In [1]:
```
import libraryF1dataNotebook as libraryDataF1
import pandas as pd
```

FORMULA 1 CRYPTO.COM MIAMI GRAND PRIX 2024 - RACE RESULT

The Miami Grand Prix is a Formula One Grand Prix which was held for the first time during the 2022 season, with the event taking place at the Miami International Autodrome on a ten-year contract.

Obtain session information

In [2]:
```
libraryDataF1.obtain_information('sessions',year=2024,country_acronym='USA
```

Out[2]:

	session_key	session_name	date_start	date_end	gmt_offset
0	9497	Practice 1	2024-05-03T16:30:00+00:00	2024-05-03T17:30:00+00:00	-04:00:00
1	9502	Sprint Qualifying	2024-05-03T20:30:00+00:00	2024-05-03T21:14:00+00:00	-04:00:00
2	9506	Sprint	2024-05-04T16:00:00+00:00	2024-05-04T16:30:00+00:00	-04:00:00
3	9498	Qualifying	2024-05-04T20:00:00+00:00	2024-05-04T21:00:00+00:00	-04:00:00
4	9507	Race	2024-05-05T20:00:00+00:00	2024-05-05T22:00:00+00:00	-04:00:00

Free Practice

Obtain setup

In [3]:
```
practice = libraryDataF1.obtain_information('laps',session_key=9497)
stintInformation = libraryDataF1.obtain_information('stints',session_key=9
drivers = libraryDataF1.obtain_information('drivers',session_key=9497)
```

In [4]:
```
stintsDataFrame =libraryDataF1.stint_configuration(drivers,stintInformatio
jointables2 = pd.merge(practice,stintsDataFrame,on=['lap_number','driver_nu
jointables2
```

Out[4]:

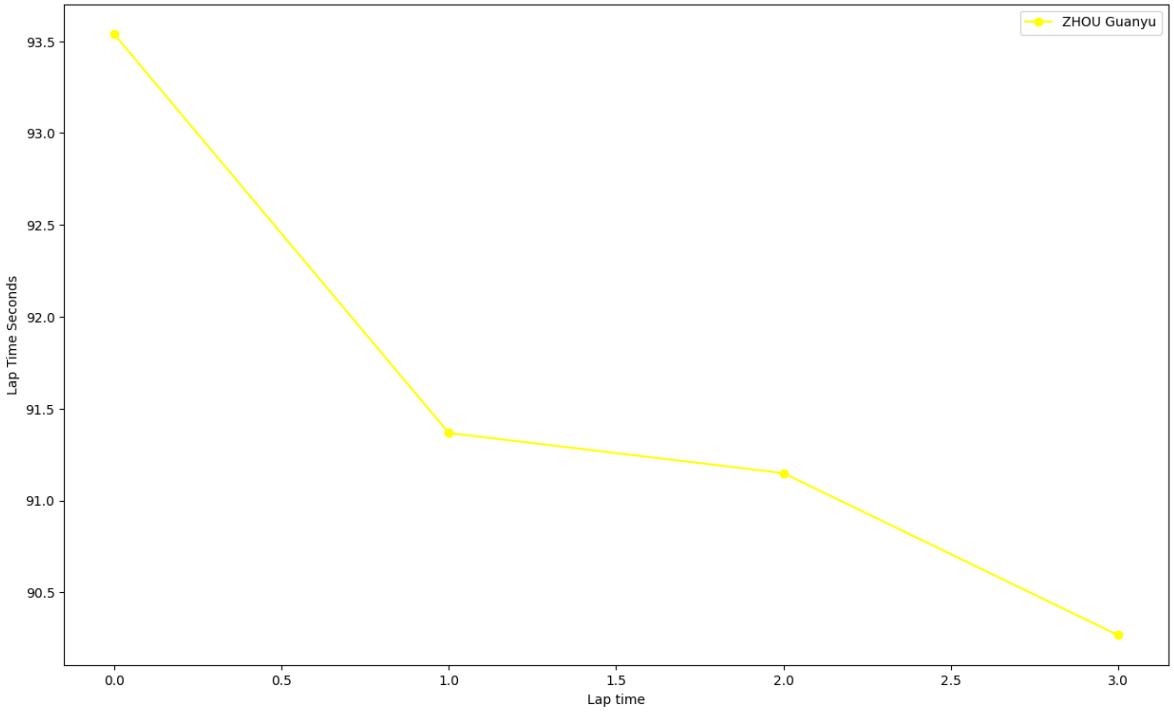
	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
0	1234	9497	20	204.0	175.0	307.0	2024-05-03T16:30:
1	1234	9497	31	197.0	147.0	286.0	2024-05-03T16:30:
2	1234	9497	81	196.0	87.0	144.0	2024-05-03T16:30:

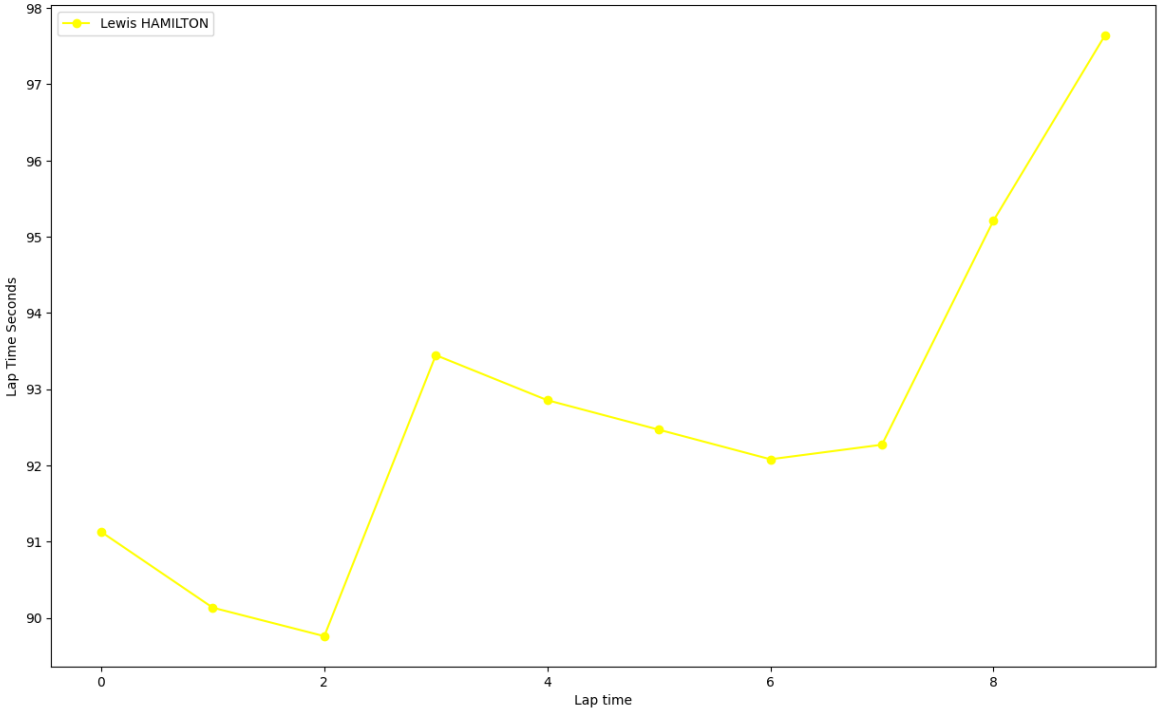
	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
3	1234	9497	4	173.0	132.0	292.0	2024-05-03T16:30:
4	1234	9497	10	199.0	164.0	275.0	2024-05-03T16:30:
...	...	...	...	...	...	...	
458	1234	9497	81	169.0	145.0	196.0	2024-05-03T17:33:
459	1234	9497	4	214.0	140.0	225.0	2024-05-03T17:33:
460	1234	9497	24	210.0	158.0	134.0	2024-05-03T17:33:
461	1234	9497	22	169.0	152.0	248.0	2024-05-03T17:33:
462	1234	9497	18	217.0	177.0	187.0	2024-05-03T17:33:

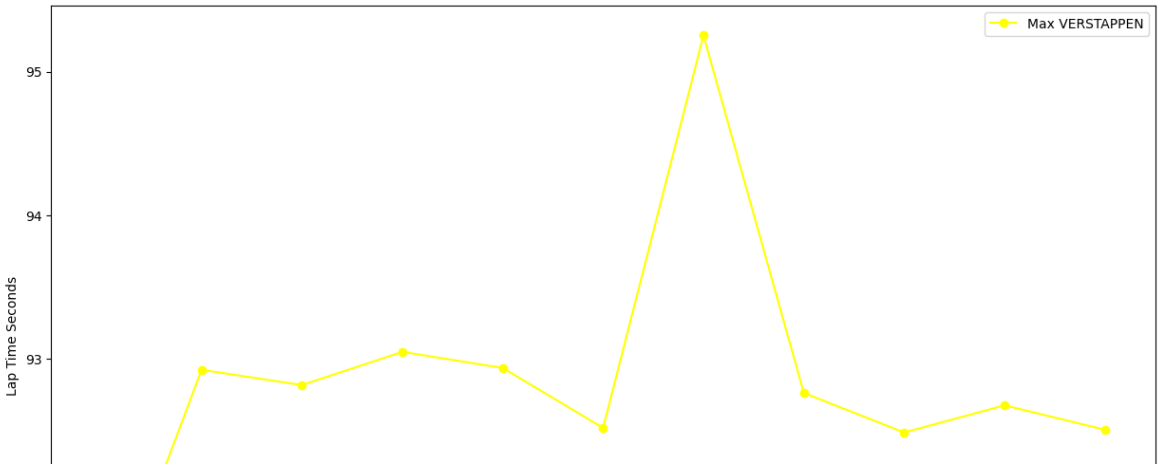
See race pace by means of the charts

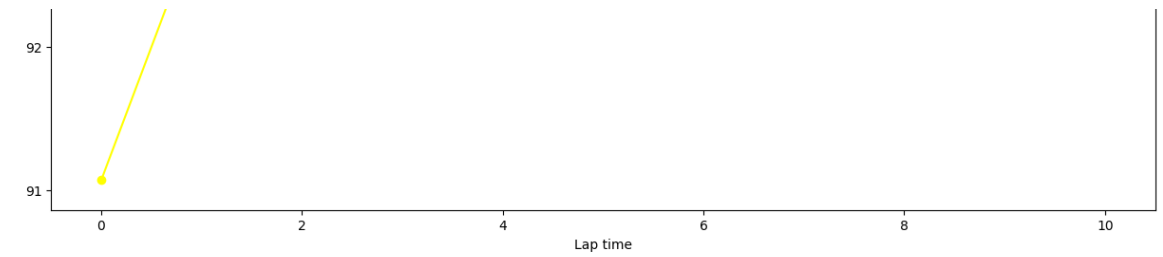
Medium tyres

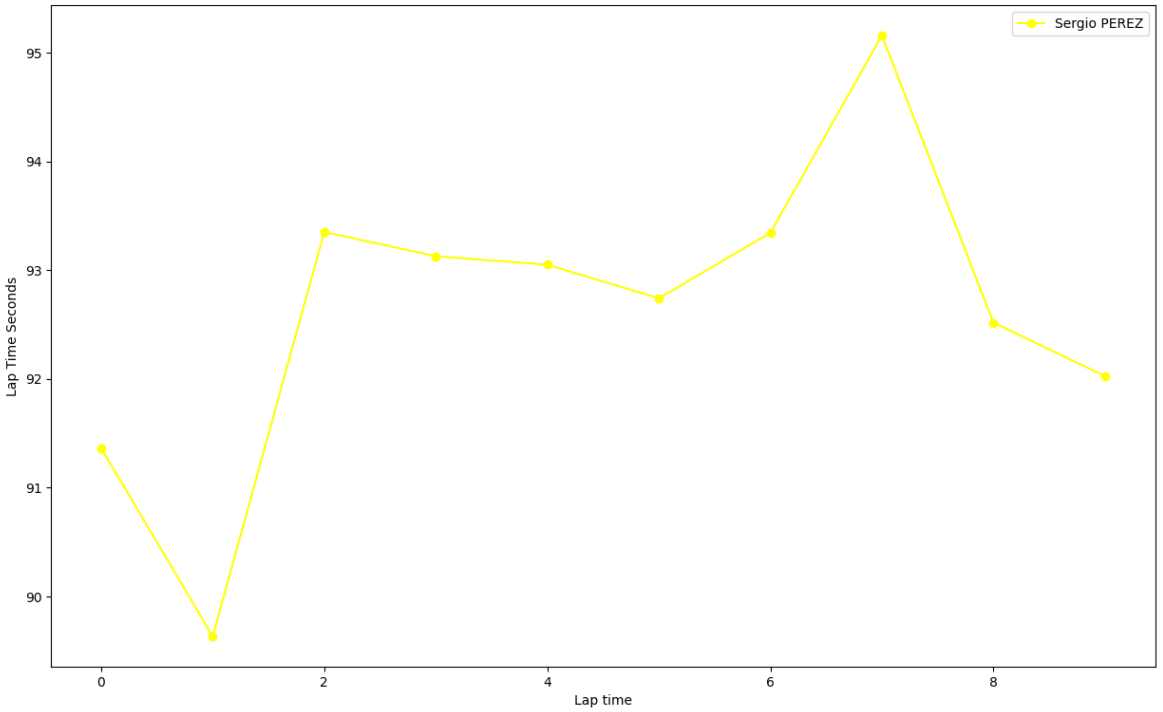
In [5]:
```
libraryDataF1.obtain_data_tyres(jointables2,"MEDIUM",98)
```

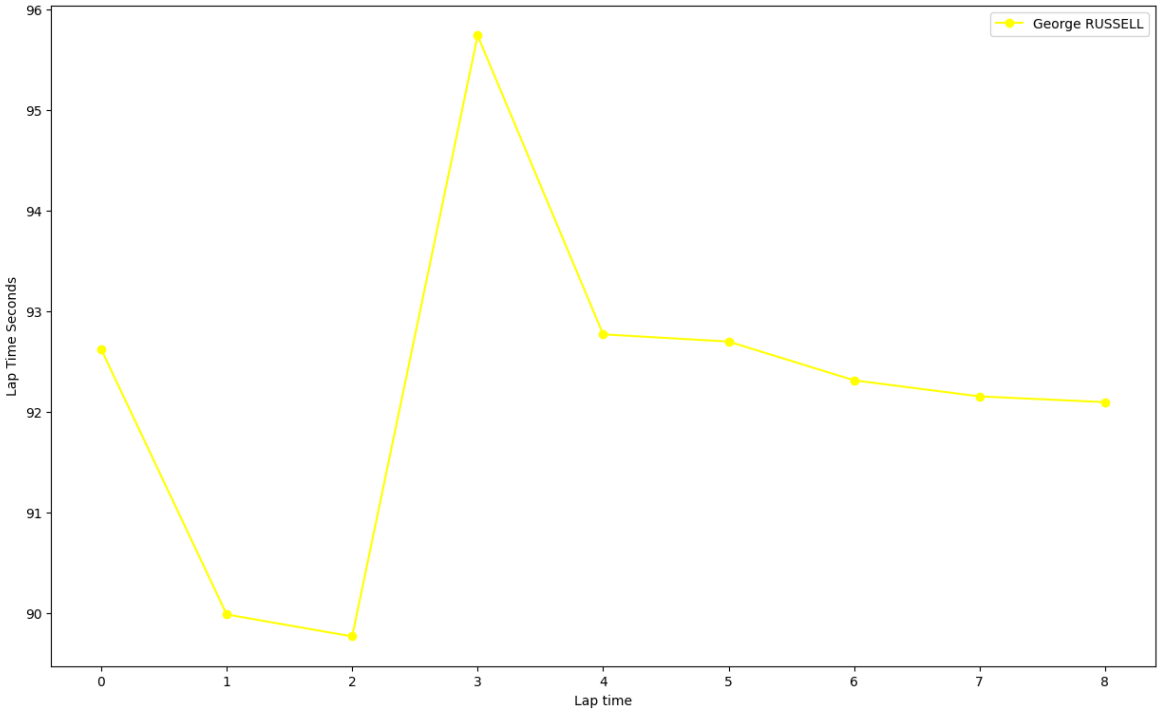

ZHOU Guanyu
Lap Time Seconds
93.5
93.0
92.5
92.0
91.5
91.0
90.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Lap time


Lewis HAMILTON
Lap Time Seconds
98
97
96
95
94
93
92
91
90
0
2
4
6
8
Lap time

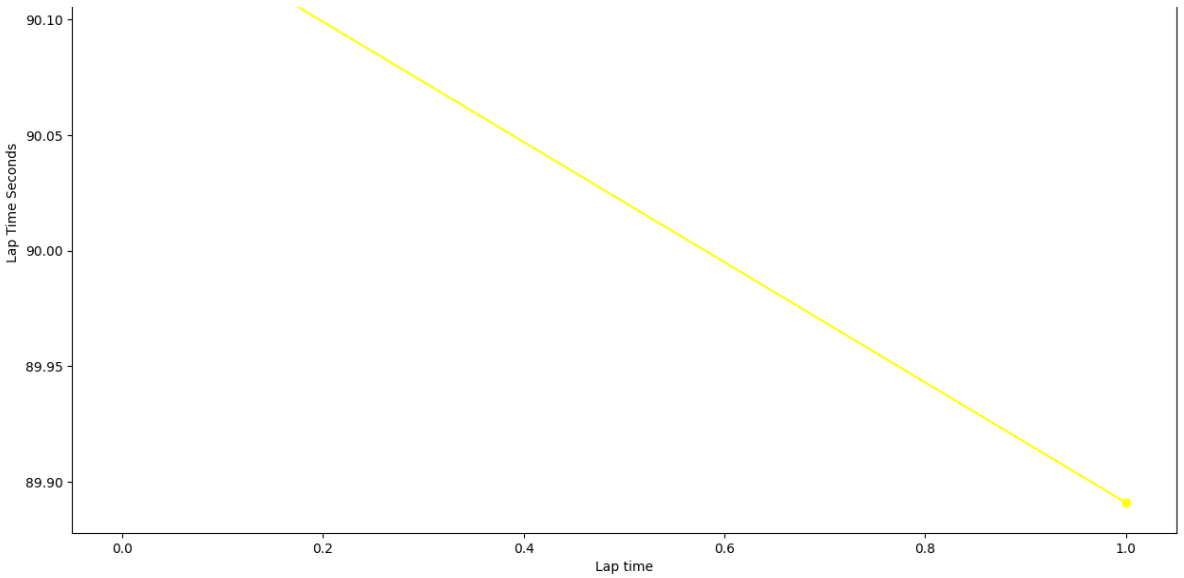

Max VERSTAPPEN
Lap Time Seconds
95
94
93

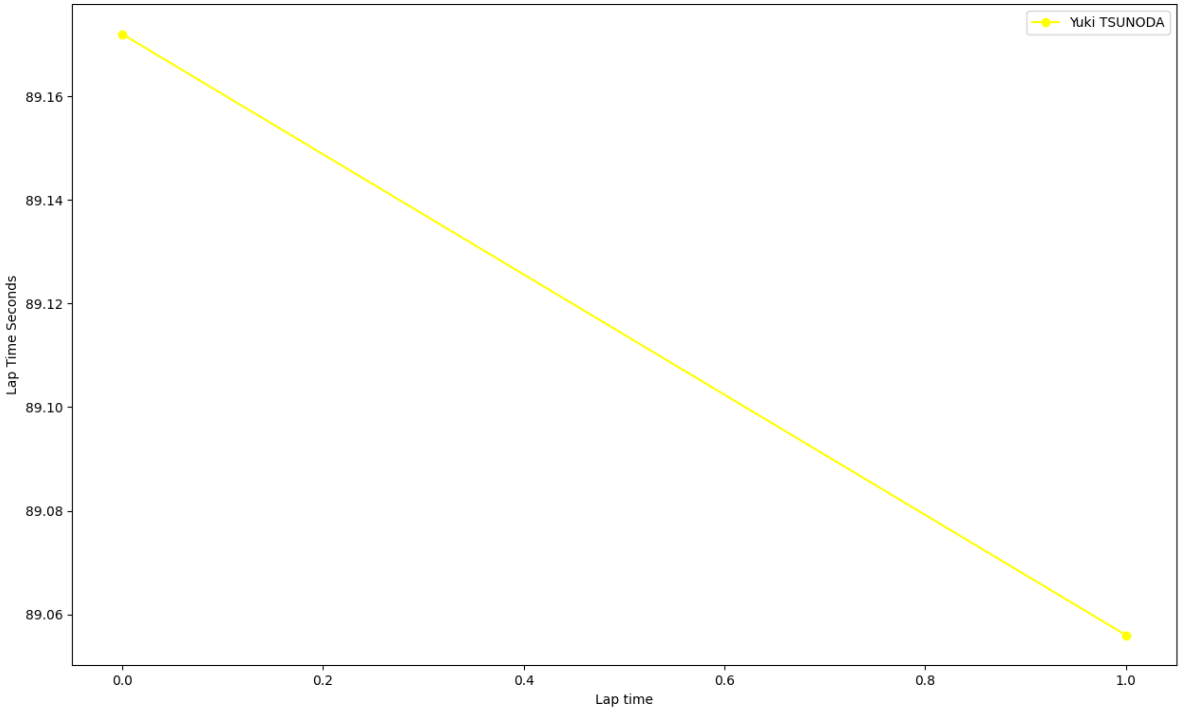

92
91
0
2
4
6
8
10
Lap time

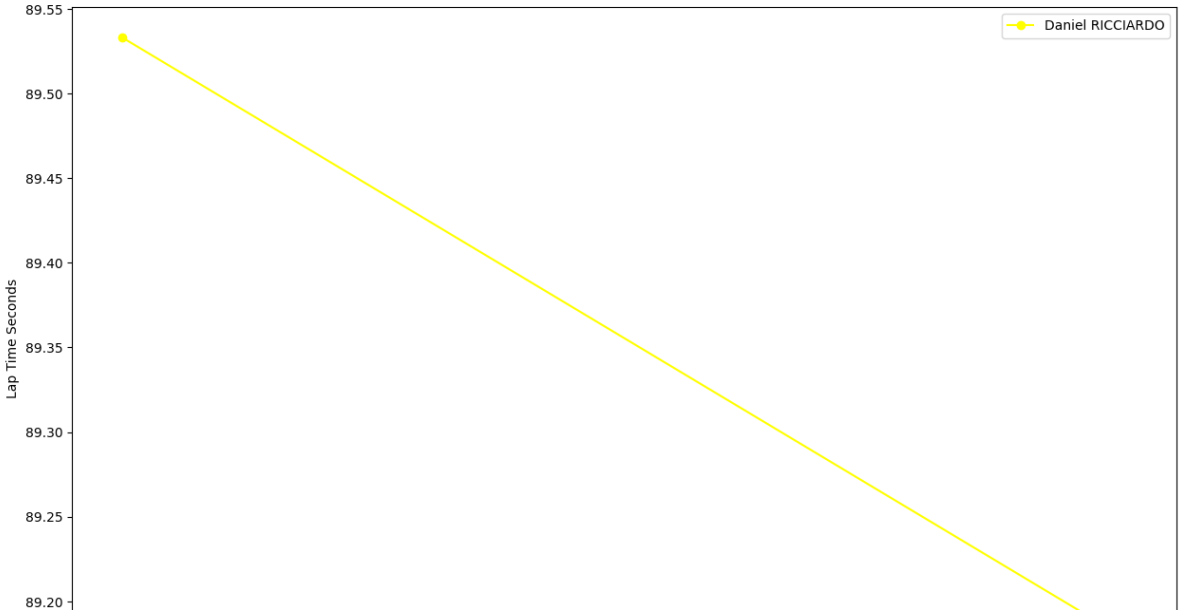

Sergio PEREZ
95
94
93
92
91
90
Lap Time Seconds
0
2
4
6
8
Lap time

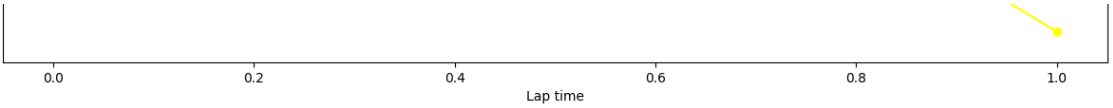

George RUSSELL
96
95
94
93
92
91
90
Lap Time Seconds
0
1
2
3
4
5
6
7
8
Lap time


Logan SARGEANT
90.15


90.10
90.05
90.00
89.95
89.90
Lap Time Seconds
0.0
0.2
0.4
0.6
0.8
1.0
Lap time


Yuki TSUNODA
89.16
89.14
89.12
89.10
89.08
89.06
Lap Time Seconds
0.0
0.2
0.4
0.6
0.8
1.0
Lap time

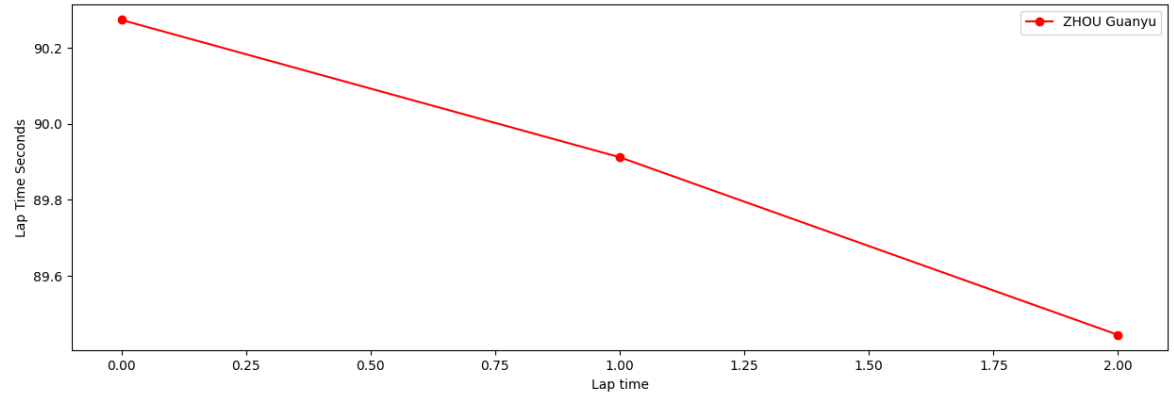

Daniel RICCIARDO
89.55
89.50
89.45
89.40
89.35
89.30
89.25
89.20
Lap Time Seconds

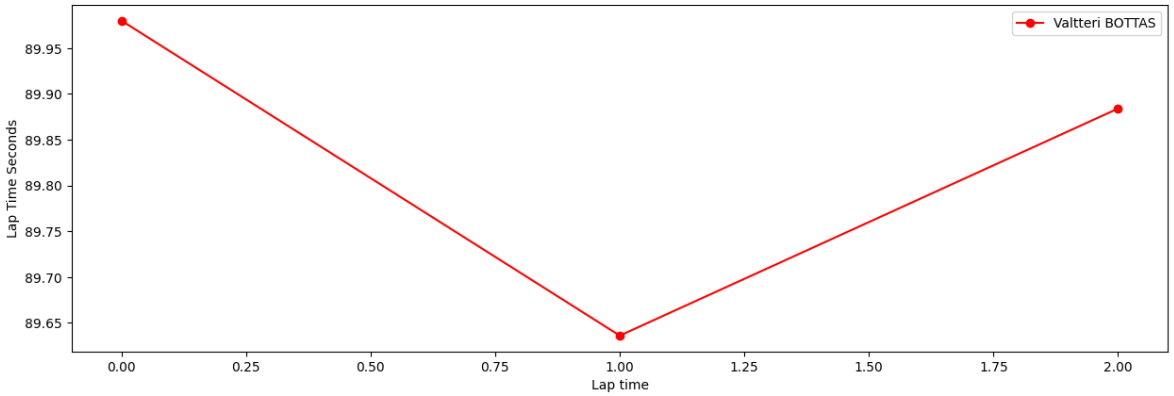


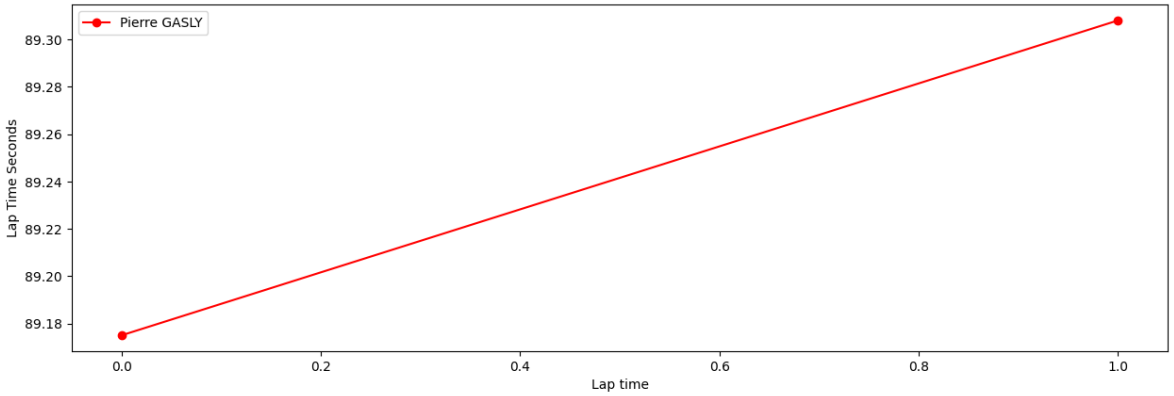
Soft tyres

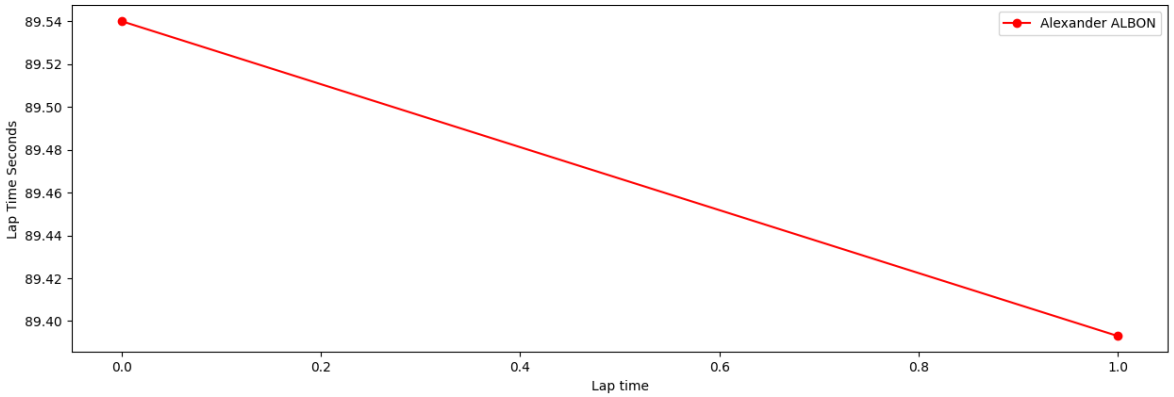
In [6]:

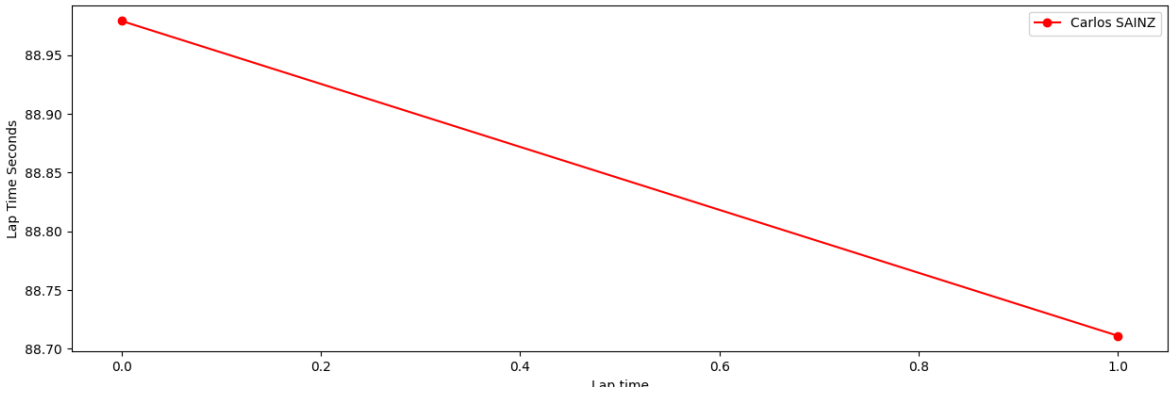
```
libraryDataF1.obtain_data_tyres(jointables2,"SOFT",98)
```

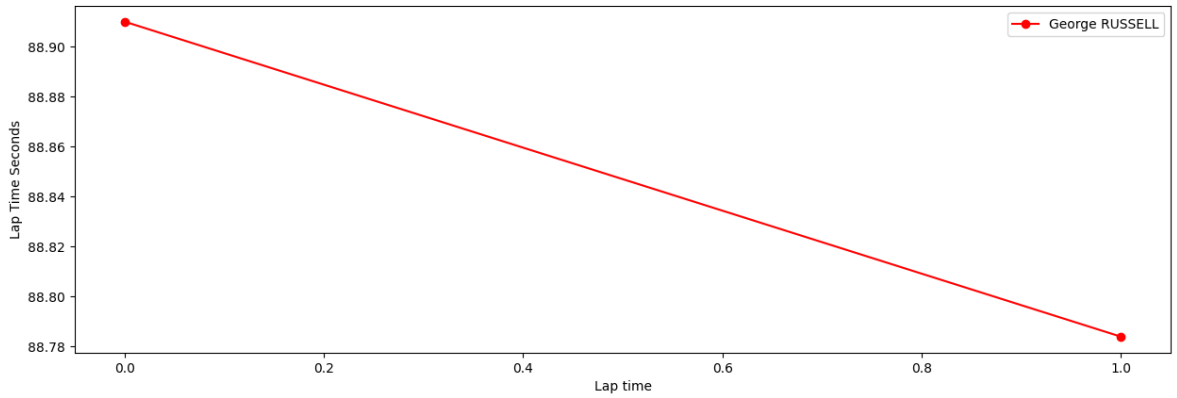

ZHOU Guanyu
Lap Time Seconds
90.2
90.0
89.8
89.6
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Lap time

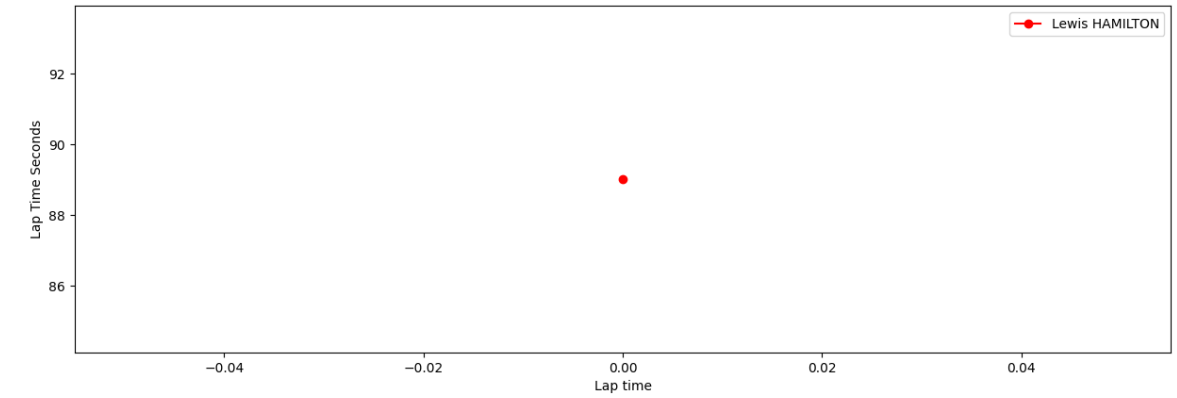

Valtteri BOTTAS
Lap Time Seconds
89.95
89.90
89.85
89.80
89.75
89.70
89.65
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Lap time

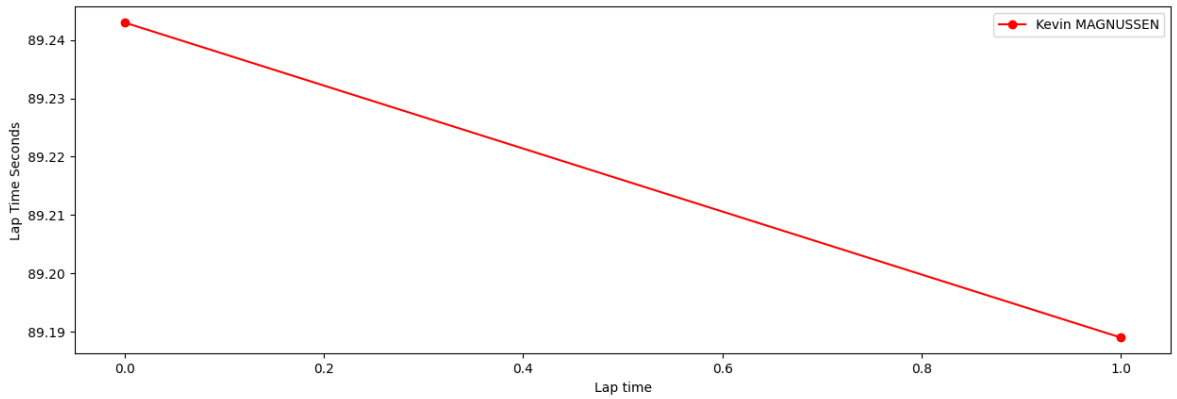

Pierre GASLY
Lap Time Seconds
89.30
89.28
89.26
89.24
89.22
89.20
89.18
0.0
0.2
0.4
0.6
0.8
1.0
Lap time

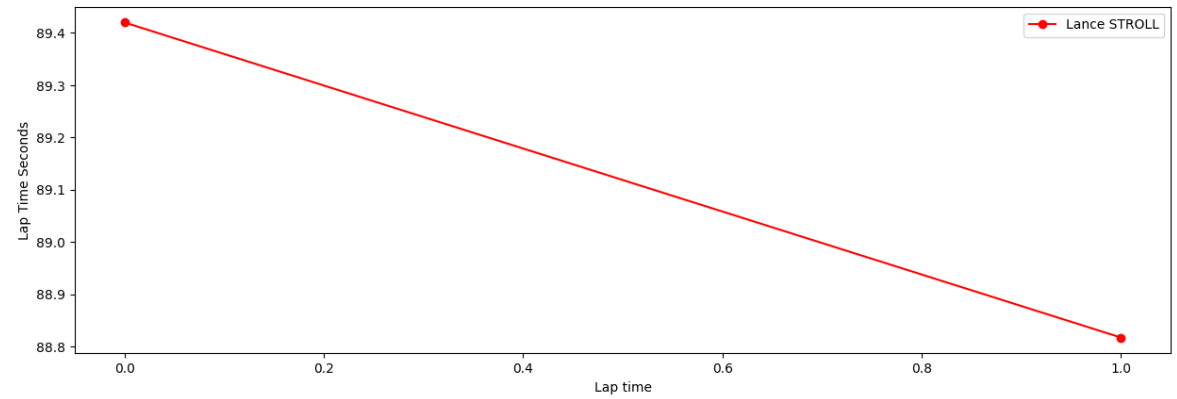

Alexander ALBON
Lap Time Seconds
89.54
89.52
89.50
89.48
89.46
89.44
89.42
89.40
0.0
0.2
0.4
0.6
0.8
1.0
Lap time

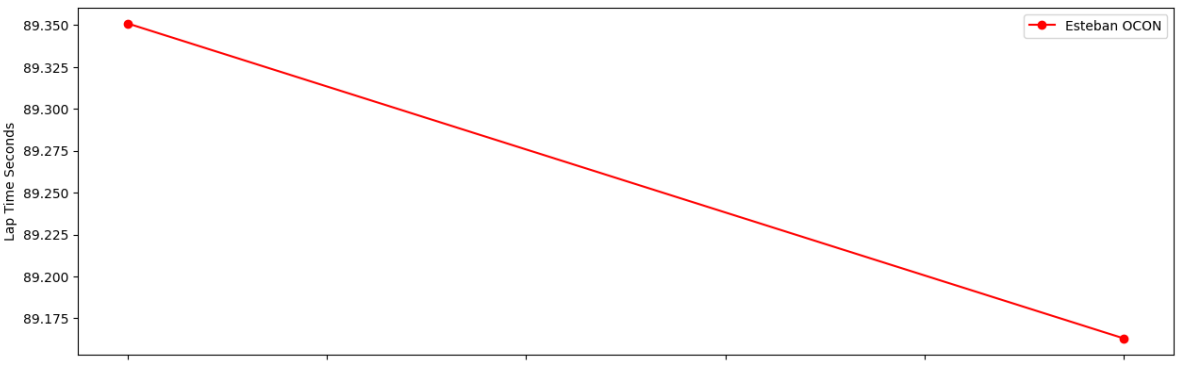

Carlos SAINZ
Lap Time Seconds
88.95
88.90
88.85
88.80
88.75
88.70
0.0
0.2
0.4
0.6
0.8
1.0
Lap time

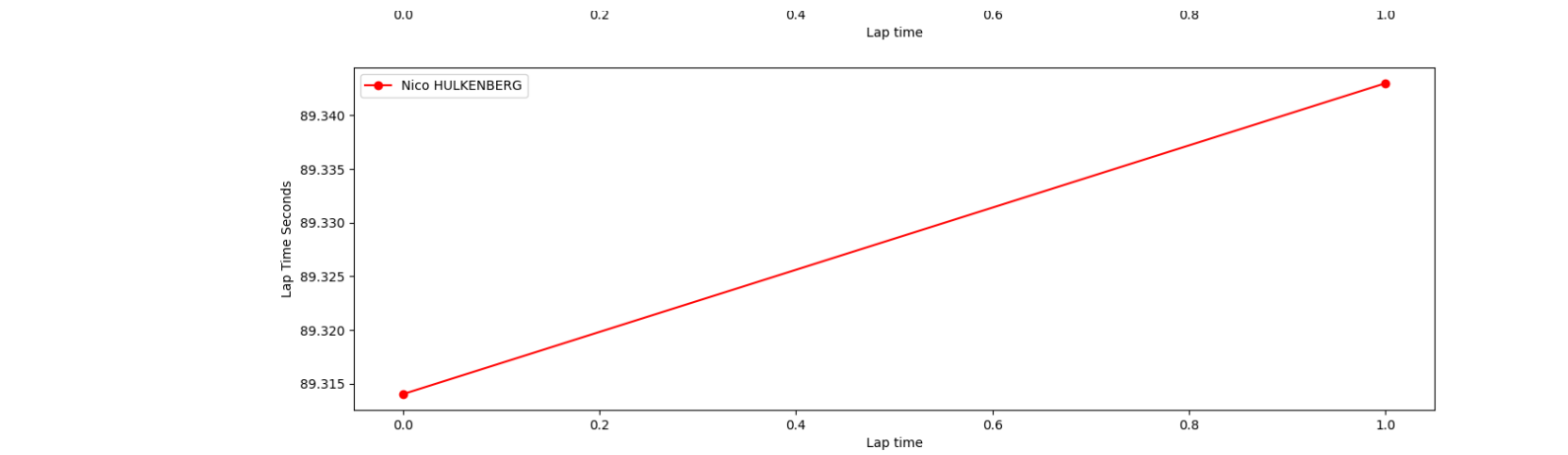

George RUSSELL
Lap Time Seconds
88.90
88.88
88.86
88.84
88.82
88.80
88.78
0.0
0.2
0.4
0.6
0.8
1.0
Lap time


Lewis HAMILTON
Lap Time Seconds
92
90
88
86
−0.04
−0.02
0.00
0.02
0.04
Lap time

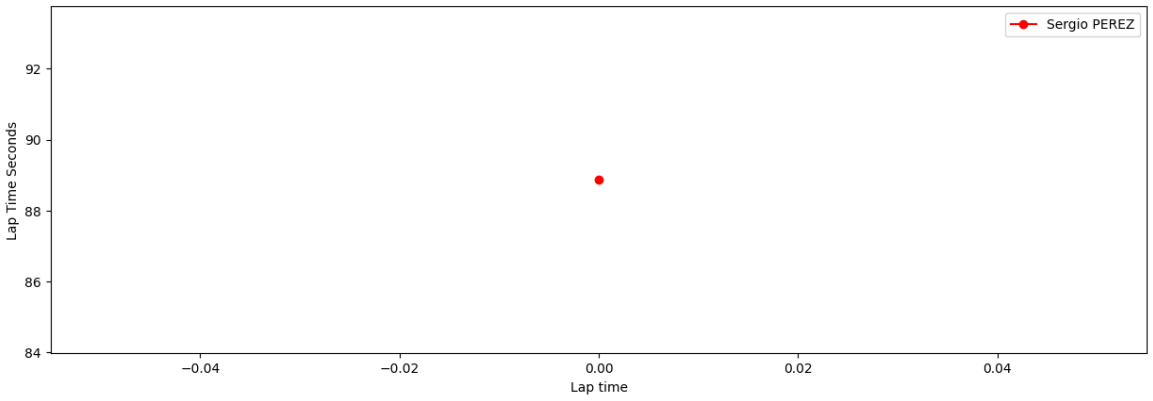

Kevin MAGNUSSEN
Lap Time Seconds
89.24
89.23
89.22
89.21
89.20
89.19
0.0
0.2
0.4
0.6
0.8
1.0
Lap time

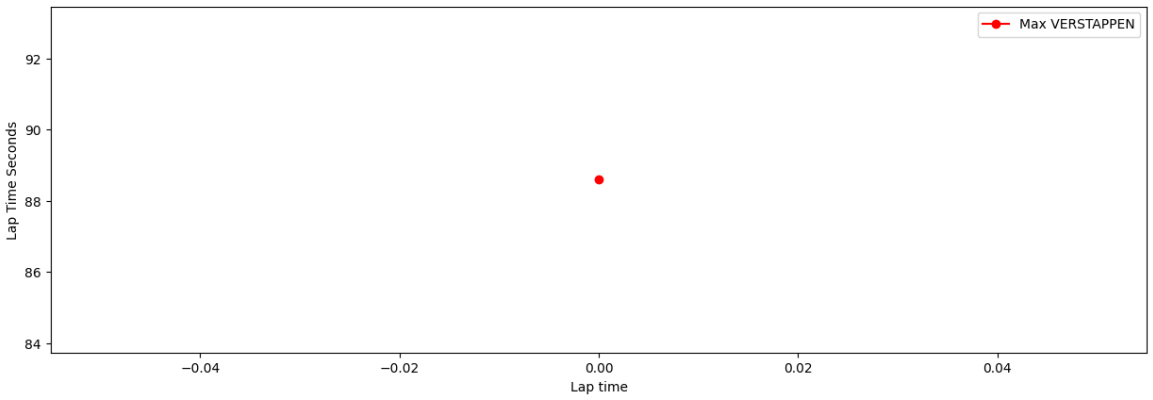

Lance STROLL
Lap Time Seconds
89.4
89.3
89.2
89.1
89.0
88.9
88.8
0.0
0.2
0.4
0.6
0.8
1.0
Lap time

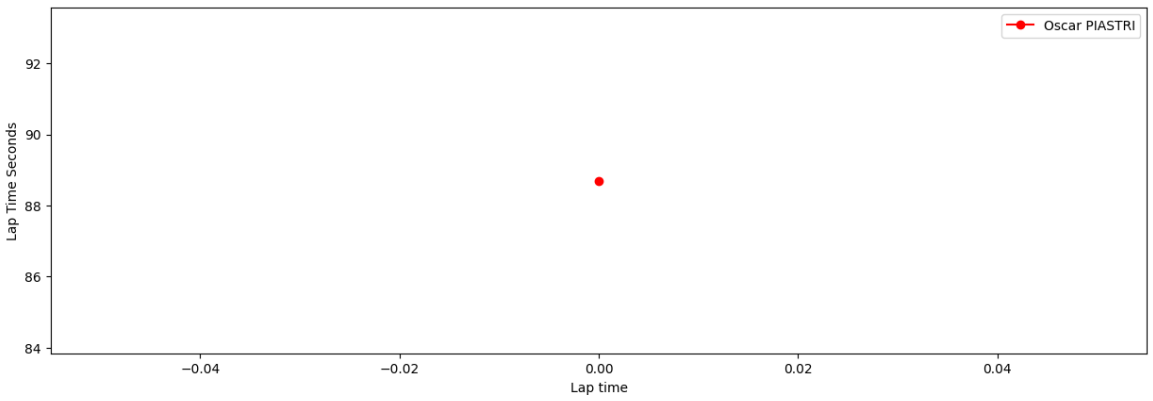

Esteban OCON
Lap Time Seconds
89.350
89.325
89.300
89.275
89.250
89.225
89.200
89.175

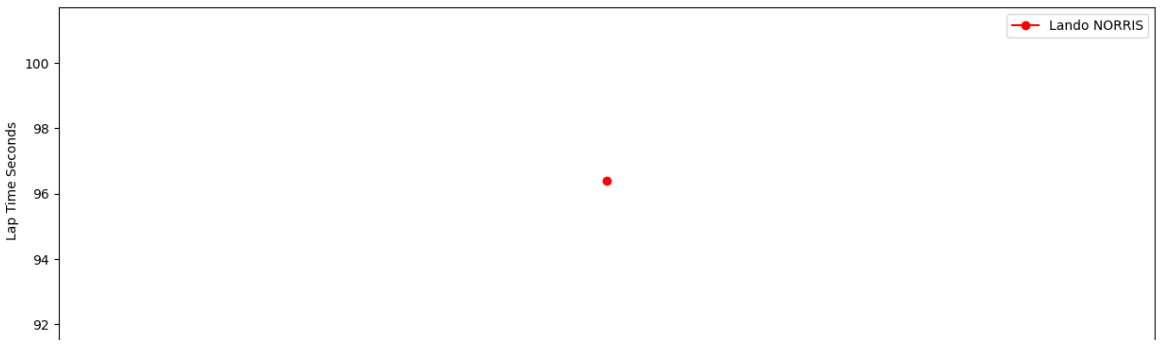

0.0
0.2
0.4
0.6
0.8
1.0
Lap time

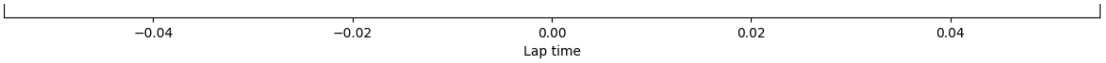
Nico HULKENBERG
Lap Time Seconds
89.340
89.335
89.330
89.325
89.320
89.315
0.0
0.2
0.4
0.6
0.8
1.0
Lap time


Sergio PEREZ
Lap Time Seconds
92
90
88
86
84
−0.04
−0.02
0.00
0.02
0.04
Lap time


Max VERSTAPPEN
Lap Time Seconds
92
90
88
86
84
−0.04
−0.02
0.00
0.02
0.04
Lap time

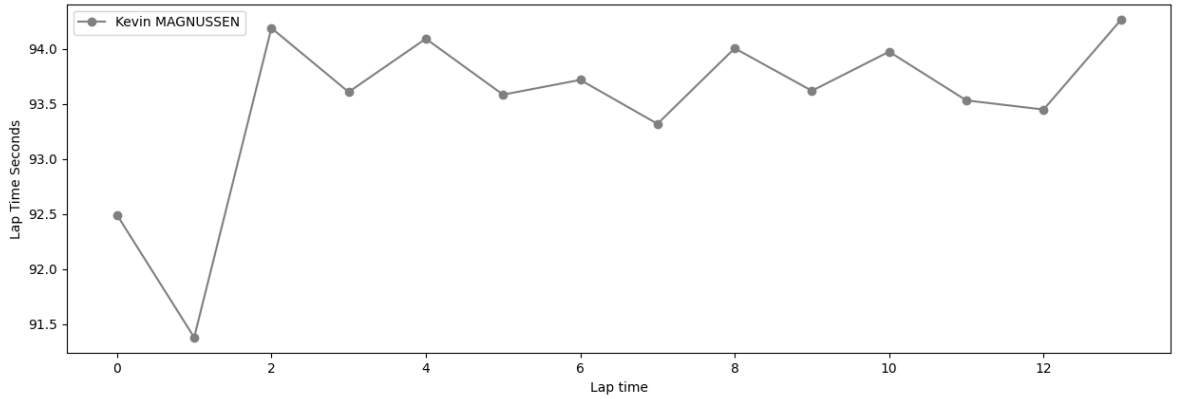

Oscar PIASTRI
Lap Time Seconds
92
90
88
86
84
−0.04
−0.02
0.00
0.02
0.04
Lap time

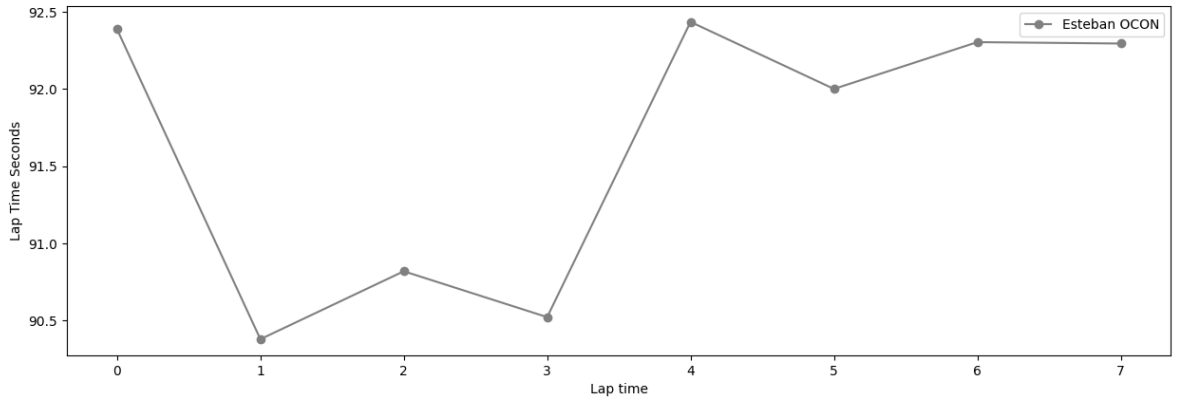

Lando NORRIS
Lap Time Seconds
100
98
96
94
92

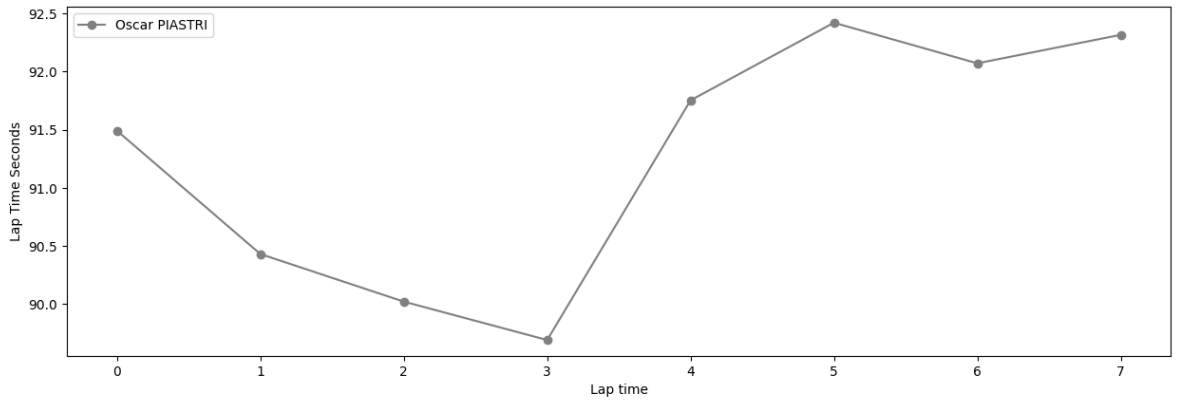


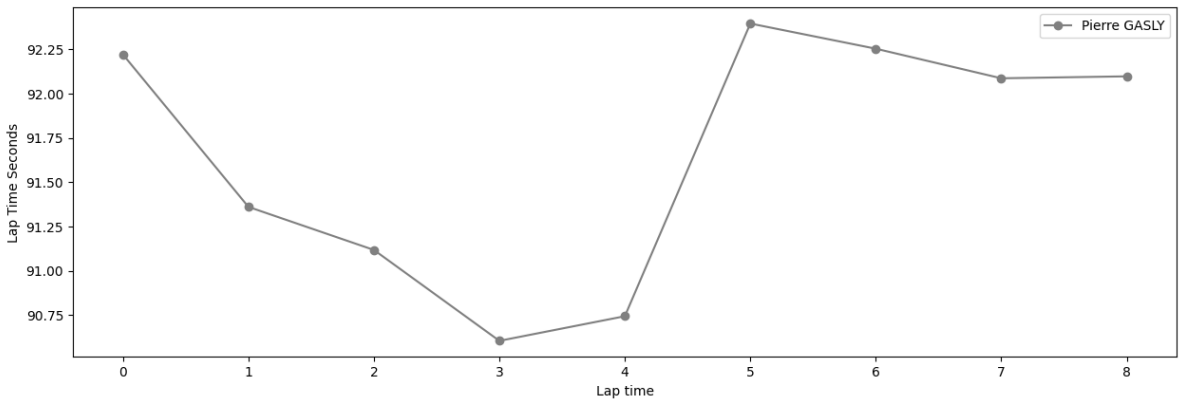
Hard tyres

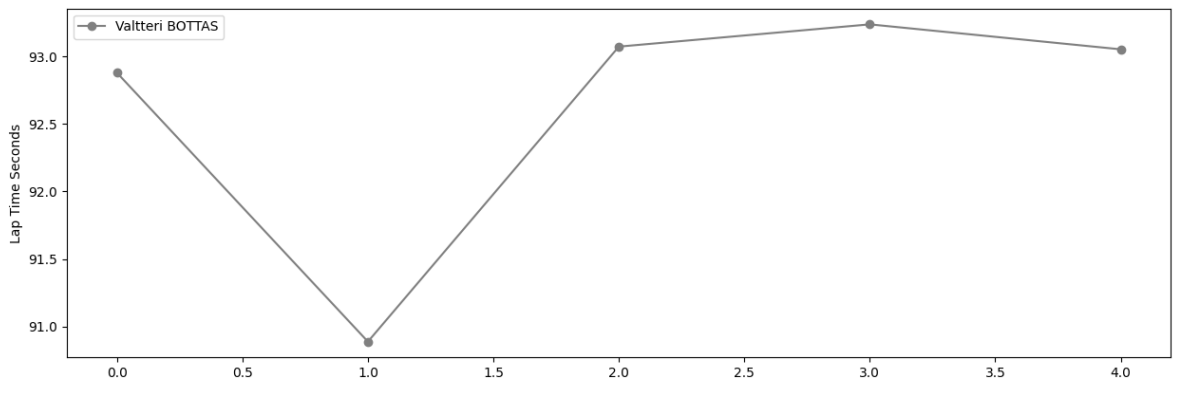
In [7]:
```
libraryDataF1.obtain_data_tyres(jointables2,"HARD",98)
```

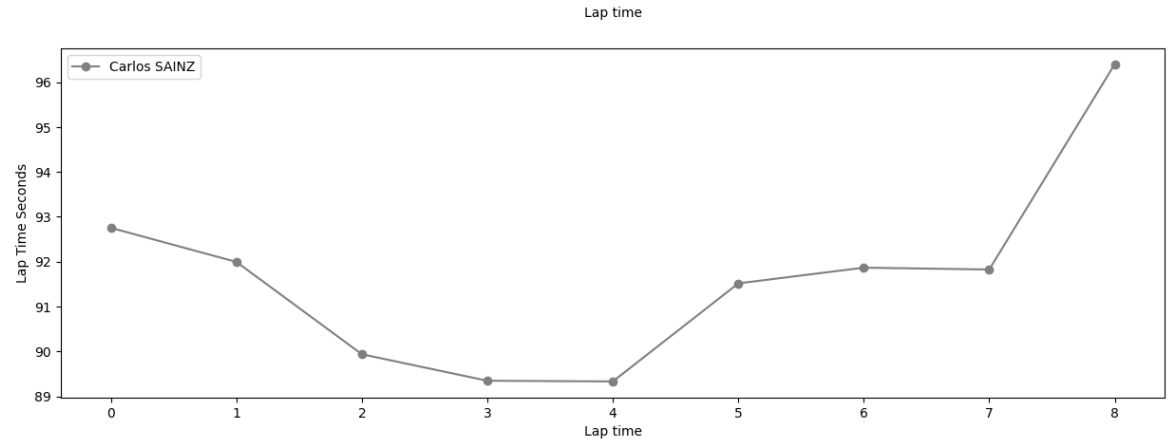

Kevin MAGNUSSEN
Lap Time Seconds
Lap time

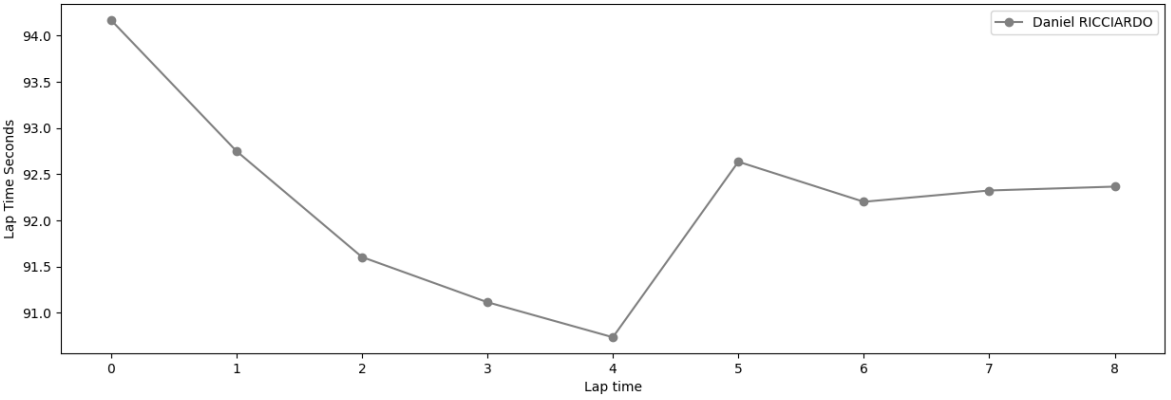

Esteban OCON
Lap Time Seconds
Lap time

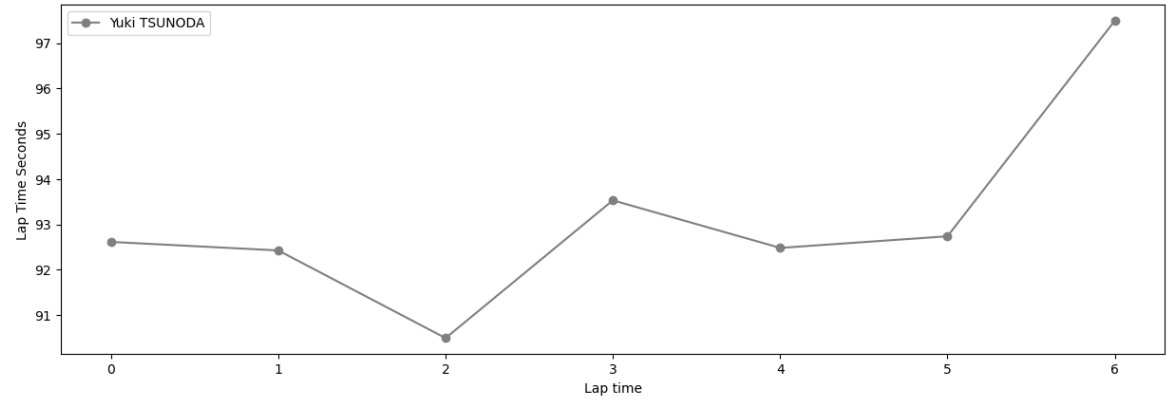

Oscar PIASTRI
Lap Time Seconds
Lap time

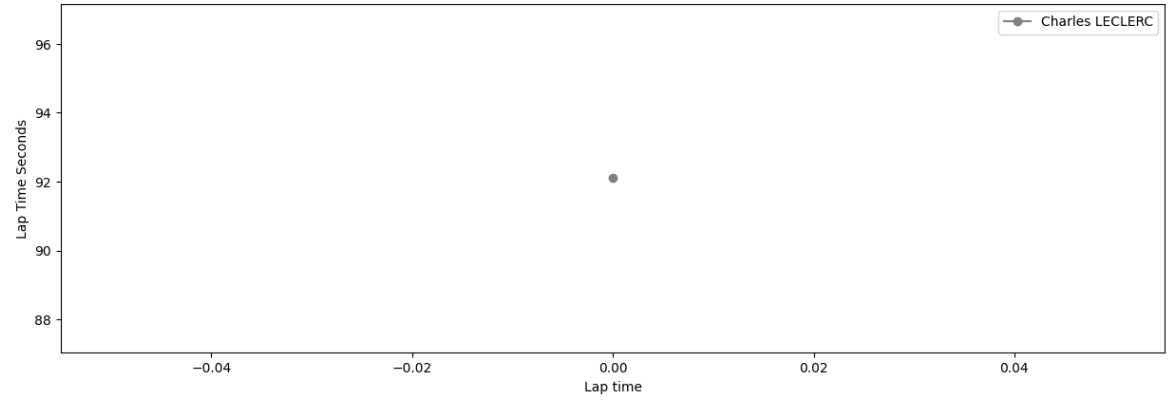

Pierre GASLY
Lap Time Seconds
Lap time

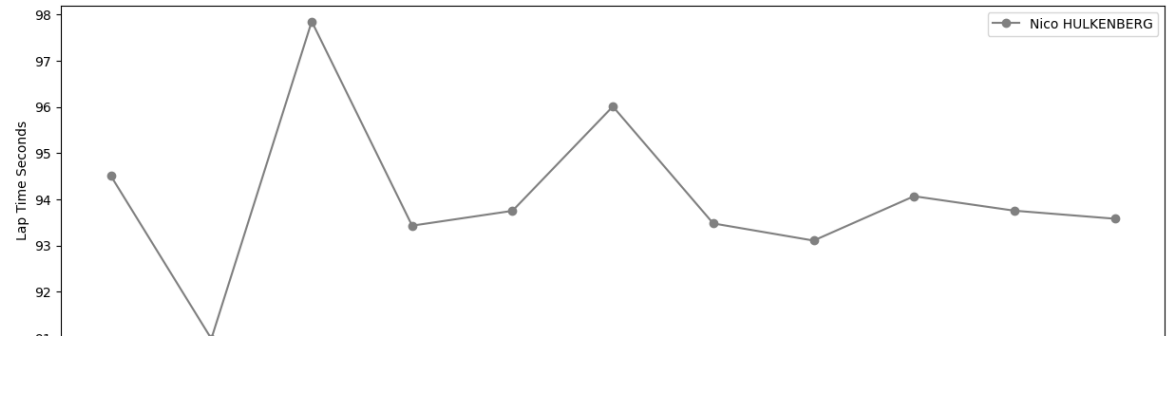

Valtteri BOTTAS
Lap Time Seconds

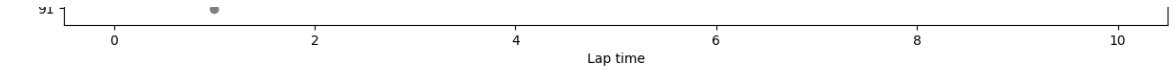

Lap time
Carlos SAINZ
Lap Time Seconds
Lap time

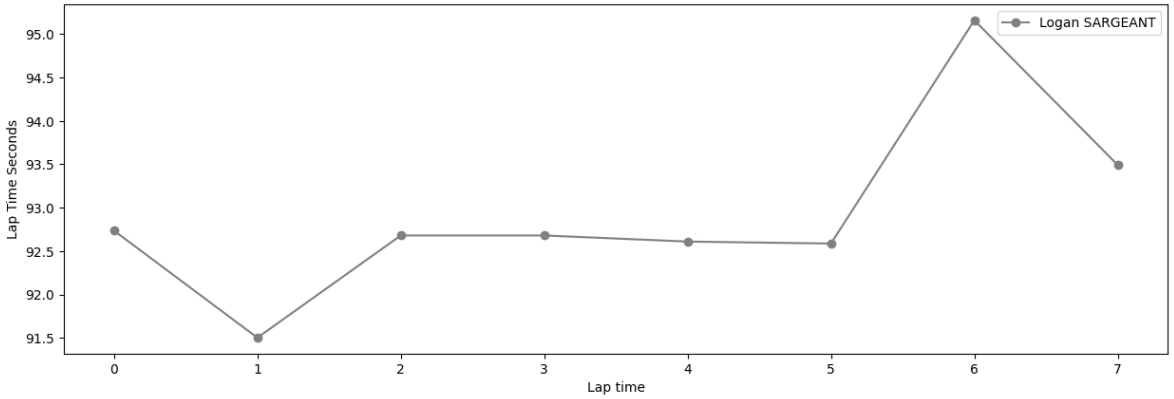

Daniel RICCIARDO
Lap Time Seconds
Lap time

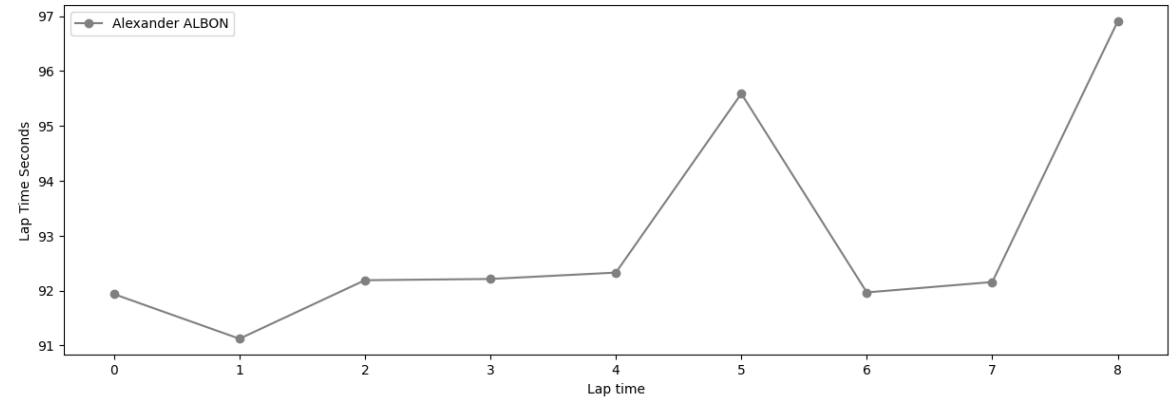

Yuki TSUNODA
Lap Time Seconds
Lap time

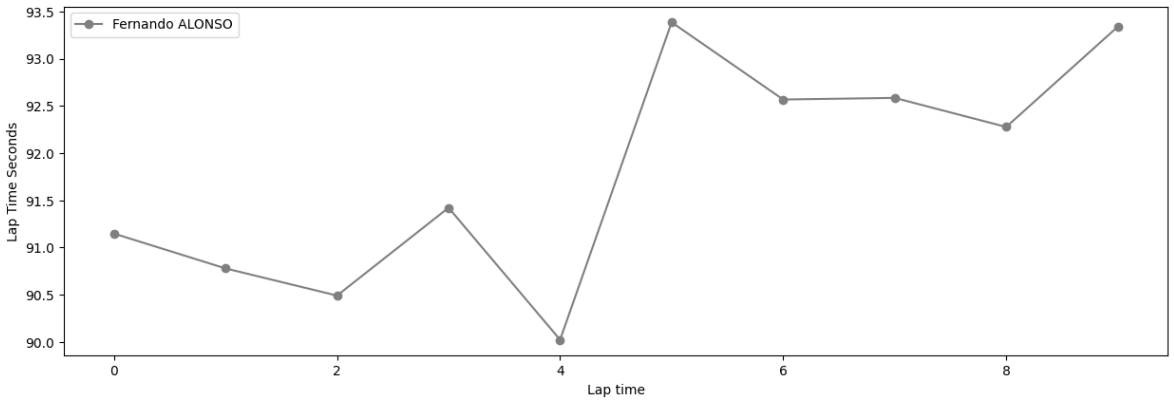

Charles LECLERC
Lap Time Seconds
Lap time

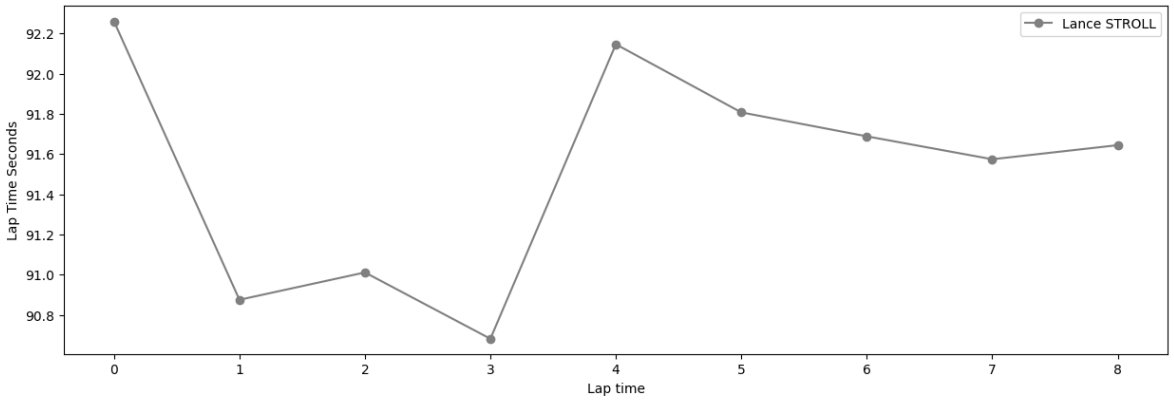

Nico HULKENBERG
Lap Time Seconds

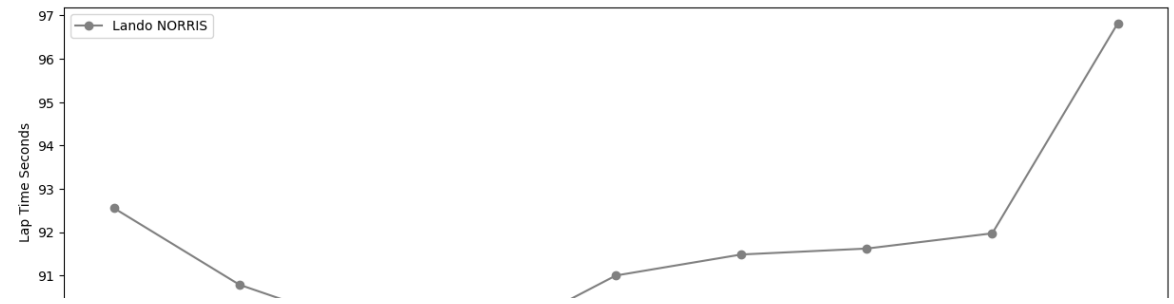

Lap time

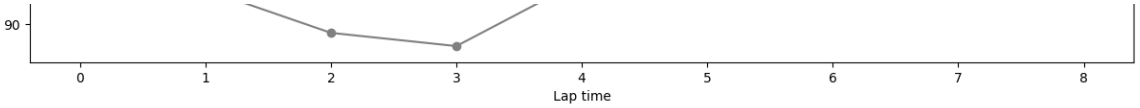

Logan SARGEANT
Lap Time Seconds
Lap time


Alexander ALBON
Lap Time Seconds
Lap time


Fernando ALONSO
Lap Time Seconds
Lap time

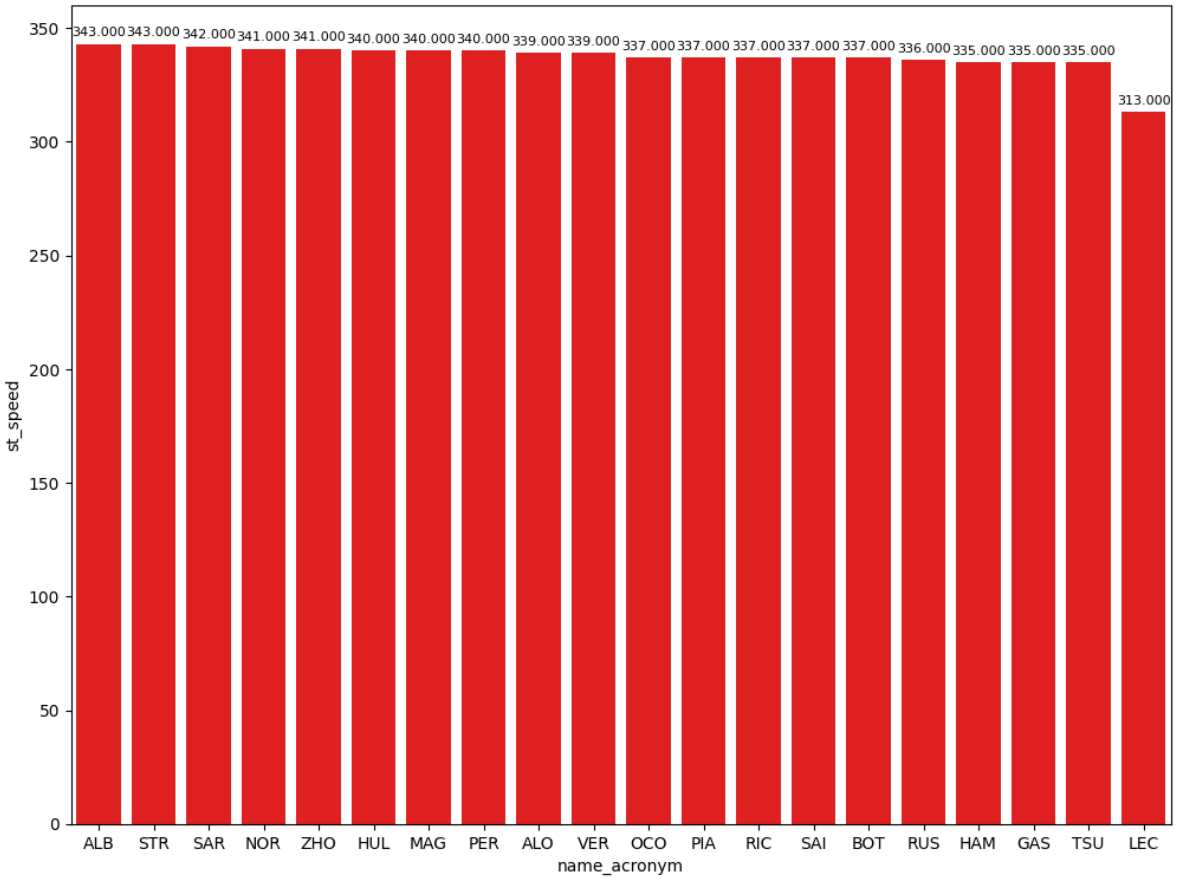

Lance STROLL
Lap Time Seconds
Lap time


Lando NORRIS
Lap Time Seconds

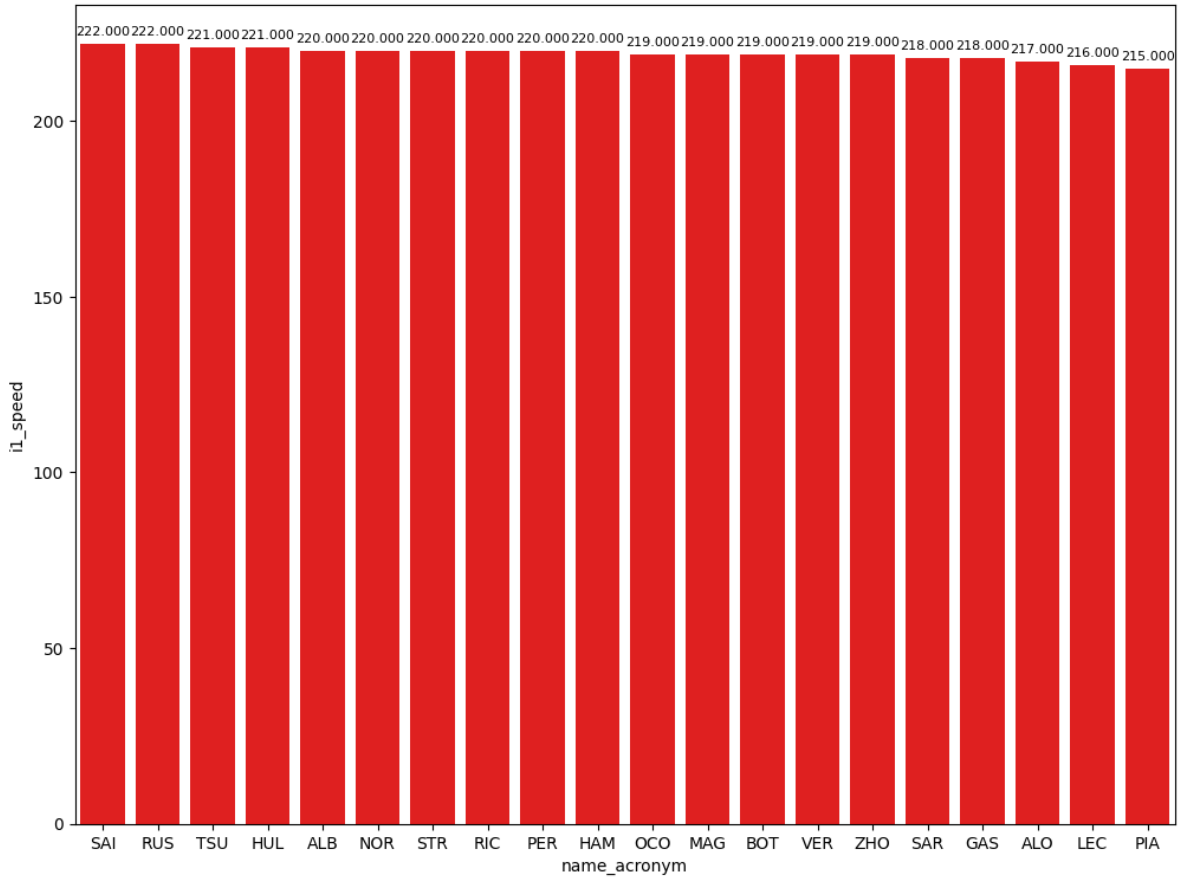


Speed trap

In [8]:
```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['st_speed
libraryDataF1.obtainchart("name_acronym","st_speed",top_speed)
```

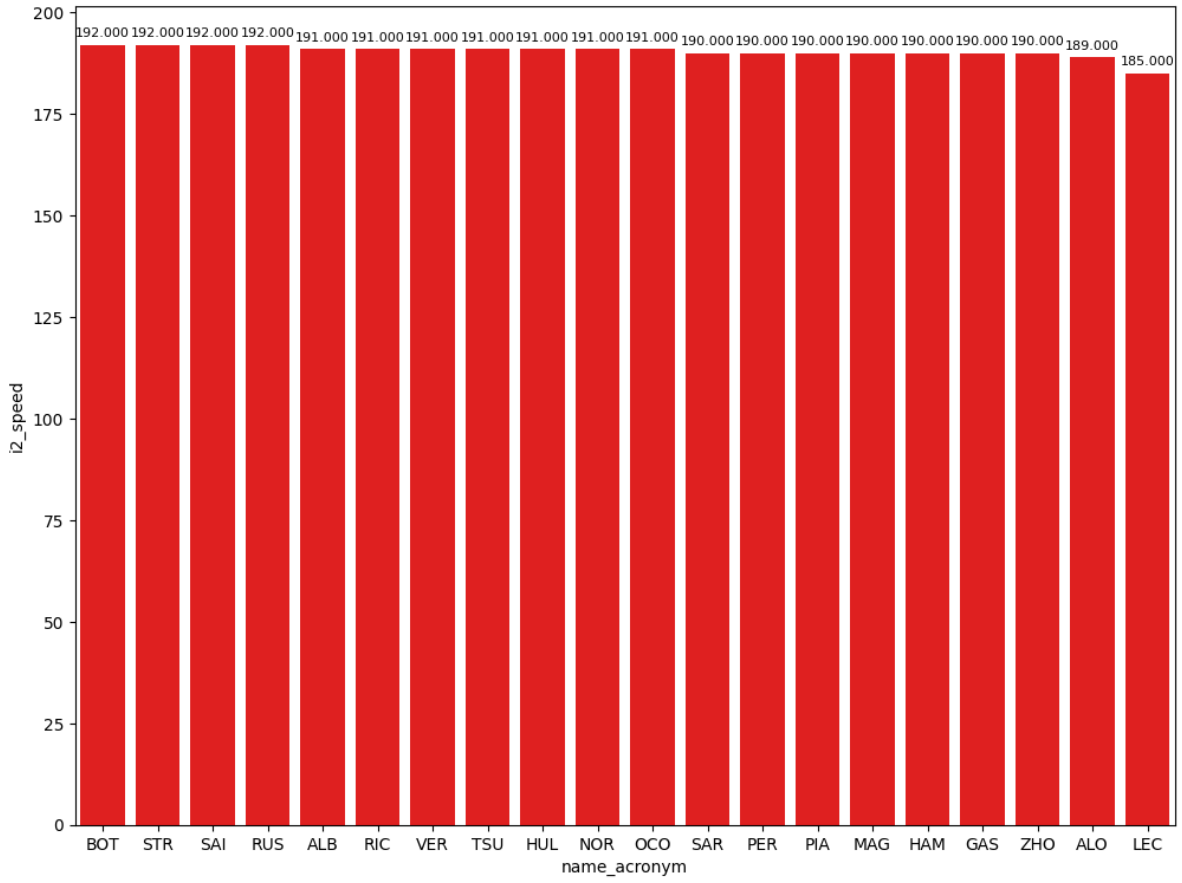


In [9]:
```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i1_speed
libraryDataF1.obtainchart("name_acronym","i1_speed",top_speed)
```



In [10]:

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i2_speed
libraryDataF1.obtainchart("name_acronym","i2_speed",top_speed)
```



Fastest lap per compound

In this section, I will show the best lap with the different compounds of the session.

In [11]:
```
compoundsPace = jointables2.loc[jointables2.groupby(['compound'])['lap_dura
compoundsPace[['full_name','compound','duration_sector_1','duration_sector_
```

Out[11]:

	full_name	compound	duration_sector_1	duration_sector_2	duration_sector_3	lap_dur
212	Carlos SAINZ	HARD	29.814	34.156	25.361	8
406	Yuki TSUNODA	MEDIUM	30.010	33.803	25.243	8
395	Max VERSTAPPEN	SOFT	29.606	33.604	25.385	8

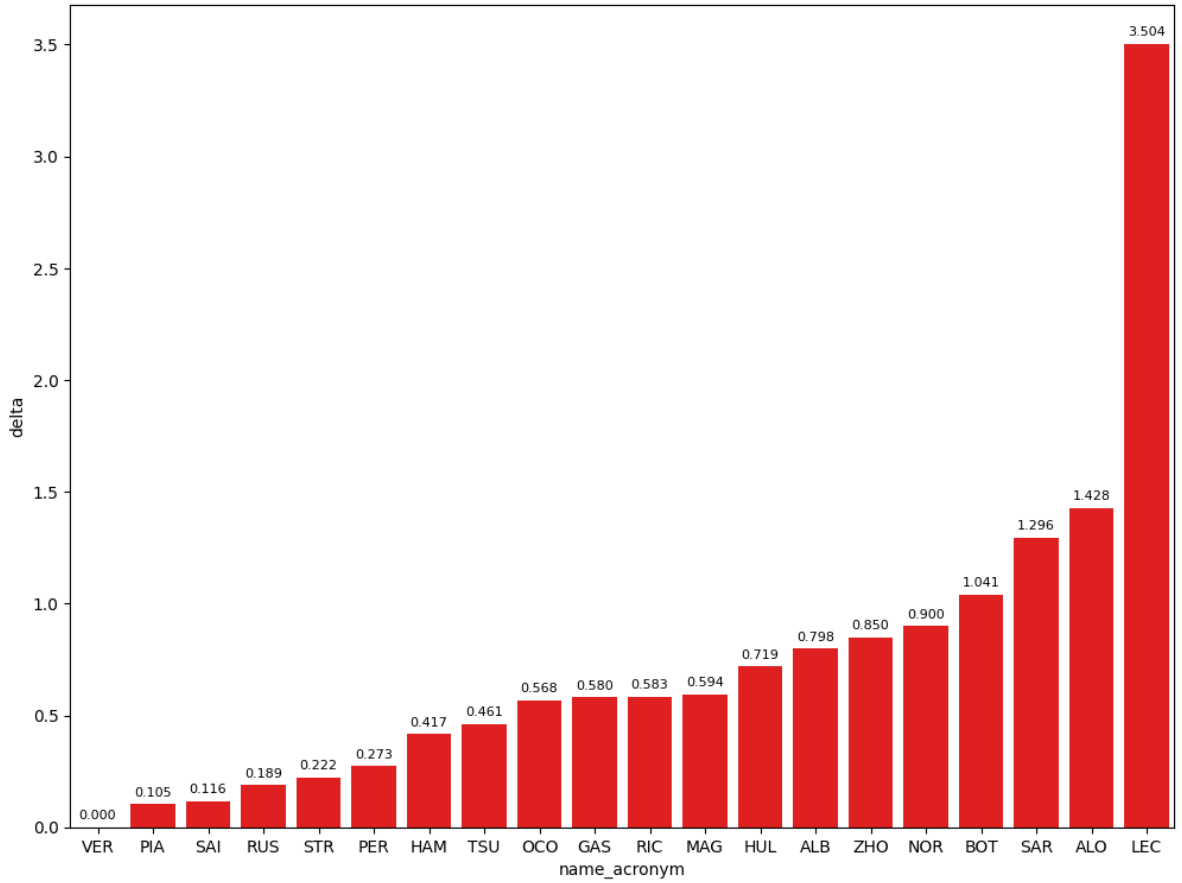
Deltas

In this section we can see the deltas of the fastest lap of each driver compared with the fastest lap of the session

In [12]:
```
practiceCleaned = jointables2.query("lap_duration >1")
drivers_list = list(practiceCleaned['driver_number'].unique())
newdataset = pd.DataFrame()
for driver in drivers_list:
    newdataset =libraryDataF1.obtain_fastest_lap(driver,practiceCleaned,new

arr= libraryDataF1.obtain_deltas(newdataset)
newdataset.insert(3,'delta',arr)
```

In [13]:
```
dt = newdataset.sort_values(ascending=True,by='delta')
libraryDataF1.obtainchart("name_acronym","delta",dt)
```



Track dominance

In this section, best sector are taken of each sector to see the car's performance in each sector.

In [14]:
```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['durat
sectorPace[['duration_sector_1','full_name','compound','lap_duration','lap
```

Out[14]:

	duration_sector_1	full_name	compound	lap_duration	lap_number
398	29.473	George RUSSELL	SOFT	88.784	23
352	29.575	Lewis HAMILTON	SOFT	89.012	20
395	29.606	Max VERSTAPPEN	SOFT	88.595	22
400	29.612	Carlos SAINZ	SOFT	88.711	21
404	29.729	Lando NORRIS	SOFT	96.398	18
401	29.746	Oscar PIASTRI	SOFT	88.700	21
327	29.748	Pierre GASLY	SOFT	89.175	20
411	29.791	Esteban OCON	SOFT	89.163	21
407	29.814	Lance STROLL	SOFT	88.817	22
349	29.861	Yuki TSUNODA	MEDIUM	89.172	19
396	29.870	Valtteri BOTTAS	SOFT	89.884	20
399	29.907	Daniel RICCIARDO	MEDIUM	89.178	24
376	29.929	Sergio PEREZ	SOFT	88.868	19
353	29.993	Kevin MAGNUSSEN	SOFT	89.243	21

	duration_sector_1	full_name	compound	lap_duration	lap_number
402	30.045	ZHOU Guanyu	SOFT	89.445	21
363	30.222	Nico HULKENBERG	SOFT	89.314	20
378	30.258	Alexander ALBON	SOFT	89.393	20
326	30.301	Fernando ALONSO	HARD	90.023	14
322	30.525	Logan SARGEANT	MEDIUM	90.151	16

In [15]:
```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['durat
sectorPace[['duration_sector_2','full_name','compound','lap_duration','lap_
```

Out[15]:

	duration_sector_2	full_name	compound	lap_duration	lap_number
395	33.604	Max VERSTAPPEN	SOFT	88.595	22
404	33.706	Lando NORRIS	SOFT	96.398	18
418	33.802	Nico HULKENBERG	SOFT	89.343	23
406	33.803	Yuki TSUNODA	MEDIUM	89.056	22
401	33.858	Oscar PIASTRI	SOFT	88.700	21
376	33.900	Sergio PEREZ	SOFT	88.868	19
400	33.904	Carlos SAINZ	SOFT	88.711	21
407	33.916	Lance STROLL	SOFT	88.817	22
345	33.965	George RUSSELL	SOFT	88.910	20
328	33.969	Alexander ALBON	SOFT	89.540	17
399	34.008	Daniel RICCIARDO	MEDIUM	89.178	24
414	34.033	Kevin MAGNUSSEN	SOFT	89.189	24
411	34.127	Esteban OCON	SOFT	89.163	21
327	34.133	Pierre GASLY	SOFT	89.175	20
369	34.179	Logan SARGEANT	MEDIUM	89.891	19
402	34.181	ZHOU Guanyu	SOFT	89.445	21
362	34.209	Valtteri BOTTAS	SOFT	89.636	18
352	34.210	Lewis HAMILTON	SOFT	89.012	20
326	34.369	Fernando ALONSO	HARD	90.023	14
29	35.199	Charles LECLERC	HARD	92.099	2

In [16]:
```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['durat
sectorPace[['duration_sector_3','full_name','compound','lap_duration','lap_
```

Out[16]:

	duration_sector_3	full_name	compound	lap_duration	lap_number
418	24.939	Nico HULKENBERG	SOFT	89.343	23
378	24.992	Alexander ALBON	SOFT	89.393	20
376	25.039	Sergio PEREZ	SOFT	88.868	19
407	25.087	Lance STROLL	SOFT	88.817	22
401	25.096	Oscar PIASTRI	SOFT	88.700	21

	duration_sector_3	full_name	compound	lap_duration	lap_number
353	25.134	Kevin MAGNUSSEN	SOFT	89.243	21
369	25.145	Logan SARGEANT	MEDIUM	89.891	19
400	25.195	Carlos SAINZ	SOFT	88.711	21
402	25.219	ZHOU Guanyu	SOFT	89.445	21
359	25.222	Esteban OCON	SOFT	89.351	18
352	25.227	Lewis HAMILTON	SOFT	89.012	20
406	25.243	Yuki TSUNODA	MEDIUM	89.056	22
399	25.263	Daniel RICCIARDO	MEDIUM	89.178	24
398	25.277	George RUSSELL	SOFT	88.784	23
327	25.294	Pierre GASLY	SOFT	89.175	20
237	25.302	Lando NORRIS	HARD	89.798	8
362	25.323	Valtteri BOTTAS	SOFT	89.636	18
326	25.353	Fernando ALONSO	HARD	90.023	14
395	25.385	Max VERSTAPPEN	SOFT	88.595	22

Mean pace with the different compound used on the session

In [17]:
```
race_pace = pd.DataFrame(jointables2.query("is_pit_out_lap == False  and la
race_pace
```

Out[17]:

compound	lap_duration
SOFT	89.531222
MEDIUM	92.155040
HARD	92.388111

Long runs

In [18]:
```
MINIMUN_SECONDS = 83
MAXIMUM_SECONDS = 98
```

Red Bull Racing

In [19]:
```
stintInformation.query('driver_number == 1 or driver_number == 11')
```

Out[19]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
5	1234	9497	1	1	1	5	MEDIUM	
7	1234	9497	1	11	1	5	MEDIUM	
26	1234	9497	2	11	6	8	MEDIUM	
32	1234	9497	2	1	6	18	MEDIUM	
44	1234	9497	3	11	9	18	MEDIUM	

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
62	1234	9497	3	1	19	21	SOFT	
63	1234	9497	4	11	19	21	SOFT	
77	1234	9497	5	11	22	24	MEDIUM	

In [20]:
```
libraryDataF1.getinfolongruns(jointables2,1,'Red Bull Racing',MINIMUN_SECOI
```

Out[20]:

	full_name	compound	date_start	lap_number	duration_sector_1
32	Max VERSTAPPEN	MEDIUM	2024-05-03T16:33:32.677000+00:00	2	30.747
127	Max VERSTAPPEN	MEDIUM	2024-05-03T16:53:02.293000+00:00	7	31.654
143	Max VERSTAPPEN	MEDIUM	2024-05-03T16:54:35.355000+00:00	8	31.653
158	Max VERSTAPPEN	MEDIUM	2024-05-03T16:56:08.113000+00:00	9	31.672
171	Max VERSTAPPEN	MEDIUM	2024-05-03T16:57:42.711000+00:00	10	31.514
181	Max VERSTAPPEN	MEDIUM	2024-05-03T16:59:14.126000+00:00	11	31.529
191	Max VERSTAPPEN	MEDIUM	2024-05-03T17:00:46.589000+00:00	12	31.458
205	Max VERSTAPPEN	MEDIUM	2024-05-03T17:02:21.908000+00:00	13	31.626
222	Max VERSTAPPEN	MEDIUM	2024-05-03T17:03:55.129000+00:00	14	31.503
239	Max VERSTAPPEN	MEDIUM	2024-05-03T17:05:27.160000+00:00	15	31.388
254	Max VERSTAPPEN	MEDIUM	2024-05-03T17:06:59.773000+00:00	16	31.257
395	Max VERSTAPPEN	SOFT	2024-05-03T17:27:01.334000+00:00	22	29.606

In [21]:
```
libraryDataF1.getinfolongruns(jointables2,11,'Red Bull Racing',MINIMUN_SEC(
```

Out[21]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
34	Sergio PEREZ	MEDIUM	2024-05-03T16:33:37.127000+00:00	2	31.073	
87	Sergio PEREZ	MEDIUM	2024-05-03T16:48:13.239000+00:00	6	29.980	
177	Sergio PEREZ	MEDIUM	2024-05-03T16:58:56.401000+00:00	9	31.701	
187	Sergio PEREZ	MEDIUM	2024-05-03T17:00:29.750000+00:00	10	31.461	
202	Sergio PEREZ	MEDIUM	2024-05-03T17:02:02.889000+00:00	11	31.613	
218	Sergio PEREZ	MEDIUM	2024-05-03T17:03:36.051000+00:00	12	31.578	

	full_name	compound	date_start	lap_number	duration_sector_1	du
234	Sergio PEREZ	MEDIUM	2024-05-03T17:05:08.678000+00:00	13	31.665	
249	Sergio PEREZ	MEDIUM	2024-05-03T17:06:42.039000+00:00	14	32.221	
264	Sergio PEREZ	MEDIUM	2024-05-03T17:08:17.168000+00:00	15	31.508	
279	Sergio PEREZ	MEDIUM	2024-05-03T17:09:49.699000+00:00	16	31.458	

Ferrari

In [22]:
```
libraryDataF1.getinfolongruns(jointables2,16,'Ferrari',MINIMUN_SECONDS,MAX
```

Out[22]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
29	Charles LECLERC	HARD	2024-05-03T16:33:25.277000+00:00	2	30.804	

In [23]:
```
libraryDataF1.getinfolongruns(jointables2,55,'Ferrari',MINIMUN_SECONDS,MAX
```

Out[23]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
25	Carlos SAINZ	HARD	2024-05-03T16:32:55.244000+00:00	2	31.148	
43	Carlos SAINZ	HARD	2024-05-03T16:34:27.125000+00:00	3	30.964	
151	Carlos SAINZ	HARD	2024-05-03T16:55:20.145000+00:00	7	30.034	
180	Carlos SAINZ	HARD	2024-05-03T16:59:10.368000+00:00	9	29.856	
212	Carlos SAINZ	HARD	2024-05-03T17:03:04.688000+00:00	11	29.814	
248	Carlos SAINZ	HARD	2024-05-03T17:06:41.245000+00:00	13	30.613	
263	Carlos SAINZ	HARD	2024-05-03T17:08:12.691000+00:00	14	30.629	
278	Carlos SAINZ	HARD	2024-05-03T17:09:44.617000+00:00	15	30.695	
289	Carlos SAINZ	HARD	2024-05-03T17:11:16.403000+00:00	16	30.574	
344	Carlos SAINZ	SOFT	2024-05-03T17:21:08.248000+00:00	18	29.754	
400	Carlos SAINZ	SOFT	2024-05-03T17:27:42.859000+00:00	21	29.612	

Mercedes

In [24]:
```
libraryDataF1.getinfolongruns(jointables2,44,'Mercedes',MINIMUN_SECONDS,MAX
```

Out[24]:

	full_name	compound	date_start	lap_number	duration_sector_1	d

	full_name	compound	date_start	lap_number	duration_sector_1	d
24	Lewis HAMILTON	MEDIUM	2024-05-03T16:32:46.629000+00:00	2	30.205	
89	Lewis HAMILTON	MEDIUM	2024-05-03T16:48:40.981000+00:00	6	29.935	
155	Lewis HAMILTON	MEDIUM	2024-05-03T16:55:53.928000+00:00	9	29.778	
227	Lewis HAMILTON	MEDIUM	2024-05-03T17:04:28.013000+00:00	12	31.485	
243	Lewis HAMILTON	MEDIUM	2024-05-03T17:06:01.455000+00:00	13	31.233	
259	Lewis HAMILTON	MEDIUM	2024-05-03T17:07:34.285000+00:00	14	31.163	
273	Lewis HAMILTON	MEDIUM	2024-05-03T17:09:06.732000+00:00	15	30.760	
284	Lewis HAMILTON	MEDIUM	2024-05-03T17:10:38.817000+00:00	16	30.949	
295	Lewis HAMILTON	MEDIUM	2024-05-03T17:12:11.083000+00:00	17	30.701	
303	Lewis HAMILTON	MEDIUM	2024-05-03T17:13:46.285000+00:00	18	30.948	
352	Lewis	SOFT	2024-05-03T17:22:14.831000+00:00	20	29.575	

In [25]:
```
libraryDataF1.getinfolongruns(jointables2,63,'Mercedes',MINIMUN_SECONDS,MAX
```

Out[25]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
37	George RUSSELL	MEDIUM	2024-05-03T16:33:44.497000+00:00	2	31.644	
90	George RUSSELL	MEDIUM	2024-05-03T16:48:46.640000+00:00	6	29.939	
124	George RUSSELL	MEDIUM	2024-05-03T16:52:43.114000+00:00	8	29.920	
203	George RUSSELL	MEDIUM	2024-05-03T17:02:04.913000+00:00	11	31.262	
219	George RUSSELL	MEDIUM	2024-05-03T17:03:40.582000+00:00	12	30.858	
235	George RUSSELL	MEDIUM	2024-05-03T17:05:13.378000+00:00	13	30.940	
250	George RUSSELL	MEDIUM	2024-05-03T17:06:46.074000+00:00	14	30.958	
265	George RUSSELL	MEDIUM	2024-05-03T17:08:18.350000+00:00	15	31.136	
291	George RUSSELL	MEDIUM	2024-05-03T17:11:30.393000+00:00	17	30.778	
345	George RUSSELL	SOFT	2024-05-03T17:21:24.953000+00:00	20	29.615	
398	George RUSSELL	SOFT	2024-05-03T17:27:27.465000+00:00	23	29.473	

McLaren

In [26]:
```
libraryDataF1.getinfolongruns(jointables2,4,'McLaren',MINIMUN_SECONDS,MAXI
```

Out[26]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
93	Lando NORRIS	HARD	2024-05-03T16:49:09.790000+00:00	3	31.385	
125	Lando NORRIS	HARD	2024-05-03T16:52:50.600000+00:00	5	30.366	
237	Lando NORRIS	HARD	2024-05-03T17:05:20.909000+00:00	8	30.329	
272	Lando NORRIS	HARD	2024-05-03T17:08:59.889000+00:00	10	30.026	
294	Lando NORRIS	HARD	2024-05-03T17:12:09.131000+00:00	12	30.549	
302	Lando NORRIS	HARD	2024-05-03T17:13:40.162000+00:00	13	30.779	
310	Lando NORRIS	HARD	2024-05-03T17:15:11.897000+00:00	14	30.891	
315	Lando NORRIS	HARD	2024-05-03T17:16:43.266000+00:00	15	30.920	
324	Lando NORRIS	HARD	2024-05-03T17:18:15.345000+00:00	16	31.003	
404	Lando NORRIS	SOFT	2024-05-03T17:28:03.690000+00:00	18	29.729	

In [27]:
```
libraryDataF1.getinfolongruns(jointables2,81,'McLaren',MINIMUN_SECONDS,MAXI
```

Out[27]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
20	Oscar PIASTRI	HARD	2024-05-03T16:32:03.324000+00:00	2	30.837	
92	Oscar PIASTRI	HARD	2024-05-03T16:49:01.946000+00:00	7	30.422	
214	Oscar PIASTRI	HARD	2024-05-03T17:03:20.897000+00:00	10	30.182	
255	Oscar PIASTRI	HARD	2024-05-03T17:07:06.869000+00:00	12	30.077	
293	Oscar PIASTRI	HARD	2024-05-03T17:12:05.728000+00:00	15	30.968	
301	Oscar PIASTRI	HARD	2024-05-03T17:13:37.382000+00:00	16	31.331	
309	Oscar PIASTRI	HARD	2024-05-03T17:15:09.739000+00:00	17	31.231	
314	Oscar PIASTRI	HARD	2024-05-03T17:16:41.801000+00:00	18	31.093	
401	Oscar PIASTRI	SOFT	2024-05-03T17:27:52.091000+00:00	21	29.746	

Aston Martin

In [28]:
```
libraryDataF1.getinfolongruns(jointables2,14,'Aston Martin',MINIMUN_SECONDS
```

Out[28]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
88	Fernando ALONSO	HARD	2024-05-03T16:48:19.719000+00:00	4	30.924	
121	Fernando ALONSO	HARD	2024-05-03T16:52:04.735000+00:00	6	30.578	
154	Fernando ALONSO	HARD	2024-05-03T16:55:47.668000+00:00	8	30.394	
299	Fernando ALONSO	HARD	2024-05-03T17:13:12.570000+00:00	11	30.770	
326	Fernando ALONSO	HARD	2024-05-03T17:18:52.307000+00:00	14	30.301	
357	Fernando ALONSO	HARD	2024-05-03T17:22:40.164000+00:00	16	31.546	
371	Fernando ALONSO	HARD	2024-05-03T17:24:13.476000+00:00	17	31.099	
383	Fernando ALONSO	HARD	2024-05-03T17:25:46.061000+00:00	18	30.945	
397	Fernando ALONSO	HARD	2024-05-03T17:27:18.707000+00:00	19	30.929	
412	Fernando ALONSO	HARD	2024-05-03T17:28:51.033000+00:00	20	31.582	

In [29]:
```
libraryDataF1.getinfolongruns(jointables2,18,'Aston Martin',MINIMUN_SECONDS
```

Out[29]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
91	Lance STROLL	HARD	2024-05-03T16:48:54.743000+00:00	4	31.183	
122	Lance STROLL	HARD	2024-05-03T16:52:12.563000+00:00	6	30.764	
156	Lance STROLL	HARD	2024-05-03T16:56:02.091000+00:00	8	30.955	
184	Lance STROLL	HARD	2024-05-03T16:59:51.560000+00:00	10	30.467	
213	Lance STROLL	HARD	2024-05-03T17:03:14.516000+00:00	12	31.079	
230	Lance STROLL	HARD	2024-05-03T17:04:46.663000+00:00	13	30.998	
245	Lance STROLL	HARD	2024-05-03T17:06:18.592000+00:00	14	30.974	
261	Lance STROLL	HARD	2024-05-03T17:07:50.099000+00:00	15	30.866	
275	Lance STROLL	HARD	2024-05-03T17:09:21.742000+00:00	16	30.817	
354	Lance STROLL	SOFT	2024-05-03T17:22:28.035000+00:00	19	30.005	
407	Lance STROLL	SOFT	2024-05-03T17:28:28.159000+00:00	22	29.814	

RB

In [30]:
```
libraryDataF1.getinfolongruns(jointables2,3,'RB',MINIMUN_SECONDS,MAXIMUM_SI
```

Out[30]:

	full_name	compound	date_start	lap_number	duration_sector_1
26	Daniel RICCIARDO	HARD	2024-05-03T16:32:57.799000+00:00	2	32.209
44	Daniel RICCIARDO	HARD	2024-05-03T16:34:31.830000+00:00	3	31.504
94	Daniel RICCIARDO	HARD	2024-05-03T16:49:13.901000+00:00	6	31.062
129	Daniel RICCIARDO	HARD	2024-05-03T16:53:10.030000+00:00	8	30.790
164	Daniel RICCIARDO	HARD	2024-05-03T16:57:04.680000+00:00	10	30.554
228	Daniel RICCIARDO	HARD	2024-05-03T17:04:30.669000+00:00	14	31.286
244	Daniel RICCIARDO	HARD	2024-05-03T17:06:03.143000+00:00	15	31.426
260	Daniel RICCIARDO	HARD	2024-05-03T17:07:35.336000+00:00	16	31.353
274	Daniel RICCIARDO	HARD	2024-05-03T17:09:07.725000+00:00	17	31.293
350	Daniel RICCIARDO	MEDIUM	2024-05-03T17:22:00.436000+00:00	21	29.948
399	Daniel RICCIARDO	MEDIUM	2024-05-03T17:27:33.684000+00:00	24	29.907

In [31]:
```
libraryDataF1.getinfolongruns(jointables2,22,'RB',MINIMUN_SECONDS,MAXIMUM_S
```

Out[31]:

	full_name	compound	date_start	lap_number	duration_sector_1	d
27	Yuki TSUNODA	HARD	2024-05-03T16:33:11.991000+00:00	2	31.170	
85	Yuki TSUNODA	HARD	2024-05-03T16:47:57.572000+00:00	6	32.202	
119	Yuki TSUNODA	HARD	2024-05-03T16:51:46.082000+00:00	8	30.482	
211	Yuki TSUNODA	HARD	2024-05-03T17:02:49.852000+00:00	12	32.215	
226	Yuki TSUNODA	HARD	2024-05-03T17:04:23.381000+00:00	13	31.106	
242	Yuki TSUNODA	HARD	2024-05-03T17:05:55.792000+00:00	14	31.444	
258	Yuki TSUNODA	HARD	2024-05-03T17:07:28.607000+00:00	15	31.368	
349	Yuki TSUNODA	MEDIUM	2024-05-03T17:21:54.374000+00:00	19	29.861	
406	Yuki TSUNODA	MEDIUM	2024-05-03T17:28:15.417000+00:00	22	30.010	

Haas

In [32]:
```
libraryDataF1.getinfolongruns(jointables2,20,'Haas F1 Team',MINIMUN_SECONDS
```

Out[32]:

	full_name	compound	date_start	lap_number	duration_sector_1
16	Kevin MAGNUSSEN	HARD	2024-05-03T16:31:43.853000+00:00	2	31.631
28	Kevin MAGNUSSEN	HARD	2024-05-03T16:33:16.315000+00:00	3	30.766
116	Kevin MAGNUSSEN	HARD	2024-05-03T16:51:37.552000+00:00	7	32.210
130	Kevin MAGNUSSEN	HARD	2024-05-03T16:53:11.658000+00:00	8	31.924
146	Kevin MAGNUSSEN	HARD	2024-05-03T16:54:45.283000+00:00	9	32.113
159	Kevin MAGNUSSEN	HARD	2024-05-03T16:56:19.334000+00:00	10	31.816
172	Kevin MAGNUSSEN	HARD	2024-05-03T16:57:52.889000+00:00	11	31.706
182	Kevin MAGNUSSEN	HARD	2024-05-03T16:59:26.605000+00:00	12	31.526
193	Kevin MAGNUSSEN	HARD	2024-05-03T17:00:59.921000+00:00	13	31.840
206	Kevin MAGNUSSEN	HARD	2024-05-03T17:02:34.003000+00:00	14	31.833
223	Kevin MAGNUSSEN	HARD	2024-05-03T17:04:07.626000+00:00	15	32.088
240	Kevin MAGNUSSEN	HARD	2024-05-03T17:05:41.569000+00:00	16	31.663
256	Kevin MAGNUSSEN	HARD	2024-05-03T17:07:15.113000+00:00	17	31.650
270	Kevin MAGNUSSEN	HARD	2024-05-03T17:08:48.613000+00:00	18	31.683
353	Kevin MAGNUSSEN	SOFT	2024-05-03T17:22:20.768000+00:00	21	29.993
414	Kevin MAGNUSSEN	SOFT	2024-05-03T17:28:55.439000+00:00	24	30.010

In [33]:
```
libraryDataF1.getinfolongruns(jointables2,27,'Haas F1 Team',MINIMUN_SECONDS
```

Out[33]:

	full_name	compound	date_start	lap_number	duration_sector_1
38	Nico HULKENBERG	HARD	2024-05-03T16:33:46.118000+00:00	2	32.403
123	Nico HULKENBERG	HARD	2024-05-03T16:52:28.777000+00:00	6	30.700
157	Nico HULKENBERG	HARD	2024-05-03T16:56:06.883000+00:00	8	30.711
215	Nico HULKENBERG	HARD	2024-05-03T17:03:21.692000+00:00	10	31.884

	full_name	compound	date_start	lap_number	duration_sector_1
232	Nico HULKENBERG	HARD	2024-05-03T17:04:56.162000+00:00	11	31.690
246	Nico HULKENBERG	HARD	2024-05-03T17:06:28.883000+00:00	12	32.879
262	Nico HULKENBERG	HARD	2024-05-03T17:08:04.974000+00:00	13	31.679
277	Nico HULKENBERG	HARD	2024-05-03T17:09:38.427000+00:00	14	31.795
287	Nico HULKENBERG	HARD	2024-05-03T17:11:11.448000+00:00	15	32.147
296	Nico HULKENBERG	HARD	2024-05-03T17:12:45.552000+00:00	16	31.938
305	Nico HULKENBERG	HARD	2024-05-03T17:14:19.227000+00:00	17	31.814
363	Nico HULKENBERG	SOFT	2024-05-03T17:23:15.191000+00:00	20	30.222
418	Nico	SOFT	2024-05-03T17:30:06.693000+00:00	23	30.601

Alpine

In [34]:
```
libraryDataF1.getinfolongruns(jointables2,31,'Alpine',MINIMUN_SECONDS,MAXI
```

Out[34]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
19	Esteban OCON	HARD	2024-05-03T16:31:54.601000+00:00	2	31.235	
138	Esteban OCON	HARD	2024-05-03T16:53:41.306000+00:00	7	30.246	
169	Esteban OCON	HARD	2024-05-03T16:57:28.283000+00:00	9	30.491	
194	Esteban OCON	HARD	2024-05-03T17:01:10.915000+00:00	11	30.280	
207	Esteban OCON	HARD	2024-05-03T17:02:41.375000+00:00	12	31.016	
224	Esteban OCON	HARD	2024-05-03T17:04:13.833000+00:00	13	30.845	
241	Esteban OCON	HARD	2024-05-03T17:05:45.872000+00:00	14	30.968	
257	Esteban OCON	HARD	2024-05-03T17:07:18.158000+00:00	15	31.051	
359	Esteban OCON	SOFT	2024-05-03T17:22:48.106000+00:00	18	29.927	
411	Esteban OCON	SOFT	2024-05-03T17:28:47.332000+00:00	21	29.791	

In [35]:
```
libraryDataF1.getinfolongruns(jointables2,10,'Alpine',MINIMUN_SECONDS,MAXI
```

Out[35]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
21	Pierre GASLY	HARD	2024-05-03T16:32:08.594000+00:00	2	30.885	

	full_name	compound	date_start	lap_number	duration_sector_1	du
97	Pierre GASLY	HARD	2024-05-03T16:49:25.904000+00:00	7	30.632	
128	Pierre GASLY	HARD	2024-05-03T16:53:05.839000+00:00	9	30.401	
161	Pierre GASLY	HARD	2024-05-03T16:56:45.655000+00:00	11	30.049	
189	Pierre GASLY	HARD	2024-05-03T17:00:39.131000+00:00	13	30.173	
204	Pierre GASLY	HARD	2024-05-03T17:02:09.922000+00:00	14	30.878	
220	Pierre GASLY	HARD	2024-05-03T17:03:42.326000+00:00	15	30.911	
236	Pierre GASLY	HARD	2024-05-03T17:05:14.553000+00:00	16	31.020	
251	Pierre GASLY	HARD	2024-05-03T17:06:46.663000+00:00	17	31.093	
327	Pierre GASLY	SOFT	2024-05-03T17:18:59.429000+00:00	20	29.748	
373	Pierre	SOFT	2024-05-03T17:24:34.425000+00:00	23	29.850	

Williams

In [36]:
```
libraryDataF1.getinfolongruns(jointables2,23,'Williams',MINIMUN_SECONDS,MA
```

Out[36]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
86	Alexander ALBON	HARD	2024-05-03T16:48:03.488000+00:00	2	31.500	
115	Alexander ALBON	HARD	2024-05-03T16:51:30.611000+00:00	4	31.237	
165	Alexander ALBON	HARD	2024-05-03T16:57:12.709000+00:00	7	31.513	
176	Alexander ALBON	HARD	2024-05-03T16:58:44.889000+00:00	8	31.446	
185	Alexander ALBON	HARD	2024-05-03T17:00:17.085000+00:00	9	31.526	
200	Alexander ALBON	HARD	2024-05-03T17:01:49.414000+00:00	10	31.688	
217	Alexander ALBON	HARD	2024-05-03T17:03:25.089000+00:00	11	31.315	
233	Alexander ALBON	HARD	2024-05-03T17:04:57.066000+00:00	12	31.305	
247	Alexander ALBON	HARD	2024-05-03T17:06:29.271000+00:00	13	31.512	
328	Alexander ALBON	SOFT	2024-05-03T17:19:04.415000+00:00	17	30.541	
378	Alexander ALBON	SOFT	2024-05-03T17:24:59.038000+00:00	20	30.258	

In [37]:
```
libraryDataF1.getinfolongruns(jointables2,2,'Williams',MINIMUN_SECONDS,MAX
```

Out[37]:

	full_name	compound	date_start	lap_number	duration_sector_1
84	Logan SARGEANT	HARD	2024-05-03T16:47:48.857000+00:00	4	31.477
96	Logan SARGEANT	HARD	2024-05-03T16:49:21.612000+00:00	5	31.313
149	Logan SARGEANT	HARD	2024-05-03T16:55:02.245000+00:00	8	31.747
160	Logan SARGEANT	HARD	2024-05-03T16:56:34.834000+00:00	9	31.790
173	Logan SARGEANT	HARD	2024-05-03T16:58:07.597000+00:00	10	31.672
183	Logan SARGEANT	HARD	2024-05-03T16:59:40.154000+00:00	11	31.568
195	Logan SARGEANT	HARD	2024-05-03T17:01:12.682000+00:00	12	31.756
210	Logan SARGEANT	HARD	2024-05-03T17:02:47.896000+00:00	13	32.678
322	Logan SARGEANT	MEDIUM	2024-05-03T17:18:10.359000+00:00	16	30.525
369	Logan SARGEANT	MEDIUM	2024-05-03T17:23:55.047000+00:00	19	30.567

Kick Sauber

In [38]:
```
libraryDataF1.getinfolongruns(jointables2,24,'Kick Sauber',MINIMUN_SECONDS
```

Out[38]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
22	ZHOU Guanyu	MEDIUM	2024-05-03T16:32:18.563000+00:00	2	32.070	
95	ZHOU Guanyu	MEDIUM	2024-05-03T16:49:17.744000+00:00	7	30.851	
131	ZHOU Guanyu	MEDIUM	2024-05-03T16:53:14.549000+00:00	9	30.852	
179	ZHOU Guanyu	MEDIUM	2024-05-03T16:59:03.346000+00:00	12	30.329	
311	ZHOU Guanyu	SOFT	2024-05-03T17:15:43.512000+00:00	15	30.485	
351	ZHOU Guanyu	SOFT	2024-05-03T17:22:04.688000+00:00	18	30.164	
402	ZHOU Guanyu	SOFT	2024-05-03T17:27:56.617000+00:00	21	30.045	

In [39]:
```
libraryDataF1.getinfolongruns(jointables2,77,'Kick Sauber',MINIMUN_SECONDS
```

Out[39]:

	full_name	compound	date_start	lap_number	duration_sector_1	du

	full_name	compound	date_start	lap_number	duration_sector_1	du
23	Valtteri BOTTAS	HARD	2024-05-03T16:32:24.441000+00:00	2	31.411	
133	Valtteri BOTTAS	HARD	2024-05-03T16:53:23.825000+00:00	7	30.654	
221	Valtteri BOTTAS	HARD	2024-05-03T17:03:49.160000+00:00	10	31.338	
238	Valtteri BOTTAS	HARD	2024-05-03T17:05:22.188000+00:00	11	31.646	
253	Valtteri BOTTAS	HARD	2024-05-03T17:06:55.502000+00:00	12	31.553	
318	Valtteri BOTTAS	SOFT	2024-05-03T17:17:08.730000+00:00	15	30.290	
362	Valtteri BOTTAS	SOFT	2024-05-03T17:23:07.773000+00:00	18	30.104	

Sprint Qualyfing

Race control

This section has been added in order to know which laps has been deleted and knowing what happened on track during this session as well.

In [40]:
```
libraryDataF1.obtain_information('race_control',session_key=9502)
```

Out[40]:

	session_key	meeting_key	date	category	flag	lap_number
0	9502	1234	2024-05-03T20:15:09+00:00	Other	None	None
1	9502	1234	2024-05-03T20:17:12+00:00	Other	None	None
2	9502	1234	2024-05-03T20:17:12+00:00	Other	None	None
3	9502	1234	2024-05-03T20:17:12+00:00	Other	None	None
4	9502	1234	2024-05-03T20:17:12+00:00	Other	None	None
5	9502	1234	2024-05-03T20:17:12+00:00	Other	None	None
6	9502	1234	2024-05-03T20:17:12+00:00	Other	None	None
7	9502	1234	2024-05-03T20:17:33+00:00	Other	None	None

	session_key	meeting_key	date	category	flag	lap_number
8	9502	1234	2024-05-03T20:17:33+00:00	Other	None	None
9	9502	1234	2024-05-03T20:21:02+00:00	Other	None	None
10	9502	1234	2024-05-03T20:21:27+00:00	Other	None	None
11	9502	1234	2024-05-03T20:21:32+00:00	Other	None	None
12	9502	1234	2024-05-03T20:21:43+00:00	Other	None	None
13	9502	1234	2024-05-03T20:22:00+00:00	Other	None	None
14	9502	1234	2024-05-03T20:30:00+00:00	Flag	GREEN	None
15	9502	1234	2024-05-03T20:34:29+00:00	Other	None	None
16	9502	1234	2024-05-03T20:40:06+00:00	Other	None	None
17	9502	1234	2024-05-03T20:40:29+00:00	Other	None	None
18	9502	1234	2024-05-03T20:40:30+00:00	Other	None	None
19	9502	1234	2024-05-03T20:40:52+00:00	Other	None	None
20	9502	1234	2024-05-03T20:42:00+00:00	Flag	CHEQUERED	None
21	9502	1234	2024-05-03T20:42:25+00:00	Other	None	None

	session_key	meeting_key	date	category	flag	lap_number
22	9502	1234	2024-05-03T20:43:20+00:00	Other	None	None
23	9502	1234	2024-05-03T20:45:39+00:00	Other	None	None
24	9502	1234	2024-05-03T20:45:55+00:00	Other	None	None
25	9502	1234	2024-05-03T20:49:01+00:00	Flag	GREEN	None
26	9502	1234	2024-05-03T20:49:12+00:00	Other	None	None
27	9502	1234	2024-05-03T20:58:30+00:00	Other	None	None
28	9502	1234	2024-05-03T20:59:00+00:00	Flag	CHEQUERED	None
29	9502	1234	2024-05-03T20:59:09+00:00	Other	None	None
30	9502	1234	2024-05-03T21:00:27+00:00	Other	None	None
31	9502	1234	2024-05-03T21:00:54+00:00	Other	None	None
32	9502	1234	2024-05-03T21:02:08+00:00	Other	None	None
33	9502	1234	2024-05-03T21:02:21+00:00	Other	None	None

	session_key	meeting_key	date	category	flag	lap_number
34	9502	1234	2024-05-03T21:06:00+00:00	Flag	GREEN	None
35	9502	1234	2024-05-03T21:14:00+00:00	Flag	CHEQUERED	None
36	9502	1234	2024-05-03T21:14:17+00:00	Other	None	None
37	9502	1234	2024-05-03T21:16:46+00:00	Other	None	None

Obtain setup

In [41]:
```
qualyfing = libraryDataF1.obtain_information('laps',session_key=9502)
stintInformation = libraryDataF1.obtain_information('stints',session_key=9
drivers = libraryDataF1.obtain_information('drivers',session_key=9502)
```

In race control dataset, I can see a lot of laptimes deleted, principally for track limits. Those laps deleted were deleted from dataset in order to obtain only the valid laps for the analysis.

In [42]:
```
ids_deleted = [36,87,69,103,176]
for idv in ids_deleted:
    qualyfing = qualyfing.drop(idv)
```

In [43]:
```
bestlap = qualyfing.loc[qualyfing.groupby(['driver_number'])['lap_duration
bestlap[0:1]
```

Out[43]:

	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
150	1234	9502	4	223	192	339	2024-05-03T20:52:

The fastest lap is 87.597 seconds (1.35.606= so that to obtain the competitve laps the fastest lap will be multiplied by 1.07 (93.72879 seconds) due to, according to the rules all the drivers have to do unless one lap within this gap.

In [44]:
```
competitiveLaps = qualyfing.query("is_pit_out_lap == False and lap_duratio
competitiveLaps
```

Out[44]:

	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
15	1234	9502	24	220	189	333	2024-05-03T20:32:
16	1234	9502	77	216	192	322	2024-05-03T20:32:

	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
19	1234	9502	18	220	192	337	2024-05-03T20:32:
21	1234	9502	14	218	189	336	2024-05-03T20:32:
23	1234	9502	55	221	189	338	2024-05-03T20:33:
...	...	...	...	...	...	...	
215	1234	9502	14	213	193	333	2024-05-03T21:13:
216	1234	9502	4	223	193	338	2024-05-03T21:13:
217	1234	9502	16	223	192	336	2024-05-03T21:13:
218	1234	9502	55	225	193	336	2024-05-03T21:13:
220	1234	9502	81	220	191	336	2024-05-03T21:13:

In [45]:

```
drivers_list = list(competitiveLaps['driver_number'].unique())
newdataset = pd.DataFrame()
for driver in drivers_list:
    newdataset =libraryDataF1.obtain_information_qualy(driver,competitiveLa
jointables = pd.merge(newdataset,drivers,on=['driver_number'])
jointables.sort_values(by=['fastest_lap'],ascending=True)
```

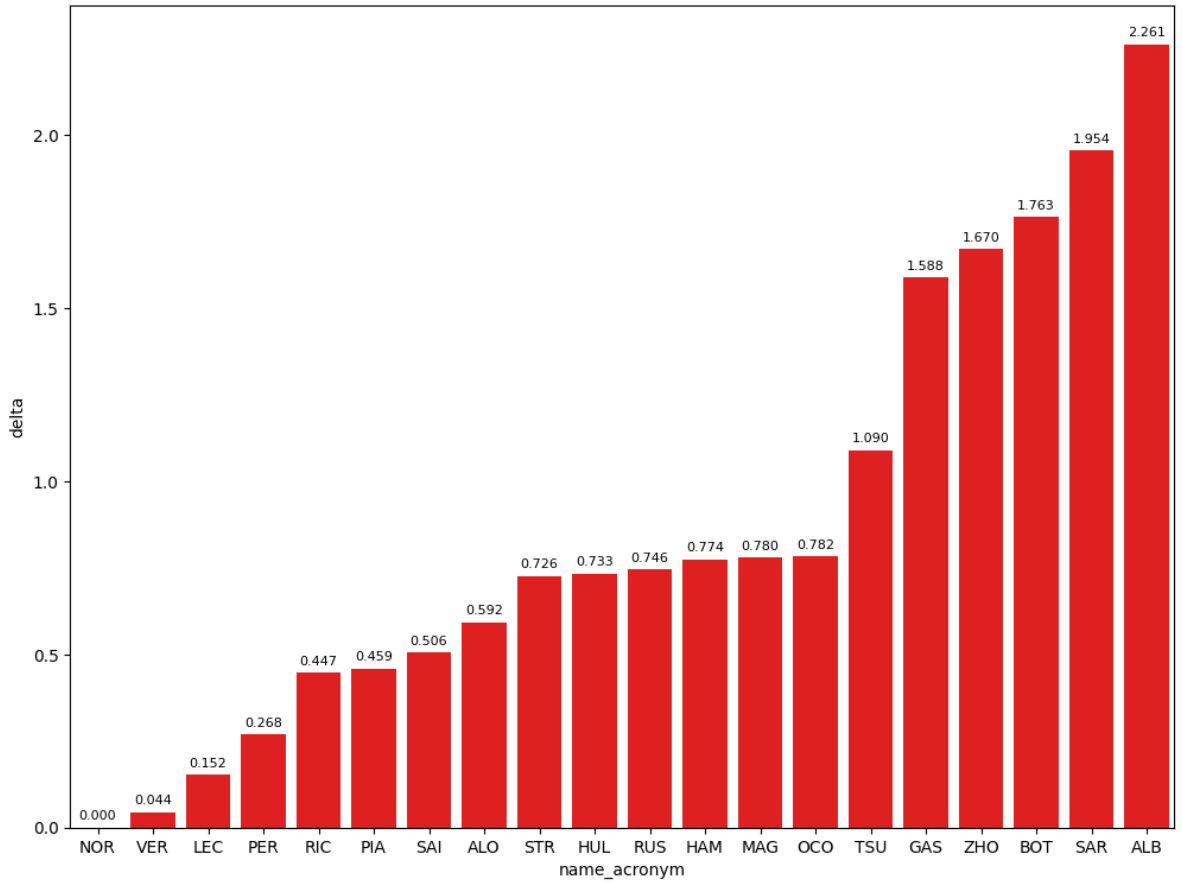
Out[45]:

	driver_number	fastest_lap	delta	st_speed	i1_speed	i2_speed	session_key	meeting_key
5	4	87.597	0.000	338	220	189	9502	1234
8	1	87.641	0.044	337	218	191	9502	1234
7	16	87.749	0.152	335	220	187	9502	1234
6	11	87.865	0.268	340	221	190	9502	1234
14	3	88.044	0.447	334	211	189	9502	1234
9	81	88.056	0.459	336	217	191	9502	1234
4	55	88.103	0.506	336	221	189	9502	1234
3	14	88.189	0.592	333	213	189	9502	1234
2	18	88.323	0.726	335	219	186	9502	1234

	driver_number	fastest_lap	delta	st_speed	i1_speed	i2_speed	session_key	meeting_key
10	27	88.330	0.733	338	210	191	9502	1234
15	63	88.343	0.746	334	219	191	9502	1234
13	44	88.371	0.774	332	220	189	9502	1234
12	20	88.377	0.780	339	215	187	9502	1234
11	31	88.379	0.782	336	219	190	9502	1234
16	22	88.687	1.090	334	220	191	9502	1234
19	10	89.185	1.588	336	219	189	9502	1234
0	24	89.267	1.670	333	220	189	9502	1234
1	77	89.360	1.763	322	216	191	9502	1234
17	2	89.551	1.954	343	216	188	9502	1234

Best lap per driver compared with the best lap of the session

In [46]:
```
libraryDataF1.obtainchart("name_acronym","delta",jointables.sort_values(by=
```



In [47]:
```
mergequaly = pd.merge(competitiveLaps,drivers,on=['driver_number'])
```

In [48]:
```
# In order to know when each session finished, race control dataset will be
maximumDateQ1 = "date_start <'2024-05-03T20:49:01+00:00'"
maximumDateQ2 = "date_start <'2024-05-03T21:06:00+00:00' and date_start >=
maximumDateQ3 = "date_start >'2024-05-03T21:06:00+00:00'"
```

Sprint Qualyfing 1

In [49]:
```
q1Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ1
q1Data
```

Out[49]:

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
21	1234	9502	4	222	192	338	2024-05-03T20
38	1234	9502	81	218	192	341	2024-05-03T20
11	1234	9502	14	219	192	337	2024-05-03T20
34	1234	9502	1	219	191	340	2024-05-03T20
51	1234	9502	20	219	191	340	2024-05-03T20
63	1234	9502	63	219	191	336	2024-05-03T20
16	1234	9502	55	221	192	338	2024-05-03T20
29	1234	9502	16	220	187	340	2024-05-03T20
24	1234	9502	11	223	191	340	2024-05-03T20
67	1234	9502	22	221	191	334	2024-05-03T20
59	1234	9502	3	220	191	336	2024-05-03T20
55	1234	9502	44	221	189	335	2024-05-03T20
6	1234	9502	18	221	186	336	2024-05-03T20
47	1234	9502	31	219	190	339	2024-05-03T20
42	1234	9502	27	210	191	343	2024-05-03T20
71	1234	9502	10	219	189	336	2024-05-03T20
1	1234	9502	24	221	190	338	2024-05-03T20
4	1234	9502	77	220	191	338	2024-05-03T20

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
68	1234	9502	2	220	189	344	2024-05-03T20
70	1234	9502	23	219	188	342	2024-05-03T20

Comparaison with driver at risk

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will be a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [50]:
```
#Reference
P15 = q1Data[14:15]
P15
```

Out[50]:

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
42	1234	9502	27	210	191	343	2024-05-03T20

1 rows × 28 columns

In [51]:
```
print(
"Driver:",P15.full_name.to_string(index=False),
"Sector 1: ",P15.duration_sector_1.to_string(index=False),
"Sector 2: ",P15.duration_sector_2.to_string(index=False),
"Sector 3: ",P15.duration_sector_3.to_string(index=False)
)
```

```
Driver: Nico HULKENBERG Sector 1:  29.67 Sector 2:  34.404 Sector 3:  24.96
6
```

In [52]:
```
newdataset2 = pd.DataFrame()
for index,row in q1Data[15::].iterrows():
    newdataset2 =  libraryDataF1.obtain_difference_regard_reference(row,P1

newdataset2
```

Out[52]:

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	10	0.145	0.013	-0.217	0.349	
1	24	0.227	0.063	-0.140	0.304	
2	77	0.320	0.298	-0.410	0.432	
3	2	0.511	0.544	-0.124	0.091	
4	23	0.818	0.540	-0.027	0.305	

Best sector per driver

In [53]:
```
pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_1'].min().sor
```

Out[53]:

	duration_sector_1

name_acronym	
ALO	29.299
PIA	29.366
RUS	29.370
SAI	29.435
NOR	29.441
HAM	29.469
LEC	29.486
VER	29.522
MAG	29.569
PER	29.614
RIC	29.615
STR	29.618
OCO	29.630
HUL	29.670
GAS	29.683
ZHO	29.733
TSU	29.799
BOT	29.968
ALB	30.210
SAR	30.214

In [54]:
```
pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_2'].min().sor
```

Out[54]:

name_acronym	duration_sector_2
NOR	33.439
VER	33.623
PIA	33.701
ALO	33.702
TSU	33.735
MAG	33.775
RUS	33.849
RIC	33.860
LEC	33.880
STR	33.909
SAI	33.953
BOT	33.994
OCO	34.017
PER	34.064

name_acronym	duration_sector_2
HAM	34.101
GAS	34.187
ZHO	34.264
SAR	34.280
ALB	34.377

In [55]:
```
pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_3'].min().sor
```

Out[55]:

name_acronym	duration_sector_3
HUL	24.966
PIA	24.989
PER	25.003
MAG	25.033
SAI	25.047
VER	25.049
SAR	25.057
NOR	25.059
TSU	25.153
HAM	25.166
RUS	25.168
LEC	25.171
ALO	25.191
RIC	25.225
OCO	25.226
ZHO	25.270
ALB	25.271
STR	25.280
GAS	25.315
BOT	25.398

Sprint Qualyfing 2

In [56]:
```
q2Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ
q2Data
```

Out[56]:

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
22	1234	9502	4	223	192	339	2024-05-03T20

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
25	1234	9502	11	221	191	341	2024-05-03T20
30	1234	9502	16	223	191	337	2024-05-03T20
35	1234	9502	1	221	191	339	2024-05-03T20
60	1234	9502	3	221	190	335	2024-05-03T20
39	1234	9502	81	217	191	337	2024-05-03T20
12	1234	9502	14	219	192	335	2024-05-03T20
18	1234	9502	55	222	192	337	2024-05-03T20
7	1234	9502	18	220	192	340	2024-05-03T20
43	1234	9502	27	220	192	340	2024-05-03T20
64	1234	9502	63	222	191	334	2024-05-03T20
56	1234	9502	44	221	191	332	2024-05-03T20
48	1234	9502	31	220	191	338	2024-05-03T20
52	1234	9502	20	218	191	339	2024-05-03T20

Comparaison with driver at risk

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will be a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [57]:
```
#Reference
P10 = q2Data[9:10]
print(
"Driver:",P10.full_name.to_string(index=False),
"Sector 1: ",P10.duration_sector_1.to_string(index=False),
"Sector 2: ",P10.duration_sector_2.to_string(index=False),
"Sector 3: ",P10.duration_sector_3.to_string(index=False)
)
```

```
Driver: Nico HULKENBERG Sector 1:  29.491 Sector 2:  33.872 Sector 3:  24.9
67
```

In [58]:
```
newdataset2 = pd.DataFrame()
for index,row in q2Data[10::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference_regard_reference(row,P10

newdataset2
```

Out[58]:

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	63	0.013	-0.174	-0.004	0.191	

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
1	44	0.041	-0.249	0.085	0.205	
2	31	0.049	0.010	-0.013	0.052	

Best sector per driver

In [59]:
```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_1'].min().sor
```

Out[59]:

name_acronym	duration_sector_1
NOR	29.112
PIA	29.227
HAM	29.242
VER	29.279
SAI	29.313
RUS	29.317
RIC	29.338
LEC	29.365
PER	29.367
ALO	29.472
HUL	29.491
OCO	29.501
STR	29.544
MAG	29.898

In [60]:
```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_2'].min().sor
```

Out[60]:

name_acronym	duration_sector_2
NOR	33.438
PER	33.514
ALO	33.596
LEC	33.597
RIC	33.634
PIA	33.651
VER	33.719
STR	33.725
MAG	33.744
OCO	33.859
SAI	33.866

name_acronym	duration_sector_2
RUS	33.868

In [61]:
```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_3'].min().sor
```

Out[61]:

name_acronym	duration_sector_3
HUL	24.967
MAG	24.972
PER	24.984
VER	25.003
LEC	25.015
OCO	25.019
NOR	25.047
STR	25.054
SAI	25.083
ALO	25.121
RIC	25.150
RUS	25.158
HAM	25.172
PIA	25.285

Sprint Qualyfing 3

In [62]:
```
q3Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ
q3Data
```

Out[62]:

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
36	1234	9502	1	219	191	337	2024-05-03T21
32	1234	9502	16	223	192	336	2024-05-03T21
26	1234	9502	11	221	190	340	2024-05-03T21
61	1234	9502	3	222	190	334	2024-05-03T21
19	1234	9502	55	225	193	336	2024-05-03T21
40	1234	9502	81	220	191	336	2024-05-03T21
9	1234	9502	18	221	192	335	2024-05-03T21
13	1234	9502	14	213	193	333	2024-05-03T21

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
23	1234	9502	4	223	193	338	2024-05-03T21
45	1234	9502	27	223	191	339	2024-05-03T21

In [63]:
```
#Reference
P1 = q3Data[:1]
print(
"Driver:",P1.full_name.to_string(index=False),
"Sector 1: ",P1.duration_sector_1.to_string(index=False),
"Sector 2: ",P1.duration_sector_2.to_string(index=False),
"Sector 3: ",P1.duration_sector_3.to_string(index=False)
)
```

```
Driver: Max VERSTAPPEN Sector 1:  29.036 Sector 2:  33.644 Sector 3:  24.96
1
```

Comparaison with poleman

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will be a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [64]:
```
newdataset2 = pd.DataFrame()
for index,row in q3Data[1::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference_regard_reference(row,P1,
newdataset2
```

Out[64]:

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	16	0.108	0.197	-0.074	-0.015	
1	11	0.235	0.214	0.004	0.017	
2	3	0.403	0.230	0.034	0.139	
3	55	0.462	0.172	-0.051	0.341	
4	81	0.520	0.539	-0.035	0.016	
5	18	0.734	0.505	0.190	0.039	
6	14	0.778	0.433	0.234	0.111	
7	4	0.831	0.770	0.098	-0.037	
8	27	0.835	0.676	0.075	0.084	

Best sector per driver

In [65]:
```
pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_1'].min().sor
```

Out[65]:

	duration_sector_1
name_acronym	
VER	29.036
SAI	29.208

name_acronym	duration_sector_1
LEC	29.233
PER	29.250
RIC	29.266
ALO	29.469
STR	29.541
PIA	29.575

In [66]:
```
pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_2'].min().sor
```

Out[66]:

name_acronym	duration_sector_2
LEC	33.570
SAI	33.593
PIA	33.609
VER	33.644
PER	33.648
RIC	33.678
HUL	33.719
NOR	33.742
STR	33.834
ALO	33.878

In [67]:
```
pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_3'].min().sor
```

Out[67]:

name_acronym	duration_sector_3
NOR	24.924
LEC	24.946
VER	24.961
PIA	24.977
PER	24.978
STR	25.000
HUL	25.045
ALO	25.072
RIC	25.100
SAI	25.302

Best sector in the session

In [68]:
```
pd.DataFrame(mergequaly.groupby("name_acronym")['duration_sector_1'].min()
```

Out[68]:

name_acronym	duration_sector_1
VER	29.036
NOR	29.112
SAI	29.208
PIA	29.227
LEC	29.233
HAM	29.242
PER	29.250
RIC	29.266
ALO	29.299
RUS	29.301
OCO	29.372
HUL	29.491
STR	29.541
MAG	29.569
TSU	29.609
GAS	29.683
ZHO	29.733
BOT	29.968
ALB	30.210
SAR	30.214

In [69]:
```
pd.DataFrame(mergequaly.groupby("name_acronym")['duration_sector_2'].min()
```

Out[69]:

name_acronym	duration_sector_2
NOR	33.438
PER	33.514
LEC	33.570
SAI	33.593
ALO	33.596
PIA	33.609
VER	33.623
RIC	33.634
HUL	33.719
STR	33.725

name_acronym	duration_sector_2
TSU	33.735
MAG	33.744
RUS	33.849
OCO	33.859
HAM	33.957
BOT	33.994
SAR	34.041
ZHO	34.093

In [70]:
```
pd.DataFrame(mergequaly.groupby("name_acronym")['duration_sector_3'].min()
```

Out[70]:

name_acronym	duration_sector_3
NOR	24.924
LEC	24.946
SAR	24.948
VER	24.961
HUL	24.966
MAG	24.972
PIA	24.977
PER	24.978
STR	25.000
OCO	25.019
SAI	25.047
ALO	25.072
RIC	25.100
RUS	25.134
TSU	25.153
HAM	25.166
BOT	25.266
ZHO	25.270
ALB	25.271
GAS	25.315

Sprint

In [71]:
```
race = libraryDataF1.obtain_information('laps',session_key=9506)
stintInformation = libraryDataF1.obtain_information('stints',session_key=95
drivers = libraryDataF1.obtain_information('drivers',session_key=9506)
```

In [72]:
```
stintsDataFrame =libraryDataF1.stint_configuration(drivers,stintInformatio
jointables = pd.merge(race,stintsDataFrame,on=['lap_number','driver_number
jointables
```

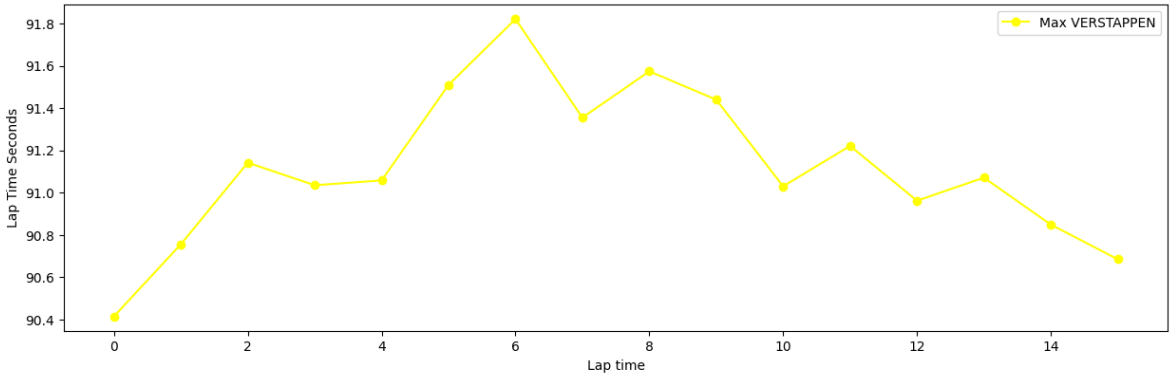
Out[72]:

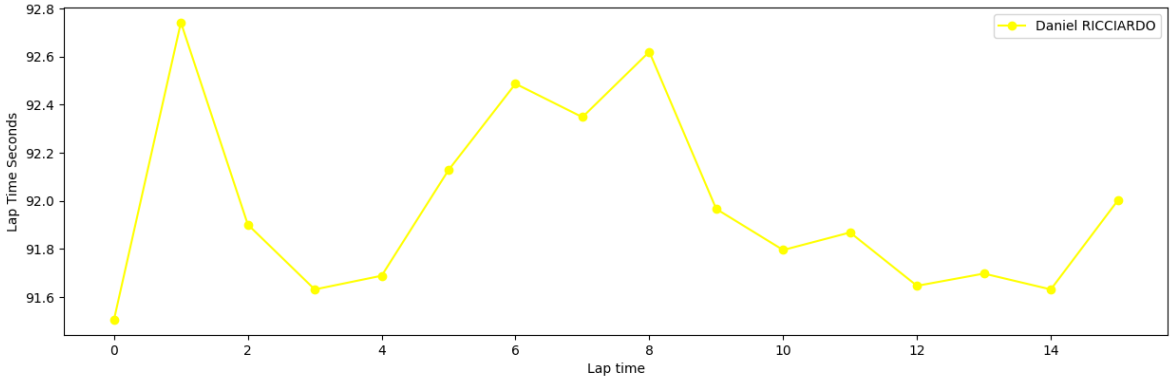
	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
0	1234	9506	1	216.0	188	158	
1	1234	9506	2	214.0	49	183	
2	1234	9506	3	212.0	188	176	
3	1234	9506	10	213.0	56	151	
4	1234	9506	11	215.0	189	158	
...	...	...	...	...	...	...	
338	1234	9506	44	210.0	186	318	2024-05-04T16:34:
339	1234	9506	55	213.0	187	330	2024-05-04T16:33:
340	1234	9506	63	210.0	186	325	2024-05-04T16:34:
341	1234	9506	77	214.0	186	335	2024-05-04T16:34:
342	1234	9506	81	214.0	185	345	2024-05-04T16:33:

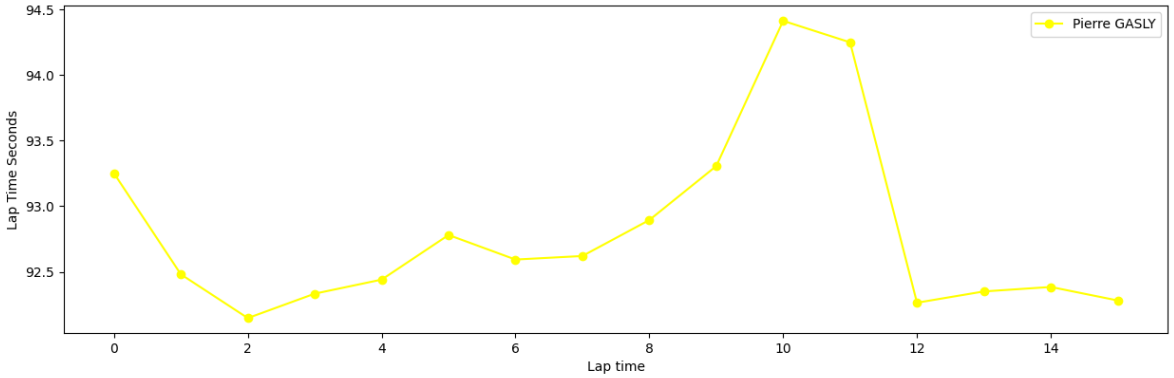
343 rows × 20 columns

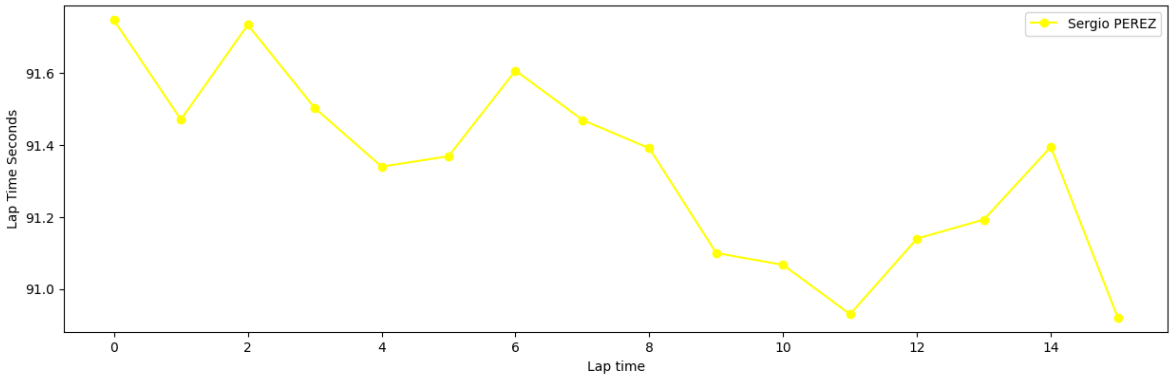
Pace per compound

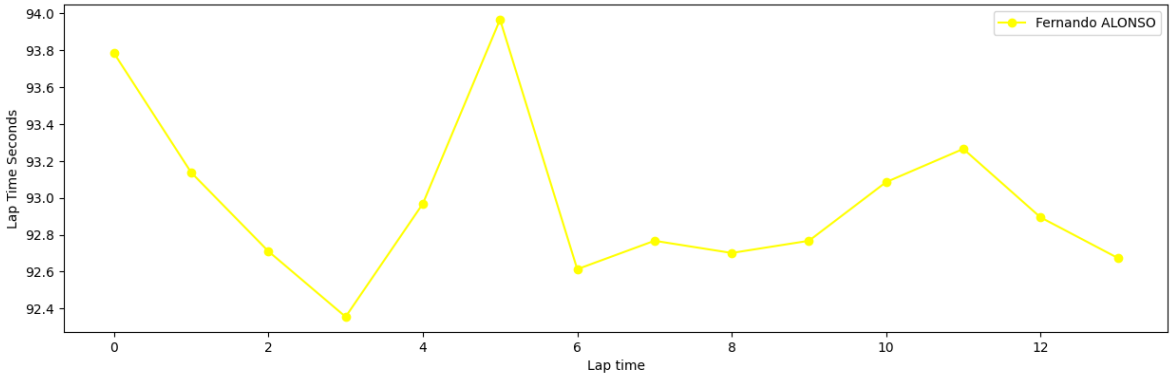
In [73]:
```
libraryDataF1.obtain_data_tyres(jointables,"MEDIUM",95)
```


Max VERSTAPPEN
Lap Time Seconds
Lap time

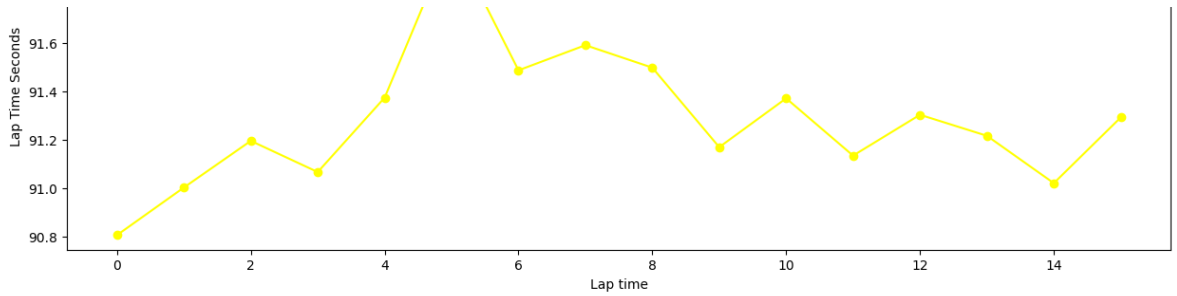

Daniel RICCIARDO
Lap Time Seconds
Lap time

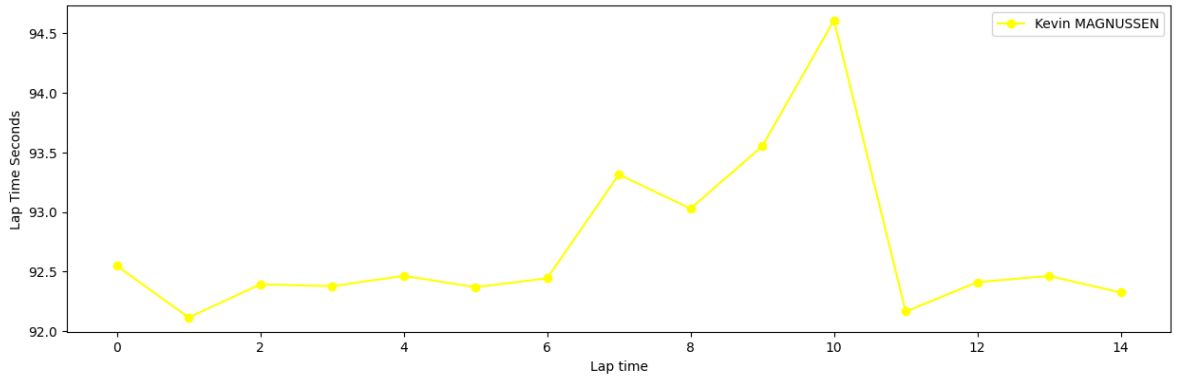

Pierre GASLY
Lap Time Seconds
Lap time

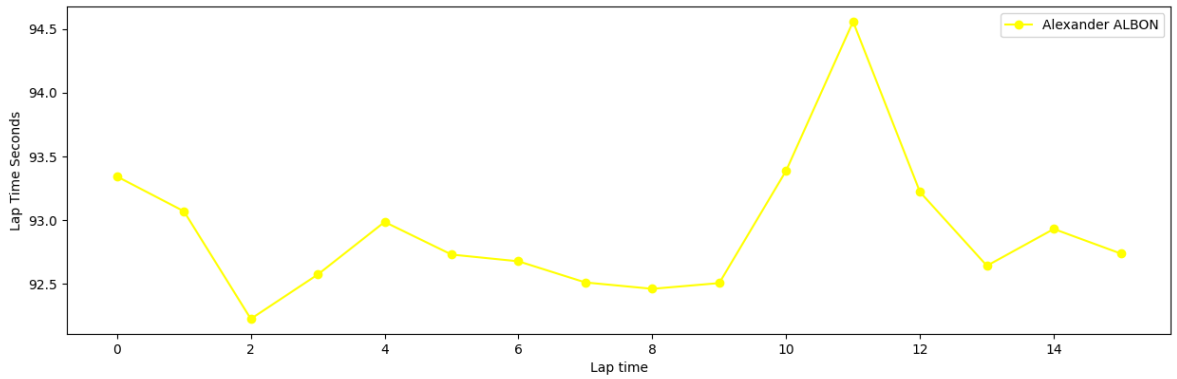

Sergio PEREZ
Lap Time Seconds
Lap time

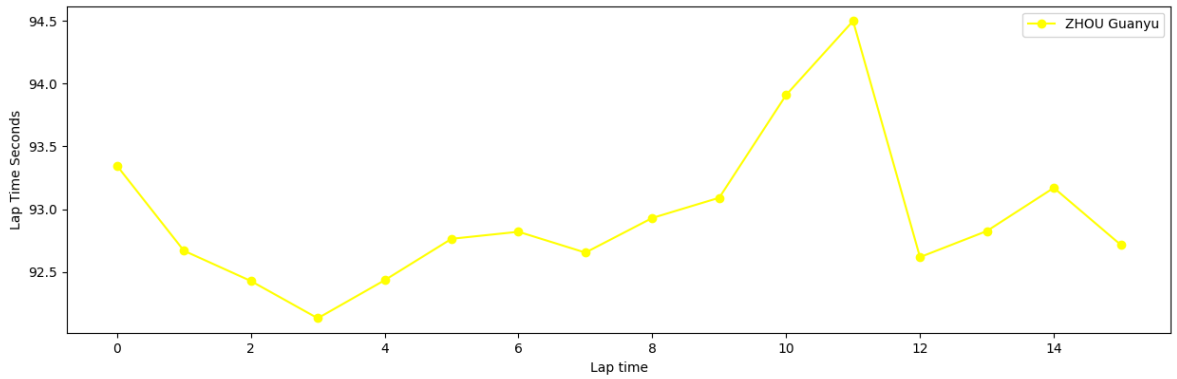

Fernando ALONSO
Lap Time Seconds
Lap time

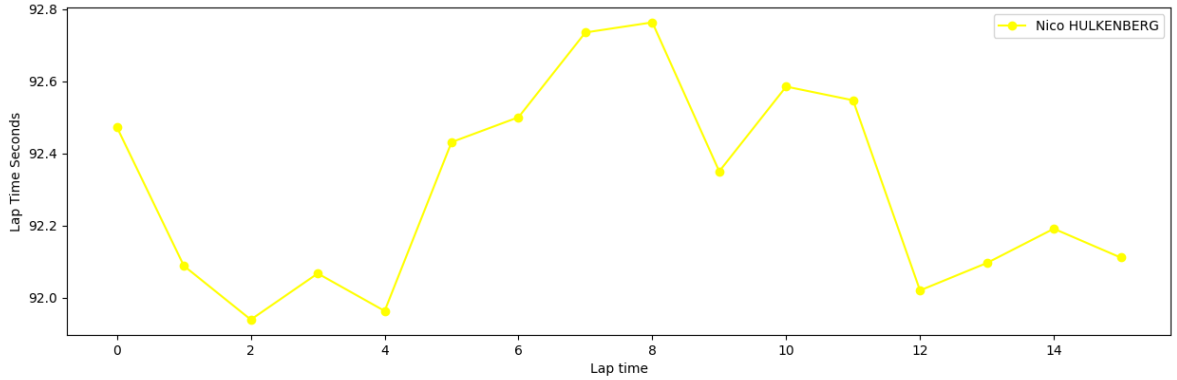

Charles LECLERC


Lap Time Seconds
91.6
91.4
91.2
91.0
90.8
0
2
4
6
8
10
12
14
Lap time

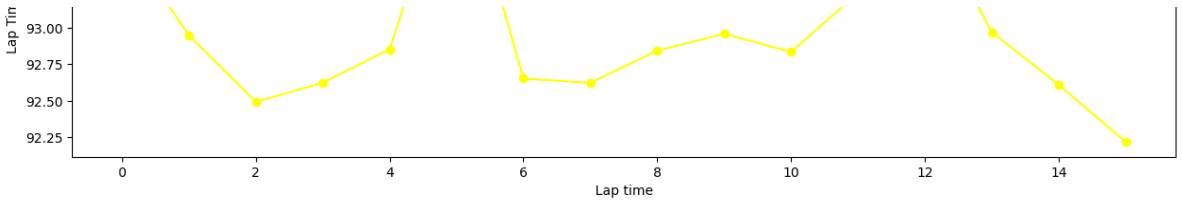

Kevin MAGNUSSEN
Lap Time Seconds
94.5
94.0
93.5
93.0
92.5
92.0
0
2
4
6
8
10
12
14
Lap time

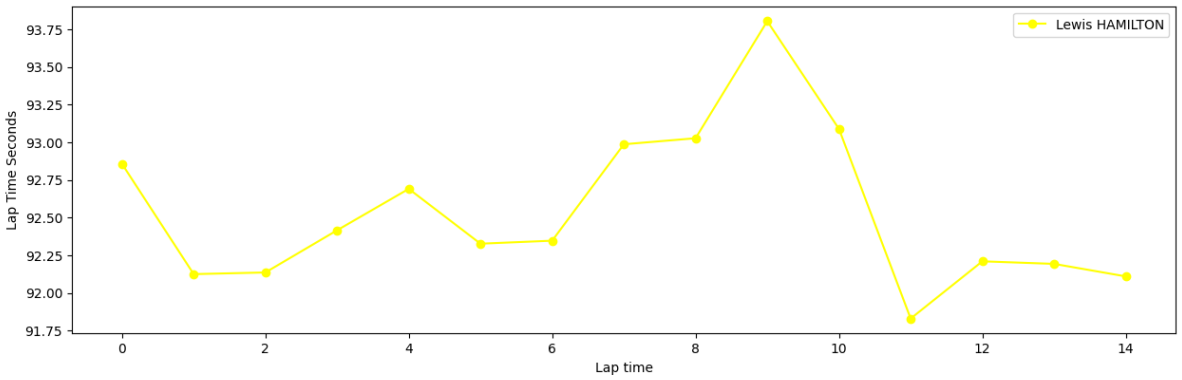

Alexander ALBON
Lap Time Seconds
94.5
94.0
93.5
93.0
92.5
0
2
4
6
8
10
12
14
Lap time

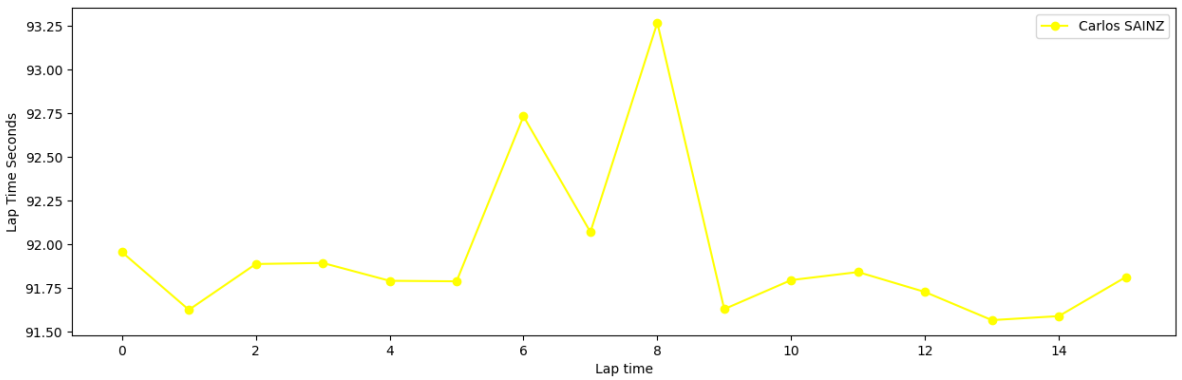

ZHOU Guanyu
Lap Time Seconds
94.5
94.0
93.5
93.0
92.5
0
2
4
6
8
10
12
14
Lap time

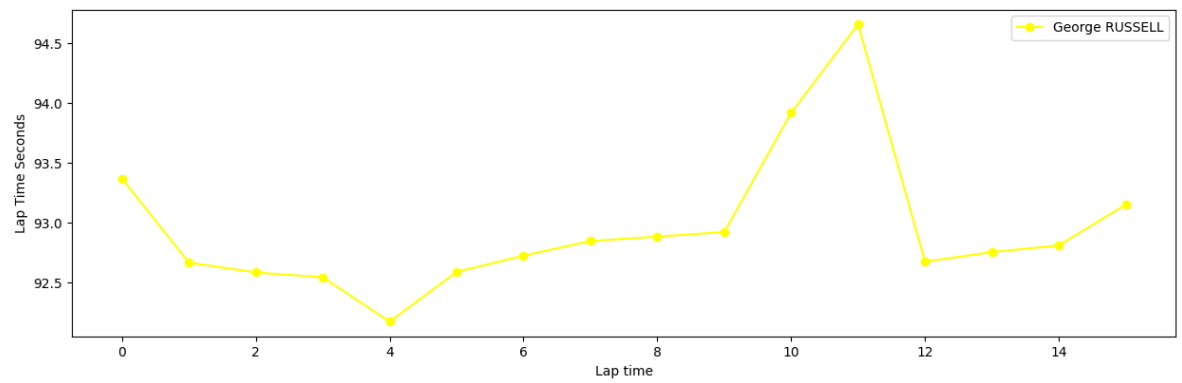

Nico HULKENBERG
Lap Time Seconds
92.8
92.6
92.4
92.2
92.0
0
2
4
6
8
10
12
14
Lap time

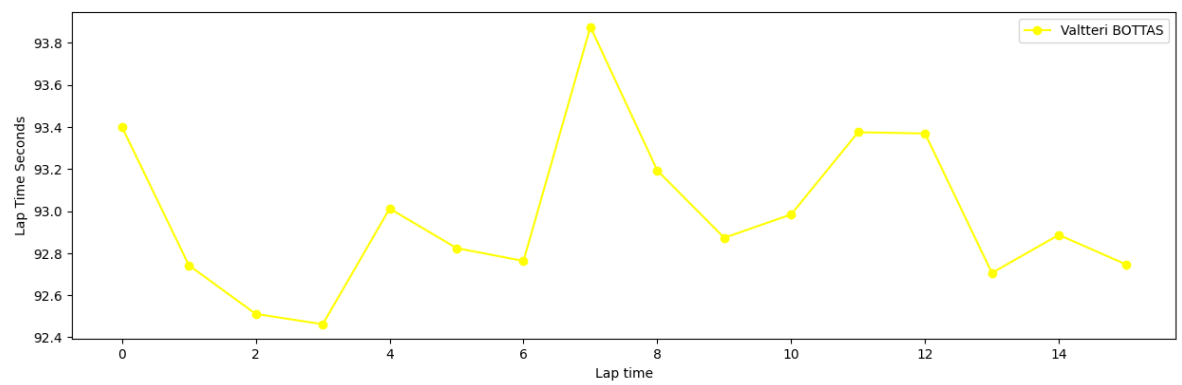

Esteban OCON
94.25
94.00
93.75
93.50
93.25

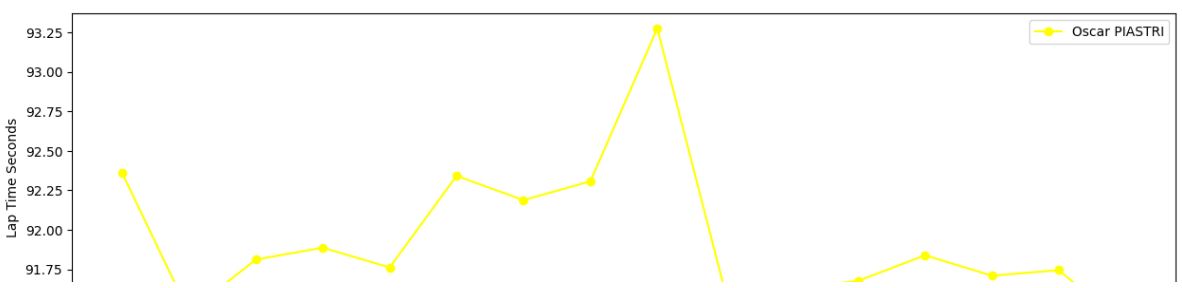

Lap Tim
93.00
92.75
92.50
92.25
0
2
4
6
8
10
12
14
Lap time

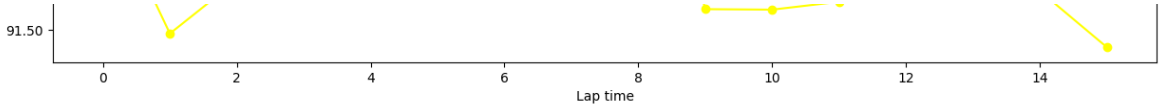

Lewis HAMILTON
Lap Time Seconds
93.75
93.50
93.25
93.00
92.75
92.50
92.25
92.00
91.75
0
2
4
6
8
10
12
14
Lap time


Carlos SAINZ
Lap Time Seconds
93.25
93.00
92.75
92.50
92.25
92.00
91.75
91.50
0
2
4
6
8
10
12
14
Lap time


George RUSSELL
Lap Time Seconds
94.5
94.0
93.5
93.0
92.5
0
2
4
6
8
10
12
14
Lap time


Valtteri BOTTAS
Lap Time Seconds
93.8
93.6
93.4
93.2
93.0
92.8
92.6
92.4
0
2
4
6
8
10
12
14
Lap time

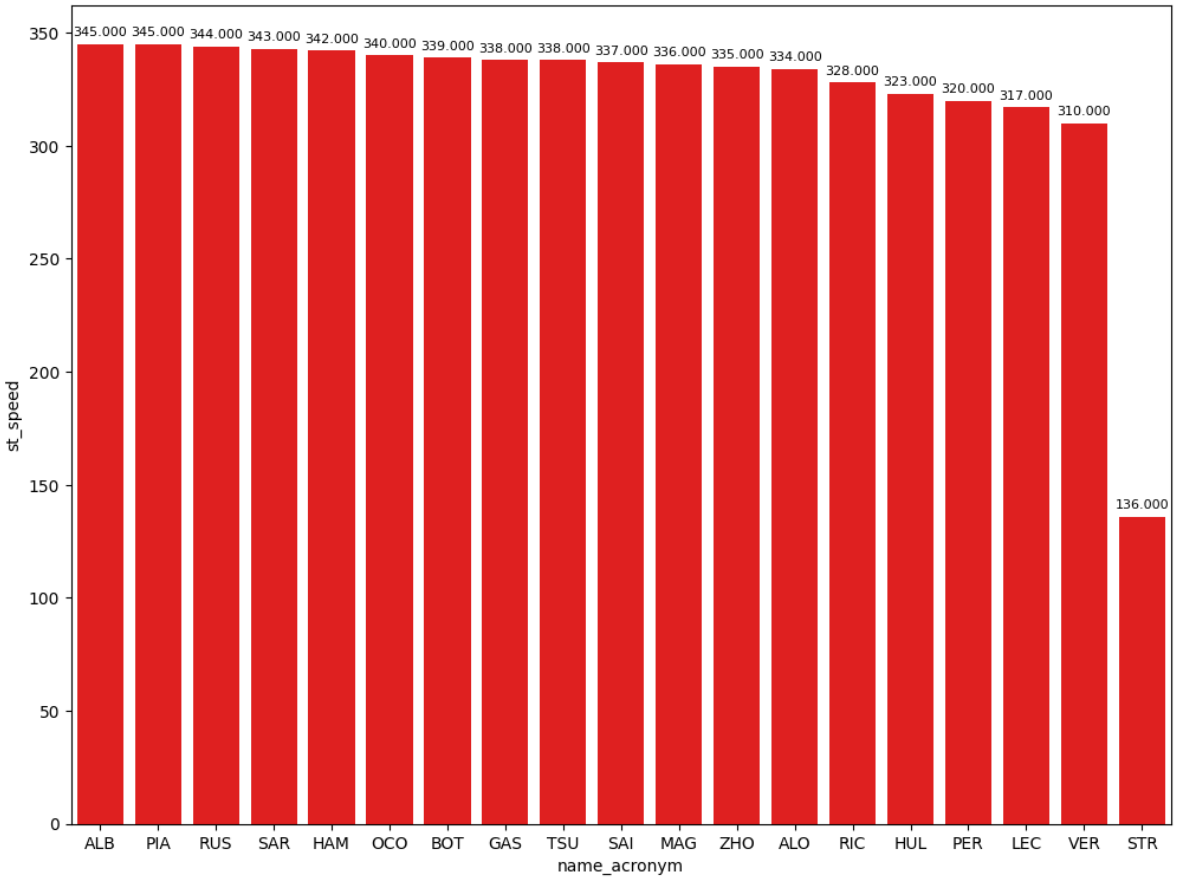

Oscar PIASTRI
Lap Time Seconds
93.25
93.00
92.75
92.50
92.25
92.00
91.75



Top speed captured in the speed trap

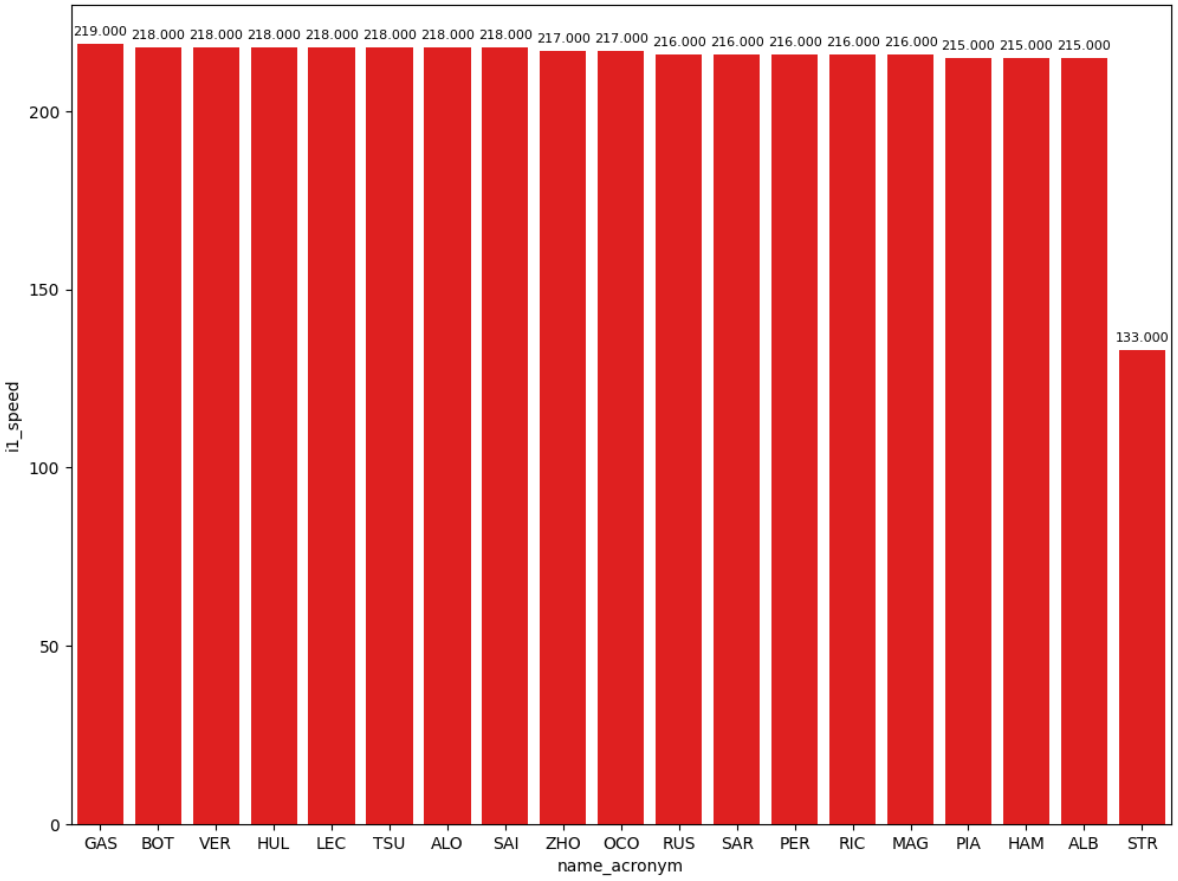
In [74]:

```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['st_speed'
libraryDataF1.obtainchart("name_acronym","st_speed",top_speed)
```



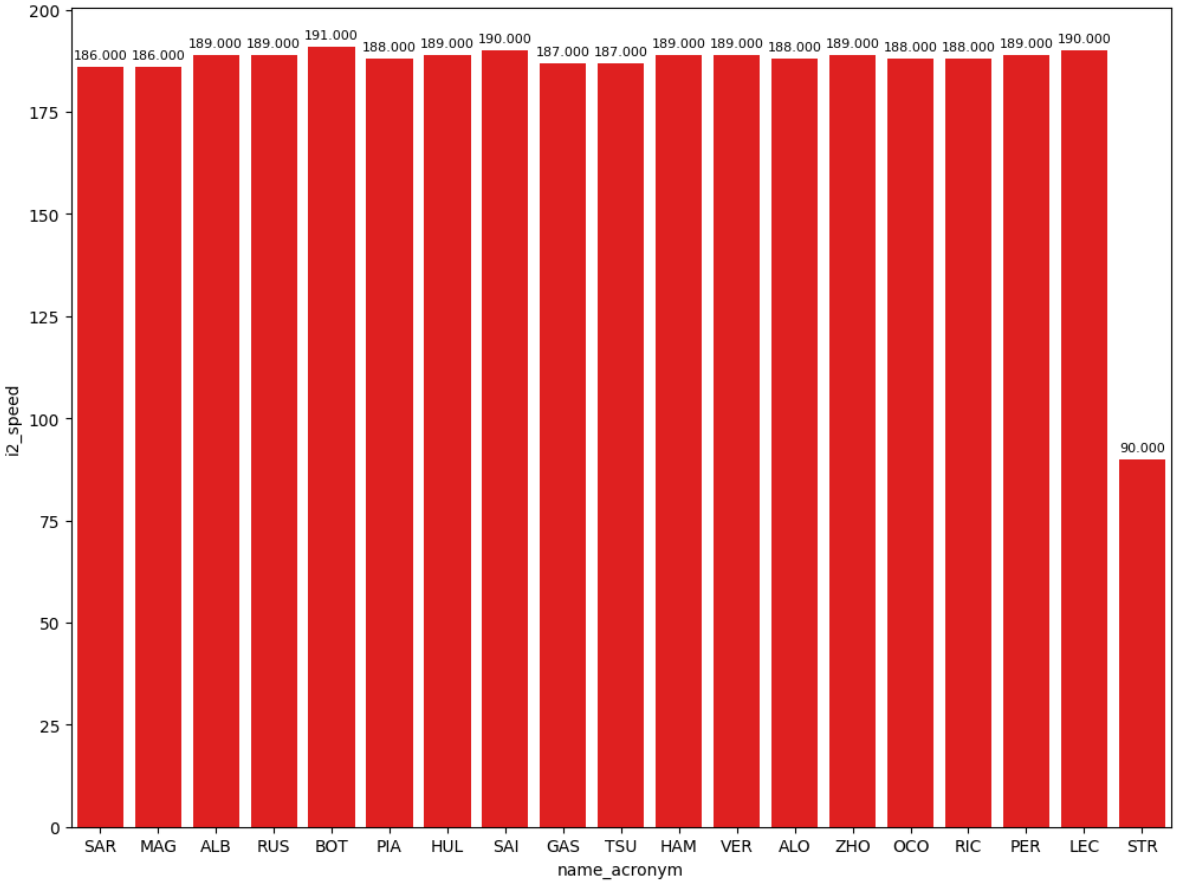
In [75]:

```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['i1_speed'
libraryDataF1.obtainchart("name_acronym","i1_speed",top_speed)
```



In [76]:

```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['i2_speed'
libraryDataF1.obtainchart("name_acronym","i2_speed",top_speed)
```



In [77]:
```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[77]:

team_name	lap_duration
Red Bull Racing	91.241000
Ferrari	91.646667
McLaren	92.013000
RB	92.314077
Haas F1 Team	92.522444
Mercedes	92.784393
Alpine	92.858679
Williams	92.871962
Kick Sauber	92.952920
Aston Martin	92.995727

Race pace per teams

In [78]:
```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[78]:

team_name	duration_sector_1
Red Bull Racing	30.686833
Ferrari	30.874148
RB	31.114154
McLaren	31.178385
Haas F1 Team	31.384222
Mercedes	31.411214
Aston Martin	31.486727
Alpine	31.563357
Kick Sauber	31.687160
Williams	31.840000

In [79]:
```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[79]:

team_name	duration_sector_2
Red Bull Racing	34.885625
Ferrari	35.094407

team_name	duration_sector_2
McLaren	35.205846
RB	35.359038
Haas F1 Team	35.400148
Williams	35.425923
Kick Sauber	35.508360
Alpine	35.533679

In [80]:
```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[80]:

team_name	duration_sector_3
Williams	25.606038
McLaren	25.628769
Red Bull Racing	25.668542
Ferrari	25.678111
Haas F1 Team	25.738074
Kick Sauber	25.757400
Alpine	25.761643
Mercedes	25.776750
RB	25.840885
Aston Martin	25.893000

Race pace

In [81]:
```
MINIMUN_SECONDS = 84
MAXIMUM_SECONDS = 95
```

Red Bull Racing

In [82]:
```
stintInformation.query('driver_number == 1 or driver_number == 11')
```

Out[82]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
0	1234	9506	1	1	1	1	MEDIUM	
5	1234	9506	1	11	1	1	MEDIUM	
20	1234	9506	2	1	2	2	MEDIUM	
24	1234	9506	2	11	2	2	MEDIUM	
39	1234	9506	3	1	3	20	MEDIUM	
43	1234	9506	3	11	3	20	MEDIUM	

In [83]:
```
libraryDataF1.getinfolongruns(jointables,1,'Red Bull Racing',MINIMUN_SECONI
```

Out[83]:

	full_name	compound	date_start	lap_number	duration_sector_1
55	Max VERSTAPPEN	MEDIUM	2024-05-04T16:10:53.979000+00:00	4	30.295
73	Max VERSTAPPEN	MEDIUM	2024-05-04T16:12:24.304000+00:00	5	30.402
91	Max VERSTAPPEN	MEDIUM	2024-05-04T16:13:55.128000+00:00	6	30.587
109	Max VERSTAPPEN	MEDIUM	2024-05-04T16:15:26.120000+00:00	7	30.617
127	Max VERSTAPPEN	MEDIUM	2024-05-04T16:16:57.219000+00:00	8	30.646
145	Max VERSTAPPEN	MEDIUM	2024-05-04T16:18:28.340000+00:00	9	30.761
163	Max VERSTAPPEN	MEDIUM	2024-05-04T16:19:59.822000+00:00	10	30.812
181	Max VERSTAPPEN	MEDIUM	2024-05-04T16:21:31.621000+00:00	11	30.618
199	Max VERSTAPPEN	MEDIUM	2024-05-04T16:23:02.953000+00:00	12	30.771
217	Max VERSTAPPEN	MEDIUM	2024-05-04T16:24:34.589000+00:00	13	30.832
235	Max VERSTAPPEN	MEDIUM	2024-05-04T16:26:06.008000+00:00	14	30.567
253	Max VERSTAPPEN	MEDIUM	2024-05-04T16:27:37.043000+00:00	15	30.551
271	Max VERSTAPPEN	MEDIUM	2024-05-04T16:29:08.215000+00:00	16	30.441
289	Max VERSTAPPEN	MEDIUM	2024-05-04T16:30:39.254000+00:00	17	30.515
307	Max VERSTAPPEN	MEDIUM	2024-05-04T16:32:10.374000+00:00	18	30.390
325	Max VERSTAPPEN	MEDIUM	2024-05-04T16:33:41.196000+00:00	19	30.318

In [84]:
```
libraryDataF1.getinfolongruns(jointables,11,'Red Bull Racing',MINIMUN_SECOI
```

Out[84]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
59	Sergio PEREZ	MEDIUM	2024-05-04T16:10:55.608000+00:00	4	31.105	
77	Sergio PEREZ	MEDIUM	2024-05-04T16:12:27.280000+00:00	5	30.858	
95	Sergio PEREZ	MEDIUM	2024-05-04T16:13:58.679000+00:00	6	31.131	
113	Sergio PEREZ	MEDIUM	2024-05-04T16:15:30.563000+00:00	7	30.987	
131	Sergio PEREZ	MEDIUM	2024-05-04T16:17:01.967000+00:00	8	30.891	

	full_name	compound	date_start	lap_number	duration_sector_1	du
149	Sergio PEREZ	MEDIUM	2024-05-04T16:18:33.363000+00:00	9	30.749	
167	Sergio PEREZ	MEDIUM	2024-05-04T16:20:04.800000+00:00	10	30.928	
185	Sergio PEREZ	MEDIUM	2024-05-04T16:21:36.389000+00:00	11	30.706	
203	Sergio PEREZ	MEDIUM	2024-05-04T16:23:07.780000+00:00	12	30.893	
221	Sergio PEREZ	MEDIUM	2024-05-04T16:24:39.180000+00:00	13	30.656	
239	Sergio PEREZ	MEDIUM	2024-05-04T16:26:10.272000+00:00	14	30.606	
257	Sergio PEREZ	MEDIUM	2024-05-04T16:27:41.312000+00:00	15	30.532	
275	Sergio PEREZ	MEDIUM	2024-05-04T16:29:12.259000+00:00	16	30.617	
293	Sergio PEREZ	MEDIUM	2024-05-04T16:30:43.373000+00:00	17	30.604	
311	Sergio PEREZ	MEDIUM	2024-05-04T16:32:14.579000+00:00	18	30.753	
	Sergio					

Ferrari

In [85]:
```
stintInformation.query('driver_number == 16 or driver_number == 55')
```

Out[85]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
7	1234	9506	1	16	1	1	MEDIUM	
15	1234	9506	1	55	1	1	MEDIUM	
26	1234	9506	2	16	2	2	MEDIUM	
34	1234	9506	2	55	2	2	MEDIUM	
44	1234	9506	3	16	3	20	MEDIUM	
52	1234	9506	3	55	3	20	MEDIUM	

In [86]:
```
libraryDataF1.getinfolongruns(jointables,16,'Ferrari',MINIMUN_SECONDS,MAXI
```

Out[86]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
61	Charles LECLERC	MEDIUM	2024-05-04T16:10:54.579000+00:00	4	30.426	
79	Charles LECLERC	MEDIUM	2024-05-04T16:12:25.462000+00:00	5	30.395	
97	Charles LECLERC	MEDIUM	2024-05-04T16:13:56.401000+00:00	6	30.563	
115	Charles LECLERC	MEDIUM	2024-05-04T16:15:27.703000+00:00	7	30.543	
133	Charles LECLERC	MEDIUM	2024-05-04T16:16:58.703000+00:00	8	30.626	

	full_name	compound	date_start	lap_number	duration_sector_1	du
151	Charles LECLERC	MEDIUM	2024-05-04T16:18:29.982000+00:00	9	30.751	
169	Charles LECLERC	MEDIUM	2024-05-04T16:20:02.047000+00:00	10	30.725	
187	Charles LECLERC	MEDIUM	2024-05-04T16:21:33.607000+00:00	11	30.784	
205	Charles LECLERC	MEDIUM	2024-05-04T16:23:05.151000+00:00	12	30.729	
223	Charles LECLERC	MEDIUM	2024-05-04T16:24:36.678000+00:00	13	30.498	
241	Charles LECLERC	MEDIUM	2024-05-04T16:26:07.820000+00:00	14	30.591	
259	Charles LECLERC	MEDIUM	2024-05-04T16:27:39.271000+00:00	15	30.462	
277	Charles LECLERC	MEDIUM	2024-05-04T16:29:10.389000+00:00	16	30.316	
295	Charles LECLERC	MEDIUM	2024-05-04T16:30:41.630000+00:00	17	30.450	
313	Charles LECLERC	MEDIUM	2024-05-04T16:32:12.915000+00:00	18	30.352	
	Charles					

In [87]:
```
libraryDataF1.getinfolongruns(jointables,55,'Ferrari',MINIMUN_SECONDS,MAXI
```

Out[87]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
69	Carlos SAINZ	MEDIUM	2024-05-04T16:10:56.015000+00:00	4	31.438	
87	Carlos SAINZ	MEDIUM	2024-05-04T16:12:27.963000+00:00	5	31.000	
105	Carlos SAINZ	MEDIUM	2024-05-04T16:13:59.648000+00:00	6	31.347	
123	Carlos SAINZ	MEDIUM	2024-05-04T16:15:31.607000+00:00	7	31.556	
141	Carlos SAINZ	MEDIUM	2024-05-04T16:17:03.406000+00:00	8	31.214	
159	Carlos SAINZ	MEDIUM	2024-05-04T16:18:35.367000+00:00	9	31.086	
177	Carlos SAINZ	MEDIUM	2024-05-04T16:20:07.011000+00:00	10	31.642	
195	Carlos SAINZ	MEDIUM	2024-05-04T16:21:39.774000+00:00	11	31.131	
213	Carlos SAINZ	MEDIUM	2024-05-04T16:23:11.820000+00:00	12	31.923	
231	Carlos SAINZ	MEDIUM	2024-05-04T16:24:45.023000+00:00	13	30.806	
249	Carlos SAINZ	MEDIUM	2024-05-04T16:26:16.747000+00:00	14	30.905	
267	Carlos SAINZ	MEDIUM	2024-05-04T16:27:48.565000+00:00	15	30.923	

	full_name	compound	date_start	lap_number	duration_sector_1	du
285	Carlos SAINZ	MEDIUM	2024-05-04T16:29:20.319000+00:00	16	30.931	
303	Carlos SAINZ	MEDIUM	2024-05-04T16:30:52.078000+00:00	17	30.833	
321	Carlos SAINZ	MEDIUM	2024-05-04T16:32:23.705000+00:00	18	30.715	

McLaren

In [88]:
```
stintInformation.query('driver_number == 4 or driver_number == 81')
```

Out[88]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
3	1234	9506	1	4	1	1	MEDIUM	
18	1234	9506	1	81	1	1	MEDIUM	
37	1234	9506	2	81	2	2	MEDIUM	
55	1234	9506	3	81	3	20	MEDIUM	

In [89]:
```
libraryDataF1.getinfolongruns(jointables,4,'McLaren',MINIMUN_SECONDS,MAXIMU
```

Out[89]:

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_

In [90]:
```
libraryDataF1.getinfolongruns(jointables,81,'McLaren',MINIMUN_SECONDS,MAXIM
```

Out[90]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
72	Oscar PIASTRI	MEDIUM	2024-05-04T16:10:56.504000+00:00	4	31.555	
90	Oscar PIASTRI	MEDIUM	2024-05-04T16:12:28.910000+00:00	5	30.912	
108	Oscar PIASTRI	MEDIUM	2024-05-04T16:14:00.441000+00:00	6	31.147	
126	Oscar PIASTRI	MEDIUM	2024-05-04T16:15:32.236000+00:00	7	31.494	
144	Oscar PIASTRI	MEDIUM	2024-05-04T16:17:04.143000+00:00	8	31.240	
162	Oscar PIASTRI	MEDIUM	2024-05-04T16:18:35.783000+00:00	9	31.364	
180	Oscar PIASTRI	MEDIUM	2024-05-04T16:20:08.231000+00:00	10	31.212	
198	Oscar PIASTRI	MEDIUM	2024-05-04T16:21:40.332000+00:00	11	31.167	
216	Oscar PIASTRI	MEDIUM	2024-05-04T16:23:12.648000+00:00	12	31.539	
234	Oscar PIASTRI	MEDIUM	2024-05-04T16:24:45.975000+00:00	13	30.997	
252	Oscar PIASTRI	MEDIUM	2024-05-04T16:26:17.647000+00:00	14	30.984	

	full_name	compound	date_start	lap_number	duration_sector_1	du
270	Oscar PIASTRI	MEDIUM	2024-05-04T16:27:49.152000+00:00	15	30.889	
288	Oscar PIASTRI	MEDIUM	2024-05-04T16:29:21.029000+00:00	16	31.015	
306	Oscar PIASTRI	MEDIUM	2024-05-04T16:30:52.744000+00:00	17	30.963	
324	Oscar PIASTRI	MEDIUM	2024-05-04T16:32:24.399000+00:00	18	30.930	

Mercedes

In [91]:
```
stintInformation.query('driver_number == 44 or driver_number == 63')
```

Out[91]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
14	1234	9506	1	44	1	1	MEDIUM	
16	1234	9506	1	63	1	1	MEDIUM	
33	1234	9506	2	44	2	2	MEDIUM	
35	1234	9506	2	63	2	2	MEDIUM	
51	1234	9506	3	44	3	20	MEDIUM	
53	1234	9506	3	63	3	20	MEDIUM	

In [92]:
```
libraryDataF1.getinfolongruns(jointables,44,'Mercedes',MINIMUN_SECONDS,MAXI
```

Out[92]:

	full_name	compound	date_start	lap_number	duration_sector_1	d
68	Lewis HAMILTON	MEDIUM	2024-05-04T16:10:57.979000+00:00	4	31.588	
86	Lewis HAMILTON	MEDIUM	2024-05-04T16:12:30.930000+00:00	5	31.185	
104	Lewis HAMILTON	MEDIUM	2024-05-04T16:14:02.972000+00:00	6	31.124	
122	Lewis HAMILTON	MEDIUM	2024-05-04T16:15:35.048000+00:00	7	31.291	
140	Lewis HAMILTON	MEDIUM	2024-05-04T16:17:07.553000+00:00	8	31.163	
158	Lewis HAMILTON	MEDIUM	2024-05-04T16:18:40.216000+00:00	9	31.004	
176	Lewis HAMILTON	MEDIUM	2024-05-04T16:20:12.479000+00:00	10	31.081	
194	Lewis HAMILTON	MEDIUM	2024-05-04T16:21:44.842000+00:00	11	30.999	
212	Lewis HAMILTON	MEDIUM	2024-05-04T16:23:17.821000+00:00	12	31.686	
230	Lewis HAMILTON	MEDIUM	2024-05-04T16:24:50.842000+00:00	13	31.671	
266	Lewis HAMILTON	MEDIUM	2024-05-04T16:27:59.687000+00:00	15	31.390	

	full_name	compound	date_start	lap_number	duration_sector_1	d
284	Lewis HAMILTON	MEDIUM	2024-05-04T16:29:32.760000+00:00	16	30.716	
302	Lewis HAMILTON	MEDIUM	2024-05-04T16:31:04.599000+00:00	17	30.903	
320	Lewis HAMILTON	MEDIUM	2024-05-04T16:32:36.879000+00:00	18	30.844	

In [93]:
```
libraryDataF1.getinfolongruns(jointables,63,'Mercedes',MINIMUN_SECONDS,MAX
```

Out[93]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
70	George RUSSELL	MEDIUM	2024-05-04T16:11:00.392000+00:00	4	31.909	
88	George RUSSELL	MEDIUM	2024-05-04T16:12:33.709000+00:00	5	31.880	
106	George RUSSELL	MEDIUM	2024-05-04T16:14:06.375000+00:00	6	31.720	
124	George RUSSELL	MEDIUM	2024-05-04T16:15:38.950000+00:00	7	31.286	
142	George RUSSELL	MEDIUM	2024-05-04T16:17:11.530000+00:00	8	31.282	
160	George RUSSELL	MEDIUM	2024-05-04T16:18:43.647000+00:00	9	31.634	
178	George RUSSELL	MEDIUM	2024-05-04T16:20:16.230000+00:00	10	31.651	
196	George RUSSELL	MEDIUM	2024-05-04T16:21:49.001000+00:00	11	31.627	
214	George RUSSELL	MEDIUM	2024-05-04T16:23:21.755000+00:00	12	31.429	
232	George RUSSELL	MEDIUM	2024-05-04T16:24:54.670000+00:00	13	31.427	
250	George RUSSELL	MEDIUM	2024-05-04T16:26:27.537000+00:00	14	31.886	
268	George RUSSELL	MEDIUM	2024-05-04T16:28:01.553000+00:00	15	32.403	
286	George RUSSELL	MEDIUM	2024-05-04T16:29:36.242000+00:00	16	31.577	
304	George RUSSELL	MEDIUM	2024-05-04T16:31:08.791000+00:00	17	31.358	
322	George RUSSELL	MEDIUM	2024-05-04T16:32:41.613000+00:00	18	31.221	
340	George RUSSELL	MEDIUM	2024-05-04T16:34:14.503000+00:00	19	31.732	

Aston Martin

In [94]:
```
stintInformation.query('driver_number == 14 or driver_number == 18')
```

Out[94]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
6	1234	9506	1	14	1	1	MEDIUM	
19	1234	9506	1	18	1	2	MEDIUM	
25	1234	9506	2	14	2	2	MEDIUM	
38	1234	9506	3	14	3	18	MEDIUM	

In [95]:
```
libraryDataF1.getinfolongruns(jointables,14,'Aston Martin',MINIMUN_SECONDS
```

Out[95]:

	full_name	compound	date_start	lap_number	duration_sector_1	du
60	Fernando ALONSO	MEDIUM	2024-05-04T16:11:02.535000+00:00	4	31.810	
78	Fernando ALONSO	MEDIUM	2024-05-04T16:12:36.195000+00:00	5	31.615	
96	Fernando ALONSO	MEDIUM	2024-05-04T16:14:09.343000+00:00	6	31.397	
114	Fernando ALONSO	MEDIUM	2024-05-04T16:15:42.069000+00:00	7	31.123	
132	Fernando ALONSO	MEDIUM	2024-05-04T16:17:14.313000+00:00	8	31.636	
150	Fernando ALONSO	MEDIUM	2024-05-04T16:18:47.309000+00:00	9	31.505	
168	Fernando ALONSO	MEDIUM	2024-05-04T16:20:21.286000+00:00	10	31.397	
186	Fernando ALONSO	MEDIUM	2024-05-04T16:21:53.994000+00:00	11	31.293	
204	Fernando ALONSO	MEDIUM	2024-05-04T16:23:26.702000+00:00	12	31.310	
222	Fernando ALONSO	MEDIUM	2024-05-04T16:24:59.431000+00:00	13	31.327	
240	Fernando ALONSO	MEDIUM	2024-05-04T16:26:32.163000+00:00	14	31.693	
258	Fernando ALONSO	MEDIUM	2024-05-04T16:28:05.380000+00:00	15	31.428	
276	Fernando ALONSO	MEDIUM	2024-05-04T16:29:38.595000+00:00	16	31.635	
294	Fernando ALONSO	MEDIUM	2024-05-04T16:31:11.321000+00:00	17	31.250	

In [96]:
```
libraryDataF1.getinfolongruns(jointables,18,'Aston Martin',MINIMUN_SECONDS
```

Out[96]:

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_

RB

In [97]:
```
stintInformation.query('driver_number == 3 or driver_number == 22')
```

Out[97]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
2	1234	9506	1	3	1	1	MEDIUM	

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
9	1234	9506	1	22	1	1	SOFT	
22	1234	9506	2	3	2	2	MEDIUM	
28	1234	9506	2	22	2	2	SOFT	
41	1234	9506	3	3	3	20	MEDIUM	

In [98]:
```
libraryDataF1.getinfolongruns(jointables,3,'RB',MINIMUN_SECONDS,MAXIMUM_SE(
```

Out[98]:

	full_name	compound	date_start	lap_number	duration_sector_1
57	Daniel RICCIARDO	MEDIUM	2024-05-04T16:10:55.080000+00:00	4	30.859
75	Daniel RICCIARDO	MEDIUM	2024-05-04T16:12:26.722000+00:00	5	30.912
93	Daniel RICCIARDO	MEDIUM	2024-05-04T16:13:59.321000+00:00	6	31.146
111	Daniel RICCIARDO	MEDIUM	2024-05-04T16:15:31.352000+00:00	7	31.174
129	Daniel RICCIARDO	MEDIUM	2024-05-04T16:17:02.873000+00:00	8	30.897
147	Daniel RICCIARDO	MEDIUM	2024-05-04T16:18:34.543000+00:00	9	30.944
165	Daniel RICCIARDO	MEDIUM	2024-05-04T16:20:06.810000+00:00	10	31.322
183	Daniel RICCIARDO	MEDIUM	2024-05-04T16:21:39.249000+00:00	11	30.947
201	Daniel RICCIARDO	MEDIUM	2024-05-04T16:23:11.619000+00:00	12	31.385
219	Daniel RICCIARDO	MEDIUM	2024-05-04T16:24:44.174000+00:00	13	30.807
237	Daniel RICCIARDO	MEDIUM	2024-05-04T16:26:16.113000+00:00	14	30.779
255	Daniel RICCIARDO	MEDIUM	2024-05-04T16:27:47.950000+00:00	15	30.856
273	Daniel RICCIARDO	MEDIUM	2024-05-04T16:29:19.883000+00:00	16	30.663
291	Daniel RICCIARDO	MEDIUM	2024-05-04T16:30:51.456000+00:00	17	30.652
309	Daniel RICCIARDO	MEDIUM	2024-05-04T16:32:23.191000+00:00	18	30.567
327	Daniel RICCIARDO	MEDIUM	2024-05-04T16:33:54.779000+00:00	19	30.670

In [99]:
```
libraryDataF1.getinfolongruns(jointables,22,'RB',MINIMUN_SECONDS,MAXIMUM_SI
```

Out[99]:

	full_name	compound	date_start	lap_number	duration_sector_1	d
63	Yuki TSUNODA	SOFT	2024-05-04T16:10:58.344000+00:00	4	31.991	

	full_name	compound	date_start	lap_number	duration_sector_1	d
81	Yuki TSUNODA	SOFT	2024-05-04T16:12:31.805000+00:00	5	31.395	
99	Yuki TSUNODA	SOFT	2024-05-04T16:14:04.007000+00:00	6	31.276	
117	Yuki TSUNODA	SOFT	2024-05-04T16:15:36.153000+00:00	7	31.144	
135	Yuki TSUNODA	SOFT	2024-05-04T16:17:08.371000+00:00	8	31.419	
153	Yuki TSUNODA	SOFT	2024-05-04T16:18:40.955000+00:00	9	31.485	
171	Yuki TSUNODA	SOFT	2024-05-04T16:20:13.737000+00:00	10	31.351	
189	Yuki TSUNODA	SOFT	2024-05-04T16:21:46.198000+00:00	11	31.218	
207	Yuki TSUNODA	SOFT	2024-05-04T16:23:18.698000+00:00	12	31.645	
225	Yuki TSUNODA	SOFT	2024-05-04T16:24:51.681000+00:00	13	31.645	
243	Yuki TSUNODA	SOFT	2024-05-04T16:26:25.309000+00:00	14	31.653	
261	Yuki TSUNODA	SOFT	2024-05-04T16:27:59.042000+00:00	15	31.492	
279	Yuki TSUNODA	SOFT	2024-05-04T16:29:32.177000+00:00	16	30.837	
297	Yuki TSUNODA	SOFT	2024-05-04T16:31:04.054000+00:00	17	30.979	
315	Yuki TSUNODA	SOFT	2024-05-04T16:32:36.189000+00:00	18	30.969	

Haas F1 Team

In [100…

```
stintInformation.query('driver_number == 20 or driver_number == 27')
```

Out[100…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
8	1234	9506	1	20	1	1	MEDIUM	
12	1234	9506	1	27	1	1	MEDIUM	
27	1234	9506	2	20	2	2	MEDIUM	
31	1234	9506	2	27	2	2	MEDIUM	
45	1234	9506	3	20	3	20	MEDIUM	
49	1234	9506	3	27	3	20	MEDIUM	

In [101…

```
libraryDataF1.getinfolongruns(jointables2,20,'Haas F1 Team',MINIMUN_SECOND
```

Out[101…

	full_name	compound	date_start	lap_number	duration_sector_1
16	Kevin MAGNUSSEN	HARD	2024-05-03T16:31:43.853000+00:00	2	31.631

	full_name	compound	date_start	lap_number	duration_sector_1
28	Kevin MAGNUSSEN	HARD	2024-05-03T16:33:16.315000+00:00	3	30.766
116	Kevin MAGNUSSEN	HARD	2024-05-03T16:51:37.552000+00:00	7	32.210
130	Kevin MAGNUSSEN	HARD	2024-05-03T16:53:11.658000+00:00	8	31.924
146	Kevin MAGNUSSEN	HARD	2024-05-03T16:54:45.283000+00:00	9	32.113
159	Kevin MAGNUSSEN	HARD	2024-05-03T16:56:19.334000+00:00	10	31.816
172	Kevin MAGNUSSEN	HARD	2024-05-03T16:57:52.889000+00:00	11	31.706
182	Kevin MAGNUSSEN	HARD	2024-05-03T16:59:26.605000+00:00	12	31.526
193	Kevin MAGNUSSEN	HARD	2024-05-03T17:00:59.921000+00:00	13	31.840
206	Kevin MAGNUSSEN	HARD	2024-05-03T17:02:34.003000+00:00	14	31.833
223	Kevin MAGNUSSEN	HARD	2024-05-03T17:04:07.626000+00:00	15	32.088
240	Kevin MAGNUSSEN	HARD	2024-05-03T17:05:41.569000+00:00	16	31.663
256	Kevin MAGNUSSEN	HARD	2024-05-03T17:07:15.113000+00:00	17	31.650
270	Kevin MAGNUSSEN	HARD	2024-05-03T17:08:48.613000+00:00	18	31.683
353	Kevin MAGNUSSEN	SOFT	2024-05-03T17:22:20.768000+00:00	21	29.993

In [102…

```
libraryDataF1.getinfolongruns(jointables2,27,'Haas F1 Team',MINIMUN_SECOND
```

Out[102…

	full_name	compound	date_start	lap_number	duration_sector_1
38	Nico HULKENBERG	HARD	2024-05-03T16:33:46.118000+00:00	2	32.403
123	Nico HULKENBERG	HARD	2024-05-03T16:52:28.777000+00:00	6	30.700
215	Nico HULKENBERG	HARD	2024-05-03T17:03:21.692000+00:00	10	31.884
232	Nico HULKENBERG	HARD	2024-05-03T17:04:56.162000+00:00	11	31.690
262	Nico HULKENBERG	HARD	2024-05-03T17:08:04.974000+00:00	13	31.679
277	Nico HULKENBERG	HARD	2024-05-03T17:09:38.427000+00:00	14	31.795
287	Nico HULKENBERG	HARD	2024-05-03T17:11:11.448000+00:00	15	32.147
296	Nico HULKENBERG	HARD	2024-05-03T17:12:45.552000+00:00	16	31.938

	full_name	compound	date_start	lap_number	duration_sector_1
305	Nico HULKENBERG	HARD	2024-05-03T17:14:19.227000+00:00	17	31.814
363	Nico HULKENBERG	SOFT	2024-05-03T17:23:15.191000+00:00	20	30.222

Alpine

In [103…
```
stintInformation.query('driver_number == 10 or driver_number == 31')
```

Out[103…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
4	1234	9506	1	10	1	1	MEDIUM	
13	1234	9506	1	31	1	1	MEDIUM	
23	1234	9506	2	10	2	2	MEDIUM	
32	1234	9506	2	31	2	2	MEDIUM	
42	1234	9506	3	10	3	20	MEDIUM	
50	1234	9506	3	31	3	20	MEDIUM	

In [104…
```
libraryDataF1.getinfolongruns(jointables,31,'Alpine',MINIMUN_SECONDS,MAXIMU
```

Out[104…

	full_name	compound	date_start	lap_number	duration_sector_1	du
67	Esteban OCON	MEDIUM	2024-05-04T16:11:02.208000+00:00	4	31.854	
85	Esteban OCON	MEDIUM	2024-05-04T16:12:35.558000+00:00	5	31.799	
103	Esteban OCON	MEDIUM	2024-05-04T16:14:08.732000+00:00	6	31.680	
121	Esteban OCON	MEDIUM	2024-05-04T16:15:41.081000+00:00	7	31.656	
139	Esteban OCON	MEDIUM	2024-05-04T16:17:13.720000+00:00	8	31.798	
157	Esteban OCON	MEDIUM	2024-05-04T16:18:46.487000+00:00	9	31.918	
175	Esteban OCON	MEDIUM	2024-05-04T16:20:20.837000+00:00	10	31.350	
193	Esteban OCON	MEDIUM	2024-05-04T16:21:53.507000+00:00	11	31.242	
211	Esteban OCON	MEDIUM	2024-05-04T16:23:26.001000+00:00	12	31.369	
229	Esteban OCON	MEDIUM	2024-05-04T16:24:58.991000+00:00	13	31.232	
247	Esteban OCON	MEDIUM	2024-05-04T16:26:31.828000+00:00	14	31.405	
265	Esteban OCON	MEDIUM	2024-05-04T16:28:04.771000+00:00	15	31.612	
283	Esteban OCON	MEDIUM	2024-05-04T16:29:37.951000+00:00	16	31.943	
301	Esteban OCON	MEDIUM	2024-05-04T16:31:11.749000+00:00	17	31.779	

	full_name	compound	date_start	lap_number	duration_sector_1	du
319	Esteban OCON	MEDIUM	2024-05-04T16:32:44.761000+00:00	18	31.369	
337	Esteban	MEDIUM	2024-05-04T16:34:17.177000+00:00	19	31.179	

In [105…

```
libraryDataF1.getinfolongruns(jointables,10,'Alpine',MINIMUN_SECONDS,MAXIMU
```

Out[105…

	full_name	compound	date_start	lap_number	duration_sector_1	du
58	Pierre GASLY	MEDIUM	2024-05-04T16:10:58.917000+00:00	4	31.953	
76	Pierre GASLY	MEDIUM	2024-05-04T16:12:32.198000+00:00	5	31.557	
94	Pierre GASLY	MEDIUM	2024-05-04T16:14:04.616000+00:00	6	31.264	
112	Pierre GASLY	MEDIUM	2024-05-04T16:15:36.743000+00:00	7	31.347	
130	Pierre GASLY	MEDIUM	2024-05-04T16:17:09.120000+00:00	8	31.458	
148	Pierre GASLY	MEDIUM	2024-05-04T16:18:41.615000+00:00	9	31.637	
166	Pierre GASLY	MEDIUM	2024-05-04T16:20:14.409000+00:00	10	31.634	
184	Pierre GASLY	MEDIUM	2024-05-04T16:21:46.845000+00:00	11	31.334	
202	Pierre GASLY	MEDIUM	2024-05-04T16:23:19.645000+00:00	12	31.664	
220	Pierre GASLY	MEDIUM	2024-05-04T16:24:52.470000+00:00	13	31.706	
238	Pierre GASLY	MEDIUM	2024-05-04T16:26:25.751000+00:00	14	31.897	
256	Pierre GASLY	MEDIUM	2024-05-04T16:28:00.187000+00:00	15	32.402	
274	Pierre GASLY	MEDIUM	2024-05-04T16:29:34.453000+00:00	16	31.263	
292	Pierre GASLY	MEDIUM	2024-05-04T16:31:06.735000+00:00	17	31.397	
310	Pierre GASLY	MEDIUM	2024-05-04T16:32:39.038000+00:00	18	31.222	
328	Pierre GASLY	MEDIUM	2024-05-04T16:34:11.389000+00:00	19	31.236	

Williams

In [106…

```
stintInformation.query('driver_number == 23 or driver_number == 2')
```

Out[106…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
1	1234	9506	1	2	1	1	SOFT	
10	1234	9506	1	23	1	1	MEDIUM	
21	1234	9506	2	2	2	2	SOFT	

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
29	1234	9506	2	23	2	2	MEDIUM	
40	1234	9506	3	2	3	20	SOFT	

In [107…

```
libraryDataF1.getinfolongruns(jointables,23,'Williams',MINIMUN_SECONDS,MAX
```

Out[107…

	full_name	compound	date_start	lap_number	duration_sector_1	du
64	Alexander ALBON	MEDIUM	2024-05-04T16:11:01.404000+00:00	4	31.950	
82	Alexander ALBON	MEDIUM	2024-05-04T16:12:34.808000+00:00	5	32.083	
100	Alexander ALBON	MEDIUM	2024-05-04T16:14:07.745000+00:00	6	31.732	
118	Alexander ALBON	MEDIUM	2024-05-04T16:15:40.045000+00:00	7	31.946	
136	Alexander ALBON	MEDIUM	2024-05-04T16:17:12.584000+00:00	8	32.095	
154	Alexander ALBON	MEDIUM	2024-05-04T16:18:45.508000+00:00	9	31.847	
172	Alexander ALBON	MEDIUM	2024-05-04T16:20:18.199000+00:00	10	31.837	
190	Alexander ALBON	MEDIUM	2024-05-04T16:21:50.923000+00:00	11	31.455	
208	Alexander ALBON	MEDIUM	2024-05-04T16:23:23.440000+00:00	12	31.604	
226	Alexander ALBON	MEDIUM	2024-05-04T16:24:55.977000+00:00	13	31.571	
244	Alexander ALBON	MEDIUM	2024-05-04T16:26:28.520000+00:00	14	31.818	
262	Alexander ALBON	MEDIUM	2024-05-04T16:28:01.850000+00:00	15	32.508	
280	Alexander ALBON	MEDIUM	2024-05-04T16:29:36.458000+00:00	16	31.943	
298	Alexander ALBON	MEDIUM	2024-05-04T16:31:09.580000+00:00	17	31.655	
316	Alexander ALBON	MEDIUM	2024-05-04T16:32:42.250000+00:00	18	31.648	
334	Alexander ALBON	MEDIUM	2024-05-04T16:34:15.156000+00:00	19	31.610	

In [108…

```
libraryDataF1.getinfolongruns(jointables,2,'Williams',MINIMUN_SECONDS,MAXI
```

Out[108…

	full_name	compound	date_start	lap_number	duration_sector_1
56	Logan SARGEANT	SOFT	2024-05-04T16:10:59.468000+00:00	4	32.042
74	Logan SARGEANT	SOFT	2024-05-04T16:12:32.888000+00:00	5	31.761

	full_name	compound	date_start	lap_number	duration_sector_1
92	Logan SARGEANT	SOFT	2024-05-04T16:14:05.252000+00:00	6	31.673
110	Logan SARGEANT	SOFT	2024-05-04T16:15:37.411000+00:00	7	31.612
128	Logan SARGEANT	SOFT	2024-05-04T16:17:09.694000+00:00	8	31.938
146	Logan SARGEANT	SOFT	2024-05-04T16:18:42.229000+00:00	9	31.818
164	Logan SARGEANT	SOFT	2024-05-04T16:20:14.908000+00:00	10	31.885
182	Logan SARGEANT	SOFT	2024-05-04T16:21:47.610000+00:00	11	31.763
200	Logan SARGEANT	SOFT	2024-05-04T16:23:20.311000+00:00	12	31.883
218	Logan SARGEANT	SOFT	2024-05-04T16:24:53.406000+00:00	13	31.684
236	Logan SARGEANT	SOFT	2024-05-04T16:26:26.540000+00:00	14	31.810
254	Logan SARGEANT	SOFT	2024-05-04T16:28:00.571000+00:00	15	32.458
272	Logan SARGEANT	SOFT	2024-05-04T16:29:34.984000+00:00	16	31.625
290	Logan SARGEANT	SOFT	2024-05-04T16:31:07.610000+00:00	17	31.691
308	Logan SARGEANT	SOFT	2024-05-04T16:32:40.399000+00:00	18	31.844

Kick Sauber

In [109…
```
stintInformation.query('driver_number == 24 or driver_number == 77')
```

Out[109…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
11	1234	9506	1	24	1	1	MEDIUM	
17	1234	9506	1	77	1	1	MEDIUM	
30	1234	9506	2	24	2	2	MEDIUM	
36	1234	9506	2	77	2	2	MEDIUM	
48	1234	9506	3	24	3	20	MEDIUM	
54	1234	9506	3	77	3	20	MEDIUM	

In [110…
```
libraryDataF1.getinfolongruns(jointables,24,'Kick Sauber',MINIMUN_SECONDS,
```

Out[110…

	full_name	compound	date_start	lap_number	duration_sector_1	du
65	ZHOU Guanyu	MEDIUM	2024-05-04T16:10:59.920000+00:00	4	31.918	
83	ZHOU Guanyu	MEDIUM	2024-05-04T16:12:33.341000+00:00	5	31.921	

	full_name	compound	date_start	lap_number	duration_sector_1	du
101	ZHOU Guanyu	MEDIUM	2024-05-04T16:14:05.848000+00:00	6	31.683	
119	ZHOU Guanyu	MEDIUM	2024-05-04T16:15:38.296000+00:00	7	31.434	
137	ZHOU Guanyu	MEDIUM	2024-05-04T16:17:10.457000+00:00	8	31.703	
155	ZHOU Guanyu	MEDIUM	2024-05-04T16:18:42.950000+00:00	9	31.795	
173	ZHOU Guanyu	MEDIUM	2024-05-04T16:20:15.598000+00:00	10	31.753	
191	ZHOU Guanyu	MEDIUM	2024-05-04T16:21:48.421000+00:00	11	31.459	
209	ZHOU Guanyu	MEDIUM	2024-05-04T16:23:21.133000+00:00	12	31.684	
227	ZHOU Guanyu	MEDIUM	2024-05-04T16:24:54.026000+00:00	13	31.623	
245	ZHOU Guanyu	MEDIUM	2024-05-04T16:26:27.147000+00:00	14	31.740	
263	ZHOU Guanyu	MEDIUM	2024-05-04T16:28:01.133000+00:00	15	32.503	
281	ZHOU Guanyu	MEDIUM	2024-05-04T16:29:35.591000+00:00	16	31.503	
299	ZHOU Guanyu	MEDIUM	2024-05-04T16:31:08.233000+00:00	17	31.537	
317	ZHOU Guanyu	MEDIUM	2024-05-04T16:32:41.046000+00:00	18	31.395	

In [111…

```
libraryDataF1.getinfolongruns(jointables,77,'Kick Sauber',MINIMUN_SECONDS,
```

Out[111…

	full_name	compound	date_start	lap_number	duration_sector_1	du
71	Valtteri BOTTAS	MEDIUM	2024-05-04T16:11:00.938000+00:00	4	31.734	
89	Valtteri BOTTAS	MEDIUM	2024-05-04T16:12:34.349000+00:00	5	31.753	
107	Valtteri BOTTAS	MEDIUM	2024-05-04T16:14:07.105000+00:00	6	31.516	
125	Valtteri BOTTAS	MEDIUM	2024-05-04T16:15:39.604000+00:00	7	31.525	
143	Valtteri BOTTAS	MEDIUM	2024-05-04T16:17:12.104000+00:00	8	31.887	
161	Valtteri BOTTAS	MEDIUM	2024-05-04T16:18:45.201000+00:00	9	31.574	
179	Valtteri BOTTAS	MEDIUM	2024-05-04T16:20:17.873000+00:00	10	31.409	
197	Valtteri BOTTAS	MEDIUM	2024-05-04T16:21:50.701000+00:00	11	32.561	
215	Valtteri BOTTAS	MEDIUM	2024-05-04T16:23:24.558000+00:00	12	31.770	
233	Valtteri BOTTAS	MEDIUM	2024-05-04T16:24:57.742000+00:00	13	31.332	

	full_name	compound	date_start	lap_number	duration_sector_1	du
251	Valtteri BOTTAS	MEDIUM	2024-05-04T16:26:30.626000+00:00	14	31.291	
269	Valtteri BOTTAS	MEDIUM	2024-05-04T16:28:03.662000+00:00	15	31.646	
287	Valtteri BOTTAS	MEDIUM	2024-05-04T16:29:37.061000+00:00	16	31.977	
305	Valtteri BOTTAS	MEDIUM	2024-05-04T16:31:10.354000+00:00	17	31.527	
323	Valtteri BOTTAS	MEDIUM	2024-05-04T16:32:43.196000+00:00	18	31.483	
	Valtteri					

Qualyfing

Set up

First of all, it is neccesary to obtain the data about the qualyfing

Race control

This section has been added in order to know which laps has been deleted and knowing what happened on track during this session.

In [112…

```
libraryDataF1.obtain_information('race_control',session_key=9498)
```

Out[112…

	session_key	meeting_key	date	category	flag	lap_number
0	9498	1234	2024-05-04T19:47:04+00:00	Other	None	None
1	9498	1234	2024-05-04T20:00:00+00:00	Flag	GREEN	None
2	9498	1234	2024-05-04T20:01:22+00:00	Other	None	None
3	9498	1234	2024-05-04T20:01:51+00:00	Other	None	None
4	9498	1234	2024-05-04T20:18:00+00:00	Flag	CHEQUERED	None
5	9498	1234	2024-05-04T20:18:10+00:00	Other	None	None

	session_key	meeting_key	date	category	flag	lap_number
6	9498	1234	2024-05-04T20:18:16+00:00	Other	None	None
7	9498	1234	2024-05-04T20:18:59+00:00	Other	None	None
8	9498	1234	2024-05-04T20:21:58+00:00	Other	None	None
9	9498	1234	2024-05-04T20:22:23+00:00	Other	None	None
10	9498	1234	2024-05-04T20:23:40+00:00	Other	None	None
11	9498	1234	2024-05-04T20:25:01+00:00	Flag	GREEN	None
12	9498	1234	2024-05-04T20:32:41+00:00	Flag	YELLOW	None
13	9498	1234	2024-05-04T20:32:42+00:00	Other	None	None
14	9498	1234	2024-05-04T20:32:45+00:00	Flag	DOUBLE YELLOW	None
15	9498	1234	2024-05-04T20:32:48+00:00	Flag	YELLOW	None
16	9498	1234	2024-05-04T20:32:55+00:00	Flag	CLEAR	None
17	9498	1234	2024-05-04T20:32:56+00:00	Flag	CLEAR	None
18	9498	1234	2024-05-04T20:32:56+00:00	Other	None	None
19	9498	1234	2024-05-04T20:34:09+00:00	Other	None	None

	session_key	meeting_key	date	category	flag	lap_number
20	9498	1234	2024-05-04T20:39:01+00:00	Other	None	None
21	9498	1234	2024-05-04T20:39:15+00:00	Other	None	None
22	9498	1234	2024-05-04T20:40:00+00:00	Flag	CHEQUERED	None
23	9498	1234	2024-05-04T20:40:06+00:00	Other	None	None
24	9498	1234	2024-05-04T20:48:00+00:00	Flag	GREEN	None
25	9498	1234	2024-05-04T20:53:13+00:00	Other	None	None
26	9498	1234	2024-05-04T20:57:04+00:00	Other	None	None
27	9498	1234	2024-05-04T21:00:00+00:00	Flag	CHEQUERED	None
28	9498	1234	2024-05-04T21:00:08+00:00	Other	None	None

Obtain setup

In [113…

```
qualyfing = libraryDataF1.obtain_information('laps',session_key=9498)
stintInformation = libraryDataF1.obtain_information('stints',session_key=9
drivers = libraryDataF1.obtain_information('drivers',session_key=9498)
```

To obtain a better analysis, those laptimes deleted will be removed from this analysis in order to obtain the data with valid values. So that,taking into account the race control table, it will be neccesary to consult the qualyfing data to obtain the ids.

In [114…

```
# qualyfing = qualyfing.drop(40)
# qualyfing = qualyfing.drop(49)
# qualyfing = qualyfing.drop(50)
```

In [115…

```
bestlap = qualyfing.loc[qualyfing.groupby(['driver_number'])['lap_duration
bestlap[0:1]
```

Out[115…

	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed

	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
273	1234	9498	1	223	192	337	2024-05-04T20:50:

In this case, the fastest lap is 87.241 seconds (1.27.241= so that to obtain the competitve laps the fastest lap will be multiplied by 1.07 (93.347 seconds) due to, according to the rules all the drivers have to do unless one lap within this gap.

In [116…

```
competitiveLaps = qualyfing.query("is_pit_out_lap == False and lap_duratio
competitiveLaps
```

Out[116…

	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
16	1234	9498	20	221	188	340	2024-05-04T20:02:
18	1234	9498	27	221	190	341	2024-05-04T20:02:
20	1234	9498	31	222	190	338	2024-05-04T20:02:
22	1234	9498	10	220	190	341	2024-05-04T20:02:
23	1234	9498	44	221	190	335	2024-05-04T20:02:
...	...	...	...	...	...	...	
303	1234	9498	4	223	193	336	2024-05-04T20:59:
304	1234	9498	16	224	191	335	2024-05-04T20:59:
305	1234	9498	55	223	192	336	2024-05-04T20:59:
307	1234	9498	44	222	191	334	2024-05-04T20:59:
309	1234	9498	63	223	191	336	2024-05-04T20:59:

103 rows × 16 columns

In [117…

```
drivers_list = list(competitiveLaps['driver_number'].unique())
newdataset = pd.DataFrame()
for driver in drivers_list:
    newdataset =libraryDataF1.obtain_information_qualy(driver,competitiveLa
jointables = pd.merge(newdataset,drivers,on=['driver_number'])
jointables.sort_values(by=['fastest_lap'],ascending=True)
```

Out[117…

	driver_number	fastest_lap	delta	st_speed	i1_speed	i2_speed	session_key	meeting_key

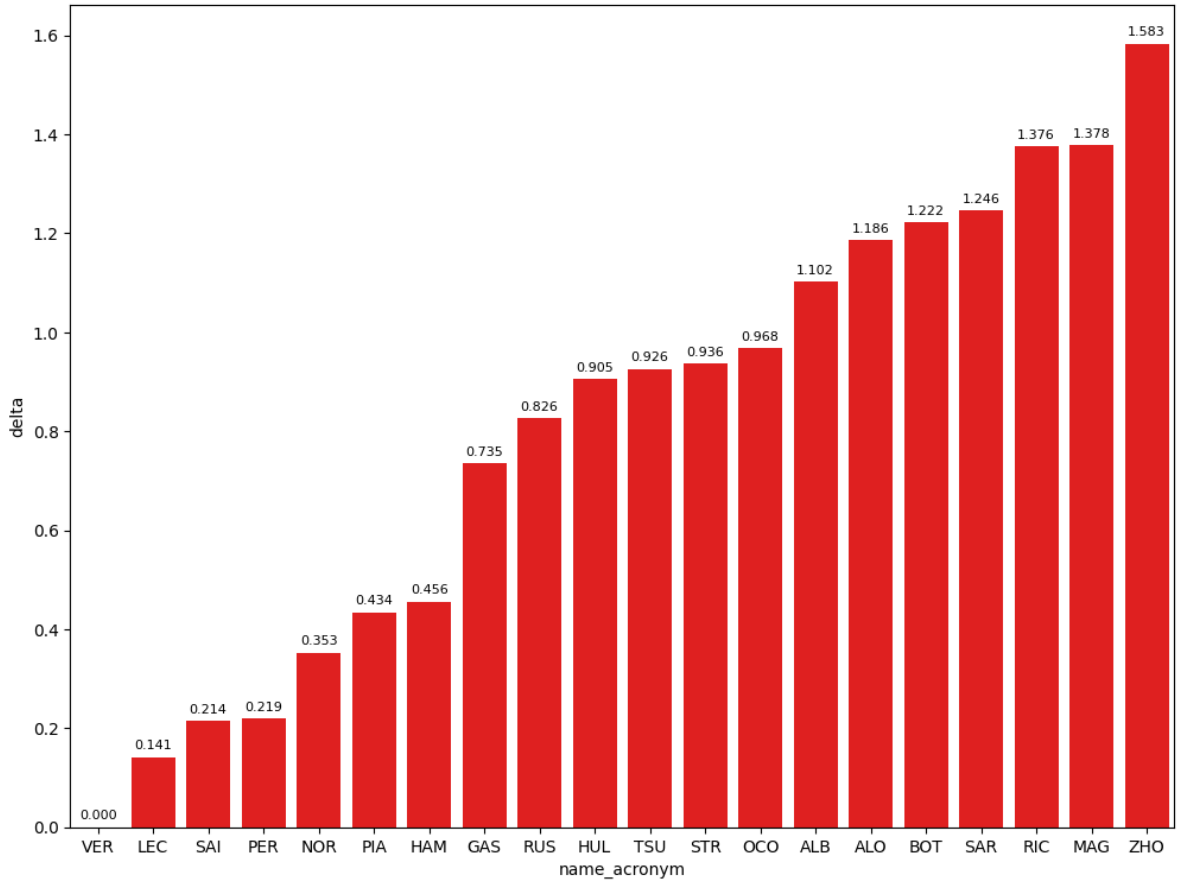
	driver_number	fastest_lap	delta	st_speed	i1_speed	i2_speed	session_key	meeting_key
17	1	87.241	0.000	337	219	191	9498	1234
12	16	87.382	0.141	335	218	189	9498	1234
10	55	87.455	0.214	336	219	191	9498	1234
15	11	87.460	0.219	339	219	190	9498	1234
13	4	87.594	0.353	334	218	191	9498	1234
14	81	87.675	0.434	335	216	191	9498	1234
4	44	87.697	0.456	334	219	189	9498	1234
3	10	87.976	0.735	337	220	190	9498	1234
7	63	88.067	0.826	335	220	191	9498	1234
1	27	88.146	0.905	327	220	190	9498	1234
16	22	88.167	0.926	222	220	190	9498	1234
11	18	88.177	0.936	335	219	190	9498	1234
2	31	88.209	0.968	336	221	190	9498	1234
5	23	88.343	1.102	340	216	185	9498	1234
9	14	88.427	1.186	333	213	189	9498	1234
18	77	88.463	1.222	337	222	192	9498	1234
19	2	88.487	1.246	340	220	191	9498	1234
8	3	88.617	1.376	335	218	189	9498	1234
0	20	88.619	1.378	339	215	188	9498	1234
6	24	88.824	1.583	331	220	190	9498	1234

Best lap per driver compared with the best lap of the session

In this chart we can see the deltas with compared with the fastest lap of the session that it could be different than the pole. In this case, this happened with Leclerc taking the best time but not taking the pole because his cest time in Q3 was not the best time of the session.

In [118…

```
libraryDataF1.obtainchart("name_acronym","delta",jointables.sort_values(by=
```

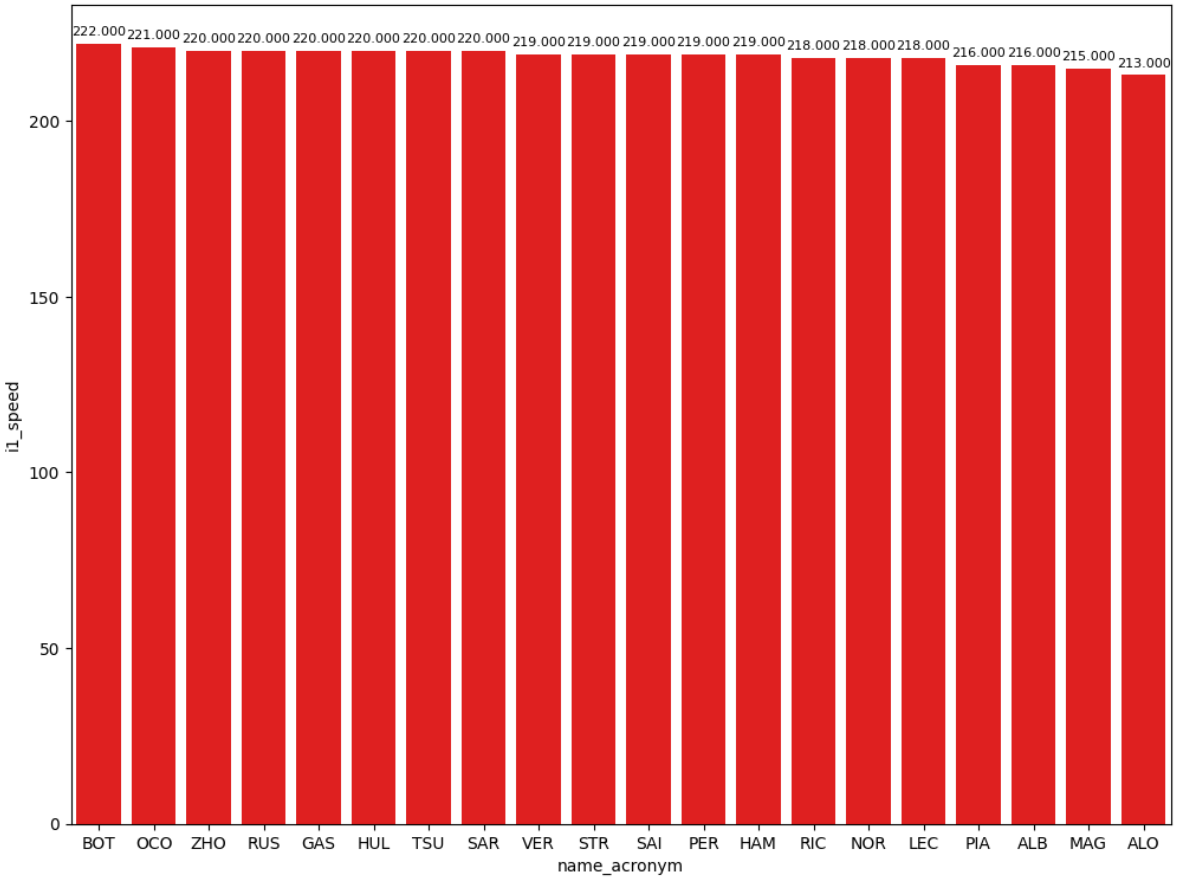


Speed trap

Maximum speed per drivers

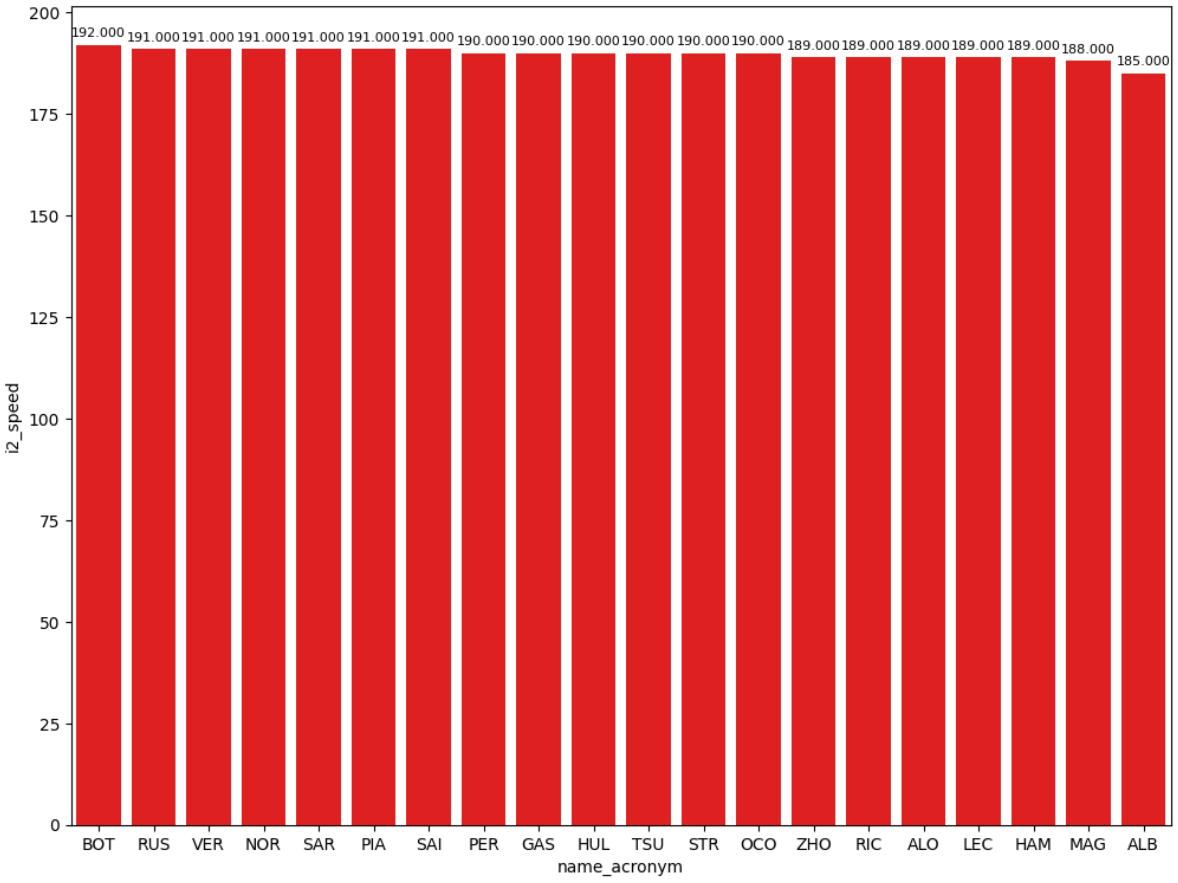
In [119…

```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['i1_speed'
libraryDataF1.obtainchart("name_acronym","i1_speed",top_speed)
```



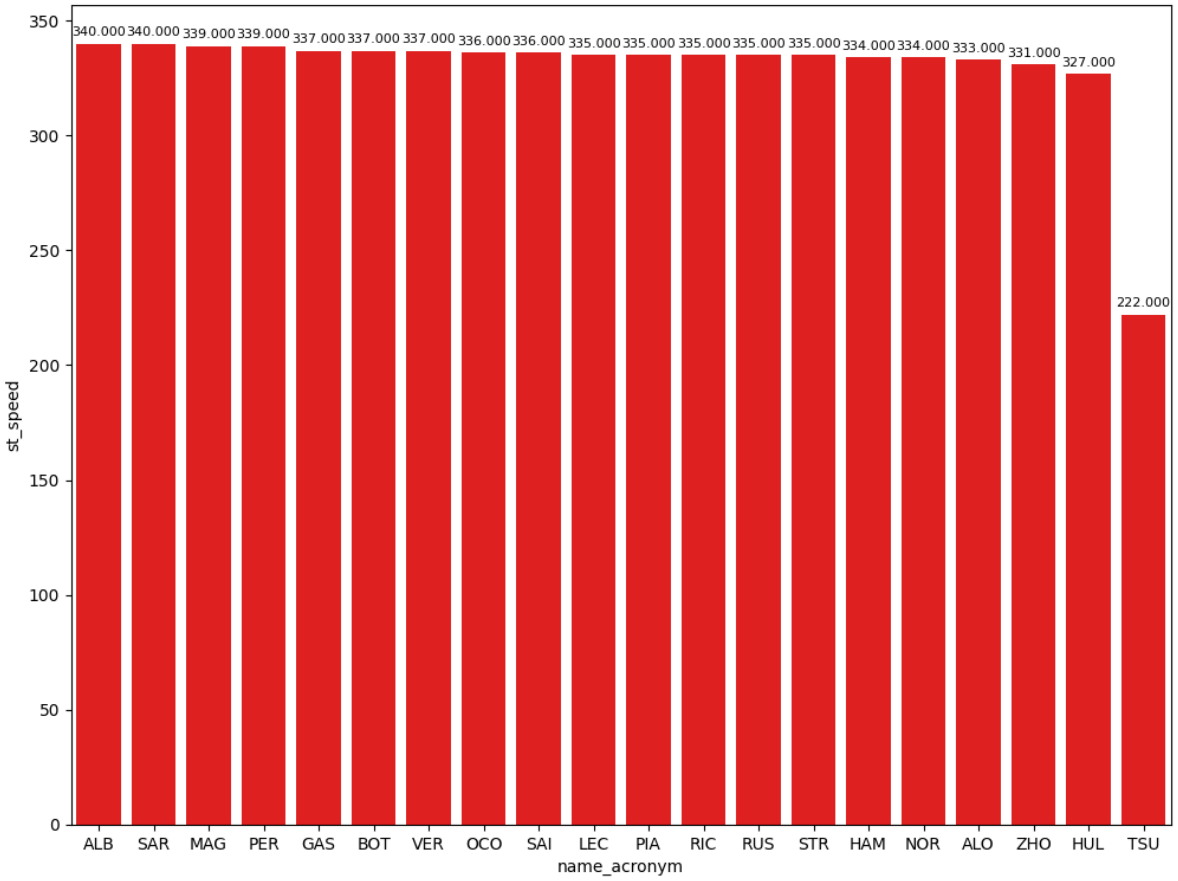
In [120…

```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['i2_speed'
libraryDataF1.obtainchart("name_acronym","i2_speed",top_speed)
```



In [121…

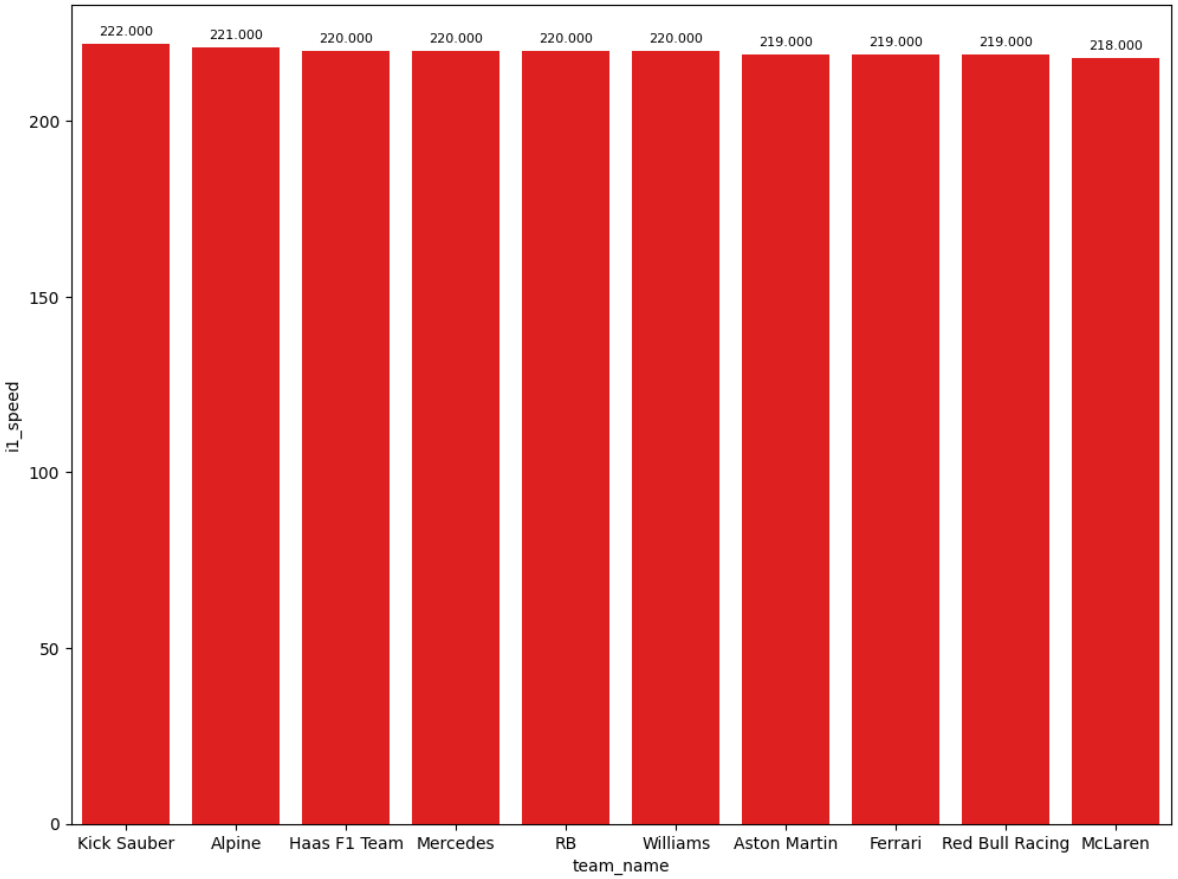
```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['st_speed'
libraryDataF1.obtainchart("name_acronym","st_speed",top_speed)
```



Maximum speed per teams

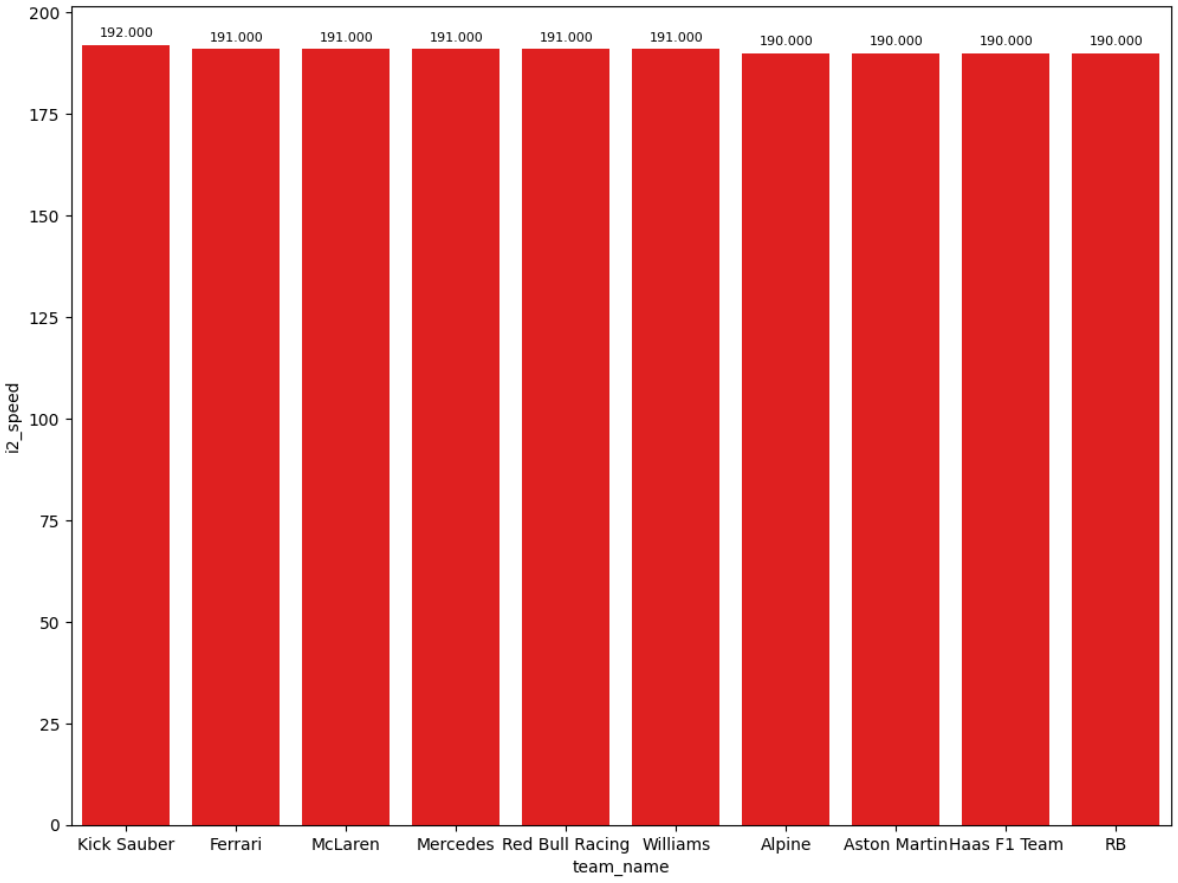
In [122…

```
top_speed = jointables.loc[jointables.groupby(['team_name'])['i1_speed'].i
libraryDataF1.obtainchart("team_name","i1_speed",top_speed)
```



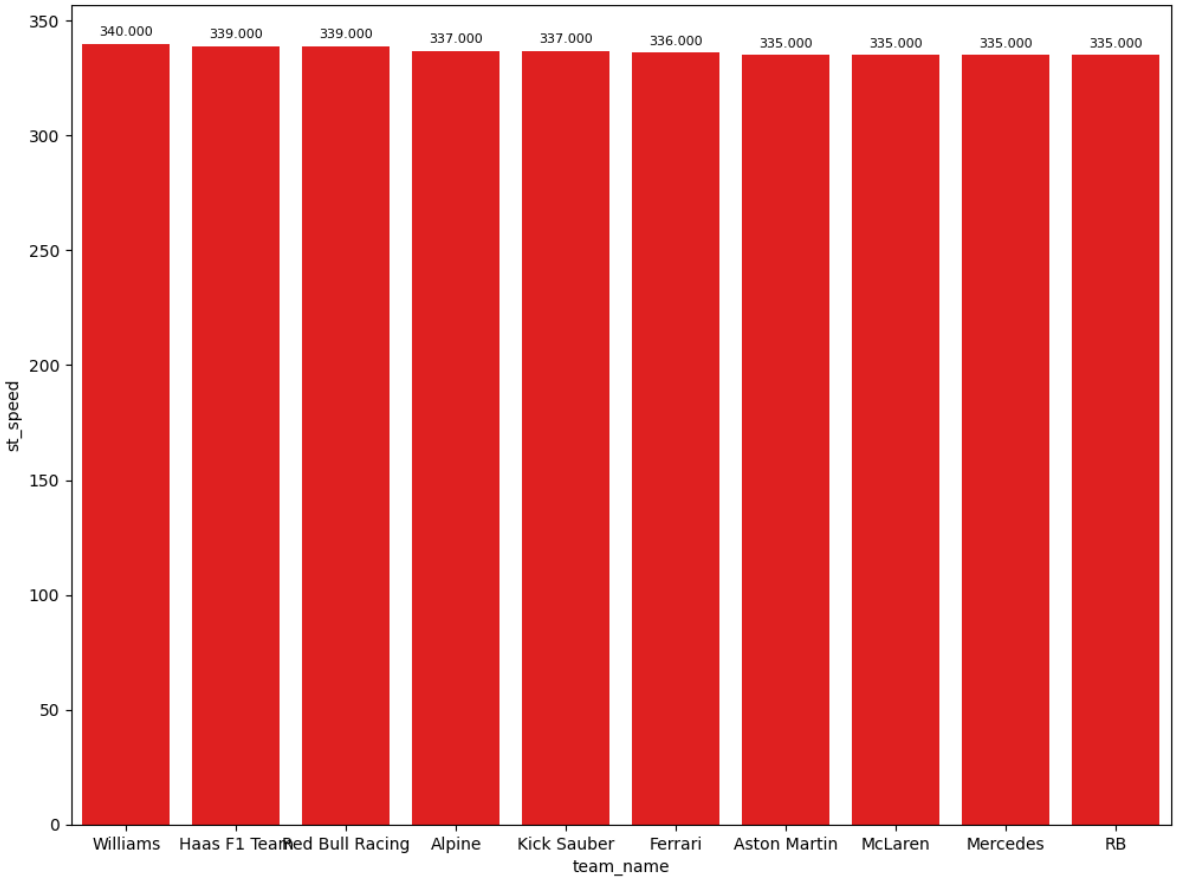
In [123…

```
top_speed = jointables.loc[jointables.groupby(['team_name'])['i2_speed'].i
libraryDataF1.obtainchart("team_name","i2_speed",top_speed)
```



In [124…

```
top_speed = jointables.loc[jointables.groupby(['team_name'])['st_speed'].i
libraryDataF1.obtainchart("team_name","st_speed",top_speed)
```



In [125…

```
mergequaly = pd.merge(competitiveLaps,drivers,on=['driver_number'])
mergequaly
```

Out[125…

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
0	1234	9498	20	221	188	340	2024-05-04T2
1	1234	9498	20	221	191	339	2024-05-04T2
2	1234	9498	20	215	191	342	2024-05-04T2
3	1234	9498	27	221	190	341	2024-05-04T2
4	1234	9498	27	221	191	341	2024-05-04T2
...	...	...	...	...	...	...	
98	1234	9498	1	223	192	337	2024-05-04T2
99	1234	9498	77	223	192	337	2024-05-04T2
100	1234	9498	77	222	193	345	2024-05-04T2
101	1234	9498	2	220	191	344	2024-05-04T2

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
102	1234	9498	2	220	191	340	2024-05-04T2

In order to know when each session finished, race control dataset will be consulted.

In [126…

```
maximumDateQ1 = "date_start <'2024-05-04T20:25:01+00:00'"
maximumDateQ2 = "date_start <'2024-05-04T20:48:00+00:00' and date_start >'
maximumDateQ3 = "date_start >'2024-05-04T20:48:00+00:00'"
```

Qualyfing 1

In this session the surprise came from Mercedes with Hamilton that knocked-out in Q1. The rest of the drivers were expected to be knocked-out

In [127…

```
q1Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ
q1Data
```

Out[127…

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
94	1234	9498	1	219	191	342	2024-05-04T2
81	1234	9498	11	221	191	341	2024-05-04T2
70	1234	9498	4	222	192	338	2024-05-04T2
50	1234	9498	55	222	192	339	2024-05-04T2
17	1234	9498	10	222	190	341	2024-05-04T2
76	1234	9498	81	216	192	336	2024-05-04T2
63	1234	9498	16	218	189	335	2024-05-04T2
36	1234	9498	63	221	192	336	2024-05-04T2
21	1234	9498	44	219	191	336	2024-05-04T2
58	1234	9498	18	222	192	343	2024-05-04T2
12	1234	9498	31	222	192	338	2024-05-04T2
88	1234	9498	22	222	191	334	2024-05-04T2
29	1234	9498	23	221	190	340	2024-05-04T2
4	1234	9498	27	221	191	341	2024-05-04T2
45	1234	9498	14	217	191	336	2024-05-04T2
100	1234	9498	77	222	193	345	2024-05-04T2

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
102	1234	9498	2	220	191	340	2024-05-04T2
41	1234	9498	3	221	189	336	2024-05-04T2
2	1234	9498	20	215	191	342	2024-05-04T2
32	1234	9498	24	221	191	331	2024-05-04T2

20 rows × 28 columns

Comparaison with driver at risk

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will do a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [128…

```
#Reference
P15 = q1Data[14:15]
P15
```

Out[128…

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
45	1234	9498	14	217	191	336	2024-05-04T20

1 rows × 28 columns

In [129…

```
print(
"Driver:",P15.full_name.to_string(index=False),
"Sector 1: ",P15.duration_sector_1.to_string(index=False),
"Sector 2: ",P15.duration_sector_2.to_string(index=False),
"Sector 3: ",P15.duration_sector_3.to_string(index=False)
)
```

```
Driver: Fernando ALONSO Sector 1:  29.475 Sector 2:  33.86 Sector 3:  25.11
8
```

In [130…

```
q1Data[15::]
```

Out[130…

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
100	1234	9498	77	222	193	345	2024-05-04T2
102	1234	9498	2	220	191	340	2024-05-04T2
41	1234	9498	3	221	189	336	2024-05-04T2
2	1234	9498	20	215	191	342	2024-05-04T2
32	1234	9498	24	221	191	331	2024-05-04T2

5 rows × 28 columns

Analysis of each sector of the driver at risk compared to the drivers eliminated.

In [131…

```
newdataset2 = pd.DataFrame()
for index,row in q1Data[15::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference_regard_reference(row,P15

newdataset2
```

Out[131…

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	77	0.010	-0.005	0.028	-0.013	
1	2	0.034	0.249	-0.124	-0.091	
2	3	0.164	0.066	-0.078	0.176	
3	20	0.166	0.035	-0.080	0.211	
4	24	0.371	0.149	0.043	0.179	

Analysis with the drivers that finished better than the driver at risk

In [132…

```
newdataset2 = pd.DataFrame()
for index,row in q1Data[0:14].iterrows():
    newdataset2 = libraryDataF1.obtain_difference_regard_reference(row,P15

newdataset2
```

Out[132…

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	n
0	1	-0.764	-0.352	-0.393	-0.019	
1	11	-0.681	-0.161	-0.420	-0.100	
2	4	-0.540	-0.216	-0.275	-0.049	
3	55	-0.516	-0.098	-0.289	-0.129	
4	10	-0.477	-0.141	-0.255	-0.081	
5	81	-0.421	-0.200	-0.084	-0.137	
6	16	-0.372	-0.273	-0.064	-0.035	
7	63	-0.294	-0.074	-0.155	-0.065	
8	44	-0.286	-0.244	0.027	-0.069	
9	18	-0.276	-0.030	-0.077	-0.169	
10	31	-0.244	-0.169	-0.091	0.016	
11	22	-0.129	0.037	-0.171	0.005	
12	23	-0.110	0.023	-0.086	-0.047	
13	27	-0.070	0.106	-0.112	-0.064	

Best sector per driver

In this section we can see the best sector of the session

In [133…

```
pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_1'].min().sor
```

Out[133…

name_acronym	duration_sector_1
VER	29.123
LEC	29.202
HAM	29.231
NOR	29.259
PIA	29.275
OCO	29.306
PER	29.314
GAS	29.334
SAI	29.377
RUS	29.401
STR	29.445
BOT	29.470
ALO	29.475
ALB	29.498
MAG	29.510
TSU	29.512
RIC	29.541
HUL	29.581
ZHO	29.624
SAR	29.724

In [134…

```
pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_2'].min().sor
```

Out[134…

name_acronym	duration_sector_2
PER	33.440
VER	33.467
SAI	33.571
NOR	33.585
GAS	33.605
TSU	33.689
RUS	33.705
SAR	33.736
HUL	33.748
OCO	33.769
ALB	33.774
PIA	33.776

name_acronym	duration_sector_2
MAG	33.780
RIC	33.782
STR	33.783
LEC	33.796
ALO	33.860
HAM	33.887

In [135…

```
pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_3'].min().sor
```

Out[135…

name_acronym	duration_sector_3
STR	24.949
PIA	24.981
SAI	24.989
PER	25.018
SAR	25.027
GAS	25.037
HAM	25.049
RUS	25.053
HUL	25.054
NOR	25.069
ALB	25.071
LEC	25.083
VER	25.099
BOT	25.105
ALO	25.118
TSU	25.123
OCO	25.134
RIC	25.294
ZHO	25.297
MAG	25.329

Qualyfing 2

In this session, Bottas entered in Q3 knocking-out Stroll

In [136…

```
q2Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ
q2Data
```

Out[136…

meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
64	1234	9498	16	221	191	337	2024-05-04T20
96	1234	9498	1	220	191	338	2024-05-04T20
24	1234	9498	44	222	191	337	2024-05-04T20
77	1234	9498	81	219	191	336	2024-05-04T20
83	1234	9498	11	222	191	341	2024-05-04T20
71	1234	9498	4	218	191	338	2024-05-04T20
52	1234	9498	55	221	191	337	2024-05-04T20
38	1234	9498	63	222	191	337	2024-05-04T20
90	1234	9498	22	223	191	336	2024-05-04T20
6	1234	9498	27	223	191	342	2024-05-04T20
60	1234	9498	18	222	190	338	2024-05-04T20
18	1234	9498	10	220	191	338	2024-05-04T20
13	1234	9498	31	221	191	337	2024-05-04T20
30	1234	9498	23	220	190	340	2024-05-04T20
48	1234	9498	14	221	189	337	2024-05-04T20

Comparaison with driver at risk

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will be a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [137…

```
#Reference
P10 = q2Data[9:10]
print(
"Driver:",P10.full_name.to_string(index=False),
"Sector 1: ",P10.duration_sector_1.to_string(index=False),
"Sector 2: ",P10.duration_sector_2.to_string(index=False),
"Sector 3: ",P10.duration_sector_3.to_string(index=False)
)
```

```
Driver: Nico HULKENBERG Sector 1:  29.281 Sector 2:  33.891 Sector 3:  25.0
28
```

Analysis of each sector of the driver at risk compared to the drivers eliminated.

In [138…

```
newdataset2 = pd.DataFrame()
for index,row in q2Data[10::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference_regard_reference(row,P10

newdataset2
```

Out[138…

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	18	0.022	-0.010	0.068	-0.036	
1	10	0.124	0.153	-0.023	-0.006	
2	31	0.171	-0.001	0.057	0.115	
3	23	0.213	0.230	-0.056	0.039	
4	14	0.227	0.186	-0.059	0.100	

Analysis with the drivers that finished better than the driver at risk

I bring this section in order to know where the driver at risk lost his chances to improve in the qualyfing.

In [139…

```
newdataset2 = pd.DataFrame()
for index,row in q2Data[0:9].iterrows():
    newdataset2 = libraryDataF1.obtain_difference_regard_reference(row,P10

newdataset2
```

Out[139…

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	16	-0.667	-0.261	-0.367	-0.039	
1	1	-0.634	-0.375	-0.283	0.024	
2	44	-0.503	-0.261	-0.256	0.014	
3	81	-0.479	-0.137	-0.361	0.019	
4	11	-0.361	-0.001	-0.246	-0.114	
5	4	-0.329	-0.056	-0.198	-0.075	
6	55	-0.259	-0.058	-0.134	-0.067	
7	63	-0.105	0.015	-0.213	0.093	
8	22	-0.033	0.018	-0.116	0.065	

Best sector per driver

In this section we can see the best sector of the session

In [140…

```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_1'].min().sor
```

Out[140…

name_acronym	duration_sector_1
VER	28.906
HAM	29.020

name_acronym	duration_sector_1
LEC	29.020
PIA	29.144
SAI	29.223
NOR	29.225
STR	29.271
OCO	29.280
PER	29.280
HUL	29.281
RUS	29.296
TSU	29.299
GAS	29.434

In [141…
```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_2'].min().sor
```

Out[141…

name_acronym	duration_sector_2
LEC	33.524
PIA	33.530
VER	33.608
HAM	33.635
PER	33.645
RUS	33.678
NOR	33.693
SAI	33.757
TSU	33.775
ALO	33.832
ALB	33.835
GAS	33.868
HUL	33.891
OCO	33.948
STR	33.959

In [142…
```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_3'].min().sor
```

Out[142…

name_acronym	duration_sector_3
PER	24.914
NOR	24.953

name_acronym	duration_sector_3
SAI	24.961
LEC	24.989
STR	24.992
GAS	25.022
HUL	25.028
HAM	25.042
PIA	25.047
VER	25.052
ALB	25.067
TSU	25.093
RUS	25.121

Qualyfing 3

In [143…

```
q3Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ1
q3Data
```

Out[143…

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
97	1234	9498	1	223	192	337	2024-05-04T20
66	1234	9498	16	222	192	337	2024-05-04T20
54	1234	9498	55	223	193	338	2024-05-04T20
85	1234	9498	11	220	192	339	2024-05-04T20
74	1234	9498	4	223	193	336	2024-05-04T20
78	1234	9498	81	222	191	335	2024-05-04T20
39	1234	9498	63	224	191	335	2024-05-04T20
26	1234	9498	44	222	191	334	2024-05-04T20
9	1234	9498	27	221	193	340	2024-05-04T20
92	1234	9498	22	222	191	336	2024-05-04T20

10 rows × 28 columns

Comparaison with poleman

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will be a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [144…

```
#Reference
P1 = q3Data[:1]
print(
"Driver:",P1.full_name.to_string(index=False),
"Sector 1: ",P1.duration_sector_1.to_string(index=False),
"Sector 2: ",P1.duration_sector_2.to_string(index=False),
"Sector 3: ",P1.duration_sector_3.to_string(index=False)
)
```

```
Driver: Max VERSTAPPEN Sector 1:  28.867 Sector 2:  33.499 Sector 3:  24.87
5
```

Analysis of each sector of the driver at risk compared to the drivers eliminated.

Red Bull was dominant in China as we can see in qualyfing.

In [145…

```
newdataset2 = pd.DataFrame()
for index,row in q3Data[1::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference_regard_reference(row,P1,
newdataset2
```

Out[145…

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	16	0.141	-0.074	0.141	0.074	
1	55	0.214	0.007	0.146	0.061	
2	11	0.219	-0.017	0.231	0.005	
3	4	0.353	0.061	0.217	0.075	
4	81	0.434	0.096	0.201	0.137	
5	63	0.826	0.258	0.358	0.210	
6	44	0.866	0.254	0.394	0.218	
7	27	0.905	0.543	0.335	0.027	
8	22	0.951	0.403	0.351	0.197	

Best sector per driver

In this section we can see the best sector of the session

In [146…

```
pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_1'].min().sor
```

Out[146…

name_acronym	duration_sector_1
LEC	28.793
PER	28.850
VER	28.867
SAI	28.874
NOR	28.928
PIA	28.963
HAM	29.121

	duration_sector_1
name_acronym	
RUS	29.125

In [147…
```
pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_2'].min().sor
```

Out[147…

	duration_sector_2
name_acronym	
VER	33.499
LEC	33.640
SAI	33.645
PIA	33.700
NOR	33.716
PER	33.730
HUL	33.834
TSU	33.850
RUS	33.857
HAM	33.893

In [148…
```
pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_1'].min().sor
```

Out[148…

	duration_sector_1
name_acronym	
LEC	28.793
PER	28.850
VER	28.867
SAI	28.874
NOR	28.928
PIA	28.963
HAM	29.121
RUS	29.125
TSU	29.270
HUL	29.410

Best sector per driver of the session (in general)

In [149…
```
pd.DataFrame(mergequaly.groupby("name_acronym")['duration_sector_1'].min()
```

Out[149…

	duration_sector_1
name_acronym	
VER	28.783

name_acronym	duration_sector_1
LEC	28.793
PER	28.850
SAI	28.874
NOR	28.928
PIA	28.930
HAM	29.020
RUS	29.125
TSU	29.270
STR	29.271
OCO	29.280
HUL	29.281
GAS	29.334
ALO	29.467
BOT	29.470
ALB	29.498
MAG	29.510
RIC	29.525

In [150…

```
pd.DataFrame(mergequaly.groupby("name_acronym")['duration_sector_2'].min()
```

Out[150…

name_acronym	duration_sector_2
PER	33.440
VER	33.467
LEC	33.524
PIA	33.530
SAI	33.571
NOR	33.585
GAS	33.605
HAM	33.635
RUS	33.678
TSU	33.689
MAG	33.725
RIC	33.727
SAR	33.736
HUL	33.748
OCO	33.769
ALB	33.774

name_acronym	duration_sector_2
ALO	33.778
STR	33.783

In [151…
```
pd.DataFrame(mergequaly.groupby("name_acronym")['duration_sector_3'].min()
```

Out[151…

name_acronym	duration_sector_3
PER	24.852
VER	24.875
HUL	24.902
SAI	24.936
SAR	24.944
STR	24.949
LEC	24.949
NOR	24.950
PIA	24.981
RUS	25.020
GAS	25.022
HAM	25.022
OCO	25.065
ALB	25.067
TSU	25.072
BOT	25.105
ALO	25.118
MAG	25.126
ZHO	25.196
RIC	25.248

Race

Obtain setup

In [152…
```
race = libraryDataF1.obtain_information('laps',session_key=9507)
stintInformation = libraryDataF1.obtain_information('stints',session_key=95
drivers = libraryDataF1.obtain_information('drivers',session_key=9507)
```

In [153…
```
stintsDataFrame =libraryDataF1.stint_configuration(drivers,stintInformatio
```

In [154…

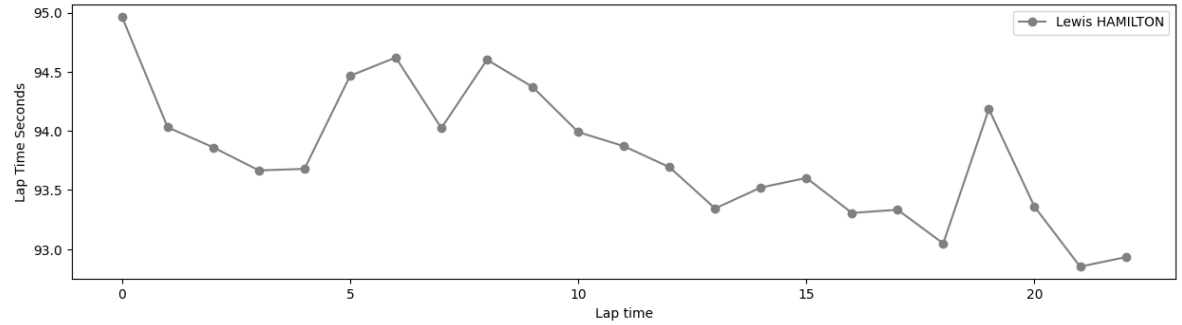
```
raceLaps = race.query("is_pit_out_lap == False")
jointables = pd.merge(raceLaps,stintsDataFrame,on=['lap_number','driver_nu
```

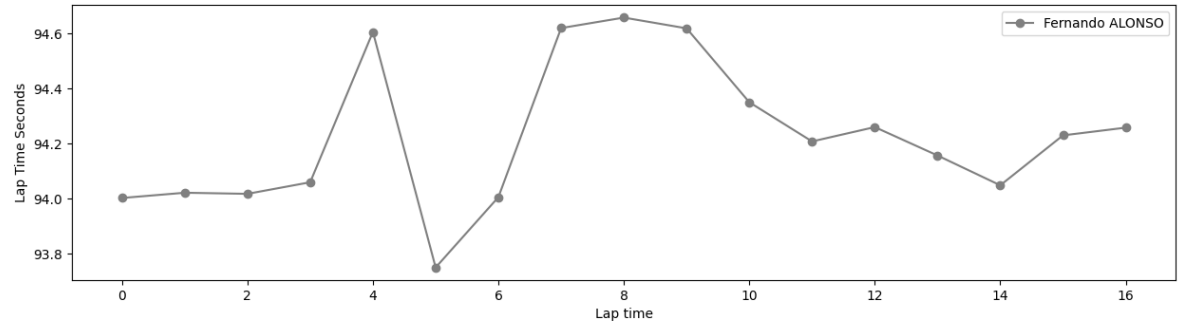
Obtain data tyres

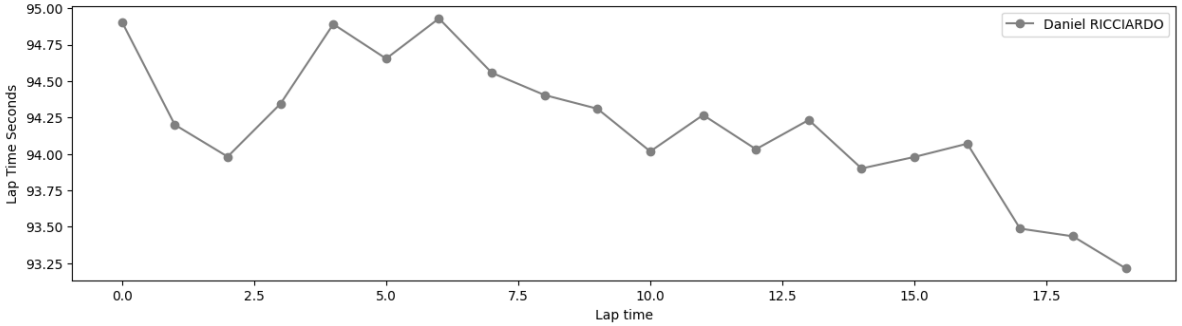
Hard tyres

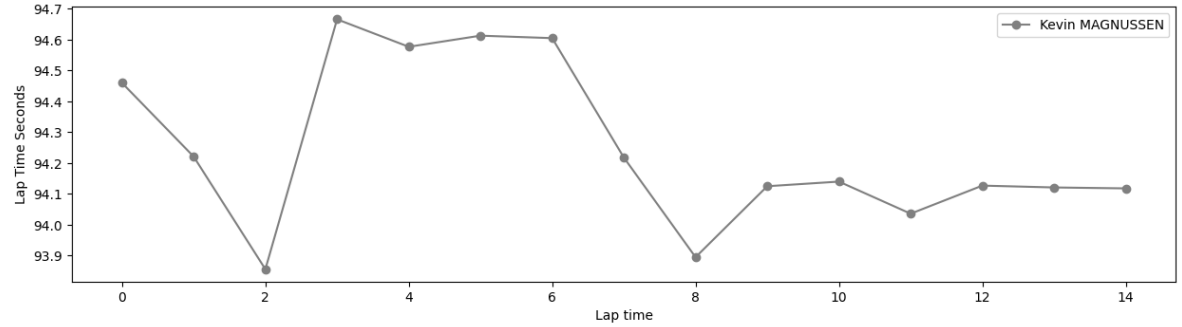
In [155…

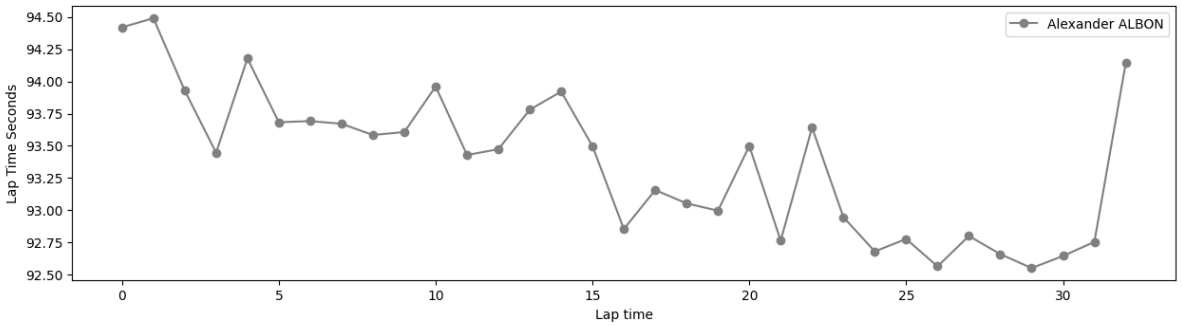
```
libraryDataF1.obtain_data_tyres(jointables,'HARD',95)
```

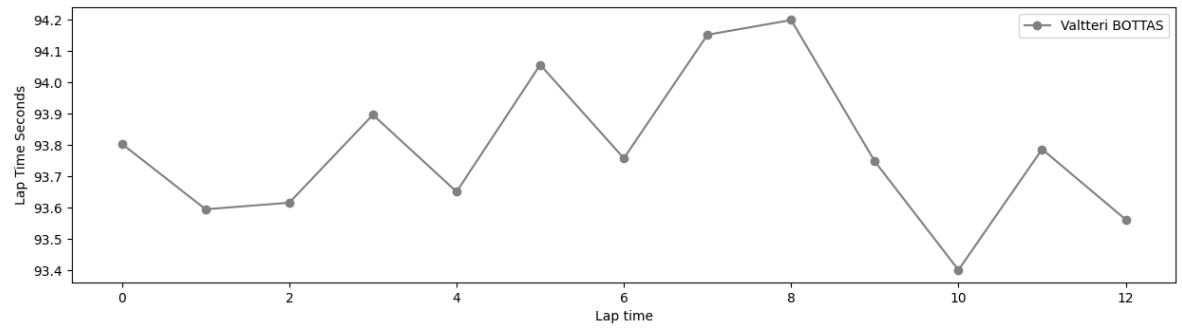

Lewis HAMILTON
Lap Time Seconds
Lap time


Fernando ALONSO
Lap Time Seconds
Lap time

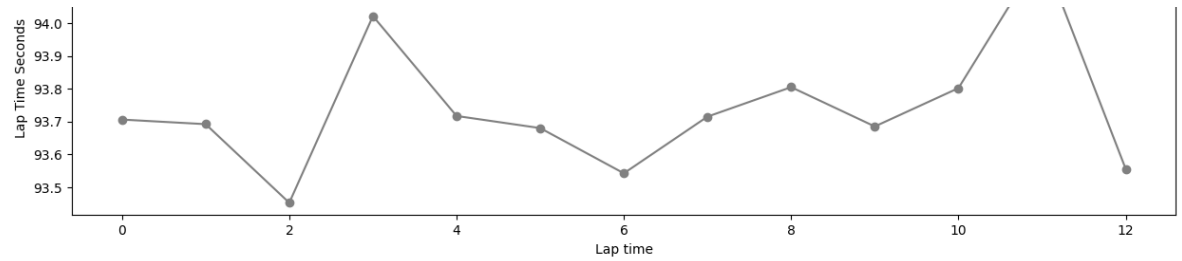

Daniel RICCIARDO
Lap Time Seconds
Lap time

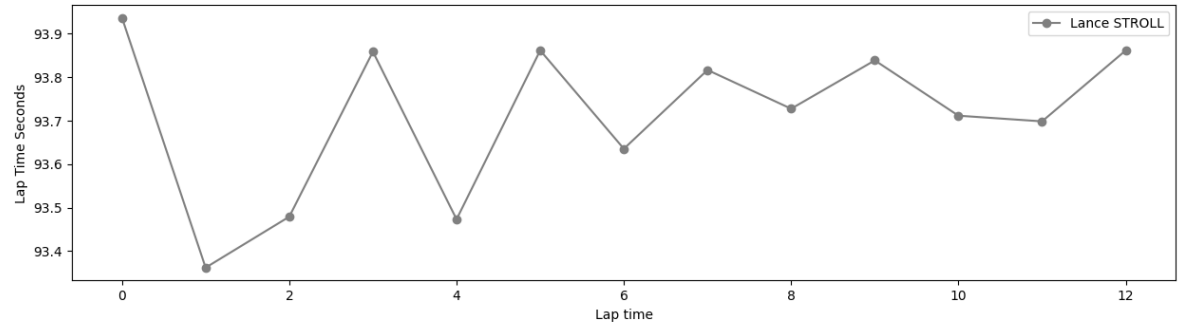

Kevin MAGNUSSEN
Lap Time Seconds
Lap time

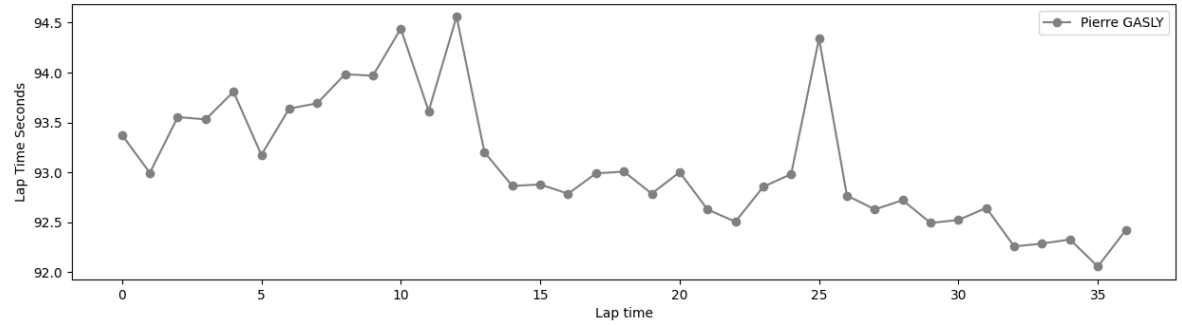

Alexander ALBON
Lap Time Seconds
Lap time

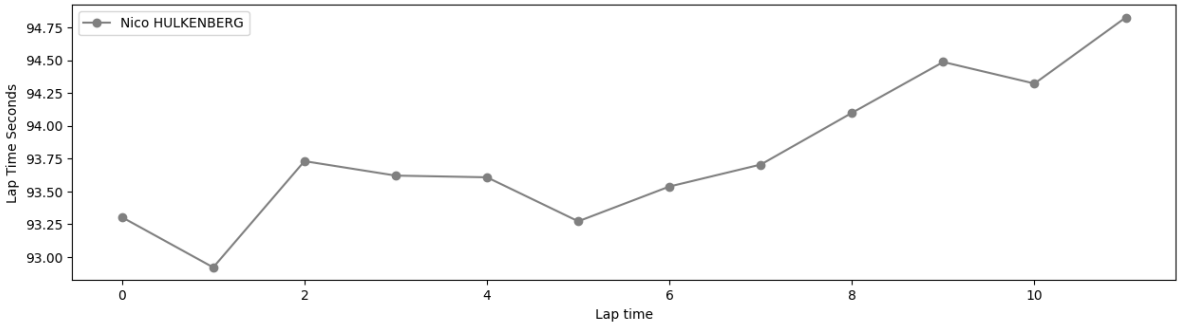

Valtteri BOTTAS
Lap Time Seconds
Lap time

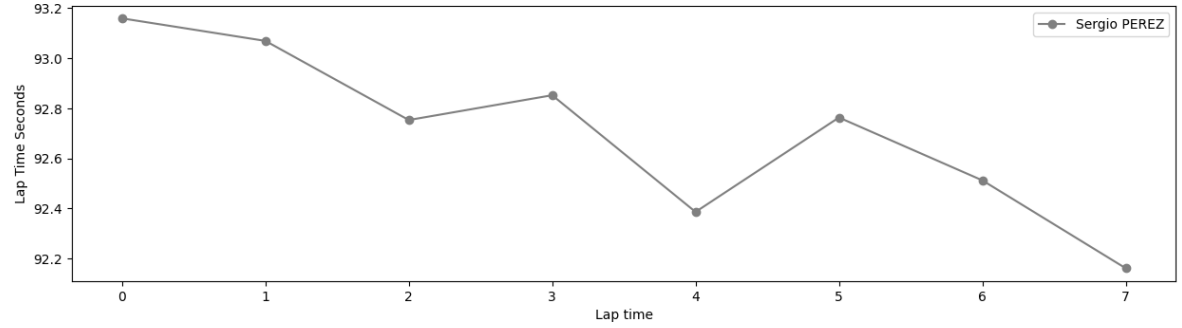

Logan SARGEANT

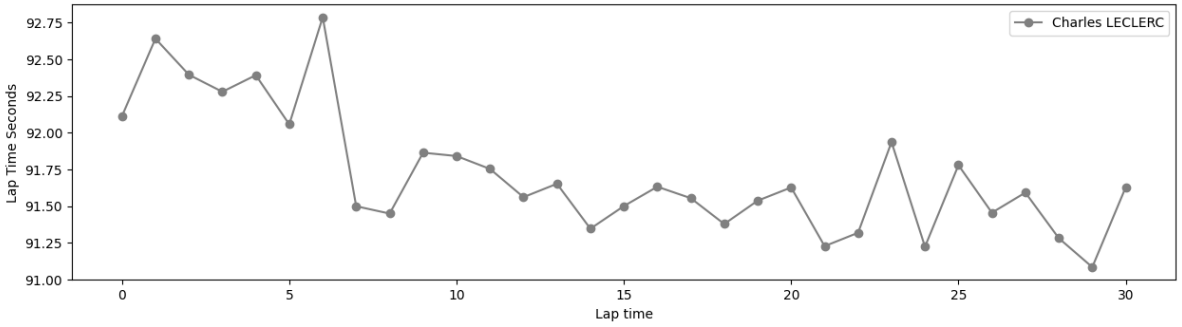

Lap Time Seconds
Lap time


Lance STROLL
Lap Time Seconds
Lap time

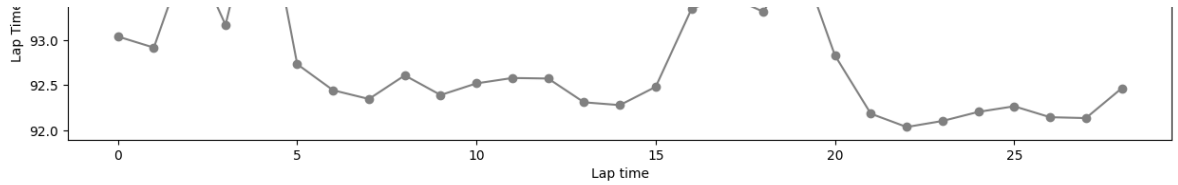

Pierre GASLY
Lap Time Seconds
Lap time

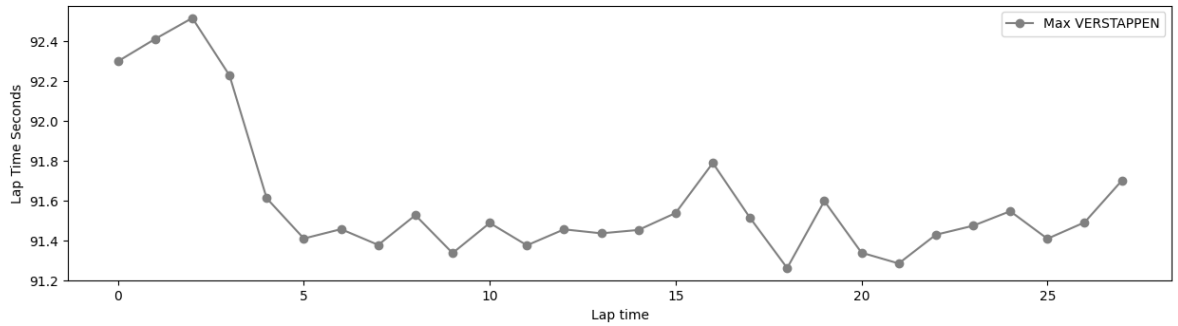

Nico HULKENBERG
Lap Time Seconds
Lap time

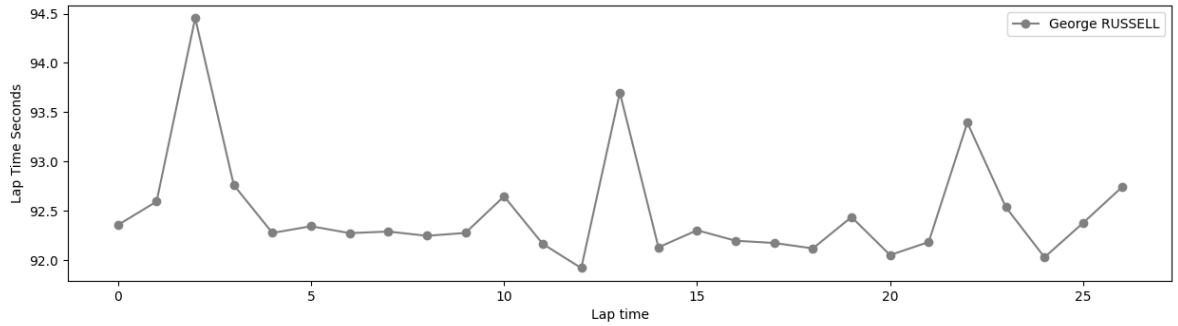

Sergio PEREZ
Lap Time Seconds
Lap time

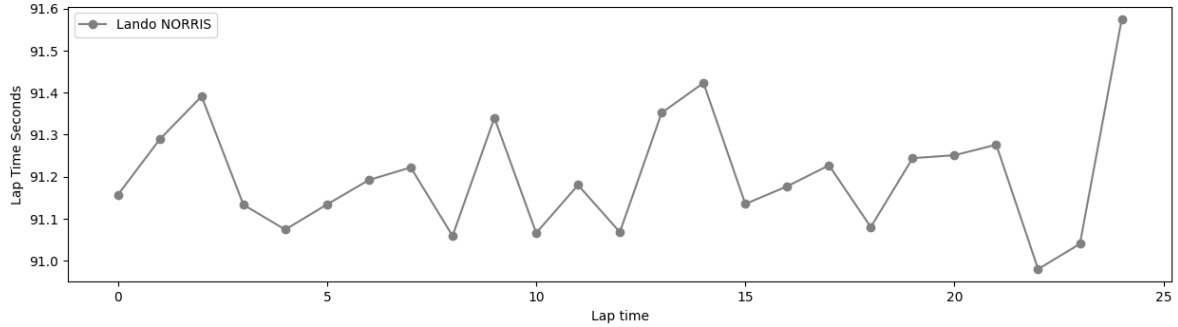

Charles LECLERC
Lap Time Seconds
Lap time

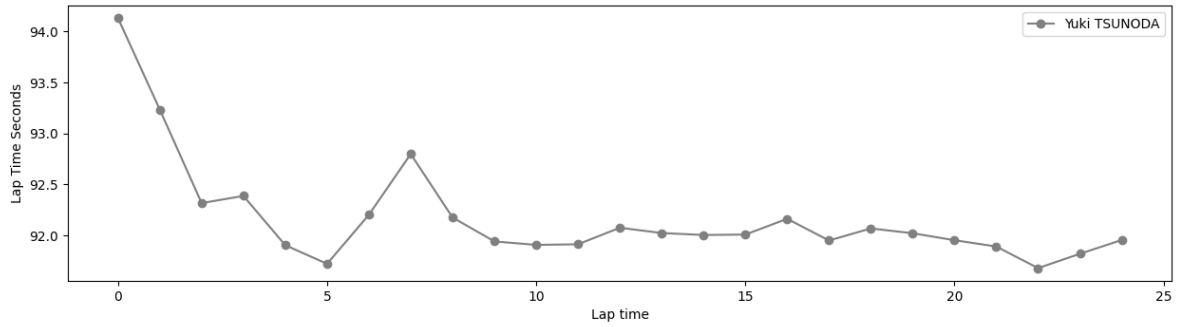

Esteban OCON

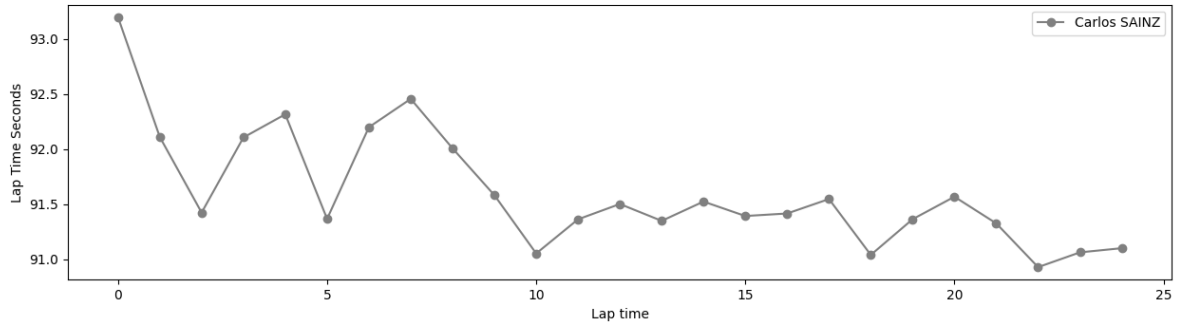

Lap Time
Lap time

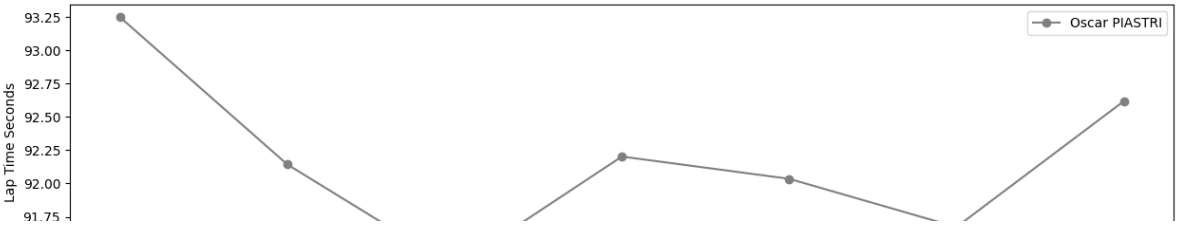

Max VERSTAPPEN
Lap Time Seconds
Lap time

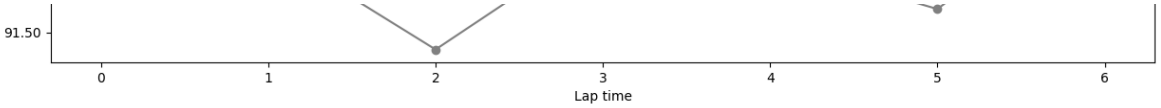

George RUSSELL
Lap Time Seconds
Lap time


Lando NORRIS
Lap Time Seconds
Lap time


Yuki TSUNODA
Lap Time Seconds
Lap time


Carlos SAINZ
Lap Time Seconds
Lap time

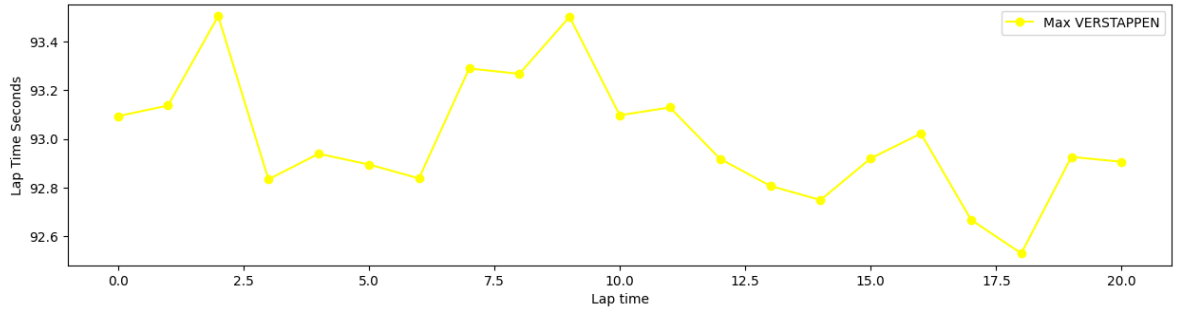

Oscar PIASTRI
Lap Time Seconds

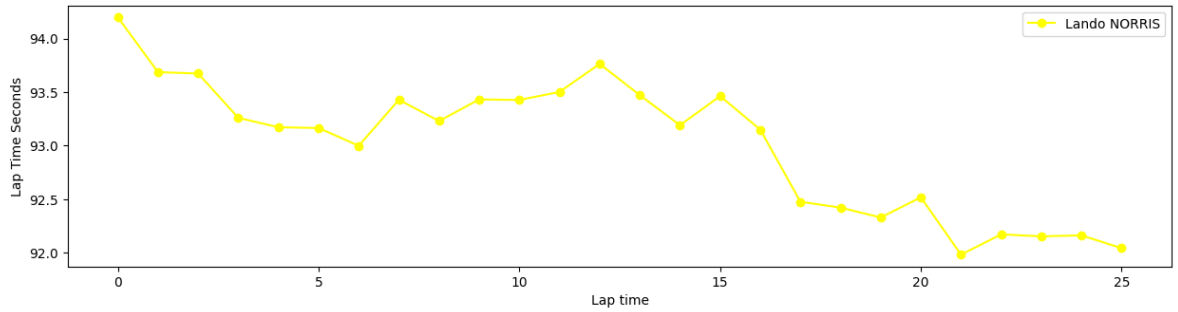


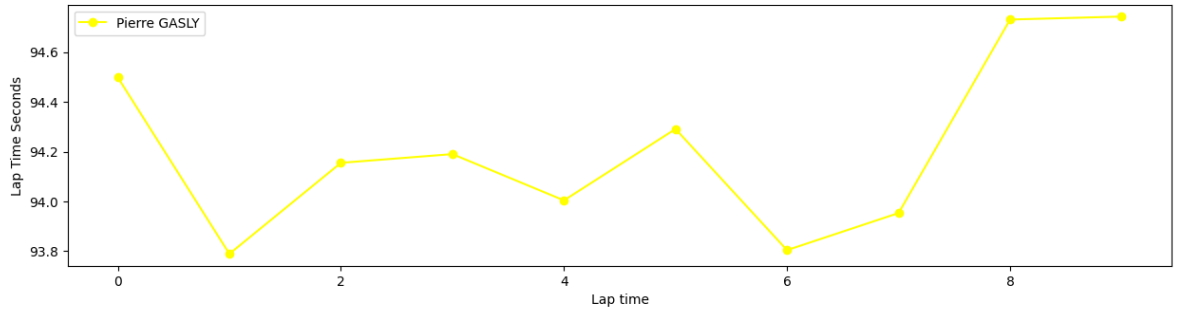
Medium tyres

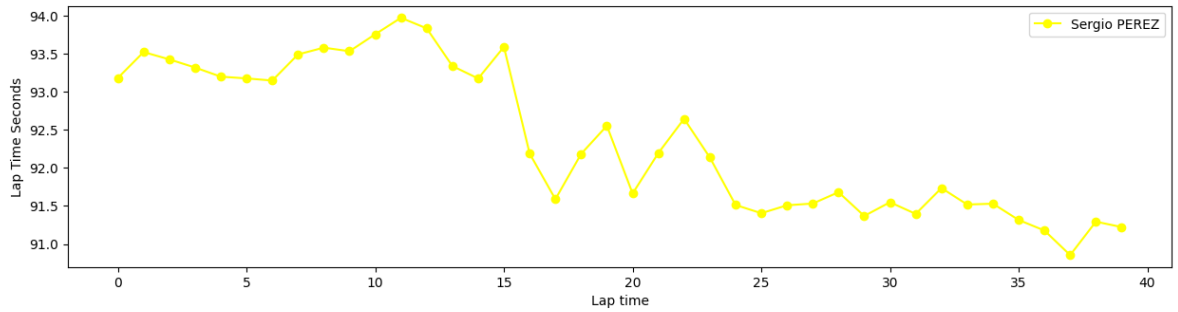
In [156…

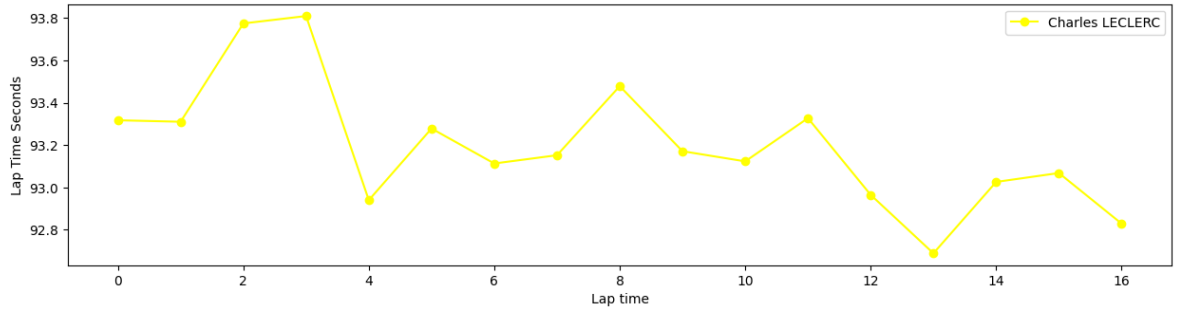
```
libraryDataF1.obtain_data_tyres(jointables,'MEDIUM',95)
```

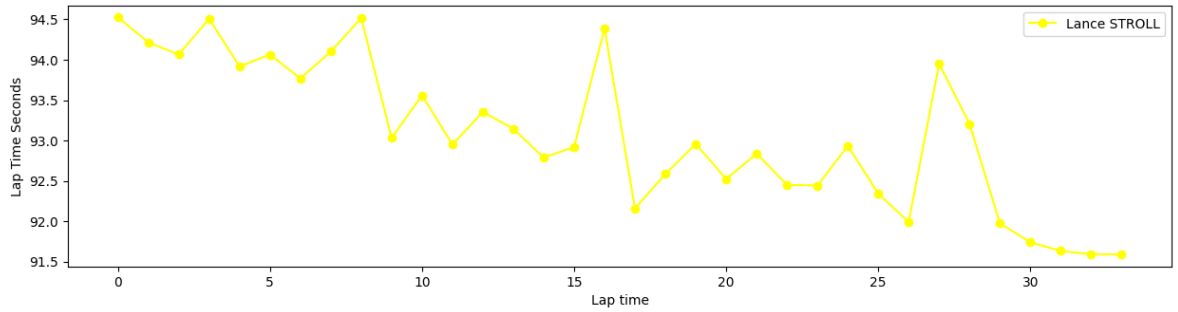

Max VERSTAPPEN
Lap Time Seconds
Lap time

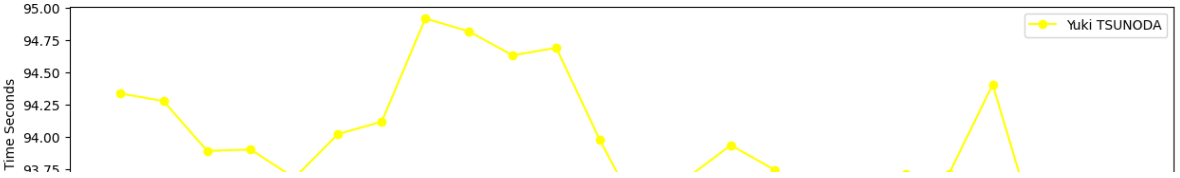

Lando NORRIS
Lap Time Seconds
Lap time

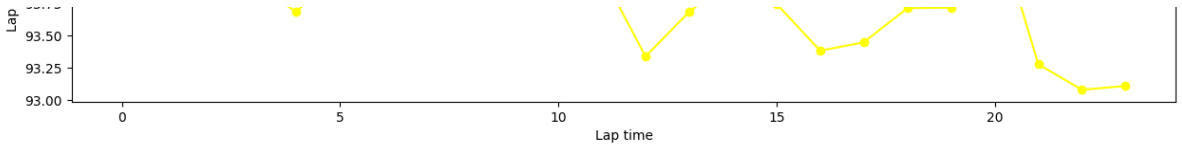

Pierre GASLY
Lap Time Seconds
Lap time

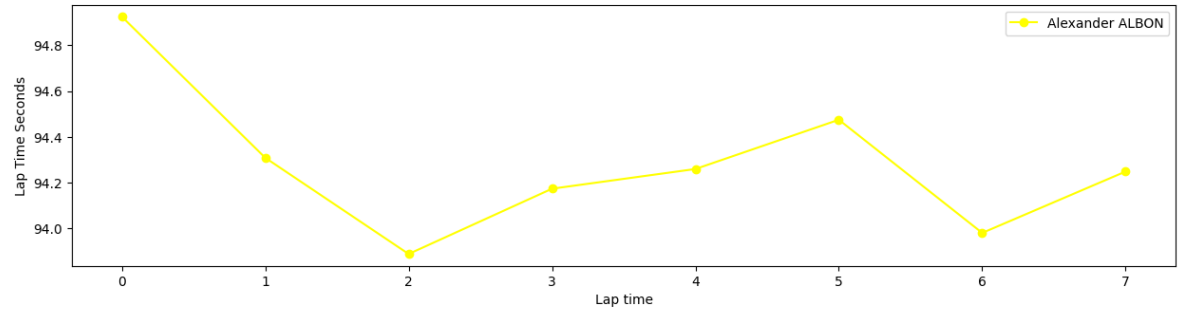

Sergio PEREZ
Lap Time Seconds
Lap time

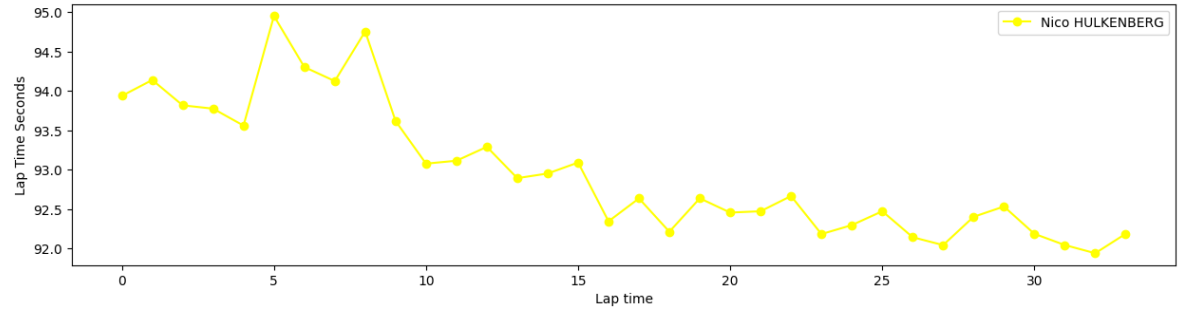

Charles LECLERC
Lap Time Seconds
Lap time

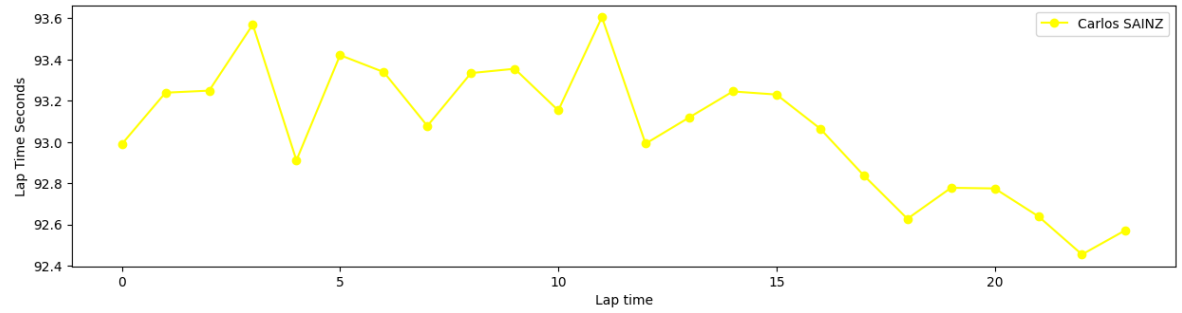

Lance STROLL
Lap Time Seconds
Lap time

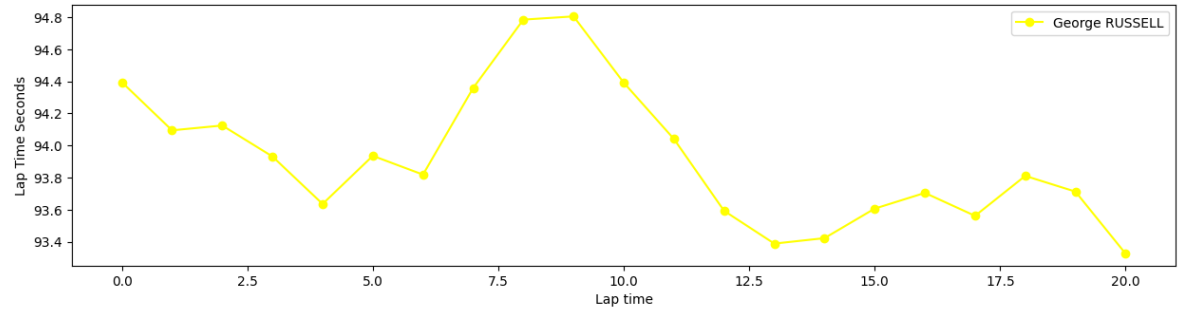

Yuki TSUNODA
Time Seconds

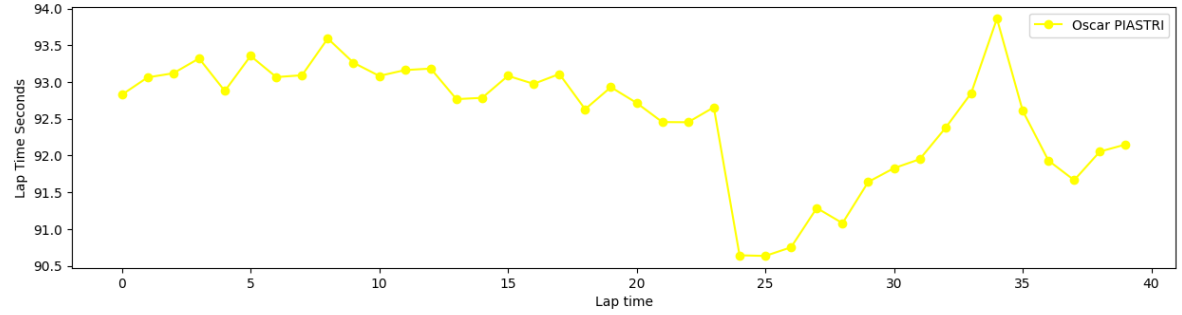

Lap
93.50
93.25
93.00
0
5
10
15
20
Lap time

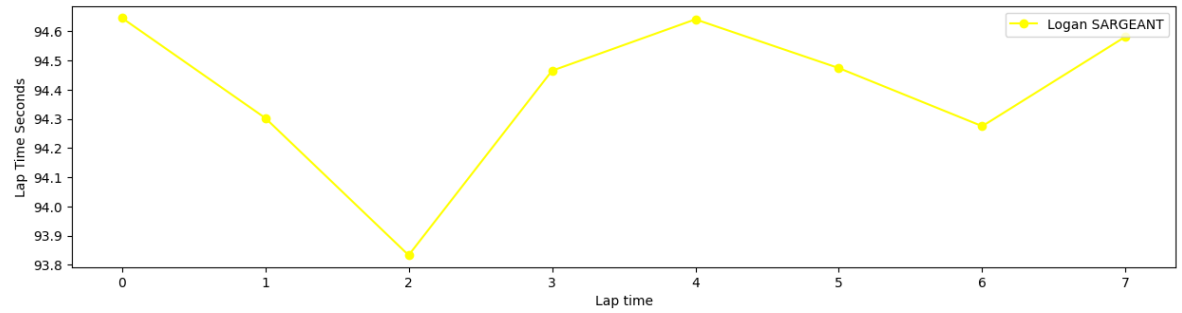

Alexander ALBON
Lap Time Seconds
94.8
94.6
94.4
94.2
94.0
0
1
2
3
4
5
6
7
Lap time


Nico HULKENBERG
Lap Time Seconds
95.0
94.5
94.0
93.5
93.0
92.5
92.0
0
5
10
15
20
25
30
Lap time

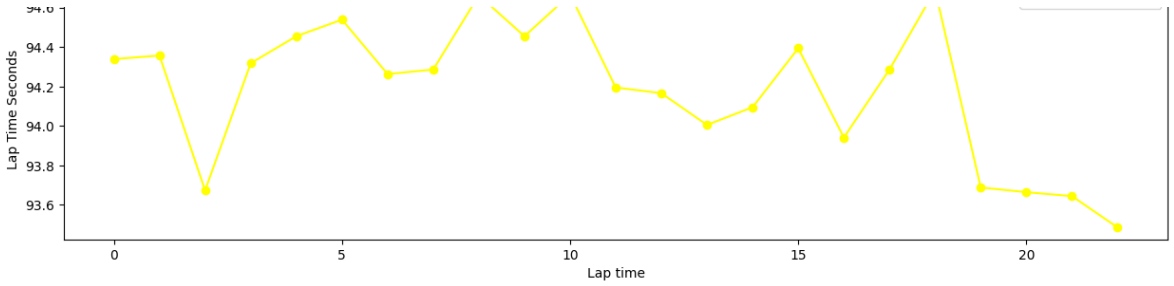

Carlos SAINZ
Lap Time Seconds
93.6
93.4
93.2
93.0
92.8
92.6
92.4
0
5
10
15
20
Lap time

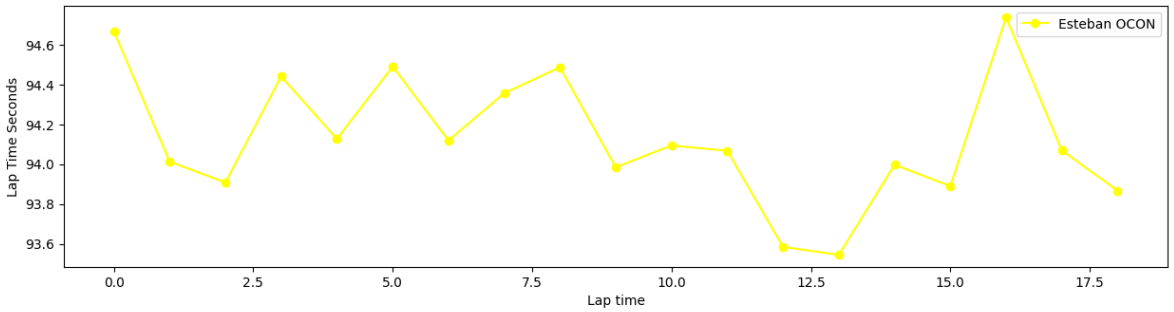

George RUSSELL
Lap Time Seconds
94.8
94.6
94.4
94.2
94.0
93.8
93.6
93.4
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Lap time

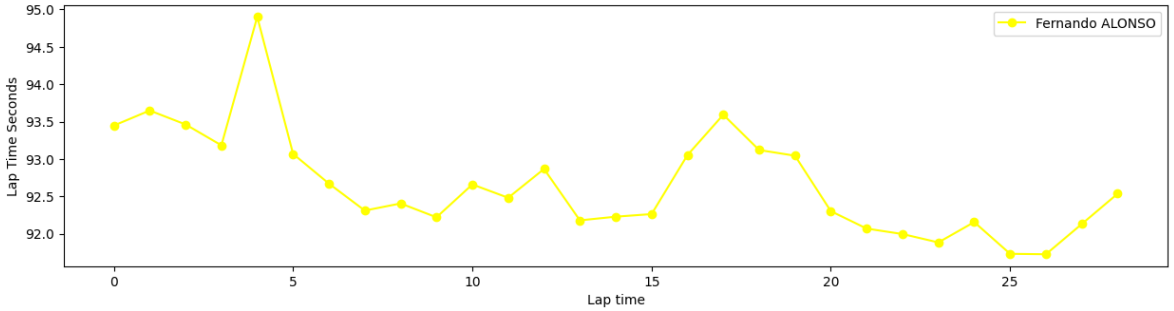

Oscar PIASTRI
Lap Time Seconds
94.0
93.5
93.0
92.5
92.0
91.5
91.0
90.5
0
5
10
15
20
25
30
35
40
Lap time

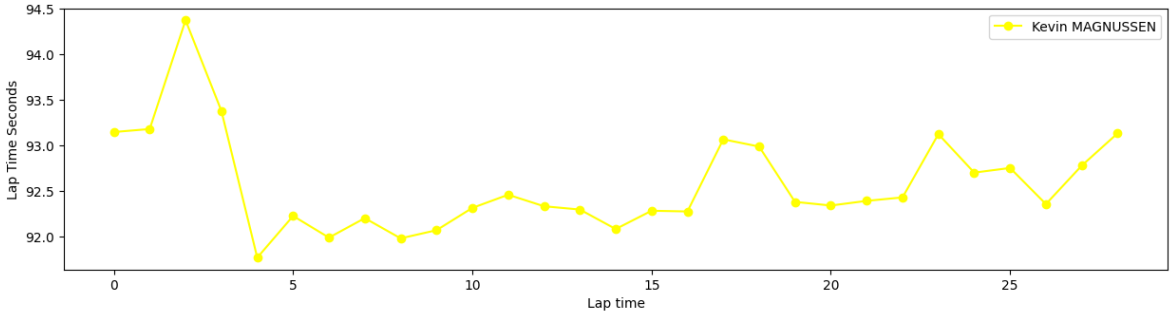

Logan SARGEANT
Lap Time Seconds
94.6
94.5
94.4
94.3
94.2
94.1
94.0
93.9
93.8
0
1
2
3
4
5
6
7
Lap time

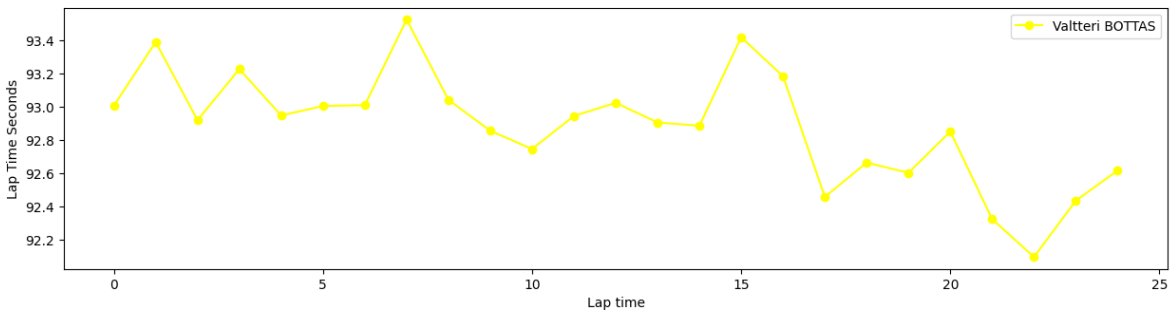

ZHOU Guanyu

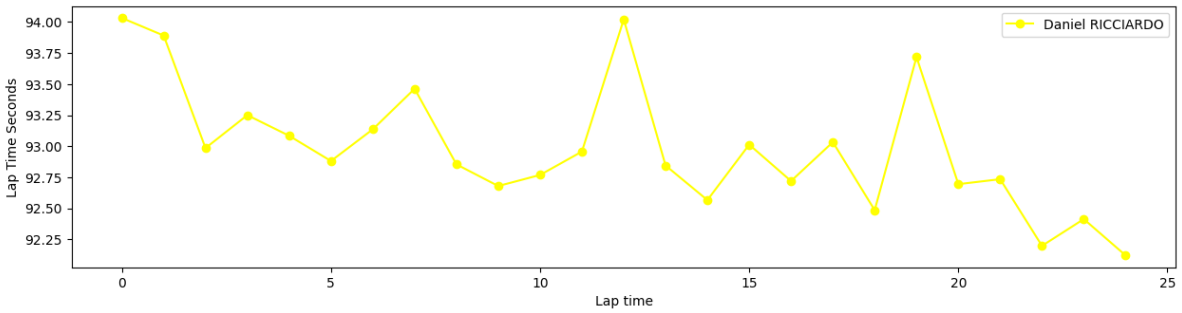

Lap Time Seconds
Lap time

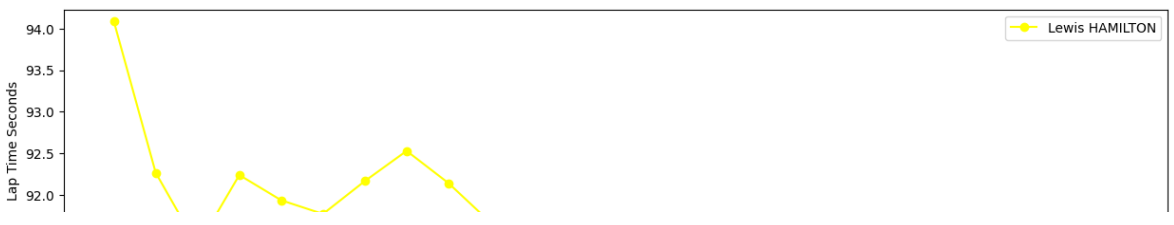

Esteban OCON
Lap Time Seconds
Lap time

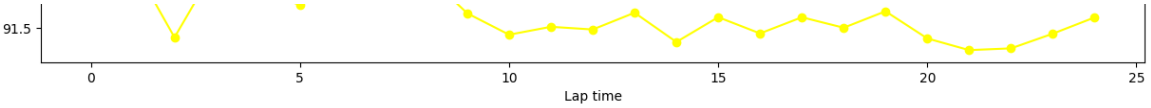

Fernando ALONSO
Lap Time Seconds
Lap time


Kevin MAGNUSSEN
Lap Time Seconds
Lap time


Valtteri BOTTAS
Lap Time Seconds
Lap time


Daniel RICCIARDO
Lap Time Seconds
Lap time

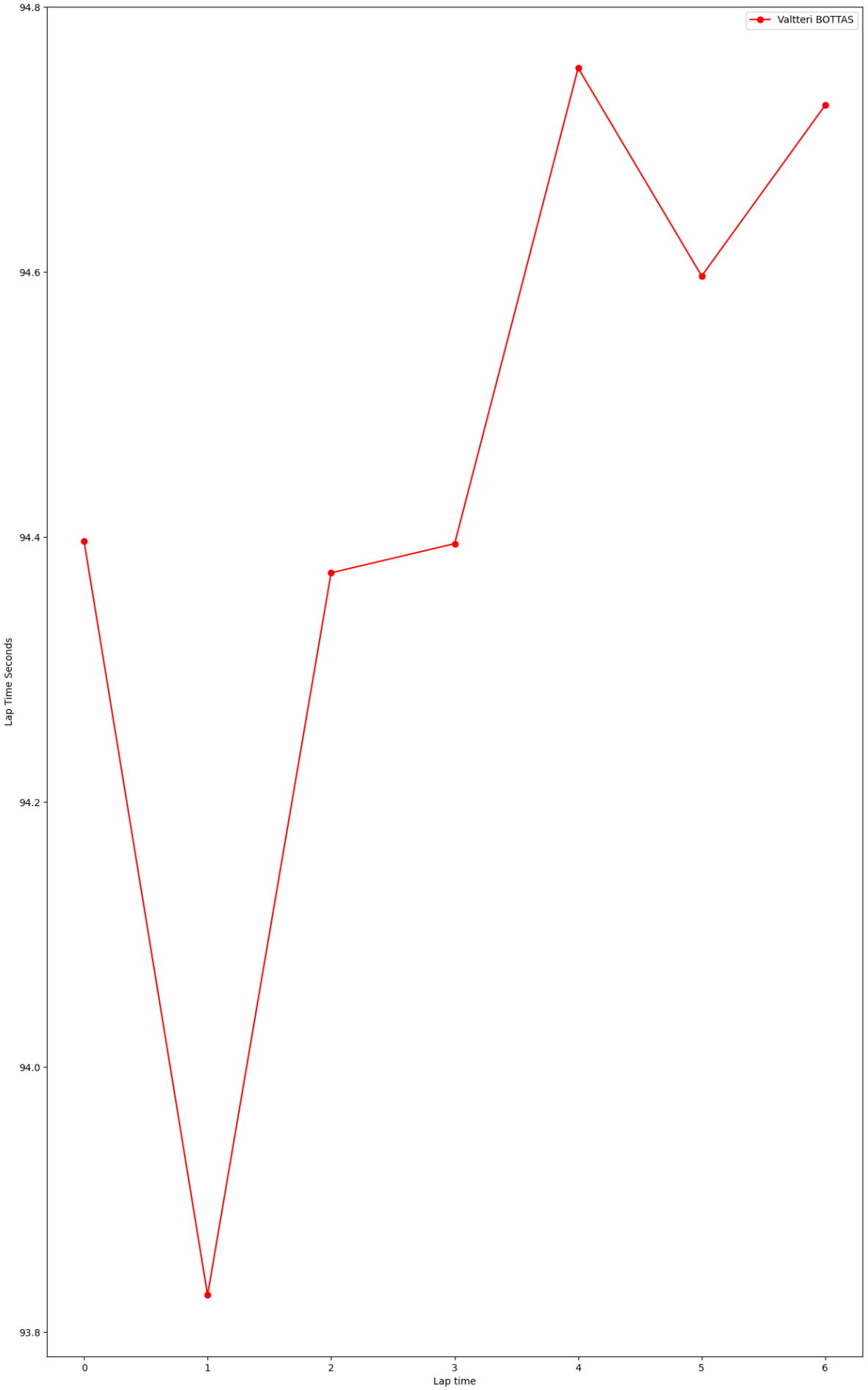

Lewis HAMILTON
Lap Time Seconds

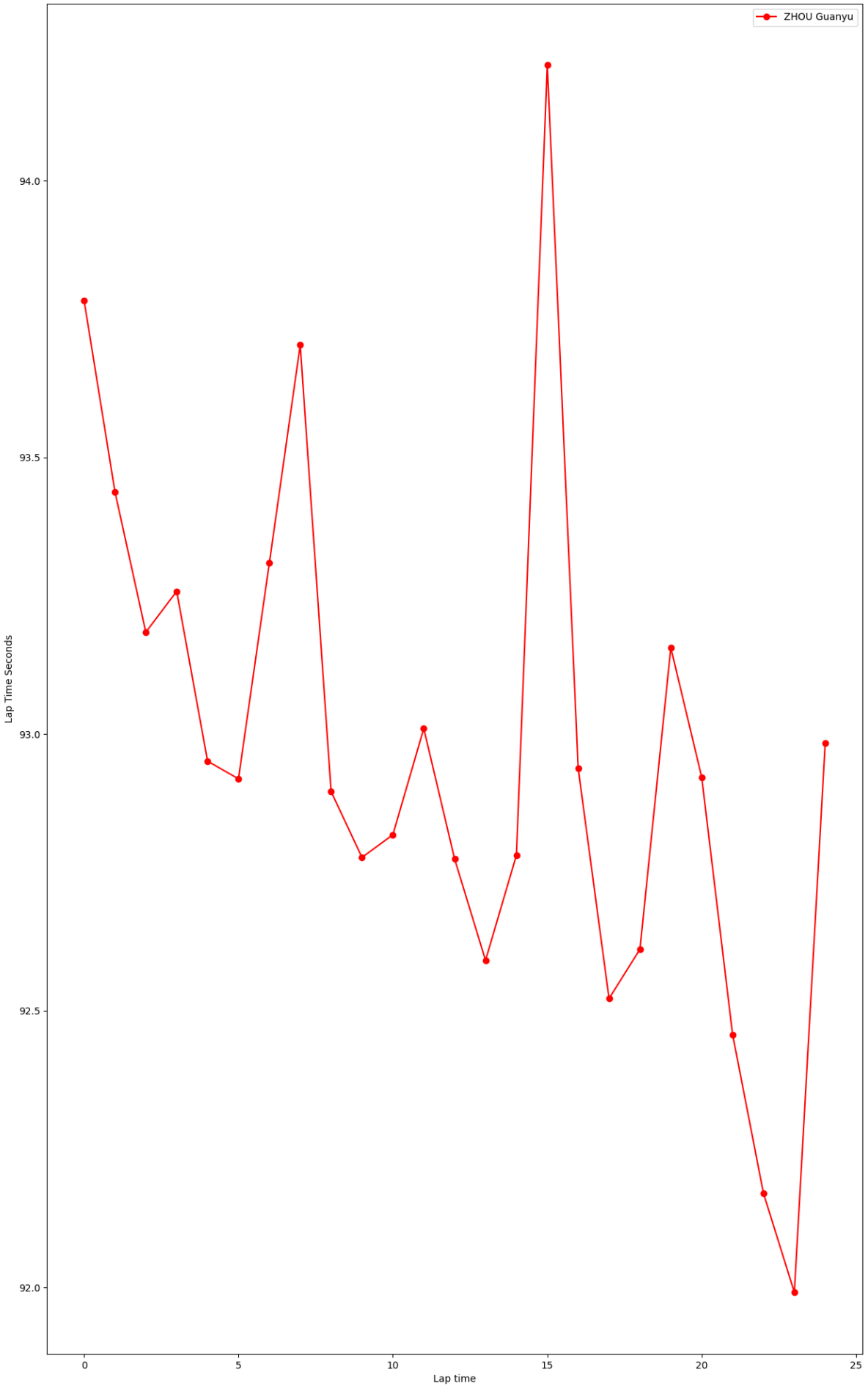


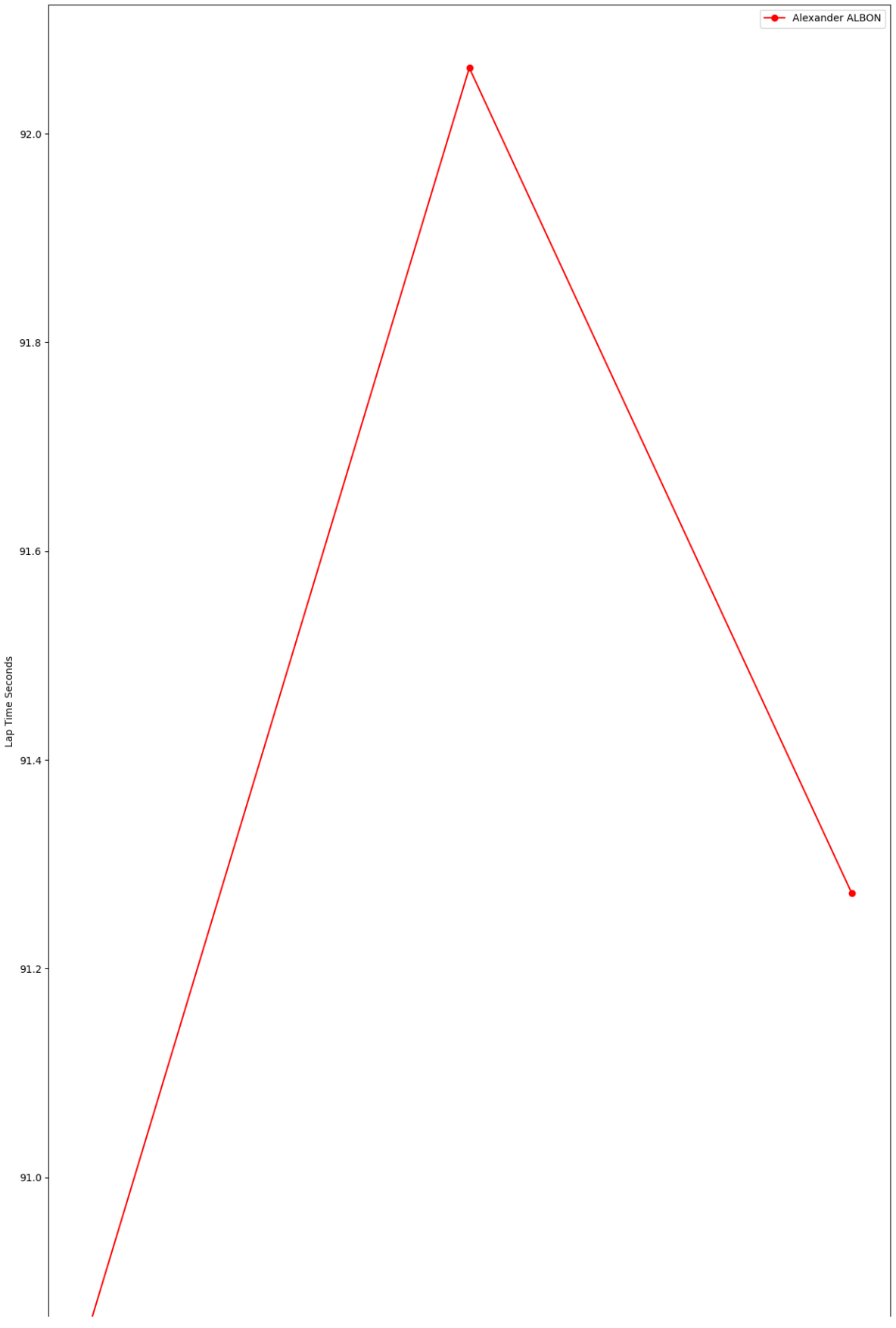
Soft tyres

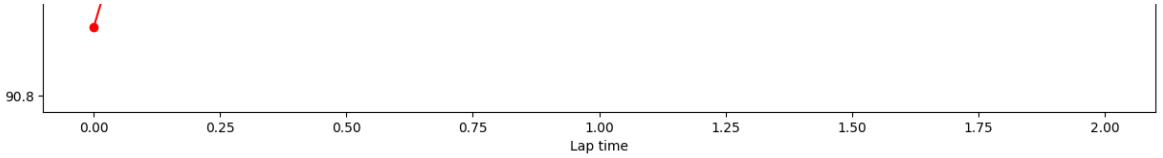
In [157…

```
libraryDataF1.obtain_data_tyres(jointables,'SOFT',95)
```


Valtteri BOTTAS
94.8
94.6
94.4
94.2
94.0
93.8
Lap Time Seconds
0
1
2
3
4
5
6
Lap time


ZHOU Guanyu
94.0
93.5
93.0
92.5
92.0
Lap Time Seconds
0
5
10
15
20
25
Lap time


Alexander ALBON
92.0
91.8
91.6
91.4
91.2
91.0
Lap Time Seconds



Mean pace with the different compound used on the session

In [158…

```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[158…

compound	lap_duration
HARD	92.818569
MEDIUM	93.065253
SOFT	93.125914

Race pace

General explanation Explanation per teams

In [159…

```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[159…

team_name	lap_duration
Ferrari	92.314819
McLaren	92.342679
Red Bull Racing	92.353583
Mercedes	92.977217
Haas F1 Team	93.168141
Aston Martin	93.227366
RB	93.299899
Alpine	93.390933
Kick Sauber	93.474173
Williams	93.574131

Mean race pace per sector

In this section, we can see the pace shown per each team in each sector sorted ascending.

Sector 1

General explanation

In [160…

```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[160…

team_name	duration_sector_1
Ferrari	31.136000
McLaren	31.177859
Red Bull Racing	31.235060
Mercedes	31.434193
RB	31.711924
Aston Martin	31.712380
Haas F1 Team	31.728352
Alpine	31.743053
Kick Sauber	31.760680
Williams	32.074672

Sector 2

General explanation

In [161…

```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[161…

team_name	duration_sector_2
Red Bull Racing	35.217976
Ferrari	35.275904
McLaren	35.280077
Williams	35.551131
Mercedes	35.555506
Haas F1 Team	35.556296
RB	35.561823
Aston Martin	35.627338
Alpine	35.638920
Kick Sauber	35.726427

Sector 3

General explanation

In [162…

```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False  and la
race_pace
```

Out[162…

team_name	duration_sector_3
Haas F1 Team	25.883493
McLaren	25.884744
Aston Martin	25.887648
Red Bull Racing	25.900548
Ferrari	25.902916
Williams	25.948328
Kick Sauber	25.987067
Mercedes	25.987518
Alpine	26.008960
RB	26.026152

Comparaison beetween drivers

Red Bull Racing

In [163…
```
race.query("driver_number== 1 and lap_duration <=95 and lap_duration >84")
```

Out[163…
```
92.19795918367346
```

In [164…
```
race.query("driver_number== 11 and lap_duration <=95 and lap_duration >84"
```

Out[164…
```
92.42995833333333
```

Ferrari

In [165…
```
race.query("driver_number== 16 and lap_duration <=95 and lap_duration >84"
```

Out[165…
```
92.24479166666667
```

In [166…
```
race.query("driver_number== 55 and lap_duration <=95 and lap_duration >84"
```

Out[166…
```
92.32365306122449
```

McLaren

In [167…
```
race.query("driver_number== 4 and lap_duration <=95 and lap_duration >84")
```

Out[167…
```
92.12811764705882
```

In [168…
```
race.query("driver_number== 81 and lap_duration <=95 and lap_duration >84"
```

Out[168…
```
92.47159574468085
```

Mercedes

In [169…
```
race.query("driver_number== 44 and lap_duration <=95 and lap_duration >84"
```
Out[169…
```
92.74439583333333
```
In [170…
```
race.query("driver_number== 63 and lap_duration <=95 and lap_duration >84"
```
Out[170…
```
93.11352083333333
```

Aston Martin

In [171…
```
race.query("driver_number== 14 and lap_duration <=95 and lap_duration >84"
```
Out[171…
```
93.24384782608696
```
In [172…
```
race.query("driver_number== 18 and lap_duration <=95 and lap_duration >84"
```
Out[172…
```
93.25489361702127
```

Haas F1 Team

In [173…
```
race.query("driver_number== 20 and lap_duration <=95 and lap_duration >84"
```
Out[173…
```
93.15136363636363
```
In [174…
```
race.query("driver_number== 27 and lap_duration <=95 and lap_duration >84"
```
Out[174…
```
93.18958695652172
```

RB

In [175…
```
race.query("driver_number== 3 and lap_duration <=95 and lap_duration >84")
```
Out[175…
```
93.51944444444446
```
In [176…
```
race.query("driver_number== 22 and lap_duration <=95 and lap_duration >84"
```
Out[176…
```
93.02775510204083
```

Williams

In [177…
```
race.query("driver_number== 2 and lap_duration <=95 and lap_duration >84")
```
Out[177…
```
93.99080952380952
```
In [178…
```
race.query("driver_number== 23 and lap_duration <=95 and lap_duration >84"
```
Out[178…
```
93.4023409090909
```

Alpine

In [179…
```
race.query("driver_number== 10 and lap_duration <=95 and lap_duration >84"
```

Out[179…
```
93.32810638297873
```

In [180…
```
race.query("driver_number== 31 and lap_duration <=95 and lap_duration >84"
```

Out[180…
```
93.2956875
```

Kick Sauber

In [181…
```
race.query("driver_number== 24 and lap_duration <=95 and lap_duration >84"
```

Out[181…
```
93.55037499999999
```

In [182…
```
race.query("driver_number== 77 and lap_duration <=95 and lap_duration >84"
```

Out[182…
```
93.38719999999999
```

Race pace

In [183…
```
MINIMUN_SECONDS = 84
MAXIMUM_SECONDS = 95
```

Red Bull Racing

In [184…
```
stintInformation.query('driver_number == 1 or driver_number == 11')
```

Out[184…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
6	1234	9507	1	11	1	17	MEDIUM	
11	1234	9507	1	1	1	23	MEDIUM	
26	1234	9507	2	11	18	28	HARD	
31	1234	9507	2	1	24	58	HARD	
39	1234	9507	3	11	29	58	MEDIUM	

In [185…
```
libraryDataF1.getinfolongruns(jointables,1,'Red Bull Racing',MINIMUN_SECONI
```

Out[185…

	full_name	compound	date_start	lap_number	duration_sector_
20	Max VERSTAPPEN	MEDIUM	2024-05-05T20:04:58.639000+00:00	2	31.45
40	Max VERSTAPPEN	MEDIUM	2024-05-05T20:06:31.802000+00:00	3	31.55
60	Max VERSTAPPEN	MEDIUM	2024-05-05T20:08:04.865000+00:00	4	31.50
80	Max VERSTAPPEN	MEDIUM	2024-05-05T20:09:38.284000+00:00	5	31.31

	full_name	compound	date_start	lap_number	duration_sector_
100	Max VERSTAPPEN	MEDIUM	2024-05-05T20:11:11.166000+00:00	6	31.52
120	Max VERSTAPPEN	MEDIUM	2024-05-05T20:12:44.103000+00:00	7	31.54
140	Max VERSTAPPEN	MEDIUM	2024-05-05T20:14:17.050000+00:00	8	31.56
160	Max VERSTAPPEN	MEDIUM	2024-05-05T20:15:49.881000+00:00	9	31.90
180	Max VERSTAPPEN	MEDIUM	2024-05-05T20:17:23.104000+00:00	10	31.73
200	Max VERSTAPPEN	MEDIUM	2024-05-05T20:18:56.379000+00:00	11	31.72
218	Max VERSTAPPEN	MEDIUM	2024-05-05T20:20:29.879000+00:00	12	31.60
236	Max VERSTAPPEN	MEDIUM	2024-05-05T20:22:03.046000+00:00	13	31.57
254	Max VERSTAPPEN	MEDIUM	2024-05-05T20:23:36.148000+00:00	14	31.44
274	Max VERSTAPPEN	MEDIUM	2024-05-05T20:25:09.082000+00:00	15	31.40
294	Max VERSTAPPEN	MEDIUM	2024-05-05T20:26:41.840000+00:00	16	31.41
314	Max VERSTAPPEN	MEDIUM	2024-05-05T20:28:14.550000+00:00	17	31.36
334	Max VERSTAPPEN	MEDIUM	2024-05-05T20:29:47.515000+00:00	18	31.38
353	Max VERSTAPPEN	MEDIUM	2024-05-05T20:31:20.552000+00:00	19	31.33
373	Max VERSTAPPEN	MEDIUM	2024-05-05T20:32:53.209000+00:00	20	31.24
392	Max VERSTAPPEN	MEDIUM	2024-05-05T20:34:25.782000+00:00	21	31.35
412	Max VERSTAPPEN	MEDIUM	2024-05-05T20:35:58.614000+00:00	22	31.38
468	Max VERSTAPPEN	HARD	2024-05-05T20:41:10.722000+00:00	25	31.14
487	Max VERSTAPPEN	HARD	2024-05-05T20:42:42.918000+00:00	26	31.18
507	Max VERSTAPPEN	HARD	2024-05-05T20:44:15.353000+00:00	27	31.06
609	Max VERSTAPPEN	HARD	2024-05-05T20:56:14.228000+00:00	33	31.59
628	Max VERSTAPPEN	HARD	2024-05-05T20:57:46.516000+00:00	34	30.89
647	Max VERSTAPPEN	HARD	2024-05-05T20:59:18.132000+00:00	35	30.80
666	Max VERSTAPPEN	HARD	2024-05-05T21:00:49.522000+00:00	36	30.88
685	Max VERSTAPPEN	HARD	2024-05-05T21:02:20.921000+00:00	37	30.79

	full_name	compound	date_start	lap_number	duration_sector_
704	Max VERSTAPPEN	HARD	2024-05-05T21:03:52.379000+00:00	38	30.84
723	Max VERSTAPPEN	HARD	2024-05-05T21:05:23.874000+00:00	39	30.81
742	Max VERSTAPPEN	HARD	2024-05-05T21:06:55.198000+00:00	40	30.93
761	Max VERSTAPPEN	HARD	2024-05-05T21:08:26.636000+00:00	41	30.79
779	Max VERSTAPPEN	HARD	2024-05-05T21:09:58.040000+00:00	42	30.89
798	Max VERSTAPPEN	HARD	2024-05-05T21:11:29.494000+00:00	43	30.84
817	Max VERSTAPPEN	HARD	2024-05-05T21:13:00.887000+00:00	44	30.81
836	Max VERSTAPPEN	HARD	2024-05-05T21:14:32.423000+00:00	45	30.84
855	Max VERSTAPPEN	HARD	2024-05-05T21:16:03.969000+00:00	46	30.95
874	Max VERSTAPPEN	HARD	2024-05-05T21:17:35.643000+00:00	47	30.85
893	Max VERSTAPPEN	HARD	2024-05-05T21:19:07.378000+00:00	48	30.77
912	Max VERSTAPPEN	HARD	2024-05-05T21:20:38.533000+00:00	49	30.69
931	Max VERSTAPPEN	HARD	2024-05-05T21:22:10.133000+00:00	50	30.53
950	Max VERSTAPPEN	HARD	2024-05-05T21:23:41.355000+00:00	51	30.58
969	Max VERSTAPPEN	HARD	2024-05-05T21:25:12.725000+00:00	52	30.61
988	Max VERSTAPPEN	HARD	2024-05-05T21:26:44.128000+00:00	53	30.63
1007	Max VERSTAPPEN	HARD	2024-05-05T21:28:15.652000+00:00	54	30.62
1025	Max VERSTAPPEN	HARD	2024-05-05T21:29:47.161000+00:00	55	30.72
1044	Max VERSTAPPEN	HARD	2024-05-05T21:31:18.575000+00:00	56	30.74

In [186…

```
libraryDataF1.getinfolongruns(jointables,11,'Red Bull Racing',MINIMUN_SECOI
```

Out[186…

	full_name	compound	date_start	lap_number	duration_sector_1	d
25	Sergio PEREZ	MEDIUM	2024-05-05T20:05:02.621000+00:00	2	31.695	
45	Sergio PEREZ	MEDIUM	2024-05-05T20:06:35.643000+00:00	3	31.821	
65	Sergio PEREZ	MEDIUM	2024-05-05T20:08:09.231000+00:00	4	31.725	

	full_name	compound	date_start	lap_number	duration_sector_1	d
85	Sergio PEREZ	MEDIUM	2024-05-05T20:09:42.579000+00:00	5	31.829	
105	Sergio PEREZ	MEDIUM	2024-05-05T20:11:16.038000+00:00	6	31.696	
125	Sergio PEREZ	MEDIUM	2024-05-05T20:12:49.237000+00:00	7	31.579	
145	Sergio PEREZ	MEDIUM	2024-05-05T20:14:22.323000+00:00	8	31.845	
165	Sergio PEREZ	MEDIUM	2024-05-05T20:15:55.456000+00:00	9	31.967	
185	Sergio PEREZ	MEDIUM	2024-05-05T20:17:29.031000+00:00	10	31.952	
205	Sergio PEREZ	MEDIUM	2024-05-05T20:19:02.660000+00:00	11	31.769	
222	Sergio PEREZ	MEDIUM	2024-05-05T20:20:36.098000+00:00	12	31.911	
240	Sergio PEREZ	MEDIUM	2024-05-05T20:22:09.891000+00:00	13	31.964	
259	Sergio PEREZ	MEDIUM	2024-05-05T20:23:43.821000+00:00	14	31.882	
279	Sergio PEREZ	MEDIUM	2024-05-05T20:25:17.633000+00:00	15	31.567	
299	Sergio PEREZ	MEDIUM	2024-05-05T20:26:50.988000+00:00	16	31.535	
358	Sergio PEREZ	HARD	2024-05-05T20:31:49.723000+00:00	19	31.811	
378	Sergio PEREZ	HARD	2024-05-05T20:33:22.823000+00:00	20	31.843	
397	Sergio PEREZ	HARD	2024-05-05T20:34:55.947000+00:00	21	31.382	
417	Sergio PEREZ	HARD	2024-05-05T20:36:28.705000+00:00	22	31.438	
453	Sergio PEREZ	HARD	2024-05-05T20:39:49.598000+00:00	24	31.391	
473	Sergio PEREZ	HARD	2024-05-05T20:41:21.859000+00:00	25	31.302	
492	Sergio PEREZ	HARD	2024-05-05T20:42:54.619000+00:00	26	31.119	
512	Sergio PEREZ	HARD	2024-05-05T20:44:27.216000+00:00	27	31.079	
613	Sergio PEREZ	MEDIUM	2024-05-05T20:56:15.383000+00:00	33	32.382	
632	Sergio PEREZ	MEDIUM	2024-05-05T20:57:49.013000+00:00	34	31.582	
651	Sergio PEREZ	MEDIUM	2024-05-05T20:59:21.285000+00:00	35	31.285	
670	Sergio PEREZ	MEDIUM	2024-05-05T21:00:52.842000+00:00	36	31.281	
689	Sergio PEREZ	MEDIUM	2024-05-05T21:02:25.043000+00:00	37	31.447	

	full_name	compound	date_start	lap_number	duration_sector_1	d
708	Sergio PEREZ	MEDIUM	2024-05-05T21:03:57.569000+00:00	38	31.050	
727	Sergio PEREZ	MEDIUM	2024-05-05T21:05:29.296000+00:00	39	31.292	
746	Sergio PEREZ	MEDIUM	2024-05-05T21:07:01.310000+00:00	40	32.009	
765	Sergio PEREZ	MEDIUM	2024-05-05T21:08:33.994000+00:00	41	30.994	
783	Sergio PEREZ	MEDIUM	2024-05-05T21:10:06.185000+00:00	42	30.890	
802	Sergio PEREZ	MEDIUM	2024-05-05T21:11:37.655000+00:00	43	30.803	
821	Sergio PEREZ	MEDIUM	2024-05-05T21:13:09.158000+00:00	44	30.729	
840	Sergio PEREZ	MEDIUM	2024-05-05T21:14:40.663000+00:00	45	30.864	
859	Sergio PEREZ	MEDIUM	2024-05-05T21:16:12.117000+00:00	46	30.825	
878	Sergio PEREZ	MEDIUM	2024-05-05T21:17:43.805000+00:00	47	30.732	
897	Sergio PEREZ	MEDIUM	2024-05-05T21:19:15.197000+00:00	48	30.750	
916	Sergio PEREZ	MEDIUM	2024-05-05T21:20:46.793000+00:00	49	30.732	
935	Sergio PEREZ	MEDIUM	2024-05-05T21:22:18.176000+00:00	50	30.746	
954	Sergio PEREZ	MEDIUM	2024-05-05T21:23:49.826000+00:00	51	30.706	
973	Sergio PEREZ	MEDIUM	2024-05-05T21:25:21.406000+00:00	52	30.739	
992	Sergio PEREZ	MEDIUM	2024-05-05T21:26:52.924000+00:00	53	30.534	
1011	Sergio PEREZ	MEDIUM	2024-05-05T21:28:24.276000+00:00	54	30.488	
1029	Sergio PEREZ	MEDIUM	2024-05-05T21:29:55.455000+00:00	55	30.505	

Ferrari

In [187…

```
stintInformation.query('driver_number == 16 or driver_number == 55')
```

Out[187…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
7	1234	9507	1	16	1	19	MEDIUM	
14	1234	9507	1	55	1	27	MEDIUM	
27	1234	9507	2	16	20	58	HARD	
35	1234	9507	2	55	28	58	HARD	

In [188…

```
libraryDataF1.getinfolongruns(jointables,16,'Ferrari',MINIMUN_SECONDS,MAXI
```

Out[188…

	full_name	compound	date_start	lap_number	duration_sector_1	d
27	Charles LECLERC	MEDIUM	2024-05-05T20:04:59.946000+00:00	2	31.481	
47	Charles LECLERC	MEDIUM	2024-05-05T20:06:33.221000+00:00	3	31.478	
67	Charles LECLERC	MEDIUM	2024-05-05T20:08:06.594000+00:00	4	31.423	
87	Charles LECLERC	MEDIUM	2024-05-05T20:09:40.350000+00:00	5	32.040	
107	Charles LECLERC	MEDIUM	2024-05-05T20:11:14.085000+00:00	6	31.331	
127	Charles LECLERC	MEDIUM	2024-05-05T20:12:47.313000+00:00	7	31.654	
147	Charles LECLERC	MEDIUM	2024-05-05T20:14:20.372000+00:00	8	31.587	
167	Charles LECLERC	MEDIUM	2024-05-05T20:15:53.487000+00:00	9	31.759	
187	Charles LECLERC	MEDIUM	2024-05-05T20:17:26.568000+00:00	10	31.807	
207	Charles LECLERC	MEDIUM	2024-05-05T20:19:00.084000+00:00	11	31.704	
224	Charles LECLERC	MEDIUM	2024-05-05T20:20:33.352000+00:00	12	31.557	
242	Charles LECLERC	MEDIUM	2024-05-05T20:22:06.362000+00:00	13	31.637	
261	Charles LECLERC	MEDIUM	2024-05-05T20:23:39.803000+00:00	14	31.595	
281	Charles LECLERC	MEDIUM	2024-05-05T20:25:12.658000+00:00	15	31.417	
301	Charles LECLERC	MEDIUM	2024-05-05T20:26:45.548000+00:00	16	31.725	
321	Charles LECLERC	MEDIUM	2024-05-05T20:28:18.445000+00:00	17	31.683	
340	Charles LECLERC	MEDIUM	2024-05-05T20:29:51.508000+00:00	18	31.483	
399	Charles LECLERC	HARD	2024-05-05T20:34:48.994000+00:00	21	31.154	
419	Charles LECLERC	HARD	2024-05-05T20:36:21.130000+00:00	22	31.232	
455	Charles LECLERC	HARD	2024-05-05T20:39:41.551000+00:00	24	31.121	
475	Charles LECLERC	HARD	2024-05-05T20:41:13.860000+00:00	25	30.926	
494	Charles LECLERC	HARD	2024-05-05T20:42:46.236000+00:00	26	31.029	
514	Charles LECLERC	HARD	2024-05-05T20:44:18.532000+00:00	27	30.806	

	full_name	compound	date_start	lap_number	duration_sector_1	d
615	Charles LECLERC	HARD	2024-05-05T20:56:14.591000+00:00	33	31.638	
634	Charles LECLERC	HARD	2024-05-05T20:57:47.309000+00:00	34	30.864	
653	Charles LECLERC	HARD	2024-05-05T20:59:18.806000+00:00	35	30.878	
672	Charles LECLERC	HARD	2024-05-05T21:00:50.299000+00:00	36	30.964	
691	Charles LECLERC	HARD	2024-05-05T21:02:22.148000+00:00	37	30.908	
710	Charles LECLERC	HARD	2024-05-05T21:03:54.010000+00:00	38	30.808	
729	Charles LECLERC	HARD	2024-05-05T21:05:25.789000+00:00	39	30.718	
748	Charles LECLERC	HARD	2024-05-05T21:06:57.257000+00:00	40	30.743	
767	Charles LECLERC	HARD	2024-05-05T21:08:28.992000+00:00	41	30.476	
785	Charles LECLERC	HARD	2024-05-05T21:10:00.269000+00:00	42	30.692	
804	Charles LECLERC	HARD	2024-05-05T21:11:31.762000+00:00	43	30.983	
823	Charles LECLERC	HARD	2024-05-05T21:13:03.410000+00:00	44	30.544	
842	Charles LECLERC	HARD	2024-05-05T21:14:35.008000+00:00	45	30.646	
861	Charles LECLERC	HARD	2024-05-05T21:16:06.414000+00:00	46	30.579	
880	Charles LECLERC	HARD	2024-05-05T21:17:37.933000+00:00	47	30.744	
899	Charles LECLERC	HARD	2024-05-05T21:19:09.491000+00:00	48	30.532	
918	Charles LECLERC	HARD	2024-05-05T21:20:40.749000+00:00	49	30.527	
937	Charles LECLERC	HARD	2024-05-05T21:22:12.042000+00:00	50	30.493	
956	Charles LECLERC	HARD	2024-05-05T21:23:43.927000+00:00	51	30.429	
975	Charles LECLERC	HARD	2024-05-05T21:25:15.198000+00:00	52	30.438	
994	Charles LECLERC	HARD	2024-05-05T21:26:47.092000+00:00	53	30.403	
1013	Charles LECLERC	HARD	2024-05-05T21:28:18.516000+00:00	54	30.567	
1031	Charles LECLERC	HARD	2024-05-05T21:29:50.007000+00:00	55	30.505	
1050	Charles LECLERC	HARD	2024-05-05T21:31:21.354000+00:00	56	30.383	

In [189…

```
libraryDataF1.getinfolongruns(jointables,55,'Ferrari',MINIMUN_SECONDS,MAXI
```

Out[189…

	full_name	compound	date_start	lap_number	duration_sector_1	d
36	Carlos SAINZ	MEDIUM	2024-05-05T20:05:01.519000+00:00	2	31.678	
56	Carlos SAINZ	MEDIUM	2024-05-05T20:06:34.506000+00:00	3	31.788	
76	Carlos SAINZ	MEDIUM	2024-05-05T20:08:07.769000+00:00	4	31.712	
96	Carlos SAINZ	MEDIUM	2024-05-05T20:09:41.034000+00:00	5	31.913	
116	Carlos SAINZ	MEDIUM	2024-05-05T20:11:14.503000+00:00	6	31.560	
136	Carlos SAINZ	MEDIUM	2024-05-05T20:12:47.451000+00:00	7	31.885	
156	Carlos SAINZ	MEDIUM	2024-05-05T20:14:20.778000+00:00	8	31.778	
176	Carlos SAINZ	MEDIUM	2024-05-05T20:15:54.228000+00:00	9	31.982	
196	Carlos SAINZ	MEDIUM	2024-05-05T20:17:27.273000+00:00	10	31.791	
215	Carlos SAINZ	MEDIUM	2024-05-05T20:19:00.671000+00:00	11	31.966	
232	Carlos SAINZ	MEDIUM	2024-05-05T20:20:33.939000+00:00	12	31.771	
250	Carlos SAINZ	MEDIUM	2024-05-05T20:22:07.094000+00:00	13	31.622	
270	Carlos SAINZ	MEDIUM	2024-05-05T20:23:40.704000+00:00	14	31.618	
290	Carlos SAINZ	MEDIUM	2024-05-05T20:25:13.649000+00:00	15	31.434	
310	Carlos SAINZ	MEDIUM	2024-05-05T20:26:46.851000+00:00	16	31.665	
330	Carlos SAINZ	MEDIUM	2024-05-05T20:28:20.171000+00:00	17	31.487	
349	Carlos SAINZ	MEDIUM	2024-05-05T20:29:53.280000+00:00	18	31.464	
369	Carlos SAINZ	MEDIUM	2024-05-05T20:31:26.511000+00:00	19	31.391	
388	Carlos SAINZ	MEDIUM	2024-05-05T20:32:59.201000+00:00	20	31.086	
408	Carlos SAINZ	MEDIUM	2024-05-05T20:34:31.875000+00:00	21	31.340	
428	Carlos SAINZ	MEDIUM	2024-05-05T20:36:04.608000+00:00	22	31.312	
464	Carlos SAINZ	MEDIUM	2024-05-05T20:39:24.792000+00:00	24	31.240	
484	Carlos SAINZ	MEDIUM	2024-05-05T20:40:57.402000+00:00	25	31.061	

	full_name	compound	date_start	lap_number	duration_sector_1	d
503	Carlos SAINZ	MEDIUM	2024-05-05T20:42:29.919000+00:00	26	31.168	
624	Carlos SAINZ	HARD	2024-05-05T20:56:15.262000+00:00	33	32.030	
643	Carlos SAINZ	HARD	2024-05-05T20:57:48.468000+00:00	34	31.166	
662	Carlos SAINZ	HARD	2024-05-05T20:59:20.610000+00:00	35	30.940	
681	Carlos SAINZ	HARD	2024-05-05T21:00:51.945000+00:00	36	30.864	
700	Carlos SAINZ	HARD	2024-05-05T21:02:24.179000+00:00	37	31.775	
719	Carlos SAINZ	HARD	2024-05-05T21:03:56.366000+00:00	38	31.051	
738	Carlos SAINZ	HARD	2024-05-05T21:05:27.883000+00:00	39	31.004	
757	Carlos SAINZ	HARD	2024-05-05T21:06:59.930000+00:00	40	31.577	
776	Carlos SAINZ	HARD	2024-05-05T21:08:32.397000+00:00	41	30.761	
794	Carlos SAINZ	HARD	2024-05-05T21:10:04.385000+00:00	42	30.772	
813	Carlos SAINZ	HARD	2024-05-05T21:11:36.045000+00:00	43	30.556	
832	Carlos SAINZ	HARD	2024-05-05T21:13:07.058000+00:00	44	30.529	
851	Carlos SAINZ	HARD	2024-05-05T21:14:38.455000+00:00	45	30.650	
870	Carlos SAINZ	HARD	2024-05-05T21:16:09.856000+00:00	46	30.513	
889	Carlos SAINZ	HARD	2024-05-05T21:17:41.232000+00:00	47	30.635	
908	Carlos SAINZ	HARD	2024-05-05T21:19:12.774000+00:00	48	30.722	
927	Carlos SAINZ	HARD	2024-05-05T21:20:44.234000+00:00	49	30.516	
946	Carlos SAINZ	HARD	2024-05-05T21:22:15.534000+00:00	50	30.318	
965	Carlos SAINZ	HARD	2024-05-05T21:23:47.119000+00:00	51	30.511	
984	Carlos SAINZ	HARD	2024-05-05T21:25:18.229000+00:00	52	30.554	
1003	Carlos SAINZ	HARD	2024-05-05T21:26:49.667000+00:00	53	30.472	
1021	Carlos SAINZ	HARD	2024-05-05T21:28:21.107000+00:00	54	30.429	
1040	Carlos SAINZ	HARD	2024-05-05T21:29:52.466000+00:00	55	30.417	
1059	Carlos SAINZ	HARD	2024-05-05T21:31:23.450000+00:00	56	30.624	

Mercedes

In [190…
```
stintInformation.query('driver_number == 44 or driver_number == 63')
```

Out[190…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
12	1234	9507	1	63	1	24	MEDIUM	
13	1234	9507	1	44	1	27	HARD	
32	1234	9507	2	63	25	58	HARD	
33	1234	9507	2	44	27	58	MEDIUM	

In [191…
```
libraryDataF1.getinfolongruns(jointables,44,'Mercedes',MINIMUN_SECONDS,MAX
```

Out[191…

	full_name	compound	date_start	lap_number	duration_sector_1
35	Lewis HAMILTON	HARD	2024-05-05T20:05:04.161000+00:00	2	33.275
55	Lewis HAMILTON	HARD	2024-05-05T20:06:39.136000+00:00	3	32.040
75	Lewis HAMILTON	HARD	2024-05-05T20:08:13.224000+00:00	4	31.931
95	Lewis HAMILTON	HARD	2024-05-05T20:09:47.055000+00:00	5	31.703
115	Lewis HAMILTON	HARD	2024-05-05T20:11:20.745000+00:00	6	31.816
135	Lewis HAMILTON	HARD	2024-05-05T20:12:54.326000+00:00	7	31.729
155	Lewis HAMILTON	HARD	2024-05-05T20:14:28.860000+00:00	8	32.400
175	Lewis HAMILTON	HARD	2024-05-05T20:16:03.548000+00:00	9	32.167
195	Lewis HAMILTON	HARD	2024-05-05T20:17:37.434000+00:00	10	32.404
214	Lewis HAMILTON	HARD	2024-05-05T20:19:12.156000+00:00	11	31.995
231	Lewis HAMILTON	HARD	2024-05-05T20:20:46.425000+00:00	12	31.809
249	Lewis HAMILTON	HARD	2024-05-05T20:22:20.475000+00:00	13	31.751
269	Lewis HAMILTON	HARD	2024-05-05T20:23:54.356000+00:00	14	31.721
289	Lewis HAMILTON	HARD	2024-05-05T20:25:28.081000+00:00	15	31.424
309	Lewis HAMILTON	HARD	2024-05-05T20:27:01.385000+00:00	16	31.570
329	Lewis HAMILTON	HARD	2024-05-05T20:28:34.813000+00:00	17	31.505
348	Lewis HAMILTON	HARD	2024-05-05T20:30:08.475000+00:00	18	31.376

	full_name	compound	date_start	lap_number	duration_sector_1
368	Lewis HAMILTON	HARD	2024-05-05T20:31:41.757000+00:00	19	31.405
387	Lewis HAMILTON	HARD	2024-05-05T20:33:15.163000+00:00	20	31.286
407	Lewis HAMILTON	HARD	2024-05-05T20:34:48.148000+00:00	21	31.411
427	Lewis HAMILTON	HARD	2024-05-05T20:36:22.336000+00:00	22	31.603
463	Lewis HAMILTON	HARD	2024-05-05T20:39:44.543000+00:00	24	31.336
483	Lewis HAMILTON	HARD	2024-05-05T20:41:17.379000+00:00	25	31.223
623	Lewis HAMILTON	MEDIUM	2024-05-05T20:56:16.232000+00:00	33	32.358
642	Lewis HAMILTON	MEDIUM	2024-05-05T20:57:50.392000+00:00	34	31.460
661	Lewis HAMILTON	MEDIUM	2024-05-05T20:59:22.624000+00:00	35	30.788
680	Lewis HAMILTON	MEDIUM	2024-05-05T21:00:54.061000+00:00	36	31.130
699	Lewis HAMILTON	MEDIUM	2024-05-05T21:02:26.300000+00:00	37	31.129
718	Lewis HAMILTON	MEDIUM	2024-05-05T21:03:58.220000+00:00	38	31.016
737	Lewis HAMILTON	MEDIUM	2024-05-05T21:05:29.987000+00:00	39	30.987
756	Lewis HAMILTON	MEDIUM	2024-05-05T21:07:02.228000+00:00	40	31.568
775	Lewis HAMILTON	MEDIUM	2024-05-05T21:08:34.590000+00:00	41	30.911
793	Lewis HAMILTON	MEDIUM	2024-05-05T21:10:06.899000+00:00	42	30.936
812	Lewis HAMILTON	MEDIUM	2024-05-05T21:11:38.594000+00:00	43	30.830
831	Lewis HAMILTON	MEDIUM	2024-05-05T21:13:09.927000+00:00	44	30.798
850	Lewis HAMILTON	MEDIUM	2024-05-05T21:14:41.431000+00:00	45	30.727
869	Lewis HAMILTON	MEDIUM	2024-05-05T21:16:12.889000+00:00	46	30.810
888	Lewis HAMILTON	MEDIUM	2024-05-05T21:17:44.637000+00:00	47	30.717
907	Lewis HAMILTON	MEDIUM	2024-05-05T21:19:15.962000+00:00	48	30.790
926	Lewis HAMILTON	MEDIUM	2024-05-05T21:20:47.599000+00:00	49	30.579
945	Lewis HAMILTON	MEDIUM	2024-05-05T21:22:19.041000+00:00	50	30.562
964	Lewis HAMILTON	MEDIUM	2024-05-05T21:23:50.594000+00:00	51	30.649

	full_name	compound	date_start	lap_number	duration_sector_1
983	Lewis HAMILTON	MEDIUM	2024-05-05T21:25:22.057000+00:00	52	30.881
1002	Lewis HAMILTON	MEDIUM	2024-05-05T21:26:53.776000+00:00	53	30.612
1020	Lewis HAMILTON	MEDIUM	2024-05-05T21:28:25.142000+00:00	54	30.510
1039	Lewis HAMILTON	MEDIUM	2024-05-05T21:29:56.484000+00:00	55	30.536

In [192…

```
libraryDataF1.getinfolongruns(jointables,63,'Mercedes',MINIMUN_SECONDS,MAX
```

Out[192…

	full_name	compound	date_start	lap_number	duration_sector_1	d
37	George RUSSELL	MEDIUM	2024-05-05T20:05:05.952000+00:00	2	32.558	
57	George RUSSELL	MEDIUM	2024-05-05T20:06:40.331000+00:00	3	32.323	
77	George RUSSELL	MEDIUM	2024-05-05T20:08:14.314000+00:00	4	32.253	
97	George RUSSELL	MEDIUM	2024-05-05T20:09:48.492000+00:00	5	31.895	
117	George RUSSELL	MEDIUM	2024-05-05T20:11:22.362000+00:00	6	31.791	
137	George RUSSELL	MEDIUM	2024-05-05T20:12:56.102000+00:00	7	31.869	
157	George RUSSELL	MEDIUM	2024-05-05T20:14:29.926000+00:00	8	32.047	
177	George RUSSELL	MEDIUM	2024-05-05T20:16:03.860000+00:00	9	32.498	
197	George RUSSELL	MEDIUM	2024-05-05T20:17:38.110000+00:00	10	32.439	
216	George RUSSELL	MEDIUM	2024-05-05T20:19:12.889000+00:00	11	32.620	
233	George RUSSELL	MEDIUM	2024-05-05T20:20:47.761000+00:00	12	32.489	
251	George RUSSELL	MEDIUM	2024-05-05T20:22:22.101000+00:00	13	31.992	
271	George RUSSELL	MEDIUM	2024-05-05T20:23:56.165000+00:00	14	31.761	
291	George RUSSELL	MEDIUM	2024-05-05T20:25:29.728000+00:00	15	31.672	
311	George RUSSELL	MEDIUM	2024-05-05T20:27:03.175000+00:00	16	31.716	
331	George RUSSELL	MEDIUM	2024-05-05T20:28:36.602000+00:00	17	31.649	
350	George RUSSELL	MEDIUM	2024-05-05T20:30:10.137000+00:00	18	31.733	
370	George RUSSELL	MEDIUM	2024-05-05T20:31:43.826000+00:00	19	31.706	

	full_name	compound	date_start	lap_number	duration_sector_1	d
389	George RUSSELL	MEDIUM	2024-05-05T20:33:17.574000+00:00	20	31.848	
409	George RUSSELL	MEDIUM	2024-05-05T20:34:51.225000+00:00	21	31.685	
429	George RUSSELL	MEDIUM	2024-05-05T20:36:25.081000+00:00	22	31.608	
504	George RUSSELL	HARD	2024-05-05T20:43:12.403000+00:00	26	31.162	
523	George RUSSELL	HARD	2024-05-05T20:44:44.778000+00:00	27	31.330	
625	George RUSSELL	HARD	2024-05-05T20:56:16.907000+00:00	33	32.419	
644	George RUSSELL	HARD	2024-05-05T20:57:51.356000+00:00	34	31.534	
663	George RUSSELL	HARD	2024-05-05T20:59:24.048000+00:00	35	31.240	
682	George RUSSELL	HARD	2024-05-05T21:00:56.395000+00:00	36	31.262	
701	George RUSSELL	HARD	2024-05-05T21:02:28.717000+00:00	37	31.312	
720	George RUSSELL	HARD	2024-05-05T21:04:00.996000+00:00	38	31.124	
739	George RUSSELL	HARD	2024-05-05T21:05:33.319000+00:00	39	31.101	
758	George RUSSELL	HARD	2024-05-05T21:07:05.498000+00:00	40	31.085	
777	George RUSSELL	HARD	2024-05-05T21:08:37.762000+00:00	41	31.283	
795	George RUSSELL	HARD	2024-05-05T21:10:10.501000+00:00	42	31.105	
814	George RUSSELL	HARD	2024-05-05T21:11:42.587000+00:00	43	30.917	
833	George RUSSELL	HARD	2024-05-05T21:13:14.597000+00:00	44	30.996	
852	George RUSSELL	HARD	2024-05-05T21:14:48.286000+00:00	45	31.004	
871	George RUSSELL	HARD	2024-05-05T21:16:20.291000+00:00	46	31.005	
890	George RUSSELL	HARD	2024-05-05T21:17:52.871000+00:00	47	31.075	
909	George RUSSELL	HARD	2024-05-05T21:19:24.950000+00:00	48	30.996	
928	George RUSSELL	HARD	2024-05-05T21:20:57.051000+00:00	49	30.795	
947	George RUSSELL	HARD	2024-05-05T21:22:29.147000+00:00	50	30.770	
966	George RUSSELL	HARD	2024-05-05T21:24:01.644000+00:00	51	30.743	
985	George RUSSELL	HARD	2024-05-05T21:25:33.610000+00:00	52	30.925	

	full_name	compound	date_start	lap_number	duration_sector_1	d
1004	George RUSSELL	HARD	2024-05-05T21:27:05.893000+00:00	53	30.946	
1022	George RUSSELL	HARD	2024-05-05T21:28:39.358000+00:00	54	30.907	
1041	George RUSSELL	HARD	2024-05-05T21:30:11.726000+00:00	55	30.723	
	George					

Aston Martin

In [193…
```
stintInformation.query('driver_number == 14 or driver_number == 18')
```

Out[193…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
3	1234	9507	1	18	1	11	MEDIUM	
8	1234	9507	1	14	1	22	HARD	
23	1234	9507	2	18	12	28	HARD	
29	1234	9507	2	14	23	58	MEDIUM	
40	1234	9507	3	18	29	58	MEDIUM	

In [194…
```
libraryDataF1.getinfolongruns(jointables,14,'Aston Martin',MINIMUN_SECONDS
```

Out[194…

	full_name	compound	date_start	lap_number	duration_sector_1	d
46	Fernando ALONSO	HARD	2024-05-05T20:06:42.957000+00:00	3	32.066	
66	Fernando ALONSO	HARD	2024-05-05T20:08:16.887000+00:00	4	32.001	
86	Fernando ALONSO	HARD	2024-05-05T20:09:50.949000+00:00	5	32.034	
106	Fernando ALONSO	HARD	2024-05-05T20:11:24.901000+00:00	6	32.282	
126	Fernando ALONSO	HARD	2024-05-05T20:12:58.999000+00:00	7	32.309	
146	Fernando ALONSO	HARD	2024-05-05T20:14:33.547000+00:00	8	31.985	
166	Fernando ALONSO	HARD	2024-05-05T20:16:07.392000+00:00	9	32.150	
186	Fernando ALONSO	HARD	2024-05-05T20:17:41.309000+00:00	10	32.448	
241	Fernando ALONSO	HARD	2024-05-05T20:22:26.290000+00:00	13	32.342	
260	Fernando ALONSO	HARD	2024-05-05T20:24:00.976000+00:00	14	32.072	
280	Fernando ALONSO	HARD	2024-05-05T20:25:35.584000+00:00	15	32.104	
300	Fernando ALONSO	HARD	2024-05-05T20:27:09.910000+00:00	16	31.995	

	full_name	compound	date_start	lap_number	duration_sector_1	d
320	Fernando ALONSO	HARD	2024-05-05T20:28:44.217000+00:00	17	31.851	
339	Fernando ALONSO	HARD	2024-05-05T20:30:18.416000+00:00	18	31.966	
359	Fernando ALONSO	HARD	2024-05-05T20:31:52.543000+00:00	19	31.715	
379	Fernando ALONSO	HARD	2024-05-05T20:33:26.628000+00:00	20	32.019	
398	Fernando ALONSO	HARD	2024-05-05T20:35:00.858000+00:00	21	31.837	
454	Fernando ALONSO	MEDIUM	2024-05-05T20:40:06.909000+00:00	24	31.890	
474	Fernando ALONSO	MEDIUM	2024-05-05T20:41:40.334000+00:00	25	32.293	
493	Fernando ALONSO	MEDIUM	2024-05-05T20:43:13.877000+00:00	26	31.651	
513	Fernando ALONSO	MEDIUM	2024-05-05T20:44:47.695000+00:00	27	31.489	
614	Fernando ALONSO	MEDIUM	2024-05-05T20:56:17.606000+00:00	33	32.451	
633	Fernando ALONSO	MEDIUM	2024-05-05T20:57:52.496000+00:00	34	31.692	
652	Fernando ALONSO	MEDIUM	2024-05-05T20:59:25.582000+00:00	35	31.427	
671	Fernando ALONSO	MEDIUM	2024-05-05T21:00:58.316000+00:00	36	31.246	
690	Fernando ALONSO	MEDIUM	2024-05-05T21:02:30.549000+00:00	37	31.379	
709	Fernando ALONSO	MEDIUM	2024-05-05T21:04:03.060000+00:00	38	31.094	
728	Fernando ALONSO	MEDIUM	2024-05-05T21:05:35.173000+00:00	39	31.356	
747	Fernando ALONSO	MEDIUM	2024-05-05T21:07:07.781000+00:00	40	31.146	
766	Fernando ALONSO	MEDIUM	2024-05-05T21:08:40.255000+00:00	41	31.131	
784	Fernando ALONSO	MEDIUM	2024-05-05T21:10:13.179000+00:00	42	31.175	
803	Fernando ALONSO	MEDIUM	2024-05-05T21:11:45.381000+00:00	43	31.193	
822	Fernando ALONSO	MEDIUM	2024-05-05T21:13:17.563000+00:00	44	31.167	
841	Fernando ALONSO	MEDIUM	2024-05-05T21:14:49.879000+00:00	45	31.235	
860	Fernando ALONSO	MEDIUM	2024-05-05T21:16:23.050000+00:00	46	31.918	
879	Fernando ALONSO	MEDIUM	2024-05-05T21:17:56.527000+00:00	47	31.460	
898	Fernando ALONSO	MEDIUM	2024-05-05T21:19:29.726000+00:00	48	31.826	

	full_name	compound	date_start	lap_number	duration_sector_1	d
917	Fernando ALONSO	MEDIUM	2024-05-05T21:21:02.664000+00:00	49	31.014	
936	Fernando ALONSO	MEDIUM	2024-05-05T21:22:35.077000+00:00	50	30.743	
955	Fernando ALONSO	MEDIUM	2024-05-05T21:24:07.028000+00:00	51	30.796	
974	Fernando ALONSO	MEDIUM	2024-05-05T21:25:39.100000+00:00	52	30.772	
993	Fernando ALONSO	MEDIUM	2024-05-05T21:27:11.044000+00:00	53	30.742	
1012	Fernando ALONSO	MEDIUM	2024-05-05T21:28:43.106000+00:00	54	30.653	
1030	Fernando ALONSO	MEDIUM	2024-05-05T21:30:14.887000+00:00	55	30.700	

In [195…

```
libraryDataF1.getinfolongruns(jointables,18,'Aston Martin',MINIMUN_SECONDS
```

Out[195…

	full_name	compound	date_start	lap_number	duration_sector_1	d
28	Lance STROLL	MEDIUM	2024-05-05T20:05:06.294000+00:00	2	32.797	
48	Lance STROLL	MEDIUM	2024-05-05T20:06:40.751000+00:00	3	32.522	
68	Lance STROLL	MEDIUM	2024-05-05T20:08:15.058000+00:00	4	32.361	
88	Lance STROLL	MEDIUM	2024-05-05T20:09:49.066000+00:00	5	32.111	
108	Lance STROLL	MEDIUM	2024-05-05T20:11:23.544000+00:00	6	32.244	
128	Lance STROLL	MEDIUM	2024-05-05T20:12:57.479000+00:00	7	32.314	
148	Lance STROLL	MEDIUM	2024-05-05T20:14:31.516000+00:00	8	32.162	
168	Lance STROLL	MEDIUM	2024-05-05T20:16:05.308000+00:00	9	32.359	
188	Lance STROLL	MEDIUM	2024-05-05T20:17:39.375000+00:00	10	32.410	
243	Lance STROLL	HARD	2024-05-05T20:22:44.373000+00:00	13	32.177	
262	Lance STROLL	HARD	2024-05-05T20:24:18.175000+00:00	14	31.802	
282	Lance STROLL	HARD	2024-05-05T20:25:51.609000+00:00	15	31.814	
302	Lance STROLL	HARD	2024-05-05T20:27:25.066000+00:00	16	31.958	
322	Lance STROLL	HARD	2024-05-05T20:28:58.847000+00:00	17	31.706	
341	Lance STROLL	HARD	2024-05-05T20:30:32.310000+00:00	18	31.895	

	full_name	compound	date_start	lap_number	duration_sector_1	d
361	Lance STROLL	HARD	2024-05-05T20:32:06.299000+00:00	19	31.777	
380	Lance STROLL	HARD	2024-05-05T20:33:39.815000+00:00	20	31.884	
400	Lance STROLL	HARD	2024-05-05T20:35:13.710000+00:00	21	31.906	
456	Lance STROLL	HARD	2024-05-05T20:40:09.828000+00:00	24	32.049	
476	Lance STROLL	HARD	2024-05-05T20:41:43.713000+00:00	25	31.843	
495	Lance STROLL	HARD	2024-05-05T20:43:17.344000+00:00	26	31.914	
515	Lance STROLL	HARD	2024-05-05T20:44:51.045000+00:00	27	31.832	
616	Lance STROLL	MEDIUM	2024-05-05T20:56:22.266000+00:00	33	31.687	
635	Lance STROLL	MEDIUM	2024-05-05T20:57:55.320000+00:00	34	32.413	
654	Lance STROLL	MEDIUM	2024-05-05T20:59:28.799000+00:00	35	31.857	
673	Lance STROLL	MEDIUM	2024-05-05T21:01:01.808000+00:00	36	31.975	
692	Lance STROLL	MEDIUM	2024-05-05T21:02:35.167000+00:00	37	32.209	
711	Lance STROLL	MEDIUM	2024-05-05T21:04:08.348000+00:00	38	31.689	
730	Lance STROLL	MEDIUM	2024-05-05T21:05:41.137000+00:00	39	31.958	
749	Lance STROLL	MEDIUM	2024-05-05T21:07:14.021000+00:00	40	33.458	
768	Lance STROLL	MEDIUM	2024-05-05T21:08:48.429000+00:00	41	31.248	
786	Lance STROLL	MEDIUM	2024-05-05T21:10:20.538000+00:00	42	31.571	
805	Lance STROLL	MEDIUM	2024-05-05T21:11:53.071000+00:00	43	31.971	
824	Lance STROLL	MEDIUM	2024-05-05T21:13:26.063000+00:00	44	31.513	
843	Lance STROLL	MEDIUM	2024-05-05T21:14:58.727000+00:00	45	32.047	
862	Lance STROLL	MEDIUM	2024-05-05T21:16:31.334000+00:00	46	31.426	
881	Lance STROLL	MEDIUM	2024-05-05T21:18:03.905000+00:00	47	31.502	
900	Lance STROLL	MEDIUM	2024-05-05T21:19:36.279000+00:00	48	31.851	
919	Lance STROLL	MEDIUM	2024-05-05T21:21:09.280000+00:00	49	31.120	
938	Lance STROLL	MEDIUM	2024-05-05T21:22:41.620000+00:00	50	31.215	

	full_name	compound	date_start	lap_number	duration_sector_1	d
957	Lance STROLL	MEDIUM	2024-05-05T21:24:13.593000+00:00	51	32.559	
976	Lance STROLL	MEDIUM	2024-05-05T21:25:47.622000+00:00	52	31.902	
995	Lance STROLL	MEDIUM	2024-05-05T21:27:20.700000+00:00	53	30.866	
1014	Lance STROLL	MEDIUM	2024-05-05T21:28:52.772000+00:00	54	30.943	
1032	Lance STROLL	MEDIUM	2024-05-05T21:30:24.526000+00:00	55	30.898	

McLaren

In [196…
```
stintInformation.query('driver_number == 4 or driver_number == 81')
```

Out[196…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
15	1234	9507	1	81	1	27	MEDIUM	
19	1234	9507	1	4	1	29	MEDIUM	
34	1234	9507	2	81	28	40	HARD	
44	1234	9507	2	4	30	58	HARD	
46	1234	9507	3	81	41	58	MEDIUM	

In [197…
```
libraryDataF1.getinfolongruns(jointables,4,'McLaren',MINIMUN_SECONDS,MAXIMU
```

Out[197…

	full_name	compound	date_start	lap_number	duration_sector_1	d
23	Lando NORRIS	MEDIUM	2024-05-05T20:05:03.347000+00:00	2	32.214	
43	Lando NORRIS	MEDIUM	2024-05-05T20:06:37.373000+00:00	3	31.766	
63	Lando NORRIS	MEDIUM	2024-05-05T20:08:11.106000+00:00	4	31.834	
83	Lando NORRIS	MEDIUM	2024-05-05T20:09:44.701000+00:00	5	31.583	
103	Lando NORRIS	MEDIUM	2024-05-05T20:11:17.977000+00:00	6	31.622	
123	Lando NORRIS	MEDIUM	2024-05-05T20:12:51.171000+00:00	7	31.650	
143	Lando NORRIS	MEDIUM	2024-05-05T20:14:24.264000+00:00	8	31.604	
163	Lando NORRIS	MEDIUM	2024-05-05T20:15:57.352000+00:00	9	31.724	
183	Lando NORRIS	MEDIUM	2024-05-05T20:17:30.902000+00:00	10	31.754	
203	Lando NORRIS	MEDIUM	2024-05-05T20:19:03.944000+00:00	11	31.625	
220	Lando NORRIS	MEDIUM	2024-05-05T20:20:37.456000+00:00	12	31.757	

	full_name	compound	date_start	lap_number	duration_sector_1	d
239	Lando NORRIS	MEDIUM	2024-05-05T20:22:10.766000+00:00	13	31.771	
257	Lando NORRIS	MEDIUM	2024-05-05T20:23:44.370000+00:00	14	31.893	
277	Lando NORRIS	MEDIUM	2024-05-05T20:25:18.074000+00:00	15	31.733	
297	Lando NORRIS	MEDIUM	2024-05-05T20:26:51.651000+00:00	16	31.564	
317	Lando NORRIS	MEDIUM	2024-05-05T20:28:24.739000+00:00	17	31.729	
337	Lando NORRIS	MEDIUM	2024-05-05T20:29:58.142000+00:00	18	31.495	
356	Lando NORRIS	MEDIUM	2024-05-05T20:31:31.352000+00:00	19	31.179	
376	Lando NORRIS	MEDIUM	2024-05-05T20:33:03.911000+00:00	20	31.208	
395	Lando NORRIS	MEDIUM	2024-05-05T20:34:36.250000+00:00	21	31.083	
415	Lando NORRIS	MEDIUM	2024-05-05T20:36:08.612000+00:00	22	31.138	
451	Lando NORRIS	MEDIUM	2024-05-05T20:39:27.964000+00:00	24	30.826	
471	Lando NORRIS	MEDIUM	2024-05-05T20:40:59.960000+00:00	25	31.017	
490	Lando NORRIS	MEDIUM	2024-05-05T20:42:32.205000+00:00	26	30.933	
510	Lando NORRIS	MEDIUM	2024-05-05T20:44:04.390000+00:00	27	31.064	
528	Lando NORRIS	MEDIUM	2024-05-05T20:45:36.436000+00:00	28	30.830	
611	Lando NORRIS	HARD	2024-05-05T20:56:13.961000+00:00	33	30.834	
630	Lando NORRIS	HARD	2024-05-05T20:57:45.245000+00:00	34	30.653	
649	Lando NORRIS	HARD	2024-05-05T20:59:16.539000+00:00	35	30.786	
668	Lando NORRIS	HARD	2024-05-05T21:00:48.008000+00:00	36	30.610	
687	Lando NORRIS	HARD	2024-05-05T21:02:19.084000+00:00	37	30.519	
706	Lando NORRIS	HARD	2024-05-05T21:03:50.079000+00:00	38	30.649	
725	Lando NORRIS	HARD	2024-05-05T21:05:21.317000+00:00	39	30.787	
744	Lando NORRIS	HARD	2024-05-05T21:06:52.372000+00:00	40	30.678	
763	Lando NORRIS	HARD	2024-05-05T21:08:23.649000+00:00	41	30.482	
781	Lando NORRIS	HARD	2024-05-05T21:09:54.738000+00:00	42	30.737	

	full_name	compound	date_start	lap_number	duration_sector_1	d
800	Lando NORRIS	HARD	2024-05-05T21:11:26.124000+00:00	43	30.530	
819	Lando NORRIS	HARD	2024-05-05T21:12:57.126000+00:00	44	30.563	
838	Lando NORRIS	HARD	2024-05-05T21:14:28.386000+00:00	45	30.453	
857	Lando NORRIS	HARD	2024-05-05T21:15:59.559000+00:00	46	30.499	
876	Lando NORRIS	HARD	2024-05-05T21:17:30.838000+00:00	47	30.556	
895	Lando NORRIS	HARD	2024-05-05T21:19:02.152000+00:00	48	30.529	
914	Lando NORRIS	HARD	2024-05-05T21:20:33.315000+00:00	49	30.427	
933	Lando NORRIS	HARD	2024-05-05T21:22:04.409000+00:00	50	30.338	
952	Lando NORRIS	HARD	2024-05-05T21:23:35.711000+00:00	51	30.328	
971	Lando NORRIS	HARD	2024-05-05T21:25:06.840000+00:00	52	30.413	
990	Lando NORRIS	HARD	2024-05-05T21:26:38.055000+00:00	53	30.309	
1009	Lando NORRIS	HARD	2024-05-05T21:28:09.279000+00:00	54	30.402	
1027	Lando NORRIS	HARD	2024-05-05T21:29:40.487000+00:00	55	30.413	
1046	Lando NORRIS	HARD	2024-05-05T21:31:11.509000+00:00	56	30.452	

In [198…

```
libraryDataF1.getinfolongruns(jointables,81,'McLaren',MINIMUN_SECONDS,MAXI
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Out[198…

	full_name	compound	date_start	lap_number	duration_sector_1	d
39	Oscar PIASTRI	MEDIUM	2024-05-05T20:05:01.011000+00:00	2	31.390	
59	Oscar PIASTRI	MEDIUM	2024-05-05T20:06:34.005000+00:00	3	31.681	
79	Oscar PIASTRI	MEDIUM	2024-05-05T20:08:07.015000+00:00	4	31.769	
99	Oscar PIASTRI	MEDIUM	2024-05-05T20:09:40.093000+00:00	5	31.562	
119	Oscar PIASTRI	MEDIUM	2024-05-05T20:11:13.507000+00:00	6	31.305	
139	Oscar PIASTRI	MEDIUM	2024-05-05T20:12:46.694000+00:00	7	31.580	
159	Oscar PIASTRI	MEDIUM	2024-05-05T20:14:19.645000+00:00	8	31.606	
179	Oscar PIASTRI	MEDIUM	2024-05-05T20:15:52.740000+00:00	9	31.727	
199	Oscar PIASTRI	MEDIUM	2024-05-05T20:17:25.832000+00:00	10	31.799	

	full_name	compound	date_start	lap_number	duration_sector_1	d
217	Oscar PIASTRI	MEDIUM	2024-05-05T20:18:59.488000+00:00	11	31.478	
235	Oscar PIASTRI	MEDIUM	2024-05-05T20:20:32.993000+00:00	12	31.522	
253	Oscar PIASTRI	MEDIUM	2024-05-05T20:22:05.852000+00:00	13	31.560	
273	Oscar PIASTRI	MEDIUM	2024-05-05T20:23:38.930000+00:00	14	31.586	
293	Oscar PIASTRI	MEDIUM	2024-05-05T20:25:12.079000+00:00	15	31.299	
313	Oscar PIASTRI	MEDIUM	2024-05-05T20:26:44.844000+00:00	16	31.448	
333	Oscar PIASTRI	MEDIUM	2024-05-05T20:28:17.599000+00:00	17	31.562	
352	Oscar PIASTRI	MEDIUM	2024-05-05T20:29:50.807000+00:00	18	31.345	
372	Oscar PIASTRI	MEDIUM	2024-05-05T20:31:23.671000+00:00	19	31.472	
391	Oscar PIASTRI	MEDIUM	2024-05-05T20:32:56.801000+00:00	20	31.173	
411	Oscar PIASTRI	MEDIUM	2024-05-05T20:34:29.530000+00:00	21	31.343	
431	Oscar PIASTRI	MEDIUM	2024-05-05T20:36:02.303000+00:00	22	31.397	
467	Oscar PIASTRI	MEDIUM	2024-05-05T20:39:22.188000+00:00	24	31.012	
486	Oscar PIASTRI	MEDIUM	2024-05-05T20:40:54.697000+00:00	25	31.003	
506	Oscar PIASTRI	MEDIUM	2024-05-05T20:42:27.214000+00:00	26	31.202	
627	Oscar PIASTRI	HARD	2024-05-05T20:56:14.837000+00:00	33	32.050	
646	Oscar PIASTRI	HARD	2024-05-05T20:57:48.058000+00:00	34	31.261	
665	Oscar PIASTRI	HARD	2024-05-05T20:59:20.258000+00:00	35	30.689	
684	Oscar PIASTRI	HARD	2024-05-05T21:00:51.450000+00:00	36	30.955	
703	Oscar PIASTRI	HARD	2024-05-05T21:02:23.890000+00:00	37	31.251	
722	Oscar PIASTRI	HARD	2024-05-05T21:03:55.710000+00:00	38	30.798	
741	Oscar PIASTRI	HARD	2024-05-05T21:05:27.434000+00:00	39	30.880	
797	Oscar PIASTRI	MEDIUM	2024-05-05T21:10:34.679000+00:00	42	30.354	
816	Oscar PIASTRI	MEDIUM	2024-05-05T21:12:05.359000+00:00	43	30.384	
835	Oscar PIASTRI	MEDIUM	2024-05-05T21:13:35.876000+00:00	44	30.437	

	full_name	compound	date_start	lap_number	duration_sector_1	d
854	Oscar PIASTRI	MEDIUM	2024-05-05T21:15:06.628000+00:00	45	30.569	
873	Oscar PIASTRI	MEDIUM	2024-05-05T21:16:37.945000+00:00	46	30.723	
892	Oscar PIASTRI	MEDIUM	2024-05-05T21:18:08.875000+00:00	47	30.834	
911	Oscar PIASTRI	MEDIUM	2024-05-05T21:19:40.589000+00:00	48	31.156	
930	Oscar PIASTRI	MEDIUM	2024-05-05T21:21:12.399000+00:00	49	30.913	
949	Oscar PIASTRI	MEDIUM	2024-05-05T21:22:44.447000+00:00	50	31.330	
968	Oscar PIASTRI	MEDIUM	2024-05-05T21:24:16.827000+00:00	51	31.961	
987	Oscar PIASTRI	MEDIUM	2024-05-05T21:25:49.610000+00:00	52	32.577	
1006	Oscar PIASTRI	MEDIUM	2024-05-05T21:27:23.513000+00:00	53	31.675	
1024	Oscar PIASTRI	MEDIUM	2024-05-05T21:28:56.057000+00:00	54	31.311	
1043	Oscar PIASTRI	MEDIUM	2024-05-05T21:30:27.951000+00:00	55	30.878	
1062	Oscar PIASTRI	MEDIUM	2024-05-05T21:31:59.713000+00:00	56	31.051	

RB

In [199…

```
stintInformation.query('driver_number == 3 or driver_number == 22')
```

Out[199…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
16	1234	9507	1	3	1	28	HARD	
17	1234	9507	1	22	1	28	MEDIUM	
38	1234	9507	2	3	29	58	MEDIUM	
41	1234	9507	2	22	29	58	HARD	

In [200…

```
libraryDataF1.getinfolongruns(jointables,3,'RB',MINIMUN_SECONDS,MAXIMUM_SE
```

Out[200…

	full_name	compound	date_start	lap_number	duration_sector_1
62	Daniel RICCIARDO	HARD	2024-05-05T20:08:22.199000+00:00	4	32.596
82	Daniel RICCIARDO	HARD	2024-05-05T20:09:57.093000+00:00	5	32.173
102	Daniel RICCIARDO	HARD	2024-05-05T20:11:31.453000+00:00	6	32.231
122	Daniel RICCIARDO	HARD	2024-05-05T20:13:05.277000+00:00	7	32.216
142	Daniel RICCIARDO	HARD	2024-05-05T20:14:39.686000+00:00	8	32.697

	full_name	compound	date_start	lap_number	duration_sector_1
162	Daniel RICCIARDO	HARD	2024-05-05T20:16:14.551000+00:00	9	32.516
202	Daniel RICCIARDO	HARD	2024-05-05T20:19:24.545000+00:00	11	32.492
219	Daniel RICCIARDO	HARD	2024-05-05T20:20:59.487000+00:00	12	32.368
238	Daniel RICCIARDO	HARD	2024-05-05T20:22:33.946000+00:00	13	32.337
256	Daniel RICCIARDO	HARD	2024-05-05T20:24:08.314000+00:00	14	32.303
276	Daniel RICCIARDO	HARD	2024-05-05T20:25:42.708000+00:00	15	32.099
296	Daniel RICCIARDO	HARD	2024-05-05T20:27:16.750000+00:00	16	32.261
316	Daniel RICCIARDO	HARD	2024-05-05T20:28:50.951000+00:00	17	32.021
336	Daniel RICCIARDO	HARD	2024-05-05T20:30:25.045000+00:00	18	32.128
355	Daniel RICCIARDO	HARD	2024-05-05T20:31:59.298000+00:00	19	32.018
375	Daniel RICCIARDO	HARD	2024-05-05T20:33:33.199000+00:00	20	31.931
394	Daniel RICCIARDO	HARD	2024-05-05T20:35:07.168000+00:00	21	32.115
450	Daniel RICCIARDO	HARD	2024-05-05T20:40:02.977000+00:00	24	31.567
470	Daniel RICCIARDO	HARD	2024-05-05T20:41:36.416000+00:00	25	31.519
489	Daniel RICCIARDO	HARD	2024-05-05T20:43:09.846000+00:00	26	31.549
610	Daniel RICCIARDO	MEDIUM	2024-05-05T20:56:20.510000+00:00	33	32.072
629	Daniel RICCIARDO	MEDIUM	2024-05-05T20:57:54.575000+00:00	34	32.633
648	Daniel RICCIARDO	MEDIUM	2024-05-05T20:59:28.462000+00:00	35	31.740
667	Daniel RICCIARDO	MEDIUM	2024-05-05T21:01:01.458000+00:00	36	31.823
686	Daniel RICCIARDO	MEDIUM	2024-05-05T21:02:34.646000+00:00	37	32.039
705	Daniel RICCIARDO	MEDIUM	2024-05-05T21:04:07.769000+00:00	38	31.636
724	Daniel RICCIARDO	MEDIUM	2024-05-05T21:05:40.697000+00:00	39	31.735
743	Daniel RICCIARDO	MEDIUM	2024-05-05T21:07:13.862000+00:00	40	32.372
762	Daniel RICCIARDO	MEDIUM	2024-05-05T21:08:47.254000+00:00	41	31.542
780	Daniel RICCIARDO	MEDIUM	2024-05-05T21:10:20.113000+00:00	42	31.477

	full_name	compound	date_start	lap_number	duration_sector_1
799	Daniel RICCIARDO	MEDIUM	2024-05-05T21:11:52.823000+00:00	43	31.706
818	Daniel RICCIARDO	MEDIUM	2024-05-05T21:13:25.675000+00:00	44	31.571
837	Daniel RICCIARDO	MEDIUM	2024-05-05T21:14:58.461000+00:00	45	32.831
856	Daniel RICCIARDO	MEDIUM	2024-05-05T21:16:32.630000+00:00	46	31.362
875	Daniel RICCIARDO	MEDIUM	2024-05-05T21:18:05.365000+00:00	47	31.307
894	Daniel RICCIARDO	MEDIUM	2024-05-05T21:19:37.999000+00:00	48	31.742
913	Daniel RICCIARDO	MEDIUM	2024-05-05T21:21:10.999000+00:00	49	31.380
932	Daniel RICCIARDO	MEDIUM	2024-05-05T21:22:43.694000+00:00	50	31.478
951	Daniel RICCIARDO	MEDIUM	2024-05-05T21:24:16.743000+00:00	51	31.473
970	Daniel RICCIARDO	MEDIUM	2024-05-05T21:25:49.258000+00:00	52	32.464
989	Daniel RICCIARDO	MEDIUM	2024-05-05T21:27:22.885000+00:00	53	31.746
1008	Daniel RICCIARDO	MEDIUM	2024-05-05T21:28:55.523000+00:00	54	31.080
1026	Daniel RICCIARDO	MEDIUM	2024-05-05T21:30:28.330000+00:00	55	31.454
1045	Daniel RICCIARDO	MEDIUM	2024-05-05T21:32:00.531000+00:00	56	31.321

In [201…

```
libraryDataF1.getinfolongruns(jointables,22,'RB',MINIMUN_SECONDS,MAXIMUM_SI
```

Out[201…

	full_name	compound	date_start	lap_number	duration_sector_1
30	Yuki TSUNODA	MEDIUM	2024-05-05T20:05:05.377000+00:00	2	32.682
50	Yuki TSUNODA	MEDIUM	2024-05-05T20:06:39.669000+00:00	3	32.245
70	Yuki TSUNODA	MEDIUM	2024-05-05T20:08:13.972000+00:00	4	32.055
110	Yuki TSUNODA	MEDIUM	2024-05-05T20:11:23.076000+00:00	6	32.005
130	Yuki TSUNODA	MEDIUM	2024-05-05T20:12:56.967000+00:00	7	31.779
150	Yuki TSUNODA	MEDIUM	2024-05-05T20:14:30.726000+00:00	8	32.253
170	Yuki TSUNODA	MEDIUM	2024-05-05T20:16:04.627000+00:00	9	32.303
190	Yuki TSUNODA	MEDIUM	2024-05-05T20:17:38.860000+00:00	10	32.517
210	Yuki TSUNODA	MEDIUM	2024-05-05T20:19:13.694000+00:00	11	32.613

	full_name	compound	date_start	lap_number	duration_sector_1
226	Yuki TSUNODA	MEDIUM	2024-05-05T20:20:48.564000+00:00	12	32.407
245	Yuki TSUNODA	MEDIUM	2024-05-05T20:22:23.105000+00:00	13	32.096
264	Yuki TSUNODA	MEDIUM	2024-05-05T20:23:57.832000+00:00	14	31.964
284	Yuki TSUNODA	MEDIUM	2024-05-05T20:25:31.818000+00:00	15	31.625
304	Yuki TSUNODA	MEDIUM	2024-05-05T20:27:05.155000+00:00	16	31.887
324	Yuki TSUNODA	MEDIUM	2024-05-05T20:28:38.904000+00:00	17	31.656
343	Yuki TSUNODA	MEDIUM	2024-05-05T20:30:12.767000+00:00	18	31.825
363	Yuki TSUNODA	MEDIUM	2024-05-05T20:31:46.512000+00:00	19	31.551
382	Yuki TSUNODA	MEDIUM	2024-05-05T20:33:19.934000+00:00	20	31.694
402	Yuki TSUNODA	MEDIUM	2024-05-05T20:34:53.350000+00:00	21	31.764
422	Yuki TSUNODA	MEDIUM	2024-05-05T20:36:27.049000+00:00	22	31.717
458	Yuki TSUNODA	MEDIUM	2024-05-05T20:39:48.623000+00:00	24	31.645
478	Yuki TSUNODA	MEDIUM	2024-05-05T20:41:22.927000+00:00	25	31.655
497	Yuki TSUNODA	MEDIUM	2024-05-05T20:42:56.348000+00:00	26	31.504
517	Yuki TSUNODA	MEDIUM	2024-05-05T20:44:29.457000+00:00	27	31.376
618	Yuki TSUNODA	HARD	2024-05-05T20:56:16.042000+00:00	33	32.342
637	Yuki TSUNODA	HARD	2024-05-05T20:57:50.155000+00:00	34	31.293
656	Yuki TSUNODA	HARD	2024-05-05T20:59:23.380000+00:00	35	31.326
675	Yuki TSUNODA	HARD	2024-05-05T21:00:55.753000+00:00	36	31.102
694	Yuki TSUNODA	HARD	2024-05-05T21:02:28.128000+00:00	37	30.995
713	Yuki TSUNODA	HARD	2024-05-05T21:03:59.996000+00:00	38	30.954
732	Yuki TSUNODA	HARD	2024-05-05T21:05:31.716000+00:00	39	31.109
751	Yuki TSUNODA	HARD	2024-05-05T21:07:04.092000+00:00	40	31.277
770	Yuki TSUNODA	HARD	2024-05-05T21:08:36.607000+00:00	41	31.006
788	Yuki TSUNODA	HARD	2024-05-05T21:10:08.984000+00:00	42	30.899

	full_name	compound	date_start	lap_number	duration_sector_1
807	Yuki TSUNODA	HARD	2024-05-05T21:11:40.967000+00:00	43	30.992
826	Yuki TSUNODA	HARD	2024-05-05T21:13:12.726000+00:00	44	30.988
845	Yuki TSUNODA	HARD	2024-05-05T21:14:44.818000+00:00	45	30.952
864	Yuki TSUNODA	HARD	2024-05-05T21:16:16.818000+00:00	46	30.840
883	Yuki TSUNODA	HARD	2024-05-05T21:17:48.867000+00:00	47	30.943
902	Yuki TSUNODA	HARD	2024-05-05T21:19:20.845000+00:00	48	30.881
921	Yuki TSUNODA	HARD	2024-05-05T21:20:52.809000+00:00	49	30.772
940	Yuki TSUNODA	HARD	2024-05-05T21:22:24.971000+00:00	50	30.749
959	Yuki TSUNODA	HARD	2024-05-05T21:23:56.951000+00:00	51	30.859
978	Yuki TSUNODA	HARD	2024-05-05T21:25:28.926000+00:00	52	30.834
997	Yuki TSUNODA	HARD	2024-05-05T21:27:01.057000+00:00	53	30.736
1016	Yuki TSUNODA	HARD	2024-05-05T21:28:32.958000+00:00	54	30.671
1034	Yuki TSUNODA	HARD	2024-05-05T21:30:04.972000+00:00	55	30.792
1053	Yuki TSUNODA	HARD	2024-05-05T21:31:36.537000+00:00	56	30.857

Haas F1 Team

In [202…

```
stintInformation.query('driver_number == 20 or driver_number == 27')
```

Out[202…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
5	1234	9507	1	27	1	12	MEDIUM	
9	1234	9507	1	20	1	22	HARD	
24	1234	9507	2	27	13	28	HARD	
28	1234	9507	2	20	23	28	MEDIUM	
36	1234	9507	3	20	29	31	MEDIUM	
43	1234	9507	3	27	29	58	MEDIUM	
45	1234	9507	4	20	32	58	MEDIUM	

In [203…

```
libraryDataF1.getinfolongruns(jointables,20,'Haas F1 Team',MINIMUN_SECONDS
```

Out[203…

	full_name	compound	date_start	lap_number	duration_sector_
69	Kevin MAGNUSSEN	HARD	2024-05-05T20:08:21.411000+00:00	4	32.66

	full_name	compound	date_start	lap_number	duration_sector_
89	Kevin MAGNUSSEN	HARD	2024-05-05T20:09:55.772000+00:00	5	32.28
109	Kevin MAGNUSSEN	HARD	2024-05-05T20:11:30.066000+00:00	6	32.30
129	Kevin MAGNUSSEN	HARD	2024-05-05T20:13:03.877000+00:00	7	32.58
169	Kevin MAGNUSSEN	HARD	2024-05-05T20:16:13.683000+00:00	9	32.54
225	Kevin MAGNUSSEN	HARD	2024-05-05T20:20:58.502000+00:00	12	32.32
244	Kevin MAGNUSSEN	HARD	2024-05-05T20:22:33.081000+00:00	13	32.31
263	Kevin MAGNUSSEN	HARD	2024-05-05T20:24:07.652000+00:00	14	32.06
283	Kevin MAGNUSSEN	HARD	2024-05-05T20:25:42.057000+00:00	15	32.09
303	Kevin MAGNUSSEN	HARD	2024-05-05T20:27:15.882000+00:00	16	32.07
323	Kevin MAGNUSSEN	HARD	2024-05-05T20:28:50.045000+00:00	17	32.06
342	Kevin MAGNUSSEN	HARD	2024-05-05T20:30:24.120000+00:00	18	32.09
362	Kevin MAGNUSSEN	HARD	2024-05-05T20:31:58.205000+00:00	19	32.12
381	Kevin MAGNUSSEN	HARD	2024-05-05T20:33:32.313000+00:00	20	32.00
401	Kevin MAGNUSSEN	HARD	2024-05-05T20:35:06.425000+00:00	21	32.05
457	Kevin MAGNUSSEN	MEDIUM	2024-05-05T20:40:13.752000+00:00	24	31.86
477	Kevin MAGNUSSEN	MEDIUM	2024-05-05T20:41:46.954000+00:00	25	31.99
496	Kevin MAGNUSSEN	MEDIUM	2024-05-05T20:43:20.151000+00:00	26	32.28
516	Kevin MAGNUSSEN	MEDIUM	2024-05-05T20:44:54.500000+00:00	27	31.94
617	Kevin MAGNUSSEN	MEDIUM	2024-05-05T20:56:38.106000+00:00	33	30.91
636	Kevin MAGNUSSEN	MEDIUM	2024-05-05T20:58:09.817000+00:00	34	31.24
655	Kevin MAGNUSSEN	MEDIUM	2024-05-05T20:59:42.054000+00:00	35	31.14
674	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:01:14.467000+00:00	36	31.21
693	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:02:46.234000+00:00	37	31.18
712	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:04:18.228000+00:00	38	31.27
731	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:05:50.220000+00:00	39	31.17

	full_name	compound	date_start	lap_number	duration_sector_
750	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:07:22.627000+00:00	40	31.32
769	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:08:55.120000+00:00	41	31.24
787	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:10:27.326000+00:00	42	31.14
806	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:11:59.638000+00:00	43	31.20
825	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:13:31.889000+00:00	44	31.26
844	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:15:04.069000+00:00	45	31.28
863	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:16:36.351000+00:00	46	31.32
882	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:18:09.363000+00:00	47	31.79
901	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:19:42.454000+00:00	48	31.14
920	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:21:14.726000+00:00	49	31.26
939	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:22:47.170000+00:00	50	31.37
958	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:24:19.615000+00:00	51	31.61
977	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:25:52.043000+00:00	52	32.06
996	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:27:25.140000+00:00	53	31.37
1015	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:28:57.708000+00:00	54	31.54
1033	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:30:30.588000+00:00	55	31.33
1052	Kevin MAGNUSSEN	MEDIUM	2024-05-05T21:32:02.905000+00:00	56	31.51

In [204…

```
libraryDataF1.getinfolongruns(jointables,27,'Haas F1 Team',MINIMUN_SECONDS
```

Out[204…

	full_name	compound	date_start	lap_number	duration_sector_
33	Nico HULKENBERG	MEDIUM	2024-05-05T20:05:04.425000+00:00	2	32.47
53	Nico HULKENBERG	MEDIUM	2024-05-05T20:06:38.214000+00:00	3	32.34
73	Nico HULKENBERG	MEDIUM	2024-05-05T20:08:12.511000+00:00	4	31.87
93	Nico HULKENBERG	MEDIUM	2024-05-05T20:09:46.261000+00:00	5	31.83
113	Nico HULKENBERG	MEDIUM	2024-05-05T20:11:20.041000+00:00	6	31.87
133	Nico HULKENBERG	MEDIUM	2024-05-05T20:12:53.712000+00:00	7	32.09

	full_name	compound	date_start	lap_number	duration_sector_
153	Nico HULKENBERG	MEDIUM	2024-05-05T20:14:28.650000+00:00	8	32.18
173	Nico HULKENBERG	MEDIUM	2024-05-05T20:16:02.898000+00:00	9	32.23
212	Nico HULKENBERG	MEDIUM	2024-05-05T20:19:12.655000+00:00	11	32.56
267	Nico HULKENBERG	HARD	2024-05-05T20:24:16.322000+00:00	14	31.46
287	Nico HULKENBERG	HARD	2024-05-05T20:25:49.542000+00:00	15	31.59
307	Nico HULKENBERG	HARD	2024-05-05T20:27:22.652000+00:00	16	32.19
327	Nico HULKENBERG	HARD	2024-05-05T20:28:56.264000+00:00	17	31.70
346	Nico HULKENBERG	HARD	2024-05-05T20:30:29.979000+00:00	18	31.82
366	Nico HULKENBERG	HARD	2024-05-05T20:32:03.502000+00:00	19	31.69
385	Nico HULKENBERG	HARD	2024-05-05T20:33:36.704000+00:00	20	31.85
405	Nico HULKENBERG	HARD	2024-05-05T20:35:10.352000+00:00	21	31.90
461	Nico HULKENBERG	HARD	2024-05-05T20:40:05.942000+00:00	24	31.93
481	Nico HULKENBERG	HARD	2024-05-05T20:41:40.037000+00:00	25	32.28
500	Nico HULKENBERG	HARD	2024-05-05T20:43:14.569000+00:00	26	32.34
520	Nico HULKENBERG	HARD	2024-05-05T20:44:48.792000+00:00	27	32.02
621	Nico HULKENBERG	MEDIUM	2024-05-05T20:56:21.051000+00:00	33	32.06
640	Nico HULKENBERG	MEDIUM	2024-05-05T20:57:54.715000+00:00	34	32.01
659	Nico HULKENBERG	MEDIUM	2024-05-05T20:59:27.646000+00:00	35	32.00
678	Nico HULKENBERG	MEDIUM	2024-05-05T21:01:00.806000+00:00	36	31.97
697	Nico HULKENBERG	MEDIUM	2024-05-05T21:02:34.112000+00:00	37	31.74
716	Nico HULKENBERG	MEDIUM	2024-05-05T21:04:07.012000+00:00	38	31.94
735	Nico HULKENBERG	MEDIUM	2024-05-05T21:05:39.888000+00:00	39	31.84
754	Nico HULKENBERG	MEDIUM	2024-05-05T21:07:12.953000+00:00	40	31.81
773	Nico HULKENBERG	MEDIUM	2024-05-05T21:08:45.399000+00:00	41	31.50
791	Nico HULKENBERG	MEDIUM	2024-05-05T21:10:18.086000+00:00	42	31.36

	full_name	compound	date_start	lap_number	duration_sector_
810	Nico HULKENBERG	MEDIUM	2024-05-05T21:11:50.254000+00:00	43	31.4
829	Nico HULKENBERG	MEDIUM	2024-05-05T21:13:22.884000+00:00	44	31.4
848	Nico HULKENBERG	MEDIUM	2024-05-05T21:14:55.281000+00:00	45	31.4
867	Nico HULKENBERG	MEDIUM	2024-05-05T21:16:27.804000+00:00	46	31.5
886	Nico HULKENBERG	MEDIUM	2024-05-05T21:18:00.474000+00:00	47	31.1
905	Nico HULKENBERG	MEDIUM	2024-05-05T21:19:32.673000+00:00	48	31.2
924	Nico HULKENBERG	MEDIUM	2024-05-05T21:21:04.935000+00:00	49	31.3
943	Nico HULKENBERG	MEDIUM	2024-05-05T21:22:37.491000+00:00	50	31.1
962	Nico HULKENBERG	MEDIUM	2024-05-05T21:24:09.502000+00:00	51	31.1
981	Nico HULKENBERG	MEDIUM	2024-05-05T21:25:41.702000+00:00	52	31.2
1000	Nico HULKENBERG	MEDIUM	2024-05-05T21:27:13.993000+00:00	53	31.1
1018	Nico HULKENBERG	MEDIUM	2024-05-05T21:28:46.573000+00:00	54	31.0
1037	Nico HULKENBERG	MEDIUM	2024-05-05T21:30:18.737000+00:00	55	31.0
1056	Nico HULKENBERG	MEDIUM	2024-05-05T21:31:50.807000+00:00	56	31.1

Kick Sauber

In [205…
```
stintInformation.query('driver_number == 24 or driver_number == 77')
```

Out[205…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
1	1234	9507	1	77	1	10	SOFT	
18	1234	9507	1	24	1	28	MEDIUM	
20	1234	9507	2	77	11	28	HARD	
37	1234	9507	3	77	29	57	MEDIUM	
42	1234	9507	2	24	29	58	SOFT	

In [206…
```
libraryDataF1.getinfolongruns(jointables,24,'Kick Sauber',MINIMUN_SECONDS,
```

Out[206…

	full_name	compound	date_start	lap_number	duration_sector_1	d
52	ZHOU Guanyu	MEDIUM	2024-05-05T20:06:45.593000+00:00	3	32.333	
72	ZHOU Guanyu	MEDIUM	2024-05-05T20:08:19.844000+00:00	4	32.342	

	full_name	compound	date_start	lap_number	duration_sector_1	d
92	ZHOU Guanyu	MEDIUM	2024-05-05T20:09:54.230000+00:00	5	32.009	
112	ZHOU Guanyu	MEDIUM	2024-05-05T20:11:27.926000+00:00	6	32.344	
132	ZHOU Guanyu	MEDIUM	2024-05-05T20:13:02.243000+00:00	7	32.243	
152	ZHOU Guanyu	MEDIUM	2024-05-05T20:14:36.673000+00:00	8	32.324	
172	ZHOU Guanyu	MEDIUM	2024-05-05T20:16:11.180000+00:00	9	32.315	
192	ZHOU Guanyu	MEDIUM	2024-05-05T20:17:45.497000+00:00	10	32.293	
211	ZHOU Guanyu	MEDIUM	2024-05-05T20:19:19.701000+00:00	11	32.492	
228	ZHOU Guanyu	MEDIUM	2024-05-05T20:20:54.353000+00:00	12	32.118	
247	ZHOU Guanyu	MEDIUM	2024-05-05T20:22:28.808000+00:00	13	32.221	
266	ZHOU Guanyu	MEDIUM	2024-05-05T20:24:03.604000+00:00	14	32.004	
286	ZHOU Guanyu	MEDIUM	2024-05-05T20:25:37.736000+00:00	15	32.004	
306	ZHOU Guanyu	MEDIUM	2024-05-05T20:27:11.922000+00:00	16	31.871	
326	ZHOU Guanyu	MEDIUM	2024-05-05T20:28:45.980000+00:00	17	31.792	
345	ZHOU Guanyu	MEDIUM	2024-05-05T20:30:20.044000+00:00	18	32.034	
365	ZHOU Guanyu	MEDIUM	2024-05-05T20:31:54.412000+00:00	19	31.970	
384	ZHOU Guanyu	MEDIUM	2024-05-05T20:33:28.395000+00:00	20	32.081	
404	ZHOU Guanyu	MEDIUM	2024-05-05T20:35:02.680000+00:00	21	32.117	
460	ZHOU Guanyu	MEDIUM	2024-05-05T20:39:59.609000+00:00	24	31.653	
480	ZHOU Guanyu	MEDIUM	2024-05-05T20:41:33.387000+00:00	25	31.644	
499	ZHOU Guanyu	MEDIUM	2024-05-05T20:43:06.996000+00:00	26	31.576	
519	ZHOU Guanyu	MEDIUM	2024-05-05T20:44:40.753000+00:00	27	31.543	
620	ZHOU Guanyu	SOFT	2024-05-05T20:56:19.974000+00:00	33	32.065	
639	ZHOU Guanyu	SOFT	2024-05-05T20:57:53.778000+00:00	34	32.359	
658	ZHOU Guanyu	SOFT	2024-05-05T20:59:27.147000+00:00	35	31.960	
677	ZHOU Guanyu	SOFT	2024-05-05T21:01:00.526000+00:00	36	31.797	

	full_name	compound	date_start	lap_number	duration_sector_1	d
696	ZHOU Guanyu	SOFT	2024-05-05T21:02:33.555000+00:00	37	31.669	
715	ZHOU Guanyu	SOFT	2024-05-05T21:04:06.560000+00:00	38	31.695	
734	ZHOU Guanyu	SOFT	2024-05-05T21:05:39.459000+00:00	39	31.624	
753	ZHOU Guanyu	SOFT	2024-05-05T21:07:12.757000+00:00	40	32.545	
772	ZHOU Guanyu	SOFT	2024-05-05T21:08:46.460000+00:00	41	31.642	
790	ZHOU Guanyu	SOFT	2024-05-05T21:10:19.388000+00:00	42	31.567	
809	ZHOU Guanyu	SOFT	2024-05-05T21:11:52.154000+00:00	43	31.811	
828	ZHOU Guanyu	SOFT	2024-05-05T21:13:24.972000+00:00	44	31.520	
847	ZHOU Guanyu	SOFT	2024-05-05T21:14:58.055000+00:00	45	31.605	
866	ZHOU Guanyu	SOFT	2024-05-05T21:16:30.723000+00:00	46	31.488	
885	ZHOU Guanyu	SOFT	2024-05-05T21:18:03.320000+00:00	47	31.548	
904	ZHOU Guanyu	SOFT	2024-05-05T21:19:36.166000+00:00	48	32.948	
923	ZHOU Guanyu	SOFT	2024-05-05T21:21:10.308000+00:00	49	31.197	
942	ZHOU Guanyu	SOFT	2024-05-05T21:22:43.410000+00:00	50	31.256	
961	ZHOU Guanyu	SOFT	2024-05-05T21:24:15.826000+00:00	51	31.353	
980	ZHOU Guanyu	SOFT	2024-05-05T21:25:48.373000+00:00	52	31.943	
999	ZHOU Guanyu	SOFT	2024-05-05T21:27:21.572000+00:00	53	31.081	
1017	ZHOU Guanyu	SOFT	2024-05-05T21:28:54.492000+00:00	54	31.084	
1036	ZHOU Guanyu	SOFT	2024-05-05T21:30:27.046000+00:00	55	31.110	
1055	ZHOU	SOFT	2024-05-05T21:31:59.131000+00:00	56	30.989	

In [207…

```
libraryDataF1.getinfolongruns(jointables,77,'Kick Sauber',MINIMUN_SECONDS,
```

Out[207…

	full_name	compound	date_start	lap_number	duration_sector_1	d
58	Valtteri BOTTAS	SOFT	2024-05-05T20:06:45.721000+00:00	3	32.358	
78	Valtteri BOTTAS	SOFT	2024-05-05T20:09:54.836000+00:00	4	32.038	
98	Valtteri BOTTAS	SOFT	2024-05-05T20:11:28.738000+00:00	5	32.365	

	full_name	compound	date_start	lap_number	duration_sector_1	d
118	Valtteri BOTTAS	SOFT	2024-05-05T20:13:03.055000+00:00	6	32.286	
138	Valtteri BOTTAS	SOFT	2024-05-05T20:14:37.503000+00:00	7	32.385	
158	Valtteri BOTTAS	SOFT	2024-05-05T20:16:12.248000+00:00	8	32.448	
178	Valtteri BOTTAS	SOFT	2024-05-05T20:17:46.818000+00:00	9	32.429	
234	Valtteri BOTTAS	HARD	2024-05-05T20:22:50.668000+00:00	12	31.689	
252	Valtteri BOTTAS	HARD	2024-05-05T20:24:24.481000+00:00	13	31.642	
272	Valtteri BOTTAS	HARD	2024-05-05T20:25:58.198000+00:00	14	31.776	
292	Valtteri BOTTAS	HARD	2024-05-05T20:27:31.711000+00:00	15	31.819	
312	Valtteri BOTTAS	HARD	2024-05-05T20:29:05.770000+00:00	16	31.551	
332	Valtteri BOTTAS	HARD	2024-05-05T20:30:39.336000+00:00	17	31.946	
351	Valtteri BOTTAS	HARD	2024-05-05T20:32:13.322000+00:00	18	31.762	
371	Valtteri BOTTAS	HARD	2024-05-05T20:33:47.152000+00:00	19	31.754	
390	Valtteri BOTTAS	HARD	2024-05-05T20:35:21.242000+00:00	20	31.756	
447	Valtteri BOTTAS	HARD	2024-05-05T20:40:17.491000+00:00	23	31.842	
466	Valtteri BOTTAS	HARD	2024-05-05T20:41:51.215000+00:00	24	31.504	
485	Valtteri BOTTAS	HARD	2024-05-05T20:43:24.712000+00:00	25	31.771	
505	Valtteri BOTTAS	HARD	2024-05-05T20:44:58.397000+00:00	26	31.646	
607	Valtteri BOTTAS	MEDIUM	2024-05-05T20:56:24.409000+00:00	32	31.456	
626	Valtteri BOTTAS	MEDIUM	2024-05-05T20:57:57.339000+00:00	33	31.762	
645	Valtteri BOTTAS	MEDIUM	2024-05-05T20:59:30.719000+00:00	34	31.414	
664	Valtteri BOTTAS	MEDIUM	2024-05-05T21:01:03.685000+00:00	35	31.805	
683	Valtteri BOTTAS	MEDIUM	2024-05-05T21:02:36.989000+00:00	36	31.685	
702	Valtteri BOTTAS	MEDIUM	2024-05-05T21:04:09.865000+00:00	37	31.608	
721	Valtteri BOTTAS	MEDIUM	2024-05-05T21:05:42.864000+00:00	38	31.556	
740	Valtteri BOTTAS	MEDIUM	2024-05-05T21:07:15.849000+00:00	39	32.107	

	full_name	compound	date_start	lap_number	duration_sector_1	d
759	Valtteri BOTTAS	MEDIUM	2024-05-05T21:08:49.384000+00:00	40	31.377	
778	Valtteri BOTTAS	MEDIUM	2024-05-05T21:10:22.336000+00:00	41	31.359	
796	Valtteri BOTTAS	MEDIUM	2024-05-05T21:11:55.293000+00:00	42	31.351	
815	Valtteri BOTTAS	MEDIUM	2024-05-05T21:13:28.088000+00:00	43	31.390	
834	Valtteri BOTTAS	MEDIUM	2024-05-05T21:15:00.919000+00:00	44	31.481	
853	Valtteri BOTTAS	MEDIUM	2024-05-05T21:16:34.010000+00:00	45	31.526	
872	Valtteri BOTTAS	MEDIUM	2024-05-05T21:18:06.978000+00:00	46	31.316	
891	Valtteri BOTTAS	MEDIUM	2024-05-05T21:19:39.834000+00:00	47	31.401	
910	Valtteri BOTTAS	MEDIUM	2024-05-05T21:21:13.240000+00:00	48	31.648	
929	Valtteri BOTTAS	MEDIUM	2024-05-05T21:22:46.475000+00:00	49	31.158	
948	Valtteri BOTTAS	MEDIUM	2024-05-05T21:24:18.896000+00:00	50	31.268	
967	Valtteri BOTTAS	MEDIUM	2024-05-05T21:25:51.509000+00:00	51	31.410	
986	Valtteri BOTTAS	MEDIUM	2024-05-05T21:27:24.100000+00:00	52	31.584	
1005	Valtteri BOTTAS	MEDIUM	2024-05-05T21:28:56.938000+00:00	53	31.247	
1023	Valtteri BOTTAS	MEDIUM	2024-05-05T21:30:29.358000+00:00	54	31.325	
1042	Valtteri	MEDIUM	2024-05-05T21:32:01.447000+00:00	55	31.181	

Williams

In [208…
```
stintInformation.query('driver_number == 23 or driver_number == 2')
```

Out[208…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
0	1234	9507	1	23	1	10	MEDIUM	
2	1234	9507	1	2	1	11	MEDIUM	
21	1234	9507	2	23	11	53	HARD	
22	1234	9507	2	2	12	28	HARD	
47	1234	9507	3	23	54	58	SOFT	

In [209…
```
libraryDataF1.getinfolongruns(jointables,23,'Williams',MINIMUN_SECONDS,MAX
```

Out[209…

	full_name	compound	date_start	lap_number	duration_sector_1	d
31	Alexander	MEDIUM	2024-05-05T20:05:08.124000+00:00	2	32.833	

	full_name	compound	date_start	lap_number	duration_sector_1	d
	ALBON					
51	Alexander ALBON	MEDIUM	2024-05-05T20:06:43.327000+00:00	3	32.569	
71	Alexander ALBON	MEDIUM	2024-05-05T20:08:17.373000+00:00	4	32.383	
91	Alexander ALBON	MEDIUM	2024-05-05T20:09:51.359000+00:00	5	32.401	
111	Alexander ALBON	MEDIUM	2024-05-05T20:11:25.570000+00:00	6	32.643	
131	Alexander ALBON	MEDIUM	2024-05-05T20:12:59.815000+00:00	7	32.519	
151	Alexander ALBON	MEDIUM	2024-05-05T20:14:34.139000+00:00	8	32.404	
171	Alexander ALBON	MEDIUM	2024-05-05T20:16:08.246000+00:00	9	32.442	
227	Alexander ALBON	HARD	2024-05-05T20:21:09.969000+00:00	12	32.068	
246	Alexander ALBON	HARD	2024-05-05T20:22:44.373000+00:00	13	32.533	
265	Alexander ALBON	HARD	2024-05-05T20:24:18.848000+00:00	14	32.128	
285	Alexander ALBON	HARD	2024-05-05T20:25:52.840000+00:00	15	32.072	
305	Alexander ALBON	HARD	2024-05-05T20:27:26.253000+00:00	16	32.389	
325	Alexander ALBON	HARD	2024-05-05T20:29:00.435000+00:00	17	31.987	
344	Alexander ALBON	HARD	2024-05-05T20:30:34.216000+00:00	18	31.990	
364	Alexander ALBON	HARD	2024-05-05T20:32:07.857000+00:00	19	32.133	
383	Alexander ALBON	HARD	2024-05-05T20:33:41.569000+00:00	20	32.087	
403	Alexander ALBON	HARD	2024-05-05T20:35:15.127000+00:00	21	32.136	
459	Alexander ALBON	HARD	2024-05-05T20:40:10.783000+00:00	24	32.093	
479	Alexander ALBON	HARD	2024-05-05T20:41:44.890000+00:00	25	31.829	
498	Alexander ALBON	HARD	2024-05-05T20:43:18.384000+00:00	26	32.075	
518	Alexander ALBON	HARD	2024-05-05T20:44:51.850000+00:00	27	32.175	
619	Alexander ALBON	HARD	2024-05-05T20:56:19.462000+00:00	33	32.204	
638	Alexander ALBON	HARD	2024-05-05T20:57:53.403000+00:00	34	32.392	
657	Alexander ALBON	HARD	2024-05-05T20:59:26.907000+00:00	35	31.885	

	full_name	compound	date_start	lap_number	duration_sector_1	d
676	Alexander ALBON	HARD	2024-05-05T21:00:59.763000+00:00	36	32.088	
695	Alexander ALBON	HARD	2024-05-05T21:02:32.932000+00:00	37	31.875	
714	Alexander ALBON	HARD	2024-05-05T21:04:05.976000+00:00	38	31.887	
733	Alexander ALBON	HARD	2024-05-05T21:05:39.039000+00:00	39	31.825	
752	Alexander ALBON	HARD	2024-05-05T21:07:12.448000+00:00	40	31.688	
771	Alexander ALBON	HARD	2024-05-05T21:08:45.217000+00:00	41	32.478	
789	Alexander ALBON	HARD	2024-05-05T21:10:18.795000+00:00	42	31.693	
808	Alexander ALBON	HARD	2024-05-05T21:11:51.915000+00:00	43	31.669	
827	Alexander ALBON	HARD	2024-05-05T21:13:24.525000+00:00	44	31.626	
846	Alexander ALBON	HARD	2024-05-05T21:14:57.295000+00:00	45	31.620	
865	Alexander ALBON	HARD	2024-05-05T21:16:29.815000+00:00	46	31.790	
884	Alexander ALBON	HARD	2024-05-05T21:18:02.561000+00:00	47	31.751	
903	Alexander ALBON	HARD	2024-05-05T21:19:35.316000+00:00	48	31.803	
922	Alexander ALBON	HARD	2024-05-05T21:21:07.857000+00:00	49	31.557	
941	Alexander ALBON	HARD	2024-05-05T21:22:40.455000+00:00	50	31.517	
960	Alexander ALBON	HARD	2024-05-05T21:24:13.245000+00:00	51	32.673	
1035	Alexander ALBON	SOFT	2024-05-05T21:30:56.030000+00:00	55	30.981	

In [210…

```
libraryDataF1.getinfolongruns(jointables,2,'Williams',MINIMUN_SECONDS,MAXI
```

Out[210…

	full_name	compound	date_start	lap_number	duration_sector_1
41	Logan SARGEANT	MEDIUM	2024-05-05T20:06:43.891000+00:00	3	32.871
61	Logan SARGEANT	MEDIUM	2024-05-05T20:08:18.537000+00:00	4	32.524
81	Logan SARGEANT	MEDIUM	2024-05-05T20:09:52.825000+00:00	5	32.257
101	Logan SARGEANT	MEDIUM	2024-05-05T20:11:26.793000+00:00	6	32.715
121	Logan SARGEANT	MEDIUM	2024-05-05T20:13:01.128000+00:00	7	32.346

	full_name	compound	date_start	lap_number	duration_sector_1
141	Logan SARGEANT	MEDIUM	2024-05-05T20:14:35.809000+00:00	8	32.454
161	Logan SARGEANT	MEDIUM	2024-05-05T20:16:10.312000+00:00	9	32.351
181	Logan SARGEANT	MEDIUM	2024-05-05T20:17:44.503000+00:00	10	32.442
237	Logan SARGEANT	HARD	2024-05-05T20:22:47.419000+00:00	13	32.027
255	Logan SARGEANT	HARD	2024-05-05T20:24:21.039000+00:00	14	32.104
275	Logan SARGEANT	HARD	2024-05-05T20:25:54.744000+00:00	15	32.123
295	Logan SARGEANT	HARD	2024-05-05T20:27:28.315000+00:00	16	32.244
315	Logan SARGEANT	HARD	2024-05-05T20:29:02.303000+00:00	17	32.076
335	Logan SARGEANT	HARD	2024-05-05T20:30:36.057000+00:00	18	31.955
354	Logan SARGEANT	HARD	2024-05-05T20:32:09.595000+00:00	19	31.979
374	Logan SARGEANT	HARD	2024-05-05T20:33:43.208000+00:00	20	32.038
393	Logan SARGEANT	HARD	2024-05-05T20:35:16.913000+00:00	21	31.866
449	Logan SARGEANT	HARD	2024-05-05T20:40:12.478000+00:00	24	31.836
469	Logan SARGEANT	HARD	2024-05-05T20:41:46.165000+00:00	25	31.854
488	Logan SARGEANT	HARD	2024-05-05T20:43:20.052000+00:00	26	32.051

Alpine

In [211…

```
stintInformation.query('driver_number == 10 or driver_number == 31')
```

Out[211…

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
4	1234	9507	1	10	1	12	MEDIUM	
10	1234	9507	1	31	1	22	MEDIUM	
25	1234	9507	2	10	13	58	HARD	
30	1234	9507	2	31	23	58	HARD	

In [212…

```
libraryDataF1.getinfolongruns(jointables,31,'Alpine',MINIMUN_SECONDS,MAXIMU
```

Out[212…

	full_name	compound	date_start	lap_number	duration_sector_1	d
54	Esteban OCON	MEDIUM	2024-05-05T20:06:43.526000+00:00	3	32.730	
74	Esteban OCON	MEDIUM	2024-05-05T20:08:18.081000+00:00	4	32.369	

	full_name	compound	date_start	lap_number	duration_sector_1	d
94	Esteban OCON	MEDIUM	2024-05-05T20:09:52.131000+00:00	5	32.255	
114	Esteban OCON	MEDIUM	2024-05-05T20:11:25.996000+00:00	6	32.562	
134	Esteban OCON	MEDIUM	2024-05-05T20:13:00.504000+00:00	7	32.259	
154	Esteban OCON	MEDIUM	2024-05-05T20:14:34.528000+00:00	8	32.613	
174	Esteban OCON	MEDIUM	2024-05-05T20:16:09.094000+00:00	9	32.272	
194	Esteban OCON	MEDIUM	2024-05-05T20:17:43.395000+00:00	10	32.355	
213	Esteban OCON	MEDIUM	2024-05-05T20:19:17.401000+00:00	11	32.305	
230	Esteban OCON	MEDIUM	2024-05-05T20:20:52.036000+00:00	12	32.223	
248	Esteban OCON	MEDIUM	2024-05-05T20:22:25.916000+00:00	13	31.887	
268	Esteban OCON	MEDIUM	2024-05-05T20:24:00.130000+00:00	14	31.929	
288	Esteban OCON	MEDIUM	2024-05-05T20:25:34.153000+00:00	15	31.743	
308	Esteban OCON	MEDIUM	2024-05-05T20:27:07.755000+00:00	16	31.711	
328	Esteban OCON	MEDIUM	2024-05-05T20:28:41.387000+00:00	17	31.827	
347	Esteban OCON	MEDIUM	2024-05-05T20:30:15.250000+00:00	18	31.797	
367	Esteban OCON	MEDIUM	2024-05-05T20:31:49.131000+00:00	19	31.785	
386	Esteban OCON	MEDIUM	2024-05-05T20:33:23.928000+00:00	20	32.061	
406	Esteban OCON	MEDIUM	2024-05-05T20:34:58.073000+00:00	21	31.868	
462	Esteban OCON	HARD	2024-05-05T20:40:06.197000+00:00	24	31.979	
482	Esteban OCON	HARD	2024-05-05T20:41:39.226000+00:00	25	31.386	
501	Esteban OCON	HARD	2024-05-05T20:43:12.077000+00:00	26	32.421	
521	Esteban OCON	HARD	2024-05-05T20:44:46.171000+00:00	27	31.610	
622	Esteban OCON	HARD	2024-05-05T20:56:17.266000+00:00	33	32.518	
641	Esteban OCON	HARD	2024-05-05T20:57:52.049000+00:00	34	31.672	
660	Esteban OCON	HARD	2024-05-05T20:59:24.870000+00:00	35	31.406	
679	Esteban OCON	HARD	2024-05-05T21:00:57.310000+00:00	36	31.348	

	full_name	compound	date_start	lap_number	duration_sector_1	d
698	Esteban OCON	HARD	2024-05-05T21:02:29.723000+00:00	37	31.429	
717	Esteban OCON	HARD	2024-05-05T21:04:02.292000+00:00	38	31.269	
736	Esteban OCON	HARD	2024-05-05T21:05:34.689000+00:00	39	31.197	
755	Esteban OCON	HARD	2024-05-05T21:07:07.107000+00:00	40	31.260	
774	Esteban OCON	HARD	2024-05-05T21:08:39.695000+00:00	41	31.158	
792	Esteban OCON	HARD	2024-05-05T21:10:12.291000+00:00	42	31.094	
811	Esteban OCON	HARD	2024-05-05T21:11:44.659000+00:00	43	31.128	
830	Esteban OCON	HARD	2024-05-05T21:13:16.855000+00:00	44	31.245	
849	Esteban OCON	HARD	2024-05-05T21:14:49.435000+00:00	45	31.327	
868	Esteban OCON	HARD	2024-05-05T21:16:22.773000+00:00	46	31.670	
887	Esteban OCON	HARD	2024-05-05T21:17:56.216000+00:00	47	31.248	
906	Esteban OCON	HARD	2024-05-05T21:19:29.594000+00:00	48	31.509	
925	Esteban OCON	HARD	2024-05-05T21:21:03.495000+00:00	49	31.378	
944	Esteban OCON	HARD	2024-05-05T21:22:36.263000+00:00	50	30.927	
963	Esteban OCON	HARD	2024-05-05T21:24:08.546000+00:00	51	30.829	
982	Esteban OCON	HARD	2024-05-05T21:25:40.551000+00:00	52	31.023	
1001	Esteban OCON	HARD	2024-05-05T21:27:12.590000+00:00	53	30.896	
1019	Esteban OCON	HARD	2024-05-05T21:28:44.847000+00:00	54	30.863	
1038	Esteban OCON	HARD	2024-05-05T21:30:17.265000+00:00	55	30.942	
1057	Esteban OCON	HARD	2024-05-05T21:31:49.312000+00:00	56	30.969	

In [213…

```
libraryDataF1.getinfolongruns(jointables,10,'Alpine',MINIMUN_SECONDS,MAXIMU
```

Out[213…

	full_name	compound	date_start	lap_number	duration_sector_1	d
24	Pierre GASLY	MEDIUM	2024-05-05T20:05:07.471000+00:00	2	32.446	
44	Pierre GASLY	MEDIUM	2024-05-05T20:06:42.063000+00:00	3	32.069	

	full_name	compound	date_start	lap_number	duration_sector_1	d
64	Pierre GASLY	MEDIUM	2024-05-05T20:08:15.899000+00:00	4	32.206	
84	Pierre GASLY	MEDIUM	2024-05-05T20:09:50.128000+00:00	5	32.047	
104	Pierre GASLY	MEDIUM	2024-05-05T20:11:24.177000+00:00	6	32.323	
124	Pierre GASLY	MEDIUM	2024-05-05T20:12:58.292000+00:00	7	32.199	
144	Pierre GASLY	MEDIUM	2024-05-05T20:14:32.511000+00:00	8	32.029	
164	Pierre GASLY	MEDIUM	2024-05-05T20:16:06.313000+00:00	9	32.218	
184	Pierre GASLY	MEDIUM	2024-05-05T20:17:40.283000+00:00	10	32.394	
204	Pierre GASLY	MEDIUM	2024-05-05T20:19:15.058000+00:00	11	32.595	
258	Pierre GASLY	HARD	2024-05-05T20:24:17.082000+00:00	14	31.827	
278	Pierre GASLY	HARD	2024-05-05T20:25:50.433000+00:00	15	31.680	
298	Pierre GASLY	HARD	2024-05-05T20:27:23.373000+00:00	16	32.027	
318	Pierre GASLY	HARD	2024-05-05T20:28:56.941000+00:00	17	31.718	
338	Pierre GASLY	HARD	2024-05-05T20:30:30.454000+00:00	18	31.886	
357	Pierre GASLY	HARD	2024-05-05T20:32:04.321000+00:00	19	31.708	
377	Pierre GASLY	HARD	2024-05-05T20:33:37.407000+00:00	20	31.804	
396	Pierre GASLY	HARD	2024-05-05T20:35:11.127000+00:00	21	32.010	
452	Pierre GASLY	HARD	2024-05-05T20:40:07.159000+00:00	24	32.199	
472	Pierre GASLY	HARD	2024-05-05T20:41:41.217000+00:00	25	31.960	
491	Pierre GASLY	HARD	2024-05-05T20:43:15.152000+00:00	26	32.166	
511	Pierre GASLY	HARD	2024-05-05T20:44:49.710000+00:00	27	31.722	
612	Pierre GASLY	HARD	2024-05-05T20:56:18.534000+00:00	33	32.141	
631	Pierre GASLY	HARD	2024-05-05T20:57:53.180000+00:00	34	32.052	
650	Pierre GASLY	HARD	2024-05-05T20:59:26.306000+00:00	35	31.554	
669	Pierre GASLY	HARD	2024-05-05T21:00:59.287000+00:00	36	31.568	
688	Pierre GASLY	HARD	2024-05-05T21:02:32.043000+00:00	37	31.498	

	full_name	compound	date_start	lap_number	duration_sector_1	d
707	Pierre GASLY	HARD	2024-05-05T21:04:04.985000+00:00	38	31.539	
726	Pierre GASLY	HARD	2024-05-05T21:05:37.885000+00:00	39	31.646	
745	Pierre GASLY	HARD	2024-05-05T21:07:10.799000+00:00	40	31.505	
764	Pierre GASLY	HARD	2024-05-05T21:08:43.687000+00:00	41	31.444	
782	Pierre GASLY	HARD	2024-05-05T21:10:16.619000+00:00	42	31.358	
801	Pierre GASLY	HARD	2024-05-05T21:11:49.279000+00:00	43	31.207	
820	Pierre GASLY	HARD	2024-05-05T21:13:21.799000+00:00	44	31.363	
839	Pierre GASLY	HARD	2024-05-05T21:14:54.635000+00:00	45	31.443	
858	Pierre GASLY	HARD	2024-05-05T21:16:27.615000+00:00	46	32.812	
877	Pierre GASLY	HARD	2024-05-05T21:18:02.059000+00:00	47	31.428	
896	Pierre GASLY	HARD	2024-05-05T21:19:34.782000+00:00	48	31.408	
915	Pierre GASLY	HARD	2024-05-05T21:21:07.434000+00:00	49	31.197	
934	Pierre GASLY	HARD	2024-05-05T21:22:40.174000+00:00	50	31.060	
953	Pierre GASLY	HARD	2024-05-05T21:24:12.583000+00:00	51	31.064	
972	Pierre GASLY	HARD	2024-05-05T21:25:45.113000+00:00	52	31.129	
991	Pierre GASLY	HARD	2024-05-05T21:27:17.702000+00:00	53	30.857	
1010	Pierre GASLY	HARD	2024-05-05T21:28:50.041000+00:00	54	30.991	
1028	Pierre GASLY	HARD	2024-05-05T21:30:22.212000+00:00	55	31.042	

Pits

Before to finish the analysis, I added the Pits sections where it can see how much time teams spent in the box.

In [214…

```
pit = libraryDataF1.obtain_information('pit',session_key=9507)
```

In [215…

```
jointables = pd.merge(drivers,pit,on=['driver_number']).query("pit_duratio
jointables
pit_duration = pd.DataFrame(jointables.groupby('team_name')['pit_duration'
pit_duration
```

Out[215…

team_name	pit_duration
Red Bull Racing	22.000000
Ferrari	22.300000
RB	22.300000
Mercedes	22.450000
Alpine	22.500000
Aston Martin	22.633333
Williams	22.633333
Kick Sauber	23.133333
McLaren	24.866667
Haas F1 Team	25.800000