

The history file is read into a history linked list, the linked list is properly updated with each command, and on exit the contents of the linked list are printed to .mssh\_history. However, the results are reversed under some circumstances.

Bang number operations start at index 0. The most recent entry is entry 0.

Redirects is not implemented.

Double pipes don't really work. One pipe runs and then the other. This may produce proper output for a double pipe, it may not.

Upon changing the path variable, my code prints out the new, altered path. I left this in because it was useful, not because it was similar to bash.

Sometimes alias doesn't accept multi-token aliases. This is a bug, not a feature.

Test run:

```
grant@grantThinkPad3-IAL:~/340/lab8$ ./mssh
command?: ls -l
total 376
drwxrwxr-x 2 grant grant 4096 May 1 17:41 commands
-rw-rw-r-- 1 grant grant 6313 May 4 19:36 cscd340Lab8.c
-rw-rw-r-- 1 grant grant 159187 Apr 26 22:57 cscd340_sl8_lab8.pdf
-rw-rw-r-- 1 grant grant 21596 Apr 27 17:04 edwardsglab8.zip
-rwxrwxr-x 1 grant grant 20928 Apr 27 10:23 lab8
drwxrwxr-x 2 grant grant 4096 May 3 19:24 linkedlist
-rw-rw-r-- 1 grant grant 1286 May 4 19:39 Makefile
-rw-rw-r-- 1 grant grant 1272 Apr 28 11:56 Makefile~
-rwxrwxr-x 1 grant grant 28126 May 4 19:39 mssh
-rw-rw-r-- 1 grant grant 6309 May 4 19:35 mssh.c~
-rw-rw-r-- 1 grant grant 1039 Apr 27 10:45 note
-rw-rw-r-- 1 grant grant 582 Apr 27 10:30 note~
drwxrwxr-x 2 grant grant 4096 May 4 18:32 pipes
drwxrwxr-x 2 grant grant 4096 Apr 26 19:35 process
drwxrwxr-x 2 grant grant 4096 May 4 17:30 tokenize
drwxrwxr-x 2 grant grant 4096 Apr 27 14:39 utils
drwxrwxr-x 2 grant grant 4096 May 3 09:10 words
command?: pwd
/home/grant/340/lab8
command?: ls -l | wc -w
155
command?: ls -l | cut -c 1,2,3 | wc _w
wc: _w: No such file or directory
command?: ls -l | cut -c 1,2,3 | wc -w
0
command?: alias one="ls"
command?: one
commands          edwardsglab8.zip  Makefile~  note~      utils
cscd340Lab8.c      lab8              mssh       pipes       words
cscd340Lab8.c~     linkedlist        mssh.c~    process
cscd340_sl8_lab8.pdf Makefile          note       tokenize
command?: PATH=$PATH:/data/myprogs
[/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/d
ata/myprogs]
command?: history
?: PATH=$PATH:/data/myprogs 钹斤拷
?: one
?: alias one="ls"
?: ls -l | cut -c 1,2,3 | wc -w
?: ls -l | cut -c 1,2,3 | wc _w
?: ls -l | wc -w
```

```
?: pwd
?: ls -l
command?: !4
commands      edwardsglab8.zip  Makefile~  note~      utils
cscd340Lab8.c  lab8               mssh       pipes      words
cscd340Lab8.c~ linkedlist         mssh.c~    process
cscd340_sl8_lab8.pdf Makefile          note       tokenize
command?: ls
commands      edwardsglab8.zip  Makefile~  note~      utils
cscd340Lab8.c  lab8               mssh       pipes      words
cscd340Lab8.c~ linkedlist         mssh.c~    process
cscd340_sl8_lab8.pdf Makefile          note       tokenize
command?: !!
commands      edwardsglab8.zip  Makefile~  note~      utils
cscd340Lab8.c  lab8               mssh       pipes      words
cscd340Lab8.c~ linkedlist         mssh.c~    process
cscd340_sl8_lab8.pdf Makefile          note       tokenize
command?: cd ..
command?: pwd
/home/grant/340
command?: cd ~
command?: pwd
/home/grant
command?: cd ./340
command?: pwd
/home/grant/340
command?: cd ./lab8/linkedlist
command?: pwd
/home/grant/340/lab8/linkedlist
command?: cd ~/350
command?: pwd
/home/grant/350
command?: exit
grant@grantThinkPad3-IAL:~/340/lab8$
```

Valgrind run:

```
grant@grantThinkPad3-IAL:~/340/lab8$ valgrind ./mssh
==3861== Memcheck, a memory error detector
==3861== Copyright (C) 2002-2013, and GNU GPL'd, by Julian Seward et al.
==3861== Using Valgrind-3.10.1 and LibVEX; rerun with -h for copyright info
==3861== Command: ./mssh
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x4C2E0E9: strlen (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3861==    by 0x401D75: strip (in /home/grant/340/lab8/mssh)
==3861==    by 0x400E71: main (cscd340Lab8.c:38)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x4C2E0F8: strlen (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3861==    by 0x401D75: strip (in /home/grant/340/lab8/mssh)
==3861==    by 0x400E71: main (cscd340Lab8.c:38)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x401DE2: strip (in /home/grant/340/lab8/mssh)
==3861==    by 0x400E71: main (cscd340Lab8.c:38)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x401D94: strip (in /home/grant/340/lab8/mssh)
==3861==    by 0x400E71: main (cscd340Lab8.c:38)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x401DBA: strip (in /home/grant/340/lab8/mssh)
==3861==    by 0x400E71: main (cscd340Lab8.c:38)
```

```
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x400E7E: main (cscd340Lab8.c:39)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x402DFB: buildTypeWord (in /home/grant/340/lab8/mssh)
==3861==    by 0x402AD7: buildNodeStr (in /home/grant/340/lab8/mssh)
==3861==    by 0x400E93: main (cscd340Lab8.c:42)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x4C2E78E: __strncpy_sse2_unaligned (in /usr/lib/valgrind/vgpreload_memcheck-
amd64-linux.so)
==3861==    by 0x402E2B: buildTypeWord (in /home/grant/340/lab8/mssh)
==3861==    by 0x402AD7: buildNodeStr (in /home/grant/340/lab8/mssh)
==3861==    by 0x400E93: main (cscd340Lab8.c:42)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x40202B: reduceSpaces (in /home/grant/340/lab8/mssh)
==3861==    by 0x400FDD: main (cscd340Lab8.c:81)
==3861==
==3861== Conditional jump or move depends on uninitialised value(s)
==3861==    at 0x40202B: reduceSpaces (in /home/grant/340/lab8/mssh)
==3861==    by 0x4018CE: main (cscd340Lab8.c:241)
==3861==
command?: pwd
==3862== Syscall param execve(argv) points to unaddressable byte(s)
==3862==    at 0x4EFC137: execve (execve.c:33)
==3862==    by 0x4EFC988: execvpe (execvpe.c:149)
==3862==    by 0x40227A: forkIt (in /home/grant/340/lab8/mssh)
==3862==    by 0x401879: main (cscd340Lab8.c:232)
==3862== Address 0x5200c68 is 0 bytes after a block of size 8 alloc'd
==3862==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3862==    by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3862==    by 0x40175B: main (cscd340Lab8.c:214)
==3862==
/home/grant/340/lab8
command?: cd ..
command?: alias lll="ls"
command?: lll
==3861== Invalid read of size 1
==3861==    at 0x4C2F1CB: strcmp (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3861==    by 0x4017DF: main (cscd340Lab8.c:223)
==3861== Address 0x5201113 is 0 bytes after a block of size 3 alloc'd
==3861==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3861==    by 0x402F4E: buildAlias (in /home/grant/340/lab8/mssh)
==3861==    by 0x402B1F: buildNodeAlias (in /home/grant/340/lab8/mssh)
==3861==    by 0x4013F4: main (cscd340Lab8.c:160)
==3861==
==3861== Invalid read of size 1
==3861==    at 0x4C2E1E4: strcpy (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3861==    by 0x40181D: main (cscd340Lab8.c:225)
==3861== Address 0x5201162 is 0 bytes after a block of size 2 alloc'd
==3861==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3861==    by 0x402F64: buildAlias (in /home/grant/340/lab8/mssh)
==3861==    by 0x402B1F: buildNodeAlias (in /home/grant/340/lab8/mssh)
==3861==    by 0x4013F4: main (cscd340Lab8.c:160)
==3861==
==3863== Syscall param execve(argv) points to unaddressable byte(s)
==3863==    at 0x4EFC137: execve (execve.c:33)
==3863==    by 0x4EFC988: execvpe (execvpe.c:149)
==3863==    by 0x40227A: forkIt (in /home/grant/340/lab8/mssh)
==3863==    by 0x401879: main (cscd340Lab8.c:232)
==3863== Address 0x52012b8 is 0 bytes after a block of size 8 alloc'd
==3863==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3863==    by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
```

```

==3863== by 0x40175B: main (cscd340Lab8.c:214)
==3863==
diningPhil Lab2out Lab3.zip lab7 notes semaphores readwrite
Fork1 Lab2.zip Lab4 lab7as8 pipesfixed.zip
Lab1 Lab3 Lab5 Lab7.zip ShellSaves
Lab1.zip Lab3out Lab5.zip lab8
Lab2 Lab3sve.zip Lab6 List
command?: ls -l | wc -w
==3864== Syscall param execve(argv) points to unaddressable byte(s)
==3864== at 0x4EFC137: execve (execve.c:33)
==3864== by 0x4EFC988: execvpe (execvpe.c:149)
==3864== by 0x4024AF: pipeIt (in /home/grant/340/lab8/mssh)
==3864== by 0x40165E: main (cscd340Lab8.c:195)
==3864== Address 0x52016b0 is 0 bytes after a block of size 16 alloc'd
==3864== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3864== by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3864== by 0x4023F0: parsePostPipe (in /home/grant/340/lab8/mssh)
==3864== by 0x40163E: main (cscd340Lab8.c:194)
==3864==
==3865== Syscall param execve(argv) points to unaddressable byte(s)
==3865== at 0x4EFC137: execve (execve.c:33)
==3865== by 0x4EFC988: execvpe (execvpe.c:149)
==3865== by 0x402515: pipeIt (in /home/grant/340/lab8/mssh)
==3865== by 0x40165E: main (cscd340Lab8.c:195)
==3865== Address 0x5201510 is 0 bytes after a block of size 16 alloc'd
==3865== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3865== by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3865== by 0x402342: parsePrePipe (in /home/grant/340/lab8/mssh)
==3865== by 0x401619: main (cscd340Lab8.c:193)
==3865==
211
command?: ls -l | cut -c 1,2,3 | wc -w
==3866== Syscall param execve(argv) points to unaddressable byte(s)
==3866== at 0x4EFC137: execve (execve.c:33)
==3866== by 0x4EFC988: execvpe (execvpe.c:149)
==3866== by 0x4024AF: pipeIt (in /home/grant/340/lab8/mssh)
==3866== by 0x4015A1: main (cscd340Lab8.c:185)
==3866== Address 0x5201af8 is 0 bytes after a block of size 24 alloc'd
==3866== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3866== by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3866== by 0x4023F0: parsePostPipe (in /home/grant/340/lab8/mssh)
==3866== by 0x40155C: main (cscd340Lab8.c:183)
==3866==
==3867== Syscall param execve(argv) points to unaddressable byte(s)
==3867== at 0x4EFC137: execve (execve.c:33)
==3867== by 0x4EFC988: execvpe (execvpe.c:149)
==3867== by 0x402515: pipeIt (in /home/grant/340/lab8/mssh)
==3867== by 0x4015A1: main (cscd340Lab8.c:185)
==3867== Address 0x5201950 is 0 bytes after a block of size 16 alloc'd
==3867== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3867== by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3867== by 0x402342: parsePrePipe (in /home/grant/340/lab8/mssh)
==3867== by 0x401537: main (cscd340Lab8.c:182)
==3867==
tot
-rw
drw
drw
-rw
drw
drw
-rw
drw
drw
-rw

```

```

-rw
drw
drw
-rw
drw
drw
drw
-rw
drw
drw
-rw
-rw
drw
==3868== Syscall param execve(argv) points to unaddressable byte(s)
==3868==   at 0x4EFC137: execve (execve.c:33)
==3868==   by 0x4EFC988: execvpe (execvpe.c:149)
==3868==   by 0x4024AF: pipeIt (in /home/grant/340/lab8/mssh)
==3868==   by 0x4015BA: main (cscd340Lab8.c:186)
==3868== Address 0x5201cf0 is 0 bytes after a block of size 16 alloc'd
==3868==   at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3868==   by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3868==   by 0x4023F0: parsePostPipe (in /home/grant/340/lab8/mssh)
==3868==   by 0x401581: main (cscd340Lab8.c:184)
==3868==
==3869== Syscall param execve(argv) points to unaddressable byte(s)
==3869==   at 0x4EFC137: execve (execve.c:33)
==3869==   by 0x4EFC988: execvpe (execvpe.c:149)
==3869==   by 0x402515: pipeIt (in /home/grant/340/lab8/mssh)
==3869==   by 0x4015BA: main (cscd340Lab8.c:186)
==3869== Address 0x5201af8 is 0 bytes after a block of size 24 alloc'd
==3869==   at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3869==   by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3869==   by 0x4023F0: parsePostPipe (in /home/grant/340/lab8/mssh)
==3869==   by 0x40155C: main (cscd340Lab8.c:183)
==3869==

^C==3861==
==3861== HEAP SUMMARY:
==3861==   in use at exit: 2,395 bytes in 58 blocks
==3861==   total heap usage: 63 allocs, 5 frees, 2,987 bytes allocated
==3861==
==3861== LEAK SUMMARY:
==3861==   definitely lost: 500 bytes in 5 blocks
==3861==   indirectly lost: 0 bytes in 0 blocks
==3861==   possibly lost: 100 bytes in 1 blocks
==3861==   still reachable: 1,795 bytes in 52 blocks
==3861==   suppressed: 0 bytes in 0 blocks
==3861== Rerun with --leak-check=full to see details of leaked memory
==3861==
==3861== For counts of detected and suppressed errors, rerun with: -v
==3861== Use --track-origins=yes to see where uninitialised values come from
==3861== ERROR SUMMARY: 16 errors from 12 contexts (suppressed: 0 from 0)

grant@grantThinkPad3-IAL:~/340/lab8$ valgrind ./mssh
==3870== Memcheck, a memory error detector
==3870== Copyright (C) 2002-2013, and GNU GPL'd, by Julian Seward et al.
==3870== Using Valgrind-3.10.1 and LibVEX; rerun with -h for copyright info
==3870== Command: ./mssh
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870==   at 0x4C2E0E9: strlen (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870==   by 0x401D75: strip (in /home/grant/340/lab8/mssh)
==3870==   by 0x400E71: main (cscd340Lab8.c:38)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)

```

```

==3870== at 0x4C2E0F8: strlen (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870== by 0x401D75: strip (in /home/grant/340/lab8/mssh)
==3870== by 0x400E71: main (cscd340Lab8.c:38)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x401DE2: strip (in /home/grant/340/lab8/mssh)
==3870== by 0x400E71: main (cscd340Lab8.c:38)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x401D94: strip (in /home/grant/340/lab8/mssh)
==3870== by 0x400E71: main (cscd340Lab8.c:38)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x401DBA: strip (in /home/grant/340/lab8/mssh)
==3870== by 0x400E71: main (cscd340Lab8.c:38)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x400E7E: main (cscd340Lab8.c:39)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x402DFB: buildTypeWord (in /home/grant/340/lab8/mssh)
==3870== by 0x402AD7: buildNodeStr (in /home/grant/340/lab8/mssh)
==3870== by 0x400E93: main (cscd340Lab8.c:42)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x4C2E78E: __strncpy_sse2_unaligned (in /usr/lib/valgrind/vgpreload_memcheck-
amd64-linux.so)
==3870== by 0x402E2B: buildTypeWord (in /home/grant/340/lab8/mssh)
==3870== by 0x402AD7: buildNodeStr (in /home/grant/340/lab8/mssh)
==3870== by 0x400E93: main (cscd340Lab8.c:42)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x40202B: reduceSpaces (in /home/grant/340/lab8/mssh)
==3870== by 0x400FDD: main (cscd340Lab8.c:81)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x40202B: reduceSpaces (in /home/grant/340/lab8/mssh)
==3870== by 0x4018CE: main (cscd340Lab8.c:241)
==3870==
command?: ls
==3871== Syscall param execve(argv) points to unaddressable byte(s)
==3871== at 0x4EFC137: execve (execve.c:33)
==3871== by 0x4EFC988: execvpe (execvpe.c:149)
==3871== by 0x40227A: forkIt (in /home/grant/340/lab8/mssh)
==3871== by 0x401879: main (cscd340Lab8.c:232)
==3871== Address 0x5200c68 is 0 bytes after a block of size 8 alloc'd
==3871== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3871== by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3871== by 0x40175B: main (cscd340Lab8.c:214)
==3871==
commands          edwardsglab8.zip  Makefile~  note~      utils
cscd340Lab8.c      lab8             mssh       pipes      words
cscd340Lab8.c~    linkedlist       mssh.c~    process
cscd340_sl8_lab8.pdf Makefile         note       tokenize
command?: cd ..
command?: alias lll="ls"
command?: lll
==3870== Invalid read of size 1
==3870== at 0x4C2F1CB: strcmp (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870== by 0x4017DF: main (cscd340Lab8.c:223)
==3870== Address 0x5201113 is 0 bytes after a block of size 3 alloc'd
==3870== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870== by 0x402F4E: buildAlias (in /home/grant/340/lab8/mssh)
==3870== by 0x402B1F: buildNodeAlias (in /home/grant/340/lab8/mssh)
==3870== by 0x4013F4: main (cscd340Lab8.c:160)

```

```

==3870==
==3870== Invalid read of size 1
==3870==    at 0x4C2E1E4: strcpy (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870==    by 0x40181D: main (cscd340Lab8.c:225)
==3870== Address 0x5201162 is 0 bytes after a block of size 2 alloc'd
==3870==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870==    by 0x402F64: buildAlias (in /home/grant/340/lab8/mssh)
==3870==    by 0x402B1F: buildNodeAlias (in /home/grant/340/lab8/mssh)
==3870==    by 0x4013F4: main (cscd340Lab8.c:160)
==3870==
==3872== Syscall param execve(argv) points to unaddressable byte(s)
==3872==    at 0x4EFC137: execve (execve.c:33)
==3872==    by 0x4EFC988: execvpe (execvpe.c:149)
==3872==    by 0x40227A: forkIt (in /home/grant/340/lab8/mssh)
==3872==    by 0x401879: main (cscd340Lab8.c:232)
==3872== Address 0x52012b8 is 0 bytes after a block of size 8 alloc'd
==3872==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3872==    by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3872==    by 0x40175B: main (cscd340Lab8.c:214)
==3872==
diningPhil  Lab2out      Lab3.zip  lab7      notes semaphores readwrite
Fork1       Lab2.zip      Lab4      lab7as8   pipesfixed.zip
Lab1        Lab3         Lab5      Lab7.zip  ShellSaves
Lab1.zip    Lab3out      Lab5.zip  lab8
Lab2        Lab3sve.zip  Lab6      List
command?: ls -l | wc -w
==3873== Syscall param execve(argv) points to unaddressable byte(s)
==3873==    at 0x4EFC137: execve (execve.c:33)
==3873==    by 0x4EFC988: execvpe (execvpe.c:149)
==3873==    by 0x4024AF: pipeIt (in /home/grant/340/lab8/mssh)
==3873==    by 0x40165E: main (cscd340Lab8.c:195)
==3873== Address 0x52016b0 is 0 bytes after a block of size 16 alloc'd
==3873==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3873==    by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3873==    by 0x4023F0: parsePostPipe (in /home/grant/340/lab8/mssh)
==3873==    by 0x40163E: main (cscd340Lab8.c:194)
==3873==
==3874== Syscall param execve(argv) points to unaddressable byte(s)
==3874==    at 0x4EFC137: execve (execve.c:33)
==3874==    by 0x4EFC988: execvpe (execvpe.c:149)
==3874==    by 0x402515: pipeIt (in /home/grant/340/lab8/mssh)
==3874==    by 0x40165E: main (cscd340Lab8.c:195)
==3874== Address 0x5201510 is 0 bytes after a block of size 16 alloc'd
==3874==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3874==    by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3874==    by 0x402342: parsePrePipe (in /home/grant/340/lab8/mssh)
==3874==    by 0x401619: main (cscd340Lab8.c:193)
==3874==
211
command?: !!
==3870== Invalid read of size 1
==3870==    at 0x4C2E1E4: strcpy (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870==    by 0x401028: main (cscd340Lab8.c:90)
==3870== Address 0x520184d is 0 bytes after a block of size 13 alloc'd
==3870==    at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870==    by 0x402E0E: buildTypeWord (in /home/grant/340/lab8/mssh)
==3870==    by 0x402AD7: buildNodeStr (in /home/grant/340/lab8/mssh)
==3870==    by 0x40191A: main (cscd340Lab8.c:249)
==3870==
==3876== Syscall param execve(argv) points to unaddressable byte(s)
==3876==    at 0x4EFC137: execve (execve.c:33)
==3876==    by 0x4EFC988: execvpe (execvpe.c:149)
==3876==    by 0x402515: pipeIt (in /home/grant/340/lab8/mssh)
==3876==    by 0x40165E: main (cscd340Lab8.c:195)
==3876== Address 0x5201950 is 0 bytes after a block of size 16 alloc'd

```

```

==3876== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3876== by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3876== by 0x402342: parsePrePipe (in /home/grant/340/lab8/mssh)
==3876== by 0x401619: main (cscd340Lab8.c:193)
==3876==
==3875== Syscall param execve(argv) points to unaddressable byte(s)
==3875== at 0x4EFC137: execve (execve.c:33)
==3875== by 0x4EFC988: execvpe (execvpe.c:149)
==3875== by 0x4024AF: pipeIt (in /home/grant/340/lab8/mssh)
==3875== by 0x40165E: main (cscd340Lab8.c:195)
==3875== Address 0x5201af0 is 0 bytes after a block of size 16 alloc'd
==3875== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3875== by 0x401C16: makeargs (in /home/grant/340/lab8/mssh)
==3875== by 0x4023F0: parsePostPipe (in /home/grant/340/lab8/mssh)
==3875== by 0x40163E: main (cscd340Lab8.c:194)
==3875==
211
command?: exit
==3870== Invalid read of size 1
==3870== at 0x4E82943: vfprintf (vfprintf.c:1661)
==3870== by 0x4E8B336: fprintf (fprintf.c:32)
==3870== by 0x401A07: main (cscd340Lab8.c:267)
==3870== Address 0x5201c8d is 0 bytes after a block of size 13 alloc'd
==3870== at 0x4C2CC70: calloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64-linux.so)
==3870== by 0x402E0E: buildTypeWord (in /home/grant/340/lab8/mssh)
==3870== by 0x402AD7: buildNodeStr (in /home/grant/340/lab8/mssh)
==3870== by 0x40191A: main (cscd340Lab8.c:249)
==3870==
==3870== Conditional jump or move depends on uninitialised value(s)
==3870== at 0x4E82943: vfprintf (vfprintf.c:1661)
==3870== by 0x4E8B336: fprintf (fprintf.c:32)
==3870== by 0x401A07: main (cscd340Lab8.c:267)
==3870==
==3870== Syscall param write(buf) points to uninitialised byte(s)
==3870== at 0x4F263C0: __write_nocancel (syscall-template.S:81)
==3870== by 0x4EAF12: _IO_file_write@@GLIBC_2.2.5 (fileops.c:1261)
==3870== by 0x4EB13EB: new_do_write (fileops.c:538)
==3870== by 0x4EB13EB: _IO_do_write@@GLIBC_2.2.5 (fileops.c:511)
==3870== by 0x4EB0C6F: _IO_file_close_it@@GLIBC_2.2.5 (fileops.c:165)
==3870== by 0x4EA4A4F: fclose@@GLIBC_2.2.5 (iofclose.c:59)
==3870== by 0x401A57: main (cscd340Lab8.c:272)
==3870== Address 0x4027039 is not stack'd, malloc'd or (recently) free'd
==3870==
==3870==
==3870== HEAP SUMMARY:
==3870== in use at exit: 1,718 bytes in 54 blocks
==3870== total heap usage: 61 allocs, 7 frees, 2,893 bytes allocated
==3870==
==3870== LEAK SUMMARY:
==3870== definitely lost: 704 bytes in 12 blocks
==3870== indirectly lost: 446 bytes in 41 blocks
==3870== possibly lost: 0 bytes in 0 blocks
==3870== still reachable: 568 bytes in 1 blocks
==3870== suppressed: 0 bytes in 0 blocks
==3870== Rerun with --leak-check=full to see details of leaked memory
==3870==
==3870== For counts of detected and suppressed errors, rerun with: -v
==3870== Use --track-origins=yes to see where uninitialised values come from
==3870== ERROR SUMMARY: 27 errors from 16 contexts (suppressed: 0 from 0)
grant@grantThinkPad3-IAL:~/340/lab8$

```