Linux Advanced

Mohammad Reza Gerami

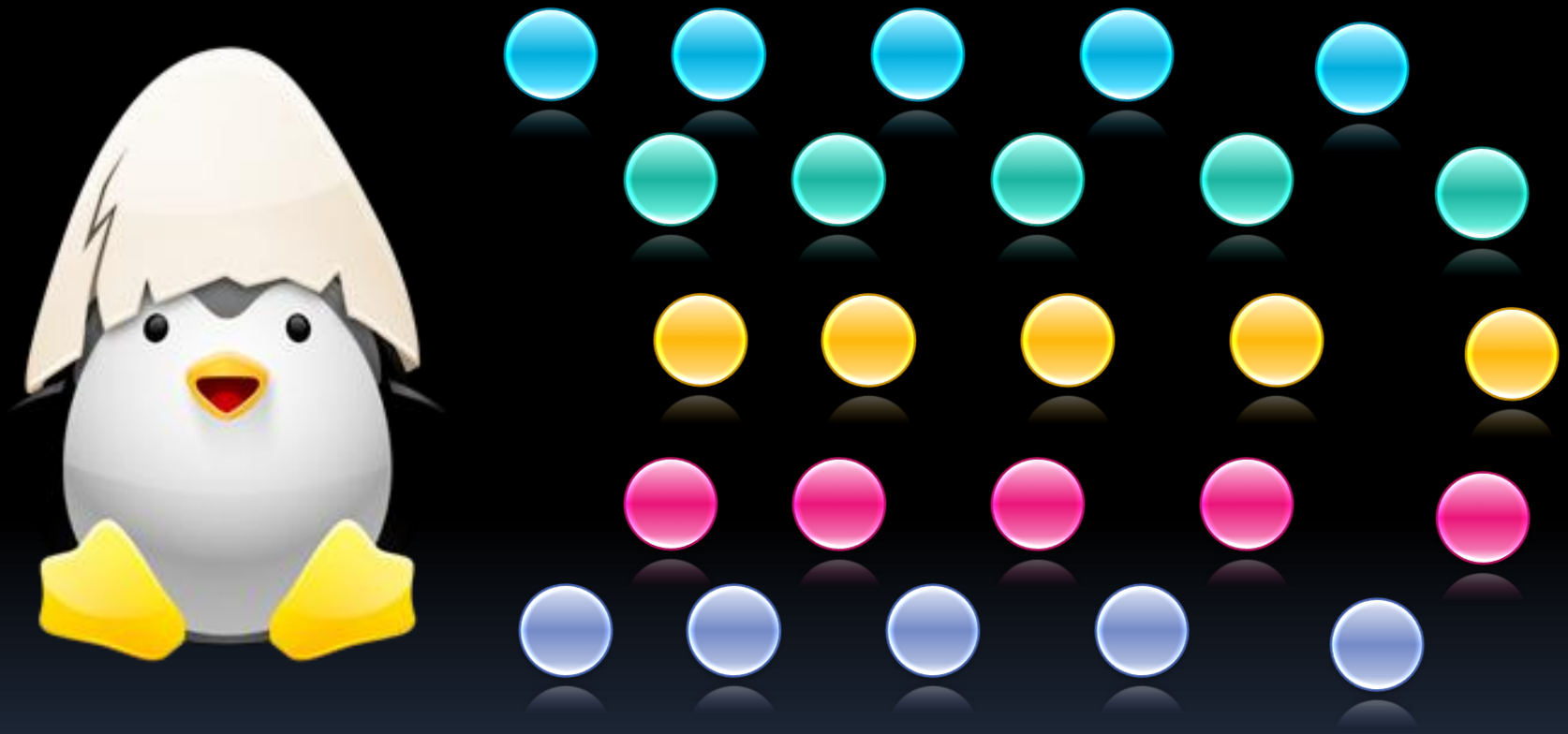
Middleware Group

gerami@ipm.ir

Linux Advanced

- Linux Introduction
- Limiting Users
- Disk Management
- File System Health Check
- Installing Software in GNU/Linux

Linux Introduction



Linux Introduction

- A Linux distribution has software worth thousands of dollars, for virtually no cost
- Linux operating system is reliable, stable, and very powerful
- Linux comes with a complete development environment, including compilers, toolkits, and scripting languages
- Linux comes with networking facilities, allowing you to share hardware
- Linux utilizes your memory, CPU, and other hardware to the fullest
- A wide variety of commercial software is also available
- Linux is very easily upgradeable
- Supports multiple processors as standard
- True multitasking. So many apps, all at once

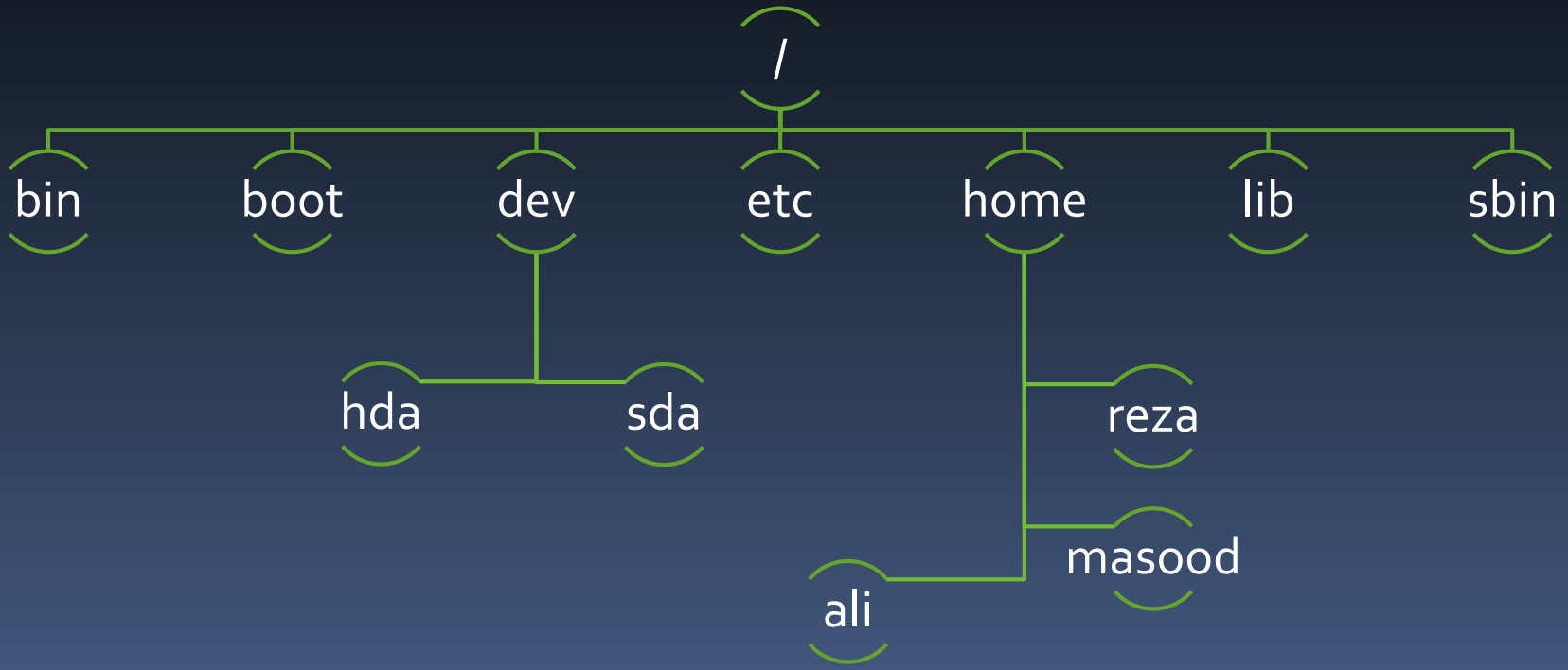
Linux Introduction

- Freely Downloadable from websites
- Available as sets of CDs
- Installation is very simple
- After installation you can create logins for different users
- Each user may login by his/her own login and passwd – own login area
- Upon login, default directory is home directory of the user

Linux Introduction

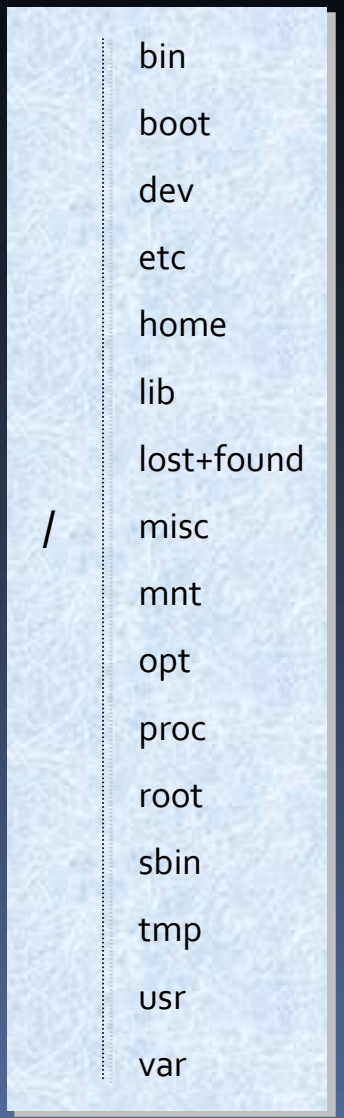
- ls, Give a listing of the current directory. Try also ls -l
- cp, Copy file from source to destination
- mv, Move file from source to destination. If both are the same directory, the file is renamed
- vi, Edit a file. vi is one of the most powerful text editors
- chmod, Change file permissions
- mkdir, rmdir Make/Remove a directory
- cd, Change directory
- rm, Remove a file. Can also remove directory tree
- man ls, Get help for ls. All commands have help

Linux Introduction



Linux Introduction

- **/bin** System binaries, including the command shell
- **/boot** Boot-up routines
- **/dev** Device files for all your peripherals
- **/etc** System configuration files
- **/home** User directories
- **/lib** Shared libraries and modules
- **/lost+found** Lost-cluster files, recovered from a disk-check
- **/mnt** Mounted file-systems
- **/opt** Optional software
- **/proc** Kernel-processes pseudo file-system
- **/root** Administrator's home directory
- **/sbin** System administration binaries
- **/usr** User-oriented software
- **/var** Various other files: mail, spooling and logging



Limiting Users

- Login
- Process
- File Size
- Sudoers

Limiting Users

Directory

/etc/security

- Login edit limits.conf

  @test - maxlogin 1

- Process

  @test hard nproc 6 (count of Process)

- File Size

  @test hard fsize 500 (kilobyte)

Limiting Users

- **core** -- Limits the core file size (KB); usually set to o for most users to prevent core dumps.
- **data** -- Maximum data size (KB).
- **fsize** -- Maximum file size (KB).
- **memlock** -- Maximum locked-in-memory address space (KB).
- **nofile** -- Maximum number of open files.
- **rss** -- Maximum resident set size (KB).
- **stack** -- Maximum stack size (KB).
- **cpu** -- Maximum CPU time (MIN).
- **nproc** -- Maximum number of processes.
- **as** -- Address space limit.
- **maxlogins** -- Maximum number of logins for this user or group.
- **priority** -- The priority to run user process with.

Limiting Users

Sudoers
The super user with unrestricted access to all system resources and files in Linux is the user named root.

If a server needs to be administered by a number of people it is normally not a good idea for them all to use the root account. This is because it becomes difficult to determine exactly who did what, when and where if everyone logs in with the same credentials. The sudo utility was designed to overcome this difficulty.

Sudoers Example

/etc/sudoers

```
User_Alias OPERATORS = reza,masood
Runas_Alias OP = root, operator
Host_Alias DataCenter = 10.10.10.0/255.255.255.0
Host_Alias Servers = 20.20.20.0/24
Cmd  Server_cmd = ls,vi,cat,top

OPERATORS ALL=ALL

reza ALL=(ALL) ALL

masood DataCenter = (ALL) ALL

reza Servers = (reza) Server_cmd
```

DISK Management

- Journaling Filesystems
- Foreign Filesystems

Disk Management
Journaling

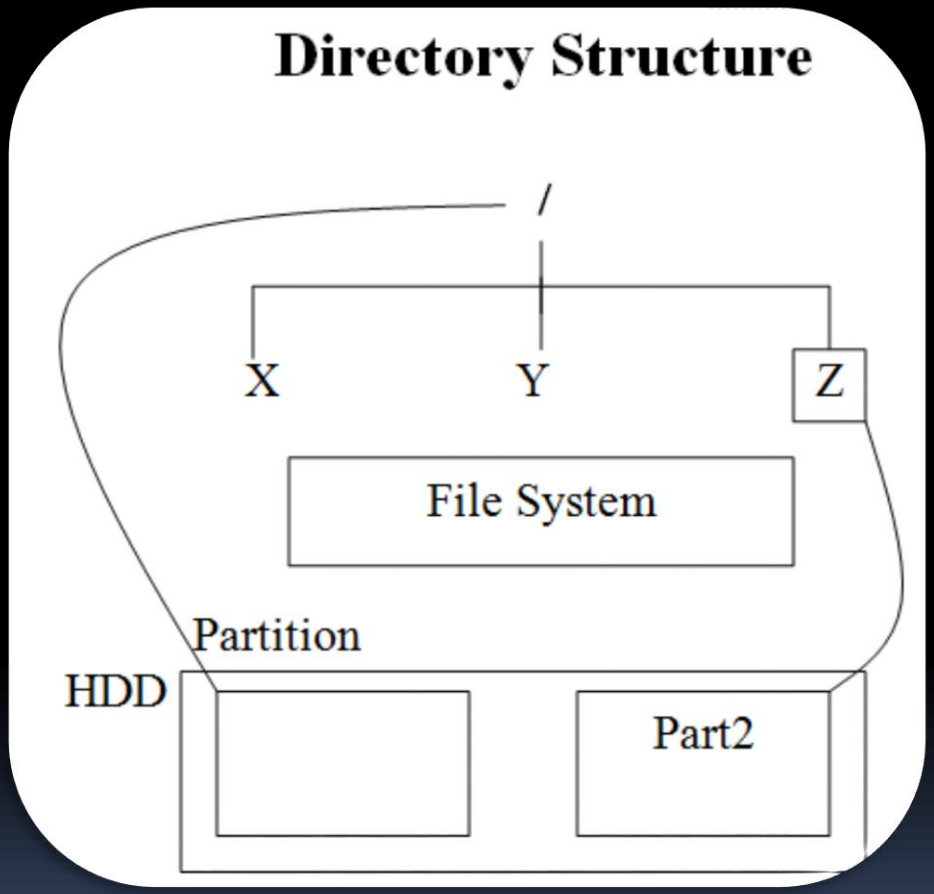
A **journaling file system** is a file system that keeps track of the changes that will be made in a *journal* (usually a circular log in a dedicated area of the file system) before committing them to the main file system.

In the event of a system crash or power failure, such file systems are quicker to bring back online and less likely to become corrupted

Disk Management
Journaling

- **Third Extended** The Third Extended Filesystem (*ext3* or *ext3fs*)
- **ReiserFS This filesystem is a completely new design, which was added to the 2.4.1 Linux kernel**
- **XFS XFS is Silicon Graphics's (SGI's) journaling filesystem**
- **JFS IBM's Journaled Filesystem (JFS)**

Disk Management
Journaling



Disk Management
Foreign Filesystems

- Microsoft Filesystems
  - FAT The File Allocation Table (FAT)
  - HPFS Microsoft developed the High–Performance Filesystem (HPFS)
  - NTFS The New Technology Filesystem (NTFS)
- Network Filesystems
  - NFS Sun's Network Filesystem (NFS)
  - Coda This is an advanced network filesystem that supports features omitted from NFS
  - SMB/CIFS The Server Message Block (SMB) protocol, which has been renamed the Core Internet Filesystem (CIFS)

File System Health Check

- File System Health Check

File System Health Check

On a Linux or Unix server, you can run the fsck command to check your file system's integrity and also make repairs when necessary. Under normal circumstances, you probably have no reason to run this command, and Linux will detect problems at boot and run fsck in the event of a power failure or other abnormal shutdown. If you do need to run it, you will have to unmount the file system you want to check. Follow these steps:

As Root, go to single user mode:

```
# init 1
```

Unmount the partition you want to check:

```
# umount /dev/sda1
```

Run fsck:

```
# fsck /dev/sda1
```

Remount the filesystem:

```
# mount -a
```

Return to multiuser mode (Init 2 or 3)

```
# init 3
```

Installing Software in GNU/Linux

- Command-line process
- Graphical (GUI) process

Command-line process

- Compiling and Installing software from source
- Installing RPM's using the Red hat Package Manager
- Installing using Debian's apt-get
- Installing with fedora / yum

Compiling and Installing software from source

- Installing from source code is the most difficult method for obtaining software on Linux and in most cases is not necessary.
- Most popular software can be found and installed quite easily using your distribution's package manager (see sections on "apt-get" and "yum"). Installing from source is recommended only for experienced Linux users and/or those who aren't afraid to break something for the purpose of learning

Compiling and Installing software from source

- Typically applications you must compile from source will come as a ".tar.gz", ".tar.bz2", or ".zip" file.

- tar -zxvf <filename>
- Configure
- Make
- Make install

Installing RPM's using the Redhat Package Manager

- Redhat RPM's offer a flexible and easy method to install new software. Software installed from an RPM package differs from compiling from source in a few ways, but the most important one of all is the software is already compiled for you.
- rpm -i <filename.rpm>
- rpm -qa <package>
- rpm -e <package>

Installing RPM's using the Redhat Package Manager

- Installing using Debian's apt-get
  - apt-get install <package_name>
  - apt-get remove <package_name>

- Installing with fedora|CentOS / yum
  - yum install
  - yum remove
  - yum update

Graphical Based process

- Using Synaptic (Fedora, Ubuntu)
- Using YaST2 (SuSE, openSuSE)

Linux Network Configuration

- IP Assignment
- Configuration File
- Networking Tools
- Firewall
- IPTables

Linux Network Configuration
IP Asignment

- ifconfig (device name) IP [netmask subnetmask]
- ifconfig eth1 1.1.1.1 [netmask 255.255.255.0]
- ifconfig eth1:0 1.1.1.2 netmask 255.255.255.0
- /etc/init.d/network restart

IP Assignment

- DNS

  /etc/resolv.conf

  nameserver 4.2.2.4

- Default Gateway

  route add default gw <gw-ip>

  route add default gw 192.168.10.1

  route del default gw <gw-ip>

  route del default gw 192.168.10.1

  route -n

Configuration File

- Files Path
  - etc/sysconfig/network-scripts/ifcfg-eth1
    - DEVICE=eth1
    - ONBOOT=yes
    - BOOTPROTO=static
    - HWADDR=00:0c:29:24:8d:c6
    - TYPE=Ethernet
    - HOSTNAME=Nightingale
    - IPADDR=192.168.10.2
    - NETMASK=255.255.255.0
    - NETWORK=192.168.10.0
    - BROADCAST=192.168.10.255
    - GATEWAY=192.168.10.1

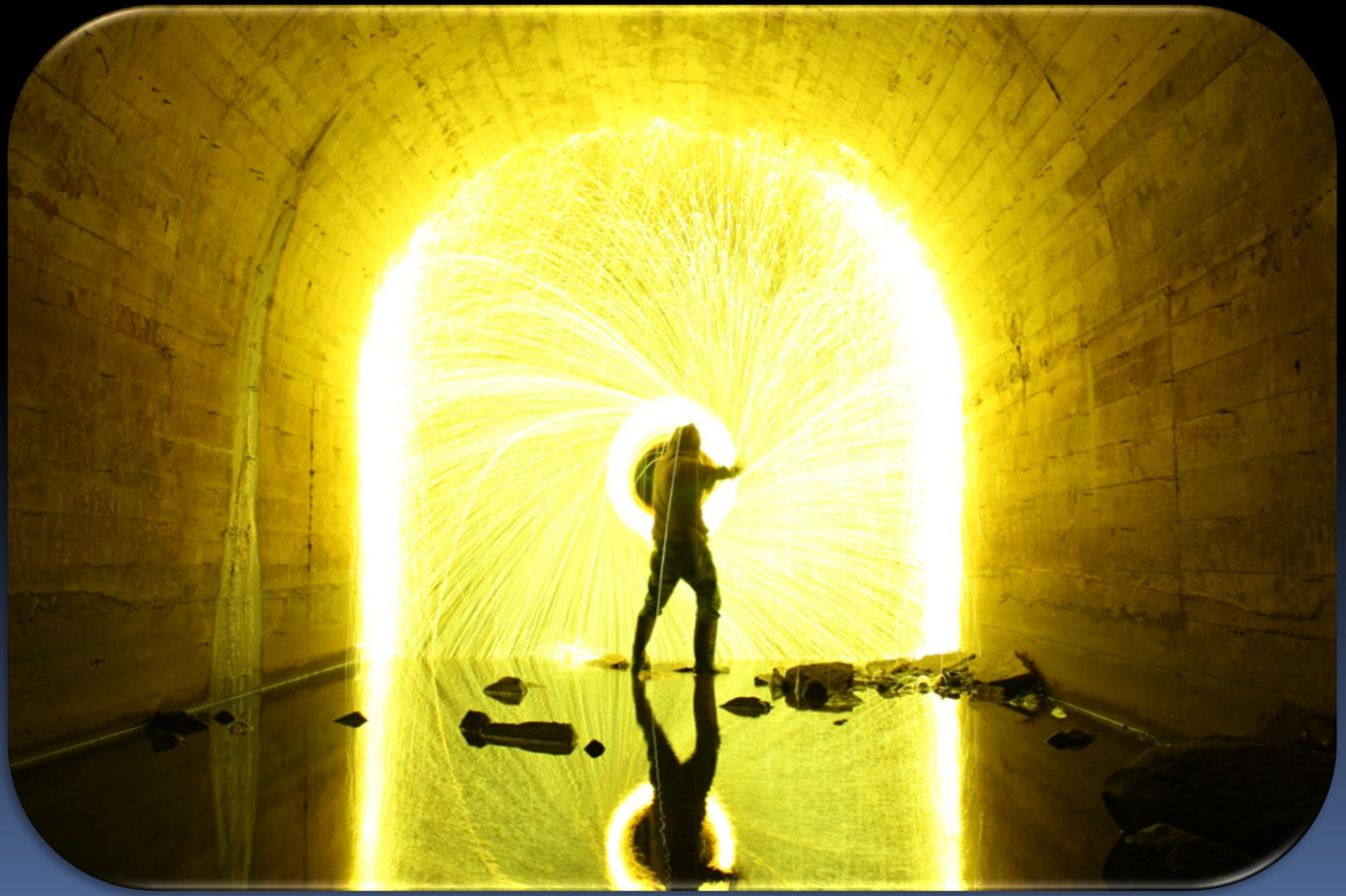
Networking Tools

- ping
  - Check a status of a host Alive or Not
    - ping 192.168.10.1
- ethtool
  - Check Network Card
    - ethtool eth1
- traceroute
  - see your hops between hosts
    - traceroute google.com

Networking Tools

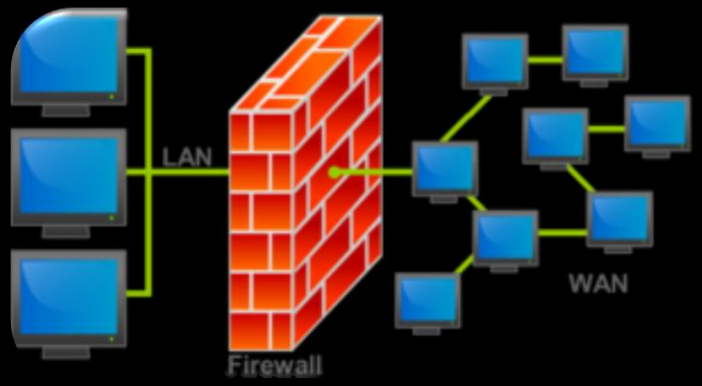
- telnet
  - Diagnostics
    - telnet 192.168.10.1 80
- nmap
  - nmap seeing what ports are open on a host
    - nmap 192.168.10.1

Firewall



Firewall

- Network firewall
  - Protect your network



- Personal Firewall
  - Protect your personal system (pc/laptop,…)

Firewall

- Hardware
  - Appliance Device

- Software
  - Combine software and hardware

Firewall

- State Less
  - Transmit traffic without check
- State Full
  - Check all of data transmission