BE PROJECT REVIEW 2

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Title and Problem Statement

Title - Distributed Replicated Block Device (DRBD) Network Packet Tracing Module.

Problem Statement - Build a packet tracing module on DRBD to track the data packets transferred over a cluster in a network during data replication between multiple block devices and analyse the transfer of packets.

Abstract

DRBD is a distributed replicated storage system for the Linux platform. It is implemented as a kernel driver, several user-space management applications, and some shell scripts.

Our objective is to write a kernel module to trace/keep track of logs in memory and on-disk, for DRBD and perform various analytics on this data. We also plan to write a utility/ daemon to pull tracing information from the kernel, and parse the data for reporting/debugging problems. The scope of our project is to provide an enterprise grade solution to analyze the packet transfer, to calculate the accuracy of data replicated at multiple nodes in a cluster, to determine the bandwidth required over a network based on the accuracy of the transfer of packets, and to determine the number of replication nodes required in a data cluster.

Introduction

Distributed Replicated Block Device(DRBD) is an open-source replication storage system. DRBD works by layering over logical block devices on participating nodes. The cluster is managed by a primary node. When a write occurs on the primary, it is simultaneously propagated to secondary nodes. When a primary fails, a secondary node from the cluster is promoted to a primary state.

It is implemented as a loadable kernel module in Linux. Loadable kernel modules are files which extend the functionalities of the kernel without rebooting the system. It can be removed when functionality is not required anymore.

Survey

DRBD vs RAID

- RAID is designed for two or more disks connected locally whereas DRBD is designed to replicate a block-device over a network.
- We use RAID (software or hardware) to increase the reliability of the local storage over 2 or more disks.DRBD would sit on top of your RAID and replicate that data to another server for failover purposes.
- DRBD can also allow two servers to access that data at the same time, which you can't really do with RAID in a cluster-aware file system.

Survey

We gained an understanding of the DRBD code. We identified various points of data transfer.


Regular mirrored write, 512-32K
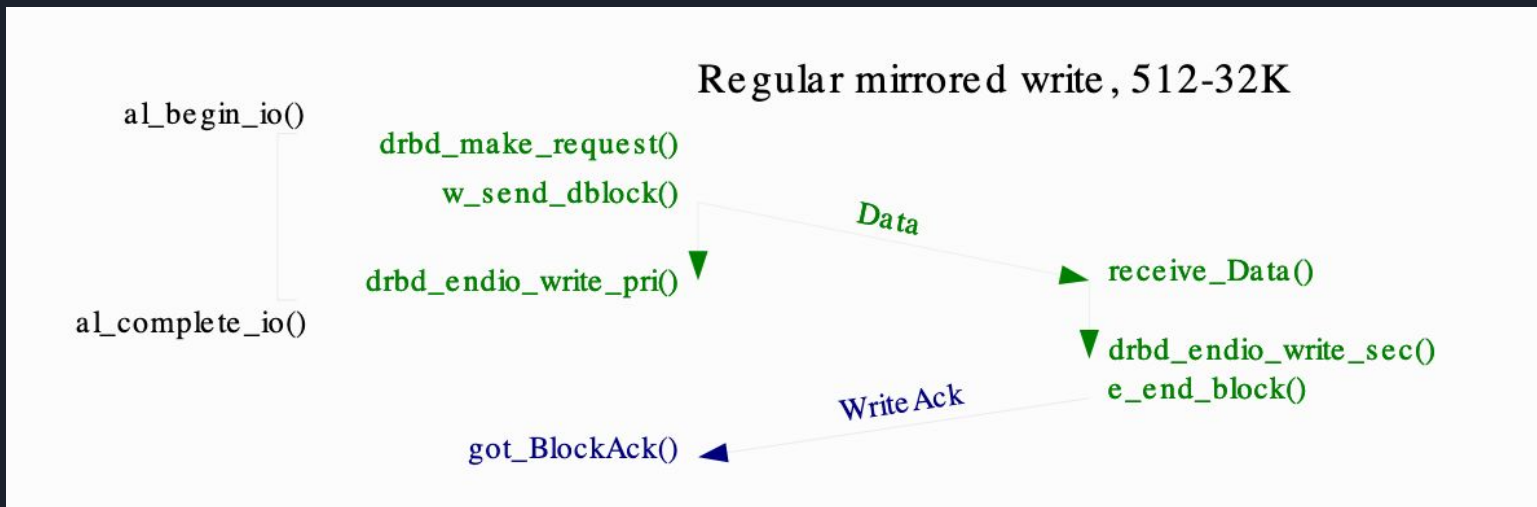
Methodology

Being an open source software, we can review and make changes in the code base of DRBD. We can identify the points where data packets are sent and received in the code.

We will implement our module as a loadable kernel module. This module will be responsible for communicating with the drbd module and prepare the log file.

We will add an user land utility which will make system calls to our module and be responsible for analysing the data in the log file and display results and reports in graphical format.

Design Used
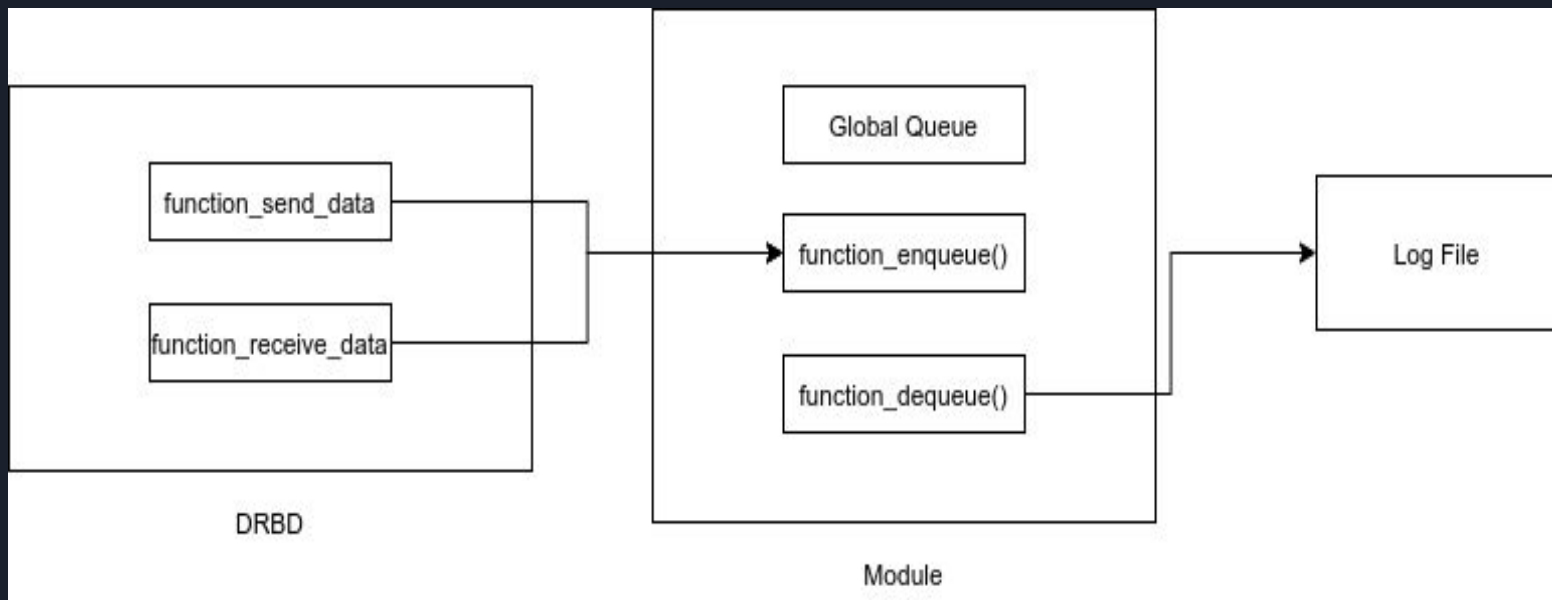
Modules

1. Understanding and Identifying Data Flow Points in DRBD
2. Creating Global Queue for logs in module
3. Calling our module functions from DRBD
4. Preparing a log file.
5. Writing a user land utility to analyse data from log file
6. Display analysis in graphical format

Software / Technologies Used

1. Oracle VM VirtualBox
2. DRBD
3. CSCOPE
4. System Tap
5. Languages -> C, Makefile

Gantt Chart