

# Git

Missing session lecture 2

# Contents

---

- Version Control System
- Git
- Github
- Open source
- Simple tutorial

# Version Control System (VCS)

---

- Imagine you're a writer...
  - while writing a book, various problems / situations can occur
    - Someone burned your draft
    - The writing went off at a tangent
    - Someone made feedback for you
    - You should collaborate with others
  - To manage / keep your writing safe, you need...
    - backup
    - log
    - platform to work / communicate with other authors
    - and else...

# Version Control System

---

- Same problems can occur in *programming!*
- Imagine such situations...
  1. HDD(or SSD) breakdown
  2. Awful code...needs to go back
  3. Collaborate with other programmers
  4. Make some experimental feature...
    - which can affect other modules
- VCS will help you

# Version Control System

---

- A component of software configuration management, which is the management of changes to document, computer programs, large web sites, and other collections of information
  - *Wikipedia*
- A system that records changes to a file or set of files over time so that you can recall specific versions later.
  - Git official website
- A category of software tools that help a software team manage changes to source code over time
  - Atlassian Cooperation

# Version Control System

---

- A component of **software configuration management**, which is the **management of changes** to document, computer programs, large web sites, and other collections of information
  - *Wikipedia*
- A system that **records changes** to a file or set of files over time so that you can **recall specific versions** later.
  - Git official website
- A category of software tools that help a **software team manage changes** to source code over time
  - Atlassian Cooperation

=> **Version Control**

=> **Backup**

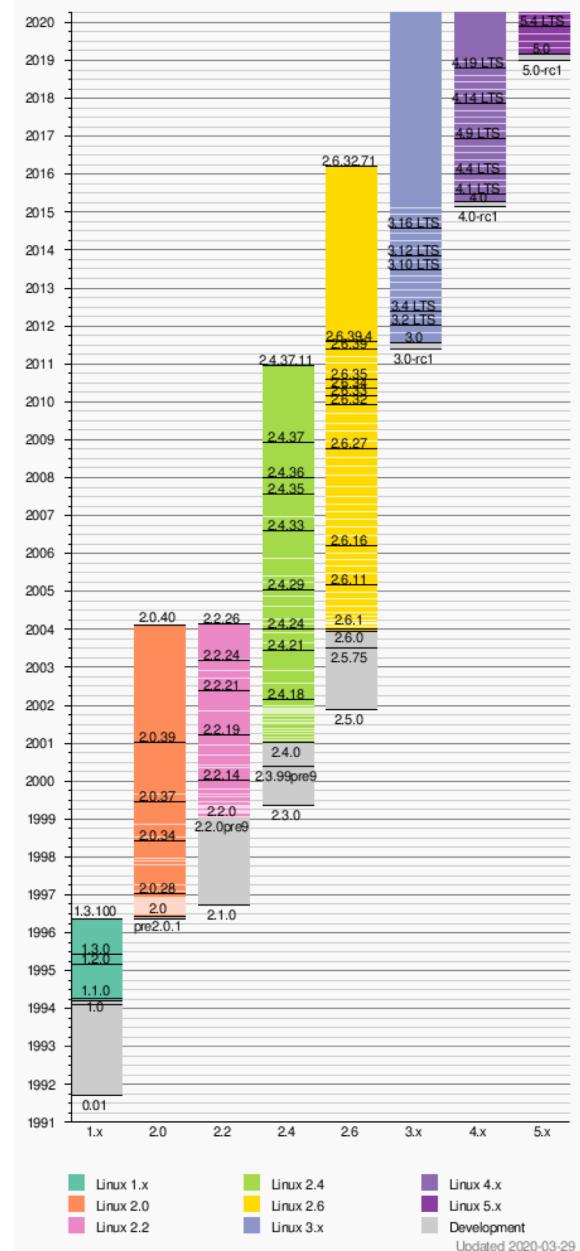
=> **Collaboration**

*Three main purposes of version control system*

# Main purposes of Version Control System

- Version Control
  - Software has *versions*
  - *linux major releases*
  - *current development history of linux*

Merge tag 'nfsd-5.7' of git://git.linux-nfs.org/projects/cel/cel-2.6	...
 torvalds committed 3 days ago	
platform/x86: intel_int0002_vgpio: Use acpi_register_wakeup_handler()	...
 jwrdegoede authored and Rafael J. Wysocki committed 4 days ago	
ACPI: PM: Add acpi_[un]register_wakeup_handler()	...
 jwrdegoede authored and Rafael J. Wysocki committed 4 days ago	
Merge tag 'rtc-5.7' of git://git.kernel.org/pub/scm/linux/kernel/git/...	...
 torvalds committed 3 days ago	
Merge tag 'gpio-v5.7-1' of git://git.kernel.org/pub/scm/linux/kernel/...	...
 torvalds committed 3 days ago	
Merge tag 'dma-mapping-5.7' of git://git.infradead.org/users/hch/dma-...	...
 torvalds committed 3 days ago	
Merge tag 'threads-v5.7' of git://git.kernel.org/pub/scm/linux/kernel...	...
 torvalds committed 3 days ago	



Updated 2020-03-29

# Main purposes of Version Control System

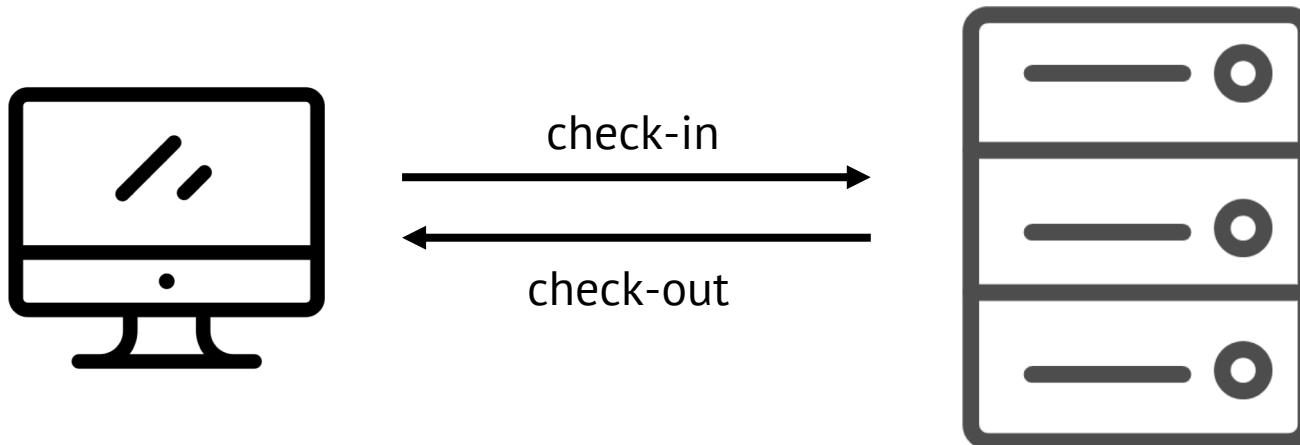
---

- Imagine...
  - you need to record code history
    - code\_draft.cpp
    - code\_2.cpp
    - code\_3.cpp
    - code\_experimental.cpp
    - ...
  - Inefficient & burdensome
- Version control system:
  - automatically records the history
  - and also efficient!!

# Main purpose of VCS

---

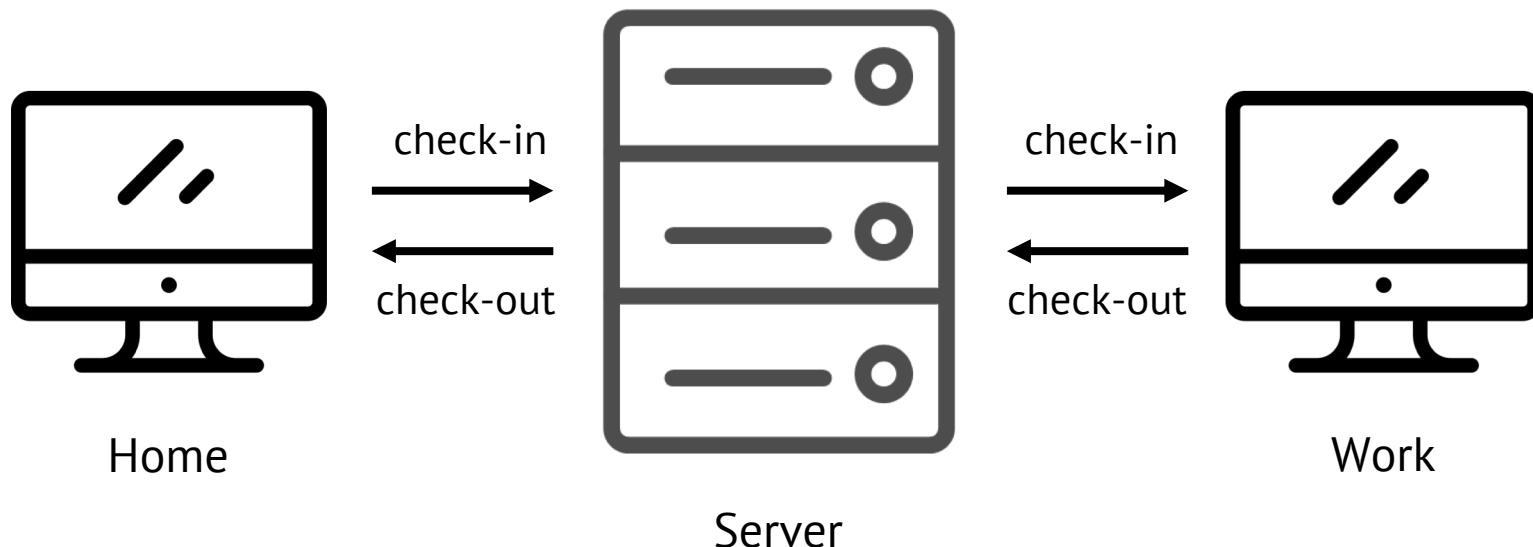
- Backup
- Even if your computer crashes, there is backup on the server
- Terminology!!
  - **Local Repository** (Your computer)
  - **Remote Repository** (Server)



# Main purpose of VCS

---

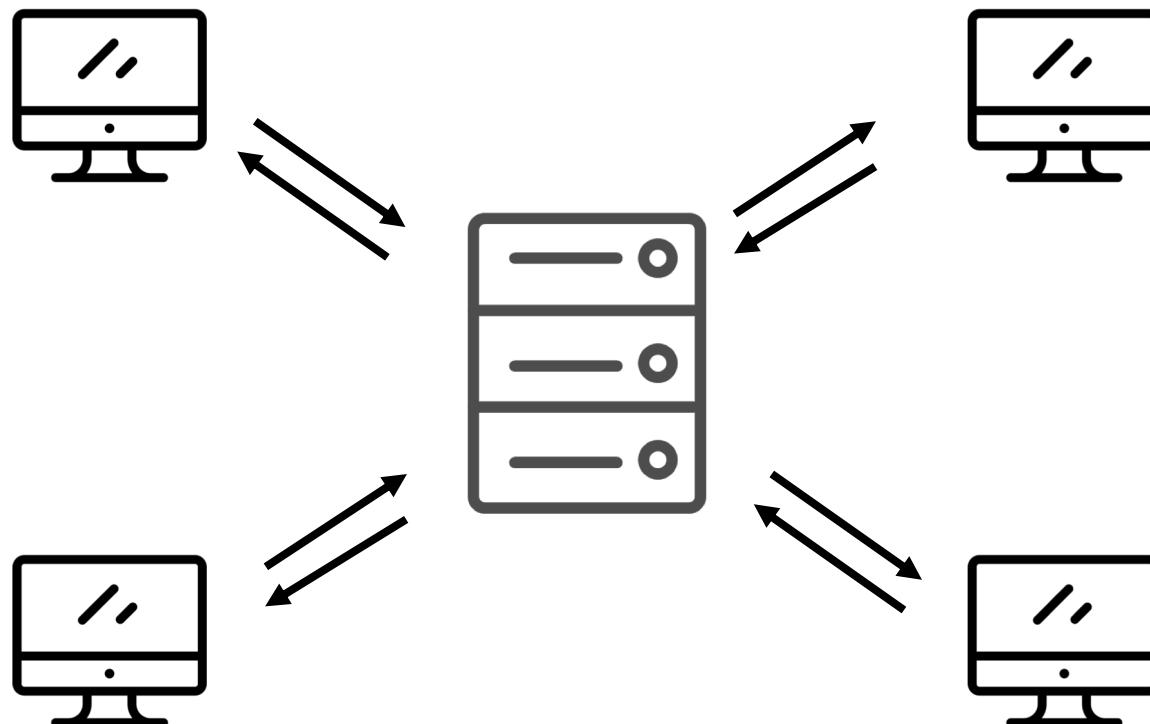
- Backup
- You can work everywhere,
  - by downloading / uploading your data from / to the server



# Main purpose of VCS

---

- Collaborating
  - Easy collaboration with other programmers
  - Work in local repository, and upload it to remote repository!!



# Git

---

- *Most famous* version control system
- Developed by ***Linus Torvalds*** (2015)
- Almost all of famous projects are managed by git
  - Including the programs we're using!!
  - gcc, visual studio code, extensions...



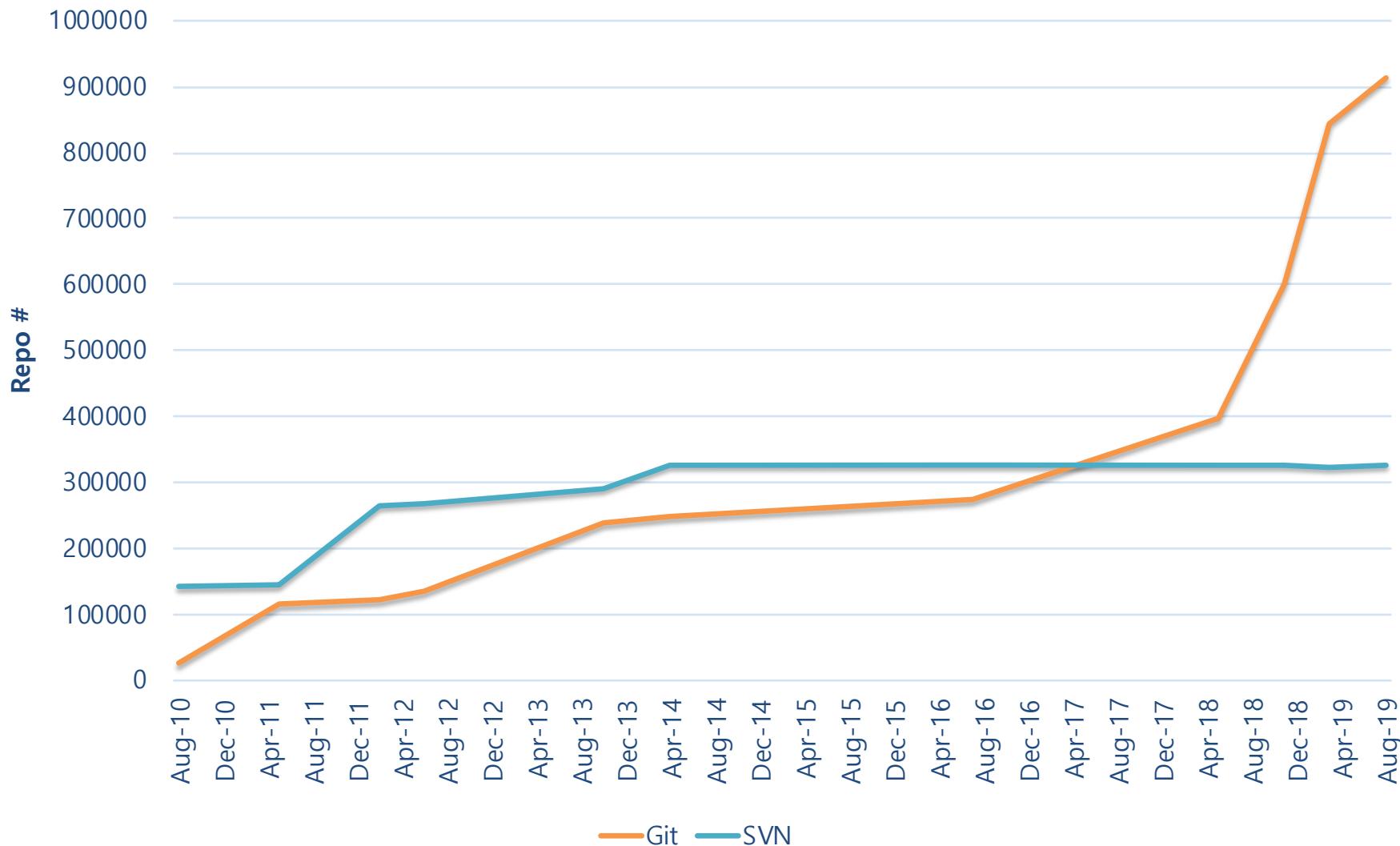
# Git

---

- Why *Linus* developed git?
  - While developing linux...
  - He used VCS named *Bitkeeper*
  - However, one day...
    - Conflict b/w linux & bitkeeper occurred
    - As *linux* is open source project, meanwhile bitkeeper is commercial
  - Torvalds just made simple solution
    - Developing new VCS -> Git!!



# Git vs. SubVersion



# Git vs. Subversion

- cf) Why still lots of SVN repo?
  - Easy to learn (quite intuitive!!)
  - Lots of companies still use SVN...
    - due to old programmers
    - or to maintain legacy code



Covid-19 made old administration systems to be revised!!  
Shows the power of legacy code / programmers...

COBOL: ancient programming language (1959)

# Git

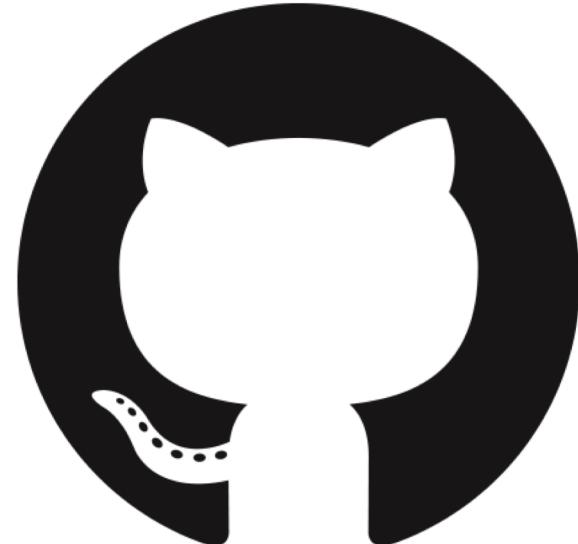
---

- Okay...why git??
- For programmers, learning git is essential!!
- Because..
  - everybody makes mistakes
  - every computer can be crashed
  - every development can get sidetracked
- Also...
  - Almost every modern programmer is familiar to git
  - Almost every IT company requires git capability for their newcomers
  - Almost every open source project is managed with git
    - Want some contribution? Learn git!!

# Github

---

- Provides web hosting service for version control using git
- Released in 2008
- Acquired by *Microsoft* (2018)
- Supports the functionalities of git & it's own features
  - Pull Request
  - Wiki
  - Issue
  - Fork
  - and else...



# Github

---

- Lots of famous open source projects are publicized in Github
  - Linux (Operating System)
  - Mozilla Firefox (Web browser)
  - Thunderbird (e-mail management platform)
  - Pytorch (ML Library)
  - Wordpress (Blogging platform)
  - MySQL (Database management system)
  - Apache (HTTP Web Server)
  - Git
  - Github

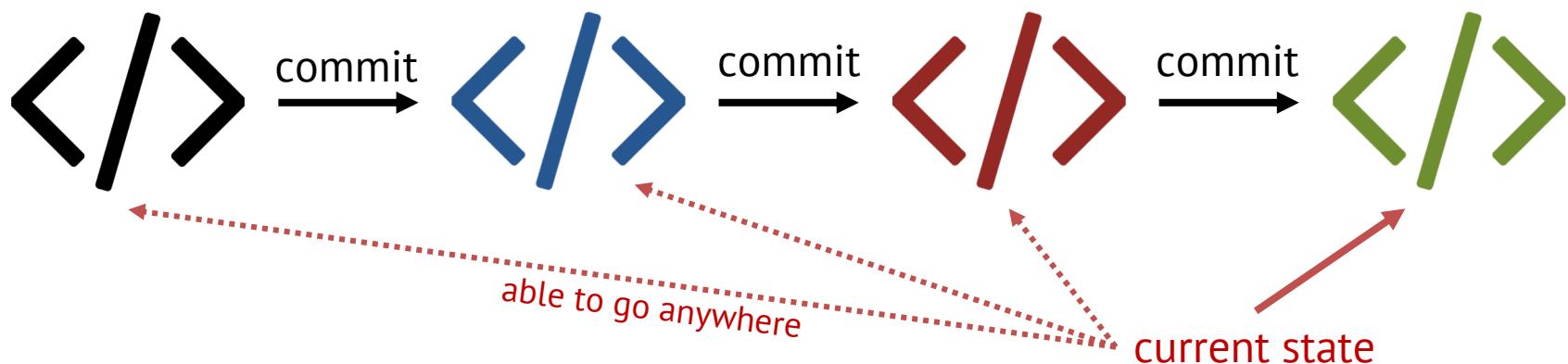
# Git vs. Github

---

- Git
  - version control system
  - developers install locally to manage their code
- Github
  - online service
  - provides remote repository
  - developers (who use git) can connect and upload / download their resources
- Simple example: We can find [Git in Github!!](#)

# Git functionalities

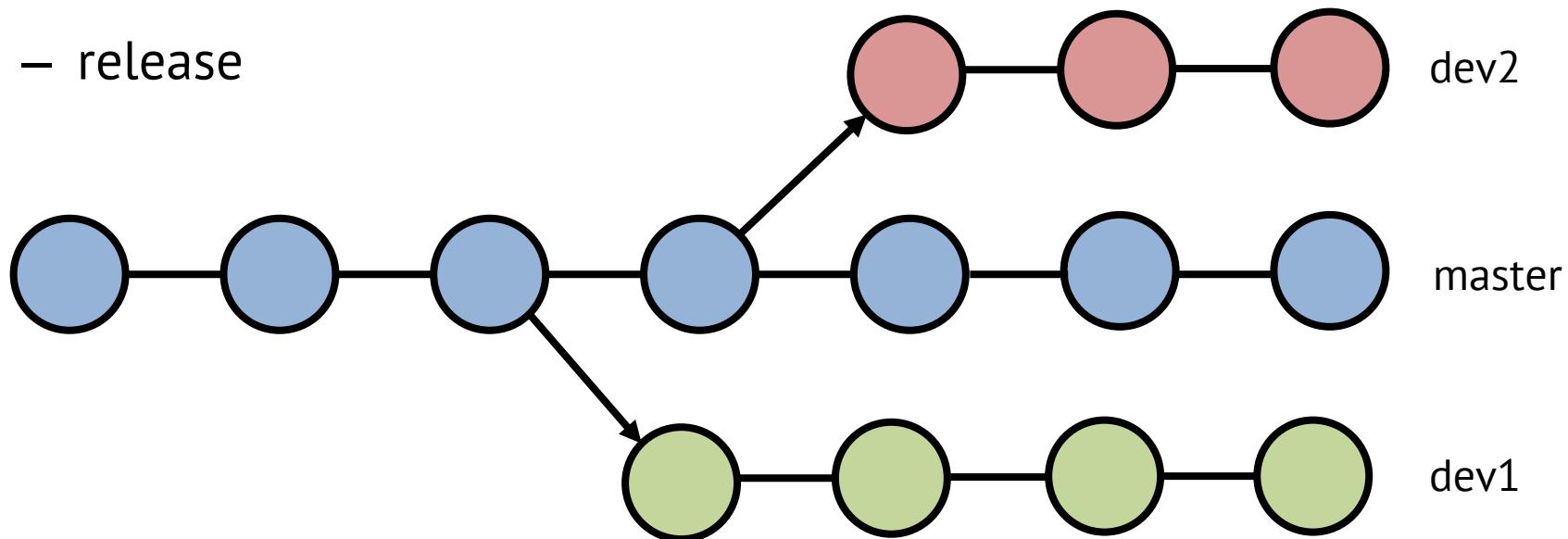
- Recording history
  - records the evolution of the code
  - provides way to go back (*checkout*)
  - ***commit*** each change



# Git functionalities

---

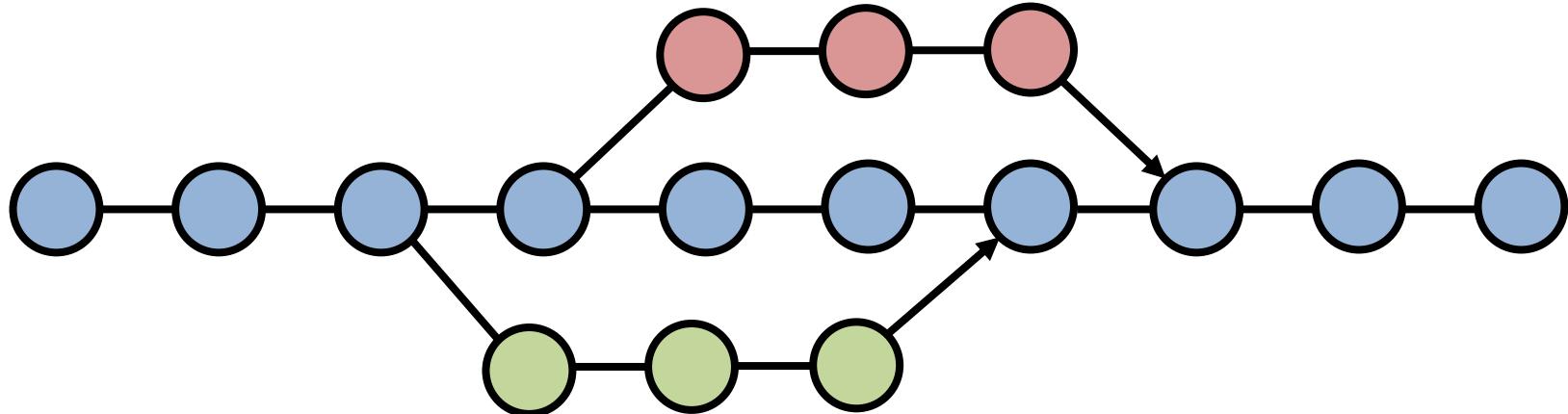
- Branching
  - developing with others
  - need to test some experimental features
  - bug fix
  - release



# Git functionalities

---

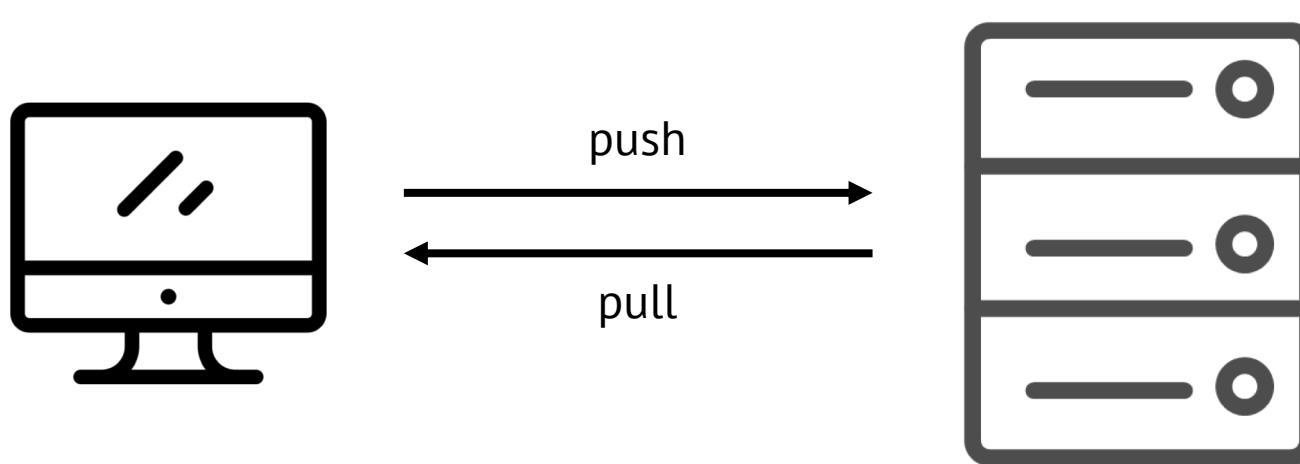
- Merge
  - merge the code from different branches
  - automatic merge...but sometimes makes conflict
  - Conventional way to combine works



# Git functionalities

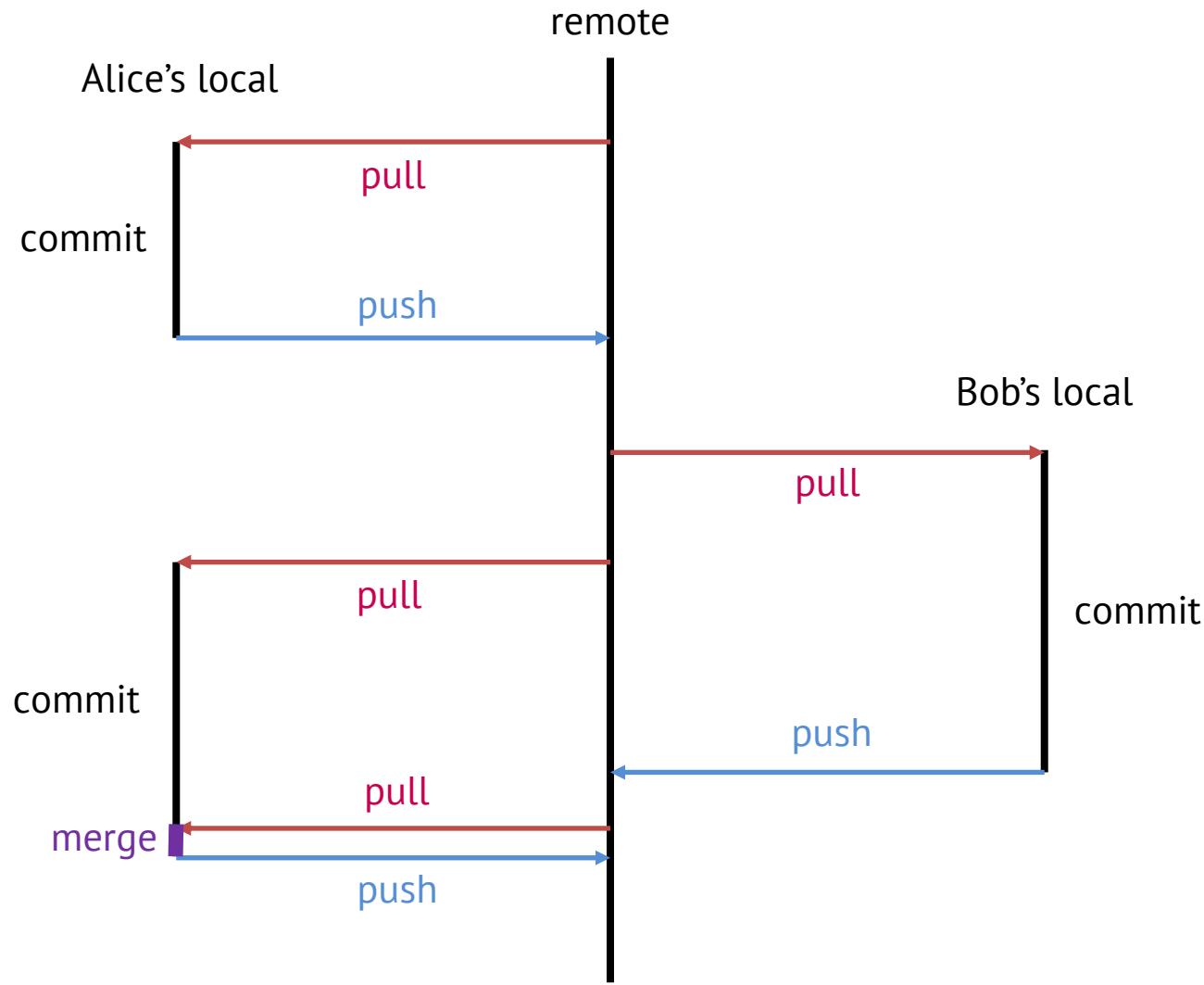
---

- Communicate with remote repository
  - Github provides remote repository
- ***push*** (upload) / ***pull*** (download) data
- For backup / collaboration



# Git functionalities

- Collaboration with *push / pull*



# Git functionalities

---

- Show history
  - show differences b/w commits
  - show the owner of certain code (to *blame* the author...)
  - show entire history (*log*)
  - *helps to control / manage project repository*

```
| * b0adc5f fixed issue where charge_now is greater than charge_full resulting in batt percentage greater than 100
|/
| * 75552da Merge pull request #249 from IngoHeimbach/master
|/
| * e8688fd Renamed all occurrences of "OSX" to "MACOS" in the macos notification count plugin
|/
| * f0d94c0 Merge pull request #248 from IngoHeimbach/master
|/
| * 55a1ae2 Added a segment for querying macOS notification counts
| * 92ffff05 Merge pull request #247 from dominikduda/master
|/
| * 50d1748 Rename prefix_mode_indicator to mode_indicator, add copy mode indication, update colors and style
| * 62fb530 Merge pull request #245 from dominikduda/master
|/
|/
| * 1fad6b7 Add return 0
| * e02d6de Add prefix_mode_indicator.sh
|/
| * f34031b Merge pull request #241 from mingchaoyan/master
|/
| * 367ae05 no logger necessary set-option -g status-utf8 on
| * bcf7bee Merge pull request #1 from erikw/master
|/
|/
| * cf5a96a Merge pull request #240 from TakkuMattsu/modify_vcs_branch_name
|/
| * 62a8c5f Modify vcs branch name
|/
|:
```

history of *tmux-powerline*

# Github functionalities

---

- Insight
  - statistics & abstraction!!
    - Contributors
    - Commit history
      - traffic
      - topology (network)
    - Code frequency
    - Forked repos... (we'll see)

# Github functionalities

---

- Issue
  - current issue?
  - Create issue to *announce* or *record* something important
    - new development feature
    - enhancement
    - bug report
    - require documentation...
    - and else...
  - Powerful tool to manage & overview the development process
    - for both history & current state

# Github functionalities

---

- Issue
  - elements
    - assignees (assigns the issue to certain developer)
    - Labels
      - explains the characteristics of issues
      - ex) enhancement, bugfix, documentation, ...
      - You can make your own label!!
  - Milestone
    - categorize issues
    - like real *milestones*...

Assignees	
Labels	
Projects	None yet
Milestone	0.77.0

# Github functionalities

---

- Fork
  - *fork* other's repository to my repository
  - make the copy of existing repository that I can freely modify
  - supports various activities in open source
    - reusing code
    - change the direction of the software development
    - contribute!! (By Pull Requests)
  - You can *fork* every repository in Github!!

# Github functionalities

---

- Pull Requests
  - Requests the repository owner to...
  - *accept your contribution!!*
  - Fork the repository, work on it, and send PR.
  - If accepted:
    - Reflects your work
  - elseif closed:
    - Rejects your work
  - else: (opened)
    - pending the permission

# Github functionalities

---

- Pull requests

opened

git value swap macro change with xor

#32 opened on May 12, 2013 by halit

git Fix M1405 netbook touchpad

#31 opened on Mar 21, 2013 by mmatviyiv

git Odroid 3.8.y

#30 by mdrjr was closed on Mar 9, 2013

git ideapad: fix the delay when controlling brightness

#29 by abdelli was closed on Mar 5, 2013

git Remove trailing slash from kernel.org link

#28 by mikegagnon was closed on Mar 2, 2013

git [PATCH] ATH6KL: "Fix the byte alignment rule to avoid loss of bytes in a TCP segment"

#27 by kingpotato was merged on Nov 15, 2013

git Tweak to support 1Mbaud and similar baudrates that require Mode16 instead of Mode8

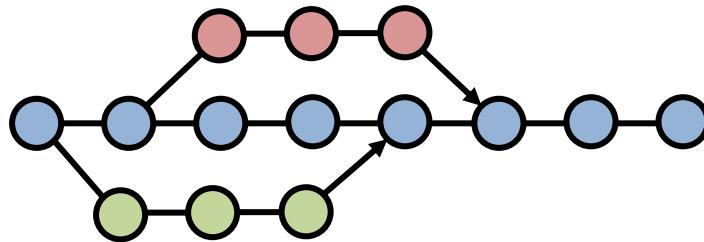
#26 by alexey-pelykh was closed on Nov 28, 2012

merged

# Github Functionalities

---

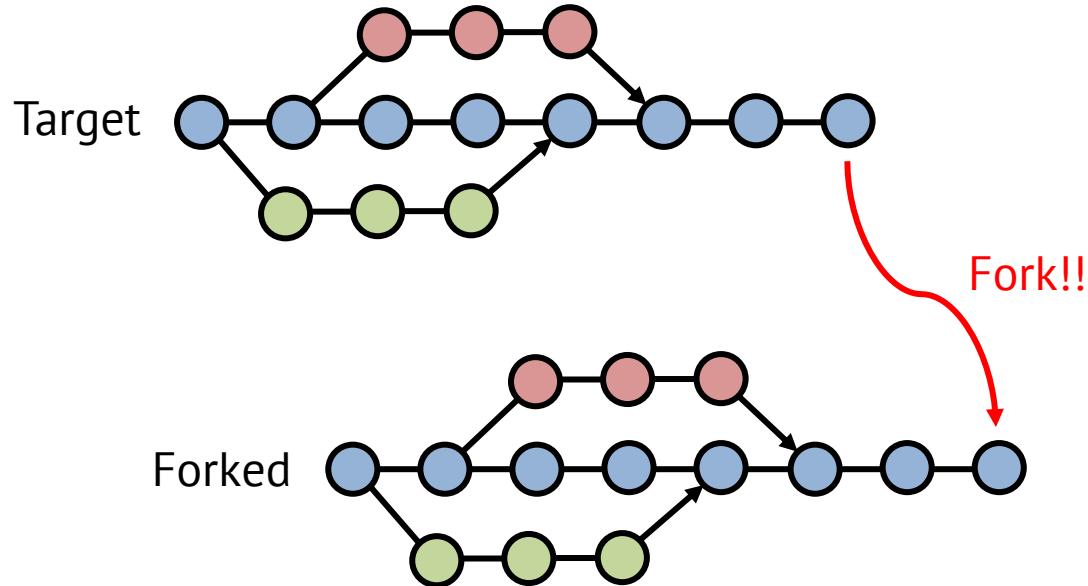
- Simple workflow for contribution
  - Starts with target repository



# Github Functionalities

---

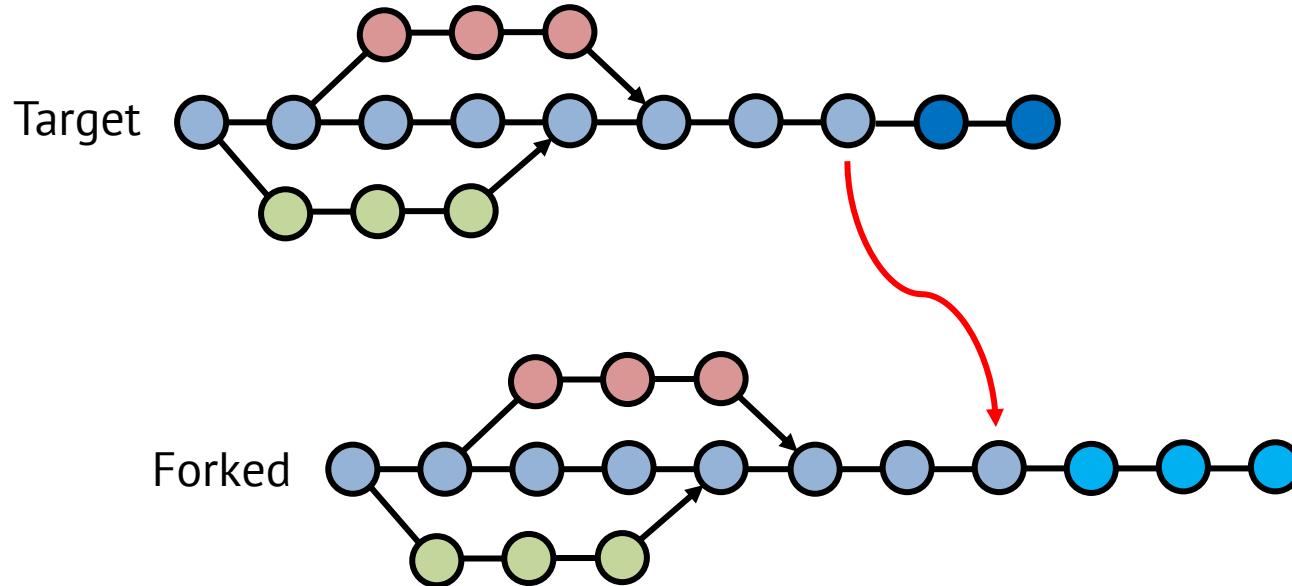
- Simple workflow for contribution
  - Fork target repository



# Github Functionalities

---

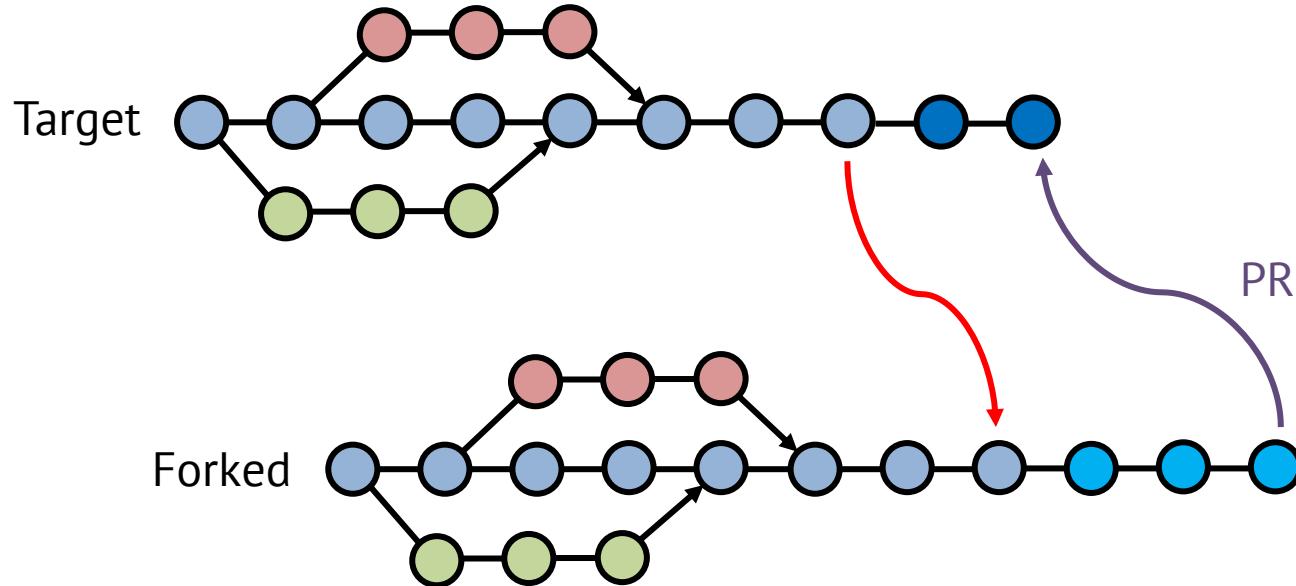
- Simple workflow for contribution
  - Work on repositories



# Github Functionalities

---

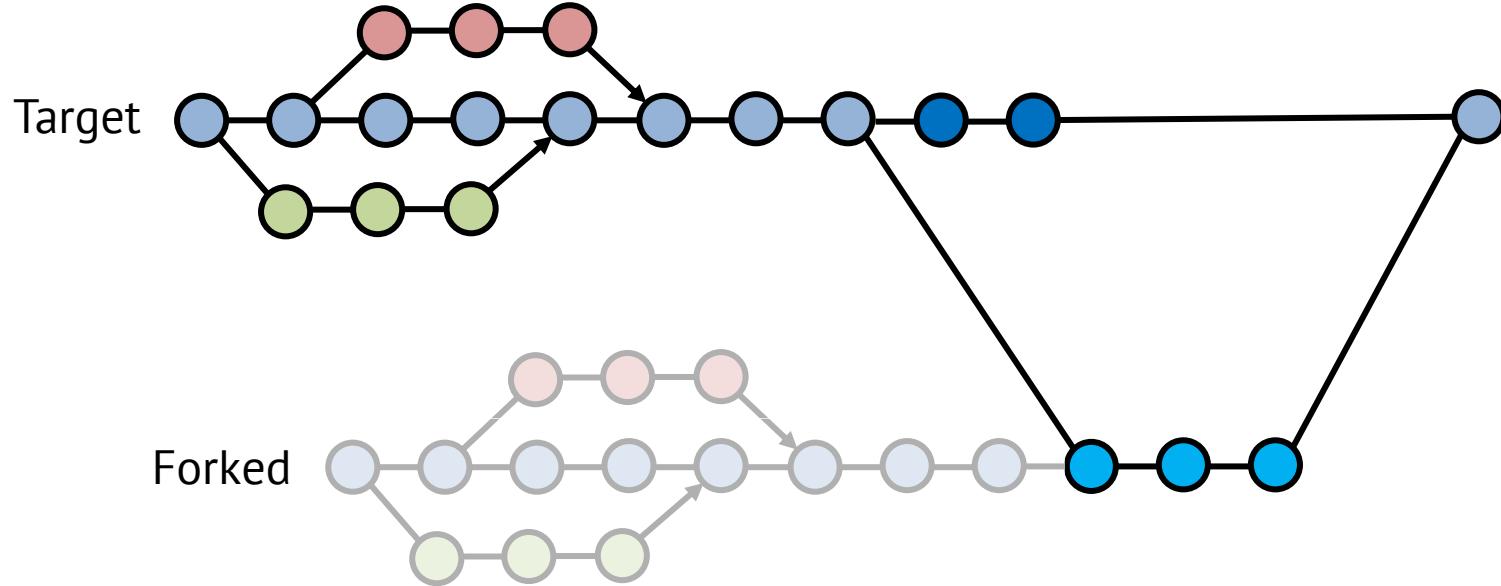
- Simple workflow for contribution
  - Send Pull request



# Github Functionalities

---

- Simple workflow for contribution
  - If accepted, your work is now reflected in target repository



# Open source Software (OSS)

---

- Source code is released under a license I which...
  - the copyright holder grants user the rights to...
    - study
    - change
    - distribute the software
  - to anyone and for any purpose!!
- Developed in a collaborative public manner
- Prominent example of open collaboration

# Open Source Software

---

- Why open source?
  - Lots of programs depends on OSS
  - Programming itself depends on OSS
  - Languages, Libraries, Frameworks, APIs....
  - Without OSS, it will be hard to develop something personally
  - ex) Every material in this course is supported by OSS!
    - cpp (including g++), mingw, visual studio code...

# OSS History

---

- Early days of computing...
  - *Computer and programming was quite academic*
  - *Programmers were also researcher*
  - shared knowledge & software
- But in 1970~1980:
  - Commercialization of software
    - Microsoft (1975), Apple(1976), Oracle(1977), EA (1982)...
  - Academics still often developed software collaboratively
    - Tex (Donald Knuth), GNU (Richard Stallman)

# OSS History

---

- In 1997, significant essay had published... (now a book)
  - *The Cathedral and the Bazaar (Eric Raymond)*
    - Contrasts two different free software development models
      - Cathedral model & Bazaar model
      - Refer [Wikipedia](#) for more detail!!
  - Motivated *Netscape* to release *Netscape Communicator* as free software (1998)
    - Became the basis of...
    - Mozilla Firefox, Mozilla Thunderbird, end else



# OSS History

---

- Conflict with software companies
  - Microsoft
    - *Open source is a new form of communism*
    - *Bill gates*
    - *Linux is cancer*
    - *Steve Balmer*
  - Microsoft even destroyed Netscape browser!!
  - However, Microsoft was not that vicious...
    - comparing to other companies

# OSS History

---

- However...
  - Open source was powerful!!
  - Millions of volunteers developed lots of programs
  - Improved CS society a lot
  - Open-source-friendly company began to arise



# OSS History

---

- In nowadays...
  - Open source became a general trend
  - Almost every IT company is supporting open source
    - Including former anti-open-source companies
      - Microsoft
      - Apple
      - Samsung electronics
      - Oracle
      - else...

# Contributing OSS

---

- You can easily become a member of open source community!!
  - Read code, fix them, and contribute!!
  - Github & Git provides convenient way
  - Attention is all you need!!

---

**Attention Is All You Need**

---

- Maybe courage??

---

Thank you!!

contact: [jeonhyun97@postech.ac.kr](mailto:jeonhyun97@postech.ac.kr)