Hidden motives

Coherent building process → systematic monitoring → troubleshooting ...

IN PRACTICE RESULTS IN:

- **Reading** Lecture and Lab materials
- **Reading** related books
- **Reading** related articles and journals
- **Reading** UNIX documentation
- **Reading your own configuration**!
- Administering your server
- Tracing errors in your configuration
Terminology

Administration vs. Management

- administration ~ technical level
- management ~ organizational level
Terminology (2)

**system** – **organized**, purposeful set of objects, regarded as whole; the structure of the system does not allow the components to be randomly rearranged; system as a whole can have properties/capabilities which the individual components do not have.
any element which has no relationship with any other element of a system, cannot be a part of that system.
Terminology: computer system

a set of hardware and software which processes data in a meaningful way
Terminology: computer system

Computer system:
• has interconnected components
• is organized, has structure
• is purposeful
• can consist of (semi-independent) sub-systems
• the goals of the system are determined by its owner
sub-systems I
sub-systems II
Terminology: user

- interacts with the system
- makes some **use** of this interaction
- can change some internal state of the system
- usually cannot change the structure of the system
Terminology: service, customer

• from the business' point of view we provide a service
• regulated with contracts
• internal and external services
• customer is the receiving side of the service
• user and customer may be the same person, but not necessarily
Selection of sysadmin's duties 1

- planning, implementing new technologies
- hardware installation, configuration, maintenance
- software installation, configuration, maintenance
- auditing the systems
Selection of sysadmin's duties 2

- monitoring the system
- responding to incidents, providing workarounds
- identifying problems, providing long-term solutions
- preventing the problems
Basic Principles in System Administration

- Take care of the basics first
- Plan ahead
- Keep solutions clear and simple
- Automate

- Know your systems and tools
- Know your users and enterprise - communicate
- Document
Activity

Which duties have you performed before?
Basic UNIX knowledge

- Networking
- File tree / File System
- Some basic UNIX commands

- But first of all ... couple of questions for you
How are these men?
Ken Thompson & Dennis Ritchie

- designed and implemented the original UNIX operating system
- also invented the B programming language, the direct predecessor to the C programming language
Who is this man?
Richard Stallman

- Author of the GNU Project - a Unix-like computer operating system composed entirely of free software
Who is this man?
Linus Torvalds

- software engineer and hacker, who is the author and lead developer of the Linux kernel
UNIX Quizz

- http://www.ch.embnet.org/CoursEMBnet/Exercises/Quiz/quix1.html
- http://www.oocities.org/satests/unix1.html
- http://edugrip.blogspot.com/2012/06/multiple-choice-questions-on-operating.html
Basic networking (1)

• Packet
  - Portion of data which is transmitted as whole
  - Consists header and payload
  - Header consists source and destination IP addresses, destination port and some other technical information
  - Payload consists user and/or protocol data
Basic networking (2)

• IP-address
  - numerical label assigned to each device participating in a computer network that uses the Internet Protocol for communication.
  - Identifies networked computer globally or locally (private address)
  - 4 numbers separated by dots. 193.40.5.73
  - Numbers are between 0 and 255
Basic networking (3)

• Port
  - Numeric value that identifies different services in networked computer
  - Port 80 – http
  - Port 22 – ssh
  - Port 443 - https
Basic networking (4)

• Router, gateway
  − Specialized computer which is responsible for packet delivery between networks
Basic networking (5)

- Network mask, netmask
  - Describes surroundings of the networked computer
  - If destination ip-address is “under” the mask then packet is sent to that computer directly
  - If destination is outside of the mask then packet is delivered through router
  - 4 numbers separated by dots 255.255.255.0
Basic networking (6)

• Network mask, netmask
  - Actually a bitmask over ip-address
  - For a start is sufficient to know that ip 10.10.10.8 with netmask 255.255.255.0 means that computers with ip-address 10.10.10.any are reachable directly and all other are possibly reachable trough router
  - Notation 10.10.10.8/255.255.255.0 means ip-address with netmask
  - 10.10.10.8/24 is the same in different notation
Basic networking (7)

• Default router, default gateway
  - Router that is used when there are no specific routes
  - Typical network has only one router
File tree (1)

- File
  - A computer file is a block of arbitrary information which is available to a computer program
File tree (2)

- Folder, directory, catalog
  - Each folder can contain an arbitrary number of files, and it can also contain other folders. These other folders are referred to as subfolders. Subfolders can contain still more files and folders and so on, thus building a tree-like structure in which one "root folder" can contain any number of levels of other folders and files.
File tree (3)

```
/  
|   |
|---|--
|bin boot dev etc home lib sbin root opt proc mnt tmp usr var srv

vmunix
hda sda st0

ld.so

yxax linux tux X11R6
bin etc lib local sbin share

bin Mail

f2c
test.c

bin lib man

bin lib man

xdm xterm xv

faq howto packages
```
File tree (4)

• Working directory, current directory
  - Every program considers one folder as its working directory
  - Some programs allow user to change working directory, for example bash, common command interpreter or “shell”
File tree (5)

- Every file in system can addressed by absolute path or by relative path
- Path consists of: folder name(s), file name, path separator(s) (“/” in linux systems)
- Absolute path always starts with /
  - /etc/debian_version
  - /etc/network/interfaces
File tree (6)

- Relative path can start directly with folder or file name
  - etc/debian_version

- Or with single dot, which means current working directory
  - ./etc/debian_version

- Or with double dots, which means one folder up from current working directory
  - ../etc/debian_version
File tree (7)

- Example: command “ls” displays folder contents
  - `ls`
    - Displays content of the current directory
  - `ls /etc`
    - Displays content of the etc folder in root folder
  - `ls ..`
    - Displays content of the folder upwards from current folder
Network testing

• ping <address or hostname>
  - check if other host is reachable (via icmp)

ulno@zaphod:$ ping 192.168.10.13
PING 192.168.10.13 (192.168.10.13) 56(84) bytes of data.
^C
--- 192.168.10.13 ping statistics ---
4 packets transmitted, 0 received, 100% packet loss,
time 3025ms

ulno@zaphod:$ ping ulno.net
PING ulno.net (81.169.141.1) 56(84) bytes of data.
64 bytes from vps.ulno.net (81.169.141.1): icmp_seq=1 ttl=50 time=42.7 ms
64 bytes from vps.ulno.net (81.169.141.1): icmp_seq=2 ttl=50 time=43.0 ms
^C
--- ulno.net ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 42.708/42.877/43.046/0.169 ms
ifconfig – Interface Configuration

ulno@zaphod:$ /sbin/ifconfig
eth0   Link encap:Ethernet  HWaddr 5c:ff:35:08:e2:8a
        inet addr:172.17.36.59  Bcast:172.17.36.255  Mask:255.255.255.0
        inet6 addr: fe80::5eff:35ff:fe08:e28a/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:357547 errors:0 dropped:0 overruns:0 frame:0
        TX packets:107465 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:69795396 (66.5 MiB)  TX bytes:26781144 (25.5 MiB)
        Memory:f2500000-f2520000