FusionFS: Fusion Distributed File System

Manual v0.03

1. Introduction

This manual is to show how to deploy FusionFS. We provide all the source code. Please follow the following steps below carefully; otherwise there might be a lot of dependency errors.

2. Filesystem in Userspace (FUSE)

- Download it (e.g. `wget` in your terminal) from
  http://iweb.dl.sourceforge.net/project/fuse/fuse-2.X/2.9.2/fuse-2.9.2.tar.gz
- Build the Makefile and specify the library location:
  #: ./configure --prefix=<libfuse_dir>
- Compile and install:
  #: make
  #: make install
  NOTE: you might get some error complaining something about this "/sbin/mount.fuse: permission denied", this can be ignored for the purpose of FusionFS. (i.e. we only need libfuse library.)
  NOTE2: I am talking to the cluster administrator to install this as a root. If you are working on your own laptop, just use "*sudo make install*".
- Load the library:
  #: export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:<libfuse_dir>/lib

3. Google Protocol Buffers (GBuffer)

- Download it and extract from
  #: wget http://protobuf.googlecode.com/files/protobuf-2.4.1.tar.gz
- Build the Makefile and specify the library location:
  #: ./configure --prefix =<SOME_DIR_UNDER_YOUR_HOME_DIR>
- Compile and install:
  #: make
  #: make install
- Load the library to the environment:
  #: export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:<GBuffer_dir/lib>

4. Download and unpack FusionFS

- http://datasys.cs.iit.edu/~dongfang/download/fusionfs_sirius.tar

5. Zero-hop distributed Hash Table (ZHT)

- Go to its source directory:
  cd fusionfs/src/zht
- Update the GBuffer location in Makefile:
  - o Find the line with "CFLAGS=-Llib –Iinc –L<SOME_DIR>", you need to update <SOME_DIR> with "<YOUR_GBuffer_DIR>/lib"
  - o Find the line with "PROTOBUF_HOME=<ANOTHER_DIR>", please change the <ANOTHER_DIR> to "<YOUR_GBuffer_DIR>/include"
- Compile ZHT:
  #: make

6. UDP-based Data Transfer (UDT)

- Go to its source directory:
  #: cd fusionfs/src/udt
- Compile UDT:
  #: make
- Load UDT into the environment:
  #: export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:<fusionfs/src/udt/src>

7. FusionFS Networking (FFSNET)

- Go to the FFSNET source directory:
  #: cd fusionfs/src/ffsnet
- Load FFSNET into the environment:
  #: export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:<fusionfs/src/ffsnet>
- Compile FFSNET:
  #: make

8. Install FusionFS

- Go to the FusionFS main source directory:
  #: cd fusionfs/src
- Update the Makefile:
  - o For "FUSEINC= -D_FILE_OFFSET_BITS=64 –I<DIR_1>", update <DIR_1> to <Your_FUSE_Library_Dir/include/fuse>
  - o For "FUSELIB=-pthread –L<DIR_2> -lfuse -lrt -ldl", update <DIR_2> to <Your_FUSE_Library_Dir/lib>
  - o For "GBUFLIB=-L<DIR_3>", update <DIR_3> to <Your_GBuffer_Dir/lib>
- Compile FusionFS:
  # : make

9. Run FusionFS

- Configuration file:

  (I supposed you test FusionFS on "jarvis"), the file "fusionfs/src/zht/neighbor" should be updated and look like the following

  ```
  [dzhao8@jarvis fusionfs]$ cat src/zht/neighbor
  localhost 50000
  [dzhao8@jarvis fusionfs]$ ▮
  ```

- Daemon services (ZHT and FFSNET)
  - Update the "fusionfs/start_service" script:

    Replace "/home/dzhao" with wherever you install FusionFS
  - Start the services:

    #: fusionfs/start_service

    If successful, you should be able to see two running processes (*ffsnetd* and *server_zht*) in your terminal:

    ```
    [dzhao8@jarvis fusionfs]$ ./start_service
    [dzhao8@jarvis fusionfs]$ ps
      PID TTY          TIME CMD
    14225 pts/0    00:00:00 bash
    16170 pts/0    00:00:00 ffsnetd
    16171 pts/0    00:00:00 server_zht
    16175 pts/0    00:00:00 ps
    [dzhao8@jarvis fusionfs]$ ▮
    ```

- Start FusionFS
  - Update the "fusionfs/start" script:

    (1) Create two directories on local storage: one for the scratch directory and the other for the virtual mount point. For example,

    mkdir –p /tmp/<your A#>/fusion_root   /tmp/<your A#>/fusion_mount

    (2) Change the script into the following:

    <your FusionFS install directory>/src/fusionfs   <FusionFS root>   <FusionFS mount>

    The following is an example (I chose "dzhao8" as my A#):

    ```
    #!/bin/sh

    /export/home/dzhao8/fusionfs/src/fusionfs /tmp/dzhao/fusion_root /tmp/dzhao/fusion_mount
    ```
  - Run FusionFS:

    #: cd fusionfs

    #: ./start

    If you see the following error on Jarvis, don't worry. You would be able to continue on once our administrator installed the FUSE mount.

    ```
    [dzhao8@jarvis fusionfs]$ ./start
    finished reading membership info, 1 nodes
    about to call fuse_main
    fusermount: mount failed: Operation not permitted
    fuse_main returned 1
    [dzhao8@jarvis fusionfs]$ ▮
    ```

- Stop FusionFS

  Update the directory in "fusionfs/stop" and execute it
- Stop Daemon Services

  Update the directory in "fusionfs/stop_service" and execute it