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# Minishell: Building a mini-bash (a @42 project)

MannBell · [Follow](#)

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Minishell is somewhat of a big project –especially for a beginner–, and a complex one too, and starting it definitely needed some planning and research, to avoid overhauling the whole design later — even though I ended up doing something similar.

Since this is a team project I had to form a team of two members, and that's what I did. I went searching for a team member, formed a team, and started coordinating tasks.

The shell basically has two parts, the parsing (where you treat user input), and the execution (where you execute what have been parsed).

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and I am very grateful that I went over the execution part because else I wouldn't have learned about many things and details.

## Anyway, let's have a project overview...

We are required to build a mini shell (command-line interpreter) that mimics the bash, hence the name it wouldn't be doing all the work that bash does, but the basic functionality:

- The shell will work only in interactive mode (no scripts, i.e. the executable takes no arguments)
- 

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- exit
- env (with no options or arguments)
- export (with no options)
- unset (with no options)
- cd
- pwd

- And for the bonus part (optional, but I did it, because it's cool!)
  - handle && and || with the parenthesis () for priority.
  - handle \* wildcards for the current working directory.

**OMG! Where to start?! — That was my reaction when I did read the**

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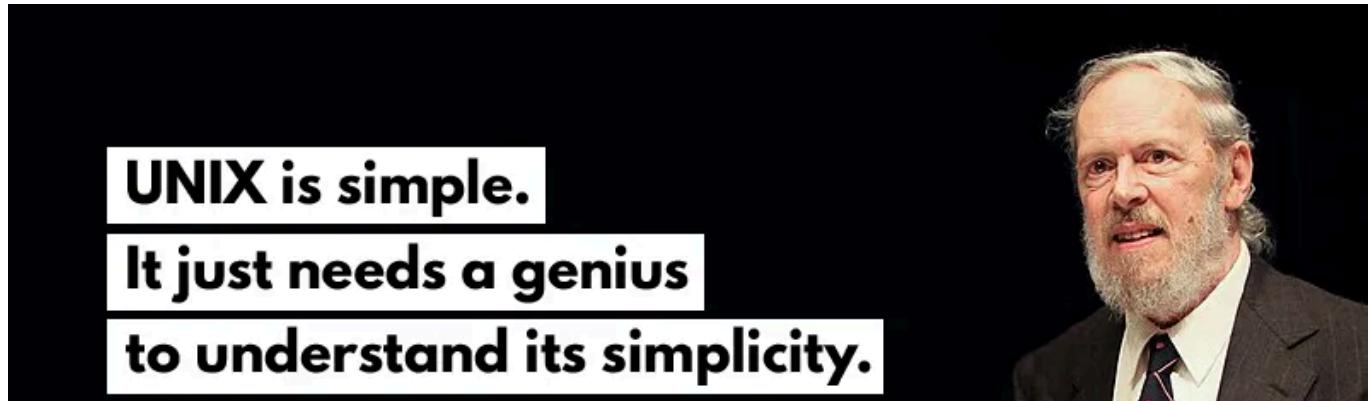
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though many of my peers/colleagues went to “hard-code” parsing and naively treating cases. Not going to lie, that was tempting for me too at first, but I realized that I should get out of my comfort zone, and learn something new.



**UNIX is simple.  
It just needs a genius  
to understand its simplicity.**

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NUMBER  
 PLUS

A graphical representation of tokens

As you can see, the tokens have a type and value, for example, the first token from the left is of type `NUMBER` and has a value of `1`.

So why do we do that? It is to have some kind of abstraction because while we

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that I don't understand, I go and I learn it, rather than going through the whole theory of computation which may contain some things that I won't really need for this project — though, I found the theory of computation very interesting.

Before I got a bit familiar with the Recursive Descent, I had to understand first what a grammar is and what a language is, etc...

So what is a grammar?

There are several kinds of grammars, but the type of grammar that is used for this project is called CFG (Context Free Grammar).

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It took me about two weeks in total to learn the basic use of this Recursive Descent, still I ended up not using it, because my main goal was how to build a simple easy to use AST, but this technique may not give an AST directly, as you will have to build a “parse tree” first and then convert it into an AST, I tried to do that, but I got stuck with the grammar and the way I would convert that “parse tree” into an AST, and also the operator precedence was an ambiguous thing for me back then, and things got over complicated quickly, that’s when I realized that I am in need of a more efficient yet simple technique to switch to...

After doing some research I found another technique that helped me to get my parser together, and it is like a newer improved version of the Recursive Descent, it is called Precedence Climbing , which you can read more about

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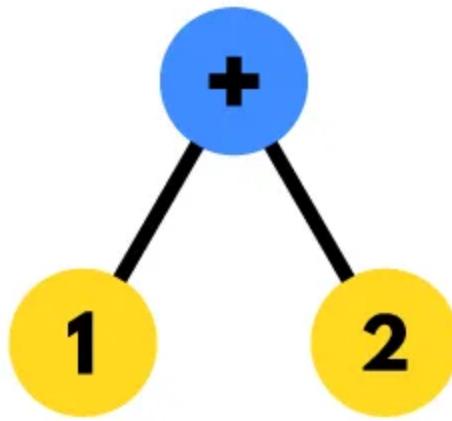
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Graphical representation of an AST

I try to keep things as simple as possible, that's why I am using a simple

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Then we get rid of empty strings, so we get:

```
1 B "CD"
```

Then we split the string by spaces (depending on the quotes), so we get three strings:

```
1 , B , "CD"
```

Then we check if there is any globbing (\* wildcard), if there is we replace the wildcard by the appropriate strings — the globbing algorithm wasn't mine, I looked it up on the internet, it's a backtracking algorithm, you can learn more about it [here](#).

Finally, we strip out any quotes:

```
1 , B , CD
```

---

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```
int eval(t_node node)
{
    if (node.type == PLUS)
        return (node.left + node.right);
    else
        return (node.value)
}
```

In the case of a shell, we would have something as |, || or && instead of +. The pseudo-code would look something similar to:

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```
        }
    else // back to the parent
    {
        //do the same for the right child
        // Make sure to close the pipe_fds in the parent too
    }
}
```

That's about the core of the execution part, beside some work on redirections, where we basically open a file and then redirect (using `dup2`) the standard input or the standard output to that file, and in case of the here-doc we redirect the standard input to a pipe.

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it is normal, it is the way it is, if you find yourself in a hardship, don't just give up, but instead start looking at what you have, what you can do, and the possible solutions... if you can't get along with somebody, it's okay, move on, look for another partner who you would get along with and so on...

Finally, I would like to finish with a quote of the brilliant Serbian Physicist and Inventor **Nikola Tesla** that I do really like:



*All that was great in the past was ridiculed,  
condemned, combated, suppressed – only to emerge*

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Write a response

What are your thoughts?



oceanO

Sep 30, 2023

...

Bro this article is so helpful! Ty



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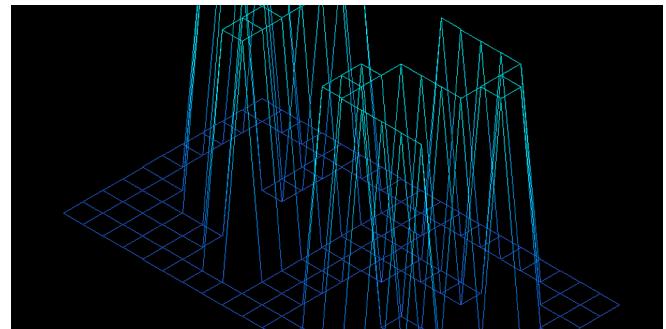
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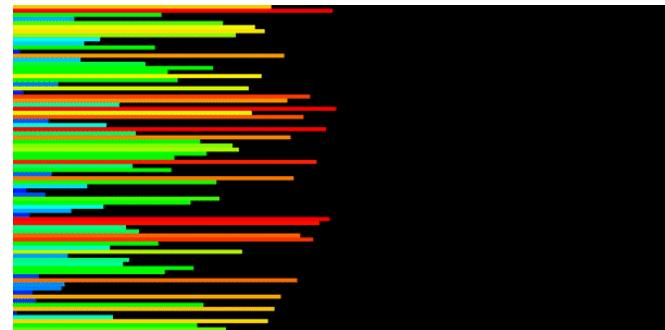
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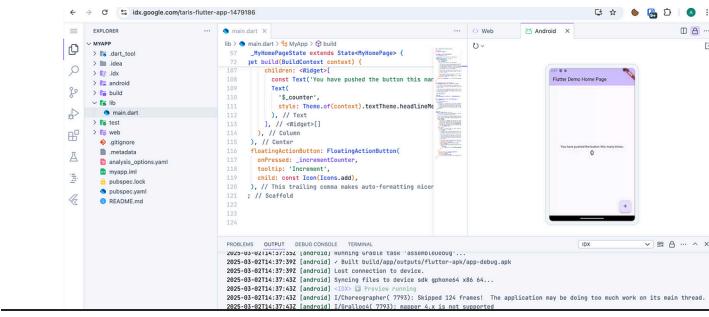
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