

Crystal Report Best Practices

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THE BEST-RUN BUSINESSES RUN SAP™



What Do You Use?



What version of Crystal Reports are you using?

- a) 2008
- b) Xlr2
- c) XI
- d) 10
- e) 9.0
- f) 8.5
- g) 8
- h) 7.5 or earlier

Which database do you use most frequently?

- a) SQL Server
- b) Oracle
- c) Teradata
- d) Sybase
- e) Informix
- f) IBM DB2
- g) Access

Anyone using a non-SQL or non-relational database?

- a) Progress
- b) dBase
- c) xBase
- d) ADABAS
- e) Notes
- f) Exchange

Multi-dimensional database?

- a) Advanced Revelation
- b) Essbase



Who Am I?



- Have been delivering Business Intelligence solutions for the past 15 years, as project/technical lead, SME and Trainer.
- Clients have included federal, medical, local government, energy, banking, accounting, commercial real estate, retail, manufacturing and consulting organizations.
- Have conducted several large successful proofs-of-concept on the Crystal and BOBJ Enterprise platform.
- Started our local users group in Dallas, with over 200 registered user companies.
- Ten years of technical sales and corporate marketing.

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- **Database SQL**
 - **Pre-processing data**
 - **Crystal SQL and Command Objects**
 - **Real life challenges**
 - **Crystal Reports performance tips**

Crystal Reports Builds a SELECT statement.

- SELECT → Report fields in Field Explorer
- FROM → Data Tables in Field Explorer
- TABLE JOINS → Linking Expert
- WHERE → Record Selection Formula

Unsupported in Crystal Reports

- Having (can select by group in Group Selection Formula)
- Union (can use in SPs, views, and Command Objects)
- Sub-queries (some can be used in Command Objects)
- Sum(decode(w,x,y,z)), except in Command Objects

Can you build your report in Crystal?

?? Does using an ORDER BY in your SQL slow down your report?

Report Request Form



REPORT REQUEST FORM

"I agree that a thorough review of the work products listed below has occurred. These work products are clearly understood and they meet with my approval. My signature also indicates my complete acceptance of these work products. I understand that any future change to these work products will require the creation of a change request that will be processed according to the formal change control procedures established for this project."

Work Product Name: _____

Client Signature: _____

PROTOTYPE

Company Name														Company Logo													
Name of Report																											
Date or date range of report																											
Parms																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21							
Filename														Data Date and Time							Page n of m						

FIELD MAPPINGS AND CALCULATIONS

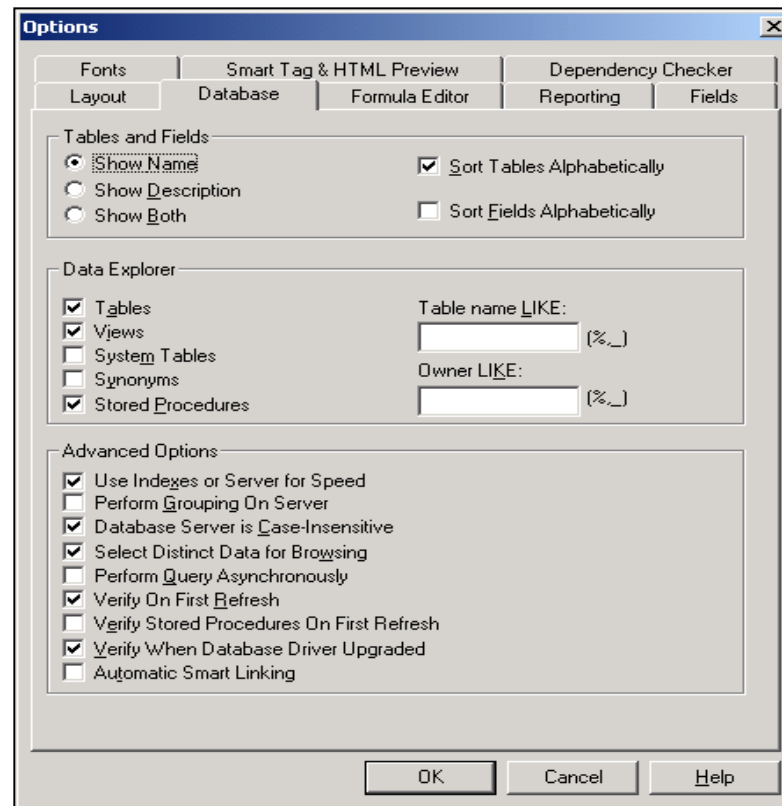
No.	Field Title	Data Source and Calculation	Select	Where	Group	Order
P1	Parm1			X		
P2	Parm2			X		
P3	Parm3			X		
P4	Parm4			X		
P5	Parm5			X		
1						
2						
3						
4						
5						
6						


?? Anyone want a copy?

Stored Procedures



Check your “SQL Options” so they show up
File...Options...Database Tab...Stored Proc Check Box



- 
- **Design requirements**
 - **Advantages over views**
 - Incremental processing
 - Temporary tables
 - Example
 - **Using the first time**
 - Deleting data (CREATE or REPLACE PROC)
 - When should it run?
 - Which is better? Dynamic SQL or a Stored Procedure?

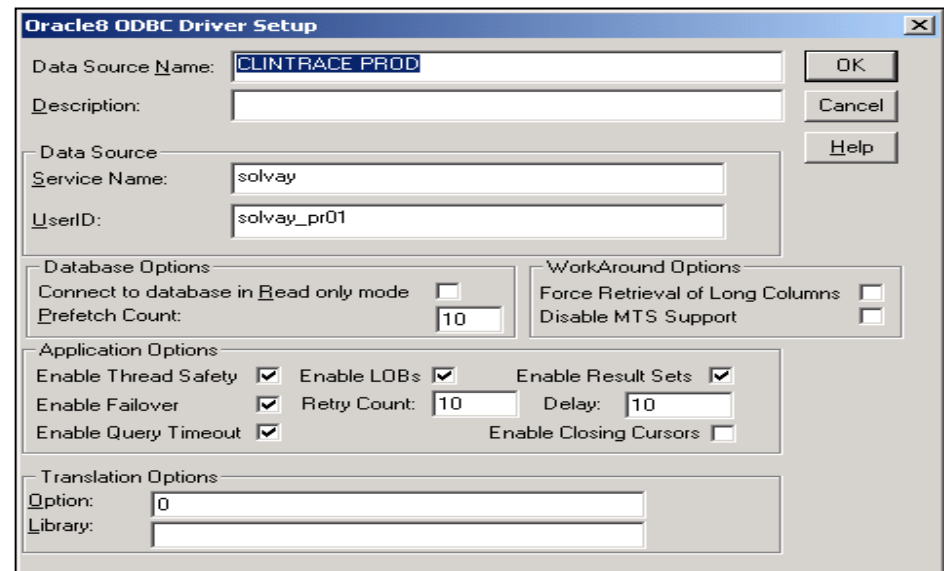
Legend – Please see next page

Modifying stored procedures and the impact on a report

- Aliasing fields or changing fields selected
- Converting data types
- Changing data types in base table
- Adding/deleting fields
- Interim logic and the from statement and where clause

Oracle stored procedure requirements

- Packages and cursors
- ODBC setup



The image shows a screenshot of the Oracle8 ODBC Driver Setup dialog box. The dialog has a title bar with the text "Oracle8 ODBC Driver Setup" and a close button. The main area contains several sections of configuration options:

- Data Source Name:** A text field containing "CLINTRACE PROD".
- Description:** An empty text field.
- Data Source:** A section containing:
 - Service Name:** A text field containing "solway".
 - UserID:** A text field containing "solway_pr01".
- Database Options:** A section containing:
 - Connect to database in Read only mode:** A checkbox that is unchecked.
 - Prefetch Count:** A text field containing "10".
- WorkAround Options:** A section containing:
 - Force Retrieval of Long Columns:** A checkbox that is unchecked.
 - Disable MTS Support:** A checkbox that is unchecked.
- Application Options:** A section containing:
 - Enable Thread Safety:** A checked checkbox.
 - Enable LOBs:** A checked checkbox.
 - Enable Result Sets:** A checked checkbox.
 - Enable Failover:** A checked checkbox.
 - Retry Count:** A text field containing "10".
 - Delay:** A text field containing "10".
 - Enable Query Timeout:** A checked checkbox.
 - Enable Closing Cursors:** An unchecked checkbox.
- Translation Options:** A section containing:
 - Option:** A text field containing "0".
 - Library:** An empty text field.

At the bottom right of the dialog are three buttons: "OK", "Cancel", and "Help".

Stored Procedures



```
PACKAGE CURSOR_TYPES_COMSN
AS TYPE VOUCHER_COMMISSION_TYPE
IS RECORD (
VOUCHER_ID VARCHAR(10) ,
CT_AMOUNT NUMBER) ;
TYPE COMMISSION_TYPE IS REF CURSOR RETURN
VOUCHER_COMMISSION_TYPE;
END CURSOR_TYPES_COMSN;
PROCEDURE VOUCHER_CT_COMMISSION (
VOUCHER_CT_COMMISSION_CV IN OUT
CURSOR_TYPES_COMMISSION_BU.COMMISSION_TYPE ,
V_DEPTID VARCHAR2, V_START_DATE IN
ARI_CT_TRANSACTION.SUBMITTED_DATE%TYPE,
V_END_DATE IN ARI_CT_TRANSACTION.SUBMITTED_DATE%TYPE)
AS
BEGIN
OPEN VOUCHER_CT_COMMISSION_CV FOR
Select .....
```

Ten Commandments for Fast Queries



1. Thou shalt not accidentally disable the use of indexes by modifying a column within thy WHERE clause.
2. Thou shalt put the table that returns the fewest rows last in the FROM clause of thy query.
3. Thou shalt investigate rewording thy query in some other way.
4. Thou shalt use the EXISTS operator whenever possible.
5. Thou shalt not ask the kernel for more than thou wantest.
6. Thou shalt not force rebinding of a query when only changing bind variables.
7. Thou shalt know the data volumetrics and use realistic test data.
8. Thou shalt use table aliases in thy queries.
9. Thou shalt not use the != operator unless absolutely necessary.
10. Thou shalt use the trace facility to monitor thy queries.

Adapted from Tina London's Guidelines and Good Practice Guide for Developing SQL

?? Anyone want a copy?



- **View advantages**
 - Case statements
 - Aggregates
 - Union
 - Having
 - Force index
 - Supported by more databases than stored procedures
- **Disadvantages**
 - Not as flexible as stored procedures (parameters, etc.)
 - Must be done in one SQL statement
- **Views used for security**
- **Views as a meta layer**
- ❖ ***What is the difference between a View and a SP?***



```
CREATE view task_vw as

SELECT a.ADDDATE, a.ADDWHO, b.ABCDESIGNATION,
       a.FROMLOC, a.SKU, b.DESCR, d.SOURCETYPE, b.QTY,
       a.INVMETHOD, a.TASKTYPE, c.FROMZONEID, b.SKU
FROM   DCTEST.TASKDTL a,
       DCTEST.SKU b,
       DCTEST.TASKHDR c,
       DCTEST.TASKTRN d
WHERE  ((a.SKU=b.SKU)
        AND (a.STORERID=b.STORERID))
        AND (a.TASKHDRKEY=c.TASKHDRKEY)
        AND ((a.TASKHDRKEY=d.TASKHDRKEY)
        AND (a.TASKDTLKEY=d.TASKDTLKEY))
        AND (a.TASKTYPE='6' OR a.TASKTYPE='7')
        AND (a.ADDDATE>=TO_DATE ('23-05-2007 00:00:00',
        'DD-MM-YYYY HH24:MI:SS'))
        AND a.ADDDATE<TO_DATE ('29-05-2008 00:00:00',
        'DD-MM-YYYY HH24:MI:SS'))
        AND a.ADDWHO='DCTEST'
```

- **Database SQL**
- **Pre-processing data**
- **Crystal SQL and Command Objects**
- **Real life challenges**
- **Crystal Reports performance tips**



➤ Advantages

- Independent of Crystal Reports
- Data can match on disparate reports
- Simplifies report logic

➤ Mechanisms

- Data can be manipulated via software code
- Database macros (stored procedures, scheduled jobs, COM Driver)
- Universe
- Data Warehouse or Data Mart
- ETL Tools (Data Integrator, Informatica,...)

?? For small Data Marts, can MS Access be used as an ETL tool?

➤ Considerations

- Data should not need to be real time if data is processed once.
- If the data is more real time, then a front end should call the processing before the report. This increases wait time and needs to consider multi-user environments.

➤ Key table generation

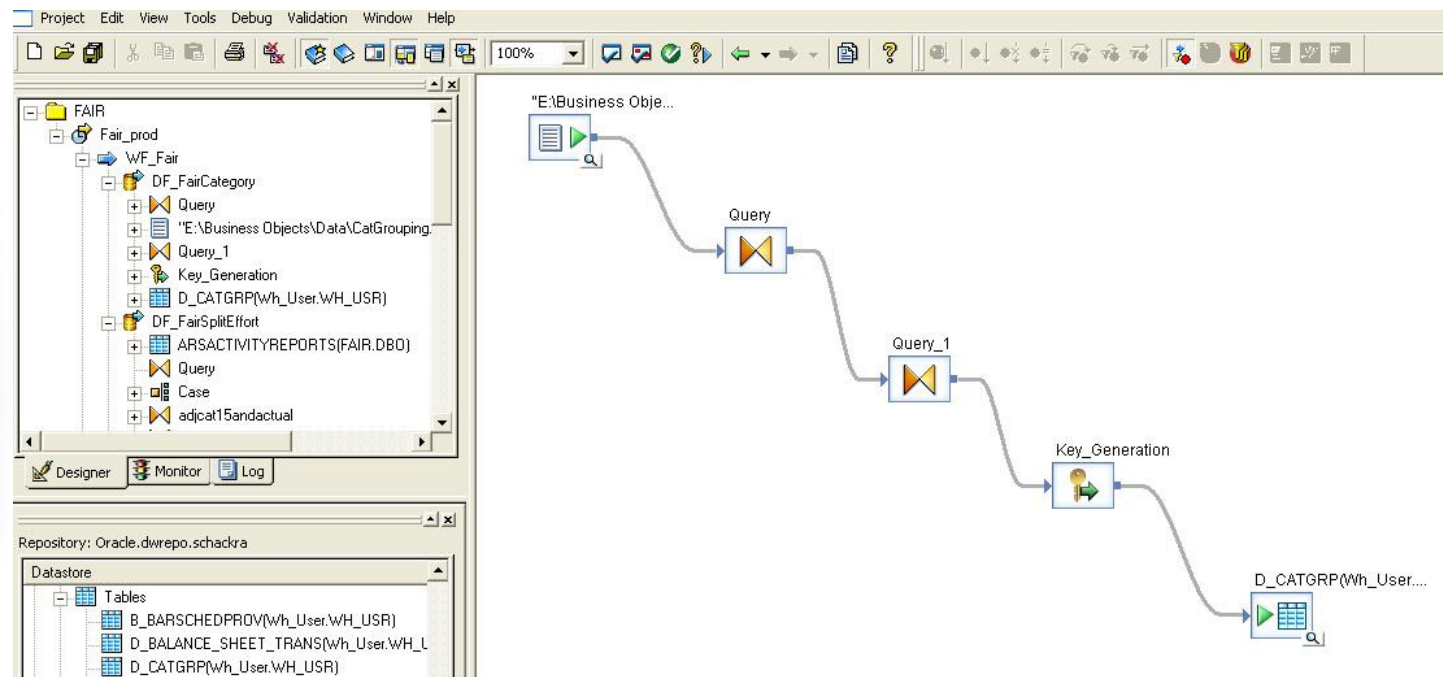
- Provides greater flexibility in report filtering.
- Can make “not exists” reports much simpler.
- Fastest form of data.



Pre-Processing Data



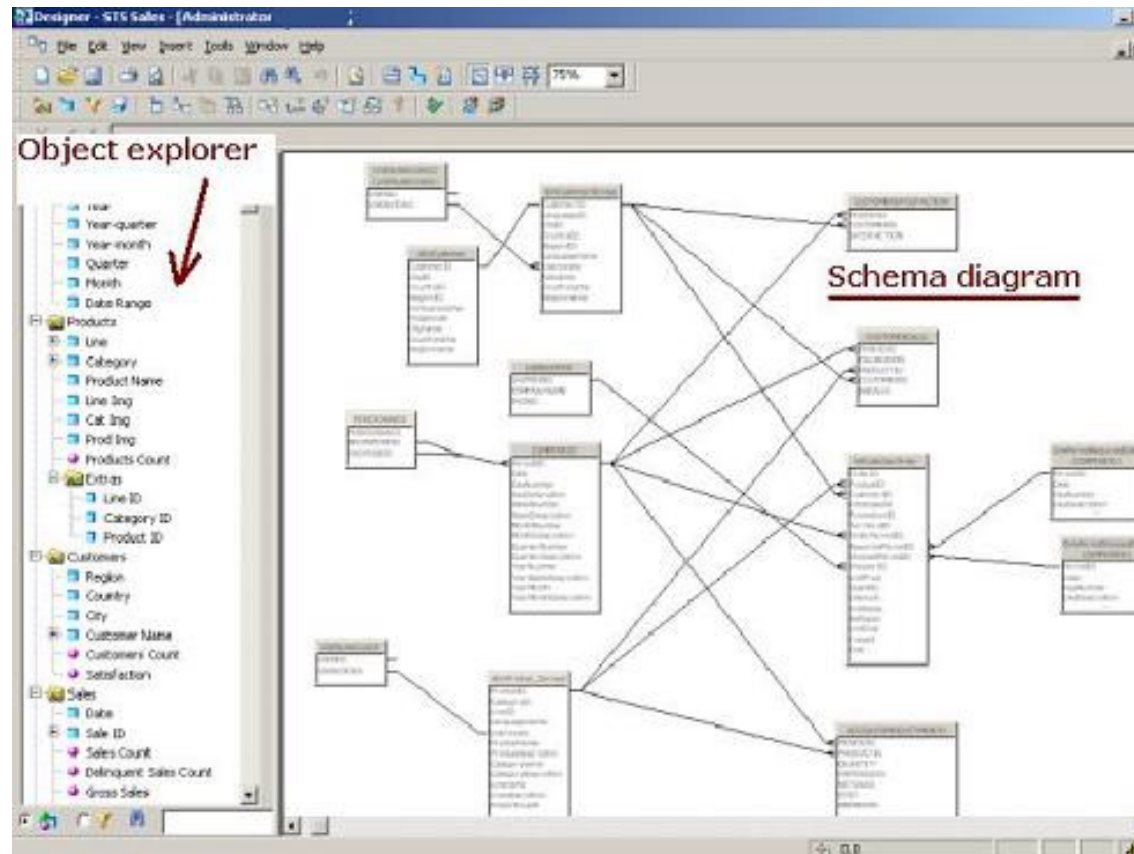
SAP BusinessObjects Data Integrator software allows organizations to easily explore, extract, transform, and deliver data anywhere. It requires no SQL code, controls data quality, and is easy to use.



Pre-Processing Data



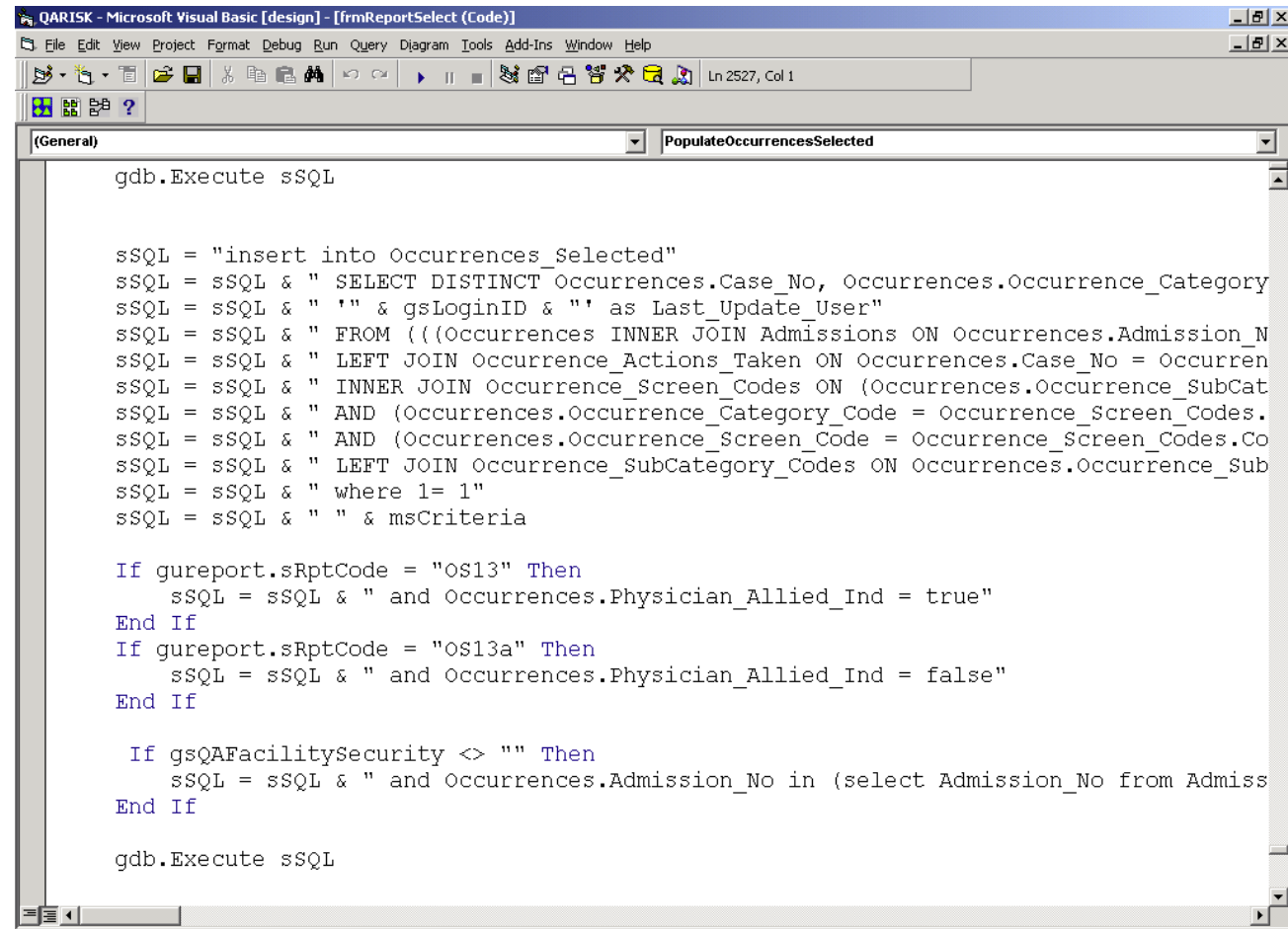
Universes



Pre-Processing Data



Dynamic SQL can be built through an application like VB, Visual Studio, J2EE, and C#.



```
QARISK - Microsoft Visual Basic [design] - [frmReportSelect (Code)]
File Edit View Project Format Debug Run Query Diagram Tools Add-Ins Window Help
Ln 2527, Col 1
PopulateOccurrencesSelected

gdb.Execute sSQL

sSQL = "insert into Occurrences_Selected"
sSQL = sSQL & " SELECT DISTINCT Occurrences.Case_No, Occurrences.Occurrence_Category"
sSQL = sSQL & " '" & gsLoginID & "' as Last_Update_User"
sSQL = sSQL & " FROM (((Occurrences INNER JOIN Admissions ON Occurrences.Admission_No = Admissions.Admission_No) LEFT JOIN Occurrence_Actions_Taken ON Occurrences.Case_No = Occurrence_Actions_Taken.Case_No) INNER JOIN Occurrence_Screen_Codes ON (Occurrences.Occurrence_SubCategory_Code = Occurrence_Screen_Codes.Occurrence_SubCategory_Code) AND (Occurrences.Occurrence_Category_Code = Occurrence_Screen_Codes.Occurrence_Category_Code) AND (Occurrences.Occurrence_Screen_Code = Occurrence_Screen_Codes.Occurrence_Screen_Code) LEFT JOIN Occurrence_SubCategory_Codes ON Occurrences.Occurrence_SubCategory_Code = Occurrence_SubCategory_Codes.Occurrence_SubCategory_Code) where 1= 1"
sSQL = sSQL & " " & msCriteria

If gureport.sRptCode = "OS13" Then
    sSQL = sSQL & " and Occurrences.Physician_Allied_Ind = true"
End If
If gureport.sRptCode = "OS13a" Then
    sSQL = sSQL & " and Occurrences.Physician_Allied_Ind = false"
End If

If gsQAFacilitySecurity <> "" Then
    sSQL = sSQL & " and Occurrences.Admission_No in (select Admission_No from Admissions where Facility_Security = " & gsQAFacilitySecurity & ")"
End If

gdb.Execute sSQL
```

- 
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➤ Changing the query in the Show Query window

- Before v.8, could change the SQL directly through the Show Query window.
- Because it is not easy to maintain, and might crash the report, this feature is not available in newer versions.

➤ Troubleshooting technique

- Can cut-and-paste the SQL from Crystal Reports into other tools to debug SQL.
- Can cut-and-paste the SQL into a Crystal Reports Command Object when the source SQL is already known to be correct. (And into the Show Query window prior to v.8.)
- Debugging is faster when the SQL is known to be correct.

?? *What tool do you use to build your SQL?*

Crystal Reports Command Object

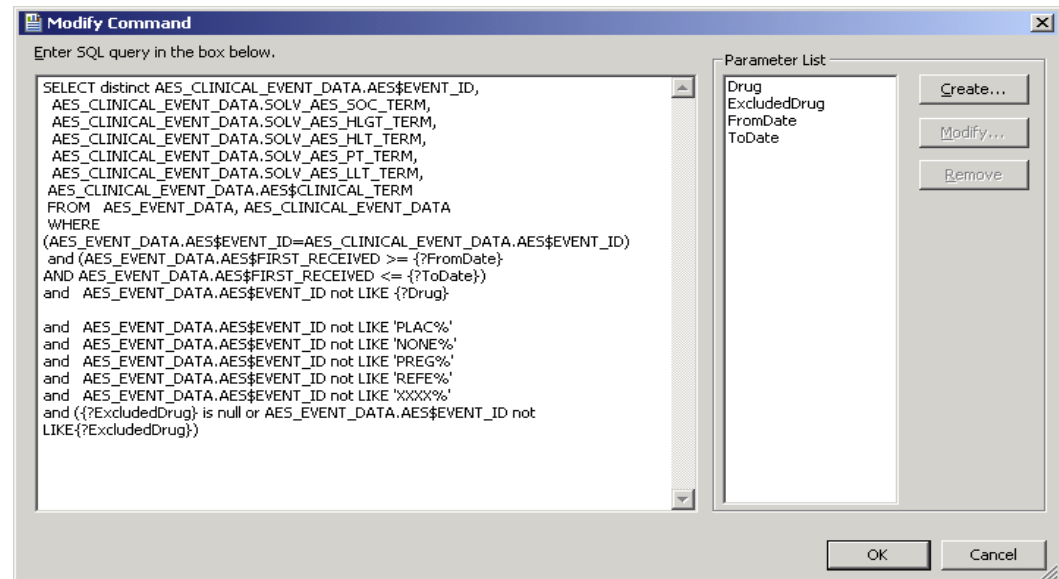


➤ Advantages

- Can use native SQL like a “pass-through” query.
- Supports UNION SELECT, aggregates, some subqueries.
- Can cut-and-paste correct SQL into the Command Object.
- Can be shared by other reports via Repository.


➤ Disadvantages


- SQL queries are not as specific as they can be in the database.
- Cannot use constructs outside a single SELECT.
- Not a database object.




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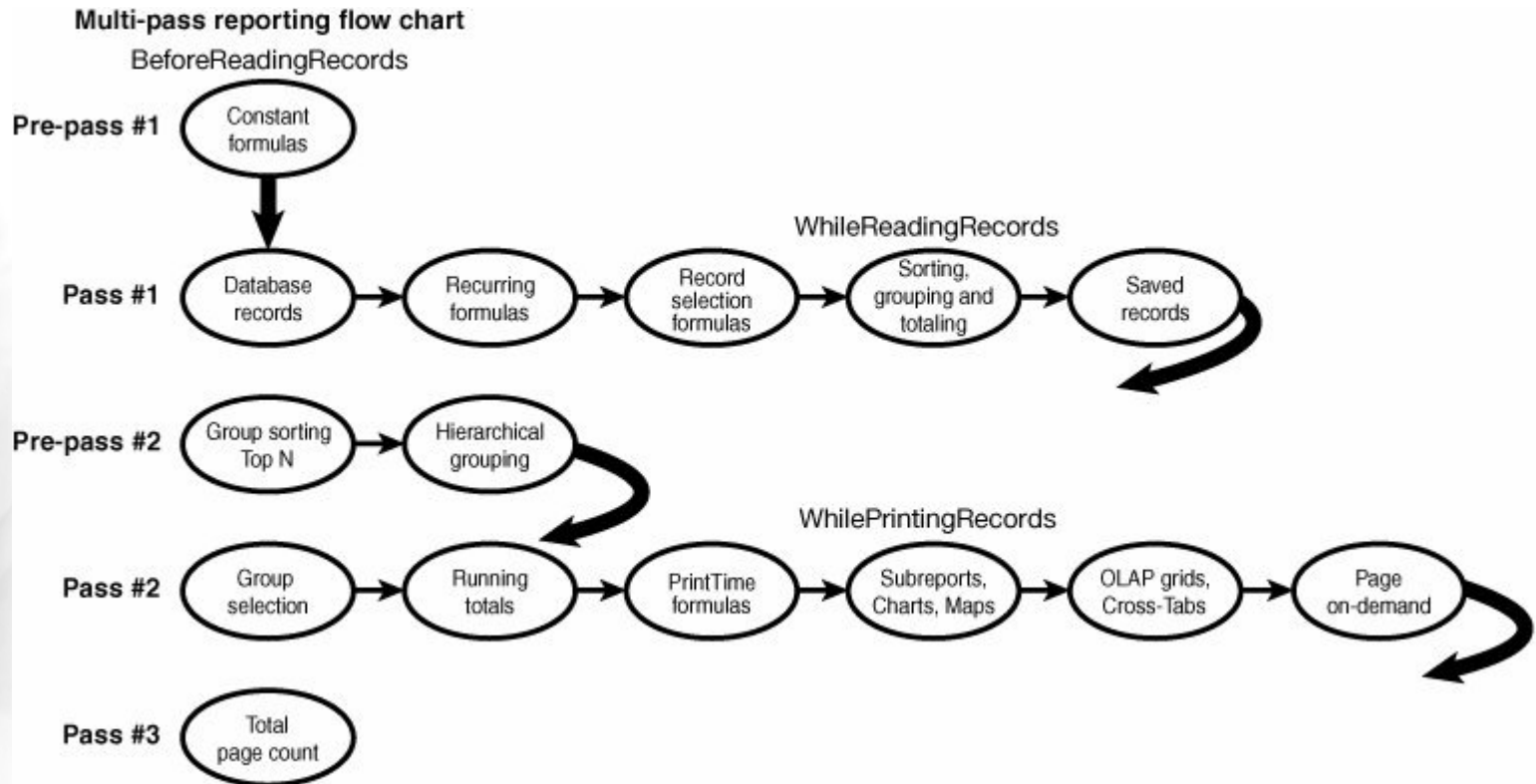


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- ?? Customer has a report that needs alternative sort orders.
 - ?? Multiple databases across geographical or functional areas, with identical reporting requirements. Security must be by these areas.
 - ?? Customer has one set of data, and needs 20 different reports, each needing 15- 20 columns, of nearly the same format, only different column or group orders.
 - ?? Customer needs summary information in the report footer, by differing groups.

- 
- ?? Customer needs four graph or cross-tab reports that are identical, except that the X-Axes need to be Day, Month, Quarter and Year.
 - ?? Customer needs one report, with three different groupings, of three different data sets.
 - ?? Customer has a drill-down report with too many records. How can it be run faster?

- 
1. **Write efficient SQL.**
 2. **Pre-process data.**
 3. **Return as few records as possible to the report.**
 4. **Eliminate Sub-Reports wherever possible.**
 5. **Check design and condition of database/data source.**
 6. **“Use Index or Server for Speed” and “Perform Grouping on Server”**
 7. **Compare database indexes with common report record selections.**
 8. **Link from your largest, best indexed table.**
 9. **Avoid using OR conditions and multi-parameter conditions.**
 10. **Use Between...And... instead of two separate comparison operators.**
 11. **Create efficient formulas.**
 12. **Beware of where you place Running Totals.**
 13. **Don't use formulas in record selection.**
 14. **Watch the record count in the status bar.**
 15. **Use variables instead of sub-reports.**
 16. **Consult the Multi-pass Reporting Flow Chart.**

Crystal Performance Tips



Questions?



Questions?

Contact: jayhack@swbell.net

