# Mercurial I

Developed by
Jeppesen Crew Academy

## Practical Details

Restrooms

Breaks

Phones

Wifi

Lunch arrangements

Evaluation

# Participants presentation

Name, company

Role

Experience

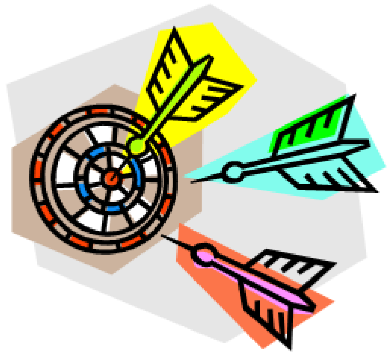
Your expectations

<Other>

## Course goals

**This course will teach you**

- Common Mercurial commands
- Useful Mercurial Extensions
- Practical Concepts
- Where to find Help Resources



## Prerequisites

- Basic Linux command line knowledge

**Please –**

**Don't be afraid to ask questions if anything is unclear!**

## Agenda

| | |
|---|---|
| 09:00 - 10:15 | Introduction, core concepts |
| **10:15 - 10:30** | **Coffee break** |
| 10:30 - 12:30 | Basic Mercurial usage |
| **12:30 - 13:30** | **Lunch** |
| 13:30 - 15:00 | Getting more advanced |
| **15:00 - 15:15** | **Coffee break** |
| 15:15 - 17:00 | Final session |

**All times are approximate – changes may/will occur**

**Short breaks every ~40 minutes or so**

# Chapter 1 – Introduction

- What is Version Control?
- Distributed Version Control
- Core Concepts

## Introduction

- A Version Control System, or VCS, stores complete version and change information about individual and/or a collection of files
- Provides ability to track changes over time, with the possibility to revert to a particular revision
- Metadata used to link developer’s working area with repository

## Introduction

### Centralized Version Control

- One central repository is used by all developers on a project
- Typically focused on changes at the individual file level
  - Suitable when programs were contained in single files (circa 1970s)
- Later versions added concurrency and remote repository control features

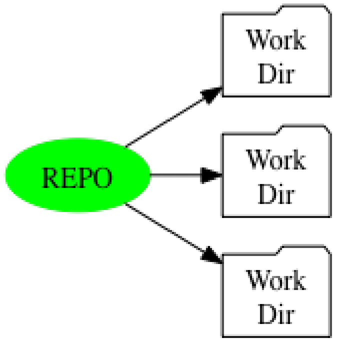
## Introduction

### Distributed Version Control

- One or many repositories used by developers on a project
- Each developer has a working clone repository
- Full metadata is distributed with each clone repository
- Connection to a central repository not required to capture and track local changes

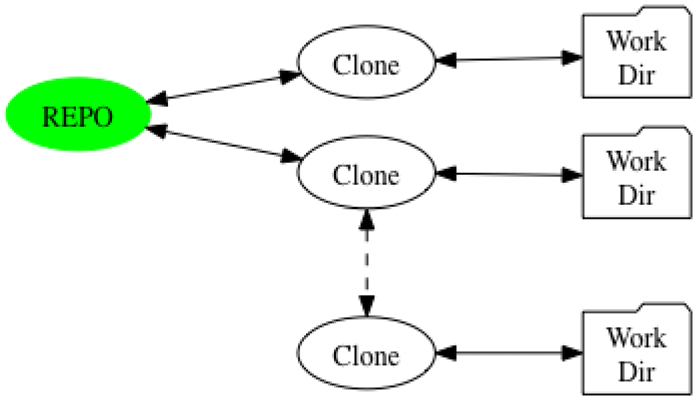
## Introduction

### Centralized



Changes cannot be shared directly between users

### Distributed



Users can share changes directly without using a central repository

## The Repository

### The Repository is the central theme for Mercurial

- The repository for a project contains all of the files that “belong to” that project, along with a historical record of the project's files

- In practice, a repository is simply a collection of managed files in a browseable directory structure

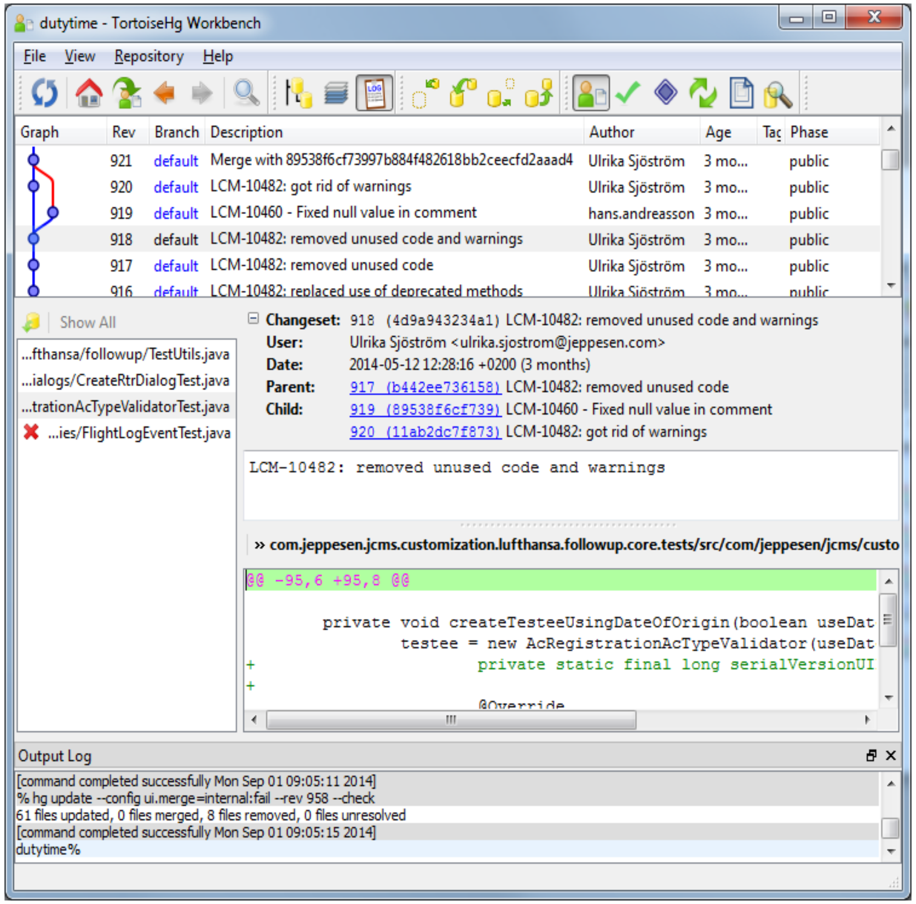
- All repositories from the same family can exchange changesets and patchsets

## The Clone

- As in Mercurial, the term clone is commonly defined as:
  - *A person or thing that duplicates, imitates or closely resembles another in appearance, function, performance or style*
- In Mercurial, a clone is an identical copy of the original (which might be itself a clone)
- All clones are themselves repositories

# The Changeset

- A changeset is a collection of changes to one or many project files
- Natural for modern applications with a large set of inter-related source code files
- Easier to track down regression bugs
- By comparison, changes to files in CVS are tracked individually on a file-by-file basis.



| Graph | Rev | Branch | Description | Author | Age | Tag | Phase |
|---|---|---|---|---|---|---|---|
| | 921 | default | Merge with 89538f6cf73997b884f482618bb2ceecfd2aaad4 | Ulrika Sjöström | 3 mo... | | public |
| | 920 | default | LCM-10482: got rid of warnings | Ulrika Sjöström | 3 mo... | | public |
| | 919 | default | LCM-10460 - Fixed null value in comment | hans.andreasson | 3 mo... | | public |
| | 918 | default | LCM-10482: removed unused code and warnings | Ulrika Sjöström | 3 mo... | | public |
| | 917 | default | LCM-10482: removed unused code | Ulrika Sjöström | 3 mo... | | public |
| | 916 | default | LCM-10482: replaced use of deprecated methods | Ulrika Sjöström | 3 mo... | | public |

...fthansa/followup/TestUtils.java
...ialogs/CreateRtrDialogTest.java
...trationAcTypeValidatorTest.java
✗ ...ies/FlightLogEventTest.java

**Changeset:** 918 (4d9a943234a1) LCM-10482: removed unused code and warnings
**User:** Ulrika Sjöström <ulrika.sjostrom@jeppesen.com>
**Date:** 2014-05-12 12:28:16 +0200 (3 months)
**Parent:** 917 (b442ee736158) LCM-10482: removed unused code
**Child:** 919 (89538f6cf739) LCM-10460 - Fixed null value in comment
920 (11ab2dc7f873) LCM-10482: got rid of warnings

```
LCM-10482: removed unused code and warnings
```

» com.jeppesen.jcms.customization.lufthansa.followup.core.tests/src/com/jeppesen/jcms/custo

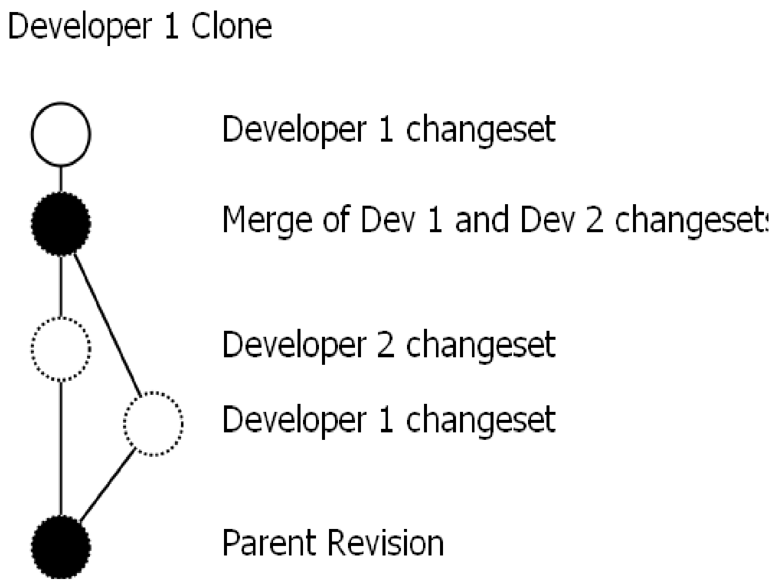
```
@@ -95,6 +95,8 @@

        private void createTesteeUsingDateOfOrigin(boolean useDat
                testee = new AcRegistrationAcTypeValidator(useDat
+                       private static final long serialVersionUI
+
                        @Override
```

```
[command completed successfully Mon Sep 01 09:05:11 2014]
% hg update --config ui.merge=internal:fail --rev 958 --check
61 files updated, 0 files merged, 8 files removed, 0 files unresolved
[command completed successfully Mon Sep 01 09:05:15 2014]
dutytime%
```

## Implicit Branching

- A branch is created when two changesets are created independently of each other
- All changesets are implicit branches
- Merging is a merge of changesets' revisions to a common base, including conflicting changes on a file basis



# The Mercurial Command Line

Mercurial is invoked from the command line,
it uses a standard syntax:

```
hg [opts] <command> [params]
```

Common `opts`:

| | |
|---|---|
| `-q,--quiet` | suppress output |
| `-v,--verbose` | enable additional output |
| `--config` | set/override config option |
| `--version` | output version information and exit |
| `-h --help` | display help and exit |

## Configuration

Some simple configuration files

- `[.]hgrc`
  Main configuration file; used to define user or project wide options

- `.hgignore`
  Identify files/directories that should not be version controlled within the repository

## Configuration - .hgrc

- Mercurial uses a layered configuration scheme for managing repositories and clones
- Later configuration overrides earlier
- Most common paths:
  - `<install-root>/etc/mercurial/hgrc.d/*.rc`
  - `<repo|clone>/.hg/hgrc`
  - `$HOME/.hgrc`

## Configuration - .hgrc

- **The resource configuration files are used to:**
  - Define basic settings (user name, …)
  - Configure custom behavior
  - Activate available extensions

## Configuration - .hgignore

- File used to ignore common spurious files (*~, .pyc, tar.gz, etc.)
- Both regular expressions and globbing are supported
  - globbing uses shell file matching syntax
    `*.log`
  - Regexp uses standard perl regular expressions syntax
    `^[hc]at`

## Mercurial – Getting Help

- `hg help`
  - Provides a list of available commands

- `hg help <cmd>`
  - Provides information about command `<cmd>`

- `hg help -v` (`-v` for `--verbose`) will print more detailed information about the specified command

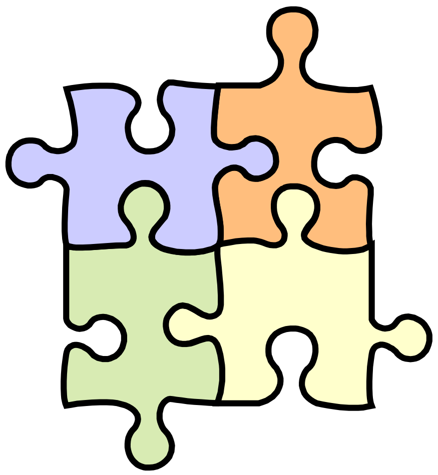
- *The built-in help will be used during the course to supplement the material presented*

## Mercurial – Course Toolchain

- Mercurial
  - http://mercurial.selenic.com/wiki
- TortoiseHG (Windows)
  - http://mercurial.selenic.com/wiki
- SourceTree (Mac OSX)
  - http://www.sourcetreeapp.com/
- MercurialEclipse (Eclipse)
  - https://bitbucket.org/mercurialeclipse/main/wiki/Home

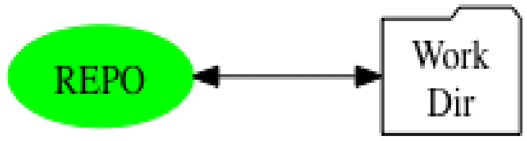
## Use Case Models

- Different use cases
  - Single User
  - Single Site, Multiple Users
  - Multiple Sites, Multiple Users
  - Service Center and Consulting support



## Single User

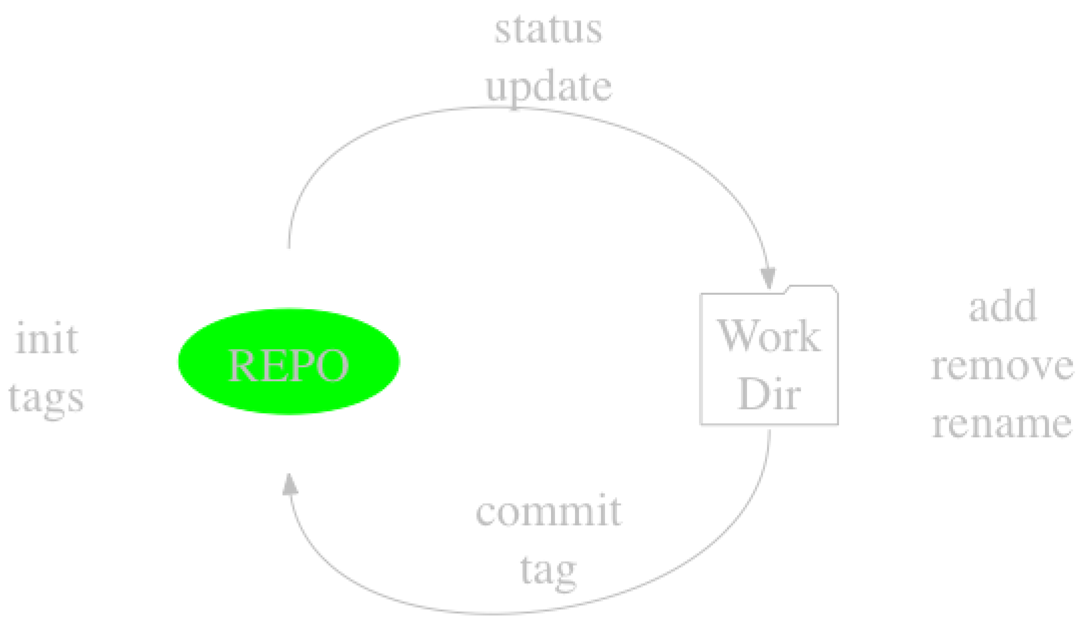
### Case #1 – Single Developer Model



## Single User

- Mercurial is used to manage source code, regardless of the number of developers
- Core feature set is not exclusive to distributed development
- Change tracking is essential, regardless of project type
  - Provides ability to track changes over time, with the possibility to revert to a particular revision

## Single User

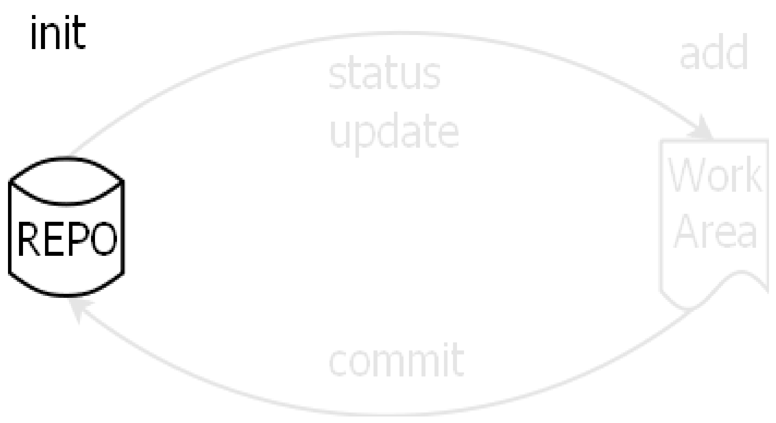


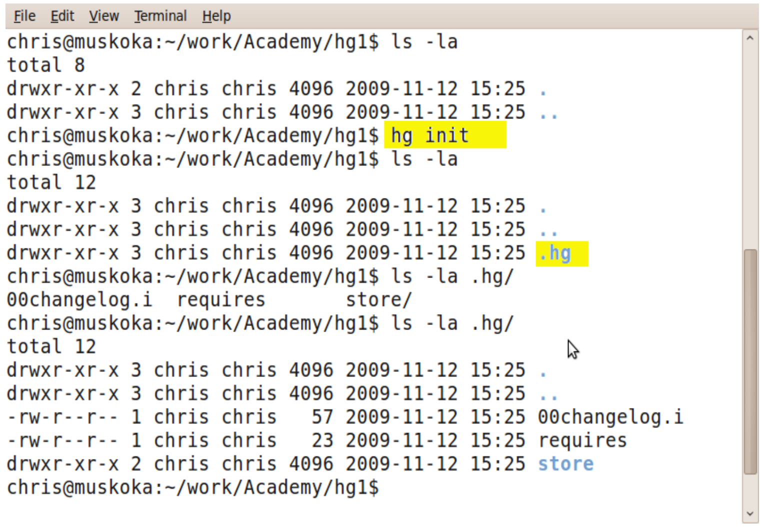
- Source code management for a single user is very similar across all the different VCS’
- A single user repository can be spawned into a multi-user repository at any time (just a matter of convention)

## Commands - List

| | |
|---|---|
| add | Add the specified files on the next commit |
| commit | Commit the specified files or all outstanding changes |
| diff | Show differences between revisions for files |
| init | Create a new repository in the given directory |
| log | Print the revision history of files or project |
| remove | Remove the specified files on the next commit |
| revert | Restore files to their checkout state |
| rename | Equivalent of copy + remove, will remember history |
| status | Show changed files in the working directory |
| serve | export the repository via HTTP |
| tag | Add one or more tags for the current or given revision |
| tags | List repository tags |

## Commands - init

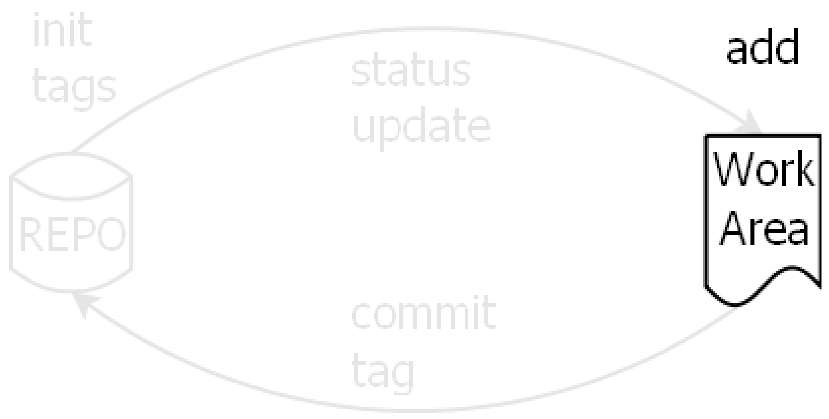




```
chris@muskoka:~/work/Academy/hg1$ ls -la
total 8
drwxr-xr-x 2 chris chris 4096 2009-11-12 15:25 .
drwxr-xr-x 3 chris chris 4096 2009-11-12 15:25 ..
chris@muskoka:~/work/Academy/hg1$ hg init
chris@muskoka:~/work/Academy/hg1$ ls -la
total 12
drwxr-xr-x 3 chris chris 4096 2009-11-12 15:25 .
drwxr-xr-x 3 chris chris 4096 2009-11-12 15:25 ..
drwxr-xr-x 3 chris chris 4096 2009-11-12 15:25 .hg
chris@muskoka:~/work/Academy/hg1$ ls -la .hg/
00changelog.i  requires       store/
chris@muskoka:~/work/Academy/hg1$ ls -la .hg/
total 12
drwxr-xr-x 3 chris chris 4096 2009-11-12 15:25 .
drwxr-xr-x 3 chris chris 4096 2009-11-12 15:25 ..
-rw-r--r-- 1 chris chris   57 2009-11-12 15:25 00changelog.i
-rw-r--r-- 1 chris chris   23 2009-11-12 15:25 requires
drwxr-xr-x 2 chris chris 4096 2009-11-12 15:25 store
chris@muskoka:~/work/Academy/hg1$
```

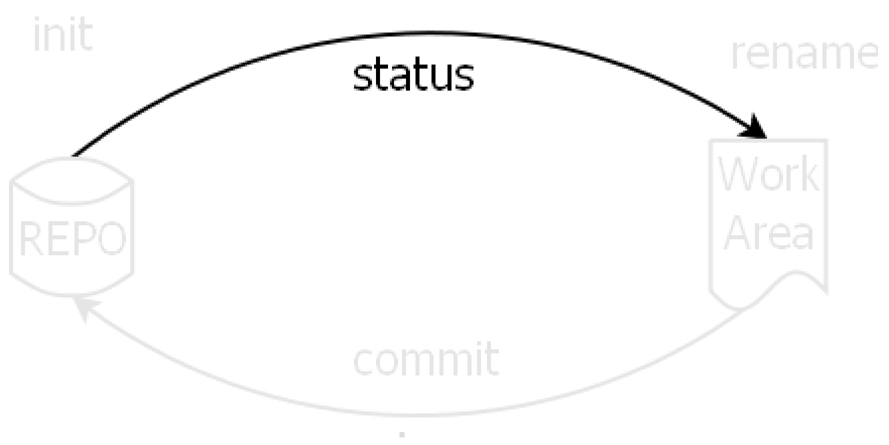
- Initialize a Mercurial repository; this creates the .hg directory for metadata
- By default, the current working directory becomes a repository
- Files and directories must be add(ed) to the repository to begin tracking

## Commands - add



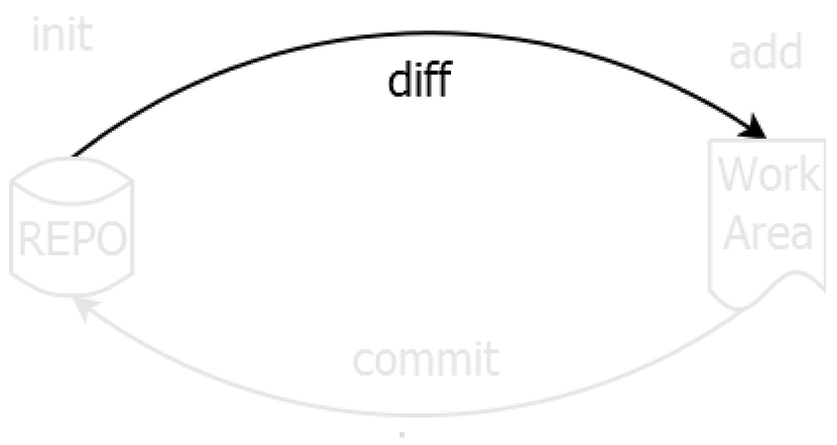
- Schedule existing working file(s) to be added to the repository upon next commit

## Commands - status



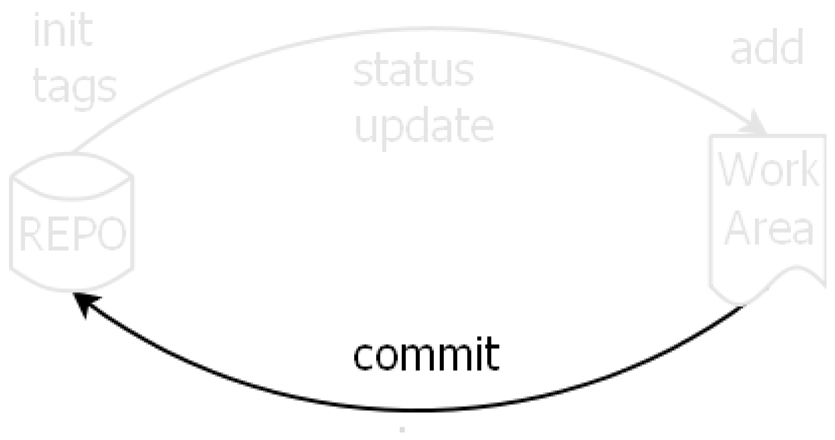
- Show the change status of the working files
- Some of the common codes showing the status of files:
  - M = modified
  - A = added
  - R = removed
  - ! = missing (deleted by non-hg command, but still tracked)
  - ? = not tracked

## Commands - diff



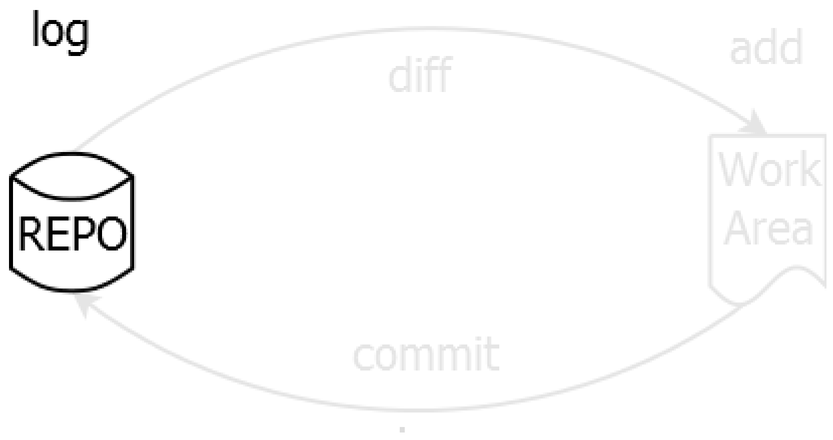
- Show differences between revisions for the specified files
- Use -c parameter to show differences in a changeset

## Commands - commit



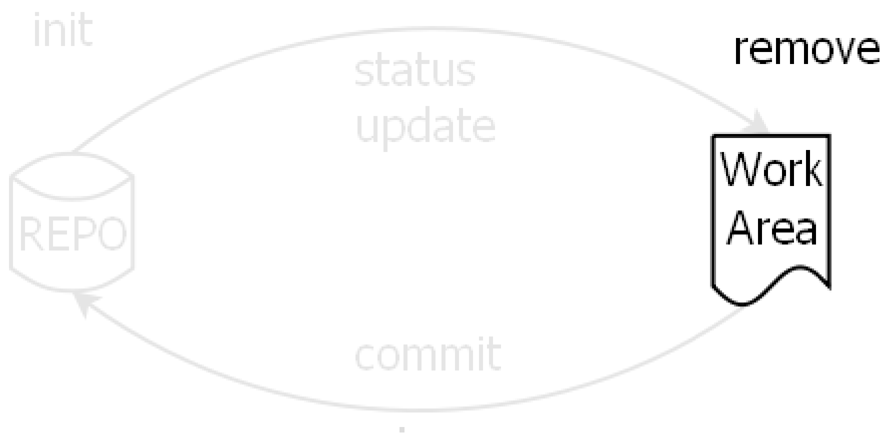
- Commit scheduled changes to the repository, creating a changeset
- Use the optional `-m` parameter to specify the commit message directly on the command line

## Commands - log



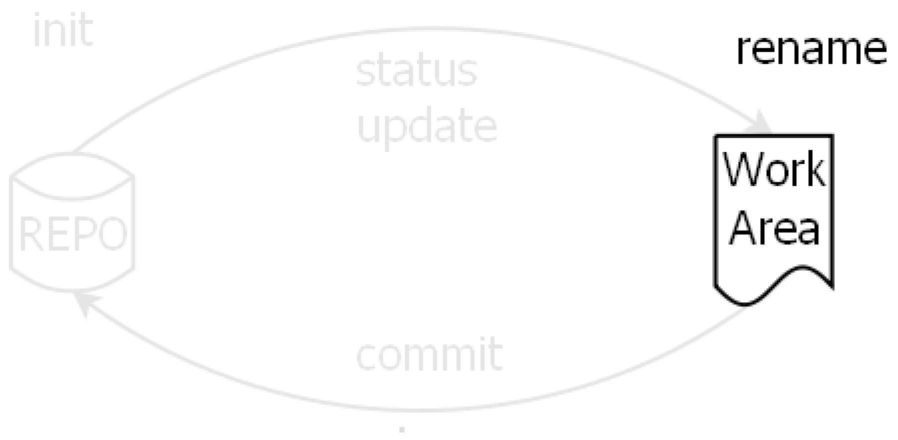
- Show revision history of entire repository or files
- Use -f to follow files across copies and renames

## Commands - remove



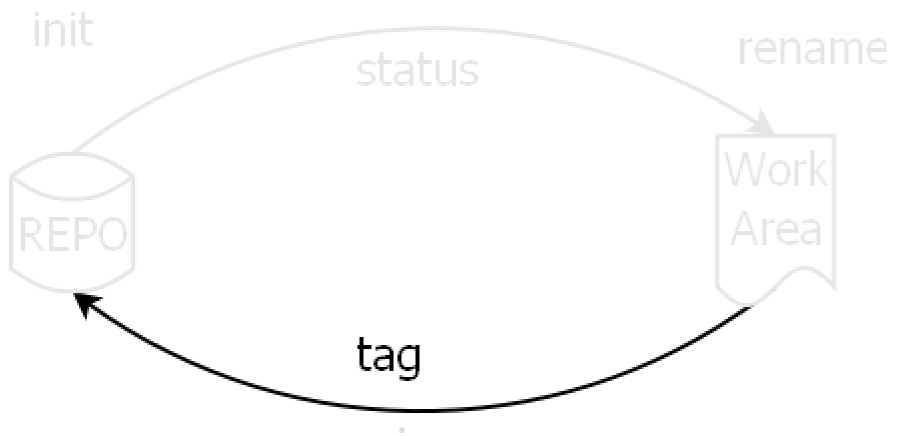
- Schedule file(s) for removal from the repository
- The file(s) remain in the project history
- File(s) will be deleted from work area, if still present

## Commands - rename



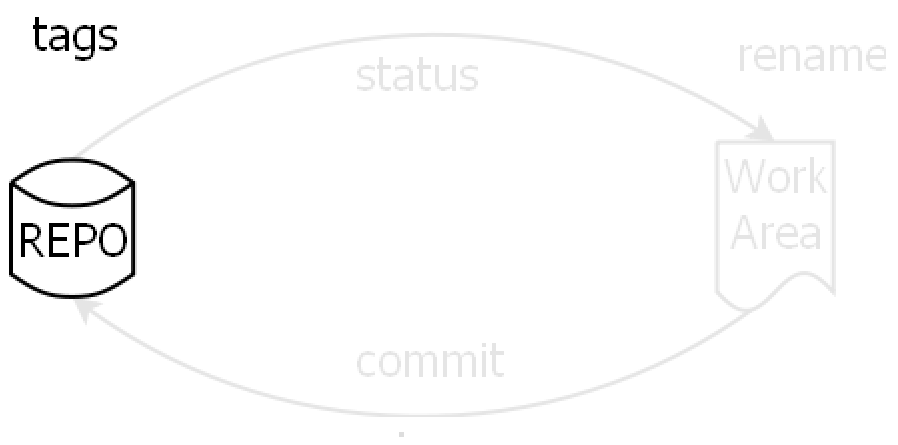
- Rename a file to a new name
- Associates the history of the original file to the renamed file
- Use --after for a rename that already occurred.

## Commands - tag



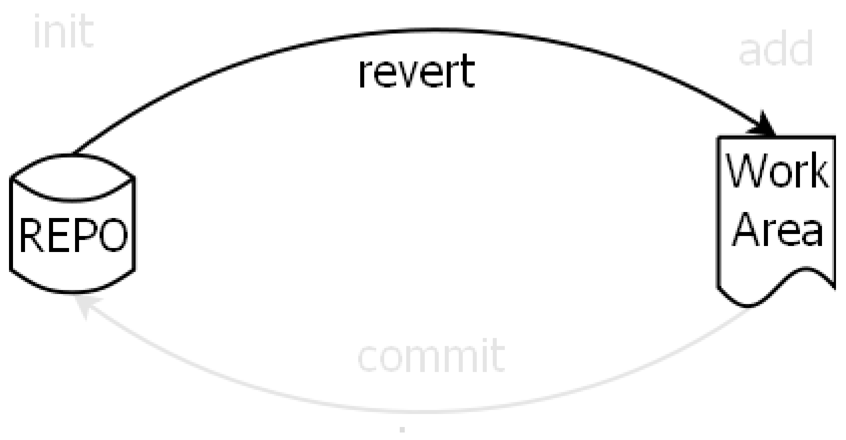
- Apply a named Tag the specified changeset revision
  - The parent of the working directory, by default
- Tag information is tracked in a repository text file: `.hgtags`
- Handy for multi-user projects
- See also: bookmark

## Commands - tags



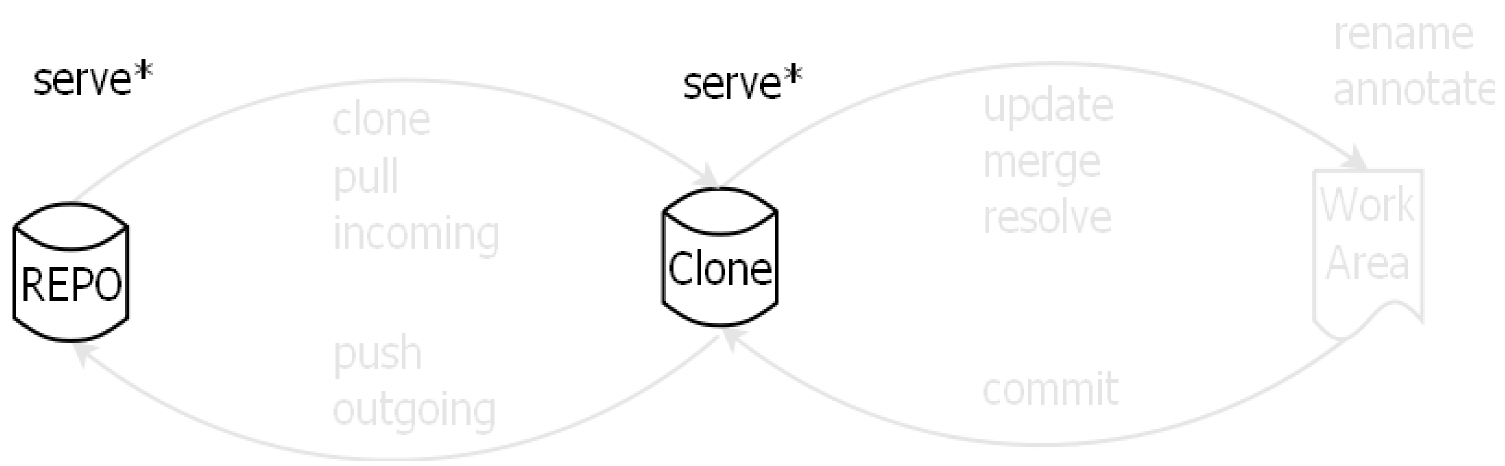
- List the repository tags existing in the project

# Commands - revert



- Discard current changes and revert to checkout state
- Handy when the current changes are too broken to be useful
- Also used to revert to older revisions

## Commands - serve



- Start an adhoc web service to export one repository for viewing in a web browser *(any repository can be served)
  - Handy alternative to `hg view` (especially when accessing across WAN)
- By default, uses the port 8000
- Connect to: `http://<server>:8000` in your web browser

## Best Practices

Commit messages:

- For project work, the message should include requirements/work packages references,
  - to make them searchable later, and
  - to find more information about a changeset
- `-m “PSFG-2: Correct block time calculation bug when trip spans DST”`

## Best Practices

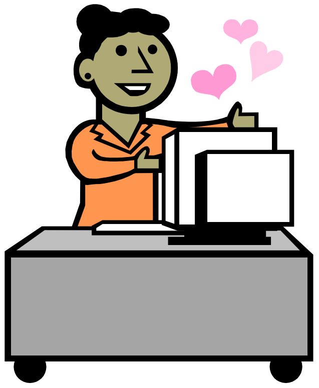
Changesets should be for atomic requirements (by convention)

- It must be possible to know which changes were made together to be able to revert
- Therefore, a changeset should address only *one* bug or *one* requirement
- If multiple tasks must be worked on concurrently, use multiple clones (seen later)

## Exercise 1

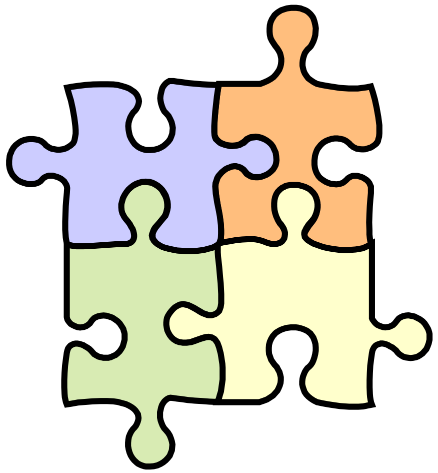
## Exercise 1 summary

- Questions and answers



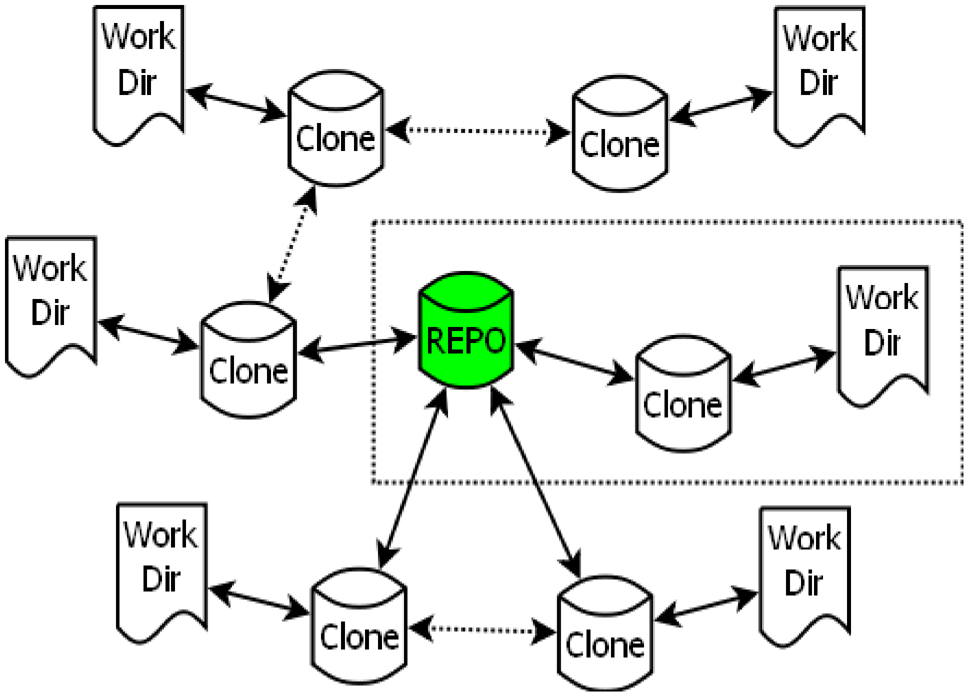
## Use Case Models

- Different use cases
  - Single User
  - Single Site, Multiple Users
  - Multiple Sites, Multiple Users
  - Service Center and Consulting support

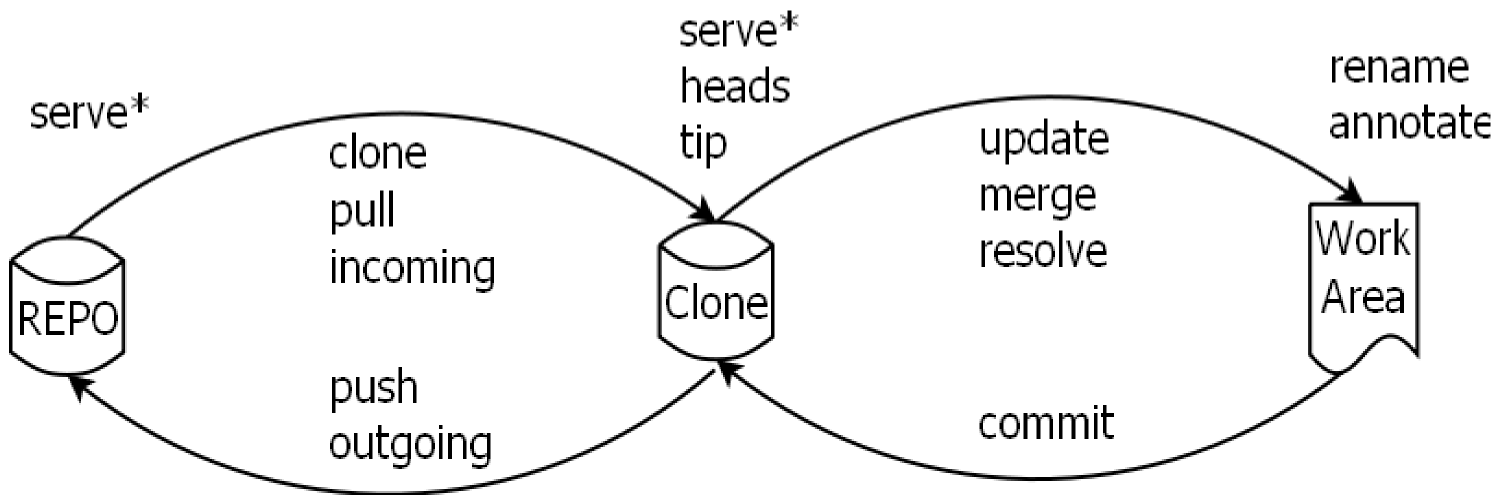


## Multiple Developers

### Case #2 – Multi-Developer Environment



## Context Diagram



- In a multi-user configuration, each user has a clone of the repository, instead of working with the repository itself
- Sets of changes are shared with other users either directly or via the main repository

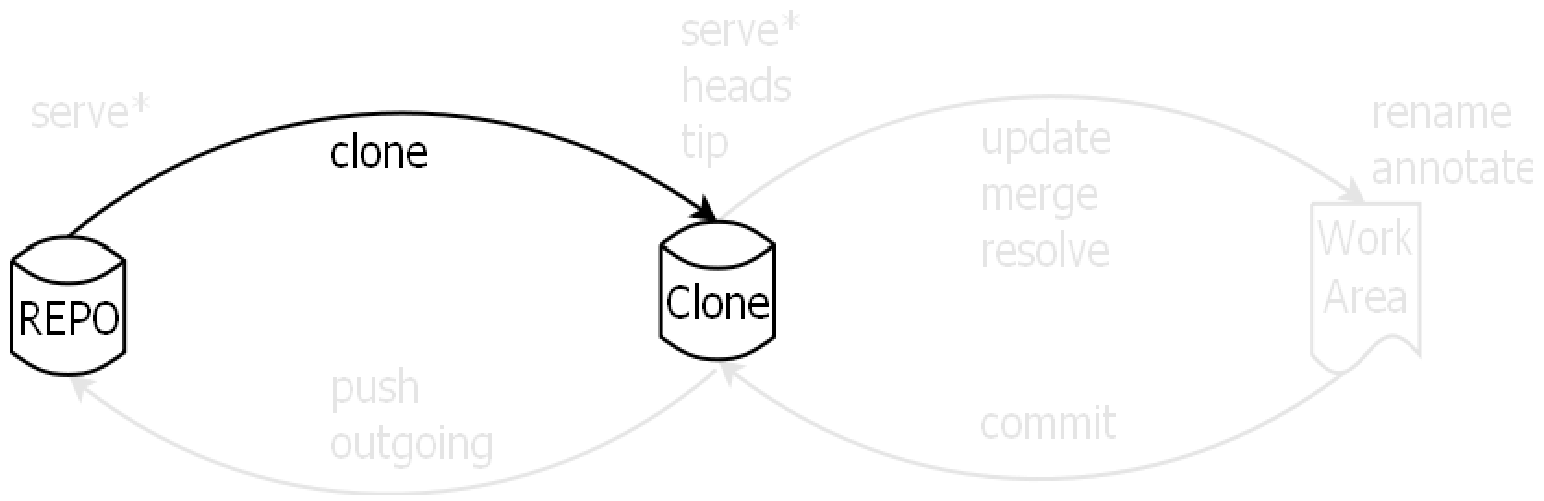
## Multiple Users

- In a multi-user project, it is common practice to share at least one (1) central repository
- This ensures that all developers use project code taken from the same family
- Multiple repositories could be used as an alternative to code branches during a development project

## Commands - List

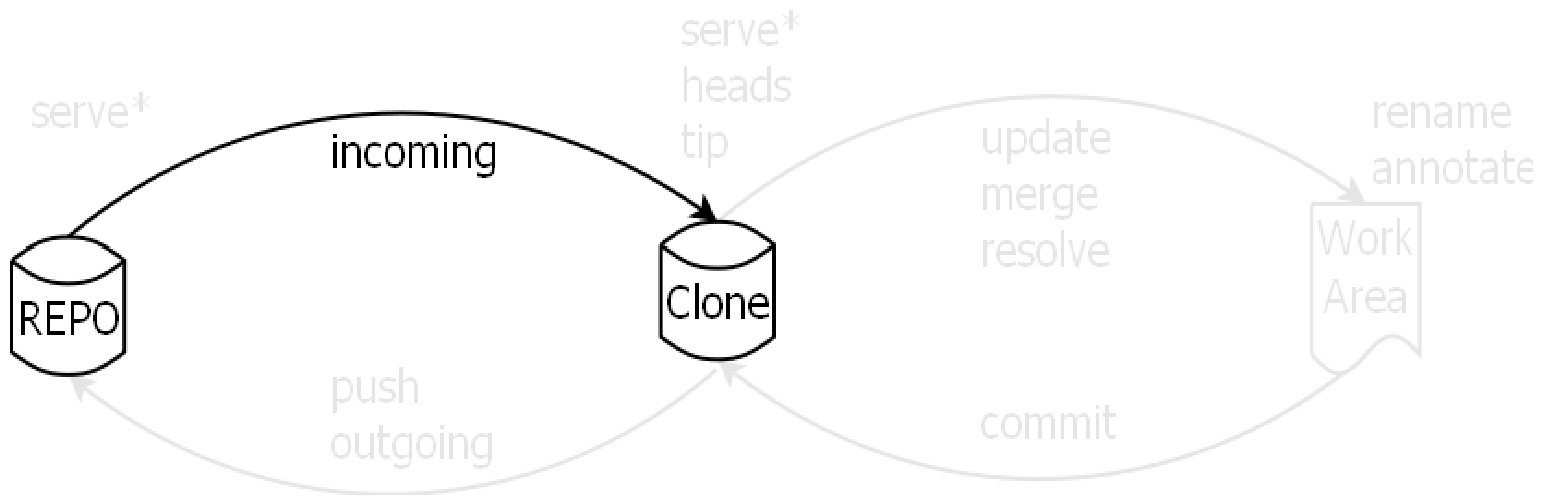
| | |
|---|---|
| annotate | show changeset information by line for each file |
| clone | make a copy of an existing repository |
| heads | show current repository heads or show branch heads |
| incoming | show new changesets found in source |
| merge | merge working directory with another revision |
| outgoing | show changesets not found in destination |
| pull | pull changes from the specified source |
| push | push changes to the specified destination |
| resolve | retry file merges from a merge or update |
| update | Update working directory |

## Commands - clone



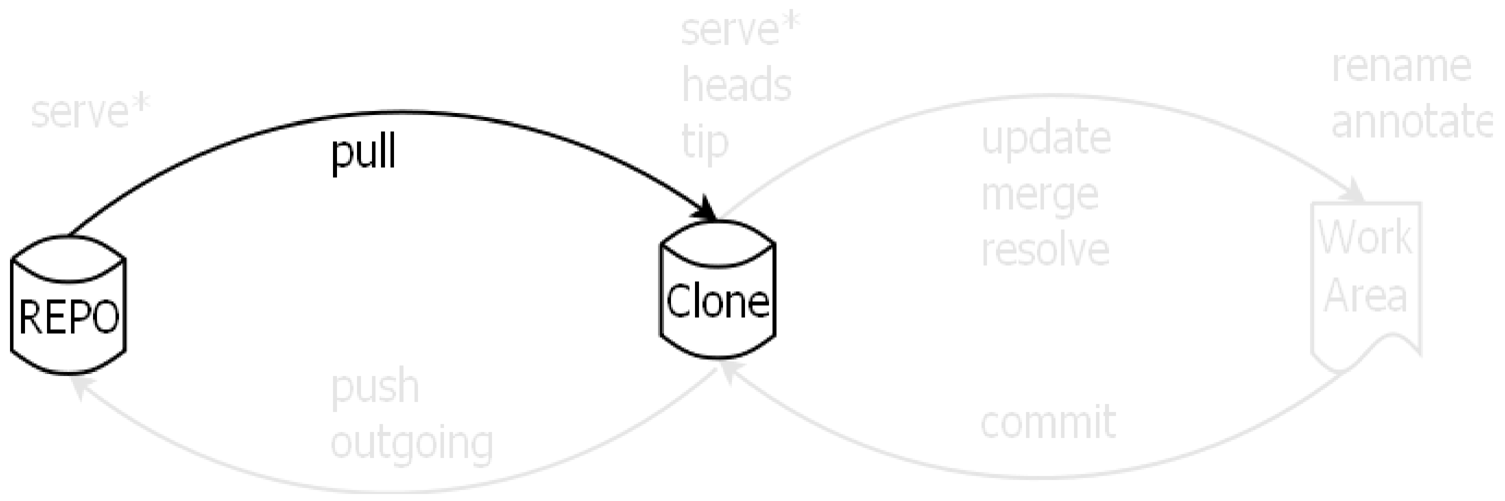
- Create a replica of a repository
  - Once the clone is created, a connection to the source repository is only required when synching with other project members
- Clones can be made to local or remote locations (using SSH)

# Commands - incoming



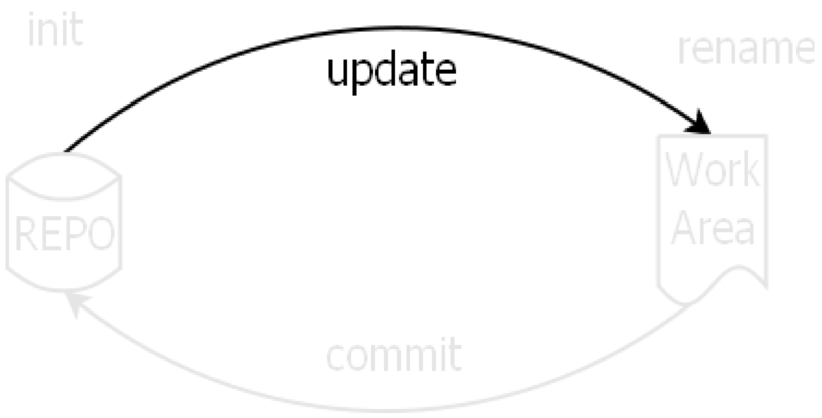
- Show a list of the changesets that would be pulled from the source repository
- Often used to see what needs to be merged, prior to performing a push

## Commands - pull



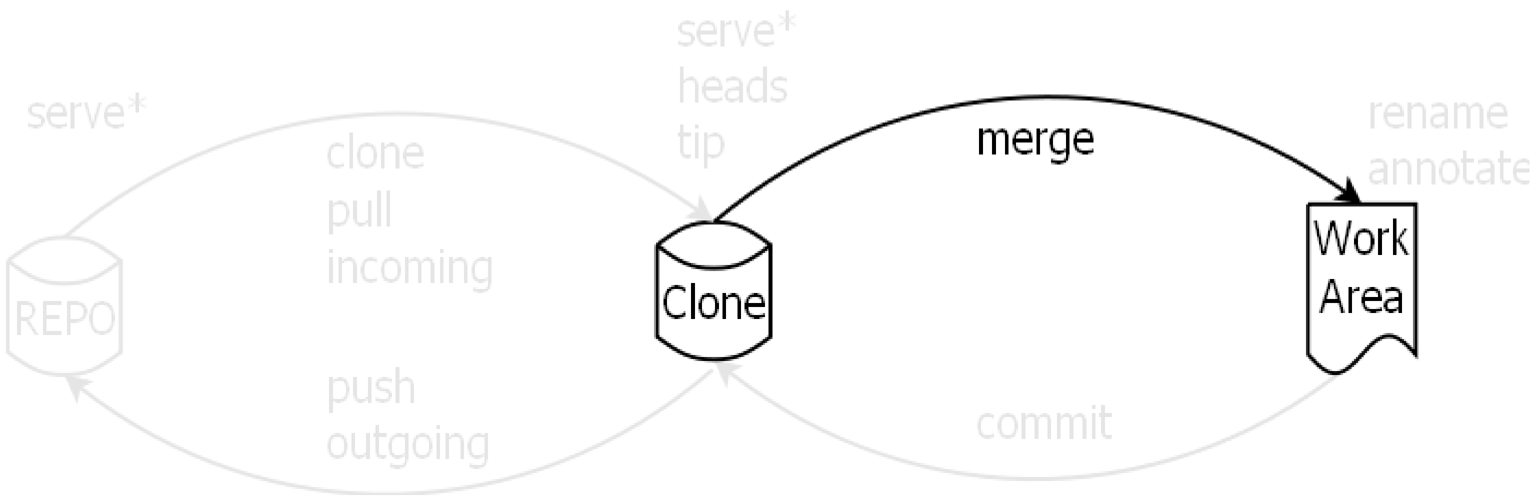
- Pull the remote changesets into the local repository
- Does not automatically update the local working directory (could use `-u` option to combine pull + update)
- Can only pull into an existing clone from the repository family

## Commands - update



- Update the working directory to a specified revision
  - By default, updates to the `tip` revision
- `-C` option provides a clean move, overwriting modified files in the working directory
- Allows to move between revisions easily; especially useful when tracking down regression bugs

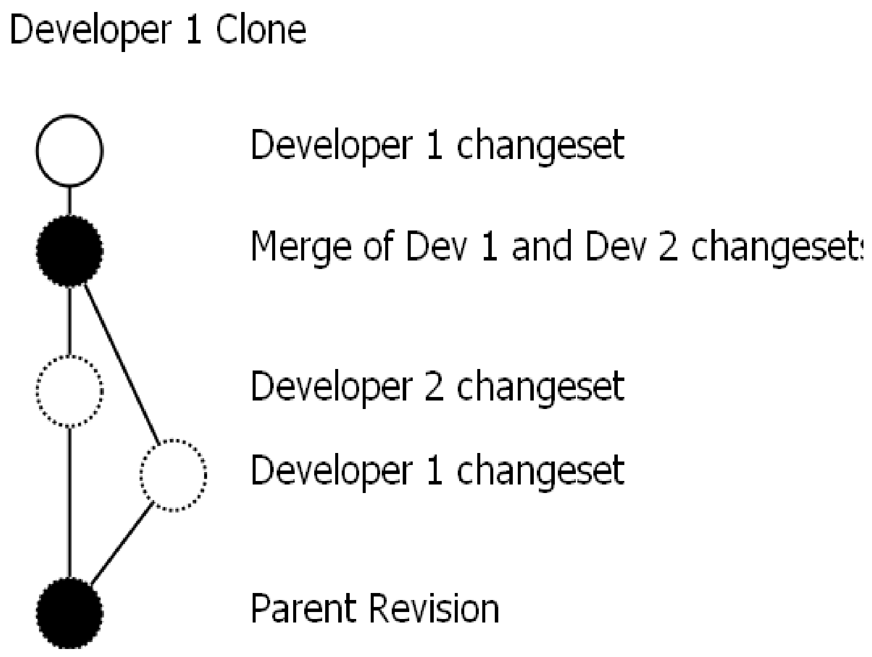
## Commands - merge



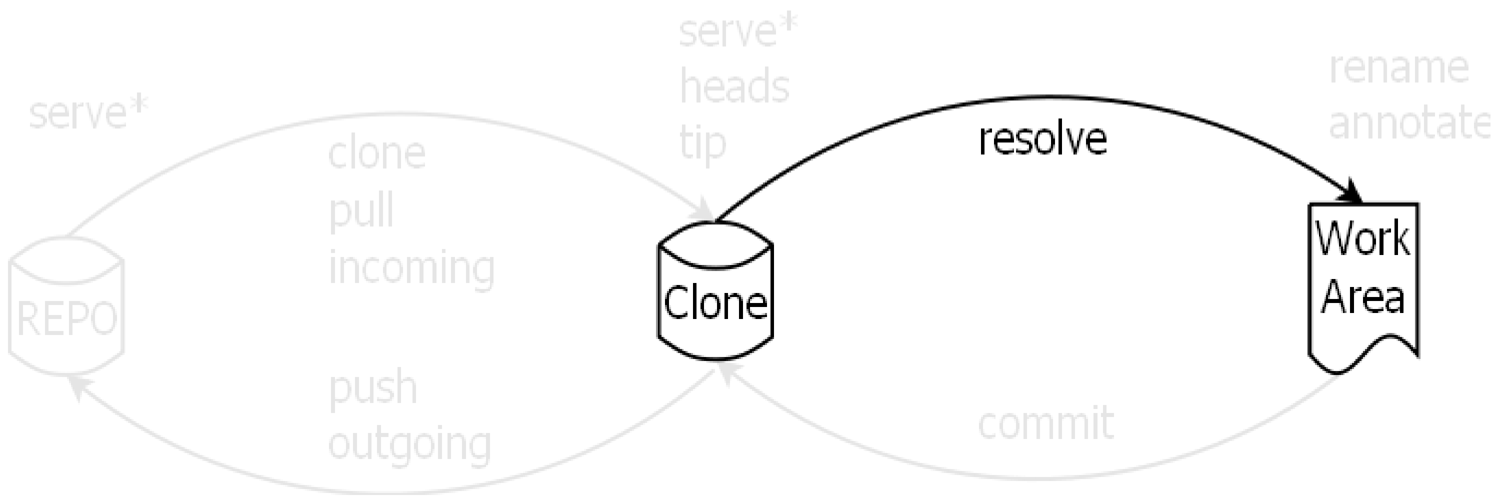
- Merge the current working directory with another version
- Merging is a core concept in Mercurial,
  and is done frequently

## Commands - List

- Mercurial automatically decides if a merge or an update is required after a pull
- Once the merge is completed successfully, a commit is required before making any further changes
- The merge becomes a changeset, capturing the results of the merge

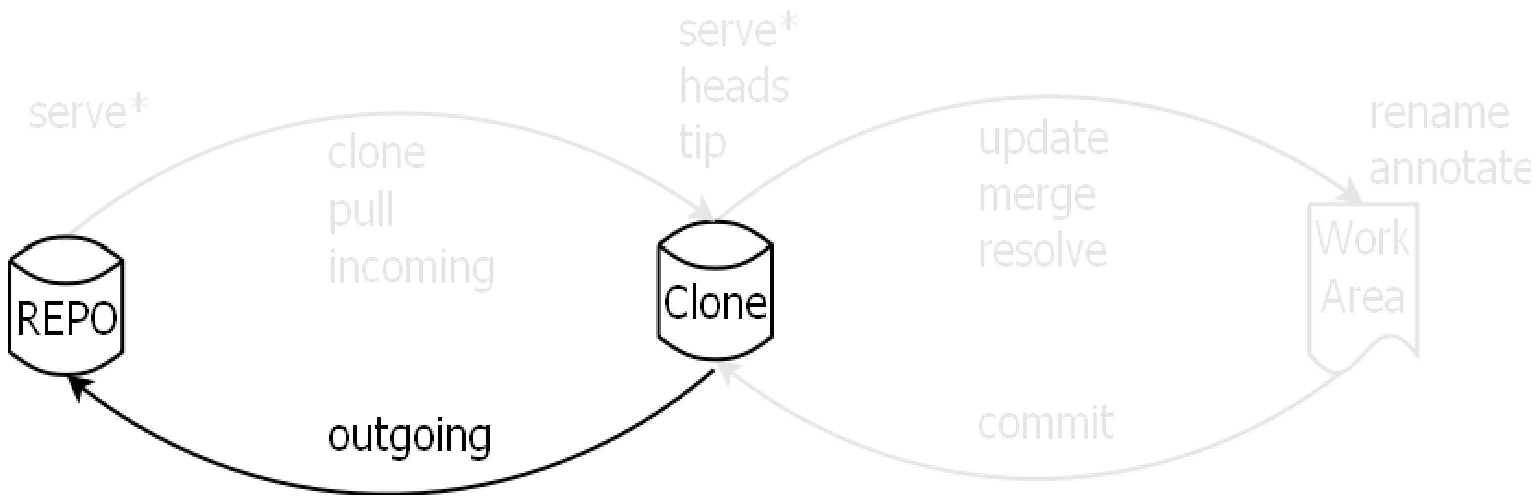


# Commands - resolve



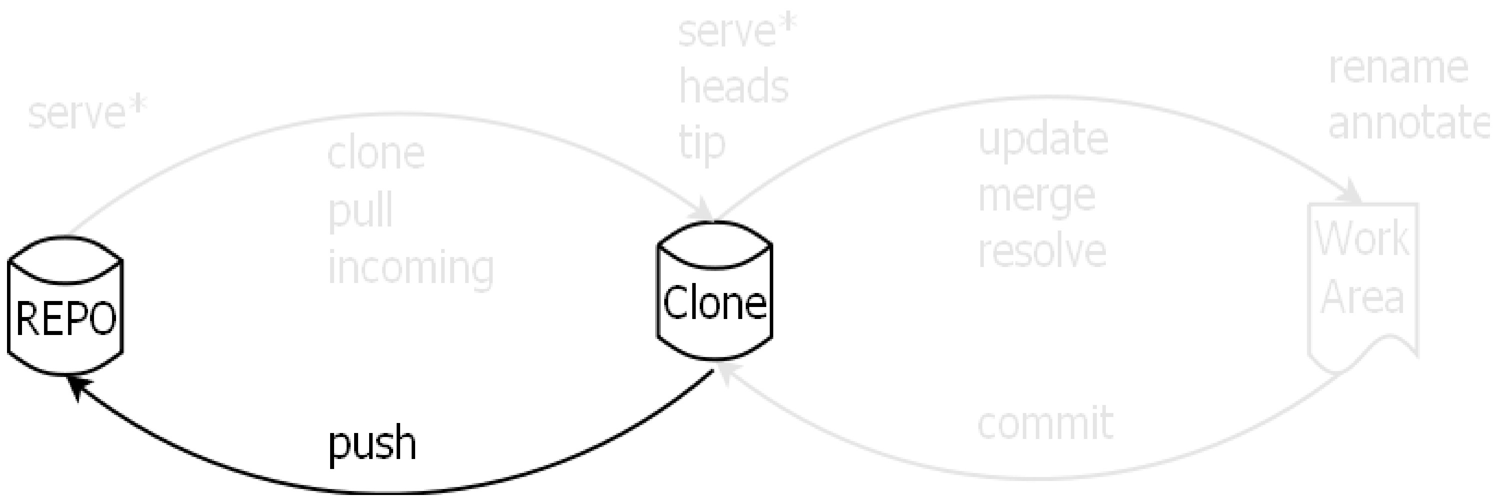
- Use to mark conflicting files as resolved during a merge
- Normally a merge tool is started automatically, e.g. Meld
- --list option shows which files require merging

## Commands - outgoing



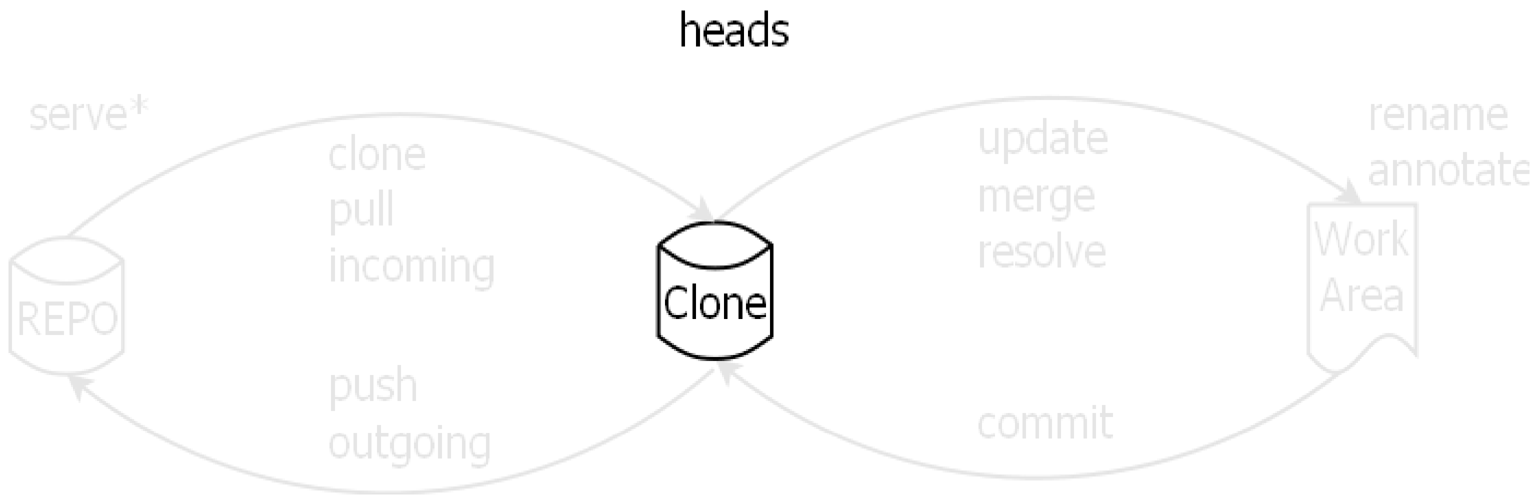
- List the local changesets to be synched at the next push to the specified repository
- Useful as a “test push”

# Commands - push



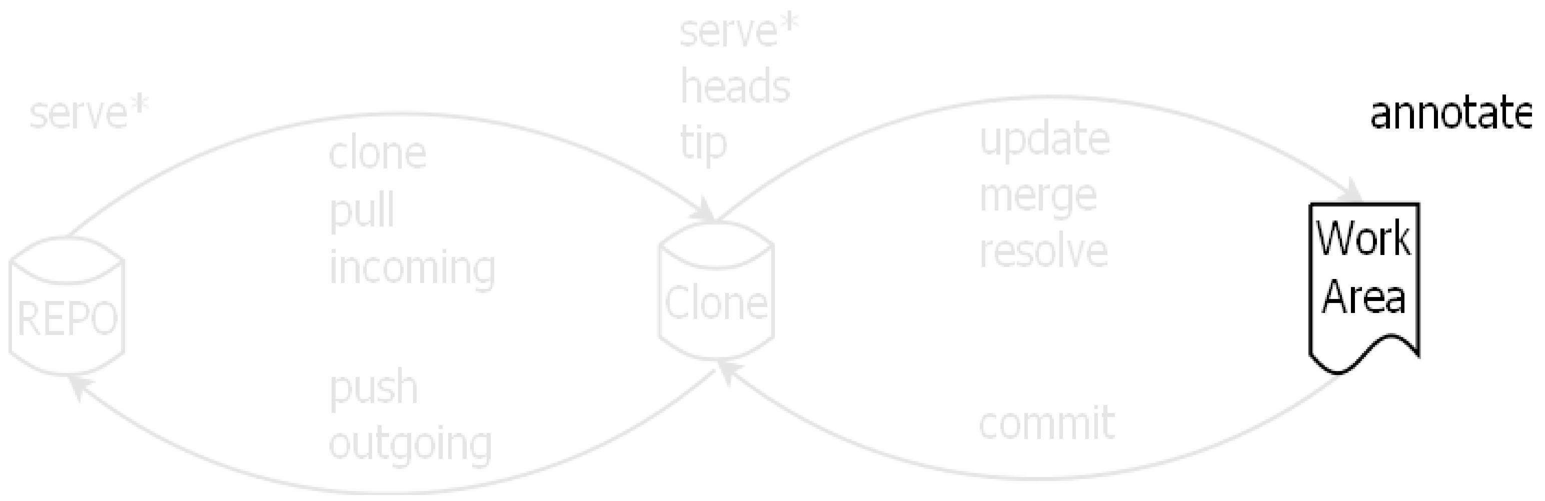
- Push the local changesets to the remote repository
- Changesets can be pushed to any repository derived from the common family tree
- By default, changes are pushed to the repository the clone was made from – shown in the file `<clone>/.hg/hgrc`
- NEVER use the `-f` option (force)

## Commands - heads



- Show a list of the branch heads in the repository
  - Unless specifically planned, there should not be multiple heads in the repository

## Commands - annotate



- Show changes per file on a line by line basis
- Helps in identifying when a particular change took place

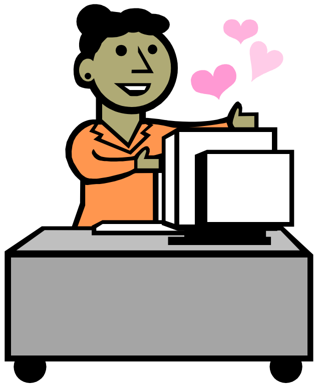
## Best Practices

- All the rules from a single user environment still apply
- Changesets can be pushed in batches
  - It is not necessary to push after each commit
  - Conventional wisdom says:
    *“Commit early, commit often”*
- Avoid creating multiple heads, unless doing “branchy” development

## Exercise 2

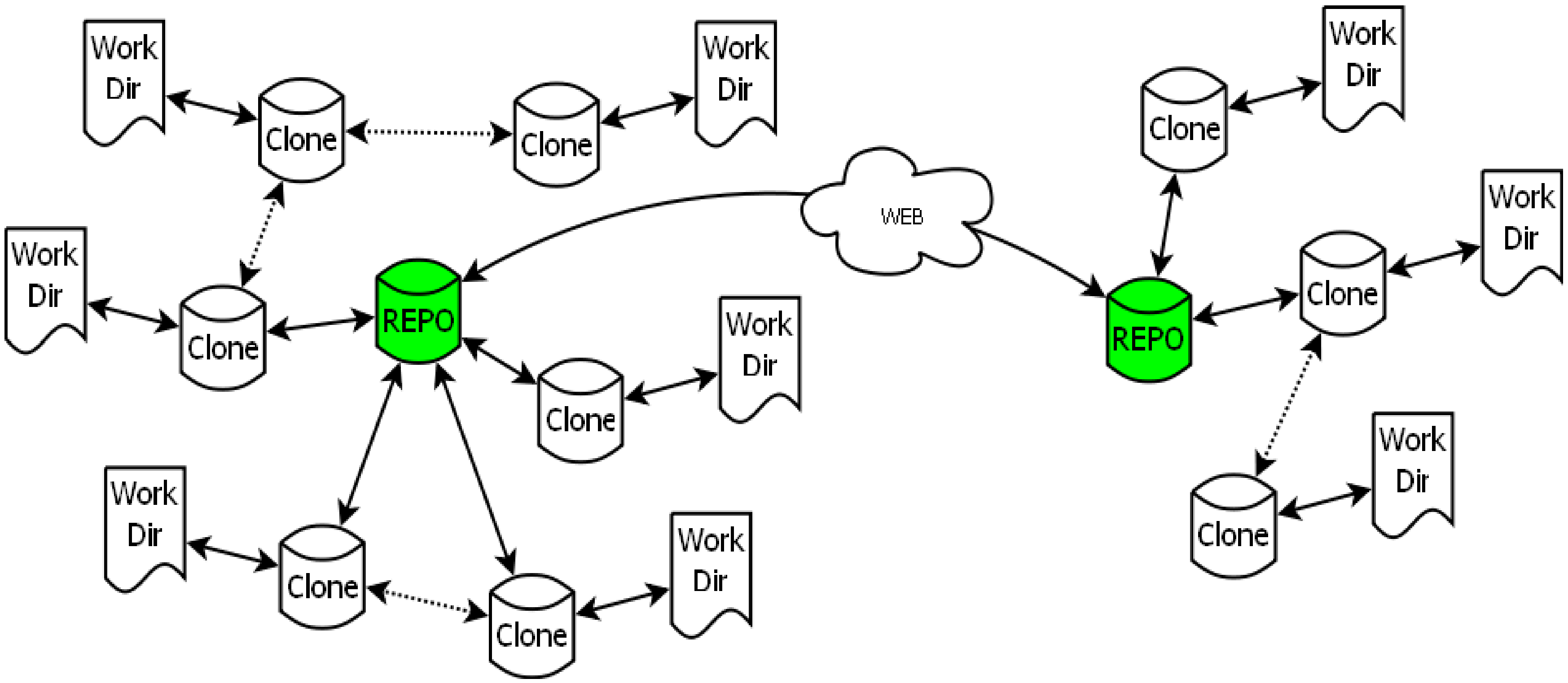
## Exercise 2 summary

- Questions and answers



# Multiple Sites

## Case #3 – Multi-Site Environment



## Multiple Users, Multiple Sites

- In a multi-user, multi-site environment, developers sync their clones with a site-specific main repository

- An administrator usually handles synching between sites

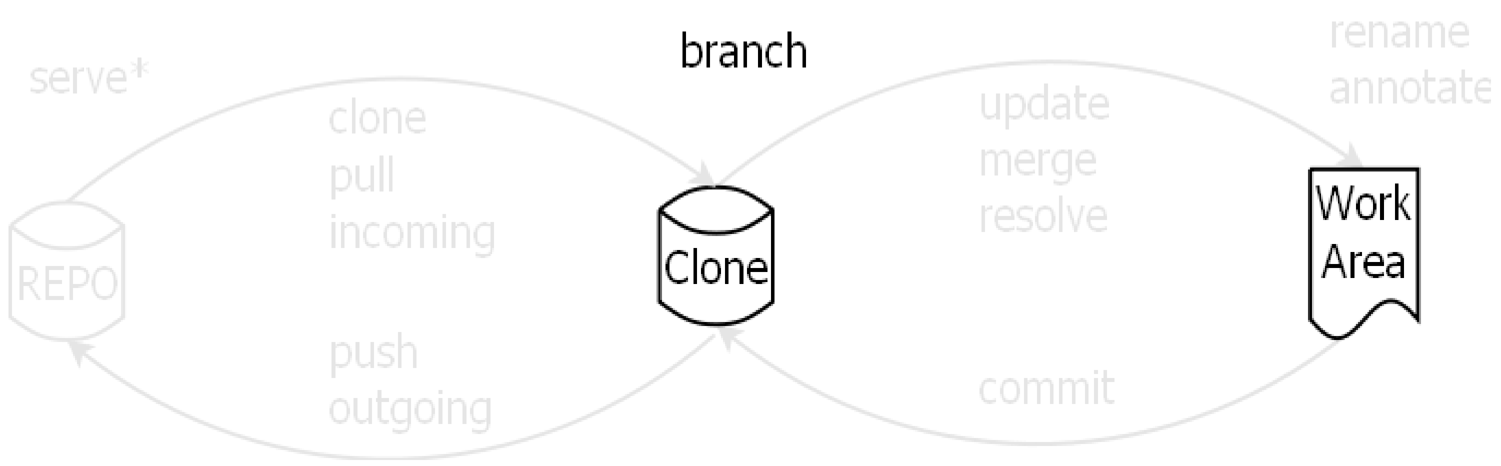
- This setup is practical for performing interim deliveries and capturing “off-site” changes

## Additional Commands

Some additional commands, though not specific to multi-site environments:

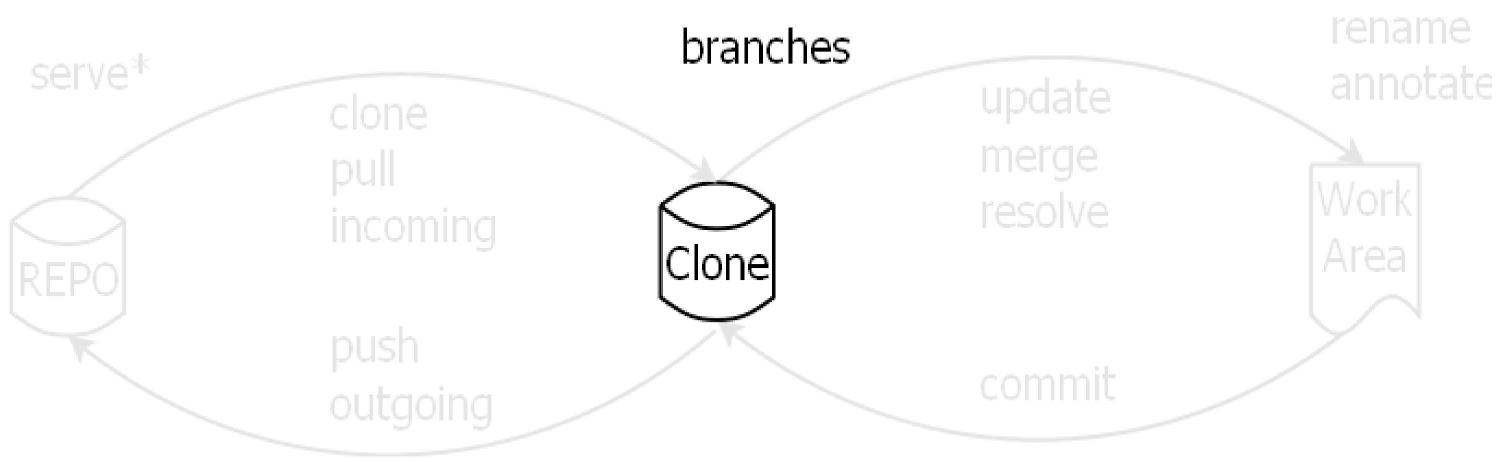
- branch
- branches
- export
- import
- graft

# Commands - branch



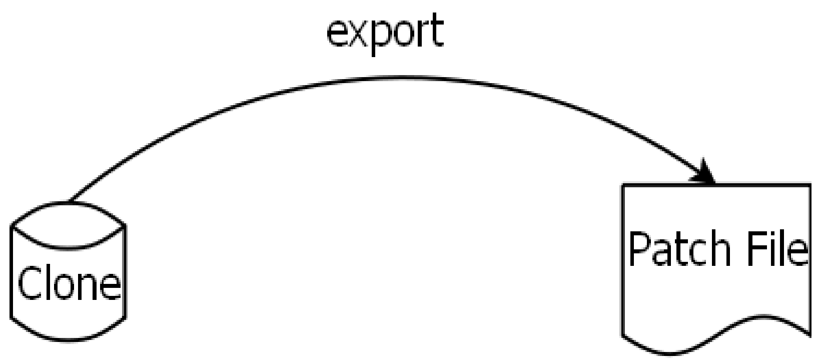
- `hg branch [NAME]`
- Display information about the current branch
- If a branch NAME is specified, instruct hg to create the branch (the next changeset commit will be placed into that branch)
- Also possible to use clones instead of branches (not recommended)

## Commands - branches



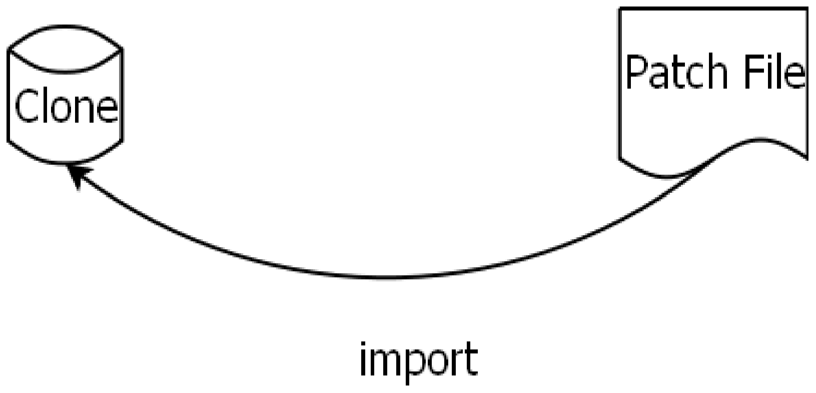
- Show the list of branches

## Commands - export



- Export a set of changesets as a patch file
- Can be sent to someone working on the project for importing into their repository (see import)

## Commands - import



- Import a patch file that was created using the hg export command
- Patch must be from same project tree

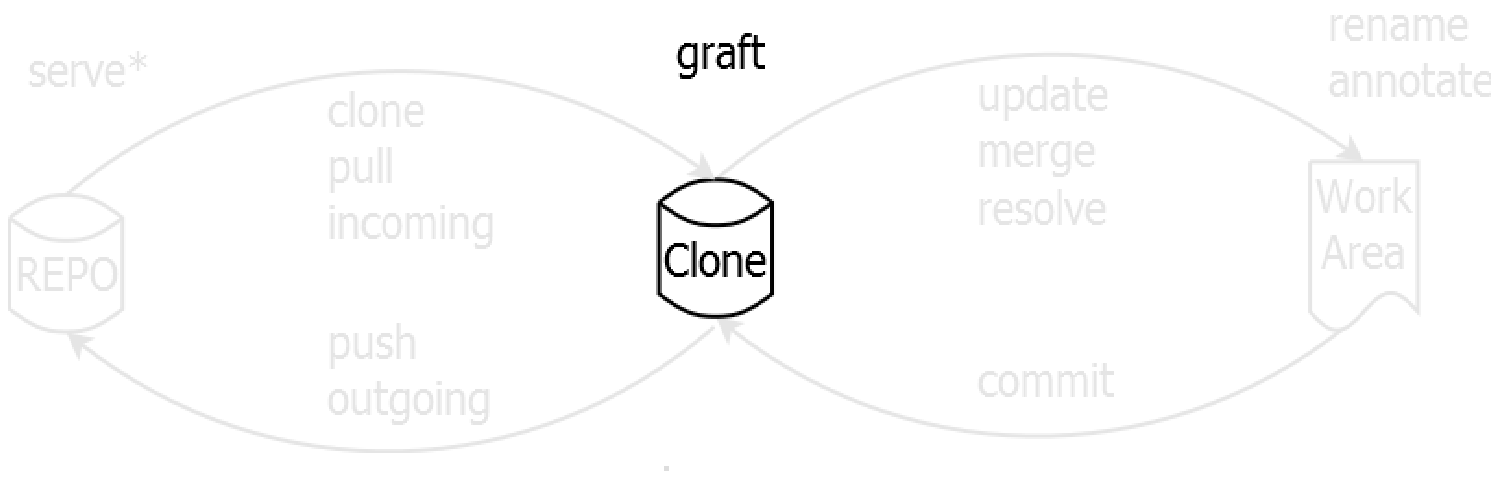
## Export / Import - Best Practices

- For deployment during projects, allows better tracking of on-the-fly bug fixes at the client
- Changes made at client can always be captured and synched with the project code
- Internet connection to client not required; repositories can be kept in sync using clone carried on a portable device

## Service Patch Mode

- Patches can be created from changesets in Mercurial using `export` and `import` commands
- These are simple text files containing all the changeset information required to import into another repository
- Service Manager/Consultant can build a changeset, create a patch file, and email it to the client for importing

## Commands - graft



- Provides the ability to transplant changes from one named branch to another
- Common when only some of the changes should be included, while skipping others
- For example, include a bug fix from default branch in release branch

## Extensions - List

- Mercurial has many extensions available
- Activate them using the .hgrc configuration file(s).
- Sample extensions:
  - extdiff
  - convert
  - rebase
  - color
  - graphlog (superfluous from 2.3, use log -G)
  - shelve (from 2.8)
  - hgk
  - purge
  - strip (from 2.8)

## Extensions - hgk

- Enables graphical project view
- Requires some special configuration, since the view is not installed as part of Mercurial
    - This is normally done as part of Jeppesen environment configuration

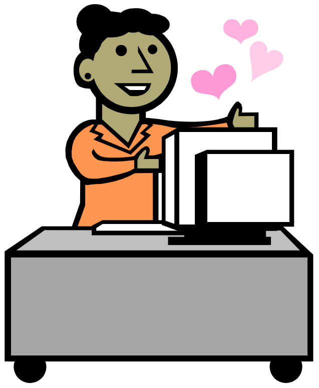
## Extensions - extdiff

- Enable graphical diff tools to be used
  - Many different tools already available and configured at Jeppesen by default
- Meld, tkdiff, kdiff3 are all viable options

## Exercise 3

## Exercise 3 summary

- Questions and answers



## Course Evaluation

Please take a few minutes to complete the evaluation form, it will help us improve the courses for you and your colleagues:

```
Special> Academy> Course Evaluation
```

Are the exercise definitions too vague (too real-life), would you like them to be more exact and straight forward?

Would you like to have even more info on slides (for self studying) or would you be stressed about the time constraint?

# The end

## This was Mercurial I

## Welcome back to Jeppesen Crew Academy!