In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
##import geopandas as gpd
```

In [2]:
```
SpaceM = pd.read_csv('space_missions.csv', encoding = 'latin-1')
SpaceM.head()
```

Out[2]:

	Company	Location	Date	Year_session	Time	Rocket	Mission	Rocket Status	Price	Mission Status
0	RVSN USSR	Site 1/5, Baikonur Cosmodrome, Kazakhstan	10/4/1957	1957-1958	19:28:00	Sputnik 8K71PS	Sputnik-1	Retired	NaN	Success
1	RVSN USSR	Site 1/5, Baikonur Cosmodrome, Kazakhstan	11/3/1957	1957-1958	2:30:00	Sputnik 8K71PS	Sputnik-2	Retired	NaN	Success
2	US Navy	LC-18A, Cape Canaveral AFS, Florida, USA	12/6/1957	1957-1958	16:44:00	Vanguard	Vanguard TV3	Retired	NaN	Failure
3	AMBA	LC-26A, Cape Canaveral AFS, Florida, USA	2/1/1958	1957-1958	3:48:00	Juno I	Explorer 1	Retired	NaN	Success
4	US Navy	LC-18A, Cape Canaveral AFS, Florida, USA	2/5/1958	1957-1958	7:33:00	Vanguard	Vanguard TV3BU	Retired	NaN	Failure

In [3]:
```
SpaceM.dtypes
```

Out[3]:
```
Company           object
Location          object
Date              object
Year_session      object
Time              object
Rocket            object
Mission           object
Rocket Status     object
Price             object
Mission Status    object
dtype: object
```

In [4]:
```
SpaceM.info
```

Out[4]:
```
<bound method DataFrame.info of         Company                                           Location       Date  \
0     RVSN USSR        Site 1/5, Baikonur Cosmodrome, Kazakhstan  10/4/1957
1     RVSN USSR        Site 1/5, Baikonur Cosmodrome, Kazakhstan  11/3/1957
2       US Navy         LC-18A, Cape Canaveral AFS, Florida, USA  12/6/1957
3          AMBA         LC-26A, Cape Canaveral AFS, Florida, USA   2/1/1958
4       US Navy         LC-18A, Cape Canaveral AFS, Florida, USA   2/5/1958
...         ...                                              ...        ...
4625     SpaceX          SLC-4E, Vandenberg SFB, California, USA  7/22/2022
4626       CASC  LC-101, Wenchang Satellite Launch Center, China  7/24/2022
4627     SpaceX       LC-39A, Kennedy Space Center, Florida, USA  7/24/2022
4628  CAS Space           Jiuquan Satellite Launch Center, China  7/27/2022
4629       CASC     LC-3, Xichang Satellite Launch Center, China  7/29/2022

     Year_session      Time            Rocket             Mission  \
0       1957-1958  19:28:00    Sputnik 8K71PS           Sputnik-1
1       1957-1958   2:30:00    Sputnik 8K71PS           Sputnik-2
2       1957-1958  16:44:00          Vanguard        Vanguard TV3
3       1957-1958   3:48:00            Juno I          Explorer 1
4       1957-1958   7:33:00          Vanguard      Vanguard TV3BU
...           ...       ...               ...                 ...
4625    2022-2023  17:39:00  Falcon 9 Block 5   Starlink Group 3-2
4626    2022-2023   6:22:00     Long March 5B             Wentian
4627    2022-2023  13:38:00  Falcon 9 Block 5  Starlink Group 4-25
4628    2022-2023   4:12:00        Zhongke-1A         Demo Flight
4629    2022-2023  13:28:00     Long March 2D   Yaogan 35 Group 03

     Rocket Status  Price Mission Status
0          Retired    NaN        Success
1          Retired    NaN        Success
2          Retired    NaN        Failure
3          Retired    NaN        Success
4          Retired    NaN        Failure
...            ...    ...            ...
4625        Active     67        Success
4626        Active    NaN        Success
4627        Active     67        Success
4628        Active    NaN        Success
4629        Active  29.75        Success

[4630 rows x 10 columns]>
```

In [5]:
```
SpaceM.shape
```

Out[5]: (4630, 10)

In [6]:
```
SpaceM.describe()
```

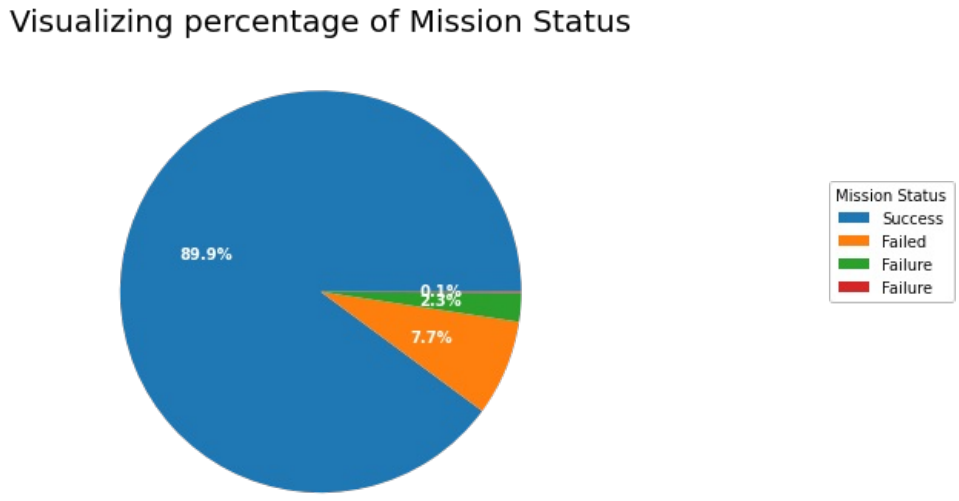
Out[6]:

	Company	Location	Date	Year_session	Time	Rocket	Mission	Rocket Status	Price	Mission Status
count	4630	4630	4630	4630	4503	4630	4630	4630	1265	4630
unique	62	158	4180	66	1300	370	4556	2	65	4
top	RVSN USSR	Site 31/6, Baikonur Cosmodrome, Kazakhstan	4/26/1962	2021-2022	12:00:00	Cosmos-3M (11K65M)	DSP	Retired	450	Success
freq	1777	251	4	159	52	446	8	3620	136	4162

In [7]:
```
SpaceM.columns
print(SpaceM['Rocket Status'].value_counts())
```

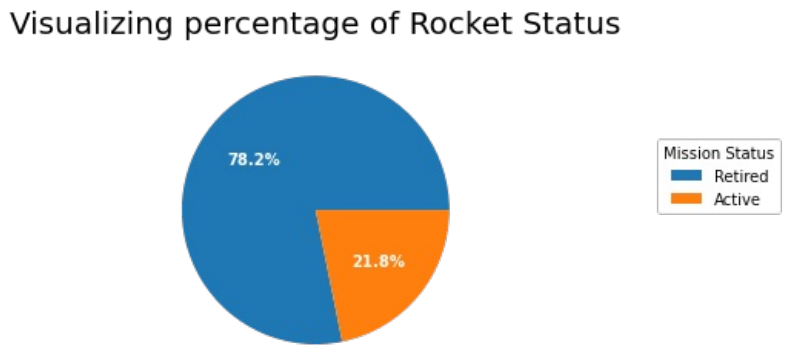
```
Retired    3620
Active     1010
Name: Rocket Status, dtype: int64
```

In [8]:
```
fig, ax = plt.subplots(figsize=(8, 6), subplot_kw=dict(aspect="equal"))

dataset = ["4162 Success",
           "357 Failed",
           "107 Partial Failure",
           "4 Prelaunch Failure"]
data = [float(x.split()[0]) for x in dataset]
sms = [x.split()[-1] for x in dataset]

wedges, texts, autotexts ,  = ax.pie(data, autopct = '%2.1f%%',
                                     textprops=dict(color="w"))

ax.legend(wedges, sms,
          title="Mission Status",
          loc="center left",
          bbox_to_anchor=(1.5, 0,0,1.2))

plt.setp(autotexts, size=10, weight="bold")

ax.set_title("Visualizing percentage of Mission Status", size=20)

#plt.rcParams["figure.figsize"] = [6.00,6.50]
plt.show()
```

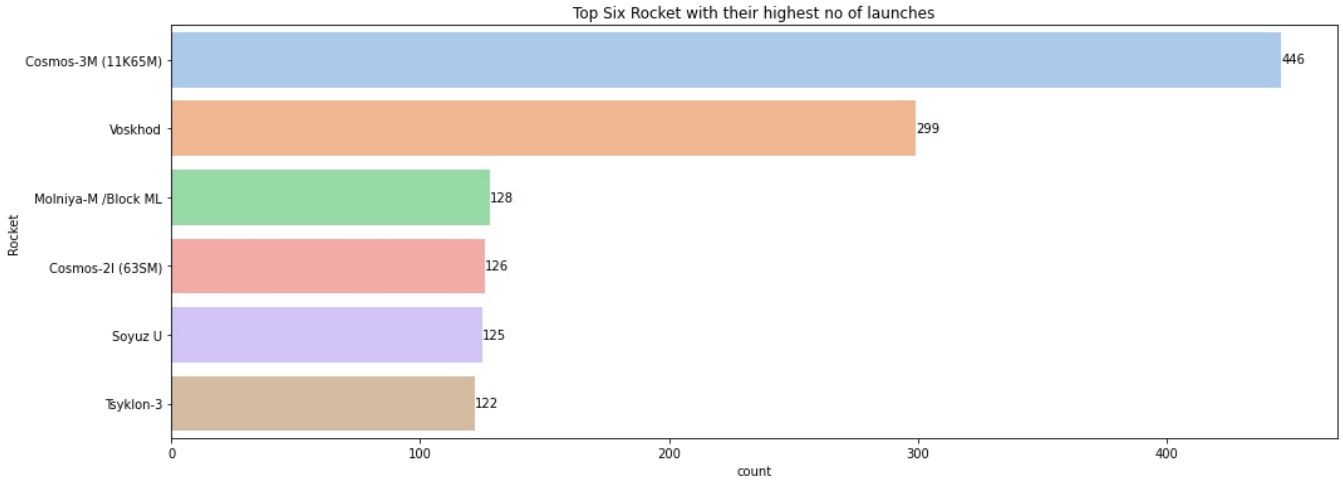


In [9]:
```
fig, ax = plt.subplots(figsize=(8, 4), subplot_kw=dict(aspect="equal"))

dataset = ["3620 Retired",
           "1010 Active",]
data = [float(x.split()[0]) for x in dataset]
sms = [x.split()[-1] for x in dataset]

wedges, texts, autotexts ,  = ax.pie(data, autopct = '%2.1f%%',
                                     textprops=dict(color="w"))

ax.legend(wedges, sms,
          title="Mission Status",
          loc="center left",
          bbox_to_anchor=(1.5, 0,0,1.2))
```

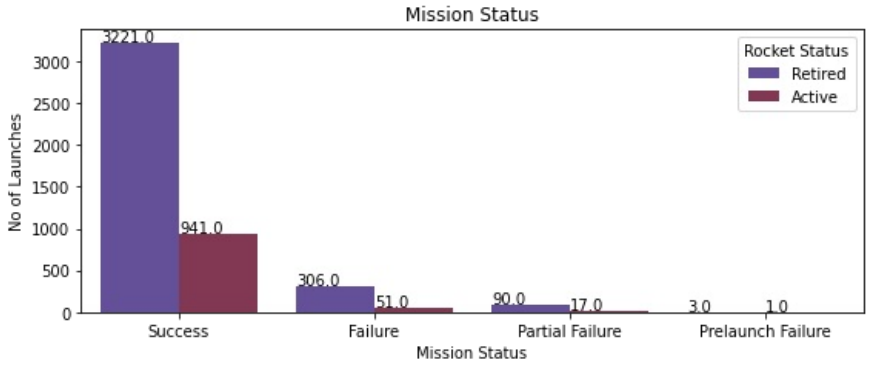
```
plt.setp(autotexts, size=10, weight="bold")

ax.set_title("Visualizing percentage of Rocket Status", size=20)

#plt.rcParams["figure.figsize"] = [6.00,6.50]
plt.show()
```



In [10]:
```
plt.rcParams ["figure.figsize"]=[15.00, 5.50]
plt.rcParams ["figure.autolayout"] = True

x= sns.countplot(y = "Rocket", data = SpaceM, palette = "pastel",
                 order = SpaceM.Rocket.value_counts().iloc[:6].index)
x.set_title("Top Six Rocket with their highest no of launches")
x.bar_label(x.containers[0])
plt.show()
```

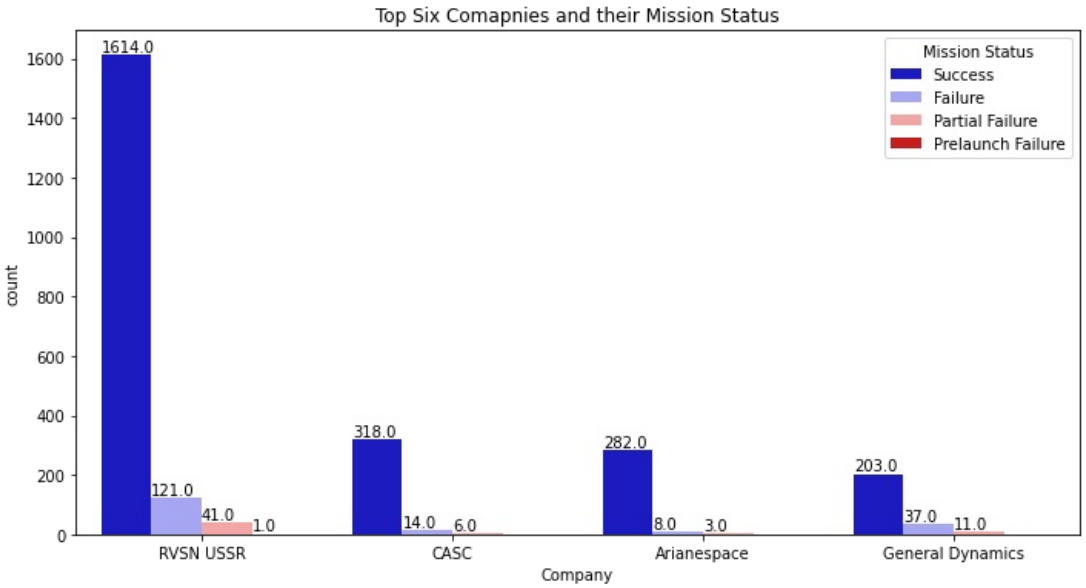


In [11]:
```
plt.rcParams ["figure.figsize"]=[8.00, 3.50]
plt.rcParams ["figure.autolayout"] = True

new = sns.countplot(x = 'Mission Status', data = SpaceM, hue = 'Rocket Status', palette = "twilight")

new.set(xlabel = "Mission Status", ylabel ="No of Launches", title = "Mission Status")
for p in new.patches:
    new.annotate('{:.1f}'.format(p.get_height()), (p.get_x(), p.get_height()+15))
plt.show()
```

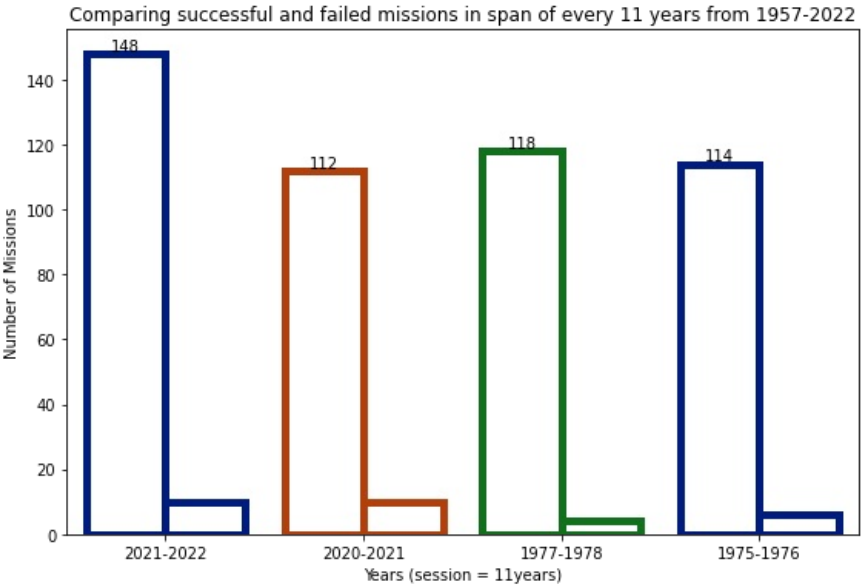


In [12]:
```
plt.rcParams ["figure.figsize"]=[10.00, 5.50]
plt.rcParams ["figure.autolayout"] = True

ms = sns.countplot(x = "Company", hue = "Mission Status", data = SpaceM, palette="seismic",
                   hue_order = ["Success", "Failure", "Partial Failure",  "Prelaunch Failure"],
                   order = SpaceM.Company.value_counts().iloc[:4].index)
ms.set_title("Top Six Comapnies and their Mission Status")
```

```
for p in ms.patches:
     ms.annotate('{:.1f}'.format(p.get_height()), (p.get_x(), p.get_height()+10))
plt.show()
```



In [13]:
```
plt.rcParams ["figure.figsize"]=[8.00, 5.50]
plt.rcParams ["figure.autolayout"] = True

X = sns.countplot(x = "Year_session", data = SpaceM, facecolor = (0, 0, 0, 0), linewidth = 5,
                  edgecolor = sns.color_palette("dark", 3), hue = 'Mission Status',hue_order = ["Success", "Failu
                   order = SpaceM.Year_session.value_counts().iloc[:4].index)
X.get_legend().remove()
X.bar_label(X.containers[0])
X.set(xlabel = "Years (session = 11years)", ylabel = "Number of Missions",
    title = 'Comparing successful and failed missions in span of every 11 years from 1957-2022')
plt.show()
```



In [ ]: