System Monitor Tool

A tool that displays real-time information about system processes, memory usage, and CPU load ? similar to the 'top' command.

Code

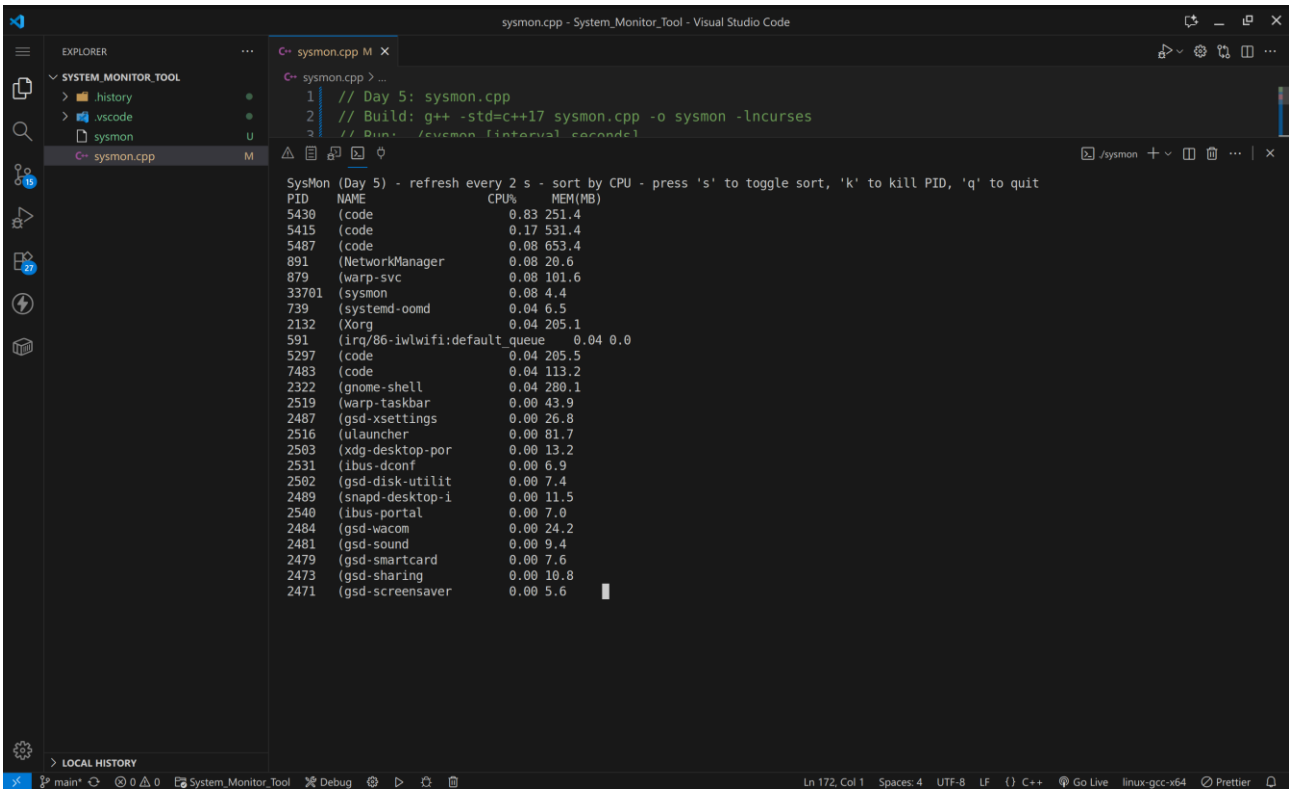
```
// sysmon.cpp

// Build: g++ -std=c++17 sysmon.cpp -o sysmon -lncurses
// Run: ./sysmon [interval_seconds]

#include <bits/stdc++.h>
#include <ncurses.h>
#include <signal.h>
using namespace std;
namespace fs = filesystem;

struct ProcSnapshot {
    int pid;
    string name;
    unsigned long total_time = 0; // utime+stime (jiffies)
    long rss_kb = 0;
    double cpu_percent = 0.0;
    double mem_mb = 0.0;
};

unsigned long get_total_jiffies() {
    ifstream f("/proc/stat");
    string line;
    getline(f, line);
    // line: cpu  3357 0 4313 1362393 ...
    stringstream ss(line);
    string cpu; unsigned long v, sum=0;
    ss >> cpu;
    while (ss >> v) sum += v;
    return sum;
}

vector<int> list_pids() {
    vector<int> pids;
    for (auto &e : fs::directory_iterator("/proc")) {
        string name = e.path().filename();
        if (!name.empty() && all_of(name.begin(), name.end(), ::isdigit))
            pids.push_back(stoi(name));
    }
```

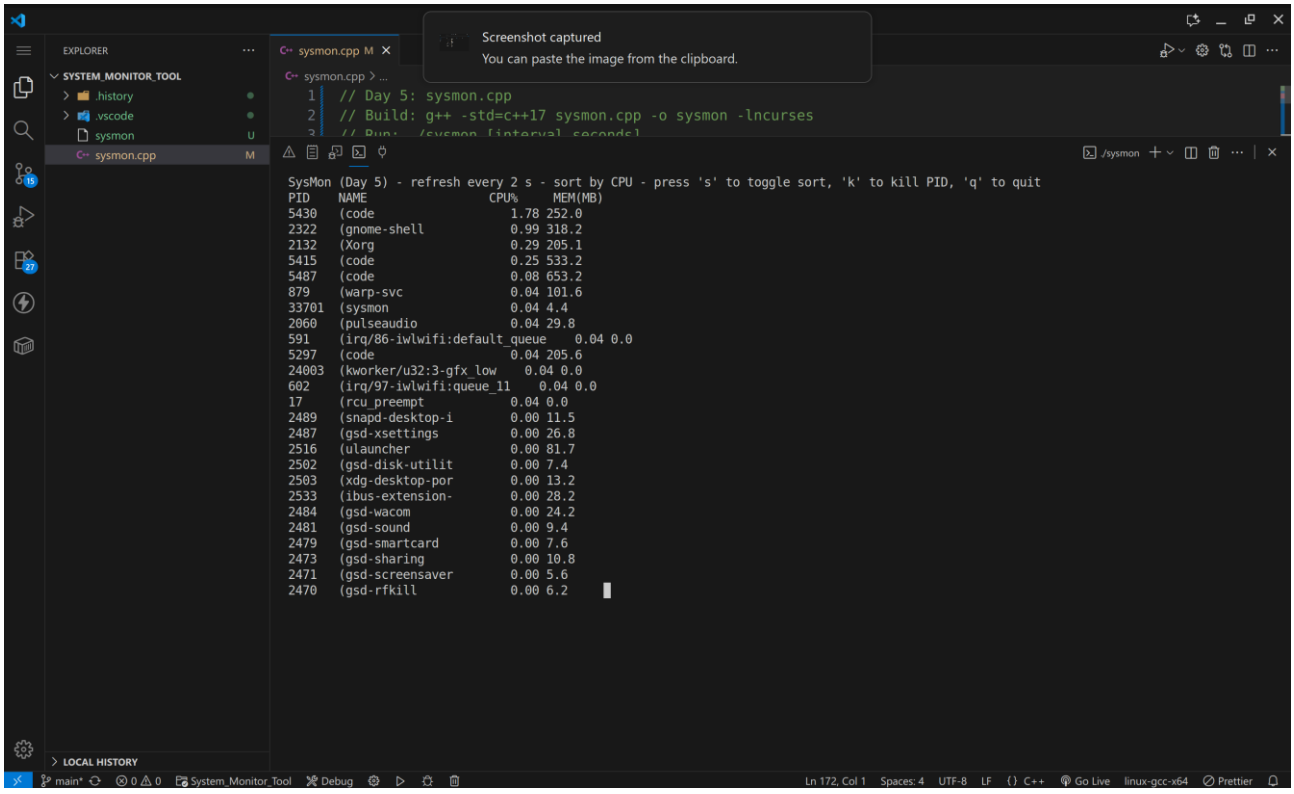
```
    return pids;
}

bool read_proc_times(int pid, unsigned long &totaltime, long &rss_kb, string &name) {
    string statp = "/proc/" + to_string(pid) + "/stat";
    ifstream sf(statp);
    if (!sf) return false;
    string content; getline(sf, content);
    size_t rp = content.rfind(')');
    if (rp == string::npos) return false;
    name = content.substr(content.find(' ')+1, rp - content.find(' ') - 1);
    string after = content.substr(rp+2);
    vector<string> toks; string t; stringstream s(after);
    while (s >> t) toks.push_back(t);
    if (toks.size() < 13) return false;
    unsigned long utime = stoul(toks[11]);
    unsigned long stime = stoul(toks[12]);
    totaltime = utime + stime;

    // rss from /proc/[pid]/status
    rss_kb = 0;
    ifstream pf("/proc/" + to_string(pid) + "/status");
    string line;
    while (pf && getline(pf,line)) {
        if (line.rfind("VmRSS:",0) == 0) {
            string key; long val; string unit;
            stringstream ss(line); ss >> key >> val >> unit;
            rss_kb = val;
            break;
        }
    }
    return true;
}

int main(int argc, char** argv) {
    int interval = 2;
    if (argc >= 2) interval = stoi(argv[1]);
    bool sort_by_cpu = true;

    initscr();
    cbreak();
    noecho();
    nodelay(stdscr, TRUE); // non-blocking getch
    keypad(stdscr, TRUE);

    // We'll keep previous snapshots in maps
    unordered_map<int, unsigned long> prev_proc_time;
    unsigned long prev_total_jiffies = get_total_jiffies();
```

```
    while (true) {
        unsigned long cur_total_jiffies = get_total_jiffies();

        vector<ProcSnapshot> procs;

        for (int pid : list_pids()) {
            unsigned long ttime;
            long rss;
            string name;
            if (!read_proc_times(pid, ttime, rss, name)) continue;
            ProcSnapshot ps;
            ps.pid = pid; ps.name = name; ps.total_time = ttime; ps.rss_kb = rss; ps.mem_mb =
rss/1024.0;
            auto it = prev_proc_time.find(pid);
            unsigned long proc_prev = (it!=prev_proc_time.end()) ? it->second : 0;
            unsigned long proc_delta = (ttime >= proc_prev) ? (ttime - proc_prev) : 0;
            unsigned long total_delta = (cur_total_jiffies >= prev_total_jiffies) ?
(cur_total_jiffies - prev_total_jiffies) : 1;
            ps.cpu_percent = 100.0 * (double)proc_delta / (double)total_delta;
            procs.push_back(ps);
            // update temp map later
        }

        // update previous maps
        prev_proc_time.clear();
        for (auto &p : procs) prev_proc_time[p.pid] = p.total_time;
        prev_total_jiffies = cur_total_jiffies;

        if (sort_by_cpu) {
            sort(procs.begin(), procs.end(), [](auto &a, auto &b){ return a.cpu_percent >
b.cpu_percent; });
        } else {
            sort(procs.begin(), procs.end(), [](auto &a, auto &b){ return a.mem_mb >
b.mem_mb; });
        }

        // Render
        erase();
        mvprintw(0,0,"SysMon (Day 5) - refresh every %d s - sort by %s - press 's' to toggle
sort, 'k' to kill PID, 'q' to quit", interval, sort_by_cpu ? "CPU" : "MEM");
        mvprintw(1,0,"%-6s %-20s %-8s %-8s", "PID", "NAME", "CPU%", "MEM(MB)");
        int row = 2;
        int show = 0;
        for (auto &p : procs) {
            if (show++ >= 25) break;
            mvprintw(row++, 0, "%-6d %-20s %7.2f %-8.1f", p.pid, p.name.c_str(),
p.cpu_percent, p.mem_mb);
```

```
        }
        refresh();

        // handle keys
        int ch;
        bool killedSomething = false;
        for (int t=0; t<interval*10; ++t) { // poll every 100ms to be responsive to keypress
            ch = getch();
            if (ch == 'q') {
                endwin();
                return 0;
            } else if (ch == 's') {
                sort_by_cpu = !sort_by_cpu;
                break; // break to refresh immediately
            } else if (ch == 'k') {
                // prompt user for PID
                echo();
                nodelay(stdscr, FALSE);
                mvprintw(row+1, 0, "Enter PID to kill (SIGTERM): ");
                char buf[32];
                getnstr(buf, 31);
                int pid = atoi(buf);
                int res = kill(pid, SIGTERM);
                if (res == 0) mvprintw(row+2,0,"SIGTERM sent to %d", pid);
                else mvprintw(row+2,0,"Failed to kill %d: %s", pid, strerror(errno));
                noecho();
                nodelay(stdscr, TRUE);
                killedSomething = true;
                break;
            } else if (ch == ERR) {
                // no input
            }
            napms(100); // 100 ms
        }
        if (killedSomething) {
            // immediate refresh in next loop iteration
            continue;
        }
    }

    endwin();
    return 0;
}
```

Output


sysmon.cpp - System_Monitor_Tool - Visual Studio Code
EXPLORER
SYSTEM_MONITOR_TOOL
.history
.vscode
sysmon
sysmon.cpp
// Day 5: sysmon.cpp
// Build: g++ -std=c++17 sysmon.cpp -o sysmon -lncurses
SysMon (Day 5) - refresh every 2 s - sort by CPU - press 's' to toggle sort, 'k' to kill PID, 'q' to quit
PID NAME CPU% MEM(MB)
5430 (code 0.83 251.4
5415 (code 0.17 531.4
5487 (code 0.08 653.4
891 (NetworkManager 0.08 20.6
879 (warp-svc 0.08 101.6
33701 (sysmon 0.08 4.4
739 (systemd-oomd 0.04 6.5
2132 (Xorg 0.04 205.1
591 (irq/86-iwlwifi:default_queue 0.04 0.0
5297 (code 0.04 205.5
7483 (code 0.04 113.2
2322 (gnome-shell 0.04 280.1
2519 (warp-taskbar 0.00 43.9
2487 (gsd-xsettings 0.00 26.8
2516 (ulauncher 0.00 81.7
2503 (xdg-desktop-por 0.00 13.2
2531 (ibus-dconf 0.00 6.9
2502 (gsd-disk-utilit 0.00 7.4
2489 (snapd-desktop-i 0.00 11.5
2540 (ibus-portal 0.00 7.0
2484 (gsd-wacom 0.00 24.2
2481 (gsd-sound 0.00 9.4
2479 (gsd-smartcard 0.00 7.6
2473 (gsd-sharing 0.00 10.8
2471 (gsd-screensaver 0.00 5.6
LOCAL HISTORY


Screenshot captured
You can paste the image from the clipboard.
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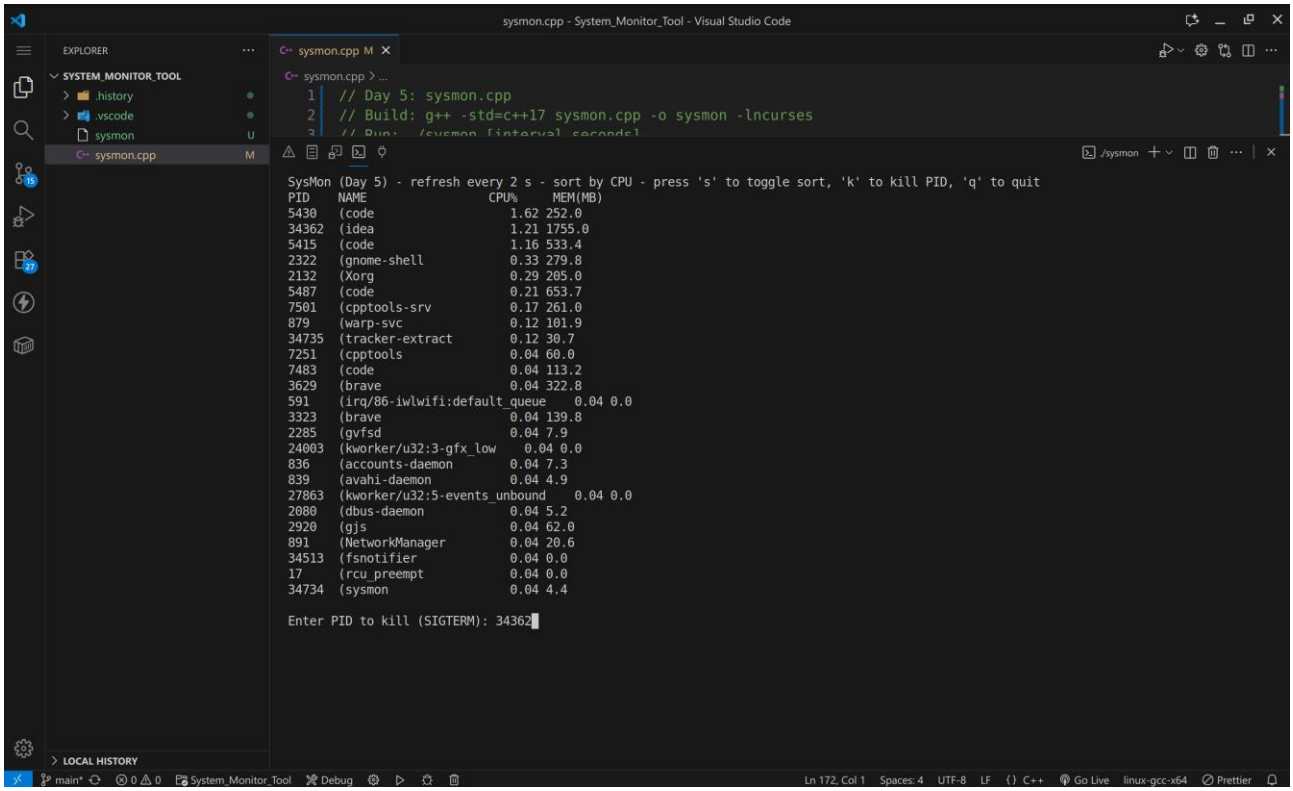
SysMon (Day 5) - refresh every 2 s - sort by CPU - press 's' to toggle sort, 'k' to kill PID, 'q' to quit
PID NAME CPU% MEM(MB)
5430 (code 1.78 252.0
2322 (gnome-shell 0.99 318.2
2132 (Xorg 0.29 205.1
5415 (code 0.25 533.2
5487 (code 0.08 653.2
879 (warp-svc 0.04 101.6
33701 (sysmon 0.04 4.4
2060 (pulseaudio 0.04 29.8
591 (irq/86-iwlwifi:default_queue 0.04 0.0
5297 (code 0.04 205.6
24003 (kworker/u32:3-gfx_low 0.04 0.0
602 (irq/97-iwlwifi:queue_11 0.04 0.0
17 (rcu_preempt 0.04 0.0
2489 (snapd-desktop-i 0.00 11.5
2487 (gsd-xsettings 0.00 26.8
2516 (ulauncher 0.00 81.7
2502 (gsd-disk-utilit 0.00 7.4
2503 (xdg-desktop-por 0.00 13.2
2533 (ibus-extension- 0.00 28.2
2484 (gsd-wacom 0.00 24.2
2481 (gsd-sound 0.00 9.4
2479 (gsd-smartcard 0.00 7.6
2473 (gsd-sharing 0.00 10.8
2471 (gsd-screensaver 0.00 5.6
2470 (gsd-rfkill 0.00 6.2
LOCAL HISTORY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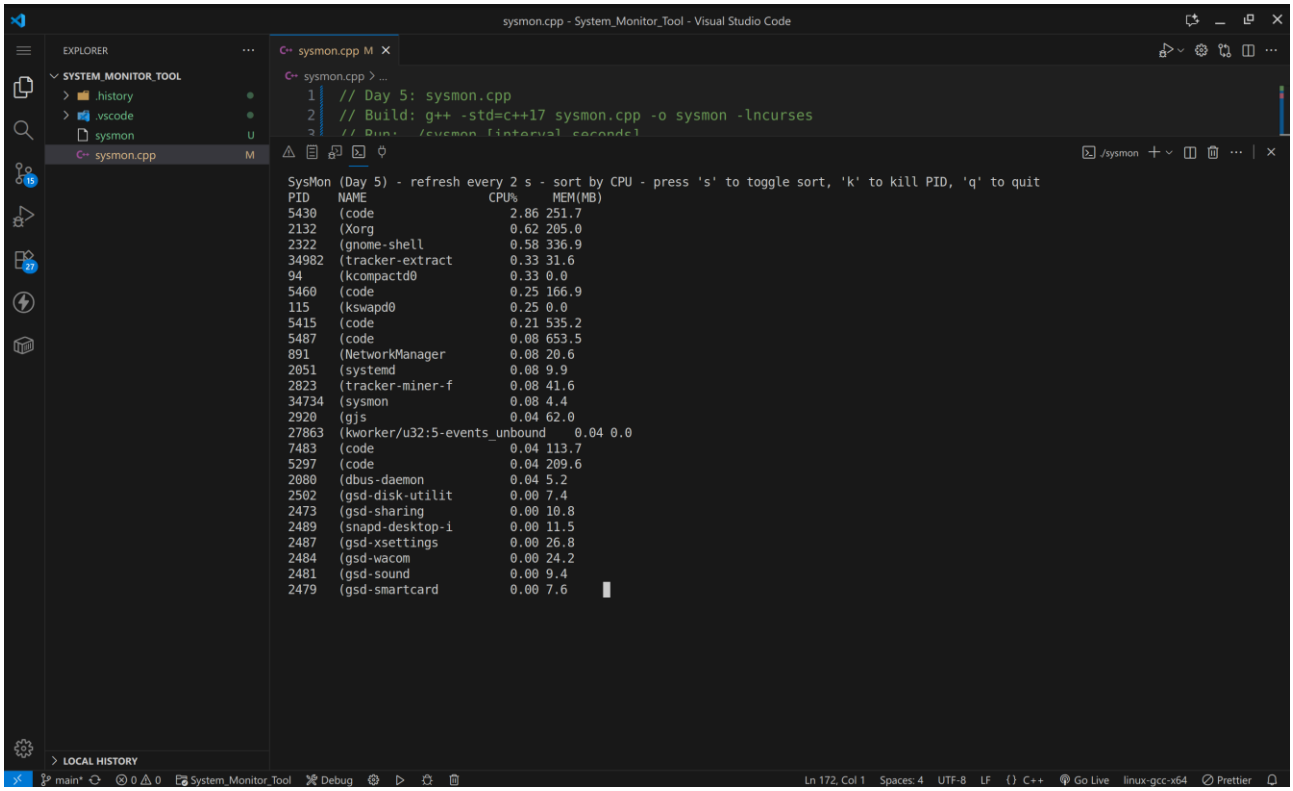
SysMon (Day 5) - refresh every 2 s - sort by CPU - press 's' to toggle sort, 'k' to kill PID, 'q' to quit
PID NAME CPU% MEM(MB)
5430 (code 1.62 252.0
34362 (idea 1.21 1755.0
5415 (code 1.16 533.4
2322 (gnome-shell 0.33 279.8
2132 (Xorg 0.29 205.0
5487 (code 0.21 653.7
7501 (cpptools-srv 0.17 261.0
879 (warp-svc 0.12 101.9
34735 (tracker-extract 0.12 30.7
7251 (cpptools 0.04 60.0
7483 (code 0.04 113.2
3629 (brave 0.04 322.8
591 (irq/86-iwlwifi:default_queue 0.04 0.0
3323 (brave 0.04 139.8
2285 (gvfsd 0.04 7.9
24003 (kworker/u32:3-gfx_low 0.04 0.0
836 (accounts-daemon 0.04 7.3
839 (avahi-daemon 0.04 4.9
27863 (kworker/u32:5-events_unbound 0.04 0.0
2080 (dbus-daemon 0.04 5.2
2920 (gjs 0.04 62.0
891 (NetworkManager 0.04 20.6
34513 (fsnotifier 0.04 0.0
17 (rcu_preempt 0.04 0.0
34734 (sysmon 0.04 4.4
Enter PID to kill (SIGTERM): 34362
LOCAL HISTORY
Ln 172, Col 1 Spaces: 4 UTF-8 LF C++ Go Live linux-gcc-x64 Prettier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PID NAME CPU% MEM(MB)
5430 (code 2.86 251.7
2132 (Xorg 0.62 205.0
2322 (gnome-shell 0.58 336.9
34982 (tracker-extract 0.33 31.6
94 (kcompactd0 0.33 0.0
5460 (code 0.25 166.9
115 (kswapd0 0.25 0.0
5415 (code 0.21 535.2
5487 (code 0.08 653.5
891 (NetworkManager 0.08 20.6
2051 (systemd 0.08 9.9
2823 (tracker-miner-f 0.08 41.6
34734 (sysmon 0.08 4.4
2920 (gjs 0.04 62.0
27863 (kworker/u32:5-events_unbound 0.04 0.0
7483 (code 0.04 113.7
5297 (code 0.04 209.6
2080 (dbus-daemon 0.04 5.2
2502 (gsd-disk-utilit 0.00 7.4
2473 (gsd-sharing 0.00 10.8
2489 (snapd-desktop-i 0.00 11.5
2487 (gsd-xsettings 0.00 26.8
2484 (gsd-wacom 0.00 24.2
2481 (gsd-sound 0.00 9.4
2479 (gsd-smartcard 0.00 7.6
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GitHub

Repo URL:
https://github.com/iammeraj/WIPRO-PROJECT-SYSTEM-MONITOR-TOOL

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