

ANATOMY OF A PROGRESS® DATADIRECT® DRIVER

INTRODUCTION

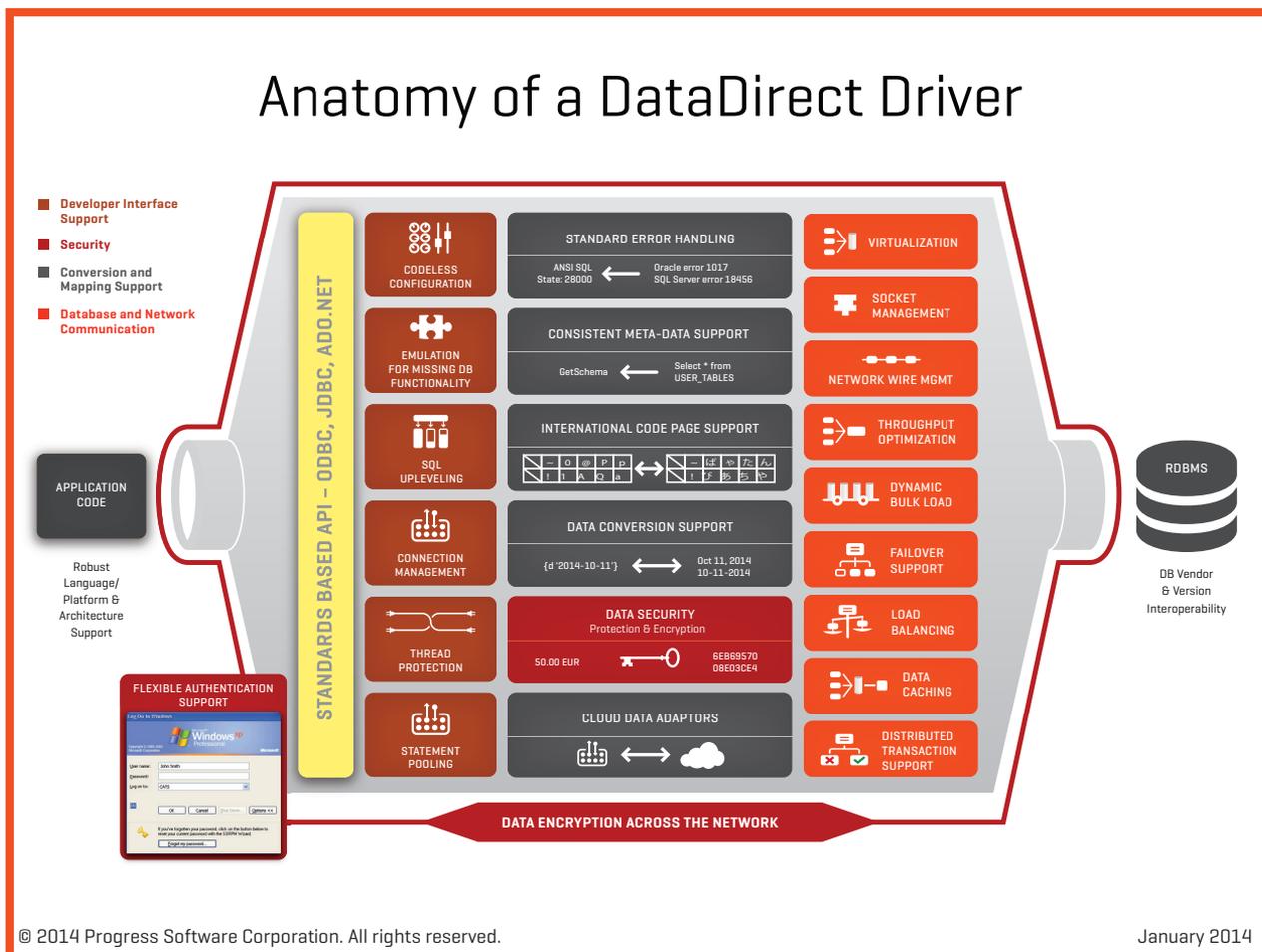
Database middleware plays a critical, often overlooked role in the success of your business applications. Progress® DataDirect® drivers and providers provide an unparalleled set of features that provide critical development, runtime and production benefits. And Progress DataDirect is more than a driver. This comprehensive suite of ODBC for all major databases serves as data connectivity infrastructure or an interface.

Specifically, Progress DataDirect drivers and providers offer functionality that significantly reduces the development, testing and deployment effort required to build mission-critical applications. Many DataDirect capabilities can be leveraged without making any code changes, and DataDirect provides a number of interoperability features that allows you to easily manage multi-database environments. These DataDirect capabilities dramatically shorten the time it takes to deliver robust, reliable and great performing applications.

Here's a closer look at the driver components and their benefits.

DRIVERS: A CLOSER LOOK

The diagram below shows the anatomy of a Progress DataDirect Driver.



As the diagram below shows, the features comprise several basic functions:

- ▶ robust language
- ▶ platform and architecture support
- ▶ developer interface support
- ▶ conversion mapping support
- ▶ database and network communication
- ▶ security

DEVELOPER INTERFACE SUPPORT	CONVERSION & MAPPING SUPPORT	DATABASE & NETWORK COMMUNICATION	SECURITY
Robust Language, Platform & Architecture Support Standards based API - ODBC, JDBC, ADO.NET Codeless Configuration Emulation for Missing DB Functionality SQL Up-Leveling Connection Management Thread Protection Statement Pooling	Standard error handling Consistent Meta-data Support International Code Page Support Data Conversion Support Encryption / Decryption	Socket Management Network Wire Management Bulk, Batch, & Throughput Optimization Failover Support Load Balancing Distributed Transaction Support DB Vendor & Version Interoperability	Flexible Authentication Support Data Encryption Across the Network

TYPES OF COMPONENTS

DEVELOPER INTERFACE SUPPORT

Robust Language, Platform & Architecture Support

Progress DataDirect Connect drivers provide unparalleled language, database [DB], platform and architecture support from single, trusted vendor to fulfill all of your DB connectivity needs:

- ▶ Robust language support
 - > Java, C#, C++, VB, etc
 - > PHP, Perl, Python, AJAX, etc.
- ▶ Support for major DBMSs / platforms
 - > Oracle, SQL Server, DB2, Sybase, Informix, My SQL, Teradata, etc.
 - > Linux, UNIX, Windows, z/OS, iSeries 3
- ▶ Supports various frameworks—Spring, Hibernate

- ▶ Supports many application platforms
- ▶ Supports any architecture
 - > Batch, online
 - > SOA, event driven, etc.
 - > Any tier (client, Web / app server, etc.)

Standards-based API – ODBC, JDBC, ADO.NET

Progress DataDirect is the database middleware standards leader, providing consistent solutions that avoid proprietary hooks that lock you into a single DB vendor. This interoperability approach makes it easy for ISV developers to support multiple databases and for corporate developers to build applications consistently, regardless of the database. Key features and characteristics include:

- ▶ Consistent support for the standards
- ▶ DB vendors use proprietary extensions that hinder interoperability and lock you in
- ▶ DB vendors often lag support for latest specification release
- ▶ Leader in standards development
- ▶ JDBC Expert group
- ▶ Co-founder of ODBC standard
- ▶ ANSI SQL Committee

How it works: DataDirect provides robust support for application languages, architectures and platforms supported. It converts standards-based API calls to proprietary DB wire protocol. It also provides consistent support for all DB vendors (Oracle, SQL Server, DB2, Sybase, MySQL, etc.) and DB versions (Oracle 9i, 10i, etc.).

Codeless Configuration

Progress DataDirect provides the ability to easily configure capabilities such as performance, security, failover without expensive code changes that reduce your application TCO:

- ▶ DataDirect supports flexible, codeless configuration of DB and driver options
- ▶ These options allow the driver to be tailored to the needs of the application
- ▶ Configuration spans a wide range of capabilities, such as performance, security, failover, connections, and bulk load.
- ▶ Performance Wizard is provided that helps pre-configure the driver based on application characteristics

Emulation for Missing DB Functionality

Progress DataDirect drivers and providers emulate missing or inconsistent DB functionality, eliminating expensive application workarounds needed to fill the gap for missing DB features.

- ▶ DataDirect emulates missing or inconsistent DB functionality, enabling developer consistency
- ▶ Functionality is implemented in the driver level that makes the DBs appear consistent to the application developer. This functionality includes:
 - > Scrollable cursors
 - > Ability to re-read data
 - > Auto-commit

- ▶ Update for current of cursor
- ▶ Emulates metadata gaps
- ▶ DB vendors don't provide this capability in their drivers, and the breadth of DataDirect emulation is unsurpassed

How it works: The application is abstracted from anomalies in the RDBMS. The DataDirect driver "emulates" missing functionality. No change is required in the DB configuration to enable emulation.

SQL Up-leveling

Progress DataDirect provides SQL up-leveling, which standardizes proprietary DB vendor implementations, providing a single way to interact with all DBs and DB versions.

- ▶ Each database vendor implements certain functionality in proprietary format
 - > Date and time literals
 - > Outer join syntax
 - > Scalar function syntax
 - > Invoking stored procedures
 - > Dynamic SQL Statement format corrections
 - > Empty string and null conversions
 - > Long character string insertion support
 - > Returning Standard SQL messages
 - > Using parameters within SQL statements and stored procedures
- ▶ Proprietary SQL implementations impact the interoperability provided by standard-based APIs

How it works: Without SQL up-leveling the developer writes different code for different DBs and versions. With DataDirect SQL up-leveling, the developer just writes a single standard version of SQL that works for all DBs and versions.

SQL Up-leveling Example

- ▶ A SQL statement that select employees hired on October 11 or October 15, 2006 would use the following syntax `SELECT EmpName, HireDate FROM Emp WHERE HireDate = {d '2006-10-11'} OR HireDate = {d '2006-10-15'}`
- ▶ DataDirect's Oracle driver executes `SELECT EmpName, HireDate FROM Emp WHERE HireDate = 'Oct 11, 2006' OR HireDate = 'Oct 15, 2006'`
- ▶ DataDirect's SQL Server driver executes `SELECT EmpName, HireDate FROM Emp WHERE HireDate = '10-11-2006' OR HireDate = '10-15-2006'`. With SQL up-leveling, the developer writes single standard version of SQL that works for all DBs and versions

Connection Management

Progress DataDirect drivers and providers support the ability to pool and manage connections resulting in better performance and system utilization.

- ▶ DataDirect connection pooling increases performance and limits drag on system resources
 - > Connection pooling is implemented and managed by the driver without impacting the application code
- ▶ DataDirect provides connection management capabilities
 - > Configurable pool options maximize pooling effect
 - > Ability to detect invalid connections
 - > Connection info can be used to prioritize work, trouble-shoot runaway queries
- ▶ Ability to re-authenticate users enhances performance in Kerberos environments

How it works: The application code requests connection to the DB. The application is completely abstracted from pooling logic: no application code required to leverage pool. DataDirect allocates connections from the pool when available; otherwise new connections are created. DataDirect takes care of managing the pool. Connection pooling has no dependencies on the underlying RDBMS.

Thread Protection

DataDirect driver ensures calls to the DB are thread safe by leveraging the most efficient and safe threading model for the application. This flexible threading support, based on network transport and DB capabilities, helps ensure application stability.

- ▶ DataDirect provides flexible threading support based on network transport and DB capabilities
 - > SQLGetInfo information type provides thread information to the driver
 - > Multiple models include fully threaded, thread support for connection model and option to serialize all requests
 - > Threading capability ensures resource efficiency & application reliability
- ▶ **Competitive drivers are known to fail threading tests:**
 - > This results in application crashes and / or data corruption

How it works: The application can determine the threading capability of network and server via a call to the DataDirect driver. The DataDirect driver returns threading information to the application. The DataDirect driver ensures calls to the DB are thread-safe by leveraging the most efficient and safe threading model for the application.

Statement Pooling

Progress DataDirect drivers and providers support the ability to pool and manage statements, resulting in better performance and system utilization.

- ▶ DataDirect statement pooling increases performance and limits drag on system resources
- ▶ Statement pooling is implemented and managed by the driver w/o impacting the application code
- ▶ DataDirect provides statement pooling management capabilities
 - > Ability to pre-configure pool and control whether a statement is poolable
 - > Ability to configure the size of the pool
 - > Ability to monitor the state of the pool
- ▶ DataDirect seamlessly manages the security aspects relating to statement execution

How it works: Frequently used SQL statements executed by the application enjoy performance benefits without modification to application code. DataDirect allocates connections from the pool when available; otherwise new connections are created. Statement pooling has no dependencies on the underlying DBMS.

CONVERSION AND MAPPING SUPPORT

Database drivers and providers play a key role in converting and mapping data formats, errors, meta-data and international code pages DataDirect breadth of support, performance, reliability and level of standards-based interoperability for conversion and mapping support is unparalleled. Since virtually every interaction with the database relies on some conversion or mapping support, any performance or reliability issues can result in application failure or performance degradations DataDirect has a proven track record of replacing inadequate alternatives thus ensuring application success. The following features support conversion and mapping:

Standard Error Handling

Progress DataDirect drivers and providers map database-specific errors to ANSI standard messages, providing consistent error processing—which reduces development cost and minimizes application errors.

- ▶ DataDirect maps DBMS specific error to ANSI standard message
 - > Standard Error codes provide consistency that helps streamline coding effort
 - > Standard Error codes and standard error handling simplifies development effort and provides interoperability between database vendors and database versions
- ▶ DB vendors only provide DB-specific error processing
 - > No motivation to provide interoperability with other DBs

SQL Up-leveling Example

- ▶ “Invalid password” given by a user at connect time results in different error numbers and text
 - > Oracle returns Oracle error number 1017 with a message text of invalid username/password: logon denied
 - > Microsoft SQL Server returns SQLServer error number 18456 with a message text of Login failed for user
 - > Sybase returns Sybase error number 4067 with a message text of Login failed because an incorrect password was supplied
- ▶ DataDirect providers support a common ErrorCollection object, which eliminates discrepancies in processing errors:
 - > Oracle does not provide an ErrorCollection object, which means different logic has to be used to retrieve an individual error
 - > DataDirect provides a standard ErrorCollection object for all DBs

How it works: The developer has to handle only the standard set of error codes. The DataDirect driver maps the DB-specific error codes using an ANSI standard SQLState mapping. The DBMS returns vendor-specific error codes that lock developers into a specific DB.

Consistent Metadata Support

Progress DataDirect drivers and providers support a common metadata interface for disparate database implementations. This reduces development cost by providing a single view of database metadata.

- ▶ “DataDirect provides a consistent mechanism for working with metadata that minimizes development effort and ensures interoperability
- ▶ DataDirect normalizes the metadata provided by the DBMS and emulates missing information

How it works: The DataDirect driver returns metadata in a consistent fashion. It also emulates missing or inconsistent metadata from the DBMS. The DBMS then returns vendor-specific metadata that locks developers into a specific DB.

International Code Page Support

Progress DataDirect provides unsurpassed coverage for code page conversion between the database and the application—which provides the reliability you need to meet the demanding needs of international implementations. Specifically, DataDirect provides:

- ▶ Highly reliable conversion for scenarios where the application codepage differs from the DB code page
- ▶ Unsurpassed code page support
- ▶ Full UNICODE support

How it works: The application code is not affected by the code page used by the DB. DataDirect converts the code page values from the client to the server. The database can use the code page of choice without affecting application.

Data Conversion Support

Progress DataDirect provides robust conversion of proprietary database formats to all native language types. This provides a critical, baselevel operation that is required for reliable and efficient applications.

- ▶ DataDirect handles all data conversions between proprietary DBMS format and all the native language data types
- ▶ Conversion algorithms are optimized to minimize the number of conversions and data copies
- ▶ Extensive testing of various scenarios ensures optimal performance and reliability

How it works: The application interaction with driver / DB is completely abstracted from individual data formats in the DB. The DataDirect driver load handles conversion to and from standards format and DB format. No special DBMS configuration is required to enable data conversion.

Data Security

Progress DataDirect offers cloud data security solutions that make it simple to safeguard the interactions between on-premise applications and cloud-based enterprise data. With DataDirect drivers you can easily shore up your cloud data security regime for mission-critical Salesforce data. More broadly, DataDirect's comprehensive line of drivers provide the benefits of standards-based access and built-in security safeguards across a wide range of data sources. For example, with DataDirect drivers you can implement high-performance, secure connectivity to a private cloud Oracle deployment; or use JDBC to enable bulk loading of data from a cloud computing Hadoop system to any major type of relational database. DataDirect drivers provide robust built-in features to boost your cloud data security architecture, including:

- ▶ Network data encryption – Progress DataDirect provides standardsbased encryption support for protecting data in flight. This capability is managed entirely by the driver, which eliminates impact to your application.
- ▶ OS authentication – With their built-in support for OS authentication via the Kerberos and NTLM protocols, you use drivers to enable Salesforce cloud services connectivity within a Single Sign-On (SSO) environment. By extending the known security advantages of SSO to applications that interface with cloud data, you fortify your overall cloud data security architecture.
- ▶ Rock-solid design – DataDirect subjects its drivers to the most rigorous testing in the industry, ensuring that they deliver the best possible ADO.NET, ODBC, and JDBC security. Independent validation by the Internet Security Advisors Group (ISAG) further ensures that DataDirect connectivity middleware is free of known security vulnerabilities.

How it works: The application code is not affected by encryption/decryption efforts. DataDirect drivers handle encryption/decryption using standards and support the encryption capability provided by the RDBMS. No special DBMS configuration is required to enable data conversion. DataDirect Connect XE drivers enhance cloud data security with integrated support for SSL/TLS data encryption. By automatically encrypting data as it transits between your on-premise applications and cloud providers' data centers, you can guard against the most common forms of data theft.

Cloud Data Adaptors

Progress DataDirect makes cloud connectivity simpler and more efficient by extending our industry-leading suite of ODBC and JDBC drivers to include connectivity to major cloud data sources. Our drivers deliver seamless ODBC or JDBC access to Salesforce cloud services as well as Force.com and Database.com. By using DataDirect middleware, you can write your applications to interface with open industry standards rather than proprietary database cloud APIs. In this way your applications can interoperate across multiple cloud data providers as well as on-premise database systems. By using DataDirect's proven, standards-based connectivity solutions, you also save on development and testing time compared to developing against proprietary interfaces.

With cloud data access solutions from Progress DataDirect, you get more than the broad benefits of industry standard ODBC and JDBC connectivity. You also get all the advantages that make DataDirect the clear leader in the data connectivity market, including:

- ▶ Performance – Industry-best SQL performance for reads and writes, enabling smaller latencies and bigger throughput between your enterprise applications and cloud data sources
- ▶ Security – Built-in security safeguards like SSL data encryption, to help ensure cloud data security
- ▶ Reliability – Proven in thousands of demanding production environments worldwide and backed by 24x7 technical support

With unmatched performance, scalability, and reliability, Progress DataDirect drivers offer substantial benefits not only to cloud service users seeking a better way to access cloud data, but also to cloud service providers looking to improve performance and agility within their data centers.

DATABASE AND NETWORK COMMUNICATION

DataDirect pioneered database driver communication by introducing ODBC access that does not rely on the native database client: our wire protocol architecture. This architecture forms the Foundation for the performance and scalability advantages that DataDirect provides over less optimal alternatives. Our Type 4 JDBC drivers and 100% managed ADO.NET providers also leverage this wire protocol design. In addition to this unique architecture, our drivers include a range of features that support high performance applications including failover support, load balancing and distributed transaction support.

Virtualization

When it comes to virtualized environments, Progress DataDirect dramatically outperforms competitive drivers in network usage, CPU efficiency, and memory footprint. Specifically:

- ▶ Network Usage – In socket-based operations, how many times applications hit the sockets is minimized

How it works: Hitting the socket too often increases network activity, so Progress DataDirect buffers up replies and sends them over as necessary.

- ▶ Memory Usage – When freeing up memory, Progress DataDirect does not keep variables any longer than necessary

How it works: Components go through application code and free up resources when no longer needed instead of de-allocating memory at a later point before the application is done.

- ▶ CPU Usage – Applications need to accomplish the most work possible

How it works: Progress DataDirect components are tuned to ensure that applications get the most rows per CPU per second or, in other words, accomplish the most work possible for each allotted CPU time slice.

Socket Management

Progress DataDirect efficiently manages the physical TCP/IP socket interaction, providing robust wire contention resolution that ensures great performance. Specifically, DataDirect drivers:

- ▶ Manage the physical socket interaction by using TCP/IP calls
- ▶ Provide wire contention resolution by efficiently managing requests over the network—synchronization methods are designed to minimize the amount of code locking so that concurrency is not inhibited at the cost of thread safety
- ▶ Support both cursor and stream-based protocols—for stream-based DBs and efficiently interleaves update statements that are paired with fetched results
- ▶ Incorporate extensive multi-threading tests into its standard test suite, which ensures thread safety as well as optimal performance

How it works: The socket management effort is abstracted from the application. The DataDirect driver provides control interaction to the network via the socket. The standard wire protocol is then leveraged by the DataDirect driver for interaction with the DB.

Network Wire Management

Progress DataDirect management of packet-based network communication provides unsurpassed packet transport, network round trips and data buffering optimization. Specifically:

- ▶ DataDirect optimizes how data is sent across the network to the database (and how it is received) based on TCP/IP, database protocol and network variables
- ▶ DataDirect buffers the database query results received from the network into the application buffer
- ▶ DataDirect mitigates network round trips by combining multiple steps in a single round trip where possible
- ▶ DataDirect provides flexible configuration options to optimize network wire communication based on the application needs (This can be preset using the Performance Wizards)
- ▶ DataDirect performs extensive testing to ensure optimal performance and reliability

How it works: The application is completely shielded from the network communication that is managed by the driver. DataDirect provides optimal network management. The standard wire protocol is leveraged by the DataDirect driver for interaction with the DB.

Bulk, Batch, and Throughput Optimization

The Progress DataDirect ability to batch queries results in optimal performance and maximum throughput. DataDirect provides a database independent bulk load capability that allows you to efficiently work with large amounts of data. DataDirect provides:

- ▶ The ability to batch queries to achieve maximum throughput
- ▶ Multiple batch mechanisms based on the capabilities of the DBMS
- ▶ DataDirect bulk load, an independent, standards-based implementation to efficiently move large amounts of data into and out of relational databases

How it works: The application executes the batch update. DataDirect controls the batch update capabilities based on the application configuration. The DBMS then returns information via the driver, based on the update status.

Dynamic Bulk Load

Progress DataDirect bulk load consists of two distinct, yet related types of bulk operations:

- ▶ Importing bulk data into a database
- ▶ Exporting bulk data from a database

Depending on API [ODBC, JDBC, or ADO.NET], each type of bulk load operation can use multiple sources of input, can be invoked in a variety of ways with the driver, and supports different output destinations. Moreover, Progress DataDirect bulk load provides an array of advanced functionality that ensures superior performance:

- ▶ Performance – Boost the performance of existing parameter array insert operations

How it works: The connection option, EnableBulkLoad, allows the driver to use database bulk load protocols for these operations without requiring application code changes.

- ▶ Flexibility – Perform a variety of bulk operations without having to use or deploy bulk load tools from the database vendor. Stream data from one database to another easily.

How it works: Progress DataDirect drivers don't require client libraries or bulk load tools from the database vendor. Data streaming between databases is done without an intermediary CSV file by using the EnableBulkLoad connection option in conjunction with a parameter array or batch insert operation. Our drivers fetch the desired data from the source database as a result set data into an array, and then binds the elements of the array as input parameters for a parameter array insert, which is executed using database bulk load protocols.

- ▶ Archive/Backup – Archive any log files into a relational database, and backup critical database information to an alternate or failover database

How it works: Using the Progress DataDirect API, you can write an application that runs as needed or as a batch process to store log files in a database, even as a CLOB or BLOB. You can also write an application that runs as a batch process to replicate data in one database into another without the need for expensive, difficult to manage data replication technology.

- ▶ Ease of Use – Consume or shred data within a CSV file as input to a relational database, dump table information from a relational database into a database-independent CSV file format, and perform a bulk load of data in a CSV file into a database without writing an application

How it works: With Progress DataDirect drivers, you can define the metadata of the CSV file format just once and repeat the consumption / shredding process over and over. Once created, Progress DataDirect uses this CSV file as input for any bulk load, regardless of API [ODBC, JDBC, or ADO.NET], platform [Windows, UNIX, Linux], or database [Oracle, DB2, or Sybase]. Using the driver setup dialogs available in the Data Source Administrator on Windows and Linux, you can bypass the need to write a script or program to perform the bulk load.

Failover Support

Progress DataDirect drivers and providers manage the ability for an application to failover to alternate database servers, which reduces development and infrastructure cost.

- ▶ DataDirect provides the ability to failover connection attempts
- ▶ Application failover provides additional options that include extended failover and select failover support
- ▶ The DataDirect failover capability is managed by the driver with no impact to the application or DB
- ▶ Costly DB failover technology [e.g., Oracle RAC, MSFT Cluster Server is not required]
- ▶ DataDirect failover is implemented in a standard way with consistent messages

How it works: The application interaction with driver / DB is completely abstracted from load balancing capability. The DataDirect driver manages failover. No special DBMS configuration or environment (e.g., Oracle RAC) is needed to enable client failover.

Load Balancing

Progress DataDirect provides client-side load balancing of application requests to multiple database servers. This reduces development effort and enables efficient usage of system resources.

- ▶ DataDirect provides client-side load balancing that distributes workload so that no one server is overwhelmed with connection requests
- ▶ Oracle tnsnames.ora and Oracle RAC are both supported

How it works: The application interaction with driver / DB is completely abstracted from load balancing capability. The DataDirect driver load balances connection requests based on random algorithm. No special DBMS configuration is required.

Data Caching

Progress DataDirect has built-in incremental real time caching (a feature of our Salesforce ODBC and JDBC drivers.)

- ▶ Performance – Boosts the performance of Salesforce connectivity with real time data caching

How it works: The driver caches data on a per-table basis, as opposed to caching the result of a particular query. This allows the caches to be queried, filtered, and sorted in other queries. Once a cache is created, its use is transparent to the applications. It is refreshed at any desired interval and only the changes are fetched on subsequent queries that are made after the refresh time interval is exceeded.

Distributed Transaction Support

Progress DataDirect provides highly reliable, standards-based distributed transaction support that ensures data integrity and reliability with minimal development effort.

- ▶ XA Protocol transaction managers such as Microsoft Transaction Server (MTS) and Java Transaction API (JTA) are supported

How it works: The application submits an update request. The DataDirect driver works in conjunction with transaction manager to commit / rollback transactions. DBMS returns the status of individual updates.

Database Vendor and Version Interoperability

Progress DataDirect provides a single installation package that does not require database vendor client libraries. This eliminates the cost and problems associated with native client deployment and versioning issues. In particular:

- ▶ A single installation package supports all versions, decreasing development, testing and deployment complexity
- ▶ Side-by-side installation support allows multiple versions of DataDirect to run on the same machine, eliminating impact on other applications when changes are required
- ▶ Single installation plus non-dependency on native DB clients eliminates client versioning issues

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SECURITY

Progress DataDirect drivers and providers provide authentication and encryption functionality that makes it easy to secure your sensitive business applications. DataDirect provides database connectivity that can help make your single sign-on (SSO) initiative successful. DataDirect also allows you to protect data in-flight between the application and the database without making costly application code changes.

Key features include:

Database Vendor and Version Interoperability

Progress DataDirect provides Kerberos-based support for user authentication. This can be used as the basis for a robust and trusted single signon (SSO) implementation.

- ▶ DataDirect supports multiple authentication mechanisms
 - > Kerberos authentication
 - > UserID/password
 - > Client authentication
- ▶ Kerberos provides standards-based, OS independent mechanism for single sign-on
 - > Active Directory and MIT Kerberos KDC
 - > Secure authentication
 - > Simplifies user administration
 - > Satisfies auditing requirements
- ▶ DataDirect differentiators include
 - > Delegation of Credentials enhances application security by allowing credentials to be passed through the application stack
 - > Re-authentication provides efficient pooled connection reusage by reassigning the active user

Data Encryption across the Network

Standards-based protection of in flight data managed by the driver handles all encryption support—eliminating impact on the application.

- ▶ Progress DataDirect provides standards-based mechanism for encrypting data in flight—all encryption management is handled by the driver without requiring changes to application code
- ▶ Data encryption protects against router vulnerabilities, packet sniffing and SQL injection attacks
- ▶ Data encryption is key in scenarios where information is transmitted over the internet, data is highly sensitive or encryption is necessary to support government or industry compliance

How it works: The application code is not affected by use of encryption. DataDirect negotiates the client side work involved with the SSL handshake sequence of events. DataDirect supports the encryption capability provided by the RDBMS.

DB Vendor and Version Interoperability

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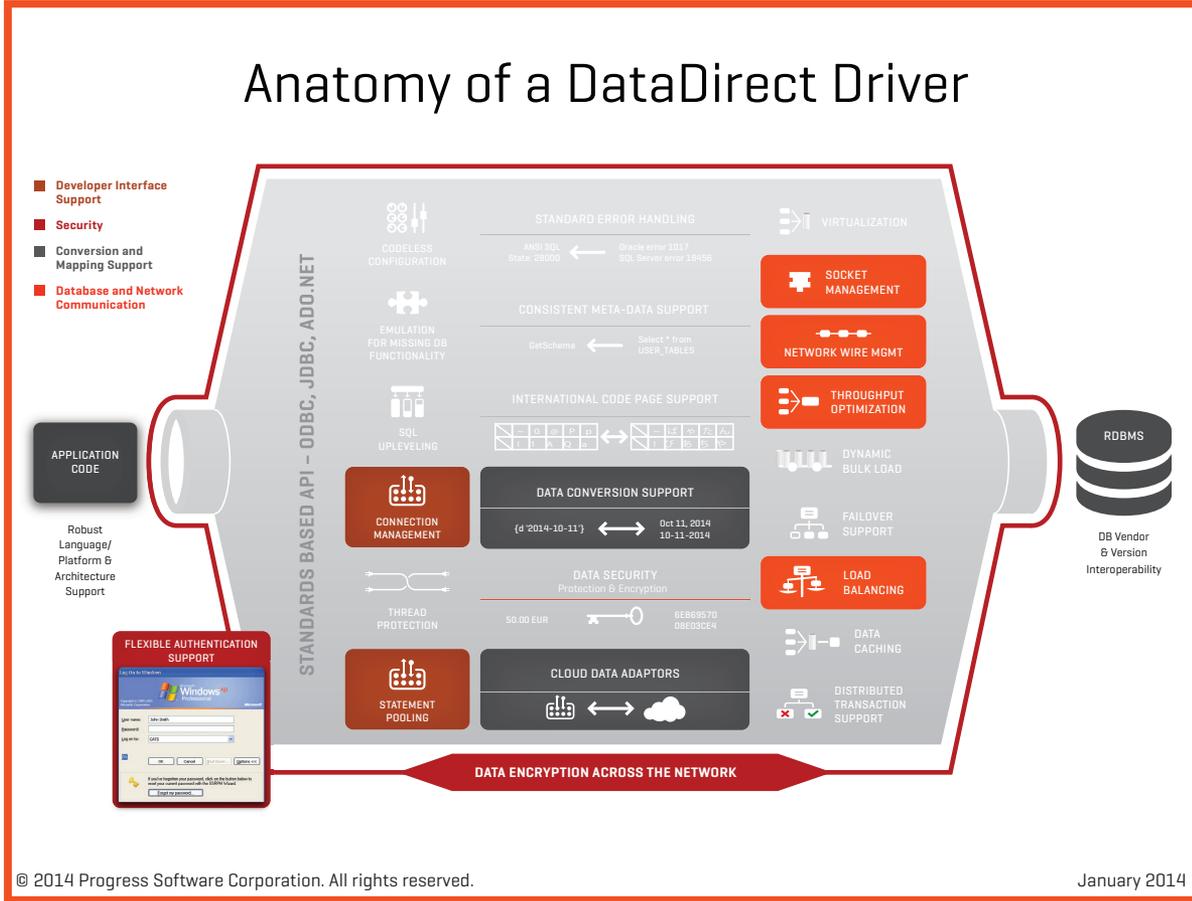
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CONCLUSION

In conclusion, here is an overview of the four main benefits—performance, reliability, developer productivity, and robust applications—of DataDirect Connect drivers and the Direct Connect for ODBC suite of drivers, which serve as connectivity infrastructure or interfaces.

PERFORMANCE

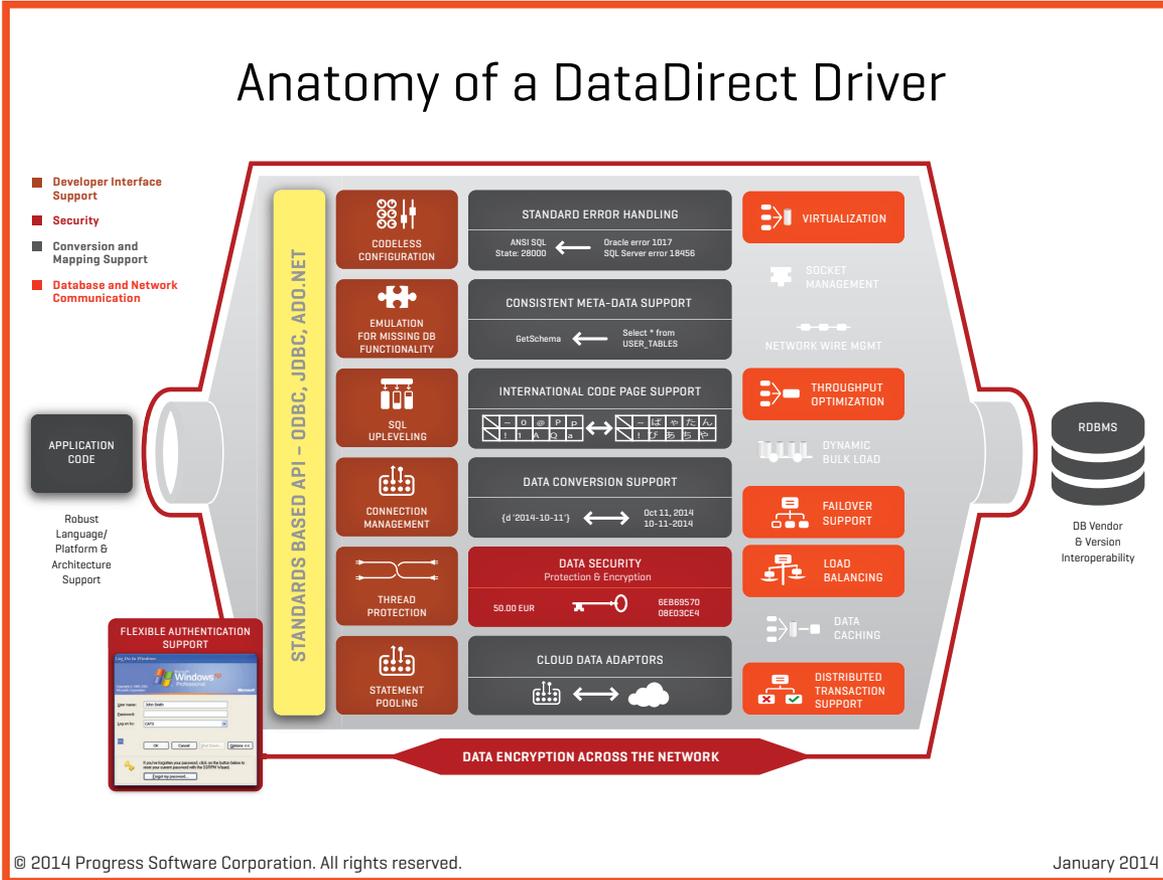
Progress DataDirect drivers and providers provide the industry's best performance and scalability. DataDirect achieves this via a unique wire protocol architecture that delivers great application performance and scalability while minimizing the impact on costly CPU, memory and network resources.



RELIABILITY

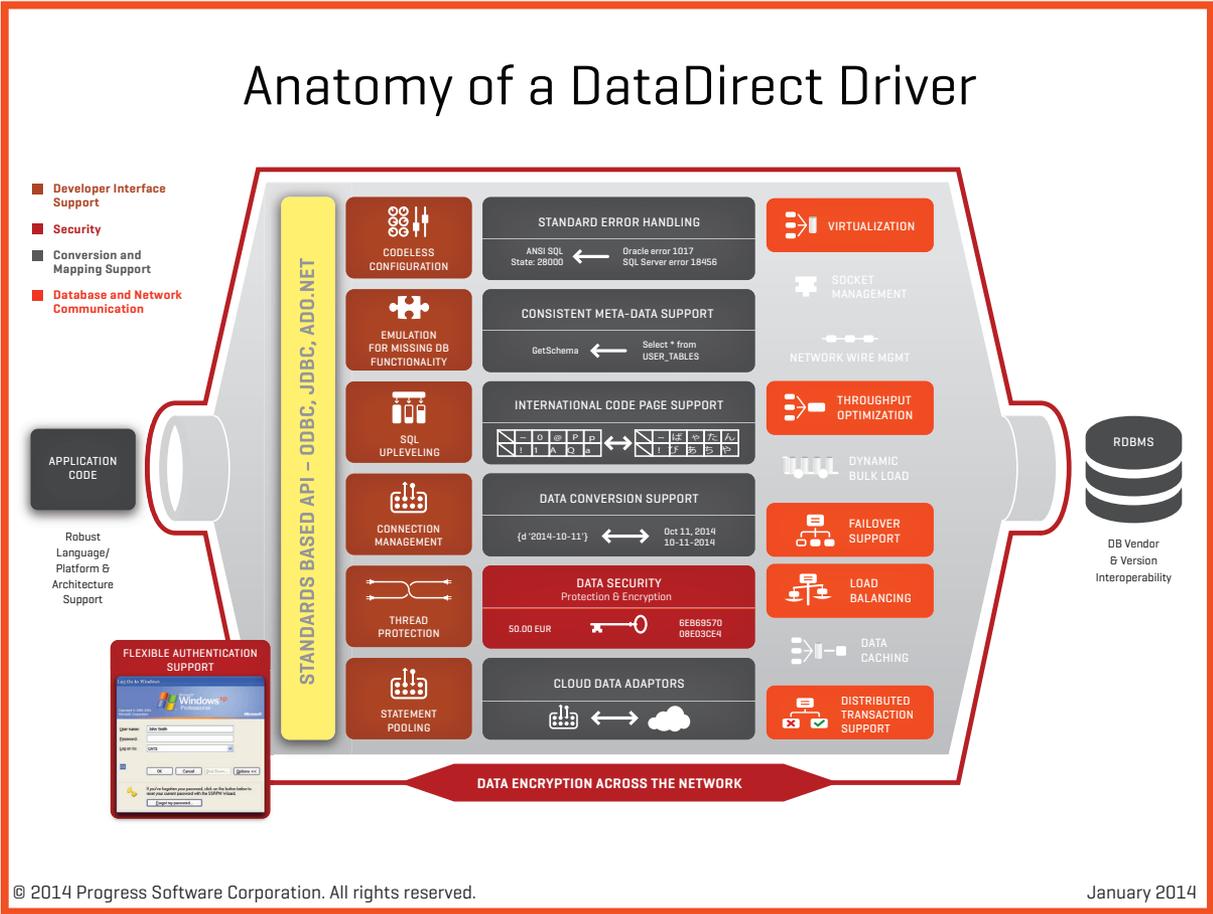
Application reliability is crucial to the success of your business. Progress DataDirect provides unparalleled database driver and provider reliability based on its technical architecture and extensive, automated testing suite. DataDirect eliminates the issues that many customers have encountered using drivers and providers from other vendors.

Anatomy of a DataDirect Driver



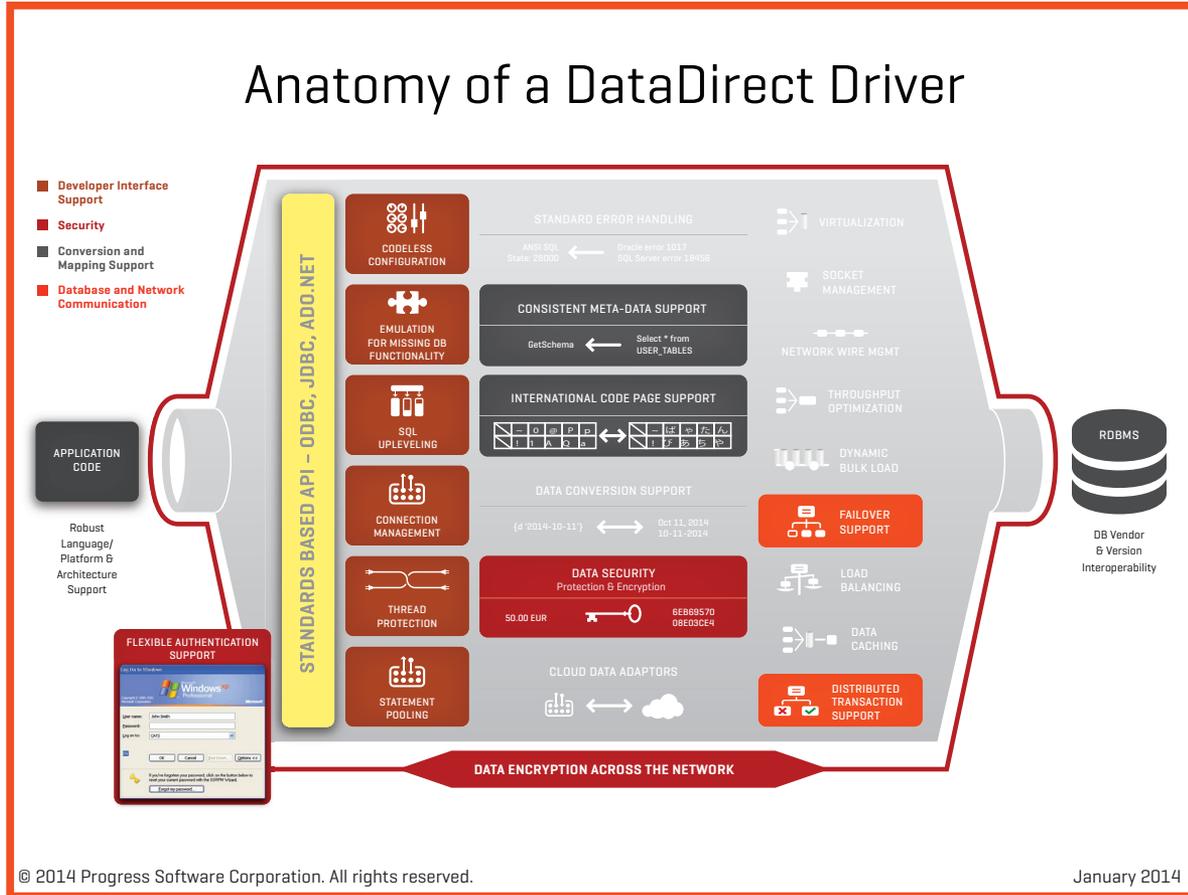
DEVELOPER PRODUCTIVITY

Developer productivity is critical to reducing your IT costs and to deliver your applications on-time within budget. Progress DataDirect provides many features that make it easy to build data-driven applications, and DataDirect provides unmatched interoperability and standards-based support that translates directly to developer ease of use.



ROBUST APPLICATIONS

IT organizations are called upon to build and deploy robust applications; user expectations have increased significantly with the advent of community-based applications like Facebook. It is imperative that developers have the proper tools that allow them to build robust applications with minimal effort. Progress DataDirect drivers and providers provide critical infrastructure support that eliminates tedious application code and makes it easy to build robust applications.



ABOUT PROGRESS DATADIRECT

Progress® DataDirect® is the only comprehensive provider of software for connecting the world’s most critical business applications to data and services, running on any platform, using proven and emerging standards. Developers worldwide depend on DataDirect products to connect their applications to an unparalleled range of data sources using standards-based interfaces such as ODBC, JDBC and ADO.NET, XQuery and SOAP. More than 300 leading independent software vendors and thousands of enterprises rely on Progress DataDirect to simplify and streamline data connectivity for distributed systems and to reduce the complexity of mainframe integration.

PROGRESS SOFTWARE

Progress Software Corporation (NASDAQ: PRGS) is a global software company that simplifies the development, deployment and management of business applications on-premise or in the cloud, on any platform or device, to any data source, with enhanced performance, minimal IT complexity and low total cost of ownership.

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