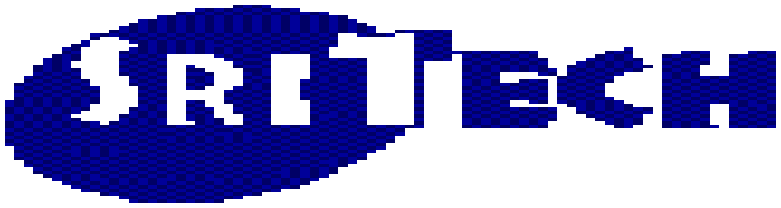

Running/Debugging Sqr Program Using SqrPlus

Tutorial Document

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Introduction

SqrPlus:

SqrPlus - developed by SRI Technologies and is a collection of programs that provide an Integrated Development Environment (IDE). The product is aimed at providing Systems Analyst/Programmers with a tool for developing and maintaining SQR programs easily and efficiently thereby cutting down System Development/Maintenance time significantly. **SqrPlus** optionally enables developers to define global/local variables before they can be used. This eliminates many hidden/unknown bugs in the program. **SqrPlus** offers a unique user friendly (GUI) on-line interactive debugger, which helps debug highly complex programs with minimum possible time thereby saving many hours of developers time. **SqrPlus** comes with **Automatic Document Generation System (ADS)** tool that automates most boring and time consuming task in software development. Last but not least, **SqrPlus** comes with a unique product called **EDS – Event Driven Sqrs** that speeds up Development and Maintenance tasks by many folds. With all these features, **SqrPlus** becomes a great time saving tool and a unique product in the market.

SqrPlus Components:

- **SqrPlus Workbench**

  It provides developers a user friendly screen through which they can carry out their development activities like editing source file, running SQR program, viewing logs, viewing output files etc. from one point.

  SqrPlus Workbench provides following functions/features:

  - Configure and hook your preferred development utilities with SqrPlus Workbench.
  - Support of multiple SQRW products.
  - Run Sqr program as Normal.
  - Run Sqr program with Debug.
  - Facility to connect to the database through centrally controlled connection strings. SQR developers need not know the Database Username/Password when their sqr program connects to the Database.
  - Maintains list of frequently used databases along with their connection details.
  - Edit Sqr with your preferred source code editor.
  - View output file (.lis) file created by Sqr program.

- View log file created by SQRW.
- Compile Sqr program to check SqrPlus errors and create Extended (SQE), Listing (LST) and sqr program with Call Trace (CTR) files.
- View SqrPlus log and SqrPlus errors.
- View SQE file.
- View LST file along with Source Analysis, Procedure Call Tree, Procedure Usage and variables cross-reference listings.
- Run Sqr program as normal but after checking for SqrPlus errors.
- Generate Program Documentation.
- Support of MRU (recall sqr program and its settings from Most Recent Used list).
- On-line help.

- **SqrPlus Compiler**

  SqrPlus Compiler is a two-phase compilation process that scans through the SQR source file and performs following functions:

  - Produces an Expanded file by processing each #include directive. It also ensures that the files are included only once.

  - Produces a listing file with source analysis and errors at the end of the listing.

  - Produces an Expanded file with call trace facility. SqrPlus compiler inserts special procedure calls at the beginning of each procedure with values of various input/output arguments. It also inserts special procedure calls just before end of the procedure. This feature helps developers in:

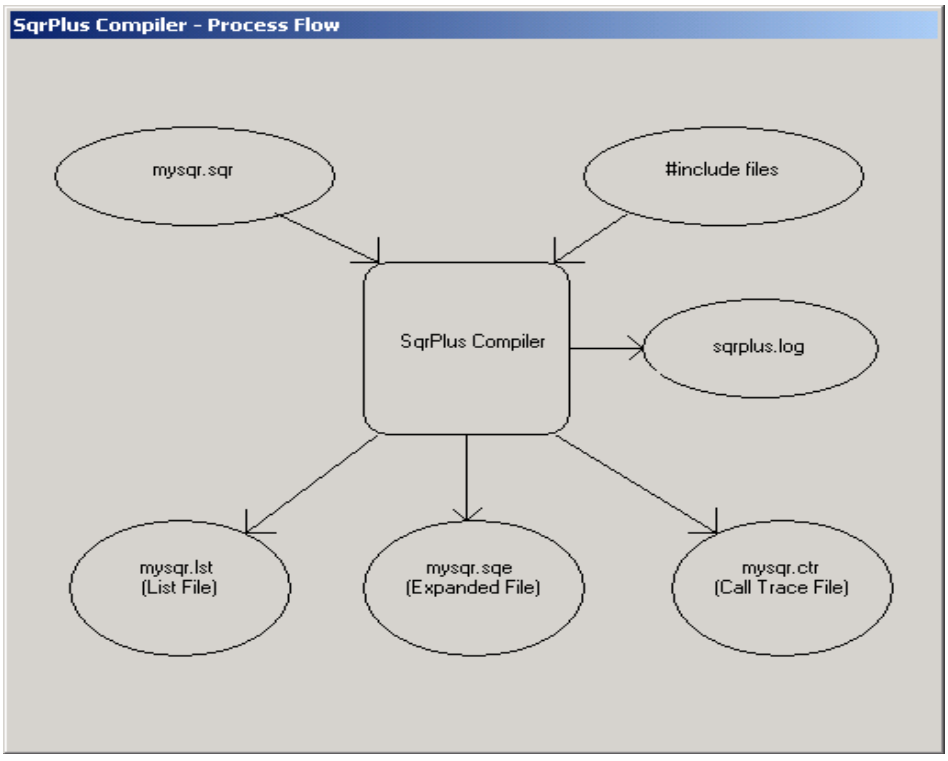
    - Debugging programs in non-interactive batch mode.
    - Performance tuning and timing analysis of their program.

    Further, when program finishes in un-expected manner, running *.CTR version of the program provides complete call trace of an error. This helps programmer in debugging their program promptly. The sqr program should trap the run time errors.

  - Produces procedure call tree listing. This is produced in the .LST file.

- Compile *.sqc file to check for SqrPlus errors and source analysis.
- Produces global and local variables cross reference report. This is produced in the LST file
- Detects and logs unused procedures.
- Detects and logs undefined global/local variables.
- Detects and logs unused global/local variables.
- Detects and logs multiple defined global/local variables.
- Detects and logs bogus global variables.
- Logs compilation process in SQRPLUS.LOG file.

Following diagram shows the inputs and outputs:



- **SqrPlus On-Line Interactive Debugger**

  SqrPlus Debugger is an on-line interactive debugger with user-friendly GUI interface. SqrPlus Debugger is invoked by clicking the 'Run with Debug' command button in SqrPlus Work Bench main screen. After going through the syntax checking, programmer gets into an interactive session in which, he/she can execute the program at his/her own pace using various SqrPlus Debug Commands examining the result of each and every SQR source line as it executes.

  SqrPlus on-line interactive debugger provides following features:

  - Break point Commands (Set Break, Cancel Break, List/Save and Restore Break points).
  - Execute Commands (Step, Step Into and Go).
  - Variables Manipulations Commands (Examine and Deposit variables).
  - Conditional break points (Watch global, Watch array variables)
  - Option to compile only selected portions of sqr program with debug.
  - On-line help.

SqrPlus Tutorial

SqrPlus has following directories:

Server Directory: Directory where Server part of SqrPlus/PsPlus software resides. For example:

P:\sritech where drive 'P' is derived from path name of your sqrw.exe.

Home Directory: Directory where Client portion of SqrPlus/PsPlus software resides. For example:

C:\sqrplus

SqrPlus Workbench main functions:

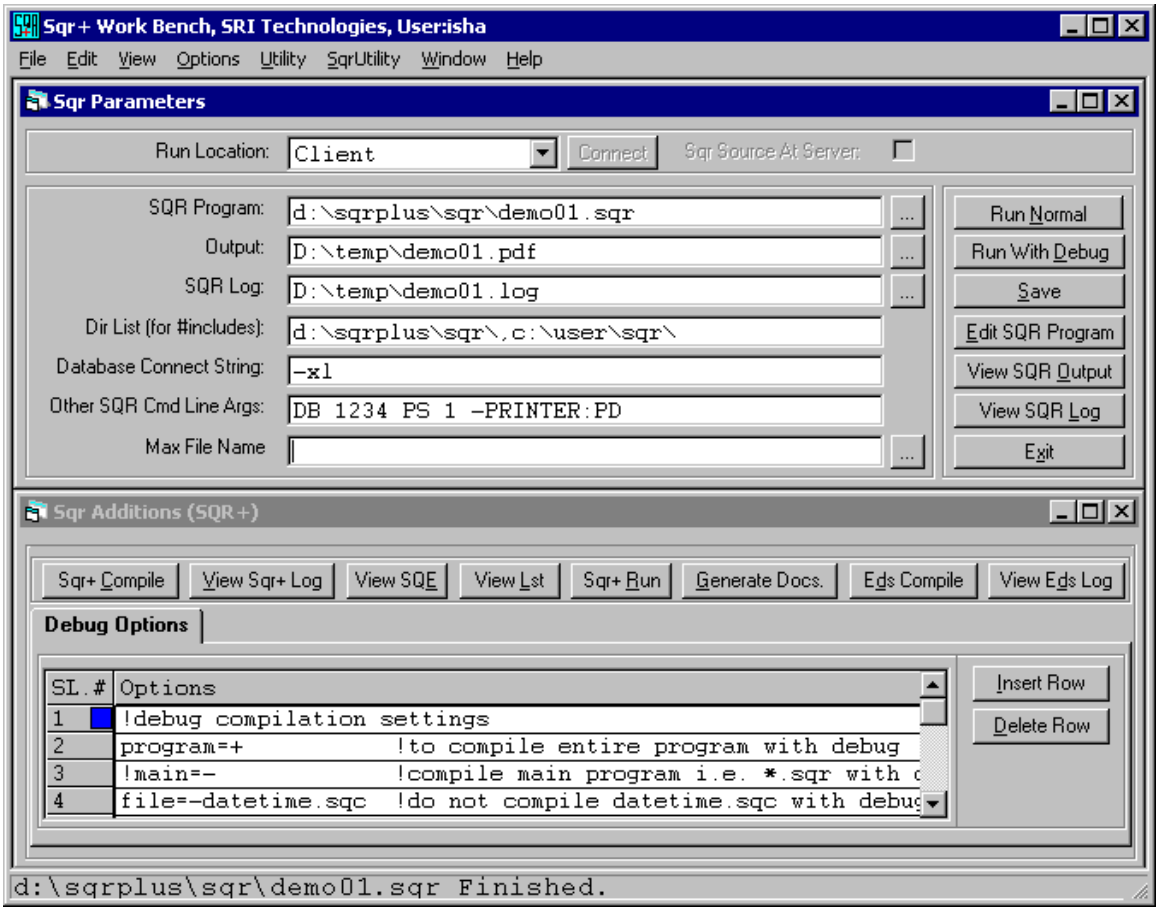
From SqrPlus Workbench, developer can perform following tasks:

- **Run Normal**: Running Sqr program as Normal.
- **Sqr+ Compile**: Compiling Sqr program for SqrPlus errors.
- **Run With Debug**: Running Sqr program with debug.
- **Sqr+ Run**: Running Sqr program after successful Sqr+ compile. (i.e. run only if no SqrPlus errors were found).
- **Generate Docs.**: Generates documentation for SQR or SQC file in htm format. This action invokes Sqr+ Compile internally.
- **Eds Compile**: Parses sqr coded written with EDS (Event Driven Sqrs) Methodology and generates *.sqr version ready for testing/deployment.

This section describes a step-by-step tutorial for using SqrPlus.

Step 1: ('Run Normal' operation)

a. Invoke SqrPlus Workbench. This program (sqrpwb.exe) is located in your Server directory (e.g. P:\sritech). You may invoke this through SqrPlus Workbench shortcut (created while installing SqrPlus client) on your Desktop. This will put you in the following SqrPlus Workbench screen. The screen supports on-line help. Further details on **Sqr Parameters**, **SqrPlus Additions (SQR+)** and **SqrPlus Options** can be obtained by pressing F1 key.



b. For simplicity, keep 'Run Location' as Client. This means that SqrPlus will use your Windows SQRW.EXE product to run sqr programs. (Other option will be discussed later when we intend to use sqr product that is located on remote server say Unix). Enter 'SQR Program:' as

'c:\sqrplus\sqr\demo01.sqr'. This will update the 'Output:' with the default value. This is the sqr program that you would like to run.

c. Enter 'SQR Log:' as 'c:\temp\sqr.log'. This is the log file which sqrw.exe will create. It is same as '-O' switch on the sqrw command line.

d. Enter 'Dir List (for #includes):' as 'c:\sqrplus\sqr\'. This is the directory where sqr will look for resolving various '#include' directives. This is same as '-I' switch on the sqrw command line.

e. Click View and then Connect string at the Menu bar. This will show/hide the Database connect string. Enter the database connect string. This will depend on type of database (Oracle, Sybase…) your are using. You may enter '-XL' if you do not want to connect to the database. The '-XL' is the sqrw command line switch that tells sqrw not to connect to the database. However if you choose not to connect to the database, there should not be any reference to the database objects in your sqr program.

f. In case your sqrw.exe does not recognize SQRFLAGS environment variable, please enter %SQRFLAGS% in 'Other SQR Cmd Line Args:' besides other things (if any). This way you are forcing the sqrflags setting in the command line. This is recommended for version 4.x of SQRW. However the total length of the DOS command that invokes sqrw.exe should not exceed 128 bytes for version 3.x and 255 bytes for version 4.x of sqrw. For version 4.x and above, SqrPlus workbench passes %SQRFLAGS% to sqrw command line by default. This can be disabled by setting 'SQRFLAGS_FLAG' item to 'OFF' (under SqrPlus Options).

g. You should also specify any additional Sqr command line flags/switches as identified in step 0 in 'Other SQR Cmd Line Args:' text box. For version 4.x of sqrw, the best way is to include flags/switches of static nature (like max file, ini file etc.) in SQRFLAGS definition and enter %SQRFLAGS% in 'Other SQR Cmd Line Args:' besides other things (if any). For older version of sqrw this may not work due to 128 bytes limitation on the DOS command length.

h. Blank out 'Max file Name:' box. This will be required only if you want SQR to pickup Max file other than the default one.

i. Enter your preferred source code editor. This is available under Options->General Options. Default value of 'System Editor' is notepad.

j. Click 'Run Normal'. This action will invoke SQRW with the sqr program as specified above.

k. Wait till the Status line shows: 'c:\sqrplus\sqr\demo01.sqr Finished'.

l. Check the SQR log by clicking ‘View SQR Log’ button.

m. If SQRW execution is successful, you will see the following message in the SQR log:

SqrPlus Demo Report
Array filled with data
Not Running Under PeopleSoft Environment
Short Desc:
Long Desc:

If any error is reported, or you did not get the log file, the problem needs to be FIXED before proceeding further.

Useful Note:

SqrFlags:

For versions of SQRW which do not recognize SQRFLAGS environment variable, it should be passed in the command line by specifying %SQRFLAGS% in the 'Other SQR Cmd Line Args' text box.

Command Length Limitation:

There is a limit on the length of sqrw command. 128 characters is a very safe limit for the entire dos command which invokes sqrw.exe. SqrPlus warns if the command line is too big. Also since the maximum limit varies from version to version, the default limit (128) may be changed by going into SqrPlus Options window of SqrPlus Workbench by modifying item max_dos_cmd_len. For Sqrw version 4 and above, the limit is 255.

SqrPlus invokes sqrw.exe through a batch file under MS-DOS. It is very important to ensure that this invocation is perfect.

To ensure that sqrw.exe is not suffering from any such problems, please follow the steps given below:

- Invoke SqrPlus workbench.
- Select demo01.sqr program.
- Click 'Run Normal' (This creates sqrp.bat file in the SqrPlus home directory and executes it).
- Watch the Status line of SqrPlus workbench. It should say:

  Running c:\sqrplus\sqr\demo01.sqr

- If no problems encountered, the status line will say:

  c:\sqrplus\sqr\demo01.sqr Finished.

- If there is some problem, then invoke a MS-DOS window session.

- Go to SqrPlus home directory (cd c:\sqrplus)

- Invoke sqrp.bat in the DOS window to find the actual error message. Connect string should be passed as an argument while invoking sqrp.bat command file.

SQR Output:

n. Check the Output by clicking 'View SQR Output' button. The output will be like:

SRI Technologies
Report ID: c:\sqrplus\sqr\demo01.sqr DEMO01 REPORT Page No. 1
Run Date: Cur Date
Time:Cur Time

As Of Date: Cur Date
Employee Listing

Employee Name	*Employee Title*	*Salary*
Employee Name 1	*Employee Title 1*	*100.00*
Employee Name 2	*Employee Title 2*	*400.00*
Employee Name 3	*Employee Title 3*	*1,200.00*
Employee Name 4	*Employee Title 4*	*3,200.00*
Employee Name 5	*Employee Title 5*	*500.00*
Employee Name 6	*Employee Title 6*	*1,200.00*
Employee Name 7	*Employee Title 7*	*2,800.00*
Employee Name 8	*Employee Title 8*	*6,400.00*
Employee Name 9	*Employee Title 9*	*900.00*
Employee Name 10	*Employee Title 10*	*2,000.00*
Employee Name 11	*Employee Title 11*	*4,400.00*
Employee Name 12	*Employee Title 12*	*9,600.00*
Employee Name 13	*Employee Title 13*	*1,300.00*
Employee Name 14	*Employee Title 14*	*2,800.00*
Employee Name 15	*Employee Title 15*	*6,000.00*
Employee Name 16	*Employee Title 16*	*12,800.00*
Employee Name 17	*Employee Title 17*	*1,700.00*
Employee Name 18	*Employee Title 18*	*3,600.00*
Employee Name 19	*Employee Title 19*	*7,600.00*

…
…

Step 2: ('Sqr+ Compile' Operation)

Debug Options:

a. Make sure that Debug Options tab has following entry.

Program=+ !to compile entire program with debug

This tells the SqrPlus compiler to compile the entire program with debug. For small programs it is OK to compile entire program with debug. For any reasonable size program, the better option will be to compile selected portions of your program with debug. This will not only reduce the memory requirements of sqrw.exe but also make your program run faster. Please refer to 'Debug Options' topic under 'SqrPlus Workbench' in the help file for more details.

b. Click 'Sqr+ Compile'. This action will create *.SQE and *.LST file in the directory as specified in SqrPlus Option window. The SqrPlus options window can be viewed by Clicking 'Options and then SqrPlus option' at the menu bar.

SqrPlus Log:

c. Click on 'view Sqr+ Log'. If Sqr+ Compile operation has been successful, SQRPLUS.LOG should look like:

1999-05-20 14:38:01 Start of Compilation Version n.n.n.x

Compiling file 'c:\sqrplus\sqr\demo01.sqr', max breaks:10
Sqr Flags: 1 : 'C:\SQRPLUS\SQR\'
Sqr Flags: 2 : 'C:\USER\SQR\'
**** Demo Copy, to be used only for evaluation ****
Compiling 'c:\sqrplus\sqr\demo01.sqr' , main
SqrPlus SQE file ' c:\sqrplus\sqr\demo01.sqe'
SqrPlus CTR file 'C:\SQRPLUS\SQR\demo01.ctr'
SqrPlus LST file ' c:\sqrplus\sqr\demo01.lst'
Whole Program Compiled with debug
Compiling 'C:\SQRPLUS\SQR\democons.sqc'
Compiling 'C:\SQRPLUS\SQR\demodate.sqc'
Compiling 'C:\SQRPLUS\SQR\demostr.sqc'
Compiling 'C:\SQRPLUS\SQR\democomm.sqc'
Lst file: C:\SQRPLUS\SQR\demo01.lst created
Sqe file: C:\SQRPLUS\SQR\demo01.sqe created
Local Variables Analysis for Referenced Procedures:
For Procedure:DB-SELECT
SqrPlus Warning: 1, Local variable '$FLD_NAM' defined but not referenced
SqrPlus Warning: 2, Local variable '$FLD_VAL' defined but not referenced
SqrPlus Warning: 3, Local variable '$LONG_NAME' defined but not referenced
SqrPlus Warning: 4, Local variable '$MSG2' defined but not referenced
SqrPlus Warning: 5, Local variable '$SHORT_NAME' defined but not referenced
Global Variables Analysis:

```
    SqrPlus Error: 1, Global Variable '#ARR_SIZE' not defined, referenced 3 times
    SqrPlus Error: 2, Global Variable '#IND' not defined, referenced 15 times
    SqrPlus Error: 3, Global Variable '$CURRDATE' not defined, referenced 2 times
    SqrPlus Error: 4, Global Variable '$END_OF_REPORT' not defined, referenced 2 times
    SqrPlus Error: 5, Global Variable '$LONG_DESC' not defined, referenced 2 times
    SqrPlus Error: 6, Global Variable '$NAME' not defined, referenced 2 times
    SqrPlus Error: 7, Global Variable '$REPORTDATE' not defined, referenced 2 times
    SqrPlus Error: 8, Global Variable '$REPORTID' not defined, referenced 2 times
    SqrPlus Error: 9, Global Variable '$REPORTTIME' not defined, referenced 2 times
    SqrPlus Error: 10, Global Variable '$REPORTTITLE' not defined, referenced 4 times
    SqrPlus Error: 11, Global Variable '$SHORT_DESC' not defined, referenced 2 times
    SqrPlus Error: 12, Global Variable '$SQRPLUS_TRACE' not defined, referenced 1 times
    SqrPlus Error: 13, Global Variable '$TITLE' not defined, referenced 2 times
    SqrPlus Error: 14, Global Variable '$_BOGUS_VAR' not defined, referenced 1 times
    SqrPlus Error: 15, Invalid Global Variable '$_BOGUS_VAR', referenced 1 times
SqrPlus Errors:
    Number of SqrPlus Warnings: 5
    Number of SqrPlus Errors: 15

1999-05-20 14:38:01 End of Compilation.
```

d. If any error is reported, that needs to be FIXED before proceeding further.

SqrPlus Expanded File (*.SQE):

e. Click ‘view SQE’ to view the demo01.sqe file. Demo01.sqe file is an expanded source file which is created by the SqrPlus compiler by expanding each ‘#include’ directive. It also puts a ‘create time stamp’ in the beginning of the file. Since this provides one source file, it can be very useful for the developer to understand the program flow or find an error quickly. The file looks like:

```
! Expanded File Created By SqrPlus Version n.n.n.x, Created at:1999-09-21
12:10:32
! Main File: c:\sqrplus\sqr\demo01.sqr'
!************************************************************************
!*      Author: SriTech                 Date: dd-mm-yyyy                *
!*                                                                      *
!*      Application: DEMO               File: DEMO01.SQR                *
!*                                                                      *
!*      Description:  Demonstration Programs Sample                     *
!************************************************************************
!                                                                       *
!               Confidentiality Information:                            *
!                                                                       *
! This module is the confidential and proprietary information of        *
! SRI Technologies Pty Ltd; it is not to be copied, reproduced          *
! in any form, or by any means, in whole or in part                      *
! for any purpose other than that for which it is expressly provided    *
! without the written permission of Company.                            *
!                                                                       *
! Copyright (c) 1999 SRI Technologies Pty Ltd. All Rights Reserved      *
!                                                                       *
!************************************************************************
!                                                                       *
!*      Change Log:                                                     *
!*      Sl.NO   Date            Author  Remark                          *
!*      1.              dd-mm-yyyy      XX              Initial coding  *
!*                                                                      *
!                                                                       *
!************************************************************************
```

```
! including: #include 'democons.sqc'  !*!*!include constants
!file:'C:\SQRPLUS\SQR\democons.sqc'
#ifndef DEMOCONS-INCLUDED

#define DEMOCONS-INCLUDED

!*************************************************************************
!*      Author: SriTech                  Date: dd-mm-yyyy                *
!*                                                                       *
!*      Application: DEMO                File: DEMOCONS.SQC             *
!*                                                                       *
!*      Description:  Demonstration Programs Sample                      *
!*************************************************************************
!                                                                        *
!               Confidentiality Information:                             *
!                                                                        *
! This module is the confidential and proprietary information of         *
! SRI Technologies Pty Ltd; it is not to be copied, reproduced           *
! in any form, or by any means, in whole or in part                      *
! for any purpose other than that for which it is expressly provided     *
! without the written permission of Company.                             *
!                                                                        *
! Copyright (c) 1999 SRI Technologies Pty Ltd. All Rights Reserved       *
!                                                                        *
!*************************************************************************
!                                                                        *
!*      Change Log:                                                      *
!*      Sl.NO   Date           Author  Remark                            *
!*      1.             dd-mm-yyyy     XX             Initial coding     *
!*                                                                       *
!                                                                        *
!*************************************************************************
!*                                                                       *
!*************************************************************************


!#define  PSOFT       !uncomment if you have the PeopleSoft environment

!following line should be commented if -XL switch is used in sqrw
!command line and date-time function gets time from the database
!e.g. if running against oracle database and do not want to connect to
!the database

!#define db_time


#define TRUE                  1
#define FALSE                 0
…
…
…
…
begin-procedure db-select ($fld_nam, $fld_val, :$short_name, :$long_name)

#ifdef PSOFT

    let $msg = 'Running Under PeopleSoft Environment'

    let #row_cnt = 0

    let $short_name = 'Undefined'
    let $long_name = 'Undefined'

begin-SELECT

XLATSHORTNAME,
XLATLONGNAME
```

```
    add 1 to #row_cnt

    move &XlatShortName to $short_name
    move &XlatLongName  to $long_name

FROM  XLATTABLE

WHERE FIELDNAME   = $fld_nam
  AND FIELDVALUE  = $fld_val
  AND EFFDT =
      (SELECT MAX(EFFDT)
       FROM   XLATTABLE
       WHERE  FIELDNAME  = $fld_nam
         AND  FIELDVALUE = $fld_val)
  AND EFF_STATUS = 'A'

end-SELECT

    if #row_cnt = 0
        let $err_msg = 'Xlat record not found for ' ||
                       'FieldName "' || $fld_nam  || '"' ||
                       ', FieldValue "' || $fld_val || '"'
        show $err_msg
    end-if

#else

        let $msg = 'Not Running Under PeopleSoft Environment'

#endif

        show $msg

end-procedure


begin-procedure define_vars local

#define dim #_salary

#define dim    db-select$msg, db-select$msg2

end-procedure
```

SqrPlus Listing File (*.LST):

f. Click 'View LST' to view the demo01.lst file. Demo01.lst file is also an expanded source file but in the listing format. This file also contains the source analysis and the statistics of the SqrPlus compilation at the end of the file. The file looks like:

```
000001 00 00000 !List File Created By SqrPlus Version n.n.n.x, Created at:1999-10-10 14:35:19
000002 00 00000 !Main File: c:\sqrplus\sqr\demo01.sqr
000003 01 00001 !*********************************************************************
000004 01 00002 !*    Author: SriTech              Date: dd-mm-yyyy                  *
000005 01 00003 !*                                                                   *
000006 01 00004 !*    Application: DEMO            File: DEMO01.SQR                  *
000007 01 00005 !*                                                                   *
000008 01 00006 !*    Description:         Demonstration Programs Sample             *
000009 01 00007 !*********************************************************************
000010 01 00008 !                                                                    *
000011 01 00009 !          Confidentiality Information:                              *
```

```
000012 01 00010 !                                                                *
000013 01 00011 ! This module is the confidential and proprietary information of *
000014 01 00012 ! SRI Technologies Pty Ltd; it is not to be copied, reproduced   *
000015 01 00013 ! in any form, or by any means, in whole or in part               *
000016 01 00014 ! for any purpose other than that for which it is expressly provided *
000017 01 00015 ! without the written permission of Company.                     *
000018 01 00016 !                                                                *
000019 01 00017 ! Copyright (c) 1999 SRI Technologies Pty Ltd. All Rights Reserved *
000020 01 00018 !                                                                *
000021 01 00019 !*****************************************************************
000022 01 00020 !                                                                 *
000023 01 00021 !*  Change Log:                                                    *
000024 01 00022 !*  Sl.NO     Date            Author          Remark               *
000025 01 00023 !*  1.        dd-mm-yyyy      XX              Initial coding       *
000026 01 00024 !*                                                                *
000027 01 00025 !                                                                 *
000028 01 00026 !*****************************************************************

...
...
...

000064 02 00034
000065 02 00035 !#define  PSOFT                  !uncomment if you have the PeopleSoft environment
000066 02 00036
000067 02 00037 !following line should be commented if -XL switch is used in sqrw
000068 02 00038 !command line and date-time function gets time from the database
000069 02 00039 !e.g. if running against oracle database and do not want to connect to
000070 02 00040 !the database
000071 02 00041
000072 02 00042 !#define db_time
000073 02 00043
000074 02 00044
000075 02 00045 #define TRUE            1
000076 02 00046 #define FALSE           0
000077 02 00047
000078 02 00048 #define YES             'Y'
000079 02 00049 #define NO              'N'
000080 02 00050
000081 02 00051 #define AMT_MSK                 999,999,999.99
000082 02 00052 #define HRS_MSK               999,999.99
000083 02 00053 #define NUM_MSK             9999999
000084 02 00054
000085 02 00055 !some date masks
000086 02 00056 #define DATE_PRT_FORMAT     'DD-MM-YYYY'
000087 02 00057 #define TIME_PRT_FORMAT     ' HH24:MI:SS'

...
...
...


000578 01 00208
000579 01 00209     show $msg
000580 01 00210
000581 01 00211 !   do db-select($fld_nam, $fld_val, $short_name, $long_name)
000582 01 00212
000583 01 00213 end-procedure
000584 01 00214
000585 01 00215
000586 01 00216
000587 01 00217 begin-procedure define_vars local
000588 01 00218
000589 01 00219 #define dim #_salary
000590 01 00220
000591 01 00221 #define dim     db-select$msg, db-select$msg2
000592 01 00222
```

```
000593 01 00223 end-procedure
000594 01 00224
000595 01 00225
000596
000597 *** End of Source ***
000598
000599
...
...
```

Source Analysis:

```
000893
Source Files:
000895
000896    File#   Lines    Last Modified Time    Name
000897       1     255    2002-04-16 13:46:39   c:\sqrplus\sqr\demo01.sqr
000898       2      98    2002-04-16 13:50:03   c:\sqrplus\sqr\democons.sqc
000899       3     142    2002-04-16 13:50:31   c:\sqrplus\sqr\demodate.sqc
000900       4     134    2002-04-16 13:51:07   c:\sqrplus\sqr\demostr.sqc
000901       5     255    2002-04-16 13:49:25   c:\sqrplus\sqr\democomm.sqc
000902
Procedures:
000904
000905          <-Source Lines-> <List  Lines>
000906    Slno  File First  Last  First:Last    Type     Name/Argument
000907       1     1   106   114 000736:000745  Global   BEGIN-PROGRAM
000908       2     3    67    79 000001:000233  Local    DATE-CURR-DATE
000909                                          Arg 01 - :$DATE
000910       3     3    96   108 000234:000262  Local    DATE-CURR-TIME
000911                                          Arg 01 - :$TIME
000912       4     3   126   139 000263:000293  Local    DATE-CURR-DATE-TIME
000913                                          Arg 01 - :$DATE
000914       5     4    68    76 000294:000373  Local    STR-LTRIM
000915                                          Arg 01 - :$STR
...
...

000941
000942
```

Procedure Call Tree:

```
000944
000945    01  BEGIN-PROGRAM
000946        02  COMM-INIT
000947            03  DATE-CURR-DATE
000948            03  DATE-CURR-TIME
000949        02  INIT-REPORT
000950            03  DATE-CURR-DATE
000951            03  COMM-CREATEARRAY
000952        02  REPORT
000953            03  DB-SELECT
000954                04  SELECT-ERR
000955        02  COMM-SOMETESTS
000956        02  TERMINATE
000957        02  BEGIN-HEADING (indirect call)
000958            03  COMM-HEADER
000959        02  BEGIN-FOOTING (indirect call)
000960
```

Unused or indirect referenced Procedures:

```
000963    001, Procedure Name:'DATE-CURR-DATE-TIME'
000964    002, Procedure Name:'STR-LTRIM'
000965    003, Procedure Name:'STR-RTRIM'
000966    004, Procedure Name:'STR-TRIM'
```

```
000967    005, Procedure Name:'COMM-SLEEP'
000968    006, Procedure Name:'DEFINE_VARS'
000969
```

Local Variables Cross-Ref: Procedure:Variable:File#:Line

```
000971
000972    DATE-CURR-DATE
000973       $DATE:          3:00075
000974    DATE-CURR-TIME
000975       $TIME:          3:00104
000976    COMM-HEADER
000977       #COL:           5:00097  5:00098  5:00099  5:00101
000978    DB-SELECT
000979       $MSG:           1:00232  1:00236
000980
000981 Global Variables Cross-Ref: Variable:File#:Line
000982
000983
000984    #ARR_SIZE:          1:00133  1:00157  5:00115
000985    #I:              5:00149  5:00151  5:00152  5:00153  5:00155  5:00157  5:00160
000986                     5:00166  5:00173  5:00174  5:00175  5:00176  5:00186  5:00191
000987                     5:00192  5:00194  5:00195
000988    #IND:               1:00131  1:00133  1:00135  1:00136  1:00137  1:00145  1:00156
000989                     1:00157  1:00159  1:00160  1:00161  1:00167
000990    #J:              5:00159  5:00161  5:00174  5:00176  5:00178  5:00195  5:00197
001014
...
...
```

Local Variables Analysis for Referenced Procedures:

```
001017
001018    For Procedure:DB-SELECT
001019       SqrPlus Warning: 1, Local variable '$FLD_NAM' defined but not referenced
001020       SqrPlus Warning: 2, Local variable '$FLD_VAL' defined but not referenced
001021       SqrPlus Warning: 3, Local variable '$LONG_NAME' defined but not referenced
001022       SqrPlus Warning: 4, Local variable '$MSG2' defined but not referenced
001023       SqrPlus Warning: 5, Local variable '$SHORT_NAME' defined but not referenced
001024
```

Global Variables Analysis:

```
001026
001027    SqrPlus Error: 1, Global Variable '#ARR_SIZE' not defined, referenced 3 times
001028    SqrPlus Error: 2, Global Variable '#IND' not defined, referenced 15 times
001029    SqrPlus Error: 3, Global Variable '$CURRDATE' not defined, referenced 2 times
001030    SqrPlus Error: 4, Global Variable '$END_OF_REPORT' not defined, referenced 2 times
001031    SqrPlus Error: 5, Global Variable '$LONG_DESC' not defined, referenced 2 times
001032    SqrPlus Error: 6, Global Variable '$NAME' not defined, referenced 2 times
001033    SqrPlus Error: 7, Global Variable '$REPORTID' not defined, referenced 2 times
001034    SqrPlus Error: 8, Global Variable '$REPORTTITLE' not defined, referenced 4 times
001035    SqrPlus Error: 9, Global Variable '$SHORT_DESC' not defined, referenced 2 times
001036    SqrPlus Error: 10, Global Variable '$SQRPLUS_TRACE' not defined, referenced 1 times
001037    SqrPlus Error: 11, Global Variable '$TITLE' not defined, referenced 2 times
001038    SqrPlus Error: 12, Global Variable '$_BOGUS_VAR' not defined, referenced 1 times
001039    SqrPlus Error: 13, Invalid Global Variable '$_BOGUS_VAR', referenced 1 times
001040
001041 SqrPlus Errors:
```

SqrPlus Errors:

```
001042    Number of SqrPlus Warnings: 5
001043    Number of SqrPlus Errors:   13
001044
001045 ** End Of Compilation **, Finish Time: 2002-04-19 14:14:20
```

Step 3: ('Run With Debug')

Step 3.0 (Debug Options)

a. Make sure that Debug Options tab in Sqr Additions (SQR+) window has following entry.

```
program=+          !to compile entire program with debug
dbg_gbl_var=yes    !Option to examine/deposit global variable
dbg_arr_var=yes    !Option to examine/deposit array variables
view_var=yes       !Option to examine globa/locall variables using mouse pointer
```

b. Click 'Run With Debug'. This action will do an implicit Sqr+ Compile (i.e. step 2).

c. Keep monitoring the Status/Progress line (bottom most line) of SqrPlus Workbench window.

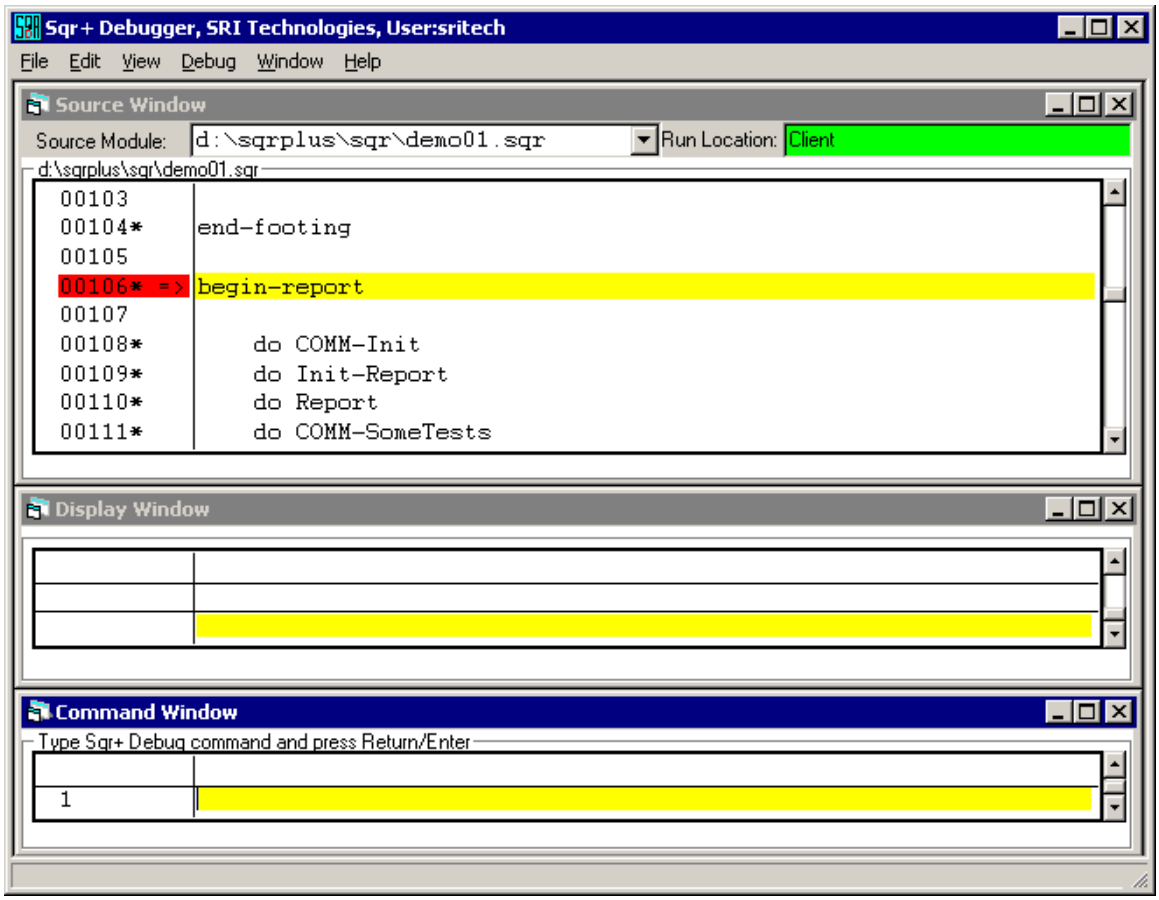
d. If everything is OK you will get into following 'Sqr+ Debugger' window for the debug session. Otherwise the problem needs to be fixed before proceeding further.

Step 3.1 (interactive Session):

a. Sqr+ Debugger has three sub windows each for Source, Display and Command. Please refer to the 'SqrPlus On-Line Interactive Debugger' topic in on-line help for screen layout. The on-line help is available by pressing F1 on any SqrPlus screen.

b. The size of the Sqr+ Debugger window can be adjusted to suit your personal preference.

Following is the screen capture:



c. At this stage you will see the Source window that shows the current sqr source file under execution. The current line under execution has line number followed by '=>' tag. e.g.

00106 => Begin Report*

'*' implies that it is a valid source line where break point can be set.

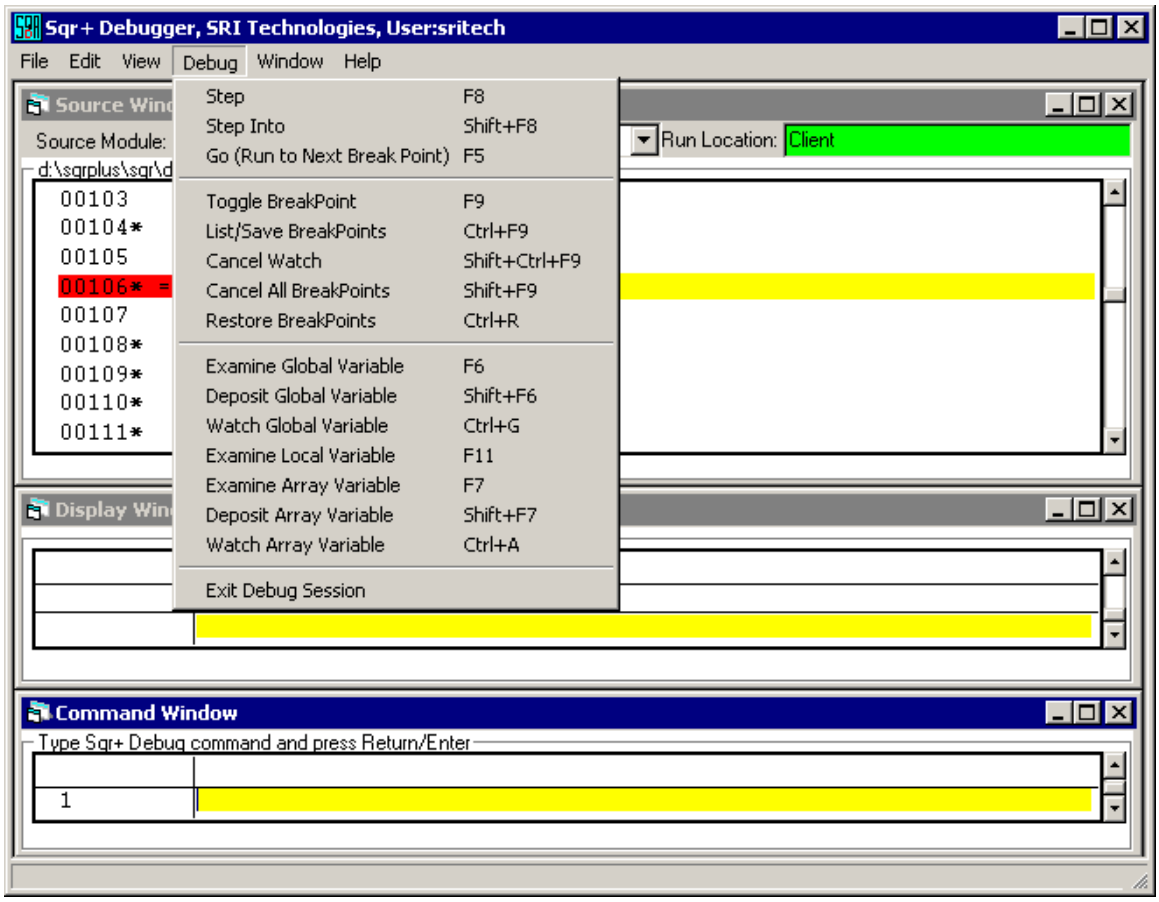
d. Display window will be blank at this stage. Later on, this window will be used to display the results of various SqrPlus debug commands.

e. Command window will also be blank at this stage. The left column shows the serial number and will be 1 at this stage.

f. Source and Display windows are 'Read Only' windows. Command window provides the area where you will enter various SqrPlus debug commands.

g. Click the mouse on any line of command window and press F1. This will take you to the help topic where all the 'SqrPlus debug' commands are described.

h. The tutorial uses the command line interface (command window) to issue various debug commands. However, function keys may also be used if preferred. Below is the screen capture showing various function keys:



Step 3.2: (Step, Step into, Examine global variable commands)

In addition to function keys, command window is used to enter various debug commands. Each debug command is terminated by 'Enter' key. The Arrow keys may be used to pickup commands from the history. It is the 'Enter' key that completes the debug command.

a. Enter the command 's' or 'step' in the command window line. This will execute the current line and move the current line pointer to next program line. i.e. the source window will show:

00108 => do COMM-Init*

b. At this stage you can either enter command 's'(step) or 'si'(step into).

c. If you enter 's' command, it will execute line 108 and move the source pointer to line 109.

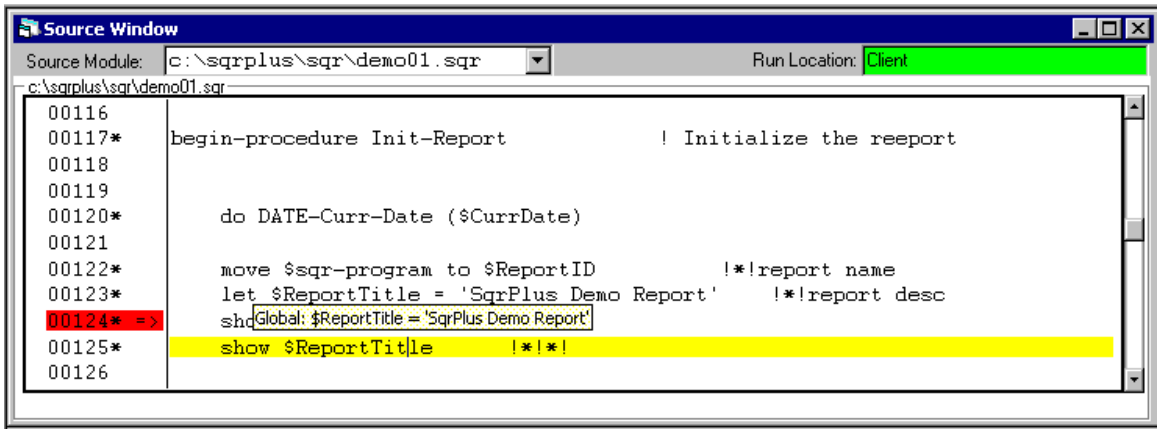
d. Enter command ‘si’. This will step into the procedure *COMM-Init* and source window will display:

00065 => begin-procedure COMM-Init local*

e. Enter command ‘s’ to move to the next source line.

i.e. line 00067 do DATE-Curr-Date ($_ReportDate)*

f. Enter command ‘eg $ReportDate’. This command (examine global) will display the value of global variable in Display window.(*i.e. $REPORTDATE=''*). Alternatively, you may highlight $ReportDate with the mouse and press F6. You may also issue this command by right clicking on source line and selecting appropriate item from the pop-up menu. You may highlight a variable partly or wholly before right click that will provide only matched variables in the pop-up menu. Variable can also be examined (provided view variable feature is enabled) by placing the mouse pointer on the variable name as shown below for $ReportTitle global variable.



g. Enter command ‘s’ again. This will execute the current line and move the current source line pointer to line 00067. (*00067* do DATE-Curr-Time ($_ReportTime)*). Alternatively, you may press F8 function key.

h. Enter command ‘eg $ReportDate’. This will display the updated value of the global variable ‘$ReportDate’ in the display window after executing the procedure *DATE-Curr-Date*. (*i.e. $REPORTDATE='20-05-1999' etc.*) You can also examine variable by placing mouse pointer on the variable name in the source window.

i. Enter command ‘s’ and ‘s’ again. This will bring you to the line 109 (*00109 do Init-Report*)

j. Enter command ‘s’ again to point to the ‘Do report’ procedure call.

k. Enter command ‘si’ at this stage to step into the procedure *Report*.

Step 3.3: (Set break, Cancel break, Examine local, go commands)

a. Position the cursor on the source window and using the down-arrow key position the cursor to line number 00161*. i.e. line:

00161 let #salary = RptArray.salary(#ind)*

b. Double click on that line. This will set the break point at line number 00161. The color of the line will change to RED. Action will also be confirmed by the message in the display window.

c. Search window can be invoked by placing the cursor on the window (where search needs to be performed) and pressing F3 function key. This is just a quick way to find the line based on some text where you would like to set the break point.

d. Enter command ‘go’ in the command window.

e. This will halt the program at line number 00161.

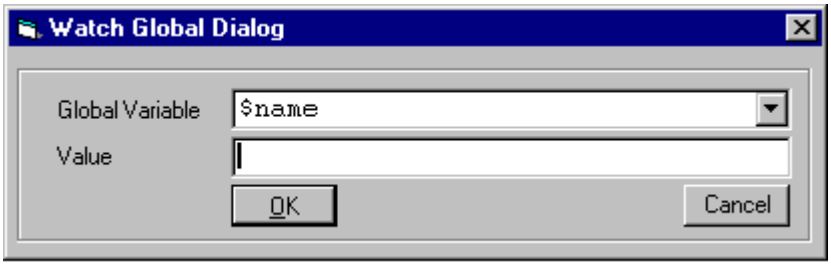
f. The variables may be examined or modified at this stage. In fact at every ‘halt’ occasion, debug command may be issued.

g. Another ‘go’ command will halt the program again at line number 00161 but this time it is the next iteration of the while loop.

h. Enter command ‘lb’. This command (list break) will list all the break points currently set in the display window.

i. Double click on the line 00161 of source window again to cancel the break point. This will change the color from RED to normal. The action will also be confirmed in the display window. However since at this stage 00161 is also the current line, therefore the line number (first column) remains highlighted.

j. Watch command may be used to set the conditional break point. If you want to set a break point whenever $name variable changes, you can highlight $name variable and press Control^g to get to the following dialog box:



Entering no value will result on a break point at every change of $name variable. If you enter a value, program flow will break when $name attains that value and then on every change of value. You may like to cancel the break point after first break has been observed. This can be achieved using 'Cancel Watch' debug command.

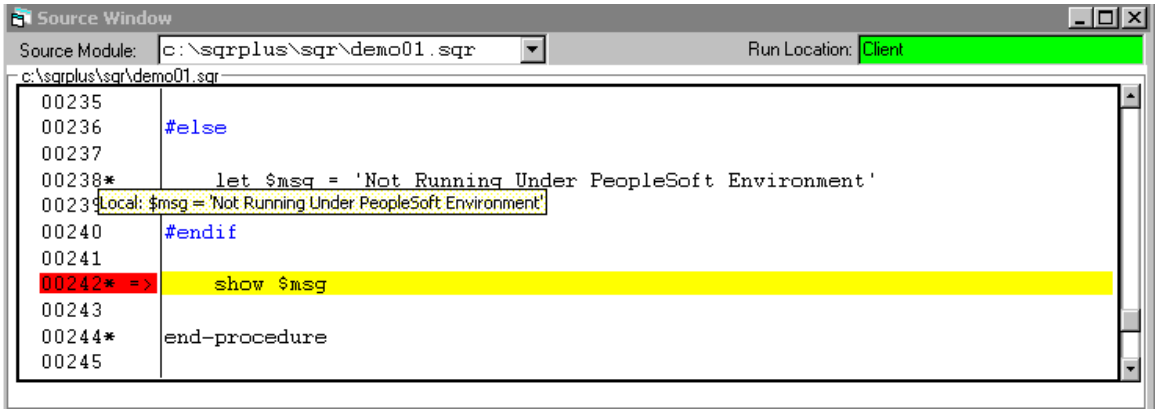
k. Enter command 'sb db-select'. This will set the break point at entry of procedure *db-select.* The action will also be confirmed in the display window.

l. Enter command 'go' in the command window. This time program will halt at beginning of db-select procedure.

m. Enter command 's'.

n. Enter command ‘el $fld_nam’. This command (examine local) will examine the value of the local variable ‘$fld_nam’. The value will be displayed in the ‘display window’. User can also issue above command through:

Debug Menu item.
Highlight variable and press F11 to get to pop-up dialog box.
Right Click on the line containing local variable to get to pop-up menu.
Place mouse pointer over the variable name provided view variables feature is enabled.



o. In this way you will be able to step through the entire program at your own pace monitoring the result of each source line as it executes.

p. Enter command ‘go’. This will execute the program in ‘non step’ mode. Since the program does not encounter any break point, it executes and finishes with the message ‘*EXIT - Normal Termination*’ in the display window.

q. Enter command ‘exit’ to close the SqrPlus Debugger window. Window can also be closed through File/Exit from the menu bar.

In the same manner, other commands Deposit global (‘dg’: modifies a global variable), Deposit array (‘da’: modifies an array variable), Examine array (‘ea’: examines the value of an array variable), watch array, cancel watch can be issued when appropriate.

Debug command can be issued either by typing the command in the command window or by using function keys.

Max File:

SQRW product runs your sqr program under the processing limits imposed by max file. This file is specified through -M command line flag which overrides default processing limits.

If you are debugging a very large program (say more than 10,000 lines), in FULL debug mode, you may have to adjust various items in the max file to cope with the additional resources required.

Following is an example of typical settings of various items in max file for version 4.x of SQRW.

```
PROGLINEPARS=65535
NUMVARIABLES=750
STRINGSPACE=65535
VARIABLES=6000
PROGLINES=15000
QUERYARGS=1000
QUERIES=300
SUBVARS=2000
FORWARDREFS=1000
```

However, for large programs, it is recommended that various Debug Options like:

```
main=+                      !compile main program i.e. *.sqr with debug
file=-datetime.sqc          !do not compile datetime.sqc with debug
procedure=+Process-Main     !compile procedure process-main with debug
etc…
```

should be used instead of compiling the entire program with debug (*program=+*).

Step 4: (‘Running Sqr Using Server Agent’)

SqrPlus uses your SQRW product to run sqr’s in normal mode or in interactive debug mode. While SqrPlus is installed against Windows Sqr product (SQRW.EXE), it can use non-windows Sqr product (like sqr for unix). That is determined by the value of ‘Run Location’ specified in the SqrPlus Workbench. If the value is ‘Client’, it uses your windows SQRW.EXE and runs that on your PC. If the value is other than ‘Client’, (say RemoteUnixMachine) it uses sqr product available on RemoteUnixMachine remote server. SqrPlus Workbench communicates with remote server through Sritech Remote Server Agent program that runs on the remote server. This is like ‘Application Server’ that must be up and running before you point ‘Run

Location' to that Remote Server Agent and connect. For example, under unix platform, supplied sta_unix.sh script should be run.

Step 4.1: ('Run Combinations')

Various run combinations that may be possible are based on:

1. Location of sqr product (at Client or at Remote Server).
2. Location of Source Code (at Client or at Remote Server).
3. Run Mode (as Normal or in Debug Mode).

Run Loccation	Source Code	Run Mode	Run Action
Client	Client	Normal	mysqr.sqr is run as normal at client's PC. Requires sqc's at client.
Client	Client	Debug	mysqr.sqr is run in debug mode at client's PC. Requires sqc's at client.
Remote Server	Client	Normal	mysqr.sqe (created by SqrPlus Compiler) is run as normal at remote server. Requires sqc's at client and not at server.
Remote Server	Client	Debug	mysqr.sqr (debug version created by SqrPlus Compiler) is run at remote server. Requires sqc's at client and not at server.
Remote Server	Sevrer	Normal	mysqr.sqr located at server is run as normal at remote server. Requires Sqc's files at server.
Remote Server	Sevrer	Debug	Invalid run combination.

---------- *End of Document* ----------