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!

REV174 11-Dec-2018

Operating Systems 2018-2 (Room 3114)
R/M (Tu/Th 13-15) | I (Tu/Th 15-17)

Week	Schedule	Topic	OSC10
Week 00	04 Sep - 12 Sep 2018	Overview 1, Virtualization & Scripting	Ch. 1, 2, 18.
Week 01	13 Sep - 19 Sep 2018	Overview 2, Virtualization & Scripting	Ch. 1, 2, 18.
Week 02	20 Sep - 26 Sep 2018	Security, Protection, Privacy, & C-language	Ch. 16, 17
Week 03	27 Sep - 03 Oct 2018	File System & FUSE	Ch. 13, 14, 15
Week 04	04 Oct - 10 Oct 2018	Addressing, Shared Lib, & Pointer	Ch. 9
Week 05	11 Oct - 17 Oct 2018	Virtual Memory	Ch. 10
Reserved	18 Oct - 19 Oct 2018		
Mid-Term	24 Oct 2018	MidTerm (UTS): 09:00 - 11:30	
Week 06	30 Oct - 05 Nov 2018	Concurency: Processes & Threads	Ch. 3, 4
Week 07	06 Nov - 12 Nov 2018	Synchronization & Deadlock	Ch. 6, 7, 8
Week 08	13 Nov - 21 Nov 2018	Scheduling	Ch. 5
Week 09	22 Nov - 28 Nov 2018	Storage, BIOS, Loader, & Systemd	Ch. 11
Week 10	29 Nov - 05 Dec 2018	I/O & Programming	Ch. 12
Reserved	06 Dec - 14 Dec 2018		
Final	19 Dec 2018	Final (UAS): 09:00 - 11:00	This schedule is
Extra	12 Jan 2019	Extra assignment	subject to change.

The Weekly Check List

- **Resources**: `https://os.vlsm.org/`
  - **(THIS) Slides** — `https://github.com/UI-FASILKOM-OS/SistemOperasi/tree/master/pdf/`
  - **Demos** — `https://github.com/UI-FASILKOM-OS/SistemOperasi/tree/master/demos/`
  - **Extra** — `BADAK.cs.ui.ac.id:///extra/`
  - **Problems** — `rms46.vlsm.org/2/195.pdf`, `196.pdf`, ..., `205.pdf`
- **Text Book**: any recent/decent OS book. Eg. (**OSC10**) Silberschatz et. al.: **Operating System Concepts**, 10^{th} Edition, 2018.
- Encode your **QRC** with size upto 7cm x 7cm (ca. 400x400 pixels): **"OS182 CLASS ID SSO-ACCOUNT Your-Full-Name"**
- For **Week 00**, send your **embedded** QRC **before the** 2^{nd} **lecture**
  `mailto:operatingsystems@vlsm.org`
  With Subject: `OS182 CLASS ID SSO-ACCOUNT Your-Full-Name`
- Write your Memo (with QRC) **every week**.
- Login to `badak.cs.ui.ac.id` via `kawung.cs.ui.ac.id` for at least **10 minutes** every week. Copy the weekly demo files to your own home directory.
  Eg. (Week00): `cp -r /extra/Week00/W00-demos/ W00-demos/`

Agenda

1. Start
2. Schedule
3. Agenda
4. Week 01
5. Week 01: Review 2
6. Free Software
7. Software Licenses
8. Potpourri
9. Scripting
10. Demo

Agenda (2)

Week 01 Overview II: Topics[1]

- 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.

[1] Source: ACM IEEE CS Curricula 2013

Week 01 Overview II: Learning Outcomes[1]

- 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]

[1] Source: ACM IEEE CS Curricula 2013

Week 01: Review 2 & Scripting

- `https://rms46.vlsm.org/1/70.pdf`
- 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.

Free Software

- Free Software Definition (FSF)
  0. 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)

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/demo.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 `putty`[2].
  - 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.

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

[2] Sesuai dengan keyakinan dan kepercayaan masing-maing.

Login into BADAK.cs.ui.ac.id

```
demo@badak:~$
demo@badak:~$ PS1=">>>>> $ "
>>>>> $
>>>>> $ git clone https://github.com/UI-FASILKOM-OS/demo.git demo-here
Cloning into 'demo-here'...
remote: Counting objects: 1697, done.
remote: Compressing objects: 100% (64/64), done.
remote: Total 1697 (delta 52), reused 60 (delta 24), pack-reused 1608
Receiving objects: 100% (1697/1697), 11.87 MiB | 3.76 MiB/s, done.
Resolving deltas: 100% (1001/1001), done.

>>>>> $ ls -F demo-here/
demos/             demos-170828-2222.zip  demostar.tgz  README.md
demos-170827-1833.zip  demos-170905-0943.zip  LICENSE     zzzThis
>>>>> $ cd demo-here
>>>>>  $ ls -F
demos/             demos-170828-2222.zip  demostar.tgz  README.md
demos-170827-1833.zip  demos-170905-0943.zip  LICENSE     zzzThis
>>>>>  $ cd demos/
>>>>>  $ ls -F
week00-introduction/ week03-boot/       week06-CnFork/      week09-File-Storage-System/
week01-scripting/ week04-pointer-io/  week07-sync-thread/      week10-video-review/
week02-c-and-security/  week05-memory/     week08-scheduling-sockets/
>>>>>  $ cd week01-scripting/
```

Inside the "week01-scripting" folder

```
>>>>> $ pwd
/home/demo/work/demo-here/demos/week01-scripting
>>>>> $ ls -al
total 60
drwxr-xr-x  2 demo demo 4096 Sep 11 15:28 .
drwxr-xr-x 13 demo demo 4096 Sep  5 09:43 ..
-rw-r--r--  1 demo demo 4817 Sep 11 15:16 a01-sort-script
-rw-r--r--  1 demo demo 2206 Sep 11 15:27 a02-some-command-lines
-rw-r--r--  1 demo demo  557 Sep  8 22:02 a03-does-it-exist
-rw-r--r--  1 demo demo  581 Sep 11 14:07 a04-finding-EXIST
-rw-r--r--  1 demo demo 1152 Sep 11 14:22 a05-append-a-file
-rw-r--r--  1 demo demo  549 Sep 11 14:25 a06-loop
-rw-r--r--  1 demo demo  745 Sep 11 14:45 a07-tester
-rw-r--r--  1 demo demo 1856 Sep 11 15:08 a08-banding
-rw-r--r--  1 demo demo 1779 Sep  8 21:57 a09-fixfs
-rw-r--r--  1 demo demo  614 Sep  8 21:58 a10-add-numbers
-rw-r--r--  1 demo demo 1068 Sep 11 15:20 a11-mysha1
-rw-r--r--  1 demo demo  367 Sep  8 21:59 .head
lrwxrwxrwx  1 demo demo   15 Sep  4 19:16 .shsh -> a01-sort-script
>>>>> $
```

Demo Files(1)

- a01-sort-script: folder sorting; preparing and deleting folder ".ZTEST".
- a02-some-command-lines: demo beberapa perintah CLI.
- a03-does-it-exist
- a04-finding-EXIST
- a05-append-a-file
- a06-loop

Demo Files(2)

- a07-tester
- a08-banding
- a09-fixfs
- a10-add-numbers
- a11-mysha1

Some Essential Commands

man	manual. Eg `"man man"`
ls	list directory contents. Eg. `"ls -al"`
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"`
sort	sort lines of text files. Eg. `"sort file1.txt"`

sed

- (to do)
- (see OLD 02-scripting)

awk

- (to do)
- (see OLD 02-scripting)

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.

Week 01: Summary

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

Week 01: Check List

- [ ] **How to improve this document?**

The End

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