



# DelphiDay

italian conference



ADVANCED FIREBIRD FOR BIG DATABASES



# Fabio Codebue

**P-Soft** – olistic developer



[firebirdsql.org](https://firebirdsql.org)



[f.codebue@p-soft.biz](mailto:f.codebue@p-soft.biz)



[twitter.com/fcodebue](https://twitter.com/fcodebue)



[github.com/fcodebue](https://github.com/fcodebue)



[linkedin.com/in/fcodebue](https://linkedin.com/in/fcodebue)



# DelphiDay

italian conference

11-12 Giugno 2024  
Piacenza



wintech  
italia



## OPEN-SOURCE PROJECTS

[github.com/fcodebue](https://github.com/fcodebue)

### eInvoice4D

[github.com/delphiforce/  
eInvoice4D](https://github.com/delphiforce/eInvoice4D)

### FirebirdSQL

<https://firebirdsql.org/>



**Firebird  
Foundation  
Founder**



**DelphiDay**  
italian conference

11-12 Giugno 2024  
Piacenza



**wintech**  
italia



# AGENDA

---

1. Intro to features
2. Installation
3. Usage scenarios
4. Web console setup
5. Adding single database
6. Configuring replication
7. Work with groups of databases
8. Performance analysis
9. HQCenter - demo
10. Tools – MonLogger, DatabaseAnalyst
11. Encryption
12. Recovery



# DISCOUNT

---

## ATTENDEE

---

HQBird Enterprise

## Order Now!

---

Mail to  
f.codebue@p-soft.biz

20%



Fabio Codebue





# Intro to features

# 1



Fabio Codebue



**DelphiDay**  
italian conference





# Improve performance

new parameters in Firebird.conf which directly improve the performance:

- without change of source of source code of applications
- without backup-restore, with ability to revert at any moment in 1 min
- HQbird has features of the next versions of Firebird, for example v5 received many functions from HQv4 and HQv3



Fabio Codebue



**DelphiDay**  
italian conference



# Designed for big database

HQbird is designed for big databases: big databases requires special maintenance:

- smart approach for sweep and garbage maintenance,
- advanced backup schemes
- special approach for backup-restore



Fabio Codebue



**DelphiDay**  
italian conference





# HQBird replication

HQbird replication: mechanism and transport

- Automated configuration of replication in the individual or group form, automatic reinitialization
- Automated transport from master to replica
- Control of replication status



Fabio Codebue



**DelphiDay**  
italian conference



# Advanced Firebird Monitoring

- Monitoring of big databases requires data from all sources – Trace, MON\$, transactions, connections, lock table
- Monitoring of many small databases is based on trace and special enhanced commands in engine







# Advanced Firebird Monitoring

- Identifying problematic queries through **multi-view Performance HQbird report.**

After fixing problems with configuration and sweep, queries are main source of slowness, and there are various reasons

HQbird allows identify them all



Fabio Codebue



**DelphiDay**  
italian conference



# HQCenter

---

- **HQCenter** – control center for many HQbird installations, to see on the single page status of all HQbird instances – was backup good, failed, delayed? Alerts about replication status, space, errors, corruptions. And view of logs from monitoring.



Fabio Codebue



**DelphiDay**  
italian conference





# Tools for deep analysis

- **Mon\$logger** — detailed view of transactions and operations. If you see problems with garbage caused by long running transactions or improper parameters
- **Database Analyst** — database structure analysis. In what tables there are many old record versions (potential garbage). What indices are slow or useless?





# Recovery tools

- FirstAid is the only tool for recovery



Fabio Codebue



**DelphiDay**  
italian conference



# Encryption

- **Transparent encryption** for v3+, performance loss 4-20% (depends on RAM and settings)
- Examples for all popular languages
  - Delphi, Java, NET, PHP, etc



Fabio Codebue



**DelphiDay**  
italian conference





# Integration tools

- Plugin to access MySQL and to any ODBC directly from Firebird stored procedure, execute block or trigger  
EXECUTE STATEMENT ON EXTERNAL
- Streaming (CDC) to Kafka, RabbitMQ, or JSON/files
- Full text search





# Installation

# 2



Fabio Codebue



**DelphiDay**  
italian conference



# Installation on Windows

- Unified installer for all versions
- All supported versions in parallel instances, on different ports, to facilitate migrations
- includes binaries of Firebird with plugins and UDRs, so it means that previously installed Firebird must be stopped
- Options of silent installation.







# Installation on Linux

---

- IBSurgeon supplies **one-step installation scripts** to install HQbird on Linux, for all popular OS

<https://github.com/IBSurgeon/firebirdlinuxinstall>



Fabio Codebue



**DelphiDay**  
italian conference



# Installation on Linux

- **Prerequisites**: make sure you have **libtommath** and **ICU** installed
- **Uninstall all previously installed Firebird** versions before running this installer
- Apply execution rights to the installation package:

```
chmod +x install_fb30_hqbird_server_2020.sh  
install_fb30_hqbird_server_2020.sh.
```

It will install Firebird into /opt/firebird and HQbird into /opt/hqbird



Fabio Codebue





# Installation on Linux

---

- By default, Firebird 3.0 is installed as SuperServer. Keep it.
- Firebird 3.0 will be installed with SYSDBA/masterkey



Fabio Codebue



**DelphiDay**  
italian conference





# Installation on Linux

---

- By default, Firebird 4.x and 5.x is installed as SuperServer. Keep it.
- Firebird 4.x and 5.x will be installed without admin user configured



Fabio Codebue



**DelphiDay**  
italian conference



# Installation on Linux

You can stop/start Firebird with command

```
service firebird-superserver stop/start
```

Check is it running with command

```
ps aux | grep firebird
```

You can stop/start Hqbird with

```
command service hqbird stop/start.
```

Check is it running with command 

```
ps aux | grep dataguard
```



Fabio Codebue



**DelphiDay**  
italian conference



# Firewall on Linux

Firebird is installed on port 3050, HQbird web interface is listening on port 8082, and licensing interface is listening on 8765.

These ports can be changed in

- `/opt/firebird/firebird.conf` (RemoteServicePort)
- `/opt/hqbird/conf/network.properties` (server.port)
- `/opt/hqbird/conf/license.properties` (serverlicense.port).

Make sure to **allow these ports** in your firewall configuration.







# Uninstallation on Linux

There is the script

```
/opt/hqbird/uninstall.sh
```

which uninstalls both HQbird and Firebird.

This script does not keep the existing configuration of HQbird, and it uninstalls Firebird binaries, configuration, and "firebird" user on Linux.



Fabio Codebue





# Demo time

---

- Try to install
- VM Windows
- VM Linux



Fabio Codebue



**DelphiDay**  
italian conference



# Silent Installation

## Mandatory parameters

**/VERYSILENT /SP** - options to perform the silent installation

**/DIR** - where to install HQBird. If you are doing silent upgrade, make sure the version is the same as it was installed previously.

**/CONFIGDIR** – where to store configuration data for HQbird.

**/OUTPUTDIR** – where to store output data (default location for backups, performance reports, etc).







# Silent Installation

**/TYPE** – what HQbird version should be installed. If you are doing silent upgrade, make sure the version is the same as it was installed previously.

- **"HQBird25x64"** - "HQbird Enterprise (with Firebird 2.5 x64)";
- **"HQBird30x64"** - "HQbird Enterprise (with Firebird 3.0 x64)";
- **"HQBird40x64"** - "HQbird Enterprise (with Firebird 4.0 x64)";
- **"HQBird50x64"** - "HQbird Enterprise (with Firebird 5.0 x64)";





# Silent Installation

---

Optional parameters

**/fbport=3050** - port for Firebird to be installed with HQbird Enterprise

**/LOG**=C:\temp\HQBirdServerSetup.log

where to store installation log



Fabio Codebue



**DelphiDay**  
italian conference



# Silent Installation

## Dataguard parameters

**/DGPORT=8082** – port for web interface of HQbird (FBDataGuard)

**/DGLOGIN=admin** – web interface login of HQbird (FBDataGuard)

◦ **/DGPASSWORD=yourPwd** – password for web interface of HQbird (FBDataGuard)



Fabio Codebue



**DelphiDay**  
italian conference





# Silent Installation

## Automatic registration parameters

`/REGEMAIL=youremail@company.com` - email to perform the automatic registration of HQBird

`/REGPASS=yourpassword` – password from IBSurgeon Deploy Center account to register HQbird

`/REGTYPE=S|E|T` == **S**tandard, **E**nterprise, **T**rial – license type, must be specified if you need to register HQbird during the installation



Fabio Codebue



**DelphiDay**  
italian conference



# Silent Installation

Offline registration parameters

incompatible with REG \*\* parameters

`/REGUIK=<uik filename>`

`/REGUNLOCK=<unlock filename>`

Must be set in pairs, **both are required!**

`/REGUIK="z:\HQBird\test\uik"`

`/REGUNLOCK="z:\HQBird\test\unl"`



Fabio Codebue



**DelphiDay**  
italian conference





# Silent Installation

## Email alert parameters

/EAHOST=smtp.company.com – SMTP server for email alerts

/EAPORT=25 – SMTP port for email alerts

/EALOGIN=username – SMTP login to send email alerts

/EAPASSWORD=pwd – SMTP password to send email alerts

/EATO=support@email.to – where to send email alerts

/EAFROM=someemaildg@company.com – from address

/EAENABLED=true – enable or disable email alerts

/EADEFAULT=true – send a copy of email alerts to IBSCC







# Silent Installation

## Built-in FTP Server parameters

`/FTPENABLED=true` – enable or disable FTP server

`/FTPSPORT=8721` - FTP port

`/FTPLOGIN=useradmin` - FTP login

`FTPPASSWORD=adminpassword` - FTP password



Fabio Codebue



**DelphiDay**  
italian conference



# Silent Installation

- command

```
HQBirdServer2024.exe /VERYSILENT /SP- /TYPE="hqbird30x64"  
/DIR="C:\HQBird" /CONFIGDIR=C:\HQBirdData\config  
/OUTPUTDIR=C:\HQBirdData\output
```

- Attention – reboot may be requested!
- in a case of error, for example the error message window will popup and installation will be canceled.





# Registration

- Open web console

- Registration requires access to web site

<https://deploy.ib-aid.com>

- can be done through email request to

[support@ib-aid.com](mailto:support@ib-aid.com)

HQbird 2024 11.0.0523: SRV-deLLg15-240424200559  
Time on server: 2024-06-08 14:12+03:00

HQbird 11.0.0523 is registered : HQbird 2024 Master (till 15-06-2024)

✓ HQbird is registered till Fri, 14 Jun 2024 22:00:00 GMT

Registered name: franciscorolon@gmail.com

Registered email: franciscorolon@gmail.com

Get new/existing license (You can order full license at [ib-aid.com](https://ib-aid.com))

Type:

- ☐ I have HQbird Master license
- ☐ I have HQbird Replica license
- ☒ I need trial license
- ☐ Off-line registration

E-mail:

test@test123.com

Activate



Fabio Codebue



**DelphiDay**  
italian conference





# Usage scenarios

# 3



Fabio Codebue



**DelphiDay**  
italian conference



# Big databases

---

- 1-10 big databases on the big server which require precise maintenance
- To register such database, need explicit steps
- Individual setup of jobs and tuning of each database





# Small databases

---

- 10-1000 databases on the same server, usually in scenario SaaS (1 database per client), which require mass management
- Need to select location of folder with databases
- Setup: Sweep, Replication, and Backups







# Cost x database

---

n.database	Cost / x DB
1	899,00
10	89,90
100	8,99
1000	0,899



Fabio Codebue



**DelphiDay**  
italian conference



# Backup / Replica server

---

- HQbird for big databases
- +
- HQbird as centralized hot backup server  
aka replica server



Fabio Codebue



**DelphiDay**  
italian conference



# Web console setup

# 4



Fabio Codebue



**DelphiDay**  
italian conference





# HQBird web console

- Start service if needed
- Open HQbird web console
  - `http://server:port`  
`http://127.0.0.1:8082`
- Credentials:  
`username: admin`  
`password: strong password`



Fabio Codebue





# Web console

## Top Toolbar

HQBird version: server name: installation date

HQbird 2024 11.0.0310: SRV-MSPSOFT-240209094323  
Time on server: 2024-06-10 11:15+02:00

HQBird live time

Internal Socket Transport Server properties

Clear Notification list

Email alerts configuration

Page refresh in 00:57

US

Auto refresh

language

Internal FTP Server

Control Center Integration

Refresh



Fabio Codebue



**DelphiDay**  
italian conference



# Email alert

Activate

Recipient

Sender name

SMTP config

TEST

Email alerts configuration

☒ Send alerts by e-mail:

Send alerts to: support@p-soft.biz

'From' field: hq@p-soft.biz

SMTP server address: smtp.cbsoft.net

SMTP server port: 587

SMTP server login: support@p-soft.biz

SMTP server password: .....

**Send Test Message**

☐ Append version info to email subject

☒ Add HQbird ID

☒ Add detailed source name

☐ Group notifications in emails

Cancel Save



Fabio Codebue







# Email alert

Activate

Recipient

Sender name

SMTP config

TEST

Email alerts configuration

☒ Send alerts by e-mail:

Send alerts to: support@p-soft.biz

'From' field: hq@p-soft.biz

SMTP server address: smtp.cbsoft.net

SMTP server port: 587

SMTP server login: support@p-soft.biz

SMTP server password: .....

**Send Test Message**

☐ Append version info to email subject

☒ Add HQbird ID

☒ Add detailed source name

☐ Group notifications in emails

Cancel Save



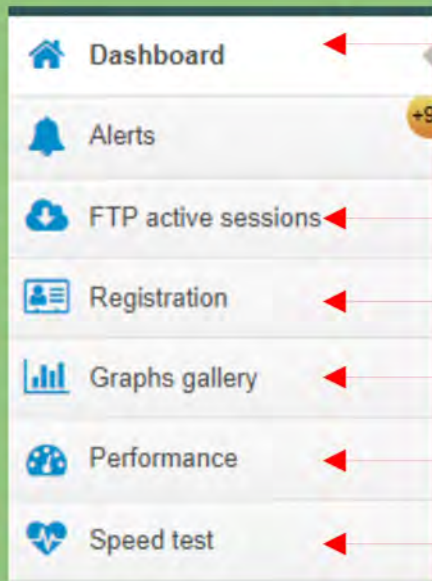
Fabio Codebue





# Web console

## Left menu



Dashboard

Alerts present and management

FTP active sessions

Start here for full version

Graph per database

Performance analysis

Check speed of your server



Fabio Codebue



**DelphiDay**  
italian conference



# Server status

## Server status

Server

✓ Active server

Server: **running** (Super Server)  
Version: WI-V4.0.5.3052 Firebird 4.0 HQbird

✓ Server log

Server log: OK [period 10 min] [Last run: 10 Jun, 11:01:06]  
[more>>](#)

✓ Firebird server folder

Firebird server folder: OK [period 10 min] [Last run: 10 Jun, 11:01:06]  
Size: 295.3 Mb

✓ Temp files

Temp files: OK [period 10 min] [Last run: 10 Jun, 11:01:06]  
Quantity: 267, Size: 103.3 Mb

✓ Replication Log

Replication Log: OK [period 10 min] [Last run: 10 Jun, 11:01:06]

✓ HQbird output folder

HQbird output folder: OK [period 30 min] [Last run: 10 Jun, 10:51:05]  
Entire agent data folder size: 474.8 Mb

- jobs output data subfolder: 418.8 Mb
- monitoring subfolder: 51.2 Mb



Fabio Codebue



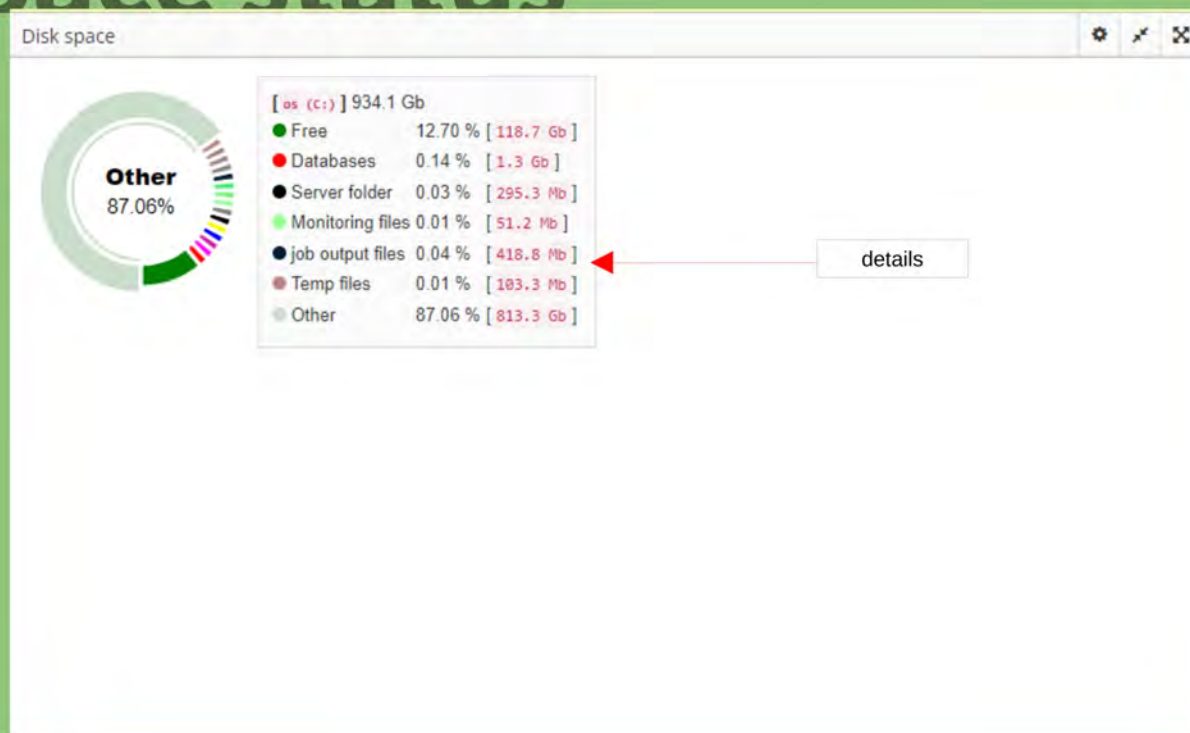
**DelphiDay**  
italian conference





# Disk space status

Disk  
space status  
overview



Fabio Codebue



**DelphiDay**  
italian conference



# Adding single database

# 5



Fabio Codebue



**DelphiDay**  
italian conference



# Adding database

---

- Open HQbird web console  
`http://serverURL:port`
- It is possible to view and register from the list of open databases (currently active) or register alias:



Fabio Codebue







# DB adding

Add database

HQbird 2024 11.0.0310: SRV-MSPSOFT-240209094323

## Databases (36)

N	File	ODS	PageSize	Size	Date	Aliases	Is open	Dataguard ID	Dataguard Name	Registered
1	C:\firebird\data\BEATREEX_SFERC_TEST.FDB		0	-1		beatreex				
2	C:\firebird\data\dday\dday2020testlogin.fdb		0	-1		ddtestlogin				
3	C:\firebird\data\iubar\anag.fdb		0	-1		iubaranag				
4	C:\firebird\data\iubar\blob.fdb		0	-1		iubarblob				
5	C:\firebird\data\iubar\common.fdb		0	-1		iubarcommon				
6	C:\firebird\data\iubar\paghe.fdb		0	-1		iubarpaghe				
7	C:\firebird\data\iubar\presenze.fdb		0	-1		iubarpresenze				
8	C:\HQbird\Firebird40\security4.fdb	13.0	8192	1966080	2024-06-10 22:28:57.370+02:00		Opened			<a href="#">Register</a>
9	G:\work\__conferenze_corsi\20240611-12_DelphiDay2024\DB\TEST-01.FDB	13.0	8192	18268160	2024-06-10 22:29:32.942+02:00			2406101852_TEST-01_FDB	DD2024 - Test01	by file name
10	G:\work\p-soft\__creativity\artego\DB\artegoprj.fdb		0	-1		artegoprj				



Server log: OK [period 10 min] [Last run: 10 Jun, 23:19:47]

Replication Log: OK [period 10 min] [Last run: ]



Fabio Codebue

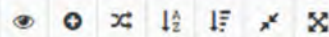








# DB adding

Add database

Databases: 1; Require(s) attention: 1























g:\work\p-soft\p...db\pSDI0000.fdb

Size: ?; Created: 2021-Sep-1, 14:26:25; Users: ?

Backups: OFF

MALFUNCTION: 

 ? : g:\work\p-soft\pSDI\vb\pSDI0000.fdb



Transactions



Transactions: **MALFUNCTION** [period 4 min] [Last run: 10 Jun, 18:14:14]  
[more>>](#)



Lockprint



Verified backup



Verified backup: OFF  
Awaiting scheduled time. 0 backup file(s) found  
[View backup files...](#)



Incremental backup



Fabio Codebue



**DelphiDay**  
italian conference



# DB adding

Add database

HQbird 2024 11.0.0310: SRV-WSPSOFT-370200024323  
Time on server: 2024-06-11 04:42+02:00

Page refresh in 00:28

US



Server

Active server

Server: **running** (Super Server)  
Version: WI-V4.0.5.3052 Firebird 4.0 HQbird

Server log

Server log: OK [period 10 min] [Last run: 11 Jun, 4:39:47]  
[more>>](#)

Firebird server fol...

Firebird server folder: OK [period 10 min] [Last run: 11 Jun, 4:39:47]  
Size: 296.6 Mb

Databases: 1. Require(s) attention: 1

### Add database to monitoring

Database nick name:

☐ DB alias:

☒ Path to database:

Crypt key name:

Crypt key value:

User (optional):

Password (optional):

Output folder (backups and logs):

Replication role: ☒ Master ☐ Replica ☐ None

☒ Enable advanced monitoring

[View list of databases](#)

% [47.7 Sb]

% [17.4 Mb]

% [1.8 Tb]

6.35 % [152.7 Gb]

03 % [296.6 Mb]

01 % [51.2 Mb]

04 % [419.8 Mb]

01 % [101.3 Mb]

3.56 % [788.6 Gb]



Fabio Codebue



**DelphiDay**  
italian conference

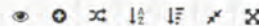




# DB status

Database status

Databases: 1; Require(s) attention: 1





DD2024 - Test01  
G:\work\\_confer... \DB\TEST-01.FDB

Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF

CRITICAL: 

 DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDay2024\DB\TEST-01.FDB



Transactions



Transactions: OK [\[period 4 min\]](#) [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000



Lockprint



Lockprint: OK [\[period 3 min\]](#) [Last run: 11 Jun, 4:28:32]



Verified backup



Verified backup: OFF  
Awaiting scheduled time. 0 backup file(s) found.  
[View backup files...](#)



Incremental backup



Incremental backup: Disabled



Fabio Codebue








**DelphiDay**  
italian conference




# DB Configure

## Database configure

Databases: 1; Require(s) attention: 1



DD2024 - Test01  
G:\work\\_confer... \DB\TEST-01.FDB  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF  
CRITICAL: 

 DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDay2024\

 Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

 Lockprint

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:32]

### Database properties: "DD2024 - Test01"

Dataguard ID: 2406101852\_TEST-01\_FDB

Database nick name:	DD2024 - Test01
<input type="radio"/> DB alias:	
<input checked="" type="radio"/> Path to database:	G:\work\_conferenze_corsi\20240611-12_DelphiDay2024\DB\TE
User (optional):	\$(server.sysdba-login)
Password (optional):	\$(server.sysdba-password)
Output folder (backups and logs):	\$(server.default-directory)/\$(db.id)

☒ Enable advanced monitoring

Do backup, restore and replace original database

Display backup/restore status

 View configuration  View list of databases

Cancel

Save



Fabio Codebue




**DelphiDay**  
italian conference




Databases: 1; Require(s) attention: 1

Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF

DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDa

 Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

 Lockprint

Lockprint: OK [period 3 min] [last run: 11 Jun 1:28:32]



# Fabio Codebue



Dataguard ID: 2406110447\_MailSto\_up\_fdb

☐ Off ☒ Master ☐ Replica

☐ Synchronous ☒ Asynchronous

90

\$ {db.path}.ReplLog

\$ {db.path}.LogArch

### Optional parameters

```
skip_upddel_without_pk=true
journal segment count=64
```

### Find and exclude tables without Primary or Unique keys

&lt;&lt;less

### Reinitialize replica database

See initialization status

### Enable publications (and grant it for all tables)

Close

Save









# Job widgets

Job name

Button RESOLVED

Status

Configuration

 Transactions   

Transactions: OK [period 4 min] [Last run: 11 Jun, 5:45:29]  
OIT: 94, OST: 95, OAT: 95  
Next: 95, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

Some more informations

Time of the most recent execution

Scheduled period



Fabio Codebue





Databases: 1; Require(s) attention: 1

DD2024 - Test01: G:\work\\_conferenze\_corsi\2024

✓ Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

 Lockprint

Lockprint: OK [period 3 min] [last run: 11. jun. 14:28:32]

Transactions monitoring / DD2024 - test-02

☒ Enabled

Check period, minutes:

4

Max transactions:

2800000000000000

Alert when OST-OIT more than:

650000


Alert when Next-OAT more than:

600000

☐ Use services API

Cancel

Save

 Incremental backup

Incremental backup Disabled



# Fabio Codebue





# Transaction

“Database: Transactions” job is intended to log transactions activity. It monitors 2 important intervals:

- difference between Oldest Active Transaction and Next transaction
- gap between Oldest Snapshot and Oldest Interesting.

If these intervals are out of the frames of the specified threshold, it means problem and database performance and application quality



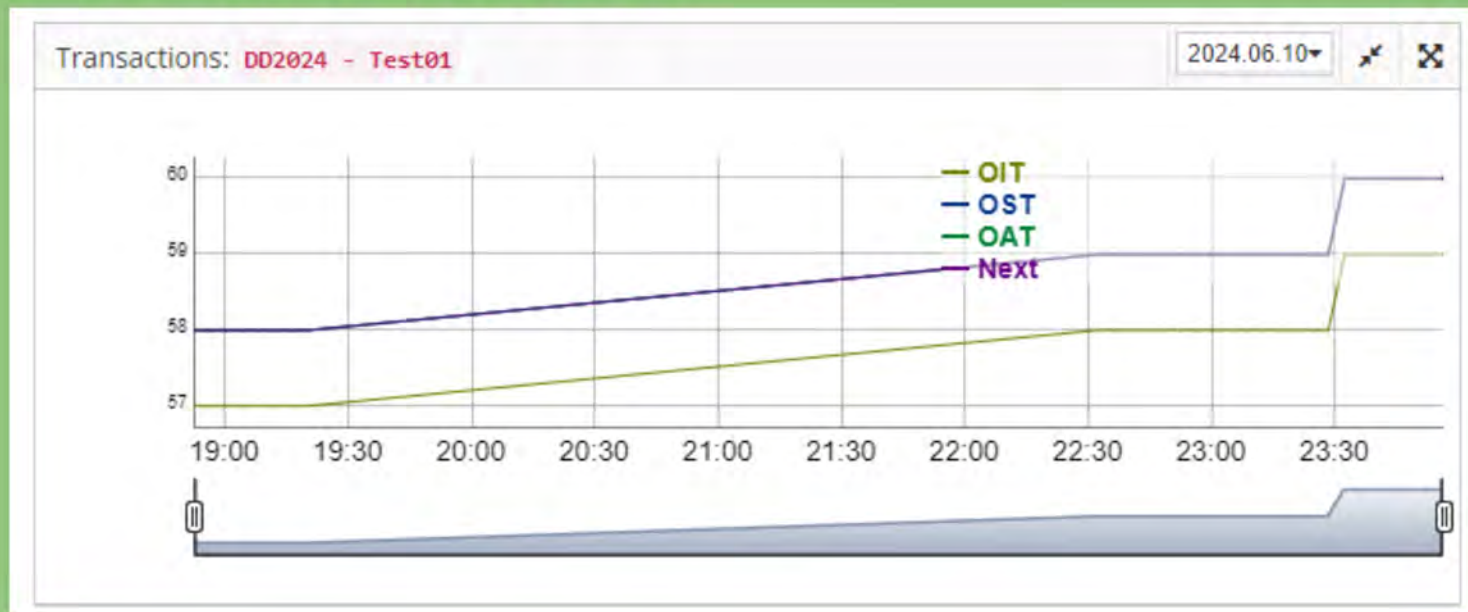
Fabio Codebue







# Transaction



Fabio Codebue



**DelphiDay**  
italian conference



Databases: 1; Require(s) attention: 1

DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDay2024\DB\TEST-01.FDB



Transactions



Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000



Lockprint



Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:32]

Lock Table Analysis / DD2024 - test-02

☒ Enabled

Check period, minutes

3

☒ Send alert if delta of Deadlock scans more than

Deadlock Scans delta threshold

10

☒ Send alert if number of Deadlocks exceeds:

Deadlock threshold

0

☒ Send alert if Mutex Wait more than

Mutex Wait threshold

18

☒ Hash slots alert

Hash Slots is less than

2047

☐ Send alert if number of database connections is more than

Min length is more than

1

☐ Send alert if size of the lock table is more than

Average length is more than

6

☒ Send alert if number of database connections is more than

Owners limit

700

☐ Send alert if size of the lock table is more than

Free owners limit

1000

☒ Send alert if size of the lock table is more than

Lock table size

52428800

☐ Send alert if number of database connections is more than

Warn if page buffers in database header more than [NNN]

10000000

Cancel

Save



# Fabio Codebue





# Lockprint

---

“Lockprint” job monitors the information from the lock table of Firebird.

It is very important for architectures Classic/SuperClassic and useful for SuperServer.

The lock table is an internal Firebird mechanism to organize access to the objects inside Firebird engine.



Fabio Codebue







# Lockprint

**Check period**, minutes - how often HQbird analyses lock table. 3min

**Deadlock Scans threshold** — deadlock scan is a process, started by Firebird engine, in case of a long response delay from the one of the threads.

**Deadlock threshold** — if Firebird engine finds the true deadlock during the deadlock scans, it increases this value.

**Mutex wait threshold** — Mutex Wait is a parameter of lock table which implicitly indicates the conflicts for the resources





# Lockprint

---

**Hash slots alerts.** Lock table header has a parameter “Hash lengths (min/avg/max): 0/0/4”, it shows the lengths in the lock table. It is important to keep these values as low as possible, so

**Owners limit** is a number of connections established

**Free owners** is the value between the peak number of owners and current number of owners.

**Lock table size.** The lock table size is an implicit indicator of the load to the system.



Fabio Codebue









# Sweep

Database status

Databases: 1; Require(s) attention: 1



DD2024 - Test01  
G:\work\\_confer...DB\TEST-01.FDB  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF  
CRITICAL: 

 DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDa

 Transactions 

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

 Lockprint 

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:32]

Sweep / DD2024 - Test01

☒ Enabled

Sweep is scheduled to start at this time

0 15 0 ? \* MON-SUN

Executable

Parameters

☒ Disconnect connections with long transactions before sweep

Do not disconnect processes with name pattern

%(\.\\)(fbsvcmgr|gstat|gfix|gbak)(.exe)(0,1}

Disconnect processes older than (min)

300

Use NN CPU cores to sweep:

Cancel

Save

Fabio Codebue



Previous values:





# Sweep

To perform scheduled sweep efficiently, HQbird before sweep disconnects connections with long-running transactions with special selection, with default threshold 300 minutes.

It allows to keep database clean and allow connections which do not block effective sweep to run without restart of Firebird.

By default it is set to 00:15 am.



Fabio Codebue






Databases: 1; Require(s) attention: 1

DD2024 - Test01: G:\work\\_conferenze\_corsi\2024061

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

Lockprint: OK [period 3 min] [last run: 11. Jun. 4:28:32]

 Incremental backup



# Disk space

---

Check period, minutes: 10

Free space minimum, %: 10

Free space minimum, bytes: 0

Maximum delta size, bytes: 52428800

Maximum delta age, minutes:



Fabio Codebue







# Index statistics recalculation

Index statistics recalculation

Cron job schedule parameter

Databases: 1; Require(s) attention: 1

DD2024 - Test01  
G:\work\\_confer...DB\TEST-01.FDB  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF  
CRITICAL: [Status icons]

DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDay2024

Transactions [Status icon] [Refresh icon]

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

Lockprint [Status icon] [Refresh icon]

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:33]

Update index statistics configuration / DD2024 - test-02

☐ Enabled

Schedule: 0 0 2 ? \* SAT

Update mode: AUTO

Included indices names:

Excluded indices names:

DB size to switch, bytes: 4000000000

☒ Check index activity

Cancel Save



Fabio Codebue



DelphiDay  
italian conference



# Index statistics recalculation

Keeps indices aligned in case of many data changes (large number of inserts, deletes, updates).

Schedule a cron job to do it

It should enable not often than once per week, or even once per month.

By default it is set to Saturday, 02:00 am.



Fabio Codebue





# Verified Backup

Verified backup

Databases: 1; Require(s) attention: 1

DD2024 - Test01: G:\work\\_\_conf\...  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; U...  
Backups: OFF  
CRITICAL: [Icons]

DD2024 - Test01: G:\work\\_\_c...

Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun...]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

Lockprint

Lockprint: OK [period 3 min] [Last run: 11 Jun 14:...

Backup (gbak) timeout, minutes:

240

Restore (gbak) timeout, minutes:

480

Final destination folder for backups

\${backup-directory}

Check free space by DB size factor:

0.7

☐ Copy backup:

/mnt/backups

☐ Execute post backup command:

Optional path to gbak executable:

Backup options for gbak:

-ST TDRW

Restore options for gbak:

<<less

Cancel

Save

Cancel

Save

Fabio





# Verified Backup

---

**Enabled** it enables or disables scheduled backups

**Schedule** set the time when backup should be run. Scheduler **uses CRON expression**

**Backups folder** should be at the same computer

**Maximum number of backup files in folder** specifies how many previous backups





# Verified Backup

---

**Backup name pattern** specifies how backup files will be named.

**Backup extension** is fbk by default.

**Compress backups** FBDataGuard archive backups after regular Firebird backup

**Check restore** perform test restore of backup



Fabio Codebue



**DelphiDay**  
italian conference



# Verified Backup

---

**Remove restored** delete restored database

**Use multiple cores to backup and test restore**

default off

**Send *Ok* report** – by default it is off, but it's strongly recommended to turn it ON and start



Fabio Codebue



**DelphiDay**  
italian conference





# Verified Backup

**Backup (gbak) timeout, minutes** - maximum time to complete only backup (gbak -b) operation, otherwise alert will be generated.

**Restore (gbak) timeout, minutes** maximum time to complete test restore operation.

**Final destination folder for backups** if you need to make backups into the one folder, and then move created backup to another folder Backup files in both locations are watched by HQbird FBDataGuard, and included into the count of backup copies shown in the widget.





# Verified Backup

**Copy backup** switch and **Copy backup to** path. If you have network location or plugged USB drive to store database where you want to store copy of backup

**Execute shell command** switch and **Shell command** path. It is possible to specify custom script or executable after the general backup procedure will be complete.

**Optional path to gbak executable** other gbak tool than standard *gbak*

**Backups option for gbak** and **Restore options for gbak**







# Incr

## Incremental backup

Databases: 1; Require(s) attention: 1

DD2024 -  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:  
Backups: OFF  
CRITICAL:

DD2024 - Test01: G:\work\

Transactions

Transactions: OK [period 4 min] [Last run: 1  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

Lockprint

Lockprint: OK [period 3 min] [Last run: 11:00]

## Incremental backup / DD2024 - test-02

☐ Enabled ☒ Simple schedule ☐ Advanced schedule

Maximum duration, sec: 86400

Minimal free space (bytes): 10737418

☐ Do not check GUID chain

Perform backup if task delay (minutes): 30

☒ Immediately create non-existing low levels backups

Initial backup (level 0)

Day of week to start:

SAT

Start time:

20:00

Keep only 5 files

Run now level 0

Backup folder: \$(db.default-directory)/\$(job.id)

Move to:

☐ Do not check existence of backup files

Journal name: \$(db.default-directory)/\$(job.id)/nt

Everyday backup (level 1)

☐ Backup everyday at

☐ SUN 07:00 ☒ MON 01:00

☒ TUE 01:00 ☒ WED 01:00

☒ THU 01:00 ☒ FRI 01:00

☒ SAT 07:00

Keep only 7 files

Run now level 1

Path to nbackup exe

(option):

Backup name pattern: {0.date,yyyyMMddHHmmss}

Options: -D OFF

☒ Send OK notification for levels 0, 1, 2

☐ Compress ready backup

Hourly backup (level 2)

☐ Backup every hour at

☐ 00h ☐ 01h ☐ 02h ☐ 03h

☐ 04h ☐ 05h ☐ 06h ☐ 07h

☒ 08h ☐ 09h ☐ 10h ☒ 11h

☐ 12h ☐ 13h ☒ 14h ☐ 15h

☐ 16h ☒ 17h ☐ 18h ☐ 19h

☐ 20h ☐ 21h ☐ 22h ☐ 23h

Keep only 24 files

Run now level 2

Cancel

Save





# Multilevel Incremental backup

Incremental backup is a job to schedule and manage incremental backups in Firebird.

Recommend to use incremental backups only in combination with verified backups, since incremental backup performs coping of database pages changed since the last backup

HQbird FBDataGuard implements 2 types of multilevel incremental backup: Simple and Advanced

incremental backups, and also Dump backup (see Database: Dump backup)



Fabio Codebue





# Simple - Dump backup

1. Create **initial backup (level 0)** which essentially is the copy of the database at the moment of backup start and mark it with backup GUID
2. Find data pages, changed from the moment of previous backup and copy only them to **form backup of level 1**
3. Different levels of backups: the initial backup (full copy, level 0) is being created every week, every day we create level 1 (differences from the level 0), and at every hour we create level 2 backups (differences from daily level 1).







# Multilevel Incremental backup

**Max duration**, sec – it limits the maximum duration of backup process, by default is 1 day (86400 seconds).

**Minimum free disk space** (bytes) – minimal size of free disk space to prevent backup to start, by default ~9Mb

**Backup folder** – where incremental backup for the selected database will be stored.

**Journal name–file** name details information about incremental backups files, for internal use only.



Fabio Codebue







# Multilevel Incremental backup

**Path to nBackup** – it is possible to specify other nbackup tool than standard nbackup (not recommended).

**Backup name pattern** – pattern for files of incremental backup (no need to change it).

**Options** – additional options for nbackup command line tool

**Do not check existence of backup files** – this option should be checked if you plan to delete or move incremental backups to another location





# Multilevel Incremental backup

**Do not check GUID chain** – this option should be checked if you want to skip existence check of previous levels of incremental backups.

**Immediately create non-existing low-level backups** – by default this option is On.

**Send OK email for levels 0, 1, 2** – enable this option to receive notifications about incremental backups (highly recommended!)



Fabio Codebue





# Dump Backup

## Dump Backup

Databases: 1; Require(s) attention: 1

DD2024 - Test01  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF

CRITICAL: [Status icons]

DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12

Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

Lockprint

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:32]

### Dump backup / DD2024 - test-02

☐ Enabled

Schedule: 0 0 22 ? \* MON-SUN

Minimal free space (bytes): 10000000

Backup folder: \${db.default-directory}/\${job.id}

Backup name: nbackup\_copy\_{0,date,yyyyMMdd\_HH-mm}

Maximum numbers of \*nbackupcopy files in folder to keep: 1

Copy type: Lock with SQL command

☐ Send OK notification

Cancel

Save



Fabio Codebue



DelphiDay  
italian conference





# Dump Backup

---

This job also utilizes nbackup functionality in Firebird, unlike multilevel backups, it always performs a full copy (level 0) of the database.

Such job is useful to quickly create a copy of working database.



Fabio Codebue





# Restore





Database status

Databases: 1; Require(s) attention: 1







DD2024 - Test01  
G:\work\\_confer... \DB\TEST-01.FDB  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF  
CRITICAL: 


 DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDay2024\DB\TEST-01.FDB

 Transactions   


Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000

 Lockprint   

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:32]

 Verified b

Verified backup: OF  
Awaiting scheduled  
[View backup files...](#)

 Incremen

Incremental backup

Restore Database / DD2024 - test-02

☐ Enabled

Scheduled: 0 22 4 ? \* MON-FRI

Get backup from folder: \${db.default-directory}/backup

Take backup not older than, hours: 24

Restore source: ☐ nbackup ☒ gbak

Use NN CPU cores to restore:

Restore options: -O

Template for gbak backup file name: backup\_{0,date,yyyyMMdd\_HH-mm}

Backup gbak file extension: .fbk

Take date of gbak backup from: ☒ File name ☐ File date

☐ Keep files from recent days (NN): 7

☐ Keep only recent files (NN): 24

Restore to directory: \${backup-directory}

Restore with file name: \${db.id}\_{0,date,yyyyMMdd\_HH-mm}\_testrestore.fdb

When existing database found: ☐ Replace existing file ☒ Rename existing file

Append suffix to database name: {0,date,yyyyMMdd\_HH-mm}.old

☐ Execute command after restore:

Restore timeout, minutes: 480

Check available space before restore: 10000000  
Minimum value (bytes)

☐ Notify on successful restore



Fabio Codebue





# Restore

---

**Scheduled** field contains CRON expression when to run restore

**Get backup from folder** specify the location of backup file(s) to be restored. If you are restoring backups at the same computer where they have been created, specify the same folder

**Take backup not older than, hours** this parameter specifies the maximum age of backup to be restored.

**Restore source** specifies what types of backups will be used to restore the database .



Fabio Codebue







# Restore

---

**Datetime pattern for nbackup** contains the template for backup names made with nbackup. See Incremental Backup.

**Template for gbak backup file name** contains the template for backup names. See Verified backup.

**Backup gbak file extension** by default it is fbk

**Use NN CPU cores to restore** only available in gbak mode.

**Restore options** - only available in gbak mode.





# Restore

**Restore to directory** folder where FBDataGuard will restore backups

**Restore with filename** template for the restored database file

- `${db.id}_{0,date, yyyyMMdd_HH-mm}_testrestore.fdb`
- Db.id – internal identifier of the database (GUID)
- 0,date, yyyyMMdd\_HH-mm – timestamp
- testrestore.fdb – description (You can set there any filename you need)





# Restore

---

**When existing database found** if FBDataGuard will encounter a file with the same name as restored database

**Append suffix to filename when rename** if you have chosen *Rename existing file*, this suffix will be used to rename it.

**Execute command after restore** in this field you can specify an optional path to the command file or another utility to be started after the restore.



Fabio Codebue



**DelphiDay**  
italian conference





# Restore

---

**Restore timeout, minutes** - here you can set the time limit for restore operation. If this limit will be exceeded, the warning will be sent

**Check available space before restore (bytes)** here you can set the limit for the minimal free space in the restore destination – if there is less free space than specified, restore will not start, and associated warning will be sent.

**Notify on successful restore** send email about successful restore (by default it is off, only salerts about problems will be sent).









# Pump files






















## Database status


Databases: 1; Require(s) attention: 1



DD2024 - Test01  
G:\work\\_confer... \DB\TEST-01.FDB

Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF

CRITICAL: 

 DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDay2024\DB\TES



Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000



Lockprint

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:32]

## Pump Files / DD2024 - test-02

☐ Enable/Disable File-Pump job

CRON:

0 0/5 \* ? \* \*

Watch for files in folder:

\$\{db.default-directory\}/backup

Filemask to pump

\*.fbk;\*.zbk

Exclude file-mask

temp\*.\*;\*.fuploaded

Compression level

NORMAL

☒ Encrypt files when packing

\*\*\*\*\*

Pump method

Send to ftp

FTP Server

127.0.0.1

FTP Port

8721

Login

admin2

Password

\*\*\*\*\*

Remote dir

/dataguard/pumped/

Connect timeout, ms

10000

Data timeout, ms

10000

Noop interval, sec

5

☒ Passive Mode

Keep NN files:

10

☐ Send OK-report on every pump



Fabio Codebue



ay  
nce



# TITLE

---

SSSSS



Fabio Codebue



**DelphiDay**  
italian conference





# Configuring replication

6



Fabio Codebue



**DelphiDay**  
italian conference



# Replication

Replication – for practical reasons use async replication

Overhead is minimal, however, every configured master requires 1 watching thread, for 20 databases require 1 core.

HQbird can pre-configure replication while registration, or it can be configured later.

To start replication – i.e., actually generate replication segments, usually **need Firebird restart or complete reconnect** (all connections).



Fabio Codebue








# Transfer Replication

## Transfer Replication Segments

Databases: 1; Require(s) attention: 1



DD2024 - Test01

G:\work\\_confer... \DB\TEST-01.FDB

Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0

Backups: OFF

CRITICAL: 

DD2024 - Test01: G:\work\\_conferenze\_corsi\20240611-12\_DelphiDay2024\DB\TEST-01.F



Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000



Lockprint

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:32]

## Transfer Replication Segments / DD2024 - test-02

☒ Enable/Disable

Check period, seconds

15

Monitor this folder

\$(db.repparam\_log\_archive\_directory)

Age of oldest file to alert (minutes)

60

Filename template

\*journal\*

☒ Compress segments

Where to upload

#	Type	Server:Port	User	Path
1	Disabled			
2	Disabled			
3	Disabled			
4	Disabled			
5	Disabled			

Failed connection attempts  
to disable FTP (nodes 2-5)

0

☒ Delete local prepared file copy

How many unsent files to keep if no  
ftp enabled

1000

How many old (sent) files to keep

10

☐ Send Ok report

Name prefix to rename uploaded reinl  
files

reinldb\_

Cancel

Save



Fabio Codebue







Work with  
Work with  
groups with  
groups of  
databases

7



Fabio Codebue



**DelphiDay**  
italian conference



# Group Sweep

---

- In the latest version we can schedule Sweep for a set of database situated in the same folder



Fabio Codebue





# Group backup

---

- In the latest version we can schedule backup for a set of database situated in the same folder



Fabio Codebue







# Performance analysis

8



Fabio Codebue



**DelphiDay**  
italian conference



# Performance analysis

---

Watch performance graph



Fabio Codebue





# HQCenter - demo

9



Fabio Codebue



**DelphiDay**  
italian conference





# HQ Control Center

URL: <http://cc.mindthebird.com:8080/>

Login credentials

## HQbird Control Center

### Create Free Account or Login

Enter Email address or Login

Enter password [Forgot password](#)

[Sign in](#)

### Configuration Calculator for Firebird:

create optimal configuration files (firebird.conf, databases.conf) for Firebird database, using parameters of your hardware/virtual machine (RAM, CPU cores, etc) and load profile (number of users, database size, etc).

### Traces Visualizer:

use raw trace output to view and analyze SQL queries to see peaks of loads: top of slow queries, top of frequent queries, etc. For each query you can see its SQL text, plan, list of parameters, and performance statistics.



Fabio Codebue



**DelphiDay**  
italian conference



# HQ Control Center

Home

Servers

Traces files

Calculate Firebird configuration

Welcome cliente

Traces

Uploaded

Uploaded trace files: 0

How to run trace for this tool

Trace configuration file for Firebird 3.0

Trace configuration file for Firebird 2.5

Servers

3/12

Total: 3

HQBird: 0

Monitoring: 3

Server status

Ok 0

Critical 0

Other 3



Fabio Codebue



**DelphiDay**  
italian conference



# HQ Control Center

cc.mindthebird.com:8080/dataguardRest.html

Date period from: 08.06.2024 21:24 to: 11.06.2024 21:24

Search:

Type of job: ALL

Filter

Search records by job status: select

Backup notifications delayed for: select

Job Status	Job Name	Date	Job Message
Server: IFK.ZUBRU.GLB.CBD			
Database Name:			
NOT_AVAILABLE		2024-06-10 23:45:57.5	⌵ show details Server is not available
OK	Agent Online Check	2024-06-10 23:02:45.	⌵ show details Dataguard daily report on 2024-06-11
MINOR	Check Server Log	2024-06-11 04:45:57.5	⌵ show details Sweep is finished
OK	Startup test email	2024-06-10 23:45:25.5	⌵ show details Dataguard startup message
Database Name: weblog			
OK	Verified backup	2024-06-10 22:11:22.4	⌵ show details Regular backup and test restore was done successfully



Fabio Codebue



DelphiDay  
italian conference





2024-06-06

2024-06-07

2024-06-08

2024-06-09

2024-06-10

2024-06-11

2024-06-12

Show Firebird Log

Hide Y Axis Labels



Fabio Codebue

**DelphiDay**  
italian conference



# Tools – MonLogger, DatabaseAnalyst



Fabio Codebue



**DelphiDay**  
italian conference





# Tools – MonLogger, DatabaseAnalyst

HQbird MonLogger is a tool to analyze monitoring tables output in Firebird and find problems with slow SQL queries, wrongly designed transactions (long-running transactions, transactions with incorrect isolation level, etc) and identify problematic applications.

MonLogger can connect to Firebird database with performance problems and identify what is the reason of slowness

MonLogger supports Firebird 2.1, 2.5, 3.0, 4.0 and 5.0 – for older Firebird versions or InterBase please use FBScanner.



Fabio Codebue







# Tools – MonLogger, DatabaseAnalyst

- **Top attachments** with highest number of IO operations, non-indexed and indexed reads
- **Top SQL statements** with highest number of IO operations, non-indexed and indexed reads
- **Problematic transactions**: long-running transactions, transactions with erroneous isolation





# Tools – MonLogger, DatabaseAnalyst

- level, read/write transactions, and related information
  - when they started,
  - what applications started these transactions,
  - from what IP address, etc
- Attachments and statements with the most intensive garbage collection actions
- Read/write ratio, INSERTS/UPDATE/DELETE ratio, and more.



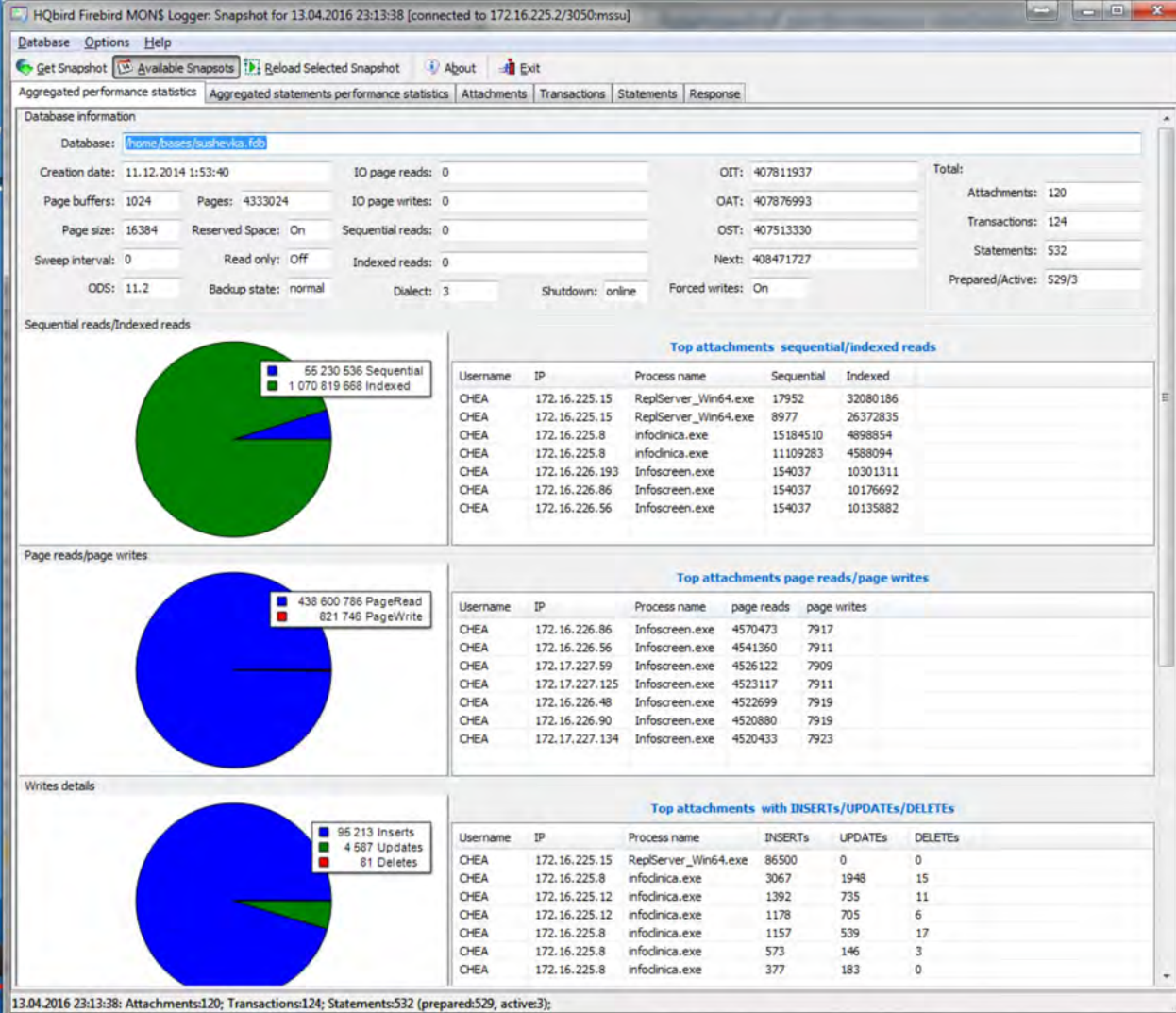




# MonLogger

## Sequential reads / Indexed reads

shows us total ratio between sequential (non-indexed) reads and



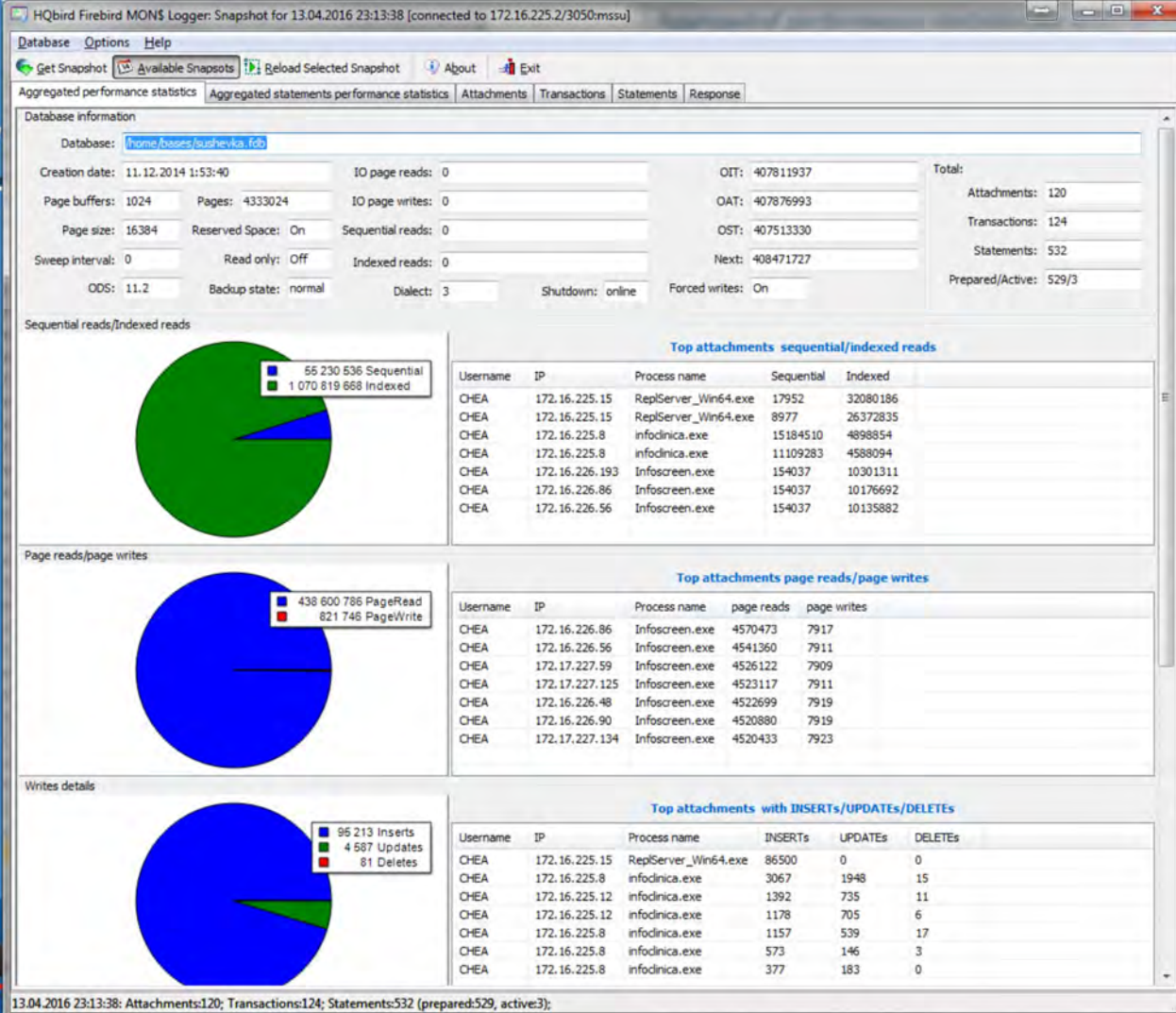
Fabio Codebue





# MonLogger

Write details gives you an overview of write operations: ratio between INSERTs/UPDATES/DELETES among all database attachments



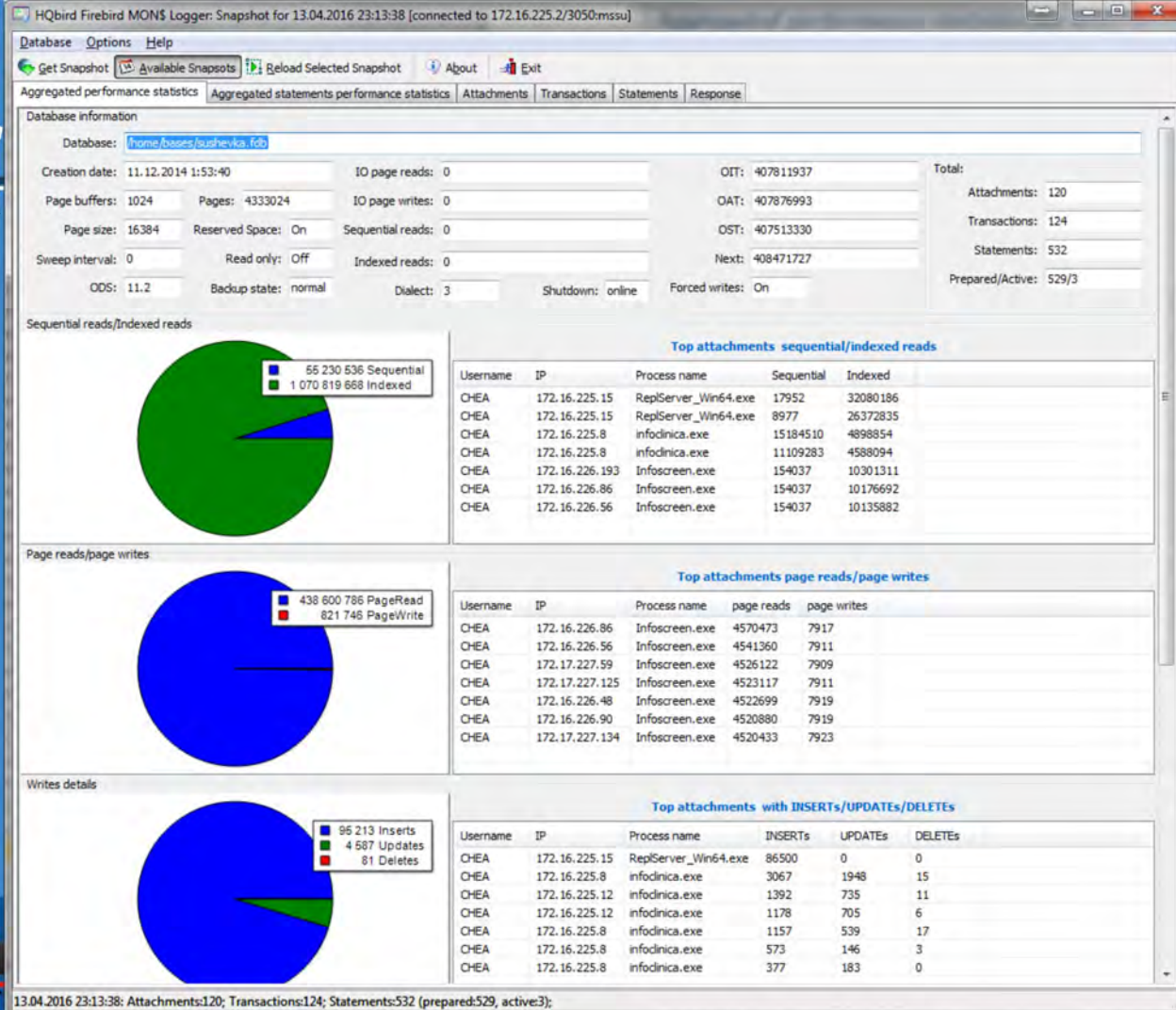
Fabio Codebue



# MonLogger

## Garbage collection

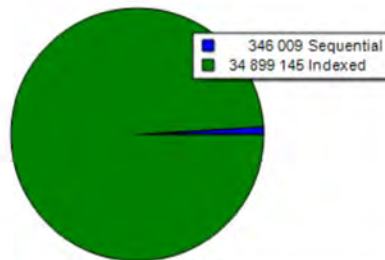
- **Purge** — engine removes back-versions, only primary version is in database.
- **Expunge** — both primary version and all back-versions were deleted.
- **Back-out** — remove only primary version (due to rollback).



Fabio Codebue



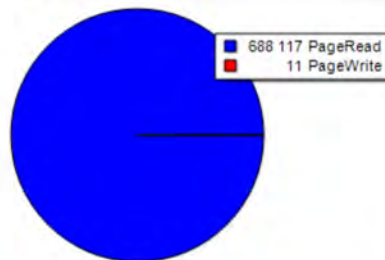
### Sequential reads/Indexed reads



### Top statements sequential reads

Username	IP	Process name	Sequential	Indexed	SQL
CHEA	172.16.225.12	infodnica.exe	74600	15	select l.prtdetinfo, R.RName, L.LName, R.Comment, ca
CHEA	172.16.225.12	infodnica.exe	74600	13	select l.prtdetinfo, R.RName, L.LName, R.Comment, ca
CHEA	172.16.225.12	infodnica.exe	59680	8	select l.prtdetinfo, R.RName, L.LName, R.Comment, ca
CHEA	172.16.225.8	infodnica.exe	51400	682	select distinct ts.treatcode, ws.schname, ts.scount, ts.
CHEA	172.16.225.8	infodnica.exe	37008	512	select distinct ts.treatcode, ws.schname, ts.scount, ts.
CHEA	172.16.225.8	infodnica.exe	14920	1	select l.prtdetinfo, R.RName, L.LName, R.Comment, ca
CHEA	172.16.225.8	infodnica.exe	14920	2	select l.prtdetinfo, R.RName, L.LName, R.Comment, ca

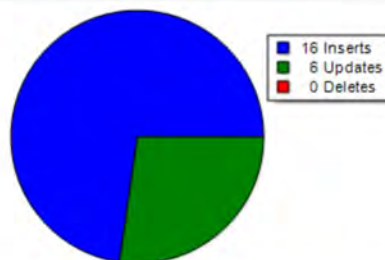
### Page reads/page writes



### Top statements page reads/page writes

Username	IP	Process name	page reads	page writes	SQL
CHEA	172.16.225.15	ReplServer_Win64.exe	234013	0	select first 100000 l.id, l.tablename, l.replid,
CHEA	172.16.225.15	ReplServer_Win64.exe	203447	0	select first 100000 l.id, l.tablename, l.replid,
CHEA	172.16.225.12	infodnica.exe	41314	0	select l.prtdetinfo, R.RName, L.LName, R.Co
CHEA	172.16.225.12	infodnica.exe	41312	0	select l.prtdetinfo, R.RName, L.LName, R.Co
CHEA	172.16.225.12	infodnica.exe	33048	3	select l.prtdetinfo, R.RName, L.LName, R.Co
CHEA	172.16.225.8	infodnica.exe	18968	0	select ds.schedident, ds.wdate, ds.beghour
CHEA	172.16.225.140	infodnica.exe	13533	0	select ds.schedident, ds.wdate, ds.beghour

### Writes details



### Top statements with INSERTs/UPDATEs/DELETEs

Username	IP	Process name	INSERTs	UPDATEs	DELETEs	SQL
CHEA	172.16.225.12	infodnica.exe	3	3	0	UPDATE TREAT SET TREATCODE = ?,PC
CHEA	172.16.225.12	infodnica.exe	2	2	0	UPDATE TREAT SET TREATCODE = ?,PC
CHEA	172.16.225.8	infodnica.exe	3	0	0	update or insert into chistrum(HISTID,PCOD
CHEA	172.16.225.8	infodnica.exe	3	0	0	update or insert into limitdents(ID,PCOD
CHEA	172.16.225.12	infodnica.exe	1	1	0	update or insert into clients(PCODE,FILL
CHEA	172.16.225.12	infodnica.exe	2	0	0	update or insert into clientgarant(ID,PCO
CHEA	172.16.225.8	infodnica.exe	2	0	0	update or insert into clients(PCODE,FILL





# MonLogger

---

Monitoring tables collect information since the beginning of each object life

- Sequential reads / Indexed reads
- Page reads/page writes
- Write details for statements
- Garbage collection details for statements
- Memory usage for statements



Fabio Codebue



**DelphiDay**  
italian conference



# FBScanner

---

Only for versione 2.x, 2.5.x 3.x

Need servicefor MITM system

A bit expansive to use in production for a long time



Fabio Codebue



**DelphiDay**  
italian conference



# Encryption

B



Fabio Codebue



**DelphiDay**  
italian conference





# Encryption

## Encryption

Databases: 1; Require(s) attention: 1

! DD2024 - Test01  
G:\work\\_confer...\DB\TEST-01.FDB  
Size: 17.4 Mb; Created: 2024-Jun-10, 16:28:32; Users: 0  
Backups: OFF  
CRITICAL: [Status Icons]

! DD2024 - Test01: G:\work\\_conferenze\_corsi\2024

Database encryption configuration: "DD2024 - test-02"

Dataguard ID: 2406110521\_TEST-02\_FDB

Crypt key name

Crypt key value

Close

Save



Transactions

Transactions: OK [period 4 min] [Last run: 11 Jun, 4:28:33]  
OIT: 66, OST: 67, OAT: 67  
Next: 67, OST-OIT: 1, Next-OAT: 0  
Sweep interval: 20000



Lockprint

Lockprint: OK [period 3 min] [Last run: 11 Jun, 4:28:33]



Verified backup

Verified backup: OFF  
Awaiting scheduled time: 0 backup file(s) found  
[View backup files...](#)



Incremental backup

Incremental backup: Disabled



Fabio Codebue



DelphiDay  
italian conference



# Database Recovery



Fabio Codebue





# Database recovery

---

There few tool, perhaps only one for database recovery

- FirstAid
- Gfix -mend



Fabio Codebue



**DelphiDay**  
italian conference





# IBAnalyst

## Summary

Database Analyst (IBAnalyst 3.0). Loaded from C:\Users\Denis\Downloads\stat.txt

Statistics Reports View Options Help

Databases Summary Tables Indices Tables + Indices

Parameter	Value
<b>Database info</b>	
Database name	D:\FbData\db.fdb
Creation date	07.09.2017 17:34:04
Statistics date	11.11.2019 20:05:36
Page size	16384
Forced Write	ON
Dialect	1
OnDiskStructure	12.0
Implementation	HW=AMD/Intel/x64 little-endian OS=Windows CC=MSVC
Attributes	force write
Sweep interval	20000
Oldest transaction	69638805
Oldest snapshot	69638806
Oldest active	69638806
Next transaction	69668480
Sweep gap (active - oldest)	
TIP size	1064 pages, 17025 kilobytes
Snapshot TIP size	29675 transactions, 23 kilobytes
Active transactions	29674, 34% of daily average
Transactions per day	87523, for 796 days
Data versions percent	0.00% - records: 978 mb, versions: 0 mb, pages 1370 mb, indices 486 mb
Blob size	25.66 megabytes
<b>Fragmented tables</b>	
ATTACHMENTS	
DNA_FREQ_PER_BREED	
EXTERIOR	
PROTECTED_NAMES	
<b>Versioned tables</b>	
<b>Tables fragmented with blobs</b>	
<b>Massive deletes/updates</b>	
<b>Very big tables</b>	

**Transaction state**

**Indication of long running transaction**

Average Fill: 37%, Records 1430, Pages 16  
Average Fill: 52%, Records 2125, Pages 16  
Average Fill: 54%, Records 7842, Pages 40  
Average Fill: 59%, Records 4315, Pages 24



Fabio Codebue





# IBAnalyst

## Table view

Database Analyst (IBAnalyst 3.0). Loaded from C:\Users\Denis\Downloads\10.11.120.10\_wssteritamak\_18\_20131119\_15-37.iba

Statistics Reports View Options Help

Databases Summary Tables Indices Tables + Indices

Table	Records	RecLength	VerLen	Versions	Max Vers	Data Pages	Size, mb	IdxSize...	Blobs...	Slots	Avg fill%	RealFill
SH_TYPTASK	68	80.81	0.00	0	0	4	0.03	0.00		4	73	20
SH_UNIT_TARA	61	42.00	0.00	0	0	1	0.01	0.00		1	44	44
SHLOP_TABLE	16386	18.00	0.00	0	0	117	0.91	0.00		117	60	60
SITE	40611	80.69	91.21	76142	501	2408	18.81	0.00		2554	95	62
SITEEMPL	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
SITETYPE	22	78.32	0.00	0	0	1	0.01	0.00		1	26	26
SITETYPETYPE	10	47.20	0.00	0	0	1	0.01	0.00		1	8	8
SLOT	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
SLOT_DATEEXPIRE	828	43.61	0.00	0	0	10	0.03	0.00		10	63	61
STOREDFILTER	23	62.17	0.00	0	0	1	0.01	0.00		1	75	22
TAX	2	52.00	0.00	0	0	1	0.01	0.00		1	2	2
TBINF_BUFFER2	36293	229.65	0.00	0	0	1221	9.54	0.00		1221	90	90
TBINF_TBTYPE	9	62.11	0.00	0	0	1	0.01	0.00		1	9	9
TD_COMMLLOG_EXPORT	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
TD_TEMP_ORDERIMORTLOAD_R	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
TEMP_EXP_OP	2027	0.00	26.00	2027	1	16	0.13	0.00		28	93	93
TEMP_HOUCOEFF	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
TEMP_MD_ORDER	12079	40.37	0.00	0	0	123	0.96	0.00		132	69	69
TEMP_OP_ART	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
TEMP_OP_FOR_EXPORT	5942	0.03	19.00	5942	1	41	0.32	0.00		41	94	95
TEMP_PT_ART	48	77.65	0.00	0	0	1	0.01	0.00		1	56	56
TEST_MDCALCORDER	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
TIMEBOARD	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
TIMEBOARD_DETAIL	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0
TMP_CHECKDOCTBL	5	82.20	0.00	0	0	1	0.01	0.00		1	6	6
TMP_PRICEON	0	0.00	0.00	0	0	0	0.00	0.00		0	0	0



Fabio Codebue



DelphiDay  
italian conference





# IBAnalyst

## Index view

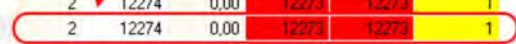
Database Analyst (IBAnalyst 3.0). Loaded from C:\Users\Denis\Downloads\10.11.120.10\_wssterlitamak\_18\_20131119\_15-37.iba

Statistics Reports View Options Help

Databases Summary Tables Indices Tables + Indices

Index	Table	Depth	Keys	Key Len	Max Dup	Total Dup	Uni...	Selectivity	Size...	A
* F_OP_CORREMPLOYEEEDRIVE	OP_CORR	2	9720	0.00	9719	9719	1	1,0000000	0.06	
* F_OP_CORREMPLOYEEESTOSK	OP_CORR	2	9720	0.00	9719	9719	1	1,0000000	0.06	
* F_OP_CORROP_ART	OP_CORR	2	9720	0.00	9719	9719	1	1,0000000	0.06	
* I_OP_CORR_OPARTCHILD	OP_CORR	2	9720	0.00	9719	9719	1	1,0000000	0.07	
* F_PLTYPE	PL_TYPE	1	17	0.00	16	16	1	1,0000000	0.01	
* F_PRICEWS	PRICE	1	712	0.00	711	711	1	1,0000000	0.01	
* F_QUESTIONEXAMINATION	QUESTION	1	22	0.00	21	21	1	1,0000000	0.01	
* F_REMLICAREMIND	REPLICA	1	2	4.00	1	1	1	1,0000000	0.01	
* F_REMLICAREMINDD	REPLICA	1	2	4.00	1	1	1	1,0000000	0.01	
* F_SERVERREPL	REPLICA	1	2	1.00	1	1	1	1,0000000	0.01	
* F_RESTCONTRCUR	RESTCONTR	2	58475	0.00	58474	58474	1	1,0000000	0.35	
* F_PARTY_RFS_ART	RFS_PARTY	2	12274	0.00	12273	12273	1	1,0000000	0.08	
* I_NUMBER	RFS_PARTY	2	12274	0.00	12273	12273	1	1,0000000	0.08	
* RDB\$PRIMARY169	R_DOMAIN	1	1	2.00	0	0	1	1,0000000	0.01	
* F_R_FIELDDOMAIN	R_FIELD	2	1836	0.00	1835	1835	1	1,0000000	0.02	
* F_R_ORDERSCHEDULER_ORDALG	R_ORDERSCHEDULER	2	1495	0.00	1494	1494	1	1,0000000	0.02	
* F_R_ORDERSCHEDULER_THROW	R_ORDERSCHEDULER	2	1495	0.00	1494	1494	1	1,0000000	0.02	
* F_R_ORDERSCHEDULER_WS	R_ORDERSCHEDULER	2	1495	0.00	1494	1494	1	1,0000000	0.02	
* F_R_QUEUESORT	R_QUEUE	2	1010554	0.00	1010553	1010553	1	1,0000000	6.66	
* F_R_QUEUESORTSERVER	R_QUEUESORT	1	9	0.00	8	8	1	1,0000000	0.01	
* F_R_REQUESTTYPE_RECEPIENT	R_REQUESTTYPE	1	9	0.00	8	8	1	1,0000000	0.01	
* F_R_STATUSTYPE	R_STATUS	1	4	0.00	3	3	1	1,0000000	0.01	
* RDB\$PRIMARY269	R_STATUSTYPE	1	1	1.00	0	0	1	1,0000000	0.01	
* F_USERREQUESTREQUESTTYPE	R_USER_REQUEST	1	1	1.00	0	0	1	1,0000000	0.01	
* F_USERREQUESTUSERS	R_USER_REQUEST	1	1	3.00	0	0	1	1,0000000	0.01	
* RDB\$PRIMARY225	R_USER_REQUEST	1	1	7.00	0	0	1	1,0000000	0.01	

Useless indices



Fabio Codebue



DelphiDay  
italian conference





Fabio Codebue

**THANK YOU**



Fabio Codebue

