Debugging Techniques

Course: Introduction to Programming and Data Structures

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Debugging a program in C



Debugger

Debugger

A program that runs other programs, allowing the user

- to exercise control over these programs,
- to examine variables when problems arise



GNU Debugger (GDB)

- The most popular debugger for UNIX systems to debug C and C++ programs.
- Helps you in getting information about the following:
 - If a core dump happened, then what statement or expression did the program crash on?
 - If an error occurs while executing a function, what line of the program contains the call to that function, and what are the parameters?
 - What are the values of program variables at a particular point during execution of the program?
 - What is the result of a particular expression in a program?



Begin with GDB

Requirement

output executable file must be compiled with -g
 \$ gcc -g -Wall demo-gdb.c -o prog.out

Starting GDB

- \$ gdb ./prog.out
- \$ gdb ./prog.out inp1 inp2 ... //If it needs command line inputs



Most used commands in GDB

After selecting the program, we can use following commands.

- \$ start, s
- \$ breakpoint, b
- \$ next, n
- \$ continue, c
- \$ print, p



Other Commands I

- b Puts a breakpoint at the current line
- b main Puts a breakpoint at the beginning of the program
- b N Puts a breakpoint at line N
- b +N Puts a breakpoint N lines down from the current line
- b fn Puts a breakpoint at the beginning of function "fn"
- d N Deletes breakpoint number N
- info break list breakpoints
- r Runs the program until a breakpoint or error
- c Continues running the program until the next breakpoint or error
- **f** Runs until the current function is finished
- s Runs the next line of the program



Other Commands II

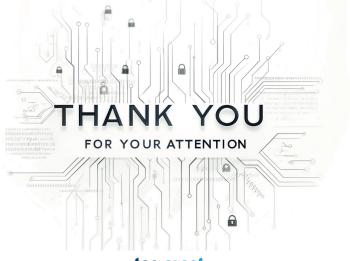
- s N Runs the next N lines of the program
- n Like s, but it does not step into functions
- u N Runs until you get N lines in front of the current line
- p var Prints the current value of the variable "var"
- bt Prints a stack trace
- u Goes up a level in the stack
- d Goes down a level in the stack
- q Quits gdb



Limitation of GDB

- Even though GDB can help you in finding out memory leakage related bugs, but it is not a tool to detect memory leakages.
- GDB cannot be used for programs that compile with errors and it does not help in fixing those errors.





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