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Project 1: Warmup to C and Unix programming

Features

- `./reverse`` — read from stdin, write to stdout (exits using 0)
- `./reverse input.txt`` — read from `input.txt``, write to stdout
- `./reverse input.txt output.txt`` — read `input.txt``, write reversed lines to `output.txt``

Build

```Bash

```
gcc -std=c11 -Wall -o reverse reverse.c
```

## Usage example:

```
essej@JessePC:~/kaysys$ cd ./projekti1/
essej@JessePC:~/kaysys/projekti1$ gcc -std=c11 -Wall -o reverse reverse.c
essej@JessePC:~/kaysys/projekti1$./reverse
hello
world
0
world
hello
essej@JessePC:~/kaysys/projekti1$./reverse input.txt
a file
is
this
hello
essej@JessePC:~/kaysys/projekti1$./reverse input.txt output.txt
essej@JessePC:~/kaysys/projekti1$
```

Input and output files:

| output.txt             | input.txt             |
|------------------------|-----------------------|
| projekti1 > output.txt | projekti1 > input.txt |
| 1 a file               | 1 hello               |
| 2 is                   | 2 this                |
| 3 this                 | 3 is                  |
| 4 hello                | 4 a file              |
| 5                      |                       |

# Project 2: Unix Utilities

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## Features

| Feature  | What does                                                                            | Usage example (bash)                                                                           |
|----------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| my-cat   | A simplified version of the `cat` utility that reads and displays file contents.     | <code>./my-cat test1.txt</code>                                                                |
| my-grep  | A simplified version of the `grep` utility that searches for text patterns in files. | <code>./my-grep foo test2.txt</code>                                                           |
| my-zip   | A file compression utility using run-length encoding.                                | <code>./my-zip test3.txt &gt; compressed.z</code>                                              |
| my-unzip | A file decompression utility for files compressed with my-zip.                       | <code>./my-unzip compressed.z</code><br><code>./my-unzip compressed.z &gt; original.txt</code> |

## Build

This project has Makefile

To build:

```
make
```

To clean:

```
make clean
```

Usage example:

```
● essey@JessePC:~/kaysys/projekti2$ make
gcc -Wall -Werror -o my-cat my-cat.c
gcc -Wall -Werror -o my-grep my-grep.c
gcc -Wall -Werror -o my-zip my-zip.c
gcc -Wall -Werror -o my-unzip my-unzip.c
● essey@JessePC:~/kaysys/projekti2$./my-cat test1.txt
Hello World
This is a test file
It has multiple lines
● essey@JessePC:~/kaysys/projekti2$./my-grep foo test2.txt
foo bar
This line has foo in it
foolish test
● essey@JessePC:~/kaysys/projekti2$./my-zip test3.txt > compressed.z
● essey@JessePC:~/kaysys/projekti2$./my-unzip compressed.z
aaaaaaaaaabbba
● essey@JessePC:~/kaysys/projekti2$./my-unzip compressed.z > original.txt
● essey@JessePC:~/kaysys/projekti2$ make clean
rm -f my-cat my-grep my-zip my-unzip *.z *.o
❖ essey@JessePC:~/kaysys/projekti2$
```

| test1.txt               | test2.txt                       |
|-------------------------|---------------------------------|
| projekti2 > test1.txt   | projekti2 > test2.txt           |
| 1 Hello World           | 1 foo bar                       |
| 2 This is a test file   | 2 This line has foo in it       |
| 3 It has multiple lines | 3 Another line without the word |
| 4                       | 4 foolish test                  |
|                         | 5                               |

| test3.txt             | original.txt             |
|-----------------------|--------------------------|
| projekti2 > test3.txt | projekti2 > original.txt |
| 1 aaaaaaaaaabbba      | 1 aaaaaaaaaabbba         |
| 2                     | 2                        |

# Project 3: Unix Shell

This project implements a simple Unix shell called 'wish' in C. The shell supports interactive and batch modes for command execution, built-in commands, external command execution, output redirection, parallel command execution, and detailed error handling.

## Build

This project has Makefile

To build:

```
make
```

To clean:

```
make clean
```

## Features Implemented

| Command                | What does                                        |
|------------------------|--------------------------------------------------|
| exit                   | Exit the shell (no arguments allowed)            |
| cd <directory>         | Change directory (exactly one argument required) |
| path <dir1> <dir2> ... | Change directory (exactly one argument required) |

## Advanced Features

Output redirection using '>'

Parallel execution using '&'

## Usage

Interactive mode:

```
./wish
```

```
wish> ls
```

```
wish> echo Hello World
```

```
wish> exit
```

Batch mode:

```
./wish commands.txt
```

## Usage examples

Interactive Mode & Basic Commands

```
● essej@JessePC:~/kaysys/projekti3$./wish
wish> ls
Makefile README.md unix_shell.c wish
wish> echo hello from shell
hello from shell
wish> pwd
/home/essej/kaysys/projekti3
wish> exit
```

Built-in Commands

```
● essej@JessePC:~/kaysys/projekti3$./wish
wish> path /bin /usr/bin
wish> cd /tmp
wish> pwd
/tmp
wish> cd /home/essej/kaysys/projekti3
wish> pwd
/home/essej/kaysys/projekti3
wish> exit
```

## Output Redirection

```
eszej@JessePC:~/kaysys/projekti3$./wish
wish> echo This is redirected output > test.txt
wish> cat test.txt
This is redirected output
wish> ls -la > listing.txt
wish> cat listing.txt
total 52
drwxr-xr-x 2 eszej eszej 4096 Dec 15 16:37 .
drwxr-xr-x 6 eszej eszej 4096 Dec 14 12:10 ..
-rw-r--r-- 1 eszej eszej 407 Dec 9 10:59 Makefile
-rw-r--r-- 1 eszej eszej 2078 Dec 15 16:16 README.md
-rw-r--r-- 1 eszej eszej 0 Dec 15 16:37 listing.txt
-rw-r--r-- 1 eszej eszej 26 Dec 15 16:37 test.txt
-rw-r--r-- 1 eszej eszej 8931 Dec 15 16:06 unix_shell.c
-rwxr-xr-x 1 eszej eszej 17864 Dec 15 16:32 wish
wish> exit
```

## Parallel Commands

```
eszej@JessePC:~/kaysys/projekti3$./wish
wish> echo Task 1 & echo Task 2 & echo Task 3
Task 1
Task 2
Task 3
wish> ls & pwd & echo Done
/home/eszej/kaysys/projekti3
Done
Makefile README.md listing.txt test.txt unix_shell.c wish
wish> exit
```