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| **Gerb-BMSTU_01** | **Министерство науки и высшего образования Российской Федерации**  **Федеральное государственное бюджетное образовательное учреждение**  **высшего образования**  **«Московский государственный технический университет**  **имени Н.Э. Баумана**  **(национальный исследовательский университет)»**  **(МГТУ им. Н.Э. Баумана)** |

ФАКУЛЬТЕТ «**Информатика и системы управления»**

КАФЕДРА **«Программное обеспечение эвм»(ИУ7)**

**Отчет**

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| **по лабораторной работе №** | 4 |

**Название:** Виртуальная файловая система /proc

**Дисциплина:** Операционные системы

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| Студент | ИУ7-62б |  |  | Д.М. Блохин |
|  | (Группа) |  | (Подпись, дата) | (И.О. Фамилия) |
|  |  |  |  |  |
| Преподаватель |  |  |  | Н.Ю. Рязанова |
|  |  |  | (Подпись, дата) | (И.О. Фамилия) |

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# Часть 1

## Листинг

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| #include <stdio.h>  #include <string.h>  #include <dirent.h>  #include <unistd.h>  #include <stdlib.h>  #define FILE\_RESULT "process.info"  #define PID "8164"  #define BUFFSIZE 0x1000  #define BUFFSIZE\_NEW 0x1000  char \*output\_names[] = {  "pid",  "filename",  "state",  "ppid",  "gid",  "session",  "tty\_nr",  "tp\_gid",  "flags",  "minflt",  "cminflt",  "majflt",  "cmajflt",  "utime",  "stime",  "cutime",  "cstime",  "priority",  "nice",  "num\_threads",  "itrealvalue",  "start\_tiime",  "vsize",  "rss",  "rsslim",  "startcode",  "endcode",  "startstack",  "kstkesp",  "kstkeip",  "signal",  "blocked",  "sigignore",  "sigcatch",  "wchan",  "nswap",  "cnswap",  "exit\_signal",  "processor",  "rt\_priority",  "policy",  "delayacct\_blkio\_tics",  "quest\_time",  "cquest\_time",  "start\_data",  "end\_data",  "start\_brk",  "arg\_start",  "arg\_end",  "env\_start",  "env\_end",  "exit\_code"  };  void cmdline(void) {  char buf[BUFFSIZE];  int len;  FILE\* f;  char result\_path[25] = "/proc/";  char cur\_file[10] = "/cmdline";  char pid[25] = PID;    strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  f = fopen(result\_path, "r");  FILE\* file = fopen(FILE\_RESULT, "w");    len = fread(buf, 1, BUFFSIZE, f);  buf[len-1] = 0;  fprintf(file, "----------------------------------------------\n");  fprintf(file, "CMDLINE: \n");  fprintf(file, "pid: %s\ncmdline:%s\n", PID, buf);  fprintf(file, "----------------------------------------------\n");  fclose(f);  fclose(file);  }  void environ(void) {  char buf[BUFFSIZE];  int len;  int i;  FILE\* f;  FILE\* file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[10] = "/environ";  char pid[25] = PID;    strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  f = fopen(result\_path, "r");  fprintf(file, "----------------------------------------------\n");  fprintf(file, "ENVIRON\n");  while((len = fread(buf, 1, BUFFSIZE, f)) > 0)  {  for(i = 0; i < len; i++)  if(buf[i] == 0)  buf[i] = 10;  buf[len -1] = 10;  fprintf(file, "%s", buf);  }  fprintf(file, "----------------------------------------------\n");  fclose(file);  fclose(f);  }  void fd(void) {  struct dirent \*dirp;  DIR \*dp;  FILE\* file = fopen(FILE\_RESULT, "a");  char string[BUFFSIZE];  char path[BUFFSIZE];  dp = opendir("/proc/self/fd"); // open directory  fprintf(file, "----------------------------------------------\n");  fprintf(file, "FD:\n");  while((dirp = readdir(dp)) != NULL) // read directory  {  if((strcmp(dirp->d\_name, ".") !=0 ) &&  (strcmp(dirp->d\_name, "..") != 0))  {  sprintf(path, "%s%s", "/proc/self/fd/", dirp->d\_name);  readlink(path, string, BUFFSIZE);  path[BUFFSIZE] = '\0';  fprintf(file, "%s -> %s\n", dirp->d\_name, string);  }  }  fprintf(file, "----------------------------------------------\n");  fclose(file);  closedir(dp);  }  void stat(void) {  char buf[BUFFSIZE\_NEW];  int n = 0;  FILE \*f;    FILE \*file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[7] = "/stat";  char pid[25] = PID;  strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  f = fopen(result\_path, "r");  fread(buf, 1, BUFFSIZE\_NEW, f);  char\* p\_ch = strtok(buf, " ");  fprintf(file, "----------------------------------------------\n");  fprintf(file, "%s", "STAT: \n");  while(p\_ch != NULL)  {  fprintf(file, "%15s: %s \n", output\_names[n], p\_ch);  n++;  p\_ch = strtok(NULL, " ");  }  fprintf(file, "----------------------------------------------\n");  fclose(file);  fclose(f);  }  void status(void) {  char buf[BUFFSIZE\_NEW];  FILE \*f;  FILE \*file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[10] = "/status";  char pid[25] = PID;    strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  f = fopen(result\_path, "r");  fread(buf, 1, BUFFSIZE\_NEW, f);  char\* p\_ch = strtok(buf, "\n");  fprintf(file, "----------------------------------------------\n");  fprintf(file, "%s", "STATUS: \n");  while(p\_ch != NULL)  {  fprintf(file, "%s \n", p\_ch);  p\_ch = strtok(NULL, "\n");  }  fprintf(file, "----------------------------------------------\n");  fclose(file);  fclose(f);  }  void statm(void) {  char buf[BUFFSIZE\_NEW];  FILE \*f;  FILE \*file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[7] = "/statm";  char pid[25] = PID;    strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  f = fopen(result\_path, "r");  fread(buf, 1, BUFFSIZE\_NEW, f);  char\* p\_ch = strtok(buf, "\n");  fprintf(file, "----------------------------------------------\n");  fprintf(file, "%s", "STATM: \n");  while(p\_ch != NULL)  {  fprintf(file, "%s \n", p\_ch);  p\_ch = strtok(NULL, "\n");  }  fprintf(file, "----------------------------------------------\n");  fclose(file);  fclose(f);  }  void maps(void) {  char buf[BUFFSIZE\_NEW];  FILE \*f;  FILE \*file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[7] = "/maps";  char pid[25] = PID;    strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  f = fopen(result\_path, "r");  fread(buf, 1, BUFFSIZE\_NEW, f);  char\* p\_ch = strtok(buf, "\n");  fprintf(file, "----------------------------------------------\n");  fprintf(file, "%s", "MAPS: \n");  while(p\_ch != NULL)  {  fprintf(file, "%s \n", p\_ch);  p\_ch = strtok(NULL, "\n");  }  fprintf(file, "----------------------------------------------\n");  fclose(file);  fclose(f);  }  void cwd(void) {  char linkbuf[256];  FILE \*file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[7] = "/cwd";  char pid[25] = PID;    strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  int len = readlink(result\_path, linkbuf, sizeof linkbuf);  linkbuf[len] = '\0';  fprintf(file, "----------------------------------------------\n");  fprintf(file, "%s", "CWD: \n");  fprintf(file, "%s\n", linkbuf);  fprintf(file, "----------------------------------------------\n");  }  void exe(void) {  char linkbuf[256];  FILE \*file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[7] = "/cwd";  char pid[25] = PID;  strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  int len = readlink(result\_path, linkbuf, sizeof linkbuf);  linkbuf[len] = '\0';  fprintf(file, "----------------------------------------------\n");  fprintf(file, "%s", "EXE: \n");  fprintf(file, "%s\n", linkbuf);  fprintf(file, "----------------------------------------------\n");  }  void root(void) {  char linkbuf[256];  FILE \*file = fopen(FILE\_RESULT, "a");  char result\_path[25] = "/proc/";  char cur\_file[7] = "/root";  char pid[25] = PID;    strncat(pid, cur\_file, 10);  strcat(result\_path, pid);  int len = readlink(result\_path, linkbuf, sizeof linkbuf);  linkbuf[len] = '\0';  fprintf(file, "----------------------------------------------\n");  fprintf(file, "%s", "ROOT: \n");  fprintf(file, "%s\n", linkbuf);  fprintf(file, "----------------------------------------------\n");  }  int main(int argc, char\*\* argv) {  cmdline();  status();  fd();  maps();  statm();  root();  cwd();  exe();  stat();  environ();  return EXIT\_SUCCESS;  } |

## Результат работы

Содержимое файла process.info:

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| ----------------------------------------------  CMDLINE:  pid: 8164  cmdline:./a.out  ----------------------------------------------  ----------------------------------------------  STATUS:  Name: a.out  Umask: 0022  State: R (running)  Tgid: 8164  Ngid: 0  Pid: 8164  PPid: 5227  TracerPid: 0  Uid: 1000 1000 1000 1000  Gid: 1000 1000 1000 1000  FDSize: 256  Groups: 4 24 27 30 46 116 126 1000  NStgid: 8164  NSpid: 8164  NSpgid: 8164  NSsid: 5227  VmPeak: 4512 kB  VmSize: 4512 kB  VmLck: 0 kB  VmPin: 0 kB  VmHWM: 792 kB  VmRSS: 792 kB  RssAnon: 64 kB  RssFile: 728 kB  RssShmem: 0 kB  VmData: 176 kB  VmStk: 132 kB  VmExe: 4 kB  VmLib: 2116 kB  VmPTE: 52 kB  VmSwap: 0 kB  HugetlbPages: 0 kB  CoreDumping: 0  THP\_enabled: 1  Threads: 1  SigQ: 0/63233  SigPnd: 0000000000000000  ShdPnd: 0000000000000000  SigBlk: 0000000000000000  SigIgn: 0000000000000000  SigCgt: 0000000000000000  CapInh: 0000000000000000  CapPrm: 0000000000000000  CapEff: 0000000000000000  CapBnd: 0000003fffffffff  CapAmb: 0000000000000000  NoNewPrivs: 0  Seccomp: 0  Speculation\_Store\_Bypass: thread vulnerable  Cpus\_allowed: fff  Cpus\_allowed\_list: 0-11  Mems\_allowed: 00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000000,00000001  Mems\_allowed\_list: 0  voluntary\_ctxt\_switches: 603  nonvoluntary\_ctxt\_switches: 1069  ----------------------------------------------  ----------------------------------------------  FD:  0 -> /dev/pts/0  1 -> /dev/pts/0  2 -> /dev/pts/0  3 -> /home/dima/Desktop/OS/part\_02/laby/lab\_4/p1/v2/process.info  4 -> /proc/8183/fdsktop/OS/part\_02/laby/lab\_4/p1/v2/process.info  ----------------------------------------------  ----------------------------------------------  MAPS:  55984168a000-55984168b000 r-xp 00000000 103:08 1574280 /home/dima/Desktop/OS/part\_01/lab\_03/a.out  55984188a000-55984188b000 r--p 00000000 103:08 1574280 /home/dima/Desktop/OS/part\_01/lab\_03/a.out  55984188b000-55984188c000 rw-p 00001000 103:08 1574280 /home/dima/Desktop/OS/part\_01/lab\_03/a.out  5598434e9000-55984350a000 rw-p 00000000 00:00 0 [heap]  7ff3021d4000-7ff3023bb000 r-xp 00000000 103:07 922199 /lib/x86\_64-linux-gnu/libc-2.27.so  7ff3023bb000-7ff3025bb000 ---p 001e7000 103:07 922199 /lib/x86\_64-linux-gnu/libc-2.27.so  7ff3025bb000-7ff3025bf000 r--p 001e7000 103:07 922199 /lib/x86\_64-linux-gnu/libc-2.27.so  7ff3025bf000-7ff3025c1000 rw-p 001eb000 103:07 922199 /lib/x86\_64-linux-gnu/libc-2.27.so  7ff3025c1000-7ff3025c5000 rw-p 00000000 00:00 0  7ff3025c5000-7ff3025ee000 r-xp 00000000 103:07 922051 /lib/x86\_64-linux-gnu/ld-2.27.so  7ff3027d8000-7ff3027da000 rw-p 00000000 00:00 0  7ff3027ee000-7ff3027ef000 r--p 00029000 103:07 922051 /lib/x86\_64-linux-gnu/ld-2.27.so  7ff3027ef000-7ff3027f0000 rw-p 0002a000 103:07 922051 /lib/x86\_64-linux-gnu/ld-2.27.so  7ff3027f0000-7ff3027f1000 rw-p 00000000 00:00 0  7ffcc7bf0000-7ffcc7c11000 rw-p 00000000 00:00 0 [stack]  7ffcc7d07000-7ffcc7d0a000 r--p 00000000 00:00 0 [vvar]  7ffcc7d0a000-7ffcc7d0b000 r-xp 00000000 00:00 0 [vdso]  ffffffffff600000-ffffffffff601000 --xp 00000000 00:00 0 [vsyscall]  S  ý  ----------------------------------------------  ----------------------------------------------  STATM:  1128 198 182 1 0 77 0  000 r-xp 00000000 103:08 1574280 /home/dima/Desktop/OS/part\_01/lab\_03/a.out  ----------------------------------------------  ----------------------------------------------  STAT:  pid: 8164  filename: (a.out)  state: R  ppid: 5227  gid: 8164  session: 5227  tty\_nr: 34817  tp\_gid: 8164  flags: 4194304  minflt: 82  cminflt: 0  majflt: 0  cmajflt: 0  utime: 1031  stime: 433  cutime: 0  cstime: 0  priority: 20  nice: 0  num\_threads: 1  itrealvalue: 0  start\_tiime: 1615328  vsize: 4620288  rss: 198  rsslim: 18446744073709551615  startcode: 94112420765696  endcode: 94112420768096  startstack: 140723659793952  kstkesp: 0  kstkeip: 0  signal: 0  blocked: 0  sigignore: 0  sigcatch: 0  wchan: 0  nswap: 0  cnswap: 0  exit\_signal: 17  processor: 0  rt\_priority: 0  policy: 0  delayacct\_blkio\_tics: 0  quest\_time: 0  cquest\_time: 0  start\_data: 94112422866336  end\_data: 94112422866960  start\_brk: 94112452612096  arg\_start: 140723659801087  arg\_end: 140723659801095  env\_start: 140723659801095  env\_end: 140723659804656  exit\_code: 0  dima/Desktop/OS/part\_01/lab\_03/a.out  ----------------------------------------------  ----------------------------------------------  ENVIRON  CLUTTER\_IM\_MODULE=xim  CONDA\_SHLVL=1  LS\_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:\*.tar=01;31:\*.tgz=01;31:\*.arc=01;31:\*.arj=01;31:\*.taz=01;31:\*.lha=01;31:\*.lz4=01;31:\*.lzh=01;31:\*.lzma=01;31:\*.tlz=01;31:\*.txz=01;31:\*.tzo=01;31:\*.t7z=01;31:\*.zip=01;31:\*.z=01;31:\*.Z=01;31:\*.dz=01;31:\*.gz=01;31:\*.lrz=01;31:\*.lz=01;31:\*.lzo=01;31:\*.xz=01;31:\*.zst=01;31:\*.tzst=01;31:\*.bz2=01;31:\*.bz=01;31:\*.tbz=01;31:\*.tbz2=01;31:\*.tz=01;31:\*.deb=01;31:\*.rpm=01;31:\*.jar=01;31:\*.war=01;31:\*.ear=01;31:\*.sar=01;31:\*.rar=01;31:\*.alz=01;31:\*.ace=01;31:\*.zoo=01;31:\*.cpio=01;31:\*.7z=01;31:\*.rz=01;31:\*.cab=01;31:\*.wim=01;31:\*.swm=01;31:\*.dwm=01;31:\*.esd=01;31:\*.jpg=01;35:\*.jpeg=01;35:\*.mjpg=01;35:\*.mjpeg=01;35:\*.gif=01;35:\*.bmp=01;35:\*.pbm=01;35:\*.pgm=01;35:\*.ppm=01;35:\*.tga=01;35:\*.xbm=01;35:\*.xpm=01;35:\*.tif=01;35:\*.tiff=01;35:\*.png=01;35:\*.svg=01;35:\*.svgz=01;35:\*.mng=01;35:\*.pcx=01;35:\*.mov=01;35:\*.mpg=01;35:\*.mpeg=01;35:\*.m2v=01;35:\*.mkv=01;35:\*.webm=01;35:\*.ogm=01;35:\*.mp4=01;35:\*.m4v=01;35:\*.mp4v=01;35:\*.vob=01;35:\*.qt=01;35:\*.nuv=01;35:\*.wmv=01;35:\*.asf=01;35:\*.rm=01;35:\*.rmvb=01;35:\*.flc=01;35:\*.avi=01;35:\*.fli=01;35:\*.flv=01;35:\*.gl=01;35:\*.dl=01;35:\*.xcf=01;35:\*.xwd=01;35:\*.yuv=01;35:\*.cgm=01;35:\*.emf=01;35:\*.ogv=01;35:\*.ogx=01;35:\*.aac=00;36:\*.au=00;36:\*.flac=00;36:\*.m4a=00;36:\*.mid=00;36:\*.midi=00;36:\*.mka=00;36:\*.mp3=00;36:\*.mpc=00;36:\*.ogg=00;36:\*.ra=00;36:\*.wav=00;36:\*.oga=00;36:\*.opus=00;36:\*.spx=00;36:\*.xspf=00;36:  CONDA\_EXE=/home/dima/miniconda3/bin/conda  LC\_MEASUREMENT=ru\_RU.UTF-8  LESSCLOSE=/usr/bin/lesspipe %s %s  LC\_PAPER=ru\_RU.UTF-8  LC\_MONETARY=ru\_RU.UTF-8  XDG\_MENU\_PREFIX=gnome-  LANG=en\_US.UTF-8  DISPLAY=:0  GNOME\_SHELL\_SESSION\_MODE=ubuntu  COLORTERM=truecolor  USERNAME=dima  CONDA\_PREFIX=/home/dima/miniconda3  XDG\_VTNR=1  SSH\_AUTH\_SOCK=/run/user/1000/keyring/ssh  \_CE\_M=  LC\_NAME=ru\_RU.UTF-8  XDG\_SESSION\_ID=1  USER=dima  DESKTOP\_SESSION=ubuntu  QT4\_IM\_MODULE=xim  TEXTDOMAINDIR=/usr/share/locale/  GNOME\_TERMINAL\_SCREEN=/org/gnome/Terminal/screen/f9fe907b\_b41b\_4c41\_a1a7\_e85cc267e960  PWD=/home/dima/Desktop/OS/part\_01/lab\_03  HOME=/home/dima  CONDA\_PYTHON\_EXE=/home/dima/miniconda3/bin/python  TEXTDOMAIN=im-config  SSH\_AGENT\_PID=1443  QT\_ACCESSIBILITY=1  XDG\_SESSION\_TYPE=x11  XDG\_DATA\_DIRS=/usr/share/ubuntu:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop  \_CE\_CONDA=  XDG\_SESSION\_DESKTOP=ubuntu  LC\_ADDRESS=ru\_RU.UTF-8  GJS\_DEBUG\_OUTPUT=stderr  LC\_NUMERIC=ru\_RU.UTF-8  CONDA\_PROMPT\_MODIFIER=(base)  GTK\_MODULES=gail:atk-bridge  WINDOWPATH=1  VTE\_VERSION=5202  TERM=xterm-256color  SHELL=/bin/bash  QT\_IM\_MODULE=xim  XMODIFIERS=@im=ibus  IM\_CONFIG\_PHASE=2  XDG\_CURRENT\_DESKTOP=ubuntu:GNOME  GPG\_AGENT\_INFO=/run/user/1000/gnupg/S.gpg-agent:0:1  GNOME\_TERMINAL\_SERVICE=:1.137  XDG\_SEAT=seat0  SHLVL=1  LC\_TELEPHONE=ru\_RU.UTF-8  GDMSESSION=ubuntu  GNOME\_DESKTOP\_SESSION\_ID=this-is-deprecated  LOGNAME=dima  DBUS\_SESSION\_BUS\_ADDRESS=unix:path=/run/user/1000/bus  XDG\_RUNTIME\_DIR=/run/user/1000  XAUTHORITY=/run/user/1000/gdm/Xauthority  XDG\_CONFIG\_DIRS=/etc/xdg/xdg-ubuntu:/etc/xdg  PATH=/home/dima/miniconda3/bin:/home/dima/miniconda3/condabin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin  LC\_IDENTIFICATION=ru\_RU.UTF-8  CONDA\_DEFAULT\_ENV=base  GJS\_DEBUG\_TOPICS=JS ERROR;JS LOG  SESSION\_MANAGER=local/dima-P65-Creator-8RE:@/tmp/.ICE-unix/1321,unix/dima-P65-Creator-8RE:/tmp/.ICE-unix/1321  LESSOPEN=| /usr/bin/lesspipe %s  GTK\_IM\_MODULE=ibus  LC\_TIME=ru\_RU.UTF-8  \_=./a.out  OLDPWD=/home/dima/Desktop/OS/part\_01  ----------------------------------------------  ----------------------------------------------  EXE:  /home/dima/Desktop/OS/part\_01/lab\_03  ----------------------------------------------  ----------------------------------------------  CWD:  /home/dima/Desktop/OS/part\_01/lab\_03  ----------------------------------------------  ----------------------------------------------  ROOT:  /  ---------------------------------------------- |