Монгол улсын их сургууль
Мэдээллийн технологи, электроникийн сургууль
Мэдээлэл , компьютерийн ухааны тэнхим

Семинарын даалгавар №10

Сэдэв: Протокол

Гүйцэтгэсэн:

 Програм хангамж-3 Э.Түвшин-Эрдэнэ (23b1num0869)

Шалгасан багш:.............................Д.Тэмүүжин

Улаанбаатар хот

2025 он

Дасгал 1

Процесс	Эхэлсэн цаг	Дууссан цаг
A	1	3
B	2	5
C	4	6

Процессийн хослол	Давхацсан эсэх
AB	T
AC	Y
BC	T

Дасгал 2

```c
#include <stdio.h>
#include <unistd.h>
#include <stdlib.h>
int main()
{
    int a = 9;
    if (fork() == 0)
    {
        printf("p1: a=%d\n", a--);
    }
    printf("p2: a=%d\n", a++);
    exit(0);
}
```

Үр дүн:

tuvshineerdene@pop-os:~/Documents/semester5/computer_system/seminar10$ ./exercise2

p2: a=9

p1: a=9

p2: a=8

    a. Хүү процессийн гаралт?

       "p1: a=9", "p2: a=8"

    b. Эцэг процессийн гаралт?

       "p2: a=9"

Дасгал 3

```c
#include <stdio.h>
#include <unistd.h>
#include <sys/wait.h>
#include <stdlib.h>
int main()
{
    if (fork() == 0)
    {
        printf("9");
        fflush(stdout);
    }
    else
    {
        printf("0");
        fflush(stdout);
        waitpid(-1, NULL, 0);
    }
    printf("3");
    fflush(stdout);
    printf("6");
    exit(0);
}
```

Боломжит гаралтууд:

903636

093636

Учир нь "waitpid(-1, NULL, 0);" функц нь хүү процессийг хүлээнэ.

Дасгал 4

```c
#include <stdio.h>
#include <unistd.h>
unsigned int wakeup(unsigned int secs)
{
    unsigned int rc = sleep(secs);
    printf("slept for %d secs.\n", secs - rc);
    return rc;
}
int main()
{
    wakeup(3);
    return 0;

}
```

tuvshineerdene@pop-os:**~/Documents/semester5/computer_system/seminar10**$
./exercise4
slept for 3 secs.

Дасгал 5

```c
#include <stdio.h>
#include <stdlib.h>
int main(int argc, char *argv[], char *envp[])
{
    int i;
    printf("Command line arguments:\n");
    for (i = 0; argv[i] != NULL; i++)
    {
        printf("argv[%2d]: %s\n", i, argv[i]);
    }
    printf("\n");
    printf("Environment vairables:\n");
    for (i = 0; envp[i] != NULL; i++)
    {
        printf("envp[%2d]:%s\n", i, envp[i]);
```

```
    }
    exit(0);
}
```

Үр дүн:
Command line arguments:
argv[0]: ./myecho
argv[1]: arg1
argv[2]: arg2

Environment vairables:
envp[0]:SHELL=/bin/bash
envp[1]:SESSION_MANAGER=local/pop-os:@/tmp/.ICE-unix/1926,unix/pop-os:/tmp/.ICE-unix/1926
envp[2]:QT_ACCESSIBILITY=1
envp[3]:NVM_RC_VERSION=
envp[4]:COLORTERM=truecolor
envp[5]:XDG_CONFIG_DIRS=/etc/xdg/xdg-pop:/etc/xdg
envp[6]:SSH_AGENT_LAUNCHER=gnome-keyring
envp[7]:XDG_MENU_PREFIX=gnome-
envp[8]:GNOME_DESKTOP_SESSION_ID=this-is-deprecated
envp[9]:GTK_IM_MODULE=ibus
envp[10]:GNOME_SHELL_SESSION_MODE=pop
envp[11]:SSH_AUTH_SOCK=/run/user/1000/keyring/ssh
envp[12]:XMODIFIERS=@im=ibus
envp[13]:DESKTOP_SESSION=pop
envp[14]:GTK_MODULES=gail:atk-bridge
envp[15]:PWD=/home/tuvshineerdene/Documents/semester5/computer_system/seminar10
envp[16]:LOGNAME=tuvshineerdene
envp[17]:XDG_SESSION_DESKTOP=pop
envp[18]:XDG_SESSION_TYPE=x11
envp[19]:GPG_AGENT_INFO=/run/user/1000/gnupg/S.gpg-agent:0:1
envp[20]:SYSTEMD_EXEC_PID=2123
envp[21]:XAUTHORITY=/run/user/1000/gdm/Xauthority
envp[22]:WINDOWPATH=2
envp[23]:HOME=/home/tuvshineerdene
envp[24]:USERNAME=tuvshineerdene
envp[25]:LANG=en_US.UTF-8
envp[26]: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:*.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:*.webp=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:
envp[27]:XDG_CURRENT_DESKTOP=pop:GNOME
envp[28]:VTE_VERSION=6800
envp[29]:GNOME_TERMINAL_SCREEN=/org/gnome/Terminal/screen/1972d43c_c19e_4bcd_8410_d4cd88aa7396
envp[30]:NVM_DIR=/home/tuvshineerdene/.nvm
envp[31]:LESSCLOSE=/usr/bin/lesspipe %s %s
envp[32]:XDG_SESSION_CLASS=user
envp[33]:TERM=xterm-256color
envp[34]:LESSOPEN=| /usr/bin/lesspipe %s
envp[35]:USER=tuvshineerdene
envp[36]:GNOME_TERMINAL_SERVICE=:1.159
envp[37]:DISPLAY=:1
envp[38]:SHLVL=1
envp[39]:NVM_CD_FLAGS=
envp[40]:QT_IM_MODULE=ibus
envp[41]:XDG_RUNTIME_DIR=/run/user/1000
envp[42]:XDG_DATA_DIRS=/usr/share/pop:/usr/share/gnome:/home/tuvshineerdene/.local/share/flatpak/exports/share:/var/lib/flatpak/exports/share:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop
envp[43]:PATH=/home/tuvshineerdene/.local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/snap/bin
envp[44]:GDMSESSION=pop
envp[45]:DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
envp[46]:_=./myecho
envp[47]:OLDPWD=/home/tuvshineerdene/Documents/semester5/computer_system

# Дасгал 6

```c
#include <stdio.h>
#include <unistd.h>
#include <stdlib.h>
#include <signal.h>

volatile sig_atomic_t interrupted = 0;
void sigint_handler(int sig)
{
    interrupted = 1;
}

unsigned int snooze(unsigned int secs)
{
    signal(SIGINT, sigint_handler);
    unsigned int rc = sleep(secs);
    if (interrupted)
    {
        unsigned int slept = secs - rc;
        printf("Slept for %u of %u seconds (interrupted!).\n", slept,
secs);
    }
    else
    {
        printf("Slept for %u of %u seconds.\n", secs, secs);
    }
    return rc;
}

int main(int argc, char *argv[])
{
    if (argc != 2)
    {
        fprintf(stderr, "Usage: %s <seconds>\n", argv[0]);
        return 1;
    }
    snooze(atoi(argv[1]));
    return 0;
}
```

```
 ./snooze 10
^CSlept for 2 of 10 seconds (interrupted!).
```