电子科技大学

University of Electronic Science and Technology of China

网络编程

(UNIX网络编程)

www.uestc.edu.cn

简介

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5. 授课时间：周一5-6、三5-6节（1~10周）
6. 课程基础：TCP/IP、操作系统编程
7. 考核方式：平时作业＋期末大作业

Syllabus

1. OSI/RM参考模型与TCP/IP参考模型的基本原理、对比
2. 客户/服务器基本原理
3. 套接字基础
   - ① 基本套接字数据结构、系统调用函数
   - ② TCP 套接字编程
   - ③ UDP套接字编程
4. 并发服务器编程技术
   - ① 迭代服务器技术 vs 并发服务器技术
   - ② 多进程服务器
   - ③ 多线程服务器

主要内容（Cont.）

5. 套接口选项与 ioctl操作
6. I/O复用：select 和 poll 函数
7. 非阻塞I/O
8. 信号驱动I/O
9. 基本名字与地址转换
10. 高级UDP套接字编程
11. 原始套接字
12. 数据链路访问
13. 守护进程：创建和配置

Course Materials

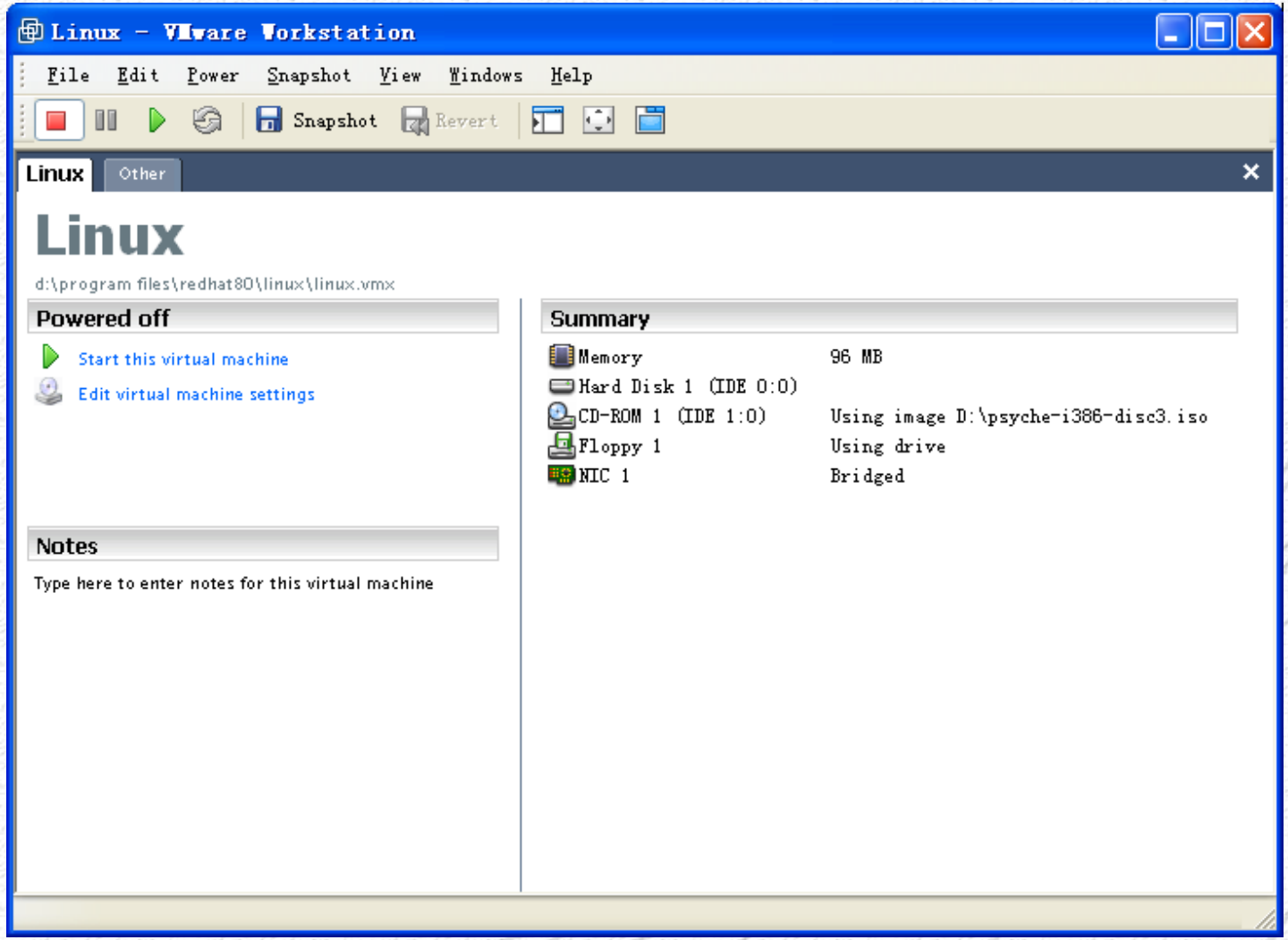
1. W.richard Stevens. "UNIX Network Programming. Volume 1: Networking APIs"（Third Edition）. 机械工业出版社;
2. W.richard Stevens. "Advanced programming in the UNIX Environment". 人民邮电出版社;
3. W.richard Stevens. "TCP/IP illustrated, Volume 1: The Protocol". 机械工业出版社;
4. Internetworking with TCP/IP,Volume 1: Principles, Protocols, and Architecture (Forth Edition), 人民邮电出版社。
5. 张斌,高波. "Linux网络编程" . 清华大学出版社;

Programming Environments

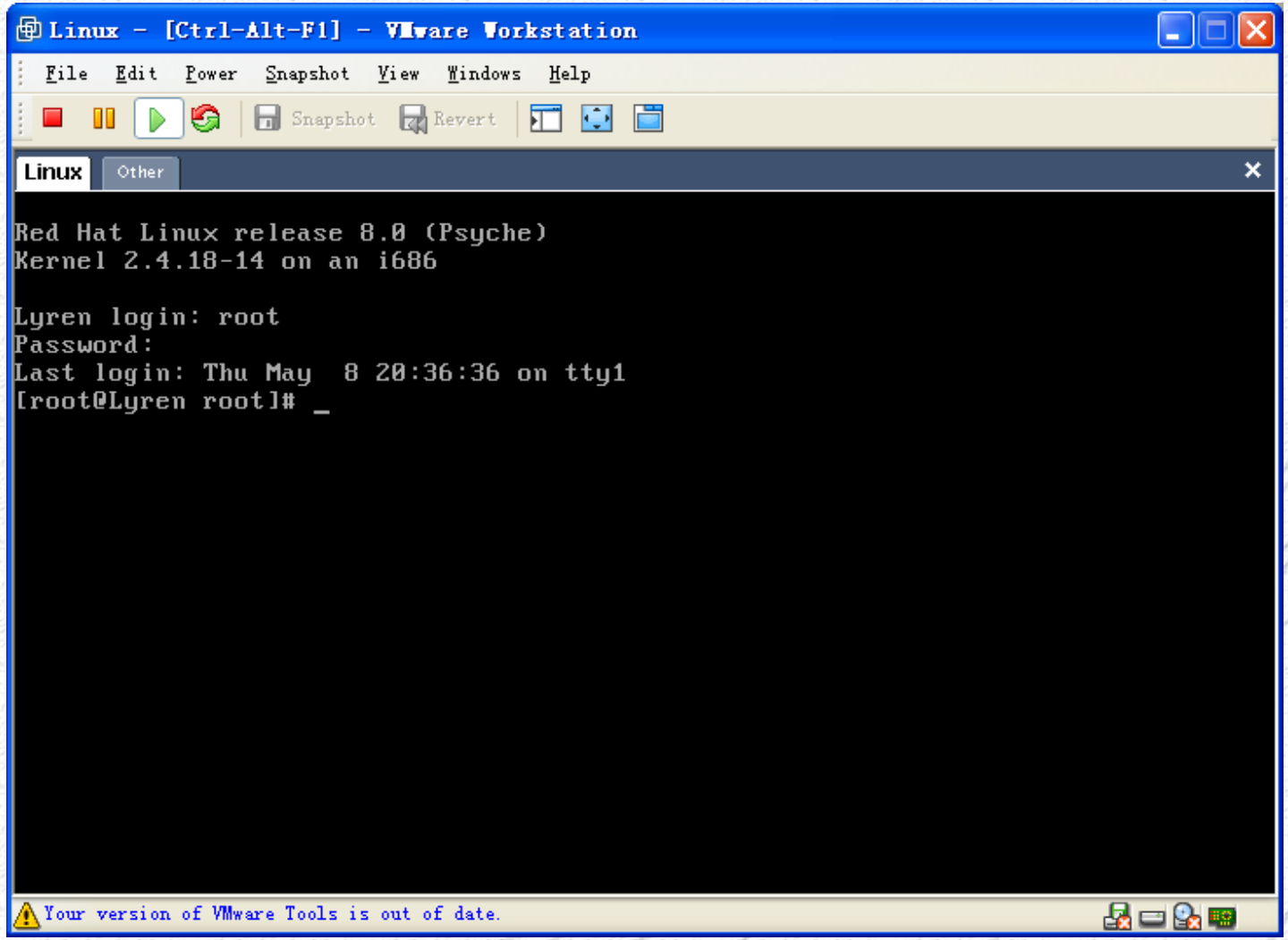
1. 可以单独安装Linux服务器；
2. 也可以先安装虚拟机，然后安装Linux系统

3. 然后通过远程登录工具（如Telnet、SecureCRT等）登录上述服务器

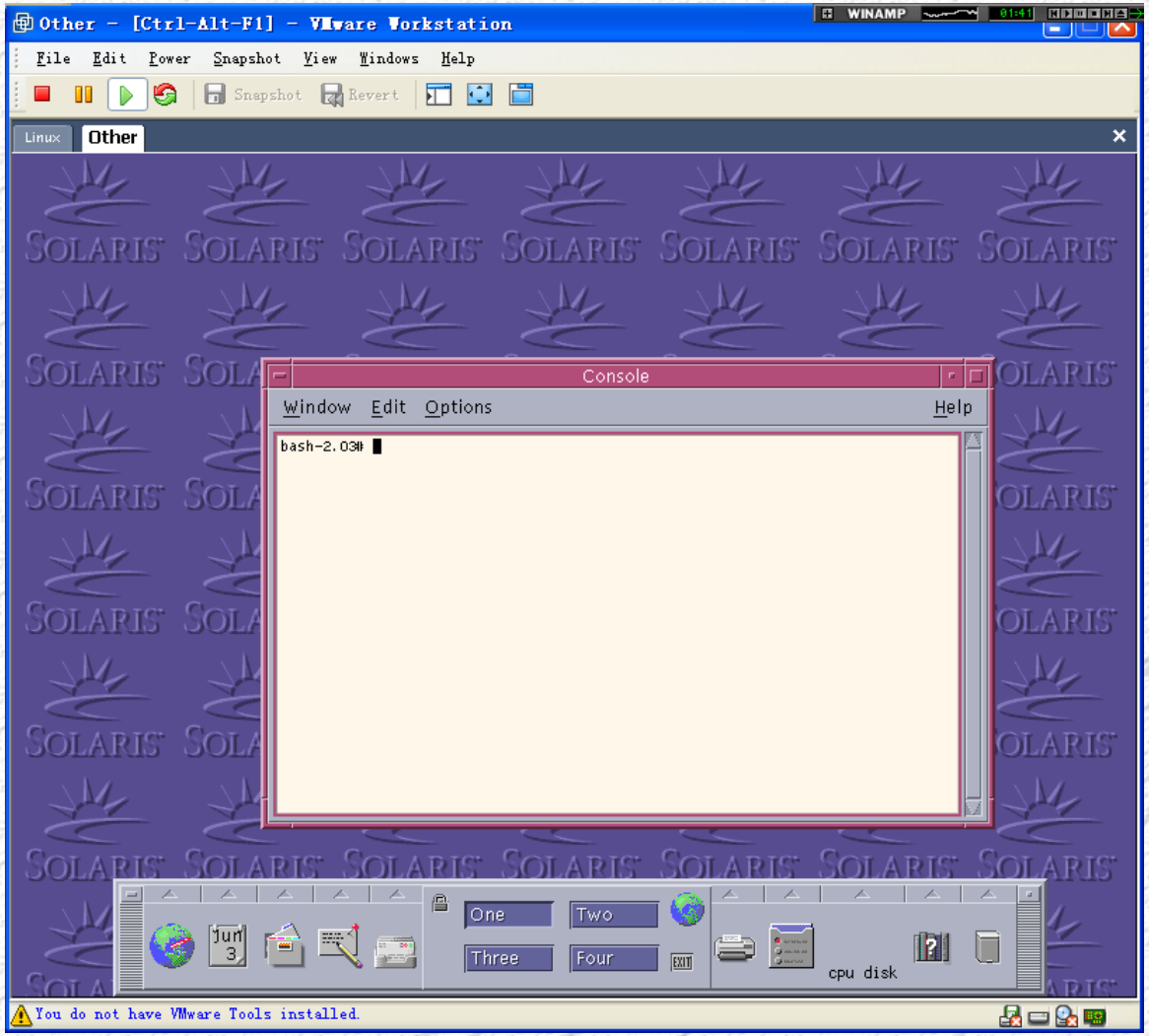
Vmware 4.0


Linux - VMware Workstation
File Edit Power Snapshot View Windows Help
Snapshot
Revert
Linux
Other
Linux
d:\program files\redhat80\linux\linux.vmx
Powered off
Start this virtual machine
Edit virtual machine settings
Notes
Type here to enter notes for this virtual machine
Summary
Memory 96 MB
Hard Disk 1 (IDE 0:0)
CD-ROM 1 (IDE 1:0) Using image D:\psyche-i386-disc3.iso
Floppy 1 Using drive
NIC 1 Bridged

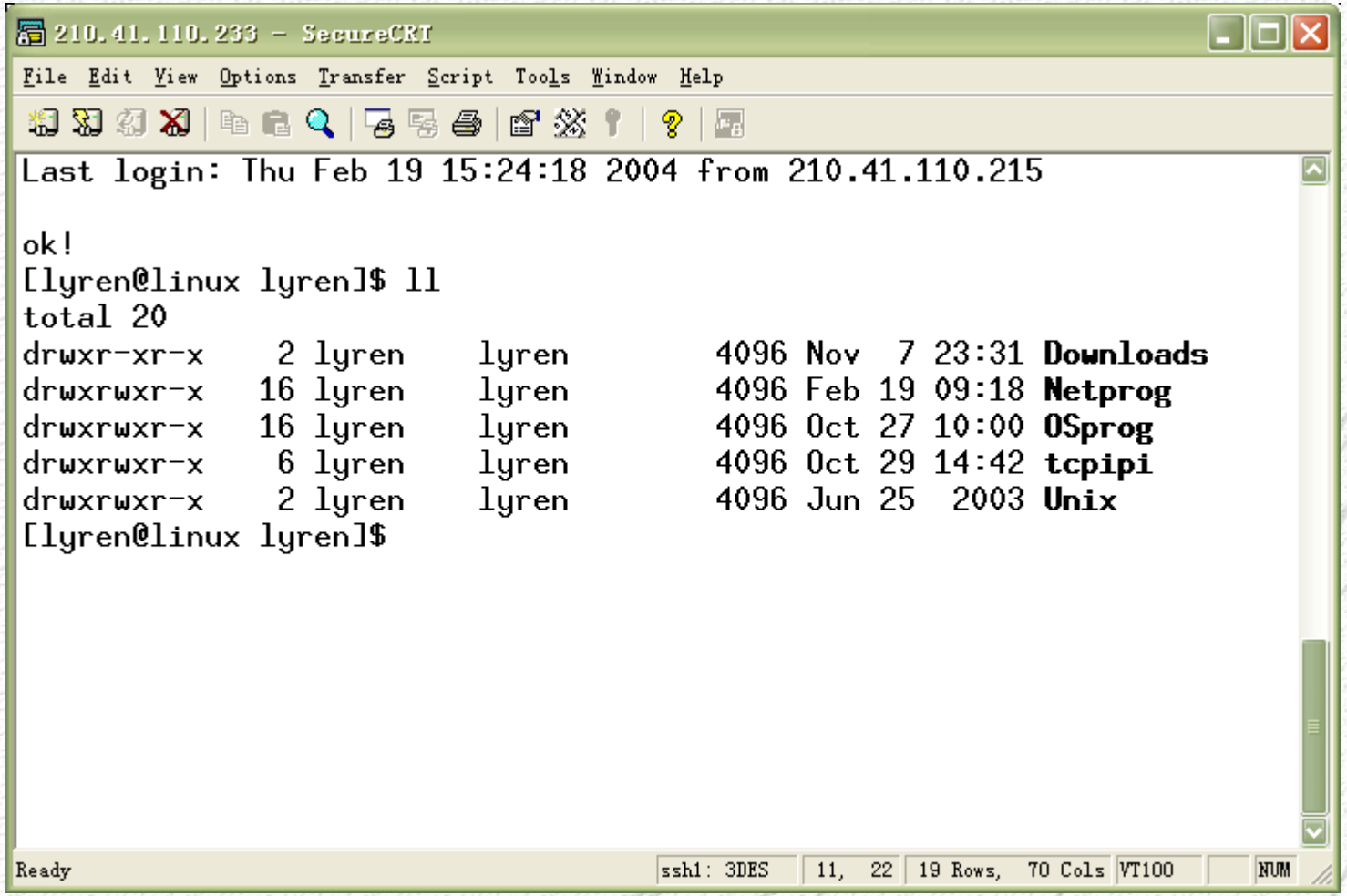
Linux on Vmware



Solaris on Vmware



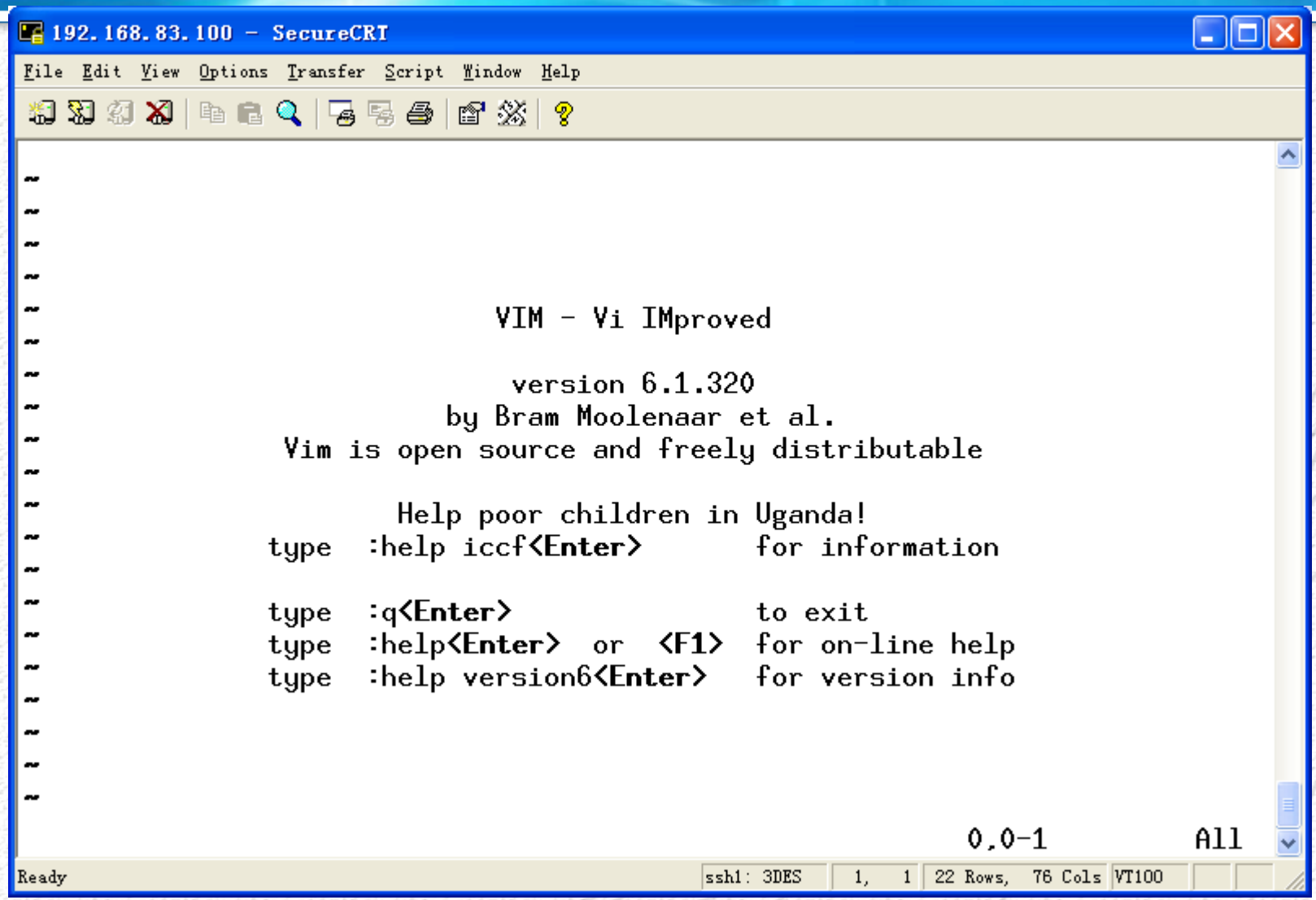
远程登录

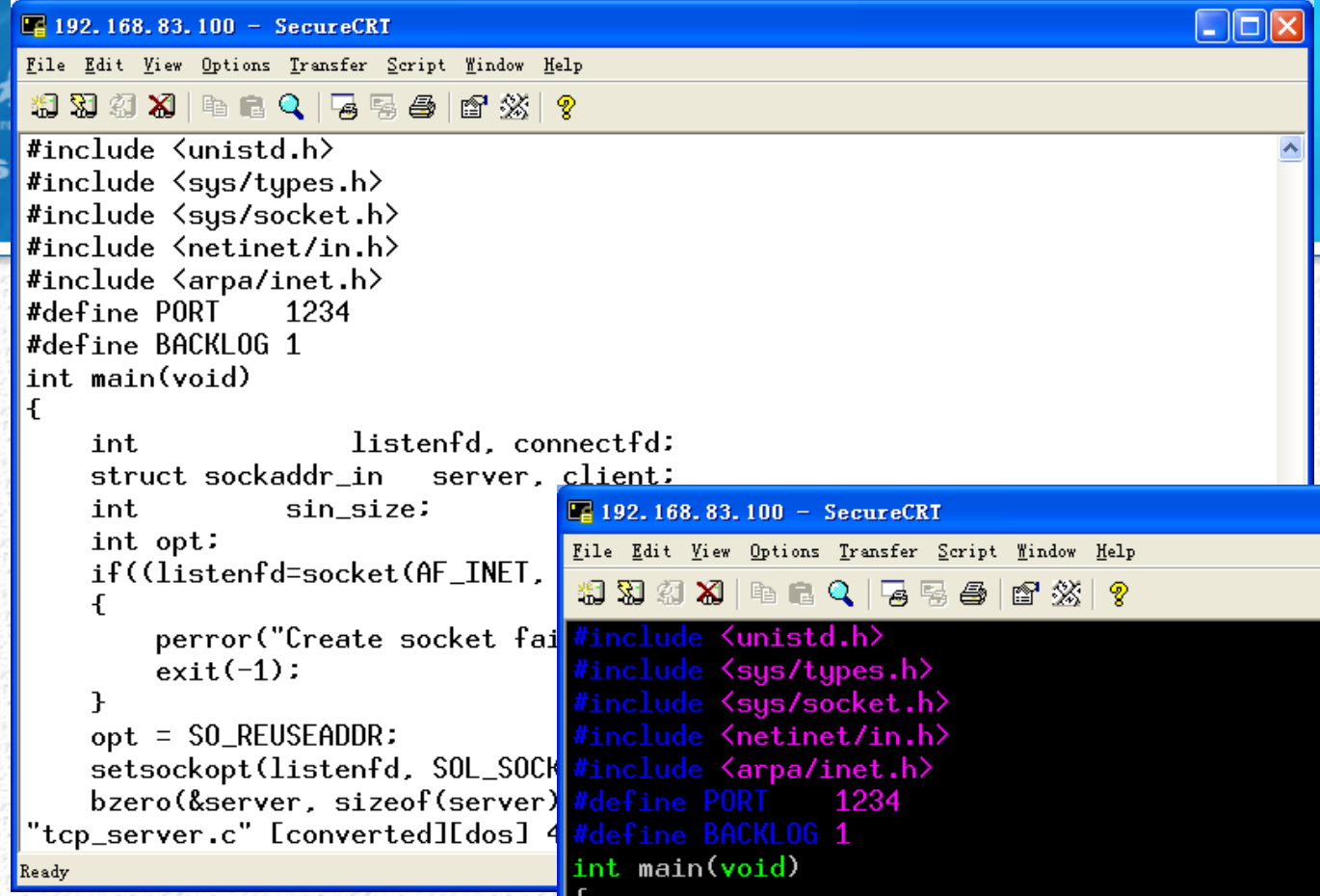

210.41.110.233 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Last login: Thu Feb 19 15:24:18 2004 from 210.41.110.215
ok!
[lyren@linux lyren]$ ll
total 20
drwxr-xr-x 2 lyren lyren 4096 Nov 7 23:31 Downloads
drwxrwxr-x 16 lyren lyren 4096 Feb 19 09:18 Netprog
drwxrwxr-x 16 lyren lyren 4096 Oct 27 10:00 OSprog
drwxrwxr-x 6 lyren lyren 4096 Oct 29 14:42 tcpipi
drwxrwxr-x 2 lyren lyren 4096 Jun 25 2003 Unix
[lyren@linux lyren]$
Ready
ssh1: 3DES
11, 22
19 Rows, 70 Cols
VT100
NUM

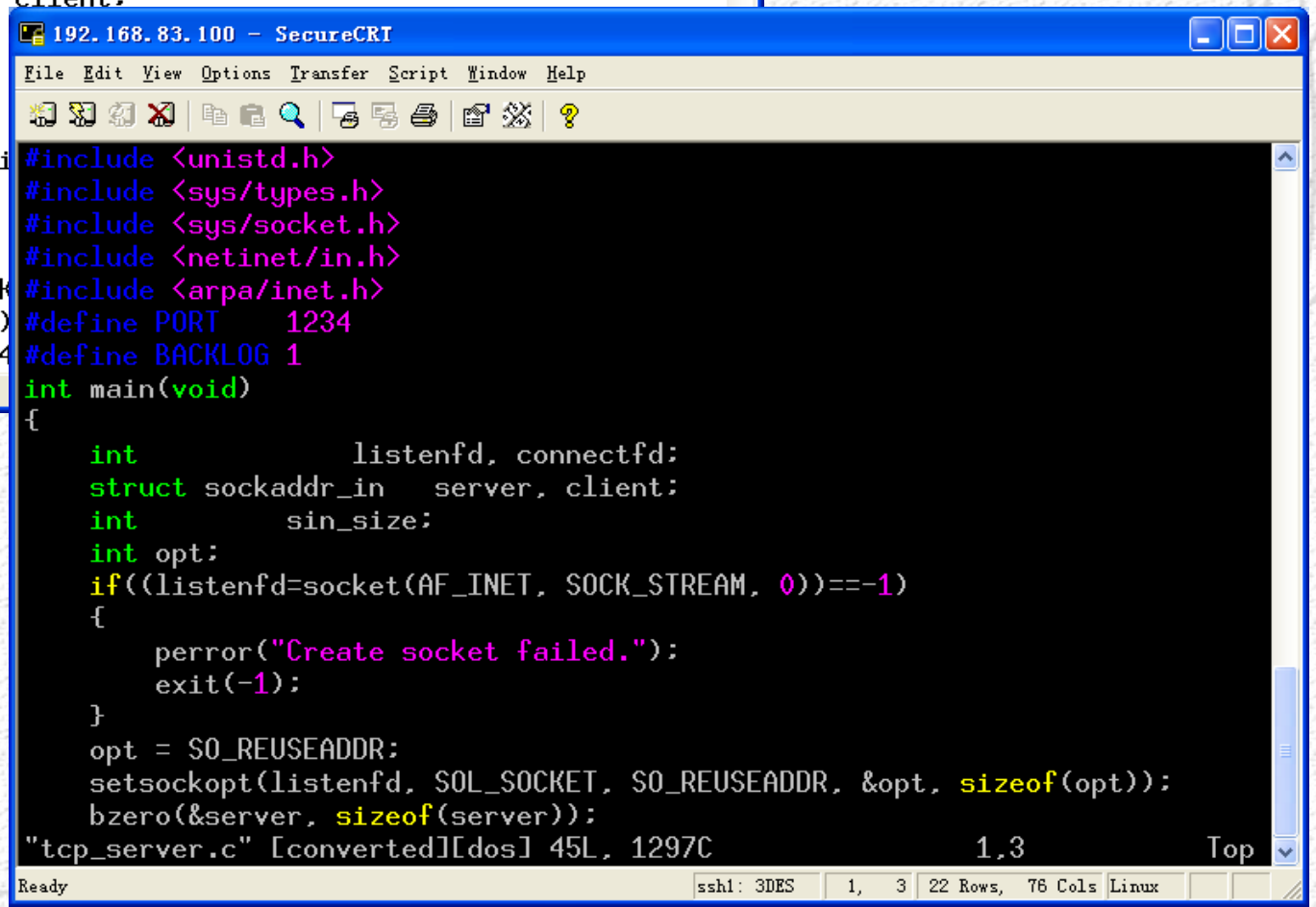
Vi编辑器

Vi是UNIX环境下的文本编辑工具，其工作模式分为：命令模式和编辑模式。常用的命令：

1. i, 进入编辑模式，并在光标所在位置插入；
2. a, 进入编辑模式，并在光标之后添加；
3. x, 删除当前字符；
4. dd , 删除当前行；
5. :number, 定位到指示的行；
6. :/string, 查找指定字符串；
7. :q, 退出vi；
8. :wq, 存盘并退出


192.168.83.100 - SecureCRT
File Edit View Options Transfer Script Window Help
VIM - Vi IMproved
version 6.1.320
by Bram Moolenaar et al.
Vim is open source and freely distributable
Help poor children in Uganda!
type :help iccf<Enter> for information
type :q<Enter> to exit
type :help<Enter> or <F1> for on-line help
type :help version6<Enter> for version info
0,0-1 All
Ready
ssh1: 3DES
1, 1
22 Rows, 76 Cols
VT100


192.168.83.100 - SecureCRT
File Edit View Options Transfer Script Window Help
#include <unistd.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#define PORT 1234
#define BACKLOG 1
int main(void)
{
int listenfd, connectfd;
struct sockaddr_in server, client;
int sin_size;
int opt;
if((listenfd=socket(AF_INET,
{
perror("Create socket fai
exit(-1);
}
opt = SO_REUSEADDR;
setsockopt(listenfd, SOL_SOCK
bzero(&server, sizeof(server)
"tcp_server.c" [converted][dos] 4
Ready


192.168.83.100 - SecureCRT
File Edit View Options Transfer Script Window Help
#include <unistd.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#define PORT 1234
#define BACKLOG 1
int main(void)
{
int listenfd, connectfd;
struct sockaddr_in server, client;
int sin_size;
int opt;
if((listenfd=socket(AF_INET, SOCK_STREAM, 0))==-1)
{
perror("Create socket failed.");
exit(-1);
}
opt = SO_REUSEADDR;
setsockopt(listenfd, SOL_SOCKET, SO_REUSEADDR, &opt, sizeof(opt));
bzero(&server, sizeof(server));
"tcp_server.c" [converted][dos] 45L, 1297C 1,3 Top
Ready ssh1: 3DES 1, 3 22 Rows, 76 Cols Linux

编译工具gcc, cc

gcc与cc 是UNIX环境下的将源程序编译称目标文件或可执行文件的工具。常见的用法有：

1. gcc test.c -> a.out
2. gcc –c test.c -> test.o
3. gcc –o test test.c -> test
4. gcc –o test test1.o test2.o -> test
5. gcc –o test test.o –lmath -> test