

# CSF2600505 Sistem Operasi CSGE602055 Operating Systems Minggu 00: Intro & Review1

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Universitas Indonesia

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

REV104 17-JAN-2018

# Operating Systems 2018-1 (Room 3114 Tue/Thu)

Class: A (10:00-12:00) | B (13:00-15:00) | C (16:00-18:00)

Week 00	06 Feb - 12 Feb 2018	Intro & Review1
Week 01	13 Feb - 19 Feb 2018	Review2 & Scripting
Week 02	20 Feb - 26 Feb 2018	Protection, Security, Privacy, & C-language
Week 03	27 Feb - 05 Mar 2018	I/O, BIOS, Loader, & Systemd
Week 04	06 Mar - 12 Mar 2018	Addressing, Shared Lib, & Pointer
Week 05	13 Mar - 19 Mar 2018	Virtual Memory
Reserved	20 Mar - 24 Mar 2018	
Mid-Term	26 Mar - 03 Apr 2018	(UTS)
Week 06	05 Apr - 11 Apr 2018	Concurrency: Processes & Threads
Week 07	12 Apr - 18 Apr 2018	Synchronization
Week 08	19 Apr - 25 Apr 2018	Scheduling
Week 09	26 Apr - 05 May 2018	File System & Persistent Storage
Week 10	07 May - 16 May 2018	I/O Programming & Network Sockets Programming
Reserved	17 May - 22 May 2018	
Final	23 May - 26 May 2018	(UAS)

# Agenda

- 1 Start
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- 7 Resources
- 8 Self Service
- 9 Memo Mingguan / QR Code
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- 14 Managers Set
- 15 Potpourri
- 16 The End

- Bekerja di Universitas Indonesia: sejak 1984<sup>1</sup>.
- Pengguna GNU/Linux: sejak 1994.
- VauLSMorg (vlsm.org): sejak 1996.
- Blog: [rahmatm.samik-ibrahim.vlsm.org/](http://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 (page only): [facebook.com/RMS46F/](https://facebook.com/RMS46F/)
- Kontak/Tanya/Jawab WhatsApp Group **OS181**  
(info +62-881-456-XXXX)  
Email (Subject:[HELP]) [os181@vlsm.org](mailto:os181@vlsm.org)

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<sup>1</sup>MDCCXXXIV — Universitas Goettingen didirikan: 1734

# TOP 10 REALITA

- 1 Nama saya **Rahmat**. Rahmat nama saya. Kalau bukan Rahmat, bukan nama saya!
- 2 Jangan datang lebih lambat dari pada Pengajar! Terdapat dua kesempatan untuk menyusul masuk kelas: T+15 menit dan setelah istirahat.
- 3 Jangan berisik/asyik sendiri dalam kelas dan jangan main "*games*" dan "*chat*" dengan "*gadget*" anda!
- 4 Jangan lupa mempersiapkan diri untuk berpartisipasi dalam kelas!
- 5 Jangan lupa membawa selembaar kertas (+QRC) untuk membuat memo kuliah!
- 6 Memo kuliah (+QRC) tersebut yang boleh dibawa saat UTS dan UAS.
- 7 Jangan curang!
- 8 Jangan meminjam peralatan selama kuis dan ujian!
- 9 Jangan menghubungi Pengajar untuk masalah Administratip!
- 10 Jangan menjadi "*Puss in Boot*"!

# Jangan menjadi Puss In Boot



Figure: Ini Puss in Boot<sup>1</sup>.

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<sup>1</sup>This is a fair use of a DreamWorks/Paramount Picture character.

# Goal

## Coverage

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

## 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.

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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 <sup>1</sup>
40 - 50 = D	30 - 40 = E	20 - 30 = E	00 - 20 = E

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- **4 SKS:** Alokasikan 12 jam per minggu.
- **No Lab — No Task — No Assistant.**
- **Active Preparation Only — Active Participation Only.**
- 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%).
- Extra untuk nilai C keatas: 1 poin<sup>1</sup>.
- C-2C untuk nilai C-: hingga 5 poin<sup>1</sup>.

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<sup>1</sup>Syarat dan Ketentuan Berlaku



# Schedule part 1

- Week00 – Intro & Review1 (OSCE2e ch1/2) (OLD 00)
- Week01 – Review2 & Scripting (ETC 000 001 002) (OLD 02-HKI 02-scripting) (Any Related Tutorial)
- Week02 – Protection, Security, Privacy, & C-language (OSCE2e ch13-4) (ETC 050-1 C001-8) (OLD 01) (Any C Language Tutorial)
- Week03 – I/O, BIOS, Loader, & Systemd (Any Related Tutorial) (ETC 300-324) (SUP WEEK03) (OLD 10)
- Week04 – Addressing, Shared Lib, & Pointer (OLD 08)
- Week05 – Virtual Memory (OSCE2e ch7/8) (OLD 06)
- UTS 00 01 02 03 04 05

## Schedule part 2

- Week06 – Concurrency: Processes & Threads (OSCE2e ch3/4) (OLD 03)
- Week07 – Synchronization (OSCE2e ch5) (OLD 04)
- Week08 – Scheduling (OSCE2e ch6) (OLD 05) (SUP 08)
- Week09 – File System & Persistent Storage (OSCE2e ch9/10/11) (OLD 07 09) (SUP WEEK09)
- Week10 – I/O Programming & Network Sockets Programming
- UAS 06 07 08 09 10

# Resources

- 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
- (GITHUB) <https://github.com/UI-FASILKOM-OS/os181>
  - (DEMO) — [demos/](#)
  - (SLIDE) — [pdf/](#) — <http://rms46.vlsm.org/2/207.html>
- (UJIAN) — <http://rms46.vlsm.org/2/195.pdf> - [205.pdf](#)
- ARCHIVE (Arsip bahan pengajaran):  
<https://scele.cs.ui.ac.id/course/view.php?id=126>
  - Enrollment key: "11100001"<sup>1</sup>.
- BADAK — (BADAK) /extra/

SCELE

Academic Links ▾

Panduan Mahasiswa ▾

Dukungan Kuliah ▾

My courses > LAIN-LAIN > Arsip RMS > General > ARSIP

 **Clock** 

 Server: Tue 9:56:21

 **Calendar** 

August 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

EVENTS KEY

 Hide global events

 Hide course events

## ARSIP

 010\_OS162

 013\_DEMOS

 015\_Video

 017\_BAHAN-AJAR-LAMA

 030\_Arsip-Ujian

 040\_EXTRA-RMS

 041\_Suplemen

 050\_OSC-Silberschatz

 060\_UJIAN-INTERNASIONAL

 070\_KULIAH-INTERNASIONAL

 075\_ETC-Video

 080\_eDOCs

 090\_KUNYUKS

 100\_Infrastruktur\_IT\_Modern\_2012

 110\_ITIM-REF

 120\_ITIM-Video

 200\_Pemrograman\_Sistem

Figure: Lihat juga [BADAK.cs.ui.ac.id:/extra/](http://BADAK.cs.ui.ac.id:/extra/)

Branch: master ▾ os181 / pdf /	
UI-FASILKOM-OS / os181	
..	
os00-181.pdf	rmsbase pdf
os01-181.pdf	rmsbase pdf
os02-181.pdf	rmsbase pdf
os03-181.pdf	rmsbase pdf
os04-181.pdf	rmsbase pdf
os05-181.pdf	rmsbase pdf
os06-181.pdf	rmsbase pdf
os07-181.pdf	rmsbase pdf
os08-181.pdf	rmsbase pdf
os09-181.pdf	rmsbase pdf
os10-181.pdf	rmsbase pdf
osXX-181.pdf	rmsbase pdf
<a href="https://github.com/UI-FASILKOM-OS/os181/tree/master/pdf">https://github.com/UI-FASILKOM-OS/os181/tree/master/pdf</a>	

Figure: Alternatif: [BADAK.cs.ui.ac.id:/extra/os181/pdf/](http://BADAK.cs.ui.ac.id:/extra/os181/pdf/)

```
rms46@pamulang1: ~/git/UF-os181/demos/week03-boot
>>>>> $ PS1="$ "
$ cd /extra/
$ ls -al
total 20
drwxr-xr-x  5 demo demo 4096 Jan 10 20:57 .
drwxr-xr-x 11 root root 4096 Aug 27 15:04 ..
drwxr-xr-x  4 demo demo 4096 Jan  3 20:21 os181
drwxr-xr-x  2 demo demo 4096 Sep  8 21:35 PDF
drwxr-xr-x  2 demo demo 4096 Nov 15 16:50 rms46
$ ls -F os181/
demos/  LICENS pdf/  README.md
$ ls -F os181/demos/
week00-introduction/  week04-pointer-io/  week08-scheduling-sockets/
week01-scripting/     week05-memory/     week09-File-Storage-System/
week02-c-and-security/ week06-CnFork/      week10/
week03-boot/          week07-sync-thread/
$ ls -F os181/pdf/
os00-181.pdf  os03-181.pdf  os06-181.pdf  os09-181.pdf
os01-181.pdf  os04-181.pdf  os07-181.pdf  os10-181.pdf
os02-181.pdf  os05-181.pdf  os08-181.pdf  osXX-181.pdf
$ ls -F PDF/
Cooper-2014-Advanced-Bash-Scripting-Guide.pdf
Garells-2008-Bash-Beginners-Guide.pdf
Goyvaerts-2007-Regular-Expressions.pdf
$ ls -F rms46/
172.pdf 195.pdf 197.pdf 199.pdf 201.pdf 203.pdf 205.pdf 94.pdf
183.pdf 196.pdf 198.pdf 200.pdf 202.pdf 204.pdf 70.pdf
$
```

Figure: BADAK.cs.ui.ac.id:/extra/

- Memo Mingguan / QR Code.
- Informasi Kuliah, Arsip Ujian, dan Demo
  - [badak.cs.ui.ac.id/extra/](http://badak.cs.ui.ac.id/extra/)
  - <https://github.com/UI-FASILKOM-OS/os181>
  - <https://rms46.vlsm.org/2/195.pdf> — [195.pdf - 205.pdf].
- BASH Account:
  - Virtual Ubuntu: [badak.cs.ui.ac.id](http://badak.cs.ui.ac.id) (SSO)
  - Ubuntu (BYOD)
  - WSL: Windows 10 Subsystem for Linux
  - Cygwin (Windows)

# Memo Mingguan

- Demo, Lab dan Scele: **TIDAK WAJIB**<sup>1</sup>
- **WAJIB**: mempersiapkan/mempelajari bahan kuliah minggu terkait.
- **WAJIB**: mempersiapkan selembaar kertas memo dengan *QR Code*.
  - Format QRC: "OS172 KELAS NPM NAMA\_SIAK".
  - Kelas: A (reguler), E (Extention), I (International), M (Matriculation), X (ETC).
  - Contoh QRC: "OS172 X 9999999999 Cicak bin Kadal".
  - Ukuran QRC: sekitar 400x400 pixel.
  - Memo berisi catatan secukupnya (lihat contoh).
- Harap **TEST** apakah QRC terbaca (dengan aplikasi QRC reader).
- Memo akan di-*scan* di kelas pada kuliah pertama minggu terkait<sup>2</sup>.
- Kesempatan SUSULAN diberikan pada akhir jam kuliah<sup>3</sup>.
- Blanko Memo sama dapat digunakan pada minggu berikutnya.

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<sup>1</sup>namun sangat direkomendasikan untuk kelas E I M!

<sup>2</sup>kecuali kuliah minggu 00.

<sup>3</sup>dengan potongan nilai.



# Contoh Memo Minggu 00



Figure: Kertas Ukuran A4: OS172 X 9999999999 Cicak bin Kadal

# Pembuatan dan Pembacaan QR Code

```
# OS172: OS 2017 2nd term
# CLASS: A (reguler), E (Extention), I (International),
#        M (Matriculation), X (ETC).
# 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

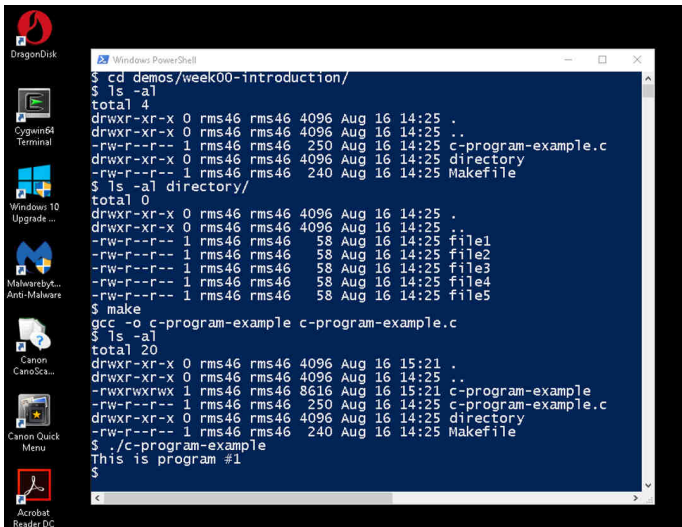
- QRCode Memo:

- tujuan pembuatan memo ialah sebagai "bukti" telah belajar.
- besar harapan pada saat datang ke kelas:
  - telah mempersiapkan diri dengan membuat memo secukupnya.
  - telah memahami garis besar bahan minggu terkait.
  - telah mempelajari jenis soal UTS/UAS yang pernah ditanyakan pada masa lalu.
- ISI memo tidak dinilai!
- Memo yang baik ialah MEMO yang bermanfaat untuk pembuatnya.
- Ujian:
  - Saat UTS dipersilakan membawa hingga 6 lembar memo ber QRC.
  - Saat UAS dipersilakan membawa hingga 5 lembar memo ber QRC.
  - Memo boleh yang pernah ditulis atau boleh juga membuat memo (ber QRC) yang baru.

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



Figure: WSL: Windows Subsystem for Linux



```

$ 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
$
```

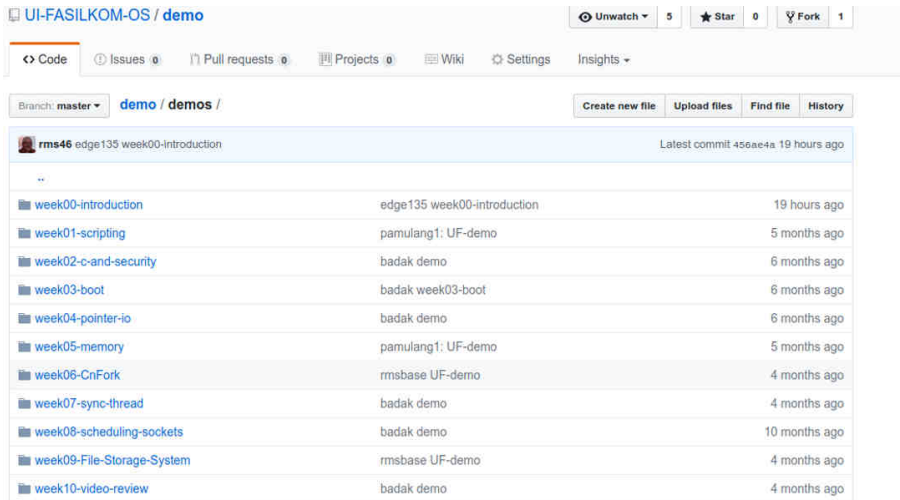
Figure: Cygwin



```
~/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

# 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

```
$ ls -al
total 44
drwxr-xr-x  3 rms46 rms46  4096 Aug 28 18:45 .
drwxr-xr-x 13 rms46 rms46  4096 Feb 28 18:50 ..
-rw-r--r--  1 rms46 rms46   334 Aug 23 20:17 c-program-example.c
drwxr-xr-x  2 rms46 rms46  4096 Sep 26  2016 directory
-rw-r--r--  1 rms46 rms46   319 Aug 23 20:17 Makefile
-rw-r--r--  1 rms46 rms46 23606 Aug 28 18:26 QuickResponseCode
                                           .docx
```

```
$ make
gcc -o c-program-example c-program-example.c
$ ./c-program-example
This is program #1
$ ls -al
total 56
.....
$ make 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, Buffer, Spool.
  - 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:  $9AB\ CDEF_{16} = 1001\ 1010\ 1011\ 1100\ 1101\ 1110\ 1111_2$

# Block Diagram



Figure: Block Diagram

# APIC



Figure: APIC (Advanced Programmable Interrupt Controller)



# Interrupt Handling



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**Figure:** Interrupt Handling with PIC (Programmable Interrupt Controller)

# Managers Set

- Process:
  - Creating/Deleting; Suspending/Resuming; Synchronization; Communication; Scheduling
- 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 & Security:
  - Protecting.
  - Security.

- 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.



Figure: T / F The advantages of a multiprocessor system include: increased throughput, economy of scale, and increased reliability.

# The End

- This is the end of the presentation.