Firebird database recovery: tools and techniques

Alexey Kovyazin

IBSurgeon

www.ib-aid.com

www.ibsurgeon.com

www.ibase.ru

Thanks to sponsors!

MOSCOW EXCHANGE

Platinum

SITa SOFTWARE

Platinum

IBPhoenix

Platinum

IBSurgeon

Platinum

REDSOFT

CopyCat

IB *Objects*

Upscene

About IBSurgeon

- Firebird and InterBase recovery and optimization: tools and services

- Platinum sponsor of Firebird Foundation

- Since 2002

- Moscow, Russia

Typical corruption «environment»

- No backups

- No administrator

- Unreliable hardware or wrong configuration of hardware

- Big database and 24/7 workmode – can't do backup/restore

- Corruption never happened before or no responsible persons

Behind the corruption

- Hardware failure
- Administrators/developers failures
- Server bugs
- Mr. Murhy and his laws:)

Corruption from user's point of view

- Unavailable database — i.e., cannot connect there, with various errors

- Errors while trying SELECT/UPDATE/INSERT/DELETE

- *Low performance*

- *«Something is wrong»*

Corruption from the server point of view

- Cannot build internal database image

  - System data lost?

  - Transactions pages lost?

- Cannot read some records

  - Record is corrupted?

- Indices corruption

Symptoms of corruptions

Corruptions appear at:

1. Users screen ("internal Firebird software consistency check" error message)

2. In firebird.log

Heavy and Easy corruptions

- Easy corruptions

  - Users data are corrupted (partially)

  - User's indices corrupted

- Heavy corruptions

  - System data are damaged (We can't read users data!)

Examples

- Cannot find TIP page
  - Lost TIP pages
  - Wrong transaction number in record header
- What we can do
  - Recreate TIP
  - Delete records

Wrong record length

- Record length does not correspond to declared size

  – Must be deleted

Attempted to read more segments..

- BLOB corruption — loss of BLOB parts

- What we can do?

  – Export as is

  – Delete corrupted BLOB

Cannot find record fragment

- Fragment of record disappeared

  – Usually on another data page

- We can only delete remained part

Nbackup delta won't merge

- Database delta won't merge

- What we can do

  - Delete delta (it hurts!)

  - Manual merge with special tools

  - Export data

Fixing

Standard means

• Stop Firebird server.

• Make a copy of Firebird database.

• Start Firebird server and run the following commands:

gfix.exe -v -full

gfix.exe -mend –ig

gbak -b –g -v

• If backup completed successfully, restore database: gbak -c -v -user SYSDBA -pass masterkey path_to_backup path_to_database

Not very well known, but still standard means

1. Run them all, even if gfix shows errors.

2. Always use switch –ig for gbak to ignore checksum errors

3. Always use switch –g for gbak to suppress garbage collection (and to workaround index errors)

4. Use –v switch to have detailed output

5. Set database to read_only with gfix -mode read_only

Restore errors

•After fixing corruptions it's a often to see "Cannot commit index" error at restore step.

•In Firebird 2.0 and later this comes as a warning and database will be not brought on-line

How to workaround

- IBDataPump

  – Bug with circular links

- FirstAID Extractor

Effectiveness

Gbak+Gfix can recover almost all easy corruptions

What they cannot fix:

- Heavy corruptions with a lot of losses
- System data corruptions

IBSurgeon Tools

IBSurgeon Tools for Recovery and data protection

- FirstAID

  - Direct

  - Extractor

- FBDataGuard

  - Protection

  - Backups

IBSurgeon FirstAID: Direct

- Scan internal structure and finds inconsistencies
- Replace/restore lost system pages where it is possible
- Delete wrong pages and dead records

- Fast!
- Effective for user's data corruptions

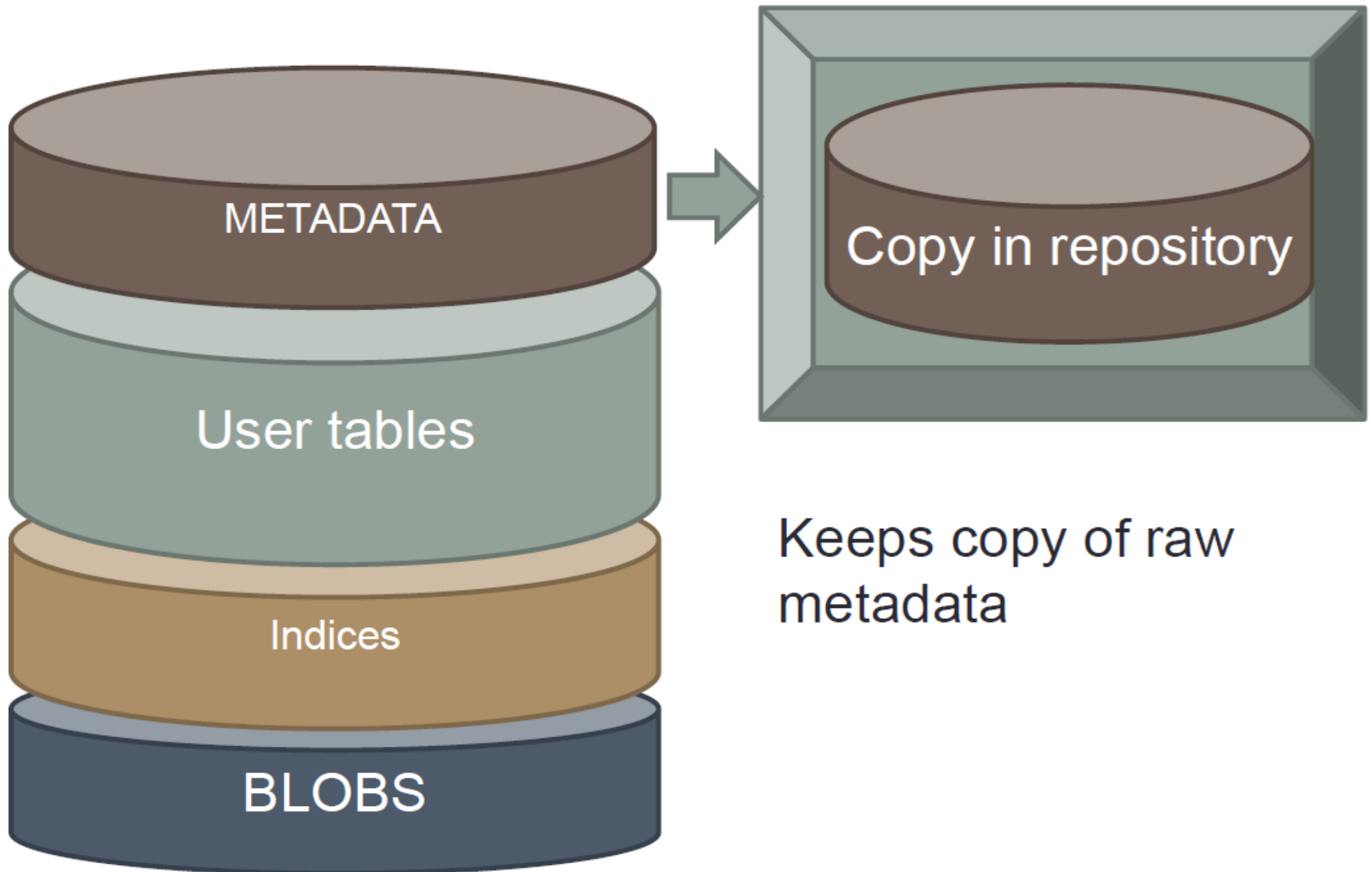# IBSurgeon FirstAID: Extractor

- Reads metadata from database and read records bypassing server

  – Free preview of records is available

- Export all good records to the new database

- Resolve dependencies

  – Foreign Keys, Triggers, UDFs

- Speed is 1Gb/hour

- Very effective

External metadata

- Extractor can borrow metadata from good healthy database with the same structure and export data from corrupted one, even if all system data lost

-

Metadata repository

Increased recovery rate

- Metadata repository increase recovery rate up to 99%

- FBDataGuard is a tool to create metadata repository

Better prevent when fix!

- FBDataGuard vs FirstAID?

- Easy licensing options

- Special offer for attendees of Firebird Conference 2014

Thank you!

- Www.ib-aid.com

- Www.ibsurgeon.com

- support@ib-aid.com