

Firebird database recovery: tools and techniques

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Tools to fix corrupted Firebird database

- Standard tools: gfix + gbak
- Third-party commercial tool:
IBSurgeon FirstAID: direct fix + extraction
- Let's consider details...

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 person

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 workaroud

- 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

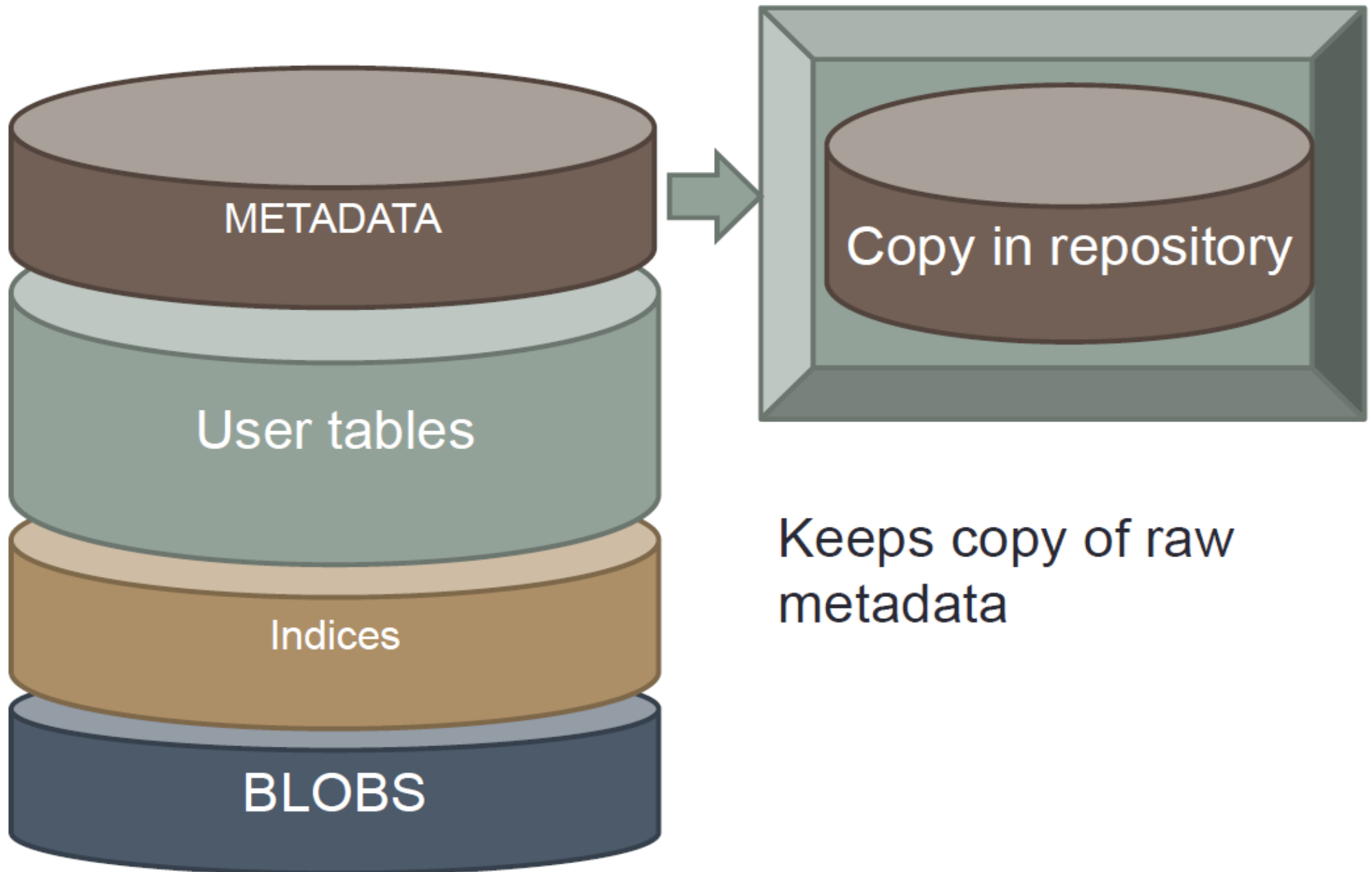
- Reads metadata from database and read records bypassing server
 - Free preview of records is available
- Export all good records to the new database
- Resolve dependencies
 - Foreign Keys, Triggers, UDFs

- 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

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About IBSurgeon



- Firebird and InterBase recovery and optimization: tools and services
- Platinum sponsor of Firebird Foundation
- Since 2002
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