

# Long's shell

A project on process management

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# Long's shell

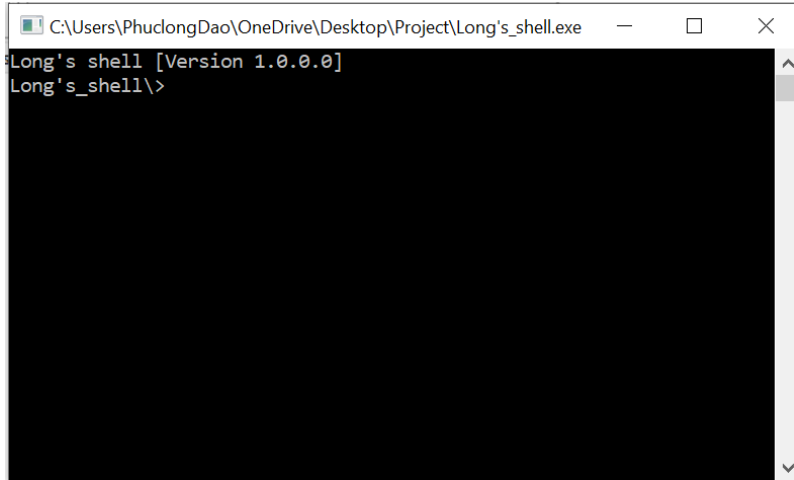
Main objectives:

- Study process management APIs in Windows
- Study how a shell works and design a simple shell

Language: C++

- Compiler: GCC 4.9.2
- IDE: Dev C++ 5.11

# Long's shell at startup



```
C:\Users\PhuclongDao\OneDrive\Desktop\Project\Long's_shell.exe
Long's shell [Version 1.0.0.0]
Long's_shell\>
```

# Outline

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## 2 Supported commands and features

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# Internal commands

`cls`:

- Clears the screen
- Syntax: `cls`

`date`:

- Displays the current date in `dd/mm/yyyy` format
- Syntax: `date`

`exit`:

- Quits this shell
- Syntax: `exit [/t]`
- Parameter: `/t` (optional): Quits all child processes managed by this shell



# Internal commands - cont.

help:

- Provides help information for Shell commands
- Syntax: `help [<command>]`
- Parameter: `<command>` (optional): Prints help information for a specific command. Returns error message if command not supported.

history:

- Displays 69 most recent commands, excluding history
- Syntax: `history [/clear]`
- Parameter: `/clear` (optional): Clears all history

# Internal commands - cont.

prompt:

- Specifies a new Shell prompt
- Syntax: `prompt [/text]`
- Parameter: `/text` (optional): The new prompt. Without this parameter, prompt is set to default (Long's\_shell\\>)

time:

- Displays the current time in 24-hour format
- Syntax: `time`

title:

- Sets the title for the Shell window
- Syntax: `title [/text]`

# Internal commands - cont.

type:

- Displays the contents of a text file
- Syntax: `type <drive>:<path><file>`
- Parameter: `<drive>:<path><file>` (mandatory). Returns error message if file not found or is not specified.

color:

- Sets the console foreground and background colors
- Syntax: `color [<foreground_color>] [<background_color>]`
- Parameters: `[<foreground_color>]`, `[<background_color>]` (both optional). Use 2 hexa digits (no spaces between) to specify. If not specified, default color is used (white foreground, black background).
- Returns error message if user attempts to set same foreground and background colors. Returns color codes for incorrect input.

# Color codes

Code	Color	Code	Color
0	Black	8	Gray
1	Blue	9	Light Blue
2	Green	A	Light Green
3	Aqua	B	Light Aqua
4	Red	C	Light Red
5	Purple	D	Light Purple
6	Yellow	E	Light Yellow
7	White	F	Bright White

# Internal commands - test 1

```

Long's_shell>date
The current date (dd/mm/yyyy) is: Sat 22/06/2024
Long's_shell>help
cls          Clears screen
color        Sets console foreground, background colors
date         Displays date in dd/mm/yyyy format
echo         Shows echo status, turns command echoing on/off or displays messages
exit        Quits shell. /t quits all child processes
fg          Moves a background process to foreground
help        Prints Help information
history      Displays 69 recent commands, excluding history. /clear to clear history
path        Displays, sets search path. ; clears path, splits directories, %PATH% adds paths
pause       Suspends processing of a batch file and displays a message
prompt      Changes Shell command prompt
rem         Indicates a comment line in a batch file
run         Runs a program or batch (.bat) file. /wait runs program in foreground mode
set         Displays, sets environmental variable var. /p gets user input, empty /text removes var
start       Starts a process in a new console. /wait starts in foreground mode
taskkill    Stops a process. /pid for process ID, /im for process name
taskpause   Pauses a process. /pid for process ID, /im for process name
taskresume  Stops a process. /pid for process ID, /im for process name
tasklist    Displays all running and paused processes
time        Displays time in 24-hour format
title       Creates title for Shell window
type        Displays contents of a text file
Long's_shell>help cls
cls          Clears screen
Long's_shell>history
0: date
1: help
2: help cls
Long's_shell>history /clear
History cleared
Long's_shell>history
History empty
Long's_shell>prompt abc>
abc>prompt
Long's_shell>time
The current time is: 07:28:32
Long's_shell>title Long
Console title set to Long

```

```

Syntax: cls
Syntax: color [<fgcolor>][<bgcolor>]
Syntax: date
Syntax: echo [on|off]<message>]
Syntax: exit [/t]
Syntax: fg /pid
Syntax: help [<command>]
Syntax: history [/clear]
Syntax: path ; | path [<drive>:<path><file>][;][%PATH%]
Syntax: pause
Syntax: prompt [<text>]
Syntax: rem [<text>]
Syntax: run <drive>:<path><file> [/wait]
Syntax: set [<var>] | set [/p] <var>=<[text]>]
Syntax: start <drive>:<path><file> [/wait]
Syntax: taskkill /pid/im <ID>|<Name>
Syntax: taskpause /pid/im <ID>|<Name>
Syntax: taskresume /pid/im <ID>|<Name>
Syntax: tasklist [<status>]
Syntax: time
Syntax: title [<text>]
Syntax: type <drive>:<path><file>

Syntax: cls

```

# Internal commands - test 2

C:\Users\PhudongDao\OneDrive\Desktop\Project\Long's\_shell.exe

Long's shell [Version 1.0.0.0]

Long's\_shell\>help abc

Cannot find the line 'abc'

Long's\_shell\>help type

type        Displays contents of a text file

Long's\_shell\>type

Incorrect syntax

type        Displays contents of a text file

Long's\_shell\>type abc.txt

Cannot find the file 'abc.txt'

Long's\_shell\>type C:\Users\PhudongDao\OneDrive\Desktop\Hello\_World.txt

Hello World!

Hello World!

Hello World!

Long's\_shell\>color 123

0 = Black        8 = Gray

1 = Blue        9 = Light Blue

2 = Green       A = Light Green

3 = Aqua        B = Light Aqua

4 = Red         C = Light Red

5 = Purple       D = Light Purple

6 = Yellow      E = Light Yellow

7 = White       F = Bright White

Long's\_shell\>color 7A

Background=White, Foreground=Light Green

Long's\_shell\>color 77

Cannot set foreground and background to same color

Long's\_shell\>color

Background=Black, Foreground=White

Long's\_shell\>color 0A

Long's\_shell\>

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  - **Process-management commands**
  - Working with batch files
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# Process-management commands

run, start:

- run: Runs a process. start: Starts a process in a new console.
- Syntax: `run/start <drive>:<path><file> [/wait]`
- Parameters: `<drive>:<path><file>`: mandatory, `[/wait]`: optional.  
`[/wait]` runs process in foreground mode.
- Returns error message if process not found or failed to start.

Background process: Shell and the process can be executed simultaneously.

Foreground process: Shell has to wait until the process ends.

run can also execute batch files.



# Process-management commands - cont.

`taskkill`, `taskpause`, `taskresume`:

- `taskkill`: Terminates a process. `taskpause`: Suspends a process.  
`taskresume`: Resumes a process.
- Syntax: `taskkill/taskpause/taskresume /pid <PID>` or  
`taskkill/taskpause/taskresume /im <Name>`
- Parameters: `/pid`, `<PID>` or `/im`, `<Name>` (mandatory). `/pid` affects the process with a particular PID, `/im` affects all processes with the Name.
- Returns error message if process not found.

# Process-management commands - cont.

`fg`:

- Brings a background process to foreground
- Syntax: `fg /pid`
- Parameter: `/pid` (mandatory): PID of the affected process
- Returns error message if process not found.

`tasklist`:

- Displays a list of currently running or paused processes. The list contains process name, PID and current status (running, running in foreground, paused).
- Syntax: `tasklist [<status>]`
- Parameter: `[<status>]` (optional): Filter processes by status.

# Process-managment commands - test 1

C:\Users\PhudlongDao\OneDrive\Desktop\Project\Long's\_shell.exe

```
Long's shell [Version 1.0.0.0]
Long's_shell\>start abc.exe
Failed to open abc.exe
Long's_shell\>start GPA_calculator.exe
Long's_shell\>tasklist
Process Name                PID Status
=====
GPA_calculator.exe         5104 running
Long's_shell\>tasklist paused
Process Name                PID Status
=====
Long's_shell\>taskkill /pid 6969
Process with ID 6969 not found
Long's_shell\>taskkill /im abc.exe
Process with name 'abc.exe' not found
Long's_shell\>taskkill /pid 5104
Process 'GPA_calculator.exe' with ID 5104 killed
Long's_shell\>tasklist
Process Name                PID Status
=====
Long's_shell\>start Rock_paper_scissors.exe
Long's_shell\>taskpause /im Rock_paper_scissors.exe
Processes with name 'Rock_paper_scissors.exe' pauseed
Long's_shell\>tasklist
Process Name                PID Status
=====
Rock_paper_scissors.exe     9192 paused
Long's_shell\>taskresume /pid 9192
Process 'Rock_paper_scissors.exe' with ID 9192 resumed
Long's_shell\>tasklist
Process Name                PID Status
=====
Rock_paper_scissors.exe     9192 running
Long's_shell\>taskkill /pid 9192
Process 'Rock_paper_scissors.exe' with ID 9192 killed
Long's_shell\>
```

# Process-management commands - test 2

```
C:\Users\PhudongDao\OneDrive\Desktop\Project\Long's_shell.exe
Long's shell [Version 1.0.0.0]
Long's_shell\>run GPA_calculator.exe
----GPA Calculator----
Syntax:
Line 1: <Unsigned integer n: Number of subjects>
Next n lines: <Unsigned integer: Number of credits> <String: Grade>

- Valid grades: A+, A, B+, B, C+, C, D+, D, F
- n=0: Clears all previous grades
- n=-1: Exits program
- Invalid input causes the program to terminate.

1
4 A
GPA: 4.00
Total Credits: 4
-1
Long's_shell\>run C:\Windows\System32\notepad.exe
Long's_shell\>date
The current date (dd/mm/yyyy) is: Sat 22/06/2024
Long's_shell\>help run
run          Runs a program or batch (.bat) file. /wait runs program in foreground mode
Long's_shell\>tasklist
Process Name          PID Status
=====
C:\Windows\System32\notep  11096 running
Long's_shell\>taskkill /pid 11096
Process 'C:\Windows\System32\notepad.exe' with ID 11096 killed
Long's_shell\>
```

Syntax: run <drive>:<path><file> [/wait]

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# Commands with batch files

run:

- Runs a batch (.bat) file
- Syntax: `run <drive>:<path><file>`
- Parameters: `<drive>:<path><file>`: mandatory .bat file.
- Returns error message if batch file not found.

echo:

- Turns command echoing (that is, displays batch file commands to Shell window) on/off, or displays messages every batch file command. Without parameters, shows echo status.
- Syntax: `echo [on|off|<message>]`
- Parameters: `[on|off|<message>]`: optional.

# Commands with batch files - cont.

pause:

- Suspends processing of a batch file and displays a message
- Syntax: pause

rem:

- Indicates a comment line in a batch file, not shown in Shell window
- Syntax: rem [<text>]

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# Environment variables

- An environment variable is a user-definable value that can affect the way running processes will behave on a computer. Environment variables are always stored as strings.
- Default environment variables in Long's shell: "prompt", "path".

set:

- set: Displays all environment variables.
- set <var>: Displays variable var. Returns error message if var is not declared.
- set <var>=: Deletes variable var.
- set <var>=<text>: Sets variable var to text.
- set /p <var>=[<message>] Pops up message (optional) to get user input for var.

# Environment variables - cont.

path:

- Sets a search path for executable files. Without parameters, displays all search paths.
- Syntax: `path ;`  
`path [<drive>:<path><file>] [;] [%PATH%]`
- `path ;:` Clears the existing path
- `%PATH%:` Adds the existing path to command
- Search paths should be separated by ;

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# Ctrl+C

- Suspends processing of a batch file and displays a message
- Terminates a foreground process
- Quits Shell