



# What's new with VSE SSH Client Suite

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# Agenda

- Overview of existing operation
- Introduction to 3270 support
  - REXX
  - LE-compatible
  - Available as a general-purpose interface not just for SSH clients
- 3270 SSH Clients in Operation
- Experimental GUI without change to clients
- Code is still pre-production



# Overview

- First release is batch orientated

```
// DLBL KEYFILE, 'ECDSA.NEW', ,SD, BLKSIZE=560
// EXTENT SYS001, SYSWK1
// EXEC SNAPSFTP, SIZE=SNAPSFTP,
           PARM='-l neale -batch_accept -i DD:KEYFILE ',
           PARM='-b DD:SYSIPT -bc ',
           PARM='cts7xdev.devlab.sinenomine.net'
site --lrecl 80 --recfm f
get test.data DD:SSHLIB.DATA(PAYLOAD.DATA)
site --lrecl 80 --recfm v
put DD:SSHLIB.DATA(PAYLOAD.DATA) payload.copy
exit
/*
```

-  
-  
-



## Existing Batch Orientated

- Terminal session

```
// ASSGN SYS002,SYSLST
// ASSGN SYS003,DISK,VOL=SYSWK1,SHR
// DLBL ERRORS,'PTERM.STDERR',,SD
// EXTENT SYS003,SYSWK1,,,49720,5
// EXEC SNAPTERM,SIZE=SNAPTERM,
      PARM='-l neale -batch_accept -i DD:KEYFILE ',
      PARM='cts7xdev.devlab.sinenomine.net pwd'
```



# Overview

- Adding an interactive interface
  - Create a 3270 driver
    - Simplify programmer engagement
    - No 3270 data stream knowledge
    - Automatic discovery of attributes (colours, size, highlighting, ...)
    - Change attributes by changing a variable
    - Use REXX function packages and the EXEC COMM interface
  - Works on CMS and VSE
- Limitation
  - Target files on VSE need to exist



# 3270 Interface

- Used my CMS RXFS package
  - Originally built for REXX
  - Implemented in VSE as ARXFUSER, in CMS as RXUSERFN

```
/*-----*/
/* In this example we'll create the screen from scratch */
/*-----*/
Hello='Hello World'      /* Variable to use in RXFSWRIT */
call RXFSOPEN 'DEV=D72L304' /* Establish the RXFS environment */
Dimension=SCR_Width 'x' Scr_Height /* Get dimensions got by OPEN */
/*
 * Write two lines to the screen buffer
 */
call RXFSWRIT "R=12 C=30 L=12 COLOR=RED VNAME='Hello'"
call RXFSWRIT "R=15 C=30 L=20 COLOR=TUR EXTHI=UND VNAME='Dimension'"
call RXFSREAD /* Write screen buffer to screen and read */
Color_Hello='WHI' /* Change the color of the Hello field */
call RXFSREAD /* Send to screen and read */
ExtHi_Hello='REV' /* Change the extended highlighting of hello */
Prot_Hello='N' /* Unprotect the field */
Cursor_Hello='Y' /* Insert the cursor at this field */
```

If DEV= isn't specified then it awaits logon applid()

Changing the attributes of a field by changing a REXX variable associated with the field



## 3270 Interface

- PANELS/WINDOW definitions as a flat file "xxx.VSEPANEL"
  - RXFSWRIT "PANEL=xxxx"
  - Rc = RXFSWRIT("WINDOW=BCPCONF H=8 W=65 SR=5 SC=5")

```
R=1 C=1 L=8 Color=GRE F=B V='device_name'  
R=9 C=1 L=8 Color=Red T='COMRG'  
R=14 C=1 L=8 Color=Red T='SYSCOM'  
R=11 C=1 L=8 Color=TUR V='PCOMRG.1'  
R=11 C=10 L=8 Color=GRE V='COMLine.1.1'  
R=11 C=20 L=8 Color=GRE V='COMLine.1.2'  
R=11 C=30 L=8 Color=GRE V='COMLine.1.3'  
R=11 C=40 L=8 Color=GRE V='COMLine.1.4'  
R=11 C=50 L=8 Color=TUR V='HexCom.1'  
R=12 C=1 L=8 Color=TUR V='PCOMRG.2'  
R=12 C=10 L=8 Color=GRE V='COMLine.2.1'  
R=12 C=20 L=8 Color=GRE V='COMLine.2.2'  
R=12 C=30 L=8 Color=GRE V='COMLine.2.3'  
R=12 C=40 L=8 Color=GRE V='COMLine.2.4'
```

T= associates a field with  
a string constant

V= associates a field with  
a REXX variable



# 3270 Interface

- Extended it to support an LE-compatible API
  - Variables are now held in a binary tree not the EXECCOMM interface

```
SET_TEST_device_name(test, "DEVNAME");
rc = RXFSWRIT(req, "PANEL=TEST");
if (rc == 0) {
    if (argc == 1) {
        RXFSRECB(req, NULL, &ecb);
        rc = RXFSREAD(req, "WAIT=N");
    :
        rc = RXFSRECV(req, NULL);
        waitForWork(&ecb);
        rc = RXFSCHCK(req, NULL);
    } else {
        RXFSCALB(req, NULL, waitForWork);
        rc = RXFSREAD(req, NULL);
    :
        var_fetch("ACTION_KEY", (char *) &key, sizeof(key));
        printf("Key Hit: %s\n", key);
    }
    rc = RXFSCLOS(req, NULL);
```



```
VMA VMA VMA +
Reset Erase EOF New Line PA1 PA2 PA3 Attn SysReq Clear Dup Erase Input Field

DEVNAME

COMRG

PCOMRG.1 COMLINE. COMLINE. COMLINE. COMLINE. HEXCOM.1
PCOMRG.2 COMLINE. COMLINE. COMLINE. COMLINE.

SYSKOM
PSYSKOM. SYCLINE. SYCLINE. SYCLINE. SYCLINE.
PSYSKOM. SYCLINE. SYCLINE. SYCLINE. SYCLINE. HEXSYC.2

F01=None F02=None F03=None F04=None F05=None F06=None F07=None F08=None
F13=None F14=None F15=None F16=None F17=None F18=None F19=None F20=None
```



## 3270 Interface

- Comes with tool to create and modify panels
  - Written in REXX and uses RXFS
- Includes C language bindings
- Sample programs included

Historical Note – The original RXFS package was written for CMS in 1984 in assembler then re-written from scratch in 1988, which was Australia's bicentennial, so the tool used to create/modify panels is called BCP (bicentennial project). The tool was extensively revised in the 1990s to support some of the more esoteric 3270 features like programmed symbols. In the later 1990s it added support for the CMS GUI. After the former's demise it was revised to support HTML/CSS so output can be rendered on a browser.



## 3270 Interface

- Invoking REXX Procedures -

```
// JOB TEST REXX
// OPTION SYSPARM='00'
// SETPARM PWRJOB,APPLID='TELNTDMY'
// LIBDEF PHASE,SEARCH=(SSHLIB.CMDS,PRD2.TCPIPB)
// LIBDEF SOURCE,SEARCH=(SSHLIB.RXFS,PRD1.BASE)
// LIBDEF PROC,SEARCH=SSHLIB.RXFS
// EXEC REXX=BCP
/*
/ &
```

ACB Name



# VSE Interactive Interface

- Invoking -

```
// JOB VSEHELL
// ASSGN SYS001,DISK,VOL=SYSWK1,SHR
// DLBL SSHPKEY,'VSESSHV2.KEY'
// EXTENT SYS001,SYSWK1
// DLBL KEYFILE,'ECDSA.NEW',,SD,BLKSIZE=560
// EXTENT SYS001,SYSWK1
// DLBL IJSYSUC,'VSESP.USER.CATALOG',,VSAM
// DLBL HOSTKEY,'VSESSH.HOSTKEY.CLUSTER',,VSAM,CAT=IJSYSUC
// OPTION SYSPARM='00'
// SETPARM PWRJOB,APPLID='TELNTDMY'
// LIBDEF PHASE,SEARCH=(SSHLIB.CMDS,PRD2.TCPIPB)
// LIBDEF SOURCE,SEARCH=(SSHLIB.RXFS,PRD1.BASE)
// LIBDEF PROC,SEARCH=SSHLIB.RXFS
// EXEC SNASHELL,SIZE=AUTO,PARM='D72L304'
/*
/&
```

SIMLOGON if DEV= is  
set on RXFSOPEN



D72L304

VSEn SSH Client Suite

2026-06-01  
13:15:24

Using RXFS  
Windowing

Help

Enter one of these commands and options:  
- ssh <options>: to start an SSH session  
- scp <options>: to start an SCP transfer  
- sftp <options>: to start an SFTP transfer  
- help: to display this information  
- quit: to exit this program

Press any action key to continue

PF01=Help PF03=Quit PF12=Exit



D72L304

VSEn SSH Client Suite

2025-09-25  
23:32:43

```
ssh -i DD:KEYFILE -l neale cts7xdev.devlab.sinenomine.net_
```

```
PF01=Help PF03=Quit PF12=Exit
```



d72L304

VSEn SSH Client - SNAPTERM

2025-09-25

23:33:15

SNAPTERM: Using username "neale".

Last login: Thu Sep 25 23:25:01 2025 from zvse63.devlab.sinomine.net

]0;neale@cts7xdev:~

[?1034h

[neale@cts7xdev ~]\$

---



```
[neale@cts7xdev ~]$  
ls --color=never -l test.*  
-rw-rw-r--. 1 neale neale 64800 Feb  2  2025 test.ascii  
-rw-rw-r--. 1 neale neale  116 May  8  2024 test.c  
-rw-r--r--. 1 neale neale 640000 Feb  4  2025 test.copy  
-rw-rw-r--. 1 neale neale 640000 Feb  2  2025 test.data  
-rw-r--r--. 1 neale neale  16320 Mar  4 20:17 test.data.2  
-rw-r--r--. 1 neale neale 640000 Jan 10  2023 test.data.new  
-rw-rw-r--. 1 neale neale  51 Apr 14  2025 test.file  
-rw-r--r--. 1 neale neale 640000 Feb  6  2025 test.file.bin  
-rw-r--r--. 1 neale neale  399 Dec  1  2020 test.rsapub  
-rw-rw-r--. 1 neale neale  777 May  8  2024 test.s  
]0;neale@cts7xdev:~  
[neale@cts7xdev ~]$
```



```
D72L304          VSEn SSH Client - SNAPSFTP          2026-06-01
                                                         13:17:13
SNAPSFTP: Using username "neale".
neale@cts7xdev.devlab.sinenomine.net's password:
-----
```

```
sftp -l neale -i DD:KEYFILE cts7xdev.devlab.sinenomine.net_
```

```
PF01=Help PF03=Quit PF12=Exit
```

```
D72L304          VSEn SSH Client - SNAPSFTP          2026-06-01
                                                         13:20:04
SNAPSFTP: Using username "neale".
Remote working directory is /home/neale
psftp>
-----
```



# Experimental GUI

- Web-based GUI
  - RXFS does not create 3270 until asked to display – kept as “intermediate representation (IR) ”
  - Unmodified code
  - IR is used to create HTML/CSS instead of 3270 datastream
  - Just set a parameter

```
// SETPARAM PWRJOB,WSADDR='IP:vsrv035.svc.sinenomine.net:8445'
```



# Experimental

- Relies on an agent written in python
  - Running on Linux host, or,
  - Running on CMS OE using experimental python support
- Same application different end-points:
  - RXFS detects if end-point is 3270 or GUI (falls back to 3270 if GUI not found)
  - Generates 3270 data stream or HTML/CSS



# VSEHELL GUI Agent

```
[neale@vsrv035 ~]$ ./wsServer.py
2026-06-01 14:21:13,542 - INFO - TLS context loaded successfully.
2026-06-01 14:21:13,557 - INFO - server listening on 0.0.0.0:8443
2026-06-01 14:21:13,557 - INFO - Main WSS server listening on wss://0.0.0.0:8443
2026-06-01 14:21:16,651 - INFO - connection open
2026-06-01 14:21:16,651 - INFO - [WSS_Handler] Active
2026-06-01 14:21:16,651 - INFO - [Bridge] New instance created for WSS client: 192.168.69.6:57633
2026-06-01 14:21:16,653 - INFO - [Bridge] Listeners running (TCP:8445 / TLS:8444).
2026-06-01 14:21:28,924 - INFO - [Bridge] TCP client requested connection to ('172.17.16.194', 4114)
2026-06-01 14:21:28,925 - INFO - [Bridge] TCP client connected: ('172.17.16.194', 4114)
2026-06-01 14:21:28,925 - INFO - [TCP->WSS] Client disconnected (Graceful).
2026-06-01 14:21:28,926 - INFO - [Bridge] Dedicated connection finished. Ready for new connection.
2026-06-01 14:21:28,937 - INFO - [Bridge] TCP client requested connection to ('172.17.16.194', 4115)
2026-06-01 14:21:28,937 - INFO - [Bridge] TCP client connected: ('172.17.16.194', 4115)
2026-06-01 14:23:59,111 - INFO - [TCP->WSS] Client disconnected (Graceful).
2026-06-01 14:23:59,111 - INFO - [Bridge] Dedicated connection finished. Ready for new connection.
2026-06-01 14:23:59,119 - INFO - [Bridge] TCP client requested connection to ('172.17.16.194', 4116)
2026-06-01 14:23:59,119 - INFO - [Bridge] TCP client connected: ('172.17.16.194', 4116)
2026-06-01 14:24:44,492 - INFO - [TCP->WSS] Client disconnected (Graceful).
2026-06-01 14:24:44,493 - INFO - [Bridge] Dedicated connection finished. Ready for new connection.
2026-06-01 14:24:44,501 - INFO - [Bridge] TCP client requested connection to ('172.17.16.194', 4117)
2026-06-01 14:24:44,501 - INFO - [Bridge] TCP client connected: ('172.17.16.194', 4117)
```

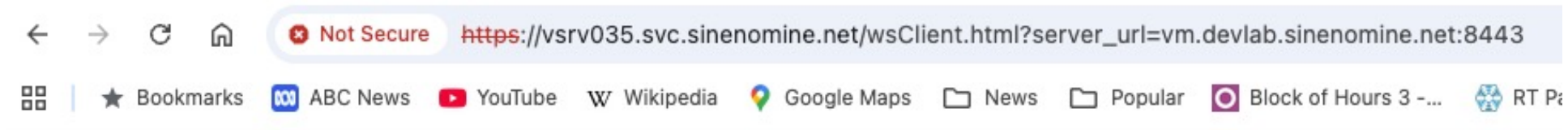


## VSEHELL GUI Agent

```
python wsServer.py
2026-06-02 19:14:02,244 - INFO - TLS context loaded successfully.
2026-06-02 19:14:06,857 - INFO - server listening on 0.0.0.0:8443
2026-06-02 19:14:06,859 - INFO - Main WSS server listening on wss://0.0.0.0:8443
2026-06-02 19:14:22,257 - INFO - connection open
2026-06-02 19:14:22,261 - INFO - [WSS_Handler] Active
2026-06-02 19:14:22,263 - INFO - [Bridge] New instance created for WSS client: 192.168.69.6:56957
2026-06-02 19:14:30,298 - INFO - [Bridge] Listeners running (TCP:8445 / TLS:8444).
2026-06-02 19:14:43,909 - INFO - [Bridge] TCP client requested connection to ('172.17.16.194', 4125)
2026-06-02 19:14:43,913 - INFO - [Bridge] TCP client connected: ('172.17.16.194', 4125)
2026-06-02 19:14:43,920 - INFO - [TCP->WSS] Client disconnected (Graceful).
2026-06-02 19:14:43,928 - INFO - [Bridge] Dedicated connection finished. Ready for new connection.
2026-06-02 19:14:43,930 - INFO - [Bridge] TCP client requested connection to ('172.17.16.194', 4126)
2026-06-02 19:14:43,931 - INFO - [Bridge] TCP client connected: ('172.17.16.194', 4126)
```



# VSEHELL GUI Mode



**Connected to WebSocket Server**



PF01	PF02	PF03	PF04	PF05	PF06	PF07	PF08	PF09	PF10	PF11	PF12	CLEAR			
PF13	PF14	PF15	PF16	PF17	PF18	PF19	PF20	PF21	PF22	PF23	PF24	PA1	PA2	PA3	

VSEn SSH Client Suite

2026-06-01  
14:21:55


PF01=Help PF03=Quit PF12=Exit

VM Workshop



# VSEHELL GUI

- Help is available as pop-up window like the 3270 mode

## Help

Enter one of these commands and options:

- ssh : to start an SSH session
- scp : to start an SCP transfer
- sftp : to start an SFTP transfer
- help: to display this information
- quit: to exit this program

Press any action key to continue



# VSEHELL

- Invoke SFTP using a keyfile and specifying a user (otherwise you get logged on as “nobody”):

```
sftp -i DD:KEYFILE -l neale.cts7xdev.devlab.sinenomine.net
```

PF01=Help PF03=Quit PF12=Exit



# VSEHELL GUI

- You are now in a session with SFTP server

VSEn SSH Client - SNAPSFTP

2026-06-01  
14:25:27

SNAPSFTP: Using username "neale".

Remote working directory is /home/neale

psftp>

ls test.\*

Listing directory /home/neale

-rw-rw-r-- 1 neale neale 64800 Feb 2 2025 test.ascii

-rw-rw-r-- 1 neale neale 116 May 8 2024 test.c

-rw-r--r-- 1 neale neale 640000 Feb 4 2025 test.copy

-rw-rw-r-- 1 neale neale 640000 Feb 2 2025 test.data

-rw-r--r-- 1 neale neale 640000 Jan 10 2023 test.data.new

-rw-r--r-- 1 neale neale 16320 Mar 4 20:17 test.data.2

-rw-rw-r-- 1 neale neale 51 Apr 14 2025 test.file

-rw-r--r-- 1 neale neale 640000 Feb 6 2025 test.file.bin

-rw-r--r-- 1 neale neale 399 Dec 1 2020 test.rsapub

-rw-rw-r-- 1 neale neale 777 May 8 2024 test.s

psftp>

---



# VSEHELL GUI

- When finished press exit

exit

Press Any Key to continue

---

- You will drop back to main screen

VSEn SSH Client Suite

2026-06-04  
15:57:33

sftp -i DD:KEYFILE -l neale cts7xdev.devlab.sinenomine.net  
Command Complete

---



# Final Thoughts

- Other features

- Log kept of command issued

```
// EXEC SNASHELL,SIZE=AUTO
1S54I  PHASE SNASHELL IS TO BE FETCHED FROM SSSLIB.CMDS
sftp -i DD:KEYFILE -l neale cts7xdev.devlab.sinenomine.net
Command Complete
sftp -i DD:KEYFILE -l neale cts7xdev.devlab.sinenomine.net
Command Complete
1S55I  LAST RETURN CODE WAS 0000
```

- Further development

- Dynamic allocation
- Additional language bindings