HIGH-PERFORMANCE WEB APPLICATION FINGERPRINTING

BASED ON SCM REPOSITORIES

András Veres-Szentkirályi 2018-01-24

$ whoami

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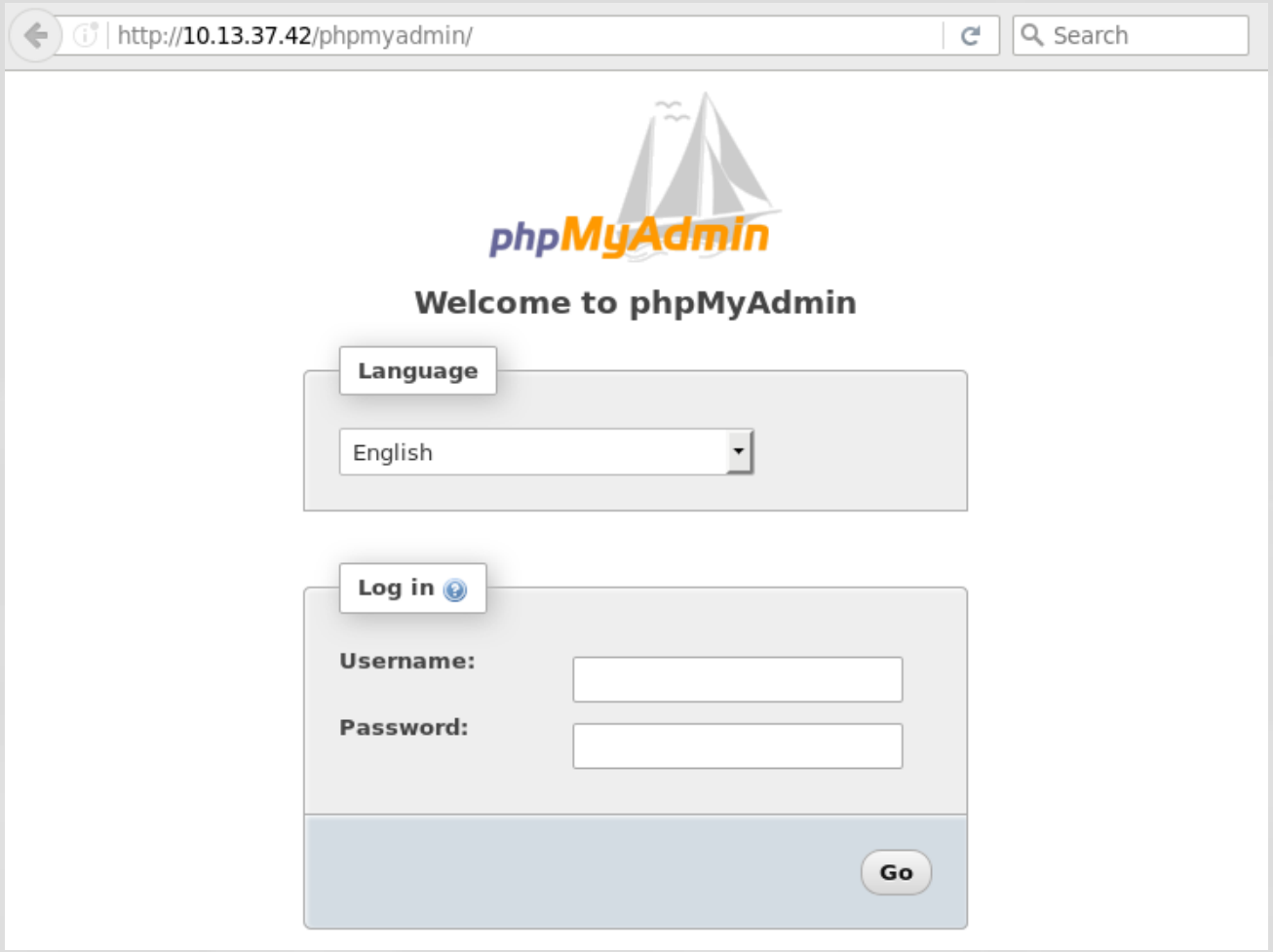
- OSCP, GWAPT, SISE
- co-founder of Silent Signal
- pentester, toolmaker

We all know that feeling



Phpmyadmin » Phpmyadmin » 4.4.6 : Security Vulnerabilities

Cpe Name:*cpe:/a:phpmyadmin:phpmyadmin:4.4.6*

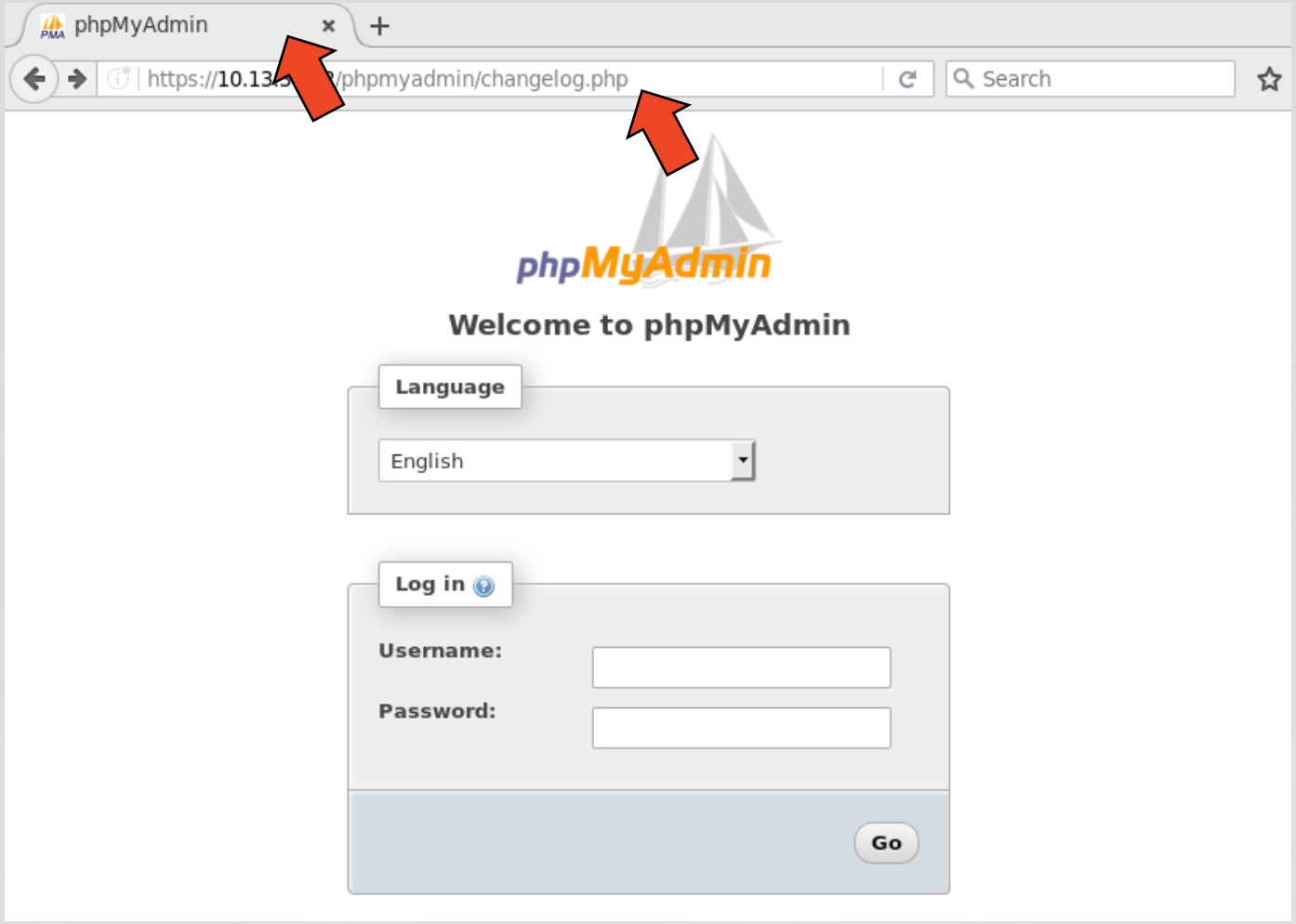
CVSS Scores Greater Than: 0 1 2 3 4 5 6 7 8 9

Sort Results By : CVE Number Descending CVE Number Ascending CVSS Score Descending Number Of Exploits Descending

Copy Results Download Results

#	CVE ID	CWE ID	# of Exploits	Vulnerability Type(s)	Publish Date	Update Date	Score	Gained Access Level	Access	Complexity	Authentication	Conf.	Integ.	Avail.
1	CVE-2017-1000018	20			2017-07-17	2017-07-19	5.0	None	Remote	Low	Not required	None	None	Partial
phpMyAdmin 4.0, 4.4., and 4.6 are vulnerable to a DOS attack in the replication status by using a specially crafted table name														
2	CVE-2017-1000017	918			2017-07-17	2017-07-19	6.5	None	Remote	Low	Single system	Partial	Partial	Partial
phpMyAdmin 4.0, 4.4 and 4.6 are vulnerable to a weakness where a user with appropriate permissions is able to connect to an arbitrary MySQL server														
3	CVE-2017-1000015	79		XSS	2017-07-17	2017-07-19	4.3	None	Remote	Medium	Not required	None	Partial	None
phpMyAdmin 4.0, 4.4, and 4.6 are vulnerable to a CSS injection attack through crafted cookie parameters														
4	CVE-2017-1000014	20			2017-07-17	2017-07-19	5.0	None	Remote	Low	Not required	None	None	Partial
phpMyAdmin 4.0, 4.4, and 4.6 are vulnerable to a DOS weakness in the table editing functionality														
5	CVE-2017-1000013	601			2017-07-17	2017-07-19	5.8	None	Remote	Medium	Not required	Partial	Partial	None
phpMyAdmin 4.0, 4.4, and 4.6 are vulnerable to an open redirect weakness														
6	CVE-2016-9866	352		CSRF	2016-12-10	2017-06-30	6.8	None	Remote	Medium	Not required	Partial	Partial	Partial
An issue was discovered in phpMyAdmin. When the arg_separator is different from its default & value, the CSRF token was not properly stripped from the return URL of the preference import action. All 4.6.x versions (prior to 4.6.5), 4.4.x versions (prior to 4.4.15.9), and 4.0.x versions (prior to 4.0.10.18) are affected.														
7	CVE-2016-9865	502		Bypass	2016-12-10	2017-06-30	7.5	None	Remote	Low	Not required	Partial	Partial	Partial
An issue was discovered in phpMyAdmin. Due to a bug in serialized string parsing, it was possible to bypass the protection offered by PMA_safeUnserialize() function. All 4.6.x versions (prior to 4.6.5), 4.4.x versions (prior to 4.4.15.9), and 4.0.x versions (prior to 4.0.10.18) are affected.														
8	CVE-2016-9864	89		Sql	2016-12-10	2017-06-30	6.0	None	Remote	Medium	Single system	Partial	Partial	Partial
An issue was discovered in phpMyAdmin. With a crafted username or a table name, it was possible to inject SQL statements in the tracking functionality that would run with the privileges of the control user. This gives read and write access to the tables of the configuration storage database, and if the control user has the necessary privileges, read access to some tables of the MySQL database. All 4.6.x versions (prior to 4.6.5), 4.4.x versions (prior to 4.4.15.9), and 4.0.x versions (prior to 4.0.10.18) are affected.														

WTF


phpMyAdmin
https://10.13
/phpmyadmin/changelog.php
Search
phpMyAdmin
Welcome to phpMyAdmin
Language
English
Log in
Username:
Password:
Go

Use the source


```
➤ curl -s https://10.13.37.42/phpmyadmin/ | egrep -o '<(script|img|link)[^>]{,80}>?'
<link rel="icon" href="favicon.ico" type="image/x-icon" />
<link rel="shortcut icon" href="favicon.ico" type="image/x-icon" />
<link rel="stylesheet" type="text/css" href="phpmyadmin.css.php?server=1&amp;lang=en&
<link rel="stylesheet" type="text/css" href="./themes/pmahomme/jquery/jquery-ui-1.9.2
<script type='text/javascript' src='js/whitelist.php?lang=en&amp;db=&amp;collation_conn
<script type="text/javascript" src="js/get_scripts.js.php?lang=en&amp;collation_connect
<script type='text/javascript' src='js/messages.php?lang=en&amp;db=&amp;collation_conne
<script type='text/javascript' src='js/get_image.js.php?theme=pmahomme'>
<script type="text/javascript">
<img src="./themes/pmahomme/img/logo_right.png" id="imLogo" name="imLogo" alt="phpMy
<img src="themes/dot.gif" title="" alt="" class="icon ic_s_error" />
<img src="themes/dot.gif" title="Documentation" alt="Documentation" class="icon ic_b
```

The basic idea

Release	SHA(file1.png)	SHA(file2.css)	SHA(file3.js)
v1.0	997b0bf3…	9d055618…	5df90ee1…
v1.1	997b0bf3…	b2e5ff43…	5df90ee1…
v1.2	997b0bf3…	b2e5ff43…	53718853…
v2.0	acf04ef6…	b2e5ff43…	5df90ee1…
v2.1	ef116a09…	b2e5ff43…	53718853…
v2.1.1	ef116a09…	b2e5ff43…	5df90ee1…
v3.0	ef116a09…	6f5681cf…	5df90ee1…
v4.0	ef116a09…	6f5681cf…	5df90ee1…
v4.0.1	ef116a09…	6f5681cf…	53718853…

Isaac Wolkerstorfer
@agnoster

Follow

Replying to @wilshipley

@wilshipley git gets easier once you get the basic idea that branches are homeomorphic endofunctors mapping submanifolds of a Hilbert space.

9:52 PM - 6 Mar 2011

584 Retweets **398** Likes

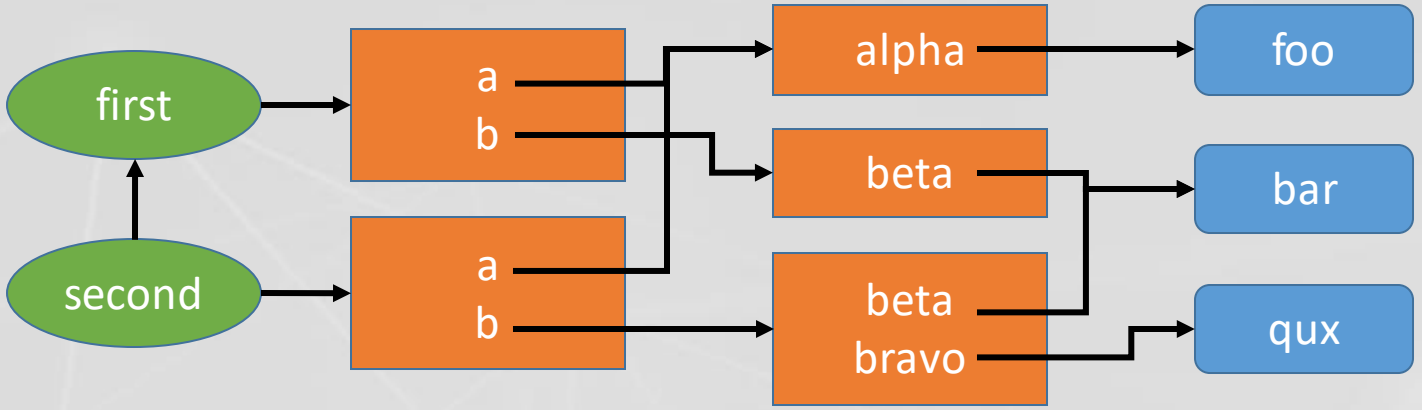
7 584 398

Git internals

```
git init

mkdir a b
echo foo >a/alpha
echo bar >b/beta
git add .
git commit -m first

echo qux >b/bravo
git add .
git commit -m second
```

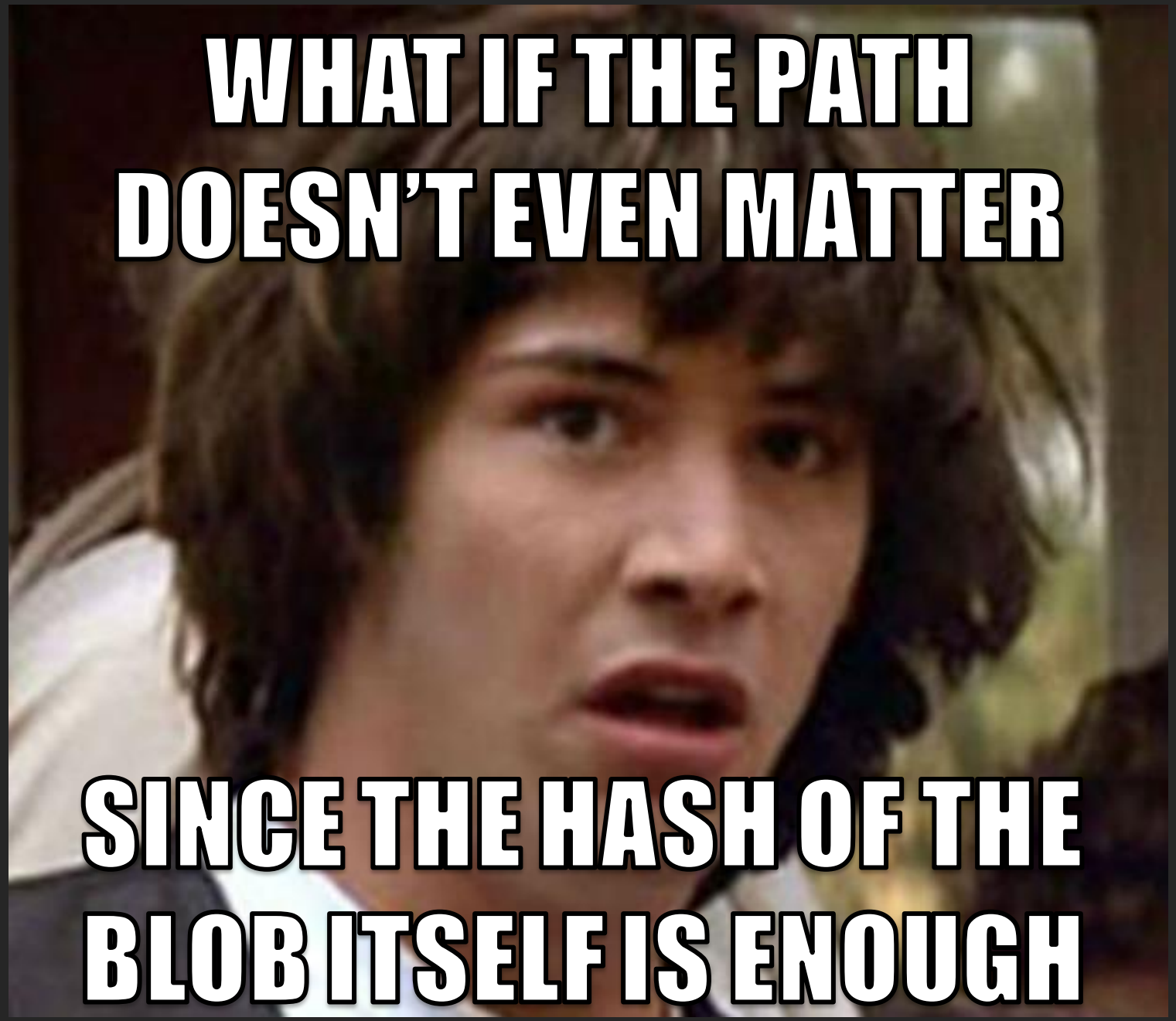


GIT OBJECT TYPES

- Tag – points to a commit
- Commit – points to a tree
- Tree – points to a list of trees and/or blobs
- Blob – file contents

Git internals


```
foo ➤ git show --pretty=raw 0b2c018 | grep tree
tree 7fe7893039e138b720acb999ab4c6df1737bfcc3
foo ➤ git ls-tree 7fe7893039e138b720acb999ab4c6df1737bfcc3
040000 tree 283c5baf40ace28b21e3db7df2dc0517ecb2ff8a    a
040000 tree 19b50acca521b41857bde95faa775c922eb9e060    b
foo ➤ git ls-tree 19b50acca521b41857bde95faa775c922eb9e060
100644 blob 5716ca5987cbf97d6bb54920bea6adde242d87e6    beta
100644 blob 100b0dec8c53a40e4de7714b2c612dad5fad9985    bravo
foo ➤ echo -ne 'blob 4\0bar\n' | sha1sum
5716ca5987cbf97d6bb54920bea6adde242d87e6  -
```


WHAT IF THE PATH
DOESN'T EVEN MATTER
SINCE THE HASH OF THE
BLOB ITSELF IS ENOUGH

Implementation

- Burp Suite → Java ☹
  - Pro not required!
- Git library: JGit (https://www.eclipse.org/jgit/, BSD licensed)
- Decoupled design
  - UI and logic separated
  - Standalone console version
  - Swing GUI when invoked as a Burp plugin

Demo time!

silent signal

What could be better

- Which files are good candidates for further narrowing the set?
  - Burp can issue HTTP requests
  - Why not do it automatically?
- List relevant tags/versions
  - For those poor souls that don't know about `git-describe(1)`
- More user friendly UI
  - "Scratched my own itch"
  - WORKSFORME™
    - (OK, I'd be able to use better)
- Needs a cool name and a logo

JVM vs. static calls


```
private static RecursiveResult isHashInTree(TreeWalk treeWalk, AnyObjectId tree,
                ObjectId hash, Set<AnyObjectId> knownToContain,
                Set<AnyObjectId> knownToBeFreeOf) throws IOException {
...
if (treeWalk.isSubtree()) {
        treeWalk.enterSubtree();
        rr = isHashInTree(treeWalk, mid, hash, knownToContain, knownToBeFreeOf);
```

Result: more than 8 times better throughput

Method name of the week

disposeBody

```
public final void disposeBody()
```

Discard the message buffer to reduce memory usage.

After discarding the memory usage of the `RevCommit` is reduced to only the `getTree()` and `getParents()` pointers and the time in `getCommitTime()`. Accessing other properties such as `getAuthorIdent()`, `getCommitterIdent()` or either message function requires reloading the buffer by invoking `RevWalk.parseBody(RevObject)`.

Since:

`4.0`

Eager vs. lazy evaluation

SHA(file1.png)	SHA(file2.css)	SHA(file3.js)
997b0bf3…	9d055618…	5df90ee1…
997b0bf3…	b2e5ff43…	5df90ee1…
997b0bf3…	b2e5ff43…	53718853…
acf04ef6…	b2e5ff43…	5df90ee1…
ef116a09…	b2e5ff43…	53718853…
ef116a09…	b2e5ff43…	5df90ee1…
ef116a09…	6f5681cf…	5df90ee1…
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ef116a09…	b2e5ff43…	5df90ee1…
ef116a09…	6f5681cf…	5df90ee1…
ef116a09…	6f5681cf…	5df90ee1…
ef116a09…	6f5681cf…	53718853…

Result: algorithm takes $\mathcal{O}(C)$ time instead of $\mathcal{O}(F \cdot C)$ in practice

Edge cases

SHA(file1.png)	SHA(file2.css)	SHA(file3.js)
997b0bf3…	9d055618…	5df90ee1…
997b0bf3…	b2e5ff43…	5df90ee1…
997b0bf3…	b2e5ff43…	53718853…
acf04ef6…	b2e5ff43…	5df90ee1…
ef116a09…	b2e5ff43…	53718853…
ef116a09…	6f5681cf…	5df90ee1…
ef116a09…	6f5681cf…	5df90ee1…
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ef116a09…	6f5681cf…	53718853…
ef116a09…	6f5681cf…	5df90ee1…
ef116a09…	6f5681cf…	5df90ee1…
ef116a09…	6f5681cf…	5df90ee1…
ef116a09…	6f5681cf…	5df90ee1…

Needs more field experience – mine and yours as well!

Caching

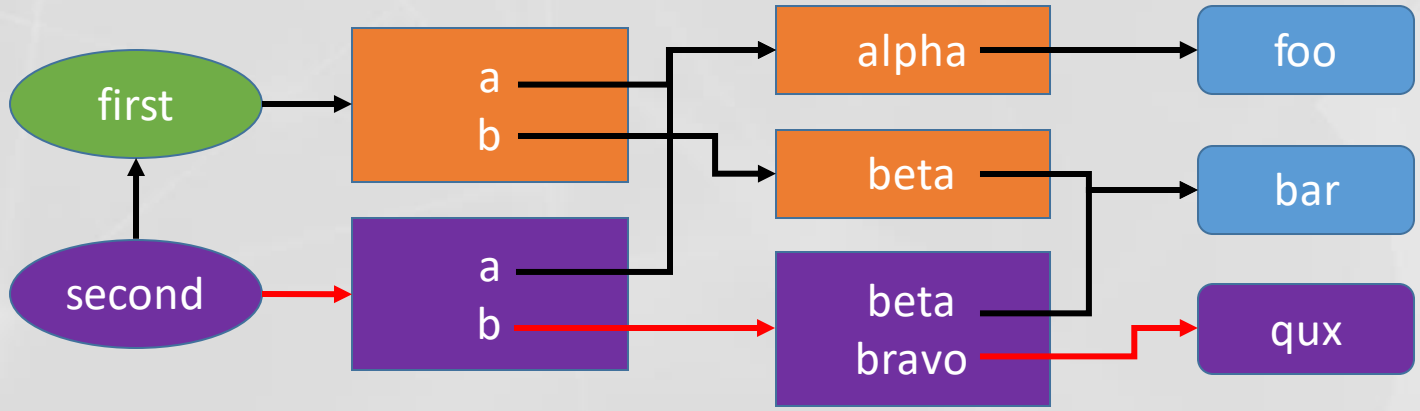
Categories: trees that directly or indirectly…

- …contain the blob we're looking for (B)
- …don't contain the blob we're looking for (N)

Observations (T, T' are trees)

- $\exists T' \in T : T' \in B \implies T \in B$
- $\forall T' \in T : T' \in N \implies T \in N$
- $|B| \ll |N|$

TODO: persistent caching



SOURCE CODE

silent signal

Everything is available on GitHub

- MIT licensed
- Pull requests welcome!
- https://github.com/silentsignal/burp-git-version

THANK YOU!

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