

# Project 1: NPShell



NP TA

**3/30 23:59**

Project 1 Deadline

Demo: 3/31 Monday 17:30 ~ 21:20

# Project 1: Info

- You are **HIGHLY** encouraged to publish your questions on Project 1 討論區
- You can contact TAs by e3. (Mails sent to other addresses will NOT be replied)
- TA hours (Tuesday: 15:00 ~ 17:00) on **3/18, 3/25**
- You **MUST** make a reservation by email in advance.
- TAs will **NOT** debug for you.

# Project 1: Submission

- Create a directory named as your student ID, put all files into the directory.
- You **MUST** use **GNU Make** to build your project and compile your source code into one executable named **npshell**. The executable and Makefile should be placed at the top layer of the directory. We will use this executable for demo.
- You are **NOT** allowed to demo if we are unable to compile your project with a single make command.
- Upload only your code and Makefile. Do **NOT** upload anything else (e.g. noop, removetag, test.html, **.git**, **\_\_MACOSX**)
- zip the directory and upload the .zip file to the E3 platform.

**ATTENTION! We only accept .zip format**

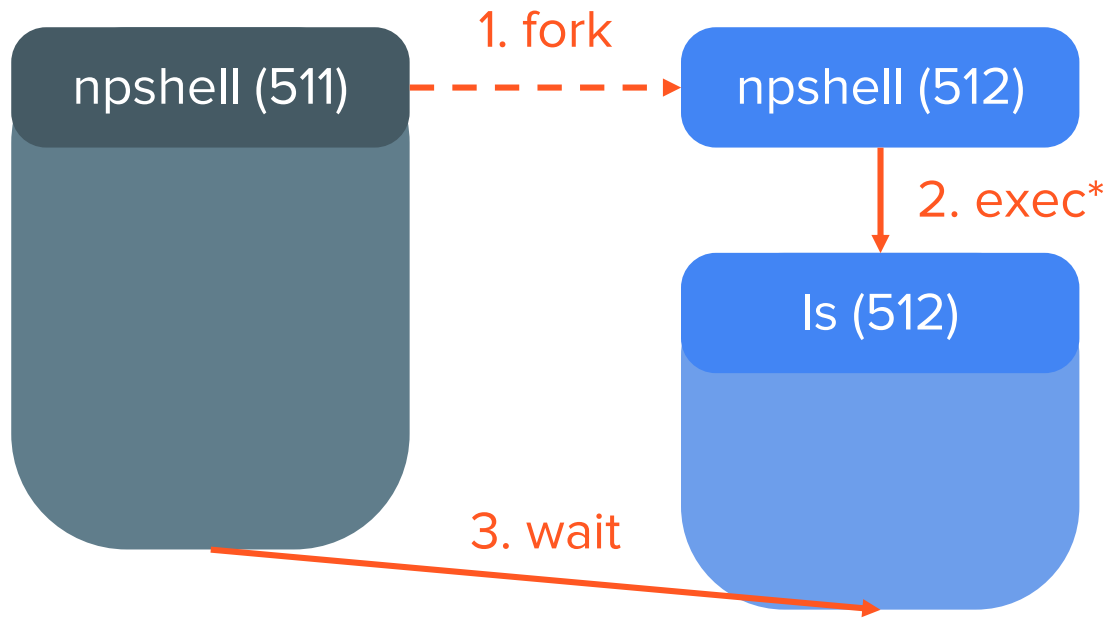
# Project 1: Demo

- 3/31 Monday 17:30 ~ 21:20
- We will announce demo slots 1 ~ 3 days before.
- Tasks:
  - QA.
  - Pass np-basic test cases.
  - Pass np-hard test cases.
  - Implement 1 or 2 extra functions with limited time.

# Implementation

# Process Lifecycle: fork-exec-wait

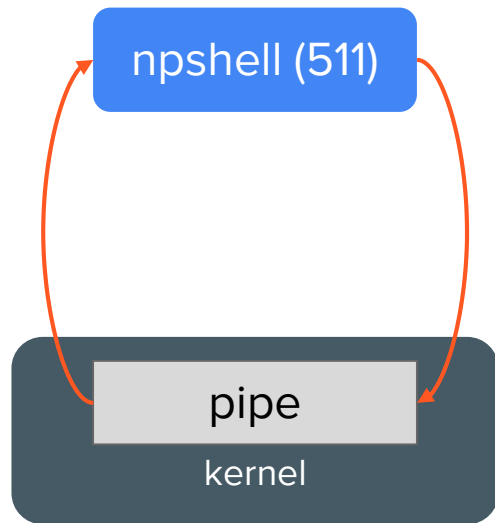
1. Creation: fork
2. Execution exec\*
3. Termination: waitpid



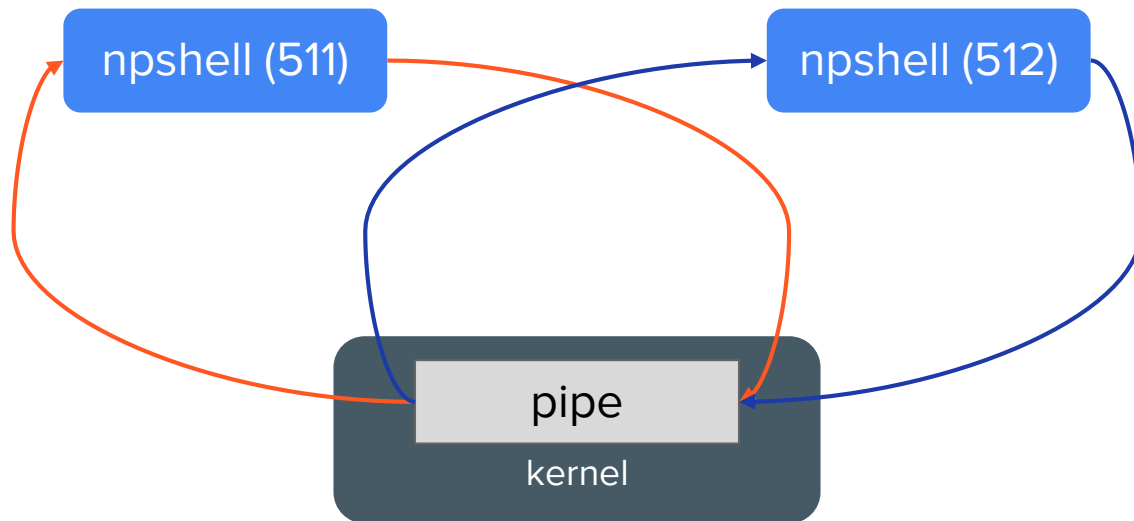
# Pipe



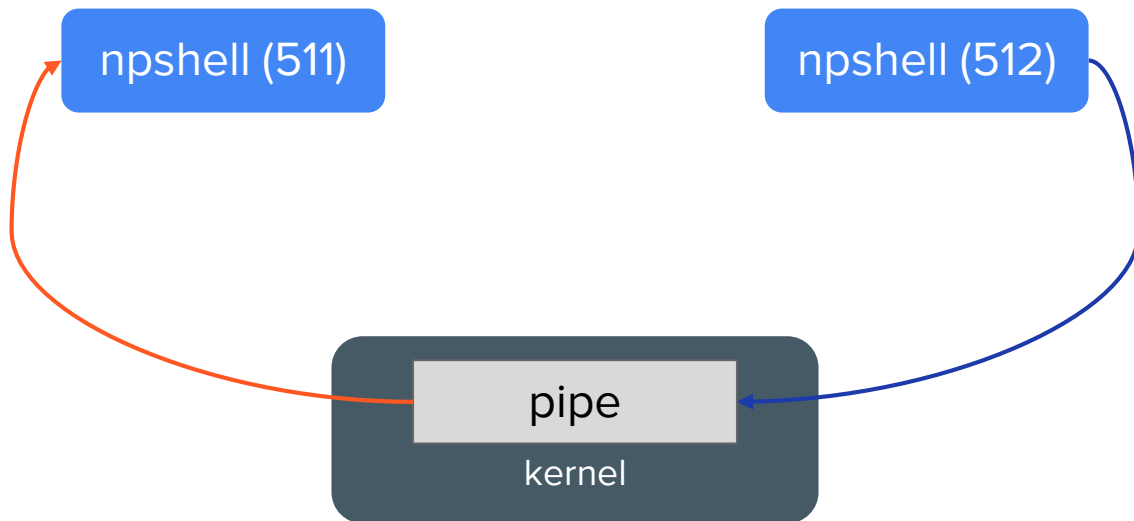
# 0. pipe



# 1. fork

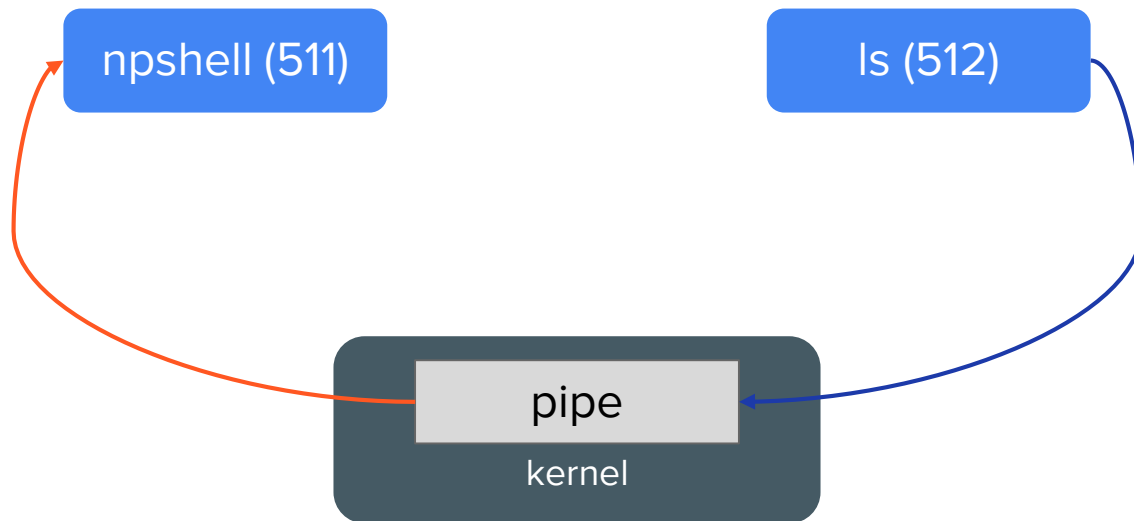


## 2. close



(because pipe is half-duplex)

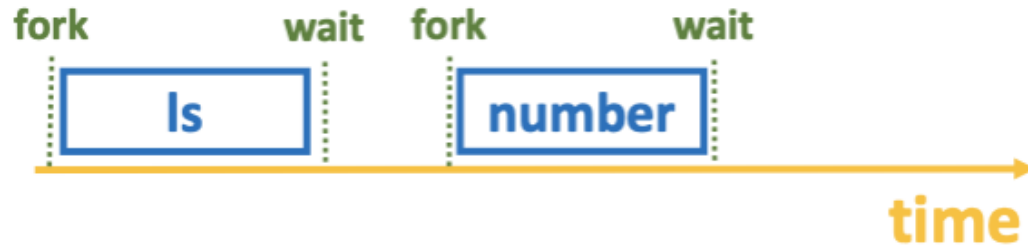
### 3. exec



# Issues

# Impl 1 : Wait for each child

% ls | number



# Problem 1 : Unable to process large data

```
% cat largeFile.txt | number % cat largeFile.txt | 1  
% number
```



**The process will hang forever !**

# Notes

- Please don't store data into temporary files.



## Impl 2 : Don't wait for processes

```
% cat largeFile.txt | number
```



## Problem 2 : % ordering

% ls  
% bin test.html

% fork



%



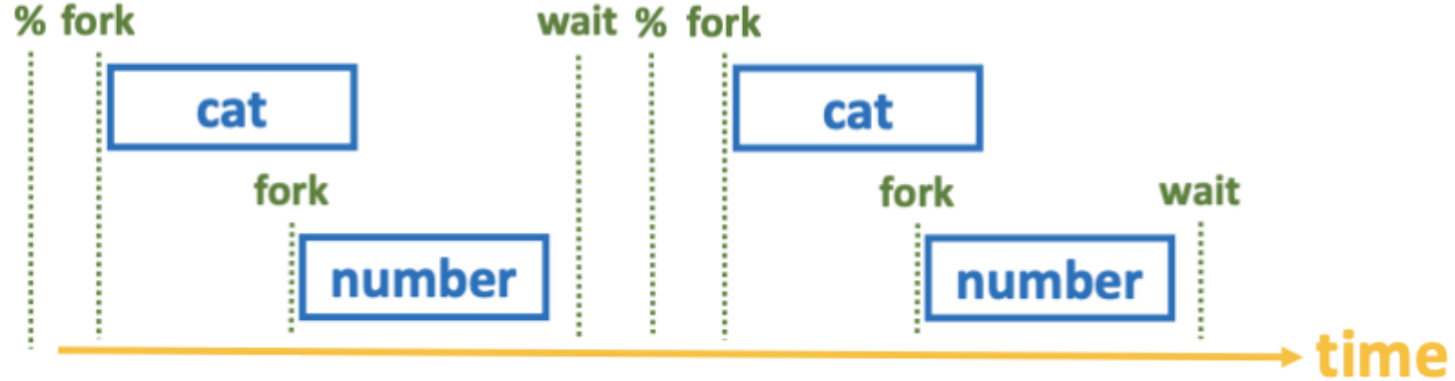
time

Correct:

% ls  
bin test.html  
%

# Impl 3 : Wait for a line if not pipeN

```
% cat largeFile.txt | number  
% cat largeFile.txt | 1  
% number
```

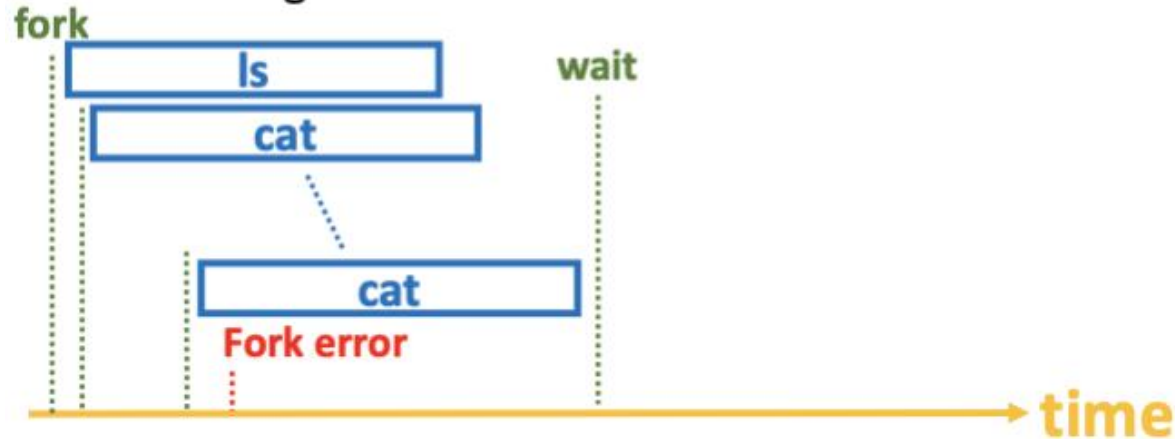


# Problem 4 : Process limitation

ls | cat | cat | cat | cat ..... cat | cat

Process limit is **512** on NP server.

Fork error might occur around the 510<sup>th</sup> cat.



# Hint

- Functions you may use
  - fork
  - pipe
  - dup, dup2
  - exec\*
  - wait, waitpid
- Handle failure
  - See man page for more information
- Debug
  - gdb
  - lsof