



PROXMOX

Proxmox Backup Server: Backup for your Datacenter

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SFSCON 24 | 8TH -9TH NOVEMBER 2024 | BOLZANO (IT)

About Proxmox

- Established in 2005
- Located in Vienna, Austria
- Privately owned, no venture capital
- Open-source software solutions, license: AGPLv3
- No feature gating
- Very active and strong community!



About Proxmox

Business Model

- Subscriptions
 - Enterprise Repository
 - Support Tickets
- Trainings
- Partners worldwide

Software Solutions

- Proxmox Mail Gateway
Email security
- Proxmox Virtual Environment
Hypervisor (QEMU/KVM and LXC guests)
- Proxmox Backup Server
Backup for hosts and guests
- Proxmox Offline Mirror
Offline repository for air-gapped hosts

Datastore & Deduplication

Namespace:
ns/pve-c0

Group:
vm/200

Snapshot:
2024-10-22T09:00:00Z

drive-scsi0.img.fidx

0xb122...
0x02c0...
...
0xef00...

2024-10-23T09:00:00Z

drive-scsi0.img.fidx

0xb122...
...
0xef00...

Group:
host/elmi

2024-10-24T09:00:00Z

home.pxar.didx

0xaf01...
0x02c0...
...
0xd1f2...

Group:
ct/100

2024-10-22T09:00:00Z

root.pxar.didx

0xaf01...
0xd1f2...
...
0xef00...

2024-10-23T09:00:00Z

root.pxar.didx

0xaf01...
0xd1f2...
...
0xef00...

2024-10-24T09:00:00Z

root.pxar.didx

0xaf01...
0xdeda...
...
0xef00...

Data chunks:
.chunks

...

0x02c0...
01010111111...

...

0xaf01...
01010000111...

...

0xb122...
11011010111...

...

0xd1f2...
01010111000...

...

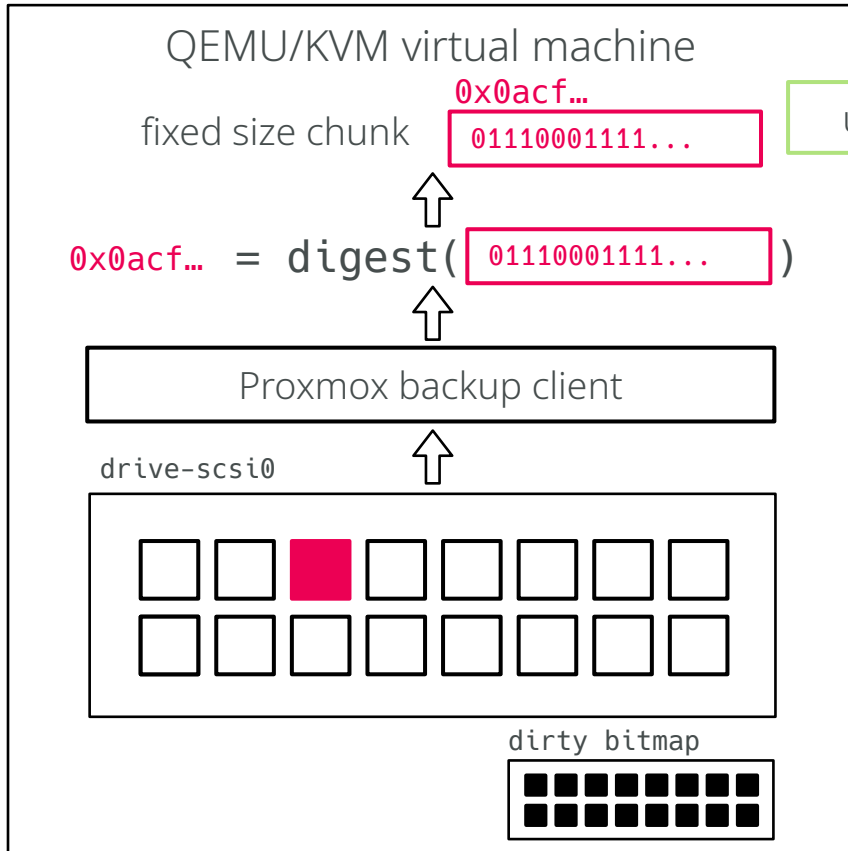
0xdeda...
01010101110...

...

0xef00...
1111000111...

...

VM Backups

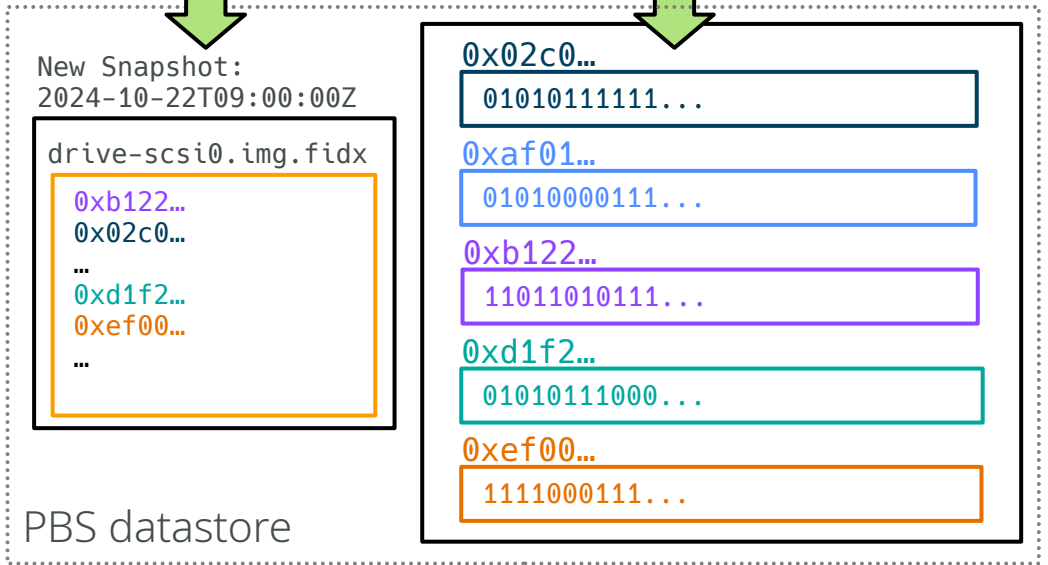


upload

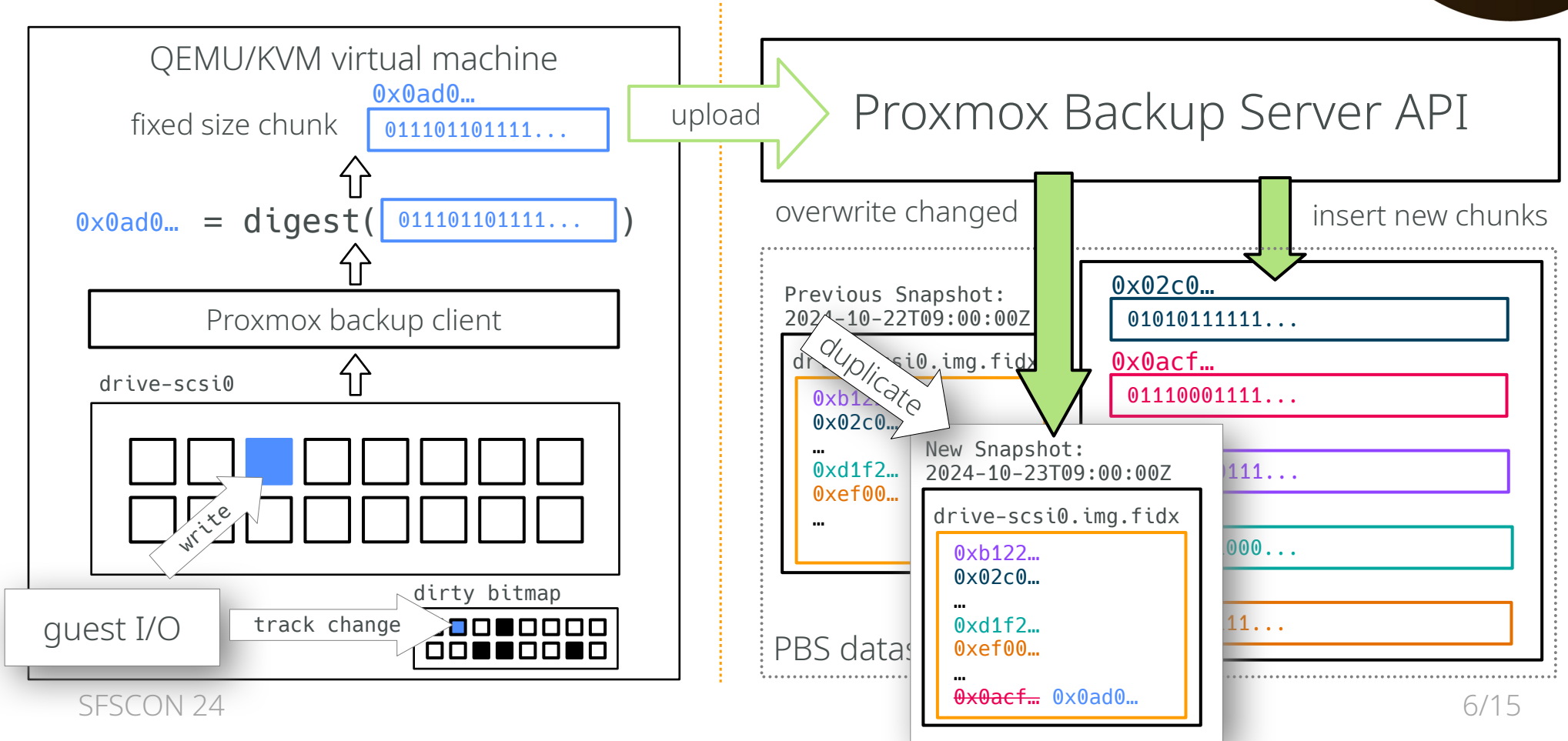


append to index

insert new chunks

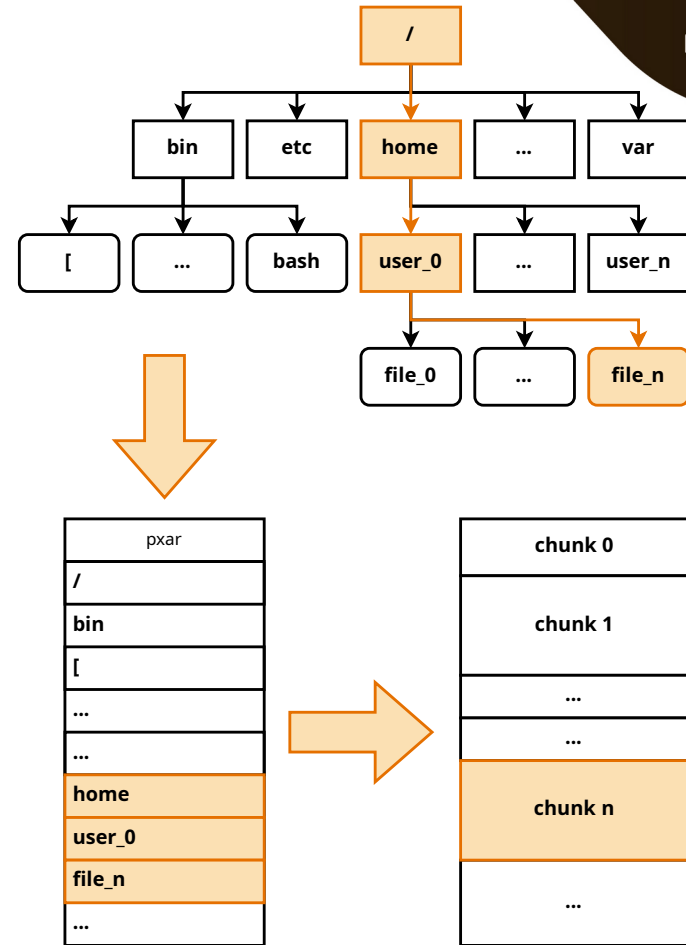


VM Backups - Fast Incremental Mode

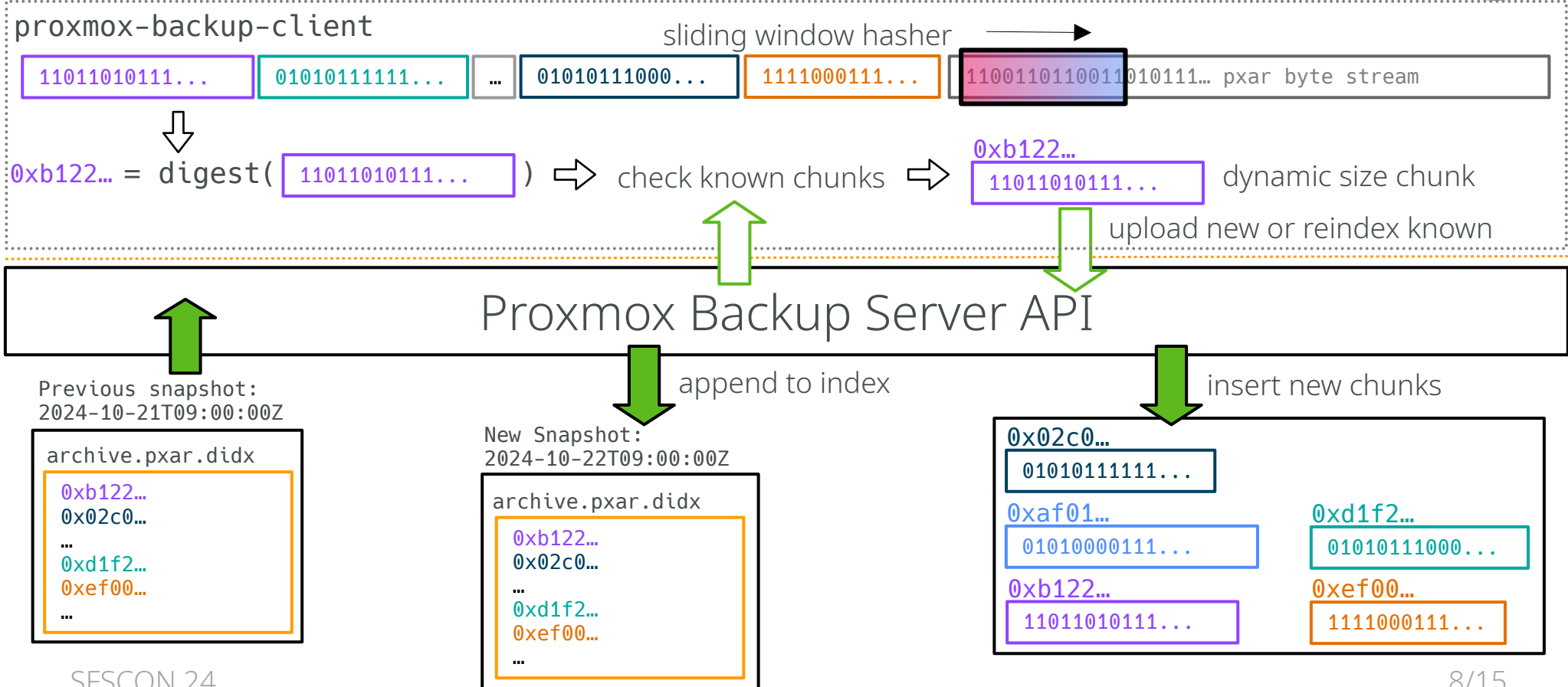


LXC and Host Backups

- Walk the filesystem tree recursively
- Encode entries in pxar file format
- Create variable sized chunks by rolling window chunker
- Calculate digest and upload new chunks, reindex known



LXC and Host Backups



Change Detection Mode

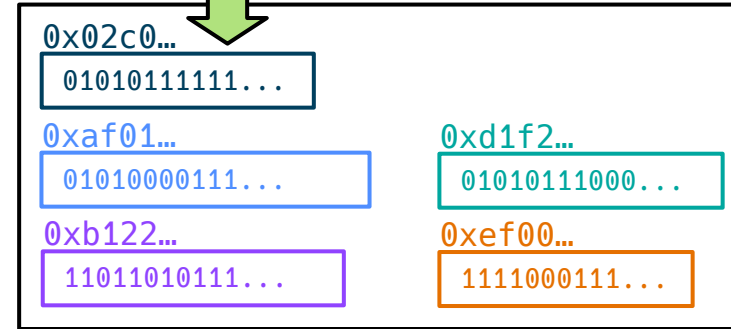
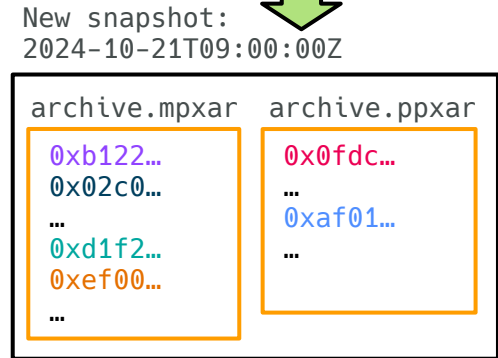
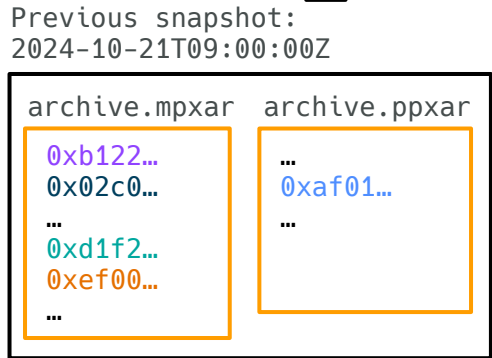
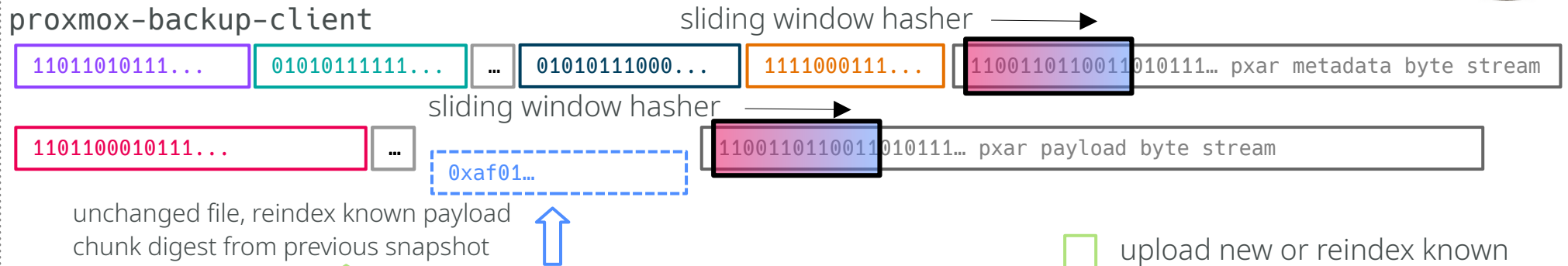
Motivation:

- Variable sized chunker requires to read all data → slow

Solution:

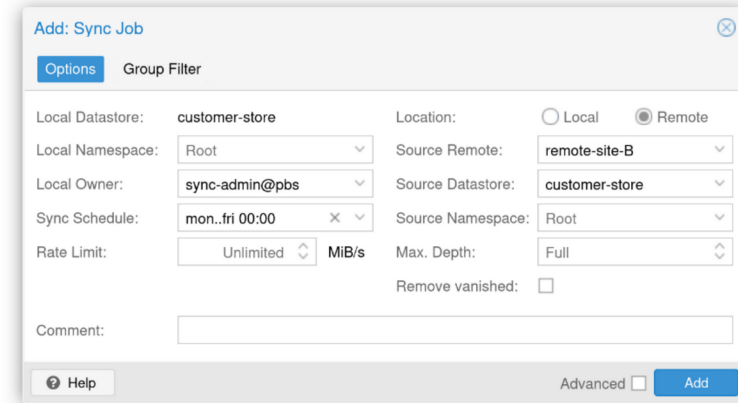
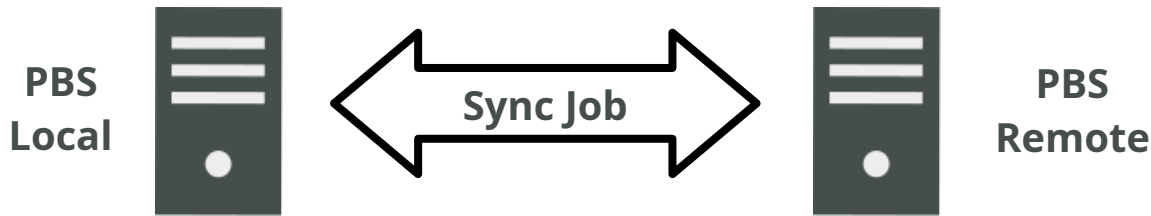
- Split files metadata and payload data into separate archive streams
- Detect unchanged files by comparing metadata (**size**, **mtime**, ...) with previous snapshot
- Only chunk payloads for changed files
- Reuse known payload chunks for unchanged files
- Reduces backup times for filesystems with mostly unchanged contents, e.g. file servers

Change Detection Mode - Metadata



Offsite Backups via Sync Jobs

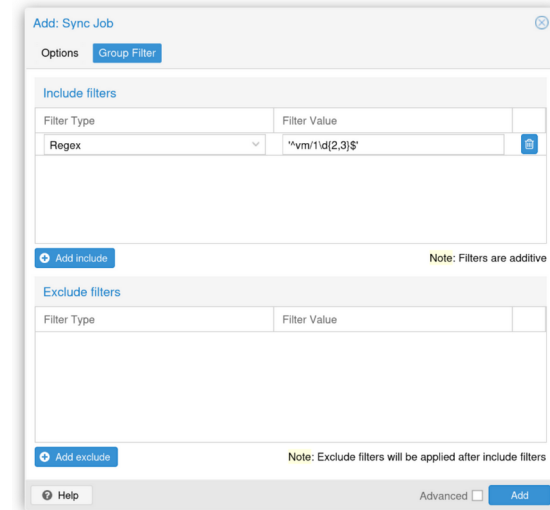
- Allow to pull contents from a source datastore (local or remote)
- Scheduled sync jobs
- Upcoming new feature: Sync datastore in push direction
- Fine grained filtering for contents to be synchronized



This screenshot shows the "Add: Sync Job" configuration window in Proxmox. The "Options" tab is selected, and the "Group Filter" section is active. The configuration includes the following fields:

- Local Datastore: customer-store
- Local Namespace: Root
- Local Owner: sync-admin@pbs
- Sync Schedule: mon..fri 00:00
- Rate Limit: Unlimited MiB/s
- Location: Remote (selected)
- Source Remote: remote-site-B
- Source Datastore: customer-store
- Source Namespace: Root
- Max. Depth: Full
- Remove vanished:

Buttons for "Help", "Advanced", and "Add" are visible at the bottom.



This screenshot shows the "Add: Sync Job" configuration window in Proxmox, specifically the "Group Filter" section. It displays two filter tables:

Filter Type	Filter Value
Regex	*vm/1d(2,3)\$

Below the include filters table, there is an "Add include" button and a note: "Note: Filters are additive".

Filter Type	Filter Value
-------------	--------------

Below the exclude filters table, there is an "Add exclude" button and a note: "Note: Exclude filters will be applied after include filters".

Buttons for "Help", "Advanced", and "Add" are visible at the bottom.

Prune and Garbage Collection

- **Prune** - Remove backup snapshots based on retention periods
- Does not remove data chunks

Edit: Prune Job

Datastore: **datastore** Prune Schedule: **0/2:00**
 Namespace: **Root** Enabled:
 Max. Depth: **Full**
 Keep Last: **2** Keep Hourly:
 Keep Daily: **1** Keep Weekly:
 Keep Monthly: Keep Yearly: **1**
 Comment:
 Job ID: **s-2fa50707-05dc**

Group: ct/100

2024-10-22T09:00:00Z ✕

```
root.pxaar.didx ✕
@xaf01...
@xd1f2...
...
@xef00...
```

2024-10-23T09:00:00Z

```
root.pxaar.didx
@xaf01...
@xd1f2...
...
@xef00...
```

2024-10-24T09:00:00Z

```
root.pxaar.didx
@xaf01...
@xdeda...
...
@xef00...
```

Proxmox Backup Server - Prune Simulator

View Options Backup Job Simulation

Show Calendar: Show Colors:

Backup Job Day of week: **Monday, Tuesday, We** Schedule: **0/6:00** Simulation Time Range End Date: **2024-10-29** End Time: **09:27** Duration: **15** Weeks

Update Simulation

Prune Options Backups

keep-last: **3** Backup Time ↓ Keep (reason)

keep-hourly: 12	2024-10-25 12:00:50	remove
keep-daily: 5	2024-10-25 06:00:50	remove
keep-weekly: 2	2024-10-25 00:00:50	remove
keep-monthly:	2024-10-24 12:00:50	remove
	2024-10-24 06:00:50	remove

Calendar

Sun, 03 Nov 2024	Sat, 02 Nov 2024	Fri, 01 Nov 2024	Thu, 31 Oct 2024	Wed, 30 Oct 2024	Tue, 29 Oct 2024	Mon, 28 Oct 2024
					06:00 (keep-last 1)	18:00 (keep-last 3)
					00:00 (keep-last 2)	12:00 (keep-hourly 1)
						06:00 (keep-hourly 2)
						00:00 (keep-hourly 3)
Sun, 27 Oct 2024	Sat, 26 Oct 2024	Fri, 25 Oct 2024	Thu, 24 Oct 2024	Wed, 23 Oct 2024	Tue, 22 Oct 2024	Mon, 21 Oct 2024
18:00 (keep-hourly 4)	18:00 (keep-hourly 8)	18:00 (keep-hourly 12)	18:00 (keep-daily 1)	18:00 (keep-daily 2)	18:00 (keep-daily 3)	18:00 (keep-daily 4)
12:00 (keep-hourly 5)	12:00 (keep-hourly 9)	12:00	12:00	12:00	12:00	12:00
06:00 (keep-hourly 6)	06:00 (keep-hourly 10)	06:00	06:00	06:00	06:00	06:00

<https://pbs.proxmox.com/docs/prune-simulator/>

Prune and Garbage Collection

- **Prune** - Remove backup snapshots based on retention periods
- Does not remove data chunks
- **Garbage collection** - remove unused chunks
 - 1st phase: mark chunks still in use by updating **atime**
 - 2nd phase: remove chunks which **atime** older than 24h + 5min grace period

Group: ct/100

2024-10-22T09:00:00Z x

```

root.pxar.didx x
  0xaf01... x
  0xd1f2... x
  ... x
  0xef00... x
  
```

2024-10-23T09:00:00Z

```

root.pxar.didx
  0xaf01... ✓
  0xd1f2... ✓
  ... ✓
  0xef00... ✓
  
```

2024-10-24T09:00:00Z

```

root.pxar.didx
  0xaf01... ✓
  0xdeda... ✓
  ... ✓
  0xef00... ✓
  
```

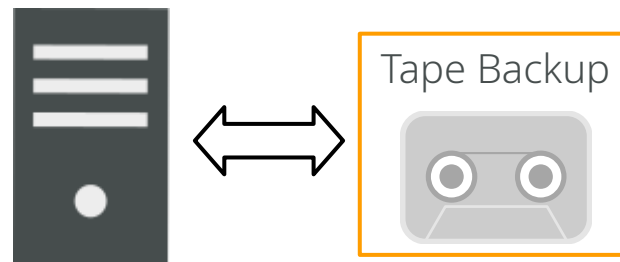
```

0x02c0... x
  010101111111... x
  0xaf01... ✓
  01010000111... ✓
  0xb122... x
  11011010111... x
  0xd1f2... ✓
  01010111000... ✓
  0xdeda... ✓
  01010101110... ✓
  0xef00... ✓
  1111000111... ✓
  
```

Tape Backup

- Easy way for long term and off-site storage
- Supports LTO5 or newer, LTO4 can work with latest Firmwares
- Supports libraries/loaders
- Proxmox specific LTO implementation

Proxmox Backup Server





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Thank you for your attention!

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