System Programming
(ELEC462)

Lab #12

Dukyun Nam

HPC Lab@KNU

Lab #12-1: Writing `tinybc`

- Write `tinybc`
  - Source code for submission
    - `tinybc.c`
  - Make sure that your code must work properly

Lab #12-2: Writing `timeserv` and `timeclnt`

- Write time server and client
  - Source code for submission
    - `timeserv.c, timeclnt.c`
  - Make sure that your code must work properly

Lab #12-3: Make remote `ls` more secure

- Rewrite `rlsd`
  - Drop `popen` and use `fork`, `exec`, `dup`, etc.
    - Using `popen` in a server is extremely risky
  - Source code for submission
    - `rls.c, rlsd2.c`
  - Make sure that your code must work properly

Lab #12: Submission

- Deadline: Tomorrow 11:59pm
  - Create a directory name (`lab12`) to another using a series of the following commands:
    - `mkdir lab12_s<Your_Student_ID>`
      - Assume your ID is 2022000000.
  - Zip your folder:
    - `zip -r lab12_s2022000000.zip lab12_s2022000000`
- Please include your **source codes** and **screenshots** of your output
- Upload the zipped directory (`lab12_s2022000000.zip`) into LMS

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HW #3

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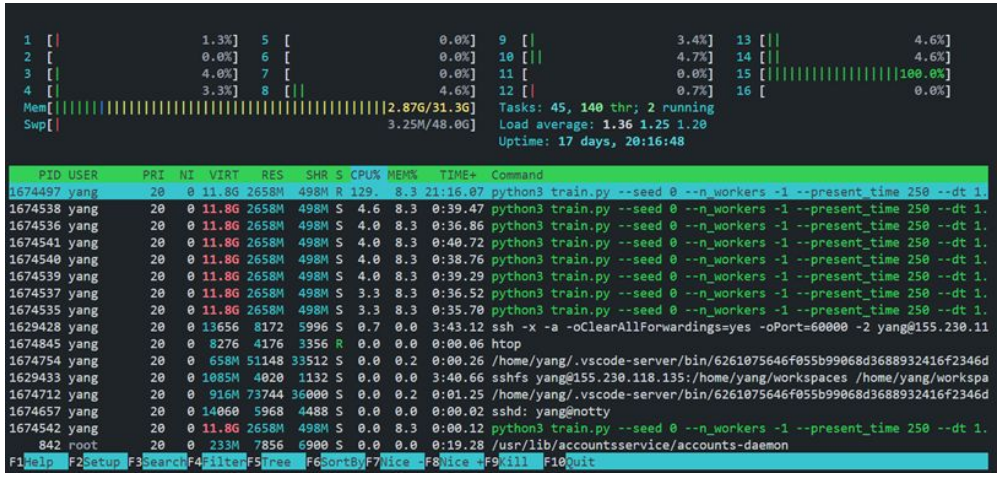
Monitoring System Resources

- Choose which resources to monitor
  - CPU usage and memory usage must be included.
- Choose more what you want to monitor
  - For example, back-end server administrators can monitor network resources.
  - Parallel computing server users can monitor GPU memory and processes
  - However, it only monitors a single server.
- Describe the monitoring tool, including why you chose that resource with the assumed situation.
- TA
  - 양희성 (leibniz21c at gmail.com)

- Evaluation Criteria
  - Monitor interface (including visualization) (30%)
  - Program completeness (exclude bugs and errors) (20%)
  - Justification of the chosen resource for the assumed circumstances (50%)

System Monitoring

- System monitoring is important for the following reasons:
  - Change to real-time web/mobile service environment
  - Business success depends on service performance management
  - Emergence of a new infrastructure environment



< htop for single system >

< Prometheus and Grafana >

Linux Perf Analysis

- `uptime`
  - Load averages to identify if load is increasing or decreasing (compare 1-, 5-, and 15-minute averages)
- `dmesg -T | tail`
  - Kernel errors including OOM events
- `vmstat -SM 1`
  - System-wide statistics: run queue length, swapping, overall CPU usage
- `mpstat -P ALL 1`
  - Per-CPU balance: a single busy CPU can indicate poor thread scaling
- `pidstat 1`
  - Per-process CPU usage: identify unexpected CPU consumers, and user/system CPU time for each process
- `iostat -sxz 1`
  - Disk I/O statistics: IOPS and throughput, average wait time, percent busy
- `free -m`
  - Memory usage including the file system cache
- `sar -n DEV 1`
  - Network device I/O: packets and throughput
- `sar -n TCP,ETCP 1`
  - TCP statistics: connection rates, retransmits
- `top`
  - Check overview

HW #3: Submission

- Deadline: The day after 2 weeks
  - Create a directory name (`hw3`) to another using a series of the following commands:
    - `mkdir hw3_s<Your_Student_ID>`
      - Assume your ID is 2022000000.
    - Include a **screenshot** of your output
  - Zip your folder:
    - `zip -r hw3_s2022000000.zip hw3_s2022000000`
- Upload the zipped directory (`hw3_s2022000000.zip`) into LMS