C Project Design & Implementation

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Library

- ***Library***
  - Calculator library

```c
/* calculator.c */

int add(int x, int y) {
  return (x + y);
}

int sub(int x, int y) {
  return (x - y);
}

long mul(int x, int y) {
  return (x * y);
}

float div(int x, int y) {
  return (x / y);
}
```

Library

Library

- Calculator library

```
/* calculator.h */

#ifndef __CALCULATOR_H__
#define __CALCULATOR_H__

int add(int, int);
int sub(int, int);
long mul(int, int);
float div(int, int);

#endif
```

Library

Library

- Calculator library compile

```
$ gcc  -c  calculator.c
```

→ calculator.o

```
$ gcc  -shared  -o  libcalculator.so  calculator.o
```

→ libcalculator.so

Library

Library

- Use Library

```
/* calculate.c */

#include <stdio.h>
#include “calculator.h”

int main() {
  int ret;
  printf(“3 + 4 = %d\n”, add(3, 4));
  printf(“5 - 3 = %d\n”, sub(5, 3));
  printf(“8 * 2 = %d\n”, mul(8, 2));
  printf(“7 / 3 = %.1f\n”, div(7, 3));

  return 0;
}
```

Library

Library

- Use Library

```
$ gcc  calculate.c  -o  calculate  -lcalculator  -L .
```

→ calculate

```
$ LD_LIBRARY_PATH=/home/$USER:$LD_LIBRARY_PATH
```

```
$ ./calculate
```

ncurses

- ***Text(Console)-based GUI***
  - Install ncurses

```
$ sudo  apt-get  install  libncurses5-dev  -y
```

ncurses

- ***Text(Console)-based GUI***
  - Install ncurses

```
$ sudo  apt-get  install  libncurses5-dev  -y
```

ncurses

- ***Text(Console)-based GUI***
  - Example #01

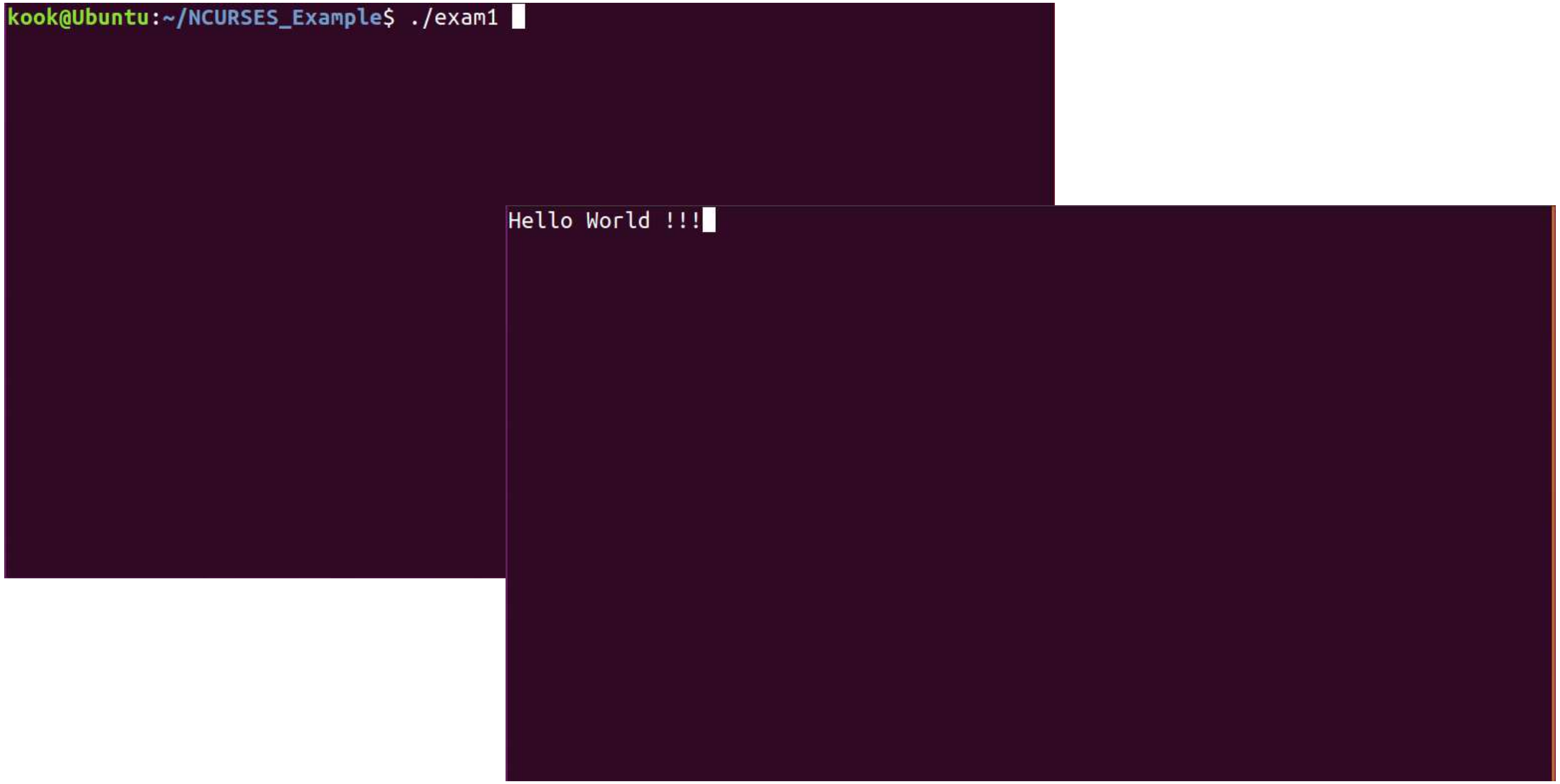
```c
#include <ncurses.h>

int main() {
  initscr();
  printw("Hello World !!!");
  refresh();
  getch();
  endwin();

  return 0;

}
```

```
$ gcc  exam1.c  -o  exam1  -lncurses
```

ncurses

Text(Console)-based GUI

- Example #01



```
kook@Ubuntu:~/NCURSES_Example$ ./exam1
```

```
Hello World !!!
```

ncurses

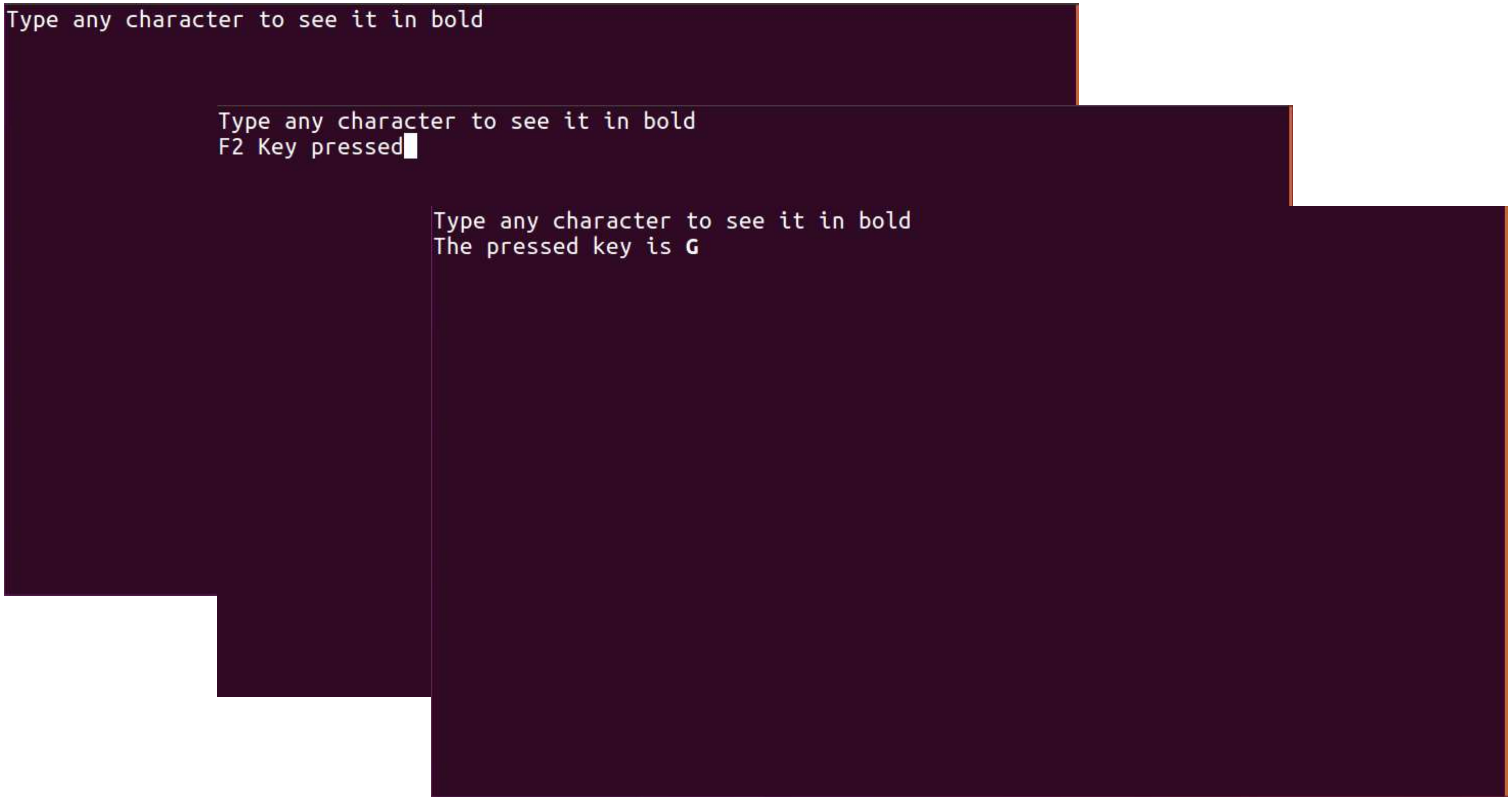
Text(Console)-based GUI

- Example #02

```
#include <ncurses.h>

int main() {
  int ch;
  initscr();
  raw();
  keypad(stdscr, TRUE);
  noecho();

  printw("Type any character to see it in bold\n");
  ch = getch();

  if (ch == KEY_F(2)) printw("F2 Key pressed");
  else {
    printw("The pressed key is ");
    attron(A_BOLD);
    printw("%c", ch);
    attroff(A_BOLD);
  }
  refresh();
  getch();
  endwin();

  return 0;
}
```

ncurses

- ***Text(Console)-based GUI***
  - Example #02



```
Type any character to see it in bold
```

```
Type any character to see it in bold
F2 Key pressed
```

```
Type any character to see it in bold
The pressed key is G
```

ncurses

Text(Console)-based GUI

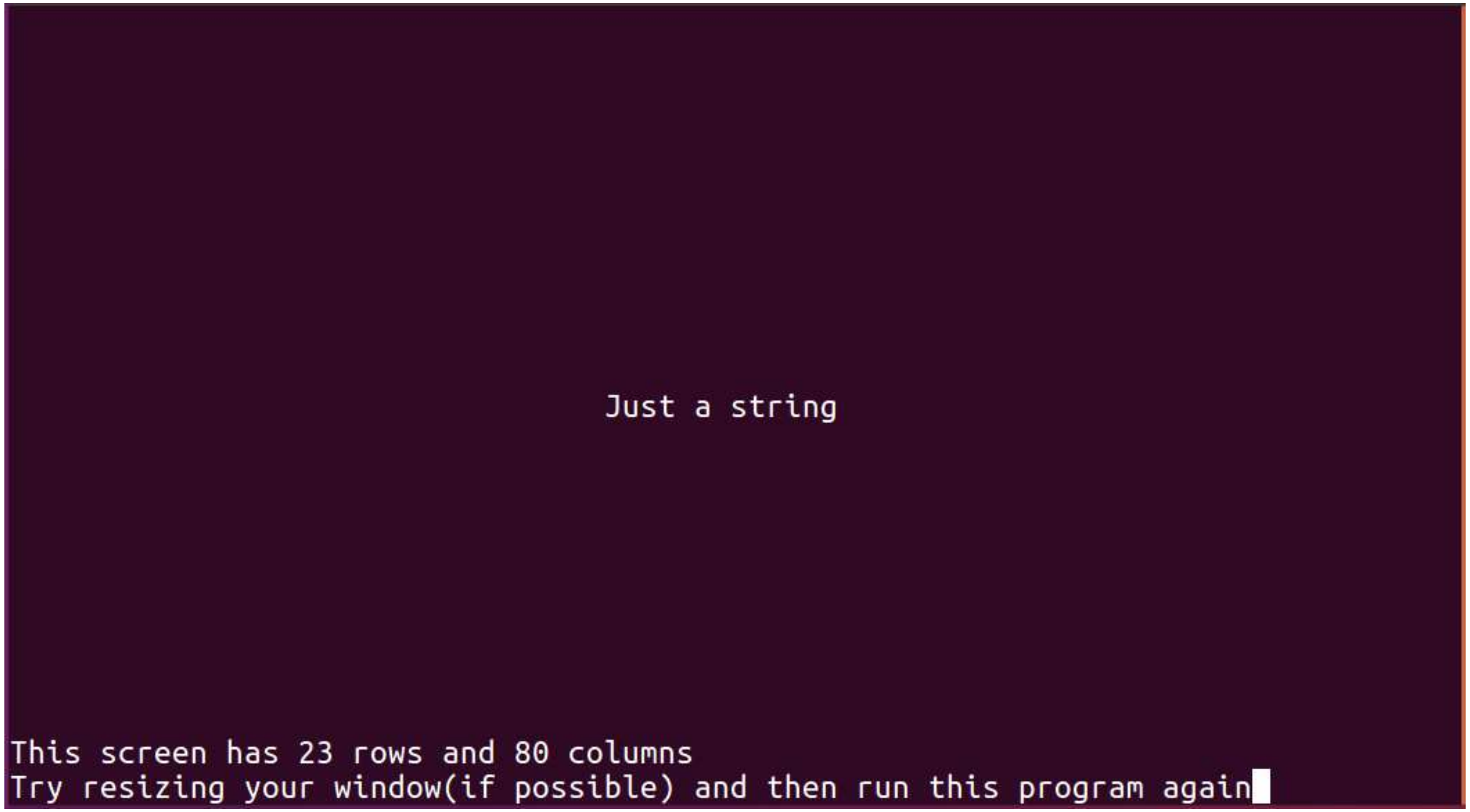
- Example #03

```
#include <ncurses.h>
#include <string.h>

int main() {
  char mesg[] = "Just a string";
  int row, col;

  initscr();
  getmaxyx(stdscr, row, col);
  mvprintw(row/2, (col-strlen(mesg))/2, "%s", mesg);

  mvprintw(row-2, 0, "This screen has %d rows and %d columns\n", row, col);

  refresh();
  getch();
  endwin();

  return 0;
}
```

ncurses

Text(Console)-based GUI

- Example #03



```
                              Just a string





This screen has 23 rows and 80 columns
Try resizing your window(if possible) and then run this program again
```

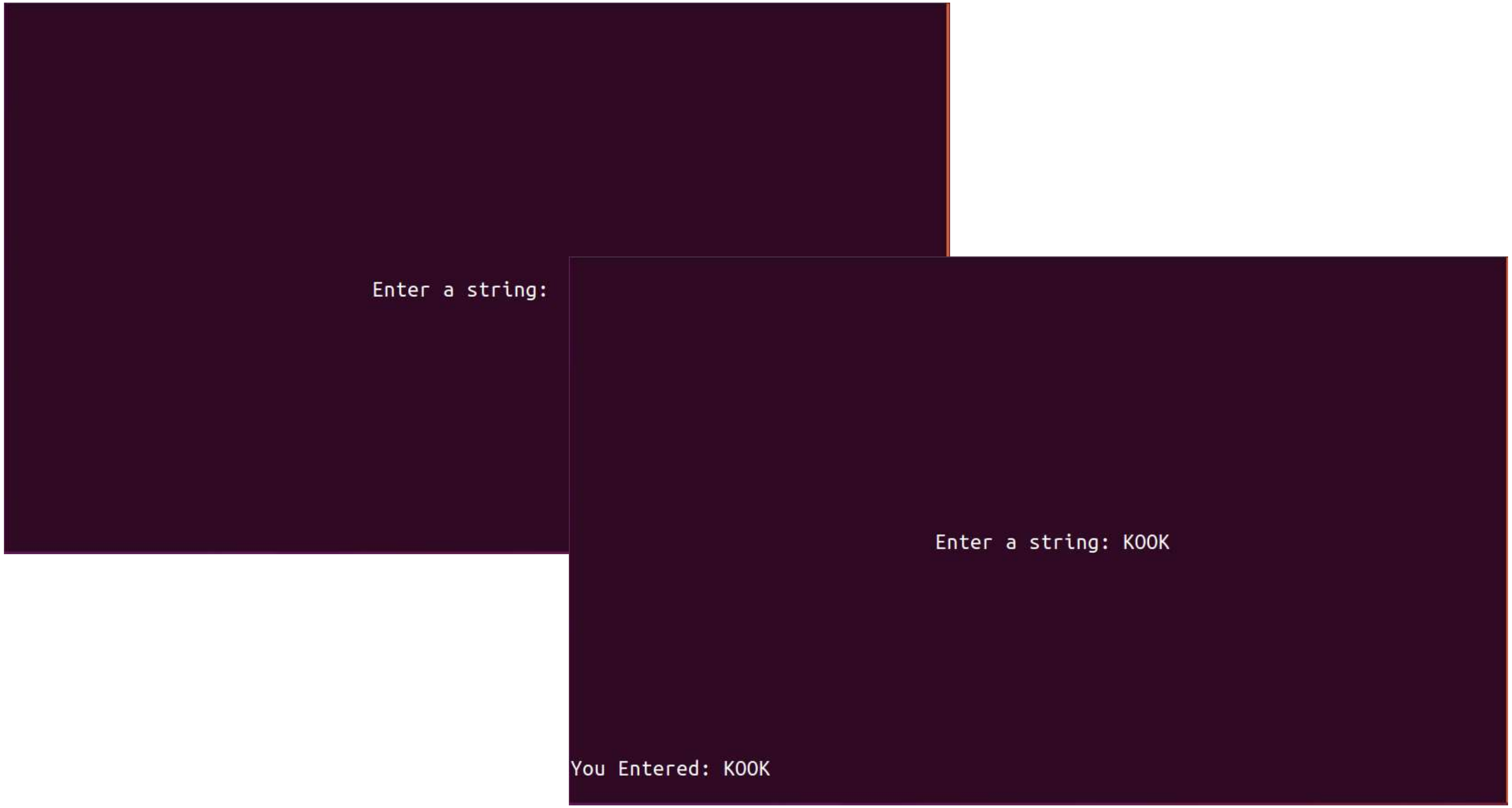
ncurses

- ***Text(Console)-based GUI***
  - Example #04

```
#include <ncurses.h>
#include <string.h>

int main() {
  char mesg[] = "Enter a string: ";
  char str[80];
  int row, col;

  initscr();
  getmaxyx(stdscr, row, col);
  mvprintw(row/2, (col-strlen(mesg))/2, "%s", mesg);

  getstr(str);
  mvprintw(LINES - 2, 0, "You Entered: %s", str);
  getch();
  endwin();

  return 0;
}
```

ncurses

- ***Text(Console)-based GUI***
  - Example #04



```
Enter a string:
```

```
Enter a string: KOOK

You Entered: KOOK
```

ncurses

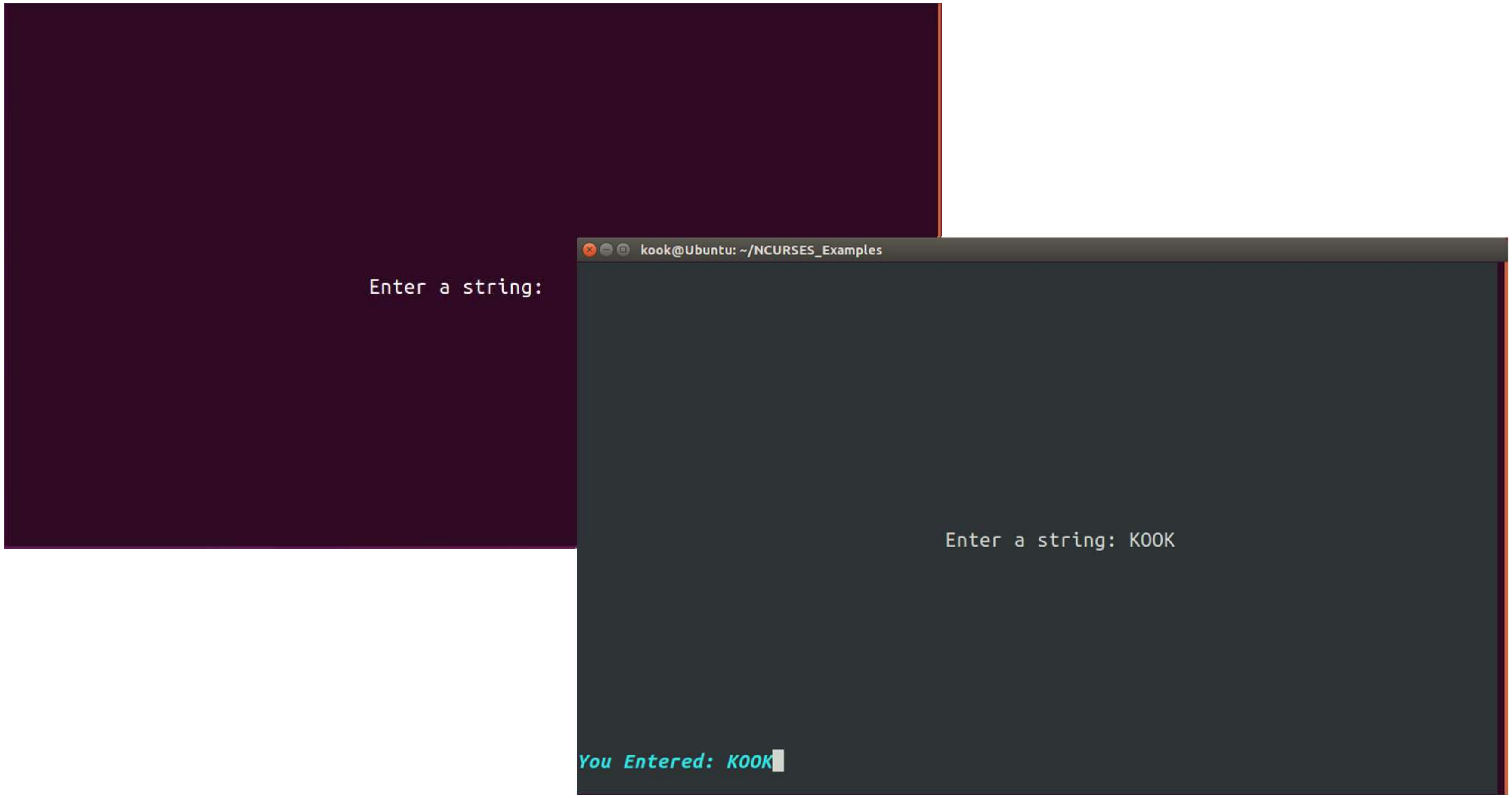
Text(Console)-based GUI

- Example #04-2

```
#include <ncurses.h>
#include <string.h>

int main() {
  char mesg[] = "Enter a string: ";
  char str[80];
  int row, col;

  initscr();
  start_color();
  init_pair(1, COLOR_CYAN, 0);

  getmaxyx(stdscr, row, col);
  mvprintw(row/2, (col-strlen(mesg))/2, "%s", mesg);

  getstr(str);
  attron(COLOR_PAIR(1)|A_BOLD|A_ITALIC);
  mvprintw(LINES - 2, 0, "You Entered: %s", str);
  attroff(COLOR_PAIR(1)|A_BOLD|A_ITALIC);
  getch();
  endwin();

  return 0;
}
```

ncurses

- ***Text(Console)-based GUI***
  - Example #04-2



```
Enter a string:
```

```
Enter a string: KOOK

You Entered: KOOK
```

ncurses

Text(Console)-based GUI

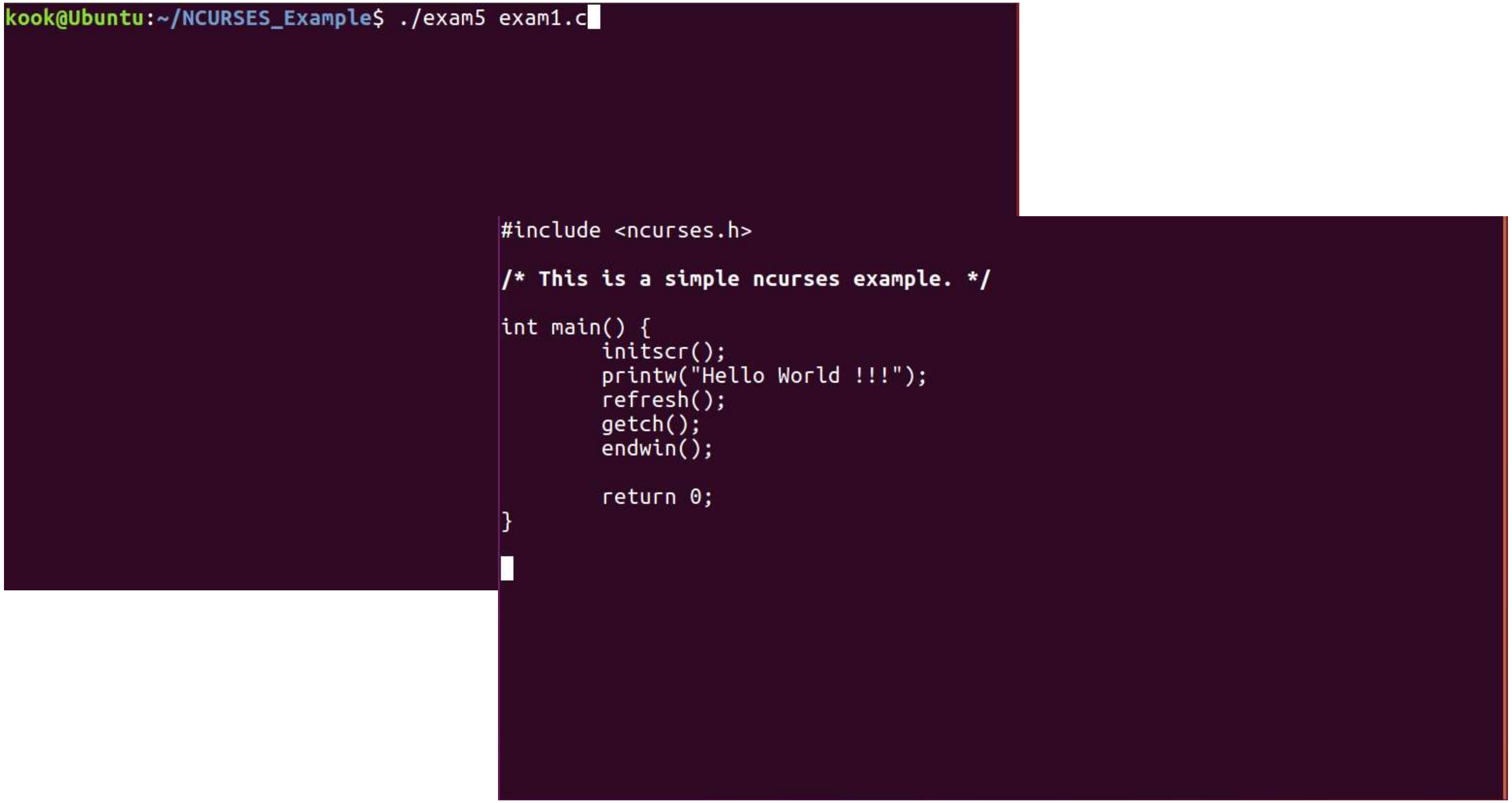
- Example #05

```
#include <ncurses.h>
int main(int argc, char *argv[]) {
  int ch, prev;
  FILE *fp = fopen(argv[1], “r”);
  int goto_prev = FALSE, y, x;
  initscr();
  prev = EOF;
  while ((ch = fgetc(fp)) != EOF) {
    if (prev == '/' && ch == '*') {
      attron(A_BOLD);
      goto_prev = TRUE;
    }
    if (goto_prev == TRUE) {
      getyx(stdstr, y, x);
      move(y, x - 1);
      printw("%c%c", '/', ch);
      ch = 'a';
      goto_prev = FALSE;
    } else printw("%c", ch);
    refresh();
    if (prev == '*' && ch == '/') attroff(A_BOLD);
    prev = ch;
  }
  getch(); fclose(fp);
  endwin();
  return 0;
}
```

ncurses

Text(Console)-based GUI

- Example #05



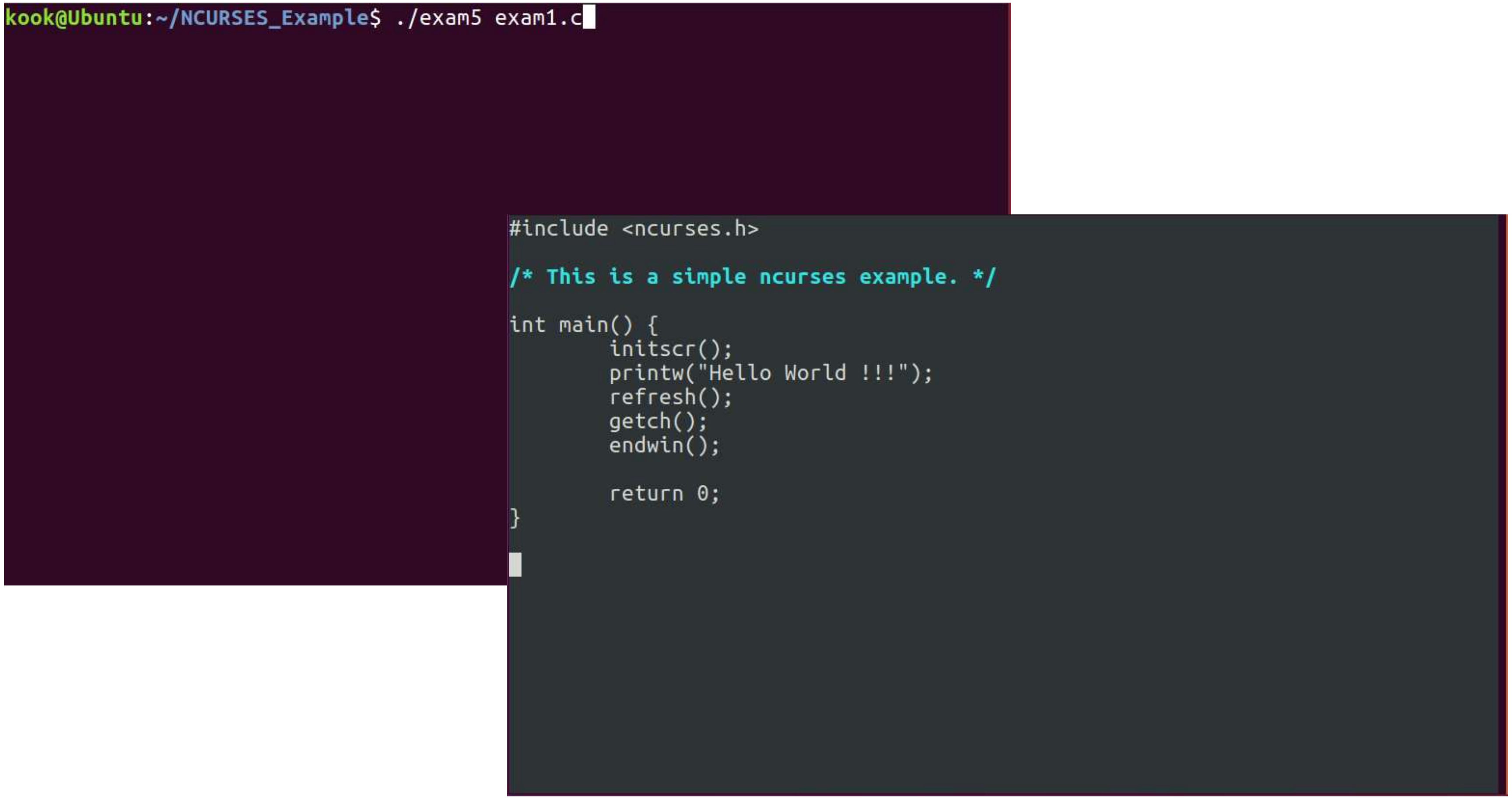
```
kook@Ubuntu:~/NCURSES_Example$ ./exam5 exam1.c
```

```
#include <ncurses.h>

/* This is a simple ncurses example. */

int main() {
        initscr();
        printw("Hello World !!!");
        refresh();
        getch();
        endwin();

        return 0;
}
```

ncurses

Text(Console)-based GUI

- Example #05



```
kook@Ubuntu:~/NCURSES_Example$ ./exam5 exam1.c
```

```
#include <ncurses.h>

/* This is a simple ncurses example. */

int main() {
        initscr();
        printw("Hello World !!!");
        refresh();
        getch();
        endwin();

        return 0;
}
```

ncurses

Text(Console)-based GUI

- Example #06

```
#include <ncurses.h>
int main(int argc, char *argv[]) {
  int ch, prev;
  FILE *fp = fopen(argv[1], “r”);
  int goto_prev = FALSE, y, x;
  initscr();
  start_color();
  init_pair(1, COLOR_CYAN, 0);
  prev = EOF;
  while ((ch = fgetc(fp)) != EOF) {
    if (prev == '/' && ch == '*') {
      attron(A_BOLD); attron(COLOR_PAIR(1));
      goto_prev = TRUE;
    }
    if (goto_prev == TRUE) {
      getyx(stdstr, y, x);
      move(y, x - 1);
      printw("%c%c", '/', ch);
      ch = 'a';
      goto_prev = FALSE;
    } else printw("%c", ch);
    refresh();
    if (prev == '*' && ch == '/') attroff(A_BOLD); attroff(COLOR_PAIR(1));
    prev = ch;
  }
  getch(); fclose(fp);
  endwin();
  return 0;
}
```

```
COLOR_BLACK
COLOR_RED
COLOR_GREEN
COLOR_YELLOW
COLOR_BLUE
COLOR_MAGENTA
COLOR_CYAN
COLOR_WHITE
```

ncurses

- ***Text(Console)-based GUI***
  - Example #07

```
#include <ncurses.h>
WINDOW *create_newwin(int height, int width, int starty, int startx);
void destroy_win(WINDOW *local_win);

int main(int argc, char *argv[]) {
  WINDOW *my_win;
  int startx, starty, width, height;
  int ch;
  initscr();
  cbreak();
  keypad(stdscr, TRUE);
  height = 3;
  width = 10;
  starty = (LINES - height) / 2;
  startx = (COLS - width) / 2;
  printw("Press F2 to exit");
  refresh();
  my_win = create_newwin(height, width, starty, startx);

  while ((ch = getch()) != KEY_F(2)) {
    switch(ch) {
      case KEY_LEFT:
        destroy_win(my_win);
        my_win = create_newwin(height, width, starty, --startx);
        break;
```

ncurses

❖ *Text(Console)-based GUI*

- Example #07

```
      case KEY_RIGHT:
        destroy_win(my_win);
        my_win = create_newwin(height, width, starty, ++startx);
        break;
      case KEY_UP:
        destroy_win(my_win);
        my_win = create_newwin(height, width, --starty, startx);
        break;
      case KEY_DOWN:
        destroy_win(my_win);
        my_win = create_newwin(height, width, ++starty, startx);
        break;
      }
  }
  endwin();
  return 0;
}

WINDOW *create_newwin(int height, int width, int starty, int startx) {
  WINDOW *local_win;
  local_win = newwin(height, width, starty, startx);
  box(local_win, 0, 0);
  wrefresh(local_win);
  return local_win;
}
```

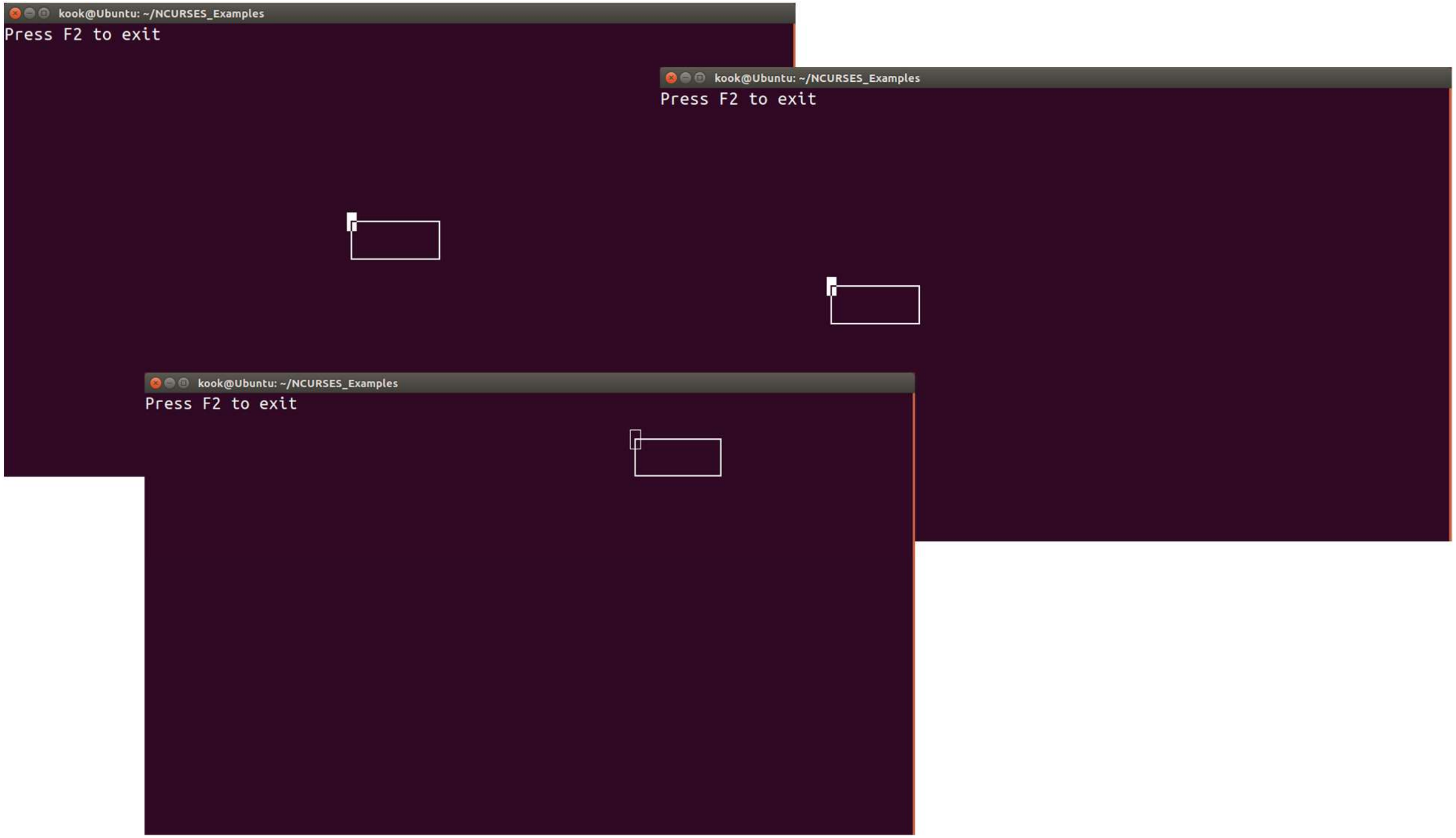
ncurses

- ***Text(Console)-based GUI***
  - Example #07

```
void destroy_win(WINDOW *local_win) {
  //wborder(local_win, '|', '|', '-', '-', '+', '+', '+', '+');
  wborder(local_win, ' ', ' ', ' ', ' ', ' ', ' ', ' ', ' ');
  wrefresh(local_win);
  delwin(local_win);
}
```

ncurses

- ***Text(Console)-based GUI***
  - Example #07



kook@Ubuntu: ~/NCURSES_Examples
kook@Ubuntu: ~/NCURSES_Examples
kook@Ubuntu: ~/NCURSES_Examples

```
Press F2 to exit
```

```
Press F2 to exit
```

```
Press F2 to exit
```

ncurses

- ***Text(Console)-based GUI***
  - Example #08

```
#include <ncurses.h>

int main() {
  int c;
  MEVENT event;
  initscr();
  noecho();
  cbreak();
  keypad(stdscr, TRUE);

  mousemask(ALL_MOUSE_EVENTS|REPORT_MOUSE_POSITION, NULL);
  //printf("\033[?1003h\n");
  printf("\033[?1002h\n");

  while (1) {
    c = wgetch(stdscr);
    switch (c) {
      case KEY_MOUSE:
        if (getmouse(&event) == OK) {
            mvprintw(0, 0, "mouse");
            if (event.bstate & BUTTON1_PRESSED) {
              mvprintw(30, 2, "left button");
            }
        }
    }
  }
  endwin();
  return 0;
}
```

Workshop #15: Just Click!

Click Game

- *화면(터미널의 크기)의 크기가* ***25row, 80col*** *이하이면 에러 메시지를 출력하고 종료한다.*
- ***3x3 box****가 화면 임의의 위치에 나타나도록 한다. (순차적으로* ***10****개)*
- *각 박스는* ***2****초 후 소멸된다.*
- *박스를 마우스로 클릭하면 점수가 부여된다. (****10****점)*
  → 점수는 화면 우측 상단에 표시한다. (빨간색)

Workshop #15

Click Game

제출 목록

- 소스 파일 (.h, .c), Makefile
- 주요 기능에 대한 스크린 캡처 이미지 [images.zip]