

# 공개SW 거버넌스 Git-Github 활용 협업

공개SW 역량플라자



2018. 9. 11  
조만석  
(hephaex@gmail.com)



## Development Experience

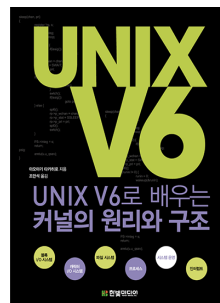
- ◆ Image Recognition using Neural Network
- ◆ Bio-Medical Data Processing
- ◆ Human Brain Mapping on High Performance Computing
- ◆ Medical Image Reconstruction(Computer Tomography)
- ◆ Enterprise System Architect
- ◆ Artificial Intelligence for medicine decision support

## ◆ Open Source Software Developer

- ◆ Committer: (Cloud NFV/SDN) 

- ◆ Contribute:

- ◆ TensorFlow (Deep Learning)
- ◆ OpenStack (Cloud compute)
- ◆ LLVM (compiler)
- ◆ Kernel (Linux)



## Book

- ◆ Unix V6 Kernel



**Lablup Inc.**

**Mario Cho**

**[hephaex@gmail.com](mailto:hephaex@gmail.com)**



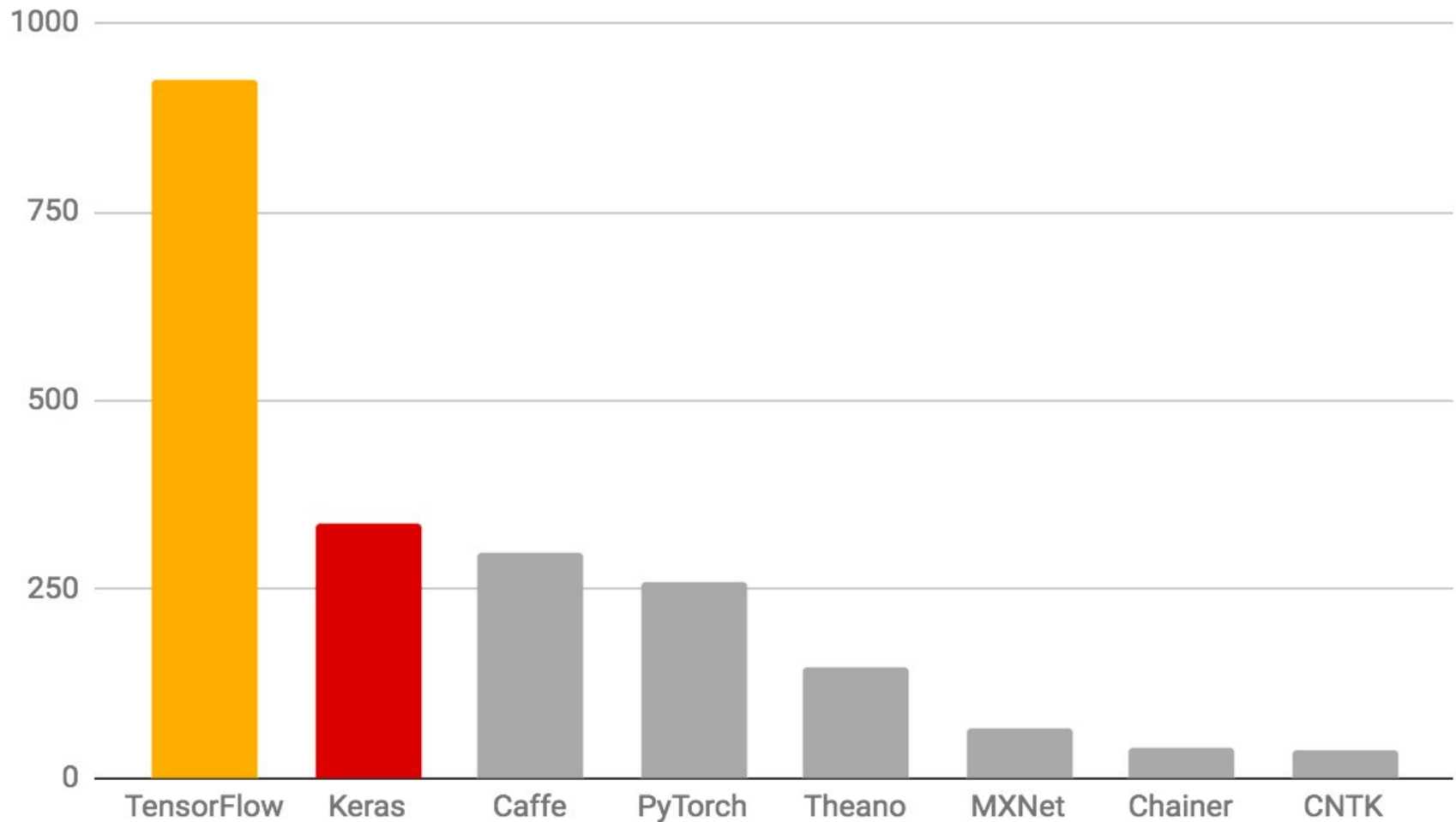




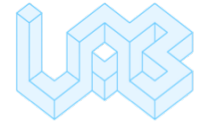
“Open source software library  
for numerical computation  
using data flow graphs”



# Percent machine learning platform of ML papers.



arXiv mentions as of 2018/08/30 (past 3 monts)



- <https://github.com/lablup/backend.ai>
  - 2016년 11월 v0.1 릴리즈
  - 2017년 10월 v1.0 릴리즈
    - 개발 매뉴얼 제공
  - 2018년 1월 v1.1 / 2월 v1.2 / 3월 v1.3 릴리즈
    - 코드 안정화
    - 설치 매뉴얼 및 싱글 클러스터용 자동 설치 지원
    - 플러그인 아키텍처 도입
  
- 향후 로드맵
  - 스케줄러 기능 강화
  - 대규모 HPC 클러스터 오케스트레이션 기능 강화
  - VPN 없는 다중 클라우드 연결을 통한 쉬운 Hybrid cloud 및 on-premise 연동
  - 오토스케일링 기능 강화
    - 장시간 연산 세션을 위한 scale-in protection
    - cpu/memory/gpu slot 여유 용량에 따라 cold/hot instance group 운영



# Backend.AI 오픈소스

---

- Backend.AI Ground
    - 오픈소스 (코어 + 라이브러리 + 플러그인)
    - 설치형 소프트웨어 / 프레임워크
    - 듀얼 라이선스 채택
      - 비상업용: LGPLv3
      - 상업용: 별도 commercial license 및 사용 계약
  - Backend.AI Cloud
    - Backend.AI Ground 기반으로 Lablup에서 직접 운영하는 클라우드
  - Backend.AI Enterprise
    - 상업 용도의 별도 계약에 따른 엔터프라이즈 솔루션
    - 온프레미스 / 서포트 플랜
-



- 현재
  - Python 3, R, PHP 5/7, node.js, JavaScript, Julia, Lua, Octave, Go, C/C++, Rust, Java, Haskell
  - 딥러닝 환경: TensorFlow, PyTorch, Keras, Caffe
- 테스트중
  - Swift, TypeScript, C# (.NET Core)





# Git-Github





- 버전관리 시스템
- 소프트웨어의 변경사항을 체계적으로 관리하는 도구



# What is github



- 오픈 소스 공개 저장소
- Git 기반으로 운영
- 얼마전 Microsoft사가 매수

# GitHub





Git: 소스 코드 버전 관리 도구

Github: git기반 소스코드 저장소 (원격)

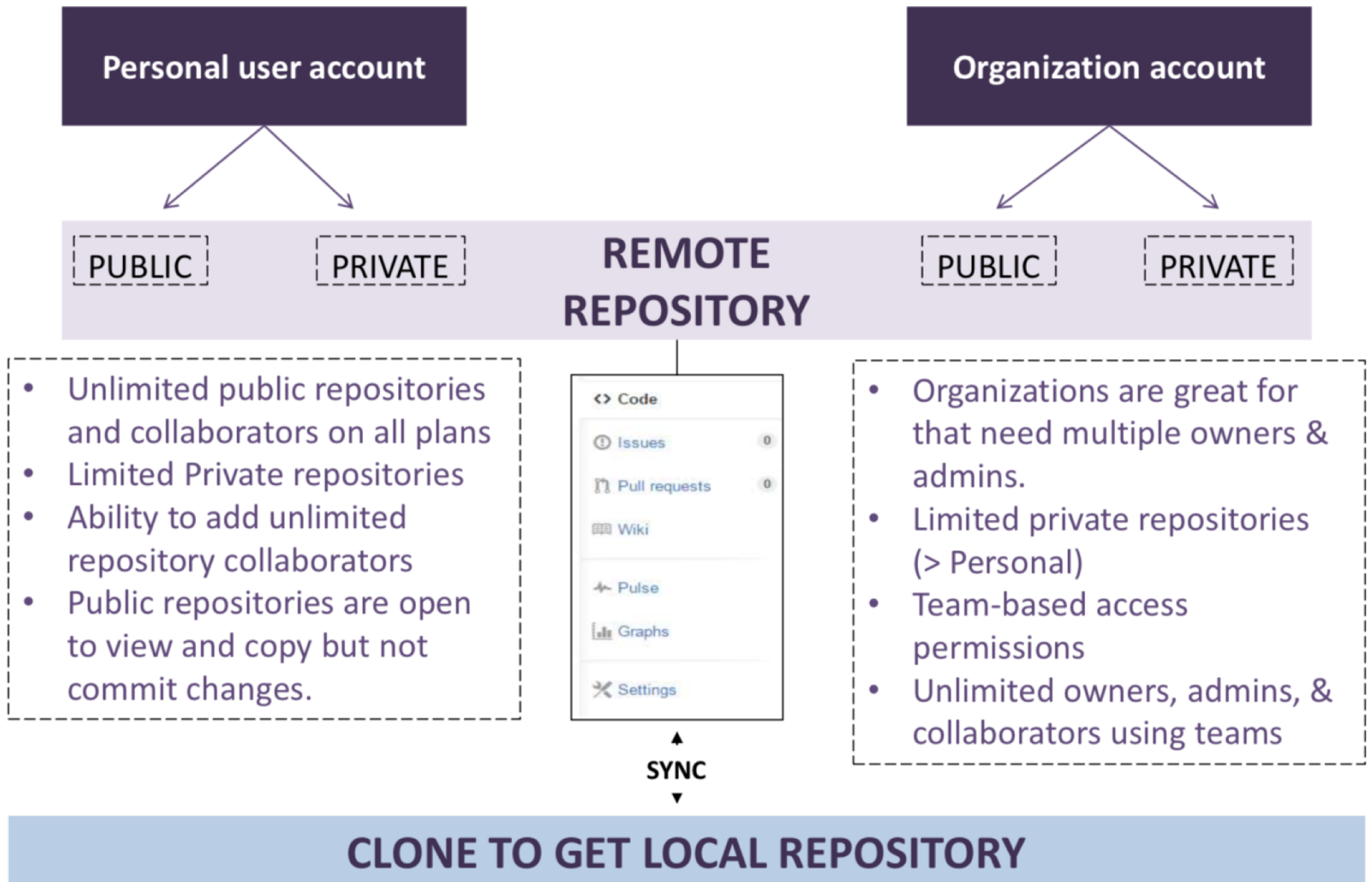
유사품

Gitlab: github와 유사한 원격 소스 코드 저장소

bitbucket : github과 유사한 원격 소스 코드 저장소



# Github structure







## 제1장 총강

### 제1조

- ① 대한민국은 민주공화국이다.
- ② 대한민국의 주권은 국민에게 있고, 모든 권력은 국민으로부터 나온다.

### 제1조

- ① 대한민국은 민주공화국이다.
- ② 대한민국의 주권은 국민에게 있고, 모든 권력은 국민으로부터 나온다.
- ③ 대한민국은 지방분권국가를 지향한다.

### 제2조

- ① 대한민국의 국민이 되는 요건은 법률로 정한다.
- ② 국가는 법률이 정하는 바에 의하여 재외국민을 보호할 의무를 진다.

### 제2조

- ① 대한민국의 국민이 되는 요건은 법률로 정한다.
- ② 국가는 법률로 정하는 바에 따라 재외국민을 보호할 의무를 진다.

### 제3조

대한민국의 영토는 한반도와 그 부속도서로 한다.

### 제3조

- ① 대한민국의 영토는 한반도와 그 부속도서(附屬島嶼)로 한다.
- ② 대한민국의 수도(首都)에 관한 사항은 법률로 정한다.

### 제4조

대한민국은 통일을 지향하며, 자유민주적 기본질서에 입각한 평화적 통일 정책을 수립하고 이를 추진한다.

### 제4조

대한민국은 통일을 지향하며, 자유민주적 기본질서에 바탕을 둔 평화 통일 정책을 수립하여 추진한다.

### 제5조

- ① 대한민국은 국제평화의 유지에 노력하고 침략적 전쟁을 부인한다.
- ② 국군은 국가의 안전보장과 국토방위의 신성한 의무를 수행함을 사명으로 하며, 그 정치적 중립성은 준수된다.

### 제5조

- ① 대한민국은 국제평화를 유지하기 위하여 노력하고 침략적 전쟁을 부인한다.
- ② 국군은 국가의 안전보장과 국토방위의 신성한 의무를 수행함을 사명으로 하며 그 정치적 중립성은 준수된다.

# git diff



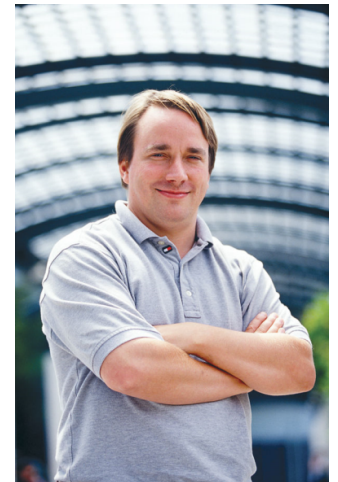
Old	New	
		제1장 총강
7	7	제1조 ① 대한민국은 민주공화국이다.
Old	8	② 대한민국의 주권은 국민에게 있고, 모든 권력은 국민으로부터 나온다.
	9	+ ③ 대한민국은 지방분권국가를 지향한다.
9		
10	New	제2조 ① 대한민국의 국민이 되는 요건은 법률로 정한다.
11		- ② 국가는 법률이 정하는 바에 의하여 재외국민을 보호할 의무를 진다.
	12	+ ② 국가는 법률로 정하는 바에 따라 재외국민을 보호할 의무를 진다.
12	13	
13		- 제3조 대한민국의 영토는 한반도와 그 부속도서로 한다.
	14	+ 제3조 ① 대한민국의 영토는 한반도와 그 부속도서(附屬島嶼)로 한다.
	15	+ ② 대한민국의 수도에 관한 사항은 법률로 정한다.
14	16	
15		- 제4조 대한민국은 통일을 지향하며, 자유민주적 기본질서에 입각한 평화적 통일 정책을 수립하고 이를 추진한다.
	17	+ 제4조 대한민국은 통일을 지향하며, 자유민주적 기본질서에 바탕을 둔 평화 통일 정책을 수립하여 추진한다.
16	18	
17		- 제5조 ① 대한민국은 국제평화의 유지에 노력하고 침략적 전쟁을 부인한다.
18		- ② 국군은 국가의 안전보장과 국토방위의 신성한 의무를 수행함을 사명으로 하며, 그 정치적 중립성은 준수된다.
	19	+ 제5조 ① 대한민국은 국제평화를 유지하기 위하여 노력하고 침략적 전쟁을 부인한다.
	20	+ ② 국군은 국가의 안전보장과 국토방위의 신성한 의무를 수행함을 사명으로 하며 그 정치적 중립성은 준수된다.



*Never mind merging. It's not an SCM, it's a distribution and archival mechanism. I bet you could make a reasonable SCM on top of it, though. Another way of looking at it is to say that it's really a content-addressable filesystem, used to track directory trees.*

*Linus Torvalds, 7 Apr 2005*

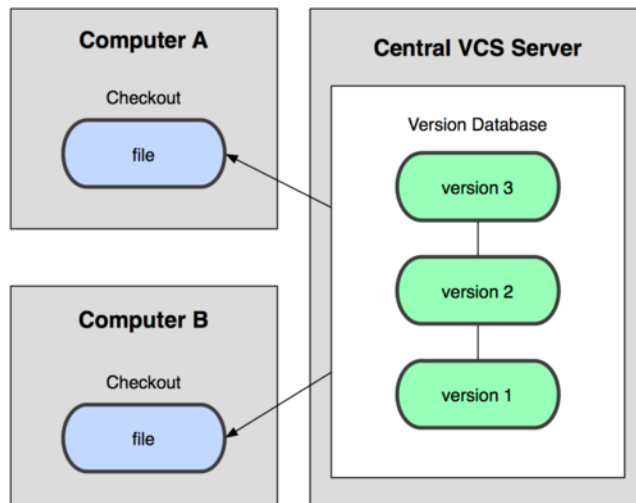
<http://lkml.org/lkml/2005/4/8/9>





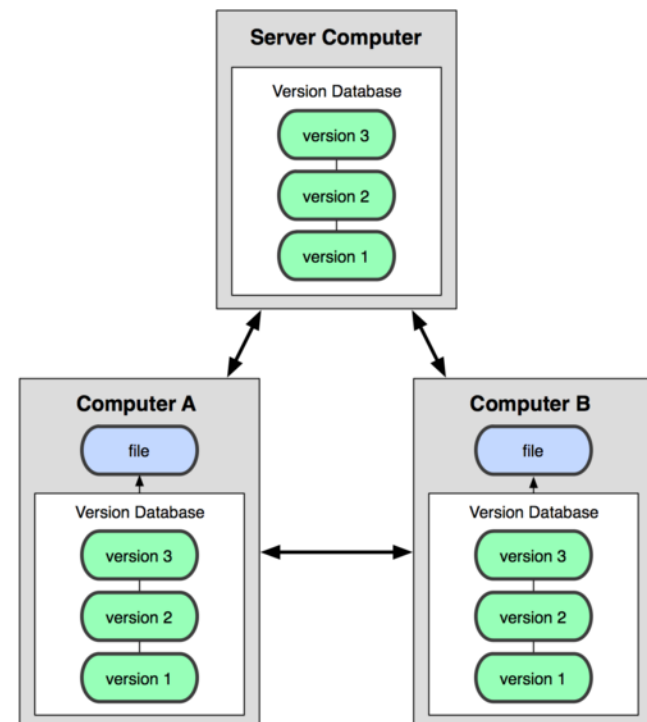


## Centralized Model



(CVS, Subversion, Perforce)

## Distributed Model



(Git, Mercurial)

Result: Many operations are local

# Github repository (저장소)



**Mario Cho**

hephaex

Add a bio

Lablup.AI

Google Campus Seoul, Korea

hephaex@gmail.com

http://www.lablup.ai

## Organizations



Overview

**Repositories** 371

Stars 31

Followers 21

Following 14

Search repositories...

Type: All

Language: All

New

## helm

Forked from emacs-helm/helm

Emacs incremental completion and selection narrowing framework

Emacs Lisp 283 GPL-3.0 Updated 4 days ago



## dotfiles

dot files like .emacs.d .bashrc ...

GPL-3.0 Updated 6 days ago



## backend.ai-hook

Private hook library to override library-level functions inside REPL containers

C LGPL-3.0 Updated 7 days ago



# Create a new repository



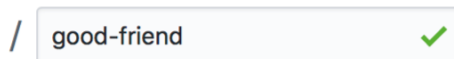
## Create a new repository

A repository contains all the files for your project, including the revision history.

Owner



Repository name



Great repository names are short and memorable. Need inspiration? How about **studious-octo-spork**.

Description (optional)



**Public**

Anyone can see this repository. You choose who can commit.



**Private**

You choose who can see and commit to this repository.

☐ **Initialize this repository with a README**

This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.

Add .gitignore: **None** ▼

Add a license: **None** ▼



Create repository



# Choose an Open Source License



☐ **Initialize this repository with a README**

This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.

Add .gitignore: **None** ▼

Add a license: **None** ▼



Create repository

## Licenses



Filter licenses...

**None**

Apache License 2.0

GNU General Public License v3.0

MIT License

BSD 2-Clause "Simplified" License

BSD 3-Clause "New" or "Revised" License

Eclipse Public License 2.0

GNU Affero General Public License v3.0

GNU General Public License v2.0

GNU Lesser General Public License v2.1

GNU Lesser General Public License v3.0

Modified Public License 2.0

[Terms](#) [Privacy](#) [Security](#) [Status](#)

[Contact GitHub](#) [Pricing](#)

# Choose an open source license



An open source license protects contributors and users. Businesses and savvy developers won't touch a project without this protection.

**Which of the following best describes your situation?**



## **I need to work in a community.**

Use the **license preferred by the community** you're contributing to or depending on. Your project will fit right in.

If you have a dependency that doesn't have a license, ask its maintainers to **add a license**.



## **I want it simple and permissive.**

The **MIT License** is short and to the point. It lets people do almost anything they want with your project, including to make and distribute closed source versions.

**Babel**, **.NET Core**, and **Rails** use the MIT License.



## **I care about sharing improvements.**

The **GNU GPLv3** also lets people do almost anything they want with your project, *except* to distribute closed source versions.

**Ansible**, **Bash**, and **GIMP** use the GNU GPLv3.



# Existing project and communities

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- [Apache](#) requires [Apache License 2.0](#)
- [Cloud Native Computing Foundation](#) dictates [Apache License 2.0](#) by default
- [GNU](#) recommends [GNU GPLv3](#) for most programs
- [NPM packages](#) overwhelmingly use the [MIT](#) or the very similar [ISC](#) licenses
- [OpenBSD](#) prefers the [ISC License](#)
- [WordPress](#) plugins and themes must be [GNU GPLv2](#) (or later)

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# Choose an open source license



An open source license protects contributors and users. Businesses and savvy developers won't touch a project without this protection.

**What if none of these work for me?**

**My project isn't software.**

There are licenses for that.

**I want more choices.**

More licenses are available.

**I don't want to choose a license.**

Here's what happens if you don't.

# Licenses



## GNU AGPLv3

### Permissions

- Commercial use
- Distribution
- Modification
- Patent use
- Private use

### Conditions

- Disclose source
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## Mozilla Public License 2.0

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- Modification
- Patent use
- Private use

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- Modification
- Patent use
- Private use

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- State changes

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- Liability
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## Apache License 2.0

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- Private use

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- Distribution
- Modification
- Private use

### Conditions

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# Create repo, Master, Branch, Commits




- Creating a repo
  - 여러 사람이 함께 작업 할 수있는 저장소 만들기
- Master in a repository
  - 팀 내의 누군가가 사용할 준비가 되어있는 것
  - 저장소가 공개인 경우, 공개된 최종 버전
- Creating a Branch
  - 새로운 아이디어를 시도 할 수있는 환경을 만들기 위해 프로젝트에서 분기를 만듭니다.
  - 분기에 대한 변경 사항은 끌어 오기 요청을 수락하지 않는 한 마스터에 영향을주지 않습니다.
  - 다른 버전을 추적하기 위해 지점에 대한 변경 사항을 반영합니다.
- Adding Commits
  - 분기 또는 마스터에서 진행 상황을 추적합니다.
  - 다른 사람들이 수행 한 작업을 이해할 수 있도록 명료하게 내용을 적습니다.

# github 예시 Tensorflow



 tensorflow / tensorflow

 Watch ▾

8,309

★ Star


108,757

 Fork

67,160

 Code

 Issues 1,572

 Pull requests 272

 Projects 0

 Insights

An Open Source Machine Learning Framework for Everyone <https://tensorflow.org>

tensorflow

machine-learning

python

deep-learning


deep-neural-networks

neural-network

ml

distributed

 39,396 commits

 26 branches

 66 releases

 1,630 contributors

 Apache-2.0

Branch: master ▾

New pull request

Create new file

Upload files

Find file

Clone or download ▾



# Company Repository




## Lablup

lab | up: Make AI Accessible - A start-up to innovate research / education processes.

📍 Seoul, Republic of Korea   🔗 <https://www.lablup.com>   ✉ [contact@lablup.com](mailto:contact@lablup.com)

 **Repositories** 78

 **People** 9

 **Teams** 3

 **Projects** 2

### Pinned repositories

**backend.ai**

Meta-repository for backend.ai

● Shell   ★ 73   🍴 12

**backend.ai-client-py**

Backend.AI Client Library for Python

● Python   ★ 4   🍴 3

**talkativot**

Talkativot: Do-It-Yourself backbone for your AI friend

● Python   ★ 5   🍴 4

Type: All ▼

Language: All ▼

 **New**

# Public & Private Repository

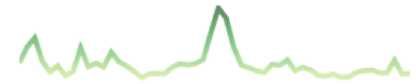


neumann

Private

Next-generation peer-to-peer sci-tech learning system

● HTML ★ 4 3 issues need help Updated 4 hours ago



backend.ai-agent

Backend.AI agent daemon that manages lifecycle of kernel containers

python

agent

docker

asyncio

multiplexer























sorna

● Python ★ 6 🍴 4 📄 LGPL-3.0 1 issue needs help Updated 15 hours ago



# Tensorflow : source code



 <b>tensorflow-gardener</b> Introduce auxiliary input and allow "cross-linking" in the bidirectio... <span>...</span>		Latest commit c1385b0 3 hours ago
 <a href="#">tensorflow</a>	Introduce auxiliary input and allow "cross-linking" in the bidirectio...	3 hours ago
 <a href="#">third_party</a>	Update downloadable clang to r340427	19 hours ago
 <a href="#">tools</a>	Merge pull request #20419 from hermanzdosilovic:patch-1	28 days ago
 <a href="#">.gitignore</a>	Merge pull request #21209 from kingofthebongo2008:ignore_cmake_build_...	10 days ago
 <a href="#">ACKNOWLEDGMENTS</a>	TensorFlow: Improve performance of Alexnet	3 years ago
 <a href="#">ADOPTERS.md</a>	Internal file cleanup.	2 years ago
 <a href="#">AUTHORS</a>	Merge changes from github.	9 months ago
 <a href="#">BUILD</a>	Make LICENSE visible to bazel.	8 months ago
 <a href="#">CODEOWNERS</a>	Fix (my) code owner github id.	4 days ago
 <a href="#">CODE_OF_CONDUCT.md</a>	Merge changes from github.	8 months ago
 <a href="#">CONTRIBUTING.md</a>	Merge changes from github.	2 months ago
 <a href="#">ISSUE_TEMPLATE.md</a>	Add mobile device field to the issue template.	2 months ago
 <a href="#">LICENSE</a>	Merge changes from github.	8 months ago
 <a href="#">README.md</a>	Add Raspberry Pi nightly build status and artifact links to the githu...	3 days ago
 <a href="#">RELEASE.md</a>	Link 1.10 release notes to Bigtable doc for discoverability	22 days ago
 <a href="#">SECURITY.md</a>	fix md link format	3 months ago
 <a href="#">WORKSPACE</a>	Updated based on PR feedback.	22 days ago
 <a href="#">arm_compiler.BUILD</a>	Merge changes from github.	a year ago
 <a href="#">configure</a>	Merge changes from github.	6 months ago
 <a href="#">configure.py</a>	Add NDK r16 to Bazel's supported range of NDKs.	4 days ago
 <a href="#">models.BUILD</a>	Make models.BUILD filegroup include everything but metadata files and...	2 years ago



README.md



Documentation

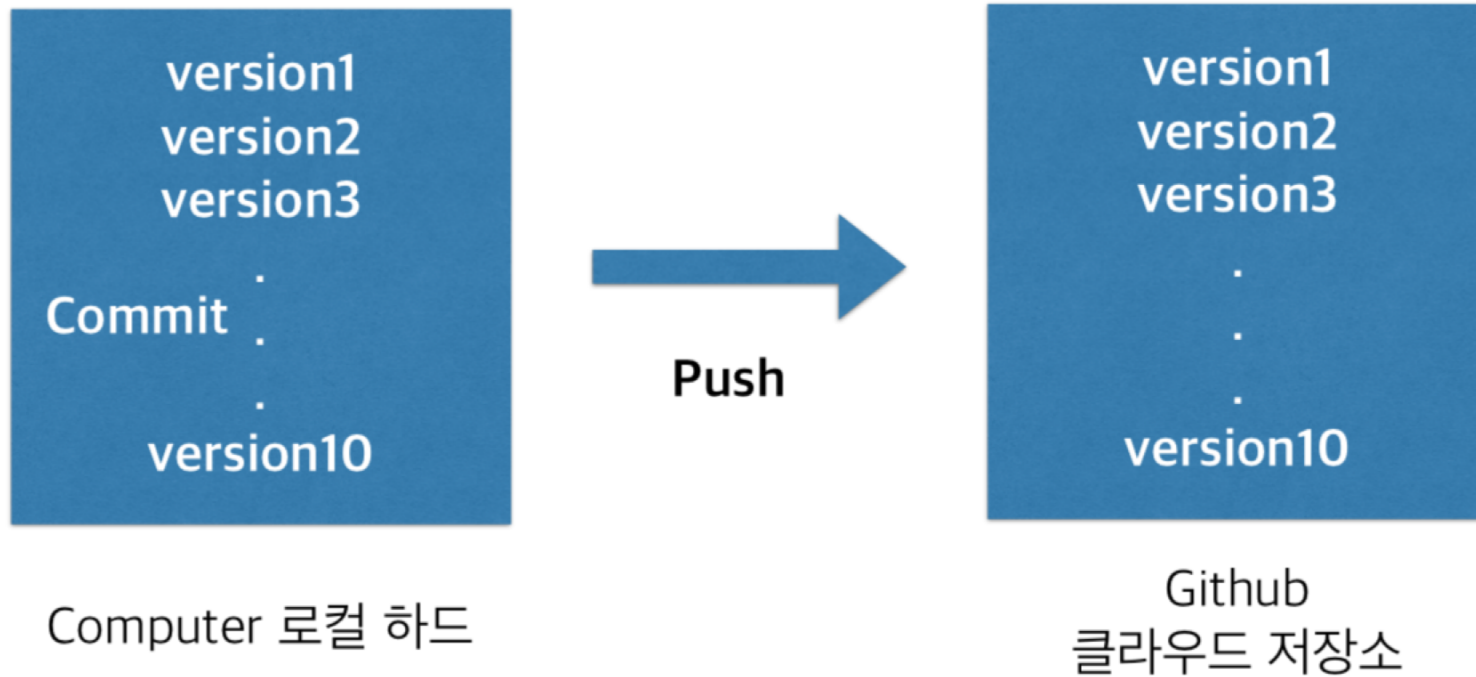
api reference

**TensorFlow** is an open source software library for numerical computation using data flow graphs. The graph nodes represent mathematical operations, while the graph edges represent the multidimensional data arrays (tensors) that flow between them. This flexible architecture enables you to deploy computation to one or more CPUs or GPUs in a desktop, server, or mobile device without rewriting code. TensorFlow also includes [TensorBoard](#), a data visualization toolkit.

# Git commit



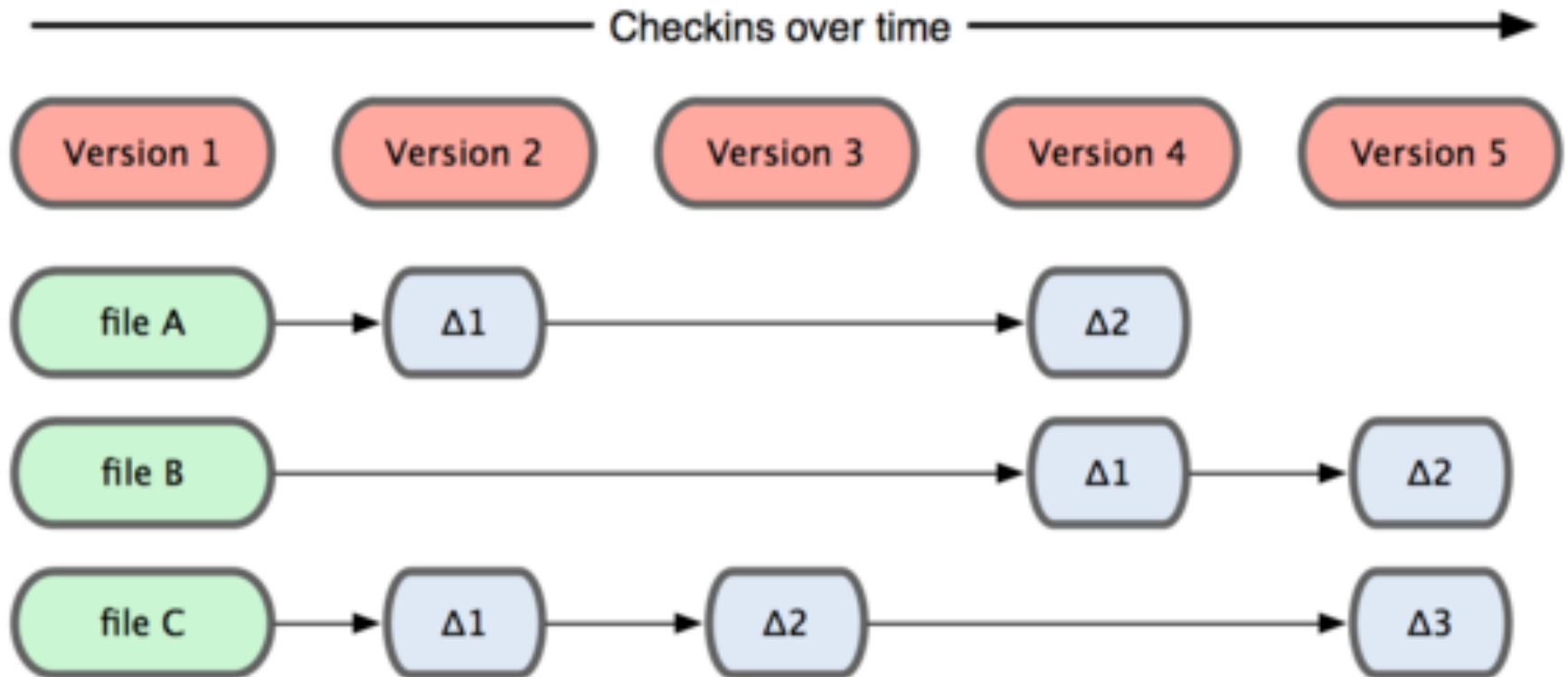
Commit을 이동할 때 메시지를 보고 하게 된다.  
메세지를 간결하면서도 핵심의미가 담기도록 하자.



# Git takes snapshot



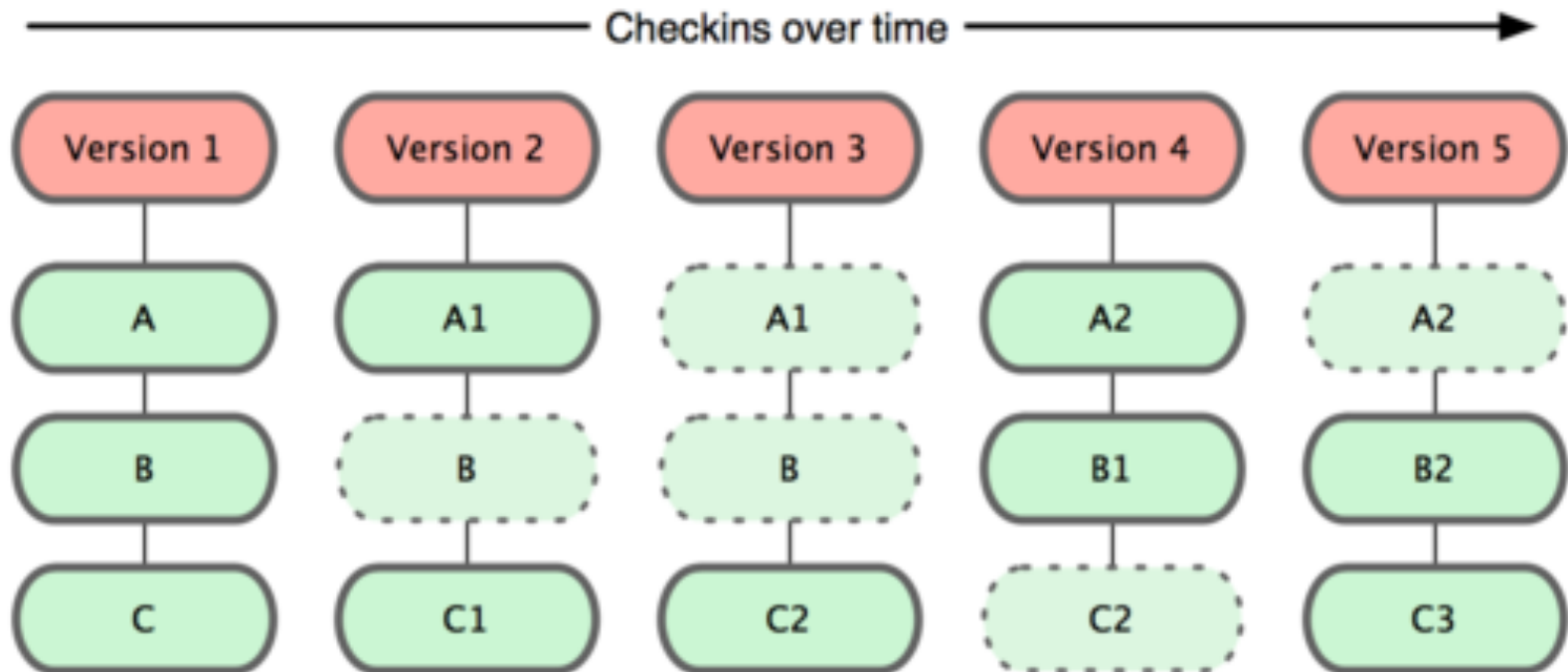
## Subversion



# Git takes snapshot

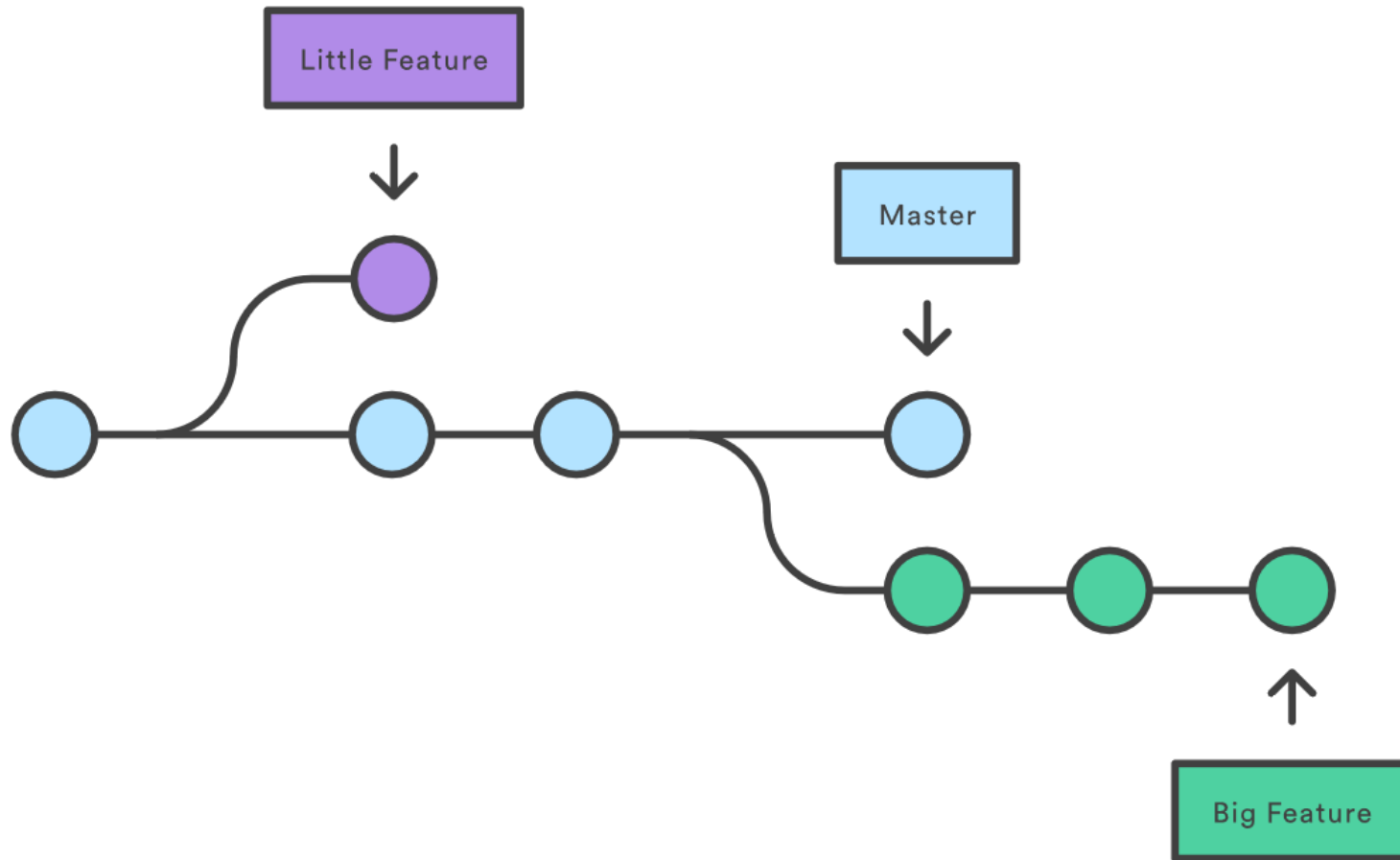


Git

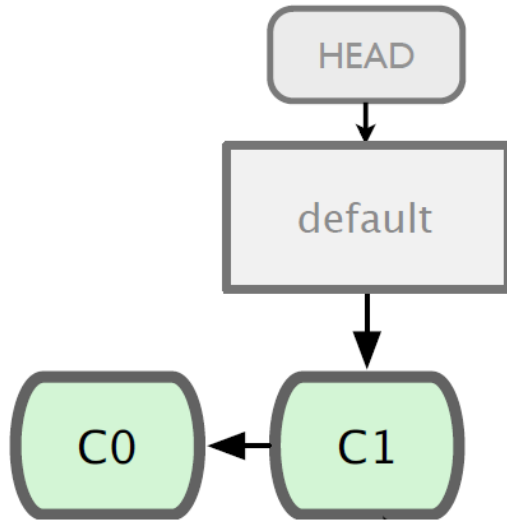


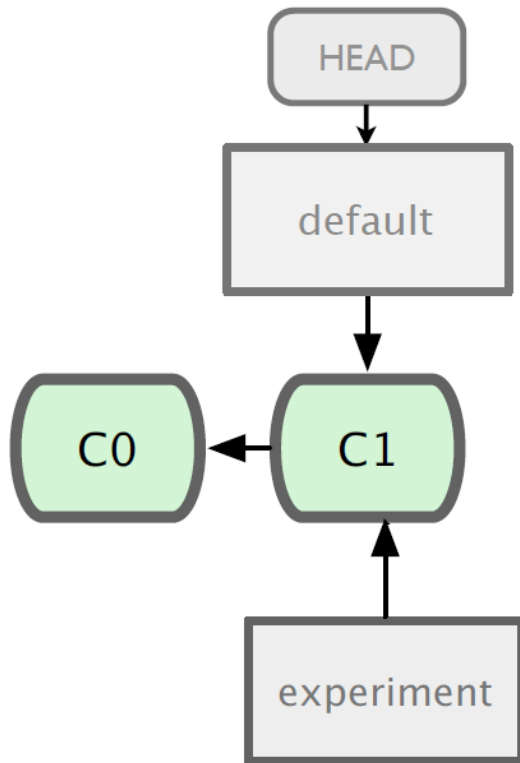


# Git branch flow



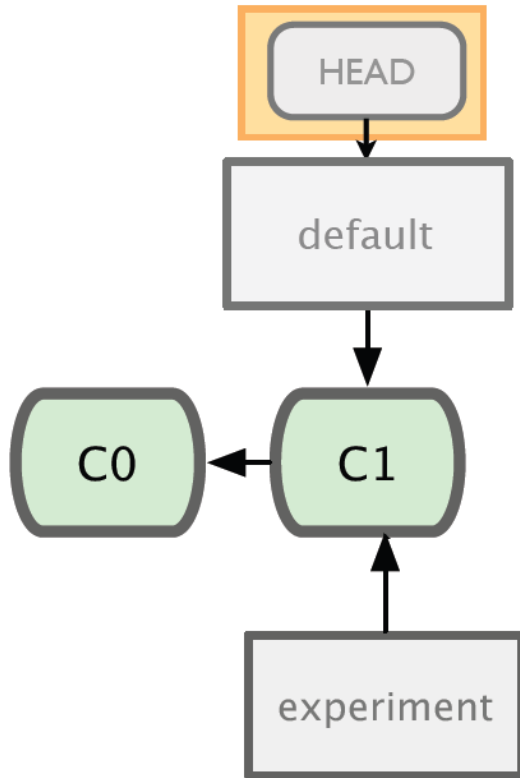
# Git commit



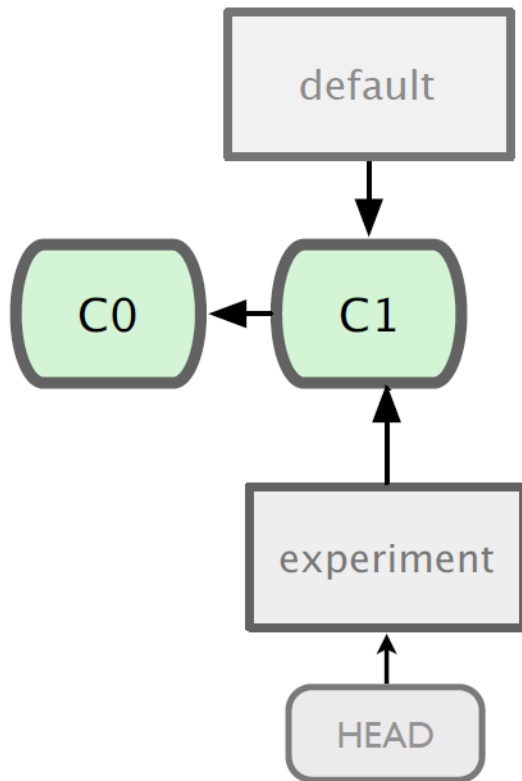


# git branch experiment

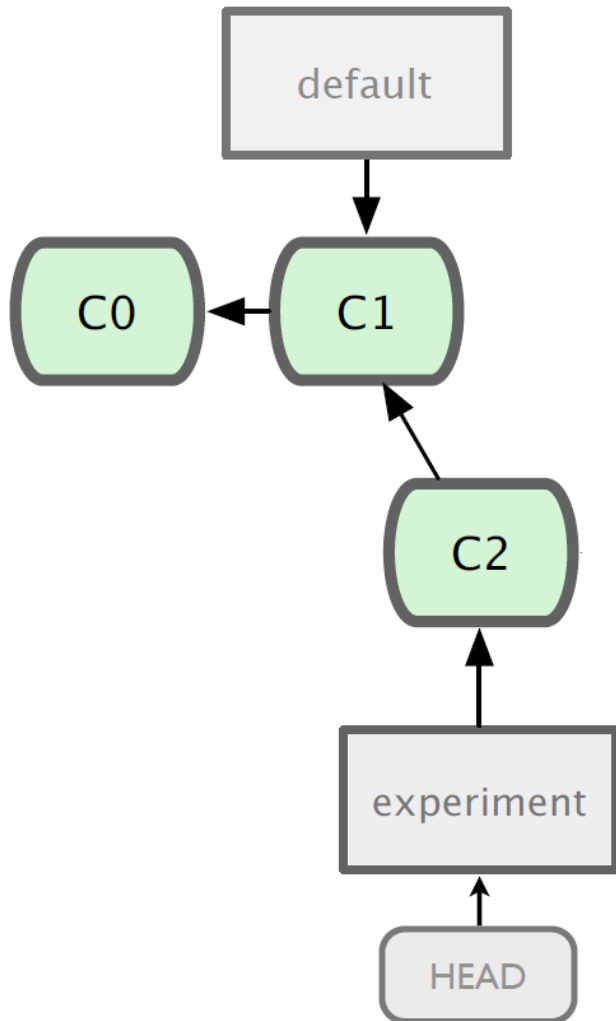
# git branch experiment



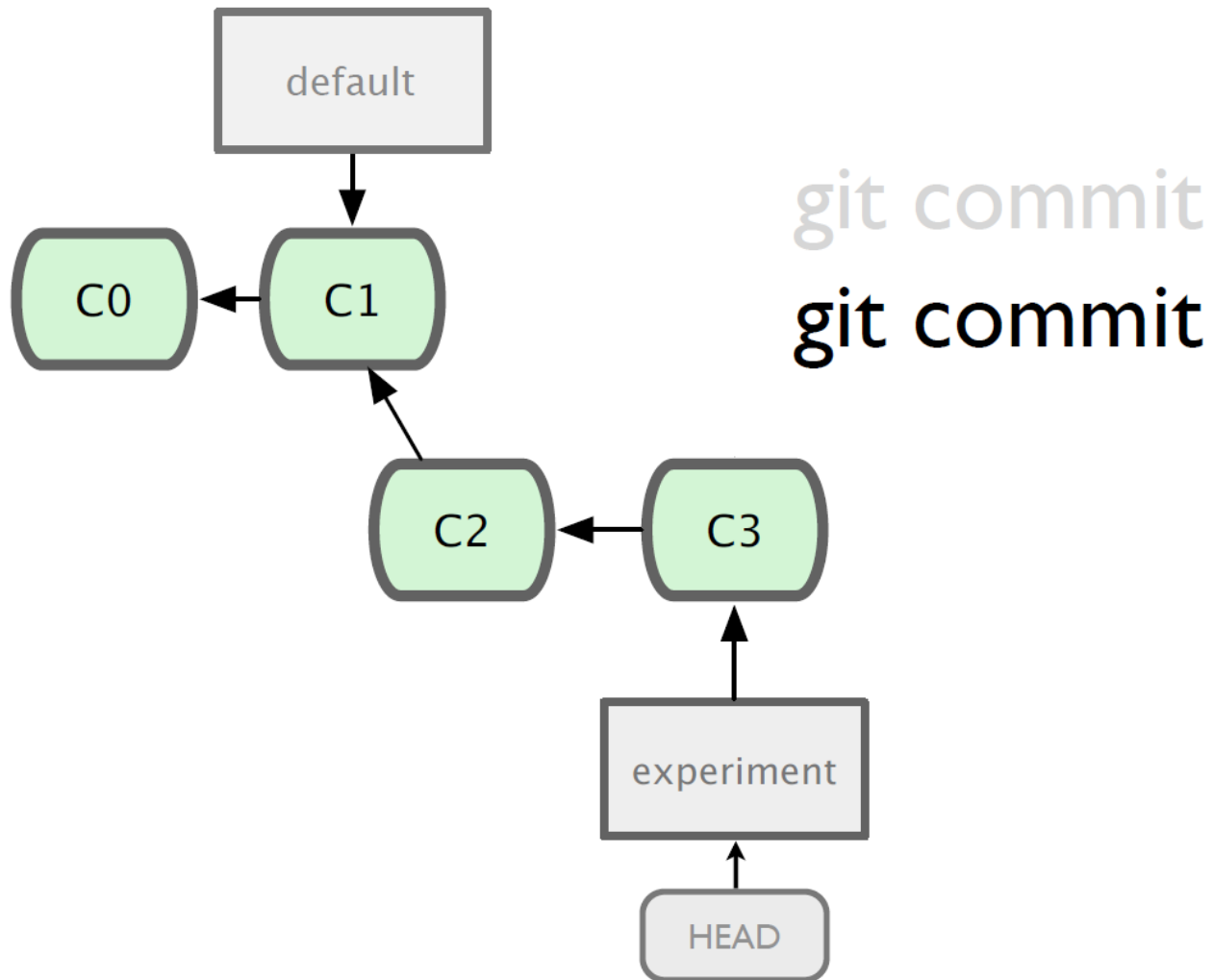
```
$ git branch  
* default  
experiment
```



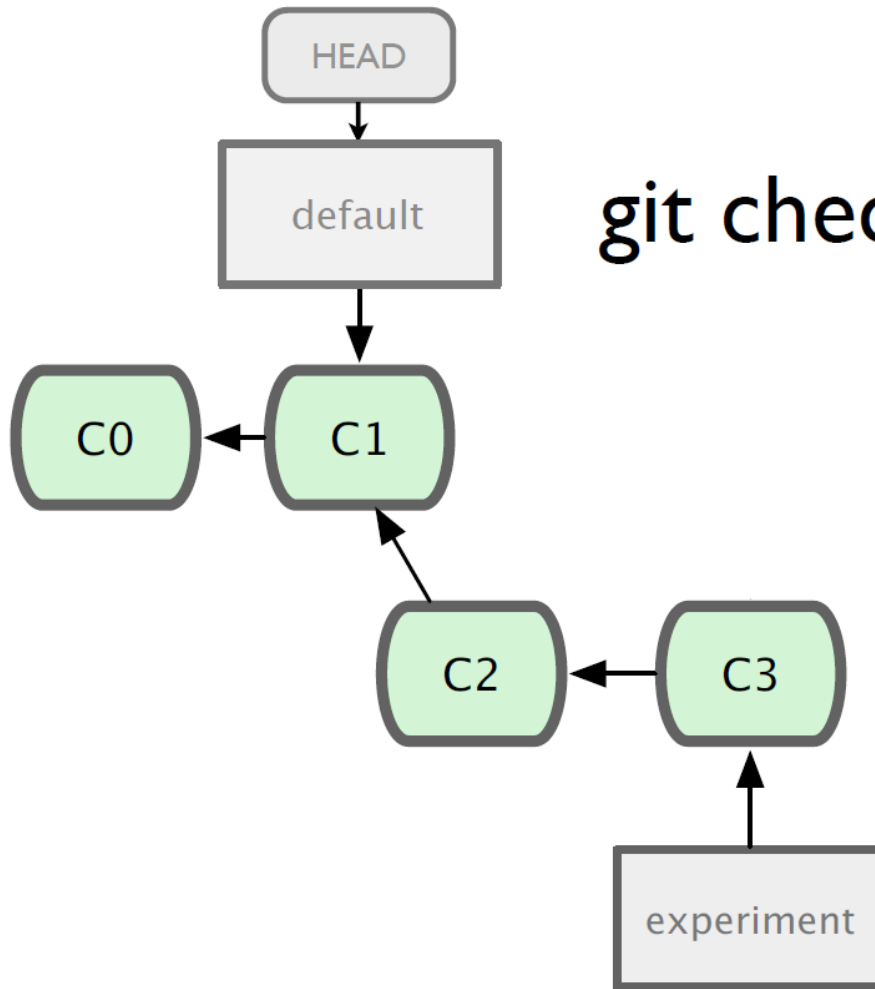
## git checkout experiment



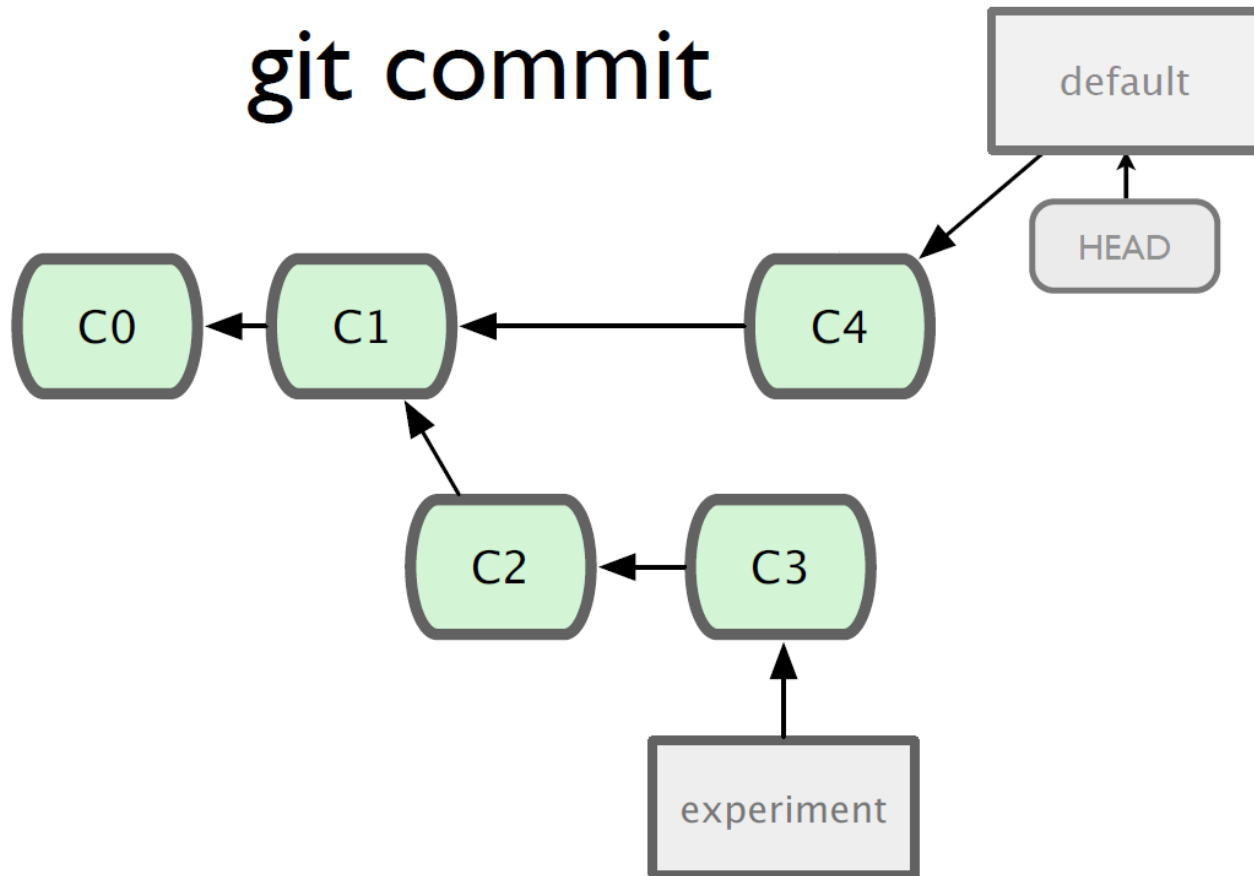
## git commit



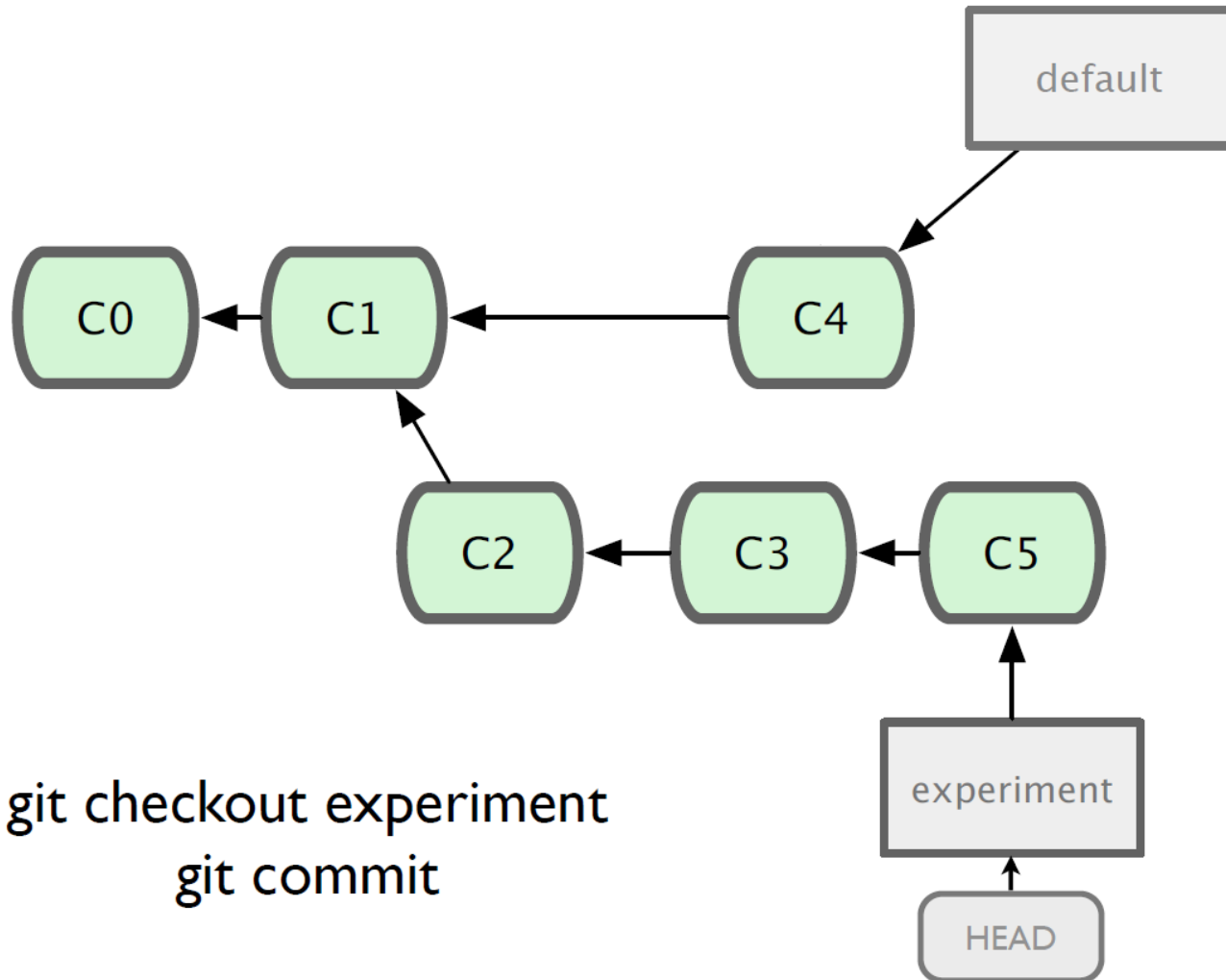




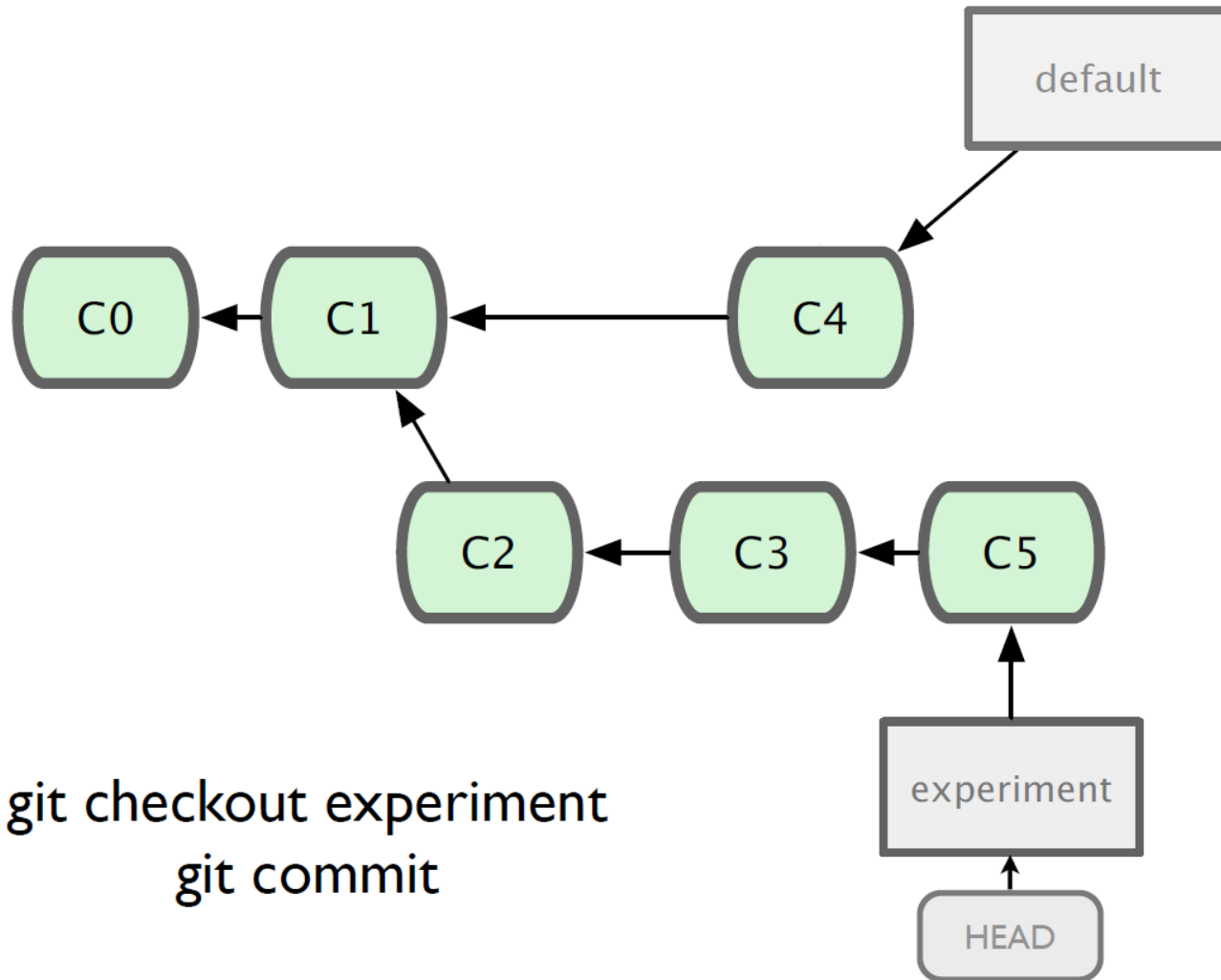
git checkout default



# git checkout experiment && git commit



# git merge



# Forking a repository



## ■ Forking a repository

- 저장소의 복사본을 변경하지 않고 독립적으로 내가 작업 할 수있는 복사본을 만듭니다.
- 내가 만들 작업을 원 소유자의 저장소에 반영할 때는 원 소유자가 변경 사항을 통합 할 수 있도록 소유자에게 요청을 제출하십시오.
- 이것을 PR, Pull request를 보냅니다 라고 합니다.

The screenshot shows the GitHub interface for the TensorFlow repository. At the top, the repository name 'tensorflow / tensorflow' is displayed. To the right are buttons for 'Watch' (8,309), 'Star' (108,757), and 'Fork' (67,160). Below this is a navigation bar with 'Code', 'Issues' (1,572), 'Pull requests' (272), 'Projects' (0), and 'Insights'. The main heading reads 'An Open Source Machine Learning Framework for Everyone' with a link to 'https://tensorflow.org'. Below the heading are tags for 'tensorflow', 'machine-learning', 'python', 'deep-learning', 'deep-neural-networks', 'neural-network', 'ml', and 'distributed'. A progress bar shows statistics: 39,396 commits, 26 branches, 66 releases, 1,630 contributors, and Apache-2.0 license. At the bottom are buttons for 'Branch: master', 'New pull request', 'Create new file', 'Upload files', 'Find file', and a green 'Clone or download' button.

tensorflow / tensorflow

Watch 8,309 Star 108,757 Fork 67,160

Code Issues 1,572 Pull requests 272 Projects 0 Insights

An Open Source Machine Learning Framework for Everyone <https://tensorflow.org>

tensorflow machine-learning python deep-learning deep-neural-networks neural-network ml distributed

39,396 commits 26 branches 66 releases 1,630 contributors Apache-2.0

Branch: master New pull request Create new file Upload files Find file Clone or download

# Pull requests



## ■ Pull requests

- Pull Requests 는 코드에 대한 커밋이나 변경 사항에 대한 토론을 시작합니다.
- PR 이 수락되면 병합될 변경 내용을 정확한지 확인합니다.
- PR의 메시지에서 GitHub의 @mention 시스템을 사용하여 의견을 요청할 수 있습니다.
- 특정 인물 또는 팀, 또는 다른 사람이 작업을 검토할 수 있도록 권한을 부여할 수도 있습니다.

Created Assigned Mentioned Review requests

is:open is:pr author:hephaex archived:false

🔗 2 Open ✓ 18 Closed

Visibility ▾

Organization ▾

Sort ▾

🔗 hephaex/helm PR

#1 opened 28 days ago by hephaex

# Issues



## ■ Issues

- 수정이 필요한 코드의 버그 또는 문제점을 강조 표시하십시오.
- 문제는 해결되지 않는 한 계속 열려 있습니다.
- 필터링 가능합니다.
- 필터는 버그 / 개선 / 질문 / 도움 요청 등으로 분류 될 수 있습니다.
- @mention은 누군가에게 알리는 데 사용할 수 있습니다.

Created

Assigned

Mentioned

is:open is:issue author:hephaex archived:false

🔔 5 Open ✓ 9 Closed

Visibility ▾

Organization ▾

Sort ▾

🔔 **lablup/backend.ai-kernels use MPI-enabled TensorFlow r1.9** enhancement

#82 opened on Jul 25 by hephaex



🔔 **tensorflow/tensorflow bazel build failure, error occur no such package @androidndk** comp:lite

#20919 opened on Jul 18 by hephaex



15

🔔 **hephaex/deeplearning-note first issue**

#1 opened on Jul 13 by hephaex

🔔 **lablup/backend.ai-kernels Ubuntu 18.04 LTS support** enhancement

#75 opened on Apr 27 by hephaex



🔔 **lablup/backend.ai-kernels #72 numpy & scipy support Intel-MLK** enhancement

#72 opened on Mar 15 by hephaex



1

# Issues: Assigned



Created Assigned Mentioned

is:open is:issue assignee:hephaex archived:false

10 Open 6 Closed

Visibility

Organization

Sort

- lablup/backend.ai-kernels** 텐서플로우 이미지(kernel-python-tensorflow:1.8-py36)에 문제가 있어요 **blocker** **bug** #85 opened 20 days ago by jams777 2
- lablup/backend.ai-kernels** use MPI-enabled TensorFlow r1.9 **enhancement** #82 opened on Jul 25 by hephaex 1
- lablup/backend.ai-kernels** Ubuntu 18.04 LTS support **enhancement** #75 opened on Apr 27 by hephaex 1
- lablup/neumann** Add support Scala language **backend** **enhancement** **major** #1128 opened on Apr 5 by adrysn Bank 2
- lablup/backend.ai-kernels** #72 numpy & scipy support Intel-MLK **enhancement** #72 opened on Mar 15 by hephaex 1
- lablup/neumann** Prototype Checklist for Design Sprint (2017w49) **backend** **due now** **enhancement** **frontend** **major** #1007 opened on Dec 7, 2017 by achimnol 8 of 19 15.6
- lablup/neumann** Support multiple language-based content **backend** **enhancement** **frontend** **hard** **major** #965 opened on Nov 6, 2017 by inureyes 0 of 3 15.6 1
- lablup/backend.ai-kernels** Migrate all Python-based kernels to minideb **enhancement** #64 opened on Oct 24, 2017 by achimnol 1
- lablup/backend.ai-kernels** MXNet + Keras **persistent** #57 opened on Sep 8, 2017 by achimnol 1
- arm10c/linux-stable** dmb(ish)의 정확한 동작 정의 필요 **[Study]** **Code** #1 opened on Dec 12, 2015 by libertyjin 127주차 (2015/1...



# Markdown syntax



## ■ Markdown syntax

- 마크 다운은 웹에서 텍스트의 스타일을 지정하는 방법입니다.
- 문제 및 풀 요청에 대한 설명 및 설명에 사용합니다.
- 마크다운을 사용할 때도 @mentions 및 SHA-1 해시, 문제 및 끌어 오기 요청에 대한 참조를 할 수 있습니다.

The screenshot shows the RStudio interface with a file named '7-Markdown.Rmd' open. The editor displays the following Markdown code:

```
1 ---
2 title: "Markdown Demo"
3 output: html_document
4 bibliography: rmarkdown.bib
5 ---
6
7 Markdown provides an easy way to make standard types of formatted
8 text, like
9
10 - *italics*
11 - **bold**
12 - `code`
13 - \[links\]\(rmarkdown.rstudio.com\)
14 - etc.
15
16 But did you know that you can also use R Markdown's markdown to
17 make
18
19 - Latex equations,  $E = mc^2$ 
20 - And bibliographies [@rmarkdown15].
21
22 # References
```

The right-hand pane shows the rendered HTML output of the Markdown file. It features a title 'Markdown Demo', a paragraph explaining that Markdown provides an easy way to make standard types of formatted text, and a list of examples: *italics*, **bold**, `code`, [links](#), and etc. Below this, it states that R Markdown's markdown can also be used to make LaTeX equations ( $E = mc^2$ ) and bibliographies ([@rmarkdown15](#)). A 'References' section follows, listing 'JJ Allaire, et. al. 2015. R Markdown. <http://rmarkdown.rstudio.com>.' The bottom status bar indicates the current line is 18:7 at the top level.

# Watch and Star





## ■ Watch


- Watch는 당신을 누군가가 @mentions으로 태그했는지
- 커밋, 토론에 대한 의견, 코드에 대한 모든 대화를 알려줍니다.


## ■ Star


- 별표는 좋아요!
- 커밋, 토론 등 코드에 대한 대화를 알려주지는 않습니다.


 tensorflow / tensorflow


 Watch ▾ 8,309


 Star 108,757


 Fork 67,160

 Code

 Issues 1,572

 Pull requests 272

 Projects 0

 Insights

An Open Source Machine Learning Framework for Everyone <https://tensorflow.org>

tensorflow

machine-learning

python


deep-learning


deep-neural-networks


neural-network


ml


distributed

 39,396 commits

 26 branches

 66 releases

 1,630 contributors

 Apache-2.0

Branch: master ▾

New pull request

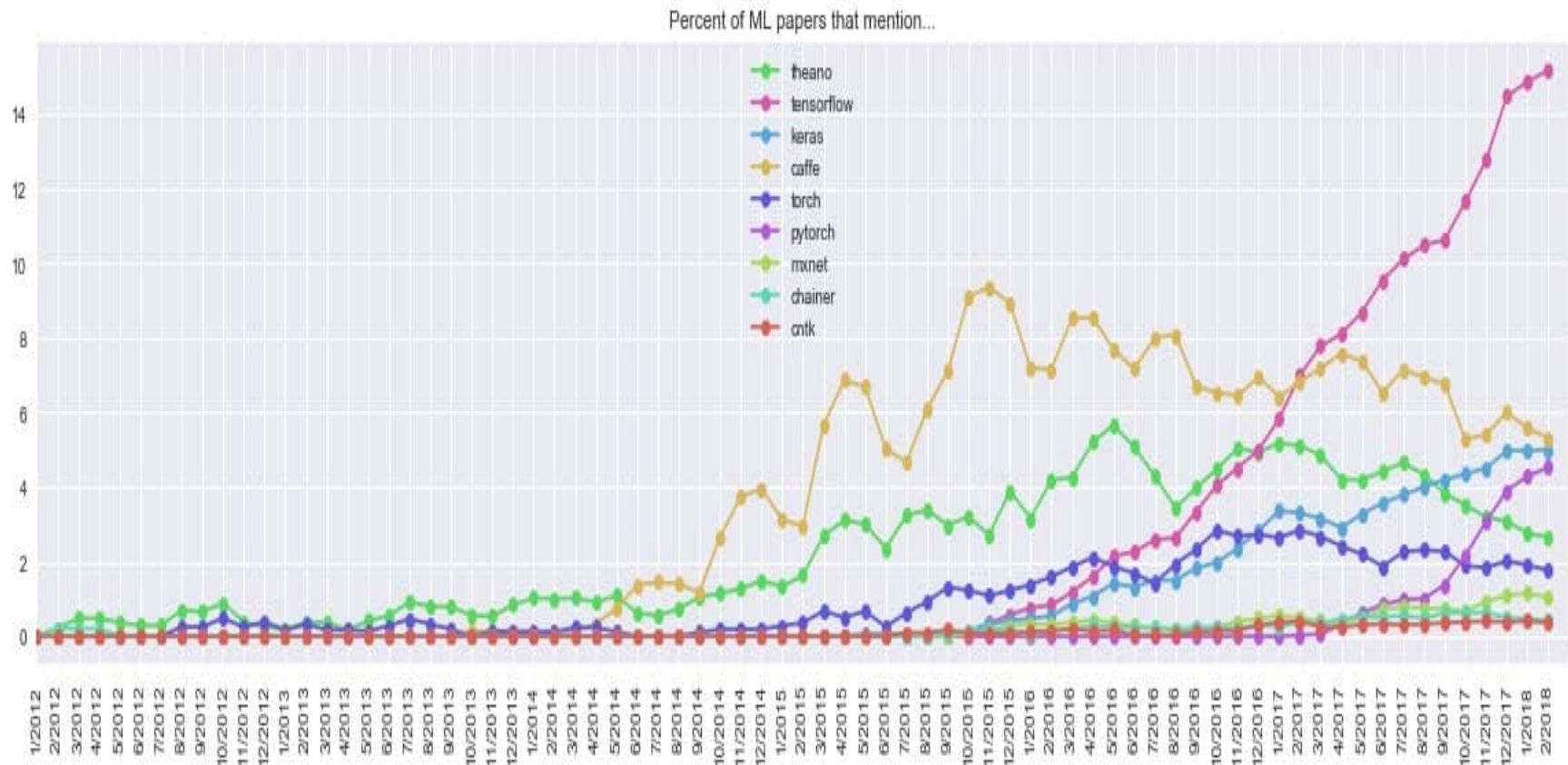
Create new file

Upload files

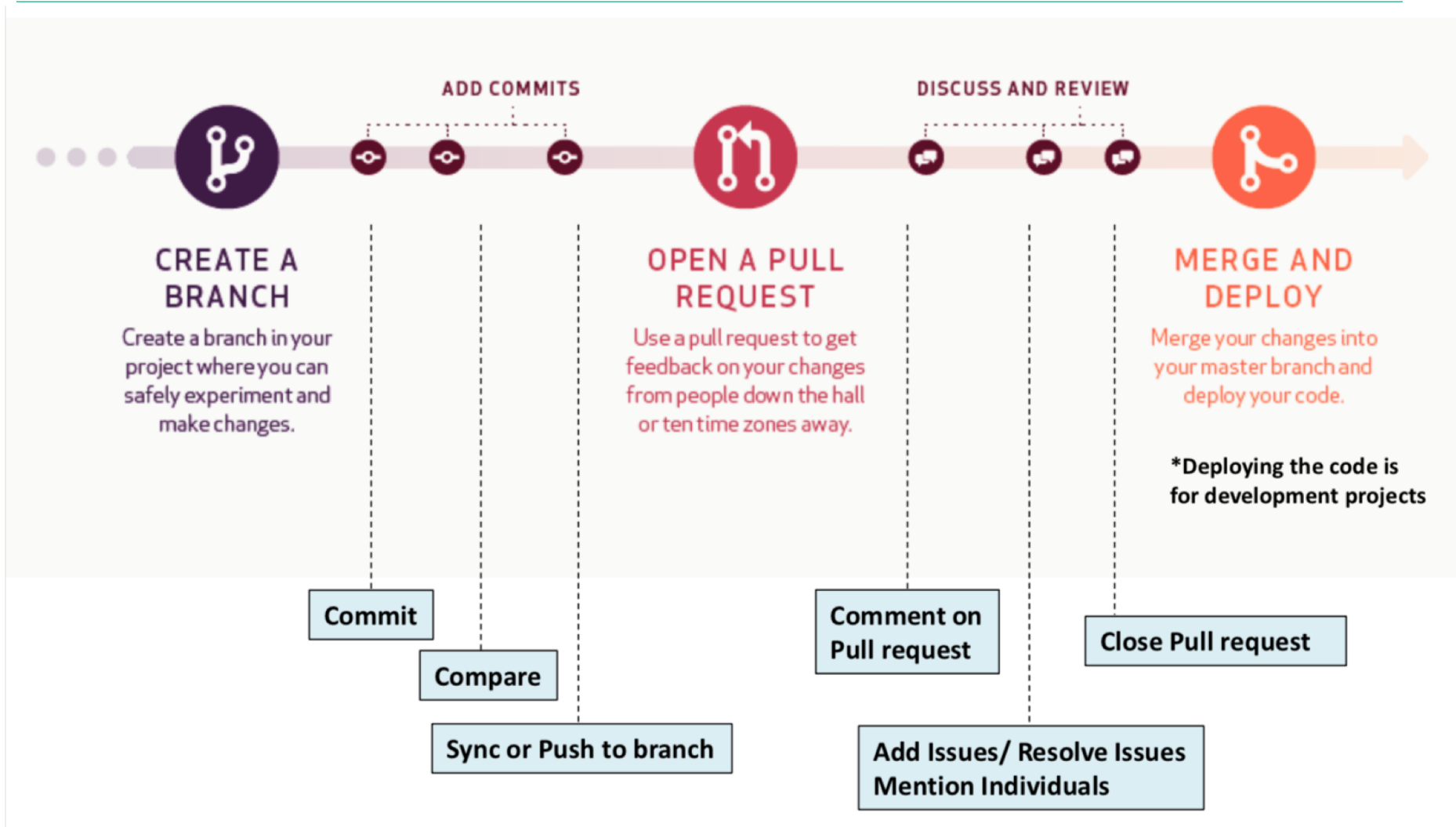
Find file

Clone or download ▾

# Deep Learning Platform Stars



# Github workflow



Git flow: <https://guides.github.com/introduction/flow/>



This organization

backend.ai

Pull requests

Issues

Marketplace

Explore



# Lablup

lab | up: Make AI Accessible - A start-up to innovate research / education processes.

Seoul, Republic of Korea

<http://www.lablup.com>

[contact@lablup.com](mailto:contact@lablup.com)

Repositories 68

People 8

Teams 4

Projects 1

Settings

## Pinned repositories

Customize pinned repositories

backend.ai

Meta-repository for backend.ai

Python 34 5

backend.ai-client-py

Client API Library for Lablup Backend.AI Service

Python 4 1

talkativot

Talkativot: Do-It-Yourself backbone for your AI friend

Python 5 3

backend.ai

Type: All

Language: All

New

16 results for repositories matching backend.ai

Clear filter

## backend.ai

Meta-repository for backend.ai

python api docker documentation distributed-computing

Python 34 5 LGPL-3.0 Updated 2 days ago

## backend.ai-kernels

Backend.AI runtime container images with REPL daemons

docker deep-learning ubuntu sandbox repl

Python 13 2 LGPL-3.0 Updated 4 days ago

## backend.ai-integration-jupyter

## Top languages

Python HTML JavaScript  
TypeScript C

## Most used topics

Manage

sorna python  
cloud-computing docker  
asyncio

## People

8 >





» Package Index > backend.ai > 1.0.2

#### PACKAGE INDEX >>

[Browse packages](#)  
[List trove classifiers](#)  
[RSS \(latest 40 updates\)](#)  
[RSS \(newest 40 packages\)](#)  
[Terms of Service](#)  
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[PyPI Support](#)  
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## backend.ai 1.0.2

*Lablup Backend.AI Meta-package*

Downloads ↓



Backend.AI is a streamlined backend service framework hosting heterogeneous programming languages and popular AI frameworks. It manages the underlying computing resources for multi-tenant computation sessions where such sessions are spawned and executed instantly on demand.

All sub-projects are licensed under LGPLv3+.

By installing this meta-package, you get the client with command-line interface by default and optionally you may add the manager and agent using pip extra tags.

```
$ pip install backend.ai
(installs the common and client libs which includes CLI)
$ pip install backend.ai[manager]
(installs the common and client libs with the manager/gateway daemon)
$ pip install backend.ai[agent]
(installs the common and client libs with the agent daemon)
```

#### Not Logged In

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[Register](#)  
[Lost Login?](#)  
[Login with OpenID](#)   
[Login with Google](#) 

#### Status

[Nothing to report](#)

## Server-side Components

### *Manager with API Gateway*

It routes external API requests from front-end services to individual agents. It also monitors and scales the cluster of multiple agents (a few tens to hundreds).

- Package namespace: `ai.backend.gateway` and `ai.backend.manager`
- <https://github.com/lablup/backend.ai-manager>



Backend.AI

latest

Search docs

#### USER MANUALS

[API Overview](#)

[Python Client Library](#)

#### API COMMON REFERENCE

[API and Document Conventions](#)

[Authentication](#)

[Rate Limiting](#)

[JSON Object References](#)

#### USER API REFERENCE

[Introduction](#)

[Kernel Management](#)

[Code Execution \(Query Mode\)](#)

[Code Execution and Monitoring \(Streaming Mode\)](#)

[Code Execution \(Batch Mode\)](#)

[Virtual Folders](#)

[Docs](#) » Backend.AI Documentation

[Edit on GitHub](#)

## Backend.AI Documentation

**Latest API version: v3.20170615 (beta)**

Backend.AI is a hassle-free backend for AI programming and service. It runs arbitrary user codes safely in resource-constrained environments, using Docker and our own sandbox wrapper.

Backend.AI supports various programming languages and runtimes, such as Python 2/3, R, PHP, C/C++, Java, Javascript, Julia, Octave, Haskell, Lua and NodeJS, as well as AI-oriented libraries such as TensorFlow, Keras, Caffe, and MXNet.

## FAQ

### vs. Notebooks

Product	Role	Problem and Solution
Apache Zeppelin, Databricks, etc.	Notebook-style document + code	Insecure host resource management



The image features a collection of origami geometric shapes on a light pink background. In the foreground, there is a green square-based pyramid with teal-colored triangular flaps. Behind it, several red triangular prisms are arranged in a fan-like pattern, pointing towards the top of the frame. The text "Thanks you!" is written in a bold, yellow, sans-serif font across the center of the image, and "Q&A" is written in the same style below it.

**Thanks you!**

**Q&A**