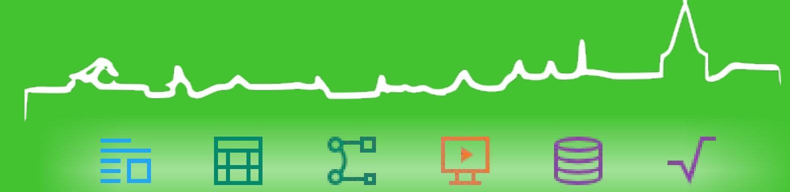
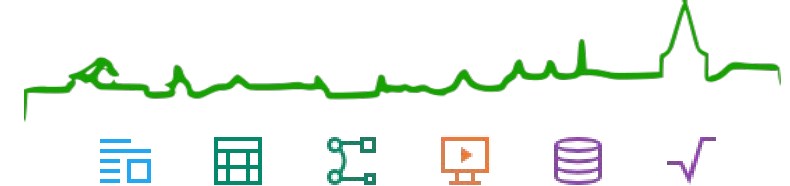


Effective Bisection and Bibisection

- Matthew Francis

Overview

- Introduction to bisection and bibisection
- How to bibisect effectively
  - Preparation
  - Execution
  - Results
- Questions



What is (bi)bisection?

A quick introduction

What is bisection?

- Bisection is a way to identify which commit introduced a bug without testing every single commit
  - Using the “git bisect” command
  - A number of commits must still be tested
  - Each must be built from source
- Binary bisection (“bibisection”) is a way to do the same thing faster
  - We provide you with pre-built binaries, making it unnecessary to build from source each time

What is bisection?

- How our git repository is structured

Release branch
for version x.y

Release x.y.1

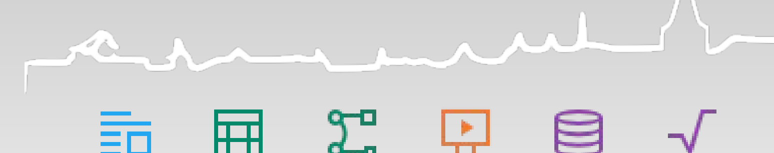
Release x.y.0

Branch
point

Master

Epoch

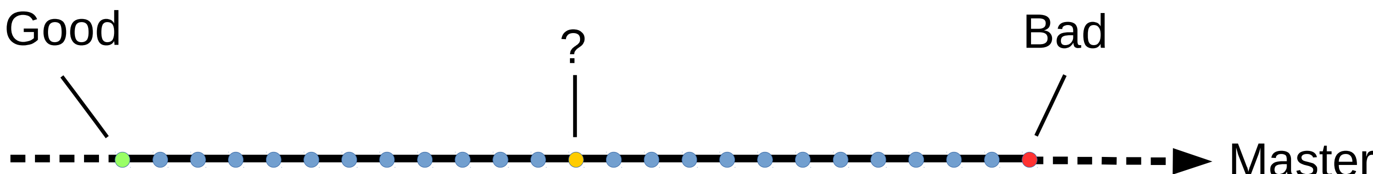
What is bisection?



- How many commits are made in a typical release?
  - 4.1: 10064
  - 4.2: 12147
  - 4.3: 14208
  - 4.4: 10932
  - 5.0: 9732 (10010 including merged branches)

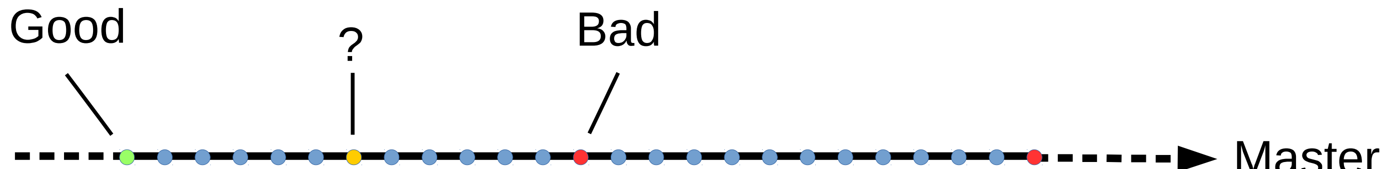
What is bisection?

- How does bisection work?
  - Starting with a known good and known bad commit, we perform a binary search for the first bad commit



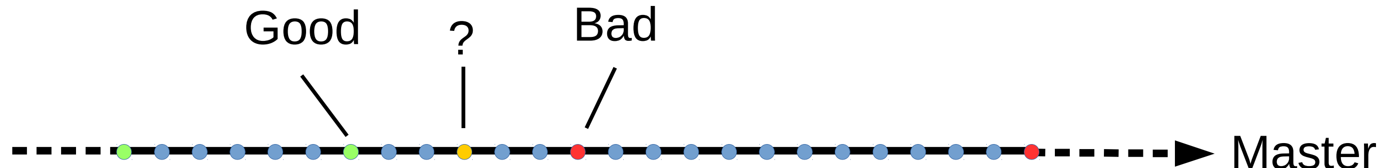
What is bisection?

- How does bisection work?
  - Each time, we test the commit in the middle of the latest known good and earliest known bad

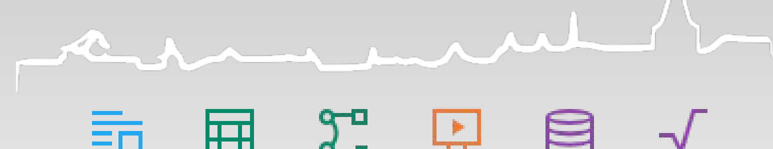


What is bisection?

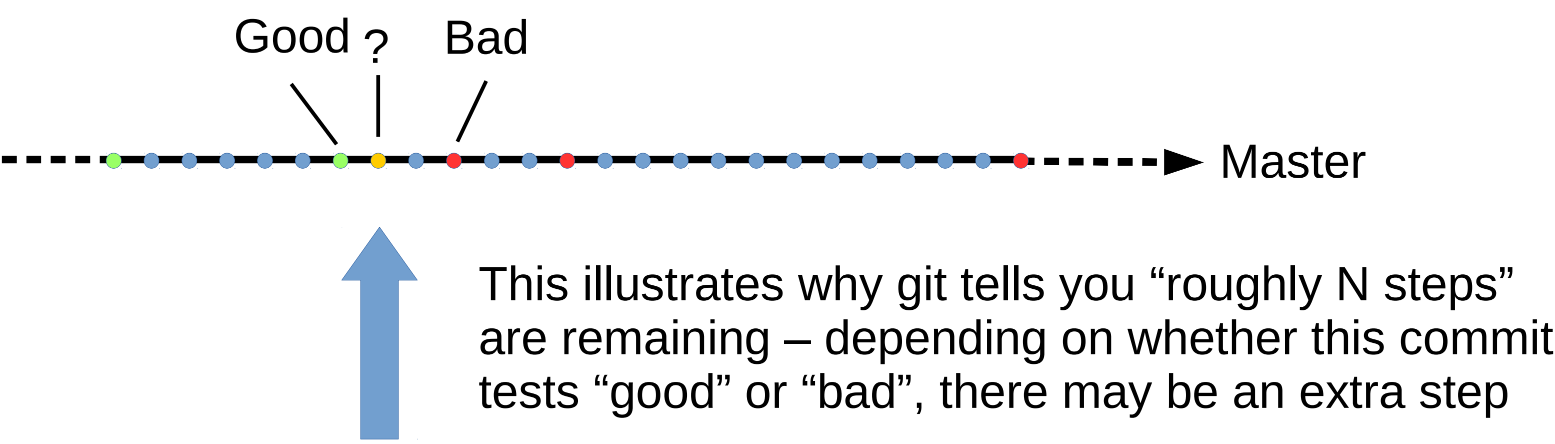
- How does bisection work?
  - Approximately half the commits in the remaining range can be eliminated on each test



What is bisection?

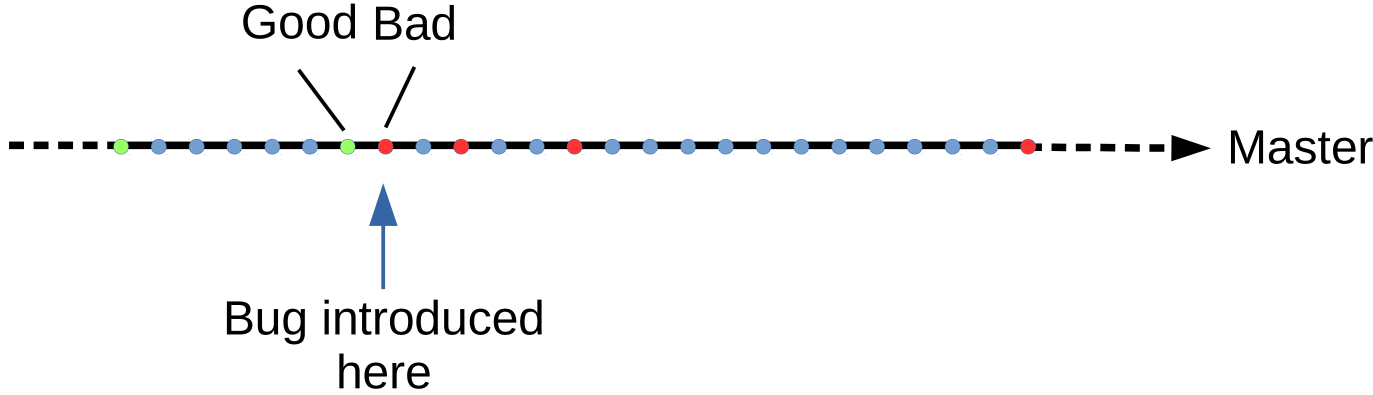


- How does bisection work?
  - This allows us to avoid testing most commits



What is bisection?

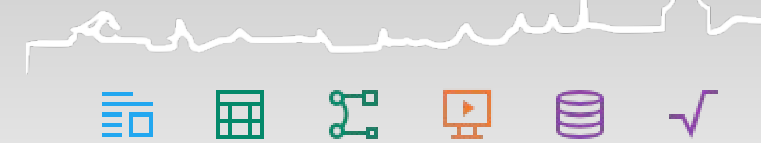
- How does bisection work?
  - After just a few tests, a single commit is identified



What is bibisection?

- Bibisection makes bisection faster
  - We provide you with a special git repository which contains pre-built binaries
  - No more need to spend all day compiling
  - A bibisect repository is at least several gigabytes in size
    - But you only have to download it once
    - Bugs can be bisected in minutes rather than hours

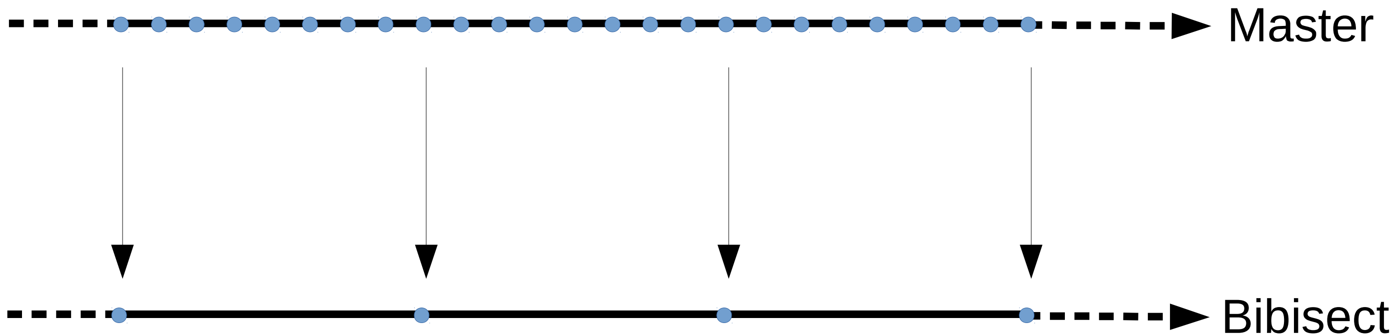
What is bibisection?



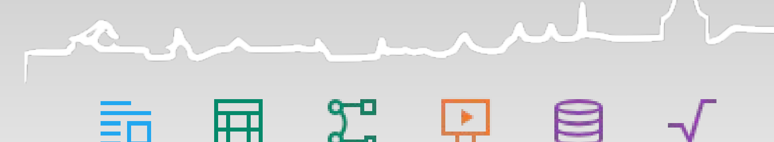
- The original kind of bibisect repository was sparse
  - Sparse bibisect repositories do not cover every source commit
    - Some contain 1 build for every N source commits, for instance 1 in 64 source commits
    - Some contain 1 build per day regardless of how many actual source commits occurred
  - Most sparse repositories are now obsolete, but a few are still useful
    - The “43all” repository covers some old periods of development which are not currently contained in any other repository
    - The “daily dbgutil” repository provides daily builds of current master

What is bibisection?

- Sparse bibisect
  - → One bibisect every several source commits



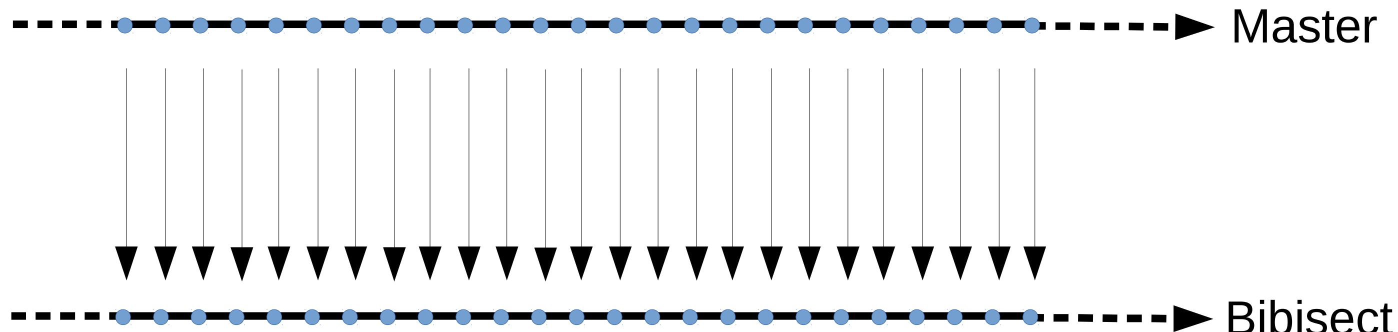
What is bibisection?



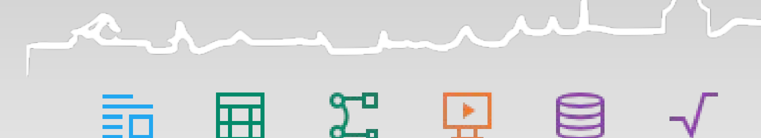
- Most recently built bibisect repositories are fine-grained
  - Fine-grained bibisect attempts to cover every source commit
    - Some commits don't compile; these are still excluded
  - Fine-grained repositories for recent master epochs are built from clean each time
    - The Linux 44max and 50max repositories have been built this way
    - This gives the greatest confidence that the result of a bibisect identifies the right commit

What is bibisection?

- Fine-grained bibisect
  → One bibisect commit per source commit



What is bibisection?



- Some fine-grained repositories for older epochs have been built incrementally
  - The Linux 41max, 42max and 43max repositories have been built this way
  - Each epoch takes about 1/4 the time to build that it would do from clean (about one week of build time rather than one month for each epoch)
  - This has allowed some remaining older regressions to be tracked down cheaply
  - The results from these repositories should be treated with care, as build system dependency errors may cause them to be imprecise. Double-check that the commit pointed to is plausible

What is bibisection?

- Bibisect coverage (as of September 2015)

3.3 3.4 3.5 3.6 4.0 4.1 4.2 4.3 4.4 5.0 5.1

Linux

43all

dbgutil

41max 42max 43max 44max 50max

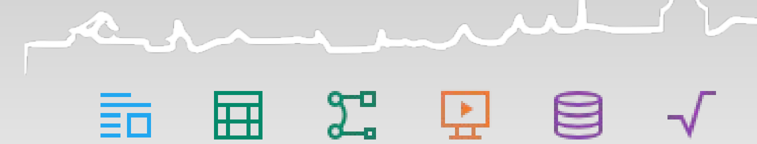
OSX

5.0 5.1

Windows

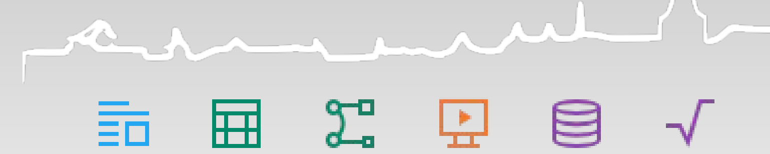
5.0 5.1

What is bibisection?

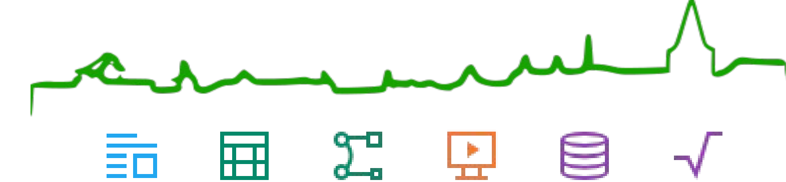


- What doesn't bibisect cover?
  - Very old commits between LibreOffice 3.3 and 3.5
  - Source commits on the release branches (with the exception of the “releases” repository)
    - Almost all regressions are first introduced on master
    - Commits on release branches should consist only of bugfixes which have been backported from an existing commit on master
    - A few bugs have occurred on a release branch alone, but this is very rare
- Source commits on the release branches may be covered in future

What is bibisection?

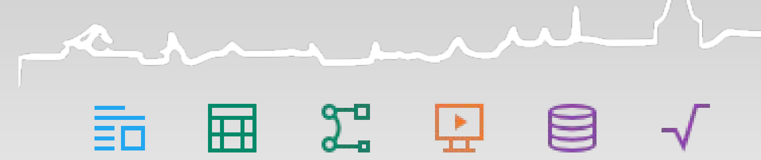


- Which of these bibisect repositories should I use?
  - Use the fine-grained repositories if possible
    - Linux 41max, 42max, 43max, 44max, 50max
  - If a bug is before or after the range covered by the above, use a suitable sparse repository
    - Linux 43all, daily dbgutil
  - There are other historical repositories, but ignore them
  - Don't use the “releases” repository for bibisection
    - Except to show that a bug predates LibreOffice



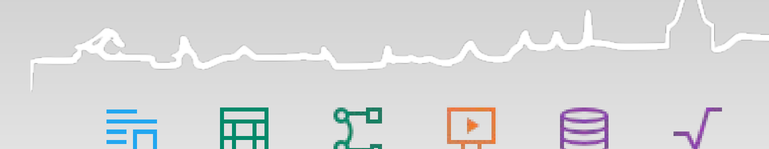
How to bibisect effectively

How to bibisect effectively



- What does “effective” mean?
  - Identifying either a single commit or a small range by a single person
  - Forwarding the bug to that person
    - Ideally while it's still recent enough for them to know and care about
- If a single commit can't be identified, documenting what you find about when a bug was introduced will still save other QA and developers from wasting time repeating what you did

Preparation



- Before starting:
  - Make sure you have solid reproduction steps, and can reproduce on some version
    - If it's not clear enough from the bug report, comment the exact steps you've worked out
    - If you can't reproduce at all, send the bug back for more information (NEEDINFO)
    - Simplify the reproduction steps as much as possible – you will have to perform them several times
    - If you have trouble reproducing, try near to the version the original reporter used

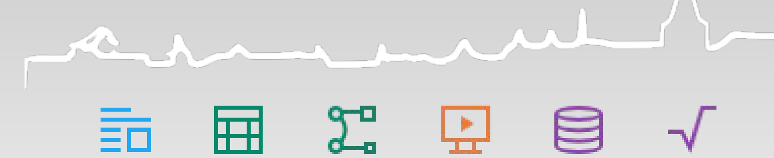
Preparation

- Before starting:
  - Make sure the bug is still present on master
    - Use the Linux daily dbgutil repo to check
      - Beware that occasionally the behaviour of dbgutil builds can be different
    - If the bug was present before, but appears to have been fixed on master, consider performing a reverse bibisect to find the commit that fixed it
      - Sometimes bugs are fixed tangentially. It's good to check that a fix has been applied to all currently supported releases

Preparation

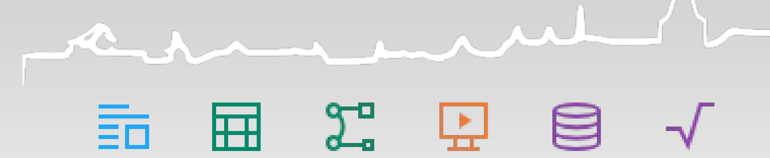
- More on simplifying reproduction steps:
  - If the original steps consist of doing several things to a document in sequence, try to prepare a test document at the point just before the bug occurs – and attach it to the bug if possible
  - If reproducing the bug requires running a macro, insert a form button which executes it so you don't have to hunt through the menus/dialogs for the macro each time
  - If the bug is about loading / saving in different file formats (e.g. loss of formatting), use command line conversion
    - `opt/program/soffice --headless –convert-to docx something.odt`

Execution



- Setting up the bibisect:
  - Select a commit that works and one that doesn't
    - Do actually check these
  - A single master epoch is usually a good range
    - i.e. a single fine-grained repo such as 44max or 50max
  - The same or a similar bug can be introduced several times, but bisection will only reveal one instance
  - Picking a good range helps ensure you find the latest instance of the bug, which will be the most useful to know

Execution



- While you're bibisecting:
  - Take care to follow the reproduction steps you worked out
  - Sometimes you may find commits which can't be used at all, or behave in some other way than before the bug or on current master
    - Start by assuming that there are only a few of these, and use “git bisect skip” to skip over them
    - If many commits must be skipped, split the work into two tasks and start again
      - Pick any commit with the third behaviour (“skip”) between the “good” and “bad” commits you started with
      - First bisect between “good” and “skip”
      - Then bisect between “skip” and “bad”
      - Comment both results on the bug

Dealing with the results

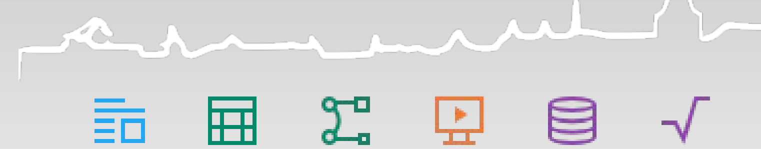
- After finishing a bibisection:
  - Re-check the result!
    - It's very easy to bisect “good” when you meant “bad” and vice versa
    - Occasionally you may find that a bug wasn't as reliably reproducible as you thought

→ Assuming a single commit has been identified in a fine-grained repository, checkout the “first bad” commit and retest that, then from that position checkout HEAD~1 and retest that

Dealing with the results

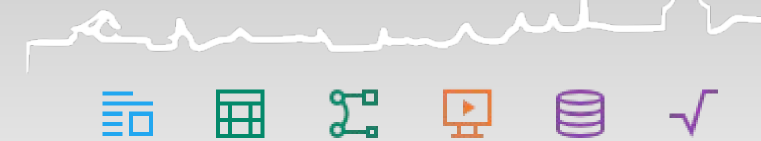
- What sorts of result are possible?
  - Fine-grained bibisect, single commit
    - → The best sort! We can send it straight to the author
  - Fine-grained bibisect, range of skipped commits
    - Or when a source range couldn't be built
      - → Maybe still OK – if all by one person. Otherwise equivalent to...
  - Sparse bibisect, single commit
    - Still a range of source commits really
      - → Someone will still need to look at this more later
  - Sparse bibisect, range of skipped commits
    - → Oh dear – extended build failure, the hardest to diagnose

Dealing with the results



- If the result points at a single commit or several by one person:
  - Adjust the bug fields
    - Remove Whiteboard: bibisectRequest
    - Check whether the bug is a true regression, or was introduced together with the feature it relates to
      - If it's a true regression, set the bug fields to include:
        - Whiteboard: bibisected
        - Keywords: bisected, regression
      - If the bug arrived together with its feature:
        - Whiteboard: bibisected implementationError
        - Keywords: bisected

Dealing with the results



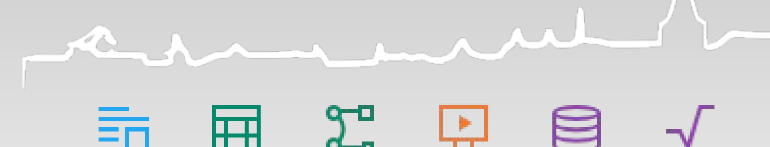
- If the result points at a single commit or several by one person:
  - Add a comment which identifies the source commit(s) in question
  - Cc: the original author on the bug
    - Note that “author” and “committer” may not be the same
    - **Don't Cc: the bibisect repo builder – listed as the “author” of the commit in the bibisect repo**

      → Look at the “author” and “committer” in the body of the commit message
    - Some commits are ported from OpenOffice. Don't try to contact the author in this case (typically addresses @apache.org)
      - Just for this case, Cc: the committer instead
    - Not everybody uses the same email address in Bugzilla as they do to commit with. If you type the author's name in the Cc: box, Bugzilla will show you a list which should contain the correct address
    - A few occasional contributors don't have accounts on Bugzilla. If you can't find a suitable email address, just note this in your comment

Dealing with the results

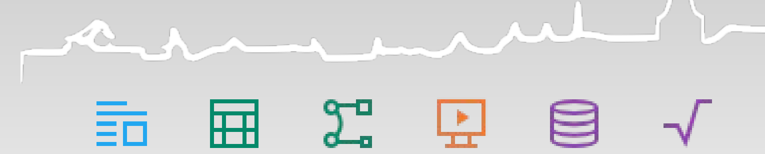
- If the result points at a single commit or several by one person:
  - Provided that the result has been double-checked, and the commit(s) identified could plausibly have introduced the bug, there's no reason to include the output of “git bisect log”
    - It adds visual noise to the bug, and doesn't add much useful information to the result

What if the results are incomplete?



- If a single commit couldn't be identified:
  - I.e. the result is a set of skipped commits that aren't by a single person, or
  - There was an extended build breakage, or
  - A sparse bibisect repository was used
- Replace Whiteboard: bibisectRequest with Whiteboard: bibisected
  - **Don't add Keywords: bisected**
- In this case, it's reasonable to append the “git bisect log” output in a comment
- Don't Cc: anybody
  - Unless you can read the corresponding source commits / commit logs and identify a very likely commit

Reverse bisection

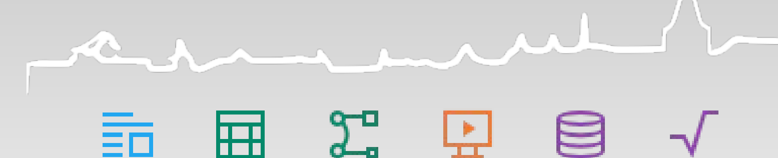


- Sometimes it's useful to know the commit that fixed a bug
  - E.g. to check that it's been applied to the branches of all currently supported releases
- To find this, you have to bisect in reverse
  - “git bisect” doesn't like to search in reverse

    → Make the initial “good” commit of the search one that contains the bug

    → Make the initial “bad” commit one in which it has been fixed
  - As you bisect, remember that “git bisect good” means “this commit contains the bug”, and “git bisect bad” means “the bug was fixed in this commit”
    - Repeat to yourself, “Fair is foul and foul is fair”

Git hints and tips

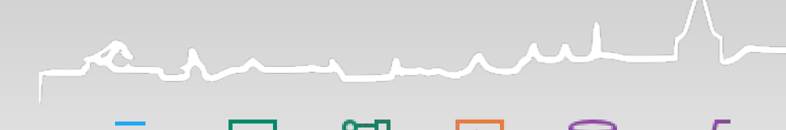


- Using the 43all repository
  - Some commits contain files they shouldn't (parts of the user profile)
  - “git bisect good / bad” may refuse to continue because there are files in the way
  - To fix this, from within the 43all directory, either:
    - Manually delete the files it complains about (slow, safe)
    - Or, run “`git clean -dffx`” (fast, hazardous)
      - Caution: this will delete **all** untracked files in the directory and reset **all** others to their state in the repository

Git hints and tips

- Use “`git bisect visualize`”
  - Shows information about the range of commits still to be tested
  - Useful to find the bounds of a range of skipped commits if bisection ended that way
    - “`git bisect log`” unhelpfully lists the skipped commits in random order
  - Needs to have “gitk” installed for graphical display

Git hints and tips



gitk: bibisect-50max

File Edit View Help

source-hash-d70ab9974d161ff1acc2543f04a6c9431e8dff43	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:31
source-hash-a59848c9999f655342db4c67e3dc390cc083e511	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:28
source-hash-60b052ccdefb44ddcd2c6d20755d9c45c67b2597	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:26
source-hash-6c84442f99de109b585d3ba8964deb8dcf261c0f	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:25
source-hash-3cd728f92c76d747cca7c8ed1d81294d3d0e9e2f	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:22
source-hash-45aaec8206182c16025cbcb20651ddbdf558b95d	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:20
source-hash-2902cdc173604068abba540118b30d97ddc6b38d	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:18
source-hash-f6a42d648e4786ddfcdb9c1f1636a2dea9bceb5f	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:15
source-hash-b86bdab9916e18c7b4c024882535f64129cd4a68	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:12
source-hash-797c48f0f74501def9f47444538c0e110fcfcca1	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:09
source-hash-e3e95f97638ff4d2c230cbc1f560a148863fb7a5	Matthew Francis <mjay.francis@gmail	2015-05-27 19:41:07

SHA1 ID: 0c30a2c797b249d0cd804cb71554946e2276b557 Row 4087 / 8173

Find commit containing: Exact All fields

Search

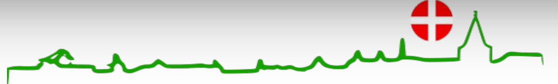
Diff Old version New version Lines of context: 3 Ignore space change

```
Author: Matthew Francis <mjay.francis@gmail.com>  2015-05-27 19:41:20
Committer: Matthew Francis <mjay.francis@gmail.com>  2015-05-27 19:41:20
Tags: source-hash-45aaec8206182c16025cbcb20651ddbdf558b95d
Parent: 98303e691ce20bfc60ed0c9f221de2ac6bcd3298 (source-hash-2902cdc173604068abba5
Child:  c2d86738026edc0015ac720351d559b446ae4017 (source-hash-3cd728f92c76d747cca7c
Branch: master
Follows: source-hash-2902cdc173604068abba540118b30d97ddc6b38d
Precedes: source-hash-3cd728f92c76d747cca7c8ed1d81294d3d0e9e2f

    source-hash-45aaec8206182c16025cbcb20651ddbdf558b95d

    commit 45aaec8206182c16025cbcb20651ddbdf558b95d
    Author:     Julien Nabet <serval2412@yahoo.fr>
    AuthorDate: Sun Mar 1 13:37:40 2015 +0100
    Commit:     Julien Nabet <serval2412@yahoo.fr>
    CommitDate: Sun Mar 1 13:38:00 2015 +0100

        Typo: ocured->occured

        Change-Id: Ic99caa7fc5189228b95b1f776dbc8c7ee835242e

------------------------- opt/program/classes/bsh.jar -------------------------
index 966ed68..8e15eb0 100644
Binary files a/opt/program/classes/bsh.jar and b/opt/program/classes/bsh.jar differ

----------------------------- opt/program/setuprc -----------------------------
index e7ad07a..909ae89 100644
@@ -1,2 +1,2 @@
```

Patch Tree

Comments
opt/program/classes/bsh.jar
opt/program/setuprc
opt/program/versionrc
opt/sdk/lib/libsalcpprt.a

asbel@micke... asbel@micke... tentests2.py ... asbel@micke... Untitled 1 - Li... Untitled 2 - Li... gitk: bibisect-... US 15:04



Git hints and tips

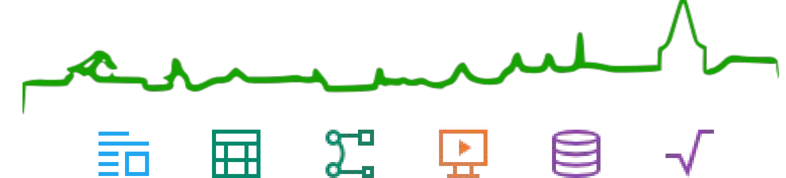
- Moving forward in history
  - There's no simple way to move forward in history from a specific commit in git, but you can use the following:
    - For the source repository and the daily dbgutil bibisect repo:

```
git checkout `git rev-list --topo-order HEAD..master | tail -1`
```

    - For other regular bibisect repositories:

```
git checkout `git rev-list --topo-order HEAD..latest | tail -1`
```

  - Useful when you want to quickly scrub backward / forward to re-check a result
  - Make them into scripts or shell aliases
    - I call mine “gitforward” and “bbforward”

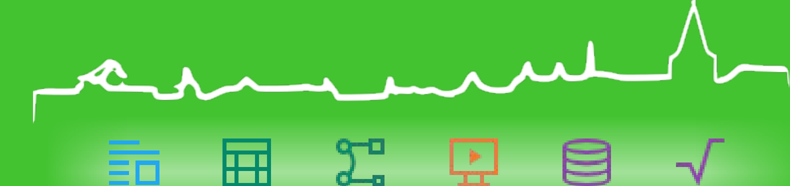


Further information

- https://wiki.documentfoundation.org/QA/Bibisect
- Freenode IRC channel #libreoffice-qa

Questions?

Aarhus 2015 CONFERENCE



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