In [ ]:
```
import time
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
import multiprocessing
from concurrent.futures import ThreadPoolExecutor

warnings.filterwarnings("ignore")
```

In [ ]:
```
# Number of Cores: 16 for Predator Helios 300 (i7 10th gen)
numberOfCores = multiprocessing.cpu_count()
print("Num of cores are: ", numberOfCores)
```

```
Num of cores are:  16
```

In [ ]:
```
# Function for multiplying two matrices
def matrix_multiply(mat1, mat2):
    return np.dot(mat1, mat2)
```

In [ ]:
```
# Function to perform matrix multiplications
def perform_matrix_multiplications(num_matrices, matrix_size, constant_matrix):
    results = []
    for _ in range(num_matrices):
        random_matrix = np.random.rand(*matrix_size)
        result = matrix_multiply(random_matrix, constant_matrix)
        results.append(result)
    return results
```

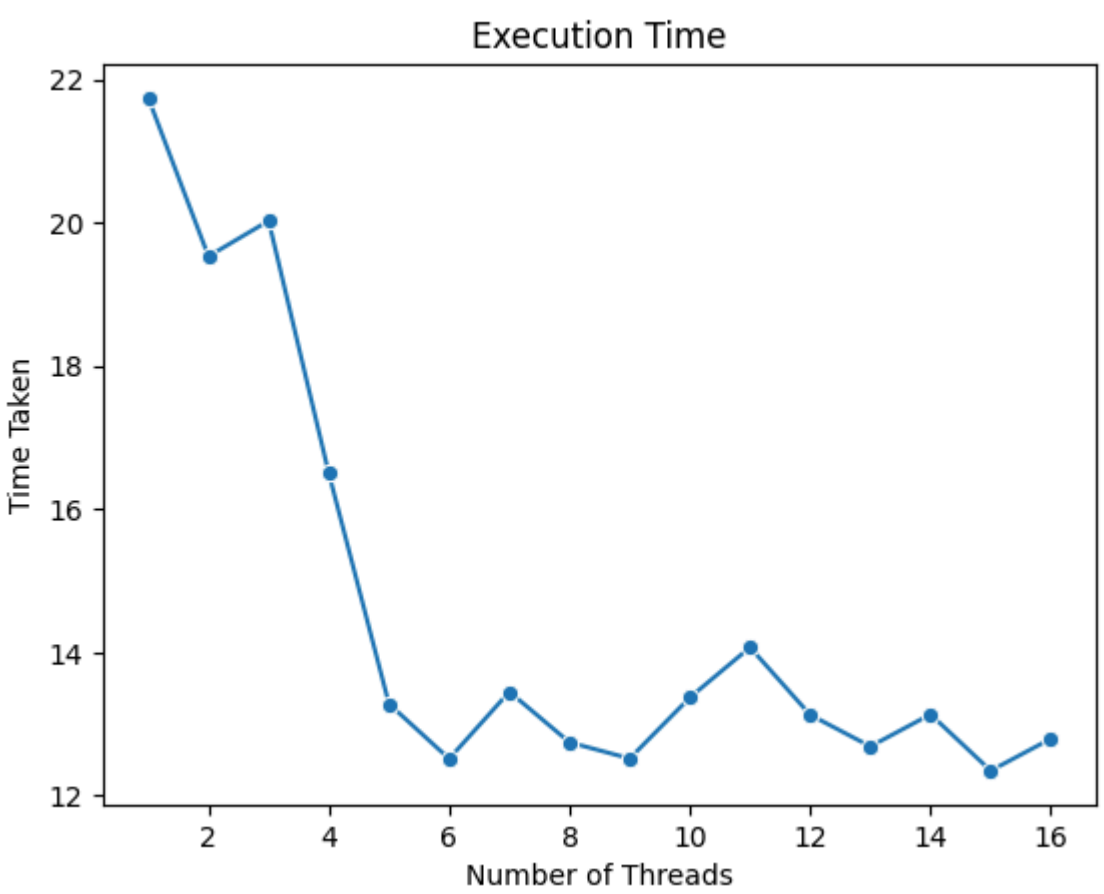
In [ ]:
```
def main(num_threads):
    matrix_size = (2000, 2000)
    num_matrices = 100
    constant_matrix = np.random.rand(*matrix_size)

    # Start time
    start_time = time.time()

    # Perform matrix multiplications with specified number of threads
    with ThreadPoolExecutor(max_workers=num_threads) as executor:
        results = executor.map(
            perform_matrix_multiplications,
            [num_matrices // num_threads] * num_threads,
            [matrix_size] * num_threads,
```

```
Time taken with 1 threads: 21.7392 seconds
Time taken with 2 threads: 19.5289 seconds
Time taken with 3 threads: 20.0245 seconds
Time taken with 4 threads: 16.5004 seconds
Time taken with 5 threads: 13.2827 seconds
Time taken with 6 threads: 12.5169 seconds
Time taken with 7 threads: 13.4517 seconds
Time taken with 8 threads: 12.7461 seconds
Time taken with 9 threads: 12.5203 seconds
Time taken with 10 threads: 13.3718 seconds
Time taken with 11 threads: 14.0723 seconds
Time taken with 12 threads: 13.1298 seconds
Time taken with 13 threads: 12.6890 seconds
Time taken with 14 threads: 13.1368 seconds
Time taken with 15 threads: 12.3505 seconds
Time taken with 16 threads: 12.7971 seconds
```

In [ ]:
```python
# Result Table
results_pd = pd.DataFrame(data = {
    'Threads': list(np.arange(1,17)),
    'Time Taken' : tt
})
results_pd
```

Out[ ]:

| | Threads | Time Taken |
|---|---|---|
| **0** | 1 | 21.739154 |
| **1** | 2 | 19.528908 |
| **2** | 3 | 20.024504 |
| **3** | 4 | 16.500403 |
| **4** | 5 | 13.282717 |
| **5** | 6 | 12.516893 |
| **6** | 7 | 13.451714 |
| **7** | 8 | 12.746060 |
| **8** | 9 | 12.520297 |
| **9** | 10 | 13.371803 |
| **10** | 11 | 14.072305 |
| **11** | 12 | 13.129847 |


Execution Time
Time Taken
Number of Threads
22
20
18
16
14
12
2
4
6
8
10
12
14
16