Чепоков Елизар ПИ-18-2

НИС №3 "Практическая работа с базой данных временных рядов InfluxDB, средой визуализации Grafana и языком программирования Python"

1. Ссылки на "авторитетов"
   Найти фамилии ученых, мирового уровня, имеющих самые высокие индексы Хирша (цитирование) и эти индексы выписать, по теме анализа данных в IoT. Выпишите, где они работают и их регалии (должности, ученая степень, награды). Смотрим базы данных Scopus, Web of science, IEEE

   M A Hossain (Professor of Computer Science, <u>University of Northumbria at Newcastle</u>)

   https://scholar.google.com/citations?user=etPAW2cAAAAJ&hl=en

   h-index: 83

   Awards:

   1996: IET-F C Williams 1996
   2010: Best Paper Award
   2012: IEEE Fellow

--2)-Импорт-данных-в-InfluxDB-с-помощью-скрипта-на-Python-----
-----из-csv-файла---

--3)-Вывести-содержимое-измерения-cluster3-------------------
select pressure1 from cluster3 limit 20
precision rfc3339
use cluster3
select * from cluster3

```
> select * from cluster3
name: cluster3
time                 pressure1 pressure2 pressure3 pressure4 pressure5 well
----                 --------- --------- --------- --------- --------- ----
2019-01-01T00:00:00Z 0.302     0.579     0.772     11.915    10.989    ID0100
2019-01-01T00:30:00Z 0.333     0.582     0.773     11.138    9.905     ID0100
2019-01-01T01:00:00Z 0.549     0.582     0.779     10.629    9.577     ID0100
2019-01-01T01:30:00Z 0.301     0.581     0.78      9.5       10.034    ID0100
2019-01-01T02:00:00Z 0.522     0.577     0.781     10.055    8.072     ID0100
2019-01-01T02:30:00Z 0.286     0.578     0.784     9.199     8.105     ID0100
2019-01-01T03:00:00Z 0.252     0.579     0.784     7.692     7.19      ID0100
2019-01-01T03:30:00Z 0.238     0.585     0.784     7.028     6.456     ID0100
2019-01-01T04:00:00Z 0.158     0.585     0.79      6.197     5.952     ID0100
2019-01-01T04:30:00Z 0.274     0.589     0.791     5.992     5.082     ID0100
2019-01-01T05:00:00Z 0.226     0.592     0.794     5.846     5.485     ID0100
2019-01-01T05:30:00Z 0.247     0.589     0.789     5.481     4.758     ID0100
2019-01-01T06:00:00Z 0.196     0.59      0.787     5.467     4.656     ID0100
2019-01-01T06:30:00Z 0.168     0.586     0.785     4.943     4.446     ID0100
2019-01-01T07:00:00Z 0.181     0.587     0.782     5.602     4.248     ID0100
2019-01-01T07:30:00Z 0.251     0.592     0.785     5.036     4.06      ID0100
2019-01-01T08:00:00Z 0.2       0.584     0.781     5.758     4.4       ID0100
2019-01-01T08:30:00Z 0.282     0.59      0.789     5.831     4.858     ID0100
2019-01-01T09:00:00Z 0.259     0.591     0.786     5.439     5.225     ID0100
2019-01-01T09:30:00Z 0.18      0.59      0.784     6.007     6.312     ID0100
2019-01-01T10:00:00Z 0.217     0.595     0.785     6.333     7.283     ID0100
2019-01-01T10:30:00Z 0.406     0.596     0.783     6.287     6.295     ID0100
2019-01-01T11:00:00Z 0.427     0.589     0.782     7.919     5.983     ID0100
2019-01-01T11:30:00Z 0.329     0.589     0.778     8.568     6.505     ID0100
2019-01-01T12:00:00Z 0.331     0.299     0.78      8.142     7.393     ID0100
2019-01-01T12:30:00Z 0.336     0.291     0.789     8.528     8.538     ID0100
2019-01-01T13:00:00Z 0.276     0.228     0.781     9.996     8.028     ID0100
2019-01-01T13:30:00Z 0.386     0.229     0.78      9.774     8.863     ID0100
2019-01-01T14:00:00Z 0.367     0.229     0.782     10.062    8.461     ID0100
2019-01-01T14:30:00Z 0.585     0.233     0.784     10.147    9.592     ID0100
2019-01-01T15:00:00Z 0.487     0.227     0.812     10.287    9.358     ID0100
2019-01-01T15:30:00Z 0.428     0.233     0.785     10.239    10.106    ID0100
2019-01-01T16:00:00Z 0.47      0.228     0.78      10.28     8.978     ID0100
2019-01-01T16:30:00Z 0.278     0.22      0.767     9.561     11.709    ID0100
2019-01-01T17:00:00Z 0.36      0.373     0.762     11.003    12.279    ID0100
2019-01-01T17:30:00Z 0.445     0.437     0.763     11.505    12.721    ID0100
2019-01-01T18:00:00Z 0.419     0.553     0.787     12.241    12.438    ID0100
2019-01-01T18:30:00Z 0.462     0.568     0.791     13.525    11.315    ID0100
2019-01-01T19:00:00Z 0.531     0.576     0.798     12.267    11.991    ID0100
2019-01-01T19:30:00Z 0.378     0.579     0.821     12.355    11.289    ID0100
2019-01-01T20:00:00Z 0.316     0.622     0.851     12.527    11.443    ID0100
2019-01-01T20:30:00Z 0.391     0.594     0.856     12.682    11.275    ID0100
2019-01-01T21:00:00Z 0.218     0.582     0.86      12.804    10.719    ID0100
2019-01-01T21:30:00Z 0.238     0.588     0.857     12.475    11.177    ID0100
2019-01-01T22:00:00Z 0.215     0.588     0.858     12.905    10.65     ID0100
2019-01-01T22:30:00Z 0.245     0.599     0.855     12.613    9.932     ID0100
2019-01-01T23:00:00Z 0.304     0.62      0.86      11.373    11.298    ID0100
2019-01-01T23:30:00Z 0.253     0.589     0.868     11.093    10.827    ID0100
2019-01-02T00:00:00Z 0.275     0.583     0.865     10.991    9.826     ID0100
2019-01-02T00:30:00Z 0.176     0.59      0.865     8.852     8.572     ID0100
2019-01-02T01:00:00Z 0.14      0.582     0.871     7.955     7.313     ID0100
```

--4)-Вывести-первые-20-строк-значений-pressure1--------------
-----из-измерения-cluster3---------------------------------
select pressure1 from cluster3 limit 20

```
> select pressure1 from cluster3 limit 20
name: cluster3
time                    pressure1
----                    ---------
2019-01-01T00:00:00Z 0.302
2019-01-01T00:30:00Z 0.333
2019-01-01T01:00:00Z 0.549
2019-01-01T01:30:00Z 0.301
2019-01-01T02:00:00Z 0.522
2019-01-01T02:30:00Z 0.286
2019-01-01T03:00:00Z 0.252
2019-01-01T03:30:00Z 0.238
2019-01-01T04:00:00Z 0.158
2019-01-01T04:30:00Z 0.274
2019-01-01T05:00:00Z 0.226
2019-01-01T05:30:00Z 0.247
2019-01-01T06:00:00Z 0.196
2019-01-01T06:30:00Z 0.168
2019-01-01T07:00:00Z 0.181
2019-01-01T07:30:00Z 0.251
2019-01-01T08:00:00Z 0.2
2019-01-01T08:30:00Z 0.282
2019-01-01T09:00:00Z 0.259
2019-01-01T09:30:00Z 0.18
```

--5)-Вывести-результат-сглаживания-временного-ряда-по---------
-----значению-pressure1-с-окном,-равным-3-значения.-----------
-----Используем-операцию-moving_average(pressure1,3)----------
select moving_average(pressure1, 3) from cluster3

```
> select moving_average(pressure1, 3) from cluster3
name: cluster3
time                    moving_average
----                    --------------
2019-01-01T01:00:00Z 0.3946666666666667
2019-01-01T01:30:00Z 0.39433333333333337
2019-01-01T02:00:00Z 0.45733333333333337
2019-01-01T02:30:00Z 0.36966666666666664
2019-01-01T03:00:00Z 0.35333333333333333
2019-01-01T03:30:00Z 0.25866666666666666
2019-01-01T04:00:00Z 0.216
2019-01-01T04:30:00Z 0.22333333333333336
2019-01-01T05:00:00Z 0.21933333333333335
2019-01-01T05:30:00Z 0.249
2019-01-01T06:00:00Z 0.223
2019-01-01T06:30:00Z 0.2036666666666667
2019-01-01T07:00:00Z 0.18166666666666673
2019-01-01T07:30:00Z 0.20000000000000004
2019-01-01T08:00:00Z 0.21066666666666667
2019-01-01T08:30:00Z 0.24433333333333337
2019-01-01T09:00:00Z 0.24700000000000003
2019-01-01T09:30:00Z 0.24033333333333337
2019-01-01T10:00:00Z 0.2186666666666667
2019-01-01T10:30:00Z 0.2676666666666667
2019-01-01T11:00:00Z 0.350000000000001
2019-01-01T11:30:00Z 0.38733333333333335
2019-01-01T12:00:00Z 0.36233333333333345
2019-01-01T12:30:00Z 0.3320000000000013
2019-01-01T13:00:00Z 0.3143333333333335
2019-01-01T13:30:00Z 0.33266666666666683
2019-01-01T14:00:00Z 0.3430000000000002
2019-01-01T14:30:00Z 0.4460000000000002
2019-01-01T15:00:00Z 0.4796666666666685
2019-01-01T15:30:00Z 0.5000000000000001
2019-01-01T16:00:00Z 0.4616666666666684
2019-01-01T16:30:00Z 0.3920000000000002
2019-01-01T17:00:00Z 0.3693333333333335
2019-01-01T17:30:00Z 0.3610000000000002
2019-01-01T18:00:00Z 0.4080000000000002
2019-01-01T18:30:00Z 0.4420000000000002
2019-01-01T19:00:00Z 0.4706666666666696
2019-01-01T19:30:00Z 0.4570000000000003
2019-01-01T20:00:00Z 0.4083333333333366
2019-01-01T20:30:00Z 0.3616666666666697
2019-01-01T21:00:00Z 0.3083333333333336
2019-01-01T21:30:00Z 0.2823333333333336
2019-01-01T22:00:00Z 0.2236666666666693
2019-01-01T22:30:00Z 0.2326666666666694
2019-01-01T23:00:00Z 0.254666666666667
2019-01-01T23:30:00Z 0.26733333333333364
2019-01-02T00:00:00Z 0.2773333333333365
2019-01-02T00:30:00Z 0.2346666666666694
2019-01-02T01:00:00Z 0.1970000000000029
2019-01-02T01:30:00Z 0.15233333333333363
2019-01-02T02:00:00Z 0.15366666666666695
2019-01-02T02:30:00Z 0.15766666666666695
2019-01-02T03:00:00Z 0.16833333333333358
2019-01-02T03:30:00Z 0.1560000000000025
2019-01-02T04:00:00Z 0.15300000000000025
2019-01-02T04:30:00Z 0.1433333333333356
```

--6)-Вывести-все-минимальные,-максимальные-и-средние-значения-

-----для-всех-давлений---------------------------------------

select max(/pressure/), min(/pressure/), mean(/pressure/) from cluster3

```
> select max(/pressure/), min(/pressure/), mean(/pressure/) from cluster3
name: cluster3
time            max_pressure1 max_pressure2 max_pressure3 max_pressure4 max_pressure5 min_pressure1 min_pressure2 min_pressure3 min_pressure4 min_pressure5 mean_pressure1    mean_pressure2    mean_pressure3    mean_pressure4    mean_pressure5
1970-01-01T00:00:00Z 0.815        0.708         0.888         18.56         21.03         0.135         0             0.259         3.933         3.848         0.3465304193548393 0.4387634408602153 0.7245672043010756 9.686063844086023 9.273440188172044
```

--7)-Вывести-разброс-значений-давления1----------------------

-----командой-SPREAD(<field>)---------------------------------

select spread(pressure1) from cluster3

```
> select spread(pressure1) from cluster3
name: cluster3
time                 spread
----                 ------
1970-01-01T00:00:00Z 0.6799999999999999
```

--8)-Вывести-стандартное-отклонение-для-давления1-------------

-----командой-STDDEV(<field>)---------------------------------

select stddev(pressure1) from cluster3

```
> select stddev(pressure1) from cluster3
name: cluster3
time                 stddev
----                 ------
1970-01-01T00:00:00Z 0.14932423129505185
```

--9)-Что-выведет-этот-запрос??--------------------------------

select stddev(pressure1),stddev(pressure2),stddev(pressure3) from cluster3 group by time(7d)

```
> select stddev(pressure1),stddev(pressure2),stddev(pressure3) from cluster3 group by time(7d)
name: cluster3
time                 stddev              stddev_1            stddev_2
----                 ------              --------            --------
2018-12-27T00:00:00Z 0.11731139398155126 0.1591020402462719  0.052064508527840864
2019-01-03T00:00:00Z 0.14299155396750265 0.14065010483483387 0.0675208715000834
2019-01-10T00:00:00Z 0.15601744040679372 0.16515084635641078 0.047755250056997095
2019-01-17T00:00:00Z 0.14930002608119822 0.20099767145504022 0.042140666118823535
2019-01-24T00:00:00Z 0.15394832006978795 0.19380982569032754 0.15689270017259713
2019-01-31T00:00:00Z 0.12515040419516335 0.18401487278004275 0.043212360012272282
2019-02-07T00:00:00Z
```

(Стандартное отклонение давлений по неделе)

--10)-Вывести-прогноз-значения-pressure1-на-сутки-вперед------

select holt_winters(first(pressure1),5,24) from cluster3 group by time(1h)

```
> select holt_winters(first(pressure1),5,24) from cluster3 group by time(1h)
name: cluster3
time                 holt_winters
----                 -----------
2019-02-01T00:00:00Z 0.30485467960072776
2019-02-01T01:00:00Z 0.33246311160704706
2019-02-01T02:00:00Z 0.3277292273581258
2019-02-01T03:00:00Z 0.22999131308255272
2019-02-01T04:00:00Z 0.22246317346964242
```

--11)-Вывести-все-содержимое-измерений-по-кусту3-------------
------базы-данных-production------------------------------
select * from cluster3

```
> select * from cluster3
name: cluster3
time                 pressure1 pressure2 pressure3 pressure4 pressure5 well
----                 --------- --------- --------- --------- --------- ----
2019-01-01T00:00:00Z 0.302     0.579     0.772     11.915    10.989    ID0100
2019-01-01T00:30:00Z 0.333     0.582     0.773     11.138    9.905     ID0100
2019-01-01T01:00:00Z 0.549     0.582     0.779     10.629    9.577     ID0100
2019-01-01T01:30:00Z 0.301     0.581     0.78      9.5       10.034    ID0100
2019-01-01T02:00:00Z 0.522     0.577     0.781     10.055    8.072     ID0100
2019-01-01T02:30:00Z 0.286     0.578     0.784     9.199     8.105     ID0100
2019-01-01T03:00:00Z 0.252     0.579     0.784     7.692     7.19      ID0100
2019-01-01T03:30:00Z 0.238     0.585     0.784     7.028     6.456     ID0100
2019-01-01T04:00:00Z 0.158     0.585     0.79      6.197     5.952     ID0100
2019-01-01T04:30:00Z 0.274     0.589     0.791     5.992     5.082     ID0100
2019-01-01T05:00:00Z 0.226     0.592     0.794     5.846     5.485     ID0100
2019-01-01T05:30:00Z 0.247     0.589     0.789     5.481     4.758     ID0100
2019-01-01T06:00:00Z 0.196     0.59      0.787     5.467     4.656     ID0100
2019-01-01T06:30:00Z 0.168     0.586     0.785     4.943     4.446     ID0100
2019-01-01T07:00:00Z 0.181     0.587     0.782     5.602     4.248     ID0100
2019-01-01T07:30:00Z 0.251     0.592     0.785     5.036     4.06      ID0100
2019-01-01T08:00:00Z 0.2       0.584     0.781     5.758     4.4       ID0100
2019-01-01T08:30:00Z 0.282     0.59      0.789     5.831     4.858     ID0100
2019-01-01T09:00:00Z 0.259     0.591     0.786     5.439     5.225     ID0100
2019-01-01T09:30:00Z 0.18      0.59      0.784     6.007     6.312     ID0100
2019-01-01T10:00:00Z 0.217     0.595     0.785     6.333     7.283     ID0100
2019-01-01T10:30:00Z 0.406     0.596     0.783     6.287     6.295     ID0100
2019-01-01T11:00:00Z 0.427     0.589     0.782     7.919     5.983     ID0100
2019-01-01T11:30:00Z 0.329     0.589     0.778     8.568     6.505     ID0100
2019-01-01T12:00:00Z 0.331     0.299     0.78      8.142     7.393     ID0100
2019-01-01T12:30:00Z 0.336     0.291     0.789     8.528     8.538     ID0100
2019-01-01T13:00:00Z 0.276     0.228     0.781     9.996     8.028     ID0100
2019-01-01T13:30:00Z 0.386     0.229     0.78      9.774     8.863     ID0100
2019-01-01T14:00:00Z 0.367     0.229     0.782     10.062    8.461     ID0100
2019-01-01T14:30:00Z 0.585     0.233     0.784     10.147    9.592     ID0100
2019-01-01T15:00:00Z 0.487     0.227     0.812     10.287    9.358     ID0100
2019-01-01T15:30:00Z 0.428     0.233     0.785     10.239    10.106    ID0100
2019-01-01T16:00:00Z 0.47      0.228     0.78      10.28     8.978     ID0100
2019-01-01T16:30:00Z 0.278     0.22      0.767     9.561     11.709    ID0100
2019-01-01T17:00:00Z 0.36      0.373     0.762     11.003    12.279    ID0100
2019-01-01T17:30:00Z 0.445     0.437     0.763     11.505    12.721    ID0100
2019-01-01T18:00:00Z 0.419     0.553     0.787     12.241    12.438    ID0100
2019-01-01T18:30:00Z 0.462     0.568     0.791     13.525    11.315    ID0100
2019-01-01T19:00:00Z 0.531     0.576     0.798     12.267    11.991    ID0100
2019-01-01T19:30:00Z 0.378     0.579     0.821     12.355    11.289    ID0100
2019-01-01T20:00:00Z 0.316     0.622     0.851     12.527    11.443    ID0100
2019-01-01T20:30:00Z 0.391     0.594     0.856     12.682    11.275    ID0100
2019-01-01T21:00:00Z 0.218     0.582     0.86      12.804    10.719    ID0100
2019-01-01T21:30:00Z 0.238     0.588     0.857     12.475    11.177    ID0100
2019-01-01T22:00:00Z 0.215     0.588     0.858     12.905    10.65     ID0100
2019-01-01T22:30:00Z 0.245     0.599     0.855     12.613    9.932     ID0100
2019-01-01T23:00:00Z 0.304     0.62      0.86      11.373    11.298    ID0100
2019-01-01T23:30:00Z 0.253     0.589     0.868     11.093    10.827    ID0100
2019-01-02T00:00:00Z 0.275     0.583     0.865     10.991    9.826     ID0100
2019-01-02T00:30:00Z 0.176     0.59      0.865     8.852     8.572     ID0100
2019-01-02T01:00:00Z 0.14      0.582     0.871     7.955     7.313     ID0100
```

--12)-Вывести-первые-10-значений-давлений-1-и-3,--------------
------каждое-из-которых-превышает-величину-0.5----------------
select pressure1,pressure3 from cluster3 where pressure1>0.5 and pressure3>0.5 limit 10

```
>   select pressure1,pressure3 from cluster3 where pressure1>0.5 and pressure3>0.5 limit 10
name: cluster3
time                 pressure1 pressure3
----                 --------- ---------
2019-01-01T01:00:00Z 0.549     0.779
2019-01-01T02:00:00Z 0.522     0.781
2019-01-01T14:30:00Z 0.585     0.784
2019-01-01T19:00:00Z 0.531     0.798
2019-01-02T13:00:00Z 0.658     0.725
2019-01-02T15:30:00Z 0.516     0.732
2019-01-03T11:30:00Z 0.669     0.775
2019-01-03T14:00:00Z 0.509     0.678
2019-01-03T14:30:00Z 0.538     0.687
2019-01-03T15:00:00Z 0.585     0.676
```

--13)-Вывести-средние-за-сутки-значения-давления2------------
select mean(pressure2) from cluster3 group by time(1d) fill(none)

```
> select mean(pressure2) from cluster3 group by time(24h) fill(none)
name: cluster3
time                 mean
----                 ----
2019-01-01T00:00:00Z 0.5075416666666669
2019-01-02T00:00:00Z 0.46308333333333335
2019-01-03T00:00:00Z 0.46102083333333344
2019-01-04T00:00:00Z 0.4572291666666668
2019-01-05T00:00:00Z 0.46045833333333325
2019-01-06T00:00:00Z 0.44012499999999993
2019-01-07T00:00:00Z 0.4243333333333334
2019-01-08T00:00:00Z 0.40881249999999997
2019-01-09T00:00:00Z 0.4312291666666666
2019-01-10T00:00:00Z 0.39008333333333334
2019-01-11T00:00:00Z 0.4220833333333334
2019-01-12T00:00:00Z 0.4200208333333335
2019-01-13T00:00:00Z 0.4436875
2019-01-14T00:00:00Z 0.49620833333333353
2019-01-15T00:00:00Z 0.5172708333333333
2019-01-16T00:00:00Z 0.3735833333333334
2019-01-17T00:00:00Z 0.2693125
2019-01-18T00:00:00Z 0.2572083333333333
2019-01-19T00:00:00Z 0.29020833333333323
2019-01-20T00:00:00Z 0.2720208333333334
2019-01-21T00:00:00Z 0.33985416666666673
2019-01-22T00:00:00Z 0.4862916666666666
2019-01-23T00:00:00Z 0.5313125
2019-01-24T00:00:00Z 0.5161041666666667
2019-01-25T00:00:00Z 0.5228333333333332
2019-01-26T00:00:00Z 0.5329166666666666
2019-01-27T00:00:00Z 0.5271666666666666
2019-01-28T00:00:00Z 0.4767708333333333
2019-01-29T00:00:00Z 0.4947500000000001
2019-01-30T00:00:00Z 0.4905208333333333
2019-01-31T00:00:00Z 0.477625
```

--14)-Вывести-максимальные-значения-давлений-по-суткам--------
select max(/pressure/) from cluster3 group by time(1d) fill(none)

```
> select max(/pressure/) from cluster3 group by time(24h) fill(none)
name: cluster3
time                 max_pressure1 max_pressure2 max_pressure3 max_pressure4 max_pressure5
----                 ------------- ------------- ------------- ------------- -------------
2019-01-01T00:00:00Z 0.585         0.622         0.868         13.525        12.721
2019-01-02T00:00:00Z 0.658         0.61          0.888         14.838        12.316
2019-01-03T00:00:00Z 0.669         0.578         0.878         17.612        13.61
2019-01-04T00:00:00Z 0.653         0.61          0.85          16.033        13.819
2019-01-05T00:00:00Z 0.653         0.59          0.855         15.312        14.469
2019-01-06T00:00:00Z 0.651         0.586         0.804         14.446        15.337
2019-01-07T00:00:00Z 0.607         0.553         0.69          15.571        16.063
2019-01-08T00:00:00Z 0.676         0.529         0.763         18.56         18.003
2019-01-09T00:00:00Z 0.636         0.535         0.79          18.212        21.03
2019-01-10T00:00:00Z 0.674         0.534         0.81          16.194        19.792
2019-01-11T00:00:00Z 0.622         0.527         0.746         17.982        15.781
2019-01-12T00:00:00Z 0.614         0.519         0.79          17.049        16.652
2019-01-13T00:00:00Z 0.723         0.542         0.805         16.279        17.107
2019-01-14T00:00:00Z 0.755         0.664         0.773         15.425        15.822
2019-01-15T00:00:00Z 0.746         0.659         0.796         16.023        14.451
2019-01-16T00:00:00Z 0.685         0.661         0.788         15.306        15.033
2019-01-17T00:00:00Z 0.595         0.356         0.807         15.241        14.53
2019-01-18T00:00:00Z 0.678         0.358         0.843         15.944        13.913
2019-01-19T00:00:00Z 0.723         0.401         0.772         15.096        13.956
2019-01-20T00:00:00Z 0.644         0.399         0.774         15.844        16.222
2019-01-21T00:00:00Z 0.719         0.654         0.776         14.702        15.533
2019-01-22T00:00:00Z 0.635         0.676         0.776         17.548        16.153
2019-01-23T00:00:00Z 0.784         0.682         0.821         17.143        17.341
2019-01-24T00:00:00Z 0.7           0.677         0.826         15.898        15.419
2019-01-25T00:00:00Z 0.576         0.708         0.77          17.321        17.497
2019-01-26T00:00:00Z 0.723         0.7           0.796         16.954        17.437
2019-01-27T00:00:00Z 0.733         0.678         0.802         16.554        19.014
2019-01-28T00:00:00Z 0.815         0.637         0.773         16.24         15.869
2019-01-29T00:00:00Z 0.727         0.636         0.788         16.066        16.604
2019-01-30T00:00:00Z 0.785         0.651         0.782         16.712        14.875
2019-01-31T00:00:00Z 0.591         0.643         0.779         14.959        14.168
```

--15)-Вывести-разницу-среднесуточных-значений-давлений-1-и-2--

------по-каждым-суткам-за-первые-2-недели-измерений-----------

select mean(pressure1)-mean(pressure2) from cluster3 group by time(1d) fill(none) limit 12

```
> select mean(pressure1)-mean(pressure2) from cluster3 group by time(1d) fill(none) limit 12
name: cluster3
time                 mean_mean
----                 ---------
2019-01-01T00:00:00Z -0.18456250000000013
2019-01-02T00:00:00Z -0.18431249999999988
2019-01-03T00:00:00Z -0.14014583333333347
2019-01-04T00:00:00Z -0.15702083333333355
2019-01-05T00:00:00Z -0.13622916666666662
2019-01-06T00:00:00Z -0.09929166666666661
2019-01-07T00:00:00Z -0.11337499999999995
2019-01-08T00:00:00Z -0.08129166666666665
2019-01-09T00:00:00Z -0.11102083333333329
2019-01-10T00:00:00Z -0.05637500000000001
2019-01-11T00:00:00Z -0.10893750000000013
2019-01-12T00:00:00Z -0.07445833333333352
```

--16)-Вывести-минимальное,-максимальное,-среднее-значения-----

------всех-давлений-по-каждым-суткам-в-первую-смену-----------

------работы-персонала,-то-есть-с-8-00-до-17-00---------------

select first(*) from (select max(/pressure/), min(/pressure/), mean(/pressure/) from cluster3 where time >= '2019-01-01T08:00:00Z' group by time(8h)) where time >= '2019-01-01 00:00:00' group by time(24h,8h) fill(none)

--17)-Вывести-отклонения-среднесуточных-значений--------------

------от-среднего-значения-за-месяц-по-давлению4-и-давлению5--

select mean(pressure4),mean(pressure5) from cluster3 where time >= '2019-01-01 00:00:00' group by time(31d,10d) fill(none)

```
> select mean(pressure4),mean(pressure5) from cluster3 where time >= '2019-01-01 00:00:00' group by time(31d,10d) fill(none)
name: cluster3
time                 mean              mean_1
----                 ----              ------
2019-01-01T00:00:00Z 9.686063844086023 9.273440188172044
```

select mean(pressure4)-9.686063844086023,mean(pressure5)-9.273440188172044 from cluster3 group by time(1d)

```
> select mean(pressure4)-9.686063844086023,mean(pressure5)-9.273440188172044 from cluster3 group by time(1d)
name: cluster3
time                 mean                 mean_1
----                 ----                 ------
2019-01-01T00:00:00Z -0.4726055107526914  -0.8097735215053774
2019-01-02T00:00:00Z -0.537647177419359   -0.9514401881720431
2019-01-03T00:00:00Z 0.4125194892473072   -0.3962735215053783
2019-01-04T00:00:00Z 0.03999865591397622  -0.5174193548387098
2019-01-05T00:00:00Z 0.0312694892473111   -0.515815188172045
2019-01-06T00:00:00Z -0.7729180107526883  -0.77935685483871
2019-01-07T00:00:00Z 0.4028528225806465   0.2448723118279581
2019-01-08T00:00:00Z 1.4130611559139759   1.6303931451612854
2019-01-09T00:00:00Z 2.2651236559139782   2.3463306451612898
2019-01-10T00:00:00Z 1.1472069892473122   2.507497311827956
2019-01-11T00:00:00Z 1.7281861559139742   0.7349348118279551
2019-01-12T00:00:00Z 0.6830819892473095   0.18399731182795698
2019-01-13T00:00:00Z -0.11302217741935827 0.20355981182795801
2019-01-14T00:00:00Z -0.638251344086024   -0.85102352515053754
2019-01-15T00:00:00Z -0.41241801075268825 -0.8630860215053779
2019-01-16T00:00:00Z -0.636480510752695   -1.1560651881720467
2019-01-17T00:00:00Z -0.682813844086219   -0.6782735215053766
2019-01-18T00:00:00Z -0.0482305107526883  -0.17454435483871222
2019-01-19T00:00:00Z -1.082605510752689   -0.9303985215053743
2019-01-20T00:00:00Z -0.8381263440860245  -0.9382943548387104
2019-01-21T00:00:00Z -0.31993884408602113 -0.4574401881720416
2019-01-22T00:00:00Z -0.6654596774193564  -0.255190188172044
2019-01-23T00:00:00Z 0.2409778225806427   -0.2209818548387119
2019-01-24T00:00:00Z 0.5710403225806431   1.0826639784946206
2019-01-25T00:00:00Z 0.6009361559139776   1.7869764784946192
2019-01-26T00:00:00Z -0.5505221774193547  0.3499556451612893
2019-01-27T00:00:00Z -0.235418010752692   0.2194348118279566
2019-01-28T00:00:00Z 0.03722278225806454  -0.23606518817204503
2019-01-29T00:00:00Z -0.4931471774193561  0.17580981182795334
2019-01-30T00:00:00Z -0.39643884408602226 -0.7781693548387114
2019-01-31T00:00:00Z -0.6774388440860228  0.043184811827954306
2019-02-01T00:00:00Z
```

--18)-Посчитать-количество-дней,-когда-среднее-за-сутки------

------давление1-превышало-среднемесячное-значение------------

select mean(pressure1) from cluster3 where time >= '2019-01-01 00:00:00' group by time(31d,10d) fill(none) --среднее значение

```
> select mean(pressure1) from cluster3 where time >= '2019-01-01 00:00:00' group by time(31d,10d) fill(none)
name: cluster3
time                 mean
----                 ----
2019-01-01T00:00:00Z 0.34653024193548393
```

select count(mean) from (select mean(pressure1) from cluster3 group by time(1d) fill(none)) where mean > 0.34653024193548393 group by time(31d,10d) fill(none)

```
> select count(mean) from (select mean(pressure1) from cluster3 group by time(1d) fill(none)) where mean > 0.34653024193548393 group by time(31d,10d) fill(none)
name: cluster3
time                 count
----                 -----
2019-01-01T00:00:00Z 15
```

--19)-Подсчитать-число-дней,-когда-среднесуточные-значения----

------давление1-и-давления2-одновременно-находились-----------

------в-диапазонах-+/-10%-от-среднего-значения-за-месяц------

select mean(pressure1),mean(pressure2) from cluster3 where time >= '2019-01-01 00:00:00' group by time(31d,10d) fill(none) --среднее значение

```
> select mean(pressure1),mean(pressure2) from cluster3 where time >= '2019-01-01 00:00:00' group by time(31d,10d) fill(none)
name: cluster3
time                 mean                 mean_1
----                 ----                 ------
2019-01-01T00:00:00Z 0.34653024193548393 0.4387634408602153
```

select count(mean) from (select mean(pressure1),mean(pressure2) from cluster3 group by time(1d) fill(none)) where mean > 0.31187721774 and mean < 0.38118326612 and mean_1 > 0.39488709677 and mean_1 < 0.48263978494 group by time(31d,10d) fill(none)

```
> select count(mean) from (select mean(pressure1),mean(pressure2) from cluster3 group by time(1d) fill(none))
 where mean > 0.31187721774 and mean < 0.38118326612 and mean_1 > 0.39488709677 and mean_1 < 0.48263978494 gr
oup by time(31d,10d) fill(none)
name: cluster3
time                 count
----                 -----
2019-01-01T00:00:00Z 10
```

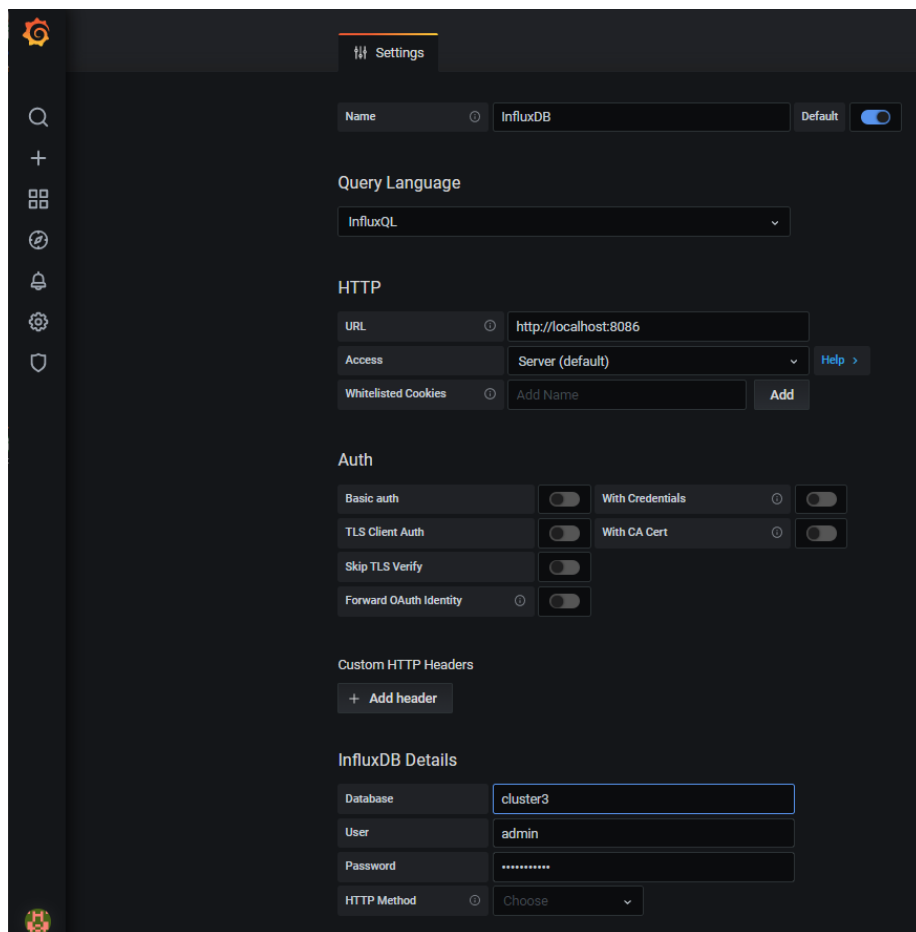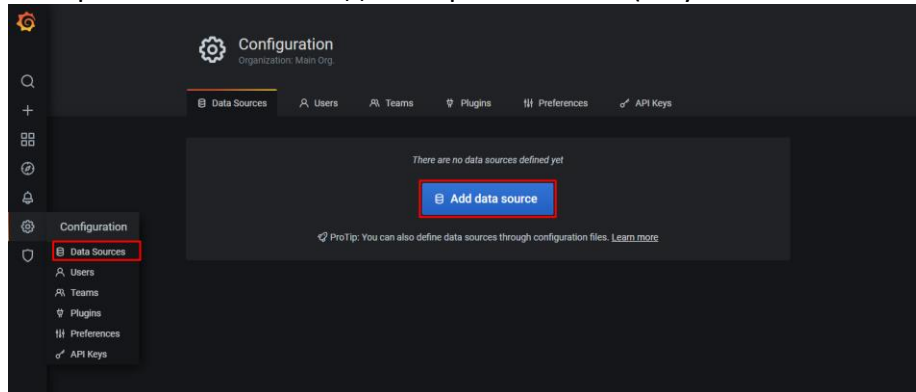--20)-Построить-прогноз-каждого-давления-на-2-суток-вперед----

select HOLT_WINTERS(first(/pressure/),5,48) from cluster3 group by time(1h)

```
> select HOLT_WINTERS(first(/pressure/),5,48) from cluster3 group by time(1h)
name: cluster3
time                 holt_winters_pressure1 holt_winters_pressure2 holt_winters_pressure3 holt_winters_pressure4 holt_winters_pressure5
----                 ---------------------- ---------------------- ---------------------- ---------------------- ----------------------
2019-02-01T00:00:00Z 0.33301843062828657    0.47677107749186587    0.7002713218320329     9.752962066579194      9.202830855970207
2019-02-01T01:00:00Z 0.401079741990905      0.48156229231538455    0.7202045150322192     10.06992266275045      10.089271824798205
2019-02-01T02:00:00Z 0.37768321308618125    0.460155689546523      0.7088536115087004     9.714806677647147      9.72779838130988
2019-02-01T03:00:00Z 0.32403952437559796    0.4600471723564605     0.7186781843112214     9.770335551956626      9.14507364912562
2019-02-01T04:00:00Z 0.35356229600072675    0.5027623608288969     0.7437315720147912     9.505826215069202      8.705326526002725
```

21. Установка и настройка Grafana
Откройте интернет браузер и перейдите по адресу http://localhost:8080 (или 3000)
В открывшемся окне введите пароль и логин (по умолчанию admin, admin)

22. Сделать каждому студенту свой дашборд с 10 виджетами, на которых должны быть представлены результаты запросов, связанных с расчетами среднего, минимального, максимального значения, запросы с группировкой значений по суткам и неделям, ++запросы с трансформаторами (скользящее среднее и простейшая арифметическая операция), запросы с предиктором Хольта-Винтерса

Нужно адаптировать запрос на извлечение времени работы:
*SELECT sum("Energy")/mean("Energy")*15 FROM "K1" WHERE ("Energy" > 40) AND $timeFilter GROUP BY time(1d) fill(null)*
Время простоя:

*SELECT sum("Energy")/mean("Energy")*15 FROM "K1" WHERE ("Energy" < 40) AND $timeFilter GROUP BY time(1d) fill(null)*

http://localhost:3000/goto/PGHDU-YGk