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Assignment 5 – Buffered I/O Read

Description:

This assignment teaches us how to handle buffered IO where we are the ones doing the buffering. We are given three functions to implement b_io_fd b_open (char * filename, int flags); int b_read (b_io_fd fd, char * buffer, int count); int b_close (b_io_fd fd). With these functions we are able to open files, read them specifying the amount to read, what buffer and what file, and lastly close the file. We are to use the low-level API's given so we can implement the functions. We also allocate memory, read data in chunks, and free any resource needed at the end. In addition, we are getting used to reading code that has already been written so we can add without causing any errors.

Approach:

1. b_open
    a. First needed to see if the file can be opened or not return the value if an error occurs
    b. check to see if we can get a file control block, and return a value if an error
    c. malloc the block size returns a value if an error occurs
    d. initialize any other variable that will help
2. b_read
    a. The parameters include a file descriptor, buffer, and the count of how many bytes are needed.
    b. Already had code checking if the file descriptor was valid or not
    c. Check if the count is bigger than zero if not return 0
    d. If the count is bigger than the file we just switch the requested count to the file length
    e. Create a while loop so we make sure we hit every case that might be thrown at us
    f. First case: we have more space in our buffer than what the user requested
        i. We can just copy it directly into ours
    g. Second case: our buffer doesn't have more space so we call LBAread to get the new data in chunks of B_CHUNK_SIZE(512) and directly put it into our buffer
        i. Calculate the lba count by getting bytes/ B_CHUNK_SIZE (this is integer math)
    h. Third case: since we do integer math for the second case we might have remaining bytes that we have to account for
        i. Check if we have any bytes left, get the bytes, and put them from our to users
    i. Track the file so we always are getting new data instead of old or repeated
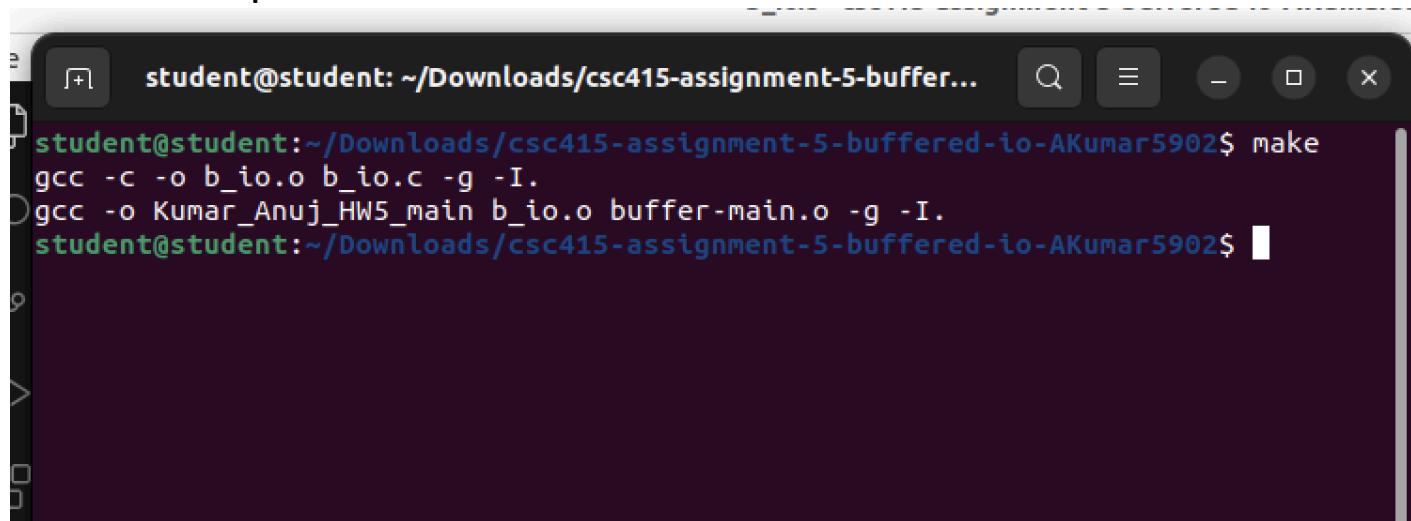   j. Return the amount copied

3. b_close
   a. Free buffer and set to null

Issues and Resolutions:

Some issues I had when I was implementing the read function was that I thought I was using LBAread correctly to get the number of blocks of data and then used memcopy to copy them into our buffer. When I tried to run it wasn't printing continuously as the lines wouldn't make sense. I then added printf statements asking for the file names, the size of the files, and the location. I wanted to see if I was correctly opening the file in the first place. I then saw that it was reading the file correctly because I wasn't getting the right position for it to be continuous. I then ensured the last parameter of LBAread was correct which fixed the problem.

Another issue I had was that I didn't account for when the buffer couldn't reach byte-size chunks. We needed to buffer them into 512-byte chunks but what if the amount wanted wasn't multiples. I then added another if statement checking if we still had some remaining since integer math wouldn't account for any remaining. I then just called one more LBAread to get one more chunk and then copied it into our buffer. For example, if the user wanted 1078 bytes of data we would only get 2 but still have 58 bytes left so call one more time to get the leftover bytes.

Screenshot of compilation:

Screenshot(s) of the execution of the program:

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student@student:~/Downloads/csc415-assignment-5-buffered-io-AKumar5902$ make run
./Kumar_Anuj_HW5_main DATA DecOfInd.txt CommonSense.txt
The unanimous Declaration of the thirteen united States of America, Whe
Perhaps the sentiments contained in the following pages, are
n in the Course of human events, it beco
 not yet
sufficiently fashionable to procure th
mes necessary for one people to dissolve the political bands which have connec
em general favor; a long habit
of not thinking a thing wrong, gives it a superf
ted them with another, and to assume among the powers of the earth, the separate and
icial appearance of
being right, and raises at first a formidable outcry in defense
equal station to which the Laws of Nature and of Nature_s God _ntitle
 of
custom. But the tumult soon subsides. Time makes more converts than
reason.

As a lo
t_em, a decent respect to the opinions of mankind requires that they should decl
ng and violent abuse of power, is generally the Means of calling
the right of it in quest
are 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 una
lienable Rights, that among these are Life, Liberty and the pursuit of Happiness.--That to secure these rights, Governments are
instituted among Men, deriving their just powers from the consent of the governed, --That whenever any Form of Government become
s destructive of these ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying it
s foundation on such principles and organizing its powers in such form, as to them shall seem most likely to effect
ion (and in Matters too which might never have
been thought of, had not the Sufferers been aggravated into the inquiry)
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student@student: ~/Downloads/csc415-assignment-5-buffered-io-AKumar5902

been thought of, had not the Sufferers been aggravated into the inquiry)
and as the King of England hath undertaken in his own Right, to support
the Parliament in what he calls Theirs, and as the good people of this
country are grievously oppressed by the combination, they have an undoubted
privilege to inquire into the pretensions of both, and equally to reject the
usurpation of either.

In the following sheets, the author hath studiously avoided every thing
which is personal among ourselves. Compliments as well as censure to
individuals make no part thereof. The wise, and the worthy, need not the
triumph of a pamph
their Safety and Happiness. Prudence, indee
let; and those whose sentiments are injudic
d, will dictate that Governments long established should not be changed
ious, or
unfriendly, will cease of themselve
 for light and transient causes; and accordingly all
s unless too much pains are bestowed
upon their con
 experience hath shewn, that mankind are more disposed to suffer, while evils are
version.

The cause of America is in a great
 sufferable, than to right themselves by abolishing the forms
measure the cause of all mankind. Many
circumstances hath, and will aris
 to which they are accustomed. But when a long train of abuses and usurpations, pursuing
e, which are not local, but universal, and
through w
 invariably the same Object evinces a design to reduce them under absolute Despotism, it i
hich the principles of all Lovers of Mankind are affected, and in

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student@student: ~/Downloads/csc415-assignment-5-buffered-io-AKuma

hich the principles of all Lovers of Mankind are affected, and in
the Event o
s their right, it is their duty, to throw off such
f which, their Affections are interested. The laying a Country
desolate with Fire
 Government, and to provide new Guards for their future security.--Such h
and Sword, declaring War against the natural rights of
as been the patient sufferance of these Colonies; and such is now the necessit
all
Mankind, and extirpating the Defenders thereof from the Face of the
y which constrains them to alter their former Systems of Govern
Earth,
is the Concern of every Man to whom Nature hath given the
ment. The history of the present King of Great Britain is a hi
 Power of feeling;
of which Class, regardless of Party C
story of repeated injuries and usurpations, all having in direct object the establi
ensure, is the

AUTHOR
shment of an absolute Tyranny over these States. To prove this, let Facts be submi
tted to a candid world.

He has refused
his Assent to Laws, the most wholesome and necessary for the public good.


He has forbidden his Governors to pass Laws of immediate and pressing importance, unles
s suspended in their operation till his Assent should be obtained; and whe
n so suspended, he has utterly neglected t
o attend to them.
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                                                    student@student: ~/Downloads/csc415-assignment-5-buffered-io-AKumar5
o attend to them.

He has refused to pass other Laws for the accommodation of l
arge districts of people, unless those people would relinquish the righ
t of Representation in the Legislature, a right inestimable to them and for
midable to tyrants only.

He has called together legislative bodies at places unusual, u
ncomfortable, and distant from the depository of their public Records, for the sole purp
ose of fatiguing them into compliance with his measures.

He has dissolved
Representative Houses repeatedly, for opposing with m
anly firmness his invasions on the rights of the people.

He has refused f
or a long time, after such dissolutions, to cause others to be elected; whereby the Legisl
ative powers, incapable of Annihilation, have retu
rned to the People at large for their exercise; the State remaining in the
 mean time exposed to all the dangers of invasion from without, and convul
sions within.

He has endeavoured to prevent the population of these States; for
 that purpose obstructing the Laws for Naturalization of Foreigners; refu
sing to pass others to encourage their migrations hit
her, and raising the conditions of new Appropriations of Lands.

He has obstructed the
 Administration of Justice, by refusing his Ass
ent to Laws for establishing Judiciary powers.
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student@student: ~/Downloads/csc415-assignment-5-buffered-io-AKum

ent to Laws for establishing Judiciary powers.

He
has made Judges dependent on his Will alone, for the tenure of their o
ffices, and the amount and payment of their salarie
s.

He has erected a multitude of New Offices, and se
nt hither swarms of Officers to harrass our people, and eat out their substa
nce.

He has kept among us, in times of peace, Standing Armies with
out the Consent of our legislatures.

He has affec
ted to render the Military independent of and superior to the Civil power.

He has comb
ined with others to subject us to a jurisdiction foreig
n to our constitution, and unacknowledged by
our laws; giving his Assent to their Acts of pretended Legisla
tion:

For Quartering large bodies of armed troops among us:

For pro
tecting them, by a mock Trial, from punishment for any Murders which they should c
ommit on the Inhabitants of these States:

For cutting off our Trade with all p
arts of the world:
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arts of the world:

For imposing Taxes on us without our
Consent:

For depriving us in many cases, of the benefits of Trial by Jury:


For transporting us beyond Seas to be tried for pret
ended offences

For abolishing the free System of E
nglish Laws in a neighbouring Province, establishing therein an Arbitrary government
, and enlarging its Boundaries so as to render it at once
 an example and fit instrument for introducing the same absolute
rule into these Colonies:

For taking away our Charters, abolish
ing our most valuable Laws, and altering fundamentally the
Forms of our Governments:

For suspending our own Legislatures, and de
claring themselves invested with power to legislate for us in all cases whatsoever.

He h
as abdicated Government here, by declaring us out of his Protection and
waging War against us.

He has plundered our
 seas, ravaged our Coasts, burnt our towns, and destroyed the li
ves of our people
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student@student: ~/Downloads/csc415-assignment-5-buffered-io-AKu

 seas, ravaged our Coasts, burnt our towns, and destroyed the li
ves of our people.

He is at this time t
ransporting large Armies of foreign Mercenaries to compleat the works of
death, desolation and tyranny, already begun wi
th circumstances of Cruelty & perfidy scarcely paralleled in the most barbarous ages,
 and totally unworthy the Head of a civilized nati
on.

He has constrained our fellow Citizens taken Captive on the high Seas to bea
r Arms against their Country, to become the executioners of their fri
ends and Brethren, or to fall themselves by their Hands.

He has excited
domestic insurrections amongst us, and h
as endeavoured to bring on the inhabitants of our frontiers, the merciless Ind
ian Savages, whose known rule of warfare, is an undistinguished d
estruction of all ages, sexes and conditi
ons.

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 wh
ich may define a Tyrant, is unfit to be the
 ruler of a free people.

Nor have We been wantin
g in attentions to our Brittish brethren.
 We have warned them from time to time of at
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student@student: ~/Downloads/csc415-assignment-5-buffered-io-AKum

 We have warned them from time to time of at
tempts by their legislature to extend an unwarra
ntable jurisdiction over us. We have reminded them of
the circumstances of our emigration and settlement here. We have ap
pealed to their native justice and magnanimity, and we have conjured them by the
 ties of our common kindred to disavow th
ese usurpations, which, would inevitably interrupt our connections and correspondence
. They too have been deaf to the voice of justice and of c
onsanguinity. We must, therefore, acquiesce in the necessity, which denounces our Separat
ion, and hold them, as we hold the rest of
mankind, Enemies in War, in Peace Friends.

We, therefore, the Representatives of the uni
ted States of America, in General Congress, As
sembled, appealing to the Supreme Judge of the world f
or the rectitude of our intentions, do, in the Name, and by Authority o
f the good People of these Colonies, solemnly publish and declare, That these United
 Colonies are, and of Right ought to be F
ree and Independent States; that they are Absolved from all Allegiance to the Briti
sh Crown, and that all political connection between them
and the State of Great Britain, is and ought to be totally d
issolved; and that as Free and Independent
 States, they have full Power to levy War, conclude Peace,
contract Alliances, establish Commerce, and to do a
ll other Acts and Things which Independent S
tates may of right do. And for the support of t
his Declaration, with a firm reliance on the protection of divi
ne Providence, we mutually pledge to each other our Lives, our Fortunes and our sa
cred Honor.
We have read 8120 characters from file DecOfInd.txt
We have read 1877 characters from file CommonSense.txt
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cred Honor.
We have read 8120 characters from file DecOfInd.txt
We have read 1877 characters from file CommonSense.txt
student@student:~/Downloads/csc415-assignment-5-buffered-io-AKumar5902$
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