

**R&R Report Writer/ReportWorks training topics – days I and II**

# ***R&R Report Writer/ReportWorks***

## ***Day I Training Topics***

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## Introduction

R&R Report Writer is a well-established, stable and powerful tool for creating reports from xBase and other databases. As well as producing printed reports R&R can extract sub-sets of data and can export to other data formats.

### Database basics

A database is a collection of information in a structured form. A report is the answer to a question we ask of a database. A query is the question itself. Before we can report on our database we need to understand its structure. In this section we cover database types, how databases divide into tables and indexes and what kind of individual data elements we will encounter. The ability to understand our database structure, often referred to as the schema, is the first challenge we face in report writing. Here we break it down and demystify it.

- Types of database:
  - xBase: dBase, FoxPro, Clipper
  - SQL database managers: e.g. SQL Server, Oracle.
    - SQL – Structured Query Language basics.
- Tables
  - xBase tables as disk files (e.g. names.dbf) with associated index files (e.g. names.cdx)
  - SQL database manager tables and indexes as entities, defined and stored internally.
- Rows and columns
  - Records as rows and fields as columns as in a spreadsheet.
  - SQL views as predefined virtual tables.
  - SQL stored procedures as built-in programs.
- Indexes
  - Indexes for sorting and fast record retrieval.
    - xBase index tags, expressions and formats.
    - SQL indexed columns.
  - Index scope, reading a range of records rapidly.
- Relationships
  - Retrieving records from more than one table through linking.
- Memo fields
  - xBase memo files.
  - SQL text columns.
- Primary key as a unique identifier.
- Foreign keys as links to other tables.

### Data types

We have seen how databases store information in rows and columns, now we look at the different types data we will encounter. For efficient storage and retrieval databases divide down further into separate types for each data element. We show how to mix, match and convert character, numeric, date and logical data types.

- Character.
- Numeric.
- Date/time
- Logical.
- Memo.

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- BLOB – binary large object.

### A short tour of R&R

R&R comes in one version with two flavours, xBase and SQL. R&R has a simple and powerful user interface with a single document model. Here we take a short tour of R&R to see the basic structure of reports and how to choose an output destination.

- xBase version.
- SQL version
- Report band lines
  - Title
  - Page headers
  - Record lines
  - Page footers
  - Summary area.
  - Positioning fields
- Output
  - Screen
  - Print
  - File
  - PDF

### Creating reports.

R&R stores reports as definition files, the first step in creating a new report is to choose a name and place under which to save it. Next we look at how to set up file locations and paths to database tables to make it easy to find things. Then we see how to choose the tables will needed for the report and decide which should be the master table.

- Naming and saving reports.
- File locations and table paths - setting up in Options
- Choosing the main table
  - Reading at lowest level and look up.
    - No lower level record, no lookup; report could be misleading.
  - Reading at a high level and scan down.
    - Chance to list a record from the high table even though there may be no transaction(s) in the lower table.
  - Setting report scope with an index, faster than a query if you have an index.
- Ways to relate tables
  - The concept of the composite record
  - Unique key and foreign keys.
  - Linking with database fields.
  - Linking with calculated fields.
  - Linking with the record number or with expression 1.
  - Full lookup.
  - Partial lookup.
  - Scan and multiple-scan.
- Speeding lookups with the built-in Lookup() function.
- Flexlink, how R&R can build an index on the fly.

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- Why xBase index files may need to be rebuilt from time to time.

### **Laying out the report**

Its the layout that gives reports their look and feel. But it's not just a question of how things look, the report layout is crucial to the presentation – and sometime to the credibility – of data. Learn here how to present titles, headers, records, footers, group summaries and totals for effective reports.

- Band lines.
  - Title.
  - Page headers
- Group headers.
  - Swapping headers
- Record lines.
  - Logical print control
  - How to suppress record lines for summary reports.
  - Multiple scan – scan first one table then another.
- Group footers.
  - Totals, counts, cross tabs, averages, etc
- Page footers.
- Summary.
  - Totals, counts, averages, etc
- Using graphics and images.

### **Sorting and grouping**

A key part of report writing is giving the reader just the information needed in a concise and easily-read form. Effective sorting and grouping enables us to divide down complex reports to produce both full listings and summaries. Here we look at efficient ways to sort and group based on stored or calculated data.

- Sorting
  - Ordering records, sort levels.
- Grouping.
  - Ordering and grouping records according to a condition, perhaps with group summary information (counts, totals, averages, max., min.).
  - Group headers, group footers.
- Page breaks
- Sorting/grouping on database fields.
- Sorting/grouping on calculated fields.

### **Querying**

Querying is the heart of the report. The query is the question we ask of the database. This section is where we look at how to select what the user needs. There are several ways to filter the data we wish to retrieve: fixed queries saved with the report, queries with parameters supplied by the user when the report is run, and queries written in Structured Query Language (SQL).

- Using a saved query.
- Auto-SQL, R&R can create your database query.
- User SQL, create a custom query.
- Using index scoping.
  - Fast, limited to indexed field.
- Using ParameteRR to prompt your user.

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- As part of a query.
- To set a scope.

### Calculated fields

Any information that is stored in the database or that can be calculated from what is stored in the database can be used in an R&R report. The ability to create calculated fields is one of the most powerful features of any report writer. R&R has a full set of operators and more than eighty built-in functions to help in creating calculated fields. Here we look at how to tap into that power.

- Operators.
  - Concatenating strings.
  - Arithmetic.
  - Date arithmetic.
  - Logical comparisons.
    - AND
    - OR
    - NOT
    - \$
- Using built-in R&R functions to create new fields
- Using IIF() to switch values
- Using Case() to test combinations of values.
- Using Inlist() to choose according to a pre-set list.
- Expressions
  - Literal or using any function, database field or calculated field.
- Arithmetic with dates.
- Wild cards in expressions.

### Output

With today's extensive use of email for exchanging information, a report is now much more than just a listing on paper. R&R can output reports to screen, printer, PDF and a whole range of file formats. This section looks at how to deliver reports to users in the format that they need.

- Print
- Screen
- File
  - Text – effectively printing to a file, exports all band lines.
  - Data – create .CSV files for opening in other applications. You have to choose just one band line for the export.
- PDF- how to export your reports as PDF documents.
- Mail – exporting to a file and placing it straight into the mail queue.

### User-defined functions

If there is no built-in R&R function that does what we need, we can create our own user-defined function (UDF). We can then make our UDF available to all reports as if it were built in to R&R. This is another powerful feature than R&R makes available in an easy-to-use form. Here we look at what's involved in programming R&R.

- Defining a UDF
  - Choosing a data type
  - Argument list
  - Writing the code
  - Making your functions available for all reports.

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### **Distributing reports**

Once we have created our reports we have to make them available to users. R&R comes with a runtime module that can be installed on workstations or servers so that reports can run anywhere. There are several R&R utilities that simplify not only the deployment of reports but the capturing of query parameters from users.

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# ***R&R Report Writer/ReportWorks***

## ***Day II Training Topics Advanced Workshop***

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### **Introduction**

This is a one day advanced workshop, building on the basics learned on Day I. Pre-requisites are attendance on Day I or appropriate experience with R&R or application development experience.

### **Brief revision of R&R basics**

#### **Advanced topics**

- Managing users in a network environment.
- Building reports from participants' own data sets.
- Extracting data.
  - R&R can be your front end to data extracts, important in today's world of data interchange.
- Crosstabs
  - Summarise data across records and columns, excellent for management summaries.
- Advanced calculated fields.
  - Tapping the full power of the R&R operators and functions.
- Advanced UDF
  - We look at practical applications of user defined functions.
- Data dictionary.
  - R&R has a utility program that enables us to provide meaningful descriptions for field names, set default alias names for tables, set default display formats for fields and define calculations that will be available across reports.
- Embedding objects.
  - R&R can hold embedded/linked objects from any OLE server-enabled application which then become part of the report. If the linked source changes, the changes are reflected in the report.
- SQL edition specifics.
  - Views
    - R&R reads views as if they were tables. Views simplify complex schemas.
  - Stored procedures.
    - Parameter passing.
  - Auto-SQL: using the R&R SQL designer
    - Auto-SQL, choose master and related tables and R&R will build the SQL query.
  - User SQL
  - Entering an appropriate SQL SELECT statement (or a string to execute a stored procedure) provides some advantages over Auto-SQL reports:
    - Since almost all processing of data is done on the server, User-SQL reports can be faster and more efficient.
    - Certain operations (such as creating a report based on a union) are only available through the SELECT statement, not through an Auto-SQL report.
    - Any SELECT statement that Report Designer builds for an Auto-SQL report can be the starting point for developing a User-SQL report.
  - Query testing.
    - Making simple reports to test queries.
    - Importing queries from other environments.

#### **Optimising reports**

Today's bigger databases call for faster, more responsive reports. How can our reports be configured to meet that need?

- The efficient use of indexes.
- Scoping
  - By index.

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- By record range.
- Fast lookups
  - Retrieving a single value from another table without a full link.
- SQL edition: server-based querying.

### Application development

Developing reporting suites within applications. Calling the report runtime from a variety of environments. Reporting from a web server.

- The R&R runtime, distributing stand-alone reports.
  - Deploying the runtime.
  - Control tables/files.
    - Controlling aspects of the report at run time by setting values in the control file.
  - Calling the report viewer DLL.
  - Trapping and reporting errors.
- ActiveX report component (RRW32.OCX)
  - R&R uses RRW32.OCX to expose properties and methods for initialising and calling reports from applications.
- Supported application development environments.
  - .NET
    - VB
    - C#
    - Other
  - Delphi
- R&R Open Scripting
  - R&R for Windows provides an open architecture for report generation. Called "R&R Open Scripting," this new architecture allows developers to create application-specific reporting front ends that use R&R's sophisticated reporting engine for actual report generation. R&R Open Scripting allows any developer who can generate text files to communicate effectively with R&R.
  - R&R Open Scripting interface generates reports in two ways. The Report Wizards make use of this script mechanism to pass a user-defined report specification from the R&R Wizards to the main Report Designer executable. In order to provide a custom interface for report creation, developers can configure Report Designer to integrate their own Windows executable (EXE) in place of the R&R Wizard application.
  - In addition to the Report Wizard interface, a report can be generated by passing a script file pathname on the Report Designer command line. When Report Designer is invoked in this way, the script file is read and the report is created automatically. Passing a script file on the command line requires that a master table pathname be specified in the Report section of the script file. See the Script File Format section in this chapter for information about the contents of the script file.
- Web reporting, calling and viewing reports from a web pages.
  - Active X viewer control.

### Tips and tricks

Free-form discussion of personal experiences.