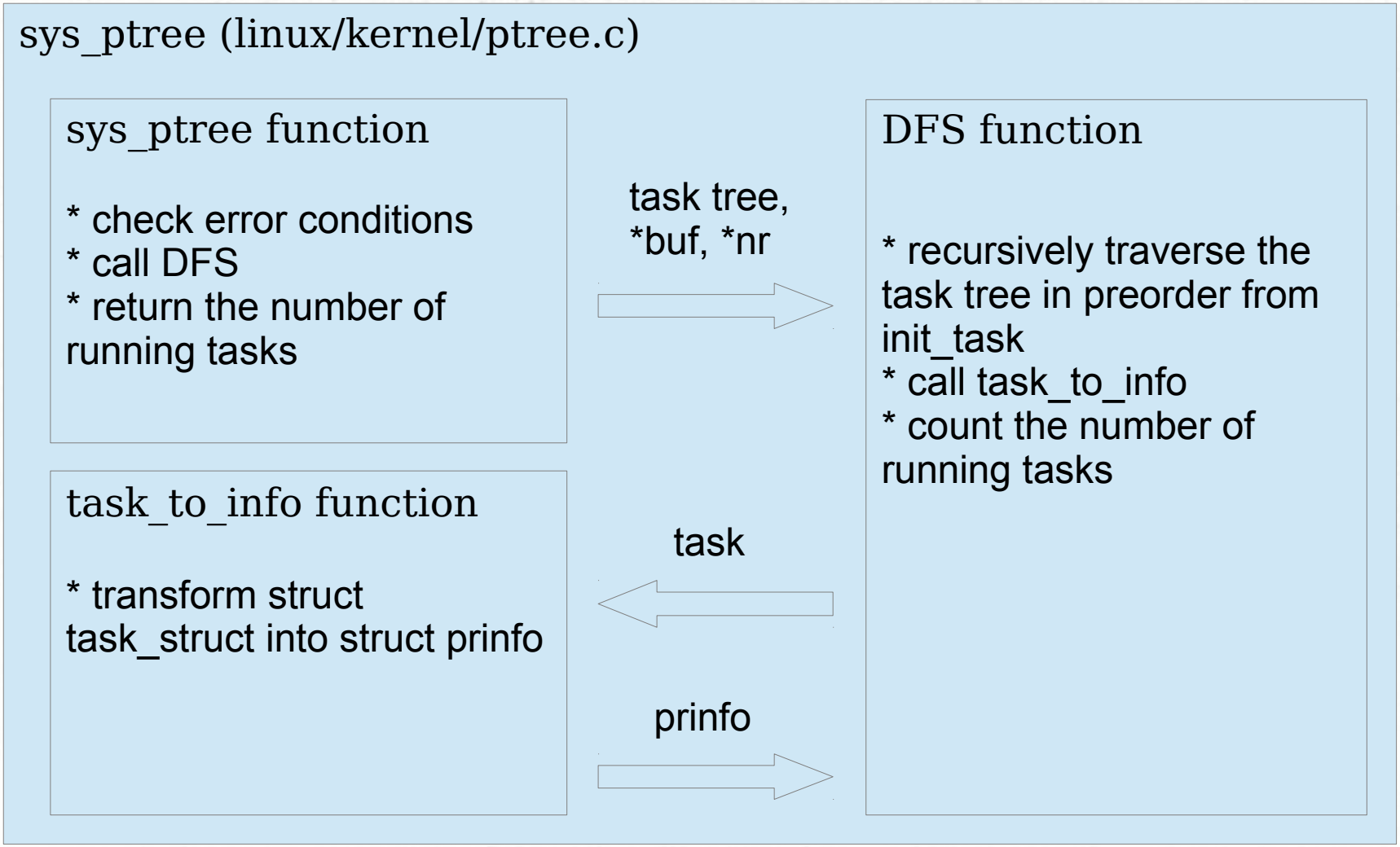
Operating System 2016-1 Project 1

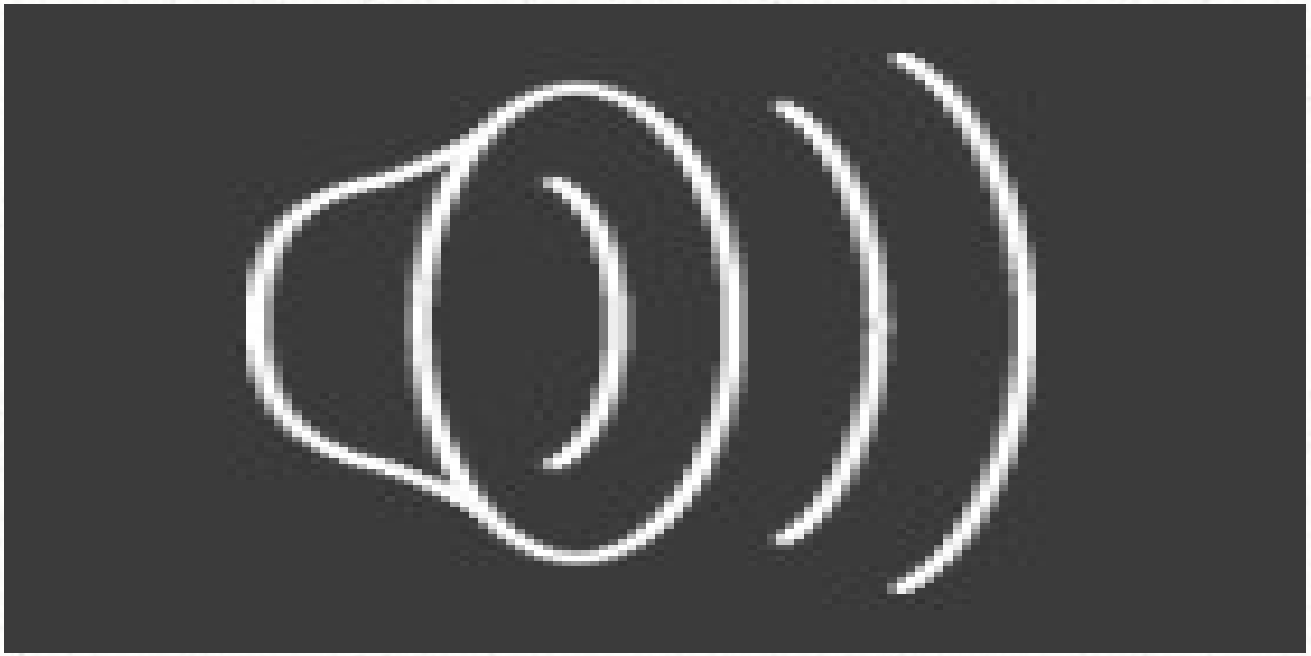
System Calls

Team 1
2014-19768 Sungyun Hur
2014-17184 Yeonwoo Kim
2013-13494 Eunhyang Kim

Design


sys_ptree (linux/kernel/ptree.c)
sys_ptree function
* check error conditions
* call DFS
* return the number of running tasks
task_to_info function
* transform struct task_struct into struct prinfo
task tree, *buf, *nr
task
prinfo
DFS function
* recursively traverse the task tree in preorder from init_task
* call task_to_info
* count the number of running tasks

Demo



LINK: https://youtu.be/pSH9Kjo-fU8

Investigations

- Process tree
  - Systemd-udevd generates a child periodically
    * Systemd-udevd manages the device and events and communicates between the device and the kernel.
    * Its child is created when our test program sends a syscall message and the process is destroyed when we don't need it.

Investigations

- Process tree
  - New kworkers are created and deleted from time to time
    * Kworkers are kernel threads.

Investigations

- Process tree and Applications
  - Tasks related to the applications appears as a child of launchpad-process
  - New kworkers and functional tasks appear.

Investigations

- Launchpad and Launchpad loader Tests
  - Tasks related to the applications appears as a child of launchpad-process
  - They remain even if we stopped the applications by pressing the home button
  - The tasks disappear when we do the clear all

Investigations

- Launchpad
  - The launchpad saves the tasks of applications used in the order that they were started.
  - The launchpad saves a snapshot of the app even if it was force stopped so that the application can be launched from where it was stopped.
  - The launchpad also manage tasks. When one app calls another app, it sends the request to the launchpad.

Investigations

- Launchpad-loader
  - It is used for pre-fork service to increase throughput and decrease latency.
  - If the launchpad decides to launch another app, the launchpad-loader launches the app with its process which was made beforehand.

Lessons learned

- The process of system call operation in both user and kernel space.
- Functions of some specific kernel tasks.