



Student Learner Outcomes

1. Navigate and manage the UNIX/Linux file system by viewing, copying, moving, renaming, creating, and removing files and directories.
2. Use the UNIX features of file redirection and pipelines to control the flow of data to and from various commands.
3. With the aid of online manual pages, execute UNIX system commands from either a keyboard or a shell script using correct command syntax.

What is UNIX/Linux?

UNIX/Linux is an operating system that is widely used, constantly improving and growing fast!

- Used heavily in cloud infrastructure
- Embedded in smartphones, tablets and many other appliances.
- Internet services - Web, DNS, DHCP, Net News, Mail, etc.
- Enterprise and mission critical applications - Large databases, Enterprise Resource Management (ERM), Customer Relationship Management (CRM), data warehouse, manufacturing, supply chain management, etc.
- Hollywood - feature animation, visual effects, rendering farms.
- Number-crunching super computers for research.
- Companies like Google, Amazon, Facebook, PayPal, Yahoo etc. are using it to run their businesses on



Businesses and organizations that run on Linux



WIKIPEDIA
The Free Encyclopedia



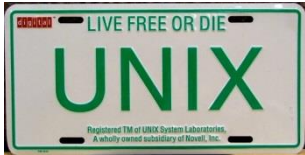
Where did
UNIX/Linux
come from?

In 1971 Ken Thompson and
Dennis Ritchie developed
Unix at AT&T's Bell Labs

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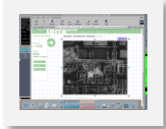
Descendants from the Unix OS developed in Bell Labs



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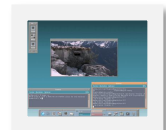
SCO UNIX
PC servers



IBM AIX
servers, mainframes and workstations



Sun Solaris
servers and workstations



HP HP-UX
servers and workstations



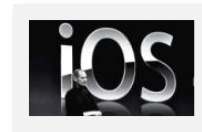
Apple OS X
Mac computers



Berkeley Software Distribution
Mini-computers and servers



GNU Linux
Servers, PC, smartphones,
tablets, embedded



Apple iOS
Smartphones and tablets

UNIX and Unix-like operating systems are found on all types of computers from high end commercial mainframes, servers, and workstations to consumer focused Apple desktop and mobile devices

Where can
you find
UNIX/Linux?

Embedded Linux (just a few)



Katana Robotic Arm



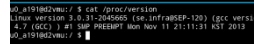
Asus RT-AC66U
wireless router



Tivo



Yamaha Disklavier
Mark IV



Android



Some TomTom
GPS models



Garmin
Nuvi 5000



Buffalo
NAS storage



Virgin America
Personal
Entertainment



MikroTik Routers



Sony TVs



Android Tablets



Raspberry Pi

Embedded Unix in Apple Products

Apple iOS



The Apple iOS, internally known as Darwin, like Mac OS X, runs on a Unix-like kernel (Mach kernel + BSD components)

Sources: [http://en.wikipedia.org/wiki/Darwin_\(operating_system\)](http://en.wikipedia.org/wiki/Darwin_(operating_system))
[http://en.wikipedia.org/wiki/IOS_\(Apple\)](http://en.wikipedia.org/wiki/IOS_(Apple))
<http://code.google.com/p/mobileterminal/>

Various Linux Distributions for PCs and Servers

OpenSUSE



Red Hat Enterprise Linux



Fedora



Debian



CentOS



Ubuntu



Mandriva



*Note: A distribution is built by a company or organization. They start with the **Linux kernel** then add a custom mix of open source components. They may then add some of their own unique software to differentiate their distribution.*



Tux, the penguin, is the Linux kernel mascot

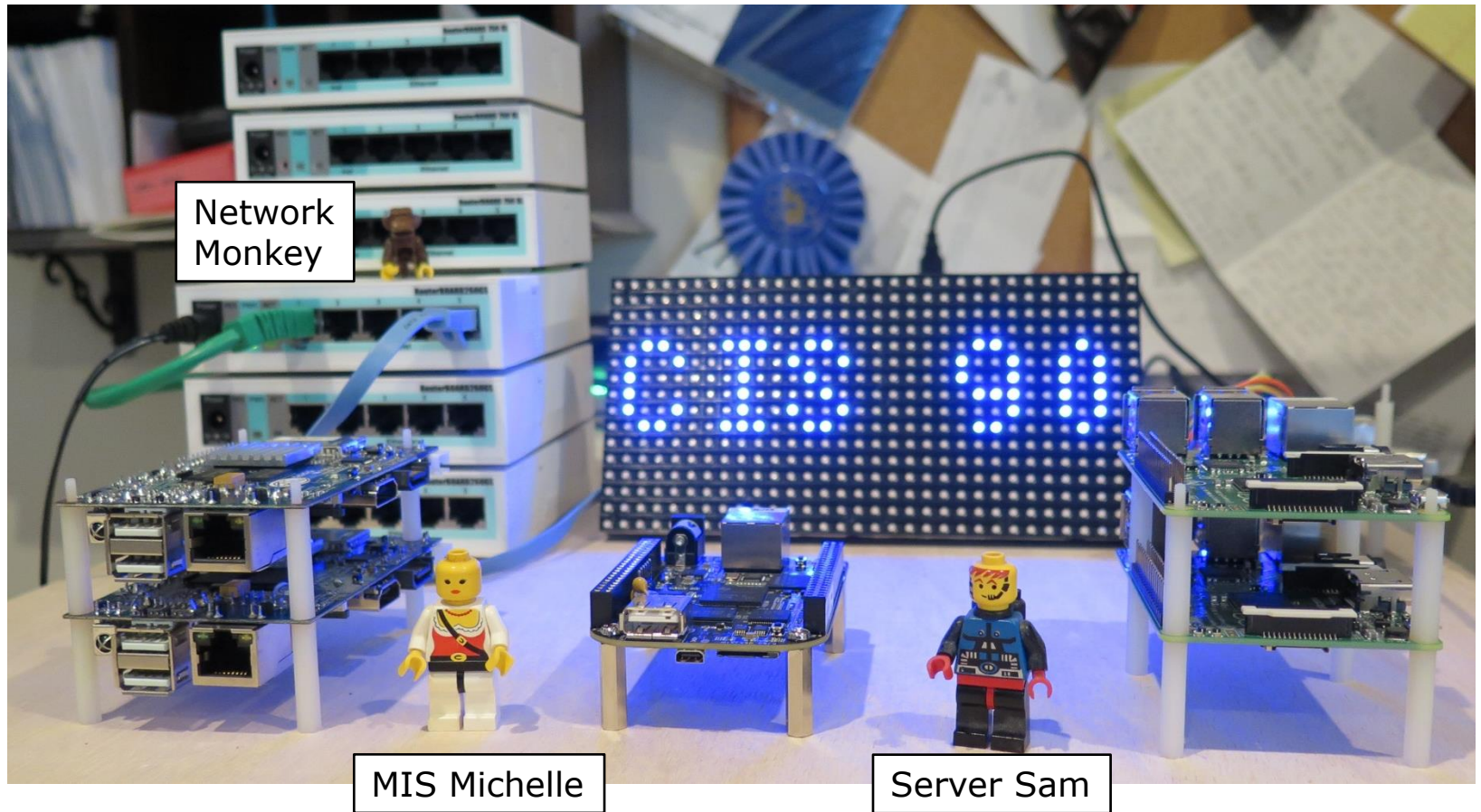
An Amazon Data Center



Every day, Amazon Web Services adds enough new capacity to support all of Amazon.com's global infrastructure through the company's first 5 years, when it was a \$2.76B annual revenue enterprise

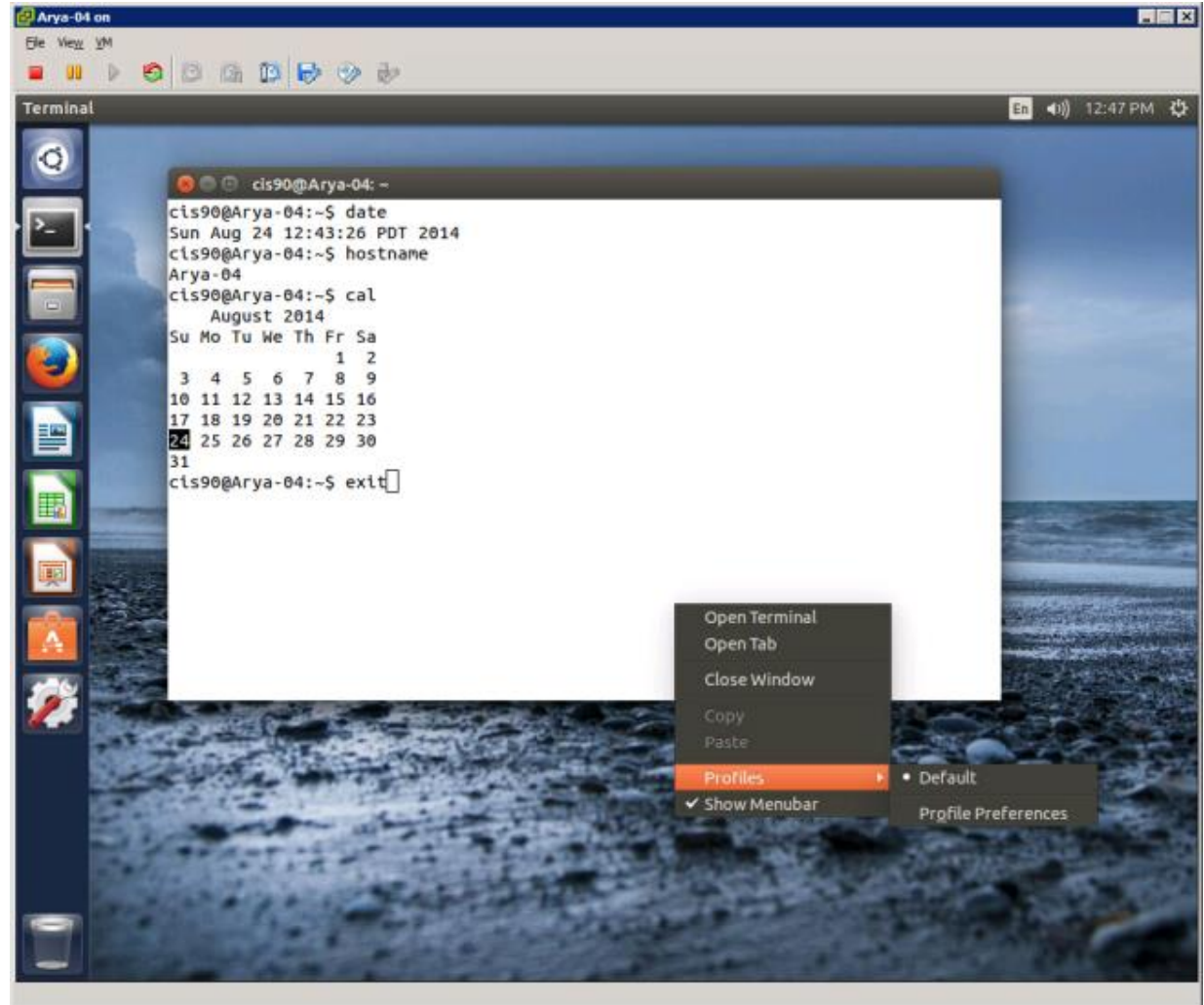


Rich's Home Micro Data Center

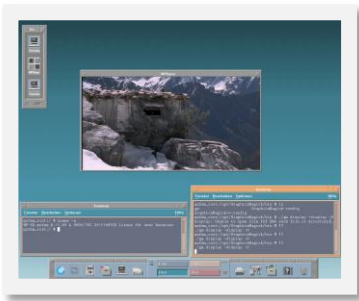


What does the
UNIX/Linux
shell
look like?

Ubuntu Linux



HP-UX



```
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Palo Alto, CA 94304 U.S.A.

Rights for non-DOD U.S. Government Departments and Agencies are as set
forth in FAR 52.227-19(c)(1,2).
You have mail.

Value of TERM has been set to "xterm".
WARNING: YOU ARE SUPERUSER !!

# ls /
.mozilla          .sw             home            sbin
.mozilla-license  bin            lib            stand
.profile          core           lost+found     tmp
.rnd              dev            net            usr
.ssh              etc            opt            var

# uname -a
HP-UX cupsim98 B.11.23 U ia64 0564465391 unlimited-user license
#
```


VMware ESXi server



```

simben90@excalibur:~
~ # clear
~ # date
Thu Aug 28 00:59:38 UTC 2014
~ # hostname
vmserver3.cis.cabrillo.edu
~ # who
root          char/pty/t0    00:00   Aug 28 00:57:54  excalibur.cis.cabrillo.edu
~ # uname
VMkernel
~ # ps | head
WID  CID  World Name          Command

32769      idle1
32770      idle2
32771      idle3
32772      idle4
32773      idle5
32774      idle6
32775      idle7
32776      idle8
~ # ps | grep sh
32786      tlbflushcount
32787      tlbflushcountryflush
32788      vaSpaceTLBFlush
32873      pshare-est
32901      OCFlush
32903      BCFlush-0
33273 33273 sh                  /bin/sh
33315 33315 sh                  /bin/sh
33479 33479 sh                  /bin/sh
33743 33743 sh                  /bin/sh
33780 33780 sh                  /bin/sh
33818 33818 sh                  /bin/sh
33871 33871 sh                  /bin/sh
33911 33911 sh                  /bin/sh
33947 33947 sh                  /bin/sh
33990 33990 sh                  /bin/sh
34064 34064 sh                  /bin/sh
34115 34115 sh                  /bin/sh
34217 34217 sh                  /bin/sh
34260 34260 sh                  /bin/sh
34297 34297 sh                  /bin/sh
34333 34333 sh                  /bin/sh
34539 34539 sh                  /bin/sh
34613 34613 sh                  /bin/sh
34706 34706 sh                  /bin/sh
35049 35049 sh                  /bin/sh
4197333 4197333 sshd                 sshd
4197376 4197376 sh                  -sh
~ # █
  
```

Apple iPad



```
ipa$ v.2.5.1 - Copyright 2013, Martino Orlandi (www.treehousetec.com)
```



```
Type 'help' for a list of available commands
```

```
August 25, 2014 at 5:25 PM logged on Mary's iPad
```

```
ipa$/$ date
Monday, August 25, 2014 at 5:25:49 PM Pacific Daylight Time
ipa$/$ hostname
Mary's iPad
ipa$/$ uname
Darwin
ipa$/$ ps
PID  PROCESS NAME      USER      PRIORITY
18   timed                mobile    17
21   mediaremoted         mobile    17
23   fairplayd.A1        mobile    17
25   iaptransportd        mobile    24
28   softwareupdated      mobile    17
29   backboardd           mobile    24
33   SpringBoard          mobile    17
34   routined             mobile    17
35   softwarebehavior     mobile    17
37   aggregated           mobile    17
42   aosnotifyd           mobile    17
45   mediaserverd         mobile    24
54   identityservices    mobile    17
56   imagent              mobile    17
59   BTServer             mobile    24
60   installd             mobile    17
70   lsd                  mobile    17
72   xpcd                 mobile    17
73   MobileGestaltHel    mobile    17
74   BlueTool             mobile    24
80   IMDPersistenceAg    mobile    17
83   apsd                 mobile    24
85   accountsd           mobile    17
92   dataaccessd         mobile    24
94   itunescloudd        mobile    17
95   itunesstored        mobile    17
96   storebookkeeperd    mobile    17
97   gamed               mobile    24
99   medialibraryd       mobile    17
100  DuetLST              mobile    17
101  tccd                 mobile    17
104  kbd                  mobile    17
105  MobileMail          mobile    24
106  softwareupdatese    mobile    17
107  assetd              mobile    17
108  librariand          mobile    17
111  calaccessd          mobile    17
115  Skype               mobile    17
118  MobileSlideShow     mobile    24
124  geod                 mobile    24
125  MobileCal           mobile    17
127  absd                 mobile    17
128  ipash               mobile    17
ipa$/$
```

Samsung Galaxy smartphone



```

172.30.1.1 - PuTTY
u0_a61@d2vmu:/ $ clear
u0_a61@d2vmu:/ $ date
Wed Aug 27 17:52:55 PDT 2014
u0_a61@d2vmu:/ $ echo $SHELL
/system/bin/sh
u0_a61@d2vmu:/ $ id
uid=10061(u0_a61) gid=10061(u0_a61) groups=1015(sdcard_rw),1028(sdcard_r),3003(inet),50061(all_a61) context=u:
r:untrusted_app:s0
u0_a61@d2vmu:/ $ cat /proc/version
Linux version 3.4.0-1368792 (dpi@SWDD5612) (gcc version 4.7 (GCC) ) #1 SMP PREEMPT Wed Apr 30 20:46:12 KST 201
4
u0_a61@d2vmu:/ $ ps
USER      PID     PPID  VSIZE  RSS      WCHAN    PC         NAME
root       1         0    1372   888      ffffffff 00000000  S /init
root       2         0         0         0      ffffffff 00000000  S kthreadd
root       3         2         0         0      ffffffff 00000000  S ksoftirqd/0
root       6         2         0         0      ffffffff 00000000  S migration/0
root       7         2         0         0      ffffffff 00000000  S watchdog/0
root      12         2         0         0      ffffffff 00000000  S khelper
root      13         2         0         0      ffffffff 00000000  S suspend_sys_syn
root      14         2         0         0      ffffffff 00000000  S suspend
root      17         2         0         0      ffffffff 00000000  S irq/203-msmdata
root      18         2         0         0      ffffffff 00000000  S sync_supers
root      19         2         0         0      ffffffff 00000000  S bdi-default
root      20         2         0         0      ffffffff 00000000  S kblockd
root      21         2         0         0      ffffffff 00000000  S khubd
root      22         2         0         0      ffffffff 00000000  S l2cap
root      23         2         0         0      ffffffff 00000000  S a2mp
root      24         2         0         0      ffffffff 00000000  S cfg80211
root      25         2         0         0      ffffffff 00000000  S rpciod
root      26         2         0         0      ffffffff 00000000  S modem_notifier
root      27         2         0         0      ffffffff 00000000  S smd_channel_clo
root      28         2         0         0      ffffffff 00000000  S smsm_cb_wq
root      30         2         0         0      ffffffff 00000000  S qmi
root      31         2         0         0      ffffffff 00000000  S nmea
root      32         2         0         0      ffffffff 00000000  S msm_ipc_router
root      33         2         0         0      ffffffff 00000000  S apr_driver
root      34         2         0         0      ffffffff 00000000  S khungtaskd
root      35         2         0         0      ffffffff 00000000  S kswapd0
root      36         2         0         0      ffffffff 00000000  S fsnotify_mark
root      37         2         0         0      ffffffff 00000000  S ecryptfs-kthrea
root      38         2         0         0      ffffffff 00000000  S nfsiod
root      39         2         0         0      ffffffff 00000000  S cifsioc
root      40         2         0         0      ffffffff 00000000  S crypto
root      58         2         0         0      ffffffff 00000000  S mdp_dma_wq
    
```

Asus Router



```

172.30.1.1 - PuTTY
admin@RT-AC66U: /tmp/home/root# uname
Linux
admin@RT-AC66U: /tmp/home/root# date
Mon Aug 25 18:13:02 DST 2014
admin@RT-AC66U: /tmp/home/root# ps
  PID  USER     VSZ  STAT  COMMAND
    1  admin    2360  S     /sbin/init
    2  admin      0  SW<   [kthreadd]
    3  admin      0  SWN   [ksoftirqd/0]
    4  admin      0  SW<   [events/0]
    5  admin      0  SW<   [khelper]
   18  admin      0  SW<   [kblockd/0]
   49  admin      0  SW    [pdflush]
   50  admin      0  SW    [pdflush]
   51  admin      0  SW<   [kswapd0]
   52  admin      0  SW<   [aio/0]
   96  admin      0  SW<   [mtdblockd]
  125  admin      0  SW<   [kmmcd]
  129  admin     608  S     hotplug2 --persistent --no-coldplug
  162  admin    2344  S     console
  166  admin    1552  S     /bin/sh
  168  admin    1540  S     syslogd -m 0 -S -O /tmp/syslog.log -s 256 -l 6
  170  admin    1540  S     /sbin/klogd
  172  admin      0  SW<   [khubd]
  248  admin    2352  S     usbld
  320  admin    2352  S     /sbin/wanduck
  327  admin    1544  R     telnetd
  330  admin    1056  S     /bin/eapd
  335  admin    1492  S     nas
  336  admin    1860  S     /bin/wps_monitor
  337  admin    2352  S     wpaide
  340  nobody   1100  S     dnsmasq --log-async
  341  admin    4356  S     httpd
  343  admin    1552  S     crond
  344  admin    1028  S     /usr/sbin/infosvr br0
  347  admin    3700  S     watchdog
  348  admin    2352  S     ots
  351  admin    1240  S     rstats
  365  admin    1072  S     lld2d br0
  375  admin    1376  S     /usr/sbin/acsd
  386  admin    2052  S     u2ec
  388  admin    1128  S     lpd
  391  admin    2052  S     u2ec
  395  admin    2052  S     u2ec
  412  admin    1016  S     rdnssd -u admin -i eth0
  413  admin    1084  S     rdnssd -u admin -i eth0
  461  admin    2352  S     ntp
  468  admin     748  S     dhcp6c -T LL eth0
  472  admin     744  S     dhcp6s -c /etc/dhcp6s.conf br0
  474  admin     768  S     radvd -u admin
  476  admin     768  S     radvd -u admin
  477  admin    1556  S     udhcpc -i eth0 -p /var/run/udhcpc0.pid -s /tmp/udhcp
  485  admin     760  S     miniupnpd -f /etc/upnp/config
  486  admin    2352  S     disk_monitor
  884  admin    1308  S     networkmap
 2734  admin    1692  S     -sh
 2794  admin    1544  R     ps
admin@RT-AC66U: /tmp/home/root# █

```

CIS 90 taught in Virtual or Physical Classrooms

CCC Confer - Attending class online

The screenshot displays the CCC Confer application window titled "CCC Confer - 0 - RICH SIMMS". The interface includes a menu bar (File, Edit, View, Tools, Window, Help) and a toolbar with icons for drawing, erasing, and navigating. The main content area shows a slide titled "CIS Linux Classes" with the Cabrillo College logo and instructor information: "Instructor: Rich Simms" and "Dial-in: 888-450-4821". The slide background features a grid of 30 white silhouette icons representing participants. A blue callout box with a red arrow points to a set of four icons (smiley face, hand, hand with star, checkmark) in the "PARTICIPANTS" sidebar, with the text: "Show your state of mind, let others know you stepped away, raise your hand, and indicate responses using these controls". Another blue callout box with a red arrow points to the "CHAT" area at the bottom of the sidebar, which contains the text: "Ask and answer questions using the chat area". The chat area shows a log of events: "- You joined the Main Room. (2:23 PM) -" and "- Rich Simms joined the Main Room. (2:24 PM) -". The "PARTICIPANTS" sidebar also lists "Benji" and "Rich Simms (Moderator)".

Credits

The creator of the UNIX/Linux courses at Cabrillo College



Jim Griffin

*Instructor at Cabrillo College since 2001
Computer and Information Systems*

RETIRED



Past Courses

- CIS 90** [Introduction to UNIX/Linux](#)
- CIS 98 [UNIX/Linux Shell Programming](#)
- CIS 164 [Introduction to the Apache Web Server](#)
- CIS 191 [UNIX/Linux System Administration](#)
- CIS 192** [UNIX/Linux Network Administration](#)
- CIS 193** [UNIX/Linux Security Administration](#)

Spring 2015 Term

- Rich Simms teaching CIS 90
- Mike Matera teaching CIS 192AB
- Mike Matera teaching CIS 193AB

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