CSGE602055 Operating Systems CSF2600505 Sistem Operasi Week 01: Overview 2, Virtualization & Scripting

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Operating Systems 2019-2

A/M (Rm 3114) $\overline{[Tu/Th\ 08-10]}$ — I (Rm A7.14) $\overline{[Tu\ 13-15/Th\ 14-16]}$

Week	Schedule	Topic	OSC10
Week 00	03 Sep - 09 Sep 2019	Overview 1, Virtualization & Scripting	Ch. 1, 2, 18.
Week 01	10 Sep - 16 Sep 2019	Overview 2, Virtualization & Scripting	Ch. 1, 2, 18.
Week 02	17 Sep - 23 Sep 2019	Security, Protection, Privacy,	Ch. 16, 17
		& C-language	
Week 03	24 Sep - 30 Sep 2019	File System & FUSE	Ch. 13, 14, 15
Week 04	01 Oct - 07 Oct 2019	Addressing, Shared Lib, & Pointer	Ch. 9
Week 05	08 Oct - 14 Oct 2019	Virtual Memory Ch. 10	
Reserved	15 Oct - 18 Oct 2019	Q & E	
MidTerm	Sat, 26 Oct 2019	13:00 - 15:30 — MidTerm (UTS)	
Week 06	29 Oct - 04 Nov 2019	Concurrency: Processes & Threads	Ch. 3, 4
Week 07	05 Nov - 11 Nov 2019	Synchronization & Deadlock Ch. 6, 7, 8	
Week 08	12 Nov - 18 Nov 2019	Scheduling + W06/W07	Ch. 5
Week 09	19 Nov - 25 Nov 2019	Storage, Firmware, Bootldr, & Systemd Ch. 11	
Week 10	26 Nov - 02 Dec 2019	I/O & Programming Ch. 12	
Reserved	03 Dec - 13 Dec 2019	Q & E	
Final	14 Dec - 21 Dec 2019	TBA — Final (UAS) This schedule is	
Extra	09 Jan 2020	Extra assignment confirmation	subject to change.

STARTING POINT — https://os.vlsm.org/

☐ **Text Book** — Any recent/decent OS book. Eg. (**OSC10**) Silberschatz et. al.: **Operating System Concepts**, 10th Edition, 2018. See also http://codex.cs.yale.edu/avi/os-book/OS10/. Weekly Encode your **QRC** with size about 5cm \times 5cm (ca. 400 \times 400 pixels): "OS192 CLASS ID SSO-ACCOUNT Your-Full-Name" Write your Memo (with QRC) every week. See also Assignment#0: Generate your QR Code. Login to badak.cs.ui.ac.id via kawung.cs.ui.ac.id for at least 10 minutes every week. Copy all weekly demo folders into your own badak home directory. Eg.: cp -r /extra/Demos/ . Resources All In One — BADAK.cs.ui.ac.id:///extra/(FASILKOM only!). Download Slides and Demos from GitHub.com https://github.com/UI-FASILKOM-OS/SistemOperasi/ Problems — https://rms46.vlsm.org/2/: 195.pdf (W00), 196.pdf (W01), 197.pdf (W02), 198.pdf (W03), 199.pdf (W04), 200.pdf (W05), 201.pdf (W06), 202.pdf (W07), 203.pdf (W08), 204.pdf (W09), 205.pdf (W10).

Agenda

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Week 01 Overview II: Topics¹

- Types of virtualization (including Hardware/Software, OS, Server, Service, Network)
- Paging and virtual memory
- Virtual file systems
- Hypervisors
- Portable and cost of virtualization; emulation vs. isolation
- Cloud services: IAAS, PAAS and Platform APIs, SAAS
- Introduction to Scripting and REGEX.

¹Source: ACM IEEE CS Curricula 2013

Week 01 Overview II: Learning Outcomes¹

- Explain the concept of virtual memory and how it is realized in hardware and software. [Familiarity]
- Discuss hypervisors and the need for them in conjunction with different types of hypervisors. [Usage]
- Differentiate emulation and isolation. [Familiarity]
- Evaluate virtualization trade-offs. [Assessment]
- Discuss the importance of elasticity and resource management in cloud computing. [Familiarity]
- Explain the advantages and disadvantages of using virtualized infrastructure. [Familiarity]

¹Source: ACM IEEE CS Curricula 2013

Week 01: Review 2 & Scripting

- Pengenalan Lisensi Perangkat Lunak Bebas: https://rms46.vlsm.org/1/70.pdf
- The Minix3 Notes: https://rms46.vlsm.org/2/166.pdf
- Linux Help: https://www.mediacollege.com/linux/
- Intelectual Property Right (IPR)
- Operating System Services
- User Operating System Interface
- System Calls
- Types of System Calls
- System Programs
- Operating System Design and Implementation
- Operating System Structure

Intelectual Property Right (IPR)

- Rahasia Dagang (Trade Sceret) UU no. 30/2000.
- Desain Industri (Industrial Design) UU no. 31/2000.
- Desain Tata Letak Sirkuit Terpadu (Integrated Circuit Layout Design)
 UU no. 32/2000.
- Paten (Patent) UU no. 14/2001.
- Hak Cipta (Copyright) UU no. 19/2002.
- Konsekuensi HKI
- HKI Perangkat Lunak
- Lisensi Perangkat Lunak: GNU GPL, EULA. Public Domain, Apache, Microsoft Public License.

Is this a Software Patent or Not?



Timothu B. Terriberru

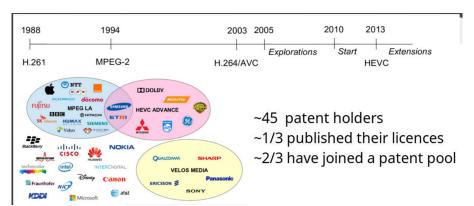
LINUX CONF. AU 21-25 Januaru

EP 0 460 751 B1

Description

The invention relates to a method of transmitting audio and/or video signals via some transmission medium. More particularly the transmission medium is constituted by an optically readable disc. However, the transmission medium may also be a magnetic tape or disc or a direct connection between a transmitter and a receiver. The invention also relates to the transmission medium. on which the audio and/or video signals are recorded, to an encoding apparatus for transmitting the audio and/ or video signals, and to a decoding apparatus for receiving these signals.

The Codec Mess





Courtesy of Jonatan Samuelsson Divideon Co-founder and CEO

Alliance for Open Media



Source (per 18-Feb-19): https://aomedia.org/membership/members/

Free Software

- Free Software Definition (FSF)
 - The freedom to run the program as you wish, for any purpose (freedom 0).
 - The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
 - The freedom to redistribute copies so you can help your neighbor (freedom 2).
 - The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.
- Free Software vs. Open Source Software.
- Copyleft Software.

Software Licenses

- 3-clause BSD license and 2-clause BSD license (BSD-X-Clause)
- Apache License 2.0 (Apache-2.0)
- Artistic License 2.0 (ArtisticLicense2)
- Common Development and Distribution License (CDDL-1.0)
- Eclipse Public License (EPL-1.0)
- Educational Community License 2.0 (ECL2.0)
- Expat License (Expat) aka. MIT license (MIT)
- GNU Affero General Public License v3 (AGPL-3.0)
- GNU All-Permissive License (GNUAllPermissive)
- GNU General Public License (GPL)
- GNU Lesser General Public License (LGPL)
- Microsoft Public License (MS-PL)
- Mozilla Public License 2.0 (MPL-2.0)
- "Public Domain" (PublicDomain)
- X11 License (X11License)

Potpourri

- Mobile/Distributed/Client-Server/Peer-to-Peer Computing.
- Real-Time Computing: Hard Real-Time vs. Soft Real-Time.
- Operating System Comparison: Android, *BSD, GNU/Linux, iOS, Mac OS, Windows.
- Operating System Services: UI (GUI, CLI); Program Executing; I/O
 Operations; File Systems Manipulation; Communication; Error
 Detection; Resource Allocation; Accounting; Protection & Security.
- System Calls: Process Control; File Management; Device Management; Information Maintenance; Communications; Protection.
- Application Programming Interface (API)
- Standard C Library.
- System Programs.
- Microkernel System Structure.
- Loadable Kernel Modules.
- Virtualization and Cloud System.

Scripting

- Readings (do Google!)
 - Machtelt Garrels: Bash Guide for Beginners.
 - Mendel Cooper: An in-depth exploration of the art of shell scripting Advanced Bash-Scripting Guide.
 - Jan Goyvaerts: Regular Expressions The Complete Tutorial.
- The ATM Way (Amati, Tiru, Modifikasi)¹.
 - Clone Demo
 - https://github.com/UI-FASILKOM-OS/SistemOperasi.git
 - GSGS ATM: Google Sana, Google Sini: Amati, Tiru, Modifikasi!
 - Medium: badak.cs.ui.ac.id
 - Opsi: BYOD, WSL (Windows 10), CYGWIN.
 - Belajar **login** dan **logout** dengan ssh atau putty².
 - Belajar editor yang bagus punya buatan (vi).
- Belajar beberapa perintah Command-Line Interface (CLI).
 - shell (Bash)
 - basic CLI: cat, cd, cp, ls, man, more, mv, rm, touch, wc.
 - vi, sed, awk, git.

¹Romi Satria Wahono sudah menggunakan istilah ini sejak tahun 2007 (Google).

²Sesuai dengan keyakinan dan kepercayaan masing-maing.

External Resources

- Linux Resources: http://www.mediacollege.com/linux/
- Tutorial: https://www.mediacollege.com/linux/command-tutorial/
- Commands: https://www.mediacollege.com/linux/command/linux-command.html
- Shell: https://www.mediacollege.com/linux/command/shell-command.html

Some Essential Command Line Commands part 1

```
manual. Eg. "man man"
man
passwd
         changes passwords.
         list directory contents. Eg. "ls -al"
ls
         change the working directory. Eg. "cd /tmp"
cd
         copy file(s). Eg. "cp SOURCE DEST"
ср
         remove file(s). Eg. "rm AFILE"
rm
         move files(s). Eg. "mv FROMFILE TOFILE"
mν
         make directories(s). Eg. "mkdir ADIRECTORY"
mkdir
         remove directories(s). Eg. "rmdir ADIRECTORY"
rmdir
         read file(s) Eg. "cat AFILE"
cat
         read file(s) per screen Eg. "more AFILE"
more
         make a link of a file. Eg. "ln -s file sfile"
ln
         search string aword inside file. Eg. "grep aworld file"
grep
         sort lines of text files. Eg. "sort file1.txt"
sort
top
         display systems task. Eg. "top"
         Eg. "find / -name minix3.iso -print". Find from "/".
find
```

Some Essential Command Line Commands part 2

```
chmod
         Eg. "chmod 755 file". Change file with access mode 755.
         Eg. "chown user file". Change owner file to user.
chown
chgrp
         Eg. "chgrp other file". Change group file to other.
         tape archive file. Eg.
tar
         "tar cf /tmp/tfile.tar dir/". Archive "dir/" into tfile.tar.
         "tar tf /tmp/tfile.tar". List tfile.tar.
         "tar xf /tmp/tfile.tar". Extract tfile.tar.
date
         print or set the system date and time. Eg. "date +%Y"
         read from standard input and write to standard output and files.
tee
         Eg. "ls -al | tee listing.txt"
diff
         compare files line by line. Eg. "diff file1.txt file2.txt"
         print newline, word, and byte counts for each file.
WC.
         Eg. "wc file.txt"
```

Regex: Regular Expressions

- [^ | matches a beginning-of-line (meaningless).
- [^\$] matches a beginning-of-line + end-of-line (empty line).
- [^hello\$| matches just "hello" in a line.
- [[01]?[0-9]|2[0-3]] 00-23.
- [[01]?[4-9] | [012]?[0-3]] 00-23.
- [[0-9]{10}| 10 digits.

The "vi" editor

	Basics		More Commands
i	insert mode	d^	delete from ^ (beginning) to the cursor
a	append mode	d\$	delete from the cursor to \$ (end)
<ESC $>$	escape mode	dd	delete the whole line
q!	quit	5dd	delete 5 lines
wq!	write and quit	уу	yank (copy) the line
ZZ	write and quit	р	put (paste) the line
hjkl	move [left, down, up, right]	J	joint current and next line
r	replace a character	:r file.txt	read (insert) file.txt
d	delete a character	:w! file.txt	write into file.txt
u	undo	:1,8 w! file.txt	write line 1 to 8 into file.txt

sed — the stream editor

- sed 'G' file.txt double space.
- sed 'G;G' file.txt triple space.
- sed -n '4,6p' file.txt show only line 4 to 6.
- sed -n '4,6p' file.txt > newfile.txt write line 4 to 6 to newfile.txt.
- sed $'/[0-9]{2}/p'$ file.txt show only lines with two digits.
- sed '4,6d' file.txt show all except line 4 to 6.
- sed '\$d' file.txt show all except last line.
- sed '5,/HABATS/d' show all except from line 5 to a line with HABATS.
- sed 's/Joko/Bowo/' file.txt replace Joko with Bowo.
- sed 's/Joko/Bowo/2' file.txt replace the second Joko with Bowo.
- sed 's/Joko/Bowo/g' file.txt replace every Joko with Bowo.
- sed 's/Bowo\|bowo/Joko/g' file.txt replace every Bowo or bowo with Joko.

awk — Aho - Weinberger - Kernighan

- awk '{print "Hello awk!"}' file.txt print "Hello awk!" for every file.txt line.
- awk '{print \$0}' file.txt print every file.txt line.
- awk '{print \$1}' file.txt print first field of every file.txt line.
- awk '{print \$2}' file.txt print second field of every file.txt line.

Login into BADAK.cs.ui.ac.id

```
demo@badak:~$ PS1=">>>> $ "
>>>> $ git clone https://qithub.com/UI-FASILKOM-OS/SistemOperasi.qit
Cloning into 'SistemOperasi' ...
remote: Enumerating objects: 51, done.
remote: Counting objects: 100% (51/51), done.
remote: Compressing objects: 100% (23/23), done.
remote: Total 972 (delta 29), reused 34 (delta 27), pack-reused 921
Receiving objects: 100% (972/972), 24.63 MiB | 4.65 MiB/s, done.
Resolving deltas: 100% (637/637), done.
>>>> $ 1s -F SistemOperasi/
CNAME config.yml demos/ LICENSE OLDREADME.md pdf/ README.md
>>>> $ ls -al SistemOperasi/demos/
total 56
drwxr-xr-x 14 demo demo 4096 Jan 16 14:24 .
drwxr-xr-x 5 demo demo 4096 Jan 16 14:24 ...
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week00
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week01
drwxr-xr-x 4 demo demo 4096 Jan 16 14:24 Week02
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week03
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week04
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week05
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week06
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week07
drwyr-yr-y 2 demo demo 4096 Jan 16 14:24 Week08
drwxr-xr-x 4 demo demo 4096 Jan 16 14:24 Week09
drwxr-xr-x 2 demo demo 4096 Jan 16 14:24 Week10
drwyr-yr-y 2 demo demo 4096 Jan 16 14:24 WeekTMP
>>>>> $
```

Inside the "week01-scripting" folder

```
>>>> $ pwd
/home/demo/mydemo/W01-demos
>>>>> $ 1s -a1
total 96
           2 demo demo 4096 Jan 23 18:38 .
drwxr-xr-x
drwx----- 14 demo demo 4096 Jan 23 18:38
-rw-r--r- 1 demo demo 1797 Jan 23 18:38 1-READ-THIS-FIRST.txt
-rw-r--r-- 1 demo demo 4880 Jan 23 18:38 a01-READ-ME
-rw-r--r- 1 demo demo 5644 Jan 23 18:38 a02-sort-n-prepare
-rw-r--r- 1 demo demo 4644 Jan 23 18:38 a03-command-lines-demo
-rw-r--r- 1 demo demo 1193 Jan 23 18:38 a04-does-it-exist
-rw-r--r- 1 demo demo 1204 Jan 23 18:38 a05-finding-EXIST
-rw-r--r- 1 demo demo 1114 Jan 23 18:38 a06-loop
           1 demo demo 1518 Jan 23 18:38 a07-tester
-rw-r--r--
-rw-r--r- 1 demo demo 1577 Jan 23 18:38 a08-append-a-file
-rw-r--r- 1 demo demo 1168 Jan 23 18:38 a09-add-numbers
-rw-r--r-- 1 demo demo 1569 Jan 23 18:38 a10-mvsha1
-rw-r--r-- 1 demo demo 2271 Jan 23 18:38 a11-banding
-rw-r--r 1 demo demo 2110 Jan 23 18:38 a12-fixfs
-rw-r--r- 1 demo demo 1576 Jan 23 18:38 a13-last
-rw-r--r- 1 demo demo 752 Jan 23 18:38 a14-absen
-rw-r--r- 1 demo demo 1187 Jan 23 18:38 a15-uts171
-rw-r--r- 1 demo demo 522 Jan 23 18:38 a16-uts181
-rw-r--r-- 1 demo demo 536 Jan 23 18:38 a17-uts182
-rw-r--r-- 1 demo demo 404 Jan 23 18:38 .head
>>>>> $
```

Demo Files(1)

- 1-READ-THIS-FIRST.txt
- a01-READ-ME: Yes, read that!
- a02-sort-n-prepare: folder sorting; preparing and deleting folder ".ZTEST".
- a03-command-lines-demo: demo beberapa perintah CLI.
- a04-does-it-exist
- a05-finding-EXIST
- a06-loop
- a07-tester

Demo Files(2)

- a08-append-a-file
- a09-add-numbers
- a10-mysha1
- all-banding
- a12-fixfs
- a13-last
- a14-absen
- a15-uts171
- a16-uts181
- a17-uts182

Week 01: Summary

• Reference: (OSC10 chapter 1 + chapter 2 + chapter 18)

Week 01: Check List

☐ How to improve this document?

The End

- \square This is the end of the presentation.
- extstyle ext
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