......... 96% 92.0M 0s
305350K .......... .......... .......... .......... .......... 96% 94.8M 0s
305400K .......... .......... .......... .......... .......... 96%  133M 0s
305450K .......... .......... .......... .......... .......... 96% 82.2M 0s
305500K .......... .......... .......... .......... .......... 96%  189M 0s
305550K .......... .......... .......... .......... .......... 96%  191M 0s
305600K .......... .......... .......... .......... .......... 96%  189M 0s
305650K .......... .......... .......... .......... .......... 96% 86.3M 0s
305700K .......... .......... .......... .......... .......... 96%  119M 0s
305750K .......... .......... .......... .......... .......... 96% 95.4M 0s
305800K .......... .......... .......... .......... .......... 96%  121M 0s
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305850K .......... .......... .......... .......... .......... 96%  170M 0s
305900K .......... .......... .......... .......... .......... 96%  179M 0s
305950K .......... .......... .......... .......... .......... 96%  188M 0s
306000K .......... .......... .......... .......... .......... 96% 94.3M 0s
306050K .......... .......... .......... .......... .......... 96% 92.3M 0s
306100K .......... .......... .......... .......... .......... 96%  187M 0s
306150K .......... .......... .......... .......... .......... 96%  188M 0s
306200K .......... .......... .......... .......... .......... 96%  181M 0s
306250K .......... .......... .......... .......... .......... 96%  192M 0s
306300K .......... .......... .......... .......... .......... 96%  203M 0s
306350K .......... .......... .......... .......... .......... 96%  105M 0s
306400K .......... .......... .......... .......... .......... 96%  137M 0s
306450K .......... .......... .......... .......... .......... 96% 82.9M 0s
306500K .......... .......... .......... .......... .......... 97%  134M 0s
306550K .......... .......... .......... .......... .......... 97%  216M 0s
306600K .......... .......... .......... .......... .......... 97%  217M 0s
306650K .......... .......... .......... .......... .......... 97%  105M 0s
306700K .......... .......... .......... .......... .......... 97%  204M 0s
306750K .......... .......... .......... .......... .......... 97%  210M 0s
306800K .......... .......... .......... .......... .......... 97%  189M 0s
306850K .......... .......... .......... .......... .......... 97%  169M 0s
306900K .......... .......... .......... .......... .......... 97%  196M 0s
306950K .......... .......... .......... .......... .......... 97%  196M 0s
307000K .......... .......... .......... .......... .......... 97% 75.3M 0s
307050K .......... .......... .......... .......... .......... 97%  109M 0s
307100K .......... .......... .......... .......... .......... 97%  119M 0s
307150K .......... .......... .......... .......... .......... 97%  183M 0s
307200K .......... .......... .......... .......... .......... 97%  190M 0s
307250K .......... .......... .......... .......... .......... 97%  157M 0s
307300K .......... .......... .......... .......... .......... 97%  129M 0s
307350K .......... .......... .......... .......... .......... 97% 88.0M 0s
307400K .......... .......... .......... .......... .......... 97%  132M 0s
307450K .......... .......... .......... .......... .......... 97%  170M 0s
307500K .......... .......... .......... .......... .......... 97%  184M 0s
307550K .......... .......... .......... .......... .......... 97%  187M 0s
307600K .......... .......... .......... .......... .......... 97%  190M 0s
307650K .......... .......... .......... .......... .......... 97% 96.8M 0s
307700K .......... .......... .......... .......... .......... 97%  112M 0s
307750K .......... .......... .......... .......... .......... 97%  103M 0s
307800K .......... .......... .......... .......... .......... 97%  119M 0s
307850K .......... .......... .......... .......... .......... 97% 90.6M 0s
307900K .......... .......... .......... .......... .......... 97%  113M 0s
307950K .......... .......... .......... .......... .......... 97% 91.7M 0s
308000K .......... .......... .......... .......... .......... 97%  184M 0s
308050K .......... .......... .......... .......... .......... 97%  155M 0s
308100K .......... .......... .......... .......... .......... 97%  196M 0s
308150K .......... .......... .......... .......... .......... 97% 93.9M 0s
308200K .......... .......... .......... .......... .......... 97%  125M 0s
308250K .......... .......... .......... .......... .......... 97% 88.6M 0s
308300K .......... .......... .......... .......... .......... 97%  130M 0s
308350K .......... .......... .......... .......... .......... 97%  121M 0s
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308400K .......... .......... .......... .......... .......... 97%  173M 0s
308450K .......... .......... .......... .......... .......... 97% 92.2M 0s
308500K .......... .......... .......... .......... .......... 97%  134M 0s
308550K .......... .......... .......... .......... .......... 97%  103M 0s
308600K .......... .......... .......... .......... .......... 97%  111M 0s
308650K .......... .......... .......... .......... .......... 97%  170M 0s
308700K .......... .......... .......... .......... .......... 97%  187M 0s
308750K .......... .......... .......... .......... .......... 97%  164M 0s
308800K .......... .......... .......... .......... .......... 97%  105M 0s
308850K .......... .......... .......... .......... .......... 97%  155M 0s
308900K .......... .......... .......... .......... .......... 97%  194M 0s
308950K .......... .......... .......... .......... .......... 97%  178M 0s
309000K .......... .......... .......... .......... .......... 97%  189M 0s
309050K .......... .......... .......... .......... .......... 97% 99.9M 0s
309100K .......... .......... .......... .......... .......... 97%  109M 0s
309150K .......... .......... .......... .......... .......... 97%  103M 0s
309200K .......... .......... .......... .......... .......... 97%  128M 0s
309250K .......... .......... .......... .......... .......... 97%  110M 0s
309300K .......... .......... .......... .......... .......... 97%  188M 0s
309350K .......... .......... .......... .......... .......... 97% 84.9M 0s
309400K .......... .......... .......... .......... .......... 97%  132M 0s
309450K .......... .......... .......... .......... .......... 97%  106M 0s
309500K .......... .......... .......... .......... .......... 97%  190M 0s
309550K .......... .......... .......... .......... .......... 97%  187M 0s
309600K .......... .......... .......... .......... .......... 97%  191M 0s
309650K .......... .......... .......... .......... .......... 98%  154M 0s
309700K .......... .......... .......... .......... .......... 98%  101M 0s
309750K .......... .......... .......... .......... .......... 98%  112M 0s
309800K .......... .......... .......... .......... .......... 98%  117M 0s
309850K .......... .......... .......... .......... .......... 98%  166M 0s
309900K .......... .......... .......... .......... .......... 98%  189M 0s
309950K .......... .......... .......... .......... .......... 98%  187M 0s
310000K .......... .......... .......... .......... .......... 98%  188M 0s
310050K .......... .......... .......... .......... .......... 98% 67.3M 0s
310100K .......... .......... .......... .......... .......... 98%  188M 0s
310150K .......... .......... .......... .......... .......... 98%  187M 0s
310200K .......... .......... .......... .......... .......... 98%  185M 0s
310250K .......... .......... .......... .......... .......... 98%  173M 0s
310300K .......... .......... .......... .......... .......... 98% 76.2M 0s
310350K .......... .......... .......... .......... .......... 98%  112M 0s
310400K .......... .......... .......... .......... .......... 98% 82.7M 0s
310450K .......... .......... .......... .......... .......... 98% 86.8M 0s
310500K .......... .......... .......... .......... .......... 98% 92.1M 0s
310550K .......... .......... .......... .......... .......... 98%  187M 0s
310600K .......... .......... .......... .......... .......... 98%  185M 0s
310650K .......... .......... .......... .......... .......... 98%  116M 0s
310700K .......... .......... .......... .......... .......... 98%  182M 0s
310750K .......... .......... .......... .......... .......... 98%  189M 0s
310800K .......... .......... .......... .......... .......... 98%  189M 0s
310850K .......... .......... .......... .......... .......... 98%  155M 0s
310900K .......... .......... .......... .......... .......... 98% 73.0M 0s
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310950K .......... .......... .......... .......... .......... 98%  130M 0s
311000K .......... .......... .......... .......... .......... 98% 86.8M 0s
311050K .......... .......... .......... .......... .......... 98%  163M 0s
311100K .......... .......... .......... .......... .......... 98%  189M 0s
311150K .......... .......... .......... .......... .......... 98%  188M 0s
311200K .......... .......... .......... .......... .......... 98%  101M 0s
311250K .......... .......... .......... .......... .......... 98% 90.3M 0s
311300K .......... .......... .......... .......... .......... 98%  178M 0s
311350K .......... .......... .......... .......... .......... 98%  187M 0s
311400K .......... .......... .......... .......... .......... 98%  190M 0s
311450K .......... .......... .......... .......... .......... 98% 72.8M 0s
311500K .......... .......... .......... .......... .......... 98%  126M 0s
311550K .......... .......... .......... .......... .......... 98% 98.1M 0s
311600K .......... .......... .......... .......... .......... 98%  135M 0s
311650K .......... .......... .......... .......... .......... 98%  149M 0s
311700K .......... .......... .......... .......... .......... 98%  186M 0s
311750K .......... .......... .......... .......... .......... 98%  183M 0s
311800K .......... .......... .......... .......... .......... 98%  186M 0s
311850K .......... .......... .......... .......... .......... 98%  168M 0s
311900K .......... .......... .......... .......... .......... 98%  101M 0s
311950K .......... .......... .......... .......... .......... 98%  181M 0s
312000K .......... .......... .......... .......... .......... 98%  185M 0s
312050K .......... .......... .......... .......... .......... 98%  157M 0s
312100K .......... .......... .......... .......... .......... 98%  135M 0s
312150K .......... .......... .......... .......... .......... 98% 94.1M 0s
312200K .......... .......... .......... .......... .......... 98%  131M 0s
312250K .......... .......... .......... .......... .......... 98% 87.0M 0s
312300K .......... .......... .......... .......... .......... 98%  185M 0s
312350K .......... .......... .......... .......... .......... 98%  189M 0s
312400K .......... .......... .......... .......... .......... 98%  191M 0s
312450K .......... .......... .......... .......... .......... 98% 76.6M 0s
312500K .......... .......... .......... .......... .......... 98%  129M 0s
312550K .......... .......... .......... .......... .......... 98%  190M 0s
312600K .......... .......... .......... .......... .......... 98%  204M 0s
312650K .......... .......... .......... .......... .......... 98%  171M 0s
312700K .......... .......... .......... .......... .......... 98% 25.6M 0s
312750K .......... .......... .......... .......... .......... 98%  188M 0s
312800K .......... .......... .......... .......... .......... 99% 69.9M 0s
312850K .......... .......... .......... .......... .......... 99%  155M 0s
312900K .......... .......... .......... .......... .......... 99% 95.9M 0s
312950K .......... .......... .......... .......... .......... 99%  106M 0s
313000K .......... .......... .......... .......... .......... 99% 85.9M 0s
313050K .......... .......... .......... .......... .......... 99% 64.7M 0s
313100K .......... .......... .......... .......... .......... 99% 74.5M 0s
313150K .......... .......... .......... .......... .......... 99% 81.2M 0s
313200K .......... .......... .......... .......... .......... 99%  153M 0s
313250K .......... .......... .......... .......... .......... 99% 89.3M 0s
313300K .......... .......... .......... .......... .......... 99% 82.9M 0s
313350K .......... .......... .......... .......... .......... 99%  142M 0s
313400K .......... .......... .......... .......... .......... 99%  188M 0s
313450K .......... .......... .......... .......... .......... 99%  163M 0s
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313500K .......... .......... .......... .......... .......... 99% 77.4M 0s
313550K .......... .......... .......... .......... .......... 99%  155M 0s
313600K .......... .......... .......... .......... .......... 99%  190M 0s
313650K .......... .......... .......... .......... .......... 99%  145M 0s
313700K .......... .......... .......... .......... .......... 99%  172M 0s
313750K .......... .......... .......... .......... .......... 99%  194M 0s
313800K .......... .......... .......... .......... .......... 99%  187M 0s
313850K .......... .......... .......... .......... .......... 99%  166M 0s
313900K .......... .......... .......... .......... .......... 99%  189M 0s
313950K .......... .......... .......... .......... .......... 99%  154M 0s
314000K .......... .......... .......... .......... .......... 99% 88.3M 0s
314050K .......... .......... .......... .......... .......... 99%  110M 0s
314100K .......... .......... .......... .......... .......... 99%  194M 0s
314150K .......... .......... .......... .......... .......... 99%  188M 0s
314200K .......... .......... .......... .......... .......... 99%  115M 0s
314250K .......... .......... .......... .......... .......... 99%  172M 0s
314300K .......... .......... .......... .......... .......... 99%  196M 0s
314350K .......... .......... .......... .......... .......... 99%  184M 0s
314400K .......... .......... .......... .......... .......... 99%  191M 0s
314450K .......... .......... .......... .......... .......... 99%  156M 0s
314500K .......... .......... .......... .......... .......... 99%  190M 0s
314550K .......... .......... .......... .......... .......... 99%  199M 0s
314600K .......... .......... .......... .......... .......... 99% 86.6M 0s
314650K .......... .......... .......... .......... .......... 99%  169M 0s
314700K .......... .......... .......... .......... .......... 99%  191M 0s
314750K .......... .......... .......... .......... .......... 99%  194M 0s
314800K .......... .......... .......... .......... .......... 99%  188M 0s
314850K .......... .......... .......... .......... .......... 99% 10.4M 0s
314900K .......... .......... .......... .......... .......... 99%  167M 0s
314950K .......... .......... .......... .......... .......... 99%  174M 0s
315000K .......... .......... .......... .......... .......... 99%  175M 0s
315050K .......... .......... .......... .......... .......... 99%  152M 0s
315100K .......... .......... .......... .......... .......... 99%  169M 0s
315150K .......... .......... .......... .......... .......... 99%  171M 0s
315200K .......... .......... .......... .......... .......... 99%  172M 0s
315250K .......... .......... .......... .......... .......... 99%  151M 0s
315300K .......... .......... .......... .......... .......... 99%  184M 0s
315350K .......... .......... .......... .......... .......... 99%  189M 0s
315400K .......... .......... .......... .......... .......... 99%  185M 0s
315450K .......... .......... .......... .......... .......... 99%  166M 0s
315500K .......... .......... .......... .......... .......... 99%  196M 0s
315550K .......... .......... .......... .......... .......... 99%  189M 0s
315600K .......... .......... .......... .......... .......... 99%  186M 0s
315650K .......... .......... .......... .......... .......... 99%  131M 0s
315700K .......... .......... .......... .......... .......... 99%  183M 0s
315750K .......... .......... .......... .......... .......... 99%  193M 0s
315800K .......... .......... .......... .......... .......... 99%  189M 0s
315850K .......... .......... .......... .......... .......... 99%  171M 0s
315900K .......... .......... .......... .......... .......... 99%  173M 0s
315950K .......... .......... .......... .......... .......... 99%  189M 0s
316000K ...                                                    100% 53.9M=2.4s
```

```
2020-05-31 14:10:04 (129 MB/s) - ‘title.principals.tsv.gz’ saved [323587283/3235872
83]

/bin/bash: line 1: fg: no job control
```

In [16]:
```
title_principals = spark.read.option("sep", "\t").csv('file:/databricks/drive
r/title.principals.tsv', header=True, inferSchema = True)
title_principals.cache()
title_principals.show(3)
```

```
+---------+--------+---------+--------------+--------------------+----------+
   tconst|ordering|   nconst|      category|                 job|characters|
+---------+--------+---------+--------------+--------------------+----------+
tt0000001|       1|nm1588970|          self|                  \N|  ["Self"]|
tt0000001|       2|nm0005690|      director|                  \N|        \N|
tt0000001|       3|nm0374658|cinematographer|director of photo...|        \N|
+---------+--------+---------+--------------+--------------------+----------+
only showing top 3 rows
```

In [17]:
```
%sh wget https://datasets.imdbws.com/title.ratings.tsv.gz
%sh
gunzip title.ratings.tsv.gz
```

```
--2020-05-31 14:11:40--  https://datasets.imdbws.com/title.ratings.tsv.gz
Resolving datasets.imdbws.com (datasets.imdbws.com)... 13.224.13.32, 13.224.13.37,
13.224.13.54, ...
Connecting to datasets.imdbws.com (datasets.imdbws.com)|13.224.13.32|:443... connec
ted.
HTTP request sent, awaiting response... 200 OK
Length: 5169313 (4.9M) [binary/octet-stream]
Saving to: ‘title.ratings.tsv.gz’

     0K ......... ......... ......... ......... .........  0% 4.34M 1s
    50K ......... ......... ......... ......... .........  1% 6.17M 1s
   100K ......... ......... ......... ......... .........  2% 13.2M 1s
   150K ......... ......... ......... ......... .........  3% 11.8M 1s
   200K ......... ......... ......... ......... .........  4% 17.9M 1s
   250K ......... ......... ......... ......... .........  5% 28.9M 0s
   300K ......... ......... ......... ......... .........  6% 20.9M 0s
   350K ......... ......... ......... ......... .........  7% 25.1M 0s
   400K ......... ......... ......... ......... .........  8% 38.7M 0s
   450K ......... ......... ......... ......... .........  9% 37.5M 0s
   500K ......... ......... ......... ......... ......... 10% 33.5M 0s
   550K ......... ......... ......... ......... ......... 11% 46.6M 0s
   600K ......... ......... ......... ......... ......... 12% 33.0M 0s
   650K ......... ......... ......... ......... ......... 13% 59.6M 0s
   700K ......... ......... ......... ......... ......... 14% 45.2M 0s
   750K ......... ......... ......... ......... ......... 15% 17.4M 0s
   800K ......... ......... ......... ......... ......... 16%  162M 0s
   850K ......... ......... ......... ......... ......... 17%  128M 0s
   900K ......... ......... ......... ......... ......... 18%  181M 0s
   950K ......... ......... ......... ......... ......... 19%  133M 0s
  1000K ......... ......... ......... ......... ......... 20%  121M 0s
  1050K ......... ......... ......... ......... ......... 21%  144M 0s
  1100K ......... ......... ......... ......... ......... 22% 89.4M 0s
  1150K ......... ......... ......... ......... ......... 23% 90.2M 0s
  1200K ......... ......... ......... ......... ......... 24% 65.8M 0s
  1250K ......... ......... ......... ......... ......... 25%  154M 0s
  1300K ......... ......... ......... ......... ......... 26%  108M 0s
  1350K ......... ......... ......... ......... ......... 27% 72.0M 0s
  1400K ......... ......... ......... ......... ......... 28% 98.8M 0s
  1450K ......... ......... ......... ......... ......... 29%  110M 0s
  1500K ......... ......... ......... ......... ......... 30%  145M 0s
  1550K ......... ......... ......... ......... ......... 31% 20.5M 0s
  1600K ......... ......... ......... ......... ......... 32%  171M 0s
  1650K ......... ......... ......... ......... ......... 33%  133M 0s
  1700K ......... ......... ......... ......... ......... 34%  149M 0s
  1750K ......... ......... ......... ......... ......... 35%  147M 0s
  1800K ......... ......... ......... ......... ......... 36%  119M 0s
  1850K ......... ......... ......... ......... ......... 37%  194M 0s
  1900K ......... ......... ......... ......... ......... 38%  202M 0s
  1950K ......... ......... ......... ......... ......... 39%  205M 0s
  2000K ......... ......... ......... ......... ......... 40%  144M 0s
  2050K ......... ......... ......... ......... ......... 41%  161M 0s
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2100K .......... .......... .......... .......... .......... 42%  189M 0s
2150K .......... .......... .......... .......... .......... 43%  165M 0s
2200K .......... .......... .......... .......... .......... 44%  141M 0s
2250K .......... .......... .......... .......... .......... 45%  184M 0s
2300K .......... .......... .......... .......... .......... 46%  188M 0s
2350K .......... .......... .......... .......... .......... 47%  193M 0s
2400K .......... .......... .......... .......... .......... 48%  155M 0s
2450K .......... .......... .......... .......... .......... 49% 13.2M 0s
2500K .......... .......... .......... .......... .......... 50%  124M 0s
2550K .......... .......... .......... .......... .......... 51%  147M 0s
2600K .......... .......... .......... .......... .......... 52%  150M 0s
2650K .......... .......... .......... .......... .......... 53%  133M 0s
2700K .......... .......... .......... .......... .......... 54%  136M 0s
2750K .......... .......... .......... .......... .......... 55%  152M 0s
2800K .......... .......... .......... .......... .......... 56%  128M 0s
2850K .......... .......... .......... .......... .......... 57%  153M 0s
2900K .......... .......... .......... .......... .......... 58%  155M 0s
2950K .......... .......... .......... .......... .......... 59%  147M 0s
3000K .......... .......... .......... .......... .......... 60%  117M 0s
3050K .......... .......... .......... .......... .......... 61%  143M 0s
3100K .......... .......... .......... .......... .......... 62%  139M 0s
3150K .......... .......... .......... .......... .......... 63%  139M 0s
3200K .......... .......... .......... .......... .......... 64%  136M 0s
3250K .......... .......... .......... .......... .......... 65%  152M 0s
3300K .......... .......... .......... .......... .......... 66%  233M 0s
3350K .......... .......... .......... .......... .......... 67%  189M 0s
3400K .......... .......... .......... .......... .......... 68%  166M 0s
3450K .......... .......... .......... .......... .......... 69%  205M 0s
3500K .......... .......... .......... .......... .......... 70%  210M 0s
3550K .......... .......... .......... .......... .......... 71%  184M 0s
3600K .......... .......... .......... .......... .......... 72%  155M 0s
3650K .......... .......... .......... .......... .......... 73%  294M 0s
3700K .......... .......... .......... .......... .......... 74%  177M 0s
3750K .......... .......... .......... .......... .......... 75%  248M 0s
3800K .......... .......... .......... .......... .......... 76%  240M 0s
3850K .......... .......... .......... .......... .......... 77%  238M 0s
3900K .......... .......... .......... .......... .......... 78%  290M 0s
3950K .......... .......... .......... .......... .......... 79%  299M 0s
4000K .......... .......... .......... .......... .......... 80%  268M 0s
4050K .......... .......... .......... .......... .......... 81%  208M 0s
4100K .......... .......... .......... .......... .......... 82%  200M 0s
4150K .......... .......... .......... .......... .......... 83%  212M 0s
4200K .......... .......... .......... .......... .......... 84%  182M 0s
4250K .......... .......... .......... .......... .......... 85%  296M 0s
4300K .......... .......... .......... .......... .......... 86%  184M 0s
4350K .......... .......... .......... .......... .......... 87%  203M 0s
4400K .......... .......... .......... .......... .......... 88%  265M 0s
4450K .......... .......... .......... .......... .......... 89%  184M 0s
4500K .......... .......... .......... .......... .......... 90%  193M 0s
4550K .......... .......... .......... .......... .......... 91%  284M 0s
4600K .......... .......... .......... .......... .......... 92%  170M 0s
```

```
 4650K .......... .......... .......... .......... .......... 93%  290M 0s
 4700K .......... .......... .......... .......... .......... 94%  294M 0s
 4750K .......... .......... .......... .......... .......... 95%  299M 0s
 4800K .......... .......... .......... .......... .......... 96% 66.5M 0s
 4850K .......... .......... .......... .......... .......... 97%  155M 0s
 4900K .......... .......... .......... .......... .......... 98%  143M 0s
 4950K .......... .......... .......... .......... .......... 99%  130M 0s
 5000K .......... .......... .......... .......... ........  100%  148M=0.08s

2020-05-31 14:11:40 (62.3 MB/s) - ‘title.ratings.tsv.gz’ saved [5169313/5169313]

/bin/bash: line 1: fg: no job control
```

In [18]:
```
title_ratings = spark.read.option("sep", "\t").csv('file:/databricks/driver/title.ratings.tsv', header=True, inferSchema = True)
title_ratings.cache()
title_ratings.show(3)
```

```
+---------+-------------+--------+
   tconst|averageRating|numVotes|
+---------+-------------+--------+
tt0000001|          5.6|    1619|
tt0000002|          6.0|     198|
tt0000003|          6.5|    1301|
+---------+-------------+--------+
only showing top 3 rows
```

Network Inference, Let’s build a network

In the following questions you will look to summarise the data and build a network. We want to examine a network that abstracts how actors and actress are related through their co-participation in movies. To that end perform the following steps:

Q1 Create a DataFrame that combines the information on each of the titles (i.e., movies, tv-shows, etc …) and the information on the participants in those movies (i.e., actors, directors, etc …), make sure the actual names of the movies and participants are included. It may be worth reviewing the following questions to see how this dataframe will be used.

How many rows does yoru dataframe have?

In [20]:
```
# filtered = title_principals.join(title_basics,['tconst'],how='left_outer').join(names_basics,['nconst'],how='left_outer')
tconts_join = title_principals.join(title_basics, title_principals.tconst == title_basics.tconst,how='left').drop(title_basics.tconst)
filtered = tconts_join.join(names_basics, tconts_join.nconst == names_basics.nconst,how='left').drop(names_basics.nconst)
```

In [21]:
```
print("This Dataframe has " + str(filtered.count()) + " rows")
```

```
This Dataframe has 39502500 rows
```

Q2 Create a new DataFrame based on the previous step, with the following removed:

1. Any participant that is not an actor or actress (as measured by the category column);
2. All adult movies;
3. All dead actors or actresses;
4. All actors or actresses born before 1920 or with no date of birth listed;
5. All titles that are not of the type movie.

How many rows does your dataframe have?

In [23]:
```
df_filter = filtered.filter(filtered.category.isin(['actor', 'actress'])) \
                            .filter(filtered.isAdult != 1) \
                            .filter(filtered.deathYear == "\\N") \
                            .filter(filtered.birthYear >= 1920) \
                            .filter(filtered.birthYear.isNotNull()) \
                            .filter(filtered.titleType == 'movie')
```

In [24]:
```
print("This Dataframe has " + str(df_filter.count()) + " rows")
```

```
This Dataframe has 451106 rows
```

Q3 Convert the above Dataframe to an RDD (you can use `.rdd` to convert a dataframe to and RDD of row objects). Use map and reduce to create a paired RDD which counts how many movies each actor / actress appears in.

Display names of the top 10 actors/actresses according to the number of movies in which they appeared. Be careful to deal with different actors / actresses with the same name, these could be different people.

In [26]:
```
df_filter.columns
```

```
Out[21]: ['tconst',
 'ordering',
 'nconst',
 'category',
 'job',
 'characters',
 'titleType',
 'primaryTitle',
 'originalTitle',
 'isAdult',
 'startYear',
 'endYear',
 'runtimeMinutes',
 'genres',
 'primaryName',
 'birthYear',
 'deathYear',
 'primaryProfession',
 'knownForTitles']
```

In [27]:
```
Ids_df = df_filter.rdd.map(lambda x :((x['nconst'], x['primaryName']), 1))   # map by ids "nconst" and "name"
df = Ids_df.reduceByKey(lambda x,y : x+y)
df_final = df.sortBy(lambda x: x[1], False)
```

In [28]:
```
print("The top 10 actors/actresses according to the number of movies in which they appeared in are: ")
df_final.take(10)
```

```
The top 10 actors/actresses according to the number of movies in which they appeare
d in are:
Out[23]: [(('nm0103977', 'Brahmanandam'), 809),
 (('nm0007123', 'Mammootty'), 379),
 (('nm0482320', 'Mohanlal'), 343),
 (('nm0149822', 'Mithun Chakraborty'), 332),
 (('nm0007106', 'Shakti Kapoor'), 309),
 (('nm0415549', 'Jagathi Sreekumar'), 303),
 (('nm0035067', 'Cüneyt Arkin'), 294),
 (('nm0374974', 'Helen'), 281),
 (('nm0534867', 'Madhu'), 277),
 (('nm0004429', 'Dharmendra'), 270)]
```

Q4 Start with the dataframe from **Q2**. Generate a DataFrame that lists all links of your network. Here we shall consider that a link connects a pair of actors/actresses if they participated in at least one movie together (actors / actresses should be represented by their unique ID's). For every link we then need anytime a pair of actors were together in a movie as a link in each direction (A -> B and B -> A). However links should be distinct we do not need duplicates when two actors worked together in several movies.

In [30]:
```
actors_rdd_1 = df_filter.rdd.map(list).map(lambda x :(x[0], x[2])) #tconst and nconst
actors_rdd_2 = df_filter.rdd.map(list).map(lambda x :(x[0], x[2]))
actors_rdd_1.take(5)
```

```
Out[24]: [('tt0110116', 'nm0000198'),
 ('tt1345836', 'nm0000198'),
 ('tt0097125', 'nm0000198'),
 ('tt3239932', 'nm0000198'),
 ('tt0208874', 'nm0000198')]
```

In [31]:
```
actors_rdd_1.join(actors_rdd_2).take(10)
```

```
Out[25]: [('tt2104129', ('nm0048122', 'nm0048122')),
 ('tt2104129', ('nm0048122', 'nm0221697')),
 ('tt2104129', ('nm0221697', 'nm0048122')),
 ('tt2104129', ('nm0221697', 'nm0221697')),
 ('tt0226612', ('nm0549603', 'nm0549603')),
 ('tt1555367', ('nm0998254', 'nm0998254')),
 ('tt0096129', ('nm0527543', 'nm0527543')),
 ('tt0096129', ('nm0527543', 'nm0295429')),
 ('tt0096129', ('nm0527543', 'nm0087787')),
 ('tt0096129', ('nm0295429', 'nm0527543'))]
```

In [32]:
```
from pyspark.sql import Row
dist_pairs =  actors_rdd_1.join(actors_rdd_2).map(lambda x :Row(x[1][0], x[1][1])).filter(lambda x: x[0] != x[1]).distinct()
```

In [33]:
```
dist_pairs.take(1)
```

```
Out[27]: [<Row(nm3216408, nm0453304)>]
```

Q5 Compute the page rank of each actor. This can be done using GraphFrames or by using RDDs and the iterative implementation of the PageRank algorithm. Do not take more than 5 iterations and use reset probility = 0.1.

List the top 10 actors / actresses by pagerank.

In [35]:
```
from graphframes import *
from pyspark.sql.types import *
from pyspark.sql.types import StructField
```

In [36]:
```
ActorA = StructField("ActorA",StringType(),True)
ActorB = StructField("ActorB",StringType(),True)

df_actors_link = sqlContext.createDataFrame(dist_pairs, StructType([ActorA, Ac
torB])).persist()
df_actors_link.show(1)
```

```
+---------+---------+
   ActorA|   ActorB|
+---------+---------+
nm3216408|nm0453304|
+---------+---------+
only showing top 1 row
```

In [37]:
```
df_cols = df_actors_link.select(df_actors_link['ActorA']).selectExpr("ActorA a
s id").distinct()
Rank_link = df_actors_link.selectExpr("ActorA as src", "ActorB as dst")
```

In [38]:
```
import graphframes.graphframe as gfm

ourGraph = gfm.GraphFrame(df_cols, Rank_link)
ourGraph.vertices.show()
ourGraph.edges.show()
```

```
+---------+
       id|
+---------+
nm0246570|
nm0352203|
nm0005258|
nm0000767|
nm0000354|
nm0000198|
nm0225216|
nm0350453|
nm0380489|
nm0397721|
nm1563338|
nm0046770|
nm0696810|
nm0505949|
nm2612218|
nm2267821|
nm1415658|
nm0048122|
nm0005535|
nm0118840|
+---------+
only showing top 20 rows

+---------+---------+
      src|      dst|
+---------+---------+
nm3216408|nm0453304|
nm0544425|nm0000778|
nm2507102|nm0102403|
nm0668271|nm0001151|
nm0429385|nm0005541|
nm0059847|nm0036924|
nm0000665|nm0000546|
nm0879203|nm0863831|
nm1231899|nm0695177|
nm0666140|nm0744037|
nm0373571|nm0003620|
nm0341176|nm1260957|
nm0467601|nm1204831|
nm0077720|nm0139716|
nm0994324|nm0945475|
nm0142972|nm0530365|
nm0878714|nm0000437|
nm0004418|nm0883305|
nm0049190|nm0820544|
nm0001092|nm0001295|
+---------+---------+
```

```
only showing top 20 rows
```

In [39]:
```
page_rank = ourGraph.pageRank(resetProbability=0.1, maxIter = 3)
page_rank.vertices.sort("pagerank", ascending = False).show(10)
#sortpagerank ascending = False).show(10) to get top 10
```

```
+---------+------------------+
       id|          pagerank|
+---------+------------------+
nm0000616|39.783048844356635|
nm0000514|23.417910767557924|
nm0001744|22.674253088847944|
nm0001803|20.265762987819404|
nm0004193| 17.40344156284936|
nm0000448|17.401842412643557|
nm0001698| 16.98356025044102|
nm0261724|16.024450112153453|
nm0920460|15.662074823121074|
nm0001424| 15.52518575030298|
+---------+------------------+
only showing top 10 rows
```

Q6: Create an RDD with the number of outDegrees for each actor. Display the top 10 by outDegrees.

In [41]:
```
ourGraph.outDegrees.sort('outDegree', ascending = False).show(10)
```

```
+---------+---------+
       id|outDegree|
+---------+---------+
nm0000616|      438|
nm0000514|      289|
nm0000367|      263|
nm0001744|      261|
nm0945189|      253|
nm0451600|      239|
nm0149822|      232|
nm0001803|      231|
nm0874676|      227|
nm0938893|      225|
+---------+---------+
only showing top 10 rows
```

Let's play Kevin's own game

Q7 Start with the graphframe / dataframe you developed in the previous section. Using Spark GraphFrame and/or Spark Core library perform the following steps:

1. Identify the id of Kevin Bacon, there are two actors named 'Kevin Bacon', we will use the one with the highest degree, that is, the one that participated in most titles;
2. Estimate the shortest path between every actor/actress in the database and Kevin Bacon, keep a dataframe with a column that includes the number of steps to Kevin Bacon as you will need it later (this will require a little processing to get from the graphframes output);
3. Summarise the data, that is, count the number of actors at each number of degress from kevin bacon (you will need to deal with actors unconnected to kevin bacon, if not connected to Kevin Bacon given these actors / actresses a score of 20). You could use the display() barchart functionality of databricks to easily display the distribution of the data.

Note: The solution time on this step can be ~15 minutes

In [43]:
```
df_filter.columns
```

```
Out[34]: ['tconst',
 'ordering',
 'nconst',
 'category',
 'job',
 'characters',
 'titleType',
 'primaryTitle',
 'originalTitle',
 'isAdult',
 'startYear',
 'endYear',
 'runtimeMinutes',
 'genres',
 'primaryName',
 'birthYear',
 'deathYear',
 'primaryProfession',
 'knownForTitles']
```

In [44]:
```
kb = df_filter.select("primaryName", "nconst")
```

In [45]:
```
#1
distances = kb.filter(filtered.primaryName == "Kevin Bacon").groupBy('nconst')
.count().sort('count', ascending = False)
distances.show(1)
```

```
+---------+-----+
   nconst|count|
+---------+-----+
nm0000102|   49|
+---------+-----+
```

In [46]:
```
shortest_path = ourGraph.shortestPaths(landmarks=["nm0000102"])
```

In [47]:
```
from pyspark.sql.functions import explode_outer

distances_value = shortest_path.select("id", explode_outer("distances"))
distances_value.show()
```

```
+----------+---------+-----+
        id|      key|value|
+----------+---------+-----+
 nm0057741|nm0000102|    4|
 nm0068551|nm0000102|    3|
 nm0309307|nm0000102|    3|
 nm2341870|nm0000102|    4|
 nm0067745|nm0000102|    4|
 nm1846114|nm0000102|    4|
 nm0190703|nm0000102|    4|
 nm0212603|     null| null|
 nm0269419|nm0000102|    3|
 nm3773942|nm0000102|    4|
 nm0111600|nm0000102|    3|
 nm7007994|nm0000102|    4|
 nm2058568|nm0000102|    4|
 nm0319244|nm0000102|    3|
 nm0505971|nm0000102|    2|
 nm3836963|nm0000102|    5|
 nm0588022|nm0000102|    4|
 nm8510546|nm0000102|    5|
 nm0001796|nm0000102|    3|
nm10364103|nm0000102|    5|
+----------+---------+-----+
only showing top 20 rows
```

In [48]:
```
actors_per_distance = distances_value.groupBy('value').count()
actors_per_distance.show()
```

```
+-----+-----+
value|count|
+-----+-----+
 null| 6489|
    1|  126|
    6| 2265|
    3|18311|
    5|13109|
    9|   16|
    4|29059|
    8|   51|
    7|  328|
   10|   12|
   11|    4|
    2| 3302|
    0|    1|
+-----+-----+
```

Exploring the data with RDD's

Using RDDs and (not dataframes) answer the following questions (if you loaded your data into spark in a dataframe you can convert to an RDD of rows easily using `.rdd`) :

Hint: paired RDD's will be useful.

Q8 Movies can have multiple genres. Considering only titles of the type 'movie' what is the combination of genres that is the most popluar (as measured by number of reviews)?

In [50]:
```
movies_type = df_filter.join(title_ratings,['tconst'])
```

In [51]:
```
movies_type.columns
```

```
Out[41]: ['tconst',
 'ordering',
 'nconst',
 'category',
 'job',
 'characters',
 'titleType',
 'primaryTitle',
 'originalTitle',
 'isAdult',
 'startYear',
 'endYear',
 'runtimeMinutes',
 'genres',
 'primaryName',
 'birthYear',
 'deathYear',
 'primaryProfession',
 'knownForTitles',
 'averageRating',
 'numVotes']
```

In [52]:
```
q8 = movies_type.select("genres", "numVotes")
title = q8.rdd.map(list).map(lambda x :(x[0], x[1]))
```

In [53]:
```
final_title_result = title.reduceByKey(lambda x,y: x+y).sortBy(lambda x: x[1],
False)
final_title_result.take(1)
```

```
Out[43]: [('Action,Adventure,Sci-Fi', 164525767)]
```

Q9 Movies can have multiple genres. Considering only titles of the type 'movie', and movies with more than 500 ratings, what is the combination of genres that has the highest **average movie rating** (you can average the movie rating for each movie in that genre combination).

In [55]:
```
Rdd_q9 = title_basics.rdd.map(lambda x:(x[0],(x[1],x[-1]))).join(title_ratings
.rdd.map(lambda x: (x[0],(x[1],x[2]))))
Rdd_q9.take(5)
```

```
Out[44]: [('tt0000001', (('short', 'Documentary,Short'), (5.6, 1619))),
 ('tt0000013', (('short', 'Documentary,Short'), (5.7, 1541))),
 ('tt0000031', (('short', 'Documentary,Short'), (5.5, 813))),
 ('tt0000038', (('short', 'Documentary,Short,Sport'), (4.1, 147))),
 ('tt0000057', (('short', 'Documentary,Short'), (4.7, 16)))]
```

In [56]:
```
movie = Rdd_q9.map(lambda x: (x[1][0][0],x[1][0][1],x[1][1][0],x[1][1][1]))
movie.take(5)
```

```
Out[45]: [('short', 'Documentary,Short', 5.6, 1619),
 ('short', 'Documentary,Short', 5.7, 1541),
 ('short', 'Documentary,Short', 5.5, 813),
 ('short', 'Documentary,Short,Sport', 4.1, 147),
 ('short', 'Documentary,Short', 4.7, 16)]
```

In [57]:
```
q9 = movie.filter(lambda x: (x[0] == 'movie') & (x[3] >= 500)).map(lambda x: (
x[1],x[2]))
q9.take(5)
```

```
Out[46]: [('Adventure,Drama,History', 7.1),
 ('Drama', 4.5),
 ('Adventure,Fantasy,Sci-Fi', 6.5),
 ('Action,Adventure', 5.7),
 ('Comedy', 6.6)]
```

In [58]:
```
Avg_q9 = q9.mapValues(lambda x: (x,1))
Avg_q9 = Avg_q9.reduceByKey(lambda x,y: (x[0]+y[0], x[1]+y[1])).mapValues(lamb
da x: x[0]/x[1]).sortBy(lambda x: x[1], False)
Avg_q9.take(1)
```

```
Out[47]: [('Music,Musical', 8.5)]
```

Q10 Movies can have multiple genres. What is **the individual genre** which is the most popular as meaured by number of votes. Votes for multiple genres count towards each genre listed.

Hint: Think about the wordcount exercise we have done with RDDs.

In [60]:
```
q10 = movie.filter(lambda x: (x[0] == 'movie')).map(lambda x: (x[1],x[3]))
q10.take(5)
```

```
Out[48]: [('Drama', 17),
 ('Drama', 12),
 ('\\N', 13),
 ('\\N', 17),
 ('Crime,Thriller', 12)]
```

In [61]:
```
rdd10_split = q10.map(lambda x: (x[0].split(","), x[1]))
rdd10_map = rdd10_split.flatMap(lambda x: [(y, int(x[1])) for y in x[0]]).redu
ceByKey(lambda x,y: x+y).sortBy(lambda x: x[1], False)
rdd10_map.take(1)
```

```
Out[89]: [('Drama', 405996518)]
```

Engineering the perfect cast

We have created a number of potential features for predicting the rating of a movie based on its cast. Use sparkML to build a simple linear model to predict the rating of a movie based on the following features:

1. The total number of movies in which the actors / actresses in the current movie have acted (based on Q3)
2. The average pagerank of the cast in each movie (based on Q5)
3. The average outDegree of the cast in each movie (based on Q6)
4. The average value for for the cast of degrees of Kevin Bacon (based on Q7).

If you were unable to generate any of these features as you could not answer the previous questions, just skip that particular feature.

You will need to create a dataframe with the required features and label. Use a pipeline to create the vectors required by sparkML and apply the model. Remember to split your dataset, leave 30% of the data for testing, when splitting your data use the option `seed=0` .

Q11 Provide the coefficients of the regression and the accuracy of your model on the test dataset according to RSME.

In [63]:
```
# Question 3 (SUM)
from pyspark.sql.types import *
from pyspark.sql.types import StructField

df_clean = df_final.map(lambda x: (x[0][0],x[0][1],x[1]))
```

```
Out[92]: [('nm0103977', 'Brahmanandam', 809),
 ('nm0007123', 'Mammootty', 379),
 ('nm0482320', 'Mohanlal', 343),
 ('nm0149822', 'Mithun Chakraborty', 332),
 ('nm0007106', 'Shakti Kapoor', 309),
 ('nm0415549', 'Jagathi Sreekumar', 303),
 ('nm0035067', 'Cüneyt Arkin', 294),
 ('nm0374974', 'Helen', 281),
 ('nm0534867', 'Madhu', 277),
 ('nm0004429', 'Dharmendra', 270),
 ('nm0000616', 'Eric Roberts', 256),
 ('nm0045119', 'Aruna Irani', 248),
 ('nm1894124', 'Seiji Nakamitsu', 245),
 ('nm0154164', 'Soumitra Chatterjee', 244),
 ('nm0453520', 'Ji-mee Kim', 244),
 ('nm0613417', 'Raza Murad', 241),
 ('nm0474820', 'Kiran Kumar', 232),
 ('nm0315553', 'Krishna Ghattamaneni', 232),
 ('nm0893449', 'Nedumudi Venu', 230),
 ('nm0764762', 'Sharada', 229),
 ('nm0352032', 'Kamal Haasan', 227),
 ('nm1001108', 'Yuri Izumi', 225),
 ('nm0695177', 'Prakash Raj', 224),
 ('nm0595934', 'Mohan Babu', 223),
 ('nm0419707', 'Jayasudha', 218),
 ('nm0419685', 'Jaya Prada', 215),
 ('nm0993695', 'Kayoko Sugi', 214),
 ('nm0004467', 'Satyanarayana Kaikala', 211),
 ('nm0482285', 'Lakshmi', 211),
 ('nm0451600', 'Anupam Kher', 206),
 ('nm2147526', 'Asrani', 205),
 ('nm0739418', 'Gloria Romero', 204),
 ('nm0764298', 'Vilma Santos', 201),
 ('nm0159159', 'Prem Chopra', 201),
 ('nm0329730', 'Suresh Gopi', 198),
 ('nm0004109', 'Gulshan Grover', 197),
 ('nm1069583', 'Shinji Kubo', 197),
 ('nm0420090', 'Jeetendra', 193),
 ('nm0707425', 'Rajinikanth', 189),
 ('nm0004469', 'Srinivasa Rao Kota', 188),
 ('nm0158112', 'Chiranjeevi', 187),
 ('nm0154146', 'Prasenjit Chatterjee', 186),
 ('nm0621937', 'Nassar', 184),
 ('nm0000821', 'Amitabh Bachchan', 183),
 ('nm0814734', 'Türkan Soray', 182),
 ('nm0430803', 'Mohan Joshi', 181),
 ('nm0994324', 'Yutaka Ikejima', 178),
 ('nm0938860', 'Kung-won Nam', 175),
 ('nm0793731', 'Shirô Shimomoto', 173),
 ('nm0320883', 'Fatma Girik', 171),
 ('nm0349347', 'Eddie Gutierrez', 171),
```

```
('nm0415556', 'Jagdeep', 171),
('nm0044796', 'Raj Babbar', 170),
('nm0006763', 'Jackie Shroff', 166),
('nm0590985', 'Yûichi Minato', 166),
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('nm0707399', 'Rajendra Prasad', 165),
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In [64]:
```
Id_actor = StructField("nconst",StringType(),True)
Movie = StructField("Movie",StringType(),True)
nvotes = StructField("TotalActs",StringType(),True)

final_dataframe = sqlContext.createDataFrame(df_clean, StructType([Id_actor, M
ovie,nvotes])).persist()
```

```
+----------+--------------+
    tconst|sum(TotalActs)|
+----------+--------------+
 tt3835486|          92.0|
 tt7860370|          64.0|
 tt0308851|          82.0|
 tt5357670|          57.0|
 tt3586950|          63.0|
 tt3355560|           6.0|
 tt2274007|          39.0|
 tt2169873|           5.0|
tt10788536|           8.0|
 tt3884798|          30.0|
 tt3887522|          30.0|
 tt4179840|          22.0|
 tt7209900|          71.0|
 tt7223904|          71.0|
 tt7229340|          71.0|
 tt7618978|          30.0|
 tt7625502|          30.0|
 tt2088382|           6.0|
 tt6302248|          65.0|
 tt0702398|           3.0|
+----------+--------------+
only showing top 20 rows
```

In [65]:
```
q11_MR = final_dataframe.join(title_principals,['nconst']).select(['nconst','T
otalActs','Movie','tconst']).distinct().groupBy('tconst').agg({'TotalActs':'su
m'})
q11_MR.show()
```

In [66]:
```
#Q5
rank_renamed = page_rank.vertices.withColumnRenamed('id','nconst')

q11_PR = rank_renamed.join(title_principals,'nconst').select(['tconst','ncons
t','pagerank']).distinct().groupBy('tconst').agg({'pagerank':'avg'})
q11_PR.show()
```

```
+----------+------------------+
    tconst|     avg(pagerank)|
+----------+------------------+
 tt3835486| 3.434041187049006|
 tt7860370| 4.178459854543034|
 tt0308851| 2.894842554684516|
 tt5357670|2.6987154184869393|
 tt3586950|3.0038843029997975|
 tt3355560|0.6448365075368346|
 tt2274007|1.3138991122555754|
 tt2169873|0.5810492369485097|
tt10788536| 0.633445120314059|
 tt3884798|1.2786099966876656|
 tt3887522|1.2786099966876656|
 tt4179840|1.1929589446056144|
 tt7209900|  1.67554651434356|
 tt7223904|  1.67554651434356|
 tt7229340|  1.67554651434356|
 tt7618978|0.7470865498323299|
 tt7625502|0.7470865498323299|
 tt2088382|0.5868120721579081|
 tt6302248|2.4295941020504177|
 tt0702398| 0.328289958489533|
+----------+------------------+
only showing top 20 rows
```

In [67]:
```
#Q6
df_out = ourGraph.outDegrees.withColumnRenamed("id","nconst")

q11_OD = df_out.join(title_principals,'nconst').select(['tconst','nconst','out
Degree']).distinct().groupBy('tconst').agg({'outDegree':'avg'})
q11_OD.show()
```

```
+----------+------------------+
    tconst|    avg(outDegree)|
+----------+------------------+
 tt3835486|             56.25|
 tt7860370|              74.0|
 tt0308851|              49.0|
 tt5357670|              44.0|
 tt3586950|              46.0|
 tt3355560|               6.5|
 tt2274007|13.833333333333334|
 tt2169873|               1.5|
tt10788536|               4.0|
 tt3884798|13.666666666666666|
 tt3887522|13.666666666666666|
 tt4179840|              11.0|
 tt7209900|             19.75|
 tt7223904|             19.75|
 tt7229340|             19.75|
 tt7618978|               7.2|
 tt7625502|               7.2|
 tt2088382|3.6666666666666665|
 tt6302248|              21.5|
 tt0702398|               2.0|
+----------+------------------+
only showing top 20 rows
```

In [68]:
```
#Q7
distance = distances_value.withColumnRenamed("id","nconst").withColumnRenamed(
"value","distance")

q11_DD = distance.join(title_principals,'nconst').select(['nconst','distance',
'tconst']).distinct().groupBy('tconst').agg({'distance':'avg'})
q11_DD.show()
```

```
+----------+------------------+
    tconst|     avg(distance)|
+----------+------------------+
 tt3835486|              2.25|
 tt7860370|               2.0|
 tt0308851|               2.5|
 tt5357670|2.6666666666666665|
 tt3586950|               3.0|
 tt3355560|               3.5|
 tt2274007|               2.8|
 tt2169873|               4.5|
tt10788536|               3.5|
 tt3884798|3.6666666666666665|
 tt3887522|3.6666666666666665|
 tt4179840|               4.0|
 tt7209900|              3.75|
 tt7223904|              3.75|
 tt7229340|              3.75|
 tt7618978|               4.0|
 tt7625502|               4.0|
 tt2088382| 4.333333333333333|
 tt6302248|               4.0|
 tt0702398| 4.333333333333333|
+----------+------------------+
only showing top 20 rows
```

In [69]:
```
all_together = q11_MR.join(q11_PR, ['tconst'],'inner').join(q11_OD, ['tconst'
], 'inner').join(q11_DD, ['tconst'],'inner').join(title_ratings, ["tconst"], h
ow="left_outer").drop('numVotes')
```

In [70]:
```
# df_out = spark.createDataFrame(ourGraph.outDegrees, schema=['nconst','OutDegree'])
df_out = ourGraph.outDegrees.withColumnRenamed("id","nconst")


q11_OD = df_out.join(title_principals,'nconst').select(['tconst','nconst','outDegree']).distinct().groupBy('tconst').agg({'outDegree':'avg'})
q11_OD.show()
```

```
+----------+------------------+
|    tconst|    avg(outDegree)|
+----------+------------------+
| tt3835486|             56.25|
| tt7860370|              74.0|
| tt0308851|              49.0|
| tt5357670|              44.0|
| tt3586950|              46.0|
| tt3355560|               6.5|
| tt2274007|13.833333333333334|
| tt2169873|               1.5|
|tt10788536|               4.0|
| tt3884798|13.666666666666666|
| tt3887522|13.666666666666666|
| tt4179840|              11.0|
| tt7209900|             19.75|
| tt7223904|             19.75|
| tt7229340|             19.75|
| tt7618978|               7.2|
| tt7625502|               7.2|
| tt2088382|3.6666666666666665|
| tt6302248|              21.5|
| tt0702398|               2.0|
+----------+------------------+
only showing top 20 rows
```

In [71]:
```
all_together_without_nan = all_together.na.drop()
```

In [72]:
```
#Don't need the tconst, numVotes and averageRating columns to create the features set
all_together_without_nan_without_tconst = all_together_without_nan.drop("tconst", "numVotes")
```

In [73]:
```
# Import LinearRegression class
from pyspark.ml.regression import LinearRegression
from pyspark.ml.evaluation import RegressionEvaluator
from pyspark.sql import Row
from pyspark.ml.linalg import Vectors

train_test = all_together_without_nan_without_tconst.randomSplit([0.7,0.3], se
ed=0)
train = train_test[0]
test = train_test[1]
```

In [74]:
```
from pyspark.ml.feature import VectorAssembler
features_Columns = all_together_without_nan_without_tconst.columns
features_Columns.remove("averageRating")
vectorAssembler = VectorAssembler(inputCols = features_Columns, outputCol = "f
eatures")
```

In [75]:
```
from pyspark.ml import Pipeline
model = LinearRegression(labelCol = "averageRating")

pipeline = Pipeline(stages = [vectorAssembler, model])
```

In [76]:
```
#Fitting the model
pipelineModel = pipeline.fit(train)
```

In [77]:
```
pred = pipelineModel.transform(test)
print('My pre final answer is:')
print(pred.show())
```

```
My pre final answer is:
+--------------+------------------+--------------+-------------+-------------+----
----------------+------------------+
sum(TotalActs)|      avg(pagerank)|avg(outDegree)|avg(distance)|averageRating|
features|        prediction|
+--------------+------------------+--------------+-------------+-------------+----
----------------+------------------+
           1.0|0.14825619416216257|           1.0|          4.0|          7.1|[1.0,
0.1482561941...| 6.970018327882341|
           1.0|0.15544664939831743|           1.0|          3.0|          6.9|[1.0,
0.1554466493...| 7.190115028803963|
           1.0|0.15544664939831743|           1.0|          3.0|          7.2|[1.0,
0.1554466493...| 7.190115028803963|
           1.0| 0.1560848019826317|           1.0|          4.0|          7.0|[1.0,
0.1560848019...| 6.969011626921726|
           1.0|0.16356841718510448|           1.0|          4.0|          3.7|[1.0,
0.1635684171...| 6.968049289455605|
           1.0|0.19027504434168363|           1.0|          4.0|          7.6|[1.0,
0.1902750443...| 6.964615015082705|
           1.0|0.19781134273910975|           1.0|          5.0|          7.2|[1.0,
0.1978113427...| 6.742624562759856|
           1.0|0.20335914470855318|           1.0|          5.0|          5.9|[1.0,
0.2033591447...| 6.741911156532335|
           1.0|0.22067750796135932|           1.0|          5.0|          6.9|[1.0,
0.2206775079...| 6.739684143336285|
           1.0| 0.2234198063954968|           1.0|          4.0|          6.6|[1.0,
0.2234198063...| 6.960352844264581|
           1.0|0.24542602176007688|           2.0|          3.0|          8.1|[1.0,
0.2454260217...|  7.18028291658288|
           1.0| 0.2639889702916298|           2.0|          3.0|          8.1|[1.0,
0.2639889702...| 7.177895858941583|
           1.0|0.26718868500129506|           3.0|          3.0|          7.4|[1.0,
0.2671886850...| 7.179222967711467|
           1.0| 0.2724191599951741|           1.0|          4.0|          7.1|[1.0,
0.2724191599...| 6.954051890446285|
           1.0|0.27991829736925433|           1.0|          4.0|          9.1|[1.0,
0.2799182973...| 6.953087556943905|
           1.0|  0.289161640773263|           3.0|          3.0|          5.7|[1.0,
0.2891616407...|7.1763974084050774|
           1.0| 0.2991571700085228|           4.0|          3.0|          6.8|[1.0,
0.2991571700...| 7.176850625779713|
           1.0|0.29943561453647044|           3.0|          3.0|          6.6|[1.0,
0.2994356145...| 7.175076251502861|
           1.0|0.31236270176388836|           1.0|          4.0|          7.5|[1.0,
0.3123627017...| 6.948915446931539|
           1.0| 0.3230245125249654|           1.0|          4.0|          5.0|[1.0,
0.3230245125...| 6.947544417065027|
+--------------+------------------+--------------+-------------+-------------+----
----------------+------------------+
only showing top 20 rows
```

```
None
```

In [78]:
```
from pyspark.ml.evaluation import RegressionEvaluator

RMSE = RegressionEvaluator(labelCol = "averageRating", predictionCol = "predic
tion", metricName = "rmse")
rmse = RMSE.evaluate(pred)

print('My final answer is: ' + str(rmse))
```

```
My final answer is: 1.335997160610406
```

Q12 What score would your model predict for the 1997 movie Titanic and how does this compare to it's actual score.

In [80]:
```
df_filter.filter((df_filter['primaryTitle'].isin(['Titanic'])) & (df_filter["s
tartYear"] == '1997')).select("tconst").show(1)
```

```
+---------+
   tconst|
+---------+
tt0120338|
+---------+
only showing top 1 row
```

In [81]:
```
toPredict = all_together.filter(all_together.tconst == "tt0120338")
```

In [82]:
```
#Preprocess to do the prediction
toPredict = pred.drop("tconst", "numVotes")
```

In [83]:
```
toPredict.show(1)
```

```
+--------------+------------------+--------------+-------------+-------------+----
----------------+-----------------+
sum(TotalActs)|      avg(pagerank)|avg(outDegree)|avg(distance)|averageRating|
features|       prediction|
+--------------+------------------+--------------+-------------+-------------+----
----------------+-----------------+
           1.0|0.14825619416216257|           1.0|          4.0|          7.1|[1.0,
0.1482561941...|6.970018327882339|
+--------------+------------------+--------------+-------------+-------------+----
----------------+-----------------+
only showing top 1 row
```

In [84]:
```
toPredict.select("averageRating",'prediction').show()
```

```
+-------------+------------------+
averageRating|        prediction|
+-------------+------------------+
          7.1| 6.970018327882339|
          6.9|7.1901150288039535|
          7.2|7.1901150288039535|
          7.0|6.9690116269217235|
          3.7| 6.968049289455603|
          7.6| 6.964615015082702|
          7.2| 6.742624562759861|
          5.9| 6.741911156532341|
          6.9| 6.739684143336291|
          6.6|6.9603528442645795|
          8.1|  7.18028291658287|
          8.1| 7.177895858941573|
          7.4| 7.179222967711457|
          7.1| 6.954051890446284|
          9.1| 6.953087556943904|
          5.7| 7.176397408405068|
          6.8| 7.176850625779704|
          6.6| 7.175076251502852|
          7.5|6.9489154469315375|
          5.0| 6.947544417065026|
+-------------+------------------+
only showing top 20 rows
```

Q13 Create dummy variables for each of the top 10 movie genres from **Q10**. These variable should have a value of 1 if the movie was rated with that genre and 0 otherwise. For example the 1997 movie Titanic should have a 1 in the dummy variable column for Romance, and a 1 in the dummy variable column for Drama, and 0's in all the other dummy variable columns.

If you were unable to answer Q10 you can just select 10 different genres and construct the same data.

Note: Question 10 uses the number of votes per genre and not the average votes per genre.

Does adding these variables to the regression improve your results? What is the new RMSE and predicted rating for the 1997 movie Titanic.

In [86]:
```
rdd10_map.take(10)
```

```
Out[359]: [('Drama', 405996518),
 ('Action', 255651018),
 ('Comedy', 245067542),
 ('Adventure', 219323086),
 ('Crime', 149530637),
 ('Thriller', 138627057),
 ('Sci-Fi', 105588895),
 ('Romance', 103837192),
 ('Fantasy', 80317716),
 ('Mystery', 78414283)]
```

In [87]:
```
df_filter.columns
```

```
Out[360]: ['tconst',
 'ordering',
 'nconst',
 'category',
 'job',
 'characters',
 'titleType',
 'primaryTitle',
 'originalTitle',
 'isAdult',
 'startYear',
 'endYear',
 'runtimeMinutes',
 'genres',
 'primaryName',
 'birthYear',
 'deathYear',
 'primaryProfession',
 'knownForTitles']
```

In [88]:
```
# from pyspark.sql import functions as F

# df = sqlContext.createDataFrame([
#     (1, "a"),
#     (2, "b"),
#     (3, "c"),
# ], ["ID", "Text"])

# categories = df.select("Text").distinct().rdd.flatMap(lambda x: x).collect()

# exprs = [F.when(F.col("Text") == category, 1).otherwise(0).alias(category)
#          for category in categories]

# df.select("ID", *exprs).show()

movie_genre = df_filter.rdd.map(lambda x: (x[13], x[0]))
```

In [89]:
```
movie_genre.take(1)
```

```
Out[362]: [('Biography,Drama,Music', 'tt0110116')]
```

In [90]:
```
movie_genre = movie_genre.map(lambda x: (x[0].split(','),x[1])).map(lambda x:
[(y, x[1]) for y in x[0]]).flatMap(lambda x: x)
```

In [91]:
```
movie_genre.take(1)
```

```
Out[364]: [('Biography', 'tt0110116')]
```

In [92]:
```
from pyspark.sql.types import *
from pyspark.sql.types import StructField
from pyspark.sql.functions import regexp_replace,col

movie_genre = movie_genre.map(lambda x: (x[1],x[0]))

tconts = StructField("ID",StringType(), True)
genre = StructField("genre",StringType(), True)

dummy = sqlContext.createDataFrame(movie_genre, StructType([tconts, genre]))
genre = rdd10_map.map(lambda x: x[0]).take(10)
```

In [93]:
```
dummy = dummy.filter(dummy.genre.isin(genre))
```

In [94]:
```
dummy.show(1)
```

```
+---------+-----+
       ID|genre|
+---------+-----+
tt0110116|Drama|
+---------+-----+
only showing top 1 row
```

In [95]:
```
from pyspark.sql import functions as func
dummy = dummy.groupBy("ID").pivot("genre").agg(func.lit(1)).na.fill(0)
```

In [96]:
```
dummy.columns
```

```
Out[370]: ['ID',
 'Action',
 'Adventure',
 'Comedy',
 'Crime',
 'Drama',
 'Fantasy',
 'Mystery',
 'Romance',
 'Sci-Fi',
 'Thriller']
```

In [97]:
```
dummy.show(5)
```

```
+---------+------+---------+------+-----+-----+-------+-------+-------+------+-----
---+
       ID|Action|Adventure|Comedy|Crime|Drama|Fantasy|Mystery|Romance|Sci-Fi|Thrill
er|
+---------+------+---------+------+-----+-----+-------+-------+-------+------+-----
---+
tt0089167|     0|        0|     1|    0|    0|      0|      0|      0|     0|
0|
tt0098048|     1|        0|     0|    0|    0|      1|      0|      0|     1|
0|
tt8400856|     0|        0|     1|    0|    1|      0|      0|      0|     0|
0|
tt3055374|     0|        0|     0|    0|    0|      0|      0|      0|     0|
1|
tt0074792|     0|        0|     0|    1|    1|      0|      0|      0|     0|
1|
+---------+------+---------+------+-----+-----+-------+-------+-------+------+-----
---+
only showing top 5 rows
```

In [98]:
```
Final_dummy = all_together_without_nan.join(dummy, all_together_without_nan.tc
onst == dummy.ID, how = 'left').na.fill(0)
```

In [99]:
```
Final_dummy.show(1)
```

In [100]:
```
#With the new dummy model
train_test = Final_dummy.randomSplit([0.7,0.3], seed=0)
train = train_test[0]
test = train_test[1]

from pyspark.ml.feature import VectorAssembler
features_Columns = Final_dummy.columns
features_Columns.remove("averageRating")
vectorAssembler = VectorAssembler(inputCols = features_Columns, outputCol = "f
eatures")

from pyspark.ml import Pipeline
model = LinearRegression(labelCol = "averageRating")

pipeline = Pipeline(stages = [vectorAssembler, model])
#Fitting the model
pipelineModel = pipeline.fit(train)
pred = pipelineModel.transform(test)
print('My pre final answer is:')
print(pred.show())
```

Q14 Improve your model by testing different machine learning algorithms, using hyperparameter tuning on these algorithms, changing the included features. Be careful not to cheat and use test data in the training of your model.

Note: We are not testing your knowledge of different algorithms, we are just testing that you can apply the different tools in the spark toolkit and can compare between them.

What is the RMSE of you final model and what rating does it predict for the 1997 movie Titanic.

In [102]:
```
from pyspark.ml.feature import VectorAssembler
features_Columns = all_together_without_nan_without_tconst.columns
features_Columns.remove("averageRating")
vectorAssembler = VectorAssembler(inputCols = features_Columns, outputCol = "f
eatures")
```

In [103]:
```
from pyspark.ml.regression import GBTRegressor  # GBT
from pyspark.ml.regression import RandomForestRegressor  # RF

train_test = all_together_without_nan_without_tconst.randomSplit([0.7,0.3], se
ed=0)
train = train_test[0]
test = train_test[1]

from pyspark.ml import Pipeline
GBTmodel = GBTRegressor(labelCol = "averageRating")
```

In [104]:
```
from pyspark.ml.tuning import CrossValidator, ParamGridBuilder
paramGrid = ParamGridBuilder().addGrid(GBTmodel.maxDepth, [4,8]).build()

evaluator = RegressionEvaluator(metricName="rmse", labelCol=GBTmodel.getLabelC
ol(), predictionCol=GBTmodel.getPredictionCol())
cv = CrossValidator(estimator = GBTmodel, evaluator = evaluator, estimatorPara
mMaps=paramGrid)
```

In [105]:
```
pipeline = Pipeline(stages=[vectorAssembler, vectorIndexer, cv])
```

In [106]:
```
pipelineModel = pipeline.fit(train)
pred = pipelineModel.transform(test)
print('My pre final answer is:')
print(pred.show())
```