NetBSD LVM implementation

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Introduction

- Hard project to choose

- Missing major feature of a server OS

  - Linux, Aix, HP-UX, Solaris, FreeBSD has it

- Available disk space is growing

  - 3-4 terabytes are common in server

- Number of disks in a server is much higher then it used to be

Motivation

- Make administration of NetBSD servers much easier than it is now

- Learn something new about NetBSD internals

Talk outline

- Introduce Logical Volume Manager in general

- Introduce NetBSD LVM implementation

- explain how, why was it done

- give usage examples

- Q&A

Traditional disk partitioning methods

- DOS partitions

- BSD disklabel

- GPT partitions

    - new partitioning scheme developed by Intel as a part of EFI

Logical Volume Manager design
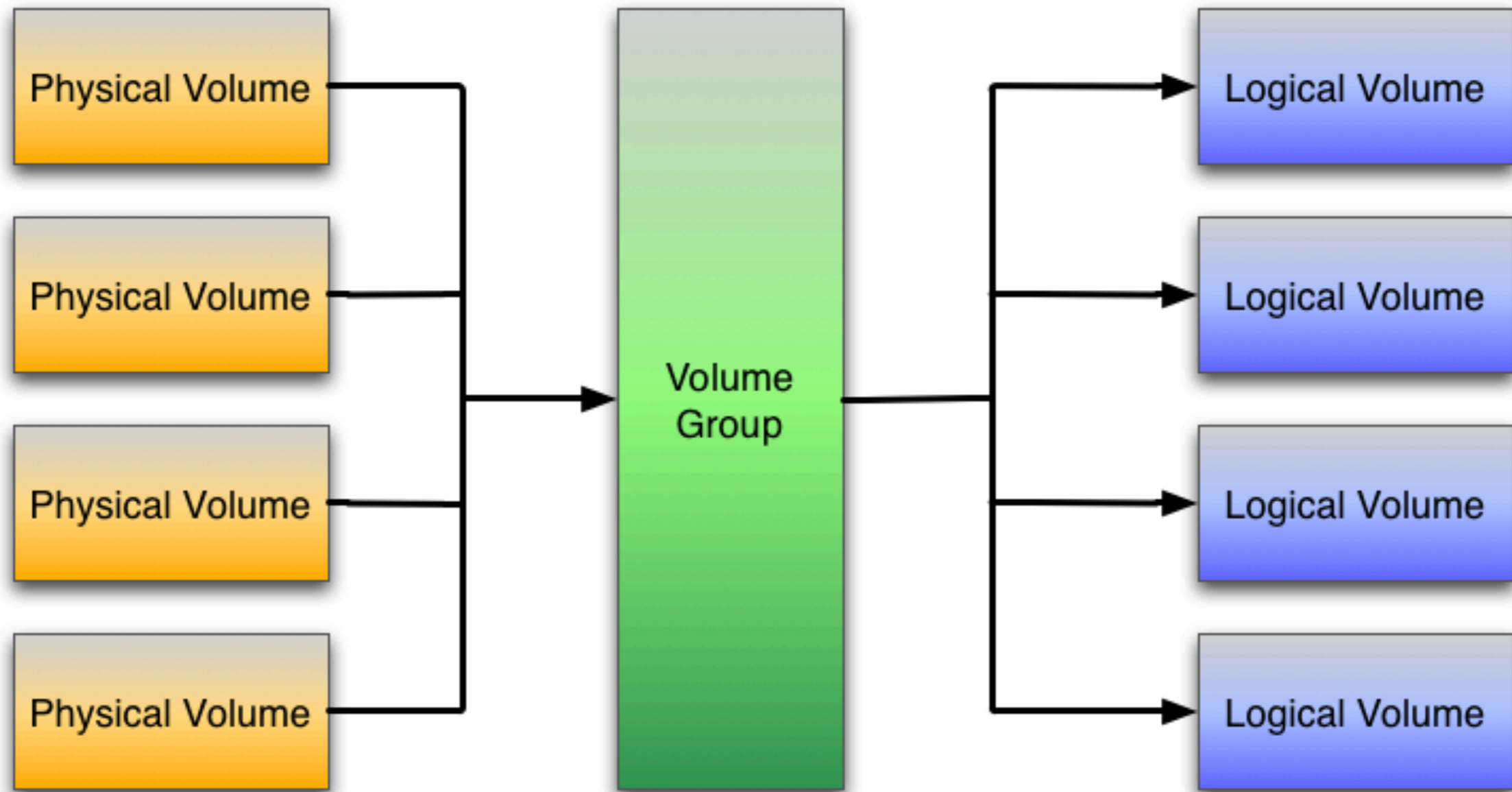
Details

- Every LVM implementation has some sort of Physical Volume which is placed on a hard disk

- Volume Group is a pool of available disk space from which virtual partitions can be created

- Logical volumes are virtual partitions which can be used in a system like normal disks

NetBSD LVM

- Done during Google Summer of Code 2008

- Simple BSD licensed kernel driver which maps real disk blocks to virtual ones

  - driver is called device-mapper
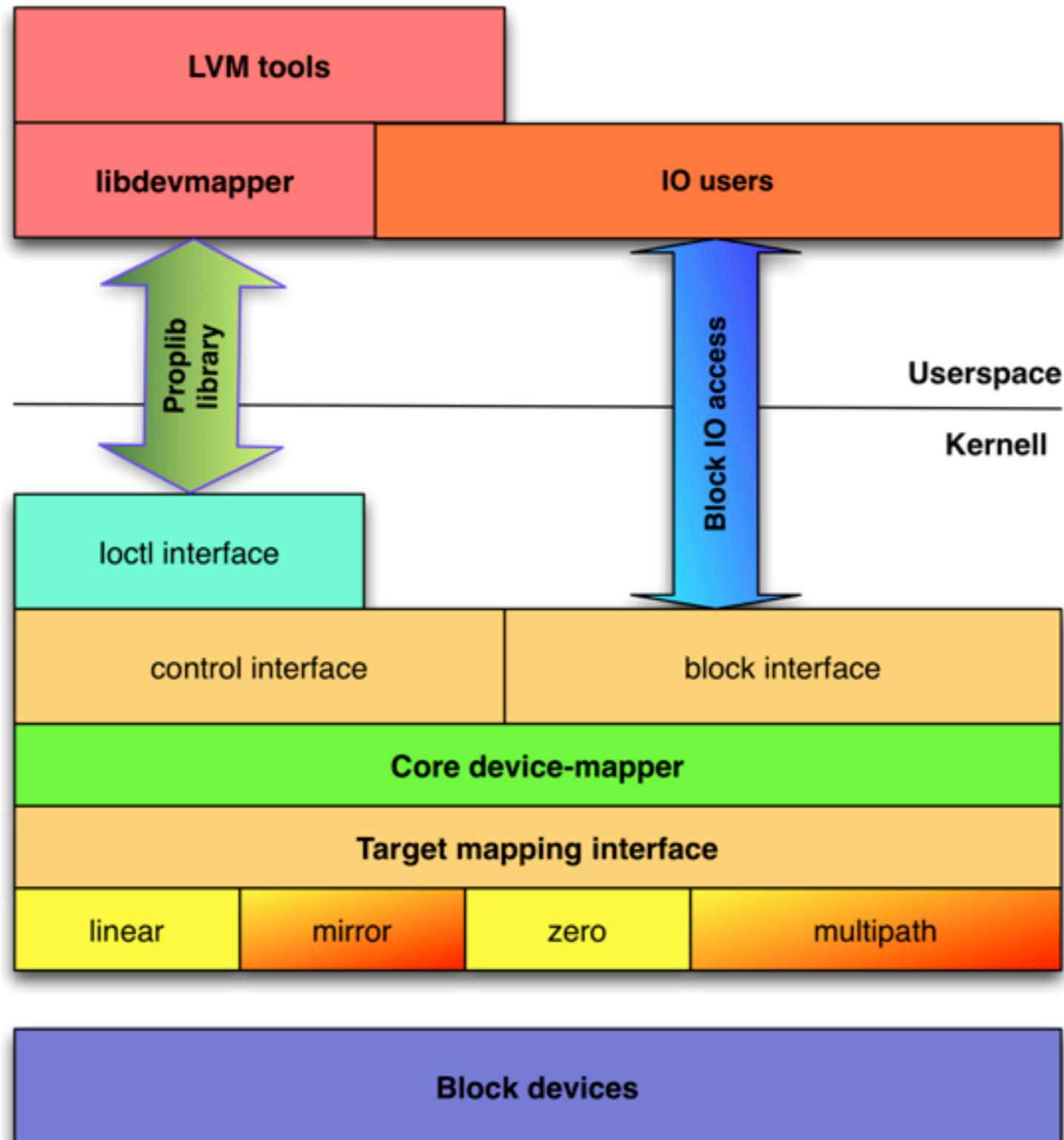
- Linux lvm tools which manage LVM metadata.

NetBSD LVM architecture
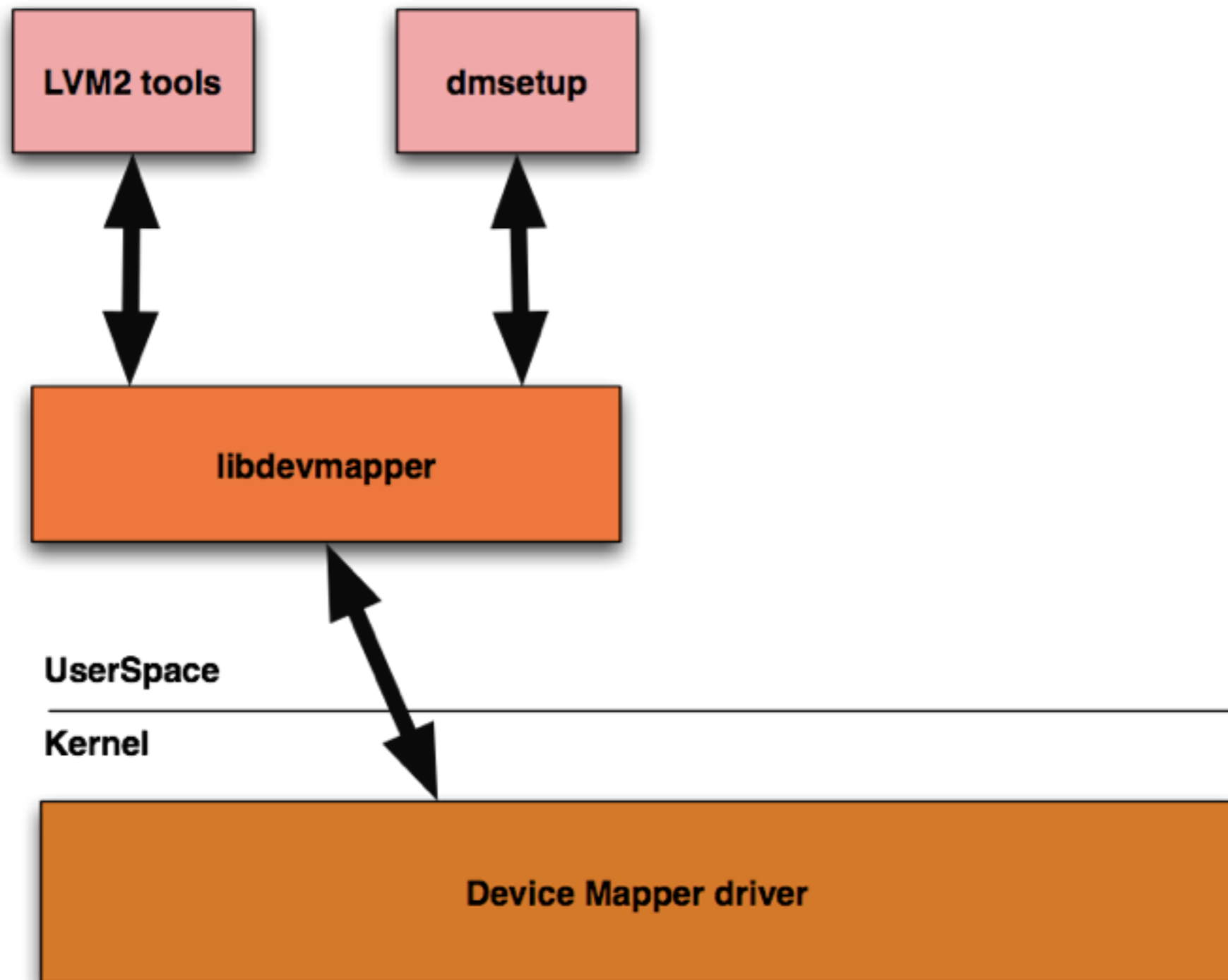
Device-mapper

- Clean and small reimplementation of Linux device-mapper driver

- BSD licensed

- Implements new kernel/userspace protocol based on proplib library

- Implements linear and stripe targets

- SMP ready

Device-mapper architecture

DM implementation

- For every device in device-mapper there is a table which describes how are physical blocks mapped to virtual one

  vg01-home: 0 67108864 linear /dev/wd0a 1024

- Device can't have more than one table loaded at time but one table can have more lines

Device-mapper targets

- Targets maps real block devices to virtual ones

- There are linear, stripe, mirror, multipath and snapshot targets in Linux

- In NetBSD linear and stripe targets were implemented which is enough to get LVM properly working

Available Targets
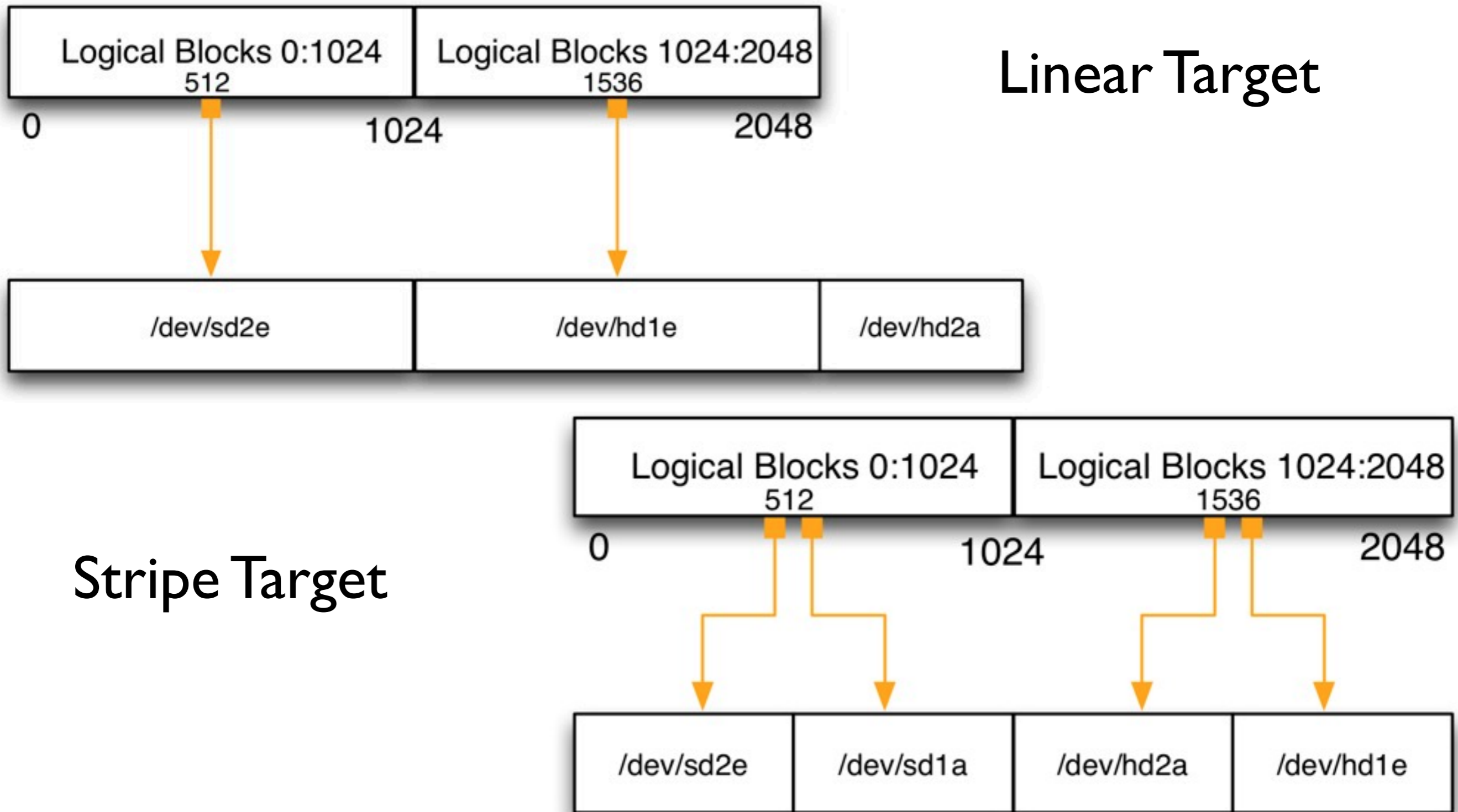
Linear Target

Stripe Target

Future Work

- Cluster LVM support

- Adding new targets mirror and snapshot

- Implementation of DRBD like device which can be used for creation of raid disks through the network

More Info

- http://netbsd.org/docs/guide/en/index.html

- src/sys/dev/dm and src/external/gpl2/lvm2

- NetBSD mailing lists

- EuroBSDcon 2009 paper

Questions & Answers

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