In [22]:
```
import numpy as np
import pandas as pd
```

In [24]:
```
df = pd.DataFrame({
    'Population' : [
        147575730,
        156256276,
        157977153,
        159685424,
        161376708,
        163046161,
        164689383,
        166303498,
        167344585],
    'GDP' : [115.28, 195.08, 221.42, 249.71, 274.04, 302.56, 324.24, 350.00, 455.00],
    'Internet Users(in million)' : [
        6.08,
        19.42,
        21.44,
        63.33,
        81.74,
        91.82,
        99.98,
        112.71,
        130.00
    ],
    'Social Media Users(in million)' : [
        1.00,
        18.00,
        23.00,
        26.00,
        30.00,
        34.00,
        36.00,
        45.00,
        50.00
    ],
    'Year' : [2010, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022]
}, columns = ['Population', 'GDP', 'Internet Users(in million)', 'Social Media Users(in million)', 'Year'])
```

In [25]:
```
df.index = [
    '2009-10',
    '2014-15',
    '2015-16',
    '2016-17',
    '2017-18',
    '2018-19',
    '2019-20',
    '2020-21',
    '2021-22'
]
```

In [26]:
```
df
```

Out[26]:

	Population	GDP	Internet Users(in million)	Social Media Users(in million)	Year
2009-10	147575730	115.28	6.08	1.0	2010
2014-15	156256276	195.08	19.42	18.0	2015
2015-16	157977153	221.42	21.44	23.0	2016
2016-17	159685424	249.71	63.33	26.0	2017
2017-18	161376708	274.04	81.74	30.0	2018
2018-19	163046161	302.56	91.82	34.0	2019
2019-20	164689383	324.24	99.98	36.0	2020
2020-21	166303498	350.00	112.71	45.0	2021
2021-22	167344585	455.00	130.00	50.0	2022

In [27]:
```
df.shape
```

Out[27]:
```
(9, 5)
```

In [28]:
```
df.size
```

Out[28]: 45

In [29]:
```
df.describe()
```

Out[29]:

	Population	GDP	Internet Users(in million)	Social Media Users(in million)	Year
count	9.000000e+00	9.000000	9.000000	9.000000	9.000000
mean	1.604728e+08	276.370000	69.613333	29.222222	2017.555556
std	6.097120e+06	97.852725	44.696482	14.669507	3.643869
min	1.475757e+08	115.280000	6.080000	1.000000	2010.000000
25%	1.579772e+08	221.420000	21.440000	23.000000	2016.000000
50%	1.613767e+08	274.040000	81.740000	30.000000	2018.000000
75%	1.646894e+08	324.240000	99.980000	36.000000	2020.000000
max	1.673446e+08	455.000000	130.000000	50.000000	2022.000000

In [30]:
```
df.dtypes
```

Out[30]:
```
Population                        int64
GDP                             float64
Internet Users(in million)      float64
Social Media Users(in million)  float64
Year                              int64
dtype: object
```

In [31]:
```
df.loc['2009-10']
```

Out[31]:
```
Population                      1.475757e+08
GDP                             1.152800e+02
Internet Users(in million)      6.080000e+00
Social Media Users(in million)  1.000000e+00
Year                            2.010000e+03
Name: 2009-10, dtype: float64
```

In [32]:
```
df[0:3]
```

Out[32]:

	Population	GDP	Internet Users(in million)	Social Media Users(in million)	Year
2009-10	147575730	115.28	6.08	1.0	2010
2014-15	156256276	195.08	19.42	18.0	2015
2015-16	157977153	221.42	21.44	23.0	2016

In [33]:
```
df.loc['2015-16' : '2021-22', ['GDP', 'Internet Users(in million)']]
```

Out[33]:

	GDP	Internet Users(in million)
2015-16	221.42	21.44
2016-17	249.71	63.33
2017-18	274.04	81.74
2018-19	302.56	91.82
2019-20	324.24	99.98
2020-21	350.00	112.71
2021-22	455.00	130.00

In [34]:
```
df.loc[df['Internet Users(in million)'] > 90, ['Population', 'GDP']]
```

Out[34]:

	Population	GDP

2018-19	163046161	302.56
2019-20	164689383	324.24
2020-21	166303498	350.00
2021-22	167344585	455.00

In [35]:
```
ipr = pd.Series([8, 12.1, 13.2, 39, 49, 55, 41, 28.8, 25],
                index = ['2009-10', '2014-15', '2015-16', '2016-17', '2017-18','2018-19', '2019-20', '2020-21', '2
                )
```

In [36]:
```
df['Internet Penetration Rate(Percentage)'] = ipr
```

In [37]:
```
df
```

Out[37]:

	Population	GDP	Internet Users(in million)	Social Media Users(in million)	Year	Internet Penetration Rate(Percentage)
2009-10	147575730	115.28	6.08	1.0	2010	8.0
2014-15	156256276	195.08	19.42	18.0	2015	12.1
2015-16	157977153	221.42	21.44	23.0	2016	13.2
2016-17	159685424	249.71	63.33	26.0	2017	39.0
2017-18	161376708	274.04	81.74	30.0	2018	49.0
2018-19	163046161	302.56	91.82	34.0	2019	55.0
2019-20	164689383	324.24	99.98	36.0	2020	41.0
2020-21	166303498	350.00	112.71	45.0	2021	28.8
2021-22	167344585	455.00	130.00	50.0	2022	25.0

In [39]:
```
df.describe()
```

Out[39]:

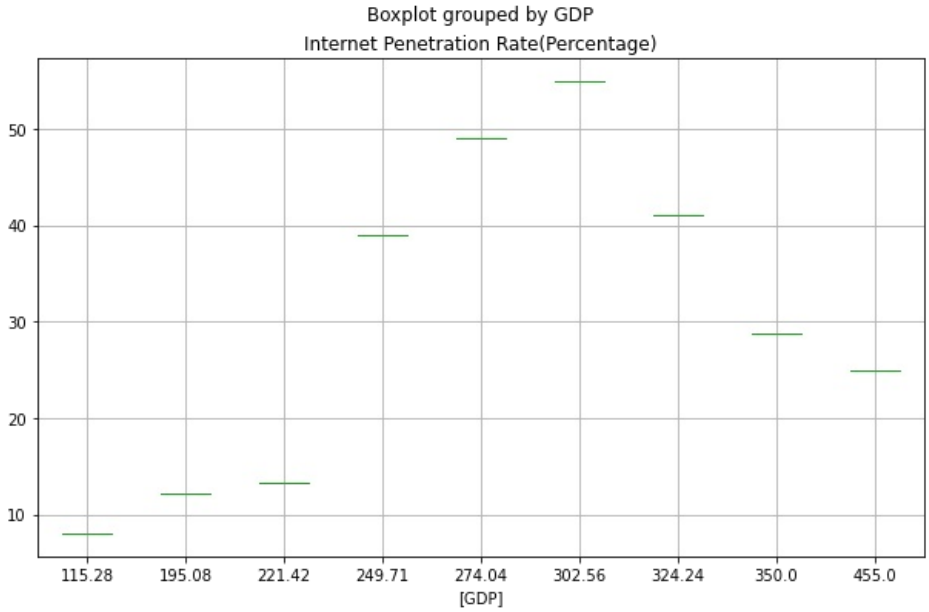
	Population	GDP	Internet Users(in million)	Social Media Users(in million)	Year	Internet Penetration Rate(Percentage)
count	9.000000e+00	9.000000	9.000000	9.000000	9.000000	9.000000
mean	1.604728e+08	276.370000	69.613333	29.222222	2017.555556	30.122222
std	6.097120e+06	97.852725	44.696482	14.669507	3.643869	16.959347
min	1.475757e+08	115.280000	6.080000	1.000000	2010.000000	8.000000
25%	1.579772e+08	221.420000	21.440000	23.000000	2016.000000	13.200000
50%	1.613767e+08	274.040000	81.740000	30.000000	2018.000000	28.800000
75%	1.646894e+08	324.240000	99.980000	36.000000	2020.000000	41.000000
max	1.673446e+08	455.000000	130.000000	50.000000	2022.000000	55.000000

In [54]:
```
df.value_counts()
```

Out[54]:
```
Population  GDP     Internet Users(in million)  Social Media Users(in million)  Year  Internet Penetration Rate(P
ercentage)
167344585   455.00  130.00                      50.0                            2022  25.0
1
166303498   350.00  112.71                      45.0                            2021  28.8
1
164689383   324.24  99.98                       36.0                            2020  41.0
1
163046161   302.56  91.82                       34.0                            2019  55.0
1
161376708   274.04  81.74                       30.0                            2018  49.0
1
159685424   249.71  63.33                       26.0                            2017  39.0
1
157977153   221.42  21.44                       23.0                            2016  13.2
1
156256276   195.08  19.42                       18.0                            2015  12.1
1
147575730   115.28  6.08                        1.0                             2010  8.0
1
dtype: int64
```

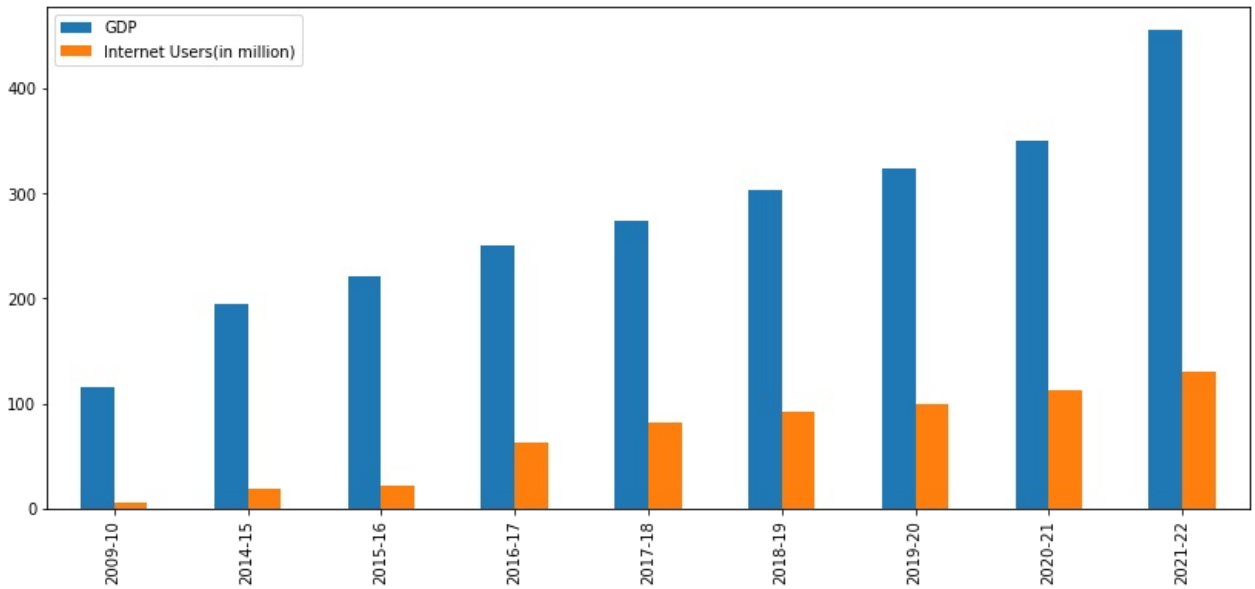
In [55]:
```
df[['GDP', 'Internet Penetration Rate(Percentage)']].boxplot(by = 'GDP', figsize=(10,6))
```

Out[55]: <AxesSubplot:title={'center':'Internet Penetration Rate(Percentage)'}, xlabel='[GDP]'>



In [58]:
```
df[['GDP', 'Internet Users(in million)']].plot(kind='bar', figsize=(14,6))
```

Out[58]: <AxesSubplot:>



In [ ]: