

# **System Administration**

**Week 09, Segment 2**  
**Backups by Example**

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## File deletion recovery

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(Accidentally) deleted files ought to be recoverable for a certain amount of time:

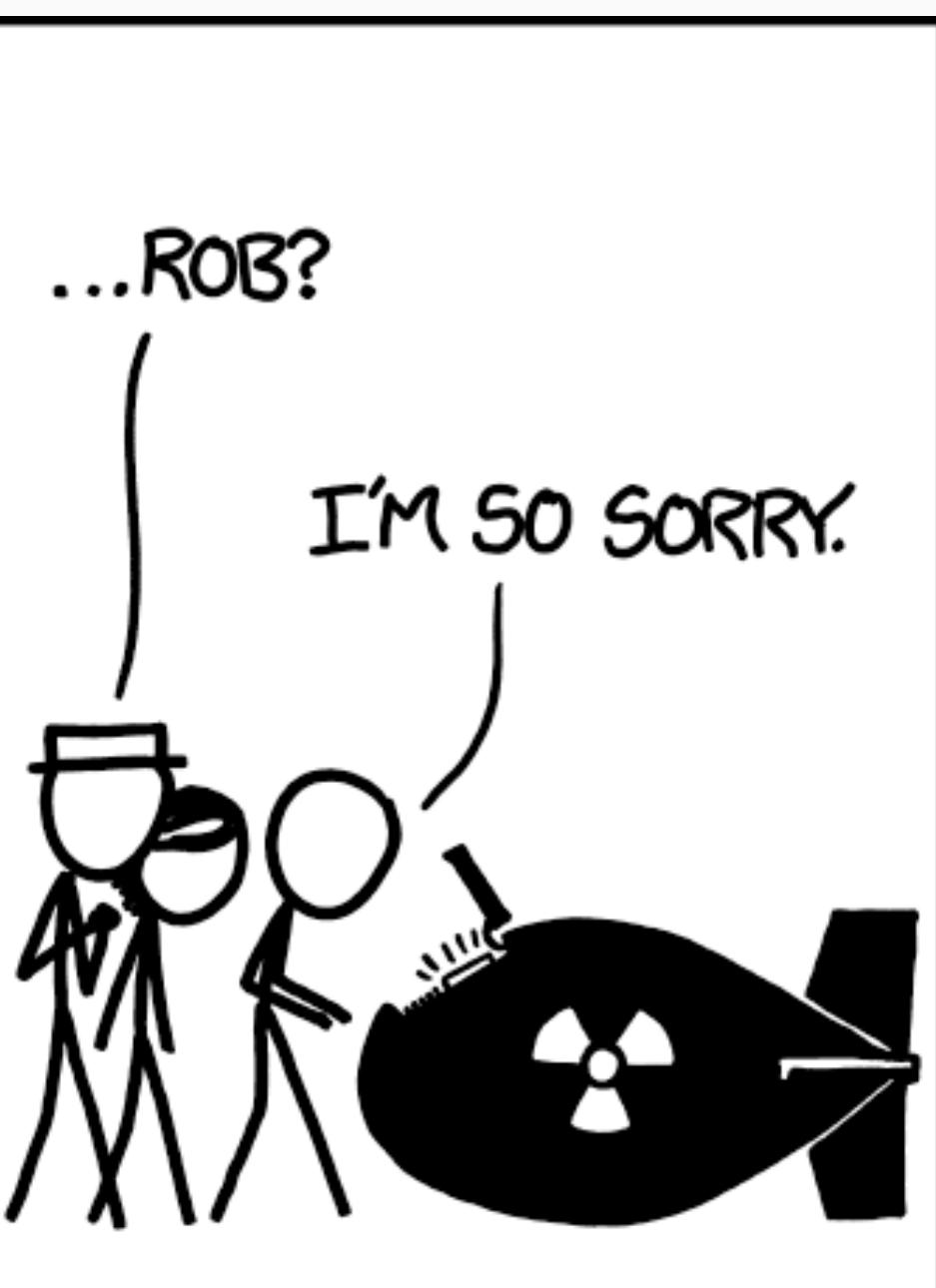
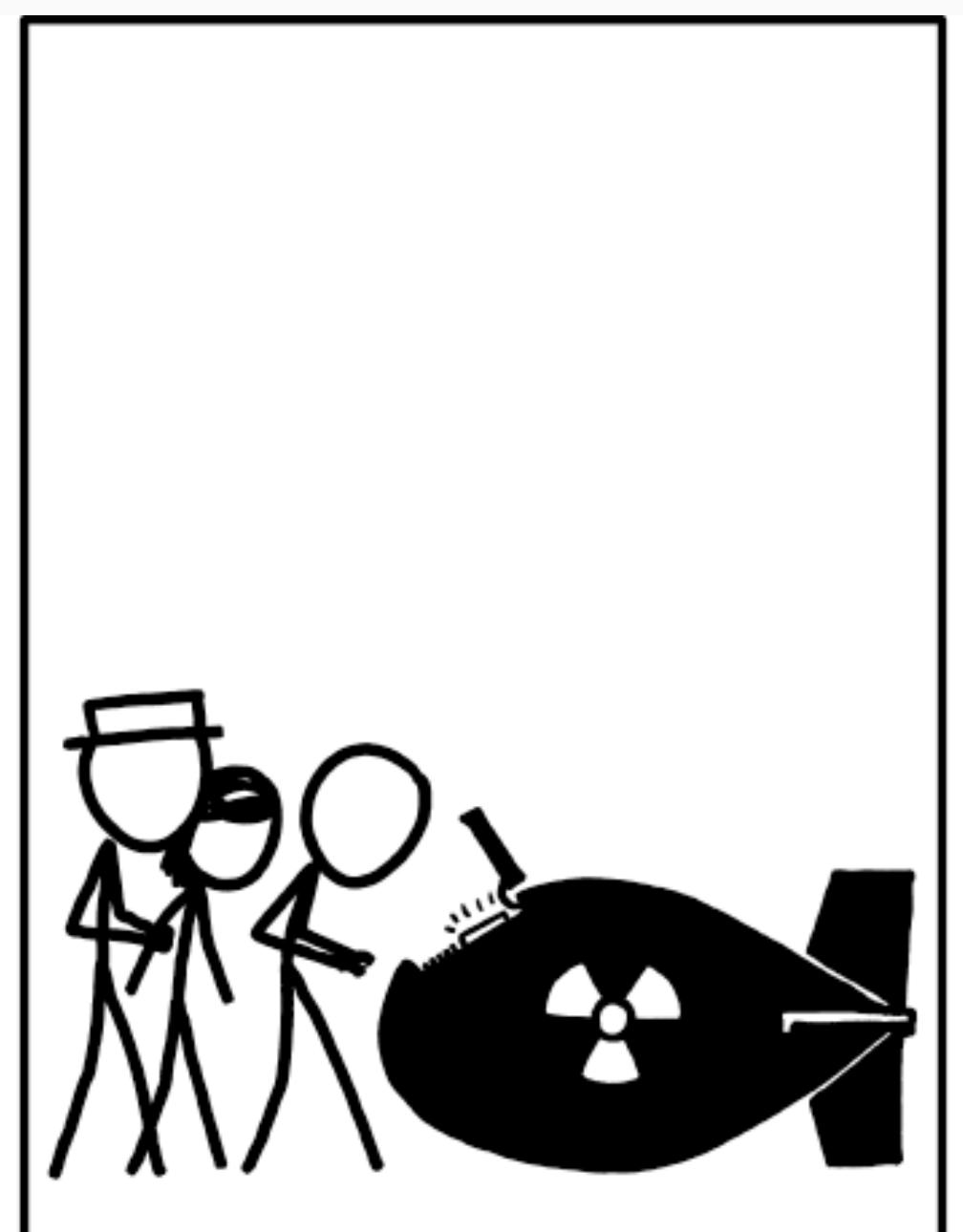
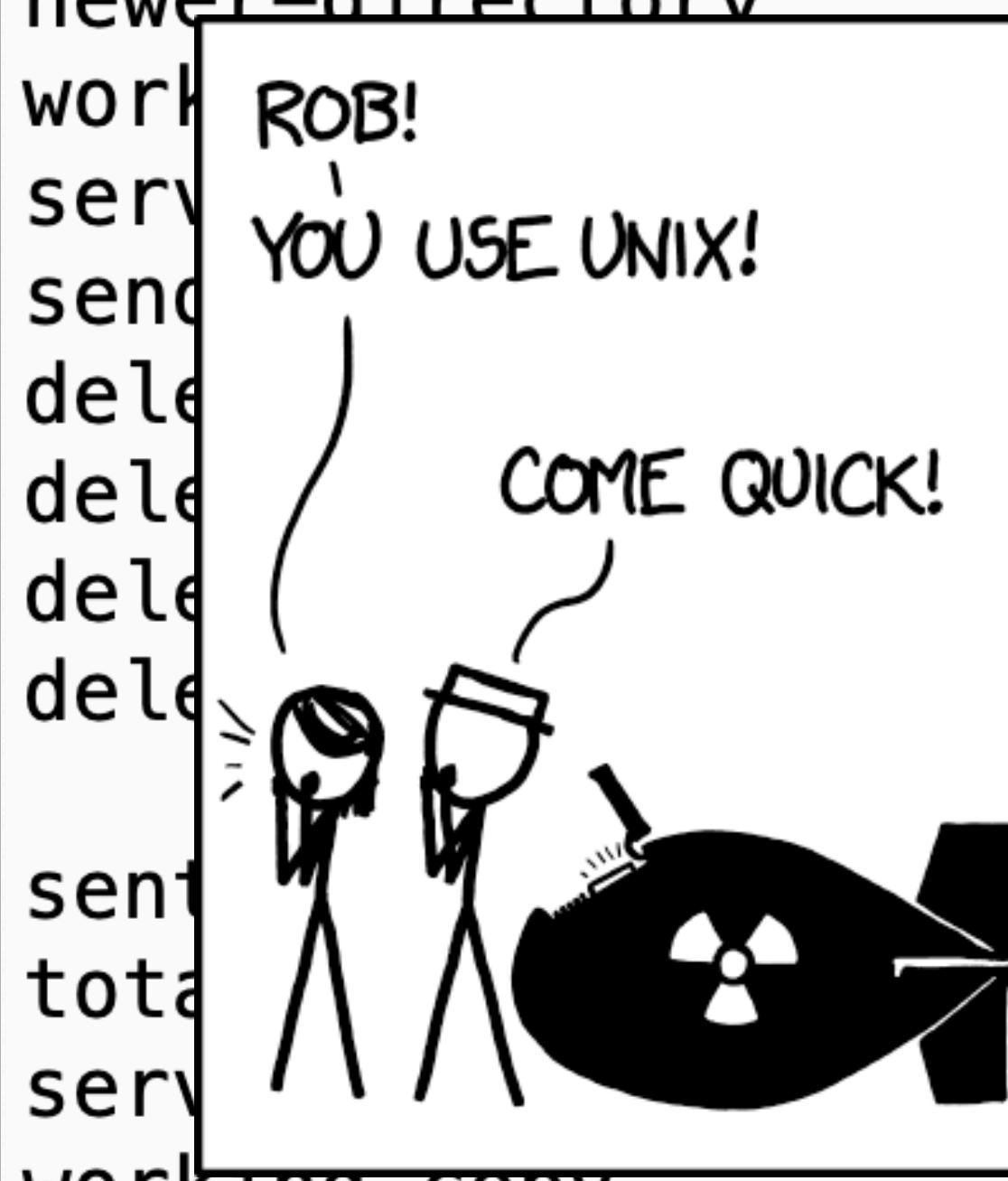
- "Undo"
- Recovery Point Objective (time window and granularity requirements)
- Recovery Time Objective (restore time), including:
  - staff availability
  - waiting until resources permit the restore
  - actual time spent restoring
- Self-service restore

But note: sometimes people *do* want to delete data and it be gone!



```
$ new-directory newer-directory working-copy  
server-to-back-up# rm -fr new*  
server-to-back-up# rsync -e ssh -avz . 10.10.0.42:/backup/.  
sending incremental file list  
. /
```

```
sent 11,853 bytes received 172 bytes 24,050.00 bytes/sec  
total size is 83,557 speedup is 6.95  
server-to-back-up# ssh 10.10.0.42 "ls /backup"  
new-directory  
newer-directory
```



```
working-copy  
server-to-back-up#
```



```
a ./working-copy/.git/hooks/applypatch-msg.sample
a ./working-copy/.git/hooks/commit-msg.sample
a ./working-copy/.git/hooks/post-update.sample
a ./working-copy/.git/hooks/pre-applypatch.sample
a ./working-copy/.git/hooks/pre-commit.sample
a ./working-copy/.git/hooks/pre-rebase.sample
a ./working-copy/.git/hooks/prepare-commit-msg.sample
a ./working-copy/.git/hooks/update.sample
server-to-back-up# cd /backup/2021-04-05/
server-to-back-up# ls
working-copy
server-to-back-up# ls -la working-copy/
total 20
drwxr-xr-x 7 1001 1001 512 Apr  5 02:34 .
drwxr-xr-x 3 root  wheel 512 Apr  5 03:04 ..
drwxr-xr-x 7 1001 1001 512 Apr  5 02:34 .git
-rw-r--r-- 1 1001 1001   44 Apr  3 20:33 .gitignore
-rw-r--r-- 1 1001 1001 391 Apr  3 20:33 CONTRIBUTORS
-rw-r--r-- 1 1001 1001 481 Apr  3 20:33 README
drwxr-xr-x 2 1001 1001 512 Apr  5 02:34 doc
drwxr-xr-x 2 1001 1001 512 Apr  5 02:34 pkg
drwxr-xr-x 3 1001 1001 512 Apr  5 02:34 src
drwxr-xr-x 2 1001 1001 512 Apr  5 02:34 test
server-to-back-up#
```



## Terminal - 80x24

```
drwxr-xr-x  0  root   wheel      0 Apr  5 03:09 ./  
drwxr-xr-x  0  1001  1001      0 Apr  5 03:09 ./working-copy/  
drwxr-xr-x  0  1001  1001      0 Apr  5 03:09 ./working-copy/.git/  
-rw-r--r--  0  1001  1001     481 Apr  3 20:33 ./working-copy/README  
drwxr-xr-x  0  1001  1001      0 Apr  5 03:09 ./working-copy/doc/  
drwxr-xr-x  0  1001  1001      0 Apr  5 03:09 ./working-copy/pkg/  
drwxr-xr-x  0  1001  1001      0 Apr  5 03:09 ./working-copy/src/  
drwxr-xr-x  0  1001  1001      0 Apr  5 03:09 ./working-copy/test/  
-rw-r--r--  0  1001  1001    391 Apr  3 20:33 ./working-copy/CONTRIBUTORS  
-rw-r--r--  0  1001  1001     44  Apr  3 20:33 ./working-copy/.gitignore  
-rw-r--r--  0  1001  1001    134 Apr  3 20:33 ./working-copy/test/README  
-rw-r--r--  0  1001  1001    602 Apr  3 20:33 ./working-copy/test/test_arg_parsing.py  
-rw-r--r--  0  1001  1001    638 Apr  3 20:33 ./working-copy/test/test_env_parsing.py  
-rw-r--r--  0  1001  1001    711 Apr  3 20:33 ./working-copy/src/README  
-rw-r--r--  0  1001  1001    101 Apr  3 20:33 ./working-copy/src/__init__.py  
-rw-r--r--  0  1001  1001     12 Mar  9 02:05 ./working-copy/src/.gitignore  
-rw-r--r--  0  1001  1001   3148 Apr  3 20:33 ./working-copy/src/main.py  
-rw-r--r--  0  1001  1001    187 Apr  3 20:33 ./working-copy/src/requirements.txt  
-rw-r--r--  0  1001  1001  1310 Apr  3 20:33 ./working-copy/src/argument_parsing.py  
--More--(byte 1405)
```



Terminal - 80x24

```
-r-xr-xr-x 1 root wheel 1600 Jan 22 00:44 swap1
-r-xr-xr-x 1 root wheel 957 Jan 22 00:44 swap2
-r-xr-xr-x 1 root wheel 391 Jan 22 00:44 sysctl
-r-xr-xr-x 1 root wheel 1583 Jan 22 00:44 sysdb
-r-xr-xr-x 1 root wheel 1328 Jan 22 00:44 syslogd
-r-xr-xr-x 1 root wheel 253 Jan 22 00:44 timed
-r-xr-xr-x 1 root wheel 348 Jan 22 00:44 tpctl
-r-xr-xr-x 1 root wheel 704 Jan 22 00:44 ttys
-r-xr-xr-x 1 root wheel 1317 Jan 22 00:44 unbound
-r-xr-xr-x 1 root wheel 632 Jan 22 00:44 veriexec
-r-xr-xr-x 1 root wheel 338 Jan 22 00:44 virecover
-r-xr-xr-x 1 root wheel 767 Jan 22 00:44 wdogctl
-r-xr-xr-x 1 root wheel 984 Jan 22 00:44 wpa_supplicant
-r-xr-xr-x 1 root wheel 2597 Jan 22 00:44 wscons
-r-xr-xr-x 1 root wheel 295 Jan 22 00:44 wsmoused
-r-xr-xr-x 1 root wheel 364 Jan 22 00:44 xdm
-r-xr-xr-x 1 root wheel 348 Jan 22 00:44 xfs
-r-xr-xr-x 1 root wheel 417 Jan 22 00:44 ypbind
-r-xr-xr-x 1 root wheel 539 Jan 22 00:44 yppasswdd
-r-xr-xr-x 1 root wheel 428 Jan 22 00:44 ypserv
-r-xr-xr-x 1 root wheel 614 Jan 22 00:44 zfs
```

```
server-to-back-up# echo yay
yay
server-to-back-up#
```



```
new-directory newer-directory working-copy
server-to-back-up# rm -fr new*
server-to-back-up# rsync -e ssh -avz . 10.10.0.42:/backup/ .
sending incremental file list
./

sent 11,853 bytes received 172 bytes 24,050.00 bytes/sec
total size is 83,557 speedup is 6.95
server-to-back-up# ssh 10.10.0.42 "ls /backup"
new-directory
newer-directory
working-copy
server-to-back-up# rsync -e ssh -avz --delete . 10.10.0.42:/backup/ .
sending incremental file list
deleting newer-directory/
deleting new-directory/new-file
deleting new-directory/file
deleting new-directory/

sent 11,846 bytes received 247 bytes 24,186.00 bytes/sec
total size is 83,557 speedup is 6.91
server-to-back-up# ssh 10.10.0.42 "ls /backup"
working-copy
server-to-back-up#
```

## Summary

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- tar(1) creates an archive of a filesystem hierarchy
- data can be written to a file (e.g., .tar), a raw block device (e.g., via | dd), a remote system (e.g., via | ssh), or any combination thereof
- tar(1) is implicitly comprehensive (i.e., no incremental backups)
- dump(8) supports incremental backups
- dump(8) allows for filesystem backup and integrates with e.g., /etc/fstab, /etc/dumpdates
- restore(8) can extract full datasets, select files, and lets you interactively browse the backup
- rsync(1) can incrementally sync filesystem hierarchies
- rsync(1) can delete data in the destination if removed from the source

## Links

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- <https://stevens.netmeister.org/615/tar.html>
- <http://surf.ml.seikei.ac.jp/~nakano/dump-restore/dump-restore-mini-HOWTO.en.html>
- <https://www.redhat.com/sysadmin/rsync-synchronize-backup-restore>