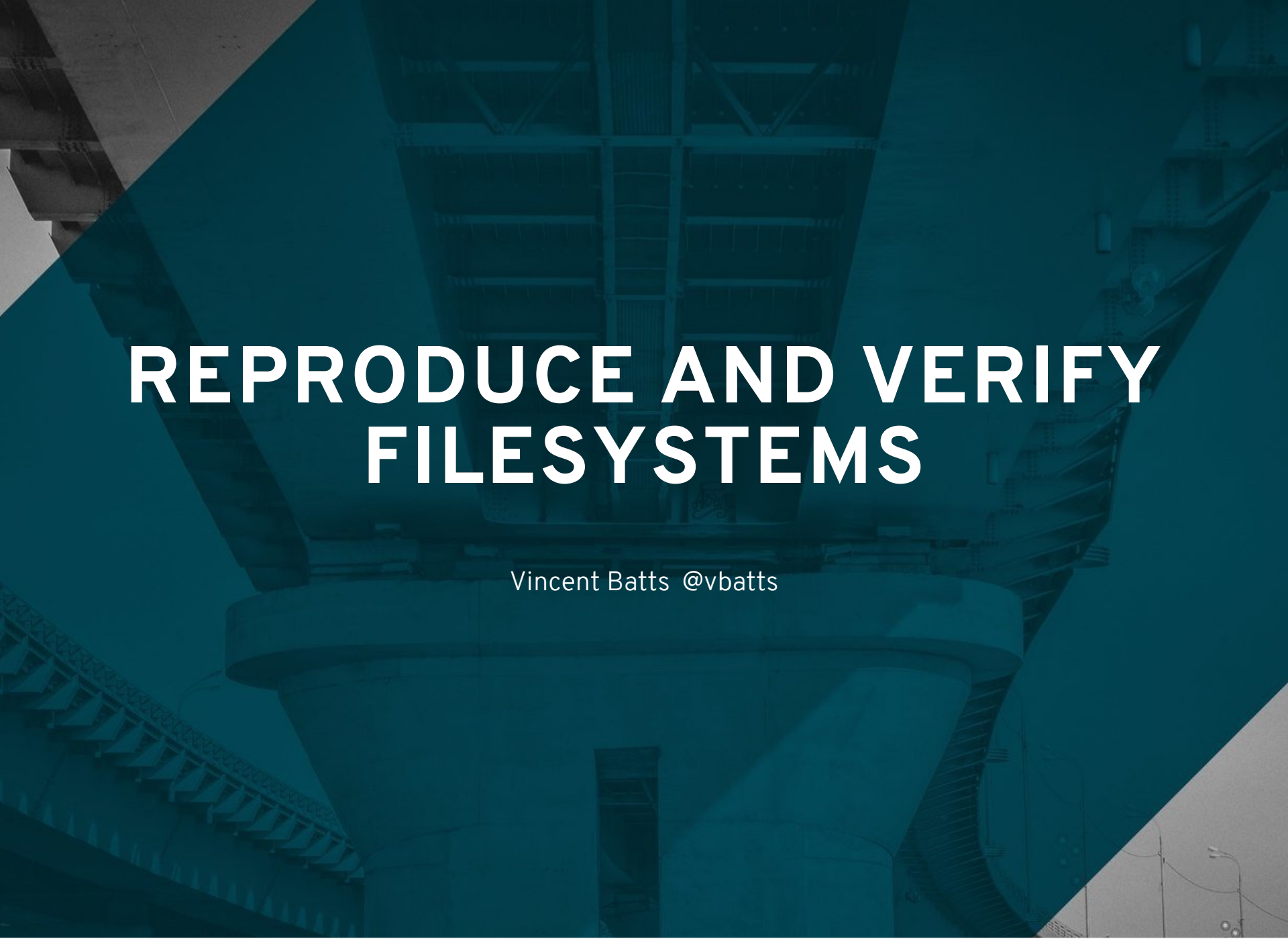


REPRODUCE AND VERIFY FILESYSTEMS

Vincent Batts @vbatts

```
$> finger $(whoami)
```

Login: vbatts **Name:** Vincent Batts

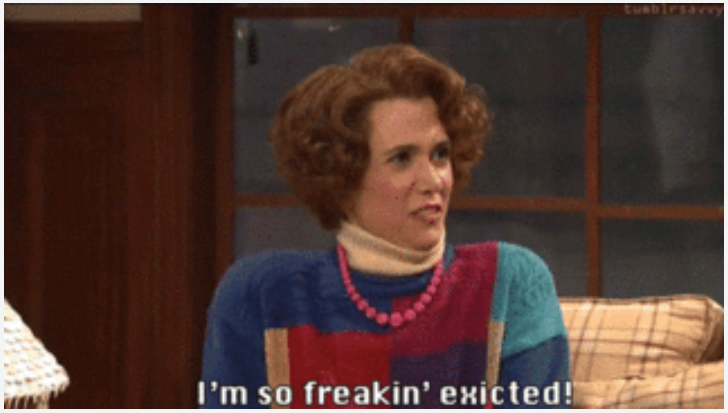
Directory: /home/vbatts **Shell:** /bin/bash

Such mail.

Plan:

OHMAN

```
$> id -Gn
devel opencontainers docker appc redhat golang slackware
```



AGENDA

- Packaging

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- Content Addressibility

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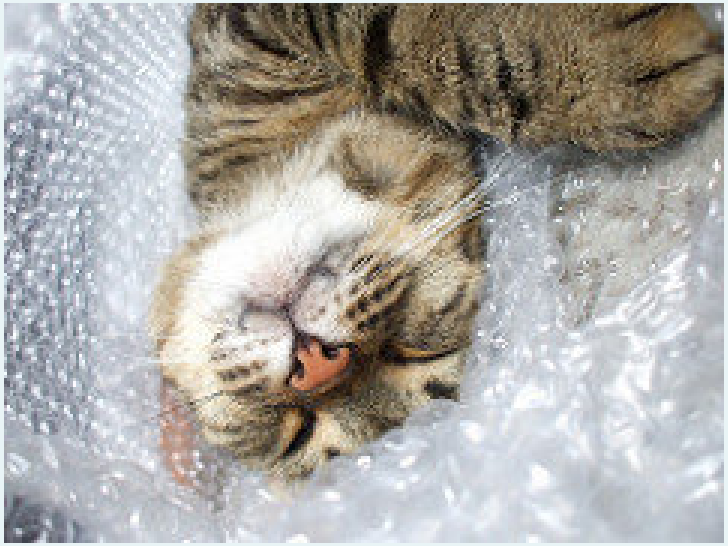

PACKAGING

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tar archives

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Slackware packages (tar(1) archives)

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Container Images (tar(1) archives)

CONTENT ADDRESSIBILITY

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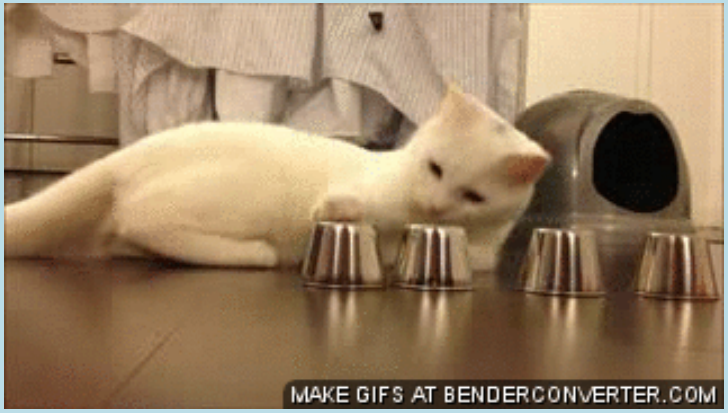

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`gzip` vs Golang `compress/gzip` vs Zlib

COMPRESSION!

same objects, but variation in compression

inflate/deflate (RFC1951)
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`gzip` vs Golang `compress/gzip` vs Zlib

ideally compress for transfer and storage, but not for identity

COMPRESSION!

```
#!/bin/sh
dd if=/dev/urandom of=rando.img bs=1M count=2
cat rando.img | gzip -n > rando.img.gz
cat rando.img | gzip -n -9 > rando.img.9.gz
cat rando.img | xz > rando.img.xz
cat rando.img | xz -9 > rando.img.9.xz
sha1sum rando.img* > SHA1

cat rando.img | gzip -n > rando.img.gz
cat rando.img | gzip -n -9 > rando.img.9.gz
cat rando.img | xz > rando.img.xz
cat rando.img | xz -9 > rando.img.9.xz
sha1sum -c ./SHA1
```

COMPRESSION!

```
#!/usr/bin/env ruby

require 'zlib'
include Zlib

input = File.open(ARGV.first)
GzipWriter.open(ARGV.first + '.gz', DEFAULT_COMPRESSION, HUFFMAN_ONLY) do |gz|
  gz.write(IO.binread(input))
end
input.flush()
input.close()
```

COMPRESSION!

```
package main

import (
        "compress/gzip"
        "io"
        "os"
)

func main() {
        input, err := os.Open(os.Args[1])
        if err != nil {
                println(err.Error())
                os.Exit(1)
        }
        output, err := os.Create(os.Args[1] + ".gz")
        if err != nil {
                println(err.Error())
                os.Exit(1)
        }
        gz := gzip.NewWriter(output)
        if _, err := io.Copy(gz, input); err != nil {
                println(err.Error())
                os.Exit(1)
        }
```

REPRODUCIBLE ARCHIVE

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reproducible-builds.org

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processed checksum of tar archive (see deprecated Docker TarSum)

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github.com/vbatts/tar-split

REPRODUCIBLE ARCHIVE

```
go install github.com/vbatts/tar-split/cmd/tar-split

tar cf demo.tar *.sh
sha1sum demo.tar | tee SHA1

tar-split disasm --no-stdout ./demo.tar
ls -lh tar-data.json.gz

rm -f demo.tar
tar-split asm --output demo.tar --path .
sha1sum -c ./SHA1
```

VERIFY AT REST FILESYSTEMS

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Passive validation of directory hierarchies
BSD mtree(8)

VERIFY AT REST FILESYSTEMS

FreeBSD mtree(8)

mtree-port (for linux)

go-mtree (golang cli and library)

libarchive-formats(5)

VERIFY AT REST FILESYSTEMS

with packages: libarchive and python-libarchive-c

```
#!/usr/bin/env python

import libarchive

with libarchive.file_writer('../demo.mtree', 'mtree') as a:
    a.add_files('./')
```

NOTICE: libarchive uses older mtree format

VERIFY AT REST FILESYSTEMS

```
mtree -c -p ./ -K sha256digest | tee /tmp/demo.mtree

mtree -f /tmp/demo.mtree -p ./
echo $?

read

touch $0 # SCANDALOUS
mtree -f /tmp/demo.mtree -p ./
```

VERIFY AT REST FILESYSTEMS

Directory Path

```
go get -u github.com/vbatts/go-mtree/cmd/gomtree
gomtree -c -p ./ -K sha256digest | tee /tmp/demo.mtree

gomtree -f /tmp/demo.mtree -p ./
echo $?

read

touch $0 # SCANDALOUS
gomtree -f /tmp/demo.mtree -p ./
```

VERIFY AT REST FILESYSTEMS

Tar Archive Support

```
tar cf /tmp/demo.tar .
gomtree -c -T /tmp/demo.tar -K sha256digest | tee /tmp/demo.mtree

gomtree -f /tmp/demo.mtree -T /tmp/demo.tar
echo $?

read

gomtree -f /tmp/demo.mtree -p ./
echo $?
```

CALL TO ACTION

You have the need to store archives, whole and extracted,

check out github.com/vbatts/tar-split

You have the need to verify, or restore, a filesystem regardless of how it was distributed, check out github.com/vbatts/go-mtree or other mtree projects

VINCENT BATTS

@VBATTS| VBATTS@REDHAT.COM

THANK YOU!