

CSGE602055 Operating Systems

CSF2600505 Sistem Operasi

Week 02: Protection, Security, Privacy, & C-language

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

Always check for the latest revision!

REV162 12-Sep-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 | 20 Oct - 27 Oct 2018 | MidTerm (UTS): TBA | |
| Week 06 | 30 Oct - 05 Nov 2018 | Concurrency: 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 | Disks, BIOS, Loader, & Systemd | Ch. 11 |
| Week 10 | 29 Nov - 05 Dec 2018 | I/O & Programming | Ch. 12 |
| Reserved | 06 Dec - 14 Dec 2018 | | |
| Final | 15 Dec - 22 Dec 2018 | Final (UAS): TBA | This schedule is subject to change. |
| Extra | 12 Jan 2019 | Extra assignment | |

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](http://rms46.vlsm.org/2/196.pdf), ..., [205.pdf](http://rms46.vlsm.org/2/205.pdf)
- ☐ **Text Book:** any recent/decent OS book. Eg. (**OSC10**) Silberschatz et. al.: **Operating System Concepts**, 10th Edition, 2018.
- ☐ Encode your **QRC** with image size of approximately 250x250 pixels:
"OS182 CLASS ID SSO-ACCOUNT Your-Full-Name"
Special for **Week 00**, mail your **embedded** QRC to:
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

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- 6 Week 02: Protection, Security, Privacy, & C-language
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- 12 Week 02: Check List
- 13 The End

Week 02 Security & Protection: Topics¹

- Overview of system security
- Policy/mechanism separation
- Security methods and devices
- Protection, access control, and authentication
- Backups

¹Source: ACM IEEE CS Curricula 2013

Week 02 Security & Protection: Learning Outcomes¹

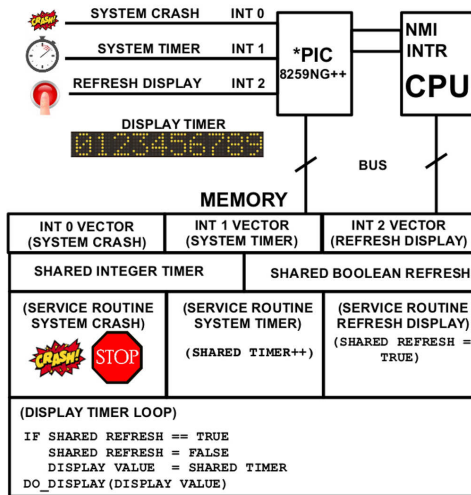
- Articulate the need for protection and security in an OS (cross-reference IAS/Security Architecture and Systems Administration/Investigating Operating Systems Security for various systems). [Assessment]
- Summarize the features and limitations of an operating system used to provide protection and security [Familiarity]
- Explain the mechanisms available in an OS to control access to resources [Familiarity]
- Carry out simple system administration tasks according to a security policy, for example creating accounts, setting permissions, applying patches, and arranging for regular backups [Usage]

¹Source: ACM IEEE CS Curricula 2013

Week 02: Protection, Security, Privacy, & C-language

- Reference: (OSC10-ch16 OSC10-ch17 demo-w02)
- Goals of Protection
- Domain and Access Matrix
- ACL: Access Control List
- The Security Problem
- Threats: Trojan Horse, Trap Door, Overflow, Viruses, Worms, Port Scanning, DOS (Denial of Service).
- Cryptography: (Symmetric and Asymmetric) Encryption,
- User Authentication: Password, Biometrics.
- Implementing Security Defenses: Policy, Assesment, Prevention, Detection, Protection, Auditing.
- Privacy.

How to Protect?



(c) 2017 VauLSMorg – This is a free picture

Figure: How to protect and secure this design?

Goals and Principles of Protection

- Principle of Least Privilege
- Domain Structure and Access Matrix
- Domain = set of Access-rights (eg. **user-id**).
- Access-right = <object-name, rights-set> (eg. object: file).

| | File1 | File2 | File3 | Printer |
|-------|-------|-------|---------|---------|
| User1 | Read | | Read | |
| User2 | | | | Print |
| User3 | | Read | Execute | Print |
| User4 | R/W | | R/W | Print |

- Access-right Plus Domain (Users) as Objects

| | F1 | F2 | F3 | Printer | U1 | U2 | U3 | U4 |
|----|-----|----|------|---------|----|----|----|----|
| U1 | R | | R | | | SW | | |
| U2 | | | | Print | | | SW | SW |
| U3 | | R | EXEC | Print | | | | |
| U4 | R/W | | R/W | Print | SW | | | |

Copy Rights

- Start

| | File1 | File2 | File3 |
|-------|-------|-------|--------|
| User1 | Exec | | Write* |
| User2 | Exec | Read* | Exec |
| User3 | Exec | | |

- User3: Read access to File2 (by User2)

| | File1 | File2 | File3 |
|-------|-------|-------------|--------|
| User1 | Exec | | Write* |
| User2 | Exec | Read* | Exec |
| User3 | Exec | Read | |

- Owner Rights

| | File1 | File2 | File3 |
|-------|-------|-------------|------------|
| User1 | O & E | | W |
| User2 | | O & R* & W* | O & R* & W |
| User3 | | W | W |

The Security Problem

- Security Violation Categories
- Security Measure Levels
- Encryption
- Linux Security
- gnupg & sha1sum

- Privacy can mean different things in different contexts; different people, cultures, and nations have different expectations about how much privacy a person is entitled to or what constitutes an invasion of privacy.
- Considering all discussions as one of these concepts
 - Right to be let alone (such as one's own home).
 - Limited access (no information collection).
 - Control over information (in the era of big data).
 - States of privacy: solitude, intimacy, anonymity, and reserve.
 - Secrecy: does not apply for any already publicly disclosed.
 - Personhood and autonomy.
 - Self-identity and personal growth.

- Reference: (Any C Language Tutorial)

Week 02: Summary

- Reference: (OSC9-ch14 OSC9-ch15 demo-w02)
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- Cryptography: (Symmetric and Asymmetric) Encryption,
- User Authentication: Password, Biometrics.
- Implementing Security Defenses: Policy, Assesment, Prevention, Detection, Protection, Auditing.
- Privacy.

☐ **How to improve this document?**

The End

- ☐ This is the end of the presentation.
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