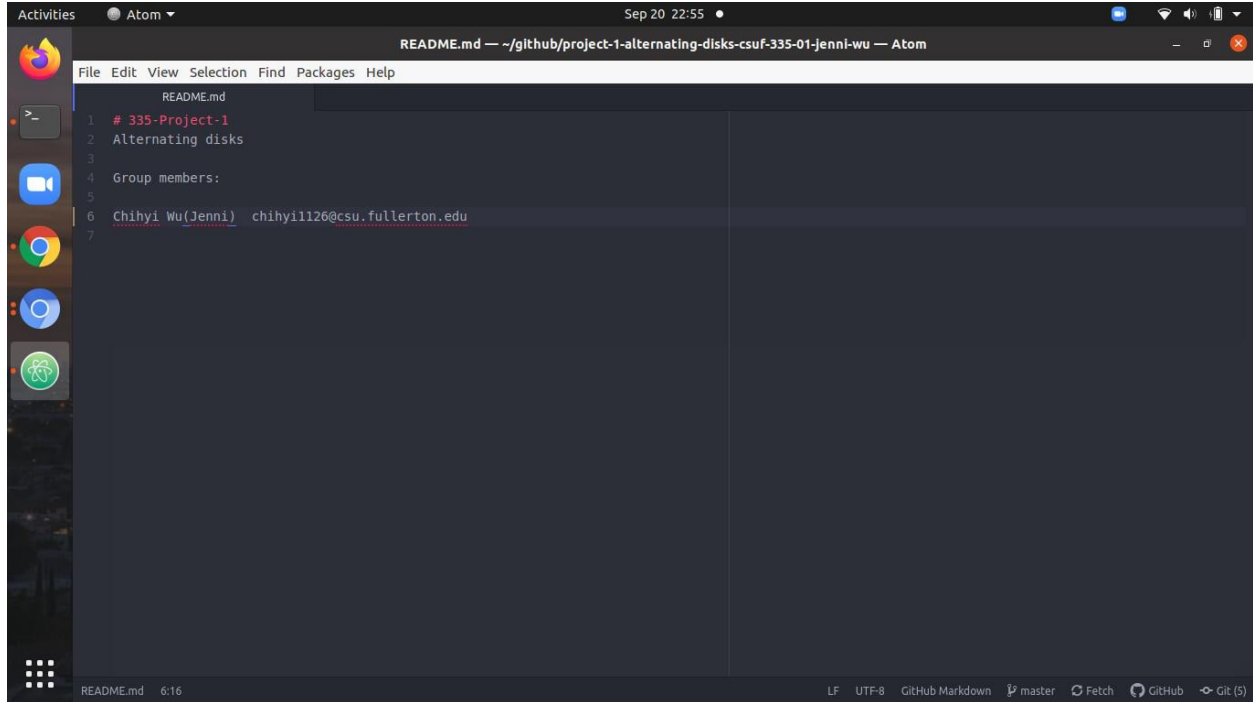


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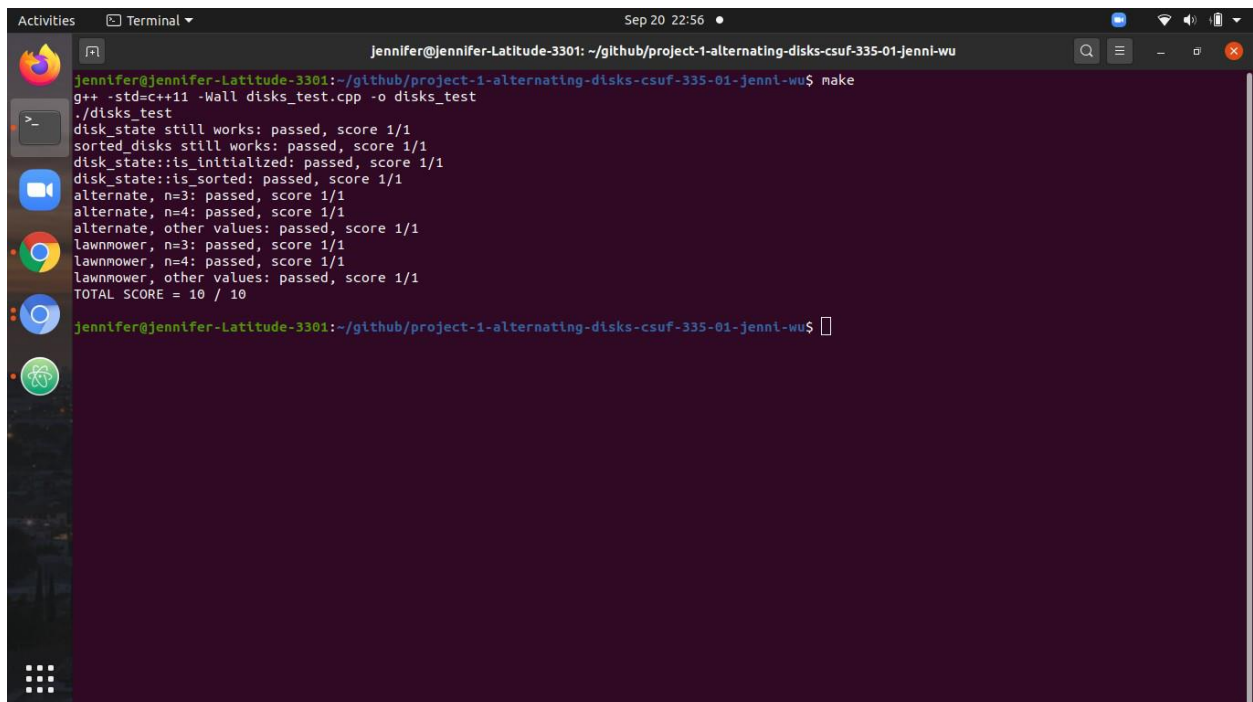
CSPS 335.01 Project 1



The screenshot shows the Atom text editor interface. The title bar indicates the file is 'README.md' located at '~/github/project-1-alternating-disks-csuf-335-01-jenni-wu'. The menu bar includes File, Edit, View, Selection, Find, Packages, and Help. The editor content shows a README file with the following text:

```
1 # 335-Project-1
2 Alternating disks
3
4 Group members:
5
6 Chihui Wu(Jenni) chihui1126@csu.fullerton.edu
7
```

The status bar at the bottom shows 'README.md 6:16' and various settings like 'LF', 'UTF-8', 'GitHub Markdown', 'master', 'Fetch', 'GitHub', and 'Git (5)'.



The screenshot shows a terminal window with the title 'jennifer@jennifer-Latitude-3301: ~/github/project-1-alternating-disks-csuf-335-01-jenni-wu'. The prompt is 'jennifer@jennifer-Latitude-3301:~/github/project-1-alternating-disks-csuf-335-01-jenni-wu\$'. The user has entered the command 'make' and the output is as follows:

```
g++ -std=c++11 -Wall disks_test.cpp -o disks_test
./disks_test
disk_state still works: passed, score 1/1
sorted_disks still works: passed, score 1/1
disk_state::is_initialized: passed, score 1/1
disk_state::is_sorted: passed, score 1/1
alternate, n=3: passed, score 1/1
alternate, n=4: passed, score 1/1
alternate, other values: passed, score 1/1
lawnmower, n=3: passed, score 1/1
lawnmower, n=4: passed, score 1/1
lawnmower, other values: passed, score 1/1
TOTAL SCORE = 10 / 10
jennifer@jennifer-Latitude-3301:~/github/project-1-alternating-disks-csuf-335-01-jenni-wu$
```

Alternate Algorithm

Pseudocode

for k= 0 to (n/2 - 1) step 1

 for i = 0 to (n - 2) step 2

 if color[i] == L && color[i + 1] == D

 tmp = color[i]

 color[i] = color[i+1]

 color[i+1]=tmp

 for l = 1 to (n - 3) step 2

 if color[i] == L && color[i + 1] == D

 tmp = color[i]

 color[i] = color[i+1]

 color[i+1]=tmp

$$\begin{aligned}sc &= \left(\frac{n}{2} - 1 - 0 + 1\right) * \left(\left(\frac{n-2-0}{2} + 1\right) * (3 + \max(3,0)) + \left(\frac{(n-3)-1}{2} + 1\right) * (3 + \max(3,0))\right) \\&= \frac{n}{2} * \left(\frac{n}{2} * 6 + \left(\frac{n-2}{2}\right) * 6\right) \\&= 3n * (n - 1) \\&= 3n^2 - 3n\end{aligned}$$

$$TC = \Theta(n^2)$$

$$\text{Proof: } 3n^2 - 3n \in \Theta(n^2)$$

$$\lim_{n \rightarrow \infty} \left(\frac{3n^2 - 3n}{n^2}\right) = \lim_{n \rightarrow \infty} \left(\frac{3n^2}{n^2}\right) - \lim_{n \rightarrow \infty} \left(\frac{3n}{n^2}\right) = \lim_{n \rightarrow \infty} 3 - \lim_{n \rightarrow \infty} \left(\frac{3}{n}\right) = 3 - 0 = 3$$

Which is non-negative and constant with respect to n

Lawnmower Algorithm

Pseudocode:

for k= 0 to (n/2 – 1) step 1

 for i = 0 to (n – 2) step 2

 if color[i] == L && color[i + i] == D

 tmp = color[i]

 color[i] = color[i+1]

 color[i+1]=tmp

 for l = (n-3) to 1 step -2

 if color[l] == L&& color[l + 1] == D

 tmp = color[l]

 color[l] = color[l+1]

 color[l+1]=tmp

$$\begin{aligned}sc &= \left(\frac{n}{2} - 1 - 0 + 1\right) * \left(\left(\frac{n-2-0}{2} + 1\right) * (3 + \max(3,0)) + \left(\frac{1-(n-3)}{-2} + 1\right) * (3 + \max(3,0))\right) \\&= \frac{n}{2} * \left(\frac{n}{2} * 6 + \left(\frac{n-2}{2}\right) * 6\right) \\&= 3n * (n - 1) \\&= 3n^2 - 3n\end{aligned}$$

$$TC = \Theta(n^2)$$

Proof: $3n^2 - 3n \in \Theta(n^2)$

$$\lim_{n \rightarrow \infty} \left(\frac{3n^2 - 3n}{n^2}\right) = \lim_{n \rightarrow \infty} \left(\frac{3n^2}{n^2}\right) - \lim_{n \rightarrow \infty} \left(\frac{3n}{n^2}\right) = \lim_{n \rightarrow \infty} 3 - \lim_{n \rightarrow \infty} \left(\frac{3}{n}\right) = 3 - 0 = 3$$

Which is non-negative and constant with respect to n