SDC
STORAGE DEVELOPER CONFERENCE
SNIA SANTA CLARA, 2016

Next Generation Scale-Out NAS

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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

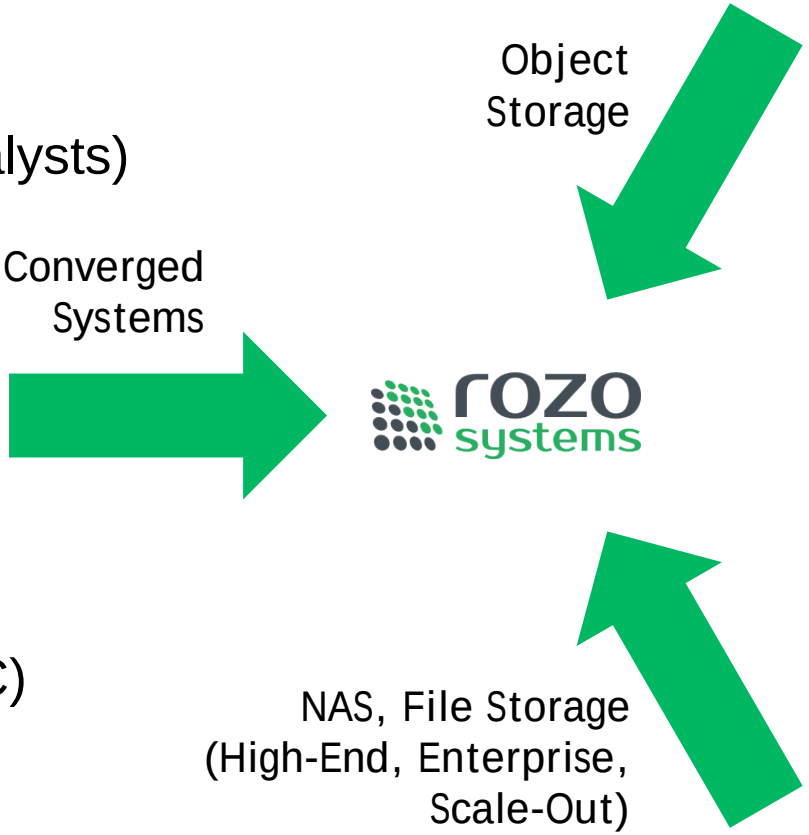
- Management
  - CEO: Pierre Evenou – COO: Michel Courtoy – CTO: Didier Feron
- Advisors
  - Philippe Nicolas and Eric Friis
- Founded in 2010 as a Spin-off of University of Nantes
- Nantes (France) & San Mateo, California
- Ready for a Series A investment round (Seed Funding 700k€)
- 10 people Worldwide
- 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 ?

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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 ?

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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 ?

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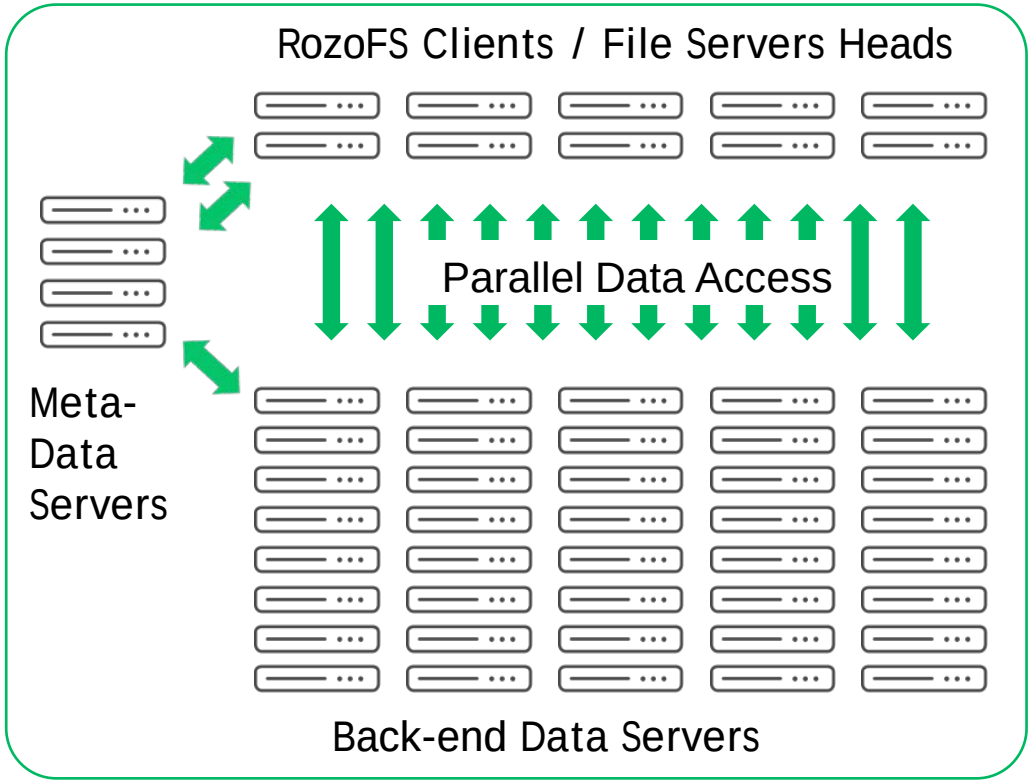
ERASURE CODE BASED SOFTWARE DEFINED SCALE-OUT NAS

High data durability with innovative Erasure Coding

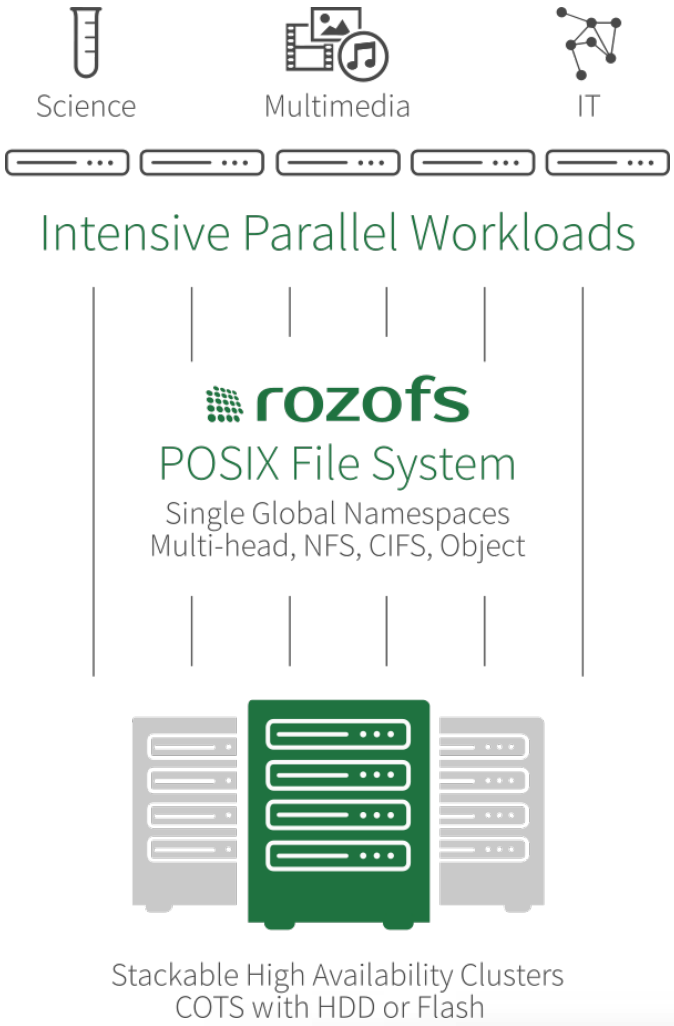
Delivers the protection level of 5 copies with just 1.5 redundancy factor while providing striping performance

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

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- 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

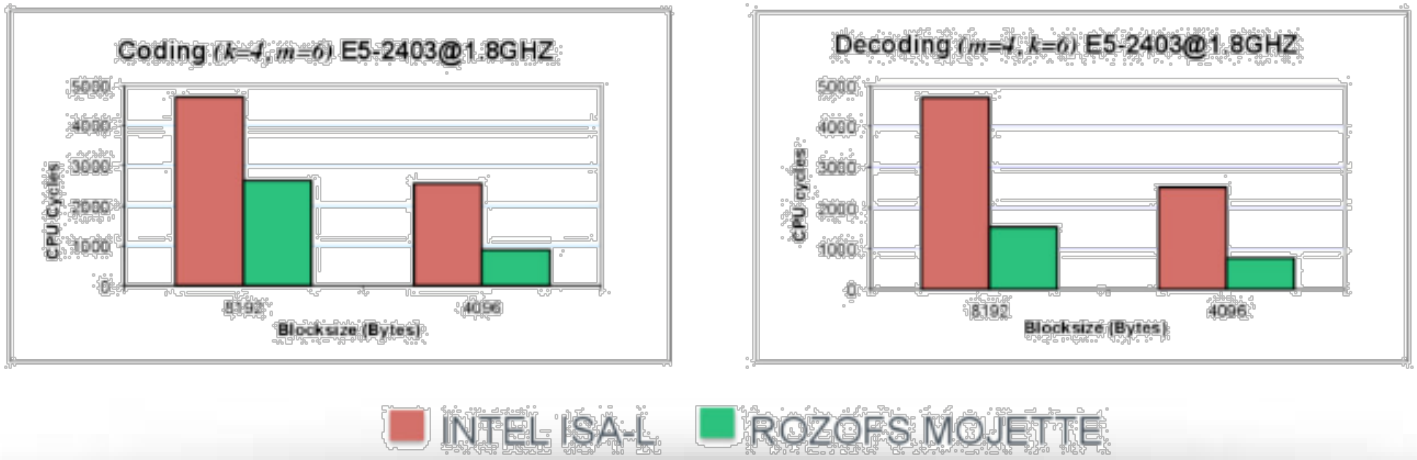
debian

CentOS

Nagios®

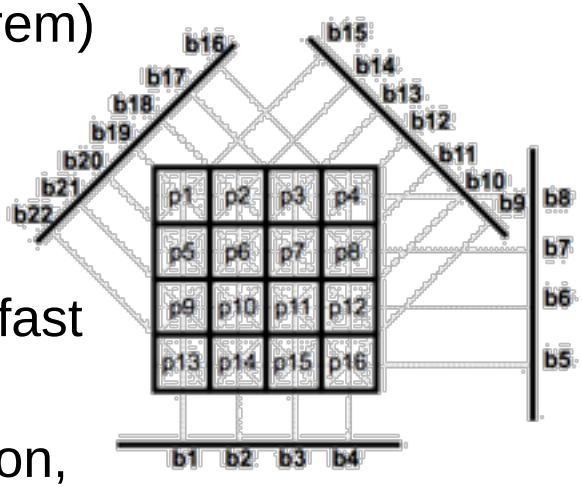
Super Efficient Data Protection

- 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

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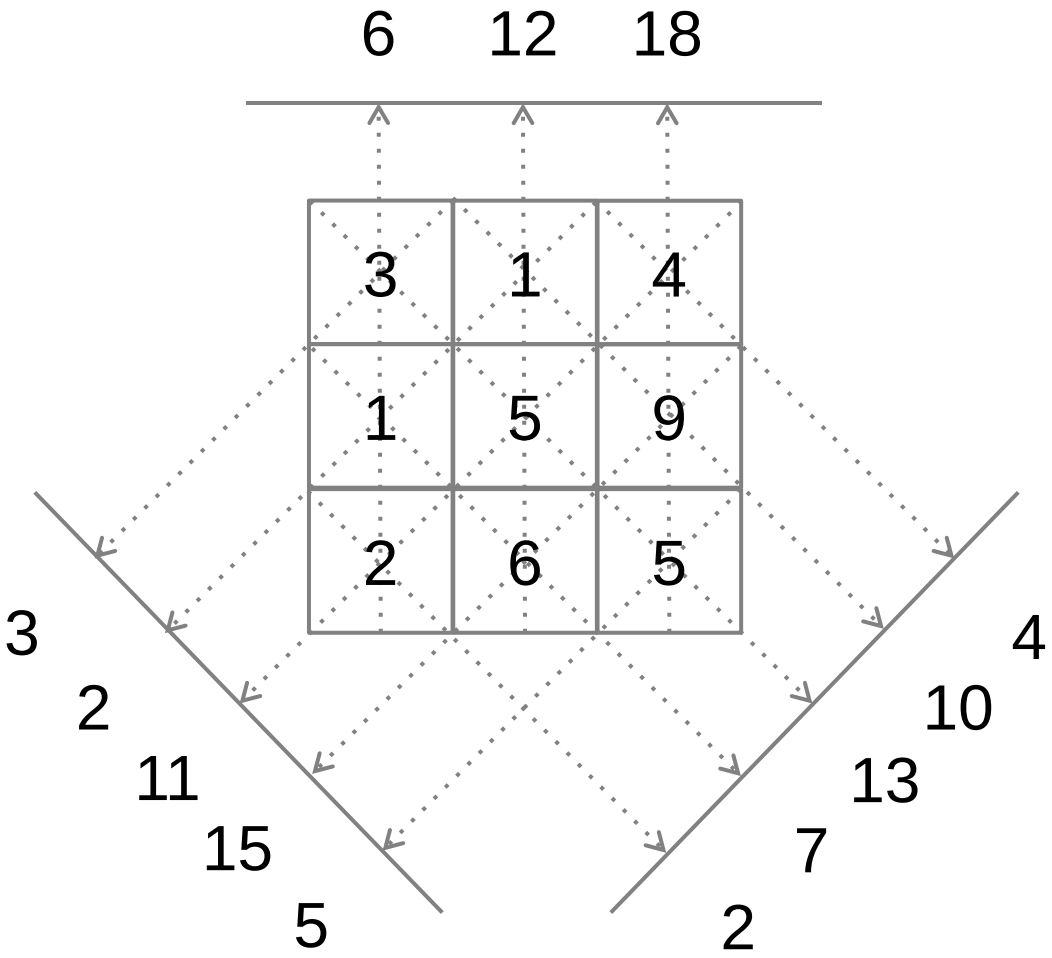
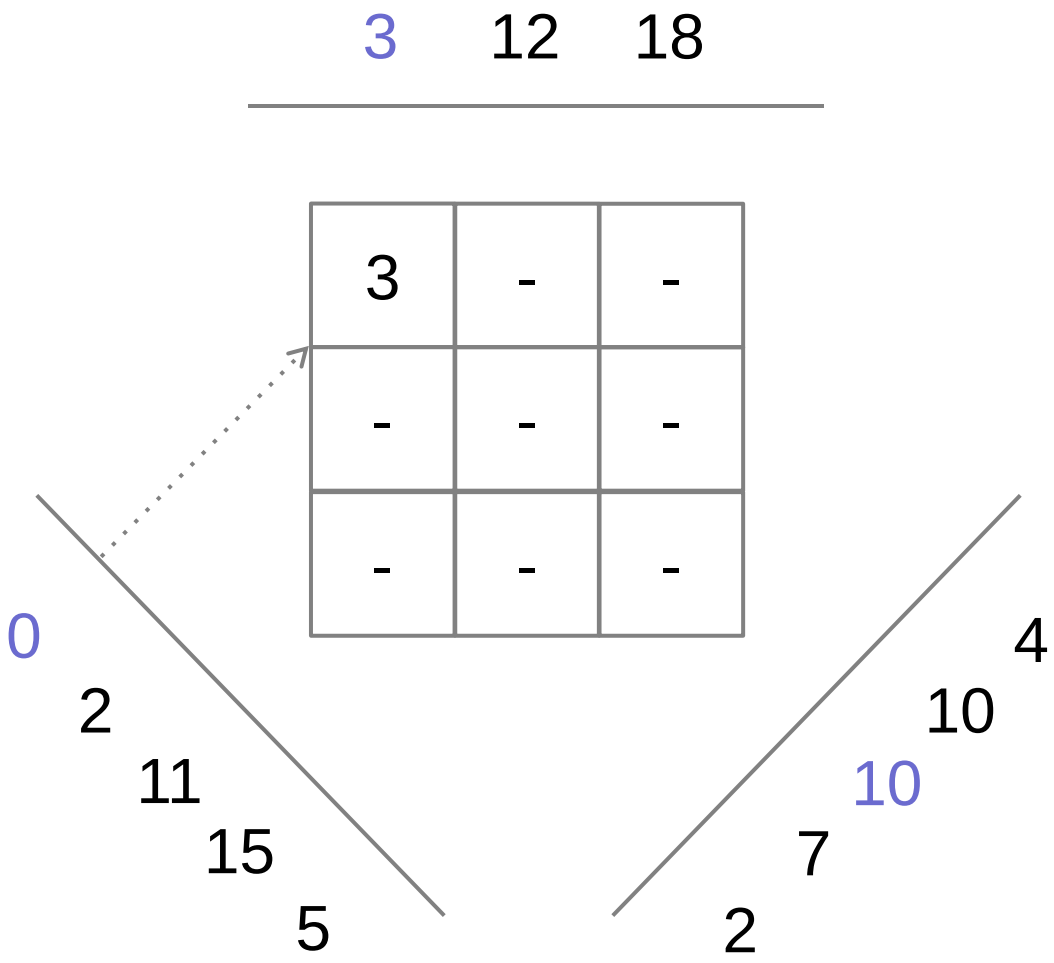
3	1	4
1	5	9
2	6	5

A Discrete Radon Transform



An Exact Discrete Radon Transform



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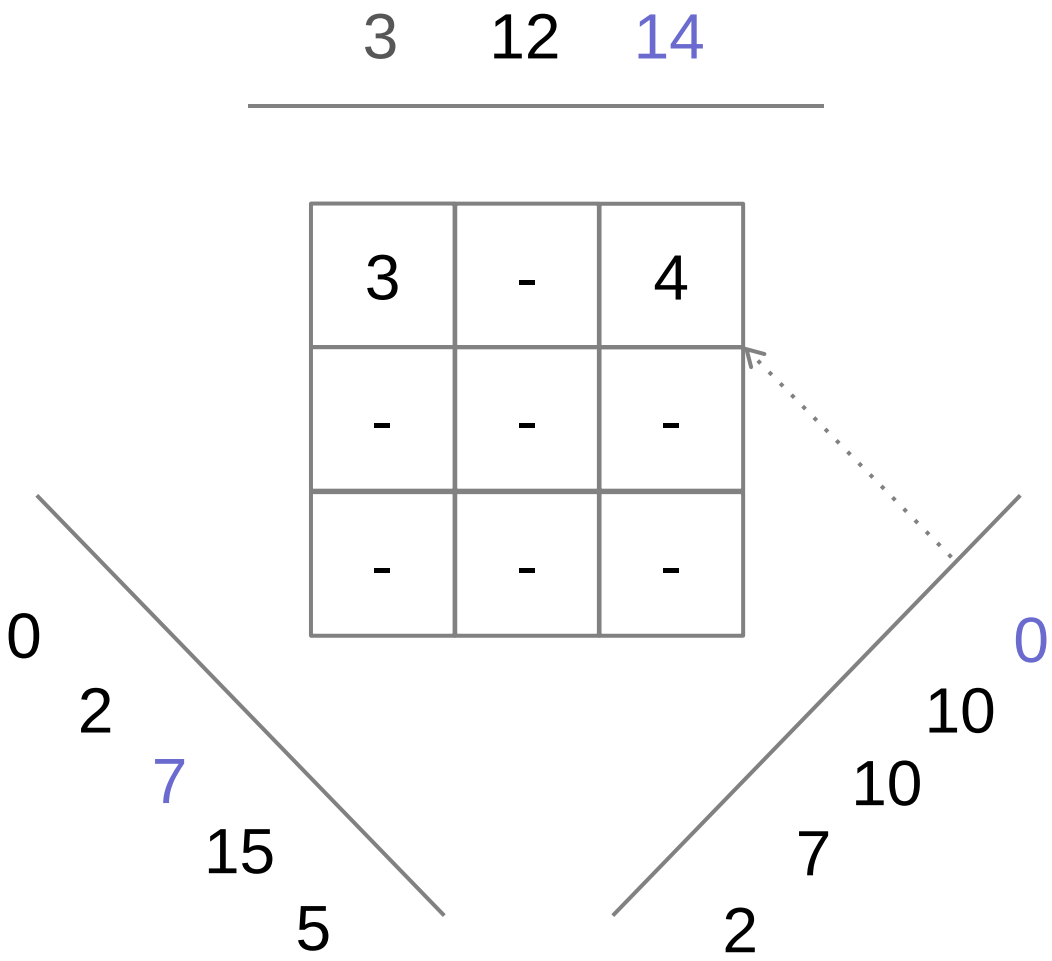

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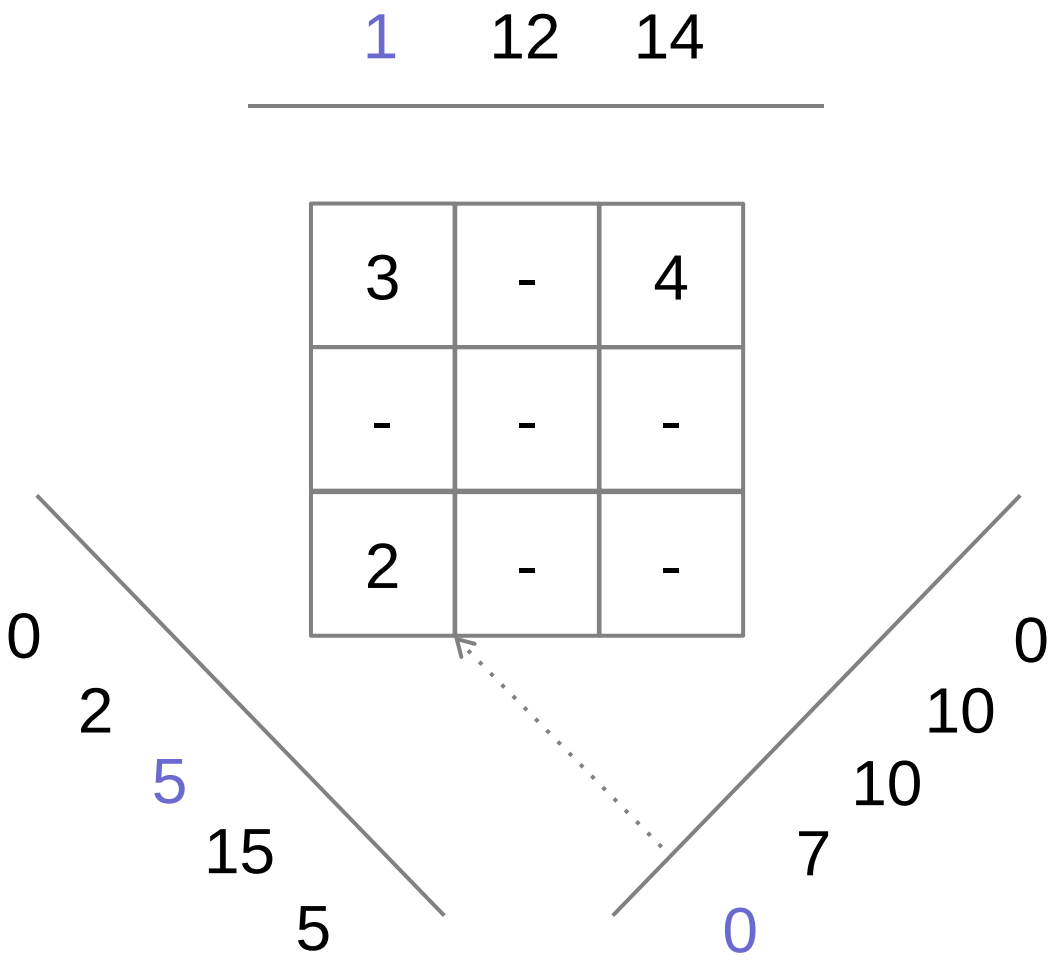

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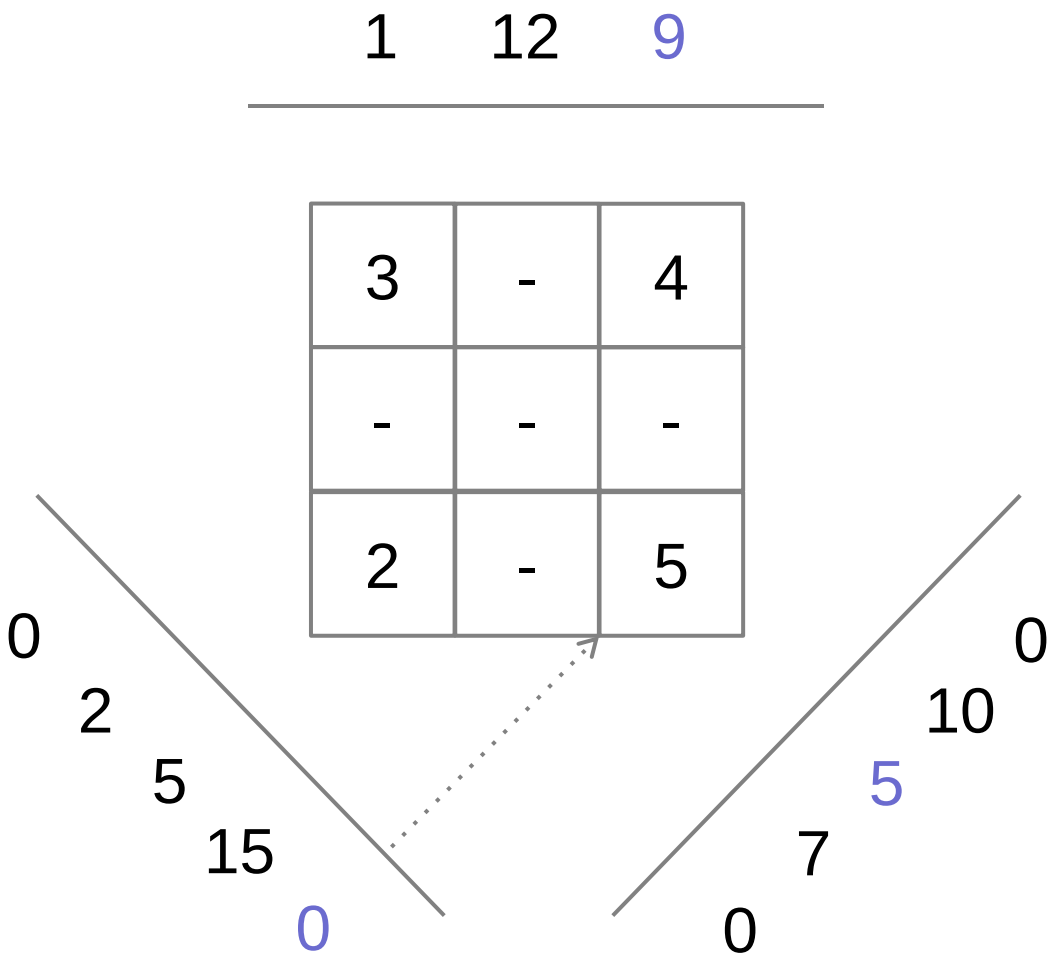

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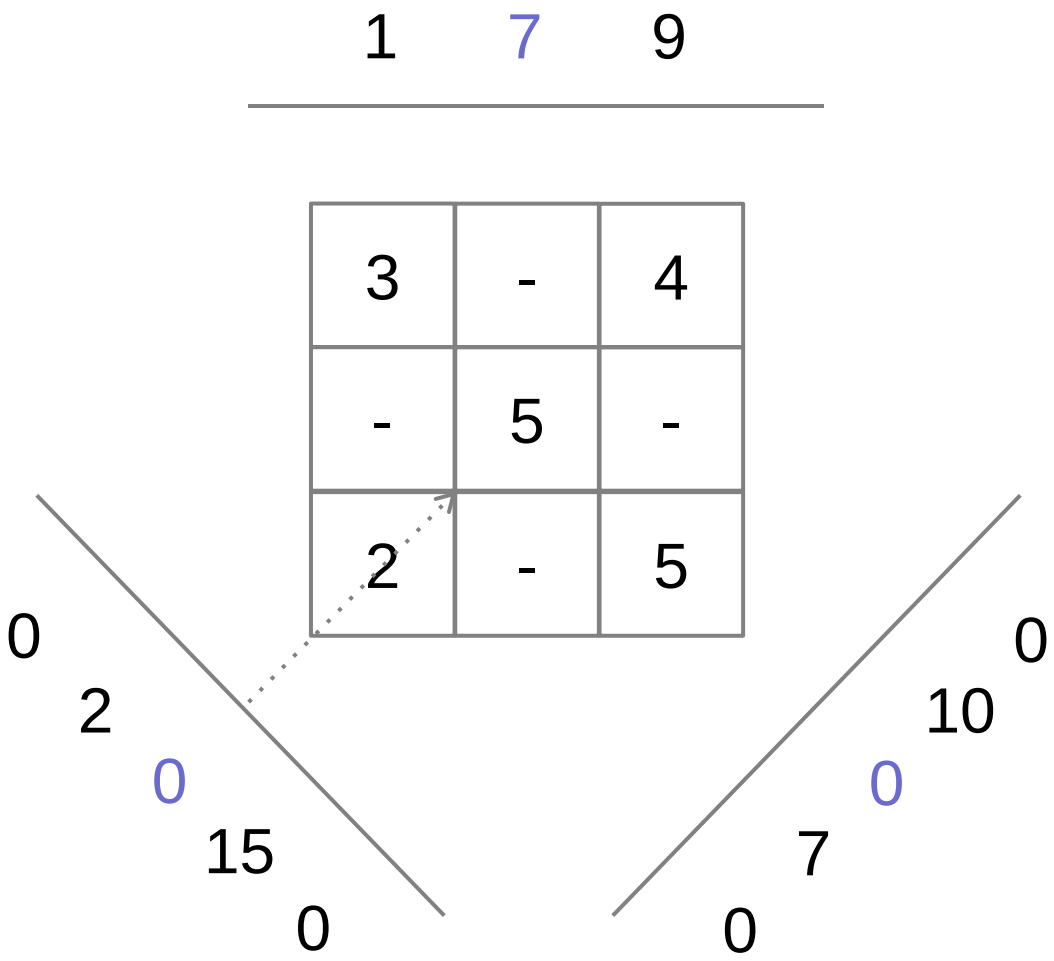

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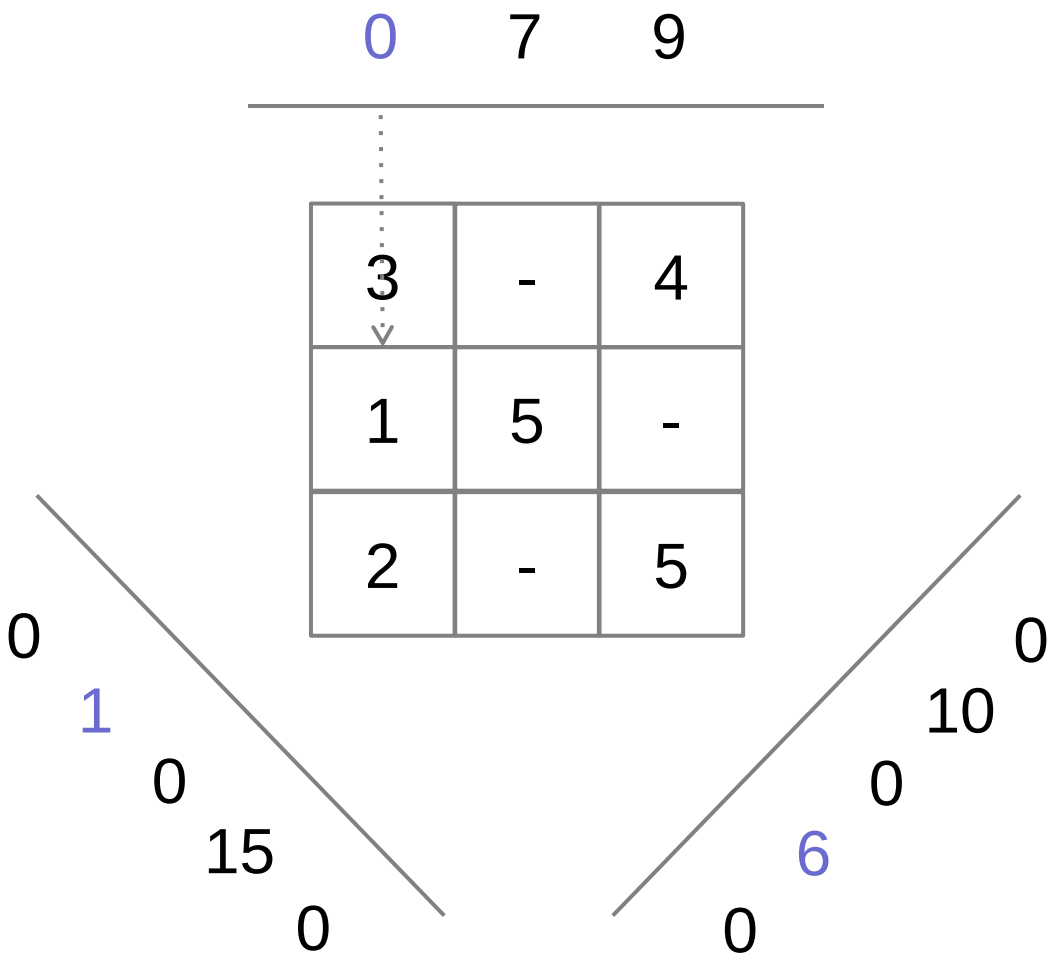

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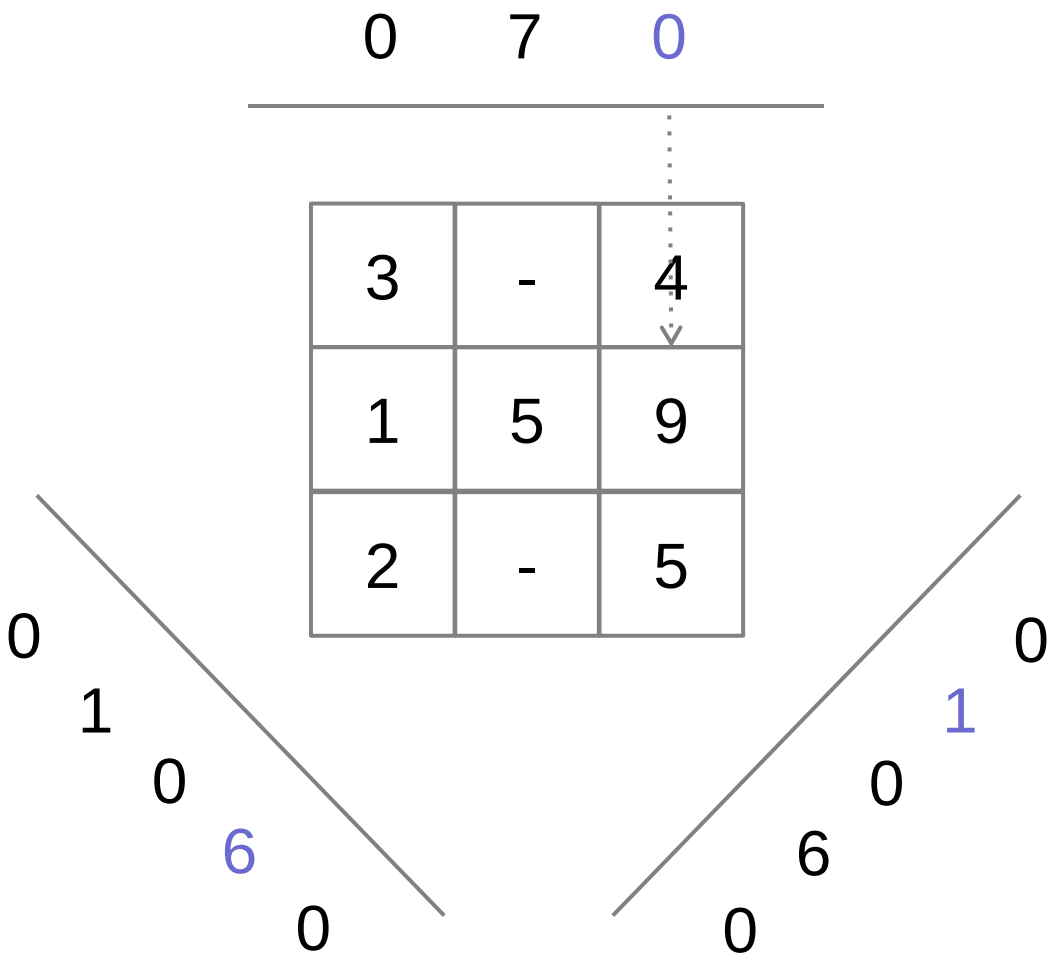

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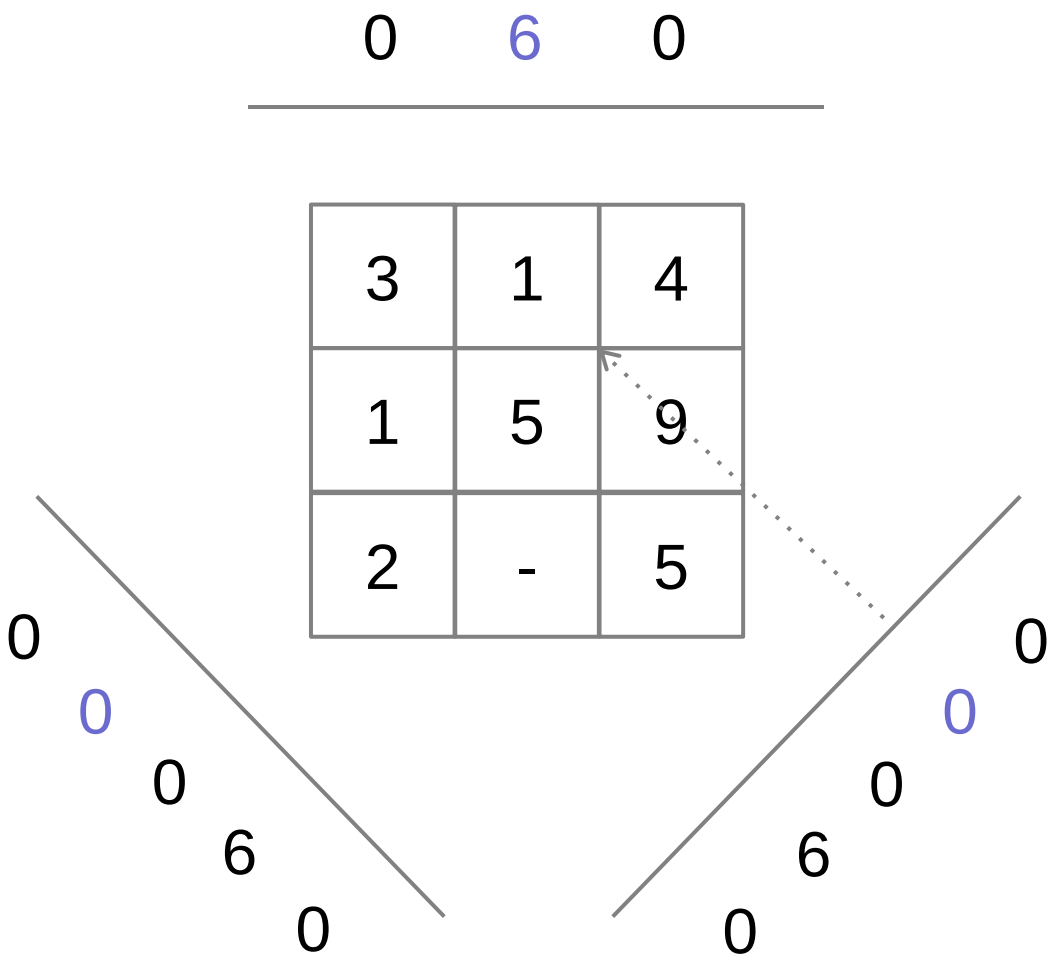
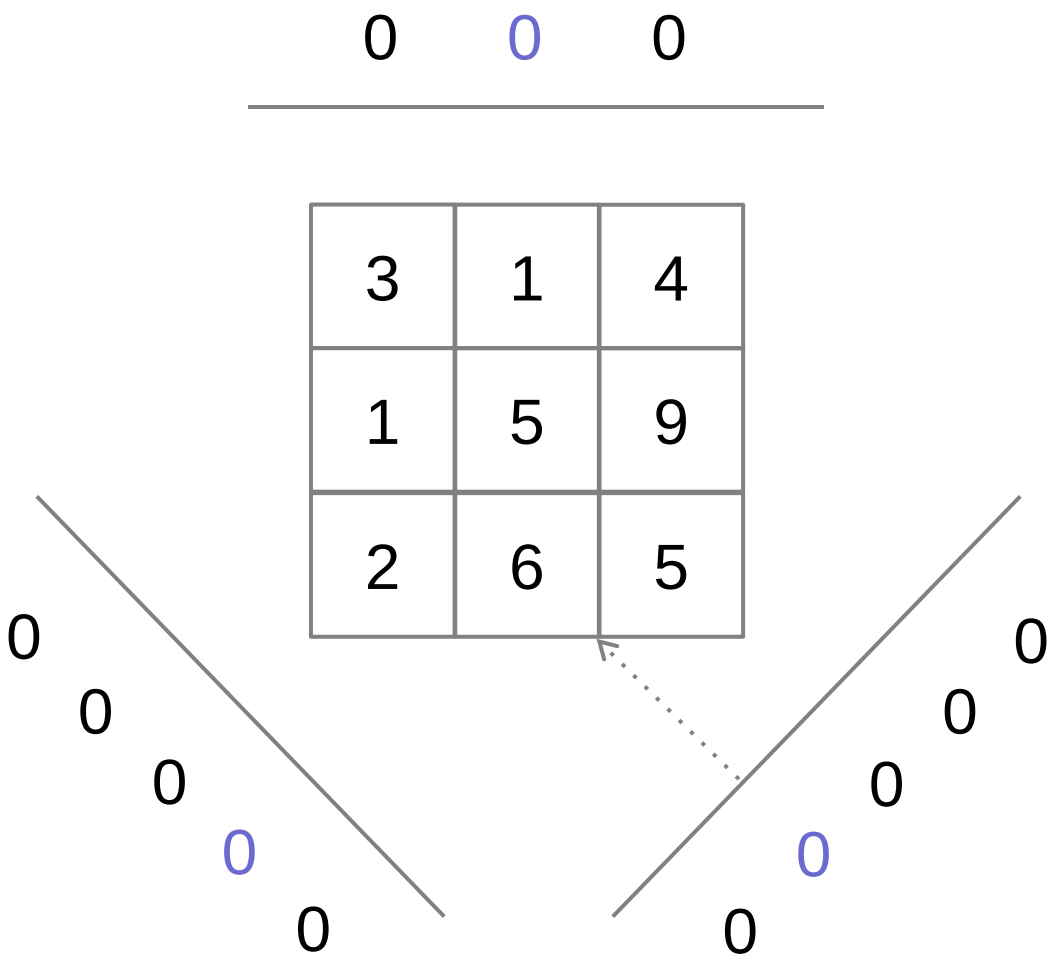
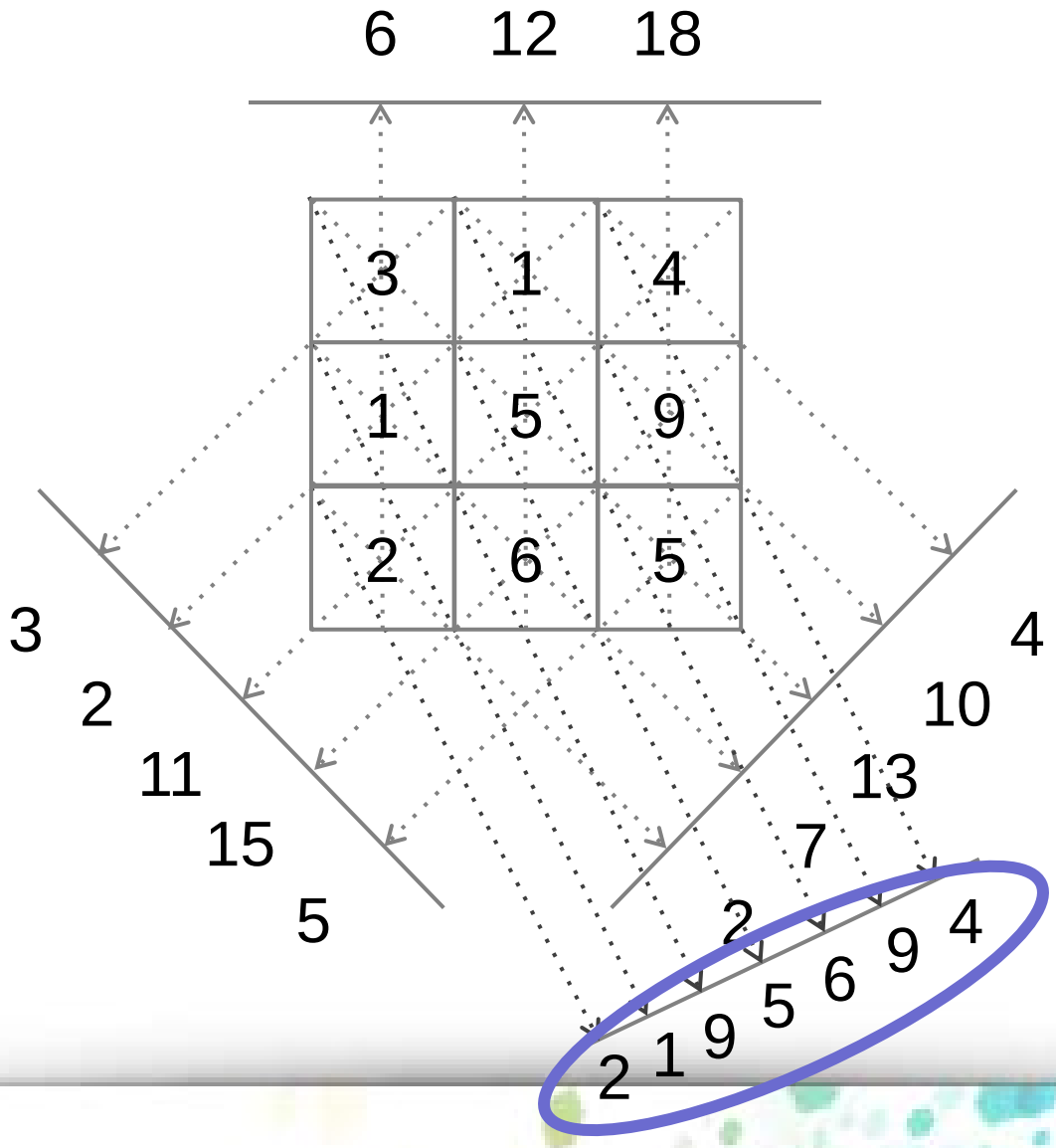


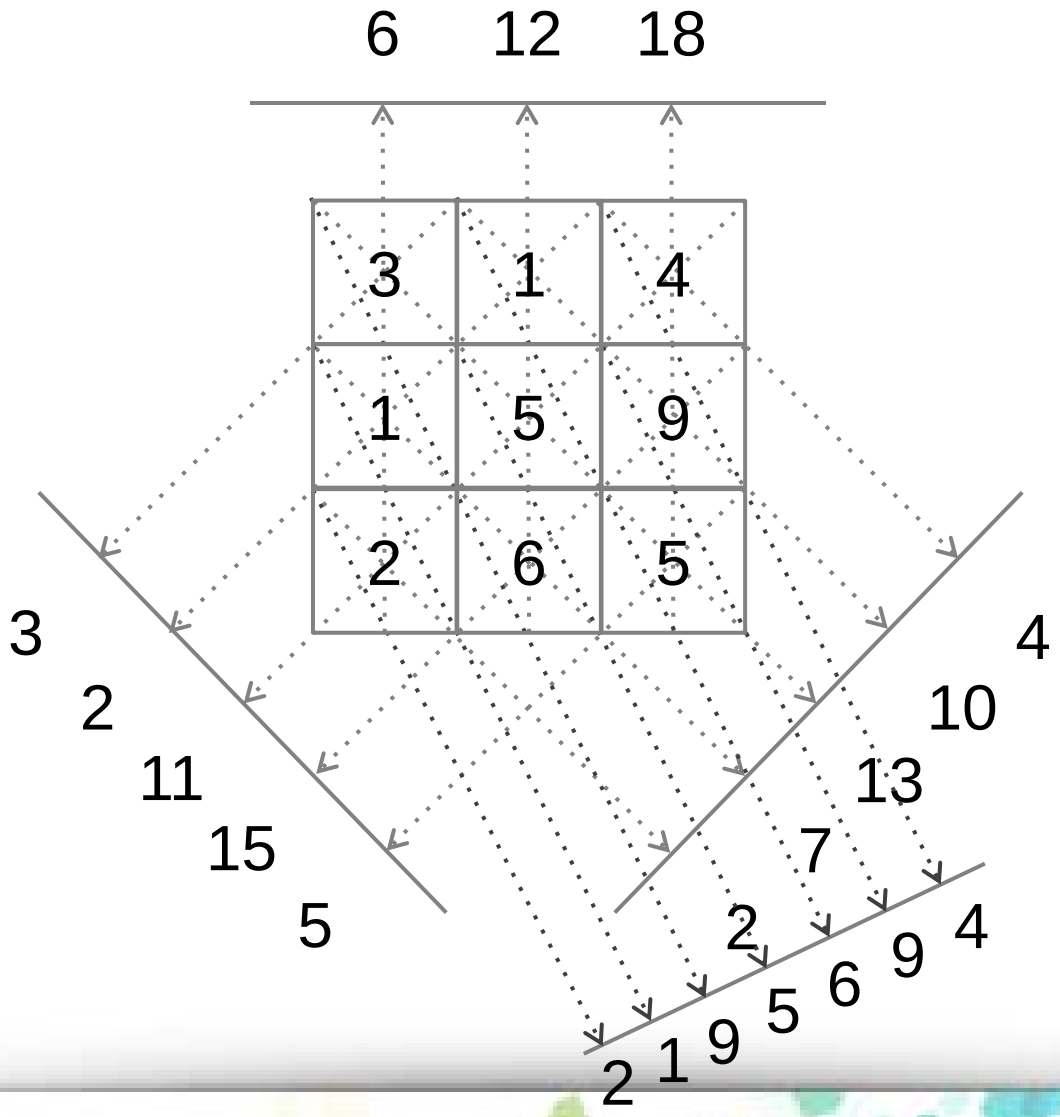
An Exact Discrete Radon Transform



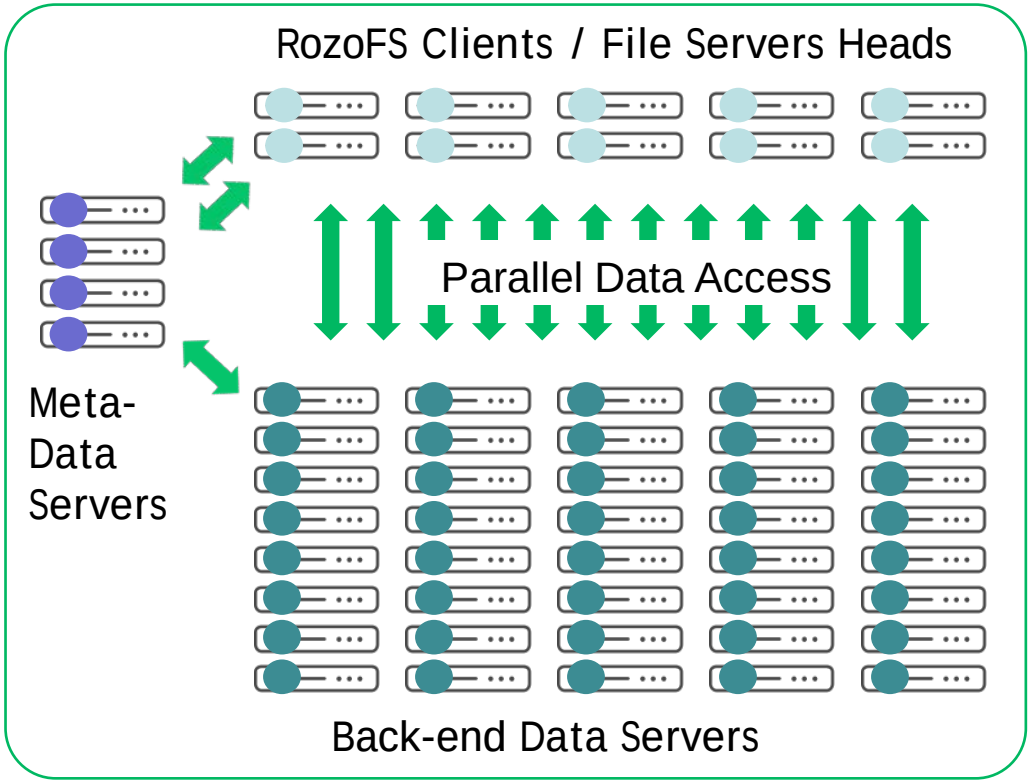
A Redundant Exact Discrete Radon Transform



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

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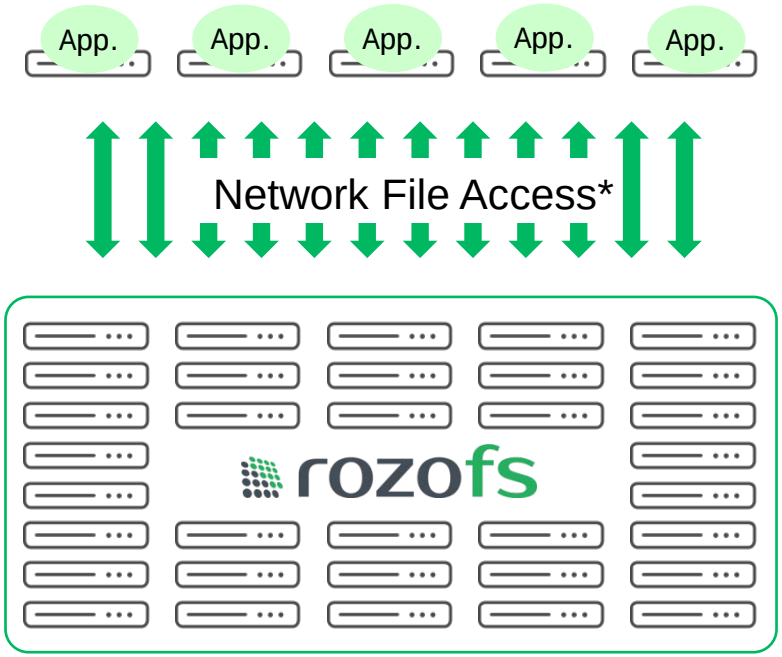
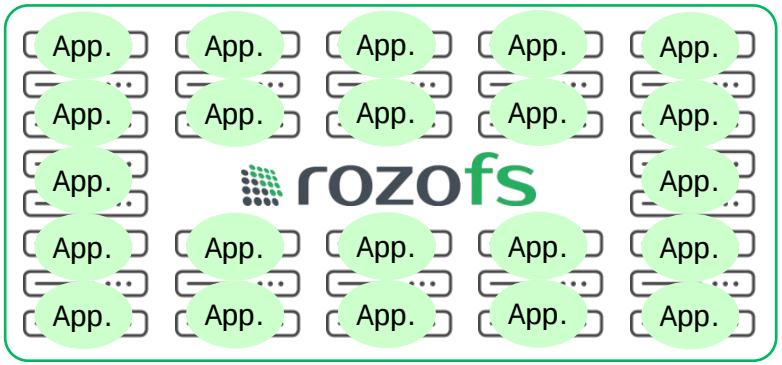


Scale-Out NAS
High Performance & High Resilient
Scalable File Service



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

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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:
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