



Aalto University

# DesigningOpenInnovation.03

## Version Control Systems – SVN, Git and GitHub

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11.03.2013

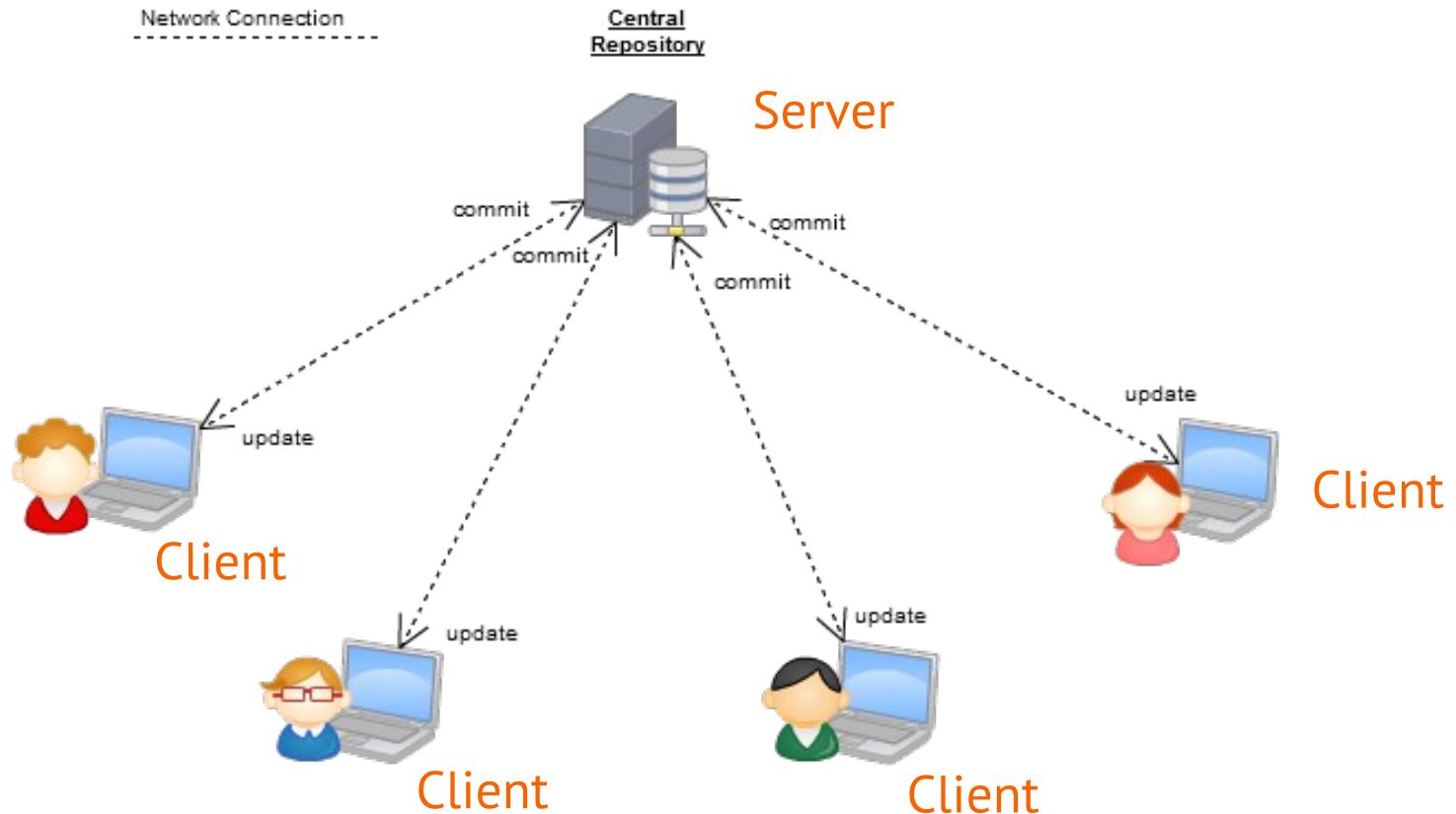


Aalto University

01.

# Subversion – the central version control system

# Server/client-based Version Control System

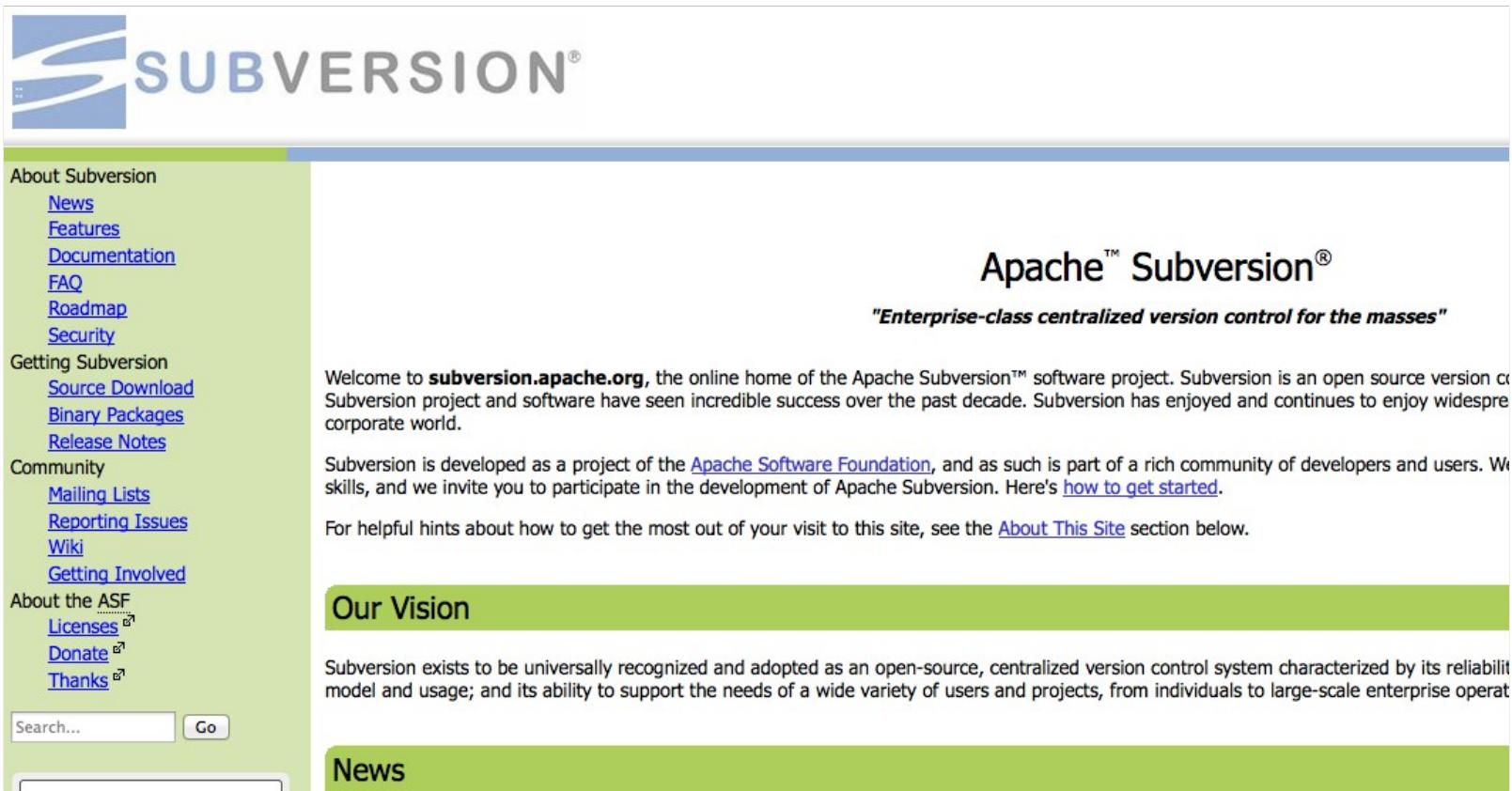


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The first architecture that emerged for  
versioning files and projects.

Source: <http://www.kalekold.net/index.php?post=13>

# Subversion: an open Version Control System



The screenshot shows the official Apache Subversion website. At the top is the Subversion logo, featuring a blue stylized 'S' icon followed by the word "SUBVERSION®". Below the logo is a navigation bar with several links: "About Subversion", "News", "Features", "Documentation", "FAQ", "Roadmap", and "Security". Under "About Subversion", there are links for "Source Download", "Binary Packages", and "Release Notes". Under "Community", there are links for "Mailing Lists", "Reporting Issues", "Wiki", and "Getting Involved". Under "About the ASF", there are links for "Licenses", "Donate", and "Thanks". A search bar with a "Go" button is located at the bottom of the sidebar.

**Apache™ Subversion®**  
*"Enterprise-class centralized version control for the masses"*

Welcome to [subversion.apache.org](http://subversion.apache.org), the online home of the Apache Subversion™ software project. Subversion is an open source version control system that has become one of the most popular tools for managing software development projects. The Subversion project and software have seen incredible success over the past decade. Subversion has enjoyed and continues to enjoy widespread adoption across the globe, from small teams to large corporations and the corporate world.

Subversion is developed as a project of the [Apache Software Foundation](#), and as such is part of a rich community of developers and users. We welcome you to learn more about Subversion, its features, and how it can help you manage your software development projects. We invite you to contribute to the development of Apache Subversion. Here's [how to get started](#).

For helpful hints about how to get the most out of your visit to this site, see the [About This Site](#) section below.

## Our Vision

Subversion exists to be universally recognized and adopted as an open-source, centralized version control system characterized by its reliability, ease of use, and efficiency; and its ability to support the needs of a wide variety of users and projects, from individuals to large-scale enterprise operations.

## News

Subversion manages files and directories, and the changes made to them, over time, like a time machine.

Source: <http://subversion.apache.org/>

# Version Control System: the vocabulary (01)

## \* **Change**

A change (or diff) represents a specific modification to a document under version control.

## \* **Checkout**

A check-out (or co) is the act of creating a local working copy from the repository. A user may specify a specific revision or obtain the latest. Also refers to the same files.

## \* **Commit**

A commit (checkin, ci) is the action of writing or merging the changes made in the working copy back to the repository. Also refers to the same files.

## \* **Head**

The most recent commit.

# Version Control System: the vocabulary (02)

## \* Conflict

A conflict occurs when different parties make changes to the same document. A user must resolve the conflict by combining the changes, or by selecting one change.

## \* Merge

A merge or integration is an operation in which two sets of changes are applied to a file or set of files.

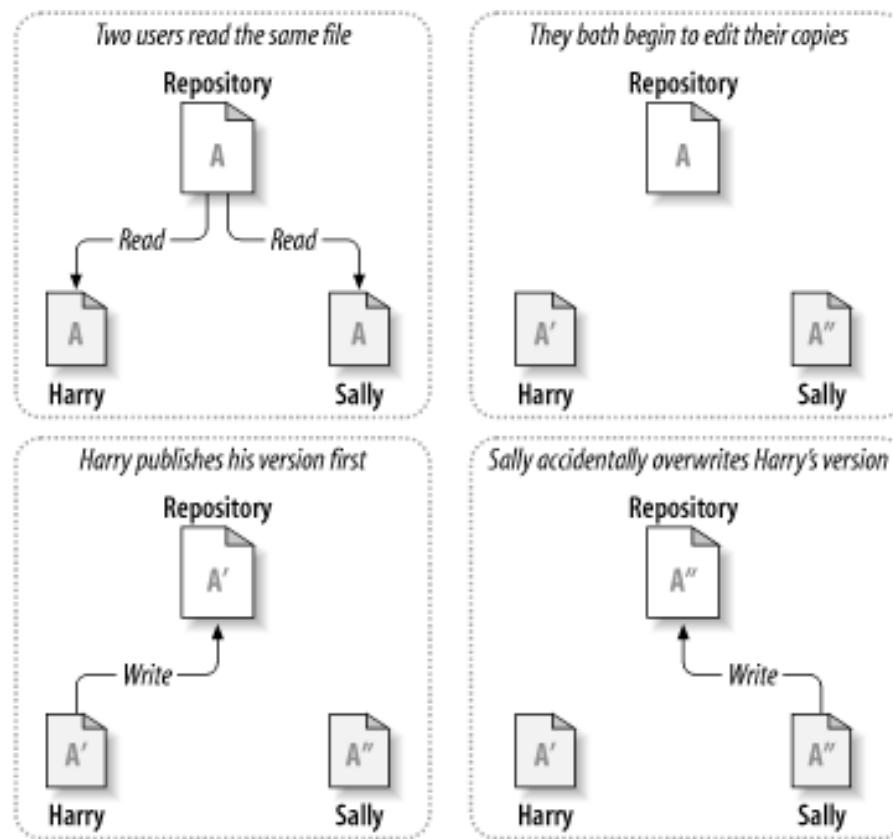
## \* Update

An update (or sync) merges changes made in the repository (by other people, for example) into the local working copy.

## \* Working copy

The working copy is the local copy of files from a repository, at a specific time or revision. Conceptually, it is a *sandbox*.

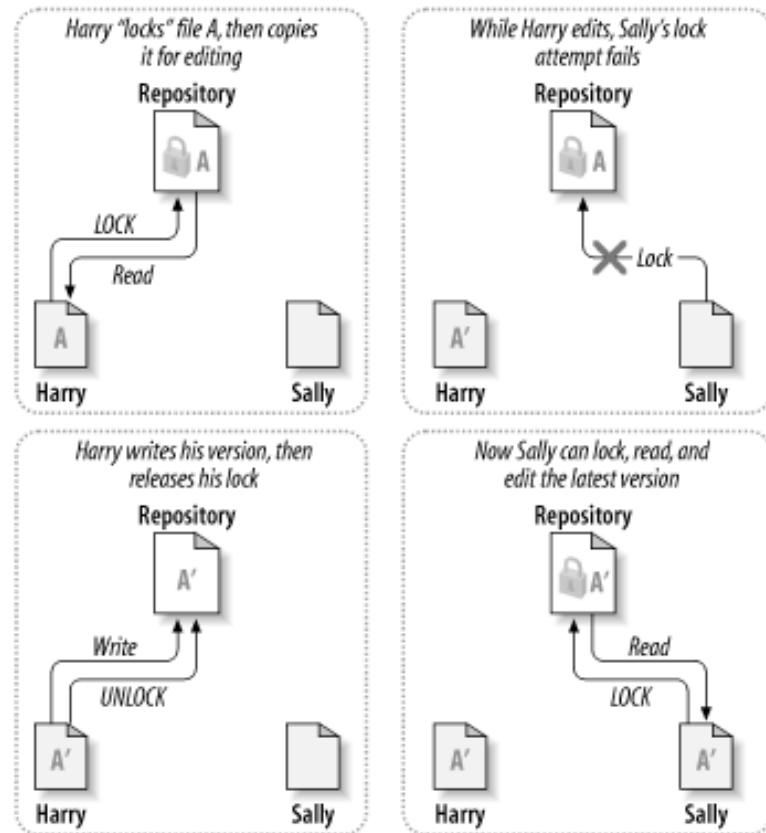
# Versioning model: the problem



How will the system allow users to share information, but prevent them from accidentally overwriting?

Source: <http://svnbook.red-bean.com/en/1.6/svn.basic.version-control-basics.html>

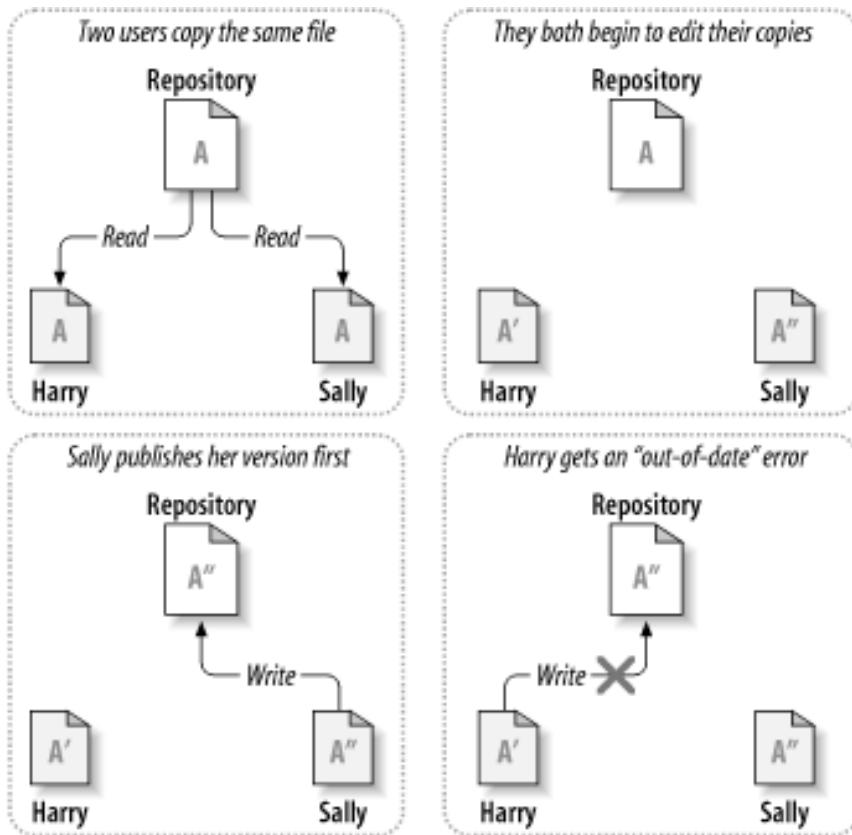
# Versioning model: the lock-modify-unlock solution



In this model, the repository allows only one person to change a file at a time, by locking it.

Source: <http://svnbook.red-bean.com/en/1.6/svn.basic.version-control-basics.html>

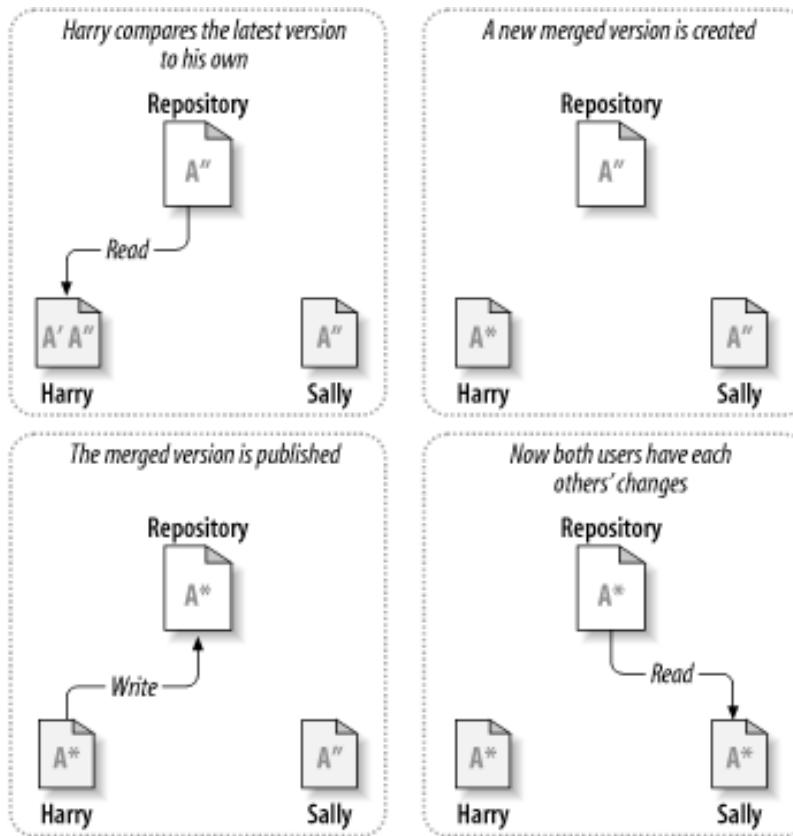
# Versioning model: the copy-modify-merge solution (01)



In this model, each user's client contacts the project repository and creates a personal working copy. The private copies are merged together into a new version.

Source: <http://svnbook.red-bean.com/en/1.6/svn.basic.version-control-basics.html>

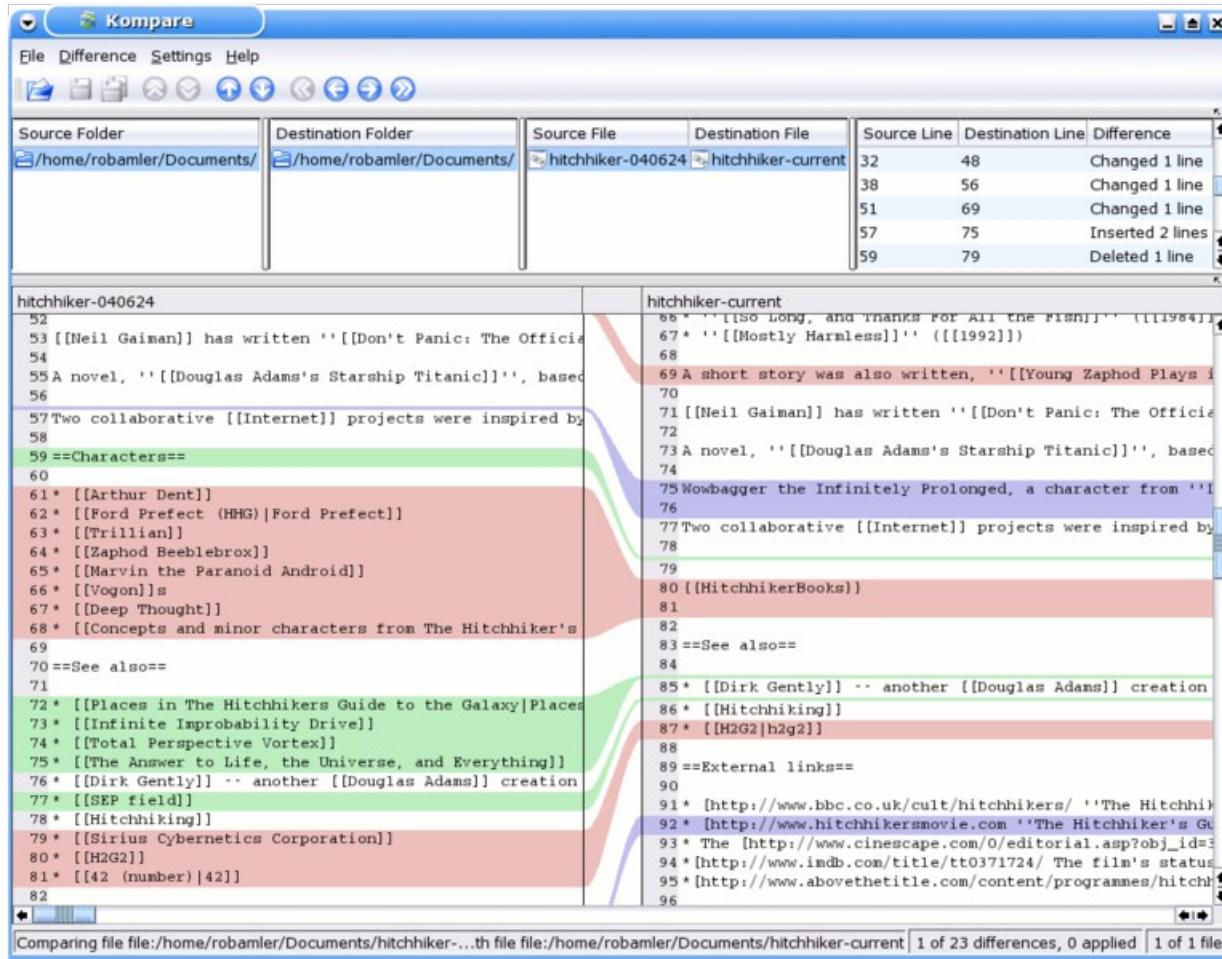
# Versioning model: the copy-modify-merge solution (01)



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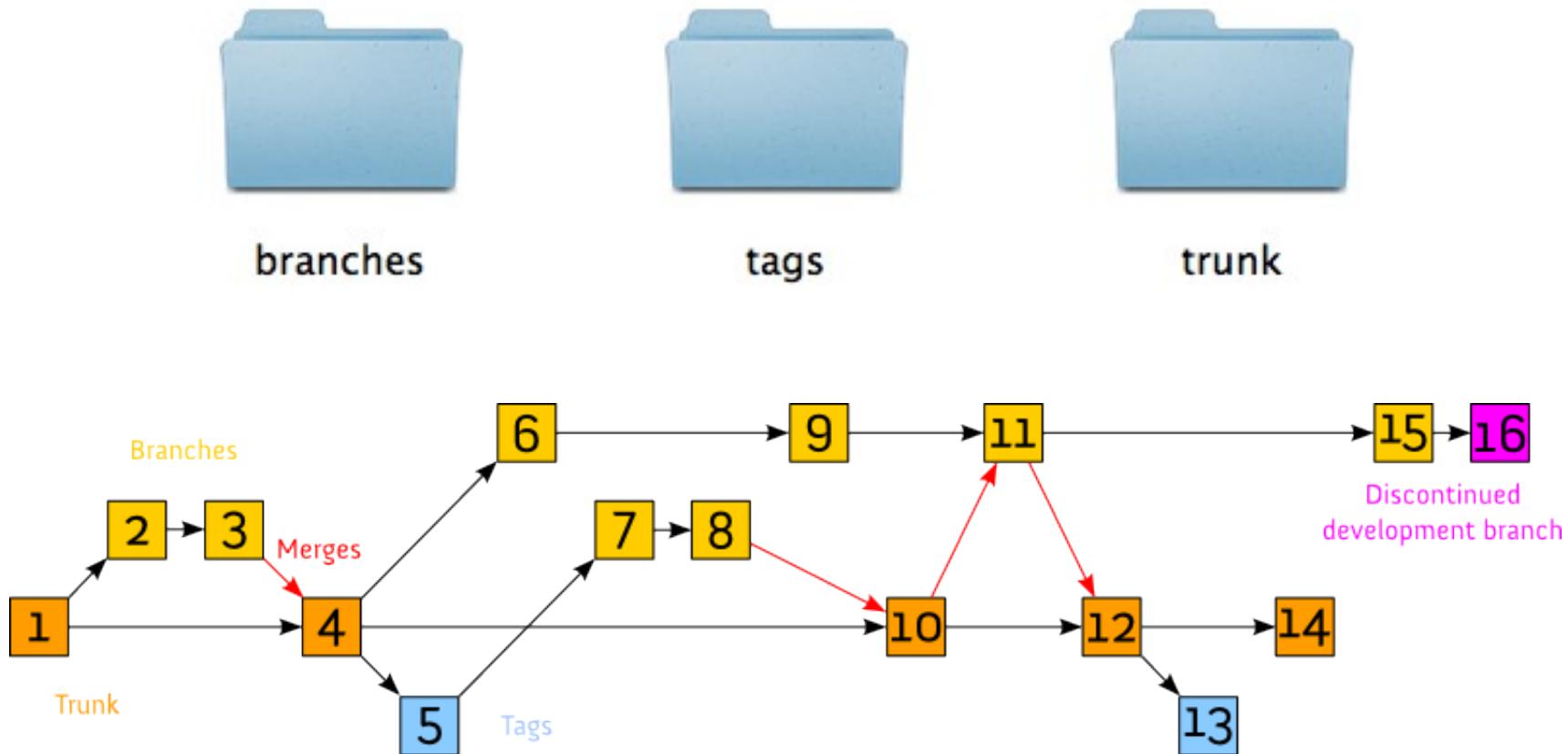
# Diff: how to understand the changes



A specific software that highlights the differences and lets you choose how to retain or discard them.

Source: <http://en.wikipedia.org/wiki/Diff> <http://en.wikipedia.org/wiki/Kompare>

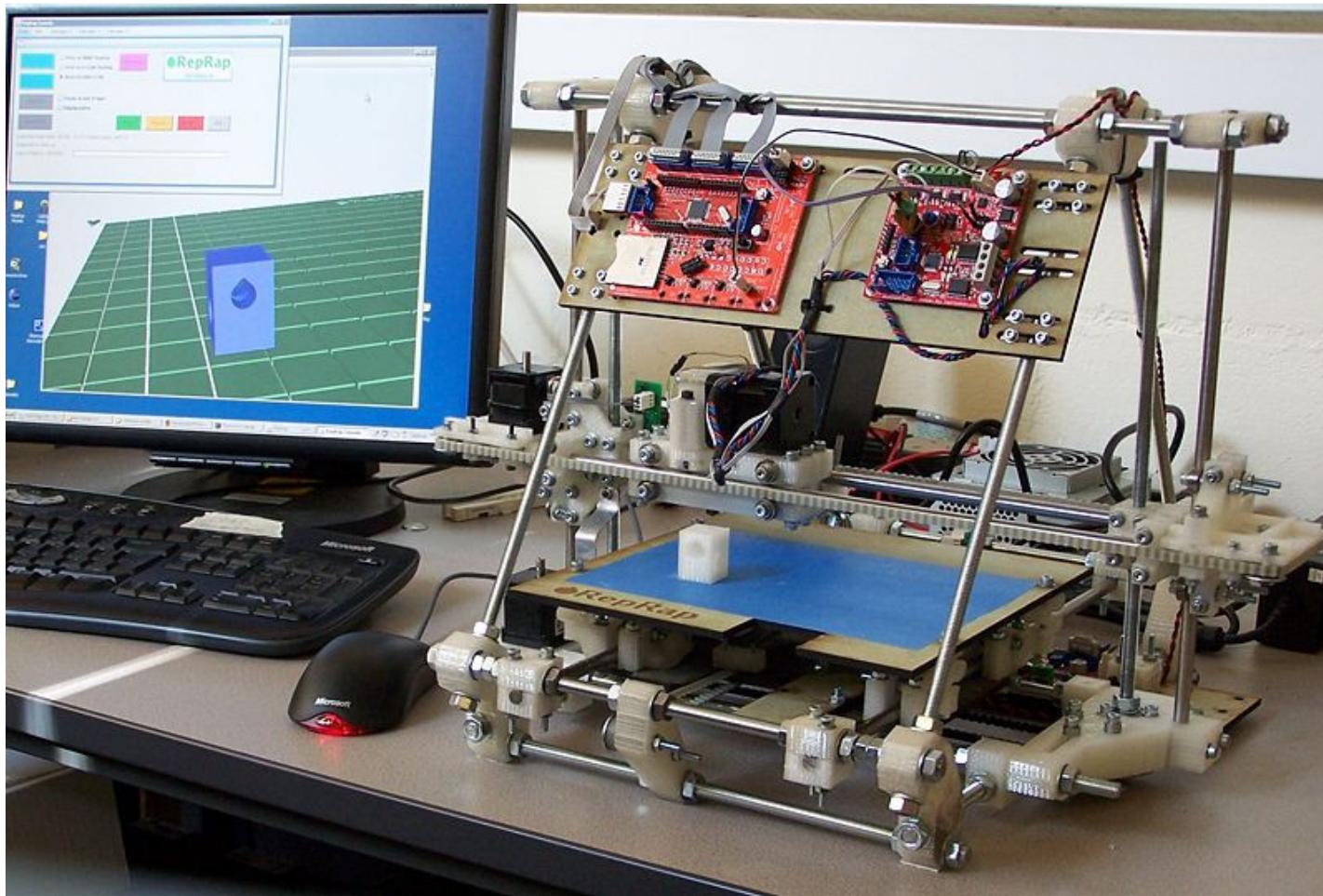
# The structure of a typical Subversion project



The typical structure of the folder, and the typical workflow in Subversion.

Source: [http://en.wikipedia.org/wiki/Apache\\_Subversion](http://en.wikipedia.org/wiki/Apache_Subversion)

# A real example: a spool for the RepRap Mendel

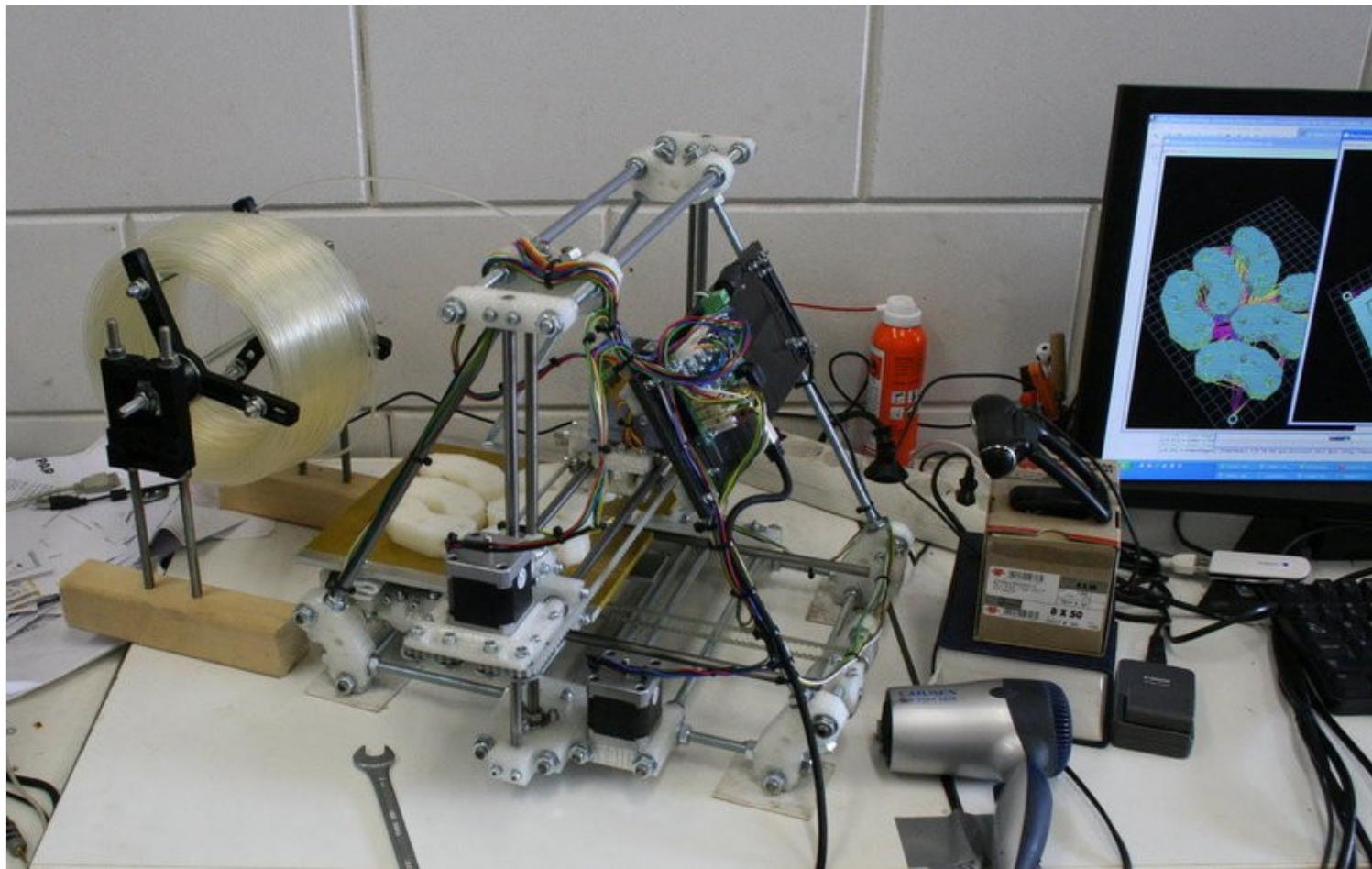


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An open source 3D printer, that has generated  
many more open source projects.

Source: <http://reprap.org/wiki/Mendel>

# A spool for the RepRap Mendel: an improvement



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A real example: a component for holding the cable for the RepRap

Source: <http://www.thingiverse.com/thing:3866>

# A real example, from Thingiverse

The screenshot shows the Thingiverse homepage. At the top left is the Thingiverse logo with a gear icon. To the right is a welcome message: "Welcome, friend. Please [register](#) or [login](#) to the Thingiverse." Below the logo is a navigation bar with links: Home, About, Blog, Upload, Newest, Featured, Popular, Tools, and Parts. A search bar is also present. The main content area features a large graphic of interlocking gears in yellow, green, and pink. To the right of the graphic is the heading "What is Thingiverse?" followed by a detailed description of the platform's mission and purpose. On the far right, there is a sidebar titled "Love Thingiverse?" with a Flattr button showing 596 clicks and a link to flattrThingiverse.com. There is also a small image for NETRAUTA.TAHMISTO.

Welcome, friend.  
Please [register](#) or [login](#) to the Thingiverse.

Google™ Custom Search

Search

Home About Blog Upload Newest Featured Popular Tools Parts

**What is Thingiverse?**

Thingiverse is a place for you to share your digital designs with the world. We believe that just as computing shifted away from the mainframe into the personal computer that you use today, digital fabrication will share the same path. Infact, it is already happening: laser cutters, cnc machines, 3D printers, and even automated paper cutters are all getting cheaper by the day. These machines are useful for a huge variety of things, but you need to supply them with a digital design in order to get anything useful out of them. We're hoping that together we can create a community of people who create and share designs freely, so that all can benefit from them.

**Love Thingiverse?**

 596  
([flattr](#) Thingiverse.com)

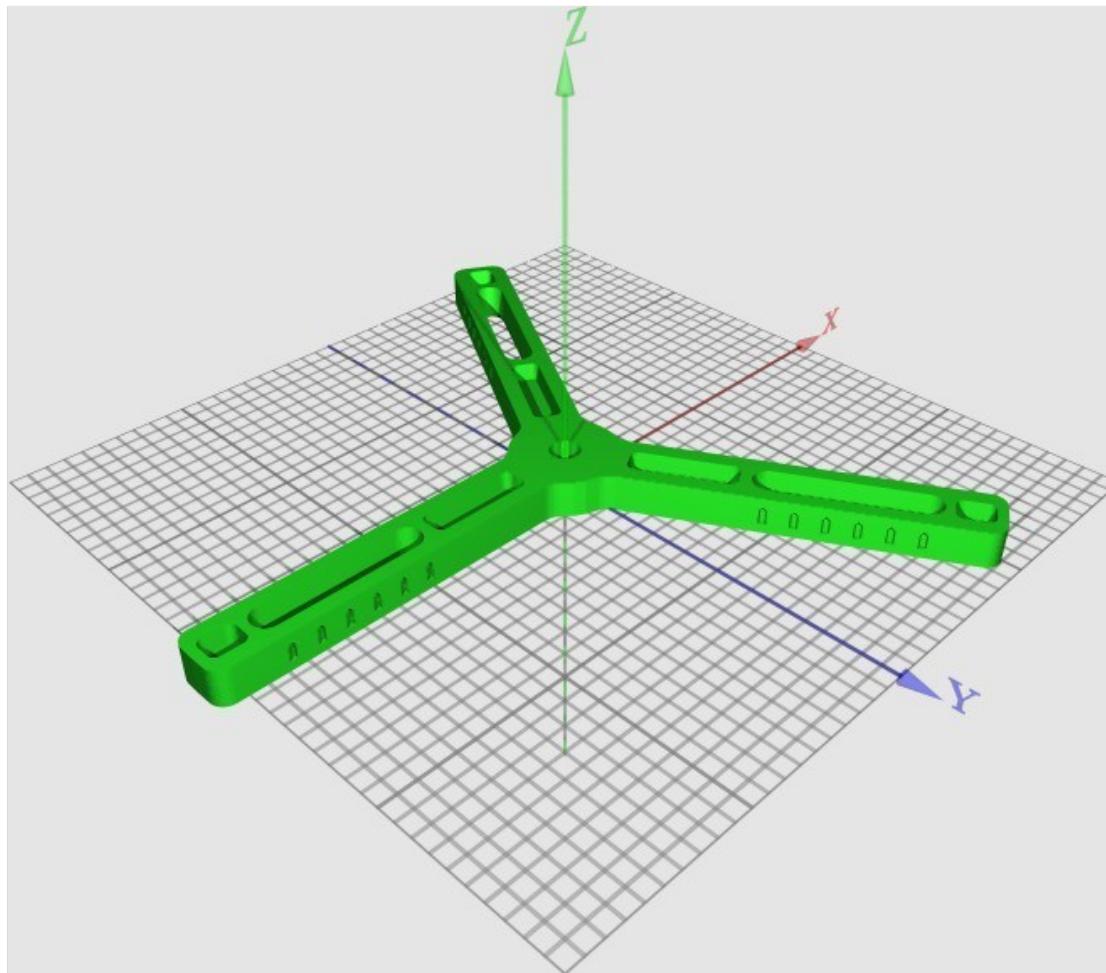


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An online platform for sharing projects of physical things as Open Source.

Source: <http://www.thingiverse.com/about>

# A spool for the RepRap Mendel: improvement 01

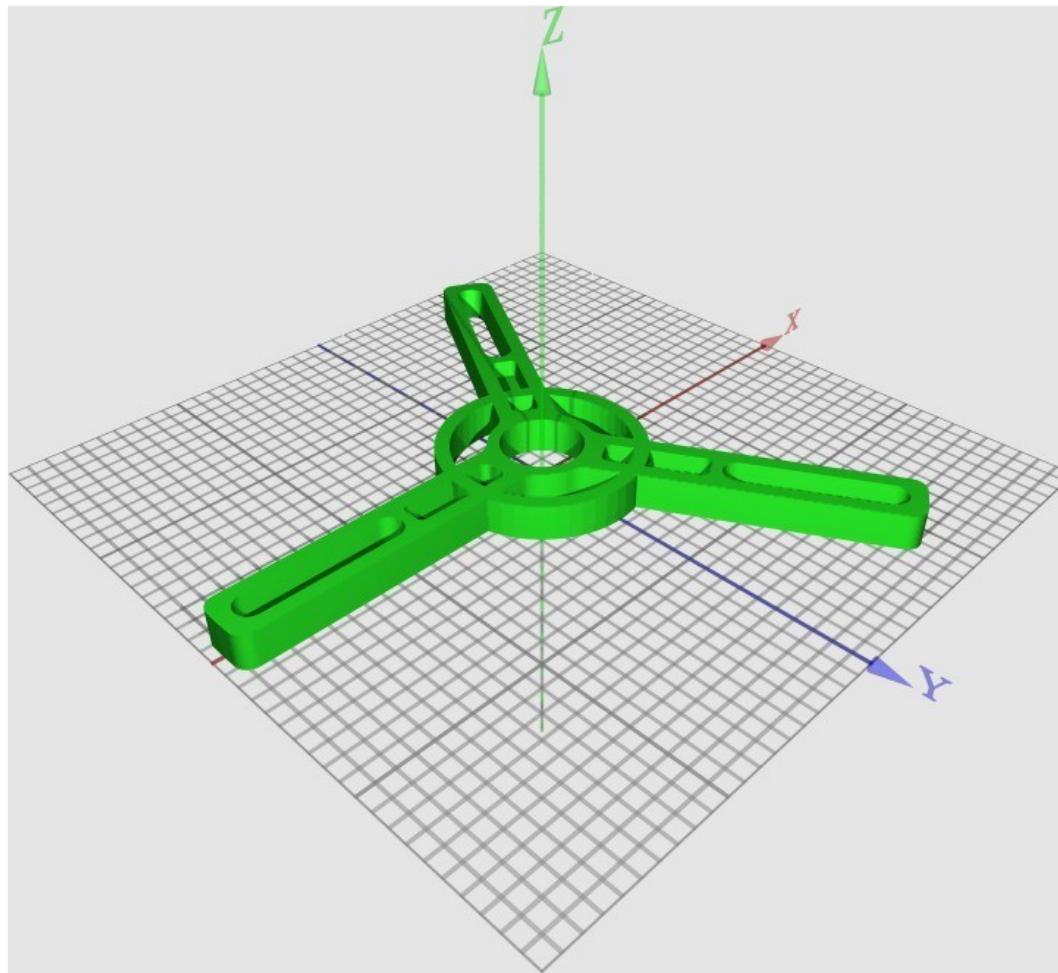


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“Well i wanted to have a very simple, but bearing based spool system.” Camiel

Source: <http://www.thingiverse.com/thing:3866>

# A spool for the RepRap Mendel: improvement 02

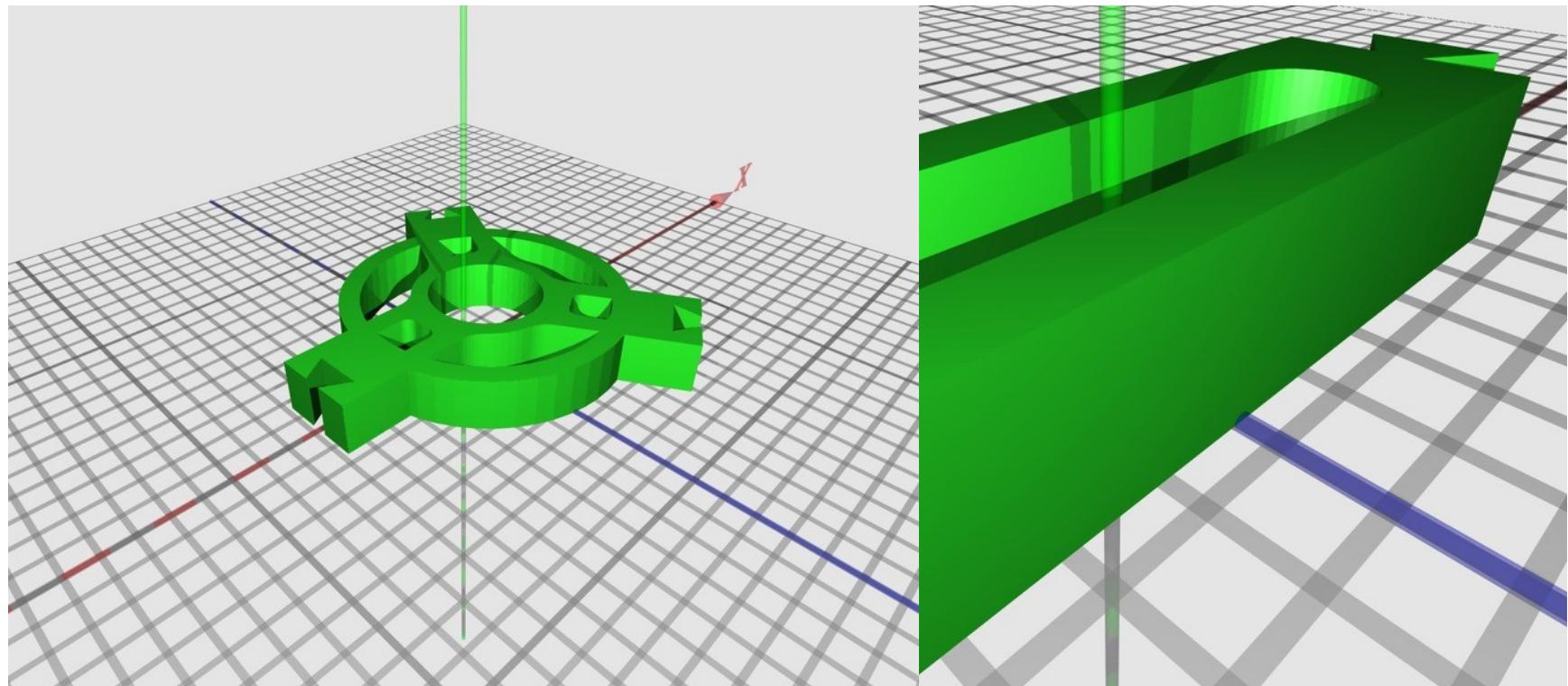


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“I have changed the design to put the bearings in the spool itself. This way you can be more flexible in what you use to support the axle.” Brokentoaster

Source: <http://www.thingiverse.com/thing:3962>

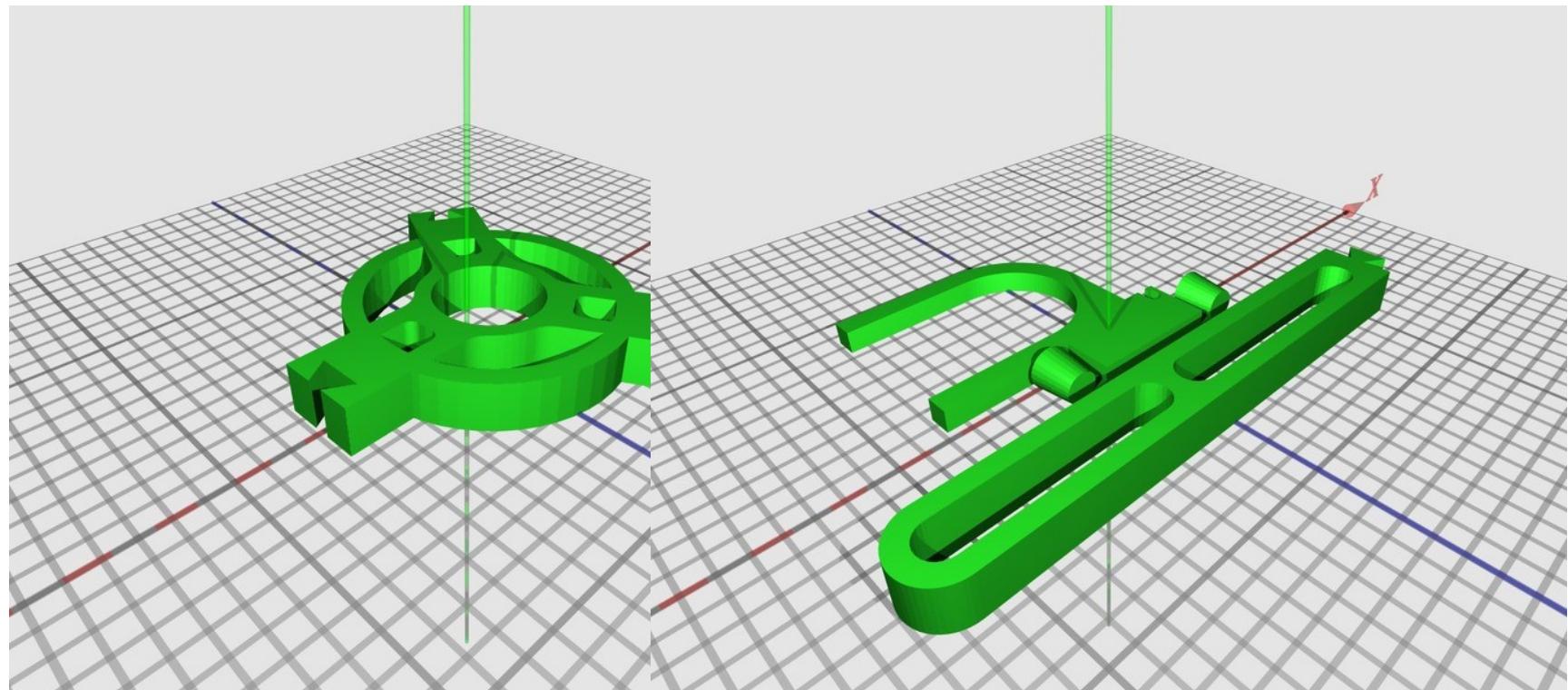
# A spool for the RepRap Mendel: improvement 03



“I liked BrokenToaster’s idea of a bearing-driven filament spool holder, but that version was too big to fit on a Makerbot [...] It now fits on a Makerbot print bed!!!” Randy

Source: <http://www.thingiverse.com/thing:4337>

# A spool for the RepRap Mendel: improvement 04



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“This takes advantage of the larger print area on RepRaps by printing the arm as one piece, avoiding the need for a dovetail joint in the middle of the arm.” Fil

Source: <http://www.thingiverse.com/thing:11250>

# SVN Client + File comparison: TortoiseSVN (Win)

**TortoiseSVN** *the coolest interface to (Sub)version control*

Home    Donate    Downloads    Translations    Support/Docs    Other tools

 **TortoiseSVN**

**About TortoiseSVN**  
TortoiseSVN is an easy-to-use SCM / source control software for Microsoft Windows and possibly the best standalone Apache™ Subversion® client there is. It is implemented as a Windows shell extension, which makes it integrate seamlessly into the Windows explorer. Since it's not an integration for a specific IDE you can use it with whatever development tools you like.

**New version of grepWin**  
*Posted on September 4, 2011*

**Subversion Client Windows**  
Download Now! Windows, Linux, OSX Subversion Repository Browser  
[www.aquafold.com](http://www.aquafold.com) AdChoices ▾

A new version of [grepWin](#) is available. This new version contains a few bugfixes and enhancements.

List of completed [issues](#)  
Download from [here](#)

**Release candidate of TortoiseSVN 1.7**  
*Posted on September 1, 2011*

**Info**  
[News](#)  
[News archive](#)

The most common Subversion client for Windows.

Source: <http://tortoisessvn.net/>

# SVN Client: SmartSVN (Win, Mac, Linux)

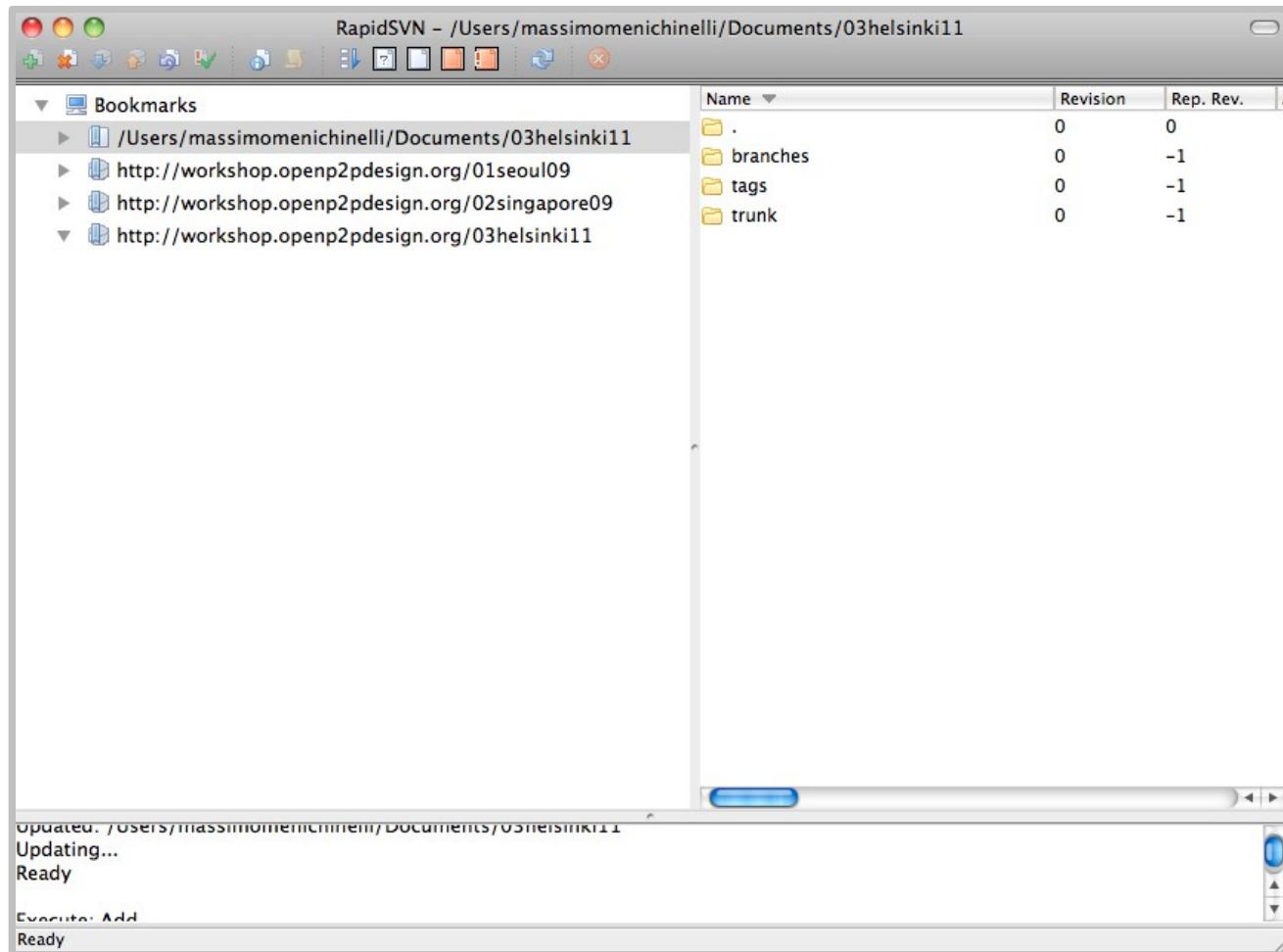


The screenshot shows the official website for SmartSVN. At the top, there's a navigation bar with the Synteko logo, menu items like SmartSVN, SmartGit, SmartCVS, SmartSynchronize, Contact, and Blog, and a search bar. A banner on the right encourages joining the dev-team and has a 'Download' button for version 6.6.9. Below the banner, the SmartSVN logo is displayed, along with a navigation menu: Home, Features, Why SmartSVN, Download, Purchase, Community, Documentation, and FAQ. A 'Printable' link is also present. The main content area features a large image of the SmartSVN application interface, which is a graphical SVN client showing a file tree, a list of files with their local and remote states, and a 'Transactions' pane. A blue callout box highlights the 'Why SmartSVN' section. To the right of the interface, the text 'The Subversion Client for Professionals' is displayed, followed by a description of SmartSVN as a graphical client for Subversion (SVN), an Open Source version control system. It emphasizes that SmartSVN targets professionals who demand a reliable, efficient and well-supported SVN client for their daily business. Another 'Download' button is located here. The overall theme is professional and user-oriented.

A multiplatform and freeware Subversion client.

Source: <http://www.synteko.com/smartsvn/index.html>

# SVN Client: RapidSVN (Win, Mac, Linux)



An open source and multiplatform Subversion client.

Source: <http://www.rapidsvn.org/>

# SVN Client: Versions (Mac)

The screenshot shows the homepage of the Versions Subversion Client for Mac website. At the top, there's a navigation bar with links for Home, Release Notes, Support, Buy, and Download. Below the navigation is a large graphic featuring a green lotus flower growing out of a mound of green grass against a dark background. The word "VERSIONS" is written in large white letters, with a small yellow badge containing "1.1" positioned above the letter "S". Below "VERSIONS" is the text "SUBVERSION CLIENT FOR MAC". On the left side, there's a block of text describing the product: "Versions offers the best way to work with Subversion on the Mac. Thanks to its clear-cut approach, you'll hit the ground running." To the right of this text are two buttons: a green "Download Now" button with a download icon and a blue "Buy for €39" button with a shopping cart icon.

Versions offers the best way to work with  
**Subversion on the Mac**. Thanks to its  
clear-cut approach, you'll **hit the ground**  
**running**.

Download Now

Buy for €39

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A paid Subversion client with a great interface, but only for Mac.

Source: <http://www.versionsapp.com/>

# File comparison: Kaleidoscope (Mac)

*Compare files with...*

# KALEIDOSCOPE

Use Kaleidoscope to **spot the differences** in text and image files. Review changes in seconds with the world's **most advanced** file comparison application.

[Download](#)  [Buy for €29](#) 

[30 Day Demo](#) [Introductory Price](#)

[Learn more...](#)

 **Text Scope**  
Compare text and

 **Image Scope**  
Review mockups

 **Workflow**  
Integrate with just

 **Details**  
Skim through the



From the same developers of Versions, a file and image comparison app for Mac.

Source: <http://www.kaleidoscopeapp.com/>

# File comparison: Perforce P4Merge (Win, Mac, Linux)

The screenshot shows the official website for Perforce. At the top, there's a navigation bar with links for Company, Partners, Resources, a search bar, and a menu with options like Products, Downloads, Documentation, Customers, Services, Purchase, and Support. Below the navigation, a large banner features the text "Create. Develop. Version everything with Perforce." and a detailed description of the product's capabilities. To the right of this text is a testimonial from NYSE Euronext, which includes a small photo of a smiling man and a quote: "We're really not even close to maxing out the scalability of the Perforce server." A navigation menu with items 1 through 5 is visible above the testimonial. At the bottom of the page, there are calls-to-action for "Why Perforce" and "Try Perforce", along with information about the beta release.

**PERFORCE**

Company Partners Resources Search

Products Downloads Documentation Customers Services Purchase Support

**Create. Develop. Version everything with Perforce.**

Only Perforce products have the Perforce Server – the fast version management platform that powers productive teamwork. Built from the ground up to be scalable and easy to manage, Perforce helps thousands of the world's leading organizations innovate and succeed.

**NYSE Euronext.** uses Perforce throughout the entire technology lifecycle of the exchange.

*"We're really not even close to maxing out the scalability of the Perforce server."*

1 2 3 4 5

Why Perforce Try Perforce

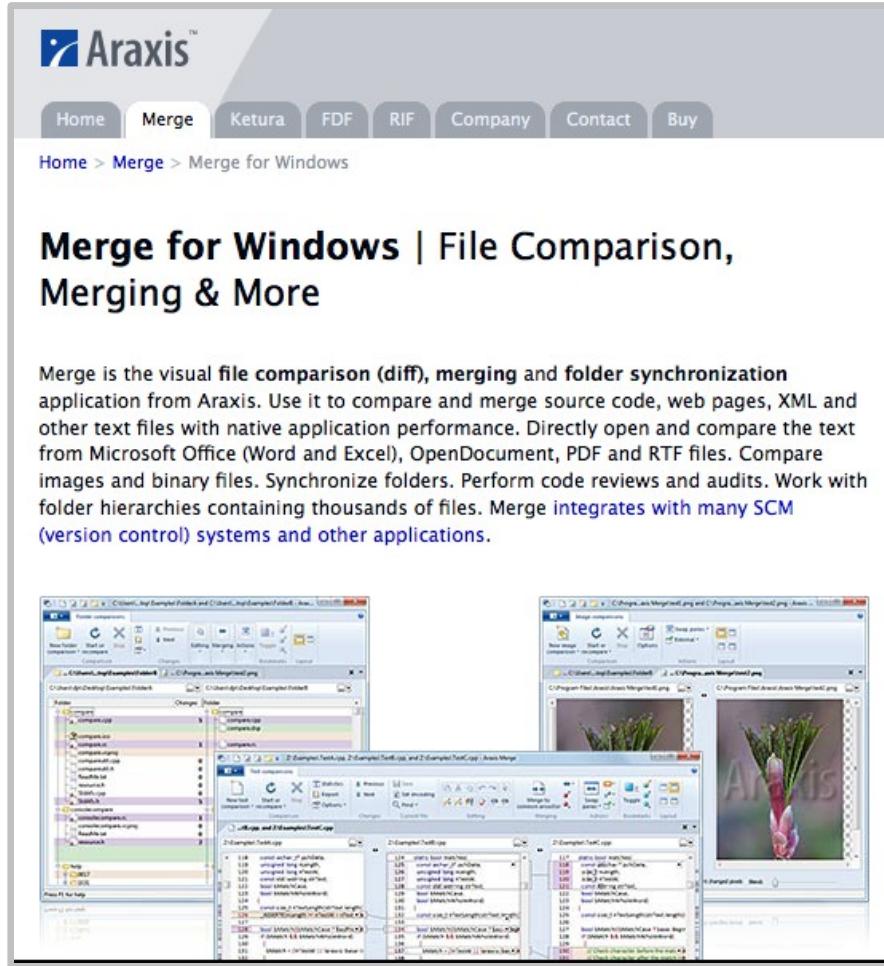
Get the fast track on better SCM... Free 2 user trial or multi-seat evaluation...

Get the Perforce 2011.1 Beta Release. Check out the [beta features](#) or [download the beta now](#).

A freeware and multiplatform file and image comparison app.

Source: [http://www.perforce.com/product/components/perforce\\_visual\\_merge\\_and\\_diff\\_tools](http://www.perforce.com/product/components/perforce_visual_merge_and_diff_tools) <http://www.andymcintosh.com/?p=33>  
<http://blog.richardadleta.com/2009/02/free-diff-merge-tool-p4merge.html>

# File comparison: Araxis Merge (Win)

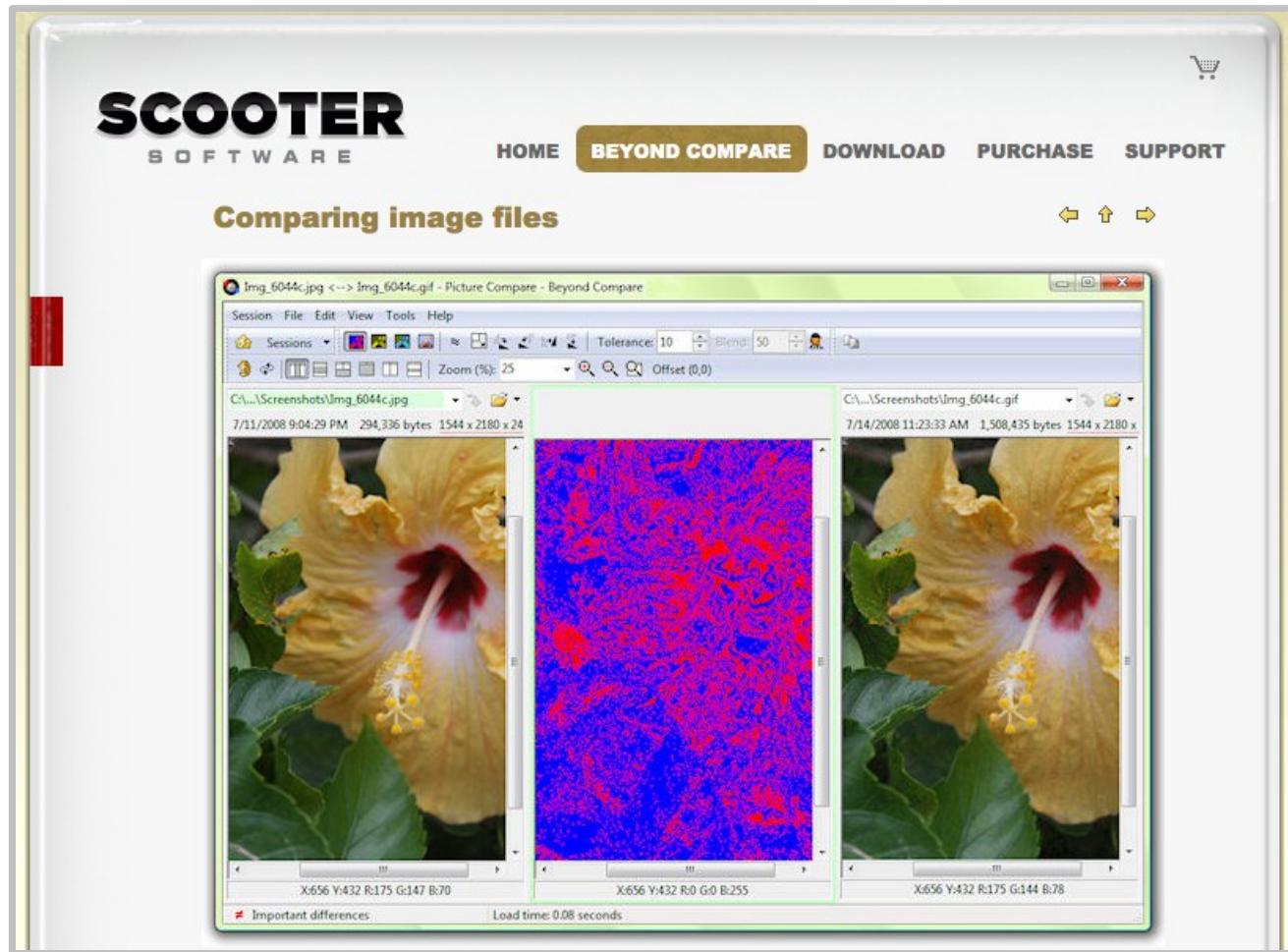


The screenshot shows the Araxis Merge application window. At the top, there's a navigation bar with links for Home, Merge, Ketura, FDF, RIF, Company, Contact, and Buy. Below the navigation bar, the URL 'Home > Merge > Merge for Windows' is displayed. The main title 'Merge for Windows | File Comparison, Merging & More' is centered above a descriptive paragraph. The paragraph explains that Merge is a visual file comparison (diff), merging, and folder synchronization application from Araxis, designed for comparing and merging source code, web pages, XML, and other text files with native application performance. It supports Microsoft Office documents, OpenDocument, PDF, and RTF files, and can handle images and binary files. The software integrates with many version control systems and other applications. Below the text, two windows of the Araxis Merge interface are shown side-by-side. The left window displays a file tree and a comparison pane showing differences between two XML files. The right window shows a preview of two image files being compared. The overall interface is professional and user-friendly.

A paid file and image comparison app for Windows.

Source: <http://www.araxis.com/merge/>

# File comparison: BeyondCompare (Win, Linux)



A paid app for Linux and Windows that can compare images.

Source: <http://www.scootersoftware.com/moreinfo.php?zz=screenshot&shot=PixCompare>

# File comparison: ComparePSD (Win)

The screenshot shows the pixelnovel website with the URL <http://pixelnovel.com/comparepsd/>. The page features a navigation bar with links for timeline, Do you like it?, SVN account, customers, blog, and sign in. Below the navigation is a breadcrumb trail: Home > comparepsd. A green button labeled "ComparePSD for Windows" is prominently displayed. To the right, there's a download button for "ComparePSD" for Windows, available "FREE". A sidebar on the right encourages users to "sign up for more exciting news" and includes a "Kudos!" button.

**ComparePSD**  
compare two Adobe Photoshop files layer-by-layer  
a must-have tool for Photoshop professionals

Imagine. You need to find the file with that unmerged effects among the heap of 2 mb files which were called hastily 'Untitled1.psd', 'Untitled2.psd', 'Untitled2\_a.psd'. And now you have to open every single file, wait for it to load, scroll through it, and then find the effects you was looking for. Sounds familiar?

ComparePSD compares two Adobe Photoshop PSD files for you and highlights the differences. Layer by layer. Effect by effect. Simple. And did we mention that ComparePSD is absolutely free?

The bottom half of the screenshot displays a screenshot of the ComparePSD application interface. It shows two Photoshop files side-by-side: "vector.psd" and "vector2.psd". The interface allows users to compare layers and effects between the two files, highlighting differences. The "vector.psd" file has layers like "small butterfly", "detail", "data 2", "data", "butterfly big left", "branch small", "branch", and "need to catch some butterflies". The "vector2.psd" file has similar layers with slight variations, such as "data 2" instead of "detail".

A freeware app that lets you compare Photoshop PSD files.

Source: <http://pixelnovel.com/comparepsd/>

# Subversion Hosting Service: Beastalk

The screenshot displays the Beastalk homepage with a dark background featuring green leaf icons. At the top, there's a navigation bar with links: Home, Feature Tour, Partners & Tools, API, Guides, Blog, Pricing & Sign Up, and Help.

The main title "beanstalk" is displayed in a large, stylized green font with three leaves above it. Below the title is the tagline: "The easiest way to manage code, collaborate and deploy."

Three main features are highlighted:

- Version Control**: Described as secure, private and reliable Git and Subversion hosting. It includes a screenshot of a mobile device displaying a dashboard.
- Collaboration**: Described as review code and discuss changes. It includes a screenshot of a desktop interface showing a list of commits and activity.
- Deployments**: Described as instantly deploying or rolling back updates to multiple web servers. It includes a screenshot of a deployment interface.

A handwritten-style note on the right side of the page says: "Beanstalk has a gorgeous interface!" with an arrow pointing to the user interface screenshot.

At the bottom left, there's a green button with white text: "View Plans & Pricing". Below it, smaller text says: "No contracts! Sign up in seconds." At the bottom right, there's a yellow button with a lock icon and white text: "Concerned about Security?"

A paid hosting service for Subversion, but  
also for Mercurial and Git

Source: <http://beanstalkapp.com/>

# Subversion hosting service: CloudForge

The screenshot shows the homepage of the CloudForge website. At the top, there's a navigation bar with links for CollabNet Home, Blog, Help, Status, Contact, and LOGIN. Below the navigation is a main header with the CloudForge logo and the text "Subversion (SVN) & Git Hosting under ONE roof". A central graphic features a globe with arrows pointing towards it, and icons for git and SVN. A call-to-action button says "Free 30 Day Trial". Below this, a section titled "Why use CloudForge dPaaS?" lists six benefits with corresponding icons:

Why use CloudForge dPaaS?					
<b>Start in Minutes</b> Teams, workspaces, hosted code & agile tools	<b>Open &amp; Agnostic</b> Supports any app framework or platform	<b>Integrate your systems</b> Integrates with your existing tools & workflow	<b>Cloud Deployment</b> One-click deployment to your preferred cloud	<b>Visibility &amp; Control</b> Across public, private, and on-premise environments	<b>Enterprise Grade</b> 99.9% Uptime, Security High Availability, Supported

Subversion and Git hosting plans.

Source: <http://cloudforge.com/>

# Subversion hosting service: Pixelnovel

The screenshot shows the Pixelnovel website with a navigation bar at the top featuring links for timeline, Do you like it?, SVN account, customers, and blog. A sign-in button is also present. Below the navigation, a breadcrumb trail shows the user is on the account page. On the left, there's a sidebar with links for home, account (which is active), and help. The main content area is titled "PIXELNOVEL ACCOUNT IS A SUBVERSION HOSTING FOR DESIGNERS". It features two columns of bullet points: one for account features and another for SVN integration. At the bottom of this section is a note about Timeline integration. To the right are "SEE PLANS" and "SIGN UP" buttons. A testimonial box contains a quote about Pixelnovel being a hassle-free alternative with extra features.

pixelnovel  
version control for designers

timeline   Do you like it?   SVN account   customers   blog

sign in

account

SVN account

Pricing & plans

PIXELNOVEL ACCOUNT IS A SUBVERSION HOSTING FOR DESIGNERS

■ 3 plans for your convenience, a **free account** is available

■ View all your files online along with **previews and history\***

■ Is based on Subversion (SVN), a proved version control system

■ Add more users to your account and manage their rights

\* only available if used along with Timeline, the Subversion client for Adobe Creative Suite

SEE PLANS >

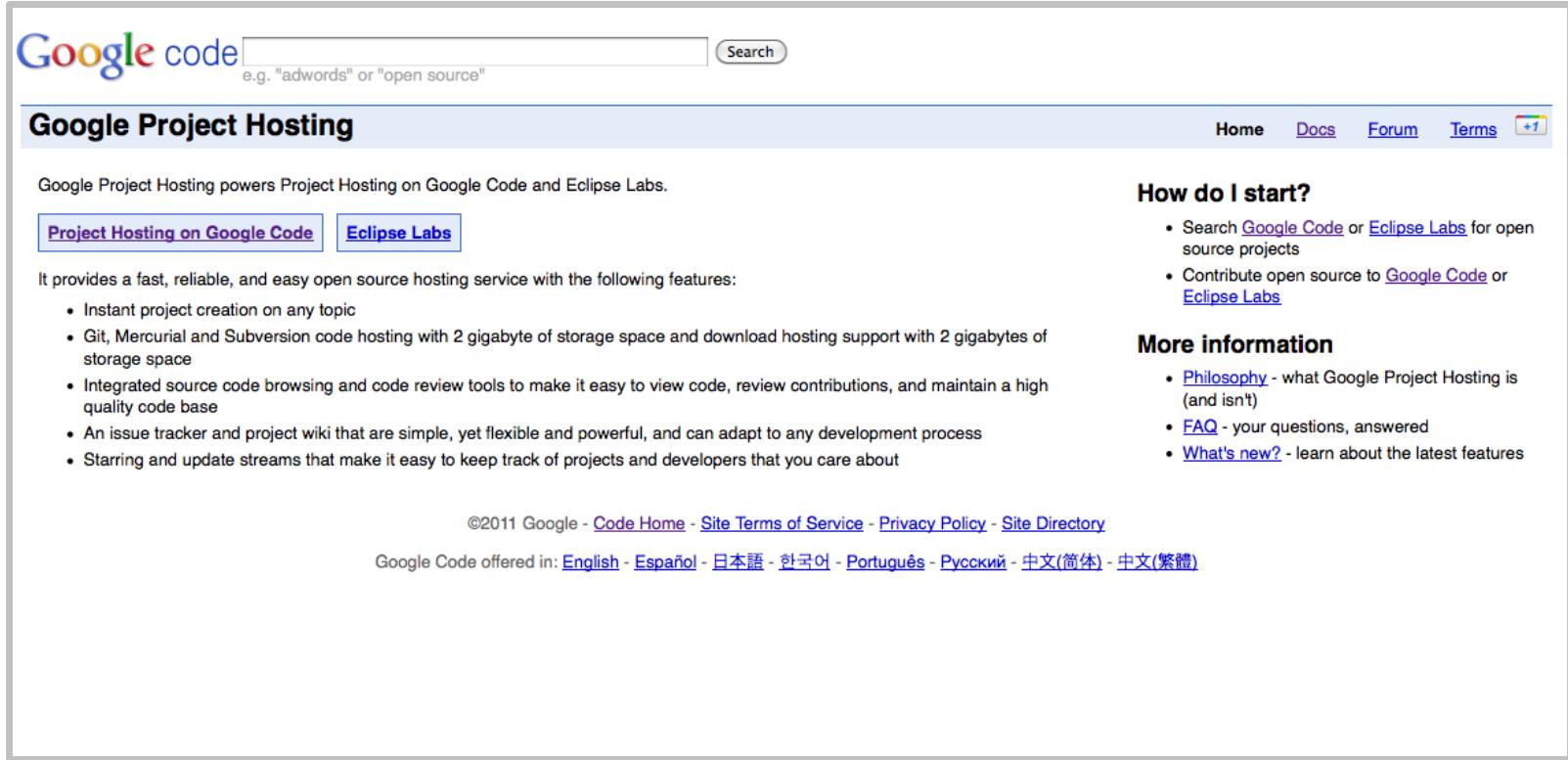
SIGN UP >

“ If you don't have your own SVN repository, a PixelNovel account will provide you with a hassle-free alternative, plus you get the extra features such as user management system and automatic back up ”

A Subversion hosting service for designers  
using Adobe Photoshop

Source: <http://pixelnovel.com/svn-account/>

# Subversion hosting service: Google Code



The screenshot shows the Google Project Hosting homepage. At the top, there's a search bar with the placeholder "e.g. 'adwords' or 'open source'" and a "Search" button. Below the search bar, the page title "Google Project Hosting" is displayed, along with navigation links for "Home", "Docs", "Forum", "Terms", and a link to "+1". A sub-header states "Google Project Hosting powers Project Hosting on Google Code and Eclipse Labs." Below this, two buttons are visible: "Project Hosting on Google Code" and "Eclipse Labs". A section titled "How do I start?" lists three items: "Search Google Code or Eclipse Labs for open source projects", "Contribute open source to Google Code or Eclipse Labs", and "Create a new project". Another section titled "More information" lists three items: "Philosophy - what Google Project Hosting is (and isn't)", "FAQ - your questions, answered", and "What's new? - learn about the latest features". At the bottom, there are copyright notices: "©2011 Google - [Code Home](#) - [Site Terms of Service](#) - [Privacy Policy](#) - [Site Directory](#)" and "Google Code offered in: [English](#) - [Español](#) - [日本語](#) - [한국어](#) - [Português](#) - [Русский](#) - [中文\(简体\)](#) - [中文\(繁體\)](#)".

A free hosting with Subversion and Git for  
Open Source projects.

Source: <http://code.google.com/projecthosting/>

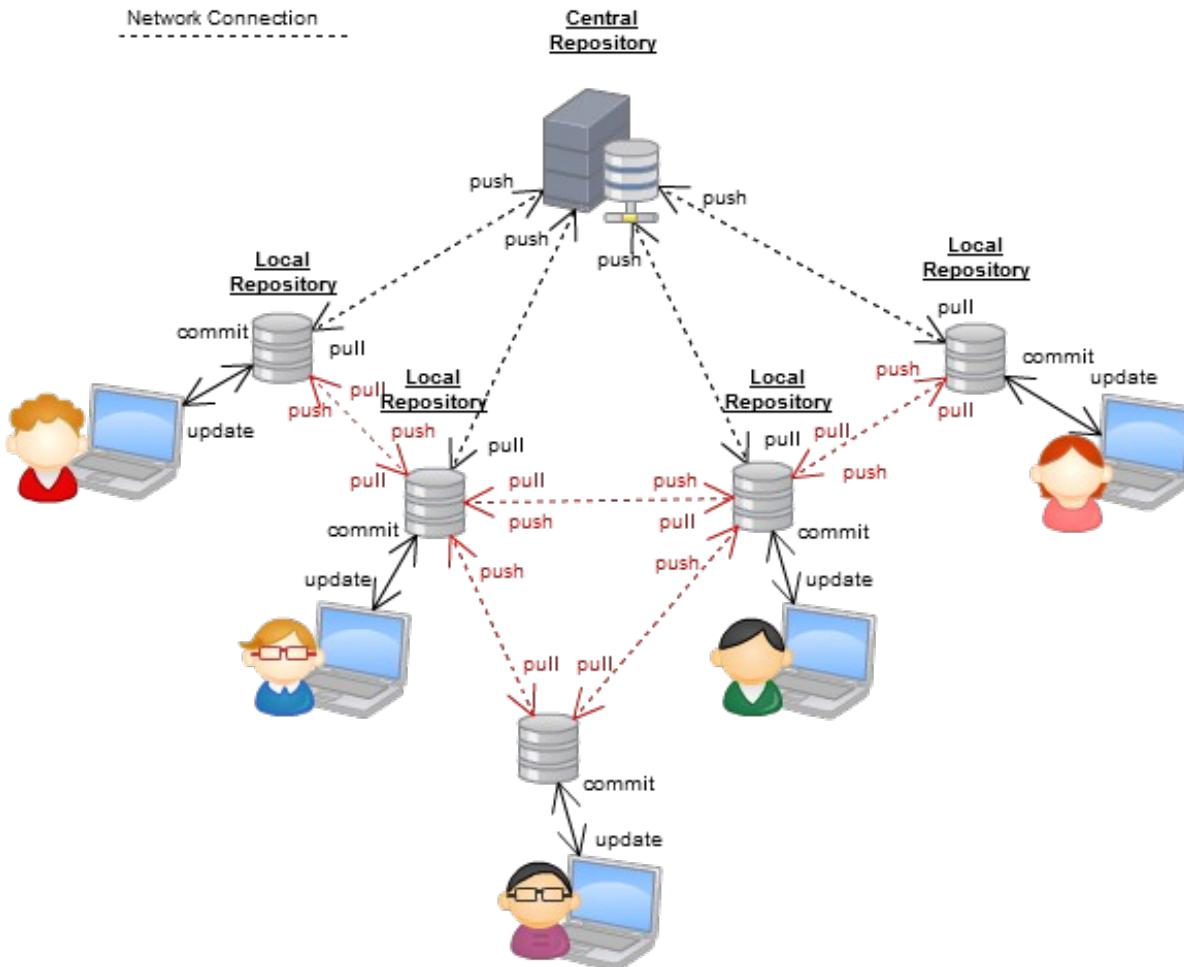


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02.

# Git – the distributed architectural engine

# Distributed version control system



A distributed version control system: it may have a central repository but it is fully distributed.

# Git: a distributed version control system

The screenshot shows the official Git website (<http://git-scm.com/>). At the top left is the Git logo with the tagline "everything-is-local". A search bar is at the top right. Below the header, there's a brief introduction to Git's distributed nature and its performance advantages over other SCM tools. To the right is a diagram illustrating the distributed nature of Git, showing multiple repositories connected by bidirectional red lines. Below the introduction are several navigation links: "About" (with a gear icon), "Documentation" (with a book icon), "Downloads" (with a download arrow icon), and "Community" (with a speech bubble icon). On the right side, there's a section for the "Latest stable release" (1.7.12) with a "Download for Mac" button. Below this are links for "Mac GUIs", "Tarballs", "Windows Build", and "Source Code". At the bottom left, there's a thumbnail for the book "Pro Git" by Scott Chacon.

git — everything-is-local

Search entire site...

Git is a **free and open source** distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Git is **easy to learn** and has a **tiny footprint with lightning fast performance**. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like **cheap local branching**, convenient **staging areas**, and **multiple workflows**.

**About**  
The advantages of Git compared to other source control systems.

**Documentation**  
Command reference pages, Pro Git book content, videos and other material.

**Downloads**  
GUI clients and binary releases for all major platforms.

**Community**  
Get involved! Mailing list, chat, development and more.

Latest stable release  
**1.7.12**  
Release Notes (2012-08-20)  
[Download for Mac](#)

[Mac GUIs](#)   [Tarballs](#)

[Windows Build](#)   [Source Code](#)

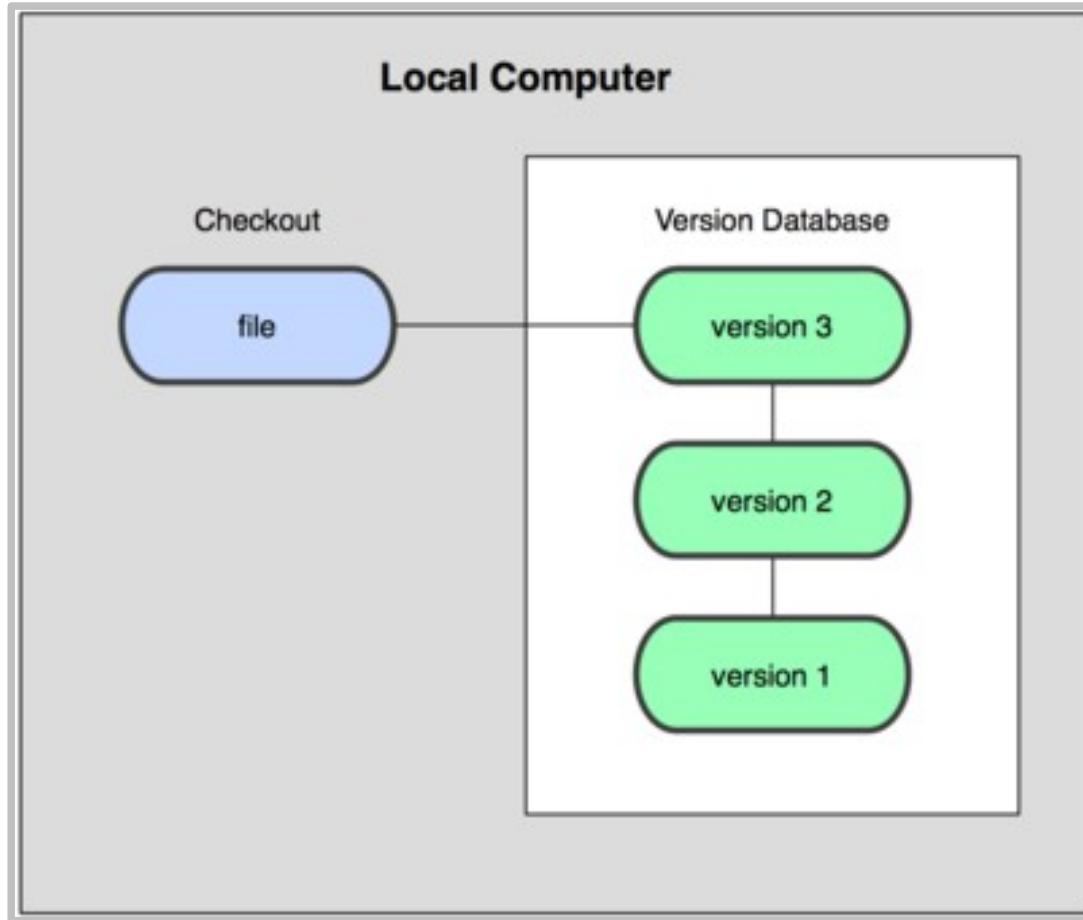
[Pro Git](#)

Pro Git by Scott Chacon is available to [read online for free](#). Dead tree versions are available on [Amazon.com](#).

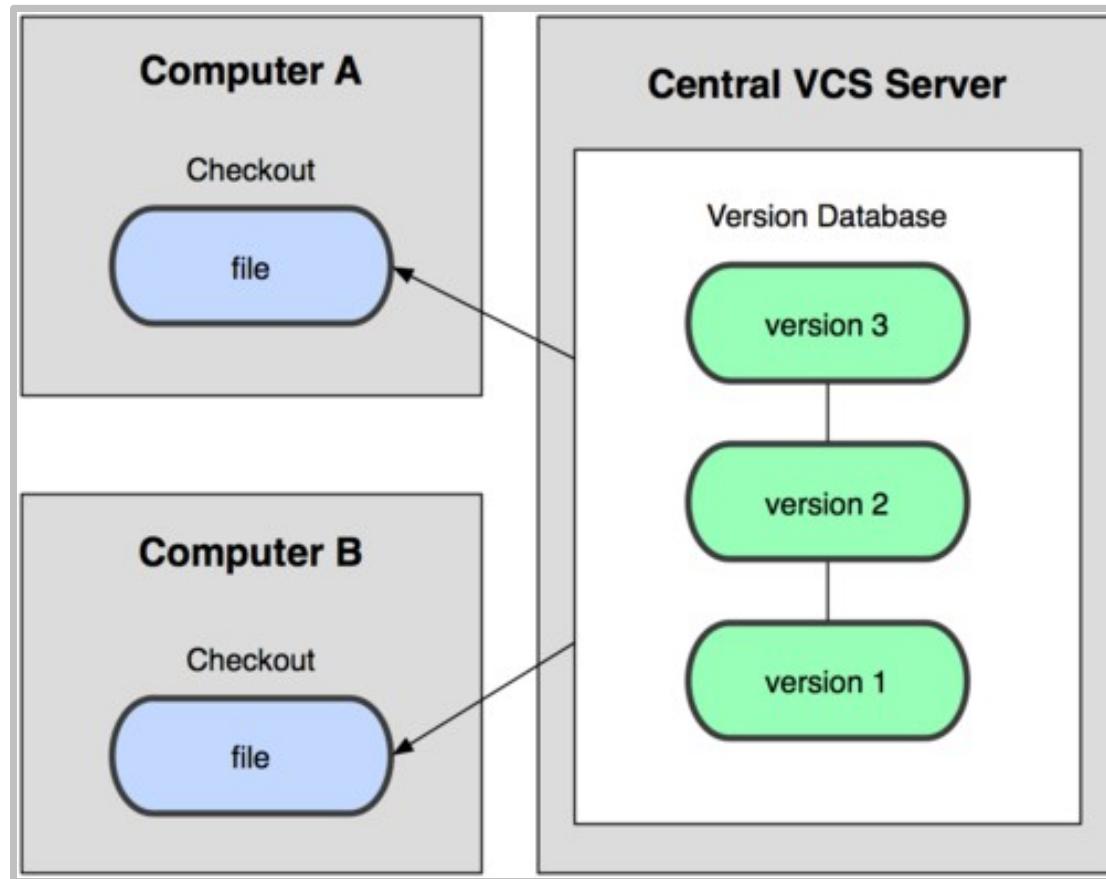
# Git: a distributed version control system



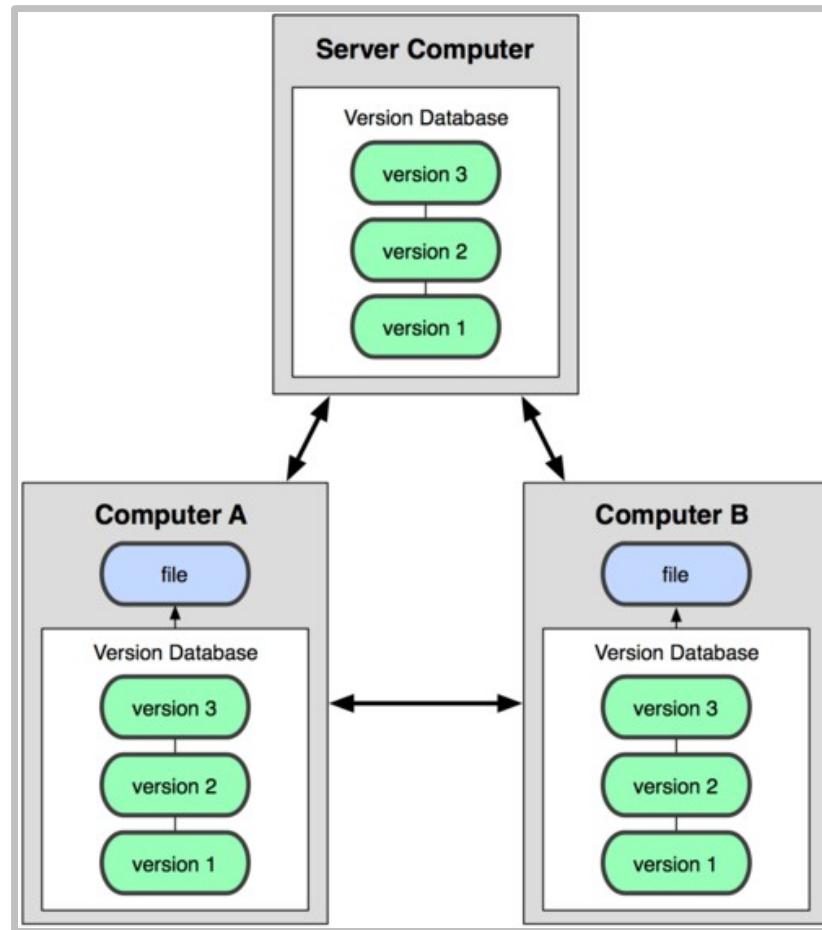
# A local version control system



# A centralized version control system



# Git: a distributed version control system



# Git: a command line tool

```
Massimos-MacBook-Air:Open-Design-Definition massimo$ git status
# On branch master
nothing to commit (working directory clean)
Massimos-MacBook-Air:Open-Design-Definition massimo$ git
usage: git [--version] [--exec-path[=<path>]] [--html-path] [--man-path] [--info-path]
           [-p|--paginate|--no-pager] [--no-replace-objects] [--bare]
           [--git-dir=<path>] [--work-tree=<path>] [--namespace=<name>]
           [-c name=value] [--help]
           <command> [<args>]

The most commonly used git commands are:
add           Add file contents to the index
bisect        Find by binary search the change that introduced a bug
branch       List, create, or delete branches
checkout     Checkout a branch or paths to the working tree
clone        Clone a repository into a new directory
commit       Record changes to the repository
diff          Show changes between commits, commit and working tree, etc
fetch        Download objects and refs from another repository
grep          Print lines matching a pattern
init          Create an empty git repository or reinitialize an existing one
log           Show commit logs
merge        Join two or more development histories together
mv            Move or rename a file, a directory, or a symlink
pull          Fetch from and merge with another repository or a local branch
push          Update remote refs along with associated objects
rebase        Forward-port local commits to the updated upstream head
reset         Reset current HEAD to the specified state
rm            Remove files from the working tree and from the index
show          Show various types of objects
status        Show the working tree status
tag           Create, list, delete or verify a tag object signed with GPG

See 'git help <command>' for more information on a specific command.
Massimos-MacBook-Air:Open-Design-Definition massimo$
```

# Git: GUIs also available

## GUI Clients

Git comes with built-in GUI tools for committing ([git-gui](#)) and browsing ([gitk](#)), but there are several third-party tools for users looking for platform-specific experience.

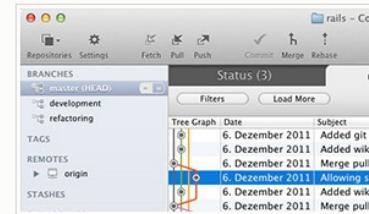
[Only show GUIs for my OS \(Mac\)](#)



### GitHub for Mac

Platforms: Mac

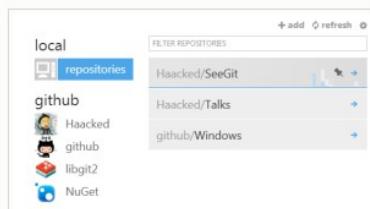
Price: Free



### Tower

Platforms: Mac

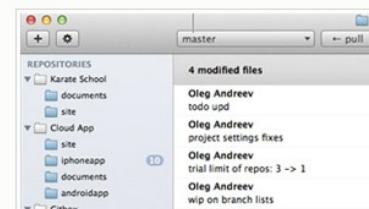
Price: \$59/user (Free 30 day trial)



### GitHub for Windows

Platforms: Windows

Price: Free



### Gitbox

Platforms: Mac

Price: \$9.99 / Free for personal use



Source: <http://git-scm.com/downloads/guis>

# Git: a good free book

 git -everything-is-local

[About](#)

[Documentation](#)

- Reference
- Book**
- Videos
- External Links

[Downloads](#)

[Community](#)

---

Download this book in [PDF](#), [mobi](#), or [ePub](#) form for free.

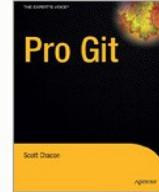
This book is translated into [German](#), [Chinese](#), [French](#), [Japanese](#) and [Dutch](#).

Partial translations available in [Arabic](#), [Czech](#), [Spanish](#), [Indonesian](#), [Italian](#), [Macedonian](#), [Polish](#), [Thai](#) and [Russian](#).

---

## Book

The entire Pro Git book, written by Scott Chacon and published by Apress, is available here. All content is licensed under the [Creative Commons Attribution Non Commercial Share Alike 3.0 license](#). Print versions of the book are available on [Amazon.com](#).



### 1. Getting Started

- [1.1 About Version Control](#)
- [1.2 A Short History of Git](#)
- [1.3 Git Basics](#)
- [1.4 Installing Git](#)
- [1.5 First-Time Git Setup](#)
- [1.6 Getting Help](#)
- [1.7 Summary](#)

### 2. Git Basics

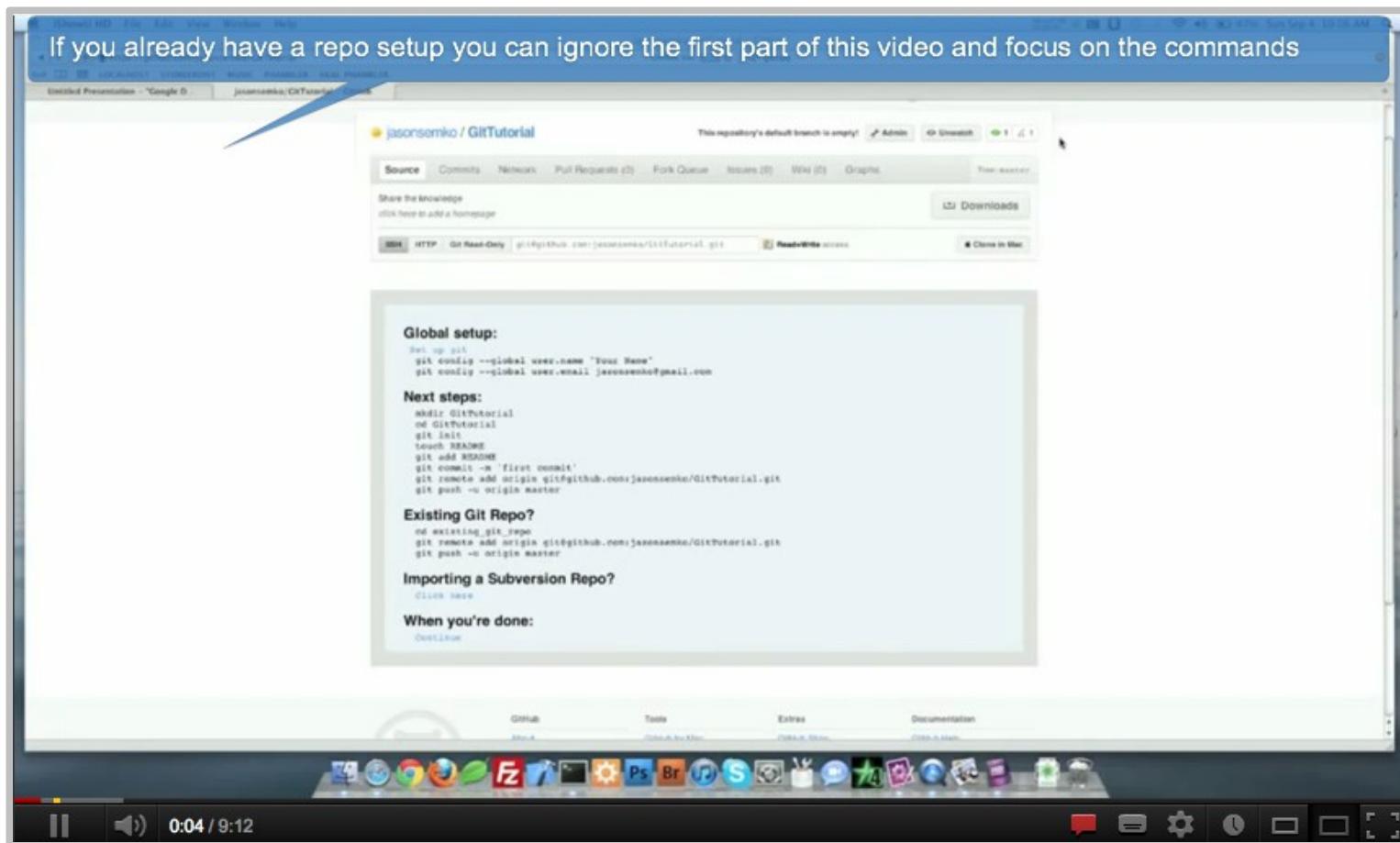
- [2.1 Getting a Git Repository](#)
- [2.2 Recording Changes to the Repository](#)
- [2.3 Viewing the Commit History](#)
- [2.4 Undoing Things](#)
- [2.5 Working with Remotes](#)
- [2.6 Tagging](#)
- [2.7 Tips and Tricks](#)

# Git: a good free lecture, from the same author

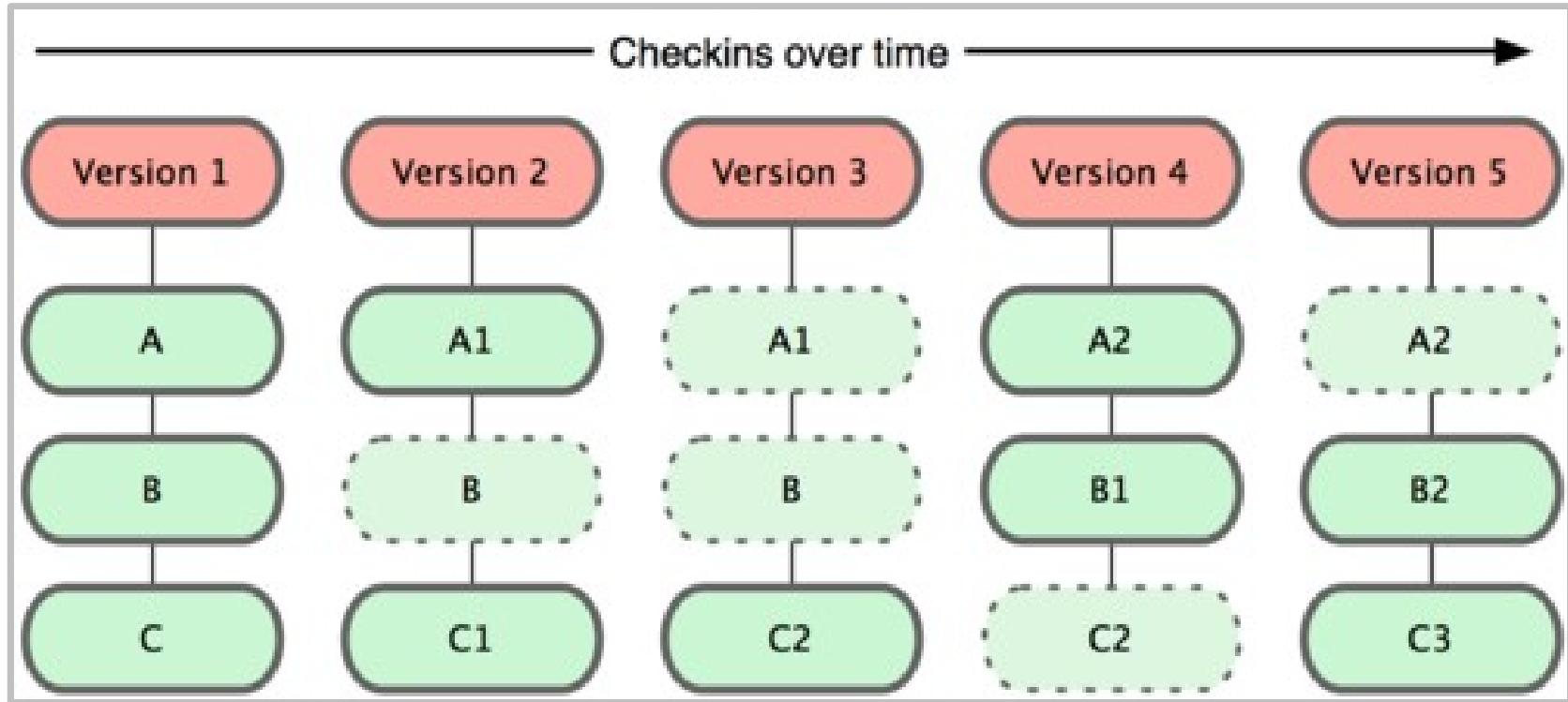


Source: <http://www.youtube.com/watch?v=ZDR433b0HJY>

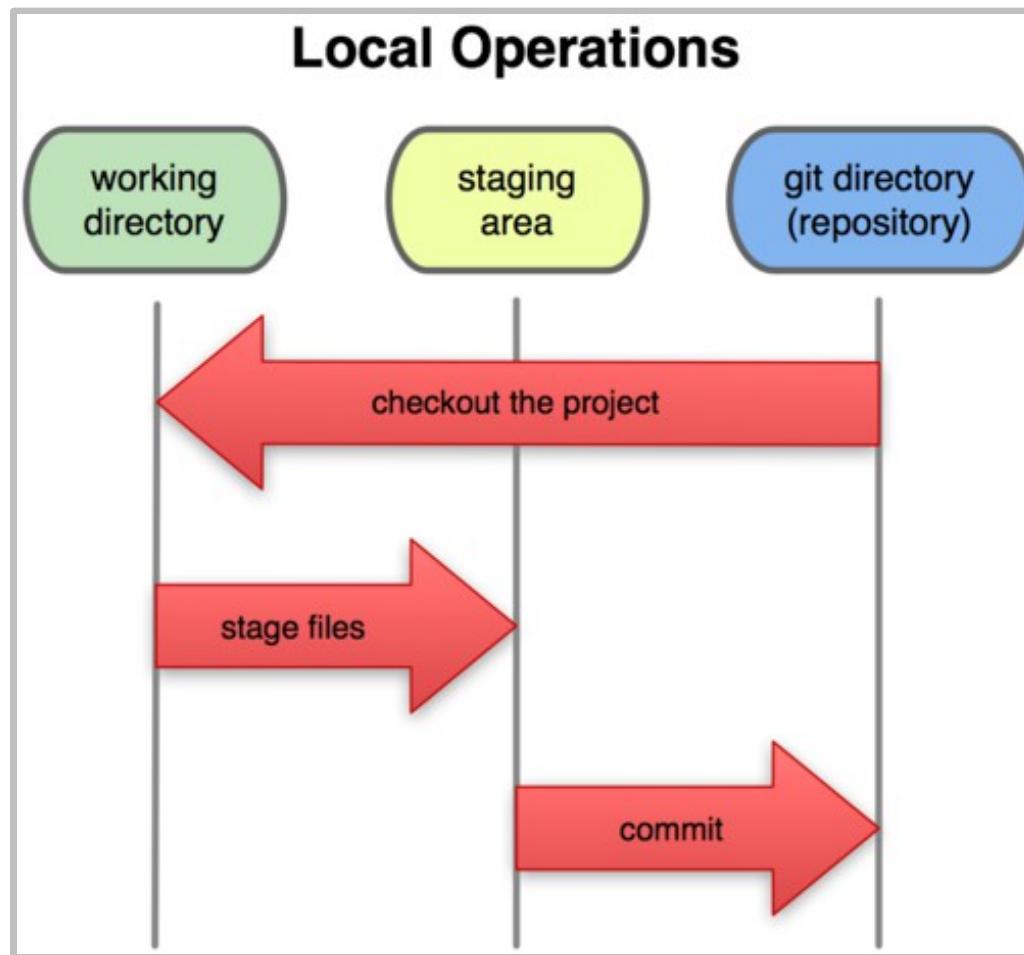
# Git: good videotutorials



# Git: history of a file system

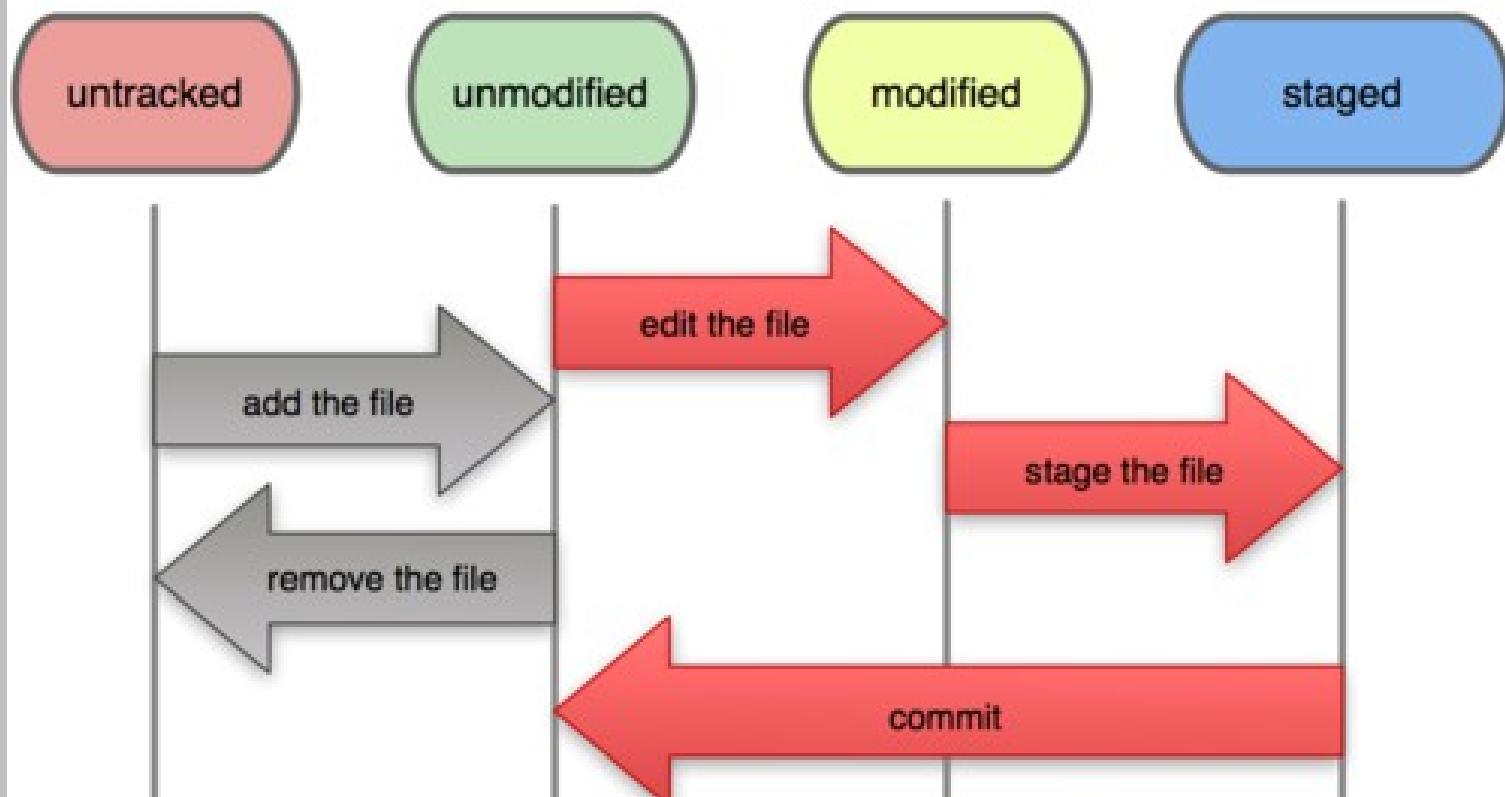


# Git: architecture

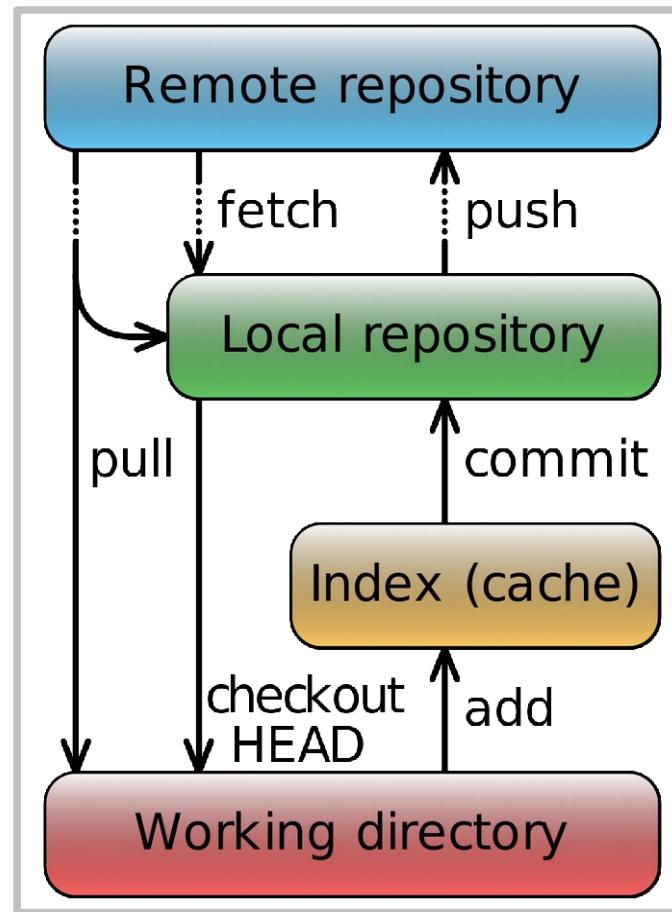


# Git: history of a file

## File Status Lifecycle



# Git: commands and architecture





Aalto University

02.

## GitHub – the easy online interface to a repository

# GitHub: a platform for open source

github Explore GitHub Search Features Blog Sign in

## Build software better, together.

Powerful collaboration, review, and code management for open source and private development projects.

Pick a username  
Your email  
Create a password  
Tip: use at least one number and at least 7 characters.  
By clicking on "Sign up for free" below, you agree to the [Terms of Service](#) and the [Privacy Policy](#).

[Sign up for free](#) See plans and pricing

 Great collaboration starts with communication.  
Review changes, comment on lines of code, report issues, and plan the future of your project with [flexible discussion tools](#).

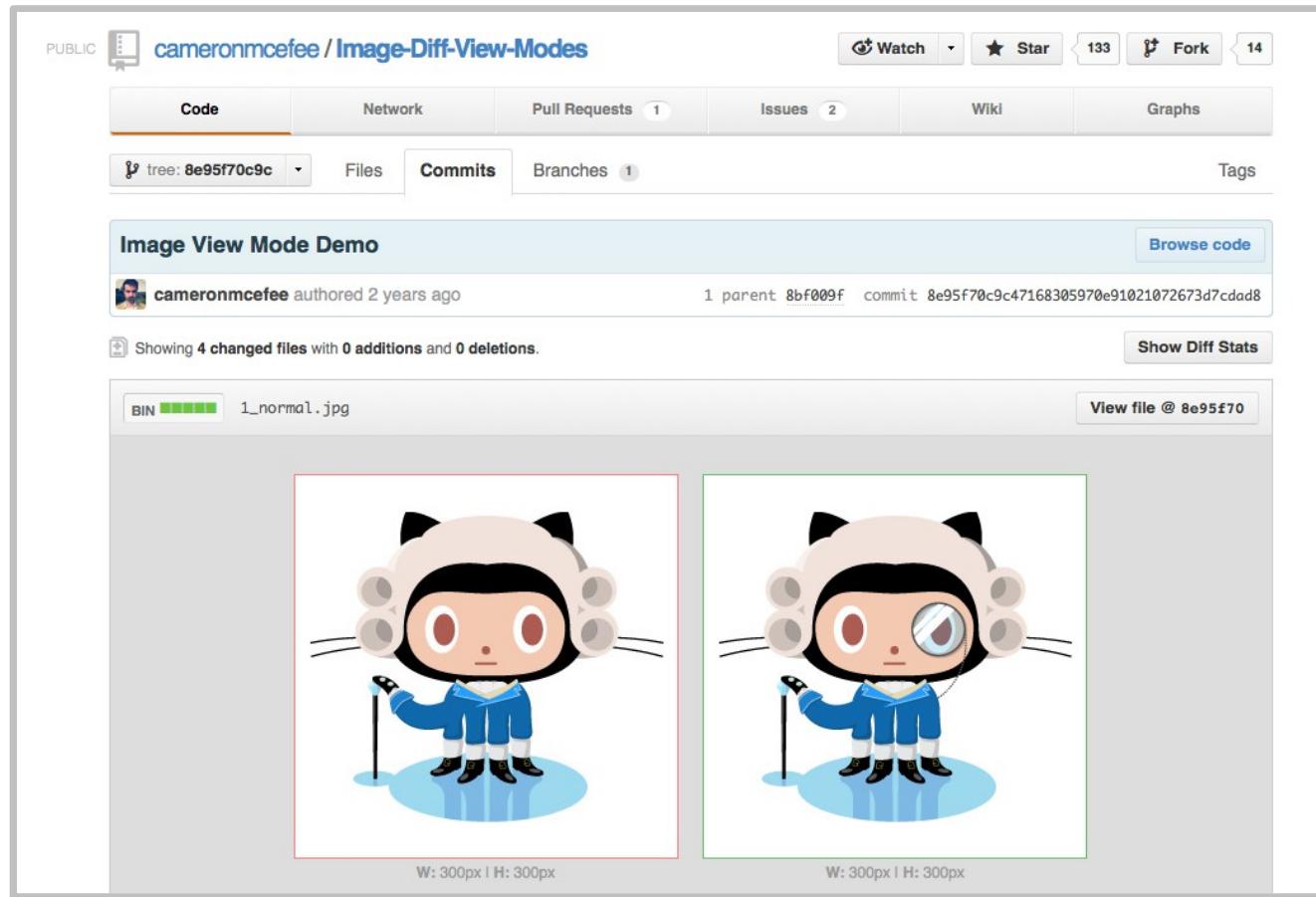
 Manage and contribute from all your devices.  
Native clients for [Mac](#), [Windows](#), and [mobile](#) devices allow you to stay involved with your projects from anywhere.

 The world's largest open source community.  
Share your code with the world and contribute to [the millions of public repositories](#) hosted on GitHub.

 Collaborate on private repositories when you [sign up for a paid individual or organization plan](#).

Source: <https://github.com/>

# GitHub: image comparison



Source: <https://github.com/cameronmcefie/Image-Diff-View-Modes/commit/8e95f70c9c47168305970e91021072673d7cdad8?diff=0=0-100>

# GitHub: good videotutorials

The screenshot shows a YouTube channel page for the user 'github'. The channel has 364 subscribers. The 'Videos' tab is selected, displaying a grid of 15 video thumbnails. Each thumbnail includes the video title, view count, and upload date. The videos are related to Git and GitHub, featuring Scott Chacon. The channel sidebar shows other GitHub-related channels like 'openp2pdesign' and 'LevelUpTuts'.

Title	Views	Upload Date
Git & GitHub Foundations • Reflog	99 views	1 month ago
History and Collaboration with Git and GitHub - A We...	146 views	1 month ago
Scott Chacon - Git Setup And Initializing - GitHub Learnin...	1,040 views	3 months ago
Scott Chacon - Git Talk	161 views	3 months ago
Scott Chacon - Git Submodules	139 views	3 months ago
Scott Chacon - Git Setup, Init, and Cloning	49 views	3 months ago
Scott Chacon - Git Intro - Ep 1 - GitHub Learning	101 views	3 months ago
Scott Chacon - Git In 30 Minutes	319 views	3 months ago
Scott Chacon - Git Casts - Branching and Merging	329 views	3 months ago
Scott Chacon - Git Casts - Basic Snapshotting	79 views	3 months ago
Scott Chacon - C9 Empty Branch	100 views	3 months ago
Scott Chacon - C8 Distributed Workflow	169 views	3 months ago
Scott Chacon - C7 Rebase	352 views	3 months ago
Scott Chacon - C4 Git Log	174 views	3 months ago
Scott Chacon - C3 Add Interactive	253 views	3 months ago

Source: [http://www.youtube.com/user/github/videos?sort=dd&tag\\_id=&view=0](http://www.youtube.com/user/github/videos?sort=dd&tag_id=&view=0)

# 02: Create a user (free plan)

The screenshot shows the GitHub 'Plans & Pricing' page. At the top left is the GitHub logo. To its right are links for 'Signup and Pricing', 'Explore GitHub', 'Features', 'Blog', and 'Sign in'. Below the header, the title 'Plans & Pricing' is displayed, followed by the subtext 'Join today and collaborate with the smartest developers in the world.' A yellow banner at the top left says '\$0/mo Free for open source' and 'Unlimited public repositories and unlimited public collaborators'. To the right of this banner is a blue button with white text that reads 'Create a free account', which is highlighted with a red rectangular box. Below the banner are three main plan categories: 'Micro' (\$7/mo), 'Small' (\$12/mo), and 'Medium' (\$22/mo). Each plan card lists repository counts and collaborator limits, followed by a 'Create an account' button. Underneath these are 'Business Plans': 'Bronze' (\$25/mo), 'Silver' (\$50/mo), 'Gold' (\$100/mo), and 'Platinum' (\$200/mo). Each business plan card includes repository counts, team counts, and public repository limits, along with a 'Create an organization' button. At the bottom of the page is a dark grey bar containing the text 'GitHub Enterprise' and 'Learn more about GitHub Enterprise ➔'. The URL 'https://github.com/plans' is visible at the very bottom of the page.

# 03: Send your username to [massimo.menichinelli@aalto.fi](mailto:massimo.menichinelli@aalto.fi)

The screenshot shows a GitHub user profile for **openp2pdesign** (Massimo Menichinelli). The profile is highlighted with a red box around the top navigation bar. The profile information includes:

- Email: info@openp2pdesign.org
- URL: http://www.openp2pdesign.org
- Member Since: Feb 21, 2012
- Followers: 7
- Starred repos: 13
- Followed users: 31

The "Public Activity" section shows recent events:

- openp2pdesign starred rogerdudler/git-guide an hour ago
- openp2pdesign starred meancet/STL-Volume-Model-Calculator 2 hours ago
- openp2pdesign pushed to master at DigitalFabricationStudio/Slides a day ago
- openp2pdesign pushed to master at DigitalFabricationStudio/Slides a day ago
- openp2pdesign pushed to master at DigitalFabricationStudio/Slides 2 days ago
- openp2pdesign pushed to master at DigitalFabricationStudio/Slides 3 days ago
- openp2pdesign pushed to master at DigitalFabricationStudio/Slides 4 days ago

The "Repositories" section lists four repositories:

- LaserCut-Badge-Generator** (Java): A Processing program that generates a set of stencil lasercut badges taking names from a csv file.... Last updated 6 days ago.
- blackout** (Java): Forked from theleagueof/blackout. A bad-ass, unhol-y-mother-shut-your-mouth stencil sans-serif. Last updated 6 days ago.
- Open-Design-Exhibition** (JavaScript): An exhibition about Open Design and Open Hardware, originally created for the Open Knowledge Fest.. Last updated 6 days ago.

Source: <https://github.com/plans>

# 04. Download Git

The screenshot shows the official Git website at <http://git-scm.com/>. At the top left is the Git logo with the tagline "fast-version-control". A search bar is located at the top right. Below the header, there's a brief introduction to Git's purpose and performance, followed by a section about its ease of learning and speed. A prominent "Try Git" button with a GitHub icon is present. To the right, a 3D-style diagram illustrates the distributed nature of Git, showing multiple repositories connected by red arrows forming a network. The main content area is divided into several sections: "About" (with a gear icon), "Documentation" (with an open book icon), "Downloads" (with a download arrow icon), and "Community" (with a speech bubble icon). On the right side, a large monitor displays the "Latest stable release" information, specifically "1.8.1.3" with a "Release Notes (2013-02-07)" link and a "Download for Mac" button.

git --fast-version-control

Search entire site...

Git is a **free and open source** distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Git is **easy to learn** and has a **tiny footprint with lightning fast performance**. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like **cheap local branching**, convenient **staging areas**, and **multiple workflows**.

 Learn Git in your browser for free with [Try Git](#).

**About**  
The advantages of Git compared to other source control systems.

**Documentation**  
Command reference pages, Pro Git book content, videos and other material.

**Downloads**  
GUI clients and binary releases for all major platforms.

**Community**  
Get involved! Mailing list, chat, development and more.

Latest stable release  
**1.8.1.3**  
Release Notes (2013-02-07)  
[Download for Mac](#)

## 05. Setup Git

```
Open-Design-Definition — bash — 124x27
```

```
massimo$ git config --global user.name "Massimo Menichinelli"  
massimo$ git config --global user.email "info@openp2pdesign.org"  
massimo$
```



# 06. Download a client: an easy client for Mac

The screenshot shows the GitHub for Mac website. At the top, there's a banner for OS X 10.7+ with a download button for the latest version (Core Charles — September 5th 2012). Below the banner, the main heading is "Introducing GitHub for Mac" with the subtext "The easiest way to share your code with GitHub". A large orange "Download GitHub for Mac" button is prominently displayed. Below the button, it says "Free to download, free to use". The navigation bar includes "Overview", "Help", and "Release Notes". A list of features with checkmarks follows: "Clone repositories", "Browse history", "Commit changes", "Branch code", and "Share code on github.com". The main content area features a quote: "At GitHub, we think that sharing code should be as simple as possible. That's why we created GitHub for Mac." Below this, three screenshots demonstrate the software's functionality: "Synchronize branches", "Clone repositories in one click", and "Powerfully simple branching".

At GitHub, we think that sharing code should be as simple as possible.  
That's why we created GitHub for Mac.

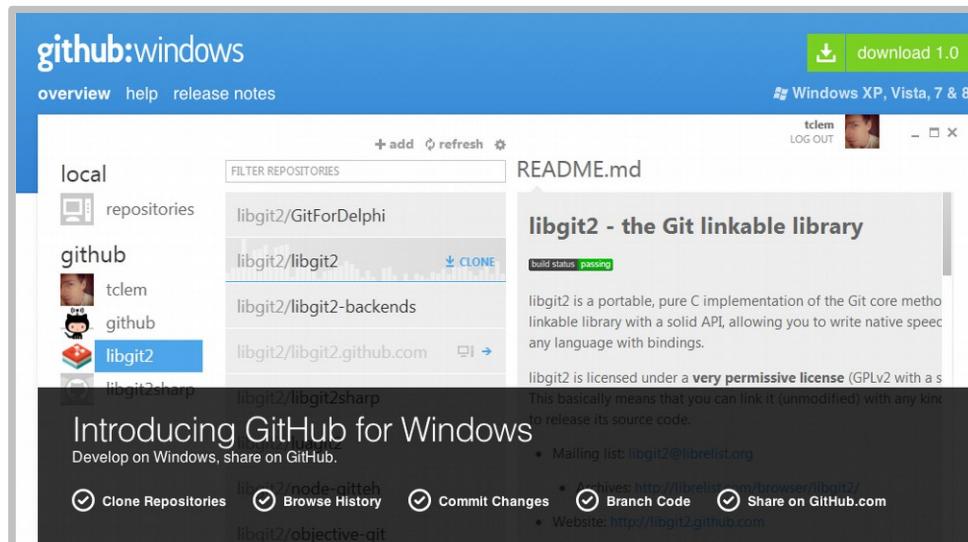
**Synchronize branches**  
The sync button pushes your changes to GitHub and pulls down other's changes in one operation, letting you quickly share local

**Clone repositories in one click**  
When you add repositories to GitHub for Mac, we automatically match them up with any organizations you belong to. Want to pull down

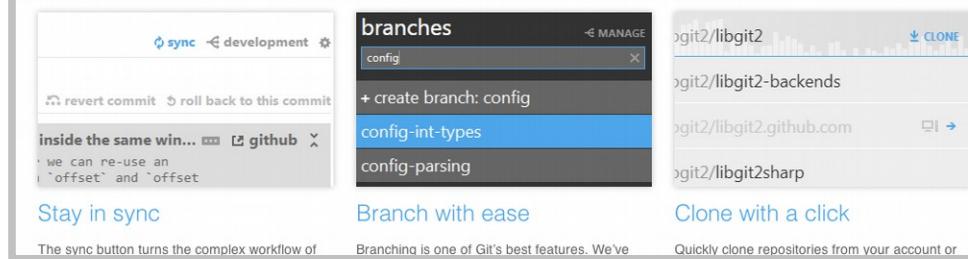
**Powerfully simple branching**  
Branching is one of Git's best features. We've made it easy to try out remote branches, create new local branches and publish

Source: <http://mac.github.com/>

# 06. Download a client: an easy client for Windows



The easiest way to use Git on Windows. Period.



Source: <http://windows.github.com/>

# 06. Download a client: an easy client for Eclipse

The screenshot displays the GitHub for Eclipse interface. At the top, there's a banner with the text "Develop with Git in Eclipse, Share and discuss on GitHub". Below this, a button says "Download Git & GitHub for Eclipse" and "Free to download, free to use.". To the right, a "Git Repositories" view shows several repositories like "bootstrap", "hubot", and "jquery". A specific commit in the "jquery" repository is highlighted, showing details such as "Issue 6289", "model.association.delete", and "Reporter Status: open Created: May 12, 2013".

Below the main view, there's a "Feature Tour" section with three cards:

- Commit Changes**: "See your uncommitted changes and easily compare, commit, or undo them."
- Track Edits**: "See why, when, and by whom each line of a file was last changed."
- Browse History**: "Visualize commits over time and quickly see which branches have been merged."

# Aptana: my suggestion for Eclipse

The screenshot displays the official website for Aptana Studio 3. At the top, there's a navigation bar with links for PRODUCTS, SUPPORT, NEWS, and CONTRIBUTE, along with a search bar. Below the navigation is a large image of the Aptana Studio 3 interface, which includes an App Explorer, Project Explorer, Terminal window showing code, and an Outline view. To the right of the interface, there's a promotional text for Aptana Studio 3, a 'DOWNLOAD' button with a download icon, and a counter showing 6144497 DOWNLOADS. Below the main image, there's a section titled 'Developers Wanted' with a Twitter feed from the @noamcb account. The feed contains three tweets about Aptana Studio 3. To the right of the feed is another section for 'Titanium' development, featuring a download button and a note about building native mobile apps for iOS, Android, and Cloud-connected mobile devices. The overall theme is dark with orange and white accents.

aptana

PRODUCTS SUPPORT NEWS CONTRIBUTE Search

App Explorer Project Explorer

Sample1 [ master ]

\_advertisements

index.htm

Event.stop();  
Event.stopPropagation();  
},  
activate: function(  
if(draggable){  
this.\_timeo  
Draggable;  
window.fo  
Draggable;  
}.bind(this);  
} else {  
window.focus  
this.activet  
},  
},  
147:  
148:  
149:  
150:  
151:  
152:  
153:  
154:  
155:  
156:  
157:  
158:  
159:  
160:  
161:  
162:  
163:  
164:

Outline

Droppables

remove(element)

Aptana Studio 3

The world's most powerful open-source web development IDE just got better. Rebuilt from the ground-up. It's now much faster, customizable and includes new features to help you be more productive. [Learn more.](#)

DOWNLOAD APTANA STUDIO 3

6144497 DOWNLOADS

APTANA ON TWITTER

Aptana: @noamcb Yes. You need to uninstall PyDev and re-install Aptana 7m

Aptana: @theDylanBarth That should have been fixed long ago. If you have a reproducible test case, please file a bug and we'd be happy to look. 7m

Aptana: @theDylanBarth Check Commands > Source > Comments for associated key commands 7m

Aptana: @theDylanBarth Thanks! What kind of commenting shortcut? 7m

Developers Wanted

Aptana Studio 3 expands on the core capabilities of Aptana Studio 2 for building, editing, previewing and debugging HTML, CSS and JavaScript websites with PHP and Ruby on Rails web development. [Download now.](#)

DOWNLOAD Titanium

Titanium helps you build native mobile apps for iOS, Android and Cloud-connected mobile devices.

Aptana Acquired by Appcelerator

Source: <http://www.aptana.com/>

# 06. Download a client: SourceTree



# 06. Download a client: GitX(L)

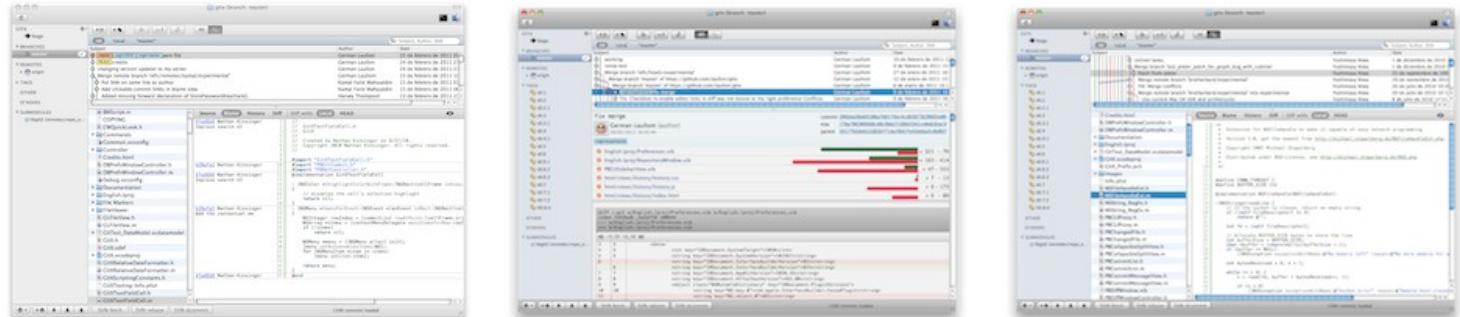


## GitX (L)

Open Source Mac OS X Git client

[Download GitX \(L\) v0.8.4](#)

[License GPL v2](#)



**Commit view**

- Commit/Parents/Tree SHA links
- File changes counts
- File Diffs
- Commit Tags and Refs

**File view**

- Source Code Highlight
- Blame
- File History (log)
- Diff with local and HEAD

**Sidebar**

- Branches
- Remotes
- Stashes
- Submodules

**Stage view**

- Unstaged/Staged files
- Stage/Discard by lines
- Amend
- File diff

# Git, a simple guide...

## git - the simple guide

just a simple guide for getting started with git. no deep shit ;)



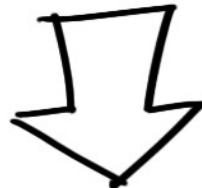
by Roger Dudler

credits to @tfnico, @fhd and Namics

this guide in deutsch, español, français, italiano, nederlands, português, русский, тürkçe,

ไทย, 日本語, 中文, 한국어

please report issues on [github](#)



# On GitHub itself ;)

The screenshot shows a GitHub repository page for 'rogerdudler / git-guide'. The repository is public and has 488 stars, 100 forks, and 6 pull requests. The 'Code' tab is selected. A note at the top says 'git - the simple guide — [Read more](#)' with a link to <http://rogerdudler.github.com/git-guide>. Below this are download options: 'Clone in Mac', 'ZIP', 'HTTP', 'Git Read-Only', and the URL 'https://github.com/rogerdudler/git-guide.git'. A 'Read-Only access' button is also present. The commit history table shows the following commits:

name	age	message	history
css	8 months ago	comment text align changed to left [rogerdudler]	<a href="#">View</a>
files	8 months ago	added cheat sheet [rogerdudler]	<a href="#">View</a>
img	8 months ago	added cheat sheet [rogerdudler]	<a href="#">View</a>
js	8 months ago	initial work [rogerdudler]	<a href="#">View</a>
.gitignore	7 months ago	Simplified chinese version complete [dotnil]	<a href="#">View</a>
README.md	7 months ago	use markdown as the readme syntax [dotnil]	<a href="#">View</a>
index.de.html	a month ago	[UPD] translated to turkish [mcka]	<a href="#">View</a>
index.es.html	a month ago	[UPD] translated to turkish [mcka]	<a href="#">View</a>
index.fr.html	a month ago	[UPD] translated to turkish [mcka]	<a href="#">View</a>

Source: <https://github.com/rogerdudler/git-guide>

# 07. Learn Markdown

The screenshot shows the Daring Fireball website with a dark gray background. At the top left is the site's logo, a white star inside a circle. To its right is the text "DARING FIREBALL". Below the logo, there are two lines of text: "By JOHN GRUBER" and "Markdown: Syntax". On the left side, there is a sidebar with links: ARCHIVE, MEMBERSHIP, PROJECTS, CONTACT, COLOPHON, RSS FEED, and SPONSORSHIP. On the right side, under the heading "Markdown: Syntax", is a navigation bar with five items: Main, Basics, Syntax (which is highlighted), License, and Dingus. Below the navigation bar is a list of sections and their sub-links:

- Overview
  - [Philosophy](#)
  - [Inline HTML](#)
  - [Automatic Escaping for Special Characters](#)
- Block Elements
  - [Paragraphs and Line Breaks](#)
  - [Headers](#)
  - [Blockquotes](#)
  - [Lists](#)
  - [Code Blocks](#)
  - [Horizontal Rules](#)
- Span Elements

Source: <http://daringfireball.net/projects/markdown/syntax>  
<http://en.wikipedia.org/wiki/Markdown>

# 07. Learn GitHub Markdown

The screenshot shows a web browser displaying the GitHub Flavored Markdown documentation. The title "githubflavoredmarkdown" is at the top left. At the top right are "Support" and "Back to GitHub" buttons. Below the title, there's a section titled "Introduction to GFM". It contains text about GFM's differences from standard Markdown, links to source and result examples, and a note about Redcarpet. To the right is a "Markdown Cheat Sheet" sidebar with instructions to press M for a cheat sheet. The main content then discusses "Differences from traditional Markdown", specifically "Newlines" and "Multiple underscores in words".

**githubflavoredmarkdown**

Support | Back to GitHub

## Introduction to GFM

Github uses what we're calling "GitHub Flavored Markdown" (GFM) for messages, issues, and comments. It differs from standard Markdown (SM) in a few significant ways and adds some additional functionality.

If you're not already familiar with Markdown, you should spend 15 minutes and go over the excellent [Markdown Syntax Guide](#) at Daring Fireball.

If you prefer to learn by example, see the following source and result:

- [Source](#)
- [Result](#)

If you're interested in how we render Markdown files, you might want to check out [Redcarpet](#), our Ruby interface to the [Sundown](#) library.

## Differences from traditional Markdown

### Newlines

The biggest difference that GFM introduces is in the handling of linebreaks. With SM you can hard wrap paragraphs of text and they will be combined into a single paragraph. We find this to be the cause of a huge number of unintentional formatting errors. GFM treats newlines in paragraph-like content as real line breaks, which is probably what you intended.

The next paragraph contains two phrases separated by a single newline character:

Roses are red  
Violets are blue

becomes

Roses are red Violets are blue

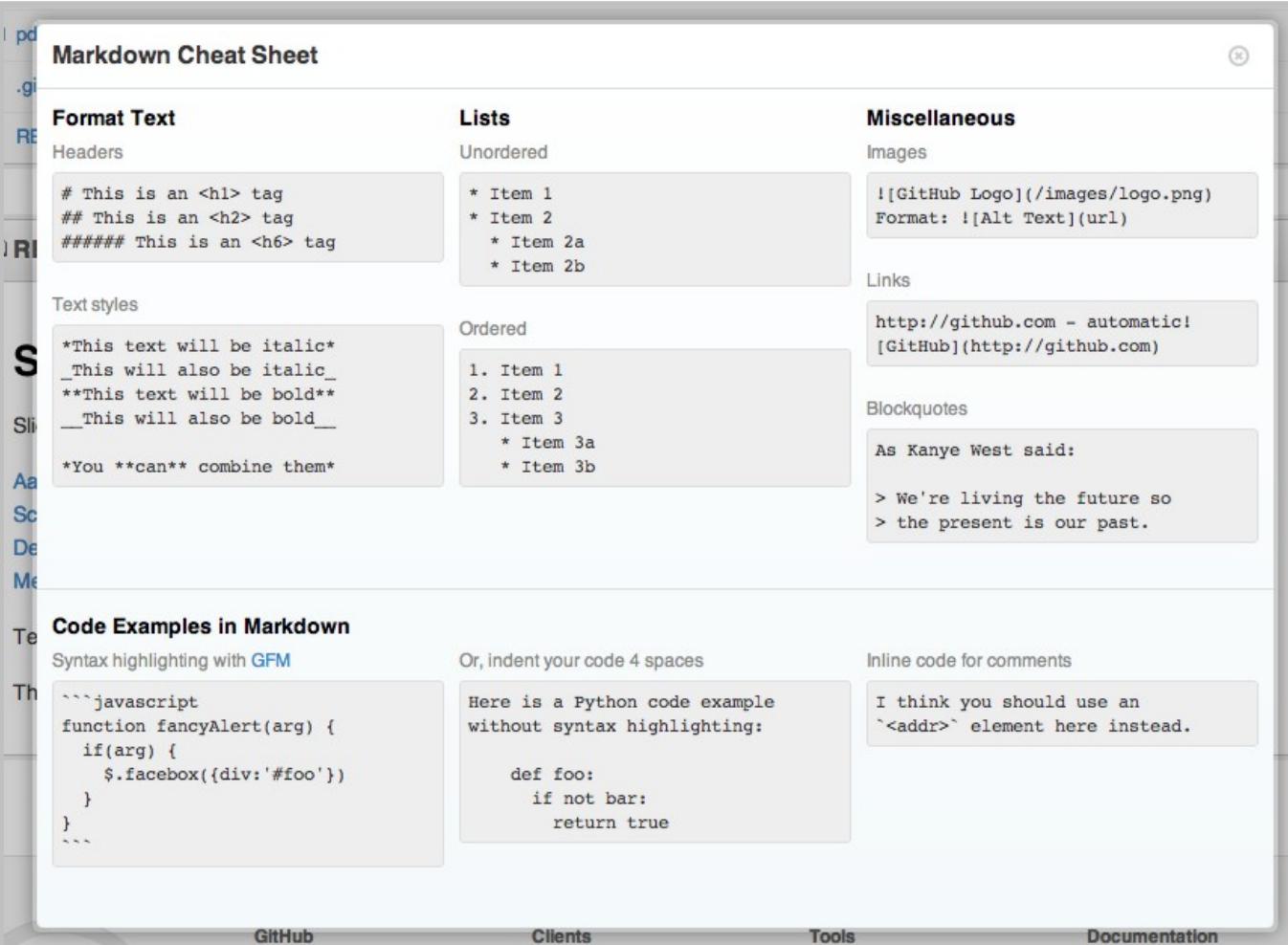
### Multiple underscores in words

It is not reasonable to italicize just *part* of a word, especially when you're dealing with code and names often appear with multiple underscores. Therefore, GFM ignores multiple underscores in words.

Markdown Cheat Sheet

On Markdown-enabled portions of the site, press M on your keyboard to display a cheat sheet.

# 07. Learn GitHub Markdown



The screenshot shows the GitHub Markdown Cheat Sheet, a guide to using GitHub's flavor of Markdown. It is organized into several sections:

- Format Text**:
  - Headers**:

```
# This is an <h1> tag
## This is an <h2> tag
##### This is an <h6> tag
```
  - Text styles**:

```
*This text will be italic*
_This will also be italic_
**This text will be bold**
__This will also be bold__

*You **can** combine them*
```
- Lists**:
  - Unordered**:
    - \* Item 1
    - \* Item 2
    - \* Item 2a
    - \* Item 2b
  - Ordered**:
    1. Item 1
    2. Item 2
    3. Item 3
      - \* Item 3a
      - \* Item 3b
- Miscellaneous**:
  - Images**:

```
![GitHub Logo](/images/logo.png)
Format: ! [Alt Text] (url)
```
  - Links**:

```
http://github.com - automatic!
[GitHub](http://github.com)
```
  - Blockquotes**:

```
As Kanye West said:

> We're living the future so
> the present is our past.
```
  - Inline code for comments**:

```
I think you should use an
`<addr>` element here instead.
```
- Code Examples in Markdown**:
  - Syntax highlighting with GFM**:

```
```javascript
function fancyAlert(arg) {
  if(arg) {
    $.facebox({div:'#foo'})
  }
}
```
```
  - Or, indent your code 4 spaces**:

```
Here is a Python code example
without syntax highlighting:

def foo:
  if not bar:
    return true
```
  - Inline code for comments**:

```
I think you should use an
`<addr>` element here instead.
```

# 07a. Convert text to Markdown

## Try Pandoc!

Type in this box and  from  to

```
# Pandoc
```

Pandoc is a program for converting between various markup formats. Input formats include markdown, reStructuredText, HTML, and LaTeX; output formats include HTML, LaTeX, ConTeXt, S5, DocBook, groff man, reStructuredText, markdown, and RTF. Many extensions to standard markdown syntax are provided, including inline LaTeX math, tables, definition lists, superscripts and subscripts, smart quotes and dashes, and footnotes. Pandoc is written in Haskell. To find out more about pandoc, visit [the pandoc home page].

```
[the pandoc home page]: /pandoc  
[Haskell]: http://haskell.org
```

Result:

```
<h1 id="pandoc">Pandoc</h1>  
<p>Pandoc is a program for converting between various markup formats. Input formats include markdown, reStructuredText, HTML, and LaTeX; output formats include HTML, LaTeX, ConTeXt, S5, DocBook, groff man, reStructuredText, markdown, and RTF. Many extensions to standard markdown syntax are provided, including inline LaTeX math, tables, definition lists, superscripts and subscripts, smart quotes and dashes, and footnotes. Pandoc is written in Haskell. To find out more about pandoc, visit the pandoc home page.
```

## Pandoc

Pandoc is a program for converting between various markup formats. Input formats include markdown, reStructuredText, HTML, and LaTeX; output formats include HTML, LaTeX, ConTeXt, S5, DocBook, groff man, reStructuredText, markdown, and RTF. Many extensions to standard markdown syntax are provided, including inline LaTeX math, tables, definition lists, superscripts and subscripts, smart quotes and dashes, and footnotes. Pandoc is written in Haskell. To find out more about pandoc, visit [the pandoc home page](#).

# 07a. Convert text to Markdown

The screenshot shows the "online demo" page of the Markdownify website. At the top left is the Markdownify logo, which includes a yellow speech bubble with the text "Markdownify" and a blue code editor icon. To the right of the logo is the title "Markdownify: The HTML to Markdown converter for PHP". Below the title are several icons: a question mark, a motorcycle, a box labeled "TGZ", a hard hat, and a server. To the right of these icons are links to "about Markdownify", "online demo", "download", "bug tracker", "sourcecode", and "project page on SF.net". Further to the right is a "PayPal Donate" button.

**online demo**

**Input**

**Options**

- Markdownify Extra:
- output link definitions after each block element:
- keep HTML Tags:

For support of [PHP Markdown Extra](#) features like definition lists and tables please select [Markdownify Extra](#).

Addresses and titles of links are displayed at the end of the generated Markdown document. To disable this default behaviour activate *output link definitions after each block element*.

If you want to ignore non markdownable HTML tags deactivate *keep HTML Tags*.

[convert to Markdown!](#)



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03.

**Exercise:**

**Create a repository, create your bio with your picture inside it. Try it with Git and with the GitHub client.**





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04.

**Exercise:**

Create a branch, add a picture to your bio. Merge the branch with the master.



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# Thank you!!

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