1.
- Total wait time: **23 time units**
- Total runnint time: **20 time units**
- Average wait time: **4.6 time units**
- Average time to completion: **8.6 time units**

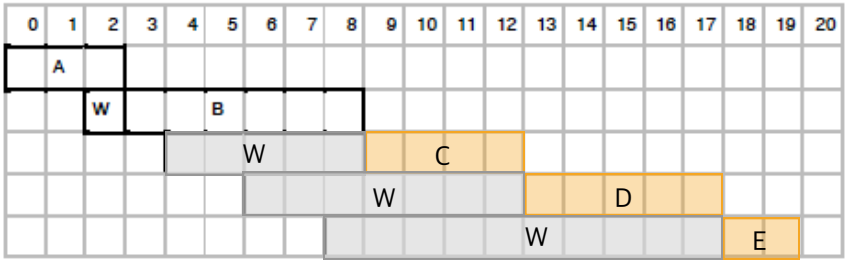
CSC 369: Exercise 11 Scheduling

Consider the following list of processes:
If time starts at 0, then A arrives at time 0 and gets 3 time units of service. At this point it is complete and leaves. B arrives at time 2, waits 1 time unit, and then runs for 6 time units. We assume that once a process has the CPU it runs to completion.

Q1. Fill in the chart below for the remaining 3 processes using a **First-Come-First-Served** algorithm. (The bars in the last 3 rows indicate the arrival time of the process.

Process	Arrival Time	Service Time
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

Time



Total Waiting time: 23 time units

Total Running time: 20 time units

Average Wait time: 4.6 time units

2. Now create a schedule that **minimizes wait time**. You may not change the arrival time,

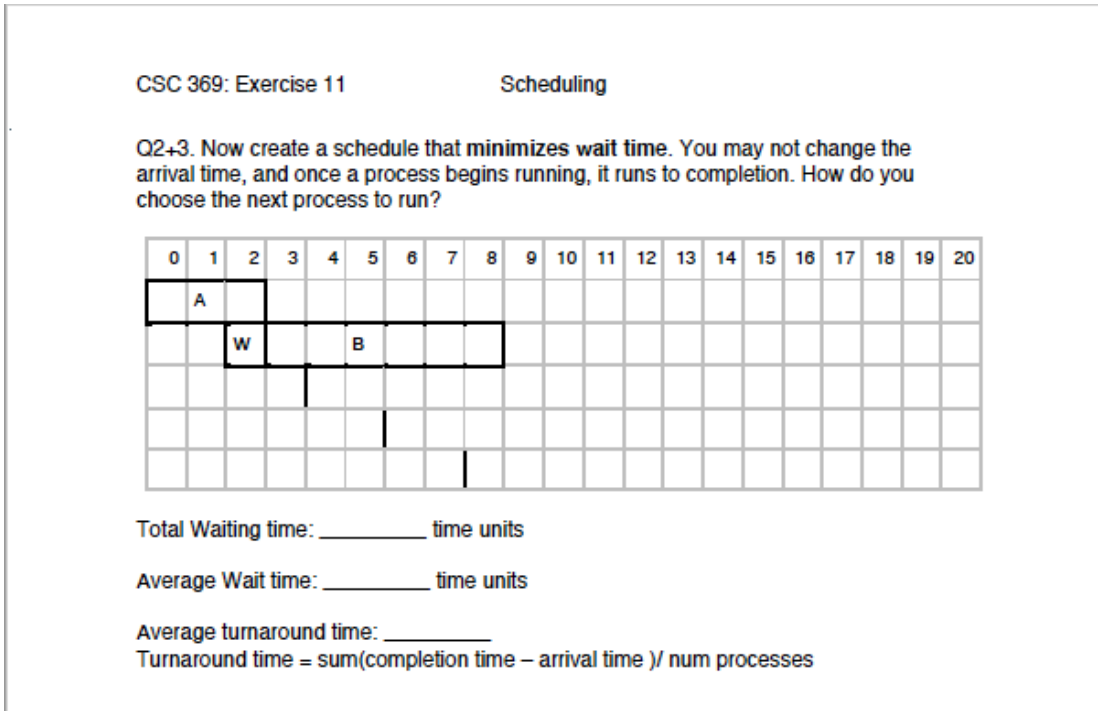
and once a process begins running, it runs to completion. How do you choose the next process to run?

Answer:

Shortest job First

From the tasks that are on schedule, choose one with the shortest job once a task finishes.

3.
- What is the minimum average waiting time?:
- What is the average turnaround time?:



CSC 369: Exercise 11 Scheduling

Q2+3. Now create a schedule that **minimizes wait time**. You may not change the arrival time, and once a process begins running, it runs to completion. How do you choose the next process to run?

Total Waiting time: _____ time units

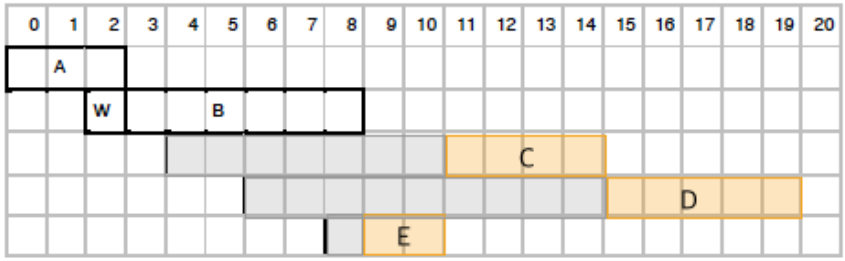
Average Wait time: _____ time units

Average turnaround time: _____
Turnaround time = sum(completion time – arrival time)/ num processes

Answer:

CSC 369: Exercise 11 Scheduling

Q2+3. Now create a schedule that **minimizes wait time**. You may not change the arrival time, and once a process begins running, it runs to completion. How do you choose the next process to run?



Total Waiting time: 18 time units

Average Wait time: 3.6 time units

Average turnaround time: 7.6

Turnaround time = sum(completion time – arrival time)/ num processes

- What is the minimum average waiting time?: **3.6 time units**
- What is the average turnaround time?: **7.6 time units**

4. When we look at the Round Robin Algorithm, it doesn't really make sense to talk about the wait time because it is technically waiting in between times when it gets the CPU. As a user, we are interested in when the job completes relative to when it arrives, so the most interesting metric is turnaround time.

   What is the average turnaround time for the processes above?

Q4: Finally, suppose we don't know when a process starts how many time units it will need. Use **round robin scheduling** with a time quantum of 2 units, to determine how the processes will run. When a process arrives, it is placed at the end of the ready queue.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A				A																
		B																		

Total Running time: _____ time units

Average turnaround time: _____

(When a process finishes its time slice at the moment of arrival of another process we need to make a scheduling decision! Which one gets enqueued first? For this exercise,