OS ASSIGNMENT 3

Name	**Areeba Farooq**
Registration Number	**200901058**
Batch & Section	**BSCS 01 (SECTION A)**
Instructor's Name	**Mam Tayyaba** **Mam Assia**

Date:28-12-2022

MERGE SORT USING MULTITHREADING

Merge sort in data structures sorts an array in nlogn time, it is a divide and conquer technique. We can enhance the performance of merge sort using the multithreading.

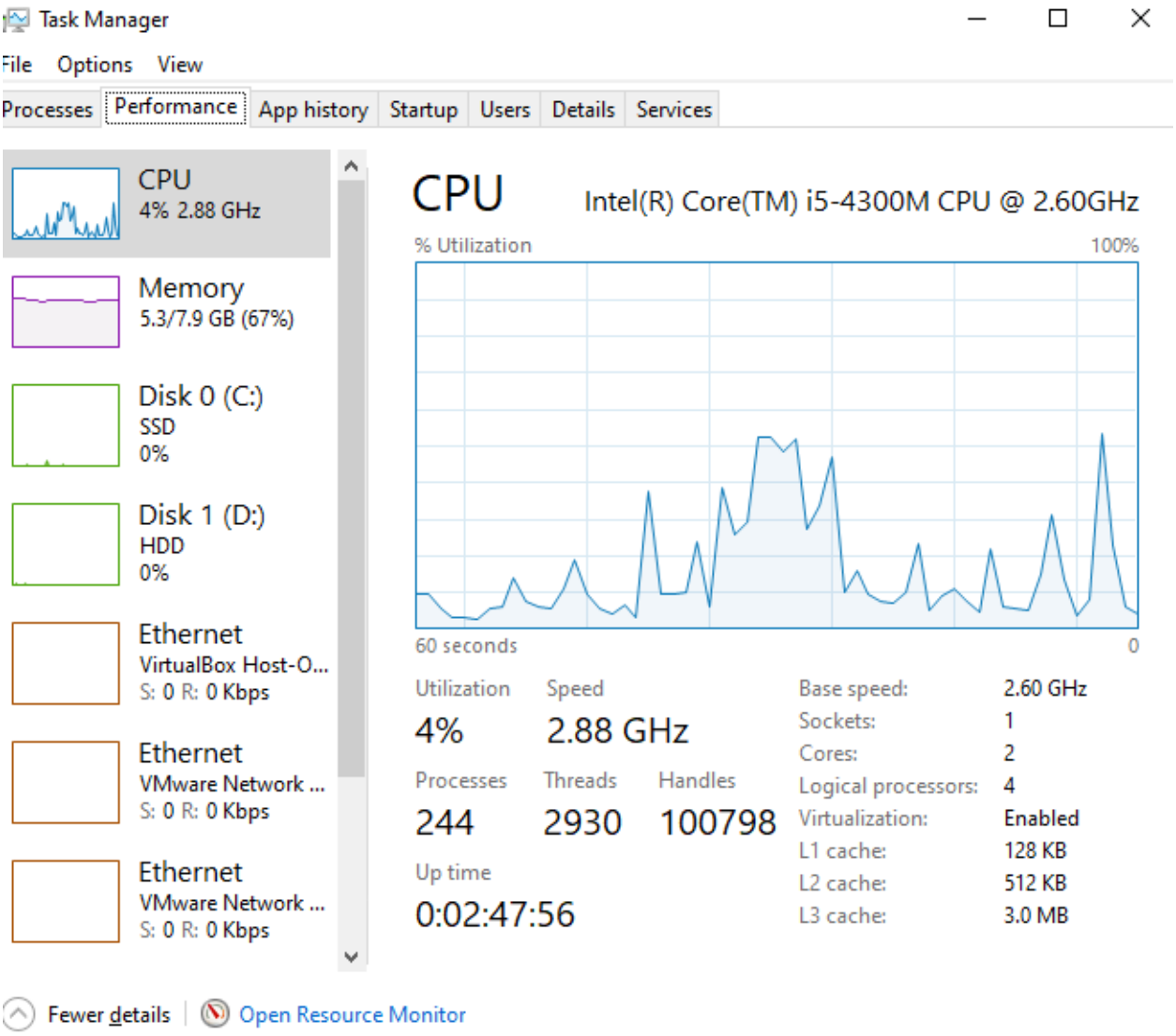
CODE

```
#include <iostream>
#include <pthread.h>
using namespace std;
const int max_size = 20;
int array[max_size];
int size;
//function for merge sort
void merge(int arr[], int l, int mid, int r)
{
int i, j, k;
int n1 = mid - l + 1;
int n2 = r - mid;
int Left[n1], Right[n2];
for (i = 0; i < n1; i++)
Left[i] = arr[l + i];
for (j = 0; j < n2; j++)
Right[j] = arr[mid + 1 + j];
i = 0;
j = 0;
k = l;
while (i < n1 && j < n2)
{
if (Left[i] <= Right[j])
{
arr[k] = Left[i];
i++;
}
else
```

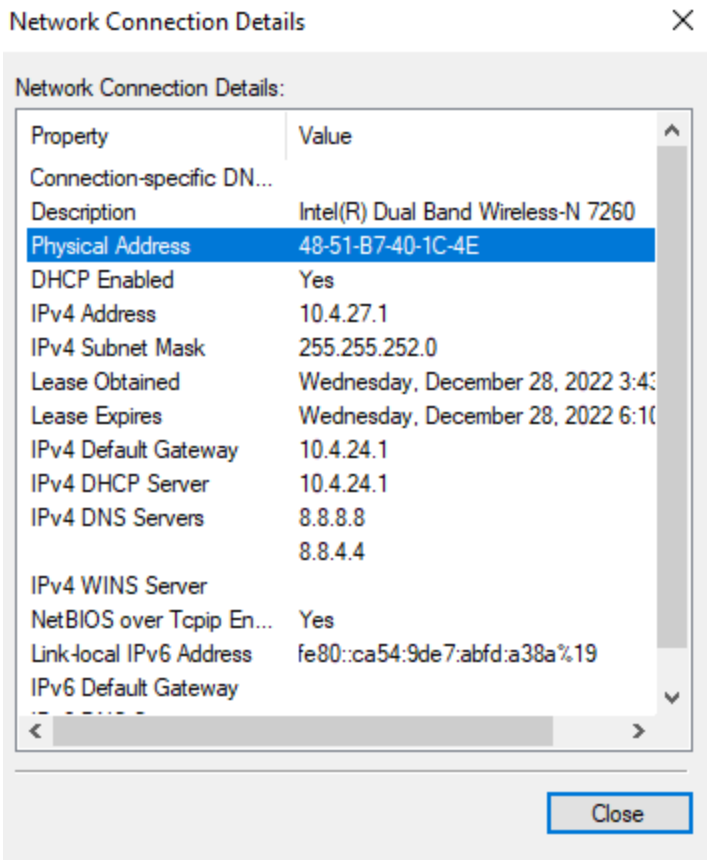
```
{
arr[k] = Right[j];
j++;
}
k++;
}
while (i < n1)
{
arr[k] = Left[i];
i++;
k++;
}
while (j < n2)
{
arr[k] = Right[j];
j++;
k++;
}
}
void mergeSort(int arr[], int left, int right)
{
if (left < right) {
int mid = left + (right - left) / 2;
mergeSort(arr, left, mid);
mergeSort(arr, mid + 1, right);
merge(arr, left, mid, right);
}
}
void *mergeSortThread(void *args)
{
int *arr = (int *) args;
int l = arr[0];
int r = arr[1];
mergeSort(array, l, r);
return 0;
```

```
}
int main()
{
cout << "Enter the total  size of  array: ";
cin >> size;
cout << "Enter the elements of that array: ";
for (int i = 0; i < size; i++)
cin >> array[i];
pthread_t thread1, thread2;
int arr1[2] = {0, size/2 - 1};
int arr2[2] = {size/2, size - 1};
pthread_create(&thread1, NULL, mergeSortThread, (void *) arr1);
pthread_create(&thread2, NULL, mergeSortThread, (void *) arr2);
pthread_join(thread1, NULL);
pthread_join(thread2, NULL);
merge(array, 0, size/2 - 1, size - 1);
cout << "So the Sorted array is : ";
for (int i = 0; i < size; i++)
cout << array[i] << " ";
cout << endl;
return 0;
}
```

CORE OF THE SYSTEM



MAC ADDRESS


Network Connection Details
Network Connection Details:
Property
Value
Connection-specific DN...
Description
Intel(R) Dual Band Wireless-N 7260
Physical Address
48-51-B7-40-1C-4E
DHCP Enabled
Yes
IPv4 Address
10.4.27.1
IPv4 Subnet Mask
255.255.252.0
Lease Obtained
Wednesday, December 28, 2022 3:43
Lease Expires
Wednesday, December 28, 2022 6:1(
IPv4 Default Gateway
10.4.24.1
IPv4 DHCP Server
10.4.24.1
IPv4 DNS Servers
8.8.8.8
8.8.4.4
IPv4 WINS Server
NetBIOS over Tcpip En...
Yes
Link-local IPv6 Address
fe80::ca54:9de7:abfd:a38a%19
IPv6 Default Gateway
Close