Text Mode

by poem
Modified by Alphar

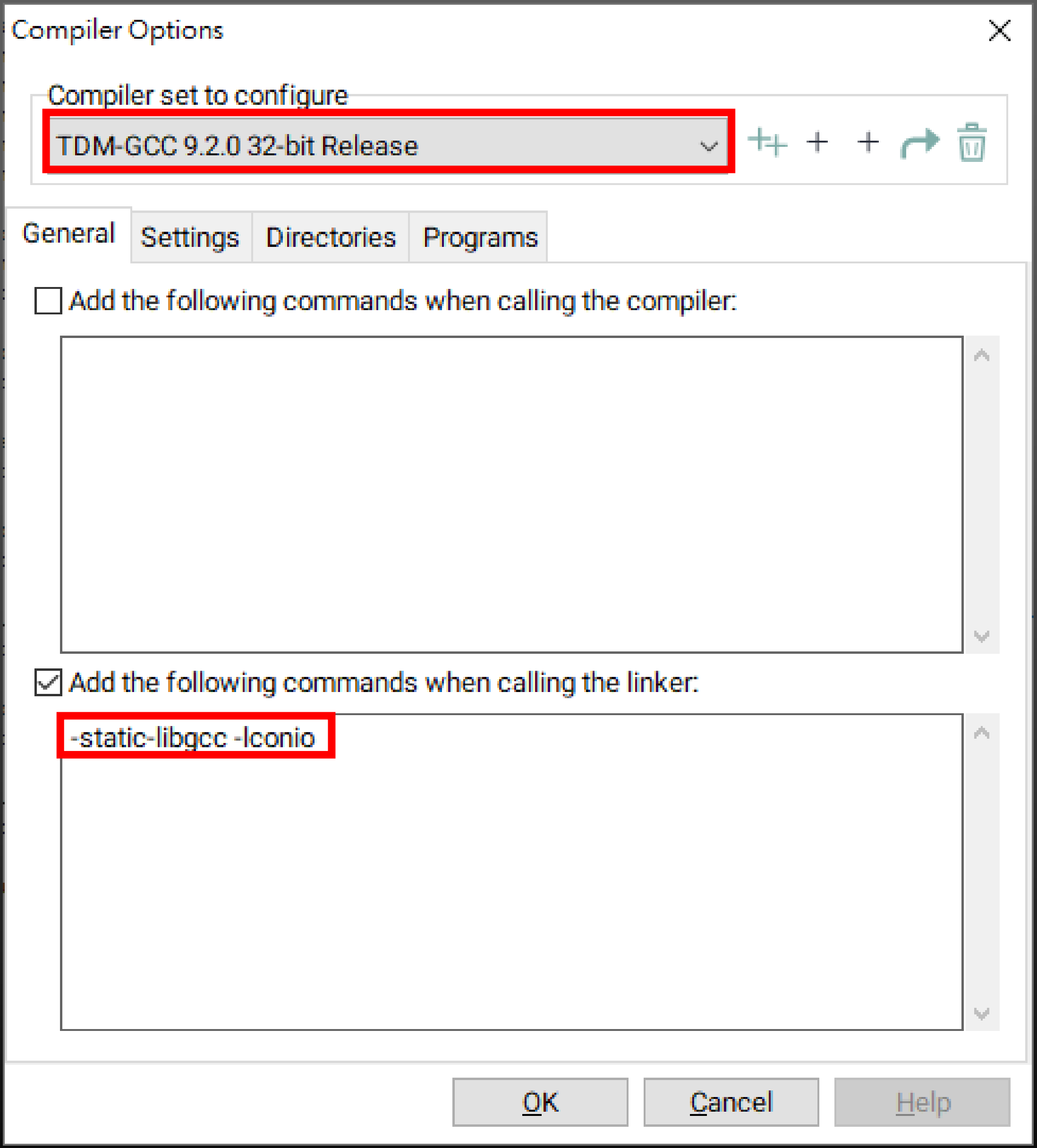
Introduction

- Text Mode
  - Console mode for text displaying with specific attributes
    - Unix, DOS, Win32 console, BBS, terminal, ...
- Environment
  - Dev-C++: need extra packages
- Header
  - `conio2.h` ("Devpak for Dev C++" package)

Introduction (cont)

- Package Installation for Dev-C++:
  - Copy “conio2.h” (provided by TA)
    to
    “C:\Program Files (x86)\Embarcadero\Dev-Cpp\TDM-GCC-64\include\”
  - Copy “libconio.a” and “libconio_unicode.a” (provided by TA)
    to
    “C:\Program Files (x86)\Embarcadero\Dev-Cpp\TDM-GCC-64\lib\”
  - Adding linker
    - In Dev-C++ compiler
    - Tools ➔ Compiler Options
    - Compiler set to configure: TDM-GCC 9.2.0 32-bit Release
    - Type “**`-lconio`**” in the dialog box below

Introduction (cont)



Compiler Options

Compiler set to configure

TDM-GCC 9.2.0 32-bit Release

□ Add the following commands when calling the compiler:

☑ Add the following commands when calling the linker:

```
-static-libgcc -lconio
```

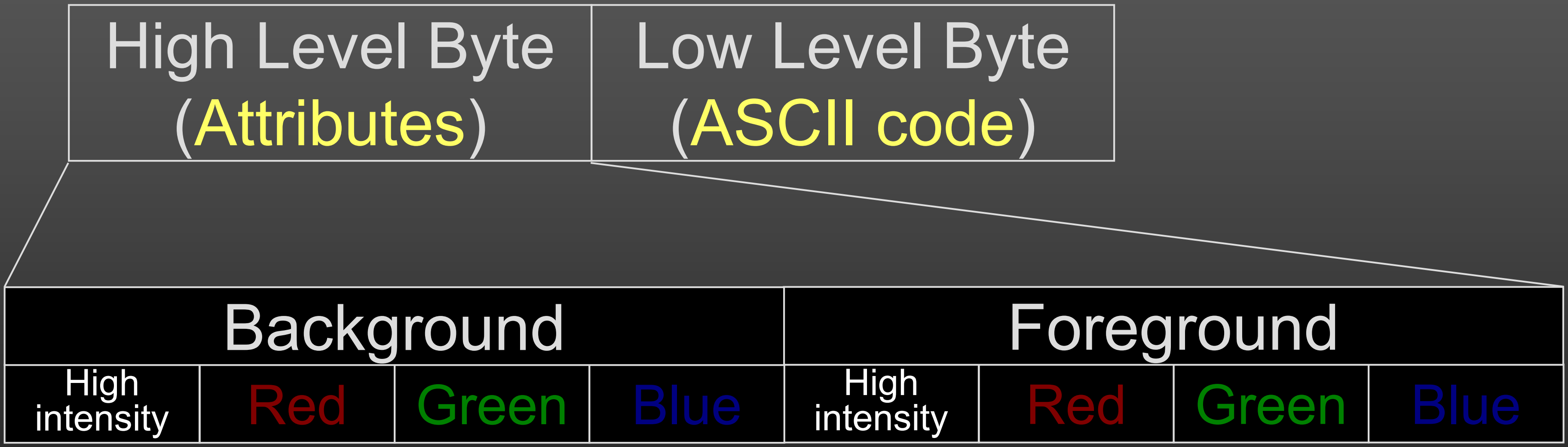
Introduction (cont)

- Window and Coordinate

(1, 1)	(2, 1)	(x, y)	(120, 1)
(1, 2)	(2, 2)		(120, 2)
(1, 25)	(2, 25)		(120, 29)

Showing the Text

- Character Storage in IBM or PS/2 Compatible Computers
  - Using 2 bytes to store a character (`char`)



High Level Byte (Attributes)	Low Level Byte (ASCII code)

Background				Foreground			
High intensity	Red	Green	Blue	High intensity	Red	Green	Blue

  - Notes:
    - Foreground → color of a character

Showing the Text (cont)

- Colors in Foreground and Background
  - Background:

7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8

  - Foreground:

7	6	5	4	3	2	1	
15	14	13	12	11	10	9	8

  - Using with `printf()` and `puts()`
- Color Constants

0: BLACK	1: BLUE	2: GREEN	3: CYAN
4: RED	5: MAGENTA	6: BROWN	7: LIGHTGRAY
8: DARKGRAY	9: LIGHTBLUE	10: LIGHTGREEN	11: LIGHTCYAN
12: LIGHTRED	13: LIGHTMAGENTA	14: YELLOW	15: WHITE

  - Example:

    11100111 ➔ foreground: gray, background: yellow

Showing the Text (cont)

- Functions
  - `void clrscr()`
    - Clearing text mode window, filling with background color
    - Moving cursor to (1, 1)
  - `void gotoxy(int x, int y)`: positioning cursor at (`x`, `y`) in a text window
    - `gotoxy(10, 26)`: moving cursor to (10, 26)
  - `int wherex()`, `int wherey()`: gives current horizontal/vertical cursor position
    - Cursor at (12, 34), `x = wherex(); y = wherey();`

      ➔ x = 12, y = 34

Showing the Text (cont)

- Functions (cont)
  - `void clreol()`: clearing to end of line in text window
    - `abcde`***`fghijkl`***, cursor between `e` and `f` → `abcde` left
  - `void delline()`: deleting a line in text window
    - `1234567`
      `abcde`***`fg`***, cursor between `e` and `f` → `1234567` `ABCDEFG` left
      `ABCDEFG`
  - `void insline()`: Inserting blank line in text window at cursor position
    - `1234567`, cursor between `E` and `F` → `1234567`
      `ABCDE`***`FG`***

      `ABCDEFG`

☞ text01.cpp

Showing the Text (cont)

- Functions (cont)
  - `void textcolor(int newcolor)`: selecting a new character color (foreground) in text mode
    - `textcolor(YELLOW)`: setting text to yellow
  - `void textbackground(int newcolor)`: selecting a new text background color
    - `textbackground(CYAN)` : setting text to cyan background

Recaps

- Bit Operation
  - <<, >>: left- and right- shift
  - a = 5
    - $a << 4 = (101)_2 << (4)_{10} = (1010000)_2 = (80)_{10}$
    - $a >> 2 = (101)_2 >> (2)_{10} = (1)_2 = (1)_{10}$
- Character Storage in IBM or PS/2 Compatible Computers

Background				Foreground			
High intensity	Red	Green	Blue	High intensity	Red	Green	Blue

Showing the Text (cont)

- Functions (cont)
  - `void textattr(int newattr)`: setting text attributes (foreground & background) for text-window functions
    - (background << 4) + (foreground) to set the attributes

Background				Foreground			
High intensity	Red	Green	Blue	High intensity	Red	Green	Blue

  - For example, try to set the background color to `LIGHTGRAY` (111) and foreground to `LIGHTBLUE` (1001):
  - Foreground: set to 1001 (the first 1 means high intensity
  - Background: 111xxxx = 1110000 + xxx = (111 << 4) + xxxx
    - `textattr((BROWN << 4) + WHITE)`: Setting

      white foreground, brown background, blinking text

☞ text02.cpp

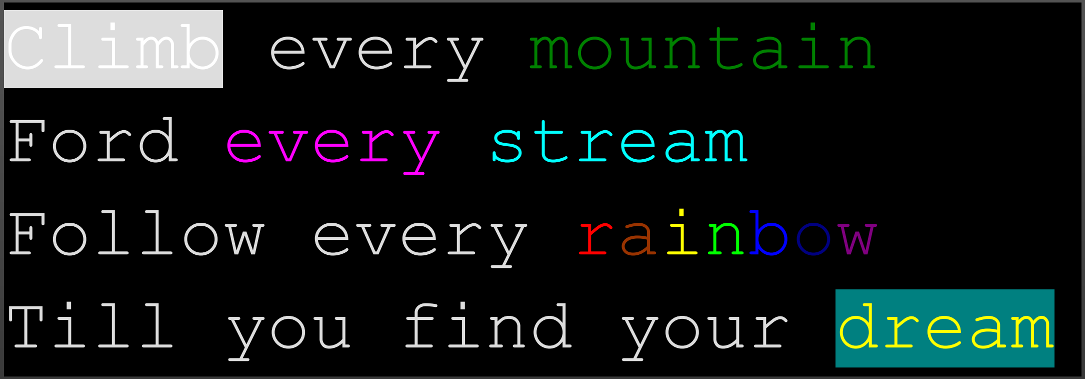
Showing the Text (cont)

- Functions (cont)
  - `void lowvideo()`
    - Selecting low-intensity text characters (clearing the high-intensity bit)
  - `void highvideo()`
    - Selecting high-intensity text characters (setting the high-intensity bit)
  - `void normvideo()`
    - Selecting normal-intensity text characters (using pre-setted text attributes)

☞text03.cpp

Showing the Text (cont)

- Exercise
  - – Writing a program to output the following text. Referring to slide 7 for the colors



```
Climb every mountain
Ford every stream
Follow every rainbow
Till you find your dream
```

Copying/Pasting

- Functions (cont)
  - `void gettext(int left, int top, int right, int bottom, struct char_info *destin)`
  - `void puttext(int left, int top, int right, int bottom, struct char_info *source)`
    - `gettext()`: copying text in the rectangular region (`left`, `top`) and (`right`, `bottom`) from text-mode screen to memory
    - `puttext()`: copying text from memory to text-mode screen in the rectangular region (`left`, `top`) and (`right`, `bottom`)

Copying/Pasting (cont)

- Functions (cont)
  - `int gettext(int left, int top, int right, int bottom, struct char_info *destin)`
  - `int puttext(int left, int top, int right, int bottom, struct char_info *source)`
    - The size of buffer
      - Dev-C++: (`right` - `left` + 1) × (`bottom` - `top` + 1) × `sizeof(char_info)`
    - Arrangement in the buffer: sequentially from left to right and top to down
    - Insufficient buffer size: causing undesired results or even abnormal termination of the program

Copying/Pasting (cont)

- Functions (cont)
  - `void movetext(int left, int top, int right, int bottom, int dest_left, int dest_top)`
    - Copying text on screen from one rectangle to a new one of the same dimension with upper left corner @ (`dest_left`, `dest_top`)
    - In Dev-C++
      - Truncating the text outside the screen

☞ text05A.cpp

Copying/Pasting (cont)

- Exercise
  - Finishing one of the following tasks:
    - Designing the interface in the ATM program
    - Finishing the “Text-Mode da Vinci” program
  - Requirements:
    - Following the progress arranged by TAs
    - Using all the text mode functions in the above slides

Obtaining Text-Mode Info

- Functions
  - `gettextinfo(struct text_info *r)`
    - Getting text-mode video information (skipped now, self-study after learning `struct` in the next semester)

    ☞ The documentation of the compiler

References

- Online Help in Turbo C++
- Internet sources for Dev-C++ plus text mode