

Distributed File Systems with XtreamFS

Setting up Your Environment

We prepared a **Vagrantfile** to set up a virtualized XtreamFS cluster on your notebook. Vagrant is a wrapper around virtualization software like VirtualBox and allows managing VMs easily in a reproducible way. Please follow the Vagrant and VirtualBox installation instructions from the workshop website: <https://harnesscloud.github.io/2015-07-15-feltham/>.

You get the Vagrantfile in this repository or at <https://github.com/chrkl/xtreemfs-software-carpentry>. The Vagrant configuration defines six virtual machines: a directory server (DIR), a metadata and replica catalogue (MRC), three object storage devices (OSDs) and a client. All VMs are connected via a common virtual network. XtreamFS packages are preinstalled. If you did not yet, run **vagrant up** on your command line in the directory containing the Vagrantfile. After your VMs started, you can list them by running **vagrant status**. To get an interactive shell on one of the VMs, run **vagrant ssh <VM>**, e.g. **vagrant ssh dir01** to connect to the directory server. Get familiar with the Vagrant help output (**vagrant -h**) to learn about suspending or resuming your cluster.

Starting the XtreamFS Services

All relevant information on setting up XtreamFS can be found in the XtreamFS user guide, which is available in this repository or online at <http://xtreemfs.org/xtfs-guide-1.5.1/index.html>. Start with connecting to your dir01 VM and start the XtreamFS directory server by calling **sudo service xtreemfs-dir start**. You can view the system status in the web interface in your browser at <http://localhost:30638>. The necessary ports are mapped by Vagrant.

In the next step, connect to the MRC and OSD VMs and start these services. Previously, you have to set the correct DIR address in the MRC and OSD configuration files, which are located at **/etc/xos/xtreemfs**. Set a meaningful UUID string for each of the services, to identify them more easily. Check the DIR web interface for the new services after starting them.

Creating and Mounting a Volume

Get familiar with the **mkfs.xtreemfs** and **mount.xtreemfs** commands, e.g. by consulting the man pages (**man mkfs.xtreemfs** and **man mount.xtreemfs**). Create an XtreamFS volume and mount it to the client01 VM. Note that a volume has to be created by targeting the MRC service and mounted by targeting the DIR service. What might be the reason for this inconsistency?

Setting Volume Properties

Volume properties like the selectable OSDs, striping, replication or snapshots can be set using the **xtfsutil** command line interface. Get familiar with the xtfsutil tool and try to configure the following scenarios:

- All new files should be stored on osd03.
- New files are striped over all OSDs.
- Replicate files with a factor of three. Note that replication and striping cannot be used at the same time, so undo the striping configuration or start with a fresh volume.
- How does replication affect the read and write performance of a volume? You can use the **dd** command to write or read a file. Run for instance **dd if=/dev/zero of=<your file> bs=128K count=1000** to write approx. 128 MB of 0s to a file or **dd if=<your file> of=/dev/null bs=128K** to read your file. How does the chosen block size (bs) affect the performance? Do you consider differences between the read and the write performance?
- Shut down one or two OSDs of your XtremFS cluster while accessing a file, e.g. by running **vagrant suspend <your OSD>**. What happens and how can you explain this behavior?
- Reproduce the VM deployment scenario: Create a read-only replicated file on a volume having the quorum based replication as its default policy.
- Enable snapshots on your volume. Create a snapshot and mount it.