**CS 344 : OS Lab** 

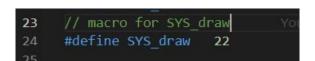
# Assignment 1 Anuraag Mahajan - 190101110

# **Exercise 1**

The following edits are required to create the custom system call -

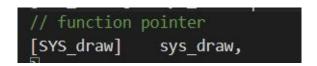
# (1) syscall.h:

This files contains macros for every system call. The file already contains 21 system calls. We add our custom call as number 22.



# (2) syscall.c:

This file contains an array of function pointers which uses numbers specified in the macros as pointers to system calls which are defined in a separate file.



We also add the function prototype in here and we define the function implementation in a different file



# (3) **sysproc.c**:

This is the file where all the system call functions are defined. We will add the implementation of our function here.

### (4) **usys.S**:

This provides an interface for user program to call the system call.

```
SYSCALL(draw)
```

#### (5) **user.h**:

This would contain the function which the user program calls.

This function will be mapped to the system call with the number 22.

```
// sytem call template to be given to the user
int draw(void *buf, uint size);
```

# **Exercise 2**

#### drawtest.c:

A user program that calls this created system call.

It sets the maximum buffer size, and calls the draw function.

If the size of image is larger that buffer size, draw returns -1, and an error message is displayed, else the ASCII art image is printed on the console.

#### Makefile:

Added the following to UPROGS: \_drawtest\

This ensures that the program is compiled, listed, and the binary is included in fs.img

(all files with brief comments explaining the code are included in patch file)

```
PROGS=\
  _cat\
  _echo\
  _forktest\
  _grep\
  _init\
  _kill\
  _ln\
  _mkdir\
  _rm\
  _sh\
  _stressfs\
  _usertests\
  _wc\
  _zombie\
  drawtest\
```

```
#include "types.h"
#include "stat.h"
#include "user.h"
//set maximum buffer size
const int max size = 6000;
int main(void)
   // allocate the size to buffer pointer
   void *buffer = malloc(max_size);
   // system call with image size as return value
   int picsize = draw(buffer, max_size);
   // Call returns -1 if size of image is greater than max_size
   if (picsize == -1)
       // print message to stdout
       printf(1, "Insufficient buffer size\n");
       exit();
   // print the image in buffer to stdout
   printf(1, "%s\n", (char *)buffer);
   exit();
```

```
$ 1s
               1 1 512
               1 1 512
README
               2 2 2286
               2 3 16256
cat
               2 4 15108
echo
forktest
               2 5 9424
               2 6 18476
grep
init
               2 7 15696
kill
               2 8 15140
ln
               2 9 14992
1s
               2 10 17620
mkdir
               2 11 15236
rm
               2 12 15212
sh
               2 13 27856
stressfs
               2 14 16128
usertests
               2 15 67232
               2 16 16992
WC
zombie
               2 17 14804
drawtest
               2 18 15208
console
               3 19 0
```

Drawtest is listed in Is

# Drawtest.c

```
^-:+oyhhdddddddddddddhhyo+:-^
                      ^-/oyhdddddddso++//:::://++ossyhddddhyo/-^
./shddddddddddddhsoo++/:-. ^^^.:/oyhdddhs/.
                   ./yhddddddddddddhhhhddddddhyo/.\\
                ^:shddddddddddddhyo/-....-:/oyhddhy/.^^^^..yddddhs:^
                                             .:ohddhyyyhhhhhhhyyyshddsohddy+.
^+ddddddddddddddddddy-./yddh+.
              .+hddddddddddhs+-.
             .ohdddddddddho:.
                                                  -ddddddddddddddd+^^: yddh+^
           ^+hddddddddddy/^
                                                  -ddddddddddddddddy. :hddy:
         :hddh++//yddh^
                                                  : dddddddddddddddddh-
       ^oddd+^
                  hddo
                                                  :ddddddddddddddddddd:
       .hddy-
                 ^ddd-
                  -ddd^
                                                  +ddddddddddddddddddd:
                                                  odddddddddddddddddddd:
                                             ^-/shdddddddddddddddddddddds:^ /ddd:
    :ddd/
                 -ddd^
                                          -/shdddhsooydddddddddddddddddddddhddho-^/ddd-
  -ddd/
                 .ddd-
                                                      ^./shddddddddddddddy-^:sdddy/sddh^
                 ^ddds/:-^
                                      ^:ohdddhs/-^
  ^hddo
                                                         ^-oyddddddddddddy:^
                :ydddddddhyo/-.
                                                                                .+hddddddo
 oddy^
                                    ./shddds+-^
               .sdddddddddddhyo::shddhs/.^
                                                            ^.+yddddddhs-^
                                                                                  ^/yddddd-
 -ddd-
              : hddddddddddddddddhs:.
                                                               ^.+ddd+.
            +dddddddddddddddddh.
           odddddddddddddddddh
                                                                  hdd/
                                                                                       ^ddd/
          +dddddddddddddddddddd
                                                                  ydd+
                                                                                       yddo
yddo^^^^^ : ddddddddddddddddddddddd
                                                                  sddo
                                                                                       oddy
hddhyyyyydddddddddddddddddddddddd
                                                                  odds
                                                                                       +ddh
hdddhhhhhhhdddddddddddddddddddd
                                                                                       +ddh
                                                                  oddy
         .hddddddddddddddddddd
                                                                  +ddy
                                                                                       oddy
          -ddddddddddddddddddd^^
                                                                  +ddy
                                                                                       yddo
           -hdddddddddddddddddd
                                                                  +ddy
                                                                                       ^ddd:
            .ydddddddddddddddddd/.
^ddd/
                                                                                      ^oddd^
                                                                  +ddy
              ^sdddddddddddddddyhddhs:^
                                                               ^:oddddo.
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               /dddddddddddhyo/-^^^:shddhs:.
                                                            ^:ohdddddddhs-
                                                                                  ^/yddddd.
                                                         .:ohdddddddddddds-
                                    .:shddhy+-^
 +ddh^
                -ddddyso/-.^^
                                                                                ./ydddddd+
                                       .:oydddhs/-^ ^-+shdddddddddddddddddddo.-ohddy+hddy^
                 ddd+^
                                           ^-/shdddysshddddddddddddddddddddddddddhddhs:.oddh
    -hdd+
                 ddd:
                                               ^-+sdddddddddddddddddddddd/. +ddh-
                 ddd/
                                                  sdddddddddddddddddddd/
     -hddo^
                 hdd+
                                                   +ddddddddddddddddddd/
      -hdds.
                                                                                .sddh-
                                                   +ddddddddddddddddddd:
                 sdds
                                                                               :hdds.
       .yddh:
```

Using the drawtest command

\$ drawtest Insufficient buffer size drawtest without enough buffer size