

МІНІСТЕРСТВО ОСВІТИ ТА НАУКИ УКРАЇНИ  
НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ  
“ХАРКІВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ”  
КАФЕДРА ПРОГРАМНОЇ ІНЖЕНЕРІЇ ТА ІНФОРМАЦІЙНИХ  
ТЕХНОЛОГІЙ УПРАВЛІННЯ

Звіт з лабораторної роботи № 4  
з дисципліни “Основи архітектури ЕОМ та операційні системи”

Виконав: ст. гр. КН-221В

Шулюпов Єгор Русланович

Перевірив: Асистент каф. ПІІТУ

Дмитро Миколайович Ковальчук

Харків

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## ФОНОВІ ПРОЦЕСИ І СИГНАЛИ

Мета: навчитися працювати з фоновими процесами та сигналами.

### ЗАВДАННЯ НА ЛАБОРАТОРНУ РОБОТУ

1. Розробити додаток для Linux, який

- запускається як демон (фоновий процес)
- відключається від терміналу, повідомляє про себе в системному журналі та чекає сигналів
- за сигналом SIGUSR1 записує інформацію про отримання сигналу системний журнал;
- по сигналу SIGINT завершує виконання (теж із записом у журналі)

Вміти дивитися стан запущеного демона командою ps пояснювати вміст різних полів виведення ps.

```
1  #include <stdio.h>
2  #include <signal.h>
3  #include <getopt.h>
4  #include <unistd.h>
5  #include <sys/types.h>
6  #include <stdlib.h>
7  #include <grp.h>
8  #include <sys/wait.h>
9  #include <sys/resource.h>
10 #include <syslog.h>
11 void user_handler (int signum){
12     switch (signum){
13     case SIGUSR1:
14         syslog (LOG_INFO, "SIGUSR1\n");
15         break;
16     case SIGINT:
17         syslog (LOG_INFO, "SIGINT\n");
18         closelog();
19         break;}}
20 int main(int argc, char** argv){
21     pid_t pid = fork();
22     if (pid < 0){
23         printf ("err. pid < 0\n");
24         return -1;}
25     if (pid > 0){
26         printf ("Daemon started with pid = %d\n", pid);
27         exit (0);}
28     setsid();
29     chdir("/");
30     struct rlimit flim;
31     getrlimit(RLIMIT_NOFILE, &flim);
32     for (int fd = 0; fd < flim.rlim_max; fd++) close(fd);
33     openlog("daemon", LOG_PID, LOG_LOCAL0);
34     syslog(LOG_INFO, "waiting for signal...\n");
35     signal (SIGUSR1, user_handler);
36     signal (SIGINT, user_handler);
37     kill(pid, SIGUSR1);
38     kill(pid, SIGINT);
39     return 0;
40 }
```

```

vorpolech@vorpolech-VirtualBox:~/Lab_ECM/44$ ./main
Daemon started with pid = 7938
vorpolech@vorpolech-VirtualBox:~/Lab_ECM/44$ ps -jx | grep 'PID\|main'
PPID   PID    PGID   SID   TTY      TPGID  STAT   UID      TIME  CMMAND
4473   7955   7954   4473  pts/0    7954   S+      1000     0:00  grep --color=auto PID\|main
vorpolech@vorpolech-VirtualBox:~/Lab_ECM/44$ grep main /var/log/syslog
May 6 12:53:32 vorpolech-VirtualBox NetworkManager[659]: <info> [1651830812.4684] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 12:53:32 vorpolech-VirtualBox NetworkManager[659]: <info> [1651830812.4685] dhcp4 (enp0s3): option domain_name_servers => '10.255.255.2 192.168.
1.1'
May 6 12:53:32 vorpolech-VirtualBox NetworkManager[659]: <info> [1651830812.4685] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 12:53:32 vorpolech-VirtualBox NetworkManager[659]: <info> [1651830812.4685] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 12:53:32 vorpolech-VirtualBox NetworkManager[659]: <info> [1651830812.4685] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 12:53:32 vorpolech-VirtualBox NetworkManager[659]: <info> [1651830812.4685] dhcp4 (enp0s3): option requested_nis_domain => '1'
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.585982] 09:54:23.218191 main VBoxService 6.1.32 r149290 (verbosity: 0) linux.amd64 (Jan 13 2022 2
0:10:27) release log
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.586508] 09:54:23.219532 main OS Product: Linux
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.586939] 09:54:23.219890 main OS Release: 5.13.0-40-generic
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.587693] 09:54:23.220328 main OS Version: #45-20.04.1-Ubuntu SMP Mon Apr 4 09:38:31 UTC 2022
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.588749] 09:54:23.221125 main Executable: /opt/VBoxGuestAdditions-6.1.32/sbin/VBoxService
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.588749] 09:54:23.221126 main Process ID: 8886
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.590506] 09:54:23.223378 main 6.1.32 r149290 started. Verbose level = 0
May 6 12:54:23 vorpolech-VirtualBox kernel: [ 55.592078] 09:54:23.224763 main vbglr3GuestCtrlDetectPeekGetCancelSupport: Supported (#1)
May 6 12:54:36 vorpolech-VirtualBox systemd[9269]: Started Path trigger for Avahi .local domain notifications.
May 6 13:23:25 vorpolech-VirtualBox kernel: [ 0.222123] ACPI: PCI Root Bridge (PCI0) (domain 0000 [bus 00-ff])
May 6 13:23:25 vorpolech-VirtualBox kernel: [ 0.297960] iommu: Default domain type: Translated
May 6 13:23:25 vorpolech-VirtualBox kernel: [ 0.299913] NetLabel: domain hash size = 128
May 6 13:23:25 vorpolech-VirtualBox kernel: [ 0.559804] platform eisa.0: EISA: Cannot allocate resource for mainboard
May 6 13:23:26 vorpolech-VirtualBox avahi-daemon[670]: Successfully dropped remaining capabilities.
May 6 13:23:26 vorpolech-VirtualBox NetworkManager[676]: <info> [1651832606.5884] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 13:23:26 vorpolech-VirtualBox NetworkManager[676]: <info> [1651832606.5885] dhcp4 (enp0s3): option domain_name_servers => '10.255.255.2 192.168.
8.1 192.168.1.1'
May 6 13:23:26 vorpolech-VirtualBox NetworkManager[676]: <info> [1651832606.5885] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 13:23:26 vorpolech-VirtualBox NetworkManager[676]: <info> [1651832606.5885] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 13:23:26 vorpolech-VirtualBox NetworkManager[676]: <info> [1651832606.5885] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 13:23:26 vorpolech-VirtualBox NetworkManager[676]: <info> [1651832606.5886] dhcp4 (enp0s3): option requested_nis_domain => '1'
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497000] 10:23:36.437411 main VBoxService 6.1.32 r149290 (verbosity: 0) linux.amd64 (Jan 13 2022 2
0:10:27) release log
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497000] 10:23:36.437417 main Log opened 2022-05-06T10:23:36.436496000Z
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497056] 10:23:36.437507 main OS Product: Linux
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497083] 10:23:36.437541 main OS Release: 5.13.0-40-generic
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497109] 10:23:36.437568 main OS Version: #45-20.04.1-Ubuntu SMP Mon Apr 4 09:38:31 UTC 2022
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497143] 10:23:36.437593 main Executable: /opt/VBoxGuestAdditions-6.1.32/sbin/VBoxService
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497143] 10:23:36.437594 main Process ID: 1014
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497143] 10:23:36.437595 main Package type: LINUX_64BITS_GENERIC
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.497912] 10:23:36.438355 main 6.1.32 r149290 started. Verbose level = 0
May 6 13:23:36 vorpolech-VirtualBox kernel: [ 16.498884] 10:23:36.439315 main vbglr3GuestCtrlDetectPeekGetCancelSupport: Supported (#1)
May 6 13:50:50 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834250.2734] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 13:50:50 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834250.2734] dhcp4 (enp0s3): option domain_name_servers => '192.168.8.1 192.168.1
.1'
May 6 13:50:50 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834250.2735] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 13:50:50 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834250.2735] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 13:50:50 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834250.2735] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 13:50:50 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834250.2735] dhcp4 (enp0s3): option requested_nis_domain => '1'
May 6 13:51:14 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834274.4609] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 13:51:14 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834274.4610] dhcp4 (enp0s3): option domain_name_servers => '10.255.255.2 192.168.
8.1 192.168.1.1'
May 6 13:51:14 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834274.4610] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 13:51:14 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834274.4610] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 13:51:14 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834274.4610] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 13:51:14 vorpolech-VirtualBox NetworkManager[676]: <info> [1651834274.4610] dhcp4 (enp0s3): option requested_nis_domain => '1'
May 6 15:32:24 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840344.3153] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 15:32:24 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840344.3153] dhcp4 (enp0s3): option domain_name_servers => '192.168.8.1 192.168.1
.1'
May 6 15:32:24 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840344.3153] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 15:32:24 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840344.3153] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 15:32:24 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840344.3153] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 15:38:07 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840687.1361] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 15:38:07 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840687.1361] dhcp4 (enp0s3): option domain_name_servers => '10.255.255.2 192.168.
8.1 192.168.1.1'
May 6 15:38:07 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840687.1361] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 15:38:07 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840687.1361] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 15:38:07 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840687.1361] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 15:38:07 vorpolech-VirtualBox NetworkManager[676]: <info> [1651840687.1362] dhcp4 (enp0s3): option requested_nis_domain => '1'
May 6 15:40:09 vorpolech-VirtualBox systemd[1951]: Started Path trigger for Avahi .local domain notifications.
May 6 16:41:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844507.3568] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 16:41:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844507.3568] dhcp4 (enp0s3): option domain_name_servers => '192.168.8.1 192.168.1
.1'
May 6 16:41:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844507.3569] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 16:41:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844507.3569] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 16:41:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844507.3569] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 16:41:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844507.3569] dhcp4 (enp0s3): option requested_nis_domain => '1'
May 6 16:43:12 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844592.0326] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 16:43:12 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844592.0326] dhcp4 (enp0s3): option domain_name_servers => '10.255.255.2 192.168.
8.1 192.168.1.1'
May 6 16:43:12 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844592.0327] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 16:43:12 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844592.0327] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 16:43:12 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844592.0327] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 16:43:12 vorpolech-VirtualBox NetworkManager[676]: <info> [1651844592.0327] dhcp4 (enp0s3): option requested_nis_domain => '1'
May 6 17:02:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651845767.8088] dhcp4 (enp0s3): option domain_name => 'NetisRouter_081011783
0c9'
May 6 17:02:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651845767.8088] dhcp4 (enp0s3): option domain_name_servers => '192.168.8.1 192.168.1
.1'
May 6 17:02:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651845767.8088] dhcp4 (enp0s3): option requested_domain_name => '1'
May 6 17:02:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651845767.8089] dhcp4 (enp0s3): option requested_domain_name_servers => '1'
May 6 17:02:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651845767.8089] dhcp4 (enp0s3): option requested_domain_search => '1'
May 6 17:02:47 vorpolech-VirtualBox NetworkManager[676]: <info> [1651845767.8089] dhcp4 (enp0s3): option requested_nis_domain => '1'

```

Висновок : під час виконання цієї лабораторної було отримано навички та знання щодо роботи з фоновими процесами та сигналами.