



Bachelor of IT (Computer Science)
Assignment 1
CAB301 - Algorithms and Complexity

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1 Algorithm Design

1.1 FirstComeFirstServed Method

This method is used to sort jobs for first come first served scheduling. It achieves this by using the selection sort algorithm to sort the jobs by their arrival time.

ALGORITHM *FirstComeFirstServed()*
// Returns a new array of jobs sorted by their arrival time
 $A \leftarrow Jobs.ToArray()$
for $i \leftarrow 0$ **in** $A.Length - 1$ **do**
 for $j \leftarrow i + 1$ **in** $A.Length$ **do**
 if $A[i].TimeRecieved > A[j].TimeRecieved$
 $temp \leftarrow A[i]$
 $A[i] \leftarrow A[j]$
 $A[j] \leftarrow temp$
return A

1.2 Priority Method

This method is used to sort jobs for priority scheduling. It achieves this by using the insertion sort algorithm to sort the jobs by their priority.

ALGORITHM *Priority()*
// Returns a new array of jobs sorted by their priority
 $A \leftarrow Jobs.ToArray()$
for $i \leftarrow 1$ **in** $A.Length$ **do** $i++$
 for $j \leftarrow i$ **in** 0 **do** $j--$
 if $A[j].Priority < A[j - 1].Priority$
 $temp \leftarrow A[j]$
 $A[j] \leftarrow A[j - 1]$
 $A[j - 1] \leftarrow temp$
 else
 break
return A

1.3 ShortestJobFirst Method

This method is used to sort jobs for shortest job first scheduling. It achieves this by using the bubble sort algorithm to sort the jobs by their execution time.

```
ALGORITHM ShortestJobFirst()
// Returns a new array of jobs sorted by their execution time
A  $\leftarrow$  Jobs.ToArray()
for i  $\leftarrow$  0 in A.Length - 1 do
    for j  $\leftarrow$  0 in A.Length - i - 1 do
        if A[j].ExecutionTime > A[j + 1].ExecutionTime
            temp  $\leftarrow$  A[j]
            A[j]  $\leftarrow$  A[j + 1]
            A[j + 1]  $\leftarrow$  temp
return A
```

2 Analysis

2.1 FirstComeFirstServed Method

2.2 Priority Method

2.3 ShortestJobFirst Method

3 Testing

3.1 Jobs ADT

3.2 JobCollection ADT

3.3 Scheduler ADT