Minishell

As beautiful as a shell

Summary:
This project is about creating a simple shell.
Yes, your very own little Bash.
You will gain extensive knowledge about processes and file descriptors.

Version: 8.3

Contents

Chapter I

Introduction

Shells have existed since the very beginning of IT.

Back then, all developers agreed that communicating with a computer via aligned 1/0 switches was extremely frustrating.

It was only logical that they came up with the idea of creating software to communicate with a computer using interactive command lines in a language somewhat close to human language.

With `Minishell`, you'll travel back in time and experience the challenges developers faced before *Windows* existed.

Chapter II

Common Instructions

- Your project must be written in C.

- Your project must be written in accordance with the Norm. If you have bonus files/functions, they are included in the norm check, and you will receive a `0` if there is a norm error.

- Your functions should not quit unexpectedly (segmentation fault, bus error, double free, etc.) except for undefined behavior. If this occurs, your project will be considered non-functional and will receive a `0` during the evaluation.

- All heap-allocated memory must be properly freed when necessary. Memory leaks will not be tolerated.

- If the subject requires it, you must submit a `Makefile` that compiles your source files to the required output with the flags `-Wall`, `-Wextra`, and `-Werror`, using `cc`. Additionally, your `Makefile` must not perform unnecessary relinking.

- Your `Makefile` must at contain at least the rules `$(NAME)`, `all`, `clean`, `fclean` and `re`.

- To submit bonuses for your project, you must include a `bonus` rule in your `Makefile`, which will add all the various headers, libraries, or functions that are not allowed in the main part of the project. Bonuses must be placed in `_bonus.{c/h}` files, unless the subject specifies otherwise. The evaluation of mandatory and bonus parts is conducted separately.

- If your project allows you to use your `libft`, you must copy its sources and its associated `Makefile` into a `libft` folder. Your project's `Makefile` must compile the library by using its `Makefile`, then compile the project.

- We encourage you to create test programs for your project, even though this work **does not need to be submitted and will not be graded**. It will give you an opportunity to easily test your work and your peers' work. You will find these tests especially useful during your defence. Indeed, during defence, you are free to use your tests and/or the tests of the peer you are evaluating.

- Submit your work to the assigned Git repository. Only the work in the Git repository will be graded. If Deepthought is assigned to grade your work, it will occur

after your peer-evaluations. If an error happens in any section of your work during Deepthought's grading, the evaluation will stop.

Chapter III

Mandatory part

Program name	minishell
Turn in files	Makefile, *.h, *.c
Makefile	NAME, all, clean, fclean, re
Arguments	
External functs.	readline, rl_clear_history, rl_on_new_line, rl_replace_line, rl_redisplay, add_history, printf, malloc, free, write, access, open, read, close, fork, wait, waitpid, wait3, wait4, signal, sigaction, sigemptyset, sigaddset, kill, exit, getcwd, chdir, stat, lstat, fstat, unlink, execve, dup, dup2, pipe, opendir, readdir, closedir, strerror, perror, isatty, ttyname, ttyslot, ioctl, getenv, tcsetattr, tcgetattr, tgetent, tgetflag, tgetnum, tgetstr, tgoto, tputs
Libft authorized	Yes
Description	Write a shell

Your shell should:

- Display a **prompt** when waiting for a new command.

- Have a working **history**.

- Search and launch the right executable (based on the `PATH` variable or using a relative or an absolute path).

- Use at most **one global variable** to indicate a received signal. Consider the implications: this approach ensures that your signal handler will not access your main data structures.

> ⚠️ Be careful. This global variable must only store the signal number and must not provide any additional information or access to data. Therefore, using "norm" type structures in the global scope is forbidden.

- Not interpret unclosed quotes or special characters which are not required by the subject such as \ (backslash) or ; (semicolon).

- Handle ' (single quote) which should prevent the shell from interpreting the meta-characters in the quoted sequence.

- Handle " (double quote) which should prevent the shell from interpreting the meta-characters in the quoted sequence except for $ (dollar sign).

- Implement the following **redirections**:

  - < should redirect input.

  - > should redirect output.

  - << should be given a delimiter, then read the input until a line containing the delimiter is seen. However, it doesn't have to update the history!

  - >> should redirect output in append mode.

- Implement **pipes** (| character). The output of each command in the pipeline is connected to the input of the next command via a pipe.

- Handle **environment variables** ($ followed by a sequence of characters) which should expand to their values.

- Handle $? which should expand to the exit status of the most recently executed foreground pipeline.

- Handle ctrl-C, ctrl-D and ctrl-\ which should behave like in bash.

- In interactive mode:

  - ctrl-C displays a new prompt on a new line.

  - ctrl-D exits the shell.

  - ctrl-\ does nothing.

- Your shell must implement the following **built-in** commands:

  - echo with option -n

  - cd with only a relative or absolute path

  - pwd with no options

  - export with no options

  - unset with no options

  - env with no options or arguments

  - exit with no options

The `readline()` function may cause memory leaks, but you are not required to fix them. However, this **does not mean your own code, yes the code you wrote, can have memory leaks**.

> You should limit yourself to the subject description. Anything that
> is not asked is not required.
>
> If you have any doubt about a requirement, take bash as a reference.

Chapter IV

Bonus part

Your program must implement:

- **&&** and **||** with parenthesis for priorities.

- Wildcards **∗** should work for the current working directory.

> ⚠️ The bonus part will only be evaluated if the mandatory part is completed perfectly. Perfect means the mandatory part is fully implemented and functions without any issues. If you have not passed ALL the mandatory requirements, your bonus part will not be evaluated at all.

Chapter V

Submission and peer-evaluation

Submit your assignment in your `Git` repository as usual. Only the work inside your repository will be evaluated during the defense. Don't hesitate to double-check the names of your files to ensure they are correct.

```
        M    L Q  *   d    z           O k  v     P
         :  )?       e Q    6 u    nk] R       *
    f                 *q    1V      -    O  , ?ZP
            7             c    1V                H
        e                         9         () 8
            U
        ’ >           D       s      /      w
          ;           E             ’   > M
         q                       <           >


      z   b        H       (           3
      l           X    0g E                 6
```