Borland® InterBase® 4

No other SQL database rivals InterBase® 4 for ease of installation, ease of use, and ease of maintenance. By adopting industry-standard interfaces such as ANSI SQL-92 and ODBC, Borland has made InterBase data available to any client tool you are working with today.

- *Enables true **scalability***
- *Achieves **superior concurrency***
- *Improves **productivity***
- *Perfect for **multimedia applications** with BLOb and multi-dimensional array capability*
- *Supports **UNICODE** and international character sets*

InterBase— when performance matters

If database performance is critical to the success of your applications, InterBase 4 from Borland is your best choice. InterBase delivers high-performance functionality that supports mission-critical operations such as stock trading, pharmaceuticals, aerospace, and network management, while adhering to the latest industry standards, like JDBC for leading edge Java™ development.

Scalable from desktop to enterprise

With scalability among all Windows environments, NetWare, and UNIX platforms, your InterBase solutions are truly platform-independent. Thus, if your workgroup application becomes a departmental success, you can easily redeploy to a higher-performance, higher-capacity server. All of the database objects developed initially (including tables, stored procedures, and triggers) are immediately available to you when the database is moved up to any enterprise platform that InterBase supports.

Multi-Generational Architecture delivers performance

The InterBase server is built on a Multi-Generational Architecture (MGA). MGA provides a unique **versioning engine** which ensures high data availability for both transaction processing users and decision-support users. Traditional database servers support the On-Line Transaction Processing (OLTP) model of database interaction, characterized by a high volume of short, simple transactions. While the InterBase versioning engine supports these short OLTP-style transactions, InterBase outperforms the competition because it also concurrently handles long-duration, decision-support-type transactions.

The versioning engine allows for transactions never to require a lock on the records being used and to be contention-free—meaning that **readers never block writers** in the transaction system. Unlike other databases, the lock-free transactions in InterBase require no additional programming, while providing a time-consistent, repeatable result for every query. Thus, the InterBase versioning engine *allows long- and short-duration transactions to coexist* and *maximizes the throughput of all transactions.*

High reliability for all your applications

InterBase pioneered the concept of an **active database** by *building advanced automation technology* into the server's kernel. The active database incorporates **event alerters, stored procedures, triggers, global UDFs,** and **Binary Large Object (BLOb™) filters** to automate database processes that occur on the server, where they occur fastest and with the greatest level of reliability. Complementing this strong support for implementing business rules, InterBase 4 also empowers the database programmer to ensure data reliability by offering *support for four types of declarative referential integrity.*

Triggers deliver reusable business objects

Triggers store and enforce a company's business rules on the server, so that every application using corporate data adheres to these rules automatically. InterBase triggers automate responses to events on the server, and frequently are used to validate data whenever a row in a table is inserted, updated, or deleted.

"InterBase . . . has the best implementation of modular, optionally-ordered, pre- and post-operation triggers."

—DBMS, July 1996

Event alerters automate your applications

Event alerters make an active database possible, by automatically notifying "interested parties" when certain changes take place. For example, when a quantity-on-hand field in an inventory table goes below a certain quantity, an event alerter could ensure that an e-mail message is sent to the purchasing manager. All this is done without constant polling of the database, so it doesn't tie up system resources and no events are missed.

Stored procedures deliver performance

The stored procedures in InterBase can lead to dramatic speed improvements by off-loading commonly used business tasks from the client to the server. A stored procedure can be used by any application that connects to an InterBase database. It encourages modular design, and makes the job of maintenance and reuse easier.

User-defined functions (UDFs) deliver custom functionality and encourage reuse

UDFs provide a means to extend the InterBase kernel analytical capabilities by creating custom business functions. UDFs are reusable code, and ensure data reliability and integrity. Similarly, UDFs can be used to call applications external to the database.

Declarative referential integrity constraints

Declarative referential integrity constraints allow InterBase to efficiently and reliably maintain the relationships of records stored in your InterBase 4 databases. InterBase supports four categories of constraints:

- **Unique and primary key:** Ensures that no two rows in a table have the same value for the set of key columns. Generators within the database can automatically create unique values such as customer IDs.
- **Referential Integrity:** Validates parent-child relationships between tables, to ensure they are always synchronized, and enables cascading updates and deletes.
- **Check:** States that the associated search condition will be valid for every row in the table.
- **Domain:** Allows for creation of new sub-types and column-level integrity specifications. Domains can be used to specify a range of acceptable values for a column, or enumerate a list of valid values as well as default values. This means that once defined, a domain may be used throughout the application as an alias to point to a more sophisticated datatype (for example, a field such as memo).

Easy to manage and maintain

Most SQL database server products were originally designed without regard to maintenance, and require complete MIS staffs to install, tune, and manage them. InterBase is *designed not only for high performance but also for all types of database developers*, and *doesn't require hours of maintenance*. It's the perfect low-maintenance solution whenever you need embedded applications that run without constant supervision or to upsize your desktop database applications.

Additionally, the InterBase server supports 16- and 32-bit Microsoft Windows graphical user interfaces (GUI) for simplified system administration, monitoring, and debugging from any designated PC client.
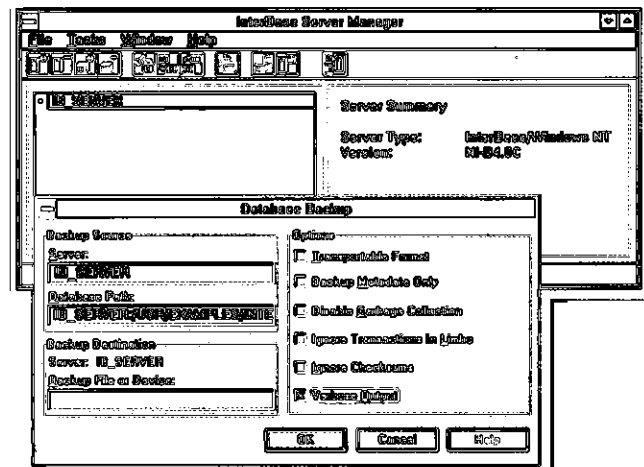
▲ *An intuitive graphical interface simplifies centralized administration.*

Installs in minutes

InterBase installs easily with a single command. Most other SQL database servers require several software tapes, and pages of loading instructions just to get started.

Self-tuning

InterBase dynamically tunes itself for the amount of disk space on your server and the number of connected users. You don't need to specify any server configuration during installation in order to provide high performance.

Small footprint

The InterBase modularized architecture efficiently utilizes system resources. It requires less than 10Mb of disk space for the InterBase product and minimal RAM. Most other relational database products use more memory and take over all the server resources, making them expensive solutions.

Distributed database for application flexibility

When you need to move your desktop database solution to a client/server configuration or enlarge your workgroup applications to serve one or more departments, InterBase is ideal because it was designed for distributed database environments.

Multidatabase joins

InterBase is a truly distributed SQL database server that lets each database system query and return information to any other InterBase server.

Automatic two-phase commit

InterBase also handles multiserver transactions quickly and easily. It includes two-phase commit transaction processing that automatically ensures your distributed transactions are committed without extra application code. Whenever a transaction spans two or more database servers, InterBase first polls the participating servers to ensure they are ready to commit the transaction, then sends the commit statement to complete the transaction.

Distributed two-phase commit recovery

InterBase takes the two-phase commit process one step further. It was the first database product to provide distributed recovery from a two-phase commit. This ensures full recovery without risking a single point of failure, since the distributed transaction is audited by all the servers.

Powerful data types increase data storage

The ability to process unstructured data is an absolute must in many applications. InterBase is the first major SQL database server to accommodate this challenge by supporting both BLOb and multidimensional array data types. This support makes InterBase the best choice for multimedia and scientific applications. You can develop virtually any type of embedded or multimedia application, taking full advantage of the powerful data types available in InterBase.

Binary Large Objects (BLObs)

InterBase set the industry standard with its first product release in 1986 when it stored sound, image, graphic, and binary information directly in the database using its BLOb data types. InterBase World Wide Web and telephony applications make extensive use of BLObs when delivering a multimedia solution. Additionally, the server is automatically enabled to make use of BLOb filters. These filters are ideal for compressing and translating data to suit the needs of an application.

Multidimensional arrays

InterBase also supports the multidimensional arrays used extensively in scientific and financial applications. Storing multidimensional arrays with as many as 16 dimensions in a single field in the database, InterBase simplifies application design and increases performance.

ANSI SQL-92

For mission-critical computing solutions, InterBase delivers exceptional SQL-92 compatibility. The robust SQL interface **reduces the learning curve** dramatically for new
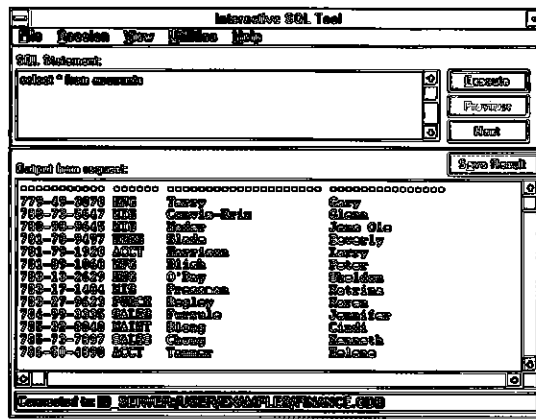
▲ *Windows tools provide easy access to corporate data.*

developers moving to InterBase, because the programming language conforms to an open standard, rather than imposing another proprietary roadblock to productivity. By using SQL to implement and leverage the power of stored procedures, triggers, constraints, and declarative Referential Integrity, you preserve your developers' investment in this industry standard language and allow them to begin developing solutions faster.

International character set support—UNICODE and more

InterBase provides exceptional multinational support for data storage and manipulation. Both single byte and multibyte character sets are supported for all string and BLOb operations. Supported character sets include UNICODE, ASCII, DOS codepages, SJIS, Windows codepages, and EUC formats. A default character set and collation order can be specified for the database as a whole, and these can be overridden for any column of

any table. String literals with a character set name prefix can be used to specify international character data, thereby delivering easy-to-implement international language set applications for worldwide deployment. Several collations are defined for each character set, allowing culture-appropriate sorting of data. And no add-on kits are necessary.

Client and tool independence for easy integration

InterBase supports all of the popular desktop database clients and application builder frameworks, such as **Delphi**™ and **Delphi Client/Server, Borland® C++, Paradox,® Visual dBASE,® ReportSmith,® PowerBuilder, Cognos Impromptu**, and **Microsoft Access, Visual Basic**, and **JDBC** applications. Further, InterBase supports all ODBC-enabled clients and integrated database API-compliant applications and tools. All of the major database and client/server tool vendors subscribe to these open standards. The bottom-line good news is that the InterBase server gives you unlimited flexibility in choosing your present and future client application development strategies.

Fast track to client/server development

InterBase adds improved ease of use to its **proven mission-critical performance**. By adopting industry standards such as an ANSI SQL-92 interface and offering new Windows GUI tools that simplify administration, InterBase 4 transforms your database inspirations into client/server applications.

InterBase Specifications

Integrity
- Declarative Primary Key
- Declarative Foreign Key
- Domain and column-level Check constraints
- Trigger procedures with the following features:
  - Unlimited triggers per record change
  - Execution at record insertion, deletion, or update
  - Ordered or unordered random multiple triggers
  - Forward-chaining (cascading) triggers

Concurrency Control
- Optimistic locking scheme
- Data isolation levels: read consistency, read committed, and cursor stability
- Shared, protected, and exclusive lock types for explicit table-level locking

Availability
- Online backups
- Immediate recovery after failure

Distributed Database
- Simultaneously connected databases—limited only by hardware
- Automatic distributed transaction processing via two-phase commit procedure

Data Types
- Character (fixed/variable length): up to 32Kb per field
- Integer (short and long)
- Floating point: single and double precision
- Date | Time: Jan. 1, 100, to Dec. 11, 5491

- Multidimensional arrays: up to 16 dimensions per column
- BLOb: unlimited size
- Import and export of ASCII fixed-length data
- BLOb filters for compressing or translating BLOb field data

Standards
- ANSI SQL-92 Entry-Level conformant
- ODBC rev. 2.0 (16-bit)
- ODBC rev 2.5 (32-bit)

Native Driver Application Development Tools
- PowerPlay, PowerHouse 4GL, and Impromptu from Cognos Corp.
- JAM for InterBase from JYACC, Inc.
- Delphi and Delphi Client/Server
- Borland® Database Engine
- Visual dBASE with Borland SQL Links
- Paradox for Windows with Borland SQL Links

Database Capacity
- Maximum number of rows per table: 2 billion
- Maximum size of a table: limited only by system resources
- Maximum number of defined databases per system: limited only by system resources
- Maximum number of active users per system: limited only by system resources
- Maximum number of tables per database: 64K
- Maximum row size (excluding BLOb): 64Kb

Available Platforms
Version 4.0
- DG-UX 4.11 on:
  - AViiON 88K
  - Intel AViiON
- Digital UNIX 3.2c

- HP 9000 with HP-UX 9.05 & 10.01
- IBM 386/486/Pentium compatibles with:
  - Windows 3.1 (Client only)
  - Windows 95/NT, 3.1x & 3.5x (Client only)
  - Novell NetWare 3.x
  - SCO Open Desktop 3.0, 5.0
- IBM PowerPC with AIX 4.1.2
- IBM RS/6000 with AIX 3.2.5 & 4.1.2
- NCR 2.03
- Silicon Graphics with IRIX 5.3
- Sun SPARC with Solaris 2.4 & 2.5
- Sun SPARC with SunOS 4.1.3

Version 4.1
- IBM 386/486/Pentium compatibles with Windows 95, Windows NT 3.5x, 4.0
- IBM PowerPC with Windows NT 3.5x, 4.0

Platforms are being added to all the time. Please call or check our Web pages for updates.

SMP Certified Platforms
- HP-UX 10.01
- DG-UX AViiON 88K
- DG-UX 4.11 Intel
- NT/3.5x & 4.0
- Solaris 2.4 & 2.5
- IBM AIX 4.1.3
- SGI IRIX 5.3
- NCR 2.03

System Requirements
- Minimum RAM and disk space varies with operating system platform
- Networking hardware and software dependent on operating system platform and development tool

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For more information about InterBase,
check out Borland Online at **www.borland.com**

Borland

Making Development Easier