CSGE602055 Operating Systems
CSF2600505 Sistem Operasi
Week 02: Security, Protection, Privacy, & C-language

Rahmat M. Samik-Ibrahim

University of Indonesia

https://os.vlsm.org/
Always check for the latest revision!

REV177 09-Jan-2018

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

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

Week 02 Security & Protection: Topics[1]

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

[1] Source: ACM IEEE CS Curricula 2013

Week 02 Security & Protection: Learning Outcomes[1]

- 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]

[1] Source: ACM IEEE CS Curricula 2013

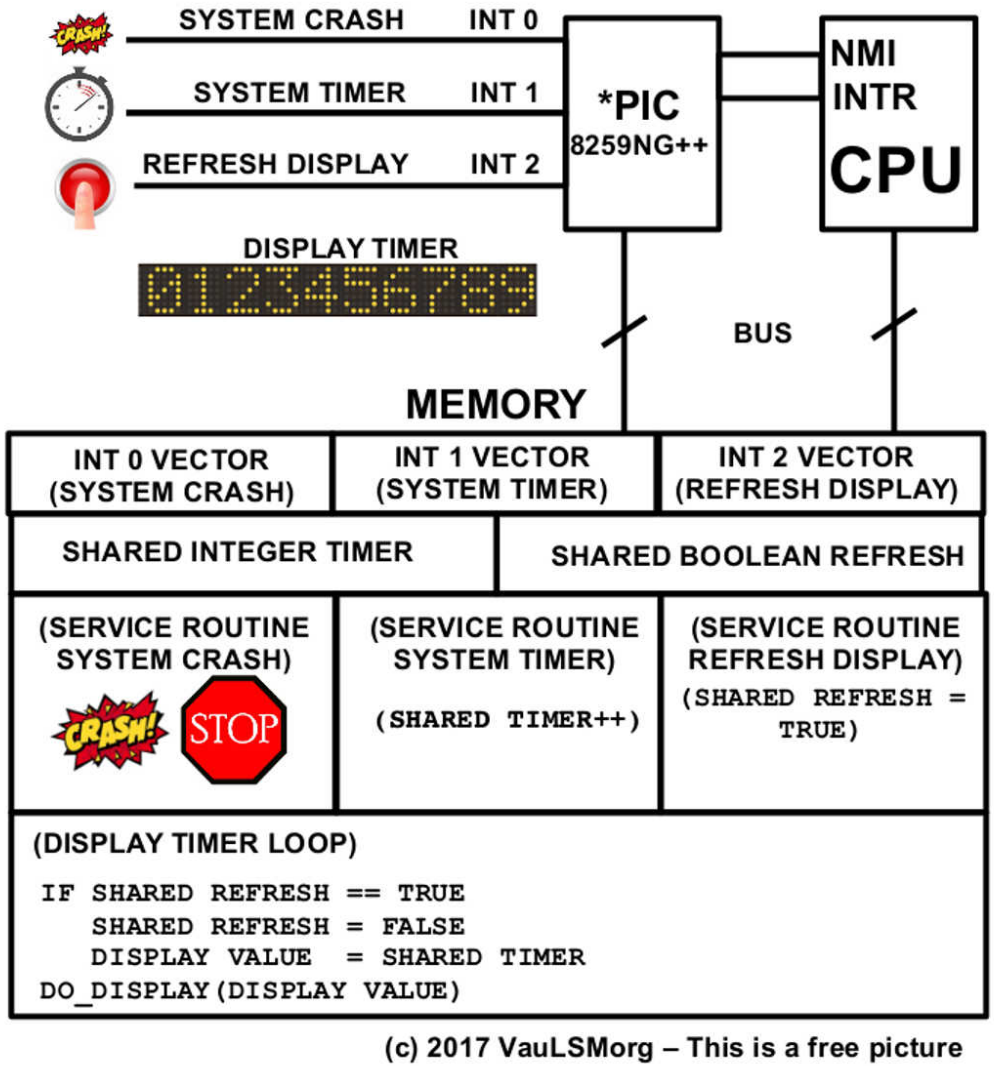

Figure: How to protect and secure this design?

The Security Problem

- Program, System, and Network Threats
  - Security Hole: Code Review
  - Principle of least privilege
- Secure System, Intruders, Threat, Attack.
- Security Violation Categories: Breach of (confidentiality, integrity, availability), theft of service, DOS.
- Security Violation Methods: Masquerading, Replay attack, Human-in-the-middle attack, Session hijacking, Privilege escalation.
- Security Measure Levels: Physical, Application, Operating System, Network.
- Threats: Malware, Trojan Horse, Spyware, Ransomware, Trap (back) Door, Logic Bomb, Code-injection Attack, Overflow, Script Kiddie.
- Viruses: Virus Dropper, Virus Signature, Keystroke Logger.
- Worm, Sniffing, Spoofing, Port Scanning, DOS (Denial of Service).

The Security Problem (cont)

- Cryptography: (Symmetric and Asymmetric) Encryption, Public/Private Key Pairs, Key Distribution, Digital Certificate.
- User Authentication:
  - Password: One Time Password, Two-Factor Authentication,
  - Biometrics.
- Implementing Security Defenses: Policy, Assesment, Prevention, Detection, Protection, Auditing.
- Linux Security
- gnupg & sha1sum

Protection

- Principle of Least Privilege
- Domain Structure and Access Matrix
- ACL: Access Control List
  - 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

Privacy (Wikipedia)

- 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.

C Language

- Reference: (Any C Language Tutorial)

Week 02: Summary

- 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.

Week 02: Check List

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

The End

- ☐ This is the end of the presentation.
- ☒ This is the end of the presentation.
- This is the end of the presentation.