

Лабораторная работа №13

Средства, применяемые при разработке программного обеспечения в ОС типа UNIX/Linux

Галиева Аделина Руслановна

3 мая 2023

Российский университет дружбы народов, Москва, Россия

Приобрести простейшие навыки разработки, анализа, тестирования и отладки приложений в ОС типа UNIX/Linux на примере создания на языке программирования. С калькулятора с простейшими функциями.

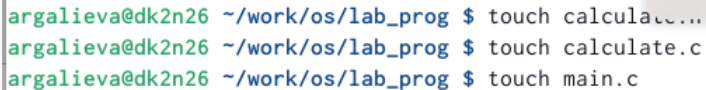
1. В домашнем каталоге создаём подкаталог ~/work/os/lab_prog.

A screenshot of a terminal window with a light gray background. The prompt 'argaliev@dk2n26 ~ \$' is shown in green, followed by the command 'cd ~/work/os/lab_prog' in blue. A vertical gray bar is on the left side of the terminal window.

```
argaliev@dk2n26 ~ $ cd ~/work/os/lab_prog
```

Рис. 1: Создаем подкаталог

2. Создаём в нём файлы: calculate.h, calculate.c, main.c.

A terminal window showing three commands being executed to create files. The prompt is 'argaliev@dk2n26' and the directory is '~/work/os/lab_prog'. The commands are 'touch calculate.h', 'touch calculate.c', and 'touch main.c'.

```
argaliev@dk2n26 ~/work/os/lab_prog $ touch calculate.h
argaliev@dk2n26 ~/work/os/lab_prog $ touch calculate.c
argaliev@dk2n26 ~/work/os/lab_prog $ touch main.c
```

Рис. 2: Создаем файлы

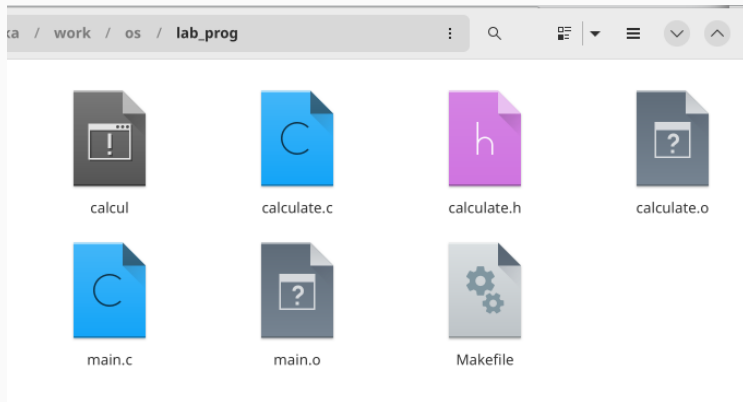


Рис. 3: Файлы

3. Выполняем компиляцию программы посредством gcc.

```
argalievadk2n26 ~/work/os/lab_prog $ gcc -c calculate.c
argalievadk2n26 ~/work/os/lab_prog $ gcc -c main.c
main.c: В функции «main»:
main.c:16:11: предупреждение: формат «%s» ожидает аргумент типа «char *», но аргумент 2 имеет тип «char (*)[4]» [-Wformat=]
   16 |     scanf("%s",&Operation);
      |           ~^ ~~~~~
      |           | |
      |           | char (*)[4]
      |           char *
```

argalievadk2n26 ~/work/os/lab_prog \$ gcc calculate.o main.o -o calcul -lm

Рис. 4: Компиляция

4. С помощью gdb выполняем отладку программы calcul (перед использованием gdb исправили Makefile).

```
argalieva@dk2n26 ~/work/os/lab_prog $ gdb ./calcul
GNU gdb (Gentoo 12.1 vanilla) 12.1
Copyright (C) 2022 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
Type "show copying" and "show warranty" for details.
This GDB was configured as "x86_64-pc-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<https://bugs.gentoo.org/>.
Find the GDB manual and other documentation resources online at:
  <http://www.gnu.org/software/gdb/documentation/>.

For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from ./calcul...
(No debugging symbols found in ./calcul)
(gdb) run
Starting program: /afs/.dk.sci.pfu.edu.ru/home/a/r/argalieva/work/os/lab_prog/calcul
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/usr/lib64/libthread_db.so.1".
Число: 5
Операция (+,-,*,/,pow,sqrt,sin,cos,tan): *
Множитель: 5
  25.00
[Inferior 1 (process 3751) exited normally]
(gdb)
```

Рис. 5: Использование отладчика


```
(gdb) list
No symbol table is loaded.  Use the "file" command.
(gdb) list 12,15
No symbol table is loaded.  Use the "file" command.
(gdb) list calculate.c:20,29
No symbol table is loaded.  Use the "file" command.
(gdb) list calculate.c:20,27
No symbol table is loaded.  Use the "file" command.
(gdb) break 21
No symbol table is loaded.  Use the "file" command.
(gdb) info breakpoints
No breakpoints or watchpoints.
(gdb) run
Starting program: /afs/.dk.sci.pfu.edu.ru/home/a/r/argalieva/work/os/lab_prog/calcul
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/usr/lib64/libthread_db.so.1".
Число: 5
Операция (+,-,*,/,pow,sqrt,sin,cos,tan): -
Вычитаемое:
backtrace
    5.00
[Inferior 1 (process 3829) exited normally]
(gdb) print Numeral
No symbol table is loaded.  Use the "file" command.
(gdb) display Numeral
No symbol table is loaded.  Use the "file" command.
(gdb) info breakpoints
No breakpoints or watchpoints.
(gdb) delete 1
```

Рис. 6: Использование отладчика

5. С помощью утилиты splint анализируем коды файлов calculate.c и main.c.

```
argaliev@dk2n26 ~/work/os/lab_prog $ splint main.c
Splint 3.1.2 --- 07 Dec 2021

calculate.h:7:38: Function parameter Operation declared as manifest array (size
                    constant is meaningless)
    A formal parameter is declared as an array with size.  The size of the array
    is ignored in this context, since the array formal parameter is treated as a
    pointer. (Use -fixedformalarray to inhibit warning)
main.c: (in function main)
main.c:14:3: Return value (type int) ignored: scanf("%f", &Num...
    Result returned by function call is not used. If this is intended, can cast
    result to (void) to eliminate message. (Use -retvalint to inhibit warning)
main.c:16:14: Format argument 1 to scanf (%s) expects char * gets char [4] *:
                    &Operation
    Type of parameter is not consistent with corresponding code in format string.
    (Use -formattype to inhibit warning)
    main.c:16:11: Corresponding format code
main.c:16:3: Return value (type int) ignored: scanf("%s", &Ope...

Finished checking --- 4 code warnings
```

Рис. 7: splint main.c

```
argaliev@dk2n26 ~/work/os/lab_prog $ splint calculate.c
Splint 3.1.2 --- 07 Dec 2021

calculate.h:7:38: Function parameter Operation declared as manifest array (size
                    constant is meaningless)
    A formal parameter is declared as an array with size.  The size of the array
    is ignored in this context, since the array formal parameter is treated as a
    pointer. (Use -fixedformalarray to inhibit warning)
calculate.c:10:31: Function parameter Operation declared as manifest array
                    (size constant is meaningless)
calculate.c: (in function Calculate)
calculate.c:16:7: Return value (type int) ignored: scanf("%f", &Sec...
    Result returned by function call is not used. If this is intended, can cast
    result to (void) to eliminate message. (Use -retvalint to inhibit warning)
calculate.c:22:7: Return value (type int) ignored: scanf("%f", &Sec...
calculate.c:28:7: Return value (type int) ignored: scanf("%f", &Sec...
calculate.c:34:7: Return value (type int) ignored: scanf("%f", &Sec...
calculate.c:35:10: Dangerous equality comparison involving float types:
                    SecondNumeral == 0
    Two real (float, double, or long double) values are compared directly using
```

Рис. 8: splint calculate.c

Я приобрела простейшие навыки разработки, анализа, тестирования и отладки приложений в ОС типа UNIX/Linux на примере создания на языке программирования. С калькулятора с простейшими функциями.