In [1]:

```
import pandas as pd
import seaborn as sns
```

In [2]:

```
df1 = pd.read_csv("sample inventory table.csv")
```

In [3]:

```
df1.head()
```

Out[3]:

	timestamp	type	status	box
0	23/4/2021	moderna	in	1000
1	23/4/2021	moderna	in	1001
2	23/4/2021	moderna	in	1002
3	23/4/2021	moderna	in	1003
4	23/4/2021	moderna	in	1004

In [4]:

```
df1.tail()
```

Out[4]:

	timestamp	type	status	box
55	7/5/2021	pfizer	in	1501
56	7/5/2021	pfizer	in	1502
57	7/5/2021	pfizer	in	1503
58	7/5/2021	pfizer	in	1504
59	7/5/2021	pfizer	in	1505

In [5]:

```
# Distribution of the Two Vaccine Types

df1.groupby('type').count()
```

Out[5]:

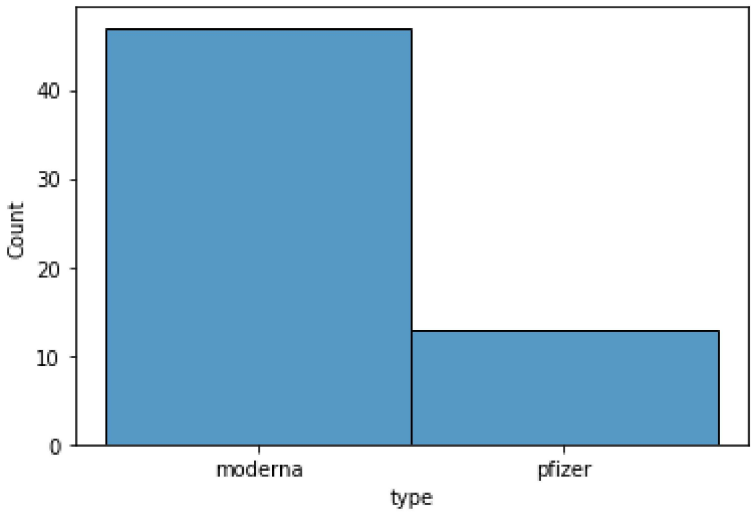
	timestamp	status	box
type			
moderna	47	47	47
pfizer	13	13	13

In [6]:

```
sns.histplot(data=df1,x='type',stat='count')
```

Out[6]:

```
<AxesSubplot:xlabel='type', ylabel='Count'>
```



In [7]:

```
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 60 entries, 0 to 59
Data columns (total 4 columns):
 #   Column     Non-Null Count  Dtype 
---  ------     --------------  ----- 
 0   timestamp  60 non-null     object
 1   type       60 non-null     object
 2   status     60 non-null     object
 3   box        60 non-null     int64 
dtypes: int64(1), object(3)
memory usage: 2.0+ KB
```

In [8]:

```
df1['timestamp'] = pd.to_datetime(df1['timestamp'], format='%d/%m/%Y')
```

In [9]:

```
# drop duplicates in case boxes were scanned more than once
# for either in or out by mistake

df1.drop_duplicates(subset=['status','type','box'],keep='first',inplace=True)
```

In [10]:

```
# Remove those boxes which have been checked out
# Methodogy is convert all the status 'out' entries into 'in' which forces
# the corresponding in to become duplicate entries.  Then we do a
# remove duplicate with keep=False to drop all duplicates
# Hence, whatever remains in the dataframe df1 represents boxes that are checked
# into the fridge and not yet checked out, ie real physical inventory

df1.loc[df1['status']=='out','status']='in'
df1.drop_duplicates(subset=['status','type','box'],keep=False,inplace=True)
```

Processing & Visualisation for Moderna Vaccine

Moderna vaccine can be stored at 2 to 8 degrees for up to 30 days

In [11]:

```
# Filtering out the Moderna Vaccine into dataframe df2

# df2 = df1[df1['type']=='moderna']


df2 = df1.loc[df1['type']=='moderna',:]
```

In [12]:

```
df2
```

Out[12]:

	timestamp	type	status	box
10	2021-04-23	moderna	in	1010
11	2021-04-23	moderna	in	1011
12	2021-04-23	moderna	in	1012
13	2021-04-23	moderna	in	1013
14	2021-04-23	moderna	in	1014
15	2021-04-23	moderna	in	1015
16	2021-04-23	moderna	in	1016
17	2021-04-23	moderna	in	1017
18	2021-04-23	moderna	in	1018
19	2021-04-23	moderna	in	1019
20	2021-04-23	moderna	in	1020
26	2021-04-24	moderna	in	1100
27	2021-04-24	moderna	in	1101
28	2021-04-24	moderna	in	1102
29	2021-04-24	moderna	in	1103
30	2021-04-24	moderna	in	1104
34	2021-04-28	moderna	in	1200
35	2021-04-29	moderna	in	1300
36	2021-04-30	moderna	in	1310
37	2021-05-01	moderna	in	1320
38	2021-05-02	moderna	in	1330
41	2021-05-07	moderna	in	1500
42	2021-05-07	moderna	in	1501
43	2021-05-07	moderna	in	1502
44	2021-05-07	moderna	in	1503
45	2021-05-07	moderna	in	1504
46	2021-05-07	moderna	in	1505

In [13]:

```
currentDate = pd.to_datetime("28/5/2021", format='%d/%m/%Y')
```

In [14]:

```
df2['ElapsedDays'] = currentDate - df2['timestamp']
```

```
<ipython-input-14-535364ac3e3e>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/
stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pand
as.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-v
ersus-a-copy)
  df2['ElapsedDays'] = currentDate - df2['timestamp']
```

In [15]:

```
df2.head()
```

Out[15]:

	timestamp	type	status	box	ElapsedDays
10	2021-04-23	moderna	in	1010	35 days
11	2021-04-23	moderna	in	1011	35 days
12	2021-04-23	moderna	in	1012	35 days
13	2021-04-23	moderna	in	1013	35 days
14	2021-04-23	moderna	in	1014	35 days

In [16]:

```
df2['ElapsedDays'] = df2['ElapsedDays'].dt.days.astype('int16')
```

```
<ipython-input-16-90c6ce392f52>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/
stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pand
as.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-v
ersus-a-copy)
  df2['ElapsedDays'] = df2['ElapsedDays'].dt.days.astype('int16')
```

In [17]:

```
df2['RemainDays'] = 30 - df2['ElapsedDays']
```

```
<ipython-input-17-92bb5608371e>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/
stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pand
as.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-v
ersus-a-copy)
  df2['RemainDays'] = 30 - df2['ElapsedDays']
```

In [18]:

```
# checking on the overall statistics

df2.describe()
```

Out[18]:

	box	ElapsedDays	RemainDays
count	27.000000	27.000000	27.000000
mean	1190.740741	30.407407	-0.407407
std	198.528741	5.773009	5.773009
min	1010.000000	21.000000	-5.000000
25%	1016.500000	26.500000	-5.000000
50%	1102.000000	34.000000	-4.000000
75%	1325.000000	35.000000	3.500000
max	1505.000000	35.000000	9.000000

In [19]:

```
# Displaying the inventory stock level

# total number of boxes in stock

total_stock = df2['box'].count()
print("Total number of boxes in stock:",total_stock)

# check for expired stock ie ElapsedDays >30

expired=df2.loc[df2['ElapsedDays']>30, 'box'].count()
print('Number of Expired boxes:',expired)

# check for number of unexpired inventory

valid_stock = total_stock - expired
print('Total number of unexpired valid stock:',valid_stock)

# mean and median of inventory

ElapsedDays_mean = df2['ElapsedDays'].mean()
ElapsedDays_median = df2['ElapsedDays'].median()

print(f'The mean and median of Elapsed Days are {ElapsedDays_mean:.2f} and {ElapsedDays_med
```

```
Total number of boxes in stock: 27
Number of Expired boxes: 16
Total number of unexpired valid stock: 11
The mean and median of Elapsed Days are 30.41 and 34.00 respectively
```

In [20]:

```
# Tabulate breakdown of inventory according to ElapsedDays

df2.groupby('ElapsedDays').agg({'ElapsedDays':'count'})
```

Out[20]:

ElapsedDays	ElapsedDays
21	6
26	1
27	1
28	1
29	1
30	1
34	5
35	11

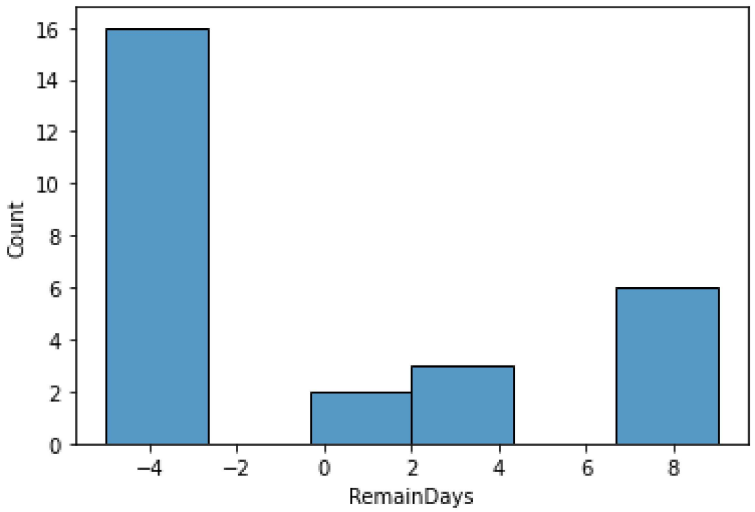
In [21]:

```
# Visualising the breakdown in Days Remaining vs box count
# Negative values mean vaccine expired

sns.histplot(data=df2,x='RemainDays',stat='count')
```

Out[21]:

```
<AxesSubplot:xlabel='RemainDays', ylabel='Count'>
```



Processing & Visualisation for Pfizer Vaccine

Pfizer vaccine can be stored at 2 to 8 degrees for up to 5 days

In [22]:

```
# Filtering out the Pfizer Vaccine into dataframe df3

df3 = df1[df1['type']=='pfizer']
```

In [23]:

```
currentDate = pd.to_datetime("7/5/2021", format='%d/%m/%Y')
```

In [24]:

```
df3['ElapsedDays'] = currentDate - df3['timestamp']
```

```
<ipython-input-24-a66c9cadef46>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/
stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pand
as.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-v
ersus-a-copy)
  df3['ElapsedDays'] = currentDate - df3['timestamp']
```

In [25]:

```
df3.head()
```

Out[25]:

	timestamp	type	status	box	ElapsedDays
49	2021-04-30	pfizer	in	1310	7 days
50	2021-05-01	pfizer	in	1320	6 days
51	2021-05-02	pfizer	in	1330	5 days
54	2021-05-07	pfizer	in	1500	0 days
55	2021-05-07	pfizer	in	1501	0 days

In [26]:

```
df3['ElapsedDays'] = df3['ElapsedDays'].dt.days.astype('int16')
```

```
<ipython-input-26-3163159dd63b>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/
stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pand
as.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-v
ersus-a-copy)
  df3['ElapsedDays'] = df3['ElapsedDays'].dt.days.astype('int16')
```

In [27]:

```
df3['RemainDays'] = 5 - df3['ElapsedDays']
```

```
<ipython-input-27-9895a1eaaa99>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/
stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pand
as.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-v
ersus-a-copy)
  df3['RemainDays'] = 5 - df3['ElapsedDays']
```

In [28]:

```
# checking on the overall statistics

df3.describe()
```

Out[28]:

	box	ElapsedDays	RemainDays
count	9.000000	9.000000	9.000000
mean	1441.666667	2.000000	3.000000
std	91.398851	3.041381	3.041381
min	1310.000000	0.000000	-2.000000
25%	1330.000000	0.000000	0.000000
50%	1501.000000	0.000000	5.000000
75%	1503.000000	5.000000	5.000000
max	1505.000000	7.000000	5.000000

In [29]:

```
# Displaying the inventory stock level

# total number of boxes in stock

total_stock = df3['box'].count()
print("Total number of boxes in stock:",total_stock)

# check for expired stock ie ElapsedDays >5

expired=df3.loc[df3['ElapsedDays']>5, 'box'].count()
print('Number of Expired boxes:',expired)

# check for number of unexpired inventory

valid_stock = total_stock - expired
print('Total number of unexpired valid stock:',valid_stock)

# mean and median of inventory

ElapsedDays_mean = df3['ElapsedDays'].mean()
ElapsedDays_median = df3['ElapsedDays'].median()

print(f'The mean and median of Elapsed Days are {ElapsedDays_mean:.2f} and {ElapsedDays_med
```

```
Total number of boxes in stock: 9
Number of Expired boxes: 2
Total number of unexpired valid stock: 7
The mean and median of Elapsed Days are 2.00 and 0.00 respectively
```

In [30]:

```
# Tabulate breakdown of inventory according to ElapsedDays

df3.groupby('ElapsedDays').agg({'ElapsedDays':'count'})
```

Out[30]:

	ElapsedDays
ElapsedDays	
0	6
5	1
6	1
7	1

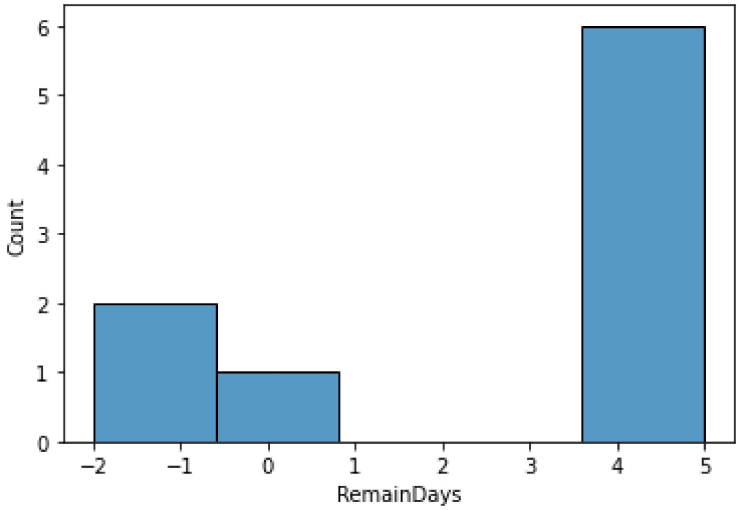
In [31]:

```
# Visualising the breakdown in Days Remaining vs box count
# Negative values mean vaccine expired

sns.histplot(data=df3,x='RemainDays',stat='count')
```

Out[31]:

```
<AxesSubplot:xlabel='RemainDays', ylabel='Count'>
```



In [ ]: