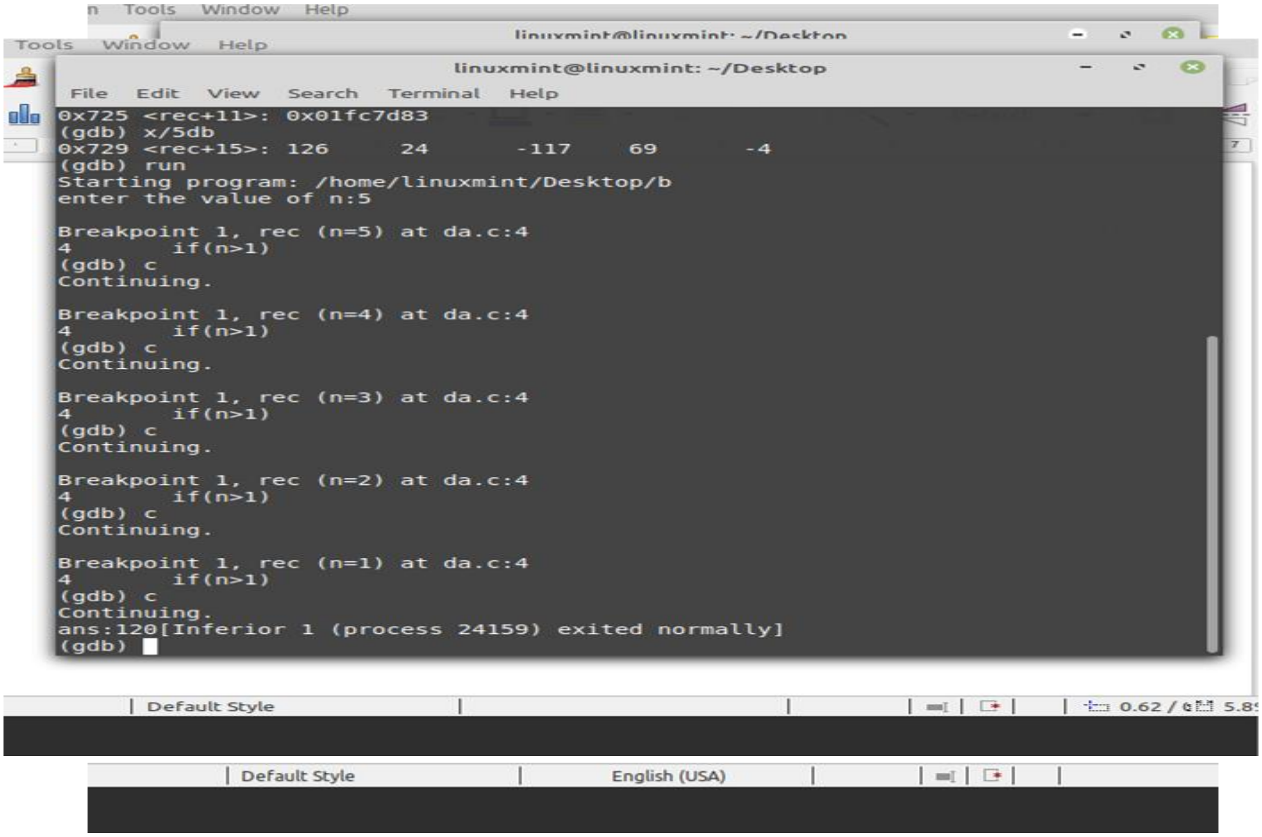
DIGITAL ASSIGNMENT 2
LINUX PROGRAMMING

17MIS1014
BLESSY BOBAN

1)

```
#include<stdio.h>
int rec(int n)
{
if(n>1)
{
n=n*rec(n-1);
}
return n;
}
int main()
{
int x,n;
printf("enter the value of n:");
scanf("%d",&n);
x=rec(n);
printf("ans:%d",x);
}
```


n Tools Window Help
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linuxmint@linuxmint: ~/Desktop
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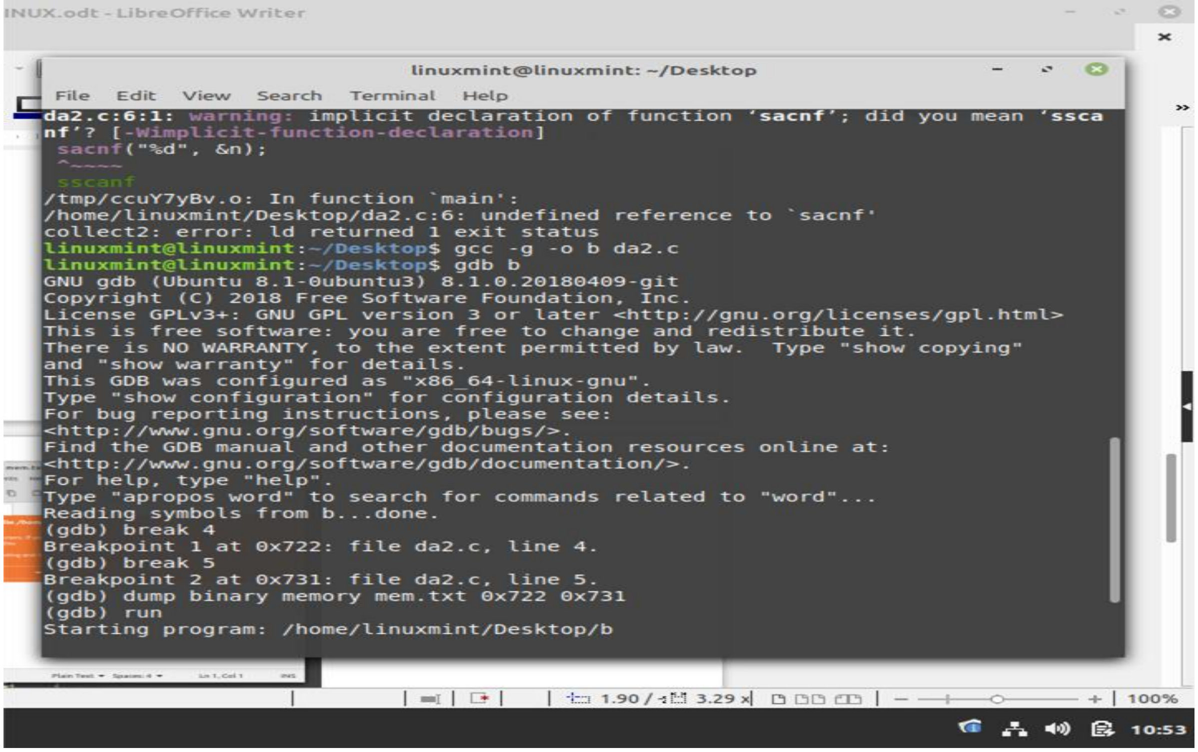
Default Style
0.62 / 5.8
Default Style
English (USA)

```
0x725 <rec+11>: 0x01fc7d83
(gdb) x/5db
0x729 <rec+15>: 126     24      -117    69      -4
(gdb) run
Starting program: /home/linuxmint/Desktop/b
enter the value of n:5

Breakpoint 1, rec (n=5) at da.c:4
4         if(n>1)
(gdb) c
Continuing.

Breakpoint 1, rec (n=4) at da.c:4
4         if(n>1)
(gdb) c
Continuing.

Breakpoint 1, rec (n=3) at da.c:4
4         if(n>1)
(gdb) c
Continuing.

Breakpoint 1, rec (n=2) at da.c:4
4         if(n>1)
(gdb) c
Continuing.

Breakpoint 1, rec (n=1) at da.c:4
4         if(n>1)
(gdb) c
Continuing.
ans:120[Inferior 1 (process 24159) exited normally]
(gdb) 
```

2)

```
#include<stdio.h>
#include<string.h>
int main()
{
int i, sum=0,n ;
sacnf("%d", &n);
for(i=1;i<=n;i++)
{
sum=sum+i;
}
printf("sum of nos:%d", sum);
}
```



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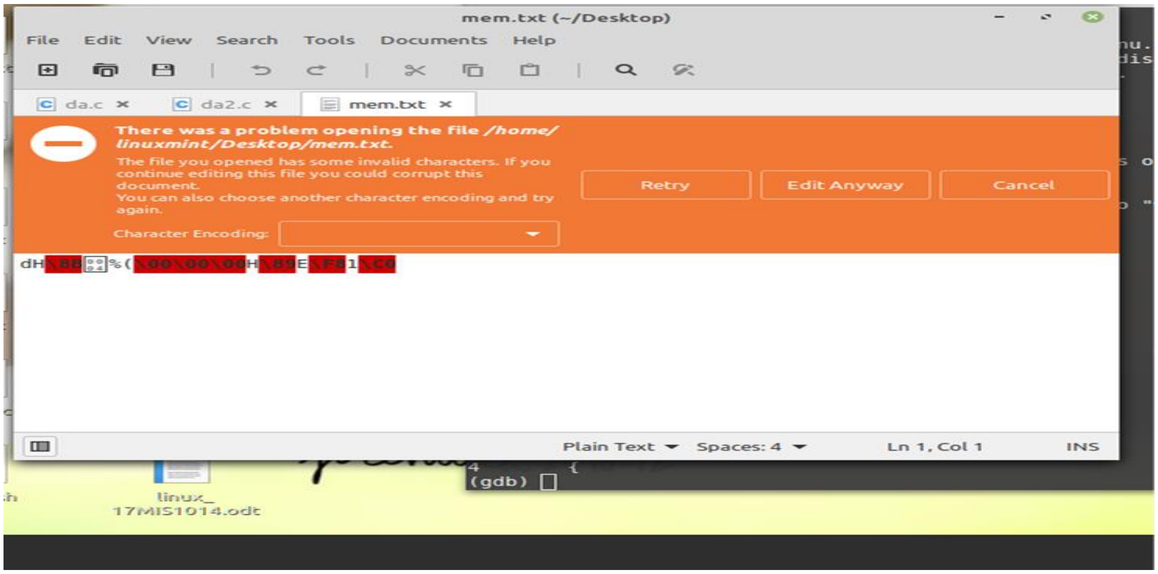
File Edit View Search Terminal Help
1.90 / 3.29
100%
10:53

```
da2.c:6:1: warning: implicit declaration of function ‘sacnf’; did you mean ‘ssca
nf’? [-Wimplicit-function-declaration]
  sacnf("%d", &n);
  ^~~~~
  sscanf
/tmp/ccuY7yBv.o: In function `main':
/home/linuxmint/Desktop/da2.c:6: undefined reference to `sacnf'
collect2: error: ld returned 1 exit status
linuxmint@linuxmint:~/Desktop$ gcc -g -o b da2.c
linuxmint@linuxmint:~/Desktop$ gdb b
GNU gdb (Ubuntu 8.1-0ubuntu3) 8.1.0.20180409-git
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.  Type "show copying"
and "show warranty" for details.
This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from b...done.
(gdb) break 4
Breakpoint 1 at 0x722: file da2.c, line 4.
(gdb) break 5
Breakpoint 2 at 0x731: file da2.c, line 5.
(gdb) dump binary memory mem.txt 0x722 0x731
(gdb) run
Starting program: /home/linuxmint/Desktop/b
```

3)



There was a problem opening the file */home/linuxmint/Desktop/mem.txt.*

The file you opened has some invalid characters. If you continue editing this file you could corrupt this document.
You can also choose another character encoding and try again.

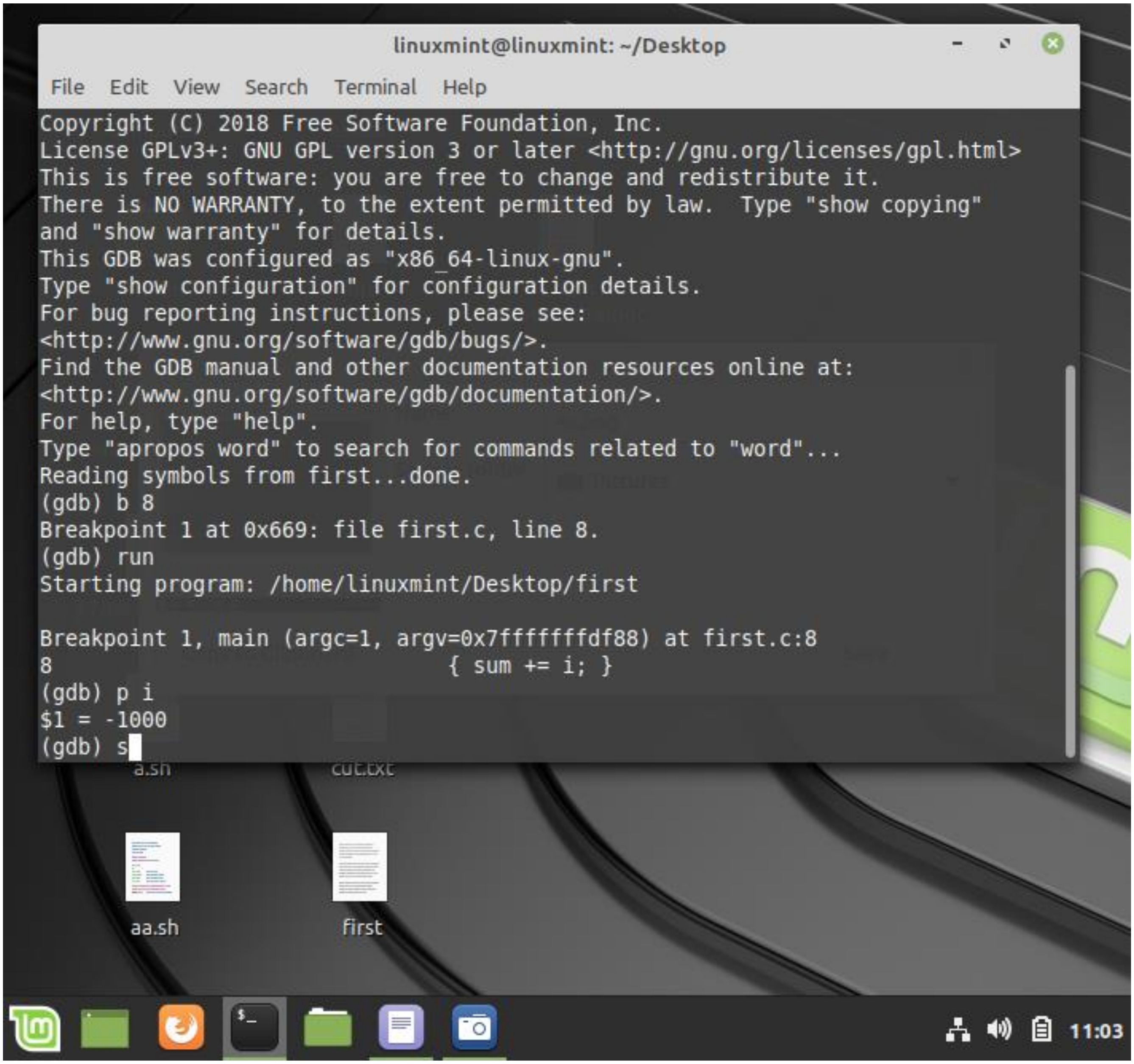
Character Encoding:

```
dH\8B0094%(\00\00\00H\89E\F81\C0
```

ORIGINAL CODE

```
#include <stdio.h>

/* Print the sum of the integers from 1 to 1000 */

intmain(int argc, char **argv)

        {

int i;

int sum;     sum = 0;

for(i = 0; i -= 1000; i++)
```

```
                { sum += i; }
        printf("%d\n", sum);
        return 0;
}
```



```
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License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.  Type "show copying"
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This GDB was configured as "x86_64-linux-gnu".
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For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from first...done.
(gdb) b 8
Breakpoint 1 at 0x669: file first.c, line 8.
(gdb) run
Starting program: /home/linuxmint/Desktop/first

Breakpoint 1, main (argc=1, argv=0x7fffffffdf88) at first.c:8
8                               { sum += i; }
(gdb) p i
$1 = -1000
(gdb) s
```
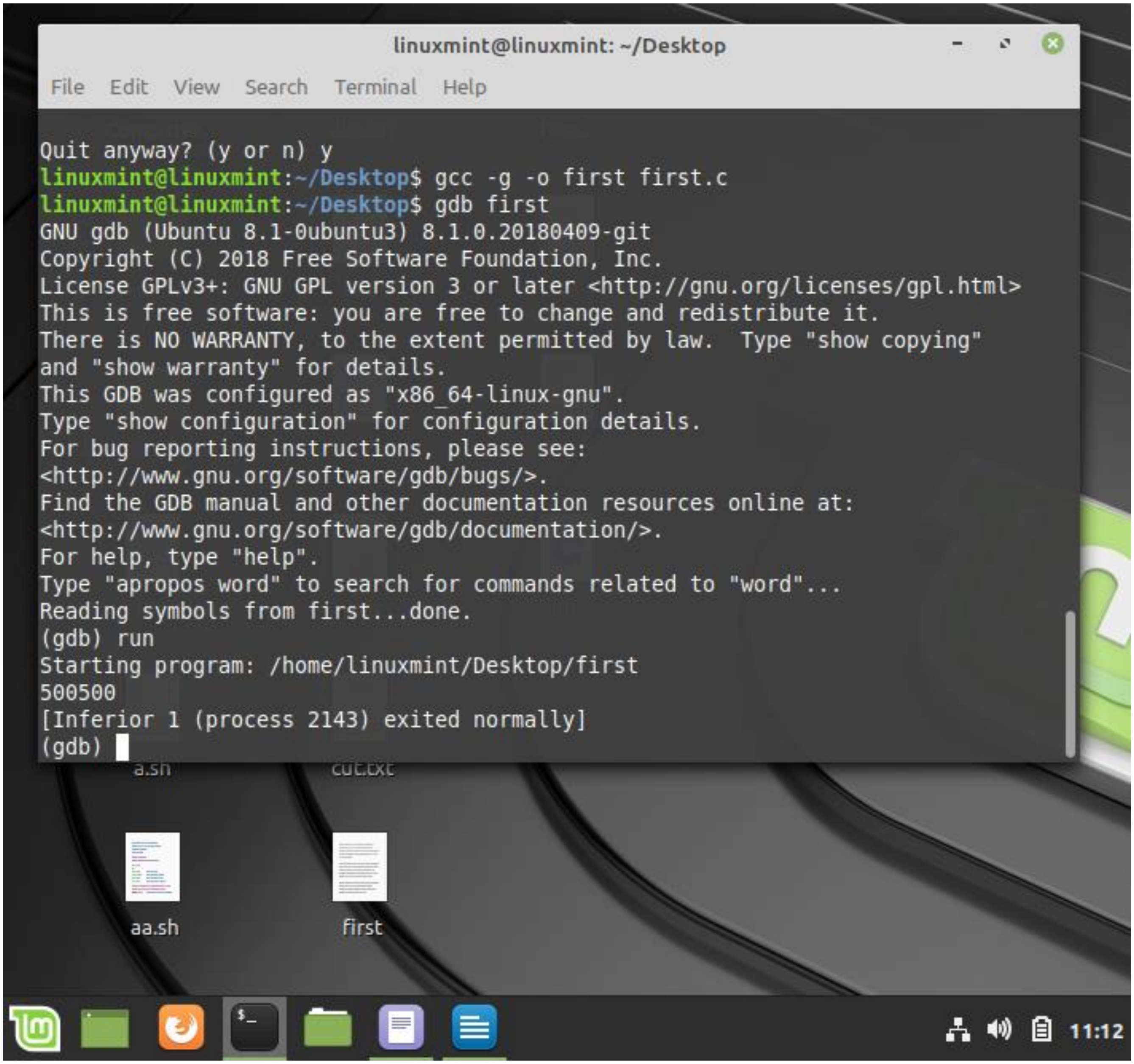

DEBUGGED CODE

```
#include <stdio.h>
```

```
int main(int argc, char **argv)
    {
        int i;
        int sum;    sum = 0;
        for(i = 1; i <= 1000; i++)
            { sum += i; }
        printf("%d\n", sum);
        return 0;
    }
```



```
Quit anyway? (y or n) y
linuxmint@linuxmint:~/Desktop$ gcc -g -o first first.c
linuxmint@linuxmint:~/Desktop$ gdb first
GNU gdb (Ubuntu 8.1-0ubuntu3) 8.1.0.20180409-git
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
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and "show warranty" for details.
This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from first...done.
(gdb) run
Starting program: /home/linuxmint/Desktop/first
500500
[Inferior 1 (process 2143) exited normally]
(gdb) 
```
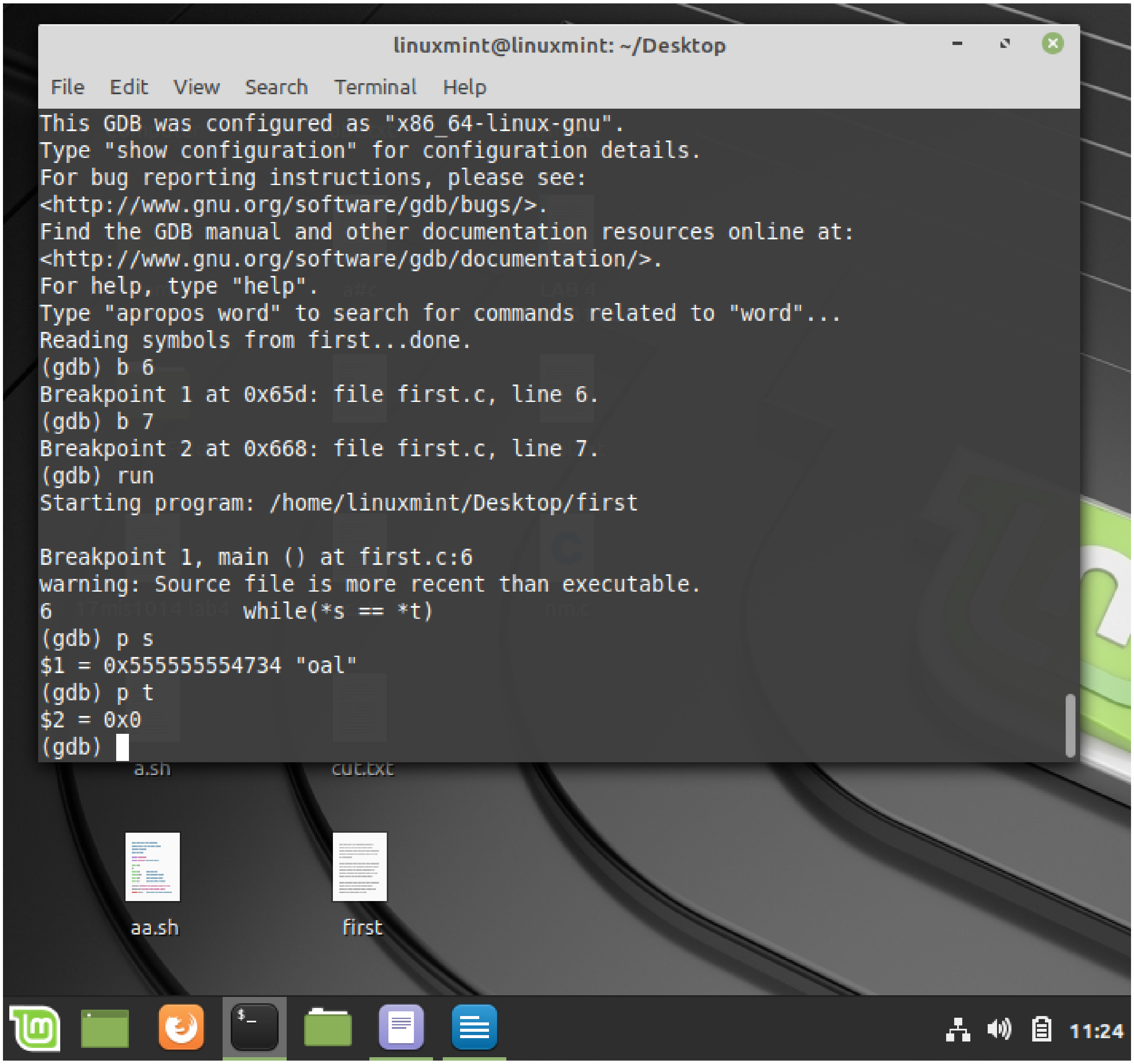

4)
ORIGINAL CODE

```
#include <stdio.h>

int main()
```

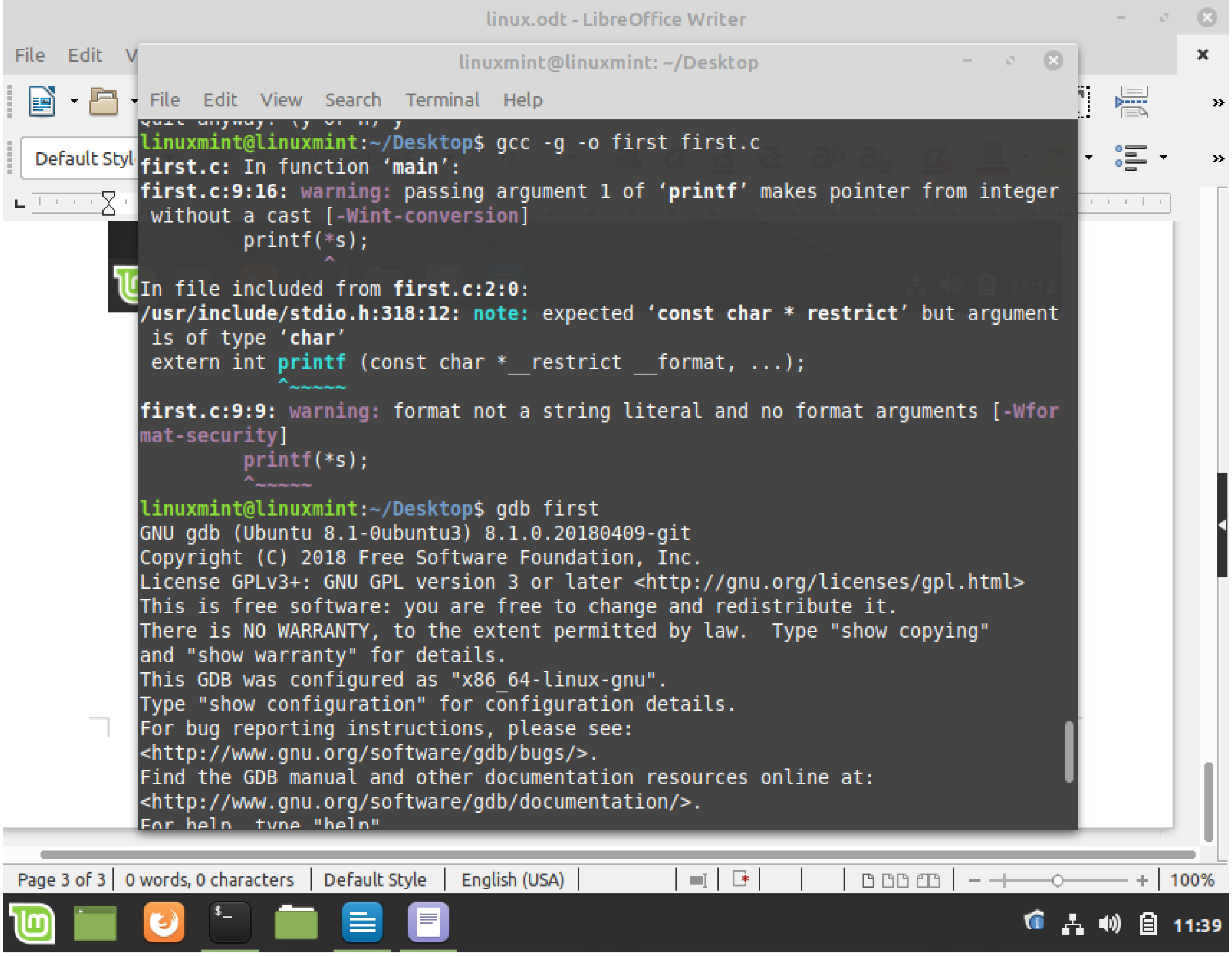
```
   {
   char *s = "goal";
char *t = "home";
while(*s++ == *t++)
printf(*s);
return 0;
   }
```



```
This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from first...done.
(gdb) b 6
Breakpoint 1 at 0x65d: file first.c, line 6.
(gdb) b 7
Breakpoint 2 at 0x668: file first.c, line 7.
(gdb) run
Starting program: /home/linuxmint/Desktop/first

Breakpoint 1, main () at first.c:6
warning: Source file is more recent than executable.
6               while(*s == *t)
(gdb) p s
$1 = 0x555555554734 "oal"
(gdb) p t
$2 = 0x0
(gdb) 
```

DEBUGGED CODE

```
#include <stdio.h>
int main()
        {
        char *s = "oal";
         char *t = "ome";
         while(*s == *t)
{
         printf(*s);
s++;
t++;
}
         return 0;
        }
```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File Edit View Search Terminal Help
Page 3 of 3
0 words, 0 characters
Default Style
English (USA)
100%
11:39

```
Quit anyway? (y or n) y
linuxmint@linuxmint:~/Desktop$ gcc -g -o first first.c
first.c: In function ‘main’:
first.c:9:16: warning: passing argument 1 of ‘printf’ makes pointer from integer
 without a cast [-Wint-conversion]
         printf(*s);
                ^
In file included from first.c:2:0:
/usr/include/stdio.h:318:12: note: expected ‘const char * restrict’ but argument
 is of type ‘char’
 extern int printf (const char *__restrict __format, ...);
            ^~~~~~
first.c:9:9: warning: format not a string literal and no format arguments [-Wfor
mat-security]
         printf(*s);
         ^~~~~~
linuxmint@linuxmint:~/Desktop$ gdb first
GNU gdb (Ubuntu 8.1-0ubuntu3) 8.1.0.20180409-git
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
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This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
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<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
```

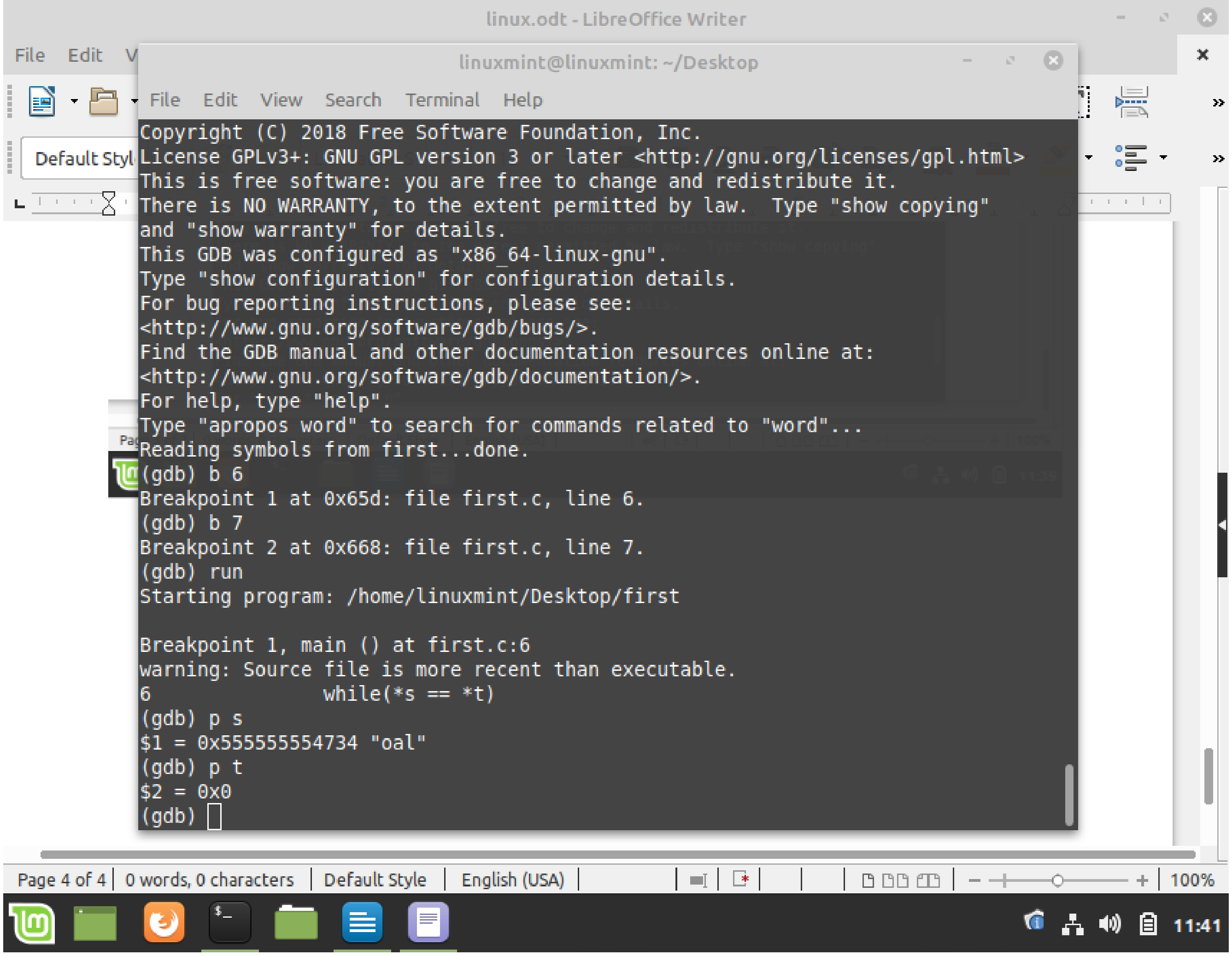

```
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This GDB was configured as "x86_64-linux-gnu".
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For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from first...done.
(gdb) b 6
Breakpoint 1 at 0x65d: file first.c, line 6.
(gdb) b 7
Breakpoint 2 at 0x668: file first.c, line 7.
(gdb) run
Starting program: /home/linuxmint/Desktop/first

Breakpoint 1, main () at first.c:6
warning: Source file is more recent than executable.
6               while(*s == *t)
(gdb) p s
$1 = 0x555555554734 "oal"
(gdb) p t
$2 = 0x0
(gdb) 
```
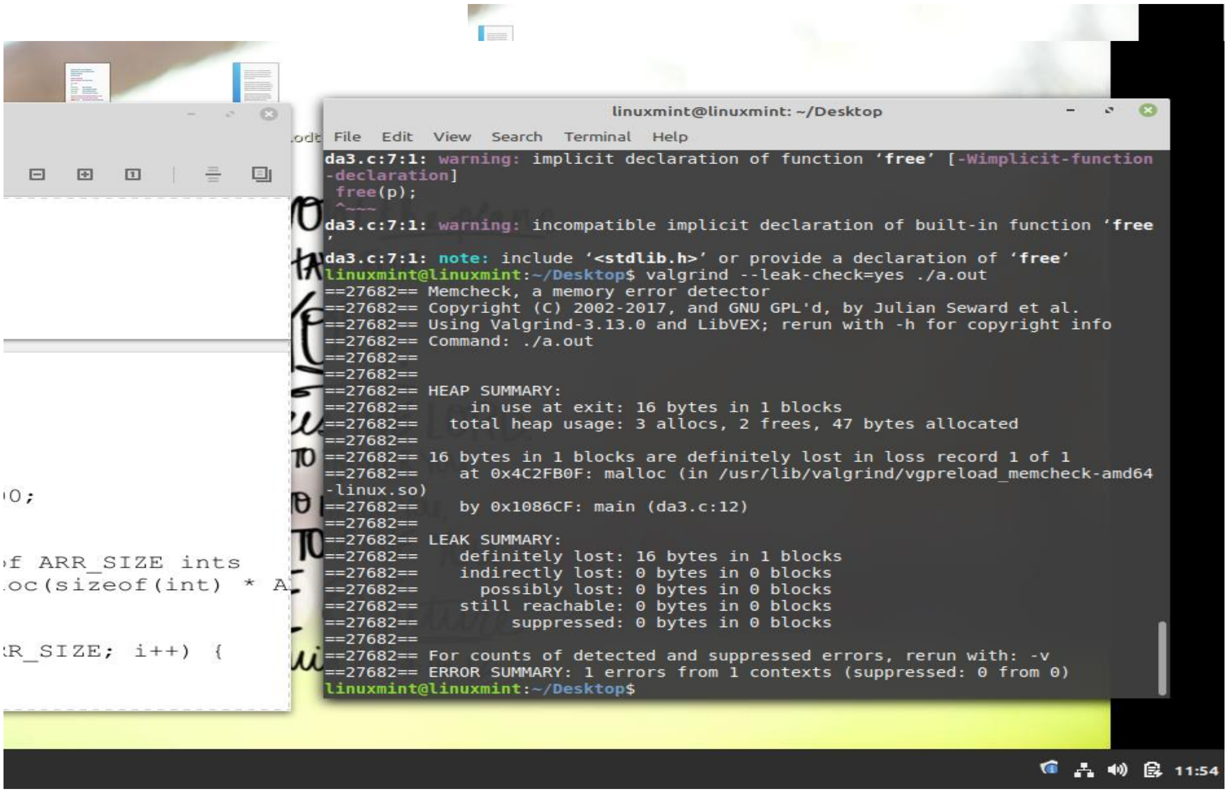

PROGRAMS TO VERIFY

```
1)#include <stdio.h>
int main()
{
char *p;
// Allocation #1 of 19 bytes
p = (char *) malloc(19);
// Allocation #2 of 12 bytes
p = (char *) malloc(12);
free(p);
// Allocation #3 of 16 bytes
p = (char *) malloc(16);
return 0;
}
```

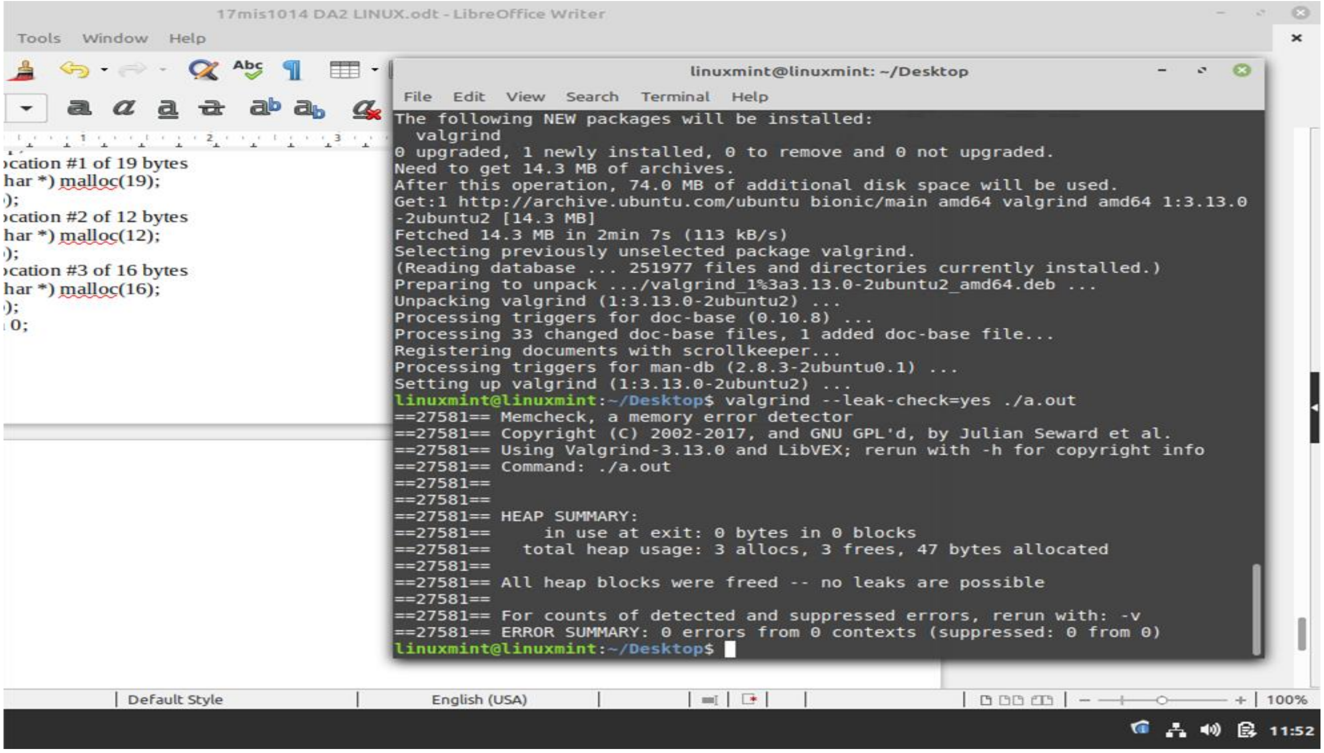
without including stdio.h


linuxmint@linuxmint: ~/Desktop
File Edit View Search Terminal Help
'0;
f ARR_SIZE ints
oc(sizeof(int) * A
R_SIZE; i++) {
11:54

```
da3.c:7:1: warning: implicit declaration of function ‘free’ [-Wimplicit-function
-declaration]
 free(p);
 ^~~~
da3.c:7:1: warning: incompatible implicit declaration of built-in function ‘free
’
da3.c:7:1: note: include ‘<stdlib.h>’ or provide a declaration of ‘free’
linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==27682== Memcheck, a memory error detector
==27682== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==27682== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==27682== Command: ./a.out
==27682==
==27682==
==27682== HEAP SUMMARY:
==27682==     in use at exit: 16 bytes in 1 blocks
==27682==   total heap usage: 3 allocs, 2 frees, 47 bytes allocated
==27682==
==27682== 16 bytes in 1 blocks are definitely lost in loss record 1 of 1
==27682==    at 0x4C2FB0F: malloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64
-linux.so)
==27682==    by 0x1086CF: main (da3.c:12)
==27682==
==27682== LEAK SUMMARY:
==27682==    definitely lost: 16 bytes in 1 blocks
==27682==    indirectly lost: 0 bytes in 0 blocks
==27682==      possibly lost: 0 bytes in 0 blocks
==27682==    still reachable: 0 bytes in 0 blocks
==27682==         suppressed: 0 bytes in 0 blocks
==27682==
==27682== For counts of detected and suppressed errors, rerun with: -v
==27682== ERROR SUMMARY: 1 errors from 1 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$
```

debugged

```
#include <stdio.h>
#include <stdlib.h>
int main()
{
char *p;
// Allocation #1 of 19 bytes
p = (char *) malloc(19);
free(p);
// Allocation #2 of 12 bytes
p = (char *) malloc(12);
free(p);
// Allocation #3 of 16 bytes
p = (char *) malloc(16);
free(p);
return 0;
```



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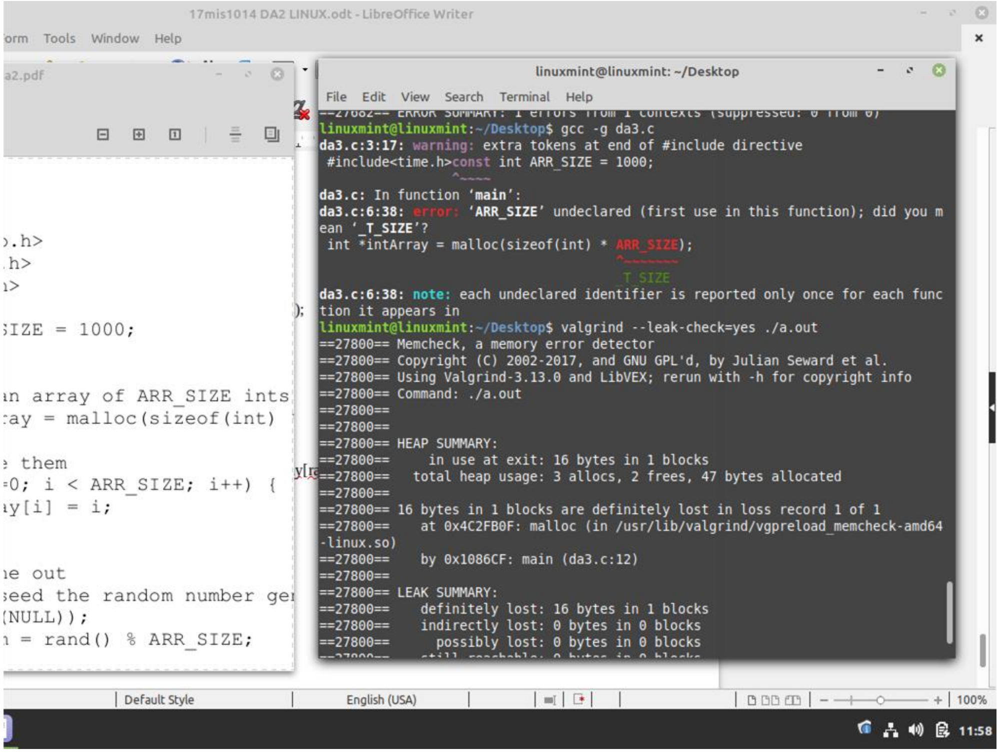
Tools Window Help
linuxmint@linuxmint: ~/Desktop
File Edit View Search Terminal Help
Default Style
English (USA)
100%
11:52

```
›cation #1 of 19 bytes
har *) malloc(19);
);
›cation #2 of 12 bytes
har *) malloc(12);
);
›cation #3 of 16 bytes
har *) malloc(16);
);
 0;
```

```
The following NEW packages will be installed:
  valgrind
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 14.3 MB of archives.
After this operation, 74.0 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 valgrind amd64 1:3.13.0
-2ubuntu2 [14.3 MB]
Fetched 14.3 MB in 2min 7s (113 kB/s)
Selecting previously unselected package valgrind.
(Reading database ... 251977 files and directories currently installed.)
Preparing to unpack .../valgrind_1%3a3.13.0-2ubuntu2_amd64.deb ...
Unpacking valgrind (1:3.13.0-2ubuntu2) ...
Processing triggers for doc-base (0.10.8) ...
Processing 33 changed doc-base files, 1 added doc-base file...
Registering documents with scrollkeeper...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Setting up valgrind (1:3.13.0-2ubuntu2) ...
linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==27581== Memcheck, a memory error detector
==27581== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==27581== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==27581== Command: ./a.out
==27581==
==27581==
==27581== HEAP SUMMARY:
==27581==     in use at exit: 0 bytes in 0 blocks
==27581==   total heap usage: 3 allocs, 3 frees, 47 bytes allocated
==27581==
==27581== All heap blocks were freed -- no leaks are possible
==27581==
==27581== For counts of detected and suppressed errors, rerun with: -v
==27581== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$
```

}

```
2)#include<stdlib.h>
#include<stdio.h>
#include<time.h>const int ARR_SIZE = 1000;
int main() {
// create an array of ARR_SIZE ints
int *intArray = malloc(sizeof(int) * ARR_SIZE);
// populate them
for (int i=0; i < ARR_SIZE; i++) {
intArray[i] = i;
}
// print one out
// first, seed the random number generator
srand(time(NULL));
int randNum = rand() % ARR_SIZE;
printf("intArray[%d]: %d\n", randNum, intArray[randNum]);
// end without freeing!
return 0;
}
```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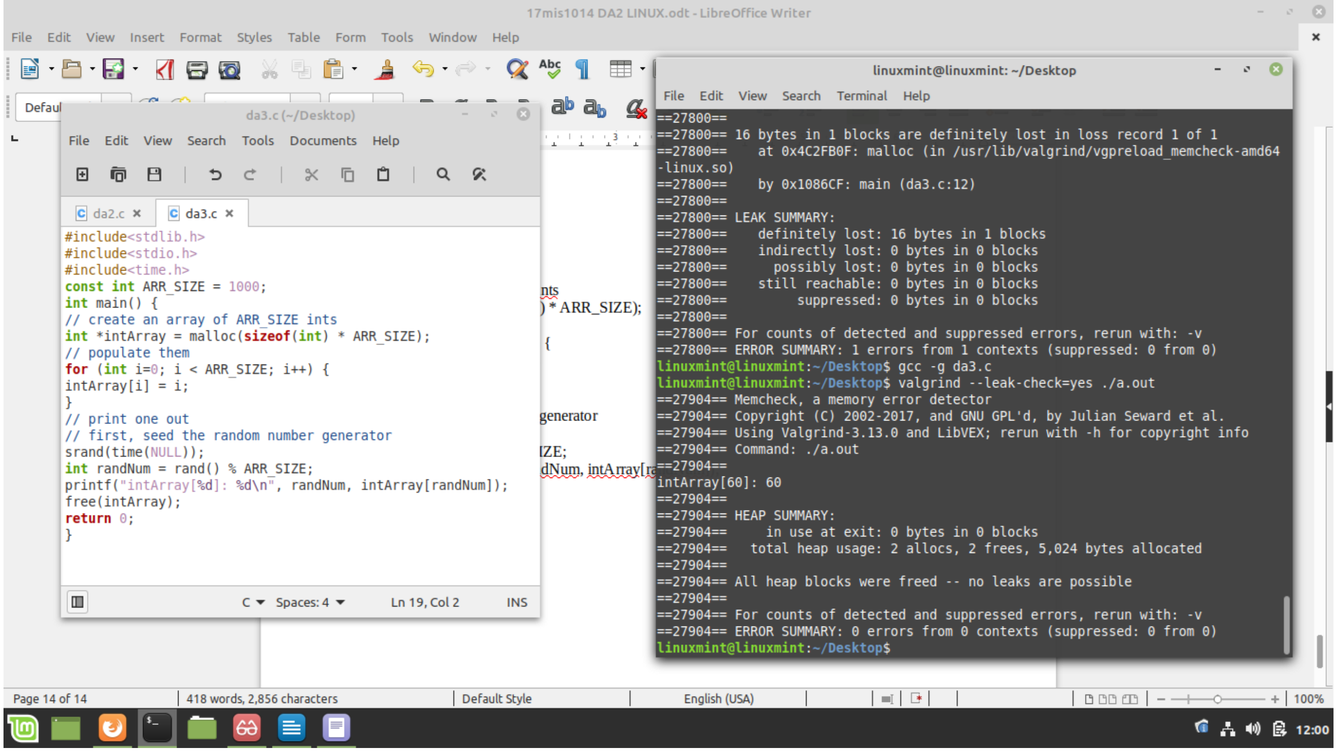
a2.pdf
linuxmint@linuxmint: ~/Desktop
File Edit View Search Terminal Help
Default Style
English (USA)
100%
11:58

```
).h>
.h>
1>

IZE = 1000;


n array of ARR_SIZE ints
ay = malloc(sizeof(int)

 them
0; i < ARR_SIZE; i++) {
y[i] = i;


e out
eed the random number ge
NULL));
 = rand() % ARR_SIZE;
```

```
==27682== ERROR SUMMARY: 1 errors from 1 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
da3.c:3:17: warning: extra tokens at end of #include directive
 #include<time.h>const int ARR_SIZE = 1000;
                 ^~~~~

da3.c: In function ‘main’:
da3.c:6:38: error: ‘ARR_SIZE’ undeclared (first use in this function); did you m
ean ‘_T_SIZE’?
 int *intArray = malloc(sizeof(int) * ARR_SIZE);
                                      ^~~~~~~~
                                       T_SIZE
da3.c:6:38: note: each undeclared identifier is reported only once for each func
tion it appears in
linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==27800== Memcheck, a memory error detector
==27800== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==27800== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==27800== Command: ./a.out
==27800==
==27800==
==27800== HEAP SUMMARY:
==27800==     in use at exit: 16 bytes in 1 blocks
==27800==   total heap usage: 3 allocs, 2 frees, 47 bytes allocated
==27800==
==27800== 16 bytes in 1 blocks are definitely lost in loss record 1 of 1
==27800==    at 0x4C2FB0F: malloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64
-linux.so)
==27800==    by 0x1086CF: main (da3.c:12)
==27800==
==27800== LEAK SUMMARY:
==27800==    definitely lost: 16 bytes in 1 blocks
==27800==    indirectly lost: 0 bytes in 0 blocks
==27800==      possibly lost: 0 bytes in 0 blocks
==27800==    still reachable: 0 bytes in 0 blocks
```

debugged code

```
#include<stdlib.h>
#include<stdio.h>
#include<time.h>
const int ARR_SIZE = 1000;
int main() {
// create an array of ARR_SIZE ints
int *intArray = malloc(sizeof(int) * ARR_SIZE);
// populate them
for (int i=0; i < ARR_SIZE; i++) {
intArray[i] = i;
}
// print one out
// first, seed the random number generator
srand(time(NULL));
int randNum = rand() % ARR_SIZE;
printf("intArray[%d]: %d\n", randNum, intArray[randNum]);
free(intArray);
return 0;
}
```



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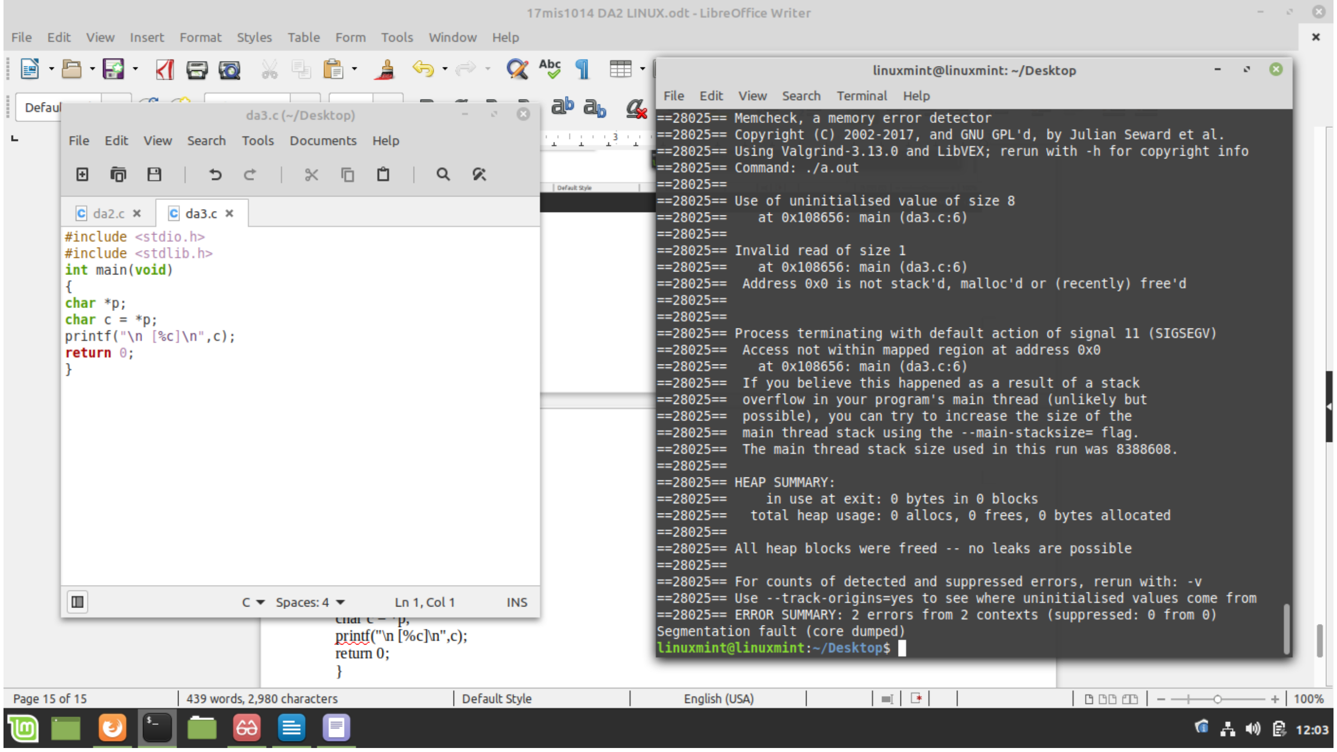
File Edit View Insert Format Styles Table Form Tools Window Help
da3.c (~/Desktop)
File Edit View Search Tools Documents Help
da2.c
da3.c
C Spaces: 4 Ln 19, Col 2 INS
linuxmint@linuxmint: ~/Desktop
File Edit View Search Terminal Help
Page 14 of 14
418 words, 2,856 characters
Default Style
English (USA)
100%
12:00

```c
#include<stdlib.h>
#include<stdio.h>
#include<time.h>
const int ARR_SIZE = 1000;
int main() {
// create an array of ARR_SIZE ints
int *intArray = malloc(sizeof(int) * ARR_SIZE);
// populate them
for (int i=0; i < ARR_SIZE; i++) {
intArray[i] = i;
}
// print one out
// first, seed the random number generator
srand(time(NULL));
int randNum = rand() % ARR_SIZE;
printf("intArray[%d]: %d\n", randNum, intArray[randNum]);
free(intArray);
return 0;
}
```

```
==27800==
==27800== 16 bytes in 1 blocks are definitely lost in loss record 1 of 1
==27800==    at 0x4C2FB0F: malloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64
-linux.so)
==27800==    by 0x1086CF: main (da3.c:12)
==27800==
==27800== LEAK SUMMARY:
==27800==    definitely lost: 16 bytes in 1 blocks
==27800==    indirectly lost: 0 bytes in 0 blocks
==27800==      possibly lost: 0 bytes in 0 blocks
==27800==    still reachable: 0 bytes in 0 blocks
==27800==         suppressed: 0 bytes in 0 blocks
==27800==
==27800== For counts of detected and suppressed errors, rerun with: -v
==27800== ERROR SUMMARY: 1 errors from 1 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==27904== Memcheck, a memory error detector
==27904== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==27904== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==27904== Command: ./a.out
==27904==
intArray[60]: 60
==27904==
==27904== HEAP SUMMARY:
==27904==     in use at exit: 0 bytes in 0 blocks
==27904==   total heap usage: 2 allocs, 2 frees, 5,024 bytes allocated
==27904==
==27904== All heap blocks were freed -- no leaks are possible
==27904==
==27904== For counts of detected and suppressed errors, rerun with: -v
==27904== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$
```

3) Original program:

```c
#include <stdio.h>
#include <stdlib.h>
int main(void)
{
char *p;
char c = *p;
printf("\n [%c]\n",c);
return 0;
}
```


17mis1014 DA2 LINUX.odt - LibreOffice Writer
da3.c (~/Desktop)
da2.c
da3.c
linuxmint@linuxmint: ~/Desktop
Page 15 of 15
439 words, 2,980 characters
Default Style
English (USA)
100%
12:03

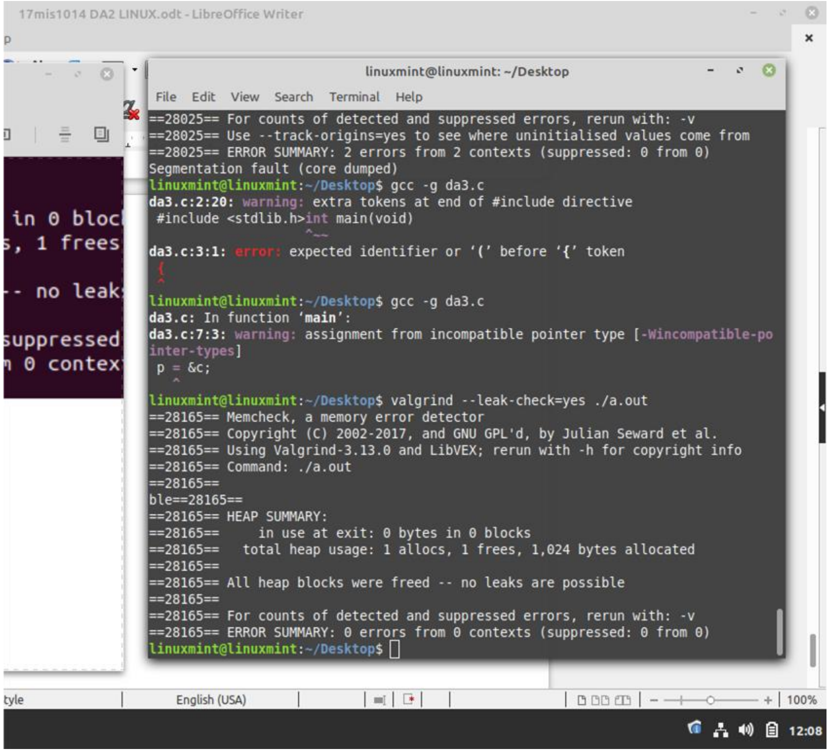
```c
#include <stdio.h>
#include <stdlib.h>
int main(void)
{
char *p;
char c = *p;
printf("\n [%c]\n",c);
return 0;
}
```

```
==28025== Memcheck, a memory error detector
==28025== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==28025== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==28025== Command: ./a.out
==28025==
==28025== Use of uninitialised value of size 8
==28025==    at 0x108656: main (da3.c:6)
==28025==
==28025== Invalid read of size 1
==28025==    at 0x108656: main (da3.c:6)
==28025==  Address 0x0 is not stack'd, malloc'd or (recently) free'd
==28025==
==28025==
==28025== Process terminating with default action of signal 11 (SIGSEGV)
==28025==  Access not within mapped region at address 0x0
==28025==    at 0x108656: main (da3.c:6)
==28025==  If you believe this happened as a result of a stack
==28025==  overflow in your program's main thread (unlikely but
==28025==  possible), you can try to increase the size of the
==28025==  main thread stack using the --main-stacksize= flag.
==28025==  The main thread stack size used in this run was 8388608.
==28025==
==28025== HEAP SUMMARY:
==28025==     in use at exit: 0 bytes in 0 blocks
==28025==   total heap usage: 0 allocs, 0 frees, 0 bytes allocated
==28025==
==28025== All heap blocks were freed -- no leaks are possible
==28025==
==28025== For counts of detected and suppressed errors, rerun with: -v
==28025== Use --track-origins=yes to see where uninitialised values come from
==28025== ERROR SUMMARY: 2 errors from 2 contexts (suppressed: 0 from 0)
Segmentation fault (core dumped)
linuxmint@linuxmint:~/Desktop$
```

```
char c = *p;
printf("\n [%c]\n",c);
return 0;
}
```

debugged code

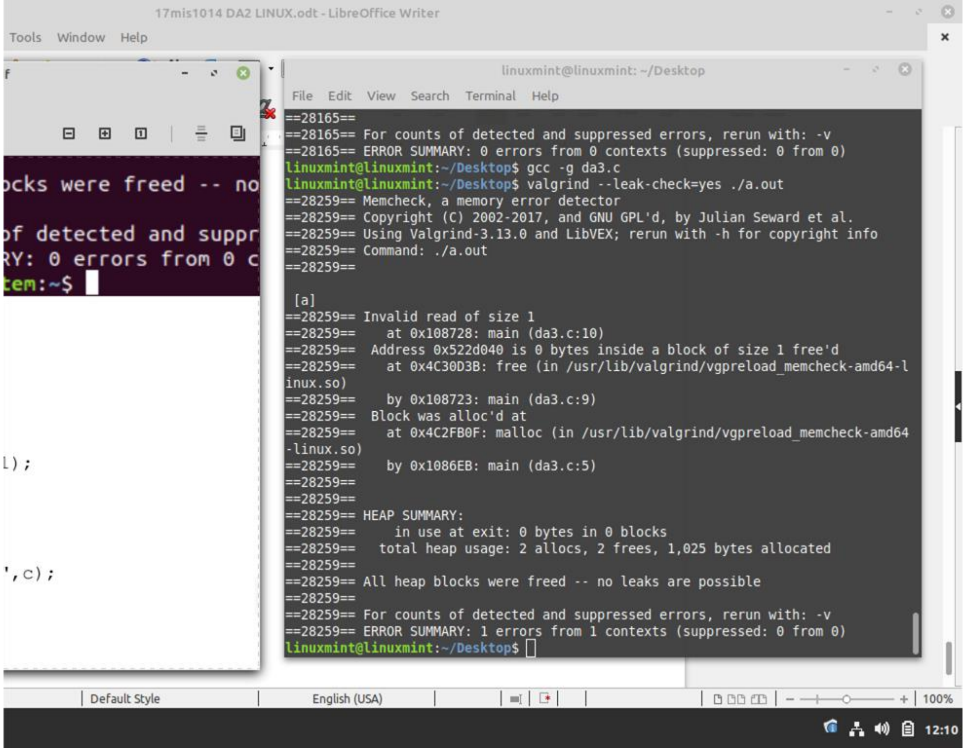
```
#include <stdio.h>
#include <stdlib.h>int main(void)
{
char *p;
char c[50]="ble";
p = &c;
printf("%s",c);
return 0;
}
```


17mis1014 DA2 LINUX.odt - LibreOffice Writer
linuxmint@linuxmint: ~/Desktop
File Edit View Search Terminal Help
English (USA)
100%
12:08

```
==28025== For counts of detected and suppressed errors, rerun with: -v
==28025== Use --track-origins=yes to see where uninitialised values come from
==28025== ERROR SUMMARY: 2 errors from 2 contexts (suppressed: 0 from 0)
Segmentation fault (core dumped)
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
da3.c:2:20: warning: extra tokens at end of #include directive
 #include <stdlib.h>int main(void)
                    ^~~

da3.c:3:1: error: expected identifier or ‘(’ before ‘{’ token
 {
 ^

linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
da3.c: In function ‘main’:
da3.c:7:3: warning: assignment from incompatible pointer type [-Wincompatible-po
inter-types]
 p = &c;
   ^

linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==28165== Memcheck, a memory error detector
==28165== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==28165== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==28165== Command: ./a.out
==28165==
ble==28165==
==28165== HEAP SUMMARY:
==28165==     in use at exit: 0 bytes in 0 blocks
==28165==   total heap usage: 1 allocs, 1 frees, 1,024 bytes allocated
==28165==
==28165== All heap blocks were freed -- no leaks are possible
==28165==
==28165== For counts of detected and suppressed errors, rerun with: -v
==28165== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$
```

4)original code

```
#include <stdio.h>
#include <stdlib.h>
int main(void)
{
char *p = malloc(1);
*p = 'a';
char c = *p;
printf("\n [%c]\n",c);
free(p);
c = *p;
return 0;
}
```



```
ocks were freed -- no

of detected and suppr
RY: 0 errors from 0 c
tem:~$
```

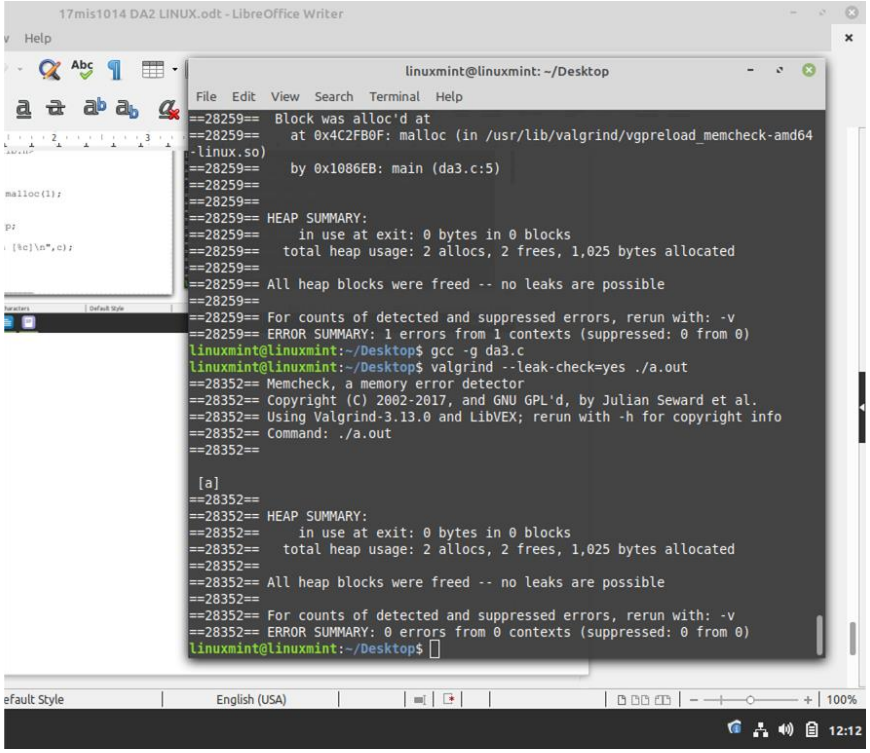
```
L);
```

```
',c);
```

```
==28165==
==28165== For counts of detected and suppressed errors, rerun with: -v
==28165== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==28259== Memcheck, a memory error detector
==28259== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==28259== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==28259== Command: ./a.out
==28259==

 [a]
==28259== Invalid read of size 1
==28259==    at 0x108728: main (da3.c:10)
==28259==  Address 0x522d040 is 0 bytes inside a block of size 1 free'd
==28259==    at 0x4C30D3B: free (in /usr/lib/valgrind/vgpreload_memcheck-amd64-l
inux.so)
==28259==    by 0x108723: main (da3.c:9)
==28259==  Block was alloc'd at
==28259==    at 0x4C2FB0F: malloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64
-linux.so)
==28259==    by 0x1086EB: main (da3.c:5)
==28259==
==28259==
==28259== HEAP SUMMARY:
==28259==     in use at exit: 0 bytes in 0 blocks
==28259==   total heap usage: 2 allocs, 2 frees, 1,025 bytes allocated
==28259==
==28259== All heap blocks were freed -- no leaks are possible
==28259==
==28259== For counts of detected and suppressed errors, rerun with: -v
==28259== ERROR SUMMARY: 1 errors from 1 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$
```

debugged code

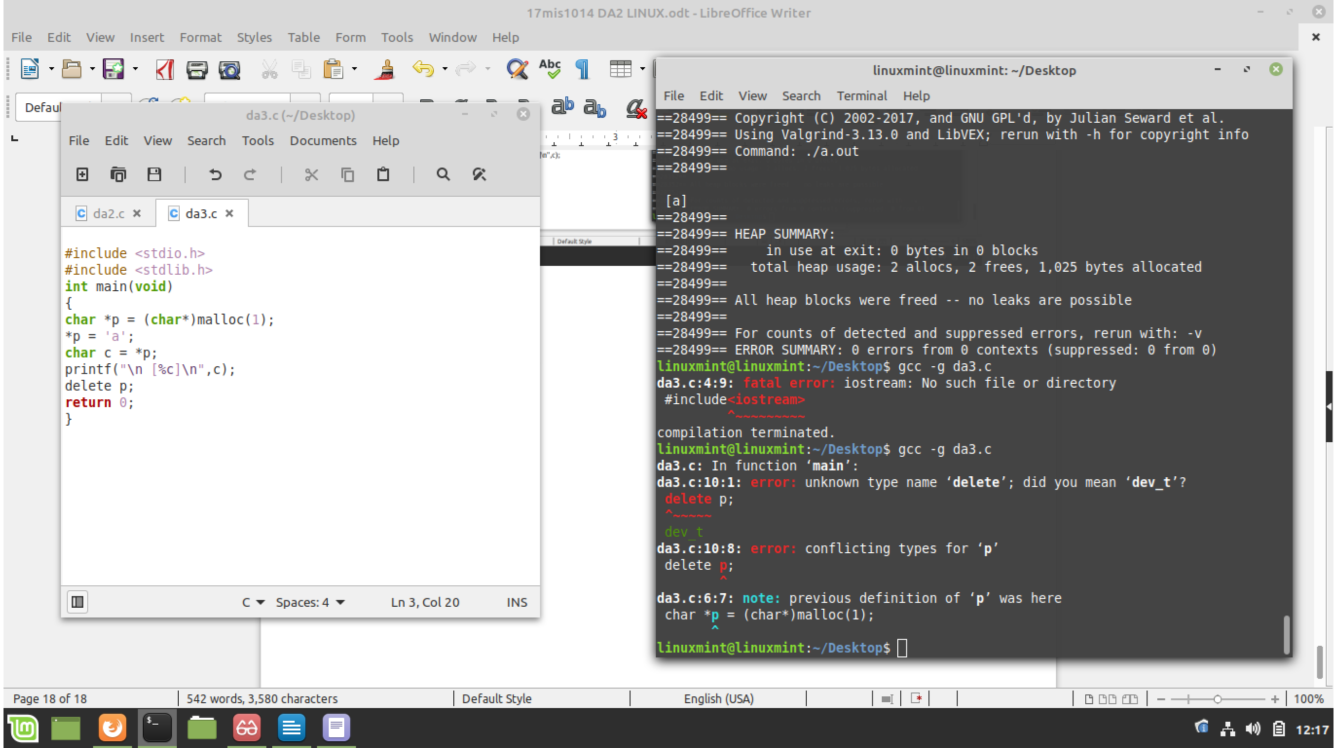
```
#include <stdio.h>
#include <stdlib.h>
int main(void)
{
char *p = malloc(1);
*p = 'a';
char c = *p;
printf("\n [%c]\n",c);
free(p);
return 0;
}
```


17mis1014 DA2 LINUX.odt - LibreOffice Writer
Help
linuxmint@linuxmint: ~/Desktop
File Edit View Search Terminal Help
efault Style
English (USA)
100%
12:12

```
==28259==  Block was alloc'd at
==28259==    at 0x4C2FB0F: malloc (in /usr/lib/valgrind/vgpreload_memcheck-amd64
-linux.so)
==28259==    by 0x1086EB: main (da3.c:5)
==28259==
==28259==
==28259== HEAP SUMMARY:
==28259==     in use at exit: 0 bytes in 0 blocks
==28259==   total heap usage: 2 allocs, 2 frees, 1,025 bytes allocated
==28259==
==28259== All heap blocks were freed -- no leaks are possible
==28259==
==28259== For counts of detected and suppressed errors, rerun with: -v
==28259== ERROR SUMMARY: 1 errors from 1 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==28352== Memcheck, a memory error detector
==28352== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==28352== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==28352== Command: ./a.out
==28352==

 [a]
==28352==
==28352== HEAP SUMMARY:
==28352==     in use at exit: 0 bytes in 0 blocks
==28352==   total heap usage: 2 allocs, 2 frees, 1,025 bytes allocated
==28352==
==28352== All heap blocks were freed -- no leaks are possible
==28352==
==28352== For counts of detected and suppressed errors, rerun with: -v
==28352== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$
```

5) ORIGINAL PROGRAM:

```
#include <stdio.h>
#include <stdlib.h>
#include<iostream>
int main(void)
{
char *p = (char*)malloc(1);
*p = 'a';
char c = *p;
printf("\n [%c]\n",c);
delete p;
return 0;
}
```



17mis1014 DA2 LINUX.odt - LibreOffice Writer
File Edit View Insert Format Styles Table Form Tools Window Help
da3.c (~/Desktop)
File Edit View Search Tools Documents Help
da2.c
da3.c
C
Spaces: 4
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INS
linuxmint@linuxmint: ~/Desktop
File Edit View Search Terminal Help
Page 18 of 18
542 words, 3,580 characters
Default Style
English (USA)
100%
12:17

```c
#include <stdio.h>
#include <stdlib.h>
int main(void)
{
char *p = (char*)malloc(1);
*p = 'a';
char c = *p;
printf("\n [%c]\n",c);
delete p;
return 0;
}
```

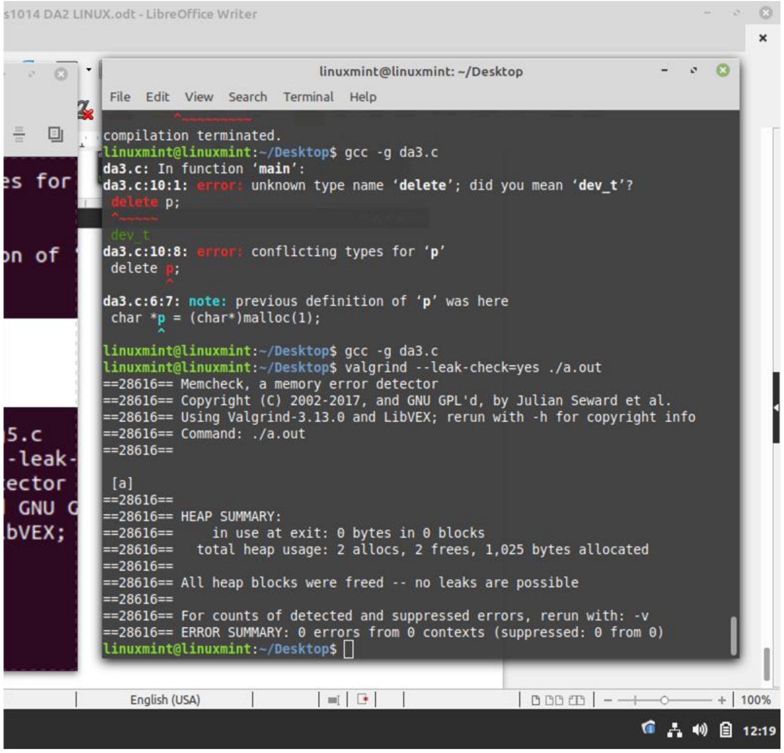
```
==28499== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==28499== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==28499== Command: ./a.out
==28499==

 [a]
==28499==
==28499== HEAP SUMMARY:
==28499==     in use at exit: 0 bytes in 0 blocks
==28499==   total heap usage: 2 allocs, 2 frees, 1,025 bytes allocated
==28499==
==28499== All heap blocks were freed -- no leaks are possible
==28499==
==28499== For counts of detected and suppressed errors, rerun with: -v
==28499== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
da3.c:4:9: fatal error: iostream: No such file or directory
 #include<iostream>
         ^~~~~~~~~~
compilation terminated.
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
da3.c: In function ‘main’:
da3.c:10:1: error: unknown type name ‘delete’; did you mean ‘dev_t’?
 delete p;
 ^~~~~~
 dev_t
da3.c:10:8: error: conflicting types for ‘p’
 delete p;
        ^
da3.c:6:7: note: previous definition of ‘p’ was here
 char *p = (char*)malloc(1);
       ^
linuxmint@linuxmint:~/Desktop$ 
```

debugged code

```
#include <stdio.h>
#include <stdlib.h>
int main(void)
{char *p = (char*)malloc(1);
*p = 'a';
```

```
char c = *p;
printf("\n [%c]\n",c);
free(p);
return 0;
}
```



```
compilation terminated.
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
da3.c: In function ‘main’:
da3.c:10:1: error: unknown type name ‘delete’; did you mean ‘dev_t’?
 delete p;
 ^~~~~~
 dev_t
da3.c:10:8: error: conflicting types for ‘p’
 delete p;
        ^
da3.c:6:7: note: previous definition of ‘p’ was here
 char *p = (char*)malloc(1);
       ^
linuxmint@linuxmint:~/Desktop$ gcc -g da3.c
linuxmint@linuxmint:~/Desktop$ valgrind --leak-check=yes ./a.out
==28616== Memcheck, a memory error detector
==28616== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==28616== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==28616== Command: ./a.out
==28616==

 [a]
==28616==
==28616== HEAP SUMMARY:
==28616==     in use at exit: 0 bytes in 0 blocks
==28616==   total heap usage: 2 allocs, 2 frees, 1,025 bytes allocated
==28616==
==28616== All heap blocks were freed -- no leaks are possible
==28616==
==28616== For counts of detected and suppressed errors, rerun with: -v
==28616== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
linuxmint@linuxmint:~/Desktop$ 
```