

CSGE602055 Operating Systems

CSF2600505 Sistem Operasi

Week 01: Overview 2, Virtualization & Scripting

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<https://os.vlsm.org/>

Always check for the latest revision!

REV209 03-Sep-2019

Operating Systems 2019-2

A/M (Rm 3114) [Tu/Th 08-10] — I (Rm A7.14) [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, & C-language | Ch. 16, 17 |
| 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 | 19 Oct - 25 Oct 2019 | TBA — 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 Extra | 14 Dec - 21 Dec 2019 09 Jan 2020 | TBA — Final (UAS) Extra assignment confirmation | This schedule is 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 x 5cm (ca. 400x400 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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Agenda (2)

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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/>
- Intellectual 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

Intellectual 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?

The AV1 Video Codec

Timothy B. Terriberry

LINUX.CONF.AU
21-25 January
2019

EUROPEAN PATENT SPECIFICATION



(11)

EP 0 460 751 B1

Date of filing: 03.06.1991

**Method of transmitting audio
and/or video signals**

1

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



**ALLIANCE FOR
OPEN MEDIA**

FOUNDING MEMBERS

amazon

Apple

arm

CISCO

facebook

Google

IBM

intel

Microsoft

mozilla

NETFLIX

NVIDIA

PROMOTER MEMBERS

Adobe

Alibaba Group

ALLEGRO

AMD

Video

vimeo

Almlogic

ARGON DESIGN

Centame

BBC
R&D

优酷
Youku

XILINX

金山云

BITMOVIN

BROADCOM

CableLabs

优酷
Youku

Chips Media

gfycat

hulu

Ittiam

优酷
Youku

iQIYI 爱奇艺

INGCODEC

Polycom

REALTEK

socionext

V-SILICON

Ven Silicon

Vidyo

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

- Free Software Definition (FSF)

- ① The freedom to run the program as you wish, for any purpose (freedom 0).
- ① 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.
- ② The freedom to redistribute copies so you can help your neighbor (freedom 2).
- ③ 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)

- 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.

- 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-masing.

- 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

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

Some Essential Command Line Commands part 2

| | |
|-------|---|
| chmod | Eg. "chmod 755 file". Change file with access mode 755. |
| chown | Eg. "chown user file". Change owner file to user. |
| chgrp | Eg. "chgrp other file". Change group file to other. |
| tar | tape archive file. Eg. "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" |
| tee | read from standard input and write to standard output and files. Eg. "ls -al tee listing.txt" |
| diff | compare files line by line. Eg. "diff file1.txt file2.txt" |
| wc | print newline, word, and byte counts for each file. 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.
- `^(From|To|CC):` — matches `^(From:` or `^(To:` or `^(CC:`.
- `[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 | yy | yank (copy) the line |
| ZZ | write and quit | p | put (paste) the line |
| h j k l | move [left, down, up, right] | J | join 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 '{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://github.com/UI-FASILKOM-OS/SistemOperasi.git
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.
```

```
>>>> $ ls -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
drwxr-xr-x  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
drwxr-xr-x  2 demo demo 4096 Jan 16 14:24 WeekTMP
>>>> $
```


Inside the "week01-scripting" folder

```
>>>> $ pwd
/home/demo/mydemo/W01-demos

>>>> $ ls -al
total 96
drwxr-xr-x  2 demo demo 4096 Jan 23 18:38 .
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
-rw-r--r--  1 demo demo 1518 Jan 23 18:38 a07-tester
-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-mysha1
-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
- a11-banding
- a12-fixfs
- a13-last
- a14-absen
- a15-uts171
- a16-uts181
- a17-uts182

Week 01: Summary

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

- ☐ **How to improve this document?**

The End

- ☐ This is the end of the presentation.
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