

CSF2600505 Sistem Operasi CSGE602055 Operating Systems Minggu 00: Intro

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Universitas Indonesia



<http://rms46.vlsm.org/2/207.html>

REV56 27-Aug-2017

Agenda

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Branch: **master** ▾ **os172 / OS172 /**

 **rms46**  **UI-FASILKOM-OS / os172**

..













| | | |
|--|--------------------|----------------|
|  os00-172.pdf | pamulang1 OS172 | 20 minutes ago |
|  os01-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os02-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os03-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os04-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os05-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os06-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os07-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os08-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os09-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  os10-172.pdf | pamulang1 UF-os172 | 44 minutes ago |
|  osXX-172.pdf | pamulang1 UF-os172 | 44 minutes ago |

Figure: <http://rms46.vlsm.org/2/207.html>

- Universitas Goettingen didirikan: **1734** (MDCCXXXIV).
- Universitas Indonesia didirikan: 1849 (STIK, pra STOVIA).
- Bekerja di Universitas Indonesia: sejak 1984.
- Pengguna GNU/Linux: sejak 1994.
- VauLSMorg (vlsm.org): sejak 1996.
- Blog: rahmatm.samik-ibrahim.vlsm.org/
 - Blog: 2016/08/panggil-saya-rahmat.html
 - Blog: 2013/10/kumpulan-hal.html
 - Blog: 2011/08/ibu-ke-pasar-membeli-ayam.html
- Twitter: @rms46
- Facebook: facebook.com/RMS46F/
- Kontak via WhatsApp group: +62-881-456-XXXX

TOP 10 OS

- 1 Nama saya **Rahmat**. Rahmat nama saya. Kalau bukan Rahmat, bukan nama saya!
- 2 Jangan datang lebih lambat dari pada Pengajar!
- 3 Jangan berisik/asyik sendiri dalam kelas!
- 4 Jangan lupa mempersiapkan diri untuk berpartisipasi dalam kelas!
- 5 Jangan lupa membawa selembaar kertas (+QRC) untuk membuat memo kuliah!
- 6 Jangan main "*games*" dan "*chat*" dengan "*gadget*" anda!
- 7 Jangan meminjam peralatan selama kuis dan ujian!
- 8 Jangan curang!
- 9 Jangan menghubungi Pengajar untuk masalah Administratip!
- 10 Jangan menjadi "*Puss in Boot*"!

Jangan menjadi Puss In Boot

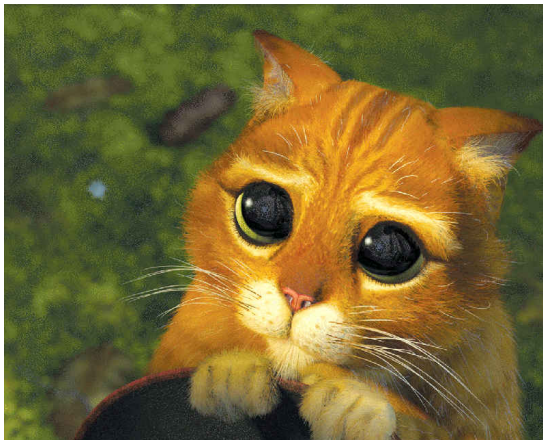


Figure: Ini Puss in Boot¹.

¹This is a fair use of a DreamWorks/Pearlman Pictures character.

Goal

Coverage

This is an introduction to a modern operating systems course. It will cover general overview, computer architecture review, operating system overview, software licenses, GNU/Linux CLI, versioning, scripting, C language overview, protection, security, gnupg, processes and threads, addressing and pointers, memory management, virtual memory, synchronization, mutual exclusion, deadlock, CPU scheduling algorithms, file systems.

Student-Centered

This course is student-centered where responsibility is in the hands of the students. Students are expected to be prepared for the class meeting.

GNU/Linux

Students will have a thorough understanding of how GNU/Linux provides services by using a Command Line Interface.

QR Code: OS172 CLASS ID NAME

```
# OS172: OS 2017 2nd term
# CLASS: A (reguler) E (Extention) I (International) M (Matriculation)
# ID:      Student ID (NPM)
# NAME:    NAME (SIAK)
```

```
$ qrencode "OS172 X 9999999999 Cicak bin Kadal" -s 20 -o
    OS172-A-9999999999.png
```

```
$ zbarimg OS172-A-9999999999.png
QR-Code:OS172 X 9999999999 Cicak bin Kadal
scanned 1 barcode symbols from 1 images in 0.11 seconds
```



Quick Response (QR) Code

[OS172][WEEK: 00 01 02 03 04 05 06 07 08 09 10]

[CLASS: A E I M X][ID: 9999999999][NAME: Cicak bin Kadal][REV03]

1. This is an example of the "Nightmare" font
2. This is an example of the "Kelly" font
3. This is an example of the "Elen" font
4. This is an example of the "Ray" font
5. This is an example of the "Tara" font
6. This is an example of the "Petal" font
7. This is an example of the "Valley" font
8. This is an example of the "Harris" font
9. This is an example of the "Bobbie #2" font
10. This is an example of the "Lilly V" font



*) This handwriting image may be subject to copyright (<http://www.walterware.com/samples.html>).

Figure: OS172 X 9999999999 Cicak bin Kadal

- **4 SKS:** Alokasikan 12 jam per minggu
- **No Lab., No Assistant: Active Preparation/Participation.**
- **Salinan Memo dengan QR Code**

- <mailto:os172@vlsm.org>

| Minggu: | Subject: |
|----------------------|----------------------|
| Minggu 00 (Week00) | W00 CLASS STUDENT-ID |
| • Minggu 01 (Week01) | W01 CLASS STUDENT-ID |
| ⋮ | ⋮ |
| Minggu 10 (Week10) | W10 CLASS STUDENT-ID |

- Harap menghubungi SEKRE (Gedung B lantai 2) untuk segala masalah administratif, terutama absen, sakit, surat sakit, ujian susulan, dst.
- Harap merampungkan masalah administrasi ujian susulan dalam 6 hari kerja.

| | | | |
|--------------|--------------|--------------|-------------------------------|
| 85 - ... = A | 80 - 85 = A- | 75 - 80 = B+ | 70 - 75 = B |
| 65 - 70 = B- | 60 - 65 = C+ | 55 - 60 = C | 50 - 55 = D or C ¹ |

- UTS: 6 set problem @ 6 point (=36%).
- UAS: 5 set problem @ 6 point (=30%).
- Partisipasi Pra-UTS: 6 set @ 3 poin (=18%).
- Partisipasi Pasca-UTS: 5 set @ 3 point (=15%).
- Pembuatan Memo dengan QR-Code.
- Extra untuk nilai C keatas: 1 poin¹.
- C-2C untuk nilai C-: hingga 5 poin¹.
- Silakan membawa kertas A4 ke ruang ujian¹.

¹Syarat dan Ketentuan Berlaku

Resources

- Silakan memilih buku Sistem Operasi yang terbit dalam 10 tahun terakhir.
- OLD — (ARSIP)(017_BAHAN-AJAR-LAMA) Previous Slides.
- SUP — (ARSIP)(041_Suplemen) Supplement.
- OSCE2e — (ARSIP)(050_OSC-Silberschatz) OSCE2e
- UCB — (ARSIP)(070_KULIAH-INTERNASIONAL) UC Berkeley
- UDA — (ARSIP)(070_KULIAH-INTERNASIONAL) UDACITY
- ETC — (ARSIP)(075_ETC-Video) ETC
- DEMO — (GITHUB) <https://github.com/UI-FASILKOM-OS/demo>
- SLIDE — (SLIDE) <http://rms46.vlsm.org/2/207.html>
- SCELE: <https://scele.cs.ui.ac.id/course/view.php?id=124>
 - Enrollment key: "01111000"¹
- ARCHIVE (Arsip bahan pengajaran):
<https://scele.cs.ui.ac.id/course/view.php?id=126>
 - Enrollment key: "11100001"¹.

¹Sewaktu-waktu akan diganti!

Schedule part 1

- Week00 – Intro (OSCE2e ch1/2)(UCB 01)(UDA P1L1/2) (OLD 00)
- Week01 – IPR & Scripting (ETC 000 001 002)(OLD 02-HKI 02-scripting) (Any Related Tutorial)
- Week02 – Protection, Security, & C-language (OSCE2e ch13-4) (ETC 050-1 C001-8) (OLD 01) (Any C Language Tutorial)
- Week03 – BIOS, Boot, & Systemd (Any Related Tutorial) (ETC 300-324) (SUP WEEK03)
- Week04 – Addressing, Pointer & I/O Programing (OLD 08 10)
- Week05 – Memory (OSCE2e ch7/8) (UCB 11 12 13) (UDA P3L2) (OLD 06)
- UTS 00 01 02 03 04 05

Schedule part 2

- Week06 – Processes & Threads (OSCE2e ch3/4) (UCB 02 03) (UDA P2L1/2/3) (OLD 03)
- Week07 – Synchronization (OSCE2e ch5) (UCB 7/8) (UDA P3L3/4) (OLD 04)
- Week08 – Scheduling & Sockets (OSCE2e ch6) (UCB 9/10) (UDA P3L1) (OLD 05)
- Week09 – File System & Persistent Storage (OSCE2e ch9/10/11) (UCB 17A/18/19) (UDA P4L2 P4L2) (OLD 07 09) (SUP WEEK09)
- Week10 – Cloud System & Virtualization (UCB 24) (SUP WEEK10)
- UAS 06 07 08 09 10

- Github Account
 - <https://github.com/UI-FASILKOM-OS/os172>
 - <https://github.com/UI-FASILKOM-OS/demo>
- BASH Account:
 - Virtual Ubuntu: badak.cs.ui.ac.id (SSO)
 - Ubuntu (BYOD)
 - WSL: Windows 10 Subsystem for Linux
 - Cygwin (Windows)

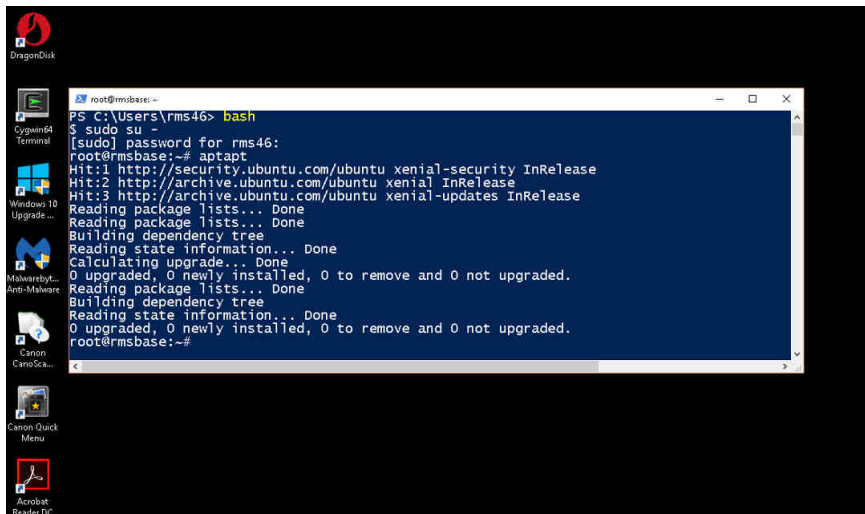


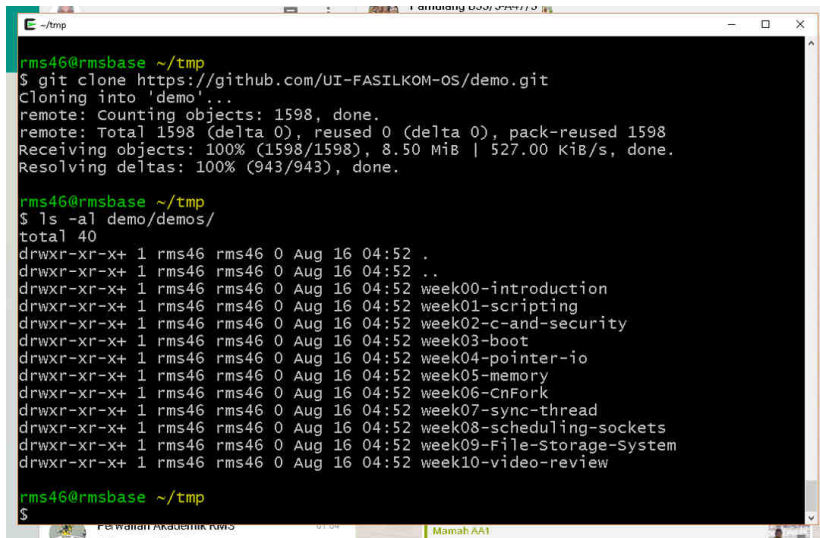
Figure: WSL: Windows Subsystem for Linux


```

Windows PowerShell
$ cd demos/week00-introduction/
$ ls -al
total 4
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 14:25 .
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 14:25 ..
-rw-r--r-- 1 rms46 rms46 250 Aug 16 14:25 c-program-example.c
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 14:25 directory
-rw-r--r-- 1 rms46 rms46 240 Aug 16 14:25 Makefile
$ ls -al directory/
total 0
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 14:25 .
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 14:25 ..
-rw-r--r-- 1 rms46 rms46 58 Aug 16 14:25 file1
-rw-r--r-- 1 rms46 rms46 58 Aug 16 14:25 file2
-rw-r--r-- 1 rms46 rms46 58 Aug 16 14:25 file3
-rw-r--r-- 1 rms46 rms46 58 Aug 16 14:25 file4
-rw-r--r-- 1 rms46 rms46 58 Aug 16 14:25 file5
$ make
gcc -o c-program-example c-program-example.c
$ ls -al
total 20
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 15:21 .
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 14:25 ..
-rwxrwxrwx 1 rms46 rms46 8616 Aug 16 15:21 c-program-example
-rw-r--r-- 1 rms46 rms46 250 Aug 16 14:25 c-program-example.c
drwxr-xr-x 0 rms46 rms46 4096 Aug 16 14:25 directory
-rw-r--r-- 1 rms46 rms46 240 Aug 16 14:25 Makefile
$ ./c-program-example
This is program #1
$

```

Figure: WSL: Windows Subsystem for Linux

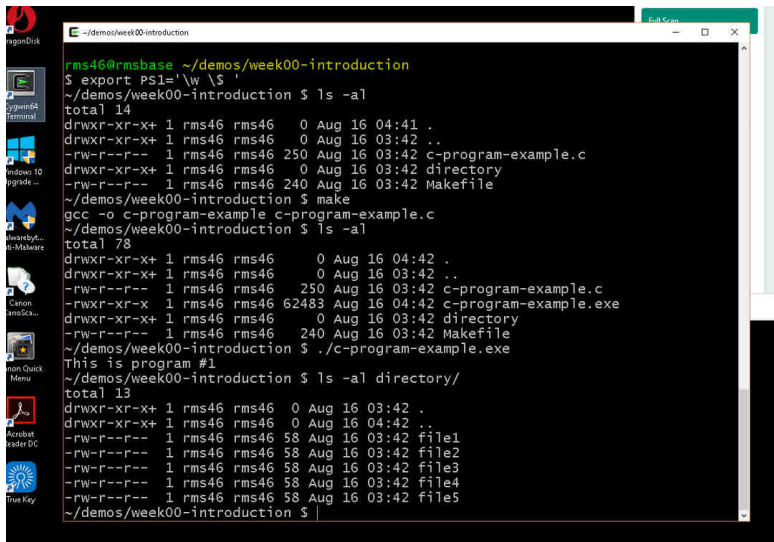


```
rms46@rmsbase ~/tmp
$ git clone https://github.com/UI-FASILKOM-OS/demo.git
Cloning into 'demo'...
remote: Counting objects: 1598, done.
remote: Total 1598 (delta 0), reused 0 (delta 0), pack-reused 1598
Receiving objects: 100% (1598/1598), 8.50 MiB | 527.00 KiB/s, done.
Resolving deltas: 100% (943/943), done.

rms46@rmsbase ~/tmp
$ ls -al demo/demos/
total 40
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 .
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 ..
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week00-introduction
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week01-scripting
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week02-c-and-security
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week03-boot
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week04-pointer-io
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week05-memory
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week06-CnFork
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week07-sync-thread
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week08-scheduling-sockets
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week09-File-Storage-System
drwxr-xr-x+ 1 rms46 rms46 0 Aug 16 04:52 week10-video-review

rms46@rmsbase ~/tmp
$
```

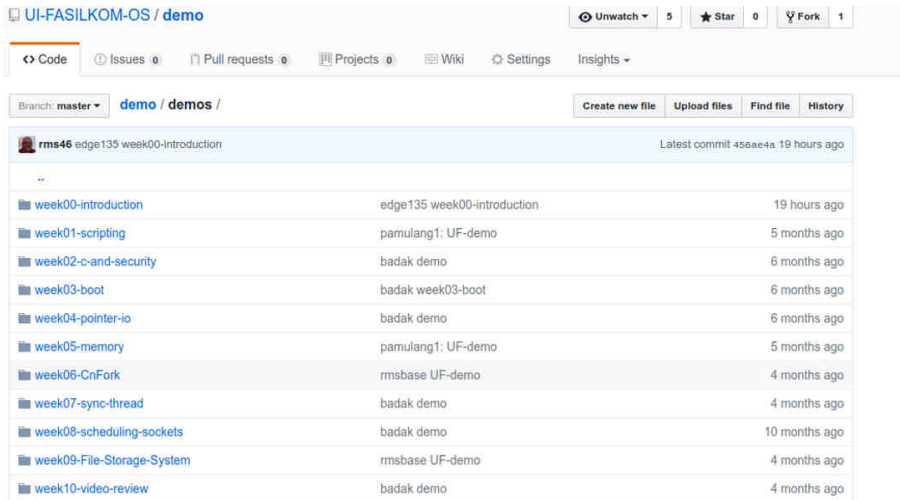
Figure: Cygwin



```
~/demos/week00-introduction
rms46@rmsbase ~/demos/week00-introduction
$ export PS1='\w \$ '
~/demos/week00-introduction $ ls -al
total 14
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 04:41 .
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 03:42 ..
-rw-r--r-- 1 rms46 rms46 250 Aug 16 03:42 c-program-example.c
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 03:42 directory
-rw-r--r-- 1 rms46 rms46 240 Aug 16 03:42 Makefile
~/demos/week00-introduction $ make
gcc -o c-program-example c-program-example.c
~/demos/week00-introduction $ ls -al
total 78
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 04:42 .
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 03:42 ..
-rw-r--r-- 1 rms46 rms46 250 Aug 16 03:42 c-program-example.c
-rwxr-xr-x 1 rms46 rms46 62483 Aug 16 04:42 c-program-example.exe
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 03:42 directory
-rw-r--r-- 1 rms46 rms46 240 Aug 16 03:42 Makefile
~/demos/week00-introduction $ ./c-program-example.exe
This is program #1
~/demos/week00-introduction $ ls -al directory/
total 13
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 03:42 .
drwxr-xr-x+ 1 rms46 rms46  0 Aug 16 04:42 ..
-rw-r--r-- 1 rms46 rms46 58 Aug 16 03:42 file1
-rw-r--r-- 1 rms46 rms46 58 Aug 16 03:42 file2
-rw-r--r-- 1 rms46 rms46 58 Aug 16 03:42 file3
-rw-r--r-- 1 rms46 rms46 58 Aug 16 03:42 file4
-rw-r--r-- 1 rms46 rms46 58 Aug 16 03:42 file5
~/demos/week00-introduction $
```

Figure: Cygwin

Github Demo



UI-FASILKOM-OS / demo

Unwatch 5 Star 0 Fork 1

<> Code Issues 0 Pull requests 0 Projects 0 Wiki Settings Insights

Branch: master demo / demos /

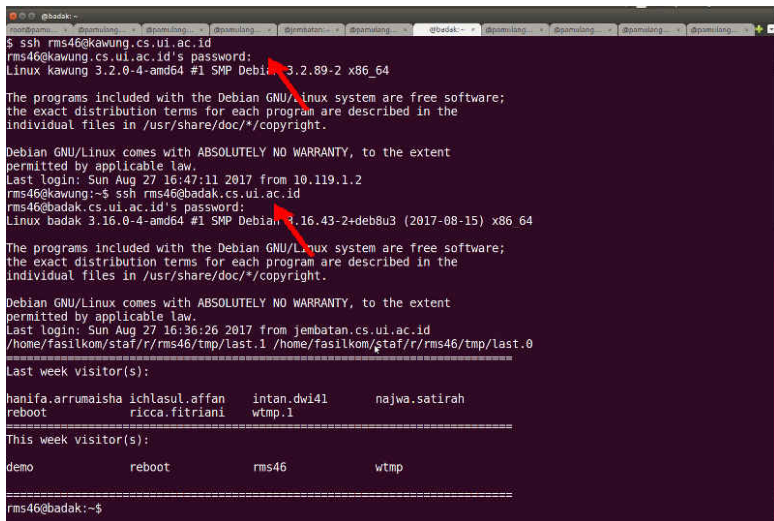
Create new file Upload files Find file History

rms46 edge135 week00-introduction Latest commit 456ae4a 19 hours ago

| | | |
|----------------------------|-----------------------------|---------------|
| .. | | |
| week00-introduction | edge135 week00-introduction | 19 hours ago |
| week01-scripting | pamulang1: UF-demo | 5 months ago |
| week02-c-and-security | badak demo | 6 months ago |
| week03-boot | badak week03-boot | 6 months ago |
| week04-pointer-io | badak demo | 6 months ago |
| week05-memory | pamulang1: UF-demo | 5 months ago |
| week06-CnFork | rmsbase UF-demo | 4 months ago |
| week07-sync-thread | badak demo | 4 months ago |
| week08-scheduling-sockets | badak demo | 10 months ago |
| week09-File-Storage-System | rmsbase UF-demo | 4 months ago |
| week10-video-review | badak demo | 4 months ago |

Figure: <https://github.com/UI-FASILKOM-OS/demo>

Login: Kawung dan Badak



```
@badak: ~  
$ ssh rms46@kawung.cs.ui.ac.id  
rms46@kawung.cs.ui.ac.id's password:  
Linux kawung 3.2.0-4-amd64 #1 SMP Debian 3.2.89-2 x86_64  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Sun Aug 27 16:47:11 2017 from 10.119.1.2  
rms46@kawung:~$ ssh rms46@badak.cs.ui.ac.id  
rms46@badak.cs.ui.ac.id's password:  
Linux badak 3.16.0-4-amd64 #1 SMP Debian 3.16.43-2+deb8u3 (2017-08-15) x86_64  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Sun Aug 27 16:36:26 2017 from jembatan.cs.ui.ac.id  
/home/fasilkom/staf/r/rms46/tmp/last.1 /home/fasilkom/staf/r/rms46/tmp/last.0  
=====
```

| Last week visitor(s): | | | |
|-----------------------|----------------|-------------|---------------|
| hanifa.arrumaisha | ichlasul.affan | intan.dwi41 | najwa.satirah |
| reboot | ricca.fitriani | wtmp.1 | |

```
=====
```

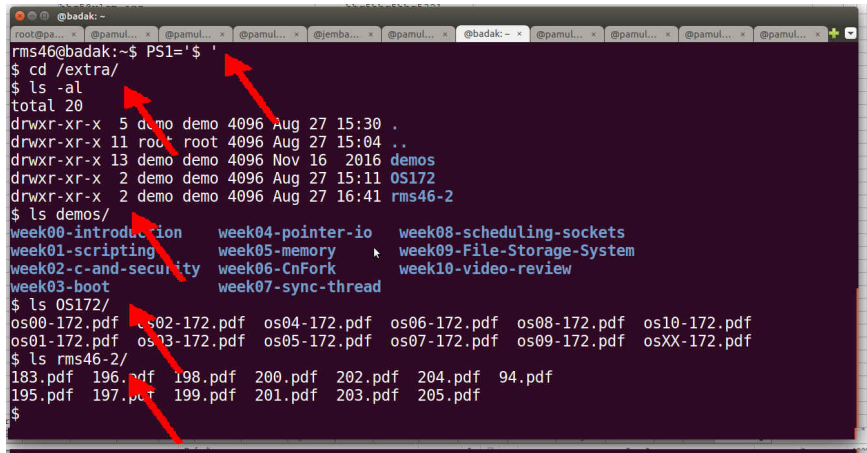
| This week visitor(s): | | | |
|-----------------------|--------|-------|------|
| demo | reboot | rms46 | wtmp |

```
=====
```

rms46@badak:~\$

Figure: Login: Kawung dan Badak

Resources



```
@badak: ~  
root@pa... x @pamul... x @pamul... x @pamul... x @jempa... x @pamul... x @badak: ~ x @pamul... x @pamul... x @pamul... x @pamul... x @pamul... x  
rms46@badak:~$ PS1='$ '  
$ cd /extra/  
$ ls -al  
total 20  
drwxr-xr-x  5 demo demo 4096 Aug 27 15:30 .  
drwxr-xr-x 11 root root 4096 Aug 27 15:04 ..  
drwxr-xr-x 13 demo demo 4096 Nov 16 2016 demos  
drwxr-xr-x  2 demo demo 4096 Aug 27 15:11 OS172  
drwxr-xr-x  2 demo demo 4096 Aug 27 16:41 rms46-2  
$ ls demos/  
week00-introduction    week04-pointer-io    week08-scheduling-sockets  
week01-scripting       week05-memory        week09-File-Storage-System  
week02-c-and-security  week06-CnFork        week10-video-review  
week03-boot           week07-sync-thread  
$ ls OS172/  
os00-172.pdf  os02-172.pdf  os04-172.pdf  os06-172.pdf  os08-172.pdf  os10-172.pdf  
os01-172.pdf  os03-172.pdf  os05-172.pdf  os07-172.pdf  os09-172.pdf  osXX-172.pdf  
$ ls rms46-2/  
183.pdf 196.pdf 198.pdf 200.pdf 202.pdf 204.pdf 94.pdf  
195.pdf 197.pdf 199.pdf 201.pdf 203.pdf 205.pdf  
$
```

The image shows a terminal window with a dark background and white text. The window title is '@badak: ~'. The terminal shows a series of commands and their outputs. Red arrows are drawn on the image, pointing to specific files: one points to 'demos' in the first 'ls' output, another points to 'OS172', a third points to 'week00-introduction', and a fourth points to '183.pdf' in the final 'ls' output. The window has multiple tabs open, most labeled '@pamul...'.

Figure: Resources

Program Example

```
$ cat c-program-example.c
/* (c) 2016-2017 Rahmat M. Samik-Ibrhaim
 * REV01 Sun Aug 20 15:01:12 WIB 2017
 * START Fri Jan 01 00:00:00 WIB 2016
 * This is a free software.
 * To compile:
 * $ gcc -o c-program-example c-program-example.c
 * To execute:
 * $ ./c-program-example
 */
```

```
#include <stdio.h>
```

```
void main() {
    printf("This is program #1\n");
}
```

Makefile

```
$ cat Makefile
```

```
# (c) 2016-2017 Rahmat M. Samik-Ibrahim  
# REV01 Tue Aug 22 14:45:14 WIB 2017  
# START Fri Jan 01 00:00:00 WIB 2016  
# This is a free Makefile configuration.  
# Just run:  
# % make
```

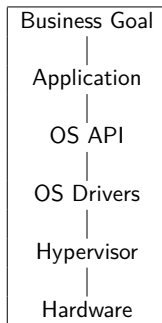
```
ALL:  c-program-example
```

```
c-program-example: c-program-example.c  
    gcc -o c-program-example c-program-example.c
```

```
clean:  
    rm -f c-program-example
```


Week 00: Introduction

- Reference: (OSCE2e ch1/2)(UCB 01)(UDA P1L1/2)(OLD 00)
- Operating System
 - Why take this OS class?
 - Definition: Resource Allocator & Control Program.
 - Managers: Process, Memory, Storage, ...
 - Layers
 - Interfaces



Computer Organization Review

- You should understand:
 - von Neumann Model.
 - Buses, Bridges, Transfer Rate, Clock.
 - Memory: DDR, DDR-2, ...
 - Cache.
 - Direct Memory Access (DMA).
 - Port & Memory Mapped I/O.
 - CPU: privilege/kernel/supervisor mode and user mode.
 - Hardware Limitation.
 - Priority: Read vs Write.
 - Interrupts: Polling & Vectored.
 - Multiprocessors: Symmetric vs. Asymmetric.
 - Multicore & Multithreading.
 - Clustered Systems.
 - Numbers: base 2, base 8, base 10, base 16.
 - Base 2: 110010101010_2
 - Base 8: $01234567_8 = 000\ 001\ 010\ 011\ 100\ 101\ 110\ 111_2$
 - Base 10: $012\ 345\ 679$
 - Base 16: $9AB\ CDEF_{16} = 1001\ 1010\ 1011\ 1100\ 1101\ 1110\ 1111_2$

Managers Set

- Process:
 - Creating/Deleting; Suspending/Resuming; Synchronization; Communication;
- Memory:
 - Tracking; Move In/Move Out; Allocating/Deallocating.
- Storage/File System:
 - Create/Delete; Open/Close; Read/Write.
- Mass Storage:
 - Scheduling; Allocating; Free Space.
- I/O:
 - Buffering; Caching; Spooling.
 - Interfacing (driving).
- Protecting & Scheduling:
 - Protecting.
 - Scheduling.

- 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.

The End

- This is the end of the presentation.