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# CVMFS-unpacked

— /cvmfs/unpacked.cern.ch —

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# CVMFS Repo for storing containers

- Store containers content (docker layers) already **unpacked**
  - Hence the name of the repository `unpacked.cern.ch`
- Do NOT store the layers as blob file (tar files)
  - This would make it pointless to store them into CVMFS
- Store the respectively singularity images as well

# Disclaimer: Work in progress

- Prototype working on a “modern” OS (CC7)
- CERN CVMFS service provides older OS (SLC6) that requires additional work
- The more feedback the better, especially now in the early stages

# Follow the OSG model ([singularity.opensciencegrid.com](http://singularity.opensciencegrid.com))

- One file to declare what we want into the repository (recipe file)
- File parsed by an utility that transfer informations in an internal database
- Daemon keeps looping into the internal database
  - Add missing images into the repository
  - Update images that are already in the repo
- Error handling
  - Continue running
  - Retry, later, on network errors
- What to delete? When?
  - Open question
  - We can apply different policies

# The Daemon

- Available on github
- <https://github.com/cvmfs/docker-graphdriver/tree/devel/daemon>
- Big Readme with all the concepts
  - If something is not clear, please let me know.
- Each command has a brief explanation of the command itself and of the available options
- Compile with `make`
- Any feedback is welcome

# The Daemon Workflow

- Look into each image on the wishlist (internal database)
- Download the manifest from the registry (docker hub or gitlab or others)
- Check, in the internal database, if the image is already being converted
- If it is move on to the next
- If it is not start the conversion
  - Download each layer
  - Ingest the layers into CVMFS
  - Create the singularity image (flatten layers)
  - Move the singularity image into CVMFS
  - Publish the thin image on the docker registry

# Recipe file

- YAML file

# Recipe file

- YAML file

```
version: 1
```

```
user: smosciat
```

```
cvmfs_repo: unpacked.cern.ch
```

```
output_format: '$(scheme)//registry.gitlab.cern.ch/thin/$(image)'
```

```
input:
```

```
- 'https://registry.hub.docker.com/library/fedora:latest'
```

```
- 'https://registry.hub.docker.com/library/debian:stable'
```



# Recipe file

- YAML file

The user that uploads the image to the docker repository

```
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output_format: '$(scheme)://registry.gitlab.cern.ch/thin/$(image)'
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```

# Recipe file

- YAML file

The user that upload the image on the docker repository

In which CVMFS repo should the content be written

```
version: 1
```

```
user: smosciat
```

```
cvmfs_repo: unpacked.cern.ch
```

```
output_format: '$(scheme)://registry.gitlab.cern.ch/thin/$(image)'
```

```
input:
```

```
- 'https://registry.hub.docker.com/library/fedora:latest'
```

```
- 'https://registry.hub.docker.com/library/debian:stable'
```

# Recipe file

- YAML file

The user that upload the image on the docker repository

In which CVMFS repo should the content be written

How to call the resulting docker image.  
And where to put it

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```

```
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```
cvmfs_repo: unpacked.cern.ch
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output_format: '$(scheme)://registry.gitlab.cern.ch/thin/$(image)'
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```
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```

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- 'https://registry.hub.docker.com/library/fedora:latest'
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# Recipe file

- YAML file

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- 'https://registry.hub.docker.com/library/fedora:latest'
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```

Which images convert

# Repository structure

- Two directories of interest
  - /cvmfs/unpacked.cern.ch/.layers/
  - /cvmfs/unpacked.cern.ch/.singularity/
- `.layers`
  - Stores the layers of each docker image
  - The layer ``abcd...`` is stored in the directory ``/.layers/abcd...``
- `.singularity`
  - Stores the complete singularity image
  - Path follows the name of the docker images
    - Start with repository
    - Dockern name
    - Tag

# Repository structure

- .layers

unpacked.cern.ch

```
25 directories, 0 files
[root@cvmfs-docker ~]# tree -a -L 2 -C /cvmfs/thin.osg.cern.ch/
/cvmfs/thin.osg.cern.ch/
├── .layers
│   ├── 05d1a5232b461a4b35424129580054caa878cd56f100e34282510bd4b4082e4d
│   ├── 08c5081d43e277be1124ae4981ea49af3888bf5dacd92dd52992afd8608f2e68
│   ├── 124c757242f88002a858c23fc79f8262f9587fa30fd92507e586ad074afb42b6
│   ├── 193a6306c92af328dbd41bbbd3200a2c90802624cccfe5725223324428110d7f
│   ├── 1c8f9aa56c90ab24207ff5ca6b853bdbfffb40b7801055d0b9c934cb16b5b43dd
│   ├── 21d6caaade028cc319cf2bca215d2c998c4578b48e3d0b434182929e66ab6ff9
│   ├── 23bf491a4f84dea4cefb2c1ab4b5acd09e3fb6d6cdd921685e4e1b7024b17539
│   ├── 252a45163f7bc67d98d89414ddd0b4d7f456a2dccbd9281f96c428f5e5e424b3
│   ├── 256b176beaff7815db2a93ee2071621ae88f451bb1e198ca73010ed5bba79b65
│   ├── 28351dec2f89f7318a7aalb3941608f822580ffc822d6cd3205f26a39620dcb5
│   ├── 28bdf9e584cc733044425cc166ce90743b25f7003cb06408b905030f76200b2a
│   ├── 367a6a68b113cde265568261ba36f477c49ff982418a561fb85d9730b5aac9a3
│   ├── 38517b3035164966f7e2b960f3e87e1f9178537d06992e6045fbd375b84cddfa
│   └── 398d32b153e84fe343f0c5b07d65e89b05551aae6cb8b3a03bb2b662976eb3b8
```

# Repository structure

- .singularity

unpacked.cern.ch

```
32 directories, 1 file
[root@cvmfs-docker ~]# tree -L 4 -C /cvmfs/thin.osg.cern.ch/.singularity/
/cvmfs/thin.osg.cern.ch/.singularity/
├── registry.hub.docker.com
│   └── library
│       ├── centos
│       │   ├── centos6
│       │   ├── centos7
│       │   └── latest
│       ├── debian
│       │   ├── latest
│       │   ├── stable
│       │   ├── testing
│       │   └── unstable
│       ├── fedora
│       │   └── latest
│       ├── openjdk
│       │   ├── 8
│       │   ├── 9
│       │   └── latest
│       ├── python
│       │   ├── 2.7
│       │   ├── 3.4
│       │   └── latest
│       └── ubuntu
│           └── latest
```

# Open question about the repository structure

- Use ``.singularity`` or ``.flat``?



# Open question about the repository structure

- Create this
  - `unpacked.cern.ch/registry.hub.docker.com/library/centos/latest`
- As symlink to
  - `unpacked.cern.ch/.flat/$(Unique Flat Layer Hash)`

# Open question about the repository structure

- Add ``singularity`` in the name
  - `unpacked.cern.ch/registry.hub.docker.com/library/centos/`
- Into
  - `unpacked.cern.ch/singularity/registry.hub.docker.com/library/centos/`

**Thanks!**