



# Firebird Essentials

## SEASON 1 MIGRATION

### EP. 2 / 4 PROBLEMS DURING MIGRATION



mqFS



 President of  
Foundation

# Migration approach — where you should be after the 1st video

- Do the test migration asap
  - Do Backup/restore,
  - create BIND OnConnect trigger,
  - Add to firebird.conf DataTypeCompatibility, DefaultTimeZone, WireCrypt, Legacy\_UserManager
- Try to work with your application

# The most frequent problems during the migration

- 1) Backup-restore does not give the warranty that sources of all metadata are compatible with FB5
- 2) SQLs can be not compatible and generate errors
- 3) SQLs can be not optimal

# Backup-restore does not convert BLR

- BLR = Binary Language Representation
- BLR has different formats in different Firebird versions
  - Demo of BLR difference
- Firebird 5 will work with old BLR until the moment of change of stored procedure/trigger/etc

# The most frequent problems

- Problems which prevent compilation of objects:
  - Implicit new data types usage
  - Using of literals timestamp NOW, functions CURRENT\_TIMESTAMP
  - Domain with name BOOLEAN
  - Using new keywords as variables/objects names

# New data types

- BOOLEAN – 3.0
- TIME WITH TIME ZONE (\*) – 4.0
- TIMESTAMP WITH TIME ZONE (\*) – 4.0
- INT128, NUMERIC(38, x), DECIMAL(38, x) (\*) – 4.0
- DECFLOAT(16), DECFLOAT(34) – 4.0

# INT128, NUMERIC/DECIMAL (38, x)

- `SELECT...SUM(AMOUNT)...FROM ...`
- If AMOUNT had type BIGINT or NUMERIC(18, x) result will be INT128/NUMERIC(38, x)
- `BIGINT * BIGINT = INT128`

# Literals NOW, TOMORROW, etc

'NOW', 'TODAY', 'TOMORROW', 'YESTERDAY' with prefix  
TIMESTAMP, DATE, TIME are now prohibited

If you have TIMESTAMP 'NOW', change to

CAST('NOW' AS TIMESTAMP) or LOCALTIMESTAMP



# DateTime types

- CURRENT\_TIMESTAMP – returns TIMESTAMP WITH TIME ZONE
- CURRENT\_TIME – returns TIME WITH TIME ZONE

In MON\$ have columns with timezones

From Firebird 2.5.9 and 3.0.4

- LOCALTIMESTAMP – returns TIMESTAMP
- LOCALTIME – returns TIME

# Examples

```
SELECT  
LOCALTIMESTAMP AS TS1, -- TIMESTAMP  
CURRENT_TIMESTAMP AS TS2 -- TIMESTAMP WITH TIME ZONE  
FROM RDB$DATABASE
```

# Examples

EXECUTE BLOCK

RETURNS (TS TIMESTAMP)

AS

BEGIN

TS = LOCALTIMESTAMP; -- all Ok

TS = CURRENT\_TIMESTAMP; -- implicit cast

-- TS = CAST(CURRENT\_TIMESTAMP AS TIMESTAMP);

SUSPEND;

END

# What DataTypeCompatibility does?

- BOOLEAN -> CHAR(5)
- TIME WITH TZ -> TIME
- TIMESTAMP WITH TZ -> TIMESTAMP
- DECFLOAT -> DOUBLE PRECISION
- INT128 -> BIGINT

# Good News! DataTypeCompatibility works for application

- Disabled DataTypeCompatibility, run in isql.exe  
SQL> select current\_timestamp from rdb\$database;  
2024-09-04 10:12:18.0920 Europe/Kiev
- DataTypeCompatibility=3, run in isql  
select current\_timestamp from rdb\$database;  
2024-09-04 10:12:55.1960

# Example for literals

```
EXECUTE BLOCK RETURNS (TS TIMESTAMP)
AS BEGIN
TS = TIMESTAMP 'NOW'; -- NOT WORK
TS = CAST('NOW' AS TIMESTAMP); -- OK
TS = 'NOW'; -- all ok, the same as CAST('NOW' AS TIMESTAMP)
SUSPEND;
END
CREATE TABLE T (
...
TS TIMESTAMP DEFAULT 'NOW' — Ok — implicit cast
)
```

# Selectable Stored Procedures without SUSPEND;

```
CREATE PROCEDURE SP_SOME (A INT, B INT) RETURNS (C INT, D INT)
AS BEGIN
C = A + B;
D = A - B;
--SUSPEND;
END

...
SELECT C, D FROM SP_SOME(1, 2)
```

Procedure SP\_SOME is not selectable (it does not contain a SUSPEND statement).

# Stored Procedures Without Output parameters

```
CREATE PROCEDURE SP_SOME (A INT, B INT)
AS BEGIN
INSERT INTO T(A, B)
VALUES (:A, :B);
SUSPEND;
END
```

...

SUSPEND could not be used without RETURNS clause in PROCEDURE or EXECUTE BLOCK



# Too many concurrent executions of the same request

- Limit — 1000 queries with the same text per connection
- Workaround — in firebird.conf  
MaxStatementCacheSize = 0

# Cursors in PSQL

```
FOR  
SELECT field_1, field_2 / 2 as field_2  
FROM t  
AS CURSOR C  
DO BEGIN  
...  
x = :C.field_1;  
DELETE t WHERE CURRENT OF C;  
END
```

no column name specified for column number 2 in derived table C.

# How to see problematic SQLs: errors

- `fbtracemgr.exe -se service_mgr -user SYSDBA -pass masterkey -start -conf C:\temp\fbtrace.conf`
- **`log_errors = true`**

# How to see problematic SQLs: performance

- `fbtracemgr.exe -se service_mgr -user SYSDBA  
-pass masterkey -start -conf C:\temp\  
fbtrace.conf`

# Fbtrace.conf

```
database
{
enabled = true
time_threshold = 200
log_connections = true
log_statement_finish = true
log_errors = true
log_initfini = false
print_plan = true
print_perf = true
}
```

# SQLs - disable join conversion

- To disable optimizations

Firebird.conf → OuterJoinConversion = false

# Read Committed Read Consistency

- RC rec\_version and no\_rec\_version by default work as read\_consistency
- read\_consistency read\_only will retain record versions for unopened cursors
- Workaround: in firebird.conf or databases.conf  
ReadConsistency = 0

# Next steps

- In the 3d video we will discuss how to solve migration problems
- In the live webinar we will answer your questions and answers (date-time to be announced)