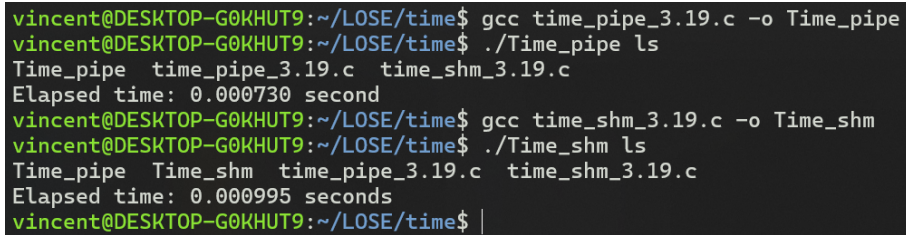


3.19 Time command evaluation using pipe and shared memory

Usage

```
gcc time_pipe.c -o Time_pipe
./Time_pipe ls
gcc time_shm.c -o Time_shm
./Time_shm ls
```

Screenshot

A terminal window showing the compilation and execution of two programs. The first program, time_pipe_3.19.c, is compiled to Time_pipe and executed with 'ls', showing an elapsed time of 0.000730 seconds. The second program, time_shm_3.19.c, is compiled to Time_shm and executed with 'ls', showing an elapsed time of 0.000995 seconds. The terminal prompt is 'vincent@DESKTOP-G0KHUT9:~/LOSE/time\$' and the directory is ~/LOSE/time.

```
vincent@DESKTOP-G0KHUT9:~/LOSE/time$ gcc time_pipe_3.19.c -o Time_pipe
vincent@DESKTOP-G0KHUT9:~/LOSE/time$ ./Time_pipe ls
Time_pipe time_pipe_3.19.c time_shm_3.19.c
Elapsed time: 0.000730 second
vincent@DESKTOP-G0KHUT9:~/LOSE/time$ gcc time_shm_3.19.c -o Time_shm
vincent@DESKTOP-G0KHUT9:~/LOSE/time$ ./Time_shm ls
Time_pipe Time_shm time_pipe_3.19.c time_shm_3.19.c
Elapsed time: 0.000995 seconds
vincent@DESKTOP-G0KHUT9:~/LOSE/time$ |
```

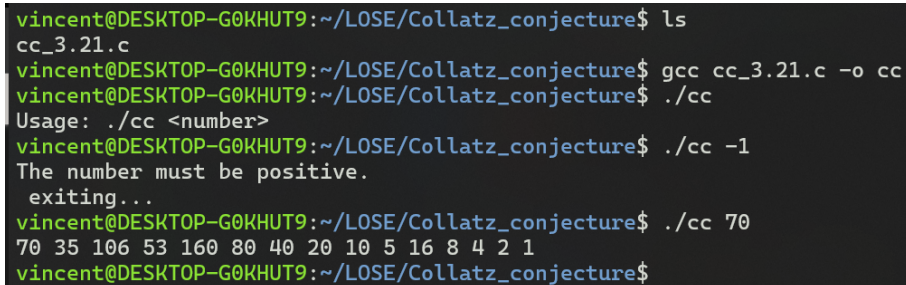
Figure 2: screenshot

3.21 Collatz Conjecture

Usage

```
gcc cc.c -o cc
./cc 70
```

Screenshot

A terminal window showing the compilation and execution of the Collatz conjecture program. The program is compiled to cc_3.21.c and executed with 'ls', showing an elapsed time of 0.000995 seconds. The program is then executed with '70', showing the sequence of numbers: 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1. The terminal prompt is 'vincent@DESKTOP-G0KHUT9:~/LOSE/Collatz_conjecture\$' and the directory is ~/LOSE/Collatz_conjecture.

```
vincent@DESKTOP-G0KHUT9:~/LOSE/Collatz_conjecture$ ls
cc_3.21.c
vincent@DESKTOP-G0KHUT9:~/LOSE/Collatz_conjecture$ gcc cc_3.21.c -o cc
vincent@DESKTOP-G0KHUT9:~/LOSE/Collatz_conjecture$ ./cc
Usage: ./cc <number>
vincent@DESKTOP-G0KHUT9:~/LOSE/Collatz_conjecture$ ./cc -1
The number must be positive.
exiting...
vincent@DESKTOP-G0KHUT9:~/LOSE/Collatz_conjecture$ ./cc 70
70 35 106 53 160 80 40 20 10 5 16 8 4 2 1
vincent@DESKTOP-G0KHUT9:~/LOSE/Collatz_conjecture$
```

Figure 3: screenshot

Usage

Screenshot

Figure 4: screenshot