

OS Project 0

Part I: Linux Kernel Building

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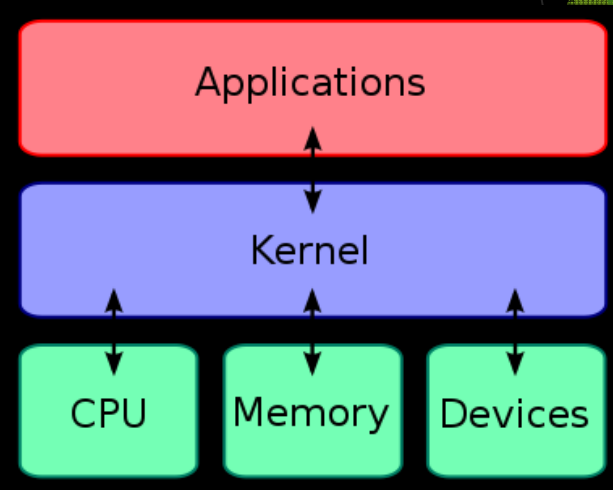
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Outline

- ▶ What is “Kernel”
- ▶ Environment Setup
- ▶ Build Linux Kernel
- ▶ Submit Requirement
- ▶ Contact TAs

What is “Kernel”?

- ▶ The kernel^[1] is a fundamental part of a modern computer's operating system.
- ▶ The kernel's primary functions are to
 - ▶ Manage the computer's hardware and resources
 - ▶ E.g., CPU, main memory, I/O devices, and so on.
 - ▶ Allow applications to run and use these resources

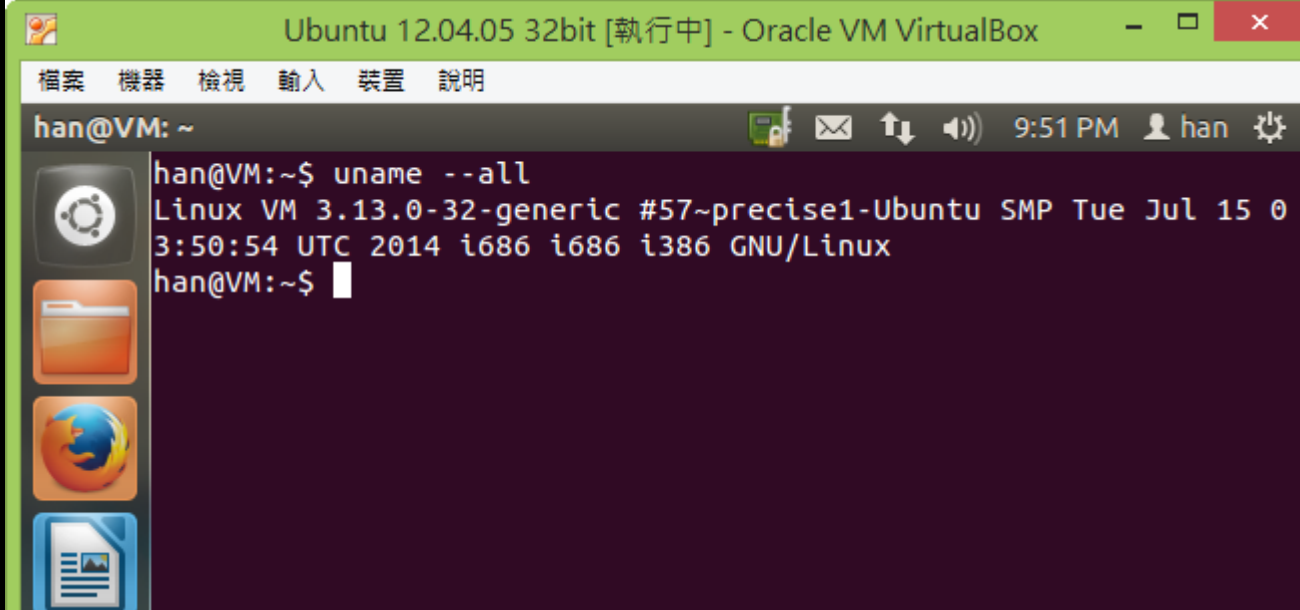


Environment Setup

- ▶ Oracle VM VirtualBox^[2]
 - ▶ Download link:
<https://www.virtualbox.org/wiki/Downloads>
- ▶ Ubuntu 12.04.5 32bits LTS^[3]
 - ▶ Download link:
<http://tw.archive.ubuntu.com/ubuntu-cd/12.04.5/ubuntu-12.04.5-desktop-i386.iso>
- ▶ Install the Ubuntu 12.04.5 on the VirtualBox

Build Linux Kernel (1/5)

- After the installation, please login Ubuntu and open a terminal to start building your Linux kernel^[4]



The screenshot shows a terminal window titled "Ubuntu 12.04.05 32bit [執行中] - Oracle VM VirtualBox". The terminal prompt is "han@VM: ~". The command "uname --all" has been executed, resulting in the output: "Linux VM 3.13.0-32-generic #57~precise1-Ubuntu SMP Tue Jul 15 03:50:54 UTC 2014 i686 i686 i386 GNU/Linux". The terminal window includes a menu bar with options like "檔案", "機器", "檢視", "輸入", "裝置", and "說明". On the left side, there is a dock with icons for the Dash, Home Folder, Firefox, and a document. The top status bar shows the time as 9:51 PM and the user as han.

```
han@VM: ~  
han@VM:~$ uname --all  
Linux VM 3.13.0-32-generic #57~precise1-Ubuntu SMP Tue Jul 15 03:50:54 UTC 2014 i686 i686 i386 GNU/Linux  
han@VM:~$
```

Build Linux Kernel (2/5)

- ▶ `$ sudo apt-get install fakeroot build-essential kernel-package libncurses5 libncurses5-dev`
- ▶ `$ cd /usr/src`
- ▶ `$ sudo wget`
<https://cdn.kernel.org/pub/linux/kernel/v2.6/longterm/v2.6.32/linux-2.6.32.68.tar.xz>
- ▶ `$ sudo tar xvf linux-2.6.32.68.tar.xz`
- ▶ `$ cd linux-2.6.32.68`
- ▶ `$ sudo make mrproper`

Build Linux Kernel (3/5)

- ▶ `$ sudo make menuconfig`
- ▶ `$ sudo make bzImage`
 - ▶ You can use `make -j#` (# is the number of your physical cores) to create multiple threads to speed up the kernel building
- ▶ `$ sudo make modules`
- ▶ `$ sudo make modules_install`

Build Linux Kernel (4/5)

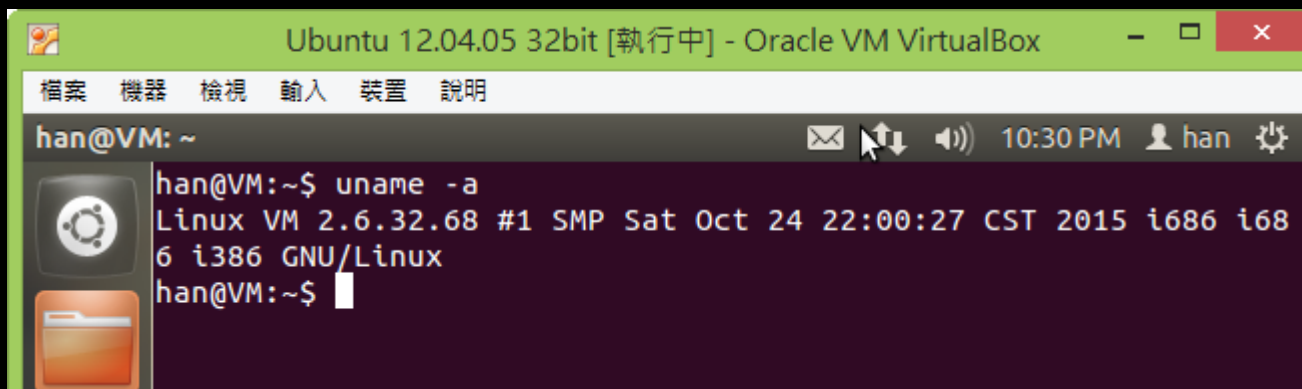
- ▶ `$ sudo make install`
- ▶ `$ sudo vim /etc/default/grub`
 - ▶ Add “#” to comment the following 2 lines
 - ▶ `#GRUB_HIDDEN_TIMEOUT=10`
 - ▶ `#GRUB_HIDDEN_TIMEOUT_QUIET=true`
- ▶ `$ sudo update-grub2`
- ▶ `$ sudo shutdown -r now`

Build Linux Kernel (5/5)

- ▶ Now, you can select the version 2.6.32.68 kernel in the GNU grub to boot your Ubuntu.



- ▶ Then, you can use terminal and type "uname -a" to check the kernel version.



Submit Requirement

- ▶ Project deadline: 2016/03/23 (Wednesday) 23:59
- ▶ Upload to FTP Server
 - ▶ IP: 140.112.28.132
 - ▶ Port: 5566
 - ▶ Account name: os2016
 - ▶ Password: ktw2016os
- ▶ The team project should
 - ▶ Contain your report (PDF format, within 2pages)
 - ▶ Be packed as one file named "OSPJO_Team##.ZIP"
- ▶ **DO NOT COPY THE HOMEWORK**

FTP Server

- ▶ IP: 140.112.28.132
- ▶ Port: 5566
- ▶ Account name: os2016
- ▶ Password: ktw2016os
- ▶ Recommended client: Filezilla
 - ▶ Supports Windows, Linux, Mac
 - ▶ Latest version not working on Win XP
- ▶ Click OK in case of "Unknown certificate"
- ▶ Upload files to the Project0 folder



ftp://os2016@140.112.28.132:5566 - FileZilla



File Edit View Transfer Server Bookmarks Help



Host: 140.112.28.132 Username: os2016 Password: [masked] Port: 5566 Quickconnect ▾

Local site: /home/yen/tmp/ftp_test/ ▾

Filename ^	Files	Filetype	Last modified
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..			
<input type="checkbox"/> Project0_B123456...	0	pdf-file	03/08/20...

1 file. Total size: 0 bytes

Remote site: /Project0 ▾

Filename ^	Filesize	Filetype	Last mo
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Empty directory listing

Empty directory.

Server/Local file	Directi	Remote file	Size	Priority	Status
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Queued files

Failed transfers

Successful transfers

Queue: empty



Unknown certificate



The server's certificate is unknown. Please carefully examine the certificate to make sure the server can be trusted.

Details

Valid from: 01/29/2011 07:49:37 AM
Valid to: 10/16/2030 07:49:37 AM
Serial number: 11:32:19:b5:54
Public key algorithm: RSA with 1024 bits
Signature algorithm: RSA-SHA1
Fingerprint (SHA-256): 74:03:b9:46:44:31:7a:f9:b1:cb:95:1d:84:04:1a:03:
18:ad:ae:05:eb:3d:7f:fb:c1:6b:b4:b7:c2:f2:91:a9
Fingerprint (SHA-1): bd:89:2e:c9:ba:c9:9e:6e:98:3f:8e:ee:90:0a:3c:41:b1:56:e0:e2

Subject of certificate

Common name: synology.com
Organization: Synology Inc.
Unit: FTP Team
Country: TW
State or province: Taiwan
Locality: Taipei
E-Mail: product@synology.com
Alternative name: product@synology.com

Certificate issuer

Common name: Synology Inc. CA
Organization: Synology Inc.
Unit: Certificate Authority
Country: TW
State or province: Taiwan
Locality: Taipei
E-Mail: product@synology.com

Session details

Host: 140.112.28.132:5566
Protocol: TLS1.2
Key exchange: RSA
Cipher: AES-256-GCM
MAC: AEAD

Trust this certificate and carry on connecting?

☐ Always trust certificate in future sessions.





ftp://os2016@140.112.28.132:5566 - FileZilla



File Edit View Transfer Server Bookmarks Help



Host: 140.112.28.132 Username: os2016 Password: ●●●●● Port: 5566 Quickconnect ▾

Status: TLS connection established.
Status: Logged in
Status: Retrieving directory listing...
Status: Directory listing of "/" successful

Local site: /home/yen/tmp/ftp_test/ ▾

Remote site: / ▾

Filename ^	Files	Filetype	Last modified
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..			
Project0_B123456...	0	pdf-file	03/08/20..

1 file. Total size: 0 bytes

Filename ^	Filesize	Filetype	Last mo
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..			
Project0		Direct...	03/08/.

1 directory

Server/Local file	Directi	Remote file	Size	Priority	Status
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Queued files

Failed transfers

Successful transfers



Queue: empty



Contact TAs

- ▶ If you have any problem about the projects, you can contact TAs by the following ways:
- ▶ Facebook: NTU OS2016 SpringGroup
 - ▶ <https://www.facebook.com/groups/1683988081869980/>
 - ▶ **HIGHLY RECOMMENDED**
- ▶ E-mail:
 - ▶ Tse-Yuan Wang: r03922064@csie.ntu.edu.tw

References

- ▶ [1] Wikipedia
[http://en.wikipedia.org/wiki/Kernel_\(computing\)](http://en.wikipedia.org/wiki/Kernel_(computing))
- ▶ [2] Oracle VM VirtualBox <https://www.virtualbox.org/>
- ▶ [3] Ubuntu <http://www.ubuntu.com/>
- ▶ [4] Linux Kernel in a Nutshell
<http://www.kroah.com/lkn/>