#### 第十章 串口编程

1. 串口通信的原理，串口通信程序包括哪些部分？

串口通过直接连接在两台设备间的线发送和接收数据;

串口通信程序包含打开关闭串口、串口属性设置、接收/发送数据

2.为了验证开发板的串口是否工作正常，可以在开发板上运行一个程序，其功能是接收串口的字节，然后+1，再发出去，另一端收到字节后，可以判断串口通信是否正常。

//ComStr\_Send.c

#include<stdio.h>

#include<stdlib.h>

#include<unistd.h>

#include<termios.h>

#include<string.h>

#include<fcntl.h>

int main(void)

{

int fd, f\_stop = 0;

char buf[512] = { 0 };

struct termios opt;

fd = open("/dev/ttyUSB0", O\_RDWR | O\_NOCTTY | O\_NDELAY);

if (fd == -1)

{

printf("COM open error!\n");

return 0;

}

//get current configuration of COM

tcgetattr(fd, &opt);

tcflush(fd, TCIFLUSH);

//set speed(115200Hz)

cfsetispeed(&opt, B115200);//input

cfsetospeed(&opt, B115200);//output

//data bits(8bits)

opt.c\_cflag &= ~CSIZE;

opt.c\_cflag |= CS8;

//set chk

opt.c\_cflag &= ~PARENB;

opt.c\_iflag &= ~INPCK;

//set stop flag

opt.c\_cflag &= ~CSTOPB;

//time out(150s)

opt.c\_cc[VTIME] = 150;

opt.c\_cc[VMIN] = 0;

//write conf to COM

tcsetattr(fd, TCSANOW, &opt);

tcflush(fd, TCIFLUSH);

do

{

printf("Input to send(\"![QUIT] to quit\"):\n");

scanf("%s", buf);

if (!strncmp(buf, "![QUIT]", 7))

f\_stop = 1;

write(fd, buf, strlen(buf));

} while (!f\_stop);

close(fd);

return 0;

}

//ComStr\_Recv.c

#include<stdio.h>

#include<stdlib.h>

#include<unistd.h>

#include<termios.h>

#include<string.h>

#include<fcntl.h>

int main(void)

{

int fd, f\_stop = 0;

char buf[512] = { 0 };

struct termios opt;

fd = open("/dev/ttySAC3", O\_RDWR | O\_NOCTTY | O\_NDELAY);

if (fd == -1)

{

printf("COM open error!\n");

return 0;

}

//get current configuration of COM

tcgetattr(fd, &opt);

tcflush(fd, TCIFLUSH);

//set speed(115200Hz)

cfsetispeed(&opt, B115200);//input

cfsetospeed(&opt, B115200);//output

//data bits(8bits)

opt.c\_cflag &= ~CSIZE;

opt.c\_cflag |= CS8;

//set chk

opt.c\_cflag &= ~PARENB;

opt.c\_iflag &= ~INPCK;

//set stop flag

opt.c\_cflag &= ~CSTOPB;

//time out(150s)

opt.c\_cc[VTIME] = 150;

opt.c\_cc[VMIN] = 0;

//write conf to COM

tcsetattr(fd, TCSANOW, &opt);

tcflush(fd, TCIFLUSH);

do

{

read(fd, buf, 1);

if (buf[0] == '!')

{

read(fd, buf, 6);

if (!strncmp(buf, "[QUIT]", 6))

f\_stop = 1;

}

else if (buf[0])

{

printf("%c", buf[0] + 1);

buf[0] = 0;

}

} while (!f\_stop);

close(fd);

return 0;

}

3.两台计算机A,B，分别运行Linux操作系统。编写一个程序，分别运行在不同的计算机上，A从键盘上输入的字符串发送到B计算机上，B计算机上输入的字符串发送到A计算机上。

//ComChat\_PC.c

#include<stdio.h>

#include<stdlib.h>

#include<unistd.h>

#include<termios.h>

#include<string.h>

#include<fcntl.h>

#include<pthread.h>

void\* th\_Recv(void \*data)

{

char buf[512] = { 0 };

int f\_stop = 0;

do

{

read(\*(int\*)data, buf, 1);

if (buf[0])

{

printf("%c", buf[0]);

buf[0] = 0;

}

} while (1);

return 0;

}

void\* th\_Send(void \*data)

{

char buf[512] = { 0 };

int f\_stop = 0;

do

{

printf("Input to send(\"![QUIT] to quit\"):\n");

scanf("%s", buf);

if (!strncmp(buf, "![QUIT]", 7))

f\_stop = 1;

else

write(\*(int\*)data, buf, strlen(buf));

} while (!f\_stop);

return 0;

}

int main(void)

{

int fd;

struct termios opt;

pthread\_t thread\_Recv, thread\_Send;

void \*ret;

fd = open("/dev/ttyUSB0", O\_RDWR | O\_NOCTTY | O\_NDELAY);

if (fd == -1)

{

printf("COM open error!\n");

return 0;

}

//get current configuration of COM

tcgetattr(fd, &opt);

tcflush(fd, TCIFLUSH);

//set speed(115200Hz)

cfsetispeed(&opt, B115200);//input

cfsetospeed(&opt, B115200);//output

//data bits(8bits)

opt.c\_cflag &= ~CSIZE;

opt.c\_cflag |= CS8;

//set chk

opt.c\_cflag &= ~PARENB;

opt.c\_iflag &= ~INPCK;

//set stop flag

opt.c\_cflag &= ~CSTOPB;

//time out(150s)

opt.c\_cc[VTIME] = 150;

opt.c\_cc[VMIN] = 0;

//write conf to COM

tcsetattr(fd, TCSANOW, &opt);

tcflush(fd, TCIFLUSH);

pthread\_create(&thread\_Recv, NULL, th\_Recv, &fd);

pthread\_create(&thread\_Send, NULL, th\_Send, &fd);

pthread\_join(thread\_Send, &ret);

pthread\_cancel(thread\_Recv);

close(fd);

return 0;

}

//ComChat\_Emb.c

#include<stdio.h>

#include<stdlib.h>

#include<unistd.h>

#include<termios.h>

#include<string.h>

#include<fcntl.h>

#include<pthread.h>

void\* th\_Recv(void \*data)

{

char buf[512] = { 0 };

int f\_stop = 0;

do

{

read(\*(int\*)data, buf, 1);

if (buf[0])

{

printf("%c", buf[0]);

buf[0] = 0;

}

} while (1);

return 0;

}

void\* th\_Send(void \*data)

{

char buf[512] = { 0 };

int f\_stop = 0;

do

{

printf("Input to send(\"![QUIT] to quit\"):\n");

scanf("%s", buf);

if (!strncmp(buf, "![QUIT]", 7))

f\_stop = 1;

else

write(\*(int\*)data, buf, strlen(buf));

} while (!f\_stop);

return 0;

}

int main(void)

{

int fd;

struct termios opt;

pthread\_t thread\_Recv, thread\_Send;

void \*ret;

fd = open("/dev/ttySAC3", O\_RDWR | O\_NOCTTY | O\_NDELAY);

if (fd == -1)

{

printf("COM open error!\n");

return 0;

}

//get current configuration of COM

tcgetattr(fd, &opt);

tcflush(fd, TCIFLUSH);

//set speed(115200Hz)

cfsetispeed(&opt, B115200);//input

cfsetospeed(&opt, B115200);//output

//data bits(8bits)

opt.c\_cflag &= ~CSIZE;

opt.c\_cflag |= CS8;

//set chk

opt.c\_cflag &= ~PARENB;

opt.c\_iflag &= ~INPCK;

//set stop flag

opt.c\_cflag &= ~CSTOPB;

//time out(150s)

opt.c\_cc[VTIME] = 150;

opt.c\_cc[VMIN] = 0;

//write conf to COM

tcsetattr(fd, TCSANOW, &opt);

tcflush(fd, TCIFLUSH);

pthread\_create(&thread\_Recv, NULL, th\_Recv, &fd);

pthread\_create(&thread\_Send, NULL, th\_Send, &fd);

pthread\_join(thread\_Send, &ret);

pthread\_cancel(thread\_Recv);

close(fd);

return 0;

}

4.编写一个程序A,B分别运行在两台计算机上，用于测试两台计算机在115200,8N1下，实际通信速率要多快（BPS），实际速率与理论速率的差别有多大？

测试210目标板串口的实际通信速率. 在实验室做。

5. 两台计算机通过串口连接在一起进行通信。编写串口通信程序，完成两台计算机chat功能。

第三题已实现