Git Command Reference Guide

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Basic Git Commands

git init # Initialize a new Git repository

git clone <url> # Clone a remote repository

git status # Show current status of working directory

git add <file> # Stage a file

git add . # Stage all changes

git commit -m "message" # Commit staged changes with a message

git log # View commit history

git diff # Show changes not yet staged

git diff --staged # Show staged changes

Remote Repositories

git remote -v # List remote connections git remote add origin # Add a remote repository git push -u origin master # Push changes and set upstream git pull # Fetch and merge changes from remote git fetch # Download changes without merging

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 Branching & Merging

git branch # List branches git branch # Create a new branch git checkout # Switch to a branch git checkout -b # Create and switch to a new branch git merge # Merge a branch into current branch git branch -d # Delete a branch

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git checkout <name> # Switch to a branch

git checkout -b <name> # Create and switch to a new branch

git merge <branch> # Merge a branch into current branch

git branch -d <name> # Delete a branch

 Undoing Changes

git reset # Unstage a file git reset --hard # Reset all changes (dangerous!) git checkout -- # Discard changes in a file git revert # Create a new commit that undoes a previous one

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git revert <commit> # Create a new commit that undoes a previous one

 Stashing

git stash # Save changes temporarily git stash list # View stashed changes git stash apply # Reapply stashed changes git stash drop # Delete a stash

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Tagging

git tag # List tags git tag # Create a new tag git push origin # Push a tag to remote

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git tag <tagname> # Create a new tag

git push origin <tagname> # Push a tag to remote

Advanced Tools

git config --global user.name "Your Name" # Set username git config --global user.email "you@example.com" # Set email git reflog # Show history of HEAD git cherry-pick # Apply a specific commit git bisect # Binary search for bugs

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Repo Hygiene

git clean -f # Remove untracked files git gc # Optimize repository

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A Comprehensive Guide to Essential Git Operations and Workflows: Daily, Weekly, Monthly, and Yearly Maintenance, Best Practices, and Team Strategies

Introduction

Git has become the backbone of modern software development, facilitating not only version control for individual developers but also robust collaboration, code integration, and automation in teams of every scale. However, simply using Git is not enough to guarantee a healthy, maintainable repository or a streamlined team workflow. Over time, as repositories grow and teams scale, neglecting regular Git operations and best practices

can lead to bloated repos, merge conflicts, technical debt, and significant productivity loss.

To help both individuals and organizations keep their Git usage effective and sustainable, this guide presents a structured, time-based approach. We map out **essential Git operations, maintenance routines, best practices, and advanced workflow strategies** across daily, weekly, monthly, and yearly cycles. This framework is designed to mitigate typical pitfalls, promote repository health, and foster high-performing team collaboration, regardless of your project size or development model.

Each time frame (daily, weekly, monthly, yearly) also includes commands, scripts, automation examples, and proven team strategies. The guide draws on a synthesis of expert sources, mainstream engineering blogs, the latest official Git documentation, and real-world case studies from established companies and open-source projects.

Table: Summary of Key Git Operations Across Timeframes

Timeframe	Essential Operations	Key Commands & Tools	Typical Goals
Daily	Status checks, commits, pushes, pulls, rebases, short-lived feature branching, reviewing/creating PRs, code reviews, semantic commit messages	`git status`, `git add`, `git commit`, `git push`, `git pull / rebase`, branch commands, PR tools; commit-msg hooks	Clean commit history, fast feedback, maintain code quality, avoid work loss
Weekly	Branch cleanup & merge, stash management, pruning remotes, resolving conflicts, team syncs, small refactors, maintenance scripts	`git branch -d`, `git branch --merged`, `git remote prune`, `git stash`, `git merge`, CI reports, linting/formatting hooks	Repository hygiene, reduction of technical debt, eliminate dead code, enforce code standards
Monthly	Repo maintenance (gc, repack, cleanup), tag releases, update docs, dependency audits, security scans, overhaul automation hooks/scripts, analyze CI pipeline	`git gc`, `git repack`, `git tag`, `git log`, custom maintenance scripts, security tools	Optimize performance, strengthen stability, prepare for releases, ensure compliance
Yearly	Deep repository audits, archival, migration reviews, re-visit team workflows, major upgrades, contribution benchmarks, governance & policy reviews	`git archive`, `git bundle`, audit scripts, codebase visualization tools, review workflows & templates	Long-term stability, reduce legacy overhead, strategic direction, policy alignment

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Daily Git Tasks and Best Practices

Core Daily Operations

For most developers and small teams, daily Git activity sets the rhythm for the codebase. Typical daily tasks include:

- **Checking project status:** Ensure you understand your working directory, staging area, and commit history using git status, git diff, and git log
- **Staging, committing, and pushing changes:** Stage changes carefully with git add . or specific files, write semantic commit messages, and push to the relevant branch (git commit -m "type: subject" and git push)
- **Pulling/rebasing from remote:** Regularly update your local repository by pulling changes and rebasing feature branches to minimize merge conflicts (git pull --rebase, git fetch + git rebase origin/main)
- **Working in branches:** Create short-lived feature or fix branches using git checkout -b feature/xyz, keeping each branch focused
- **Reviewing and submitting pull requests:** For collaborative environments, submit PRs early, review teammates' code, and respond to feedback promptly
- **Syncing with team:** Use tools and channels (Slack, email, stand-ups) to coordinate daily priorities, especially when collaborating on overlapping areas

Key best practices:

- **Keep commits small and focused**: Each commit should reflect a single logical change, aiding code review and revertability
-

 Write semantic, descriptive commit messages: Adopt the Conventional Commits or similar approach, e.g. feat(login): add Google login option or fix(api): correct user ID parsing error

- **Always pull or rebase before push**: Fetch team changes frequently to prevent drift and avoid painful merge conflicts
- **Use feature branches—never commit directly to main/master** unless publishing a hotfix
- **Review before you commit**: Use staging area (git add -p, git diff --staged) to avoid accidentally including unrelated or unfinished changes

Automated reminders and checks:

- **Configure Git hooks for local CI/CD or reminders**. Example: A pre-commit hook script to ensure no TODO comments are committed (see Sling Academy Guide):

```
#!/bin/sh
if git grep --cached -q 'TODO'; then
  echo "Your commit contains TODO comments. Resolve them before committing."
  exit 1
fi
```

- **Pre-commit linting**: Integrate tools like pre-commit or ESLint/Black for style, and static checks—a must for teams
- **Automated task management in Git**: Some teams keep daily goals and progress within tracked files (e.g., `tasks.md`), committed alongside code

Daily Command Reference Table

Task	Example Command / Usage	Notes
Check status	`git status`	Shows changes, branch, conflicts, etc.
Stage changes	`git add file1.py`, `git add .`	Use selectively for clarity

Task	Example Command / Usage	Notes
Commit with message	`git commit -m "fix(user): validate input"`	Use semantic message convention
View history	`git log --oneline`, `git log --stat`	For concise or detailed views
Check diff before commit	`git diff` (unstaged), `git diff --staged`	Avoid accidental commits
Push to remote	`git push origin feature/bug-123`	Keep branches focused and up to date
Fetch/rebase from remote	`git fetch` + `git rebase origin/main`	Avoids merge commits on feature branches
Create/switch branch	`git checkout -b feat/new-search`	Use descriptive, consistent naming
Submit/review pull request (PR)	via GitHub/GitLab UI or CLI	Provide clear description and context
Stash local work (if switching context)	`git stash`	Retrieve with `git stash pop`

Daily best practices are the foundation of effective, healthy repositories and ensure quick feedback, high code quality, and minimal headache for you and your team.

Weekly Git Operations and Cleanup

Workflow Focus

Weekly intervals are ideal for "hygiene" tasks in a developer's and team's workflow—cleaning up cruft, tidying branches, and making sure collaboration standards are met. For many projects, this is the rhythm for regular sprints, merges, CI/CD checks, and team retrospectives.

Key weekly tasks:

- **Review and clean up local/remote branches:** Delete merged or stale branches both locally and remotely. Use git branch --merged and git branch -d . For remote, git push origin --delete
- **Prune stale remotes:** Remove remote-tracking branches that have been deleted on the remote server: git fetch --prune or git remote prune origin
- **Manage stashes:** Clean up old stashes with git stash list and git stash drop
- **Merge back long-lived feature branches:** Don't let branches drift—merge/rebase into main or integration/develop branch after code review

- **Resolve merge/pr review conflicts:** Weekly is typical for addressing merge blockers, revising PRs, and closing out work-in-progress branches
- **Run and review CI builds, team code standards**
- **Refactor or pay small technical debts:** Weekly time-boxed effort for small refactors, migration of deprecated APIs, or improving code readability
- **Enforce small, frequent PRs, and pull request review best practices**
- Weekly Command Reference Table

Task	Command/Action	Notes
List merged local branches	`git branch --merged`	Exclude main/develop
Delete merged local branch	`git branch -d branchname`	Only when safely merged
Force delete (unmerged) local branch	`git branch -D branchname`	Use with caution
List remote branches merged into `main`	`git branch -r --merged main`	For remote cleanups
Delete remote branch	`git push origin --delete branchname`	Prune after merging
Prune obsolete remote-tracking branches	`git fetch --prune` or `git remote prune origin`	Syncs with actual state of the remote
Visualize branch/merge structure	`git log --graph --oneline --all`	Useful for team retrospectives
Stash list/clean	`git stash list`, `git stash drop @{n}`	Clear out old stashes
Review/merge PRs	GitHub/GitLab/Bitbucket UI or CLI	Merge, squash, or rebase as needed
Tidy up with scripts/aliases	See custom scripts in DEV guides][14,16]	Run as weekly cron/CI jobs

Essentials for automated or repeat cleanup:

- **Scripts for deleting local/remote merged branches automatically** (see examples][15]):

  # Bash: Delete all merged branches except main/develop git branch --merged main | egrep -v "(^*|main|develop)" | xargs git branch -d

- **Automate at organization scale:** Use CI/CD or GitHub Actions, or tools like GitHub Maintenance Action][43] for scheduled clean-up (artifacts, old runs, logs, etc.)

Monthly Git Maintenance Routines

Deep Maintenance for Repository Health

Monthly maintenance ensures long-term repository integrity, performance, and readiness for releases. This interval suits larger, more expensive operations and process reviews that are less urgent than daily tasks but are vital to keeping a healthy version control ecosystem.

Key monthly operations:

- **Repository garbage collection and optimization:** Run git gc and/or use git maintenance run --task=gc to clean up dangling objects, optimize packs, and reclaim disk space
- **Repacking objects for efficiency:** Use git repack, especially for large projects. For a more aggressive repack:

git repack -a -d --depth=50 --window=250

 (Use with caution on large/active repos—only after team consensus)

- **Run maintenance tasks via scheduled automation:** Use git maintenance start to set up periodic jobs. On POSIX systems, this configures cron jobs; on Windows, Task Scheduler is used. Tasks include commit-graph, incremental repacks, prefetch, loose-objects, etc.
- **Review and rotate tags/releases:** Create or annotate release tags using git tag -a vX.Y.Z -m "Release vX.Y.Z"; prune old or unused tags if unnecessary
- **Review/update automation scripts, CI/CD configs, and Git hooks:** Update security checks, integrate new static analysis tools, or rotate credentials/secrets
- **Audit project dependencies for updates:** Regularly update dependency manifests, use tools like npm audit or pip-audit if applicable
- **Update documentation and knowledge sharing artifacts**
- **Run organization-wide compliance or security scans:** Especially for regulated industries; monthly reviews can catch supply chain vulnerabilities sooner

Monthly Maintenance Command Table

Task/activity	Sample Command/Tool	Details/Considerations
Garbage collection	git gc	Cleans up unreferenced objects
Aggressive repack	git repack -a -d --depth=50 --window=250	For big cleanups; see StackOverflow][21]
Trigger scheduled maintenance	git maintenance run --task=gc	Preferable over raw git gc
Start periodic maintenance	git maintenance start	Automates gc, repack, prefetch, etc.
Annotate release	git tag -a v1.2.3 -m "Release v1.2.3"	Useful for version tracking
List outdated dependencies	Depends on lang/package (e.g., npm outdated)	Schedule audits in CI

Example: Setting up monthly scheduled git maintenance

git maintenance start --scheduler=auto

This will automatically schedule tasks for hourly, daily, weekly intervals: hourly (commit-graph, prefetch), daily (loose-objects, repack), weekly (pack-refs, gc if enabled)

Automating Monthly Audits

- **In CI (GitHub Actions):** Schedule with cron:

on: schedule: - cron: "0 0 1 * *" # First day of month jobs: maintenance: runs-on: ubuntu-latest steps: - name: Run git maintenance run: git maintenance run

-

on:

schedule:

- cron: "0 0 1 * *" # First day of month

jobs:

maintenance:

runs-on: ubuntu-latest

```
steps:
  - name: Run git maintenance
    run: git maintenance run
```

Yearly Repository Health and Strategic Operations

Deep Cleans, Policy Revisions, and Governance

Yearly attention is essential for sustainability. This is the time to review not just technical debt but also policies, workflows, strategic alignment, and long-term health of code assets. Some tasks are disruptive or time-consuming and are best done infrequently.

Yearly essentials:

- **Full repository audit:** Analyze repo size, object count, commit/branch history, and long-term artifact accumulation. Consider if a migration, split, or archiving is needed
- **Archiving old/unmaintained projects:** Use git archive to create a tar or zip snapshot of a state or branch (git archive --format=tar.gz -o repo-backup.tar.gz HEAD)
- **Migrate or restructure repositories as needed:** For legacy projects, perform history rewrites, split out monoliths, or merge projects if workflow dictates
- **Revisit and revise team strategies:** Review the effectiveness of branching, merging, and release labeling strategies—update PR processes and policies for growing team needs
- **Major dependency or language upgrades:** Plan version jumps, EG. Python 2 → 3 migration, or switch build/deploy tools
- **Large-scale maintenance or housecleaning scripts:** Remove vestigial branches, prune orphaned tags, delete outdated workflow artifacts at scale
- **Team and governance reviews:** Evaluate code ownership, reviewer responsibility, permissions, and contributor benchmarks
- **Long-term compliance and backup audits:** Ensure off-site or cold storage backups exist; review disaster preparedness

- **Contribution benchmarks & health checks:** Analyze commit/PR metrics, review bottlenecks, and adoption of new tools

Yearly Command & Strategy Table

Task	Command/Activity	Notes
Archive repo (for backup)	git archive --format=zip -o myrepo.zip HEAD	Use before unmaintained status
Bundle repo for migration	git bundle create repo.bundle --all	Transfer with full history
Audit repo metrics	Custom scripts, git count-objects -v	Review largest files/commits/branches
Review hook/scripts, rotate secrets	Review .git/hooks, .github//CI configs	Update or rotate out-of-date scripts
Analyze PR cycle times, bottlenecks	Use GitHub API, internal BI tools	Yearly reports drive process improvement

Git Maintenance Commands, Scheduling, and Automation Approaches

Using git maintenance for Automated Upkeep

Git's newer git maintenance features allow for automated cleanup, background optimization, and configurable scheduling of key tasks.

Common git maintenance Operations

- **start:** Register the current repo for background maintenance
    - git maintenance start
- **run:** Manually trigger tasks now, e.g. git maintenance run --task=gc
- **register/unregister:** Add/remove a repo from the global set of maintained repositories
- **stop:** Halt background maintenance
- **Scheduler:** Set up when tasks run: --scheduler=auto|crontab|systemd-timer|launchctl|schtasks

- **Custom Configs:** Define which tasks run and at what frequency via .git/config or global settings
- **Typical Task Schedule (incremental strategy, default):**

Task	Default Frequency	Function
commit-graph	hourly	Update commit-graph for fast history queries
prefetch	hourly	Prefetch remotes to speed up fetch/pull
loose-objects	daily	Repack loose objects for efficiency
incremental-repack	daily	Gradually consolidate packs
pack-refs	weekly	Optimize reference storage
gc	disabled by default	Aggressive, only as needed

- **Examples:**
- git maintenance start # enable automatic, platform-specific schedule git maintenance run --task=gc # force GC now git config --global maintenance.strategy incremental # set recommended pattern git config maintenance.gc.enabled true # enable weekly GC if necessary
- **For CI/CD and cloud environments**, use scheduled jobs (e.g., GitHub Actions, Jenkins, Azure DevOps) paired with `git maintenance run`, as outlined above, to automate monthly or yearly deep cleans

Advanced Git Hooks: Automated Reminders and Quality Enforcement

Git hooks are scripts executed in response to various repo events (commit, push, receive, etc.)—useful for enforcing standards, running tests, or sending notifications.

Popular use cases:

- **Pre-commit:** Linting, running tests, preventing unwanted patterns before a commit is finalized
- **Commit-msg:** Ensuring semantic/conventional commit messages
- **Pre-push:** Running test suites or security checks before code is pushed
- **Post-merge/post-receive:** Triggering builds, deployments, or team notifications

Example: Enforce semantic commit messages (commit-msg hook):

```
#!/bin/sh

if ! grep -qE "^(feat|fix|docs|style|refactor|test|chore)(\([^)]+\))?: .+" "$1"; then

  echo "Aborting commit: Commit message must follow Conventional Commits."
```

```
  exit 1
fi
```

Team-wide sharing: Store standardized hooks in a repo directory (e.g., /scripts/hooks/), and provide install scripts; or use pre-commit for cross-platform management and automatic installation in CI/CD.

Team Collaboration and Pull Request Workflows

Pull Request (PR) Best Practices

Code review via pull/merge requests is a pillar of effective team Git collaboration.

Key PR workflow steps:

1. **Create focused branches:** Each PR should correspond to a small, logical change—"One ticket = one PR"
2. **Semantic commit messages:** Use meaningful, actionable summaries to aid reviewers (and automate change logs)
3. **PR templates:** Provide checklists to standardize context, ticket links, test coverage, documentation needs, etc.
4. **Code review policies:** At least one, preferably two reviewers per PR, especially for critical codepaths
5. **Automated CI/CD checks:** Linting, tests, docs, style, security run automatically before merge
6. **Status checks and approvals:** Require all automated checks and code reviews to pass before merging into main
7. **Use PR reviews for learning, not just policing:** Encourage constructive feedback, knowledge transfer, and shared standards

Dealing with PR workflow bottlenecks:

- **Team metrics:** Track time-to-review, time-to-merge, open PR count, reviews per reviewer. Identify slow points and optimize
- **Use smaller PRs ("stacking"):** Break large features into smaller dependent PRs to parallelize reviews and reduce reviewer fatigue
- **Automated checklists and bots:** Use tools like Pull Checklist][36] or DangerBot][35] to standardize requirements and automate notifications

Real organizational success stories:

- **Microsoft Azure DevOps:** Employs Git Flow for large projects, leveraging hotfix/release branches for stability
- **GitHub Inc.:** Uses GitHub Flow, with rapid PR cycles, continuous deployment, and heavy automated review via Actions
- **Netflix:** Adapts GitHub Flow with microservices, aggressive CI/CD, and scripted branch protection policies

Branch Management and Cleanup Strategies

Best practices:

- **Short-lived branches:** Keep feature/fix/hotfix branches as ephemeral as possible
- **Descriptive naming conventions:** Use prefixes and ticket numbers (e.g., feature/login-UX-123, bugfix/login-error-456)
- **Regularly sync with base branch:** Frequently rebase/merge latest main/develop to prevent integration hell
- **Protect critical branches:** Enforce protection rules on main/develop/release branches; restrict direct pushes, require PR/code reviews
- **Automated cleanup:** Schedule script or CI jobs to auto-delete merged branches and prune remotes weekly or monthly

Continuous Integration (CI), Git Automation, and Periodic Task Scripting

Automate everything possible:

- **Linting, formatting, testing, and security checks:** All CI jobs should be triggered for PRs/merges, never rely solely on local developer discipline
- **Nightly or weekly maintenance scripts:** Run periodic jobs to clean up old branches, stashes, logs, or run git maintenance
- **Automated dependency updates:** Schedulers (Dependabot, Renovate, Snyk) to keep dependencies up to date

Typical automation scripts:

- **Clean up inactive branches (example Bash):**

Delete local branches with no recent activity and merged PR

```
git for-each-ref --format '%(refname:short) %(committerdate:unix)' refs/heads/ | \
  awk '$2 < (systime() - 30*24*60*60) { print $1 }' | \
  xargs -r git branch -D
```

 GitHub Action to prune branches/artifacts: See github-maintenance-action][43].

- **Periodic maintenance with Jenkins:** Use cron-style schedules (see Lenar.io guide][45]) or similar tools

Semantic Commit Messages and Versioning

Why semantic commit messages?

- Enable automation (changelog generation, semantic versioning, release notes)
- Facilitate navigation of project history and root cause analysis
- Drive automated policies (require "fix", "feat", or "BREAKING CHANGE" for version bumps)

Conventional format:

[optional scope]: [optional body] [optional footer(s)]

Allowed types: feat, fix, docs, style, test, chore, ci, build, refactor, perf

Examples:

- feat(auth): add two-factor authentication
- fix(api): handle timeout error
- chore(deps): update all dependencies
- docs: add API usage example
- feat!: remove deprecated payment methods
- BREAKING CHANGE: changes API v1 to v2

Versioning integration: Semantic commit automation tools (Conventional Changelog, semantic-release, commitizen) produce release notes and automate bumping patch, minor, or major versions.

Best practices:

- Impose commit message format via hook or CI check
- Use imperative mood ("add support", not "adds" or "added")

Case Studies and Organizational Git Workflows

- **Large organizations:** Microsoft, Netflix, Atlassian, and Mozilla all leverage structured branching models, strict PR policies, and automated CI/CD. Microsoft, for example, regularly refactors workflows based on periodic reviews of PR cycle metrics and integrates new static analysis or security tools on a quarterly cadence.
- **Open-source projects:** Linux Kernel, Angular, Vue.js, and React all use semantic commit conventions, detailed PR templates, and maintainers with formal policies on reviews, branch merges, and CI checks.
- **Small teams/startups:** Short-lived feature branching, trunk-based development, and automated CI pipelines dominate. Aggressive pruning and weekly/monthly git maintenance scripts reduce overhead and keep the velocity high.

Conclusion: Streamlining Long-Term Git Health and Collaboration

Git's power comes not merely from its commands, but from how systematically and collaboratively you use them. Adopting a time-based structure—daily, weekly, monthly, yearly—for maintenance, reviews, code hygiene, and process reflection is the key to avoiding "repo rot," slowdowns, and confusion.

Key strategies for any team:

- Build strong daily habits (small/semantic commits, code review, frequent pulls/rebases)
- Automate weekly hygiene (branch cleanup, stashing, merging, PR reviews)
- Schedule deep monthly and yearly maintenance (gc, repack, policy/automation audits, dependency/security reviews)
- Foster strong team workflows: rigorous PR standards, protected branches, and robust code review culture

- Use and enforce semantic commit messages for clarity, automation, and maintainability

By following these principles and routines, you enable your Git repositories—and your development teams—to remain healthy, high-performing, and future-proof