SNIA DSI '16 DATA STORAGE INNOVATION CONFERENCE
Innovation in Storage Products, Services, and Solutions
June 13-15, 2016 | Marriott San Mateo | San Mateo, CA

High Performance NAS, New design for New IT

Pierre Evenou – Philippe Nicolas
Rozo Systems

Agenda

- Company Profile
- Business Needs & Market Opportunity
- Product overview
- The Mojette Transform
- How it works ?
- Product Availability
- Configuration and use cases
- Competition
- A bit of future
- Conclusion

Rozo Systems – Company profile

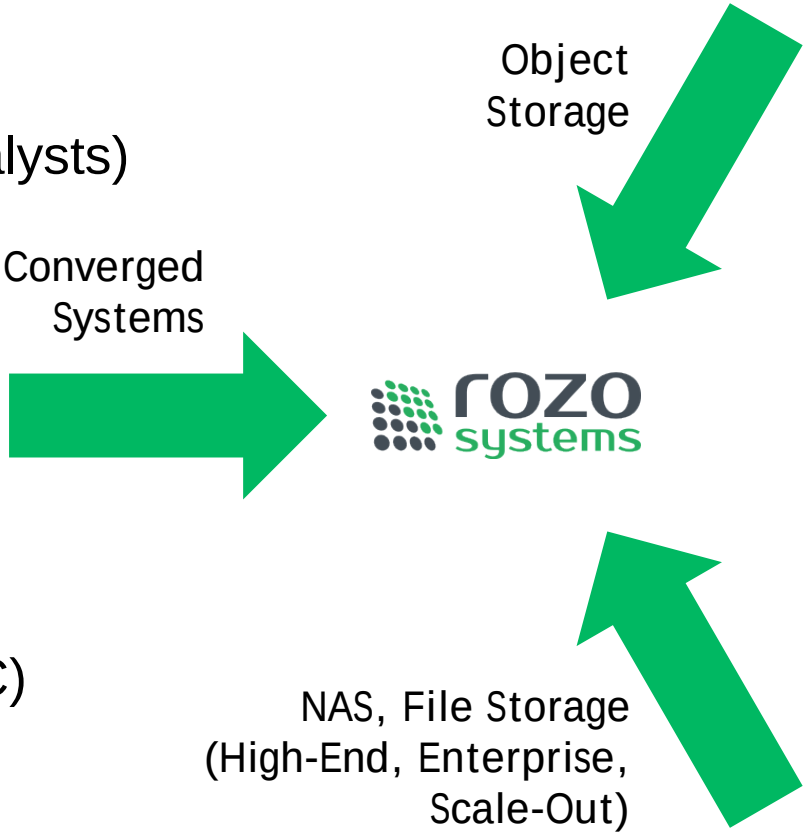
- Management
  - CEO: Pierre Evenou – COO: Michel Courtoy – CTO: Didier Feron
- Advisors
  - Philippe Nicolas and Eric Friis
- Founded in 2010 as a Spin-off of University of Nantes
- Nantes (France) & San Mateo, California
- Ready for a Series A investment round (Seed Funding 700k€)
- 10 people Worldwide
- Develops **RozoFS**, a Software-Defined Scalable File Storage with unique Erasure Code performance
- 10+ deployments
- Flexible go-to-market model

Need for Enterprises

- How to deliver a File Storage Service with TOP Performance with SUPER efficient Data Protection, HIGHLY Scalable in Capacity at a very ATTRACTIVE price at the SAME time ?
  - Enterprise/High-end NAS are LIMITED even with established vendor such Isilon…
    - Real challenge to maintain Performance when Capacity is growing
    - File Storage is rich and good BUT Data Protection is slow and impacts Applications, Users and Business
    - HW is proprietary – no real Software-Defined Storage philosophy
  - Object Storage are slow and need File Gateway for File Access – Too expensive, Too complex, Not scalable at File level
    - Most of Object Storage implement Erasure Coding BUT it is ONLY good for Secondary Storage, true Scalable in term of Capacity
    - Even with Flash, Object Storage are slow!
    - Not a native File Storage solution – Real impact on the bottom line

Market Opportunity

- NAS - File Storage
  - $7B in 2017 (Global Industry Analysts)
- Object Storage
  - $800M in 2014 (IDC)
- Converged Systems
  - $1.5B in 2016 (CAGR ~94%, IDC)
- Private Cloud
  - $69B in 2018 (CAGR 14%,Technology Business Research)



What is RozoFS ?

rozofs

SCALE-OUT NAS

It’s about File Storage & File Access
with industry standard file sharing protocols

It’s also about Scaling in any dimension

But it’s still a NAS i.e. no application integration
just plug it in, configure it and run it

What is RozoFS ?

rozofs

SOFTWARE DEFINED SCALE-OUT NAS

Transform a rack of standard x86 servers into
a high performance and high resiliency file service

Without vendor lock in

Pick your preferred brand and models
and deploy them, it’s so simple

What is RozoFS ?

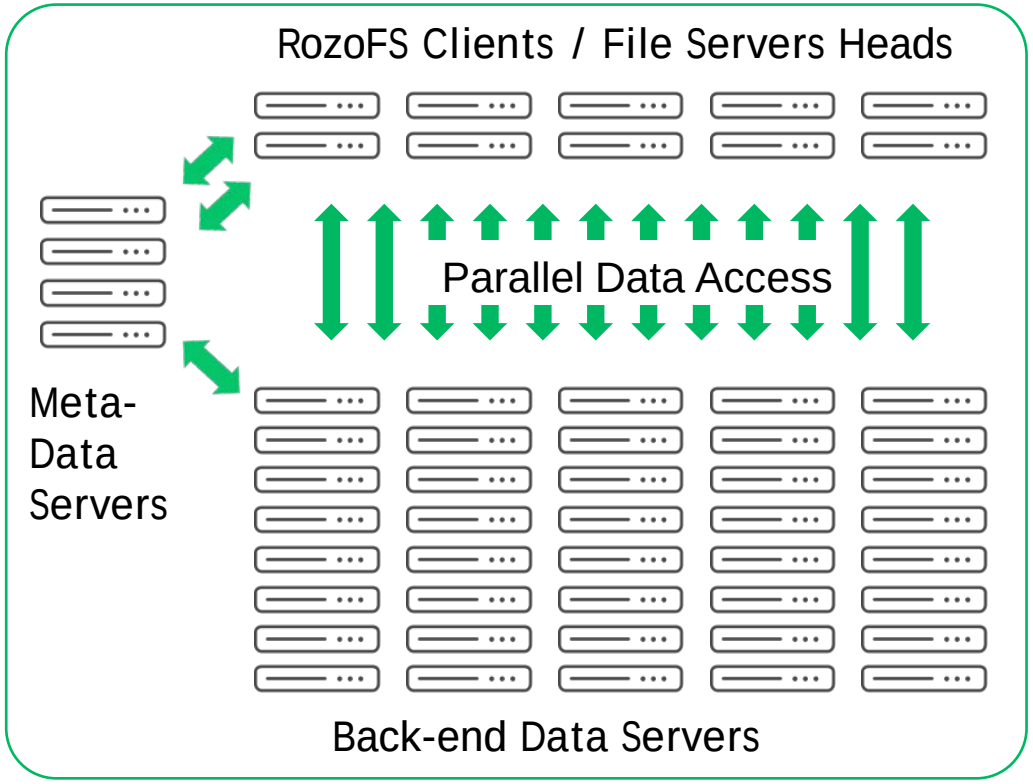
rozofs

ERASURE CODE BASED SOFTWARE DEFINED SCALE-OUT NAS

High data durability with innovative Erasure Coding

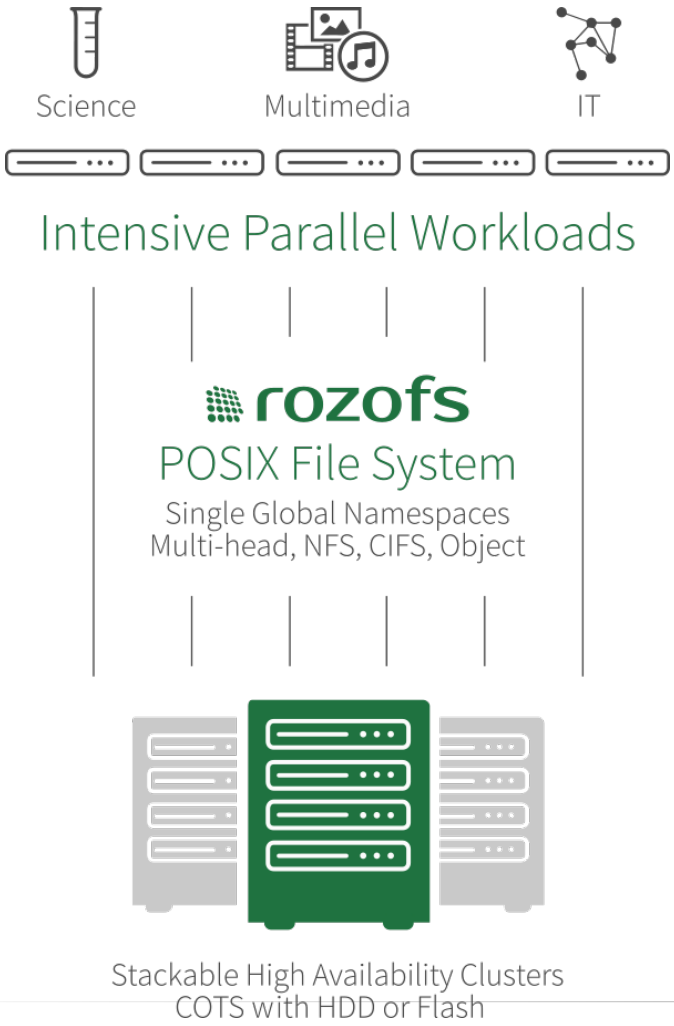
Delivers the protection level of 5 copies with just 1.5 redundancy factor while providing striping performance

Internal Logical Architecture



- Asymmetric Distributed Parallel File System
- Horizontal independent scaling for File Server Heads, Meta-Data and Data Servers
- All 3 components can reside on same systems

Ready for high demanding applications



- High Performance & Scalable File Storage with High Efficient Data Protection
- Software-Defined Storage philosophy on Commodity Hardware (Lx, x86, Eth, TCP/IP, Multi-device: SATA, SSD…)
- Distributed File System exposed as Scale-out NAS
- Parallel data access & POSIX
- Shared-nothing and Asymmetric
- Industry File Sharing Protocols
- Mojette* Erasure Code
- Multi-tenant & Multi-sites

Accessibility & Manageability

rozofs

- Full and seamless application support with no integration pain based on complex APIs – POSIX compliant
- Industry and Standard File Sharing Protocols
  - NFS (v3, v4), SMB via Samba, AFP, FTP, WebDAV, HTTP, AMZN/S3
- Direct Access Method – Key/Value mode
  - No lookup, very fast data access
- Quota per user and group, Native ACL, extended attributes
- Super Easy Deployment & Operation model
- No LUN, Volume or RAID to manage
- Simple task to add or remove nodes
- Linux (CentOS, Debian) based software
  - VM environment supported
- Standard monitoring based on Nagios
- Powerful CLI, Puppet Labs integration

NFS NETWORK FILE SYSTEM

SAMBA

samba ctdb

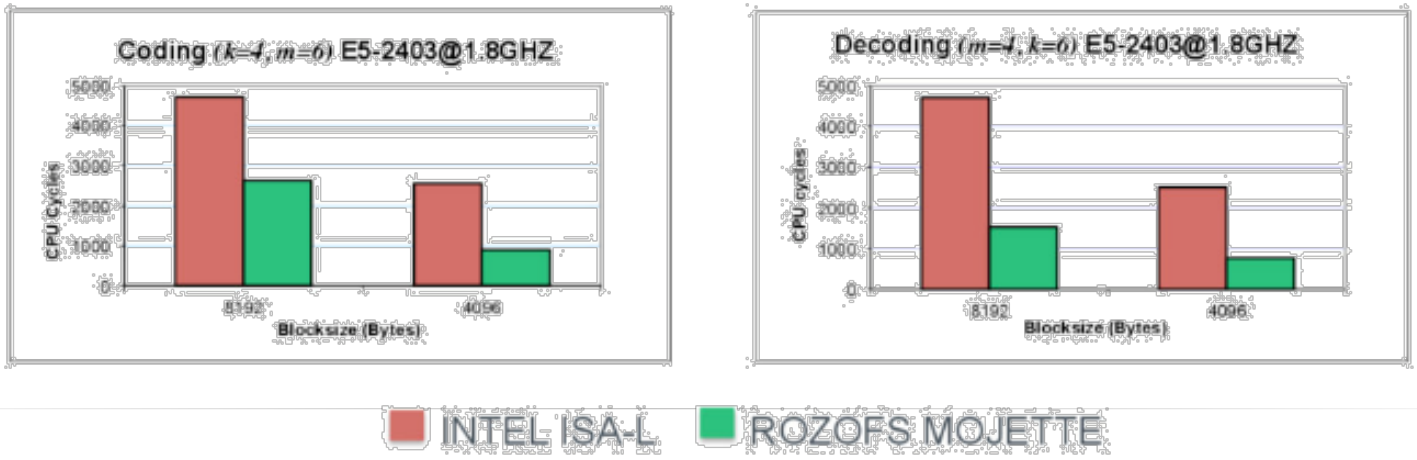
debian

CentOS

Nagios®

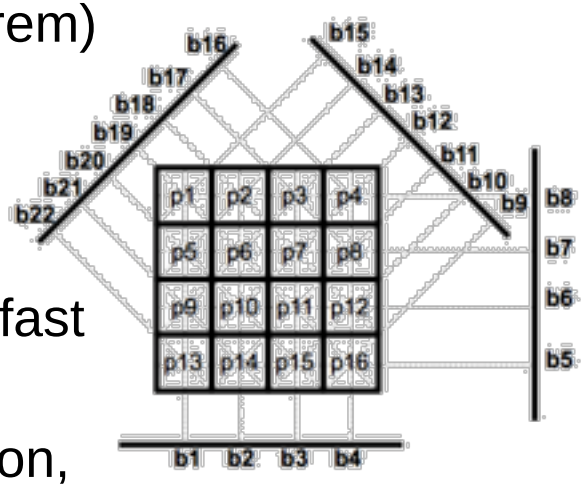
Super Efficient Data Protection

- Super fast Erasure Coding thanks to Mojette Transform for all files (works at file level) – 128 bits (v2.0)
- Mojette Transform 2x faster in Encoding & 3x faster in Decoding vs. Intel ISA-L
- Seamless repair with no impact on data access
- Implicit encryption (non systematic EC effect)
- Efficient EC ratio for Mojette (1.5:1) vs. 3-way replication (3:1)
- Self Healing & Data Integrity
- Geo-Replication



The Mojette Transform

- The Mojette Transform: The magic behind RozoFS
  - Evolution of Radon Transform (Radon Theorem)
  - Based on Discreet Algebra
  - Non-systematic EC (all datas are encoded)
  - Use Mathematical projections with only Addition and Subtraction operations so very fast
  - In Development in University of Nantes since 1994 !! (invented by Jean-Pierre Guédon, University Professor)
  - Use case: Storage, Networking, Medical, Image
  - More information on Wikipedia (https://en.wikipedia.org/wiki/Mojette_Transform)

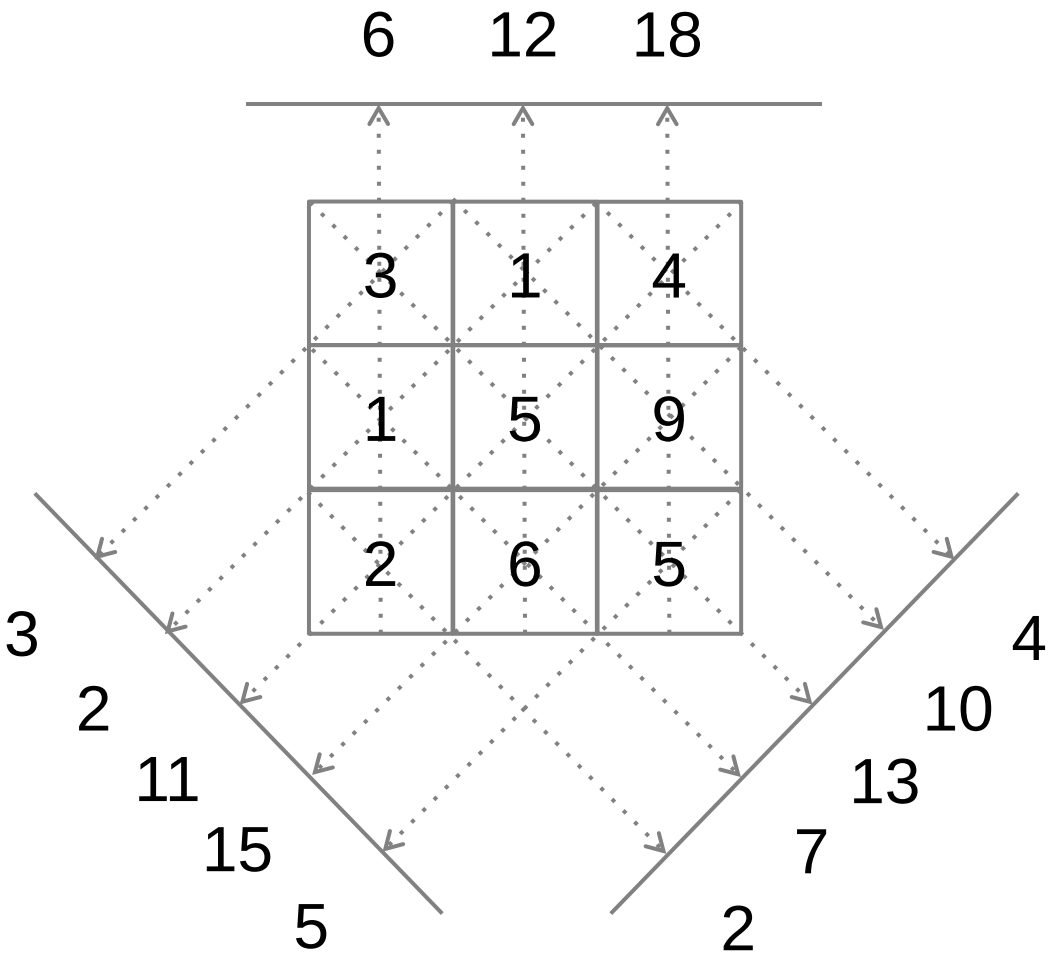


A Discrete Radon Transform

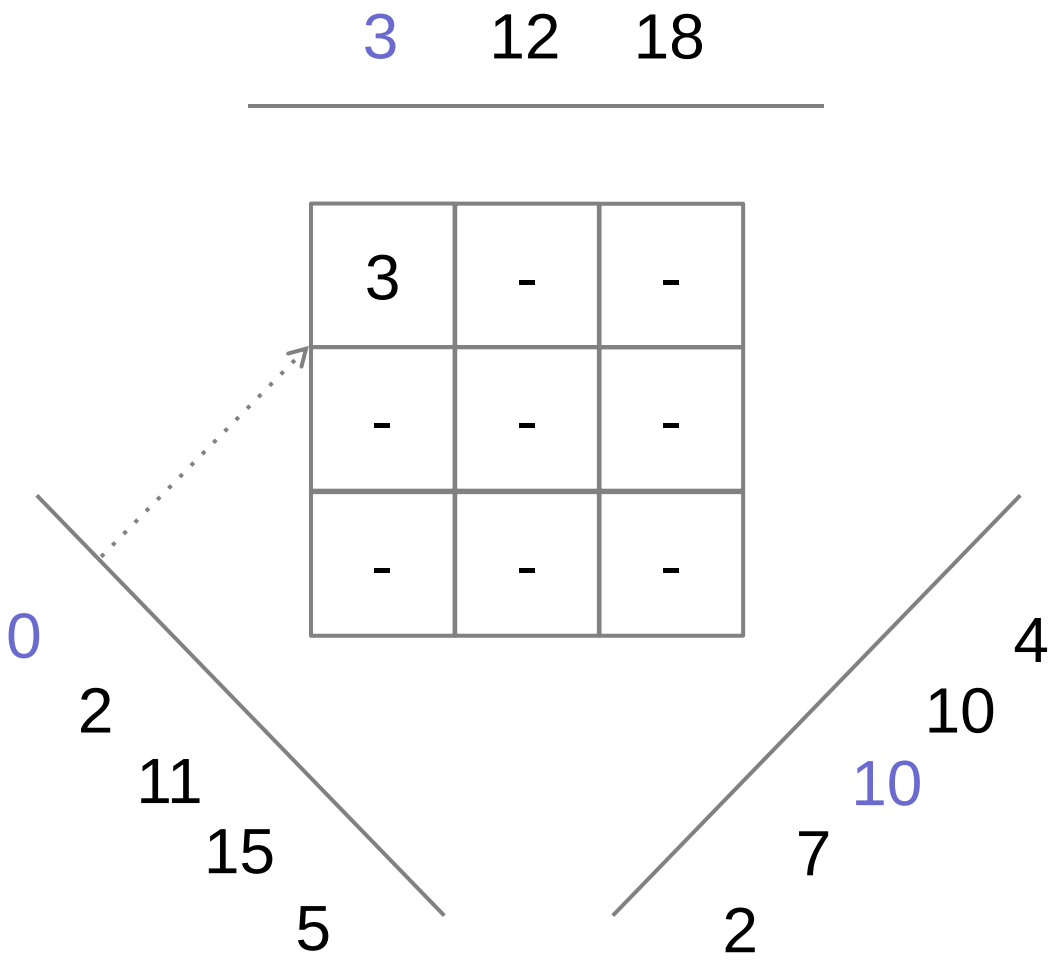
rozofs

3	1	4
1	5	9
2	6	5

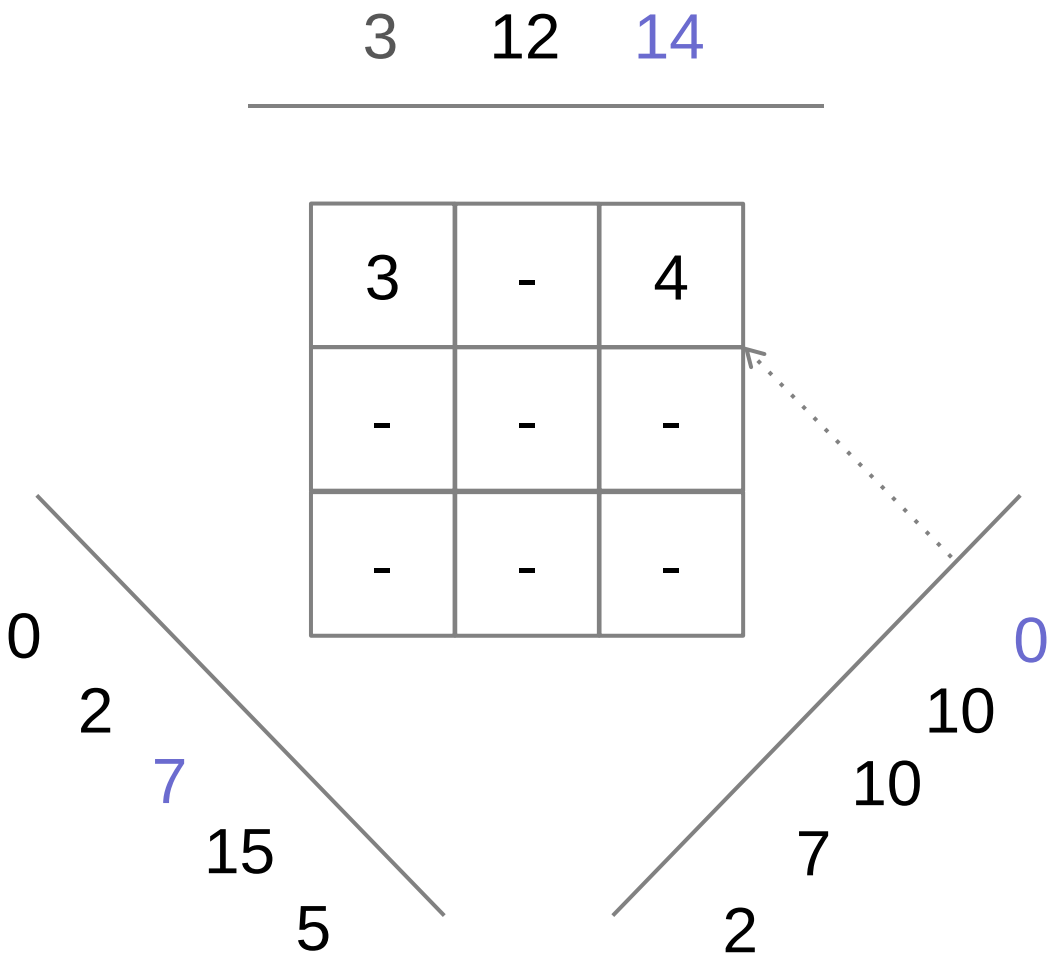
A Discrete Radon Transform



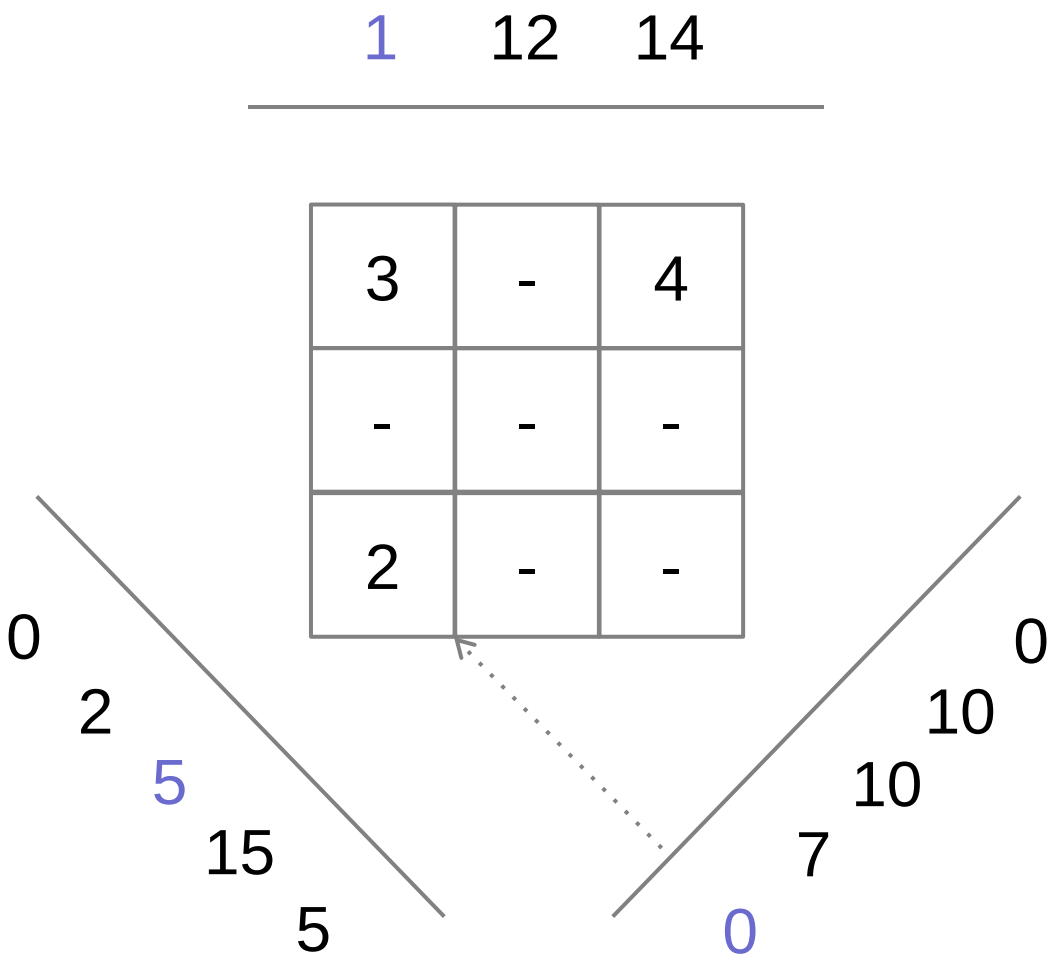
An Exact Discrete Radon Transform



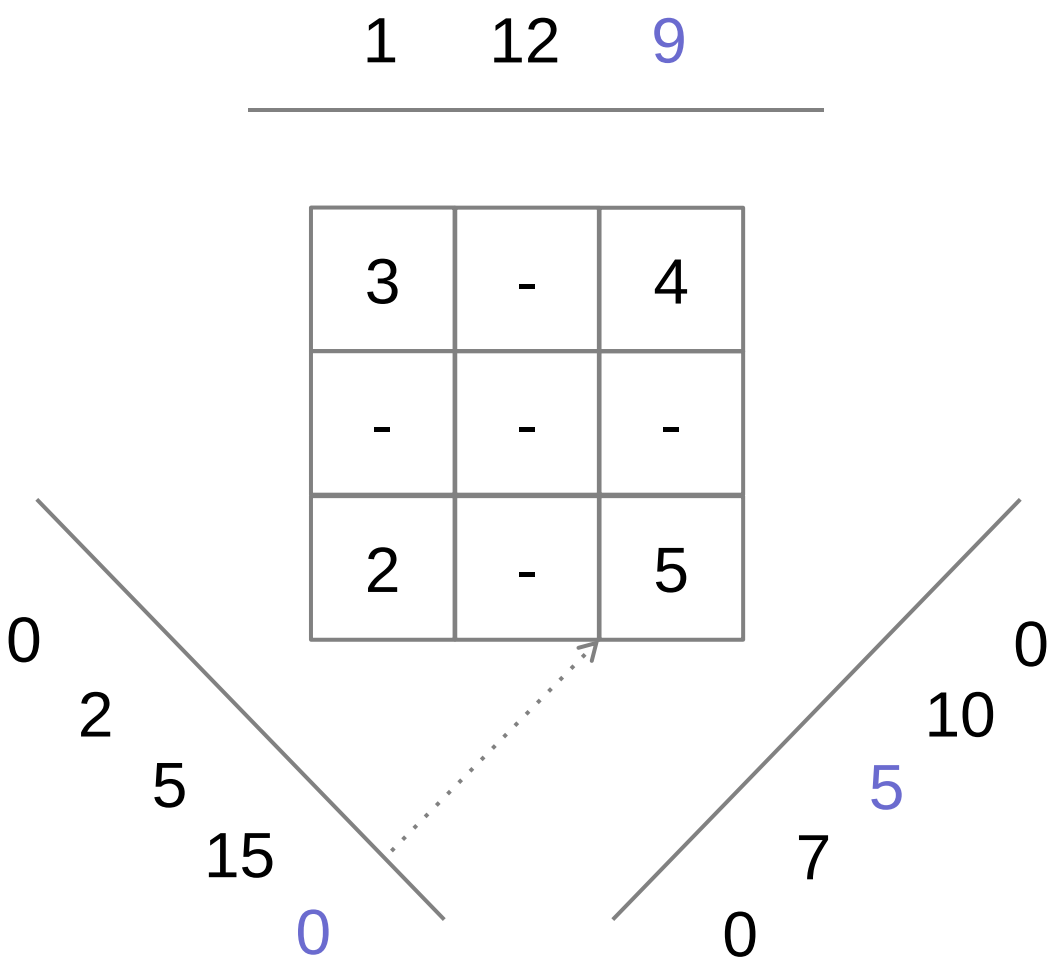
An Exact Discrete Radon Transform



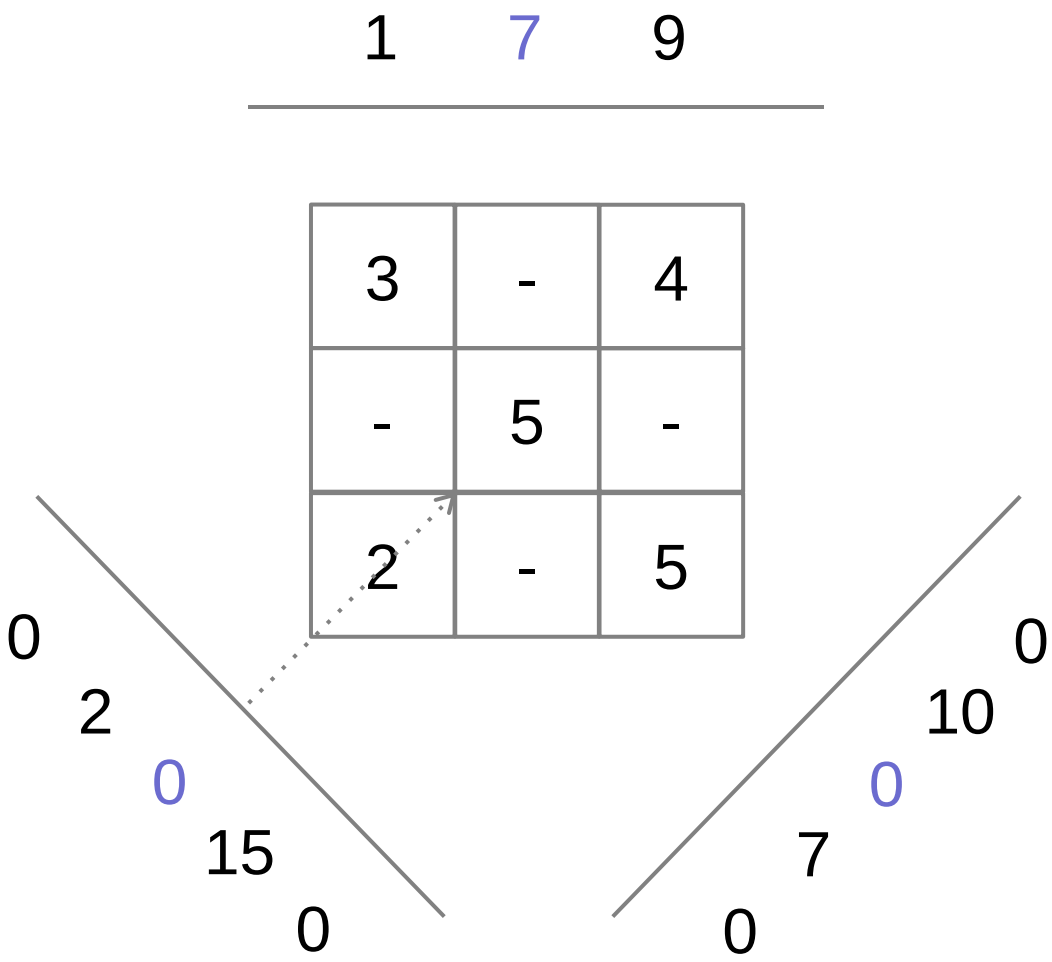
An Exact Discrete Radon Transform



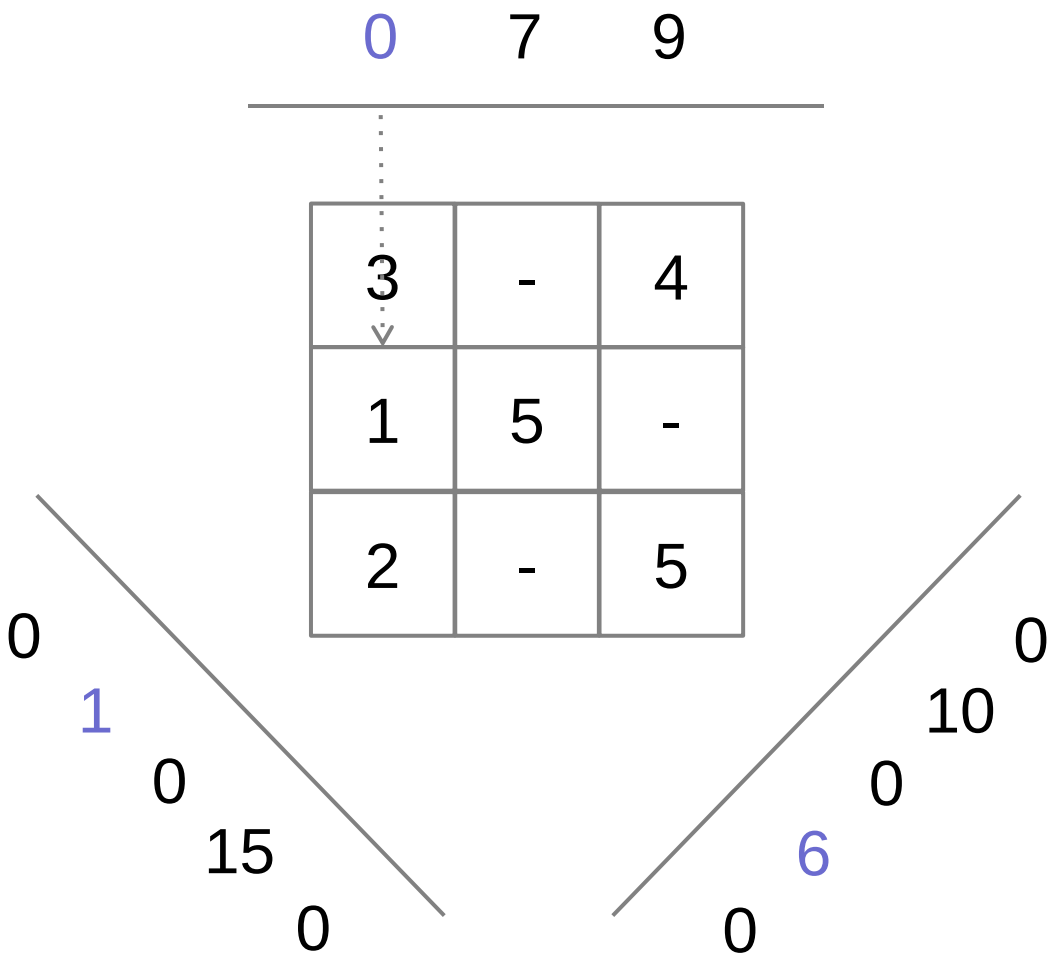
An Exact Discrete Radon Transform



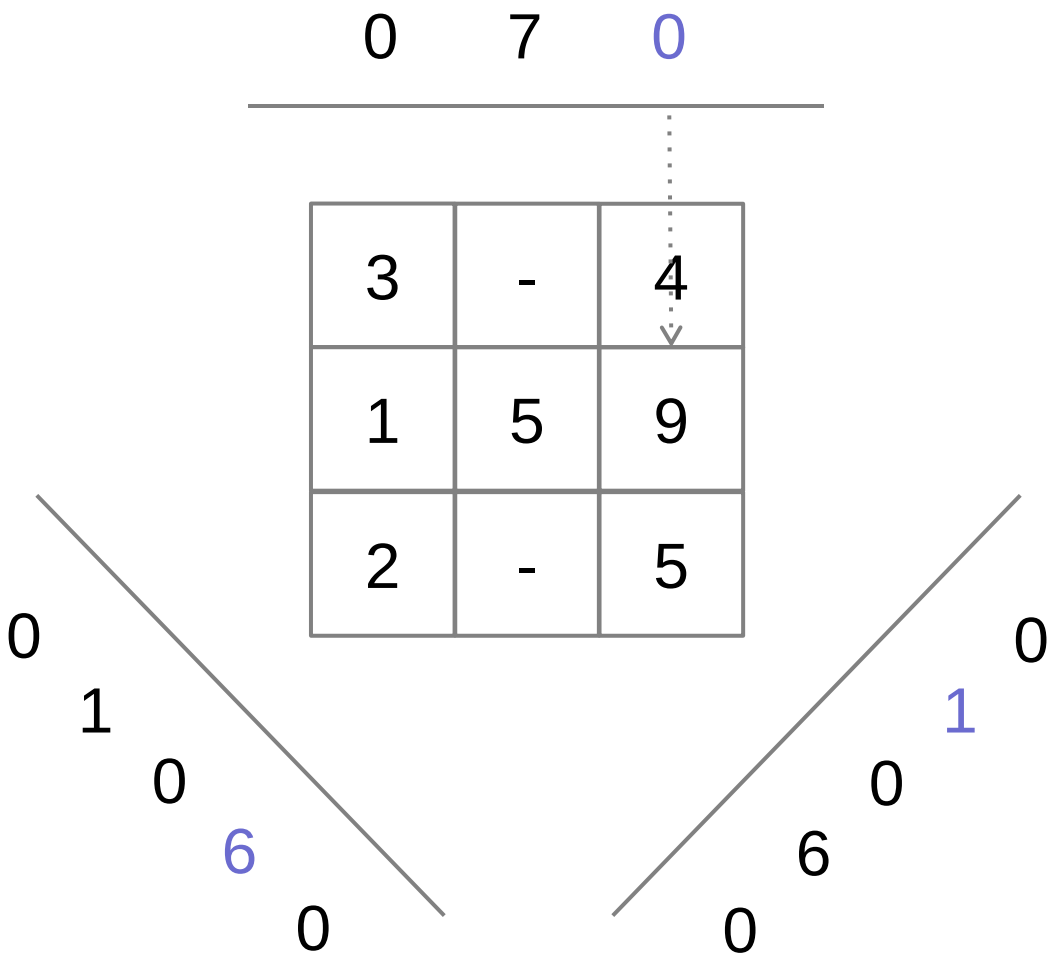
An Exact Discrete Radon Transform



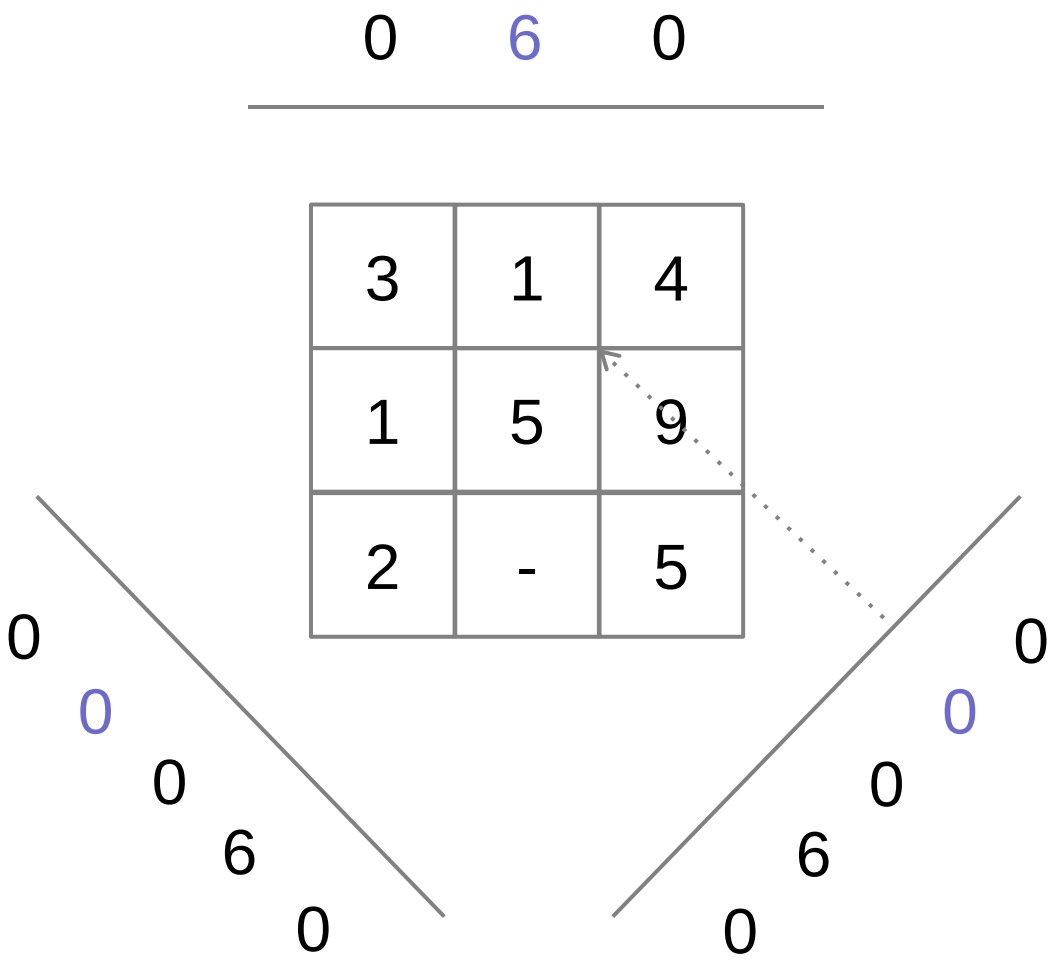
An Exact Discrete Radon Transform



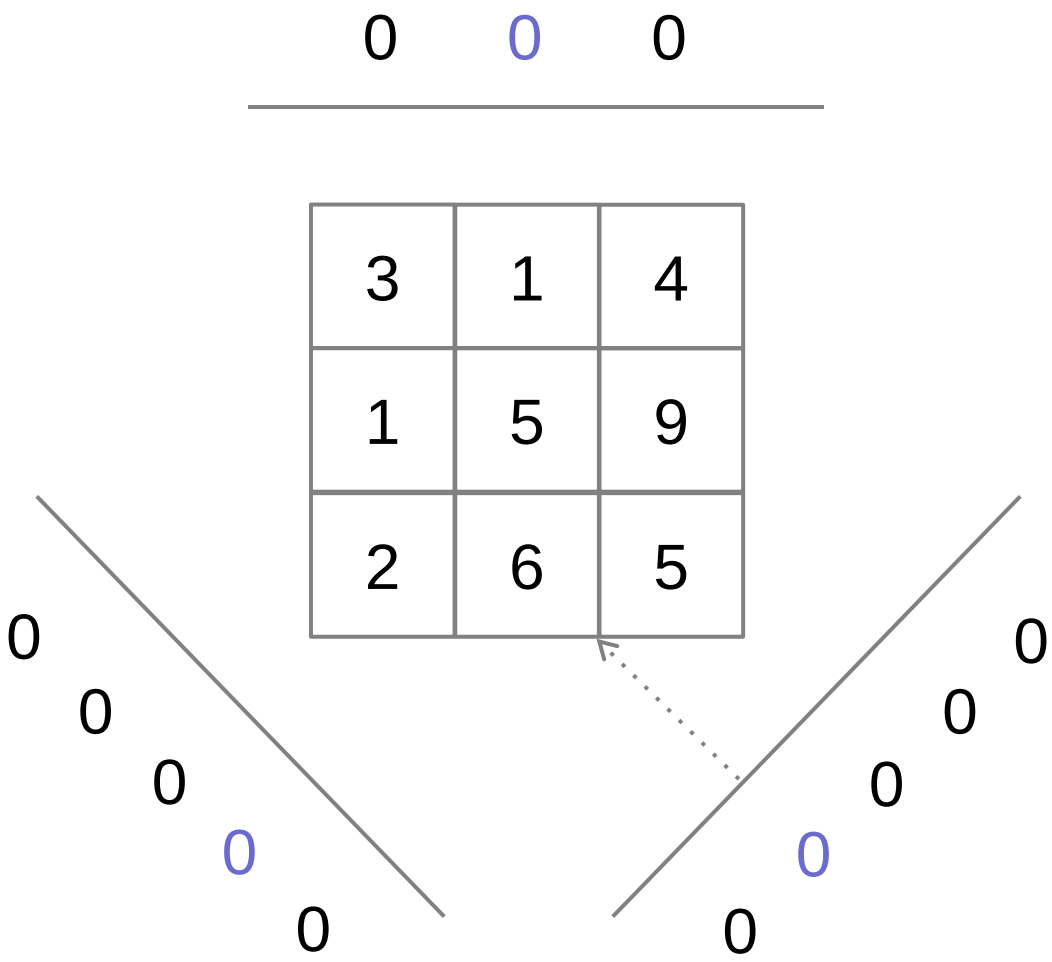
An Exact Discrete Radon Transform



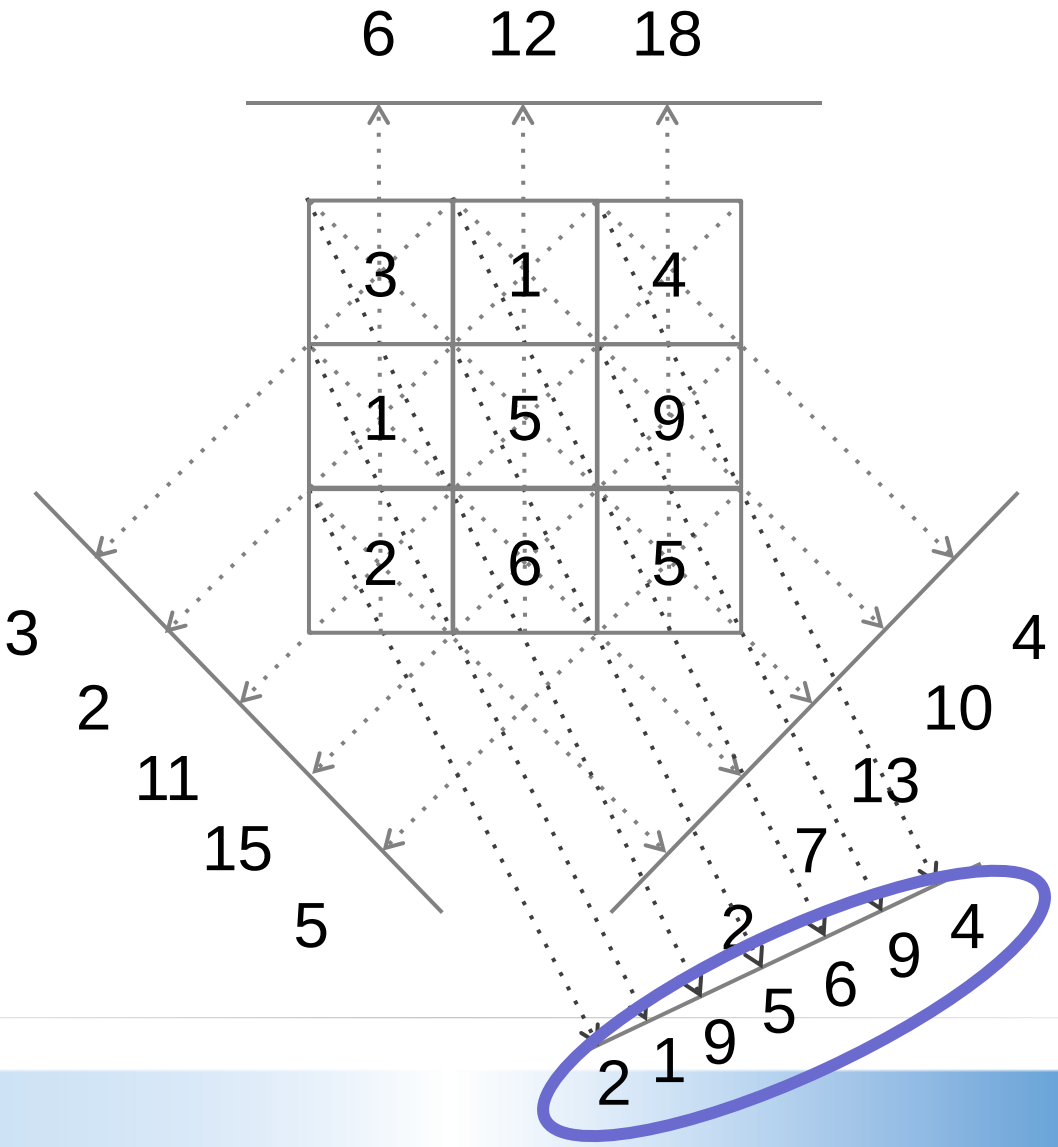
An Exact Discrete Radon Transform



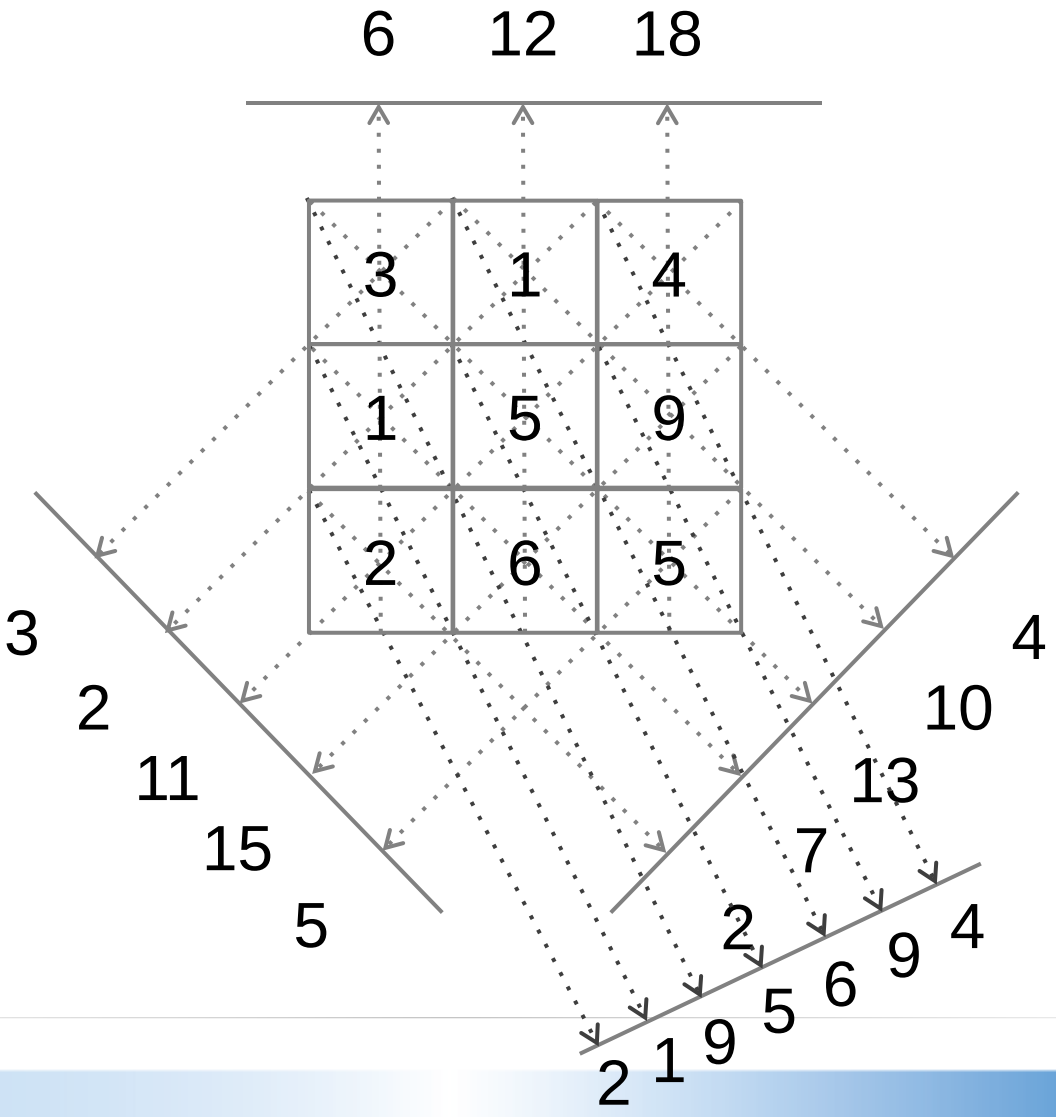
An Exact Discrete Radon Transform



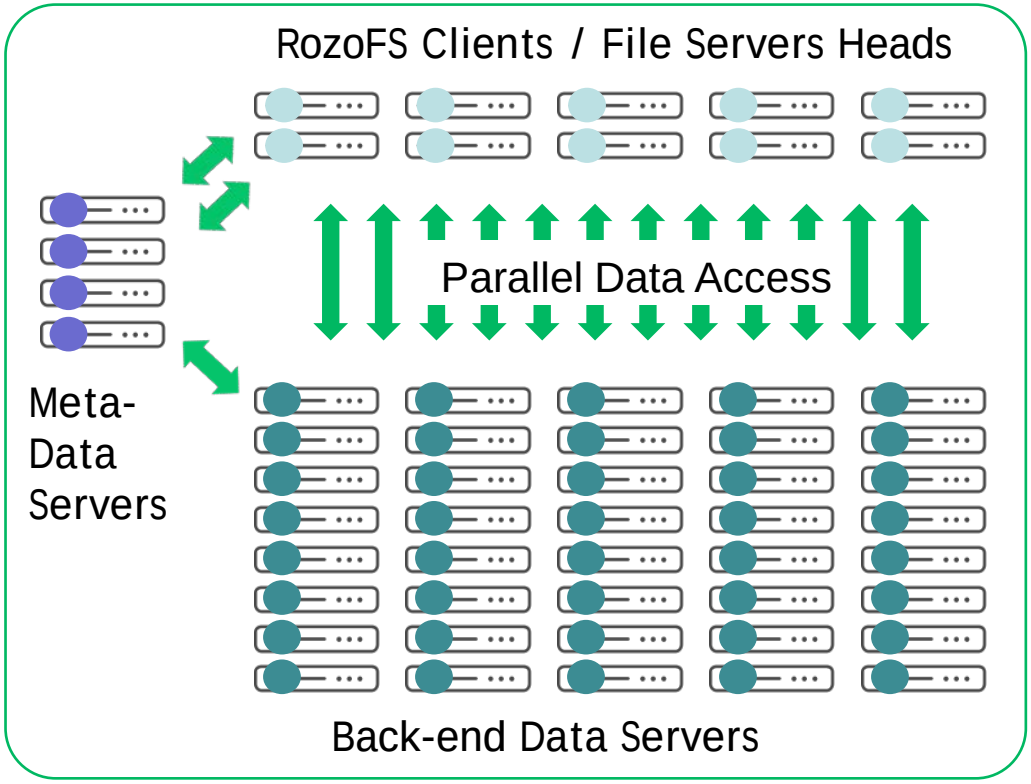
A Redundant Exact Discrete Radon Transform



An Erasure Code



Asymmetric Model



- Linux, x86, TCP/IP
- Striping, LB and Fast Failure detection
- 3 components
  - Exportd
    - Manages meta data, hierarchy and namespace
  - Storaged
    - Manage storage devices and chunk storage (multiple volumes)
  - Rozofsmount
    - Delivers FS service to OS
    - Erasure Codes and distributes data

Product Availability

rozofs

GitHub

Community Edition

- GNU GPL v2 license
- Available on GitHub
- Standard EC code

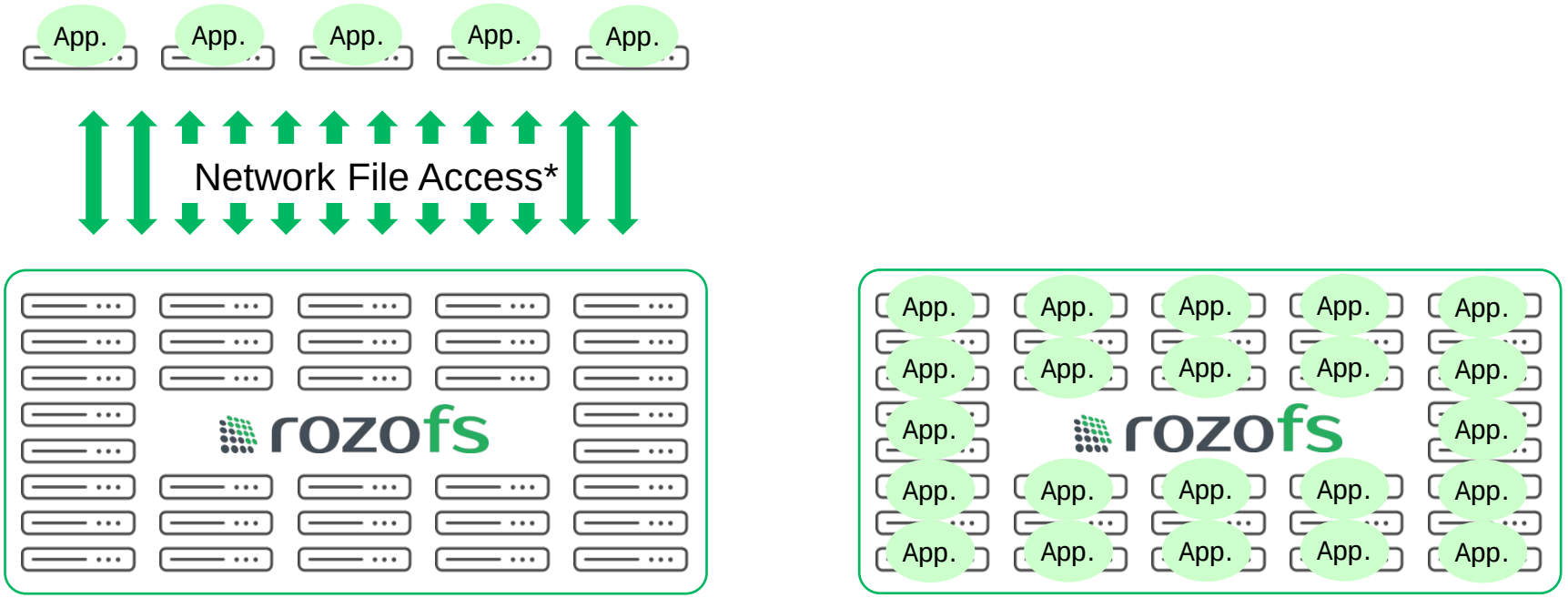
rozo systems

Advanced Edition

- Software License
- All Sales Channels
- Optimized EC code

Configurations & Use Cases

rozofs



Scale-Out NAS
High Performance & High Resilient
Scalable File Service

Converged Architecture
High Performance & High Resilient
Scalable Application Service

- Vertical use cases: Media & Entertainment, Oil & Gas, Life Sciences/Genomics, Web/Cloud Applications, HPC, Big Data/Analytics…

* NFS, SMB, AFP, FTP, HTTP…

RozoFS vs. Competition

rozofs

Solutions / Properties	NAS	Scale-Out NAS	Object Storage	Object Storage + Gateway	RozoFS (Scale-Out NAS w/ EC)
Performance (IOPS, Throughput, Repair)	x	x			x
Scalability (PB scale, Billions of files)		x	x	x	x
Durability (> 10 nines)			x[1]	x[1]	x[3]
Accessibility (File Sharing protocols and direct access)	x	x		x[2]	x[3]
Manageability (app. Integration, deployment and operation)	x	x			x
Cost Efficiency (Cloud Economics)			x		x

1/ assuming solution provides Erasure Coding (EC) 2/ Gateway to provide file access 3/ Primary file storage with EC such RozoFS, Isilon

A bit of future

- Fast indexation
- Versioning
- File recycling on deletion
- Per Directory Snapshots
- Storage QoS
- Fast Disk Encryption
- SSD Caching

Conclusion

- Tens of PBs
- Real-Time Performance
- Strong Data Protection
- Reduced TCO

- More info:
  rozosystems.com
  github.com/rozofs
  info@rozosystems.com

SNIA DSI '16 DATA STORAGE INNOVATION CONFERENCE
Innovation in Storage Products, Services, and Solutions
June 13-15, 2016 | Marriott San Mateo | San Mateo, CA

High Performance NAS, New design for New IT

Pierre Evenou – Philippe Nicolas
Rozo Systems