



The biggest configuration error in Firebird SQL

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...and the biggest configuration error is:

Use configuration from
Classic/SuperClassic on SuperServer and
vice versa

Where to configure?

- firebird.conf
- databases.conf — since 3.0
 - aliases.conf in 2.5
- Also need to check database header!

How to see changed parameters

- By default all lines in conf files are commented by #
- To see what lines are not commented
 - `findstr -v ^\# firebird.conf|findstr -v ^\$`
 - `grep = /opt/firebird/firebird.conf | grep -v ^\#`
- From v4
 - `SELECT * FROM RDB$CONFIG`

Architectures in Firebird

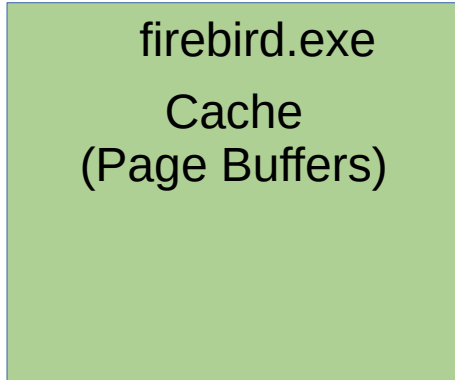
- There are 3 architectures in Firebird:
 - Classic
 - SuperServer
 - SuperClassic

How to change architecture

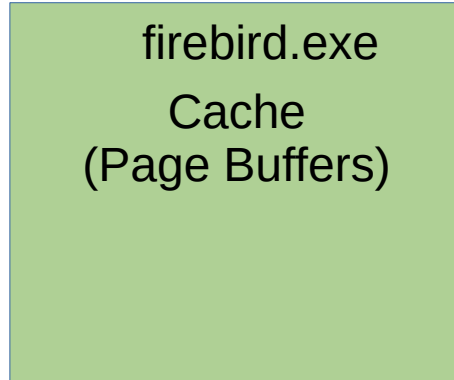
- In Firebird 3+ change parameter in firebird.conf
 - ServerMode = Classic | Super | SuperClassic
- In Firebird 2.5 separate setup step
 - Different executables
 - Windows: fbserver.exe | fb_inet_server.exe
 - Linux: fbserver | fb_inet_server | fb_smp_server

Classic

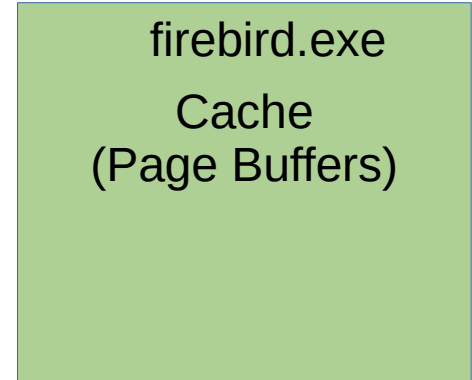
User 1



User 2



User 3



Classic key points

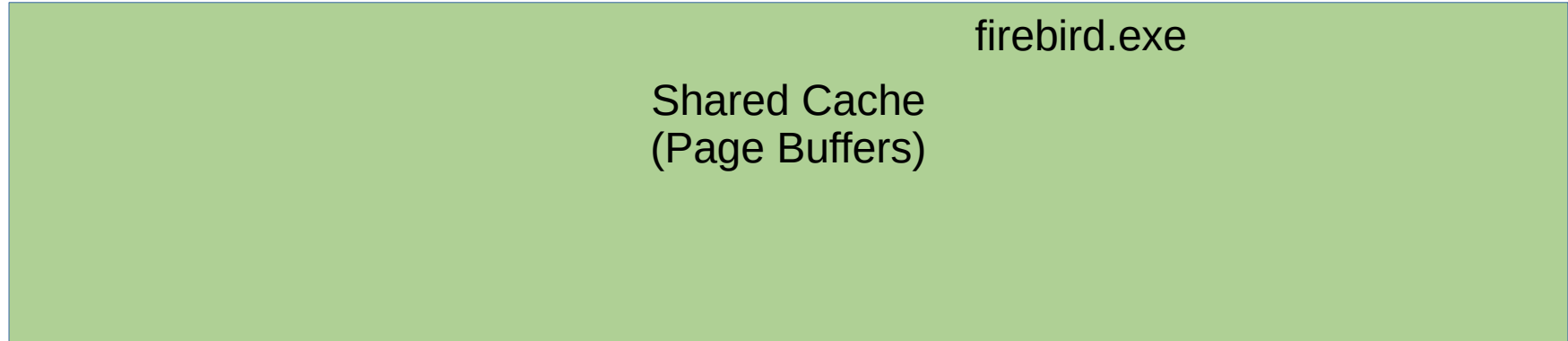
- Each connection has its own separate process
- Database cache is allocated per connection
 - Consumption of memory is proportional to the number of connections

SuperServer

User 1

User 2

User 3



SuperServer key points

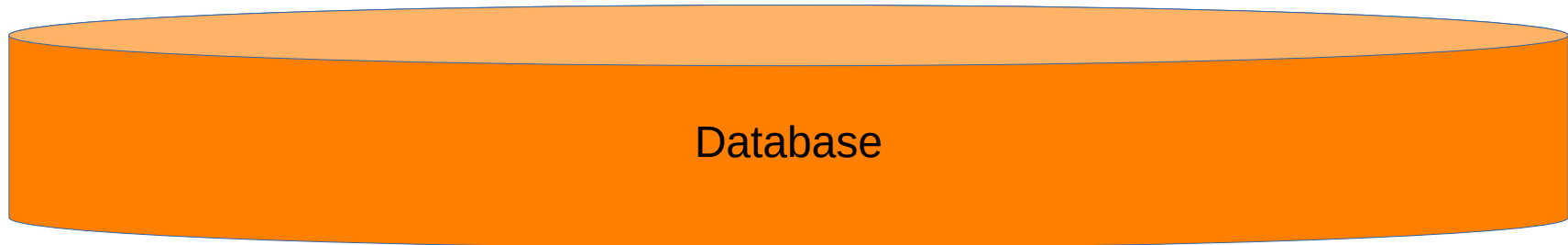
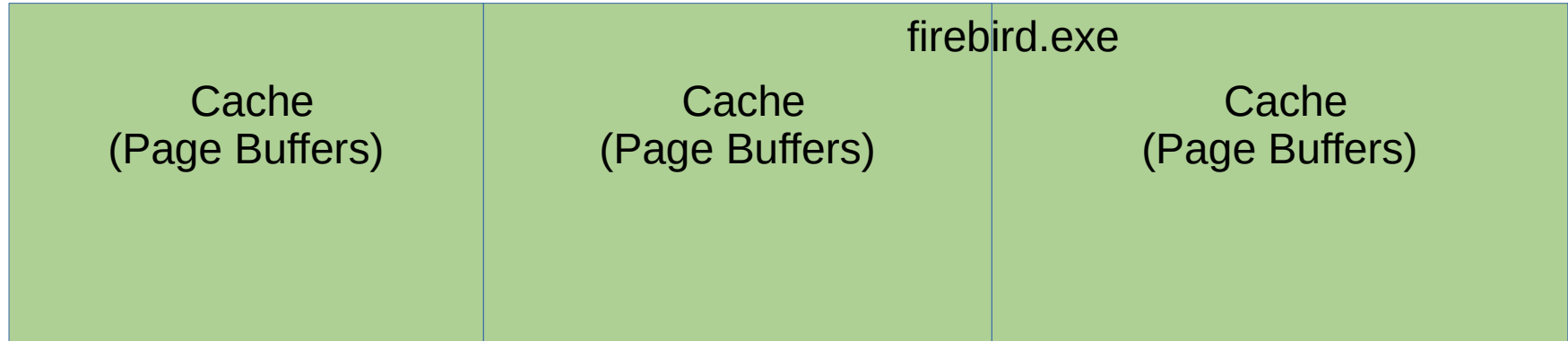
- All connections are served by the single process
- Database cache is allocated per database
 - Memory consumption does not depend on number of connections

SuperClassic

User 1

User 2

User 3



Database


SuperClassic key points

- All connections are served by the single process
- Database cache is allocated per connection
 - Consumption of memory is proportional to the number of connections

Memory allocation

- Classic/SuperClassic
 - Connections X Page Buffers
- SuperServer
 - PageBuffers

How to specify Page Buffers?

- There are 4 ways to specify PageBuffers
 - isc_dpb_ parameter on the connection level
 - In database header
 - see line Page Buffers in gstat -h output
 - In databases.conf - DefaultDBCachePages
 - In firebird.conf - DefaultDBCachePages
- 

Default values for DefaultDBCachePages parameter

- For Classic/SuperClassic: 256 (since v3)
- For SuperServer: 2048

Default values for DefaultDBCachePages parameter

- For Classic/SuperClassic: 256 (since v3)
 - $256 \text{ pages} * 16\text{K page size} * 100 \text{ connections} = 400\text{Mb}$
- For SuperServer: 2048
 - $2048 * 16\text{K} = 32 \text{ Mb}$

Too small for SuperServer or too big for Classic/SuperClassic

- If PageBuffers is too small for SuperServer (practically it is less than 6000 for v3+), performance will degrade due to insufficient size of cache
- If PageBuffers is too big for Classic/SuperClassic, there are 2 problems:
 - memory can be exhausted
 - like 100 connections * 50000 pages*16k = ~76Gb
 - cost of synchronization through LockTable will become too high

How does this error occur?

1) Human factor:

a) changed DefaultDBCachPages

b) switched to another architecture and did not change
firebird.conf/databases.conf

2) Overridden value of Page Buffers from
databases.conf/firebird.conf in the database
header!

Checking real value of Page Buffers

- Connect to your database with isql.exe
- set stat on;
- Select * from rdb\$database;
- In the statistics, check line **Buffers**
- **In FB 4 - SELECT * FROM RDB\$CONFIG**

```
Database: localhost:c:\database\employee.fdb, User: SYSDBA
SQL> set stat on;
SQL> select * from rdb$database;

RDB$DESCRIPTION  RDB$RELATION_ID  RDB$SECURITY_CLASS
=====
<null>          139  SQL$363

Current memory = 362552400
Delta memory = 19536
Max memory = 362634272
Elapsed time = 0.001 sec
Buffers = 40960
Reads = 1
Writes = 0
Fetches = 13
SQL>
```


How to fix it?

- `gfix -buff 0 localhost:Disk:\Path\bd.fdb -user SYSDBA -pass ...`
- Restart Firebird service

Recommendations

- 1) Check the real value of PageBuffers
- 2) Check that Page Buffers = 0 in the database header, fix if necessary with `gfix -buff 0`
- 3) Use the correct value of DefaultDBCachPages for each architecture
- 4) Try to create configuration with Configuration Calculator <http://cc.ib-aid.com/democalc.html>

Next parameter: TempCacheLimit

- In the next episode I will discuss the meaning and pitfalls of parameter TempCacheLimit

Thank you!

- General questions?
 - Firebird Support List
<https://groups.google.com/g/firebird-support>
- Questions about this presentation
 - ak@firebirdsql.org