# Re:제로부터 시작하는 오픈소스


KOSS Lab. 2기

Mario Cho (조만석)

hephaex@gmail.com

# Who am I ?

## Development Experience

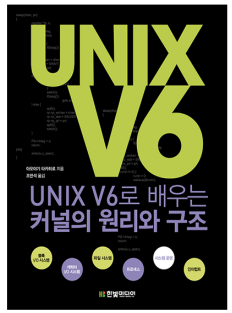
- Bio-Medical Data Processing based on HPC for Human Brain Mapping
- Bio-medical data processing based on Neural Network (Machine Learning)
- Medical Image Reconstruction (Computer Tomography)
- Enterprise System
- Open Source Software Developer

## Open Source Software Developer

- Linux Kernel & LLVM
- OpenStack & OPNFV (NFV&SDN)
- Machine Learning (TensorFlow)

## Technical Book

- Unix V6 Kernel




***Open Frontier Lab.***

***Mario Cho***

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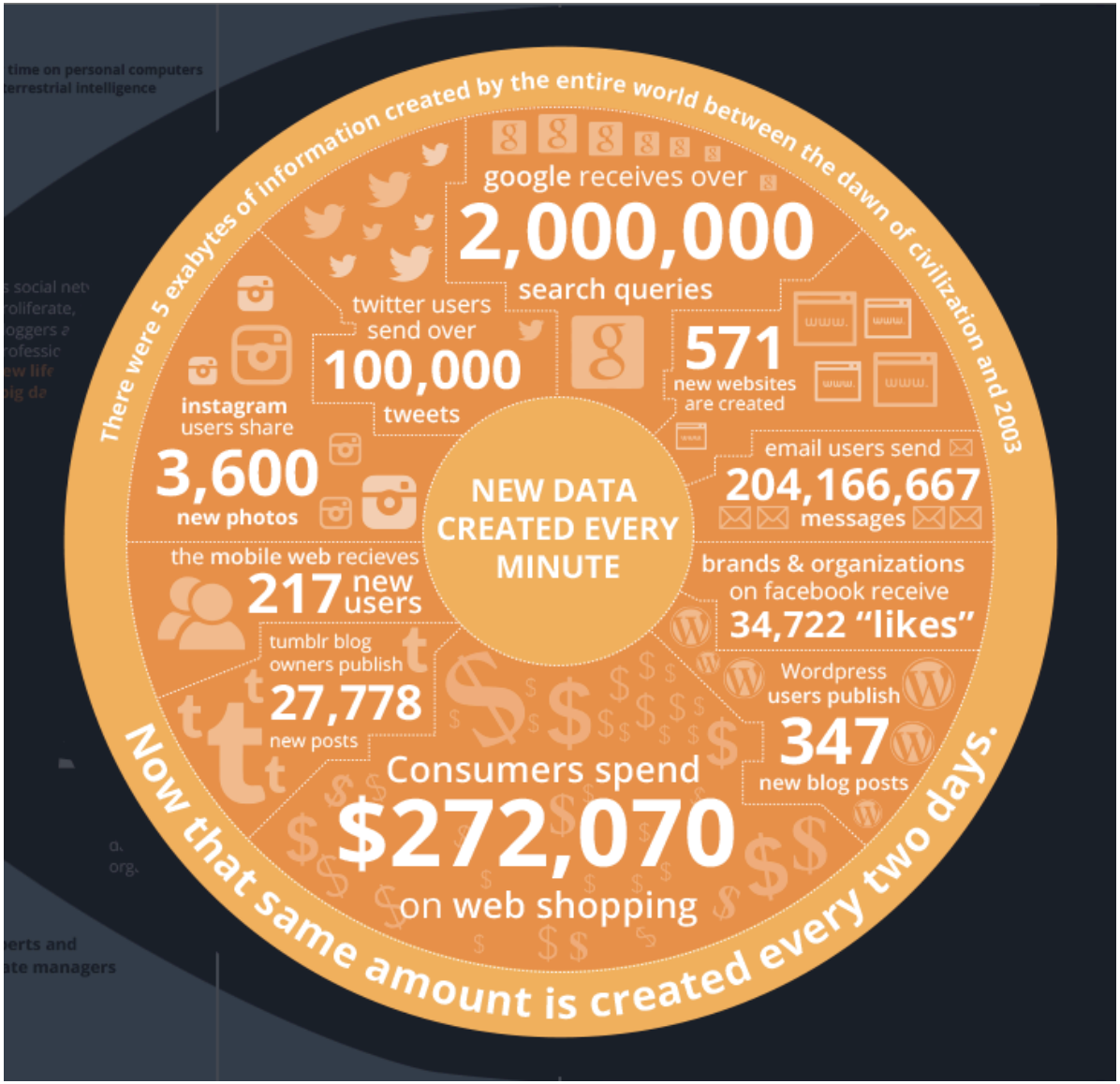
# Today's information

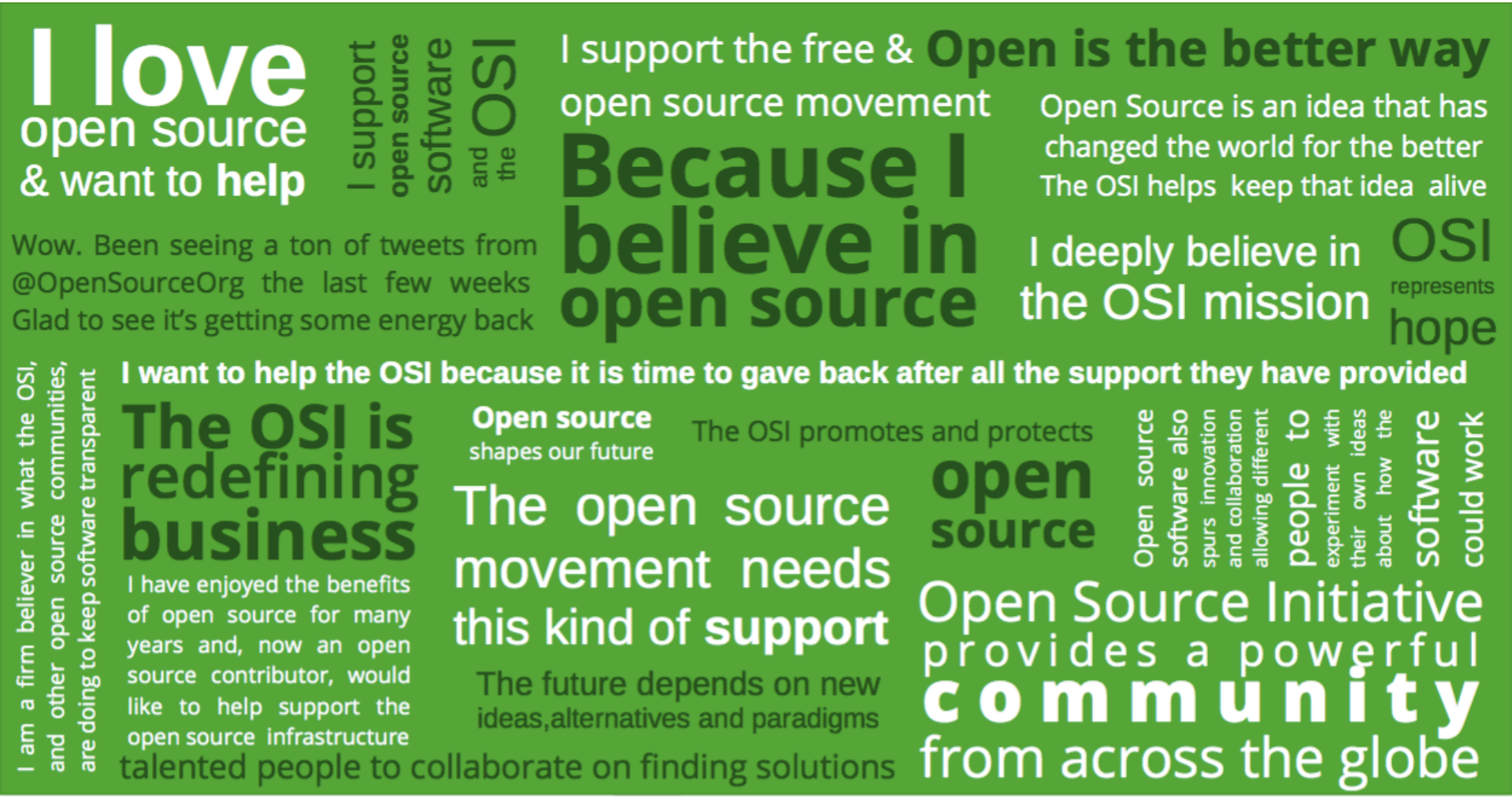



* http://www.cray.com/Assets/Images/urika/edge/analytics-infographic.html

# The Future of Jobs


"The Fourth Industrial Revolution, which includes developments in previously disjointed fields such as artificial intelligence & machine-learning, robotics, nanotechnology, 3-D printing, and genetics & biotechnology, will cause widespread disruption not only to business models but also to labor market over the next five years, with enormous change predicted in the skill sets needed to thrive in the new landscape."

# Open Source


I love
open source
& want to help
I support open source software and the OSI
I support the free & open source movement
Open is the better way
Because I believe in open source
Open Source is an idea that has changed the world for the better
The OSI helps keep that idea alive
Wow. Been seeing a ton of tweets from @OpenSourceOrg the last few weeks
Glad to see it's getting some energy back
I deeply believe in the OSI mission
OSI represents hope
I want to help the OSI because it is time to gave back after all the support they have provided
I am a firm believer in what the OSI, and other open source communities, are doing to keep software transparent
The OSI is redefining business
I have enjoyed the benefits of open source for many years and, now an open source contributor, would like to help support the open source infrastructure
Open source shapes our future
The OSI promotes and protects
open source
Open source software also spurs innovation and collaboration allowing different people to experiment with their own ideas about how the software could work
The open source movement needs this kind of support
The future depends on new ideas,alternatives and paradigms
Open Source Initiative provides a powerful community from across the globe
talented people to collaborate on finding solutions

# 오픈 소스 프로젝트 찾기

1. **구글링**

2. **오픈소스 커뮤니티에서 프로젝트 찾기**
   - The Apache Software Foundation(ASF)
   - Jboss
   - GitHub
   - BitBucket
   - Google Code
   - CodeProject
   - Sourceforge

# 오픈 소스 찾기: https://www.ohloh.net

# 오픈 소스 저장소: https://github.com

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http://manseok.blogspot.com
Joined on Mar 6, 2013

| 5 | 4 | 2 |
|---|---|---|
| Followers | Starred | Following |

Contributions | Repositories | Public activity | Edit profile

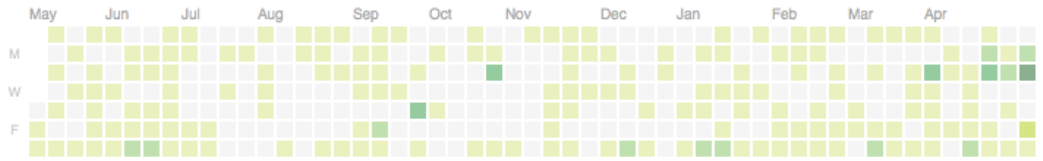
**Popular repositories**

- **unix-v6** — UNIX-V6 kernel — 8 ★
- **kernel** — ARM linux kernel study — 3 ★
- **toolchain** — OSX opensource toolchain — 1 ★
- **kernel_review** — The Linux Kernel review for ARMv7 3.13.0 (ex... — 1 ★
- **a10c** — Linux kernel 3.x — 0 ★

**Repositories contributed to**

- **arm10c/linux-stable** — Iamroot.org "Linux kernel study, ARM10C" — 6 ★
- **tensorflow/tensorflow** — Computation using data flow graphs for scalab... — 23,716 ★

**Contributions**




Summary of pull requests, issues opened, and commits. Learn how we count contributions. Less More

| Contributions in the last year | Longest streak | Current streak |
|---|---|---|
| 753 total | 12 days | 2 days |
| May 14, 2015 – May 14, 2016 | June 25 – July 6 | May 13 – May 14 |

Contribution activity — Period: **May 13, 2016**

1 commit

**Pushed 1 commit to tensorflow/tensorflow** May 13

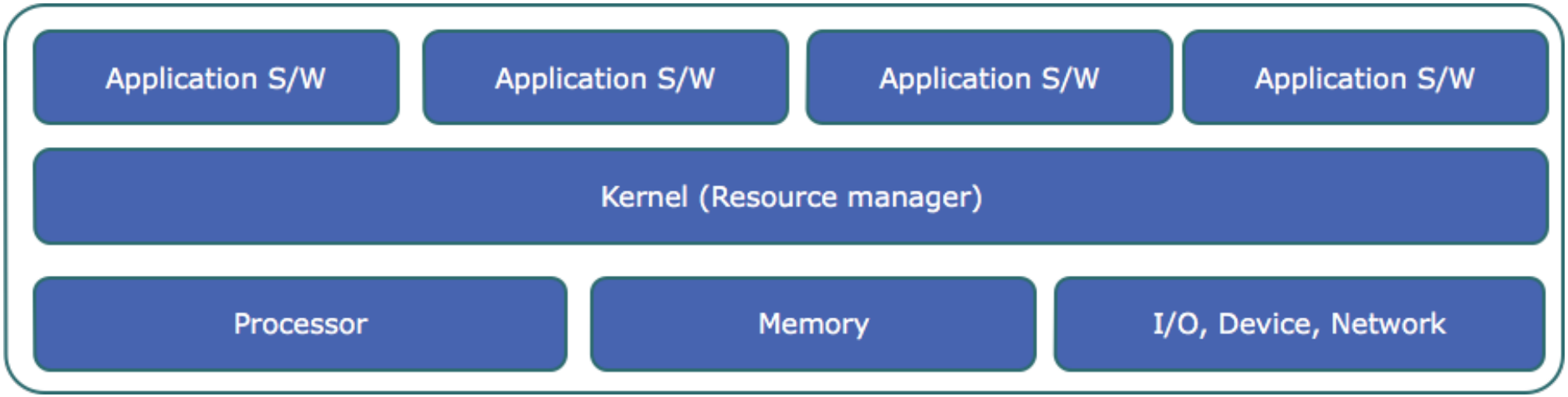
# 운영체계란?

**운영체계**

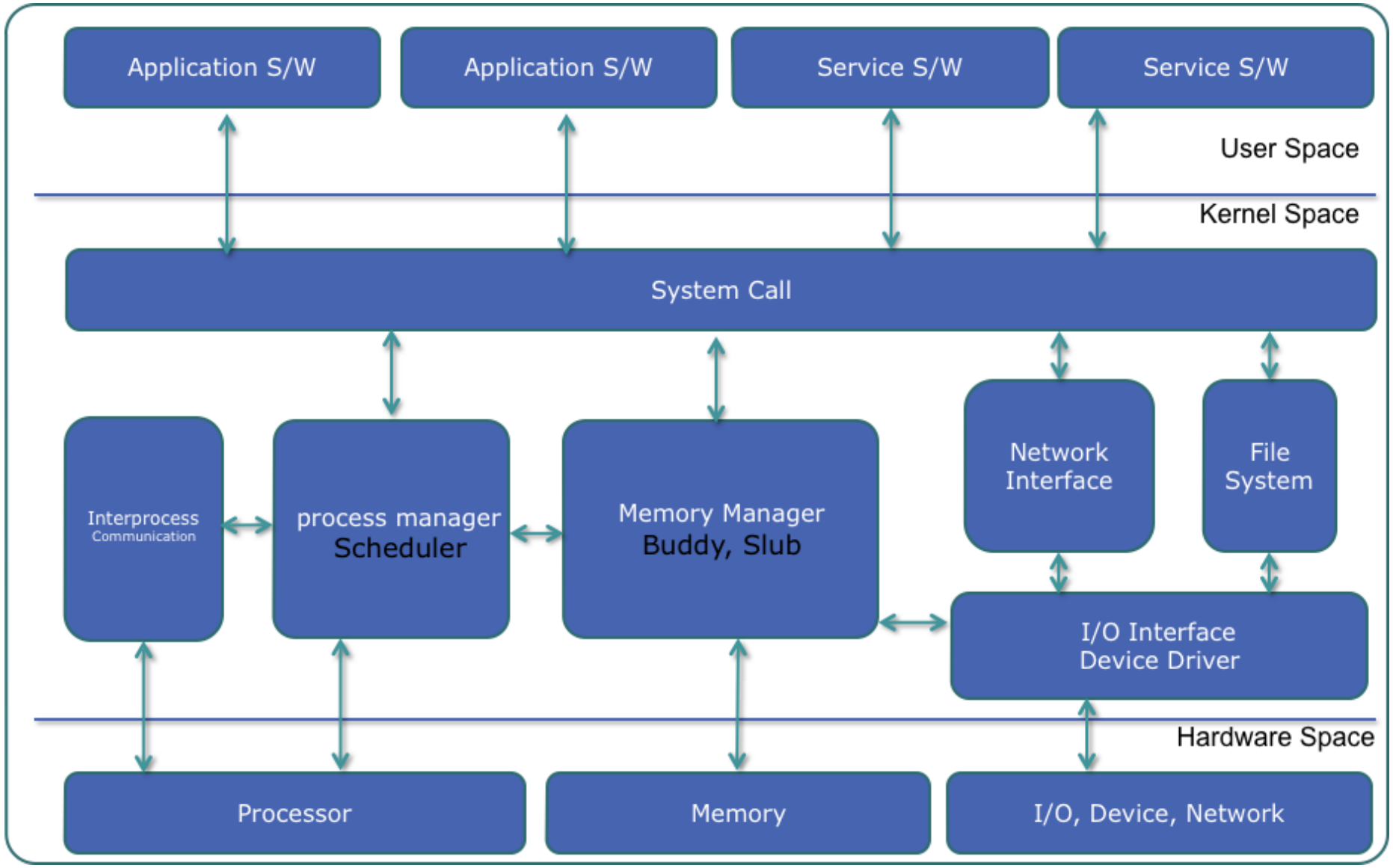
- 커널은 운영체제의 핵심으로 컴퓨터 시스템을 사용하는데 꼭 필요한 기능을 제공.

운영체계의 주 역활

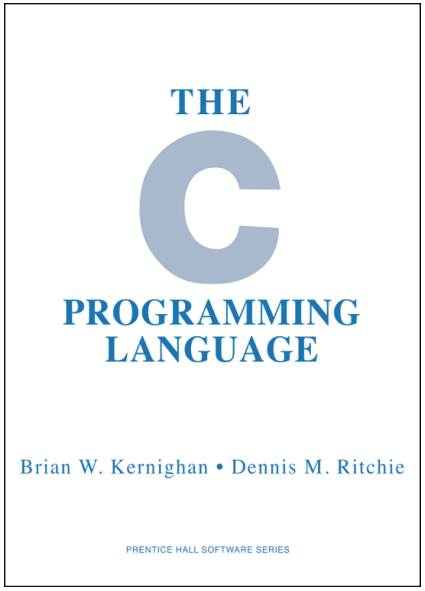
- 실행 프로그램(프로세스**Process**)관리
- **메모리 관리 (Memory Management)**
- **파일 시스템 (File System)**
- 파일과 주변 장치를 위한 **I/O**



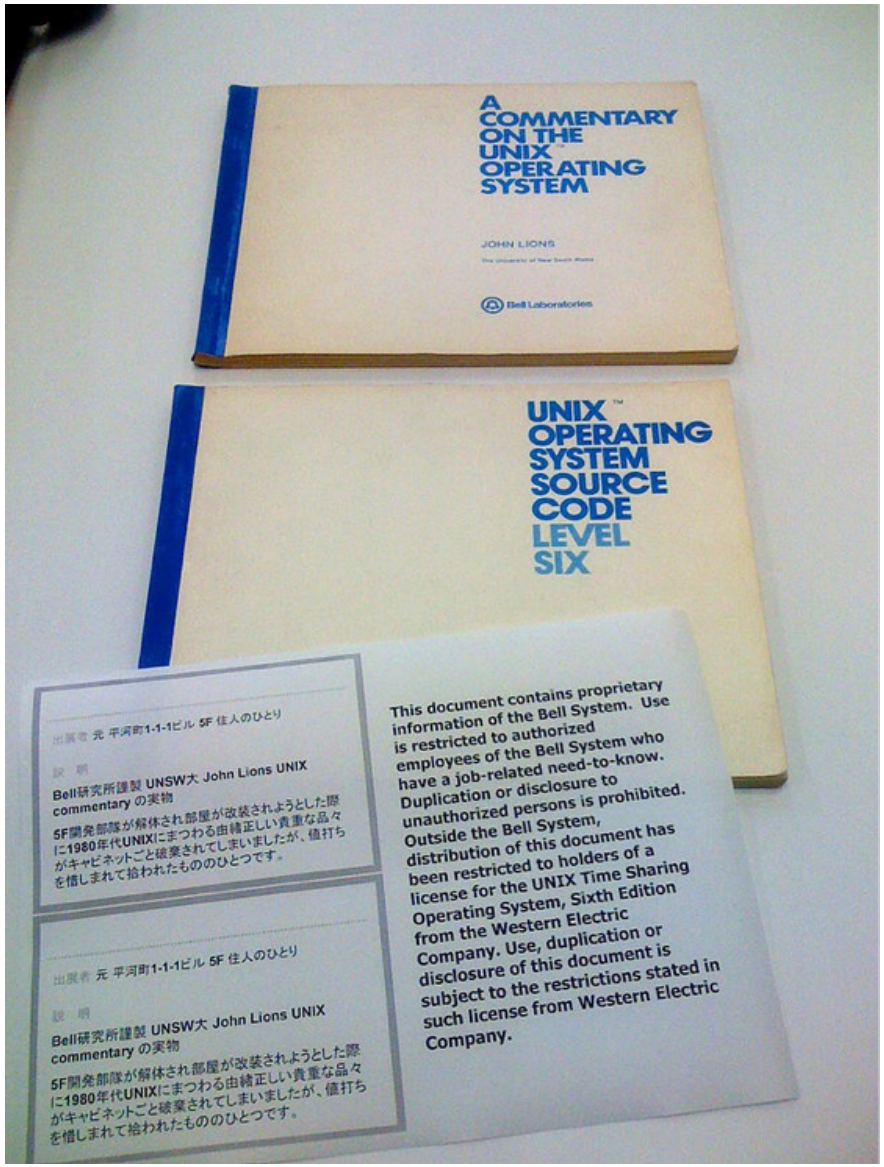
# Linux Kernel Architecture

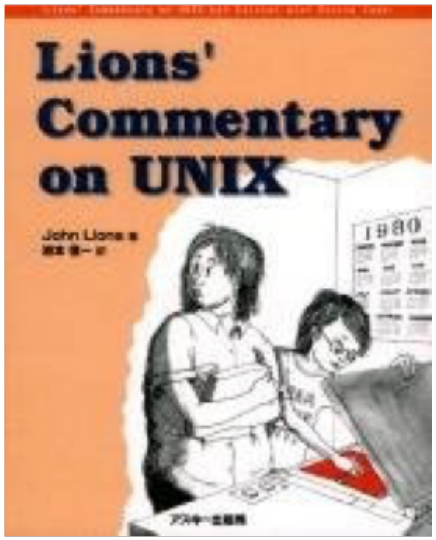


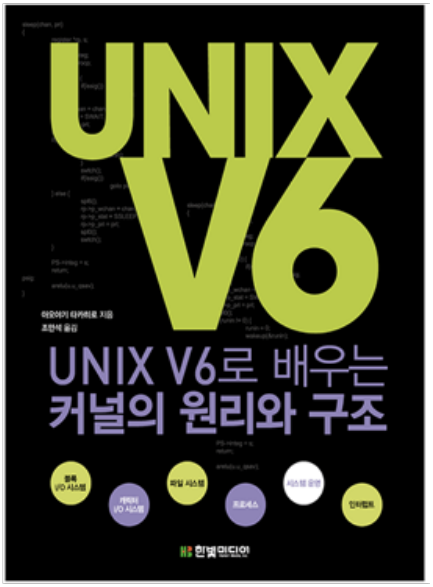
# K&R (Ken Tompson & Dennis Richie)



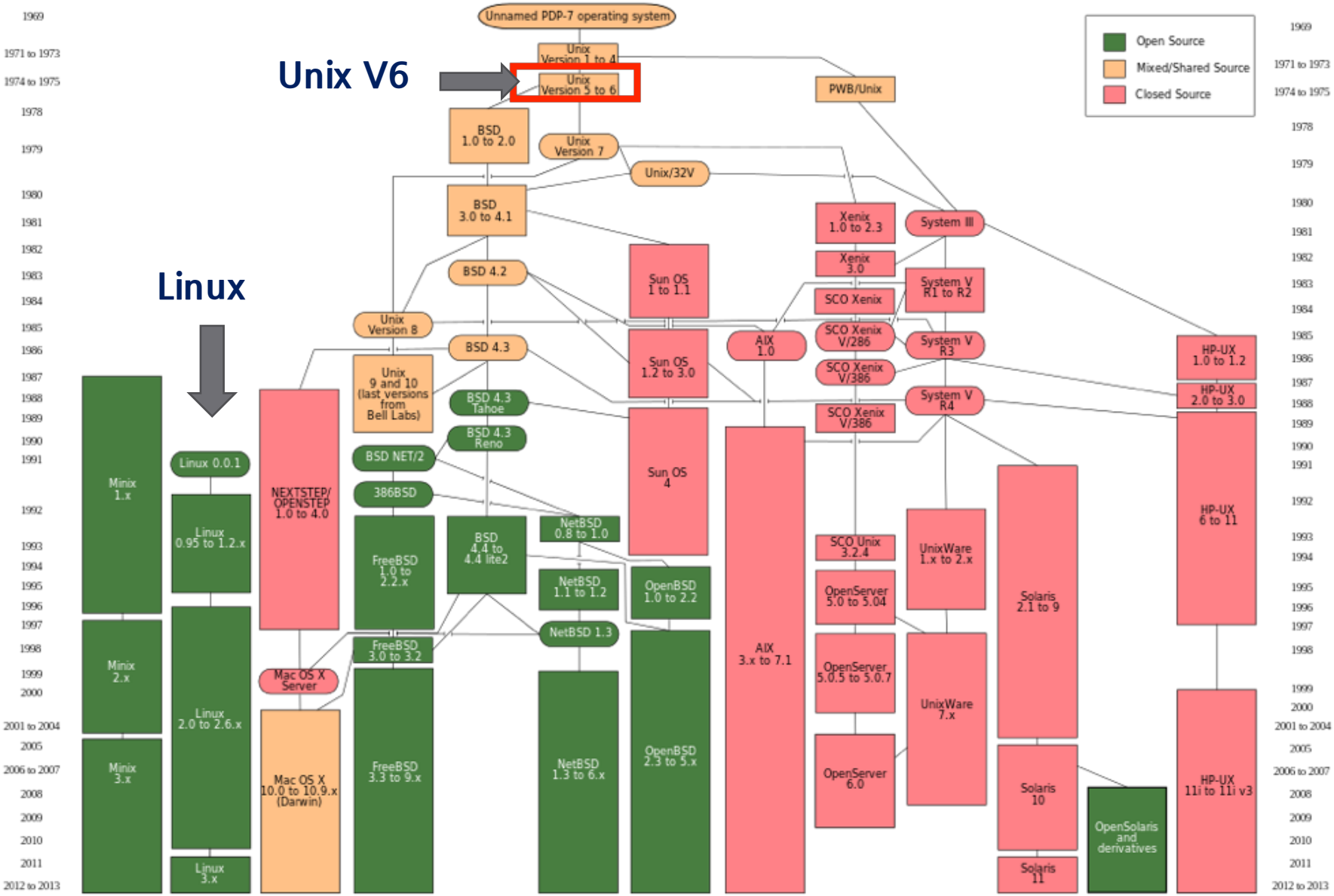
# Lions Commentary on UNIX V6



# Open Source OS From Unix V6 To Linux



# 리눅스 커널

## 운영체계

- Apple Mac OS system 1.x : 1984.x
- MS Windows 1.x : 1985.x
- Linux : 1991. 8.26

comp.os.minix ›

What would you like to see most in minix?

199 posts by 183 authors G+1 Previous Page 1 Next

**Linus Benedict Torvalds** 8/26/91

Hello everybody out there using minix -

I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

Linus (torv...@kruuna.helsinki.fi)

PS. Yes - it's free of any minix code, and it has a multi-threaded fs. It is NOT protable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(.

Click here to Reply

**Jyrki Kuoppala** 8/26/91

In article <1991Aug25....@klaava.Helsinki.FI>, torvalds@klaava (Linus Benedict Torvalds) writes:
>I've currently ported bash(1.08) and gcc(1.40), and things seem to work.
>This implies that I'll get something practical within a few months, and
>I'd like to know what features most people would want. Any suggestions
>are welcome, but I won't promise I'll implement them :-)

Tell us more! Does it need a MMU?

>PS. Yes - it's free of any minix code, and it has a multi-threaded fs.
>It is NOT protable (uses 386 task switching etc)

# I. 오픈소스(커널)를 공부하기 위한 목표 설정

리눅스 커널을 공부하기 전에  대상과 어떤 것을 분석할지 목표를 분명히 합니다.
아울러 target device도 함께 정합니다. (추천 라즈베리 파이2)

- kernel boot process
  - boot loader에서 부터 시작해서 하드웨어 초기화, 메모리 초기화, 인터럽트 설정,
  - init process 에 이르는 일련의 과정을 분석.
  - 내용이 많지만, 하드웨어, 커널에서 사용하는 주요 메크로, 알고리즘을 배울 수 있음.

- mm_init() 분석
  - start_kernel()에 보면 메모리를 초기화 하는  mm_init()이 있습니다.
  - 리눅스 커널은 buddy와 slub을 이용해서 메모리를 관리합니다.
  - buddy와 slub이 어떻게 초기화 되고 커널에 메모리 초기호/할당/제거 를 분석

- Device Driver 분석
  - GPIO 디바이스를 분석하고 라즈베리 파이2를 이용해서 실험
  - network 디바이스를 분석해서 network stack을 심화

- 그외 스케쥴러 분석 등등.

# Ⅱ. 오픈소스(커널)를 공부하기 위해 필요한 것들

- Note PC or Desktop or Cloud connection

- Editor : Vim, Emacs, ???
- Tools: ctags, gtags, cscope, …

- 참고 서적
  - AP Manual
    - ARM Cortex A Series Programmer Guide
    - ARM Cortex A15 Technical Reference Manual
    - kernel 분석에 필요한 AP user manual (가장 중요하지만, , , )
  - DTB (Device Tree Blob)
    - Power ePAPR_APPROVED_v1.1
  - Kernel 책들
    - UNIX V6 로 배우는 커널의 원리와 구조 (운영체제에 대한 근본원리)
    - 코드로 알아보는 ARM 리눅스 커널 (2.6.x 커널 기준)
    - 리눅스 커널 해설 (2.6.x 커널)
- 어셈블러
    - GNU : GNU Assembler Directive
    - GNU : GNU Assembler Manual
    - GNU : GNU Linker Manual

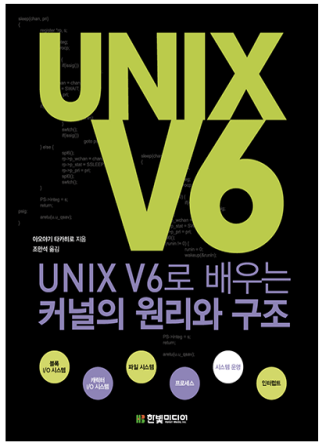
# II. 오픈소스(커널)를 공부할 때 Ground Rule

커널은 코드의 양이 크기 때문에 (약 1500만 라인) 많은 지식을 필요로 하고,
많은 시간을 걸쳐서 하는 개발자 마라톤과 같은 부분이 있으므로 꾸준히 공부할 동료가 필요합니다.

1. 함께 공부할 친구를 찾는다. (개발자 커뮤니티)
2. 오픈 소스 스터디에서 존칭을 사용 (상호 존중)
3. 오픈 소스 스터디에 부담 주는 행동 자제. (한사람이 부담을 주는 행동들…)
4. 커널에 맞는 구하기 쉬운 디바이스 선정 (라즈베리 파이 2? or 3?)
5. 꾸준히 공부 할 수 있는 공간
6. 스터디 내용을 공유할 수있는 인터넷 공간 (커뮤니티 게시판, 공유 문서)

# Ⅲ. 이론 공부 시작 Let's Start!!!

1. 각자 다른 배경의 사람들이 커뮤니티에 있으므로
   서로간의 눈 높이를 맞추기 위해서
   이론서를 함께 읽습니다.



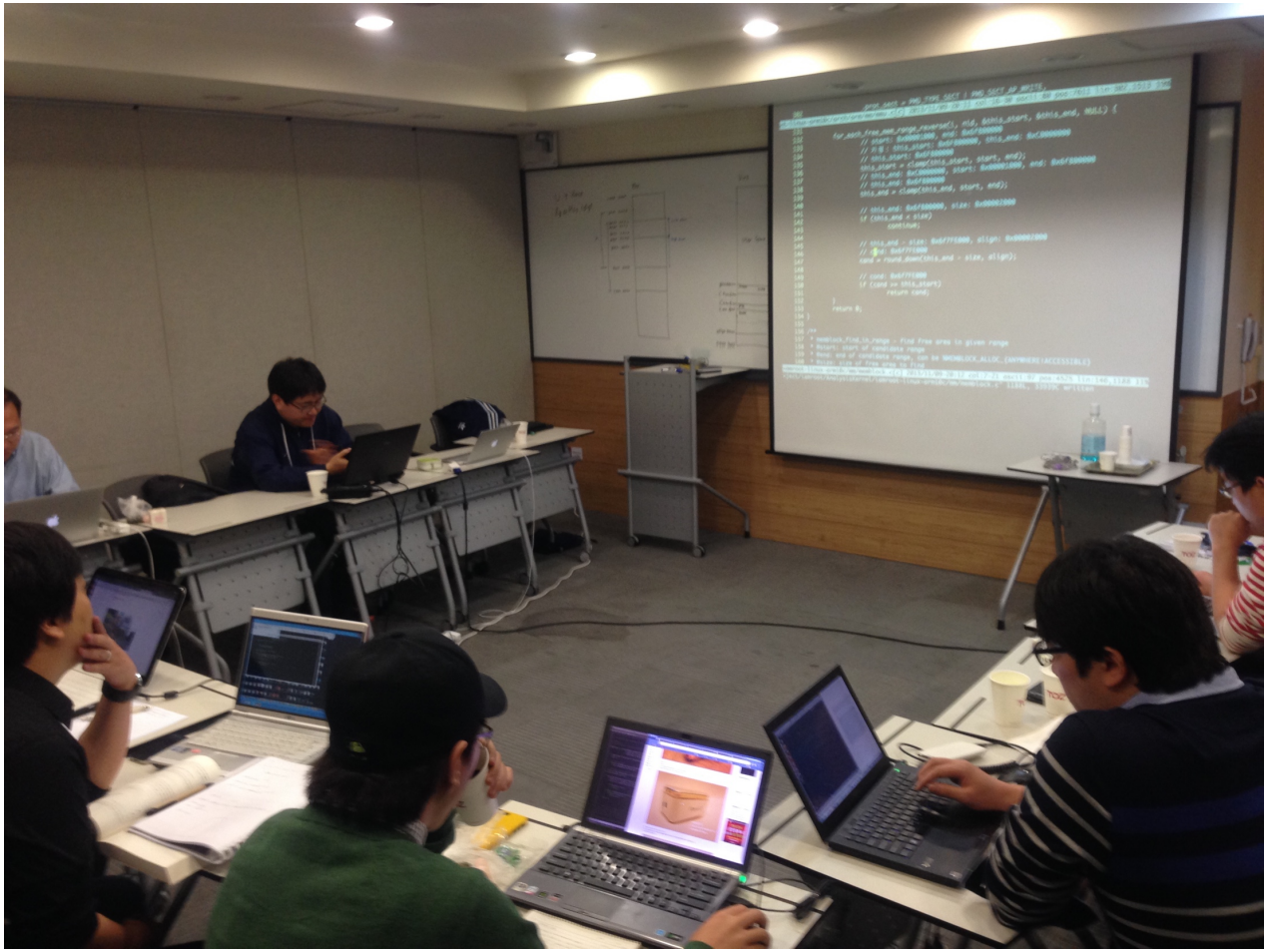


2. 이론서는 얇은 책으로…

3. 라운드 로빈 방식으로 서로 조금씩 돌아가면서
   읽습니다.

# III. 이론 공부: Linux info from the source

# Ⅳ. 소스 코드 분석



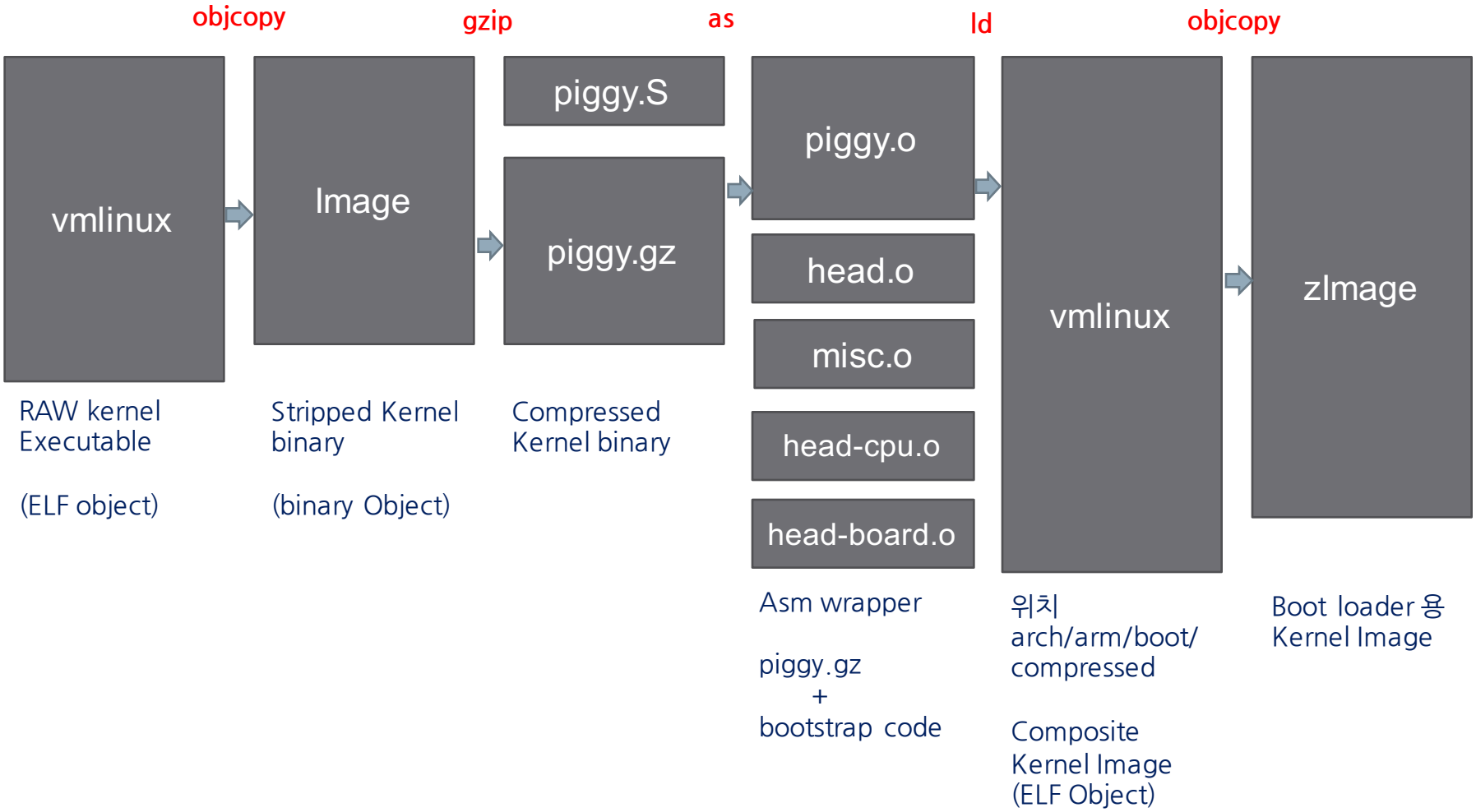
장소: 대학교 강의실, 토즈(?)

방법:

- 소스 코드 드라이빙
- 소스 코드를 보면서 토론.
- 인터넷 공유 문서 (구글 doc) 등으로 자료 공유

# IV. Linux Kernel build up

- **Make를 통해서 커널 소스 코드를 컴파일후 kernel image가 만들어지는 과정**



# Start_kernel()

```
614// ARM10C 20130824
615asmlinkage void __init start_kernel(void)
616{
617        char * command_line;
618        extern const struct kernel_param __start___param[], __stop___param[$
619        // ATAG,DTB 정보로 사용
620
621        /*
622         * Need to run as early as possible, to initialize the
623         * lockdep hash:
624         */
625        lockdep_init();
626        smp_setup_processor_id();
627        debug_objects_early_init();
628
629        /*
630         * Set up the the initial canary ASAP:
631         */
632        boot_init_stack_canary();
633
634        cgroup_init_early();
635        // cgroup 를 사용하기 위한 cgroup_dummy_root, cgroup_subsys 의 구조$
636
637        local_irq_disable();
638        // IRQ를 disable 함
639
-UUU:**--F1  main.c         52% (613,0)   Git-master  (C/l AC yas Abbrev) ------
```

# IV. 소스 코드 분석의 예 :start_kernel()

## Boot Loader -> start_kernel()

- Start_kernel()은 init 프로세스가 동작할 때까지 커널을 초기화합니다.
- 코드는 init/main.c 에 정의합니다.

```
614// ARM10C 20130824
615asmlinkage void __init start_kernel(void)
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636
637        local_irq_disable();
638        // IRQ를 disable 함
639
-UUU:**--F1  main.c         52% (613,0)   Git-master  (C/l AC yas Abbrev) ------
```
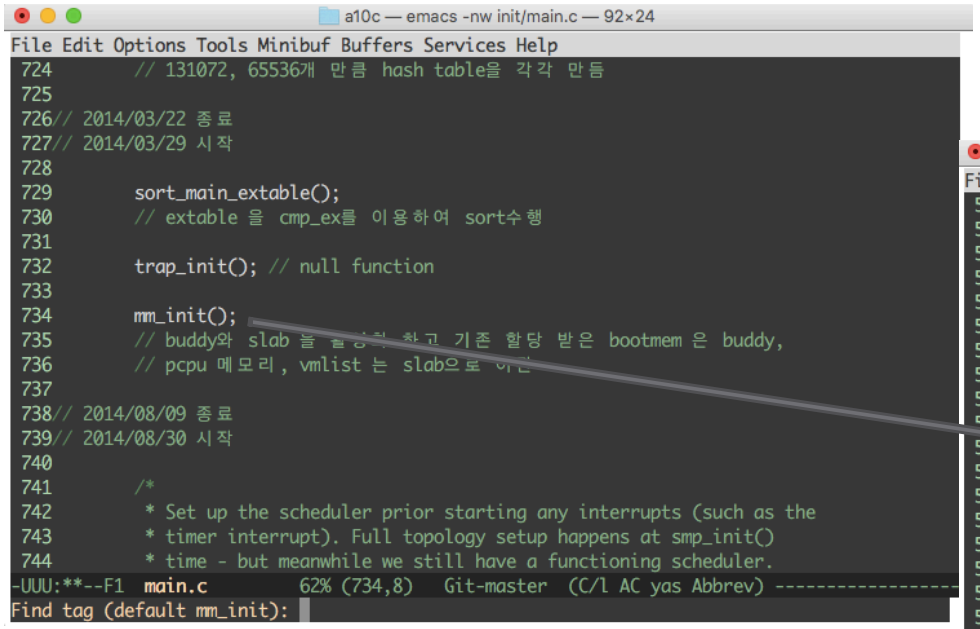
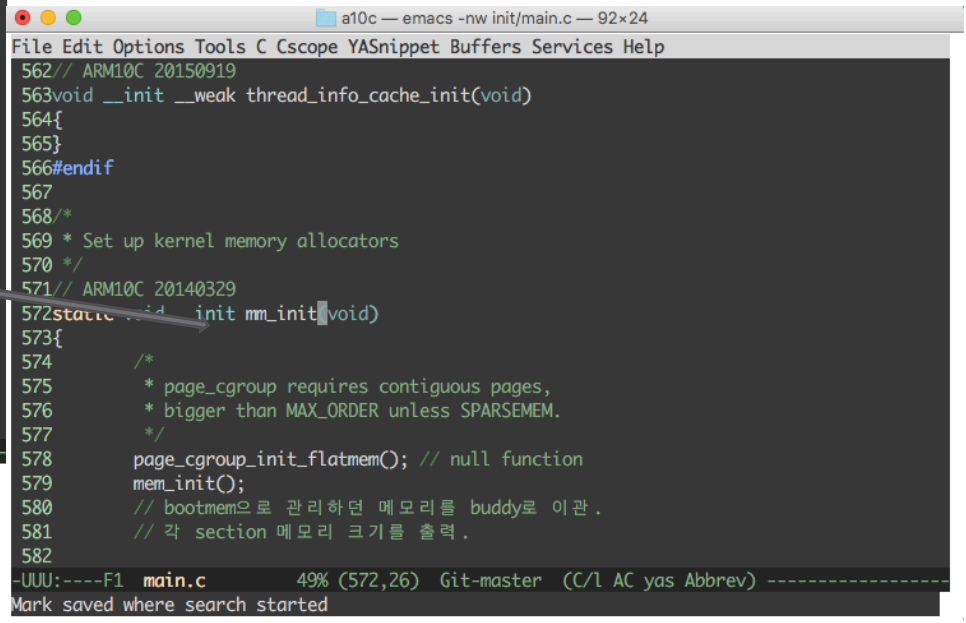

# IV. 소스 분석: tag를 이용해서 함수를 추적

리눅스 커널 개발을 위한 여러가지 도구제공
- ctags, gtags, cscope, …

예) start_kernel()->mm_init()->mem_init()



# V. 커뮤니티 활동 : 공유 (기계학습)

Neuromancer.kr

## 기계학습 5주차 노트 (Coursera, CS229, by Andrew Ng)

기계학습 (Machine Learning)

hephaex 1 15일 전 + 연결된 토픽으로 답글 작성하기

### Machine Learing Note (week #5)

- Neural Networks: Representation
- progress: 5주차
- 장소: 카페씨어터
- 일시: 2016.05.10
- Note:
  - 1주와 2주는 supervised learing 에서 Linear Regression(선형 회귀)을 공부했습니다.
  - 3주는 classification(군집화)에 대하여 공부했습니다.
  - 4주는 기계학습에서 사용하는 신경망(neural network)을 공부했습니다.
  - 5주는 신경망이 어떻게 학습을 하는지에 대하여 공부합니다.

### Week5 contents

- Cost Funciton and Backpropagation
  - Cost Function 비용함수
  - Backpropagation Algorithm 역전파 알고리즘
  - Backpropagation Intuition 역전파 직관
- Backpropagation in Practice 역전파 예시
  - Implementation Note: Unrolling Parameters 구현노트: 파라메터 풀어쓰기
  - Gradient Checking: 경사도 검증
  - Random Initialization 임의의 초기화
  - Putting It Together 함께 넣기.
- Application of Neural Networks 신경망 응용
  - Autonomous Driving 자율주행

### Cost Function and Backpropagation 비용함수와 역전파.

# V. start_kernel() 주요기능

start()_kernel()
- smp_setup_processor_id();// physical CPU 0 (가칭) 으로 boot 진행
- cgroup_init_early(); // cgroup을 사용하기 위한 구조체 초기화
- boot_cpu_init(); // 현재 cpu(core id)를 읽어서 cpu_XXX_bits를 설정함
- setup_arch(); // dtb를 읽어서 메모리 블록과 영역 초기화
- page_alloc_init(); // cpu_chain에 page_alloc_cpu_notify를 연결
- mm_init(); // 메모리 블록에서 buddy초기화 후 stub 초기화
- sched_init(); // scheduller가 사용하는 구조체 초기화, init_task설정
- rcu_init(); // rcu자료 구조, bh, sched, preemt 초기화
- early_irq_init(); // irq_desc 0~15까지 object를 할당 받고 초기화
- init_IRQ(); // GIC, COMBINNER가 사용할 메모리 할당과 자료 구조 설정
- call_function_init(); // 각 cpu core에서 사용할 call_single_queue 초기화
- pidmap_init(); // pidmap 초기화
- rest_init() // init_process (PID 1번) 실행을 위한 초기화 후실행

# V. 커뮤니티 활동: 소스 코드 분석 공유

start()_kernel()->mm_init()->mem_init()->free_all_bootmem()->free_all_bootmem_core(bdata)->__freepages_bootmem(pfn_to_page(start),order)
bootmem으로 관리하던 메모리를 buddy로 바꾸는 과정입니다.

```
- while (start < end) {
  - shift = idx & (BITS_PER_LONG - 1);
  - if (IS_ALIGNED(start, BITS_PER_LONG) && vec == ~0UL) {
      __free_pages_bootmem(pfn_to_page(start), order);
        // CPU0의 vm_event_states.event[PGFREE] 를 32로 설정함
        // page에 해당하는 pageblock의 migrate flag를 반환함
        // struct page의 index 멤버에 migratetype을 저장함
        // struct page의 _count 멤버의 값을 0 으로 초기화함
        // order 5 buddy를 contig_page_data에 추가함
        // (&contig_page_data)->node_zones[ZONE_NORMAL].vm_stat[NR_FREE_PAGES]: 32 로 설정
        // vmstat.c의 vm_stat[NR_FREE_PAGES] 전역 변수에도 32로 설정
        count += BITS_PER_LONG;
      start += BITS_PER_LONG;
  } else { // node_bootmem_map[0]의 값이 0아닐 경우
        while (vec && cur != start) {
            if (vec & 1) {
             __free_pages_bootmem(page, 0);
             // CPU0의 vm_event_states.event[PGFREE] 를 1로 설정함
             // page에 해당하는 pageblock의 migrate flag를 반환함
             // struct page의 index 멤버에 migratetype을 저장함
             // struct page의 _count 멤버의 값을 0 으로 초기화함
             // order 0 buddy를 contig_page_data에 추가함
             // (&contig_page_data)->node_zones[ZONE_NORMAL].vm_stat[NR_FREE_PAGES]: 1 로 설정
             // vmstat.c의 vm_stat[NR_FREE_PAGES] 전역 변수에도 1로 설정
             count++;
        }
  }
```

# VI. 커뮤니티 활동: 궁금하면 물어보자.

## CudNN error running TensorFlow: Could not set cudnn filter descriptor: CUDNN_STATUS_BAD_PARAM #2033

Edit | New issue

**Closed** **hephaex** opened this issue on Apr 20 · 4 comments

**hephaex** commented on Apr 20

GitHub issues are for bugs / installation problems / feature requests.

For general support from the community, see StackOverflow.
To make bugs and feature requests more easy to find and organize, we close issues that are deemed out of scope for GitHub Issues and point people to StackOverflow.

For bugs or installation issues, please provide the following information.
The more information you provide, the more easily we will be able to offer help and advice.

### Environment info

Operating System: Ubuntu 14.04

Installed version of CUDA and cuDNN:
(please attach the output of `ls -l /path/to/cuda/lib/libcud*`):

```
$ ls -l /usr/local/cuda-7.5/lib64/libcud*
-rw-r--r-- 1 root root   322936 Aug 16  2015 /usr/local/cuda-7.5/lib64/libcudadevrt.a
lrwxrwxrwx 1 root root       16 Aug 16  2015 /usr/local/cuda-7.5/lib64/libcudart.so -> lib
lrwxrwxrwx 1 root root       19 Aug 16  2015 /usr/local/cuda-7.5/lib64/libcudart.so.7.5 ->
-rwxr-xr-x 1 root root   383336 Aug 16  2015 /usr/local/cuda-7.5/lib64/libcudart.so.7.5.18
-rw-r--r-- 1 root root   720192 Aug 16  2015 /usr/local/cuda-7.5/lib64/libcudart_static.a
-rwxr-xr-x 1 root root 59823168 Apr 19 15:15 /usr/local/cuda-7.5/lib64/libcudnn.so
-rwxr-xr-x 1 root root 59823168 Apr 19 15:15 /usr/local/cuda-7.5/lib64/libcudnn.so.5
-rwxr-xr-x 1 root root 59823168 Apr 19 15:15 /usr/local/cuda-7.5/lib64/libcudnn.so.5.0.4
-rw-r--r-- 1 root root 58734618 Apr 19 15:15 /usr/local/cuda-7.5/lib64/libcudnn_static.a
```

**Labels**
None yet

**Milestone**
No milestone

**Assignee**
No one assigned

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# VII. 커뮤니티 활동: 아는 것을 알려주자.

**51** Issues created by **40** people

Opened #2343 **Distributed Runtime protos aren't sandbox compatible** 6 hours ago

Opened #2342 **"_too_large_attrs" for Graph visualization on Tensorboard.** 6 hours ago

Opened #2340 **Tensor.eval() Performance Decay** 7 hours ago

Opened #2335 **"bazel test" fails on MacOS with setuptools-21.0** 20 hours ago

Opened #2334 **Immediate-mode execution in TensorFlow** 21 hours ago

Opened #2333 **Building from source fail, error in tensorflow/core/lib/core/threadpool.cc** 21 hours ago

Opened #2332 **install_name_tool error when running reduction_ops_test_gpu on OS X** 23 hours ago

Opened #2331 **No ability to verify a jpeg before decode_jpeg-ing** a day ago

Opened #2330 **softmax_classifier input argument not right?** a day ago

Opened #2328 **Can't mix tensors and python objects** a day ago

Opened #2327 **Numerical Problem in tf.nn.softmax_cross_entropy_with_logits** a day ago

Opened #2326 **tf.QueueBase.close() docs** a day ago

Opened #2324 **Issue with tensorflow/core/lib/core/threadpool.cc** a day ago

Opened #2322 **InvalidArgumentError: Cannot assign a device to node when distributed running** a day ago

Opened #2320 **examples/udacity/1_notmnist.ipynb image normalization is not equal to Udacity video** 2 days ago

Opened #2318 **tf.constant should support pandas Series and DataFrame as input** 2 days ago

Opened #2317 **Install the latest version whl of tensorflow from Jenkins daily build system, but can not find a part of the directory。** 2 days ago

Opened #2315 **tf.nn.softmax outputs negative values (equal to tf.nn.log_softmax)!** 2 days ago

# VII. 커뮤니티 활동: 아는 것을 알려주자.

**vrv** commented on Apr 20

To use cudnn 5 you have to build from sources -- cudnn5 is not binary compatible with cudnn4, and our binaries use the latest official cudnn release (which is 4).

**vrv** closed this on Apr 20

**jamlong** commented on Apr 22 • edited

Short form:
**@vrv** I'd argue that the tensorflow.org should be update to reflect that, here:
https://www.tensorflow.org/versions/r0.8/get_started/os_setup.html#optional-install-cuda-gpus-on-linux

The following section is misleading, as it makes it sound like it should "just work" with other versions:

> Download and install cuDNN
>
> https://developer.nvidia.com/cudnn
>
> Uncompress and copy the cuDNN files into the toolkit directory. Assuming the toolkit is installed in /usr/local/cuda, run the following commands (**edited to reflect the cuDNN version you downloaded**):
>
> tar xvzf cudnn-6.5-linux-x64-v2.tgz
> sudo cp cudnn-6.5-linux-x64-v2/cudnn.h /usr/local/cuda/include
> sudo cp cudnn-6.5-linux-x64-v2/libcudnn* /usr/local/cuda/lib64
> sudo chmod a+r /usr/local/cuda/lib64/libcudnn*

Bolding for emphasis. No indication that you need to specifically download cudnn4 for that. The rest of the page merely says cudnn > 2.0. Also the versioning makes that more confusing than it needs to be (cudnn4 -> 6.5 cudnn5 -> 7.x, and the only way I know is by looking at the actual filenames in the download links)

On https://developer.nvidia.com/cudnn

**Labels**
None yet

**Milestone**
No milestone

**Assignee**
No one assigned

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# VIII. 커뮤니티 활동: 잘못 된것을 발견하면 수정

tensorflow / tensorflow

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Code | Issues 434 | Pull requests 41 | Pulse | Graphs

**Update os_setup.md (#2257)**

Browse files

```
From PR#2095, I've checked command to Installing from sources on OS X.

To set up the TensorFlow form source on OS X, pip installation need root permission.

> sudo pip install /tmp/tensorflow_pkg/tensorflow-0.8.0-py2-none-any.whl
```

master (#2257)

**hephaex** committed with **martinwicke** 36 minutes ago  1 parent 82ff4cd  commit ecd5b7255e05634cad6ea5e0bc680f7a9d981ba8

Showing 1 changed file with **1 addition** and **1 deletion**.  Unified | Split

2 tensorflow/g3doc/get_started/os_setup.md  View

```
@@ -630,7 +630,7 @@ $ bazel build -c opt --config=cuda //tensorflow/tools/pip_package:build_pip_pack
630 630  $ bazel-bin/tensorflow/tools/pip_package/build_pip_package /tmp/tensorflow_pkg
631 631
632 632  # The name of the .whl file will depend on your platform.
633     -$ pip install /tmp/tensorflow_pkg/tensorflow-0.8.0-py2-none-linux_x86_64.whl
    633 +$ sudo pip install /tmp/tensorflow_pkg/tensorflow-0.8.0-py2-none-any.whl
634 634  ```
635 635
636 636  ## Setting up TensorFlow for Development
```

**0 comments on commit** ecd5b72

Write | Preview

# VIII. 커뮤니티 활동: 수정한 것을 함께 리뷰

**tensorflow-jenkins** commented 6 days ago

Can one of the admins verify this patch?

**googlebot** added the **cla: yes** label 6 days ago

**petewarden** commented 3 days ago — tensorflow member

Test this please, Jenkins.

**martinwicke** commented 40 minutes ago — tensorflow member

I'm still not happy about just blanket adding sudo. We already have a sentence there saying the command (whl file name) may depend on the platform. I suggest we add there that "on some platforms (some versions of MacOS in particular), you may have to use sudo", without actually putting that into the code.

If you add sudo on a linux machine, it will actually mess with your pip install and prevent updates without sudo and all kinds of other nasty stuff.

**martinwicke** self-assigned this 40 minutes ago

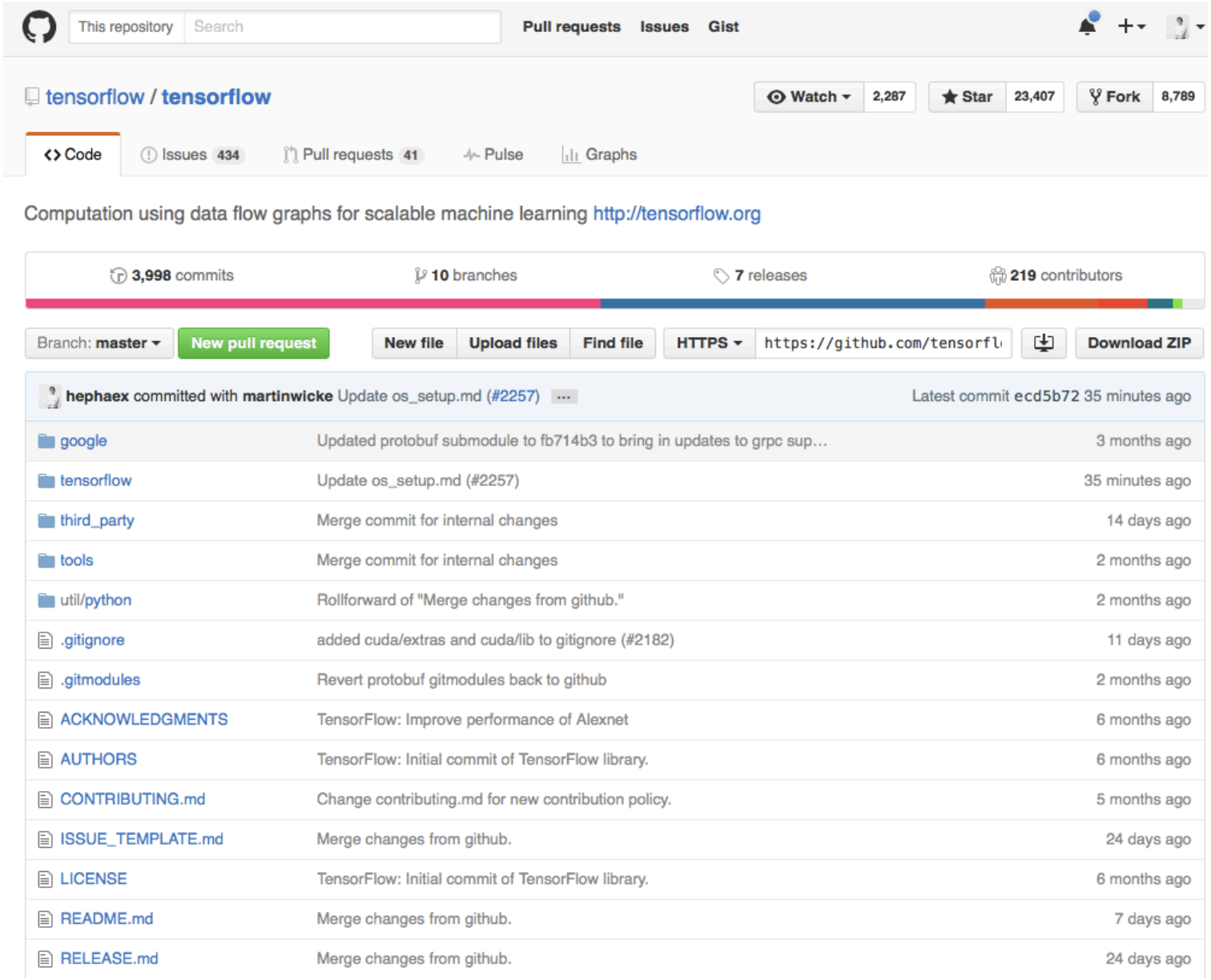
**martinwicke** commented 37 minutes ago — tensorflow member

Never mind. I got confused where in the doc this was. Sorry about that.

**martinwicke** merged commit **ecd5b72** into `tensorflow:master` 37 minutes ago — View details — Revert

8 checks passed

# IX. 커뮤니티 활동: 개선 결과 반영




Thanks you!
Q&A