Introduction/Tutorial on the Linux Ecosystem

Bash scripting, SSH, POSIX Threads, BSD Sockets (part 1)

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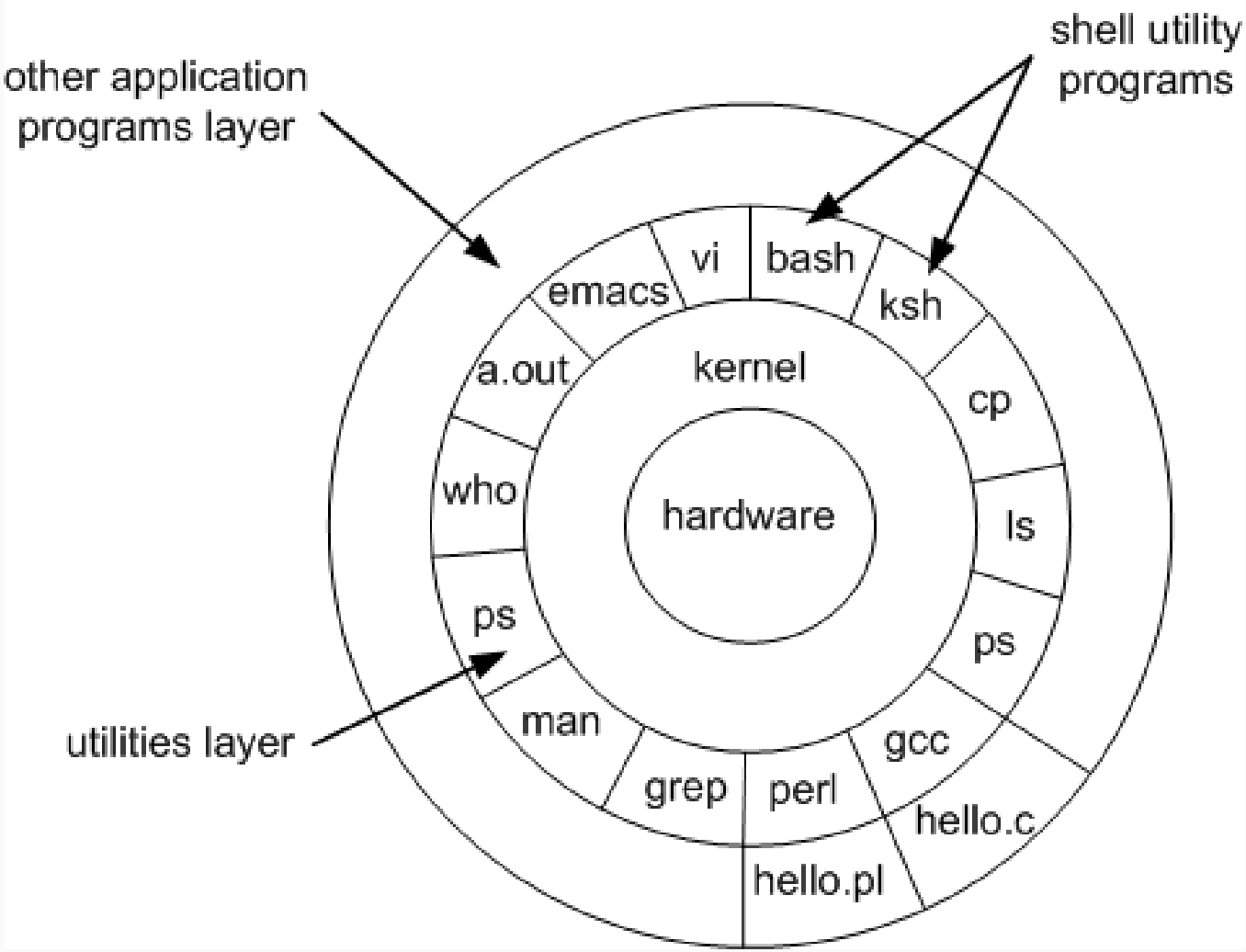
Introduction

Operating System (Overview)

- acts as and intermediary between a user and the hardware;
- manages computer hardware and software resources;
- large and complex software, implemented in layers;
- variety in purpose, design and implementation;

Operating System (Overview)



http://homepages.uc.edu/~thomam/Intro_Unix_Text/OS_Organization.html

Linux Distributions

The Shell

The Shell

- collection of utilities, text-based interface;
- allows users to communicate with the computer;
- allows programs to be started and tasks to be run;

- **sh** (Bourne shell) - basic shell, all UNIX systems;
- **ksh** (Korn shell) - Bourne shell enhanced;
- **csh** (C shell) - syntax similar to the C programming language;
- **bash** (Bourne Again Shell) - combines Korn Shell and C Shell, default in most Linux distributions;

Unix/Linux commands

- file commands (ls, cd, pwd, rm, mv, cat, head);
- process management (ps, top, kill, bg, fg, jobs);
- file permissions (chmod, chown);
- system information (whoami, uname, man, du, df, free, which);
- compression (tar, gzip);
- network (ping, dig, wget, ssh);
- build and install (make, cmake, automake, dpkg, rpm, gcc);
- shortcuts (Ctrl+C, Ctrl+Z);

cheat sheet - `https://files.fosswire.com/2007/08/fwunixref.pdf`

Unix/Linux commands

```
<cmd> --help
ps --help
du -help

man <cmd>
man tar
man uname

apropos <cmd>
apropos network
apropos disk
```

search the Internet - `https://www.google.com`
cheat sheet -
`https://files.fosswire.com/2007/08/fwunixref.pdf`

Bash Scripting

Haddop configuration - snippet

```
#!/bin/bash

export HADOOP_PREFIX=$(pwd)/download/hadoop-2.7.4
master="null"

while read line
do
  if [ "$master" == "null" ]
  then
    master=$line
    echo "$line" > $HADOOP_PREFIX/etc/hadoop/slaves
  else
    echo "$line" >> $HADOOP_PREFIX/etc/hadoop/slaves
  fi
done < hadoop-config.cfg
```

Hadoop configuration - snippet

```
#!/bin/bash

export HADOOP_PREFIX=$(pwd)/download/hadoop-2.7.4
master="null"

head -n 24 $HADOOP_PREFIX/etc/hadoop/hadoop-env.sh > temp.txt
echo "export JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk-amd64" \
  >> temp.txt
echo "export HADOOP_PREFIX=$(pwd)/download/hadoop-2.7.4" >> temp.txt
head -n -25 $HADOOP_PREFIX/etc/hadoop/hadoop-env.sh >> temp.txt
cat temp.txt > $HADOOP_PREFIX/etc/hadoop/hadoop-env.sh

rm temp.txt
```

Iterate program - snippet

```
#!/bin/bash

function clear_cache {
  sync
  sudo sh -c 'echo 3 > /proc/sys/vm/drop_caches'
}

export CLASSPATH="lib/lucene-7.1.0/build/core/classes/java/:bin"
path_hdd="/home/loki/data/"
path_ssd="/storage/data/"
log="iteration.log"

echo -n "" > $log
for i in {1..10}
do
  file="dataset$(($i * 200))MB.txt"

  clear_cache
  java XSearchData $path_hdd$file $path_hdd$terms &>> $log
done
```

Bash Scripting

- ”gluing together” system calls, tools, utilities, and binary programs;
- automate configuration steps and file editing procedures;
- automate program iteration under variant arguments;
- especially suited for system administration tasks;

more resource - `http://tldp.org/LDP/abs/html/`

Secure Shell

POSIX Threads

BSD Sockets

Last remarks