



# Perfect Recall - Lossless Backup

- **mag. Sergej Rožman**; Abakus plus d.o.o.
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<http://www.abakus.si/>





# BACKUP PLANS

Sometimes they're so good you want everything else to fail.



As na disku.

# Perfect Recall (Lossless Backup)

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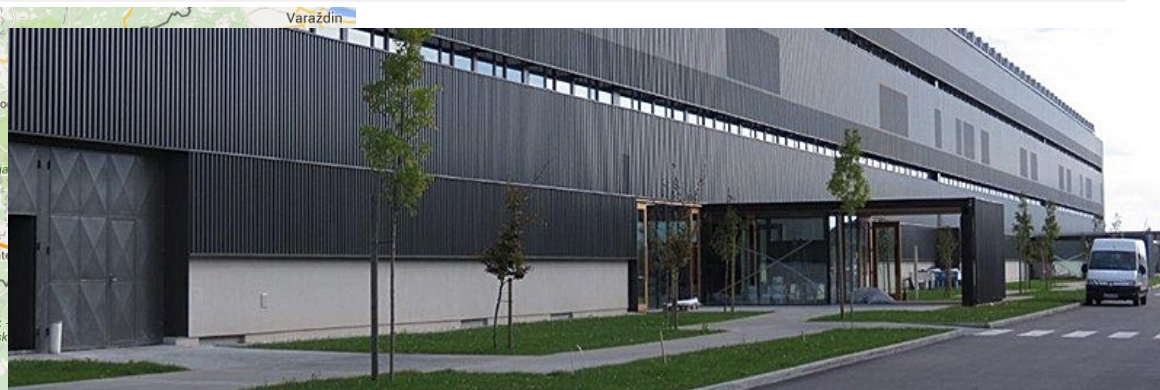
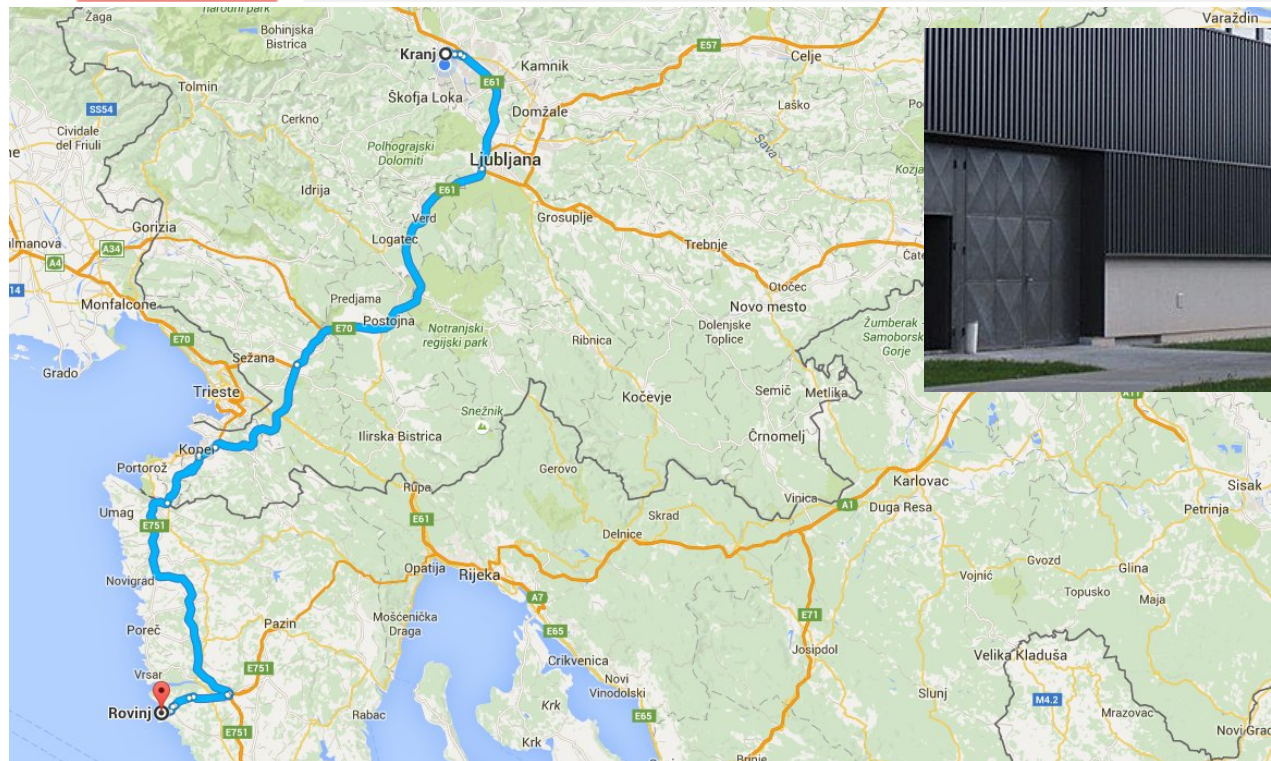
ORACLE® Gold Partner







# Abakus plus d.o.o. - Kranj





# Abakus plus d.o.o.

ORACLE® Gold Partner

## History

- from 1992, ~20 employees

## Applications:

- special (DB – Newspaper Distribution, FIS – Flight Information System)
- **ARBITER – the ultimate tool in audit trailing**
- **APPM - Abakus Plus Performance Monitoring Tool**

## Services:

- DBA, OS administration , programming (MediaWiki, Oracle)
- networks (services, VPN, QoS, security)
- open source, monitoring (Nagios, OCS, Wiki)

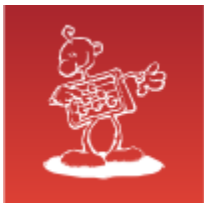
## Hardware:

- servers, **SAN storage**, firewalls, **Backup Server**

## Experience:

- from 1995 GNU/Linux (**22 years of experience !**)
- Oracle on GNU/Linux: since RDBMS 7.1.5 & Forms 3.0 (**before Oracle !**)
- **>25 years of experience with High-Availability !**





# Customers





# Goal

## BACKUP POOL

*production database*



*most recent copy*



*historical copies*



...





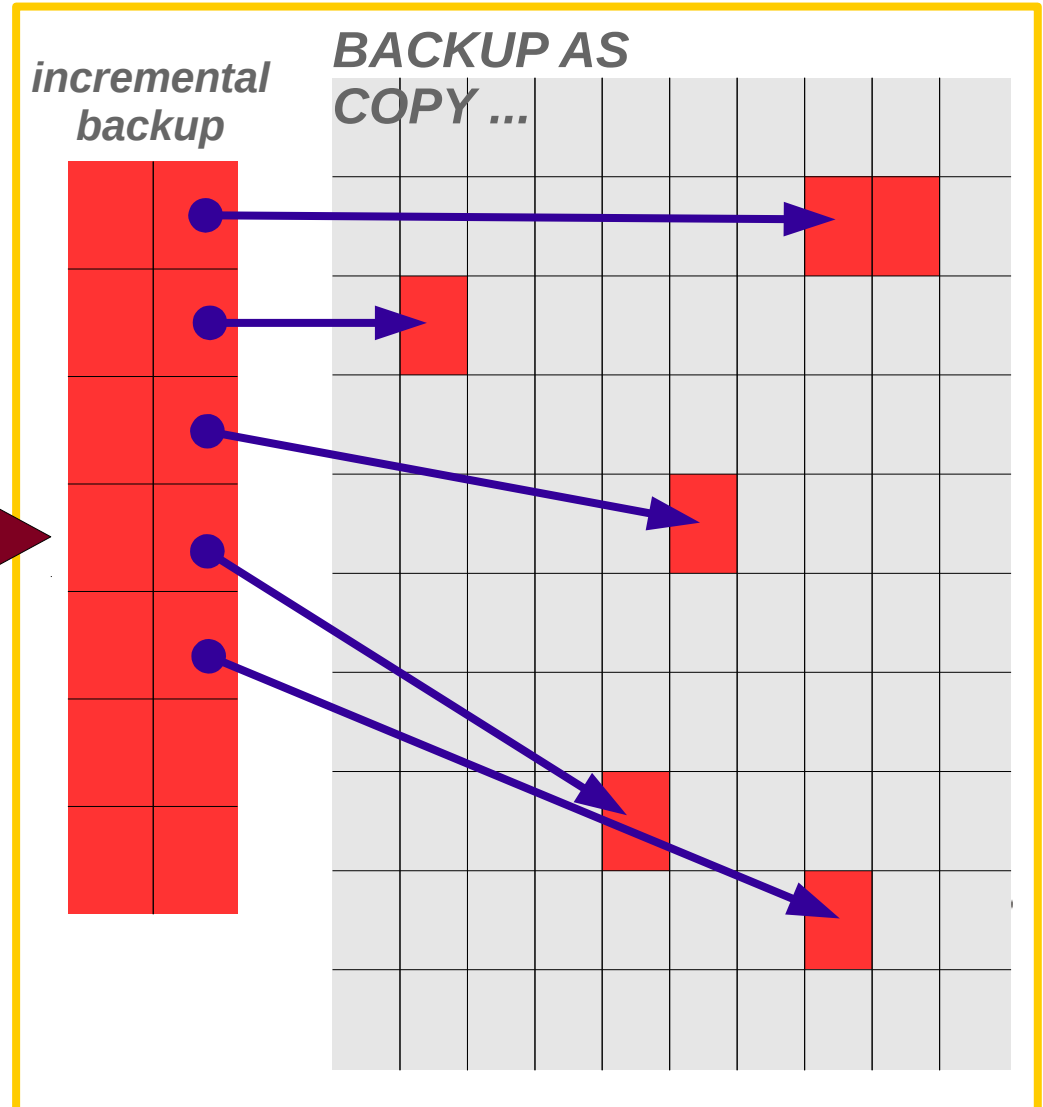
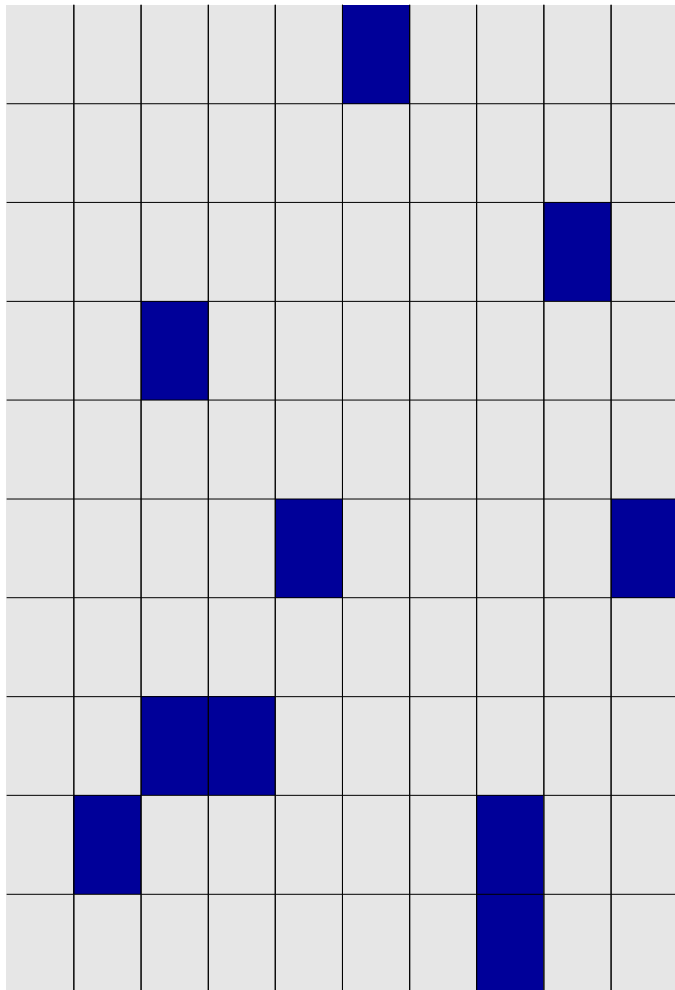


# Backup - Traditional Way

## Incrementally Updated Backups

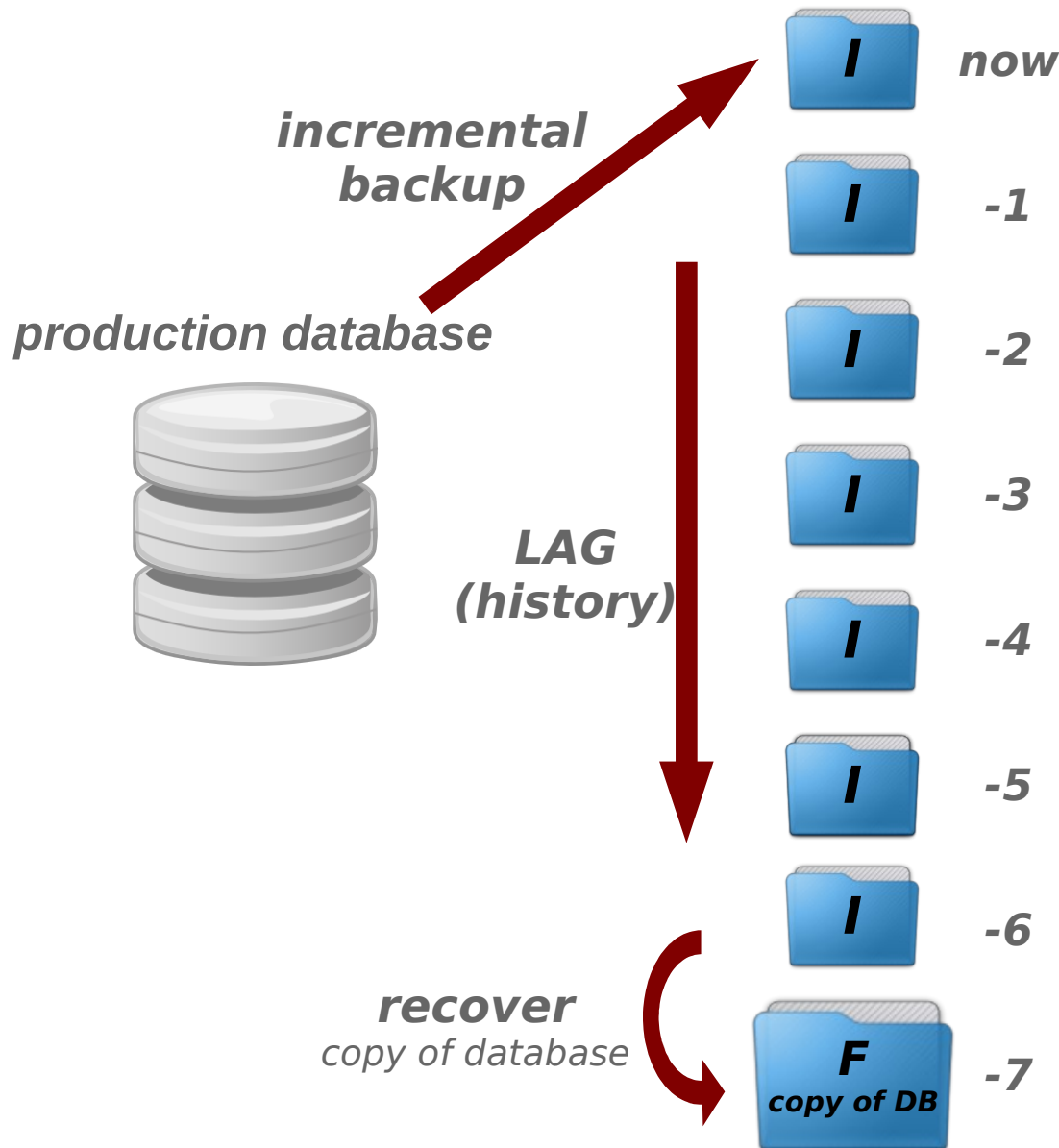
- RECOVER COPY OF DATABASE ... **BACKUP POOL**

*production database*





# Backup Full/Incremental



- somewhat optimized  
no full backup except initial
- incremental backup optimized  
with Oracle Enterprise Edition  
(block change tracking)





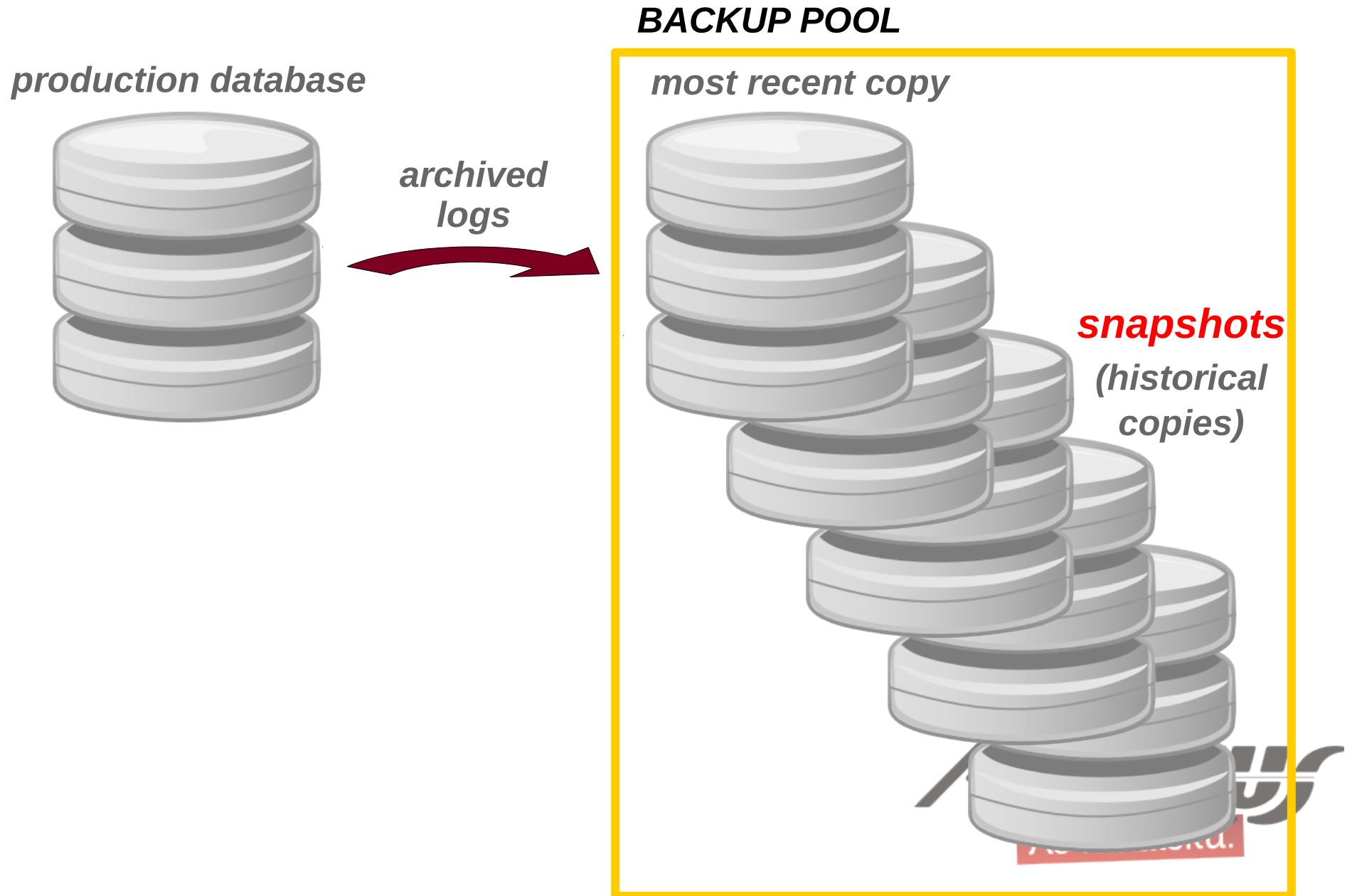
# Pros & Cons

- ✓ simple
- ✓ standard (RMAN tool)
- ✓ optimized (especially with EE)
- ✓ possible to start an instance using backup datafiles and access to DB objects
- ✗ limited historical data
- ✗ disk space
- ✗ performance impact to production database
- ✗ potential minor data loss





# Backup Server





# Implicit Deduplication

## Examples

- 577 days of backup history
- 416,40 TB of data occupies 22 TB of physical disk space

### Backup Server *backup*

**563 backups** provide **577 days** days of history until 2015-02-27.

**234.06 TB** of backup data is stored on 3.75 TB / **4.00 TB** physical volume.

### Backup Server

**398 backups** provide **113 days** days of history since 2016-06-06.

**416,40 TB** of backup data is stored on 21,90 TB / **39,09 TB** physical volume.



# Pros & Cons

- ✓ innovative
- ✓ optimized (even with SE)
- ✓ space efficient
- ✓ **near real-time backup**
- ✓ no interference with production database
- ✓ alternative use (DejaVu)
- ✗ potential minor data loss





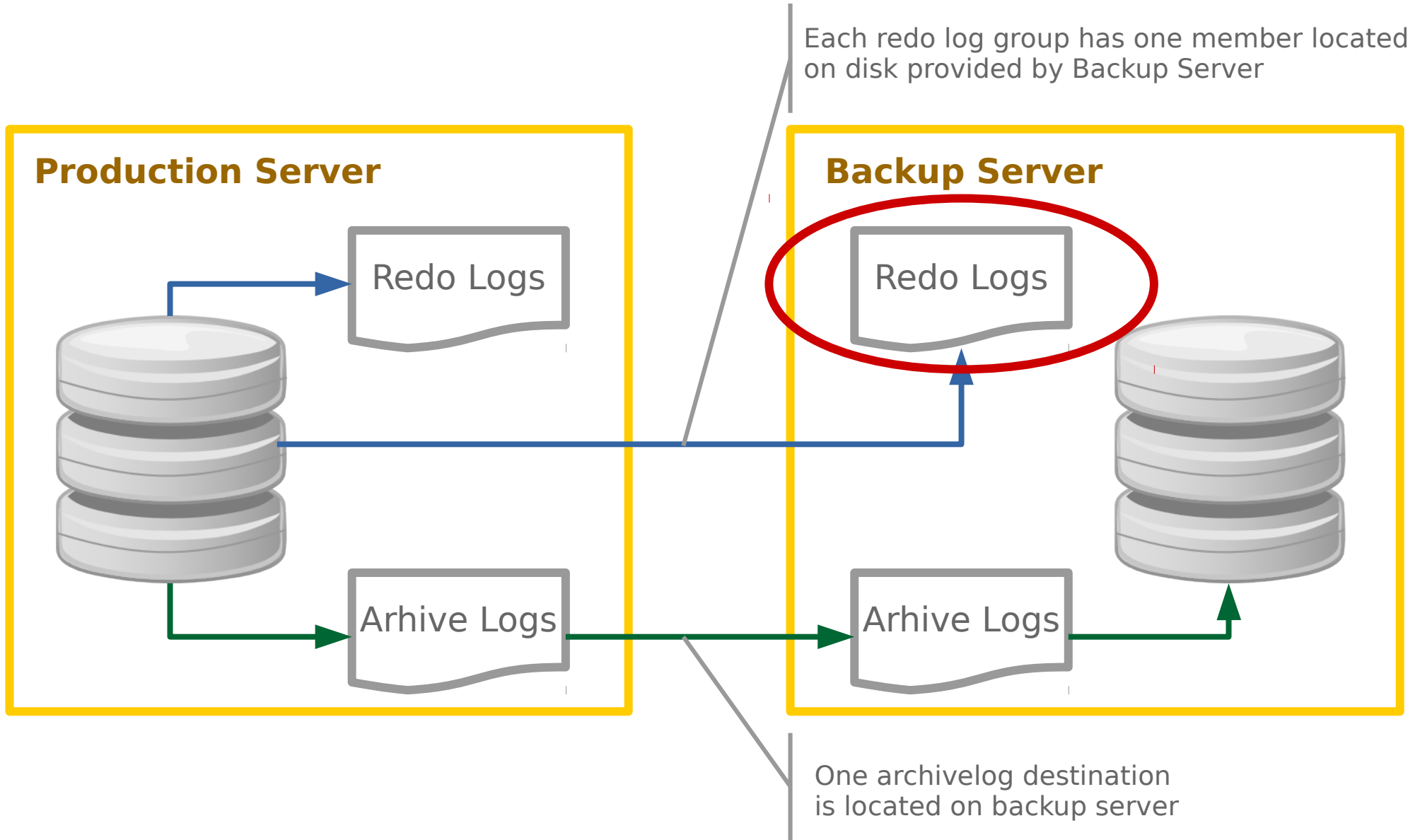
# Perfect Recall

What is a Perfect Recall?

- **true real time backup**
- no data loss

Every committed transaction has already been backed up!

# Perfect Recall







# Redo Replication Options

- OS (Linux) replication using **DRBD** – network replication
  - ✗ very complex to set and maintain
  - ✓ asynchronous option
- Oracle replication on **NAS** – NFS
  - ✗ unstable
- Oracle replication on **SAN** – iSCSI, iSER, SRP





# Hardware Requirements

## Perfect recall is a hardware solution!

### Requirements:

- high throughput
- low latency
- dedicated, local

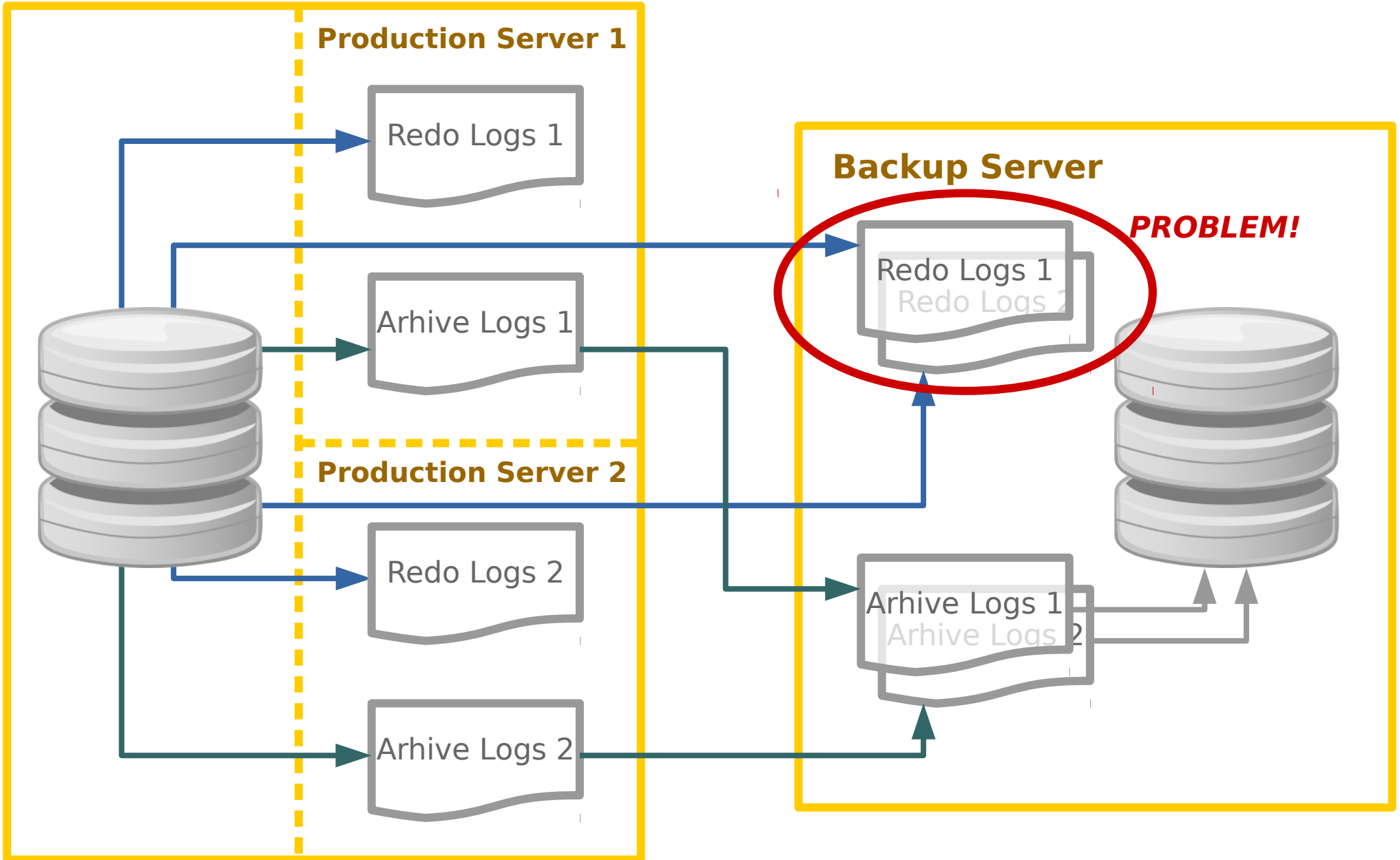
### Available Options:

- 10 Gb ethernet
- QDR InfiniBand





# Perfect Recall - RAC





# RAC Redo Replication Options

- ~~OS (Linux) replication using **DRBD** – network replication~~
- Oracle replication on **NAS** – NFS
  - ✓ perfectly fits but
  - ✗ unstable
- Oracle replication on **SAN** – iSCSI, iSER, SRP
  - ✗ clustered file system
  - ASM (Oracle Automatic Storage Management) hack?





# ASM References

- Bane Radulović;  
ASM Support Guy  
(<http://asmsupportguy.blogspot.si/2013/08/allocation-table.html>)





# Restore/Recover

## Resources

Status	Type	Name	Flash Date	First Date	Last Date
OFFLINE	database	DWSTAGE1	2014-10-02 18:10:13	2014-10-03 23:00:00	2014-06-20 23:00:00
OFFLINE	database	DWTARGET	2014-10-02 19:10:30	2014-10-03 23:00:00	2014-06-20 23:00:00
OFFLINE	database	EB	2014-10-02 18:10:07	2014-10-03 23:00:00	2014-06-20 23:00:00
OFFLINE	database	ORCL10	2014-10-02 21:10:49	2014-10-03 23:00:00	2014-06-20 23:00:00
OFFLINE	database	RIS10G	2014-10-02 23:10:16	2014-10-03 23:00:00	2014-06-20 23:00:00
	vm-incremental	san1		2014-10-03 18:00:00	2014-06-20 18:00:00

Oracle PITR Instance

Refresh

## Backups

Path	Size	Taken	Actual	Status
<b>/zbackup/ORCL10-2014-10-03-23-00</b>				<b>UNKNOWN</b>
/zbackup/ORCL10-2014-10-02-23-00	861 G		21:10:49	OK
/zbackup/ORCL10-2014-10-01-23-00	860 G		21:10:42	OK
/zbackup/ORCL10-2014-09-30-23-00	860 G		21:09:22	OK
/zbackup/ORCL10-2014-09-29-23-00	859 G		21:09:44	OK
/zbackup/ORCL10-2014-09-28-23-00	858 G		05:09:04	OK
/zbackup/ORCL10-2014-09-27-23-00	858 G		21:09:59	OK
/zbackup/ORCL10-2014-09-26-23-00	858 G		21:09:23	OK
/zbackup/ORCL10-2014-09-25-23-00	858 G		19:09:28	OK
/zbackup/ORCL10-2014-09-24-23-00	857 G		19:09:45	OK
/zbackup/ORCL10-2014-09-23-23-00	857 G	2014-09-23 23:00:00	2014-09-23 19:09:47	OK
/zbackup/ORCL10-2014-09-22-23-00	857 G	2014-09-22 23:00:00	2014-09-22 19:09:53	OK
/zbackup/ORCL10-2014-09-21-23-00	857 G	2014-09-21 23:00:00	2014-09-21 19:09:46	OK
/zbackup/ORCL10-2014-09-20-23-00	857 G	2014-09-20 23:00:00	2014-09-20 19:09:38	OK
/zbackup/ORCL10-2014-09-19-23-00	857 G	2014-09-19 23:00:00	2014-09-19 19:09:55	OK
/zbackup/ORCL10-2014-09-18-23-00	857 G	2014-09-18 23:00:00	2014-09-18 19:09:50	OK
/zbackup/ORCL10-2014-09-17-23-00	857 G	2014-09-17 23:00:00	2014-09-17 19:09:47	OK
/zbackup/ORCL10-2014-09-16-23-00	857 G	2014-09-16 23:00:00	2014-09-16 19:09:53	OK
/zbackup/ORCL10-2014-09-15-23-00	857 G	2014-09-15 23:00:00	2014-09-15 19:09:10	OK
/zbackup/ORCL10-2014-09-14-23-00	857 G	2014-09-14 23:00:00	2014-09-14 19:09:32	OK

**Details** [X]

**Resource is OFFLINE**

Target:

Point-in-Time:

Log Level:

Log Files: [alert\\_pthibis.log](#), [bks\\_task\\_pthibis.log](#)



# Conclusion

## Traditional RMAN backup (Incrementally Updated Backups)

- ✓ simple
- ✓ standard
- ✓ optimized
- ✗ limited historical data
- ✗ disk space
- ✗ performance impact to production database
- ✗ potential minor data loss

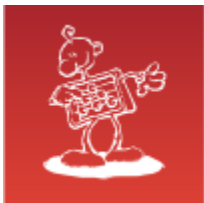
## Backup Server

- ✓ innovative
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- ✓ space efficient
- ✓ **near real-time backup**
- ✓ no interference with production database
- ✓ alternative use (DejaVu)
- ✗ potential minor data loss

## Perfect Recall

- ✓ **true real time backup**
- ✓ no data loss
- ✗ hardware requirements
- ✗ somehow complicated (especially with RAC)





# Perfect Recall

## Thank You

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