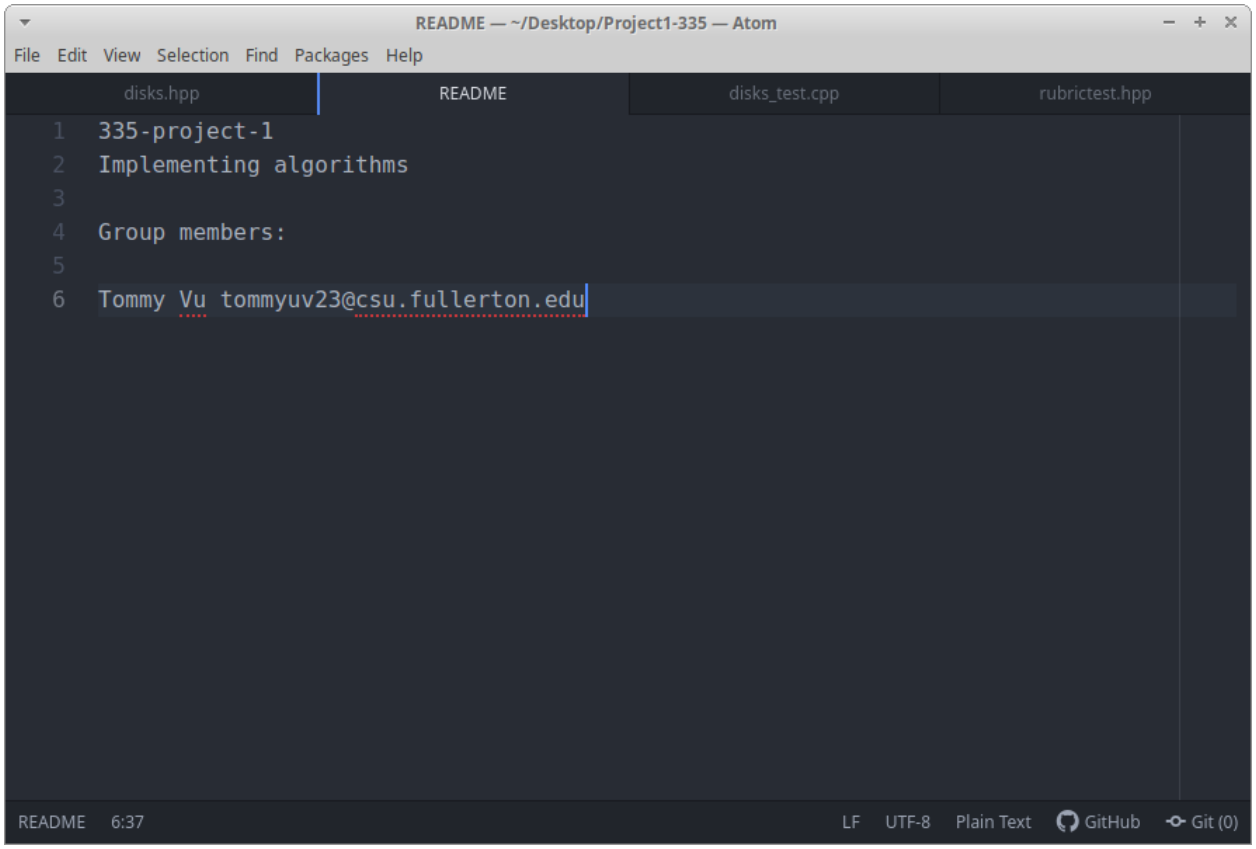
Tommy Vu

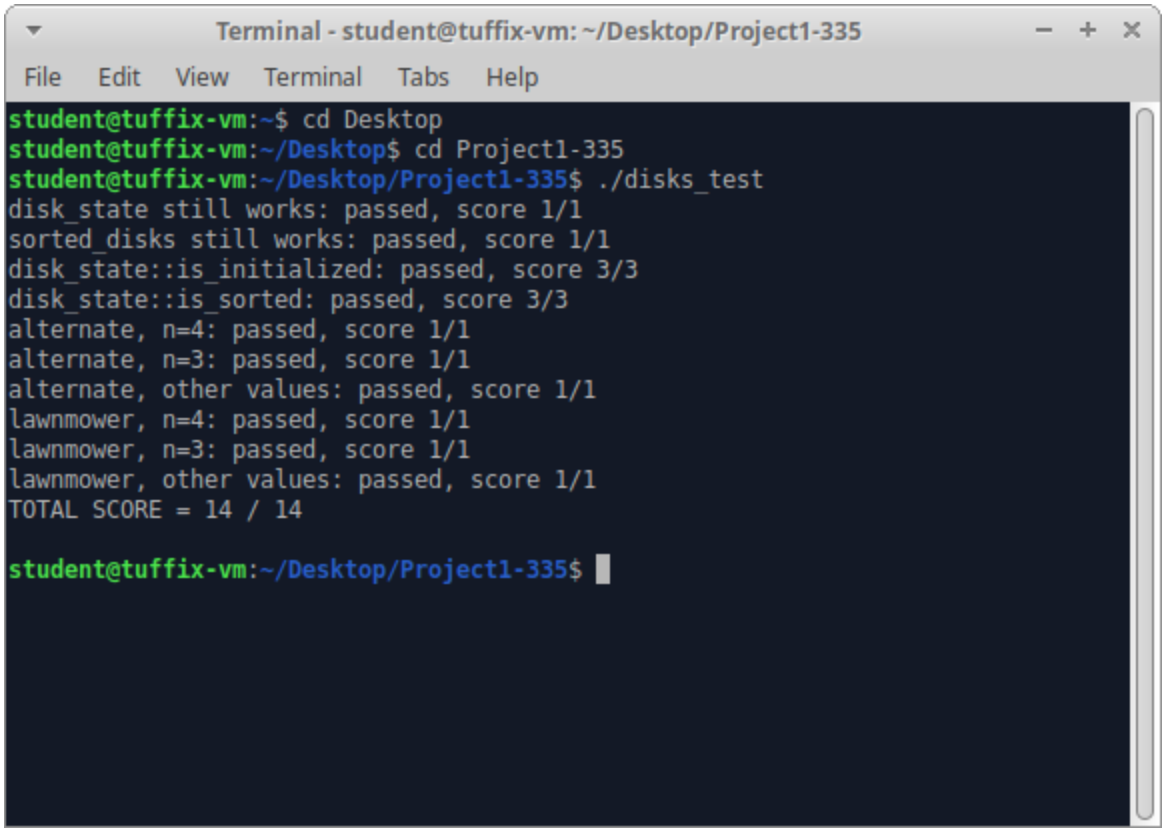
tommyuv23@csu.fullerton.edu

Project 1 - CPSC 335-01

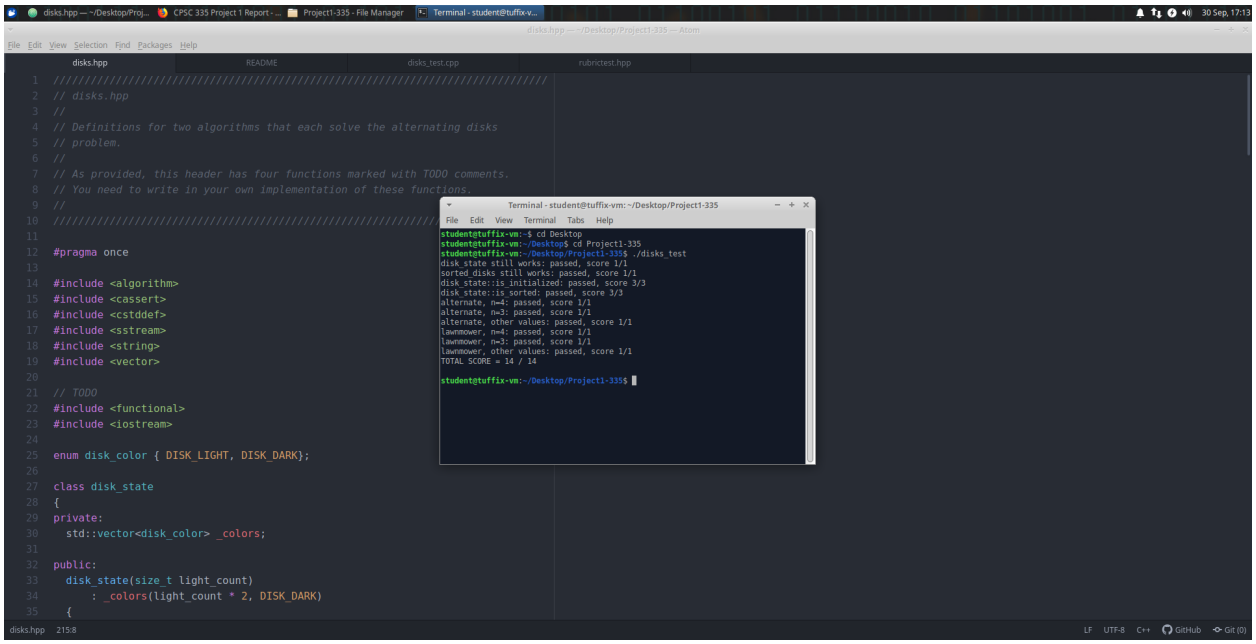
Professor Bein

Screenshots:




Terminal - student@tuffix-vm: ~/Desktop/Project1-335
File Edit View Terminal Tabs Help
student@tuffix-vm:~$ cd Desktop
student@tuffix-vm:~/Desktop$ cd Project1-335
student@tuffix-vm:~/Desktop/Project1-335$ ./disks_test
disk_state still works: passed, score 1/1
sorted_disks still works: passed, score 1/1
disk_state::is_initialized: passed, score 3/3
disk_state::is_sorted: passed, score 3/3
alternate, n=4: passed, score 1/1
alternate, n=3: passed, score 1/1
alternate, other values: passed, score 1/1
lawnmower, n=4: passed, score 1/1
lawnmower, n=3: passed, score 1/1
lawnmower, other values: passed, score 1/1
TOTAL SCORE = 14 / 14
student@tuffix-vm:~/Desktop/Project1-335$

Full screen (It is a bit small, that's why I included the two separate ones)



Pseudo Code for Alternating Algorithm

```
int alg = 0 1                                   1
for i = 0 to n
        for n = i to 2n-1
                if (n > n+1) 2 + (max(3,2))     2 +(max(3,2))
                        Swap                    3
                        algo = algorithm + 1    2
                endif
        endfor
endfor
return sorted_disks(before, alg);
```

Step Count + Proof for Alternating Algorithm

$$\sum_{i=0}^{n} \sum_{n=i}^{2n-1} 5$$

$$\sum_{i=0}^{n} 5(2n-1) + 1$$

$$\sum_{i=0}^{n} 10n - 4$$

$$10 \sum_{i=0}^{n} n - \sum_{i=0}^{n} 4$$

$$10 \cdot \frac{n(n+1)}{2} - 4n$$

$$\frac{10n^2+10n}{2} - 4n$$

$$5n^2 + 5n - 4n$$

$= 5n^2 + 5n$

Big O

Show that f(n) = $5n^2$+ n ε O(n^2)

Find C > 0 and n_0 >= 0 S.T. $5n^2$+n <= (C)n^2 ∀ n >= n_0

C = 5 + 1 = 6, n = 1

$5n^2$+n <= $6n^2$

$6n^2$- $5n^2$- n >= 0

n^2- n >= 0

0 >= 0

Yes, it belongs to O(n^2).

Pseudo Code for Lawnmower Algorithm

Note: n = light_count
2n = total count

int alg = 0;	1
for int i = 0 to n	n+1
for j = i to 2n - 1	
if (j > (j+1))	2 + max(3,2) = 5
swap()	3
algo = algo + 1	2
Endfor	
for j = 2n - 1 to 0	
if (j < (j - 1))	2 + max(3,2) = 5
swap()	3
algo = algo + 1	2
endfor	
endfor	
return sorted_disks()	

Step Count + Proof for Lawnmower Algorithm

$$\sum_{i=0}^{n} \sum_{t=i}^{2n-1} 5 = \sum_{i=0}^{n} 5(2n-1)$$

$$\sum_{i=0}^{n} 10(n) - \sum_{i=0}^{n} 5$$

$$10 \cdot \frac{n(n+1)}{2} - 5n$$

$$\frac{10n^2+10n}{2} - 5n$$

$$5n^2 + 5n - 5n$$

$$= 5n$$

Big O

Show that $f(n) = 15n^2+20n+10 \varepsilon O(n^2)$

Find $C > 0$ and $n0 >= 0$ S.T. $15n^2+20n+10 <= (C)n^2 \ \forall \ n >= n_0$

$C = 15 + 20 + 10 = 45$, $n_0 = 0$

$15n^2+20n+10 <= 45n^2$

$45n^2+15n^2+20n+10 >= 0$

$45n^2+15n^2+20n+10$

$n >= 0$

Yes, it belongs to $O(n^2)$