## Git mastery in twenty minutes increments

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#### Introduction

A series of twenty-minute presentations on Git.



Figure: Only essential information is presented here; for in-depth knowledge check the slide notes for references and read the Pro Git book by Scott Chacon.

http://git-scm.com/book/

### **Outline**

- Objects
- 2 refnames
- Merges and mergetool
- Remotes
- 6 Rebase



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# Commit objects

#### sha1 hash of:

- Message
- Author / committer
- Date
- Parents (if any)
- Pointer to the contents (tree)



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- Create two commits
- View the raw commit

### **Branches**

- A commit knows its parents!
- Branch names are for humans
  - master
  - origin/master

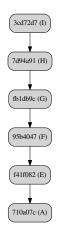


- Create feature branch (off master)
- Make a commit
- Merge into master
- Delete the branch

# Directed acyclic graph (DAG)

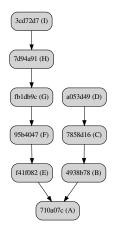


# Directed acyclic graph (DAG)





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### Git refs

#### "refname" may refer to:

- sha1
- master
- origin/master
- HEAD
- HEAD~1
- Tags
- Many, many others; see git-rev-parse(1) for more

### refs are for humans

- A ref points to an object
- That's it



• Delete the ref that points to master



# Objects without refs are garbage collected

- Unreachable objects older than 30 days
- The reflog counts as a reference
  - reflog entries are pruned after 90 days



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- Create a branch
- Make a new commit
- Delete that branch



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- Objects
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# Fast-forward merges

- Moves the branch pointer
- That's it

- Make a new branch
- Make a new commit
- Return to the original branch
- Merge the new branch

# Merge commits

A commit object with two parents



- Make a new branch
- Make a new commit
- Return to the original branch
- Merge the new branch using --no-ff

# Merge conflicts

- Stages all successful automatic merges
- Surrounds conflicts with conflict markers

- Make a branch
- Make an edit
- Make a new branch
- Make a conflicting edit
- Merge the other branch
- Resolve the conflict
- Stage the change
- Commit (use/modify the default message)



## mergetool

### Three-way merge

- LOCAL
- BASE
- REMOTE
- MERGED

View a merge conflict in a three-way diff program



### **Outline**

- Objects
- 2 refnames
- Merges and mergetool
- 4 Remotes
- 6 Rebase



#### Remotes

- Fetching from a remote adds to your local DAG
- "Remote branches" are stored locally
- You don't need to define a remote to fetch



- Fetch a remote branch
- Compare commits
- Compare changes
- Merge the remote branch

## Remote tracking

- At-a-glance comparison
- Syntactic sugar
- Track any ref (not just "remote branches")



### Outline

- Objects
- 2 refnames
- Merges and mergetool
- Remotes
- Rebase



## Rebase on incoming changesets

git rebase <upstream> <branch>

- git fetch && git rebase
- git pull --rebase



- Simulate a local and upstream branch that have diverged
- Rebase



#### Rebase in detail

git rebase <upstream> <branch>

- Commits shown by git log <upstream>..HEAD
- Current branch is reset git reset --hard <upstream>
- ORIG\_HEAD is set to branch point before the reset
- Commits reapplied, one by one, in order

- Given two branches with divergent history
- Replay the second branch on top of the first



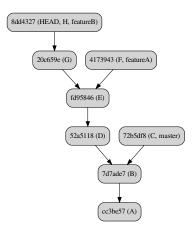
### Rebase a subset (transplant)

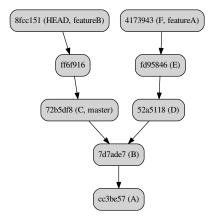
• Transplant a topic branch based on one branch to another



- Branch featureA based off master
- Branch featureB based off featureA
- Realize featureB is unrelated and should be based off master instead







#### Interactive

git rebase -i HEAD~5

• Reshuffle, fixup, squash commits



- Make seven commits
- Squash, reword, and fixup

