VE482 Lab 5

Liu Yihao 515370910207

1 Generalities on GDB

1. How to enable built-in debugging in gcc?

   Use `-g` when compiling.

2. What is the meaning of GDB?

   The GNU Project Debugger

3. Compile the C program from homework 4 with debugging enabled.

```
gcc -g -o ex4 ex4.c
```

2 Basic use of GDB

1. Find the homepage of the GDB project.

   https://www.gnu.org/software/gdb/

2. What languages are supported by GDB?

   Ada, C, C++, Objective-C, Pascal (and many other languages)

3. What are the following GDB commands doing:

   - backtrace
     Print a backtrace of the entire stack: one line per frame for all frames in the stack.
   - where
     Same as backtrace.
   - finish
     Execute until selected stack frame returns.
   - delete
     Delete some breakpoints or auto-display expressions. Arguments are breakpoint numbers with spaces in between. To delete all breakpoints, give no argument.
   - info breakpoints
     Status of specified breakpoints (all user-settable breakpoints if no argument).

4. What is -tui option for GDB?

   The TUI mode is enabled by this option. The GDB Text User Interface (TUI) is a terminal interface which uses the curses library to show the source file, the assembly output, the program registers and GDB commands in separate text windows.

5. What is the “reverse step” in GDB and how to enable it. Provide the key steps and commands.

   Reverse debugging is added in GDB 7.0, supported on limited targets (including i386/amd64 linux), so I should use GDB $\geqslant$ 7.0 on Linux to enable it. There are a few commands:

   - reverse-continue (‘rc’)

     Continue program being debugged but run it in reverse reverse-finish – Execute backward until just before the selected stack frame is called
   - reverse-next (‘rn’)

     Step program backward, proceeding through subroutine calls.
   - reverse-nexti (‘rni’)

     Step backward one instruction, but proceed through called subroutines.
   - reverse-step (‘rs’)

     Step program backward until it reaches the beginning of a previous source line
   - reverse-stepi

     Step backward exactly one instruction
   - set exec-direction (forward/reverse)

     Set direction of execution. All subsequent execution commands (continue, step, until etc.) will run the program being debugged in the selected direction.

   Breakpoints and watchpoints will work in reverse – allowing you for instance to proceed directly to the previous point at which a variable was modified.

3 API