

Assignment 5 - Buffered I/O

Description:

To handle buffered IO where you do the buffering

Approach / What I Did:

In this assignment, I initialized a file structure containing necessary information to maintain an open file, including a 512 characters buffer called `ChunkBuf[B_CHUNK_SIZE]` for storing user input, a pointer `*bufloc` to the buffer location, an user input, a pointer `*bufloc` to the buffer location, an unsigned integer `lbaPosition` to track the reading position during the `LBAREad` function, and an integer `numCharRemain` to keep track of the remaining number of user input characters.

In the `b_open` function, I declared a pointer called `*fInfo` and assigned it the value returned by the `GetFileInfo` function using the user input filename. The function then checks whether the filename is valid, returning -1 if it is not. For the file descriptor, I used the `fcIndex` variable and assigned it the value returned by the `b_getFCB` function. An if statement is used to check whether all free control blocks are in use; if they are, the function returns -1. I saved a pointer to point to the end of the buffer, indicating that no buffer has been read yet. The `numCharRemain` variable is used to check if there are any characters left, indicating whether there is a need to copy any characters.

In the `b_read` function, I initialized two variables: `netCount`, an integer that counts the number of bytes actually copied into the buffer, and `*outBuffer`, a character pointer that keeps track of where in the buffer I need to copy blocks to. I added an if statement to check if there are any remaining characters in the user input to copy.

To handle the scenario where the file has 1000 bits (125 byte) requested but the `B_Chunk_Size` has 512 bits (64 byte), I created a while loop. The loop executes until the remaining number of bytes to be read, `count`, is less than or equal to the number of characters remaining in the `chunkBuf`. Inside the loop, the available characters in the `chunkBuf` are copied to `outBuffer`, and the `outBuffer` pointer is incremented. The variable `retCount` is updated to keep track of the number of bytes that have been copied so far.

I checked if the number of available characters in the `chunkBuf` is less than the number of characters remaining in the file, and if so, the `numCharRemain` variable in the corresponding `fcArray` element is updated to reflect the remaining number of characters in the file.

If the end of the file is reached before the 125 bytes can be read, the function returns the number of bytes that were actually read.

I used an if statement to limit the number of characters to copy based on the file size. This limit on the number of characters copied ensures that the code does not read past the end of the file. By copying only a chunk of characters at a time, the code can read efficiently and reduces memory usage.

The `b_close` function frees allocated memory and returns the file control block to the pool of unused file control blocks

Issues and Resolutions:

Issue I had was that the file had 1000 characters but the `LBAread` only reads 512 so I had a problem reading the rest of 488 char. To fix this issue, I had to keep track of the rest of the character so I didn't have to allocate memory.

Screenshot of compilation:

```
excited domestic insurrections amongst us, and has endeavoured to bring
on the inhabitants of our frontiers, the merciless Indian Savages, whose known
rule of warfare, is an undistinguished destruction of
all ages, sexes and conditions.

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

Nor have We been wanting in attentions to our Brittish brethren.
n. We have warned them from time to time of attempts by their legislature to
extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances
of our emigration and settlement 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,
which, would inevitably interrupt our connections and correspondence. They too have been deaf to the
voice of justice and of consanguinity. We must, therefore, acquiesce in the necessity
, which denounces our Separation, and hold them, as we hold the rest of mankind,
Enemies in War, in Peace Friends.

We, therefore, the Representatives of the united States of America,
a, 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
ople 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 British Crown, and that all political connection
ction between them and the State of Great Britain, is and ought to be totally dissolved;
and that as Free and Independent States, they have full Power to levy War, conclude Peace, contract Alliances, establish
blish Commerce, and to do all other Acts and Things which Independent States may of right do.
hings which Independent States may of right do. And for the support of this Declaration, with a firm reliance on the protection
tection of divine Providence, we mutually pledge to each other our Lives, our Fortunes and our sacred Honor.

We have read 8120 characters from file DecOfInd.txt
We have read 1877 characters from file CommonSense.txt
```

For
abolishing the free System of English Laws in a neighbouring Prov
ince, establishing therein an Arbitrary gover
nment, 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
for taking away our Charters, abolishing our most valuable Laws, an
d altering fundamentally the Forms of our Governments:

For suspending our
own Legislatures, and declaring themselves invested with power to legislat
e for us in all cases whatsoever.

He has abdicated Government here,
by declaring us out of his Protection and w
aging War against us.

He has plundered our seas, ravaged our Co
asts, burnt our towns, and destroyed the lives of our people.

He is at this ti
me transporting large Armies of foreign Mercenaries to compleat the works of
death, desolation and tyranny, already begun with circumstances of Cruelty &
perfidy scarcely paralleled in the most barbarous ages
, and totally unworthy the Head of a civil
ized nation.

He has constrained our fellow Citizens taken Captive on the h
igh Seas to bear Arms against their Country,
to become the executioners of their friends and
Brethren, or to fall themselves by their Hands.

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

In ever
y stage of these Oppressions We have Petitioned for Redress in the
most humble terms: Our repeated Petitions have been answered

```
He has obstructed the Administration of Justice, by refu
sing his Assent to Laws for establishing Judiciary powers.

He has made Judges dependent
on his Will alone, for the tenure of the
ir offices, and the amount and payment of thei
r salaries.

He has erected a multitude of New Offices, and sent hither swarms of Offi
cers to harrass our people, and eat out their substance.

He has kept among us, in tim
es of peace, Standing Armies without the Consent of our
legislatures.

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

He has combined with others to subject us to a jurisdi
ction foreign to our constitution, and unacknowledged by
our laws; giving his Assent to their Acts of pretended Legislation
:

For Quartering large bodies of armed troops among us
:

For protecting them, by a mock Trial, from punishment for any Murders which they sh
ould commit on the Inhabitants of these States:

For cutting off our T
rade with all parts 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 pretended offences

For
abolishing the free System of English Laws in a neighbouring Prov
```

the column pointer is incremented, the variable ref_count is updated to keep track of the

AUTHOR
t object the establishment of an absolute Tyranny over these
States. To prove this, let Facts be submitted to a candid world.

H
e has refused his Assent to Laws, the most wholesome and necessary for the p
ublic good.

He has forbidden his Governors to pass Laws of immediate and pressing
importance, unless suspended in their operation
till his Assent should be obtained; and when so suspended, he has utterly neglect
ed to attend to them.

He has refused to pass other Laws for the accommodat
ion of large districts of people, unless those people would re
linquish the right of Representation in the Legis
lature, a right inestimable to them and formidable to tyrants only.

He has called
together legislative bodies at places unusual, uncomforta
ble, and distant from the depository of their publ
ic Records, for the sole purpose of fatiguing t
hem into compliance with his measures.

He has dissolved Repre
sentative Houses repeatedly, for opposing wit
h manly firmness his invasions on the rights of the people.

He has
refused for a long time, after such dissolutions, to cause others to be elected; whereb
y the Legislative powers, incapable of Annih
ilation, have returned to the People at large for their exercise; the State remai
ning in the mean time exposed to all the dange
rs of invasion from without, and convulsions within.

He has endeavoured to
prevent the population of these States; for that purpose obstructing
the Laws for Naturalization of Foreigners; refusing to pass oth
ers to encourage their migrations hither, and raising the conditions of new Appropri
ations of Lands.

He has obstructed the Administration of Justice, by refu
sing his Assent to Laws for establishing Judiciary powers.

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 pamphlet; and those whose sentiments are injudicious, or hath shewn, that mankind are more disposed to suffer, while e

unfriendly, will cease of themselves unless too much pains are bestowed upon th
vils are sufferable, than to right themselves by abolishing the
eir conversion.

The cause of America is in a great measure t
forms to which they are accustomed. But when a long train of abuses and usur
he cause of all mankind. Many
circumstances hath, and w
pations, pursuing invariably the same Object evinces a d
ill arise, which are not local, but universal, and
through which the pri
esign to reduce them under absolute Despotism, it is
nciples of all Lovers of Mankind are affected, and in
the Event of which, their Aff
their right, it is their duty, to throw off such Government, and to prov
ections are interested. The laying a Country
de
ide new Guards for their future security.--Such has been the patient sufferance of these
solate with Fire and Sword, declaring War against the natural rights of all
Mankind,
Colonies; and such is now the necessity which constrain
and extirpating the Defenders thereof from the Face of the Earth,
is the Concern
s them to alter their former Systems of Gove
of every Man to whom Nature hath given the Power of fee
rnment. The history of the present King of Gr
ling;
of which Class, regardless of Party Censure, is t
eat Britain is a history of repeated injuries and usurpations, all having in direc
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t object the establishment of an absolute Tyranny over these
States. To prove this, let Facts be submitted to a candid world.

```
student@student-VirtualBox:~/csc415-assignment-5-bufferedio-hMiyazaki95$ make run
./miyazaki_hajime_HW5_main DATA DecOfInd.txt CommonSense.txt
The unanimous Declaration of the thirteen united States of America, When in th
Perhaps the sentiments contained in the followi
e Course of human events, it becomes necessary for one people to dissolve the politi
ng pages, are not yet
sufficiently fashionable to
cal bands which have connected them with another, and to assume am
, procure them general favor; a long habit
of not thinking a thing wrong, gives
ong the powers of the earth, the separate and equal station to which the Laws
, it a superficial appearance of
being right, and raises at first
of Nature and of Nature's God entitle them, a decent respect to the opinions
a formidable outcry in defense of
custom.
of mankind requires that they should declare the causes which impel them to the sep
But the tumult soon subsides. Time makes more convert
aration.

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creato
r with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness.--That to s
ecure these rights, Governments are instituted among Men, deriving their just powers from the consent of the g
overned, --That whenever any Form of Government becomes destructive of these ends, it is the Right of the Peop
le to alter or to abolish it, and to institute new Government, laying its foundation on such principles and or
ganizing its powers in such form, as to them shall seem most likely to effect their Safety and Happines
s than
reason.

As a long and violent abuse of power, is generally
s. Prudence, indeed, will dictate that Governments long established shou
the Means of calling
the right of it in question (and in Matters too which m
ld not be changed for light and transient causes; and accordingly all experience
ight never have
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

student@student-VirtualBox:~/csc415-assignment-5-bufferedio-hMiyazaki95$ make
gcc -g -I. -c -o b_io.o b_io.c
gcc -g -I. -o miyazaki_hajime_HW5_main b_io.o buffer-main.o
```