

# Software Engineer Test Case

## Task 1.1

1. What is the % of symbols from table bars\_1 for which the following condition is satisfied:

`Adj.Close(t) > Average(Adj_close{t-40:t})` for at least one t in 2019 ?

SQL query:

```
WITH all_symbols AS (SELECT COUNT(DISTINCT symbol) as all_symbols
                     FROM bars_1),
     filtered_symbols AS (SELECT COUNT(DISTINCT symbol) as filtered_symbols
                        FROM (SELECT symbol,
                                      "date",
                                      adj_close,
                                      AVG(adj_close)
                                      OVER (PARTITION BY symbol ORDER BY "date" ROWS BETWEEN 39 PRECEDING AND CURRENT ROW) as avg_40
                        FROM bars_1
                        WHERE "date" BETWEEN '2019-01-01' AND '2019-12-31'
                        and adj_close is not null) sub
                        WHERE adj_close > avg_adj_close_40)
SELECT (filtered_symbols * 1.0 / all_symbols) * 100 as percentage
FROM all_symbols,
     filtered_symbols;
```

Answer: `97.9166666666666667`

2. Write a SQL query to calculate the average dollar volume (dollar volume = Adj Close \* Volume) in February 2019. What is the average dollar volume in February 2019?

SQL query :

```
SELECT AVG(adj_close * volume) as avg_dollar_volume
FROM bars_1
WHERE "date" BETWEEN '2019-02-01' AND '2019-02-28';
```

Answer : `301975497.05271081208773`

3. Rank stocks in 2015 by Positive Volume in ascending order.

`Positive Volume(t) = Volume(t) if Adj.Close(t) >= Adj.Close(t-1) else 0 .`

SQL query :

```
WITH positive_volume AS (SELECT symbol,
                              "date",
                              CASE
                                WHEN adj_close >= lag(adj_close) OVER (PARTITION BY symbol ORDER BY "date")
                                THEN volume
                                ELSE 0
                              END as positive_volume
                        FROM bars_1
                        WHERE "date" BETWEEN '2015-01-01' AND '2015-12-31')
SELECT symbol, SUM(positive_volume) as total_positive_volume
FROM positive_volume
GROUP BY symbol
ORDER BY total_positive_volume;
```

Answer :

### task 1.1.3

Aa symbol	# total_positive_volume
<u>LUV</u>	416074000
<u>BBY</u>	283741600

Aa symbol	# total_positive_volume
<u>BIIB</u>	144481400
<u>KMX</u>	80877400
<u>BK</u>	378679200
<u>CDNS</u>	223711100
<u>UPS</u>	154048100
<u>VZ</u>	934048100
<u>SWKS</u>	279720200
<u>ATVI</u>	535466600
<u>TMUS</u>	306698800
<u>BWA</u>	88415700
<u>CRM</u>	310007500
<u>CZR</u>	11012900
<u>TRV</u>	129671900
<u>TYL</u>	15341200
<u>WM</u>	137492000
<u>UNP</u>	289152000
<u>AMD</u>	896602700
<u>CARR</u>	0
<u>TDY</u>	12546300
<u>SYK</u>	85754500
<u>TWTR</u>	1175519100
<u>AVB</u>	46853100
<u>VFC</u>	144782669
<u>SO</u>	341758900
<u>ZTS</u>	235494200
<u>SLB</u>	500425000
<u>UNH</u>	0
<u>VICI</u>	0
<u>BAC</u>	4841504600
<u>AMCR</u>	6800
<u>SRE</u>	68394900
<u>WELL</u>	130885800
<u>TECH</u>	11916700
<u>APH</u>	143931600
<u>WYNN</u>	163255400
<u>BAX</u>	404326758
<u>BA</u>	250455700
<u>CTLT</u>	48140200
<u>SBNY</u>	28462200
<u>SYF</u>	214002300
<u>USB</u>	455937900
<u>AAPL</u>	11486728800
<u>SIVB</u>	23341700
<u>AKAM</u>	91558100
<u>NOW</u>	104500000
<u>WDC</u>	120349200
<u>BXP</u>	44612800
<u>CHRW</u>	82988700

Aa symbol	# total_positive_volume
<u>AVGO</u>	207598900
<u>AWK</u>	63273100
<u>CPB</u>	125559400
<u>WMT</u>	422601200
<u>CCL</u>	240228300
<u>VLO</u>	397265500
<u>WBD</u>	227916100
<u>ABT</u>	416565700
<u>TSCO</u>	67660500
<u>ULTA</u>	59947500
<u>WRB</u>	93353850
<u>BRK-B</u>	188497100
<u>URI</u>	132636600
<u>VTRS</u>	490843500
<u>WRK</u>	57128331
<u>BDX</u>	76629223
<u>ADBE</u>	220316600
<u>TROW</u>	86095300
<u>GOOGL</u>	137712500
<u>GOOG</u>	143967203
<u>BMJ</u>	409005000
<u>SNA</u>	27985600
<u>TPR</u>	253264400
<u>AMGN</u>	241102200
<u>AFL</u>	294438800
<u>BKNG</u>	41673300
<u>UHS</u>	55305800
<u>MMM</u>	145858300
<u>AIG</u>	504636300
<u>VTR</u>	156889126
<u>ANSS</u>	24459600
<u>WST</u>	19492800
<u>ALK</u>	92979800
<u>TXN</u>	379733200
<u>AAL</u>	750725000
<u>SHW</u>	120895500
<u>TSN</u>	331166500
<u>WY</u>	185212700
<u>VRSN</u>	75603600
<u>ABBV</u>	602908700
<u>ATO</u>	34014800
<u>BSX</u>	789662300
<u>A</u>	177665500
<u>WBA</u>	240155700
<u>BALL</u>	135387400
<u>AES</u>	367851500
<u>AEE</u>	104899000
<u>ADP</u>	117997200

Aa symbol	# total_positive_volume
<u>APA</u>	297513400
<u>TER</u>	0
<u>ABC</u>	151614000
<u>VMC</u>	75956500
<u>SEE</u>	152579500
<u>VRSK</u>	93583600
<u>BR</u>	50408300
<u>WMB</u>	523468600
<u>ADI</u>	160705900
<u>ALB</u>	86043100
<u>WTW</u>	26145449
<u>TMO</u>	110623400
<u>AEP</u>	164632000
<u>YUM</u>	376047253
<u>TEL</u>	127901500
<u>ADSK</u>	163231100
<u>BKR</u>	220477000
<u>TDG</u>	25359000
<u>WEC</u>	148710400
<u>CBOE</u>	40826100
<u>AXP</u>	327283800
<u>CPT</u>	47649500
<u>AJG</u>	67295600
<u>APD</u>	75940469
<u>UDR</u>	121997000
<u>CAH</u>	135086500
<u>MO</u>	517310800
<u>TJX</u>	368146000
<u>AON</u>	78866500
<u>AVY</u>	64542600
<u>ALGN</u>	48272600
<u>TFC</u>	248447600
<u>ALLE</u>	42123700
<u>V</u>	572189200
<u>ZION</u>	188208300
<u>STI</u>	136590000
<u>BIO</u>	9451600
<u>AIZ</u>	49995600
<u>CAT</u>	291030700
<u>TXI</u>	134343900
<u>BBWI</u>	130054348
<u>WAB</u>	35315000
<u>ACN</u>	178225500
<u>SPGI</u>	92842700
<u>BF-B</u>	102242500
<u>WFC</u>	1080782600
<u>SWK</u>	83436200
<u>ALL</u>	145886800

Aa symbol	# total_positive_volume
<u>ANET</u>	196733200
<u>CBRE</u>	118238600
<u>ARE</u>	24017900
<u>ZBH</u>	70910144
<u>AMT</u>	112468900
<u>SPG</u>	99112900
<u>STE</u>	45749800
<u>SEDG</u>	44847700
<u>ZBRA</u>	31708100
<u>WAT</u>	33248700
<u>AOS</u>	93719600
<u>AZO</u>	18906700
<u>SYN</u>	338940800
<u>COF</u>	188924000
<u>AAP</u>	62504400
<u>XYL</u>	71225500
I	2512103451
<u>SBAC</u>	62691100
<u>ABMD</u>	42256000
<u>XEL</u>	204251600
<u>BLK</u>	37852000
<u>SJM</u>	59776300
<u>GWW</u>	41377600
<u>TTWO</u>	107738300
<u>TGT</u>	290494300
<u>AMP</u>	70124900
<u>AME</u>	74535700
<u>SLA</u>	1274253000
<u>SNPS</u>	53655800
<u>APT</u>	170030779
<u>VNO</u>	52311557
<u>TFX</u>	20122200
<u>AMAT</u>	935733500
<u>UAL</u>	419547800
<u>ADM</u>	214358400
<u>VRTX</u>	110656900
<u>WHR</u>	54895000
<u>LNT</u>	75710200
<u>SBUX</u>	670669100
<u>AMZN</u>	6211682000
<u>STX</u>	259869100
<u>BRO</u>	69783600
<u>TRMB</u>	114668000
II	175454942

4. For each stock, calculate Average Absolute Daily Percent Change  
Average Absolute Daily Percent Change = Mean[Abs(Daily % changes for a stock)]

```
WITH daily_pct_change AS (SELECT symbol,
                                "date",
                                (adj_close - lag(adj_close) OVER (PARTITION BY symbol ORDER BY "date")) /
```

```

lag(adj_close) OVER (PARTITION BY symbol ORDER BY "date") as pct_change
FROM bars_1)
SELECT symbol, AVG(ABS(pct_change)) as avg_abs_daily_pct_change
FROM daily_pct_change
GROUP BY symbol;

```

Answer :

#### task 1\_1\_4

Aa symbol	# avg_abs_daily_pct_change
<u>A</u>	0.016835465015937266
<u>AAL</u>	0.03165722661907242
<u>AAP</u>	0.017367176141869112
<u>AAPL</u>	0.017417351815409682
<u>ABBV</u>	0.01650511640534908
<u>ABC</u>	0.015174546367049008
<u>ABMD</u>	0.026678252079807865
<u>ABT</u>	0.012784703192168838
<u>ACN</u>	0.01386318891149173
<u>ADBE</u>	0.018017026947129117
<u>ADI</u>	0.01656737492329858
<u>ADM</u>	0.015596514437851457
<u>ADP</u>	0.012626039732967663
<u>ADSK</u>	0.021774291451951037
<u>AEE</u>	0.012160863521421771
<u>AEP</u>	0.01145069413888168
<u>AES</u>	0.0178894756538713
<u>AFL</u>	0.014689636430777456
<u>AIG</u>	0.01975908349414473
<u>AIZ</u>	0.01449024660138989
<u>AJG</u>	0.01169442449802394
<u>AKAM</u>	0.019602545139636364
<u>ALB</u>	0.022149450795508906
<u>ALGN</u>	0.025098565874978353
<u>ALK</u>	0.0227734244304186
<u>ALL</u>	0.013037557714420035
<u>ALLE</u>	0.015295694697568894
<u>AMAT</u>	0.021971884314121806
<u>AMCR</u>	0.010367938144218266
<u>AMD</u>	0.033169503057576065
<u>AME</u>	0.01450076900777212
<u>AMGN</u>	0.014468529085380526
<u>AMP</u>	0.01844988317799127
<u>AMT</u>	0.013895897630093582
<u>AMZN</u>	0.019079444755449287
<u>ANET</u>	0.025375653130632007
<u>ANSS</u>	0.01645692878314926
<u>AON</u>	0.012719949519403822
<u>AOS</u>	0.0164926394749221
<u>APA</u>	0.02788681281124251
<u>APD</u>	0.013347580366253274

Aa symbol	# avg_abs_daily_pct_change
<u>APH</u>	0.014168285606345659
<u>APT</u>	0.020152215765964435
<u>ARE</u>	0.013744828370338058
<u>ATO</u>	0.01176573134288116
<u>ATVI</u>	0.018047350777406383
<u>AVB</u>	0.01394478189736507
<u>AVGO</u>	0.021195102126960658
<u>AVY</u>	0.0160558665016837
<u>AWK</u>	0.012062989362890035
<u>AXP</u>	0.015715823769399288
<u>AZO</u>	0.01343141661681088
<u>BA</u>	0.019880455957422553
<u>BAC</u>	0.020450867847099926
<u>BALL</u>	0.013764594189509658
<u>BAX</u>	0.01315547987271473
<u>BBWI</u>	0.02414744930701399
<u>BBY</u>	0.023840618686380807
<u>BDX</u>	0.012068934370786271
<u>BF-B</u>	0.013422803390976117
<u>BIIB</u>	0.0200957598149563
<u>BIO</u>	0.014675690137149224
<u>BK</u>	0.016335653405880186
<u>BKNG</u>	0.020213462573093637
<u>BKR</u>	0.023135462662676916
<u>BLK</u>	0.01620212157399133
<u>BMJ</u>	0.013450779519780779
<u>BR</u>	0.013700154376849944
<u>BRK-B</u>	0.011273386012190474
<u>BRO</u>	0.012763640030477832
<u>BSX</u>	0.017570975400804472
<u>BWA</u>	0.021875512507707535
<u>BXP</u>	0.0150244831736302
<u>CAH</u>	0.015665207466705525
<u>CARR</u>	0.024185041079539147
<u>CAT</u>	0.018260189266639467
<u>CBOE</u>	0.015085087143121801
<u>CBRE</u>	0.020026147337680048
<u>CCL</u>	0.023776629739108743
<u>CDNS</u>	0.018217668093355528
<u>CDW</u>	0
<u>CHRW</u>	0.01443433069940088
<u>COF</u>	0.01929624117155113
<u>CPB</u>	0.01256359076575898
<u>CPT</u>	0.014061702870316379
<u>CRM</u>	0.0209677045218809
<u>CTLT</u>	0.021083714083096835
<u>CZR</u>	0.03336409232911281
<u>GOOG</u>	0.015855189581904135

Aa symbol	# avg_abs_daily_pct_change
<u>GOOGL</u>	0.015541275615797844
<u>GWW</u>	0.015890200904763317
<u>KMX</u>	0.020692464005853794
<u>LNT</u>	0.011923238914784789
<u>LUV</u>	0.019629016688656062
<u>MMM</u>	0.012266047820172831
<u>MO</u>	0.012114145517277752
<u>NOW</u>	0.02514618932918648
<u>RCL</u>	0.04494374760076472
<u>SBAC</u>	0.014303937758978336
<u>SBNY</u>	0.01955234093232217
<u>SBUX</u>	0.015572010244702826
<u>SEDG</u>	0.037210875665254814
<u>SEE</u>	0.017423763045165786
<u>SHW</u>	0.014463684256761275
<u>SIVB</u>	0.023022250962848795
<u>SJM</u>	0.012724338747637684
<u>SLB</u>	0.021028499432282494
<u>SNA</u>	0.015481474585786987
<u>SNPS</u>	0.014355429751143118
<u>SO</u>	0.01057263462084993
<u>SPG</u>	0.01699640491041413
<u>SPGI</u>	0.01439607968429101
<u>SRE</u>	0.0123828050138369
<u>STE</u>	0.014596540690611368
<u>STI</u>	0.01852679267694994
<u>STX</u>	0.02456035129999435
<u>SWK</u>	0.017257973046307516
<u>SWKS</u>	0.024320365185392052
<u>SYF</u>	0.020857059570401574
<u>SYK</u>	0.01404991291779435
<u>SYY</u>	0.013252728078635636
<u>I</u>	0.01137112082182383
<u>TDG</u>	0.017062327428206712
<u>TDY</u>	0.015757408916555412
<u>TECH</u>	0.01583851711136808
<u>TEL</u>	0.016370551184894753
<u>TER</u>	0
<u>TFC</u>	0.01685690848087335
<u>TFX</u>	0.014596499737728192
<u>TGT</u>	0.015314550035634053
<u>TJX</u>	0.013825214936649944
<u>TMO</u>	0.014844158731671728
<u>TMUS</u>	0.020039074210648752
<u>TPR</u>	0.023009664854146822
<u>TRMB</u>	0.01969078448568699
<u>TROW</u>	0.01590622901891898
<u>TRV</u>	0.012093556049748258



Aa symbol	# avg_abs_daily_pct_change
<u>TSCO</u>	0.017567934091754202
<u>TSLA</u>	0.03441604985411143
<u>TSN</u>	0.016466662380221236
<u>TI</u>	0.01627420481746528
<u>TIWO</u>	0.02142094236393179
<u>TWTR</u>	0.031390105604076075
<u>TXN</u>	0.01616337652623928
<u>TXI</u>	0.02072084653326039
<u>TYL</u>	0.017027452692576297
<u>UAL</u>	0.027936986856374763
<u>UDR</u>	0.014330993731019172
<u>UHS</u>	0.018568054344592383
<u>ULTA</u>	0.021728039828465658
<u>UNH</u>	0
<u>UNP</u>	0.01524100771973052
<u>UPS</u>	0.013034200271312609
<u>URI</u>	0.028935198740777882
<u>USB</u>	0.014677480043200682
<u>V</u>	0.015046740469773357
<u>VFC</u>	0.01695800302406195
<u>VICI</u>	0.018056644958880114
<u>VLO</u>	0.023640865614435486
<u>VMC</u>	0.020566318706764276
<u>VNO</u>	0.016115148098084363
<u>VRSK</u>	0.011857963418608088
<u>VRSN</u>	0.01475264770013247
<u>VRTX</u>	0.02304562136629697
<u>VTR</u>	0.016972712367118798
<u>VTRS</u>	0.02116660440267367
<u>VZ</u>	0.010584876193281474
<u>WAB</u>	0.018477723448196155
<u>WAT</u>	0.014812570290552236
<u>WBA</u>	0.016200309043602493
<u>WBD</u>	0.021658895775163833
<u>WDC</u>	0.026089041268267874
<u>WEC</u>	0.011394819662349167
<u>WELL</u>	0.015496326870156181
<u>WFC</u>	0.017065769787807467
<u>WHR</u>	0.02110583459152327
<u>WM</u>	0.011149634680395353
<u>WMB</u>	0.020444627383880996
<u>WMT</u>	0.010601538064333095
<u>WRB</u>	0.01179805805044628
<u>WRK</u>	0.022129008025056487
<u>WST</u>	0.015569267421193217
<u>WTW</u>	0.012554231391412566
<u>WY</u>	0.01784842118573482
<u>WYNN</u>	0.02779637183651408

Aa symbol	# avg_abs_daily_pct_change
<u>XEL</u>	0.011389217688968473
<u>XYL</u>	0.015193920342815338
<u>YUM</u>	0.013767414166635903
<u>ZBH</u>	0.015034452743616965
<u>ZBRA</u>	0.019967760012754524
<u>ZION</u>	0.021291689437155224
<u>ZTS</u>	0.014548754443895494