

## TECHNOLOGY AUDIT

# DL/2

Circle Computer Group Ltd.

## BUTLER GROUP VIEW

### ABSTRACT

Circle Computer Group's DL/2 is an effective and comprehensive toolset which allows organisations to successfully and easily migrate from IMS/DB to DB2 for z/OS. Many enterprises have large investments in IMS systems that support essential business processes and which are too costly and risky to change or redevelop, even if the skills and the knowledge were readily available to allow this. Circle's solution overcomes these challenges, as the IMS applications remain unchanged and a phased approach of one IMS database at a time can be instigated. The solution enables the opening up of data access and provides cost and resource savings that come from only having to support one mainframe database environment. When using DL/2 on-line response times are generally comparable and for batch processing elapsed times can often be reduced, although due to the different way that DB2 operates, there will be an additional processing overhead, which in many instances equates to less than 10%. Butler Group believes that anyone with a significant investment in IMS would benefit from using DL/2 and the subsequent migration of data to DB2.

### KEY FINDINGS



Low-risk migration approach.



Investment in IMS applications protected.






Significant cost savings possible.



Re-engineering of the database is possible during migration.



Applicable for z/OS, IMS, and DB2 environments only.

Key:  Product Strength  Product Weakness  Point of Information

### LOOK AHEAD

The main on-going development effort is to continue to extend the automation of the database migration process.

## FUNCTIONALITY

### *Product Analysis*

Many enterprises have large investments in IMS systems that support essential business processes and which are too costly and risky to change or redevelop, even if the skills and the knowledge were readily available to allow this. A mechanism to enable query and analysis of the IMS data is to replicate the information in DB2 but this can be time consuming and unwieldy. The need for real-time information also makes this approach less attractive. Alternatively, the applications could be re-written to use DB2 but this is a proposition which needs significant investment and could take years to accomplish. Another option is to migrate from IMS to DB2 in a number of manageable stages but this approach also has its drawbacks, including having applications under constant redevelopment and the need to access both IMS and DB2 simultaneously. DL/2 provides a once and for all migration from IMS/DB to DB2 without any changes needed to application code and at a pace of the organisation's choosing.

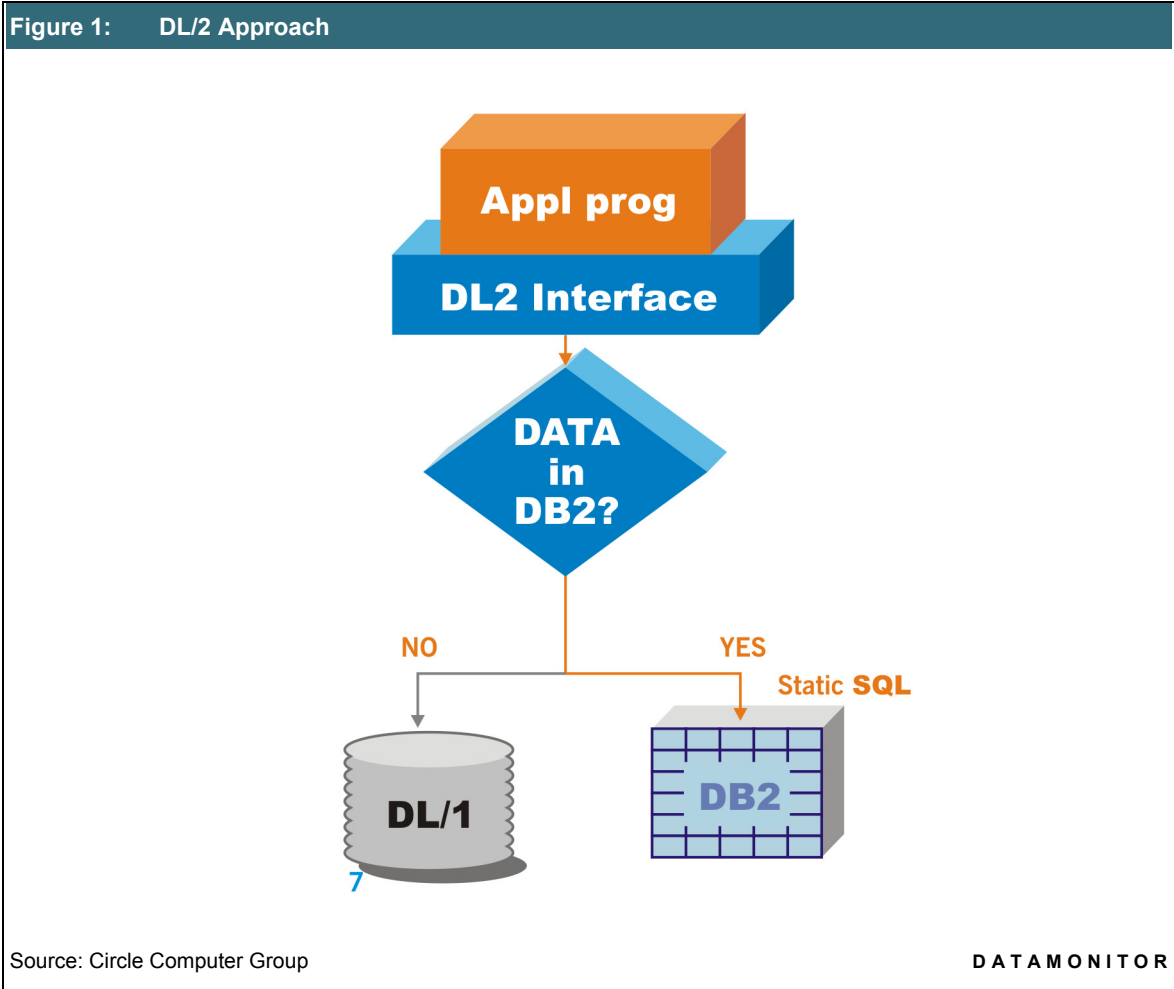
There are also a number of other reasons which make the moving of data from IMS to DB2 more pressing. These include:

- IMS DBA skills are expensive and in short supply.
- IMS is designed for transaction processing and not open to management reporting, and analytics.
- Data held in IMS does not easily integrate with information from other systems.
- IMS licences and DBA tools are expensive.

### *Product Operation*

In most IT environments IMS/DB is a silo of technology that is costly to run and support, as well as the data being not easily accessible to non-IMS applications and the rest of the organisation. Converting IMS-based application software to DB2 is often rejected because of the expense and risks of data migration are too great. Circle's solution overcomes these challenges, as with DL/2, the existing programs remain unchanged. Mapping and migration tools ease the migration to DB2, allowing a phased approach of one IMS database at a time. Applications continue to issue IMS/DB requests as before but where the data has been migrated to DB2, DL/2 retrieves it (or updates it) and delivers it back to the application as if it came from IMS/DB. The increased overhead of this transparency layer is typically less than 10% in CPU time with no appreciable increase in elapsed transaction time. Once all data is migrated to DB2 the IMS/DB licence may be cancelled, along with licences for any related tools. Applications can continue to run through DL/2's transparency layer, or may be modified over time to run natively against DB2.

There are three main components to DL/2. The mapping component is an ISPF application to enable the IMS database structures to be mapped to their equivalent DB2 tables. The data migration component is a series of batch utilities to enable the validation and migration of the IMS data to DB2. The run-time component intercepts IMS calls issued by application programs. DL/2 is an extension of the application program, and pre-generated run-time modules are loaded when required. There are no DL/2 started tasks, or sub-systems.



Migration of IMS/DB applications is achieved without any changes to application code. Converting applications to use DL/2 involves running the supplied DL/2 utilities against the existing application programs and replacing the IMS or CICS stub with a DL/2 module, which intercepts the DL/1 calls at run-time. If a call includes a database known by DL/2 to have been migrated to DB2 then the call is passed to the appropriate DL/2 SQL driver module. The static SQL in the driver processes the appropriate DB2 row and the DL/2 code converts the DB2 data back into IMS format (or from IMS format to DB2 format), returning the data and DB PCB area back to the calling program. The DB PCB and IMS status codes are populated by DL/2 as appropriate for the results of the call. User definable status codes can be defined where no equivalent status code is available. DL/2 follows IMS' hierarchical navigation rules and controls communication between applications and the database.

When using DL/2 on-line response times are generally comparable and for batch processing elapsed times can often be reduced, although this is dependent on design factors, such as access patterns and the number of levels in the database. There will be an additional processing overhead which in most instances equates to less than 10%. The CPU overhead for batch programs exceeds 10% in most cases. The impact is very much reliant on the number of IMS calls in the application program and the amount of data re-engineering that is required.

From a scalability perspective, as DL/2 runs in the application program address space (or CICS TCB or IMS MPR), there is no single, common component that could be a potential bottleneck. A banking sector customer uses DL/2 to process 20 million CICS transactions per day. In the event of a problem the data migration component includes utility programs to enable an application or database(s) to fall back to IMS with minimal service outage and no loss of data integrity.

### **Product Emphasis**

DL/2 is a data migration and application transparency solution that allows the moving of data from IMS/DB to DB2 on z/OS without software changes. The solution enables the opening up of data access and 24x7 availability, along with providing cost and resource savings, which come from only having to support one mainframe database environment.

## **DEPLOYMENT**

Circle can provide as much assistance as required during installation. Customers can opt for a full turnkey solution agreed with and implemented by Circle, avail themselves of just training from Circle to enable their own migration, or anywhere in between. On site training is provided unless a turnkey solution is purchased. The implementation of the solution typically takes between one and three months to achieve full migration, excluding testing. The additional human resources required to manage the new migrated DB2 databases are normally provided by existing DBA staff. Extra CPU and DASD resources are required due to the fundamental difference between the way IMS and DB2 operate.

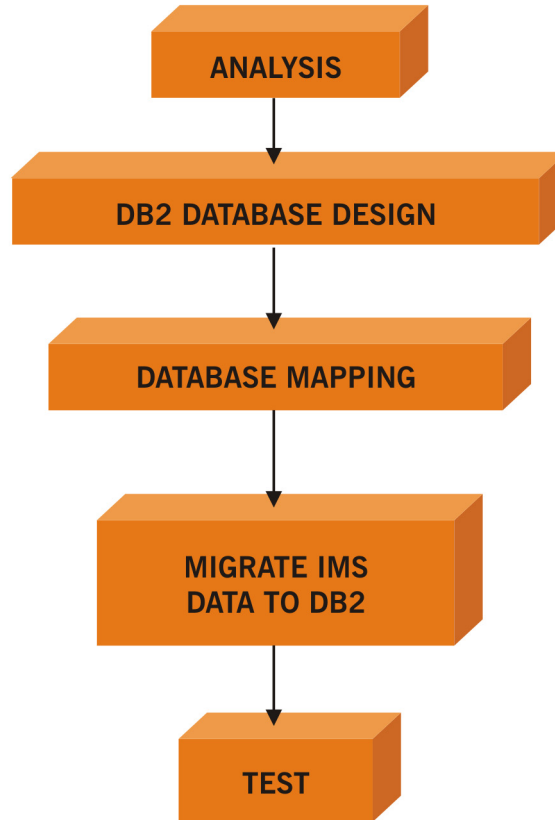
On-going support is available either by phone and e-mail. Three DL/2 manuals are provided with the solution:

1. The DL/2 Installation Guide – providing full information on how to install DL/2.
2. The DL/2 Mapper Installation Guide – explaining how to install this separate DL/2 component.
3. The DL/2 Users Guide – explaining how to use DL/2, including a step-by-step approach to database migration.

The solution runs on the Z/OS platform, and the following products are required to operate DL/2:

- DB2; all versions up to and including version 9 are supported by DL/2 (both CM and NFM mode for V8).
- IMS DB, Version 1.3 or above; although when all IMS databases have been migrated to DB2, there is the option of cancelling the IMS licence.
- CICS Version 2.1.2 or above, if database used with CICS.
- COBOL II run-time library, or equivalent.
- ISPF Version 2.3, or above.

DL/2 is supplied either on a cartridge or electronically and can be installed with a few straightforward operations. The solution is made up of an ISPF-based dialogue for mapping IMS segments to DB2 tables, a DataBase and OS (DBOS)-based migration and test utility, and a run-time component that intercepts DL/1 calls and directs them to DB2 or IMS as appropriate.

**Figure 2: Typical DL/2 Database Migration**

Source: Circle Computer Group

DATAMONITOR

A typical deployment consists of the following phases:

#### *Analysis*

Circle initially provides an analysis service, during which a consultant will analyse the existing IMS DBDs and PSBs to determine the scope, scale, and complexity of the migration to DB2.

#### *DB2 Database Design*

The normal DB2 database design process that has to be done for any method of migration needs to be completed. Any re-engineering of the database design, to remove any anomalies or exploit the potential of DB2 is done at this time. Functionality within DL/2 is provided to assist with database design.

### *Database Mapping*

Mapping establishes the relationship between a DL/1 segment and DB2 table, and within that the link between the fields and columns. Usually one DL/1 segment will relate to one DB2 table, although this does not need to be the case as DL/2 allows one segment to relate to multiple tables. This is achieved through user exit points. A copybook field will usually map to a DB2 column (or multiple columns in the case of a group field). DL/2 is able to translate between IMS and DB/2 data types. For example, a data field held as numeric in IMS can be converted to and from a DB2 date column. In addition to the field-level transformation capabilities that are built into the product, user exits can be written to manipulate data at a field level and perform specific tasks on a data update command. Many sample exits are available, and Circle can develop customer-specific exits if required. Once mapping is complete the DL/2 DBD driver and DL/2 SQL drivers are generated, along with the use of an ISPF dialog to register the migrated DBDs to DL/2.

### *Data Migration*

The DBOS file utility is fully integrated with DL/2 and is principally used as a mechanism to migrate data from IMS to DB2. Records are unloaded from IMS and DBOS then calls DL/2 to reformat the data as required in the DB2 segment. The output records are written to a sequential data set for processing by the DB2 load utility.

### *Testing*

Applications are re-linked to replace the DL/1 interface module with the DL/2 equivalent. The solution provides a utility to assist with this. Initial testing can be conducted using DBOS which enables the comparison of IMS and DB2 data following initial migration. For application program testing, the DL/2 compare tool processes data in both IMS and DB2 and automatically compares the results. This facility reduces the application testing effort significantly. In addition, the solution contains a trace facility which provides information ranging from high-level summary data to detailed diagnostics of DL/2 processing. This can help during testing and initial implementation to resolve mapping inconsistencies and show that DL/2 is working correctly.

## PRODUCT STRATEGY

The target market for DL/2 encompasses all types of verticals and by its very nature is applicable only to IMS/DB users in IBM mainframe environment. These potential customers tend to be larger organisations with an annual turnover in excess of US\$100 million. Despite the much heralded demise of the mainframe there remains a large number of mainframe users around the globe and Circle estimates that there is a sizeable market of up to 4,000 enterprises still using IMS/DB, which could benefit from its solution. DL/2 has never been more relevant for these organisations as they struggle with compliance, resource, and increasing cost issues. The company continues to focus solely on offering tools to assist organisations to easily migrate from legacy data environments to DB2.

In the UK and US the route to market is through direct sales, whereas in Europe and Asia selected mainframe partners are used as the channel to market. IBM is a key partner for Circle with mainframe collaboration going back many years. In the past Circle has developed CICS and DB2 education collateral which is still used by IBM clients around the world. Latterly, with Circle's development of migration solutions, the company has partnered with IBM's Hursley Laboratory on the creation of IBM's CICS VSAM Transparency for z/OS product, which utilises a lot of Circle's VS/2 technology and resulted in IBM entering into an OEM Agreement to utilise it worldwide.

The project value for a typical installation is in the region of US\$400,000, made up of US\$250,000 in a perpetual licence fee and US\$150,000 for services. The core product is licensed by CPU size, and there are no optional modules. Other license bundles are available on request. Where the IMS/DB is eliminated then the typical Return On Investment (ROI) is between 12 and 18 months. Maintenance charges are usually 15% of the license fee per annum. New releases of the solution average once every three years. Virtually every feature of IMS full function DB is transparently emulated by DL/2. Although, less commonly-used features, such as the Q-command code, and fastpath databases are not supported. The main on-going development effort is to extend automation of the database migration process.

## COMPANY PROFILE

Circle Computer Group is privately funded with offices in the UK and US, providing migration solutions that enable IBM mainframe applications running on legacy infrastructures to utilise DB2 and other strategic platforms. Circle's transparent solutions enable the migration of data from IMS/DB (DL/2) and VSAM (VS/2) to DB2 without the need to change established applications.

The business was founded in 1977 and has a long history in mainframe consulting, education, and software. The company has 12 employees, 10 based in the UK and two in the US. There are between 15 and 20 customers currently using its solutions, and a total customer base numbering between 50 and 60. Key clients include Aviva (Norwich Union), Banco Santander (Abbey National), HM Land Registry, Florida Power and Light, Semler (Denmark), State of Washington (Department of Corrections), State of Tennessee (Motor Vehicles Registration), and Levi Strauss.

## SUMMARY

DL/2 provides an effective and comprehensive toolset to allow organisations to migrate from IMS to DB2 without having to change any application code. Importantly, this can be done at a pace to suit the organisation. The risk involved with the migration is significantly reduced as unchanged IMS applications can continue to run with the DL/1 calls transparently converted into DB2 SQL by DL/2. Once the migration is complete then applications can be changed and new DB2 applications developed to access the data in a timescale to suit the IT department. Butler Group recommends that any organisation with a significant investment in IMS should be looking to install DL/2 to enable the continued exploitation of the intellectual capital invested in the technology and to ease the migration to a more flexible and accessible DB2 environment.

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