Task 5: Traffic Accident Data Analysis and Visualization

In this task, we analyze traffic accident data from the US to identify patterns based on road conditions, weather, time of day, and locations.
We also visualize accident hotspots and contributing factors to understand public safety trends.

In [5]:
```
import os
os.listdir()
```

Out[5]:
```
['.config',
 '.cache',
 '.profile',
 'US_Accidents_Dec21.csv.csv',
 'nltk_data',
 '.npm',
 '.jupyter',
 '.pythonstartup.py',
 '.gitconfig',
 '.vimrc',
 '.virtualenvs',
 'anaconda_projects',
 'bank-full.csv',
 '.ipython',
 'Untitled3.ipynb',
 '.bashrc',
 '.anaconda',
 'Untitled4.ipynb',
 'README.ipynb',
 '.local',
 'task1.ipynb',
 '.ipynb_checkpoints',
 'Untitled2.ipynb',
 'Untitled.ipynb',
 'Untitled1.ipynb']
```

In [7]:
```
import pandas as pd

df = pd.read_csv('US_Accidents_Dec21.csv.csv')
df.head()
```

```
/tmp/ipykernel_855/2942577143.py:3: DtypeWarning: Columns (29,30,31,32,33,34,35,36,37,38,39,40,41) have mixed types. Specify dtype option on import or set low_memory=False.
  df = pd.read_csv('US_Accidents_Dec21.csv.csv')
```

Out[7]:

	ID	Source	Severity	Start_Time	End_Time	Start_Lat	Start_Lng	End_Lat	End_Ln
0	A-1	Source2	3	2016-02-08 05:46:00	2016-02-08 11:00:00	39.865147	-84.058723	NaN	Na
1	A-2	Source2	2	2016-02-08 06:07:59	2016-02-08 06:37:59	39.928059	-82.831184	NaN	Na
2	A-3	Source2	2	2016-02-08 06:49:27	2016-02-08 07:19:27	39.063148	-84.032608	NaN	Na
3	A-4	Source2	3	2016-02-08 07:23:34	2016-02-08 07:53:34	39.747753	-84.205582	NaN	Na
4	A-5	Source2	2	2016-02-08 07:39:07	2016-02-08 08:09:07	39.627781	-84.188354	NaN	Na

5 rows × 46 columns

In [8]:
```
df.isnull().sum().sort_values(ascending=False).head(10)
```

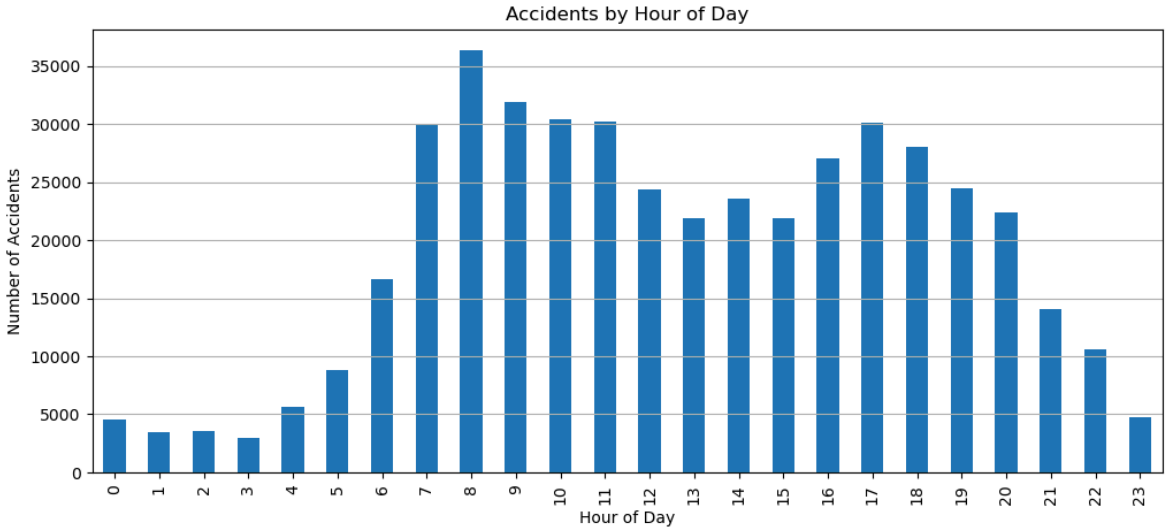
Out[8]:
```
End_Lat              457582
End_Lng              457582
Precipitation(in)    409482
Wind_Chill(F)        395605
Wind_Speed(mph)       81585
Visibility(mi)         9748
Weather_Condition      9288
Humidity(%)            7269
Temperature(F)         6630
Pressure(in)           5241
dtype: int64
```

In [10]:
```
import matplotlib.pyplot as plt
```

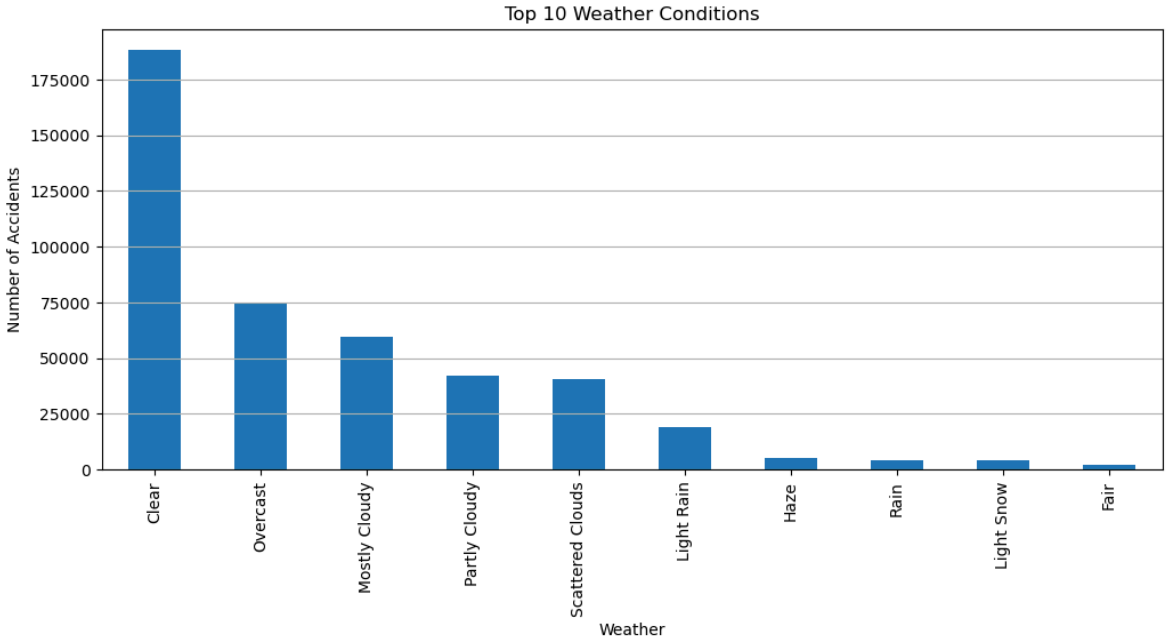
In [11]:
```
import matplotlib.pyplot as plt  # ✅ Make sure this is included

df['Start_Time'] = pd.to_datetime(df['Start_Time'], errors='coerce')
df['Hour'] = df['Start_Time'].dt.hour

df['Hour'].value_counts().sort_index().plot(kind='bar', figsize=(12,5), title='A
plt.xlabel('Hour of Day')
plt.ylabel('Number of Accidents')
plt.grid(axis='y')
plt.show()
```



In [12]:
```
df['Weather_Condition'].value_counts().head(10).plot(kind='bar', figsize=(12,5),
plt.xlabel('Weather')
plt.ylabel('Number of Accidents')
plt.grid(axis='y')
plt.show()
```



In [13]:
```
!pip install folium
import folium

accident_map = folium.Map(location=[39.5, -98.35], zoom_start=4)

for i, row in df[['Start_Lat', 'Start_Lng']].dropna().head(500).iterrows():
    folium.CircleMarker(
        location=[row['Start_Lat'], row['Start_Lng']],
        radius=1,
        color='red',
        fill=True
    ).add_to(accident_map)

accident_map
```

```
Defaulting to user installation because normal site-packages is not writeable
Looking in links: /usr/share/pip-wheels
Collecting folium
  Obtaining dependency information for folium from https://files.pythonhosted.org
g/packages/b5/a8/5f764f333204db0390362a4356d03a43626997f26818a0e9396f1b3bd8c9/fol
ium-0.20.0-py2.py3-none-any.whl.metadata
  Downloading folium-0.20.0-py2.py3-none-any.whl.metadata (4.2 kB)
Collecting branca>=0.6.0 (from folium)
  Obtaining dependency information for branca>=0.6.0 from https://files.pythonhos
ted.org/packages/f8/9d/91cddd38bd00170aad1a4b198c47b4ed716be45c234e09b835af41f4e7
17/branca-0.8.1-py3-none-any.whl.metadata
  Downloading branca-0.8.1-py3-none-any.whl.metadata (1.5 kB)
Requirement already satisfied: jinja2>=2.9 in /opt/conda/envs/anaconda-panel-202
3.05-py310/lib/python3.11/site-packages (from folium) (3.1.2)
Requirement already satisfied: numpy in /opt/conda/envs/anaconda-panel-2023.05-py
310/lib/python3.11/site-packages (from folium) (1.24.3)
Requirement already satisfied: requests in /opt/conda/envs/anaconda-panel-2023.05
-py310/lib/python3.11/site-packages (from folium) (2.31.0)
Requirement already satisfied: xyzservices in /opt/conda/envs/anaconda-panel-202
3.05-py310/lib/python3.11/site-packages (from folium) (2022.9.0)
Requirement already satisfied: MarkupSafe>=2.0 in /opt/conda/envs/anaconda-panel-
2023.05-py310/lib/python3.11/site-packages (from jinja2>=2.9->folium) (2.1.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /opt/conda/envs/anacon
da-panel-2023.05-py310/lib/python3.11/site-packages (from requests->folium) (2.0.
4)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/anaconda-panel-202
3.05-py310/lib/python3.11/site-packages (from requests->folium) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in /opt/conda/envs/anaconda-pan
el-2023.05-py310/lib/python3.11/site-packages (from requests->folium) (1.26.16)
Requirement already satisfied: certifi>=2017.4.17 in /opt/conda/envs/anaconda-pan
el-2023.05-py310/lib/python3.11/site-packages (from requests->folium) (2023.7.22)
Downloading folium-0.20.0-py2.py3-none-any.whl (113 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 113.4/113.4 kB 2.5 MB/s eta 0:00:00
0:00:01
Downloading branca-0.8.1-py3-none-any.whl (26 kB)
Installing collected packages: branca, folium
Successfully installed branca-0.8.1 folium-0.20.0
```

Out[13]: Make this Notebook Trusted to load map: File -> Trust Notebook

Conclusion

- Most accidents happen during peak traffic hours (7–9 AM, 4–6 PM).
- Common weather during accidents: Rain, Fog, and Snow.
- Hotspot maps show accident clusters around major urban areas.

In [ ]: