Fyracle

Oracle-mode Firebird

Running enterprise applications on Firebird

GigaCon, March 2006

Agenda

- **An introduction to Firebird**
- **Why Oracle-mode?**
- **Oracle-mode: the issues**
- **What is inside Fyracle?**
- **Fyracle roadmap**

A summary of Firebird

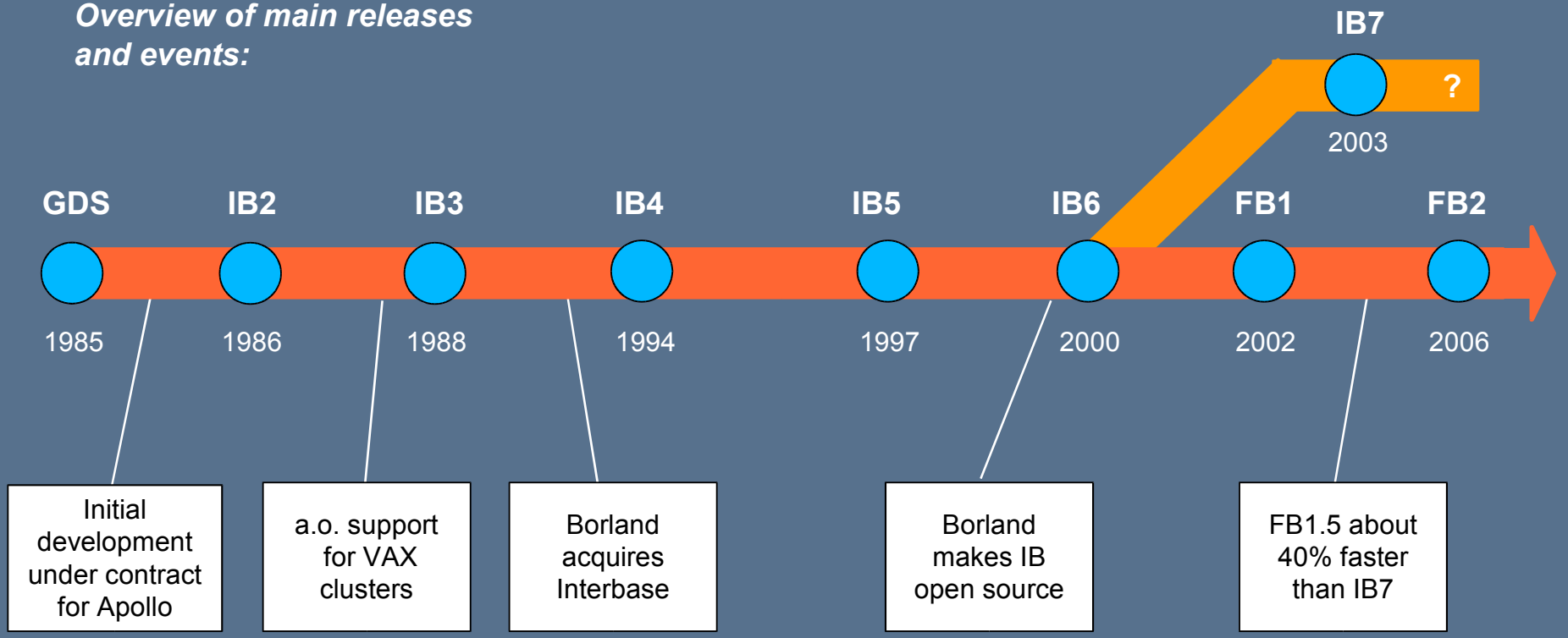
- **Firebird is an open source relational database system**
- Very popular with Windows and Delphi developers (70% of users)
- Runs on many platforms: Windows, Linux, OSX, Solaris, HP-UX, etc.
- Continuation of Interbase code base
- Large installed base, estimated at about 3 million for all versions combined
- Impressive features, exciting roadmap

Five good reasons to pick Firebird as your DB

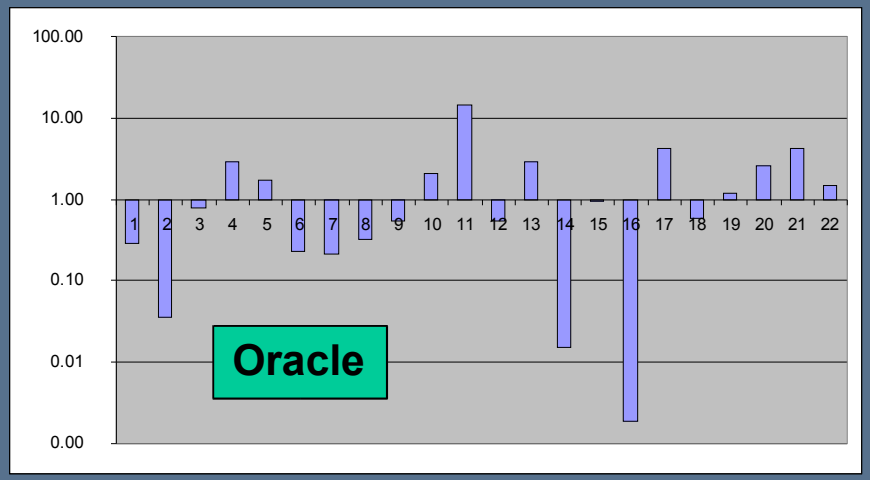
1. Capable: fast, reliable, scales
2. Compact
3. Easy
4. Free
5. Community

Firebird has a 20+ year track record

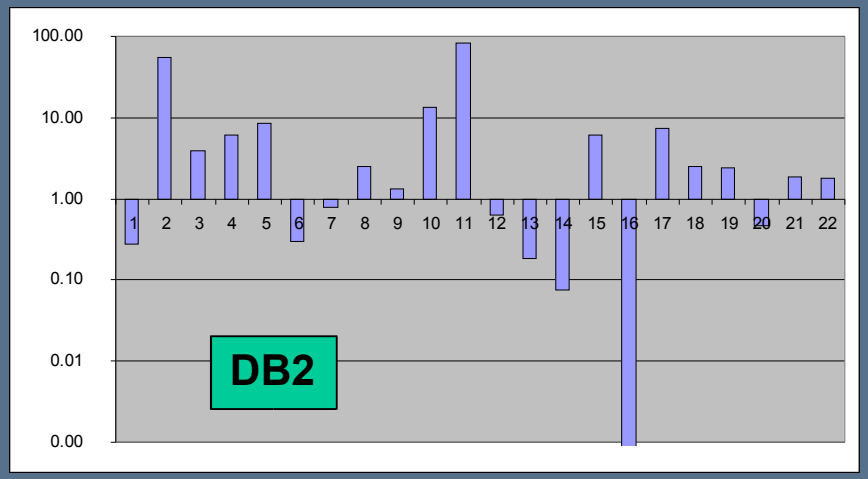
Overview of main releases and events:

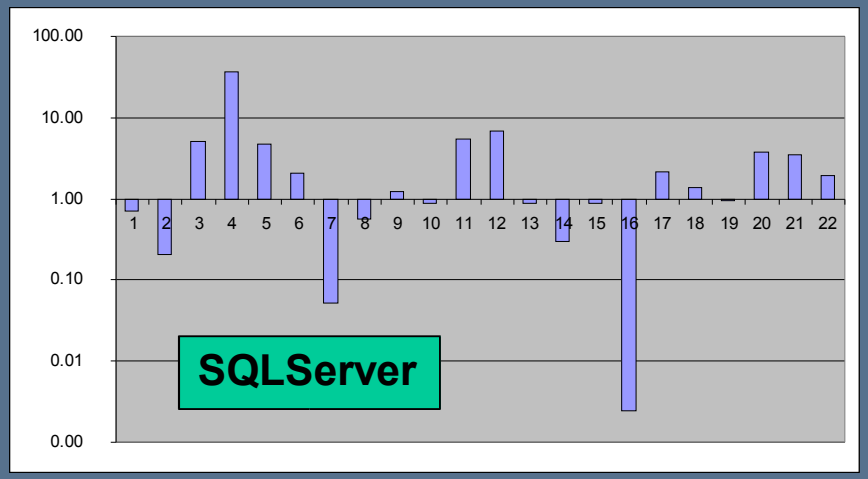


Firebird has similar performance to leading systems



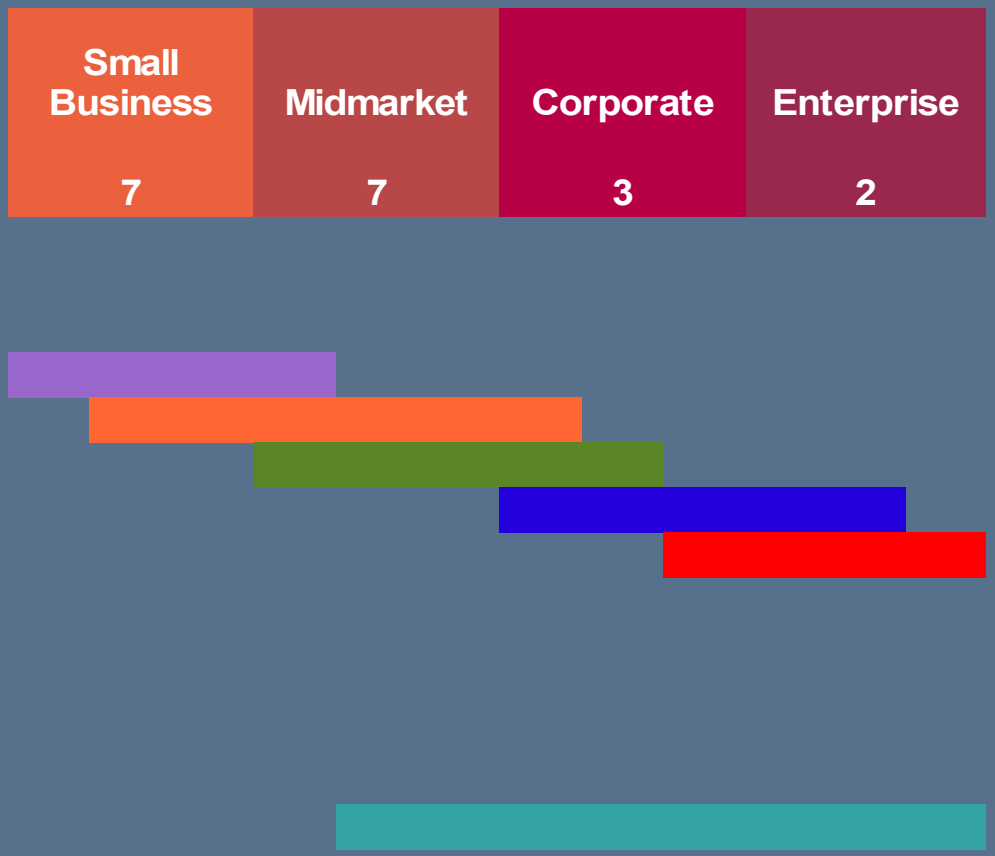
- Graphs show relative performance on the TPC-R benchmark tests
- Figures >1 mean that Firebird is faster
- Figures <1 mean that Firebird is slower





Note: Oracle 9i, SQLServer 2000, DB2-V8 and Firebird2 running on identical 3.2Ghz/2GB system; source: Oleg Loa

A view of the database market



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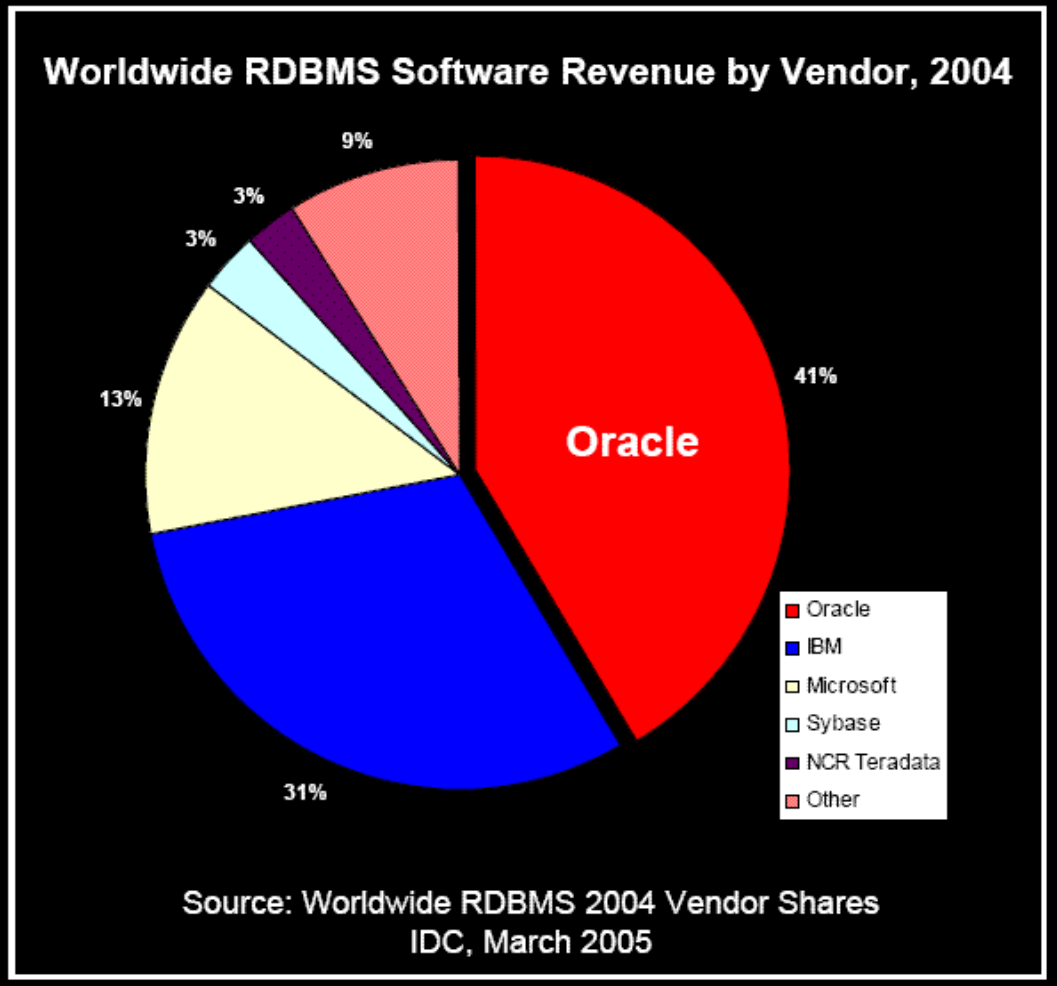
Oracle's share of the RDBMS market continues to grow

Market Facts[1]

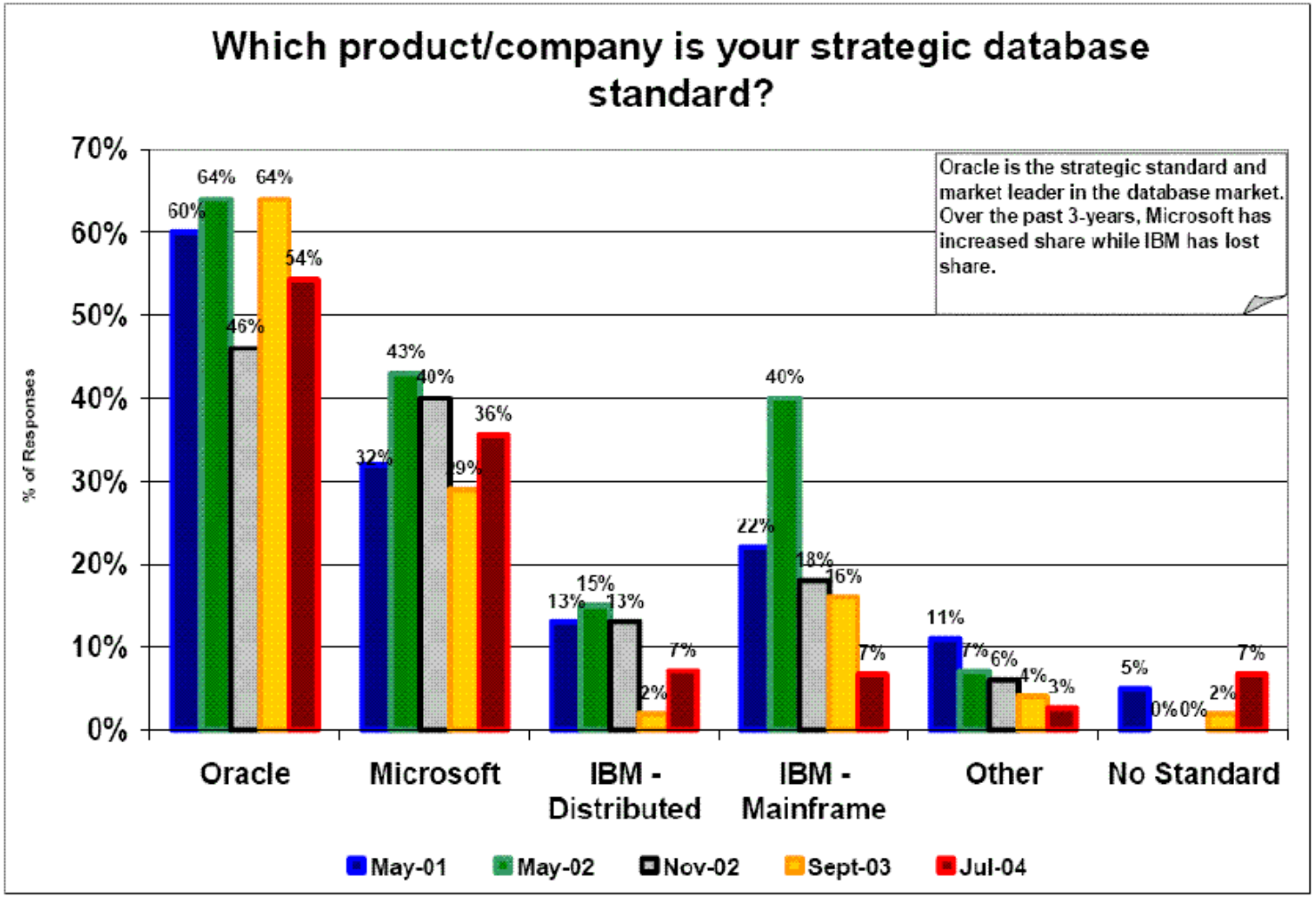
- Oracle has a 41.3% market share
- Oracle outpaced the industry for the second year in a row
- Oracle experienced 14.5% growth as compared to 12% for the industry as a whole
- Oracle increased its lead over its largest competitor, IBM



ORACLE

1. Based on Worldwide RDBMS 2004 Vendor Shares, IDC Corporation, March 2005

Oracle is the strategic database of choice

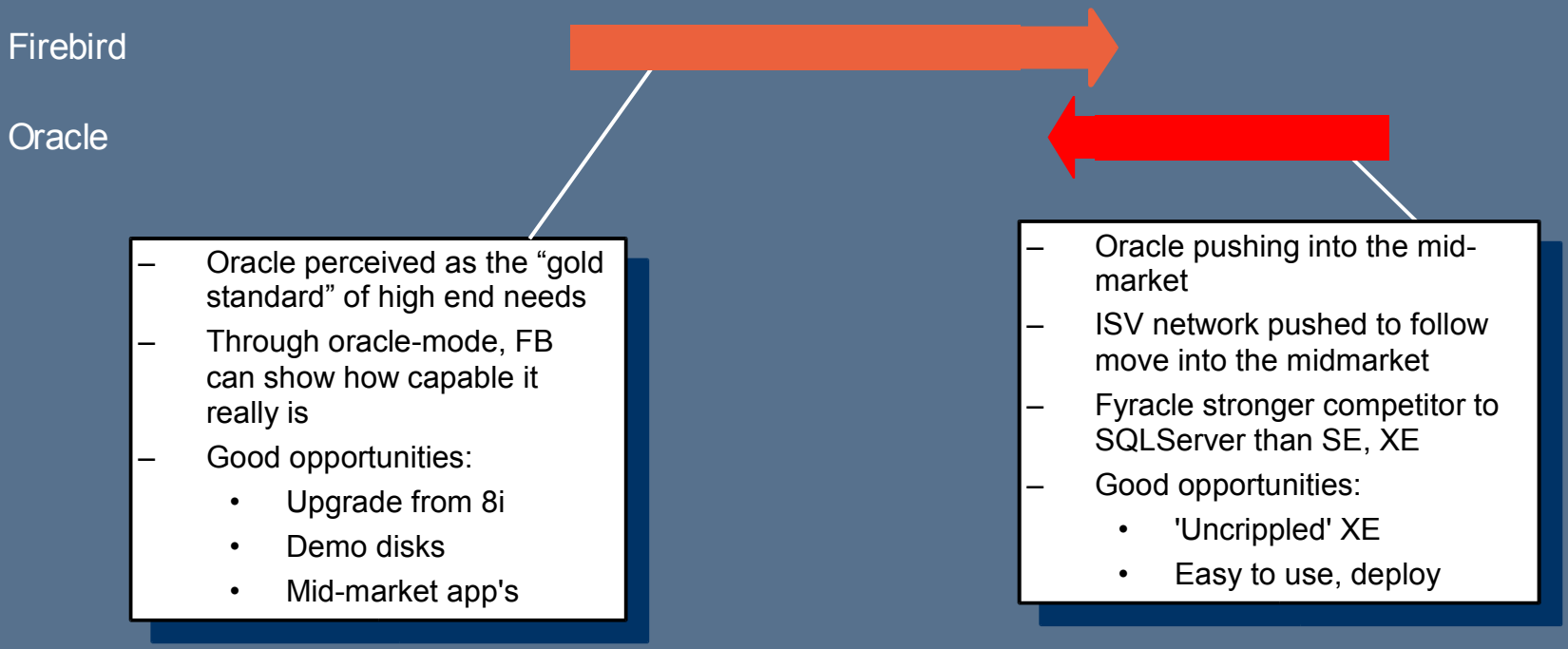


Source: Morgan Stanley CIO Survey, July 2004.

Enterprise Technology – August 11, 2004

The Oracle-mode opportunity

	Small Business	Midmarket	Corporate	Enterprise
Est. no. of servers ---------->	7	7	3	2



Oracle-mode databases

- **SapDB**: 1995, special purpose to run SAP R3
- **Fyracle**: 2003, generic
- **Ingres**: 2004, “million dollar contest” – abandoned ?
- **Postgres EDB**: 2005, generic – aims for MySQL market ?
- **Oracle XE**: 2005, hard to manage crippleware version

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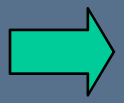
Oracle-mode issues



- **The relational engine:** **“SQL issues”**
- Stored procedures: PL/SQL, Java, dotNet, C/C++
- Packages: user packages, standard packages
- Connectivity: OCI, ODBC, JDBC, dotNET
- Tools: SQL*Loader, SQL*Plus, ...

“SQL issues”

- **Datatypes**
  - Maximum integer size (128 bits?), localization, blob’s, domains, arrays, ...
- **Views**
  - access control, views-on-views, updateable views, “with check option”, ...
- **Triggers**
  - before, after, instead of, access to :old & :new, constraints, body language, ...
- **DML**
  - sub-queries, named cursors, hierarchical queries, built-in functions, ...
- **Transactions**
  - ACID, MVCC, save points, autonomous transactions, two-phase commit, …

Overview of oracle-match at the basic level

Match with Oracle's way of doing things

	Firebird 1.5 native	Firebird Fyracle	Postgres EDB	SapDB Oracle mode	Ingres Oracle mode
Datatypes					
Views					
Triggers					
DML functionality					
Transactions					
Overall fit:					

Oracle-mode issues

- The relational engine: “SQL issues”
- **Connectivity: OCI, ODBC, JDBC, dotNET, PHP**
- **Stored procedures: PL/SQL, Java, dotNet, C/C++**
- **Packages: user packages, standard packages**
- **Tools: SQL*Loader, SQL*Plus, ...**

The issues: Connectivity

Which of the following are supported?

- **OCI**
  The OCI library is the native C/C++ call interface for Oracle. Its function is similar to the function of the 'fbclient' library for Firebird.

- **ODBC**
  Like it or not, ODBC is still the workhorse of DB connectivity. Most VB/Delphi applications that were written for Oracle connect using ODBC.

- **Java**
  In the last five years Java has become the centerpiece of enterprise class application servers. Oracle even bundles its own J2EE app server.

- **dotNET**
  Although still not nearly as popular as Java, dotNet is steadily gaining ground. Oracle is supporting it and more and more applications will require a dotNET driver.

- **PHP**
  PHP is beating both dotNET and J2EE for developing web app's. Oracle is bundling a special build of PHP with its latest releases.

The issues: Stored Procedures

Which of the following are supported?

- **PL/SQL**
  PL/SQL is the core stored procedure language of Oracle databases. It is estimated that there are >250K PL/SQL developers in the world.

- **Java**
  Increasingly stored procedures are shifting from PL/SQL to Java, tapping into the large pool of J2EE java programmers.

- **dotNET**
  With Microsoft making a major push for the enterprise customer using dotNET integration as its lever, Oracle has pre-empted and added dotNET support.

- **C/C++**
  Despite having been around for over 25 years, C/C++ is still the most popular language on the planet and used in Oracle for fancy custom interaction with the environment.

The issues: PL/SQL

- **Language design**
  PL/SQL is a language from the Algol-family, not the C-family, and uses lexical scoping:
  - Are block level variables supported?
  - Are local procedure definitions allowed?
  - Can cursor definitions be parameterised?

- **Complex datatypes**
  PL/SQL has become ever more object oriented:
  - Are collections supported?
  - Are (ref) cursors supported?

Fyracle 0.8.12

- **Interaction with the relational engine**
  PL/SQL is tightly integrated, yet separate from the relational engine
  - Can cursors be passed between procedures?
  - Can procedures operate under an autonomous transaction?

Fyracle 0.8.12

The issues: Packages

- **Support for packages**
  PL/SQL can be organised in compilation units, called packages.
  - Are packages supported?
  - Are package local, global variables implemented?

- **Support for built-in packages**
  Oracle comes with a library of about 50 pre-defined packages, handling all sorts of common tasks. Which ones are supported?
  - DBMS_OUTPUT (handles 'printing' from within SP's)
  - UTL_FILE (handles file access)
  - HTP/OWA (handles call interface to Apache)
  - ...

The issues: Tools

- Oracle comes with a large bundle of management tools. Most of these tools are 'automatic management' tools for the zillions of configuration settings and DBA tasks. Equivalents are unnecessary for Firebird, because it was designed to be self-managing.

- Two tools are of wider importance though:
  - **SQL*Plus** is a utility like Firebird's ISQL. However, it is far more programmable, a bit like our QLI, and is often used for all sorts of scripts that automate tasks.
  - **SQL*Loader** is a programmable bulk loader tool. There is no direct Firebird equivalent. Like Plus, Loader is used often in scripts.

X

- Oracle did not have its own GUI tool (like FB). Popular choices from third parties are **Toad** and **Tora**. Recently, Oracle has released its own (free) GUI tool, code name “**Raptor**”.

Firebird has the most complete oracle-mode

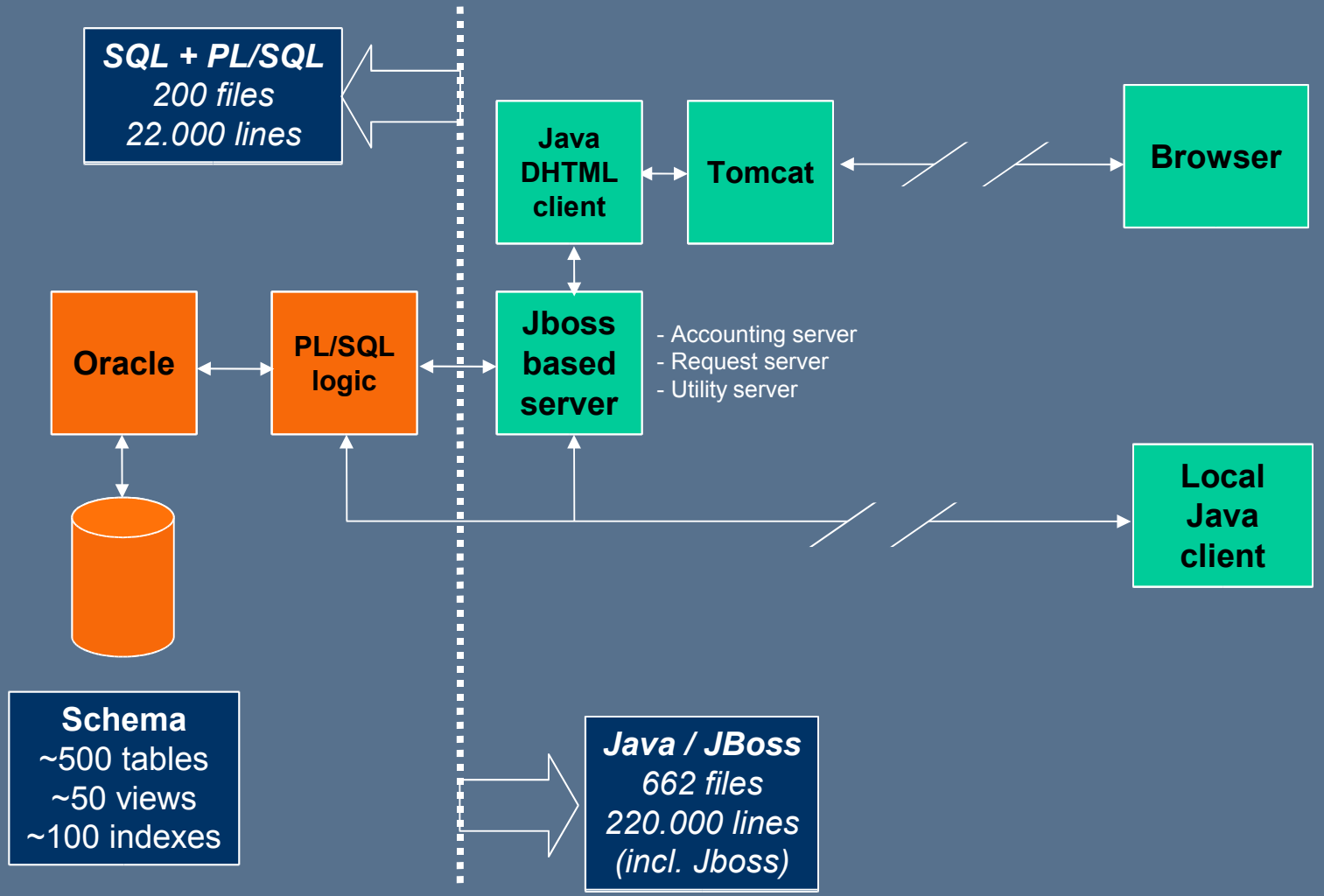
	Firebird Fyracle	Postgres EDB	SapDB Oracle mode	Ingres Oracle mode
"SQL"				
Connectivity				
Stored procedures				
Packages				
Tools			?	?
Overall fit:				

Example non-trivial Oracle application: Compiere

- **"Compiere" is an open-source ERP+CRM package**
  - ERP = Enterprise Resource Planning
  - CRM = Customer Relation Management

- **Currently one of the most popular open-source packages of this kind**
  - >800.000 downloads from Sourceforge
  - Usually in the Top-10 most active list
  - > 50 active installations
  - > 10 implementation partners (VAR's)

Compiere 2.5.0 basic design



Only Oracle and Fyracle can run Compiere

- **Fyracle is the only database that can run Compiere 2.5.0 virtually unchanged**
  There is a port to Postgres and a port to DaffodilDB. Both required heavy modification to the Compiere codebase. Postgres EDB cannot handle Compiere 2.5.0 unmodified.

- **Fyracle is only database that can run Compiere 2.5.2 virtually unchanged**
  Version 2.5.2 moved all PL/SQL to either the client or to Java stored procedures in an effort to become database independent.
  - This change was paid for by Sybase. Still, Sybase cannot run Compiere 2.5.2 reliably!
  - Postgres EDB cannot handle Compiere 2.5.2 (no java SP support)
  - Even Oracle XE cannot handle Compiere 2.5.2 for the same reason

- **About half of Fyracle users use it to run Compiere**, the other half use it to run other applications once developed for Oracle. Typical development environments are:
  - VB
  - Delphi
  - Dev/2000

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What is Fyracle?

All of the following:

- **Firebird 1.5 with enhancements**
  Fyracle is currently based on Firebird 1.5.2 and makes a number of enhancements to it. Some things are backported from FB2, but most enhancements are new functionality

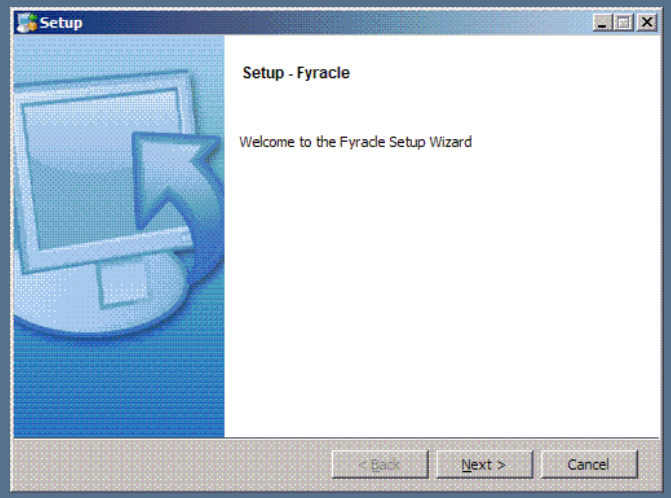
- **A Firebird distribution**
  Fyracle is a '4-click' GUI installer for both Windows and Linux, which installs Firebird, ODBC drivers, Java drivers, documentation and a GUI admin tool. Once the installer completes, Firebird is up and running without further admin.

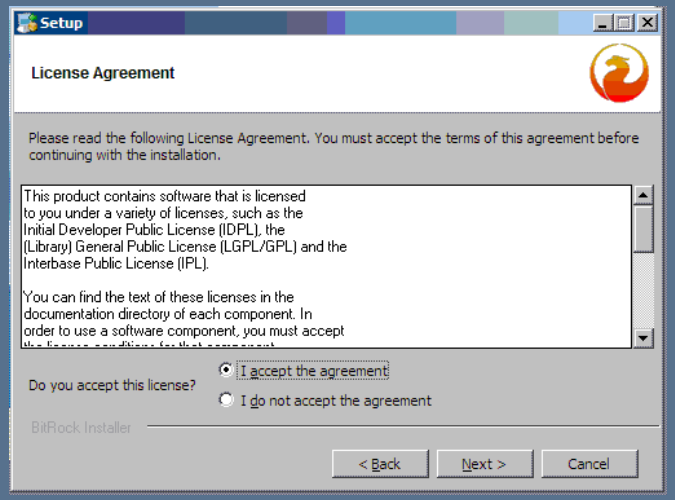
- **Oracle-mode Firebird**
  Fyracle includes all the components to run applications written for Oracle against Firebird. This includes a special translation library and a PL/SQL compiler.

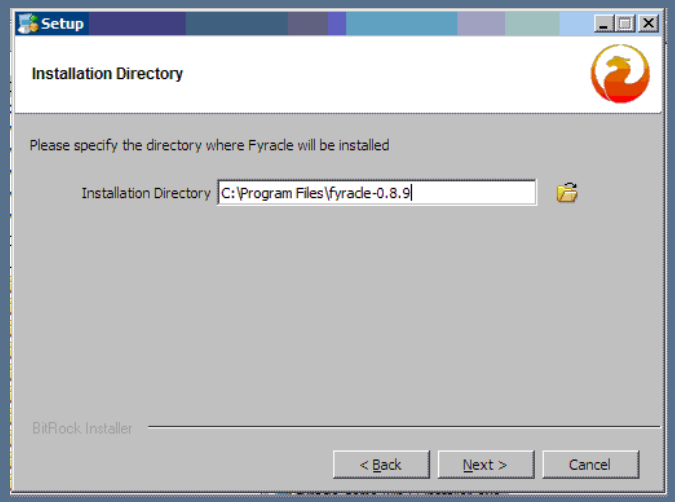
Enhancements to Firebird 1.5

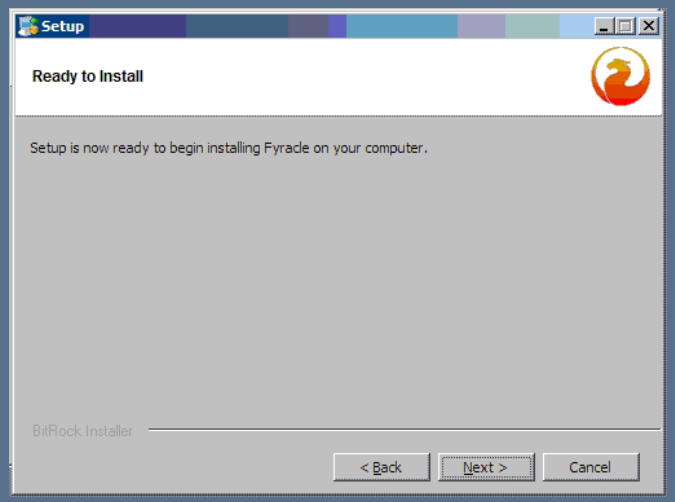
- Derived tables (“select in from list”): backported from FB2
- Common sub-expressions (“with ... select”): new feature, part of FB3
- Hierarchical queries (“with recursive ... select”): new feature, needed to implement Oracle's “connect by” syntax, part of FB3
- Global temporary tables: developed for FB3, backported
- External stored procedures (Java, dotNET, Delphi): developed for Fyracle, part of FB3
- Pseudo-columns: ROWNUM
- Built-in function library: to_char, to_date, add_months, lpad, rpad, round, trunc, etc.
- PL/SQL byte code engine: needed to run compiled PL/SQL stored procedures
- “Dialect 4”: adds autocasting between string and numbers, dates; empty string matches Null; etc.

A 'distribution' with a four click install





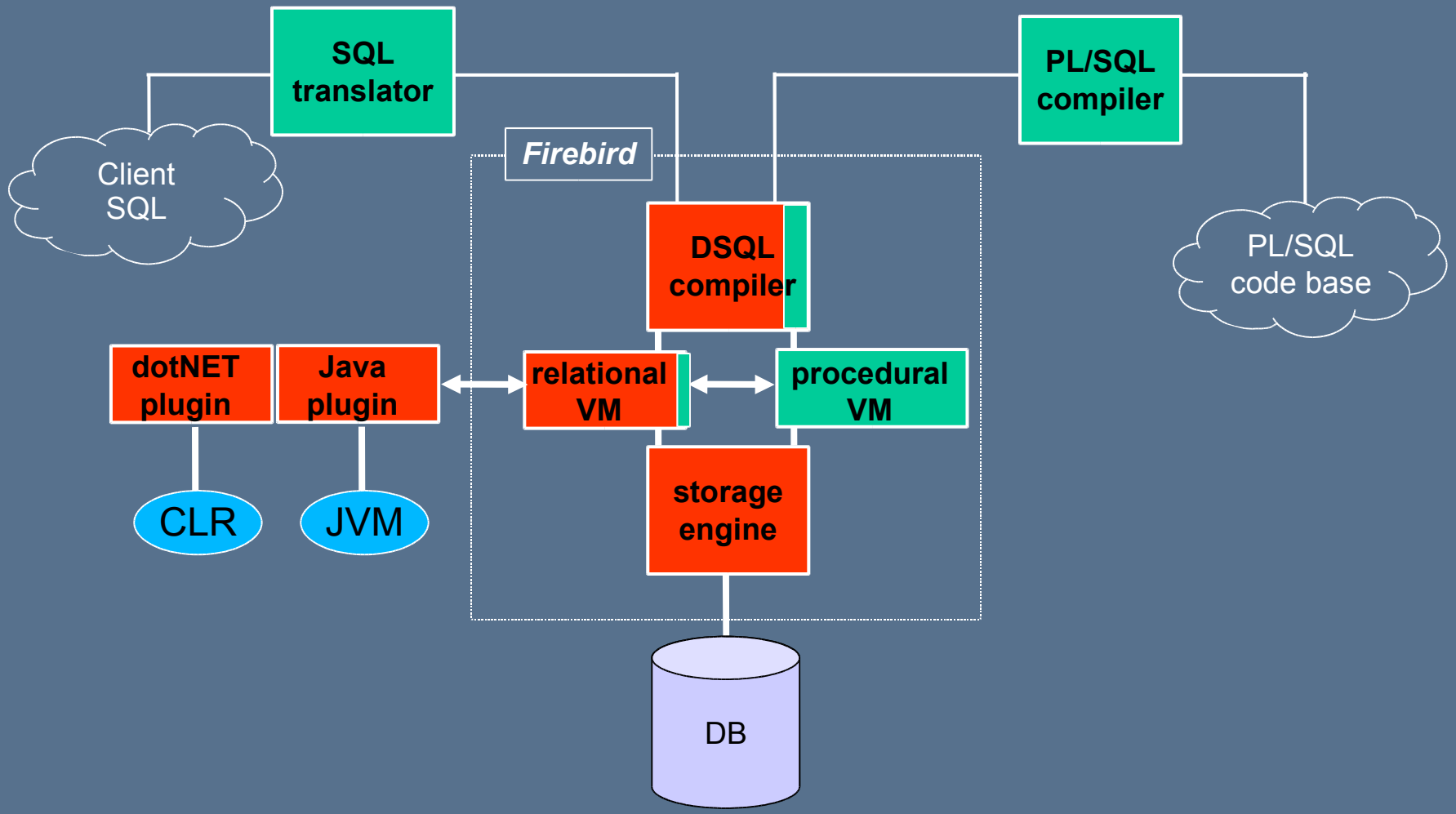




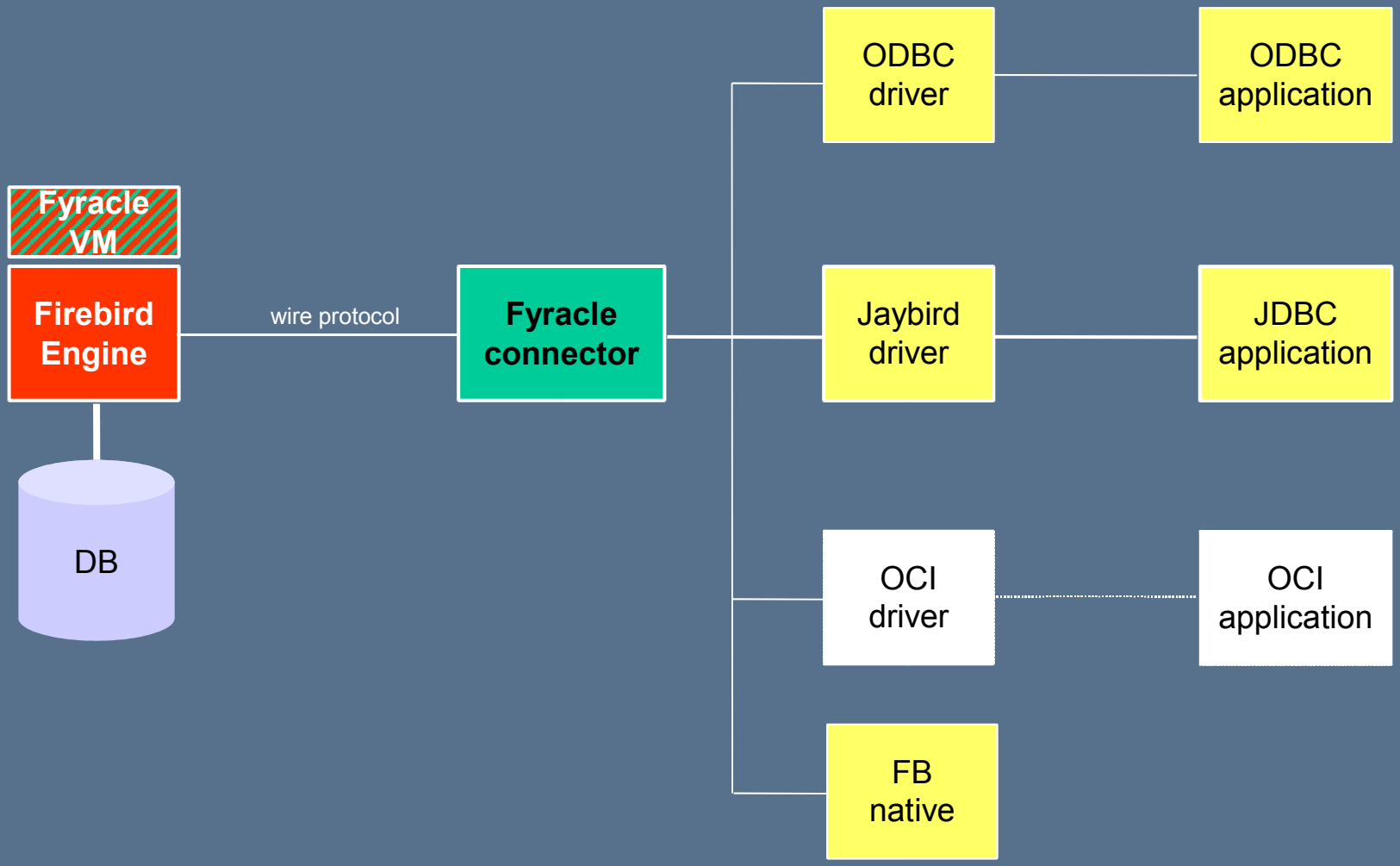
Oracle-mode

- **PL/SQL procedures and trigger bodies**
  - PL/SQL compiler
  - VM to execute compiled bytecode
  - Mechanisms to switch between relational and procedural VM's
- **Components to connect Oracle apps to the Firebird Engine**
  - Smoothes over syntax differences (such as "(+)" join sytax)
  - Works with Delphi, JDBC, ODBC and dotNET (OCI planned)
  - "SQL*Plus"-like scripting tool

How does it work?



Connection options



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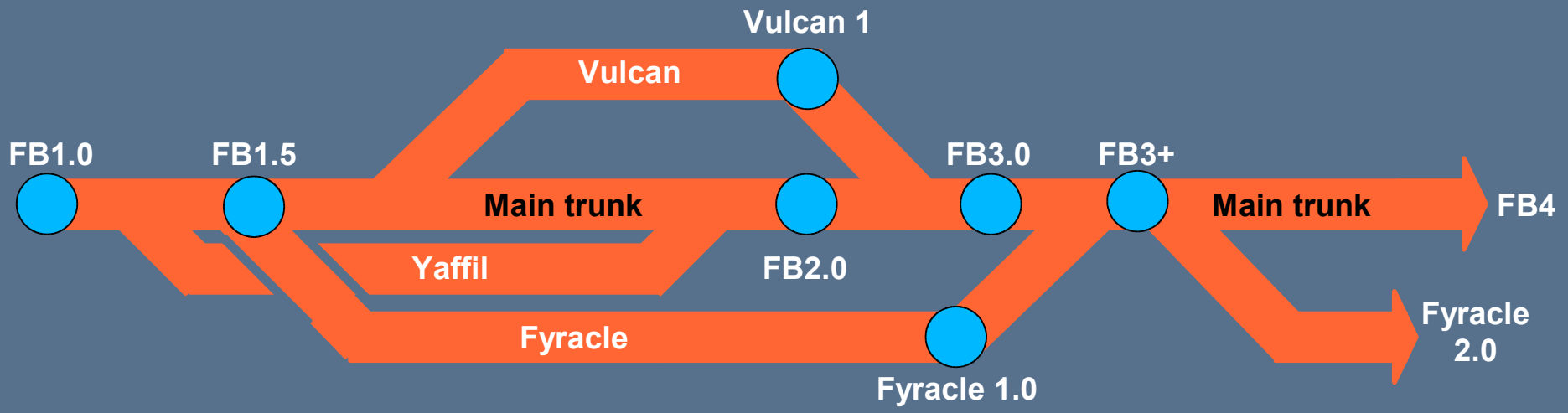
Outlook: high level roadmap



Conclusions

- **Firebird is doing well**
  - Public recognition as a market leader
  - Large, vibrant community
  - High quality code base, and getting even better
  - Exciting roadmap, good development progress

- **Oracle-mode Firebird excellent opportunity to sell into corporate market**
  - Firebird has the technology
  - (Oracle) ISV's have a growing need for a database that is
    - Capable, i.e. fast, powerful & reliable
    - Compact
    - Easy to deploy, easy to manage
    - Free