

# CSCE604227 System Programming

## CSCE604227 Pemrograman Sistem

### Week 01: Linux Kernel and Programming Interface

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<https://doc0S.vlsm.org/SPSlides/sp01.pdf>

Always check for the latest revision!

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# SP241<sup>1</sup>): System Programming

Week	Topic
Week 00	Overview
Week 01	Linux Kernel and Programming Interface
Week 02	Revisit Linux From Scratch
Week 03	FUSE: Filesystem in Userspace
Week 04	GetOpt
Week 05	Autoconf and Automake
Week 06	Boxing/Unboxing
Week 07	Sync, SETUID, and MMAP
Week 08	Kernel Modules I
Week 09	Kernel Modules II
Week 10	Kernel Modules III

<sup>1</sup>) This information will be on **EVERY** page two (2) of this course material.

- ❑ **Text Book** — The Linux Programming Interface, 2010, No Starch Press, ISBN 978-1-59327-220-3 — <https://man7.org/tlpi/>.
- ❑ **Resources**
  - ❑ **SCELE** — <https://scele.cs.ui.ac.id/course/view.php?id=3742>.  
The enrollment key is **XXX**.
  - ❑ **Download Slides and Demos from GitHub.com**  
<https://github.com/os2xx/docOS/>:  
[sp00.pdf \(W00\)](#), [sp01.pdf \(W01\)](#), [sp02.pdf \(W02\)](#), [sp03.pdf \(W03\)](#),  
[sp04.pdf \(W04\)](#), [sp05.pdf \(W05\)](#), [sp06.pdf \(W06\)](#), [sp07.pdf \(W07\)](#),  
[sp08.pdf \(W08\)](#), [sp09.pdf \(W09\)](#), [sp10.pdf \(W10\)](#).
  - ❑ **LFS** — <http://www.linuxfromscratch.org/lfs/view/stable/>
  - ❑ **OSP4DISS** — <https://osp4diss.vlsm.org/>
  - ❑ **This is How Me DO IT!** — <https://doit.vlsm.org/>
    - ❑ PS: "Me" rhymes better than "I" duh!

# Agenda

- 1 Start
- 2 Schedule
- 3 Agenda
- 4 The Linux Kernel Archives
- 5 The Linux Programming Interface

# The Linux Kernel Archives

- URL: <https://kernel.org/>
  - HTTP: <https://www.kernel.org/pub/>
  - Kernel Source: <https://www.kernel.org/pub/linux/kernel/>
- 30-Jan-2024 — 6.7.2 — [https://www.kernel.org/finger\\_banner](https://www.kernel.org/finger_banner)

```
The latest stable version of the Linux kernel is:           6.7.2
The latest mainline version of the Linux kernel is:         6.8-rc2
The latest stable 6.7 version of the Linux kernel is:       6.7.2
The latest longterm 6.6 version of the Linux kernel is:     6.6.14
The latest longterm 6.1 version of the Linux kernel is:     6.1.75
[...]
The latest longterm 5.4 version of the Linux kernel is:     5.4.268
The latest longterm 4.19 version of the Linux kernel is:    4.19.306
The latest longterm 4.14 version of the Linux kernel is:    4.14.336 (EOL)
The latest linux-next version of the Linux kernel is:       next-20240130
```

- How to compile Linux Kernel on Debian VirtualBox Guest — <https://doit.vlsm.org/007.html>.

# The Linux Programming Interface (1)

- URL: <https://man7.org/tlpi/>
- Purchasing: <https://man7.org/tlpi/purchase.html>
- Source Code: <https://man7.org/tlpi/code/>
  - Lastest Distribution:  
<https://man7.org/tlpi/code/download/tlpi-240109-dist.tar.gz>
  - Download Full List: <https://man7.org/tlpi/code/download/>
- README: <https://man7.org/tlpi/code/README.html>
- BUILDING notes: <https://man7.org/tlpi/code/BUILDING.html>
- FAQ: <https://man7.org/tlpi/code/faq.html>
- Debian Packages List: <https://doit.vlsm.org/026.html>.

# The Linux Programming Interface (2)

- Test: `time/calendar_time`

```
cbkadal@cbkadal:~/src/tlpi-dist$ time/calendar_time
Seconds since the Epoch (1 Jan 1970): 1644855271 (about 52.123 years)
  gettimeofday() returned 1644855271 secs, 35730 microsecs
Broken down by gmtime():
  year=122 mon=1 mday=14 hour=16 min=14 sec=31 wday=1 yday=44 isdst=0
Broken down by localtime():
  year=122 mon=1 mday=14 hour=23 min=14 sec=31 wday=1 yday=44 isdst=0

asctime() formats the gmtime() value as: Mon Feb 14 16:14:31 2022
ctime() formats the time() value as:      Mon Feb 14 23:14:31 2022
mktime() of gmtime() value:      1644830071 secs
mktime() of localtime() value: 1644855271 secs

cbkadal@cbkadal:~/src/tlpi-dist$
```

# The Linux Programming Interface (3)

- Test: getopt/t\_getopt (TLPI Appendix B)

```
cbkadal@cbkadal:~/src/tlpi-dist$ getopt/t_getopt -x -p hello world
opt =120 (x); optind = 2
opt =112 (p); optind = 4
-x was specified (count=1)
-p was specified with the value "hello"
First nonoption argument is "world" at argv[4]
```

```
cbkadal@cbkadal:~/src/tlpi-dist$ getopt/t_getopt -p
opt = 58 (:); optind = 2; optopt =112 (p)
Missing argument (-p)
Usage: getopt/t_getopt [-p arg] [-x]
```

```
cbkadal@cbkadal:~/src/tlpi-dist$ getopt/t_getopt -a
opt = 63 (?); optind = 2; optopt = 97 (a)
Unrecognized option (-a)
Usage: getopt/t_getopt [-p arg] [-x]
```

```
cbkadal@cbkadal:~/src/tlpi-dist$ getopt/t_getopt -p str -- -x
opt =112 (p); optind = 3
-p was specified with the value "str"
First nonoption argument is "-x" at argv[4]
```

```
cbkadal@cbkadal:~/src/tlpi-dist$ getopt/t_getopt -p -x
opt =112 (p); optind = 3
-p was specified with the value "-x"
```