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GitHub ID: Ninjaruss

Assignment 2 - Buffered I/O Read

<https://github.com/CSC415-Fall2020/assignment-2-buffered-i-o-read-Ninjaruss>

Description:

This assignment is intended for learning how to implement a buffered input/output reader with a handled file table. The `b_io.c` file should have the ability to open a file given the file's name, read from a file with a given file descriptor that identifies its index, and close the opened file without any memory leaks.

Process:

To start off the project, I began with laying out the foundation for the program. Creating a struct that contained the open file table and implementing the `b_open` and `b_close` functions were relatively easy; however, they were originally unoptimized using a for loop to check the indices instead of referring to the array position directly.

The `b_read` function presented itself as a difficult task to implement due to the amount of confusion I had felt when a bug occurred in the program. Looking back at the source code, the two major problems (aside from the many offset mistakes) I had while working on the project was retaining the previous read from file call and handling `memcpy` when there's no space left in the buffer. After some tinkering, I found that saving the return value from `read` as a free space variable was the solution to this problem. This way, I can check to see if there's any space left directly and adjust it appropriately. The `memcpy` issue became a simple free space check along with offset handling and segmenting the data into two pieces. Begin with copying the first piece into the parameter buffer then reading a new chunk and copying and transferring the leftover count. In spite of the progress I had made, the program was not able to read the buffer correctly.

I had tried numerous times trying to fix the offset problems in my code, but I ultimately decided to rewrite the `b_read` function again due to the confusing structure my code became (see `old_io_code.c`). In doing this, I was able to successfully get the `b_read` function to work. It seems that most of my problems came from the sequencing of the read process.

Output:

```
student@student-VirtualBox:~/Documents/assignment-2-buffered-i-o-read-Ninjaruss$ make run RUNOPTIONS="DecOfInd.txt"
gcc -c -o Azucenas_Russell_HW2_main.o Azucenas_Russell_HW2_main.c -g -I.
gcc -c -o b_io.o b_io.c -g -I.
gcc -o Azucenas_Russell_HW2_main Azucenas_Russell_HW2_main.o b_io.o -g -I.
./Azucenas_Russell_HW2_main DecOfInd.txt
The unanimous Declaration of the thirteen united States of America, When in the
Course of human events, it becomes necessary for one people to dissolve the poli
tical bands which have connected them with another, and to assume among the powe
rs of the earth, the separate and equal station to which the Laws of Nature and
of Nature's God entitle them, a decent respect to the opinions of mankind requir
es that they should declare the causes which impel them to the separation.

We hold
these truths to be self-evident, that all men are created equal, that they are
endowed by their Creator with certain unalienable Rights, that among these are
Life, Liberty and the pursuit of Happiness.--That to secure these rights, Govern
ments are instituted among Men, deriving their just powers from the consent of
the governed, --That whenever any Form of Government becomes destructive of the
se ends, it is the Right of the People to alter or to abolish it, and to institu
te new Government, laying its foundation on such principles and organizing its p
owers in such form, as to them shall seem most likely to effect their Safety and
Happiness. Prudence, indeed, will dictate that Governments long established sho
uld not be changed for light and transient causes; and accordingly all experienc
e hath shewn, that mankind are more disposed to suffer, while evils are sufferab
le, than to right themselves by abolishing the forms to which they are accustome
d. But when a long train of abuses and usurpations, pursuing invariably the same
Object evinces a design to reduce them under absolute Despotism, it is their ri
ght, it is their duty, to throw off such Government, and to provide new Guards f
or their future security.--Such has been the patient sufferance of these Colonie
s; and such is now the necessity which constrains them to alter their former Sys
tems of Government. The history of the present King of Great Britain is a histor
y of repeated injuries and usurpations, all having in direct object the establis
hment of an absolute Tyranny over these States. To prove this, let Facts be subn
titled to a candid world.

He has refused his Assent to Laws, the most wholesome
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their Hands.

He has excited domestic insurrections amongst us, and has endeavour
red to bring on the inhabitants of our frontiers, the merciless Indian Savages,
whose known rule of warfare, is an undistinguished destruction of all ages, sexe
s and conditions.

In every stage of these Oppressions We have Petitioned for Redress
in the most humble terms: Our repeated Petitions have been answered only by
repeated injury. A Prince whose character is thus marked by every act which ma
y define a Tyrant, is unfit to be the ruler of a free people.

Nor have We been wanting in attentions to our Brittish brethren. We have warned them from time to
time of attempts by their legislature to extend an unwarrantable jurisdiction o
ver us. We have reminded them of the circumstances of our emigration and settlem
ent here. We have appealed to their native justice and magnanimity, and we have
conjured them by the ties of our common kindred to disavow these usurpations, wh
ich, would inevitably interrupt our connections and correspondence. They too hav
e been deaf to the voice of justice and of consanguinity. We must, therefore, ac
quiesce in the necessity, which denounces our Separation, and hold them, as we h
old the rest of mankind, Enemies in War, in Peace Friends.

We, therefore, the Representatives of the united States of America, in General Congress, Assembled,
appealing to the Supreme Judge of the world for the rectitude of our intentions,
do, in the Name, and by Authority of the good People of these Colonies, solemnly
publish and declare, That these United Colonies are, and of Right ought to be
Free and Independent States; that they are Absolved from all Allegiance to the B
ritish Crown, and that all political connection between them and the State of Gr
eat Britain, is and ought to be totally dissolved; and that as Free and Independ
ent States, they have full Power to levy War, conclude Peace, contract Alliances
, establish Commerce, and to do all other Acts and Things which Independent Stat
es may of right do. And for the support of this Declaration, with a firm relianc
e on the protection of divine Providence, we mutually pledge to each other our L
ives, our Fortunes and our sacred Honor.