



Rexx LA Symposium 2021 - H2

Database JDBC API with NetRexx and BSF4ooRexx

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Features of the H2 Java Database - I

- **Main Features**

- Java Based
- Very Fast Performance
- Open Source
- JDBC API Support (Subject of this Presentation)
- Based on PostGres DBMS Network Protocol for ODBC
- Embedded, Server and In-Memory Database Options
- Web Browser Based Admin Console Application
- Small Footprint; 2MB Jar File

Features of the H2 Java Database - II

- **Additional Features**

- Transaction Processing Support (read committed)
- Two Phase Commit Processing Capable (with autocommit off)
- Allows Multiple Database Connections
- Table Level Database Locking
- Supports AES Database Encryption
- SHA-256 Password Encryption; SSL Support
- Supports Referential Integrity and Foreign Keys
- DB Engine Support for Compatibility with Other DBMS Jar Files (HSQLDB, Derby, Postgres, Oracle, MS SQL and other DBMS)
- CSV File Support

Table of Features Compared to Other Open Source DBMS

Feature	H2	Derby	HSQLDB	MySQL	Postgres
Pure Java	Yes	Yes	Yes	No	No
Memory Mode	Yes	Yes	Yes	No	No
Encrypted Database	Yes	Yes	Yes	No	No
ODBC Driver	Yes	No	No	Yes	Yes
Fulltext Search	Yes	No	No	Yes	Yes
Multi Version Concurrency	Yes	No	Yes	Yes	Yes
Footprint (Embedded)	2 MB	3 MB	1.5 MB	--	--
Footprint (Client)	500 KB	600 KB	1.5 MB	1 MB	700 KB

H2 Development History

- **Project Start: May 2004**
- **First Published: December 2005**
- **Author: Thomas Mueller; also the original developer of what would become HSQLDB**
- **H2 : Hypersonic 2**
- **H2 does not share code with Hypersonic 1 (Commercial Product) or HSQLDB (Open Source)**

Why Java Based?

- **Facilitates integration with Java Applications**
- **Multi Platform Support**
 - Demo programs from Linux, Windows and FreeBSD
- **Multiple Architectures**
 - Demos programs tested for Intel and RPi4 CPUs in this presentation
- **More secure than native applications (no buffer overflows)**
- **Unicode Support**
- **Portable: Minimal Dependence on Hardware Dependent Libraries**

System Requirements

- **OS Platforms Supported**

- Windows 7, 8 and 10
- Mac OS X
- Most Linux Implementations
- FreeBSD

- **Java**

- Oracle 7 or Later (8 will be used in this presentation)

- **Web Browsers Tested**

- Firefox (Default)
- Chrome (Chromium)

Installation of H2 DBMS

- **Windows**

- Download and Run the .exe Installer

- **Debian Linux**

- Install Package: h2
 - `sudo apt install h2`

- **Other Platforms**

- Download and Extract the .zip Archive

- **Current Zip Archive Releases**

- **Latest:** Version 1.4.200 (2019-10-14)
- **Stable:** Version 1.4.199 (2019-03-13), Last Stable

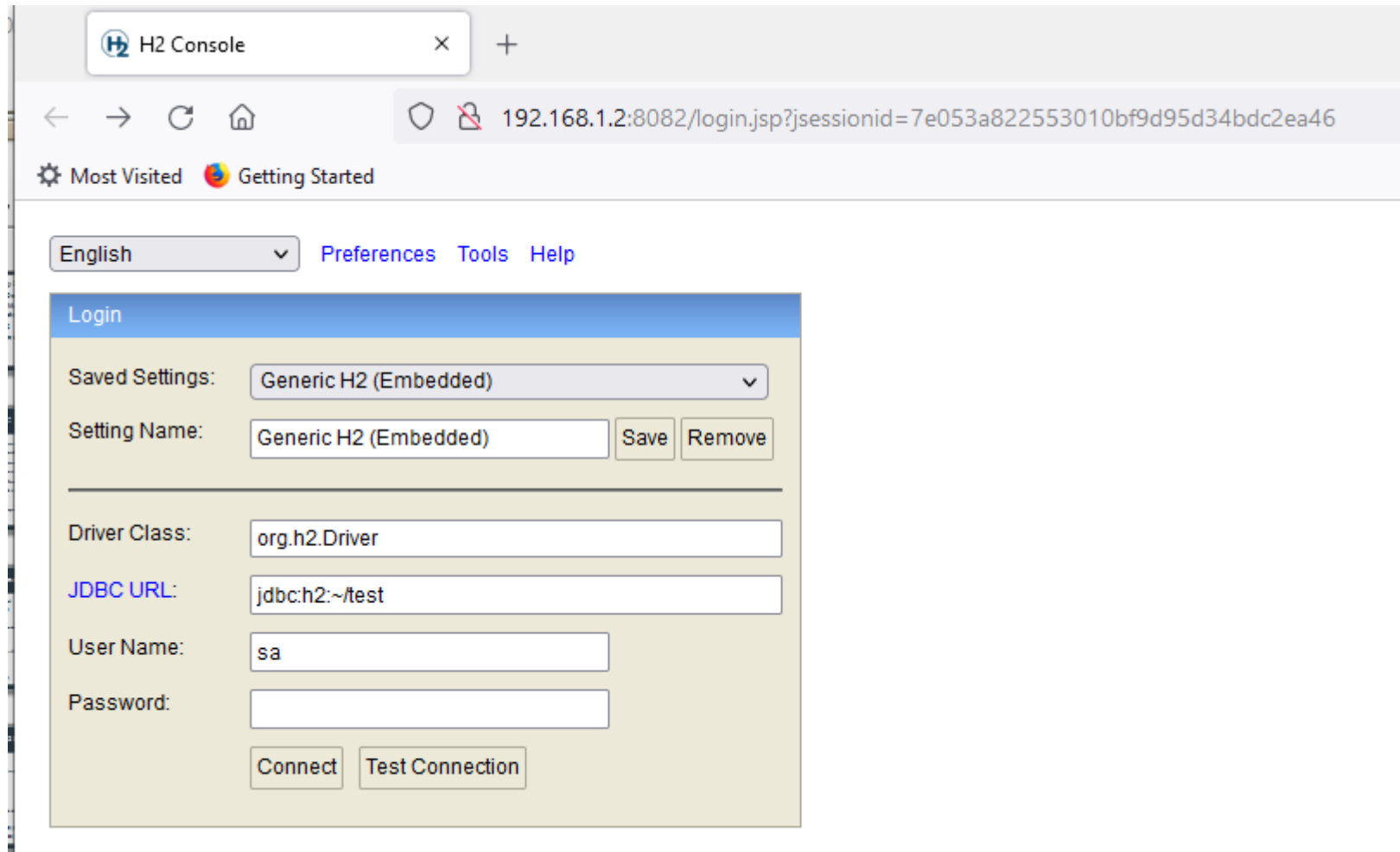
Java Based H2 Tutorials

- **Tutorials for H2 DBMS Use & API with Java Code Examples**
 - H2Database.com Website Tutorial
 - **URL:** <https://h2database.com/html/tutorial.html>
 - Tutorials Point Website – Learn H2 Database for Absolute Beginners
 - **URL:** https://www.tutorialspoint.com/h2_database/index.htm
 - Baeldung – Spring Boot with H2 Database
 - **URL:** <https://www.baeldung.com/spring-boot-h2-database>

Accessing the H2 Database Console

- **Copy H2 Jar File to Classpath to JAVA_HOME Library Extensions Directory (Requires Setup of JAVA_HOME Environment Variable)**
 - **Linux:** `sudo cp h2*.jar $JAVA_HOME/jre/lib/ext`
 - **Windows:** `copy h2*.jar %JAVA_HOME%\jre\lib\ext`
- **Disregard Using the Shell or BAT File or Start Menu for Console Startup**
- **Recommendation: Use Java Jar File Startup from Shell Console**
 - From Directory where h2*.jar File Exists ...
 - `java -jar h2<Version>.jar`
- **Startup the H2 Jar File Where JAVA_HOME Environment is Set**
 - `Java -jar %JAVA_HOME%\jre\lib\ext\h2-1.4.199.jar <Enter> {Stable Windows}`
 - `Java -jar $JAVA_HOME/jre/lib/ext/h2-1.4-200.jar <Enter> {Latest Linux}`
- **Web Browser Should Start Pointing to the Following URL:**
 - <http://localhost:8082> {Windows} <http://127.0.1.1:8082> {RaspPi OS Linux}

Windows - H2 Console Login Sample Firefox



Logging In to “test” Database

- For additional details on Getting Started refer to URL:
<https://www.h2database.com/html/quickstart.html>
- The “**sa**” User ID does not have a Password after the initial install
- You can click the “Connect” button to connect and initialize the “**~/test**” database (DB stored in User Directory; Linux: \$HOME Windows: %HOMEPATH%)
- Default Option is to Create an **H2 Embedded Database** Named: **test**
- After connecting one should get the following screen on the next slide ...

Windows 10 - H2 Web Console - Start Menu

jdbc:h2:~/test

- INFORMATION_SCHEMA
- Users
- H2 1.4.199 (2019-03-13)

Run Run Selected Auto complete Clear SQL statement:

Important Commands

?		Displays this Help Page
		Shows the Command History
▶	Ctrl+Enter	Executes the current SQL statement
▶	Shift+Enter	Executes the SQL statement defined by the text selection
	Ctrl+Space	Auto complete
🔌		Disconnects from the database

Sample SQL Script

Delete the table if it exists	DROP TABLE IF EXISTS TEST;
Create a new table with ID and NAME columns	CREATE TABLE TEST(ID INT PRIMARY KEY, NAME VARCHAR(255));
Add a new row	INSERT INTO TEST VALUES(1, 'Hello');
Add another row	INSERT INTO TEST VALUES(2, 'World');
Query the table	SELECT * FROM TEST ORDER BY ID;
Change data in a row	UPDATE TEST SET NAME='Hi' WHERE ID=1;
Remove a row	DELETE FROM TEST WHERE ID=2;

H2 Console - User Administration

SQL Examples

- **SQL Syntax - Set a Password for User: SA**
 - ALTER USER SA SET PASSWORD 'MyPassword'
- **SQL Syntax - Add a New User with ADMIN Rights**
 - CREATE USER H2USER PASSWORD 'H2Password' ADMIN
- **SQL Syntax - Remove ADMIN Rights from USER**
 - ALTER USER H2USER ADMIN FALSE
- **SQL Syntax - Add ADMIN Rights to USER**
 - ALTER USER H2USER ADMIN TRUE

H2 Console - Users With Admin Example

H2 Console - Mozilla Firefox

H2 Console x H2 Console x +

127.0.1.1:8082/login.do?jsessionid=83a9fa101fb8812d0f79...

Auto commit Max rows: 1000 Auto complete: Off Auto select: On

jdbc:h2:~/test

- INFORMATION_SCHEMA
- Users
 - SA
 - Admin
 - TONYD
 - Admin

H2 1.4.199 (2019-03-13)

Run Run Selected Auto complete Clear SQL statement:

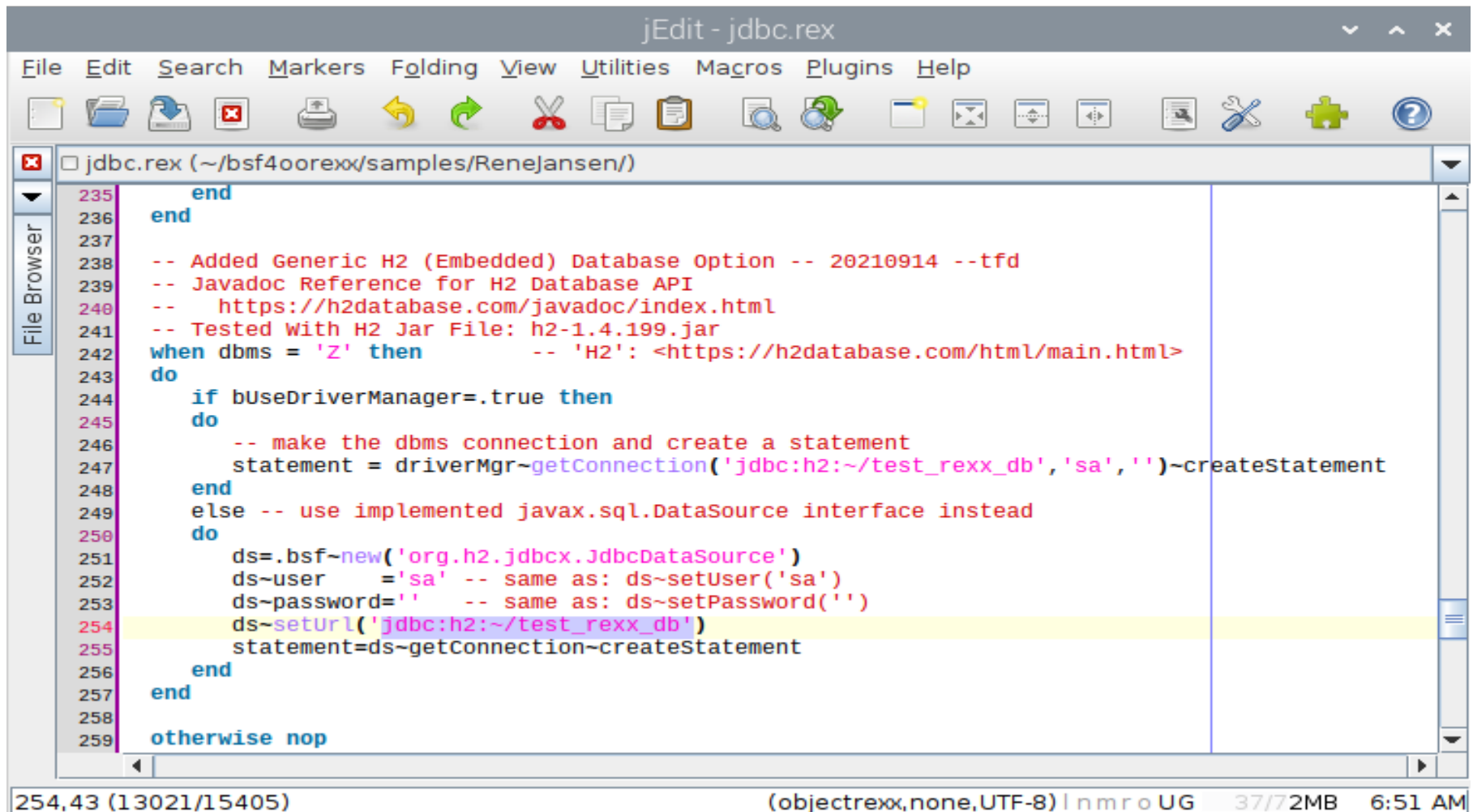
```
ALTER USER TONYD ADMIN TRUE
```

ALTER USER TONYD ADMIN TRUE;
Update count: 0
(3 ms)

BSF4ooRexx Sample - jdbc.rex

- **Part of the Sample Programs Included in the BSF4ooRexx Installation Initially Contributed by Rene` Jansen**
- **Program has been modified to Add A New Option, 'Z', for Creating a H2 Embedded DB, Adding and Displaying DB Rows using either a JDBC Driver Manager or Datasource**
- **Revision Included in Samples for Latest BSF4ooRexx Release on SourceForge**
- **Core Code Modification Snippet Follows ...**

BSF4ooRexx Sample - Core Code



```
jEdit - jdbc.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
jdbc.rex (~/bsf4ooorex/samples/ReneJansen/)
235     end
236   end
237
238   -- Added Generic H2 (Embedded) Database Option -- 20210914 --tfd
239   -- Javadoc Reference for H2 Database API
240   -- https://h2database.com/javadoc/index.html
241   -- Tested With H2 Jar File: h2-1.4.199.jar
242   when dbms = 'Z' then          -- 'H2': <https://h2database.com/html/main.html>
243   do
244     if bUseDriverManager=.true then
245     do
246       -- make the dbms connection and create a statement
247       statement = driverMgr~getConnection('jdbc:h2:~/test_rexx_db','sa','')~createStatement
248     end
249     else -- use implemented javax.sql.DataSource interface instead
250     do
251       ds=.bsf~new('org.h2.jdbcx.JdbcDataSource')
252       ds~user      ='sa' -- same as: ds~setUser('sa')
253       ds~password  =' ' -- same as: ds~setPassword(' ')
254       ds~setUrl('jdbc:h2:~/test_rexx_db')
255       statement=ds~getConnection~createStatement
256     end
257   end
258
259   otherwise nop
254,43 (13021/15405) (objectrexx,none,UTF-8) | nmro UG 37/72MB 6:51 AM
```

BSF4ooRexx Sample - jdbc.rex Run

- **Linux Syntax:**

- **sh ./rexxj2.sh jdbc.rex Z M**
 - (Use the JDBC Driver Manager)
- **sh ./rexxj2.sh jdbc.rex Z S**
 - (User the JDBC Data Source)

- **Windows Syntax:**

- **rexxj2.cmd jdbc.rex Z M**
- **rexxj2.cmd jdbc.rex Z S**

- **H2 DB Specifics:**

- Embedded Generic H2 Database
- **URL:**
 - jdbc:h2:~/test_rexx_db

BSF4ooRexx Sample - jdbc.rex

- **Run Using JDBC Datasource Option**

```
pi@CyberMonday: ~/bsf4oorexx/source
File Edit Tabs Help
pi@CyberMonday:~/bsf4oorexx/source $ sh ./rexj2.sh jdbc.rex Z S
./rexj2.sh: 32: [: unexpected operator
... using environment variable 'BSF4Rexx_JavaStartupOptions' to configure Java:
[]
... kind=[S] therefore using 'javax.sql.DataSource' for connecting ...
... using JDBC statement object: [org.h2.jdbc.JdbcStatement@56aac163]

[Jeff Hennick] from [Fort Myers, FL, USA]
[Lee Peedin] from [Wallace, NC, USA]
[Rene Jansen] from [Amsterdam, Netherlands]
[Rony G. Flatscher] from [Vienna, Austria]

BSF4ooRexx has probably at least 4 fans! (Using alias name 'Total_Fans' as argument.)
BSF4ooRexx has probably at least 4 fans! (Using positional argument.)
pi@CyberMonday:~/bsf4oorexx/source $
```

H2 Embedded DB - Creating a Sample Database - I

- **Database Name: `rpi4osinvdb` - DB Collection of OS Inventory, SDCard, Storage Cases, System Update and Backup Date Info for Raspberry Pi 4 SBCs**
- **4 DB Tables**
 - **`rpi4osarchs`** - OS Architectures for the RPi4 SBC
 - **`sdcards`** - SDHC Data Storage Cards
 - **`rpi4cases`** - Hardware Storage Cases for RPi4 SBC
 - **`rpi4osinfo`** - Operating System Information

H2 Embedded DB - Creating a Sample Database - II

- **DB API Properties & Language Tech Stack Versions**
 - **Format:** H2 Embedded Database
 - **JDBC Driver Class:** org.h2.Driver
 - **Jar File:** h2-1.4.199.jar {Stable Version}
 - **Java JDK:** Oracle JDK 8 or OpenJDK 8 (1.8)
 - **ooRexx:** Version 5.0 Beta
 - **NetRexx:** v3.09GA
 - **BSF4ooRexx:** v641

H2 Embedded DB - Creating a Sample Database - III

- **DB Create Program**

- **Program Name:**

- createrpi4osinvh2db.rex

- **Language:** BSF4ooRexx

- **Program Short Description:**

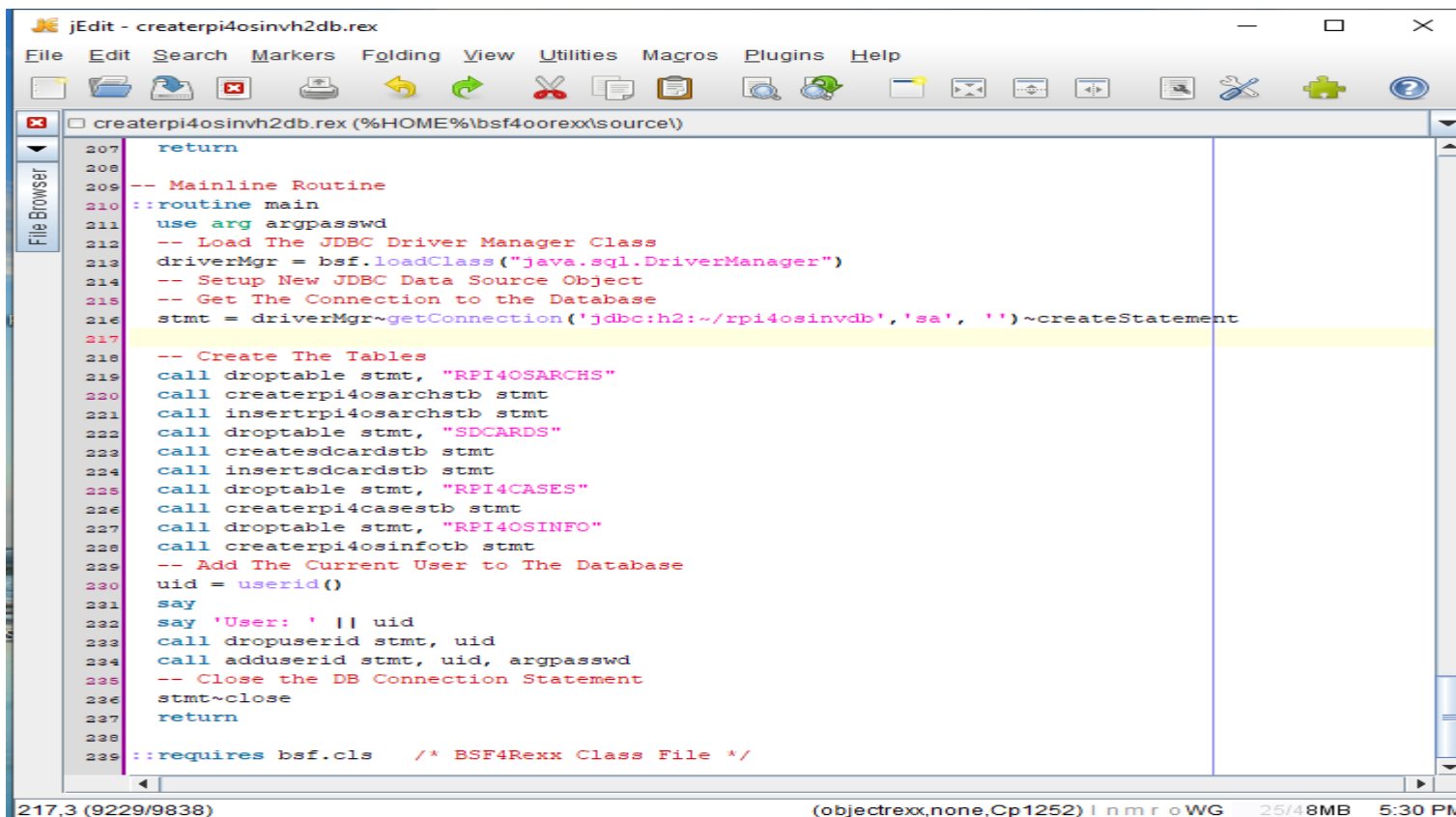
- Create a H2 Embedded Database: **rpi4osinvdb**
 - Set a password for the the currently logged in user
 - Create 4 Database Tables:
 - **rpi4osarchs** - OS Architectures for RPi4
 - **sdcards** - SDHC Storage Cards Data
 - **rpi4cases** - HW Storage Cases for RPi4 SBC
 - **rpi4osinfo** - Operating System Information

H2 Embedded DB - Creating a Sample Database - IV

- **More JDBC API Details for Program**
 - **JDBC Driver Manager** will be used to Provide Connection Properties
 - SQL **CREATE TABLE** DDL Statements will be used to Create the 4 Tables
 - SQL **CREATE USER** with Password Specified on The Command Line
 - New User will have **ADMIN** authority
 - JDBC Connection will Be Closed

H2 Embedded DB - Creating a Sample Database - V

- Program: `createrpi4osinvh2db.rex` (Main Routine)



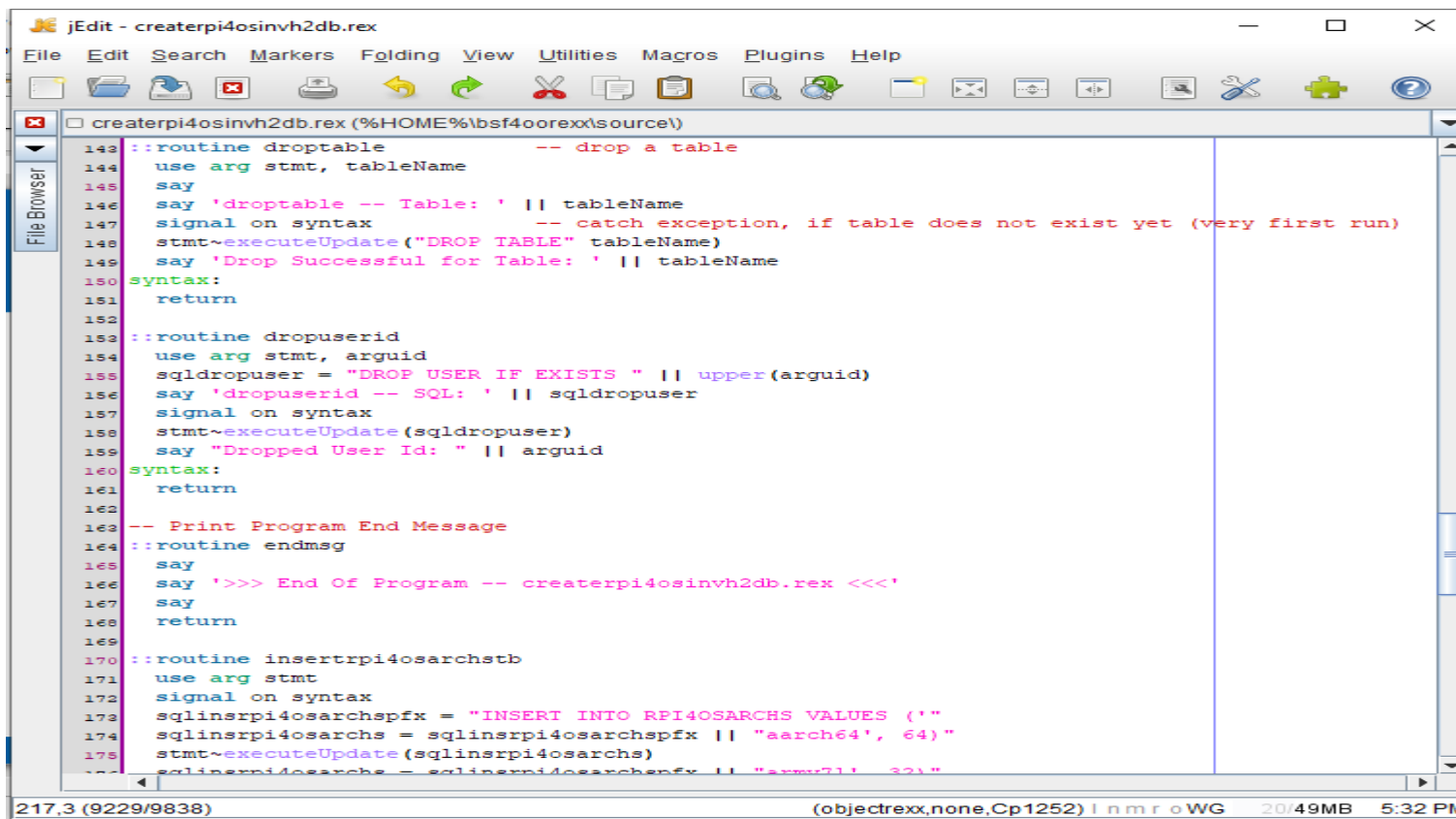
```
jEdit - createrpi4osinvh2db.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
createrpi4osinvh2db.rex (%HOME%\bsf4oorex\source\)
```

```
207 return
208
209 -- Mainline Routine
210 ::routine main
211 use arg argpasswd
212 -- Load The JDBC Driver Manager Class
213 driverMgr = bsf.loadClass("java.sql.DriverManager")
214 -- Setup New JDBC Data Source Object
215 -- Get The Connection to the Database
216 stmt = driverMgr~getConnection('jdbc:h2:~/rpi4osinvdb','sa','')~createStatement
217
218 -- Create The Tables
219 call droptable stmt, "RPI4OSARCHS"
220 call createrpi4osarchstb stmt
221 call insertrpi4osarchstb stmt
222 call droptable stmt, "SDCARDS"
223 call createsdcardstb stmt
224 call insertsdcardstb stmt
225 call droptable stmt, "RPI4CASES"
226 call createrpi4casestb stmt
227 call droptable stmt, "RPI4OSINFO"
228 call createrpi4osinfotb stmt
229 -- Add The Current User to The Database
230 uid = userid()
231 say 'User: ' || uid
232 call dropuserid stmt, uid
233 call adduserid stmt, uid, argpasswd
234 -- Close the DB Connection Statement
235 stmt~close
236 return
237
238
239 ::requires bsf.cls /* BSF4Rexx Class File */
```

217.3 (9229/9838) (objectrex.none,Cp1252) | n m r o W G 25/48MB 5:30 PM

H2 Embedded DB - Creating a Sample Database - VI

- **createrpi4osinvh2db.rex (SQL Drop Table & Drop User)**



```
jEdit - createrpi4osinvh2db.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
createrpi4osinvh2db.rex (%HOME%\bsf4ooorex\source\)
```

```
143 ::routine droptable -- drop a table
144 use arg stmt, tableName
145 say
146 say 'droptable -- Table: ' || tableName
147 signal on syntax -- catch exception, if table does not exist yet (very first run)
148 stmt~executeUpdate("DROP TABLE" tableName)
149 say 'Drop Successful for Table: ' || tableName
150 syntax:
151 return
152
153 ::routine dropuserid
154 use arg stmt, arguid
155 sqldropuser = "DROP USER IF EXISTS " || upper(arguid)
156 say 'dropuserid -- SQL: ' || sqldropuser
157 signal on syntax
158 stmt~executeUpdate(sqldropuser)
159 say "Dropped User Id: " || arguid
160 syntax:
161 return
162
163 -- Print Program End Message
164 ::routine endmsg
165 say
166 say '>>> End Of Program -- createrpi4osinvh2db.rex <<<'
167 say
168 return
169
170 ::routine insertrpi4osarchstb
171 use arg stmt
172 signal on syntax
173 sqlinsrpi4osarchspfx = "INSERT INTO RPI4OSARCHS VALUES ('"
174 sqlinsrpi4osarchs = sqlinsrpi4osarchspfx || "aarch64', 64)"
175 stmt~executeUpdate(sqlinsrpi4osarchs)
176 sqlinsrpi4osarchs = sqlinsrpi4osarchspfx || "axmx71', 32)"
```

217,3 (9229/9838) (objectrex,none,Cp1252) | n m r o W G 20/49MB 5:32 PM

H2 Embedded DB - Creating a Sample Database - VII

- **createrpi4osinvh2db.rex (SQL Create Table Routines)**

```
89
90 ::routine createrpi4cases
91 use arg stmt
92 sqlcreaterpi4cases = "CREATE TABLE RPI4CASES (casemnem varchar(3) primary key, casemfr varchar(50) not NULL, "
93 sqlcreaterpi4cases = sqlcreaterpi4cases || "casedesc varchar(50) not NULL, rpi4casecolor varchar(50) not NULL, "
94 sqlcreaterpi4cases = sqlcreaterpi4cases || "rpi4bcmemsize varchar(50) not NULL, rpi4bodesc varchar(50) not NULL, "
95 sqlcreaterpi4cases = sqlcreaterpi4cases || "PRIMARY KEY(casemnem))"
96 say 'createrpi4cases -- SQL:'
97 say sqlcreaterpi4cases
98 signal on syntax
99 stmt~executeUpdate(sqlcreaterpi4cases)
100 say 'Table: rpi4cases Created Successfully!'
101 syntax:
102 return
103
104 ::routine createrpi4osarch
105 use arg stmt
106 sqlcreaterpi4osarch = "CREATE TABLE RPI4OSARCHS (rpi4arch varchar(50) not NULL, bitness INTEGER not NULL, "
107 sqlcreaterpi4osarch = sqlcreaterpi4osarch || "PRIMARY KEY (rpi4arch))"
108 say 'createrpi4osarch -- SQL:'
109 say sqlcreaterpi4osarch
110 signal on syntax
111 stmt~executeUpdate(sqlcreaterpi4osarch)
112 say 'Table: rpi4osarchs Created Successfully!'
113 syntax:
114 return
115
116 ::routine createrpi4osinfo
117 use arg stmt
118 sqlcreaterpi4osinfo = "CREATE TABLE RPI4OSINFO (rpiosid INTEGER not NULL, rpiosname varchar(50) not NULL, rpiosdistro varchar(50) not null, "
119 sqlcreaterpi4osinfo = sqlcreaterpi4osinfo || "rpiosfamily varchar(10) not NULL, rpi4arch varchar(10) not null, "
120 sqlcreaterpi4osinfo = sqlcreaterpi4osinfo || "lastuptdtdt varchar(10) NULL, lastbkupdt varchar(10) NULL, "
121 sqlcreaterpi4osinfo = sqlcreaterpi4osinfo || "casemnem varchar(3) not NULL, sdcardid INTEGER not NULL, "
122 sqlcreaterpi4osinfo = sqlcreaterpi4osinfo || "sdcusepnts INTEGER null PRIMARY KEY (rpiosid))"
```

H2 Embedded DB - Creating a Sample Database - VIII

- **createrpi4osinvh2db.rex (SQL Insert Table Routines)**

```
jEdit - createrpi4osinvh2db.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
createrpi4osinvh2db.rex (%HOME%\bsf40orex\source\)
```

```
170 ::routine insertрпи4osarchstb
171 use arg stmt
172 signal on syntax
173 sqlinsрпи4osarchspfx = "INSERT INTO RPI4OSARCHS VALUES ('"
174 sqlinsрпи4osarchs = sqlinsрпи4osarchspfx || "aarch64', 64)"
175 stmt~executeUpdate(sqlinsрпи4osarchs)
176 sqlinsрпи4osarchs = sqlinsрпи4osarchspfx || "armv71', 32)"
177 stmt~executeUpdate(sqlinsрпи4osarchs)
178 sqlinsрпи4osarchs = sqlinsрпи4osarchspfx || "arm64', 64)"
179 stmt~executeUpdate(sqlinsрпи4osarchs)
180 say '3 rpiosarchs Table Rows Inserted!'
181 syntax:
182 return
183
184 ::routine insertsdcardstb
185 use arg stmt
186 signal on syntax
187 sqlinssdcardspfx = "INSERT INTO SDCARDS VALUES ("
188 vals = "1, 'Samsung', 'EVO Plus microSDXC UHS-I Card with Adapter', '64GB'"
189 sqlinssdcards = sqlinssdcardspfx || vals
190 stmt~executeUpdate(sqlinssdcards)
191 vals = "2, 'Samsung', 'EVO Plus microSDXC UHS-I Card with Adapter', '32GB'"
192 sqlinssdcards = sqlinssdcardspfx || vals
193 stmt~executeUpdate(sqlinssdcards)
194 vals = "3, 'Samsung', 'EVO Select microSDXC UHS-I Card with Adapter', '64GB'"
195 sqlinssdcards = sqlinssdcardspfx || vals
196 stmt~executeUpdate(sqlinssdcards)
197 vals = "4, 'Verbatim', 'Carte Premium microSDHC Card with Adapter', '32GB'"
198 sqlinssdcards = sqlinssdcardspfx || vals
199 stmt~executeUpdate(sqlinssdcards)
200 vals = "5, 'Samsung', 'EVO Select microSDXC UHS-I Card with Adapter', '32GB'"
201 sqlinssdcards = sqlinssdcardspfx || vals
202 stmt~executeUpdate(sqlinssdcards)
203 vals = "6, 'Samsung', 'EVO Select microSDXC UHS-I Card with Adapter', '128GB'"
204 sqlinssdcards = sqlinssdcardspfx || vals
205 stmt~executeUpdate(sqlinssdcards)
206 say '6 sdcard Table Rows Inserted!'
207 syntax:
208 return
```

217,3 (9229/9838) (objectrexx.none,Cp1252) | n m r o W G 47/83MB 5:43 PM

H2 Embedded DB - Creating a Sample Database - IX

- **createrpi4osinvh2db.rex (SQL Insert Table Routines)**

```
jEdit - createrpi4osinvh2db.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
createrpi4osinvh2db.rex (%HOME%\bsf4oorex\source\)
```

```
170 ::routine insertрпи4осarchstb
171 use arg stmt
172 signal on syntax
173 sqlinsрпи4осarchspfx = "INSERT INTO RPI4OSARCHS VALUES ('"
174 sqlinsрпи4осarchs = sqlinsрпи4осarchspfx || "aarch64', 64)"
175 stmt~executeUpdate(sqlinsрпи4осarchs)
176 sqlinsрпи4осarchspfx = sqlinsрпи4осarchspfx || "armv71', 32)"
177 stmt~executeUpdate(sqlinsрпи4осarchs)
178 sqlinsрпи4осarchspfx = sqlinsрпи4осarchspfx || "arm64', 64)"
179 stmt~executeUpdate(sqlinsрпи4осarchs)
180 say '3 rpiosarchs Table Rows Inserted!'
181 syntax:
182 return
183
184 ::routine insertsdcardstb
185 use arg stmt
186 signal on syntax
187 sqlinssdcardspfx = "INSERT INTO SDCARDS VALUES ("
188 vals = "1, 'Samsung', 'EVO Plus microSDXC UHS-I Card with Adapter', '64GB'"
189 sqlinssdcards = sqlinssdcardspfx || vals
190 stmt~executeUpdate(sqlinssdcards)
191 vals = "2, 'Samsung', 'EVO Plus microSDXC UHS-I Card with Adapter', '32GB'"
192 sqlinssdcards = sqlinssdcardspfx || vals
193 stmt~executeUpdate(sqlinssdcards)
194 vals = "3, 'Samsung', 'EVO Select microSDXC UHS-I Card with Adapter', '64GB'"
195 sqlinssdcards = sqlinssdcardspfx || vals
196 stmt~executeUpdate(sqlinssdcards)
197 vals = "4, 'Verbatim', 'Carte Premium microSDHC Card with Adapter', '32GB'"
198 sqlinssdcards = sqlinssdcardspfx || vals
199 stmt~executeUpdate(sqlinssdcards)
200 vals = "5, 'Samsung', 'EVO Select microSDXC UHS-I Card with Adapter', '32GB'"
201 sqlinssdcards = sqlinssdcardspfx || vals
202 stmt~executeUpdate(sqlinssdcards)
203 vals = "6, 'Samsung', 'EVO Select microSDXC UHS-I Card with Adapter', '128GB'"
204 stmt~executeUpdate(sqlinssdcards)
205 say '6 sdcard Table Rows Inserted!'
206 syntax:
207 return
208
```

217,3 (9229/9838) (objectrexx.none,Cp1252) | nmr oWG 47/83MB 5:43 PM

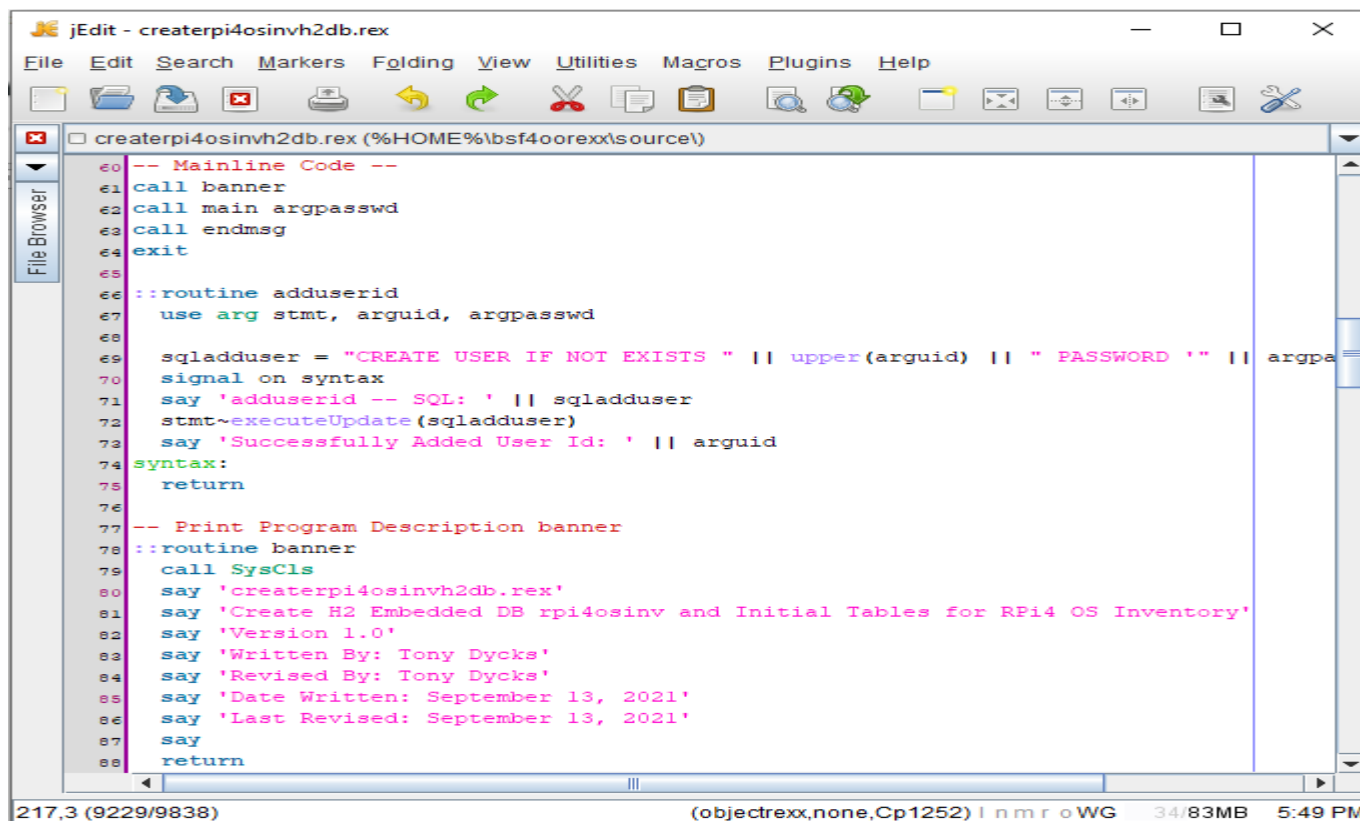
H2 Embedded DB - Creating a Sample Database - X

- **createrpi4osinvh2db.rex (SQL Alter Table Foreign Keys Routine)**

```
jEdit - createrpi4osinvh2db.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
createrpi4osinvh2db.rex (%HOME%\bsf4oorexx\source)
170 ::routine foreignkeysrpi4osinfotb
171 use arg stmt
172 altercnt = 0
173 -- RPIARCH FOREIGN KEY
174 sqlalterrpi4osinfo = "ALTER TABLE RPI4OSINFO ADD FOREIGN KEY (RPIARCH) "
175 sqlalterrpi4osinfo = sqlalterrpi4osinfo || "REFERENCES RPI4OSARCHS (RPIARCH)"
176 say 'foreignkeysrpi4osinfotb -- SQL:'
177 say sqlalterrpi4osinfo
178 signal on syntax
179 stmt~executeUpdate(sqlalterrpi4osinfo)
180 say 'Table: rpi4osinfo Altered for Column RPIARCH Successfully!'
181 altercnt = altercnt + 1
182 -- CASEMNEM FOREIGN KEY
183 sqlalterrpi4osinfo = "ALTER TABLE RPI4OSINFO ADD FOREIGN KEY (CASEMNEM) "
184 sqlalterrpi4osinfo = sqlalterrpi4osinfo || "REFERENCES RPI4CASES (CASEMNEM)"
185 say 'foreignkeysrpi4osinfotb -- SQL:'
186 say sqlalterrpi4osinfo
187 signal on syntax
188 stmt~executeUpdate(sqlalterrpi4osinfo)
189 say 'Table: rpi4osinfo Altered for Column CASEMNEM Successfully!'
190 altercnt = altercnt + 1
191 -- SDCARDID FOREIGN KEY
192 sqlalterrpi4osinfo = "ALTER TABLE RPI4OSINFO ADD FOREIGN KEY (SDCARDID) "
193 sqlalterrpi4osinfo = sqlalterrpi4osinfo || "REFERENCES SDCARDS (SDCARDID)"
194 say 'foreignkeysrpi4osinfotb -- SQL:'
195 say sqlalterrpi4osinfo
196 signal on syntax
197 stmt~executeUpdate(sqlalterrpi4osinfo)
198 say 'Table: rpi4osinfo Altered for Column SDCARDID Successfully!'
199 altercnt = altercnt + 1
200 syntax:
201 if altercnt < 3 then
202 do
203 say 'Not All Foreign Key Constraints Were Added!'
199,26 (8605/11547) (objectrexx.none,Cp1252) | n m r o W G 27/52MB 9:47 AM
```

H2 Embedded DB - Creating a Sample Database - XI

- **createrpi4osinvh2db.rex (SQL Add User Routine)**



```
jEdit - createrpi4osinvh2db.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
createrpi4osinvh2db.rex (%HOME%\bsf4oorex\source\
60 -- Mainline Code --
61 call banner
62 call main argpasswd
63 call endmsg
64 exit
65
66 ::routine adduserid
67   use arg stmt, arguid, argpasswd
68
69   sqladduser = "CREATE USER IF NOT EXISTS " || upper(arguid) || " PASSWORD '" || argpa
70   signal on syntax
71   say 'adduserid -- SQL: ' || sqladduser
72   stmt~executeUpdate(sqladduser)
73   say 'Successfully Added User Id: ' || arguid
74 syntax:
75   return
76
77 -- Print Program Description banner
78 ::routine banner
79   call SysCls
80   say 'createrpi4osinvh2db.rex'
81   say 'Create H2 Embedded DB rpi4osinv and Initial Tables for RPi4 OS Inventory'
82   say 'Version 1.0'
83   say 'Written By: Tony Dycks'
84   say 'Revised By: Tony Dycks'
85   say 'Date Written: September 13, 2021'
86   say 'Last Revised: September 13, 2021'
87   say
88   return
217.3 (9229/9838) (objectrexx,none,Cp1252) | n m r o W G 34.83MB 5:49 PM
```

H2 Embedded DB - Creating a Sample Database - XII

- **createrpi4osinvh2db.rex (Run Output)**

```
Command Prompt
createrpi4osinvh2db.rex
Create H2 Embedded DB rpi4osinv and Initial Tables for RPi4 OS Inventory
Version 1.0
Written By: Tony Dycks
Revised By: Tony Dycks
Date Written: September 13, 2021
Last Revised: September 13, 2021

droptable -- Table: RPI4OSARCHS
Drop Successful for Table: RPI4OSARCHS
createrpi4osarchstb -- SQL:
CREATE TABLE RPI4OSARCHS (rpiarch varchar(50) not NULL, bitness INTEGER not NULL, PRIMARY KEY (rpiarch))
Table: rpi4osarchs Created Successfully!
3 rpiosarchs Table Rows Inserted!

droptable -- Table: SDCARDS
Drop Successful for Table: SDCARDS
createsdcardstb -- SQL:
CREATE TABLE SDCARDS (sdcardsid INTEGER not NULL, sdcmftr varchar(10) not NULL, sdcdesc varchar(50) not NULL, sdcmemsize v
archar(5) not NULL, PRIMARY KEY (sdcardsid))
Table: sdcards Created Successfully!

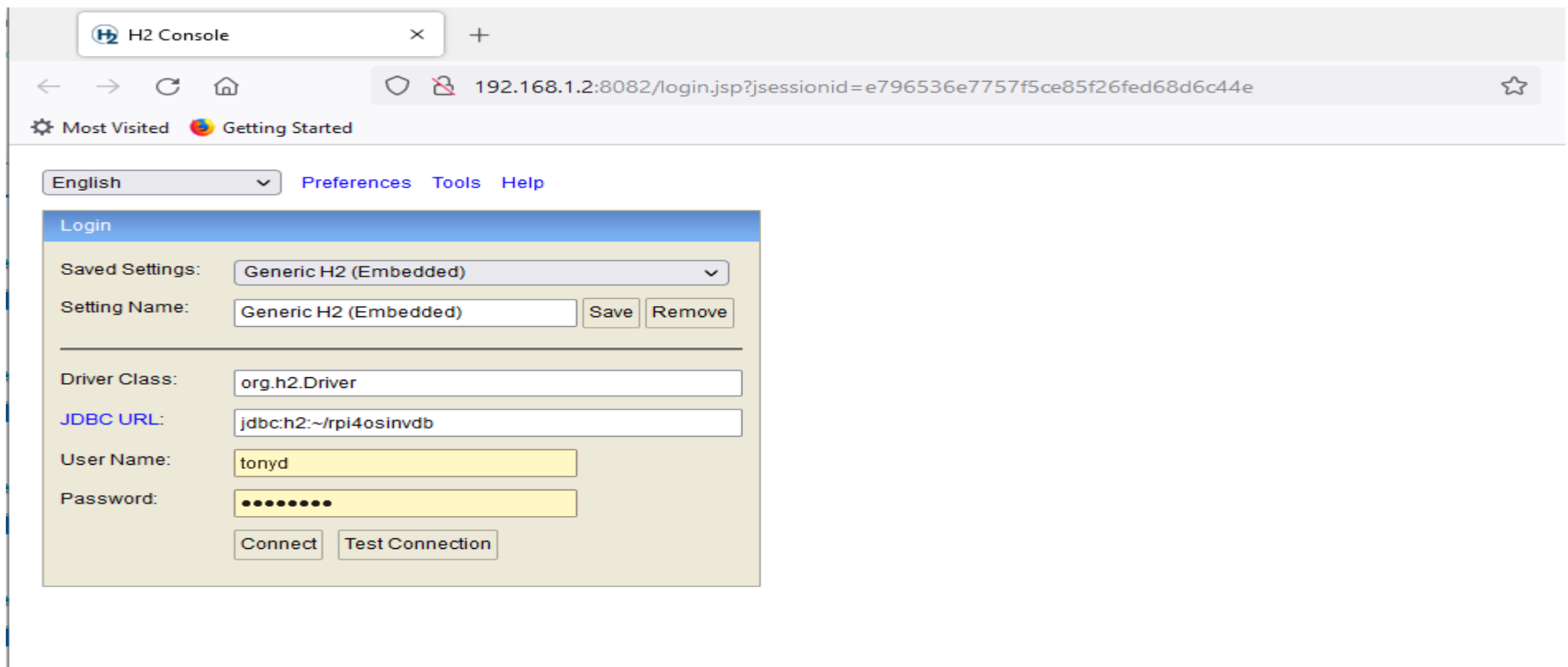
droptable -- Table: RPI4CASES
Drop Successful for Table: RPI4CASES
createrpi4casestb -- SQL:
CREATE TABLE RPI4CASES (casemnem varchar(3) primary key, casemfr varchar(50) not NULL, casedesc varchar(50) not NULL, rp
icasecolor varchar(50) not NULL, rpisbcmemsize varchar(50) not NULL, rpisbcdesc varchar(50) not NULL, PRIMARY KEY(casemn
em))
Table: rpi4cases Created Successfully!

droptable -- Table: RPI4OSINFO
Drop Successful for Table: RPI4OSINFO
createrpi4osinfotb -- SQL:
CREATE TABLE RPI4OSINFO (rpiosid INTEGER not NULL, rpiosname varchar(50) not NULL, rpiosdistribro varchar(50) not null, rpi
osfamily varchar(10) not NULL, rpiarch varchar(10) not null, lastupdt dt varchar(10) NULL, lastbkupdt varchar(10) NULL, c
asemnem varchar(3) not NULL, sdcardsid INTEGER not NULL, sdcusepctg INTEGER null, PRIMARY KEY (rpiosid))
Table: rpi4osinfo Created Successfully!

User: TonyD
dropuserid -- SQL: DROP USER IF EXISTS TONYD
Dropped User Id: TonyD
adduserid -- SQL: CREATE USER IF NOT EXISTS TONYD PASSWORD [REDACTED] * ADMIN
```


H2 Embedded DB - Creating a Sample Database - XIII

- **Verify Run Using H2 Console - Login Screen**

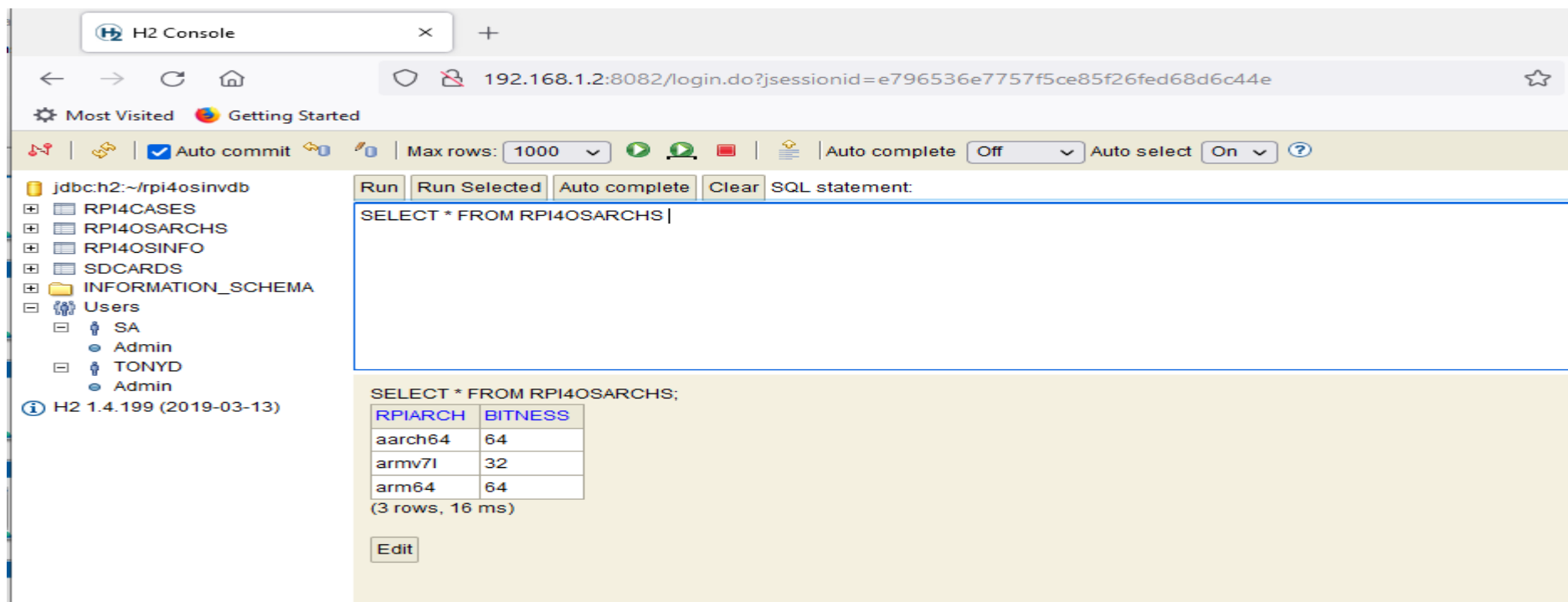


The screenshot shows a web browser window titled "H2 Console" with the address bar displaying "192.168.1.2:8082/login.jsp?jsessionId=e796536e7757f5ce85f26fed68d6c44e". The page content includes a language dropdown set to "English", and navigation links for "Preferences", "Tools", and "Help". The main "Login" form contains the following fields and buttons:

- Saved Settings:** A dropdown menu showing "Generic H2 (Embedded)".
- Setting Name:** A text input field containing "Generic H2 (Embedded)", with "Save" and "Remove" buttons to its right.
- Driver Class:** A text input field containing "org.h2.Driver".
- JDBC URL:** A text input field containing "jdbc:h2:~/rpi4osinldb".
- User Name:** A text input field containing "tonyd".
- Password:** A text input field with masked characters (dots).
- Buttons:** "Connect" and "Test Connection" buttons are located at the bottom of the form.

H2 Embedded DB - Creating a Sample Database - XIV

- **Verify Run Using H2 Console - Select rpi4osarchs Table**



The screenshot shows the H2 Console web interface. The browser address bar displays the URL `192.168.1.2:8082/login.do?jsessionid=e796536e7757f5ce85f26fed68d6c44e`. The interface includes a toolbar with options like "Auto commit", "Max rows: 1000", "Auto complete", and "Auto select". On the left, a tree view shows the database structure, including tables like RPI4CASES, RPI4OSARCHS, RPI4OSINFO, SDCARDS, and an INFORMATION_SCHEMA folder. The main area contains a SQL statement input field with the query `SELECT * FROM RPI4OSARCHS |`. Below the input field, the results of the query are displayed as a table with columns RPIARCH and BITNESS, containing three rows of data. The execution time is noted as (3 rows, 16 ms).

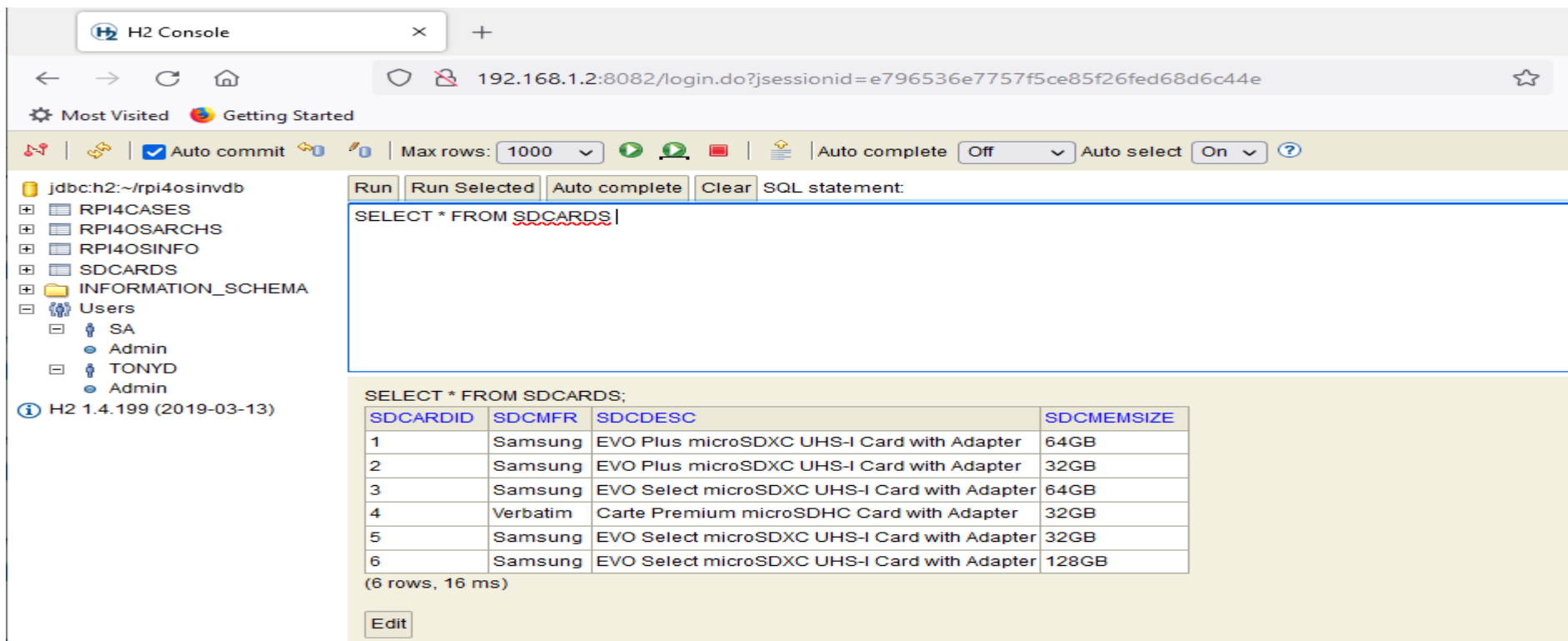
```
SELECT * FROM RPI4OSARCHS |
```

RPIARCH	BITNESS
aarch64	64
armv7l	32
arm64	64

(3 rows, 16 ms)

H2 Embedded DB - Creating a Sample Database - XV

- **Verify Run Using H2 Console - Select sdcards Table**

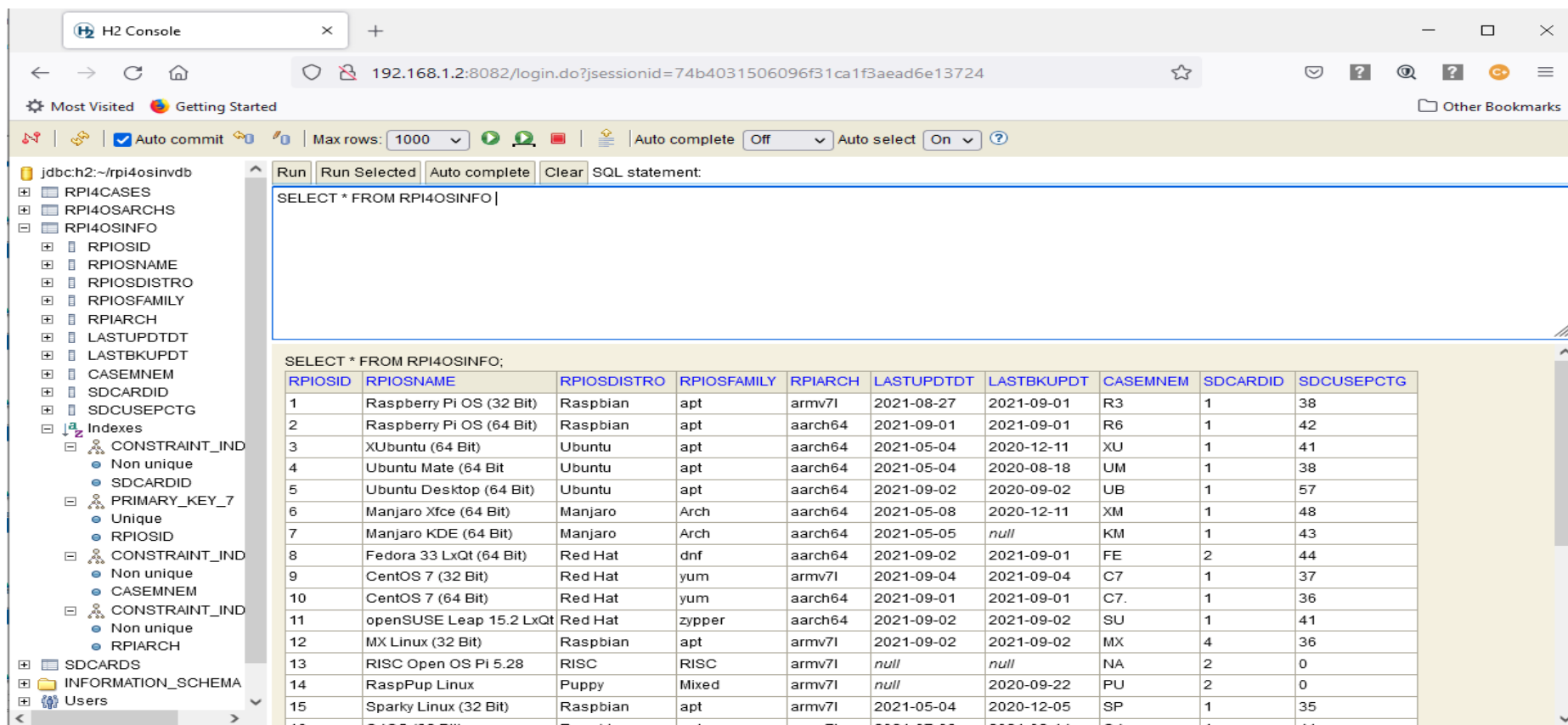


The screenshot shows the H2 Console web interface. The browser address bar displays the URL `192.168.1.2:8082/login.do?jsessionid=e796536e7757f5ce85f26fed68d6c44e`. The interface includes a navigation pane on the left with a tree view of the database structure, including tables like `RPI4CASES`, `RPI4OSARCHS`, `RPI4OSINFO`, `SDCARDS`, and `INFORMATION_SCHEMA`. The main area contains a SQL editor with the query `SELECT * FROM SDCARDS;` and a results table below it. The results table has 6 rows and 4 columns: `SDCARDID`, `SDCMFR`, `SDCDESC`, and `SDCMEMSIZE`. Below the table, it indicates `(6 rows, 16 ms)` and an `Edit` button.

SDCARDID	SDCMFR	SDCDESC	SDCMEMSIZE
1	Samsung	EVO Plus microSDXC UHS-I Card with Adapter	64GB
2	Samsung	EVO Plus microSDXC UHS-I Card with Adapter	32GB
3	Samsung	EVO Select microSDXC UHS-I Card with Adapter	64GB
4	Verbatim	Carte Premium microSDHC Card with Adapter	32GB
5	Samsung	EVO Select microSDXC UHS-I Card with Adapter	32GB
6	Samsung	EVO Select microSDXC UHS-I Card with Adapter	128GB

H2 Embedded DB - Creating a Sample Database - XVI

- Verify Run Using H2 Console - rpi4osinfo Table Primary & Foreign Keys

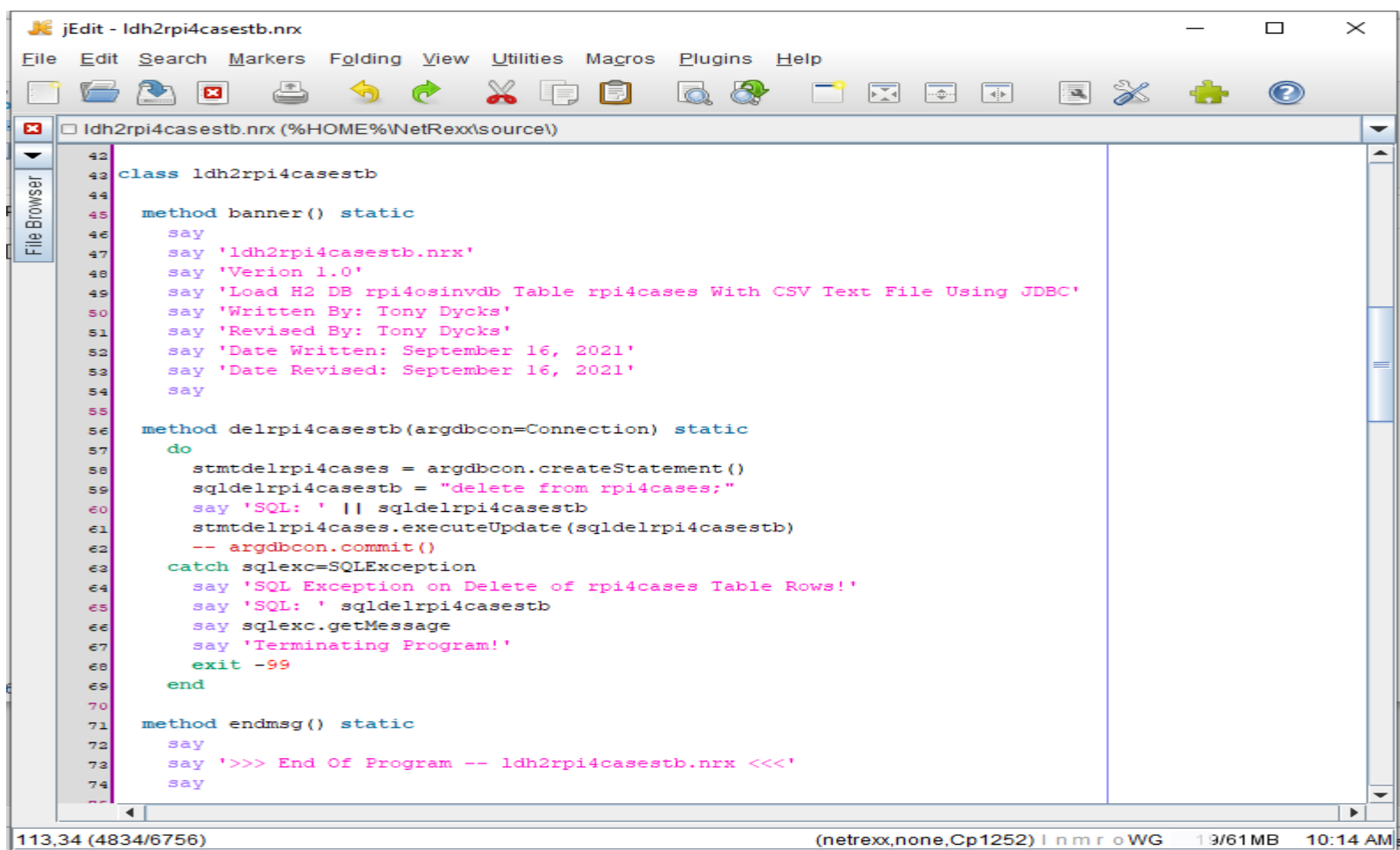


The screenshot shows the H2 Console interface. The left sidebar displays a tree view of the database schema, including tables like RPI4CASES, RPI4OSARCHS, RPI4OSINFO, RPIOSID, RPIOSNAME, RPIOSDISTRO, RPIOSFAMILY, RPIARCH, LASTUPDTDT, LASTBKUPDT, CASEMNEM, SDCARDID, SDCUSEPCTG, and various indexes. The main area shows a SQL query: `SELECT * FROM RPI4OSINFO;` and its results in a table format.

RPIOSID	RPIOSNAME	RPIOSDISTRO	RPIOSFAMILY	RPIARCH	LASTUPDTDT	LASTBKUPDT	CASEMNEM	SDCARDID	SDCUSEPCTG
1	Raspberry Pi OS (32 Bit)	Raspbian	apt	armv7l	2021-08-27	2021-09-01	R3	1	38
2	Raspberry Pi OS (64 Bit)	Raspbian	apt	aarch64	2021-09-01	2021-09-01	R6	1	42
3	XUbuntu (64 Bit)	Ubuntu	apt	aarch64	2021-05-04	2020-12-11	XU	1	41
4	Ubuntu Mate (64 Bit)	Ubuntu	apt	aarch64	2021-05-04	2020-08-18	UM	1	38
5	Ubuntu Desktop (64 Bit)	Ubuntu	apt	aarch64	2021-09-02	2020-09-02	UB	1	57
6	Manjaro Xfce (64 Bit)	Manjaro	Arch	aarch64	2021-05-08	2020-12-11	XM	1	48
7	Manjaro KDE (64 Bit)	Manjaro	Arch	aarch64	2021-05-05	null	KM	1	43
8	Fedora 33 LxQt (64 Bit)	Red Hat	dnf	aarch64	2021-09-02	2021-09-01	FE	2	44
9	CentOS 7 (32 Bit)	Red Hat	yum	armv7l	2021-09-04	2021-09-04	C7	1	37
10	CentOS 7 (64 Bit)	Red Hat	yum	aarch64	2021-09-01	2021-09-01	C7	1	36
11	openSUSE Leap 15.2 LxQt	Red Hat	zypper	aarch64	2021-09-02	2021-09-02	SU	1	41
12	MX Linux (32 Bit)	Raspbian	apt	armv7l	2021-09-02	2021-09-02	MX	4	36
13	RISC Open OS Pi 5.28	RISC	RISC	armv7l	null	null	NA	2	0
14	RaspPup Linux	Puppy	Mixed	armv7l	null	2020-09-22	PU	2	0
15	Sparky Linux (32 Bit)	Raspbian	apt	armv7l	2021-05-04	2020-12-05	SP	1	35

NetRexx Program - Load rpi4cases Table - I

- Program: Idh2rpi4cases.nrx (Screenshot #1)



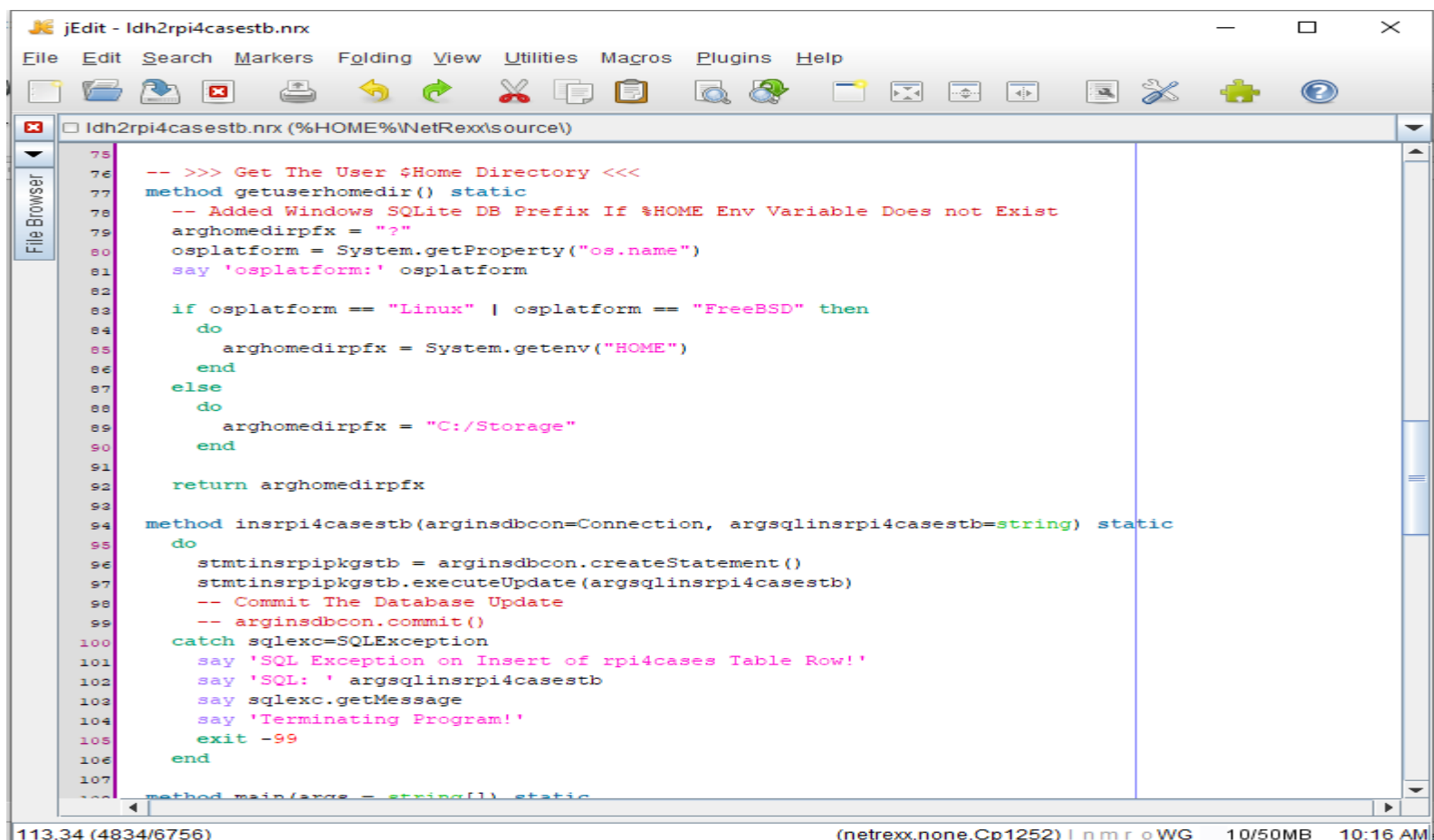
```
jEdit - Idh2rpi4cases.nrx
File Edit Search Markers Folding View Utilities Macros Plugins Help
Idh2rpi4cases.nrx (%HOME%\NetRexx\source\)
```

```
42
43 class Idh2rpi4cases.nrx
44
45 method banner() static
46     say
47     say 'ldh2rpi4cases.nrx'
48     say 'Version 1.0'
49     say 'Load H2 DB rpi4osinvdb Table rpi4cases With CSV Text File Using JDBC'
50     say 'Written By: Tony Dycks'
51     say 'Revised By: Tony Dycks'
52     say 'Date Written: September 16, 2021'
53     say 'Date Revised: September 16, 2021'
54     say
55
56 method delrpi4cases(argdbcon=Connection) static
57     do
58         stmtdelrpi4cases = argdbcon.createStatement()
59         sqldelrpi4cases = "delete from rpi4cases;"
60         say 'SQL: ' || sqldelrpi4cases
61         stmtdelrpi4cases.executeUpdate(sqldelrpi4cases)
62         -- argdbcon.commit()
63     catch sqlexc=SQLException
64         say 'SQL Exception on Delete of rpi4cases Table Rows!'
65         say 'SQL: ' sqldelrpi4cases
66         say sqlexc.getMessage
67         say 'Terminating Program!'
68         exit -99
69     end
70
71 method endmsg() static
72     say
73     say '>>> End Of Program -- ldh2rpi4cases.nrx <<<'
74     say
```

113.34 (4834/6756) (netrexx,none,Cp1252) | n m r o W G 19/61 MB 10:14 AM

NetRexx Program - Load rpi4cases Table - II

- Program: Idh2rpi4cases.nrx (Screenshot #2)



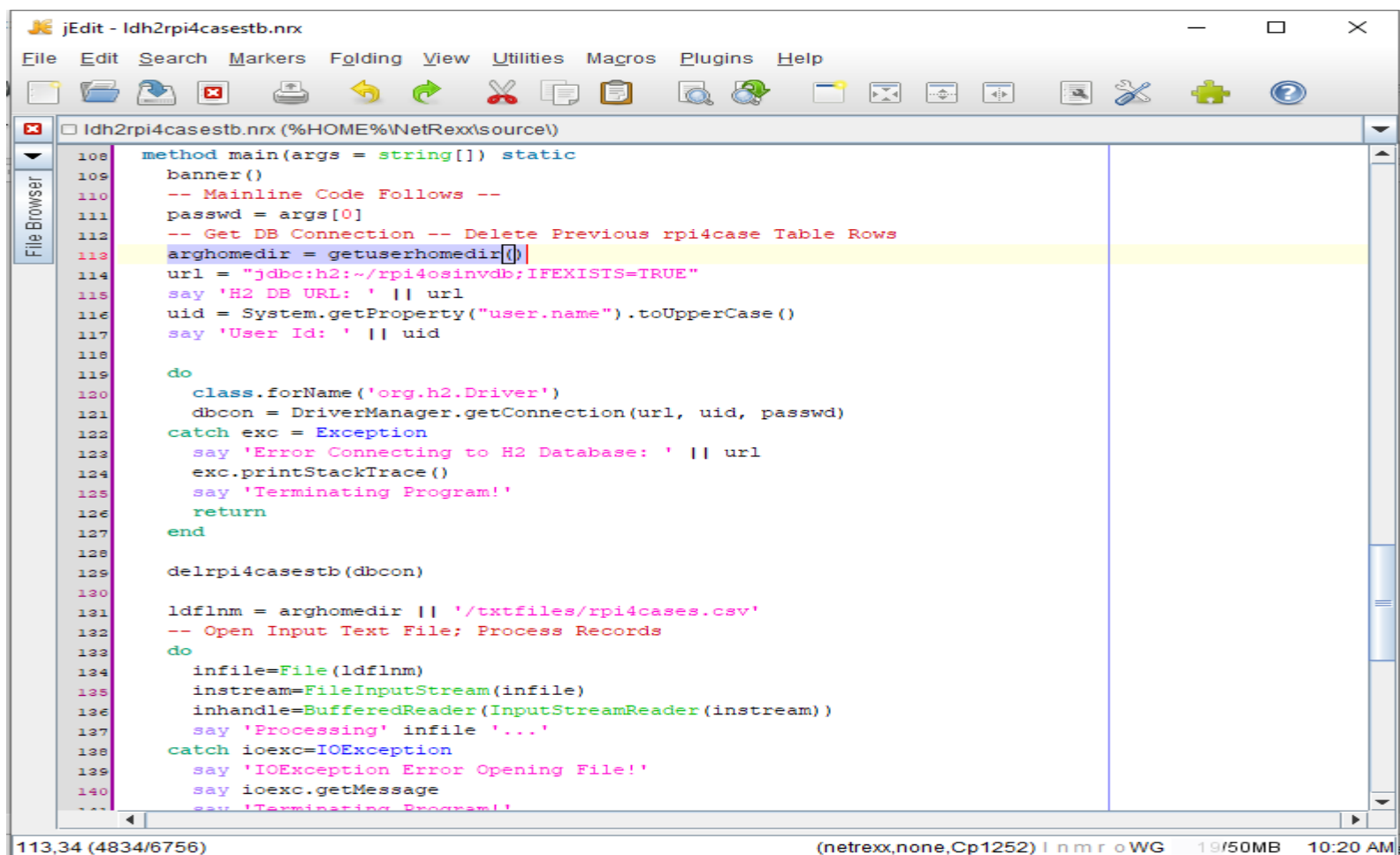
```
jEdit - Idh2rpi4cases.nrx
File Edit Search Markers Folding View Utilities Macros Plugins Help
Idh2rpi4cases.nrx (%HOME%\NetRexx\source\)
```

```
75
76 -- >>> Get The User $Home Directory <<<
77 method getuserhomedir() static
78 -- Added Windows SQLite DB Prefix If $HOME Env Variable Does not Exist
79 arghomedirpfx = "?"
80 osplatform = System.getProperty("os.name")
81 say 'osplatform:' osplatform
82
83 if osplatform == "Linux" | osplatform == "FreeBSD" then
84 do
85     arghomedirpfx = System.getenv("HOME")
86     end
87 else
88 do
89     arghomedirpfx = "C:/Storage"
90     end
91
92 return arghomedirpfx
93
94 method insrpi4cases(bcon=Connection, argsqlinsrpi4cases=string) static
95 do
96     stmtinsrpi4cases = bcon.createStatement()
97     stmtinsrpi4cases.executeUpdate(argsqlinsrpi4cases)
98     -- Commit The Database Update
99     bcon.commit()
100 catch sqlexc=SQLException
101     say 'SQL Exception on Insert of rpi4cases Table Row!'
102     say 'SQL: ' argsqlinsrpi4cases
103     say sqlexc.getMessage()
104     say 'Terminating Program!'
105     exit -99
106 end
107
108 method main(args = string[]) static
```

113,34 (4834/6756) (netrex,none,Cp1252) | n m r o W G 10/50MB 10:16 AM

NetRexx Program - Load rpi4ocases Table - III

- Program: Idh2rpi4cases.nrx (Screenshot #3)

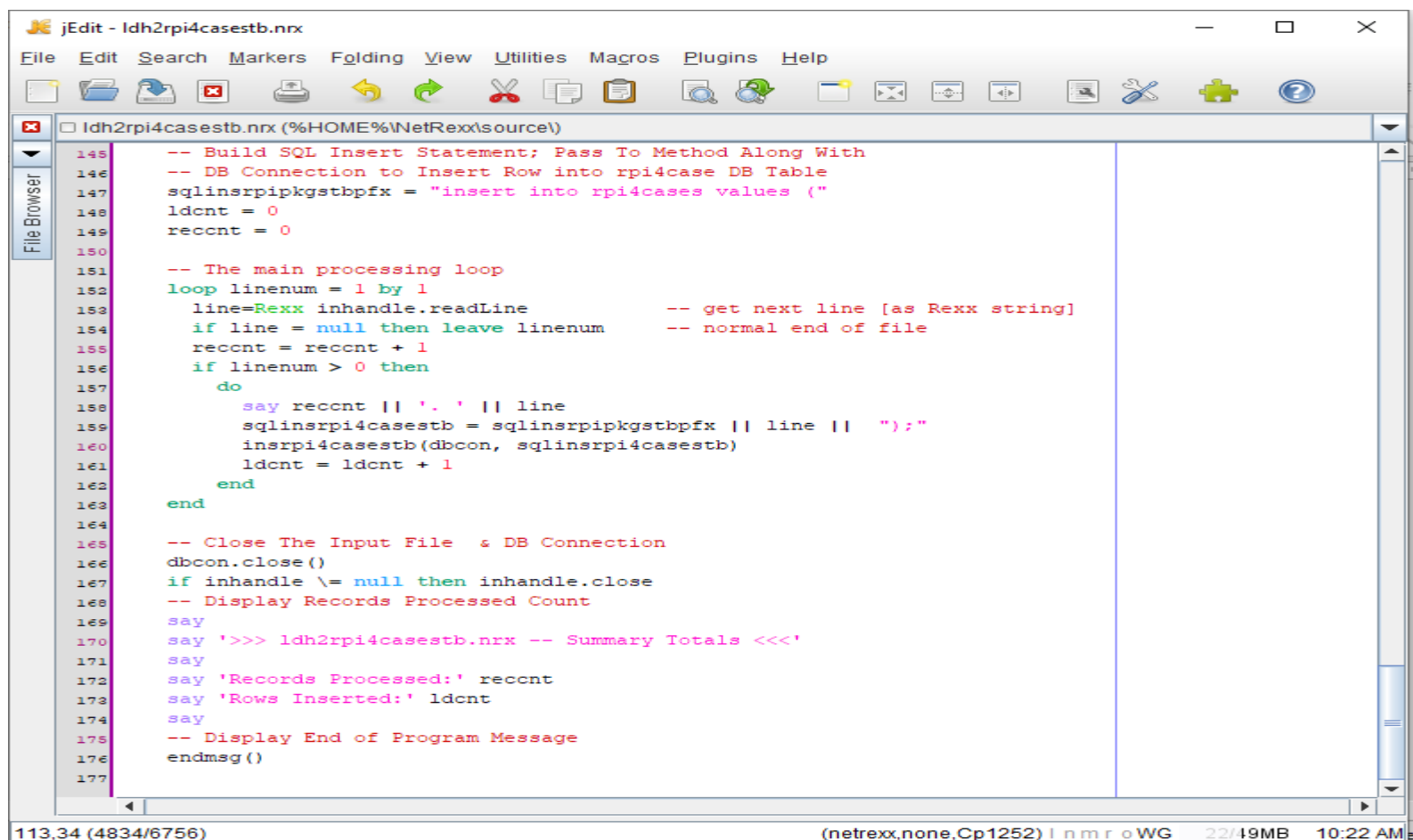


```
108 method main(args = string[]) static
109     banner()
110     -- Mainline Code Follows --
111     passwd = args[0]
112     -- Get DB Connection -- Delete Previous rpi4case Table Rows
113     arghomedir = getuserhomedir()
114     url = "jdbc:h2:~/rpi4osinvdb;IFEXISTS=TRUE"
115     say 'H2 DB URL: ' || url
116     uid = System.getProperty("user.name").toUpperCase()
117     say 'User Id: ' || uid
118
119     do
120         class.forName('org.h2.Driver')
121         dbcon = DriverManager.getConnection(url, uid, passwd)
122     catch exc = Exception
123         say 'Error Connecting to H2 Database: ' || url
124         exc.printStackTrace()
125         say 'Terminating Program!'
126         return
127     end
128
129     delrpi4casestb(dbcon)
130
131     ldflnm = arghomedir || '/txtfiles/rpi4cases.csv'
132     -- Open Input Text File; Process Records
133     do
134         infile=File(ldflnm)
135         instream=FileInputStream(infile)
136         inhandle=BufferedReader(InputStreamReader(instream))
137         say 'Processing' infile '...'
138     catch ioexc=IOException
139         say 'IOException Error Opening File!'
140         say ioexc.getMessage()
141         say 'Terminating Program!'
142     end
143 end
```

113,34 (4834/6756) (netrexx,none,Cp1252) | n m r o WG 19/50MB 10:20 AM

NetRexx Program - Load rpi4ocases Table - IV

- Program: Idh2rpi4cases.nrx (Screenshot #4)



```
jEdit - Idh2rpi4cases.nrx
File Edit Search Markers Folding View Utilities Magros Plugins Help
Idh2rpi4cases.nrx (%HOME%\NetRexx\source\)
```

```
145 -- Build SQL Insert Statement; Pass To Method Along With
146 -- DB Connection to Insert Row into rpi4case DB Table
147 sqlinsrpi4cases = "insert into rpi4cases values ("
148 ldcnt = 0
149 recnt = 0
150
151 -- The main processing loop
152 loop linenum = 1 by 1
153   line=Rexx inhandle.readLine           -- get next line [as Rexx string]
154   if line = null then leave linenum     -- normal end of file
155   recnt = recnt + 1
156   if linenum > 0 then
157     do
158       say recnt || '. ' || line
159       sqlinsrpi4cases = sqlinsrpi4cases || line || ";"
160       insrpi4cases(dbcon, sqlinsrpi4cases)
161       ldcnt = ldcnt + 1
162     end
163   end
164
165 -- Close The Input File & DB Connection
166 dbcon.close()
167 if inhandle \= null then inhandle.close
168 -- Display Records Processed Count
169 say
170 say '>>> Idh2rpi4cases.nrx -- Summary Totals <<<'
171 say
172 say 'Records Processed:' recnt
173 say 'Rows Inserted:' ldcnt
174 say
175 -- Display End of Program Message
176 endmsg()
177
```

113.34 (4834/6756) (netrex.none,Cp1252) | n m r o W G 22/19MB 10:22 AM

NetRexx Program - Load rpi4ocases Table - V

- Program: Idh2rpi4cases.nrx (CSV Input Data)

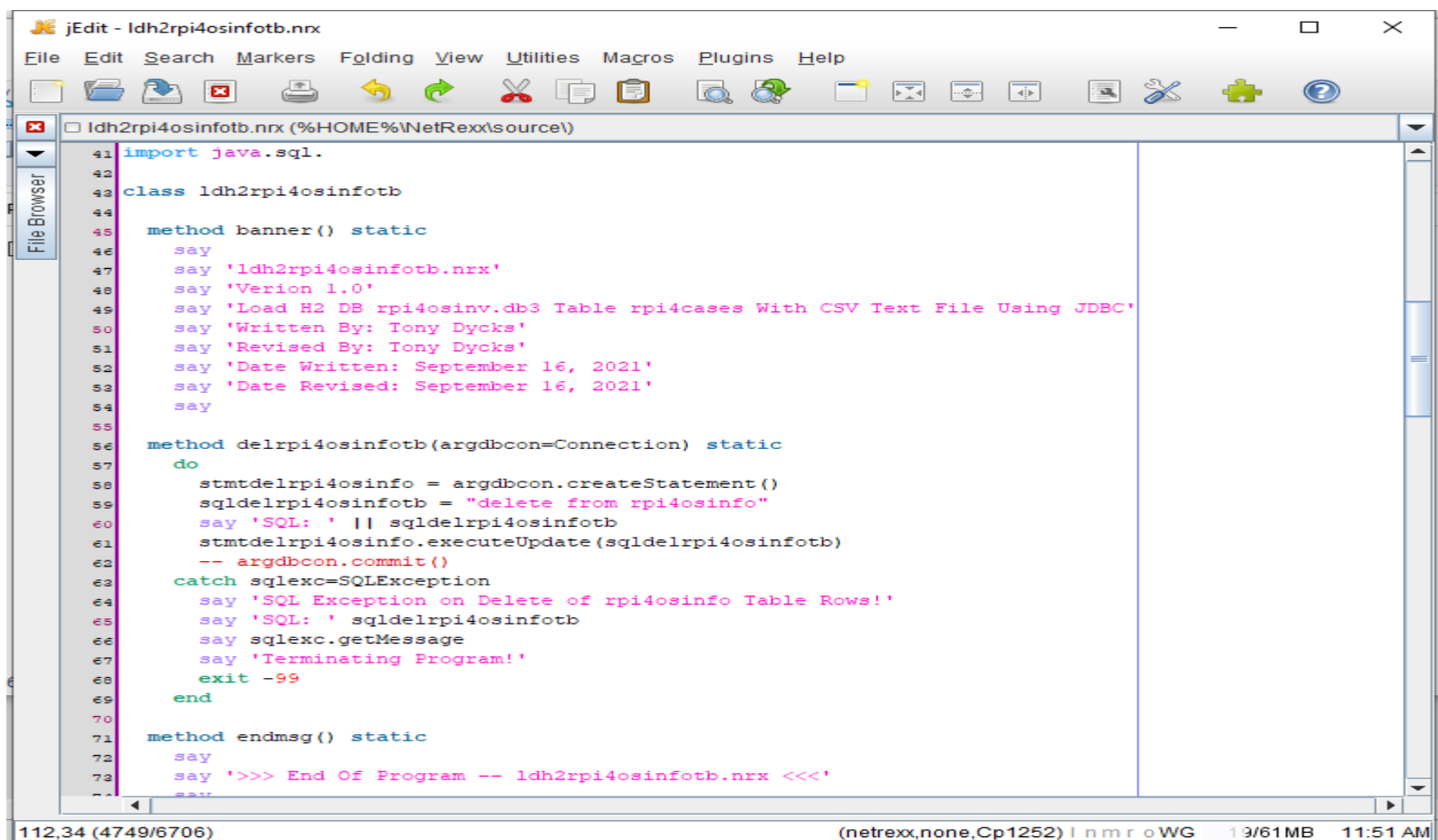
```
C:\Storage\txtfiles\rpi4cases.csv - SciTE
File Edit Search View Tools Options Language Buffers Help
1 |R3','Canakit','Raspberry Pi 4 Case - Premium','Black','4GB','Raspberry Pi4 Model B'
2 |'XU','Canakit','Raspberry Pi 4 Case - Premium','White','4GB','Raspberry Pi4 Model B'
3 |'XM','Canakit','Raspberry Pi 4 Case - Premium','Clear','4GB','Raspberry Pi4 Model B'
4 |'KL','Vilros','Raspberry Pi 4 Self Cooling Heavy Duty Aluminum Alloy Case','Black','4GB','Raspberry Pi4 Model B'
5 |'UM','Vilros','Raspberry Pi 4 Self Cooling Heavy Duty Aluminum Alloy Case','Silver','4GB','Raspberry Pi4 Model B'
6 |'DP','Vilros','Raspberry Pi 4 Self Cooling Heavy Duty Aluminum Alloy Case','Silver','4GB','Raspberry Pi4 Model B'
7 |'C7','Vilros','Raspberry Pi 4 Acrylic Case with Built-In Fan','Clear','4GB','Raspberry Pi4 Model B'
8 |'Q4','iUniker','Raspberry Pi 4 Fan ABS Case with Cooling Fan','Black','4GB','Raspberry Pi4 Model B'
9 |'C7.','iUniker','Raspberry Pi 4 Fan ABS Case with Cooling Fan','Black','4GB','Raspberry Pi4 Model B'
10 |'SP','iUniker','Raspberry Pi 4 Fan ABS Case with Cooling Fan','White','4GB','Raspberry Pi4 Model B'
11 |'UB','iUniker','Raspberry Pi 4 Fan ABS Case with Cooling Fan','White','4GB','Raspberry Pi4 Model B'
12 |'FE','iUniker','Raspberry Pi 4 BIFACE Raspberry Pi 4 Aluminium Model V Case with Cooling Fan','Black/Silver','4GB','Raspberry Pi4 Model B'
13 |'R6','iUniker','Raspberry Pi 4 Fan Heatsink Metal Case with Cooling Fan','Black','4GB','Raspberry Pi4 Model B'
14 |'KM','Smraza','Case for Raspberry Pi 4 with Cooling Fan and 4 pcs Aluminum Heat Sinks','Black/Smoke','8GB','Raspberry Pi4 Model B'
15 |'MX','Miuzei','Case for Raspberry Pi 4 with Cooling Fan and 4 pcs Aluminum Heat Sinks','Black/Blue','4GB','Raspberry Pi4 Model B'
16 |'TW','Geek Pi','Raspberry Pi 4 Case with Fan (Blue Backlight) ','Blue/Clear','4GB','Raspberry Pi4 Model B'
17 |'SU','MazerPi','Pi 4 Case with Cooling Fan and Heatsink','Clear/Black','4GB','Raspberry Pi4 Model B'
18 |'PU','MazerPi','Pi 4 Case with Cooling Fan and Heatsink','Clear/Black','4GB','Raspberry Pi4 Model B'
19 |'NA','Not Applicable','No Case Assigned','N/A','0GB','Raspberry Pi4 Model B'
20 |'SU*','Geek Pi','Raspberry Pi 4 Case with Fan','White/Brown','8GB','Raspberry Pi4 Model B'
21 |'AL','Geek Pi','Raspberry Pi 4 Fan ABS Case with Cooling Fan','White','4GB','Raspberry Pi4 Model B'
22
```

NetRexx Program - Load rpi4ocases Table - VI

- Program: **ldh2rpi4cases.nrx** (Run Considerations)
- Any Existing **rpiosinfo** Table needs to be deleted before Reloading the **rpi4cases** Table due to the **Foreign Key constraint** on the DB column: **CASEMNEM**
- Program will **Delete** Any Existing **rpi4cases** Table Rows Prior to Reading the CSV File and Inserting the DB Rows
- **H2 DB Password for Current User** Must Be Specified as a Command Line Argument
- Input Data File: **rpi4cases.csv** (Comma Separated Values)

NetRexx Program - Load rpi4osinfo Table - I

- Program: Idh2rpi4osinfo.nrx (Screenshot #1)



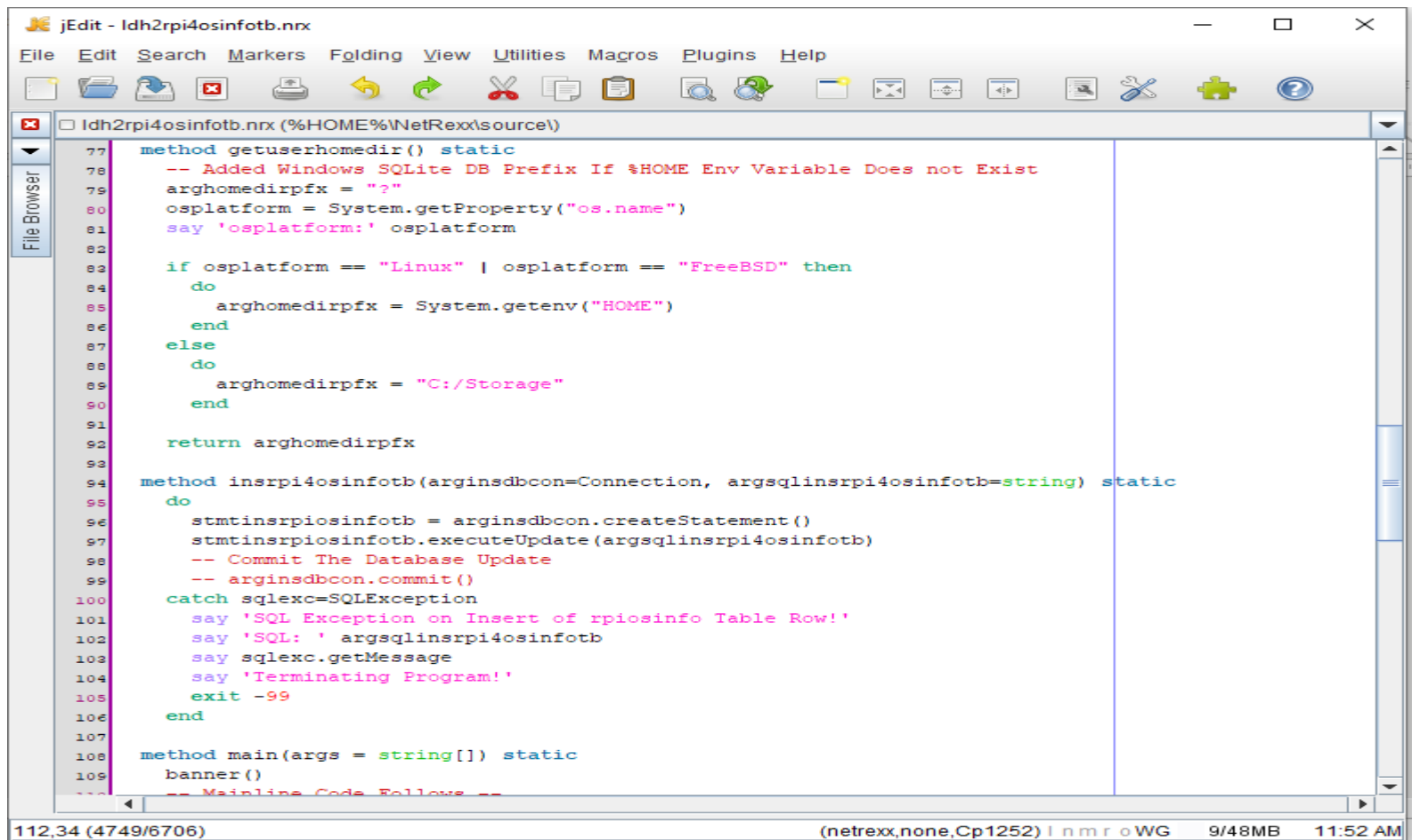
```
jEdit - Idh2rpi4osinfo.nrx
File Edit Search Markers Folding View Utilities Macros Plugins Help
Idh2rpi4osinfo.nrx (%HOME%\NetRexx\source\)
```

```
41 import java.sql.
42
43 class Idh2rpi4osinfo
44
45     method banner() static
46         say
47         say 'ldh2rpi4osinfo.nrx'
48         say 'Verion 1.0'
49         say 'Load H2 DB rpi4osinv.db3 Table rpi4cases With CSV Text File Using JDBC'
50         say 'Written By: Tony Dycks'
51         say 'Revised By: Tony Dycks'
52         say 'Date Written: September 16, 2021'
53         say 'Date Revised: September 16, 2021'
54         say
55
56     method delrpi4osinfo(argdbcon=Connection) static
57         do
58             stmtdelrpi4osinfo = argdbcon.createStatement()
59             sqldelrpi4osinfo = "delete from rpi4osinfo"
60             say 'SQL: ' || sqldelrpi4osinfo
61             stmtdelrpi4osinfo.executeUpdate(sqldelrpi4osinfo)
62             -- argdbcon.commit()
63         catch sqlexc=SQLException
64             say 'SQL Exception on Delete of rpi4osinfo Table Rows!'
65             say 'SQL: ' sqldelrpi4osinfo
66             say sqlexc.getMessage
67             say 'Terminating Program!'
68             exit -99
69         end
70
71     method endmsg() static
72         say
73         say '>>> End Of Program -- ldh2rpi4osinfo.nrx <<<'
74         say
```

112.34 (4749/6706) (netrex,none,Cp1252) | n m r o W G 19/61MB 11:51 AM

NetRexx Program - Load rpi4osinfo Table - II

- Program: Idh2rpi4osinfo.nrx (Screenshot #2)



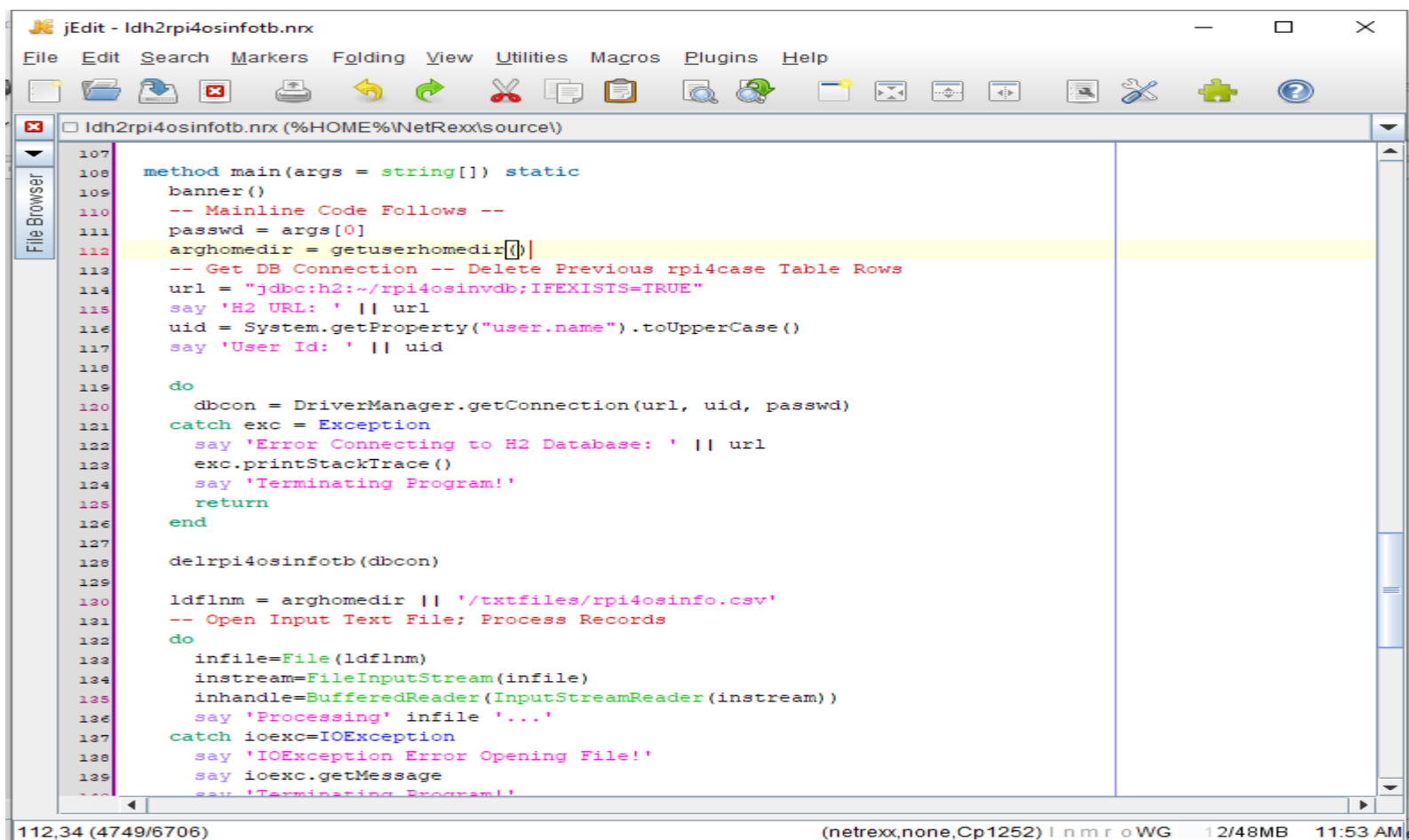
```
jEdit - Idh2rpi4osinfo.nrx
File Edit Search Markers Folding View Utilities Magros Plugins Help
Idh2rpi4osinfo.nrx (%HOME%\NetRexx\source\)
```

```
77 method getuserhomedir() static
78 -- Added Windows SQLite DB Prefix If %HOME Env Variable Does not Exist
79 arghomedirpfx = "?"
80 osplatform = System.getProperty("os.name")
81 say 'osplatform:' osplatform
82
83 if osplatform == "Linux" | osplatform == "FreeBSD" then
84 do
85   arghomedirpfx = System.getenv("HOME")
86 end
87 else
88 do
89   arghomedirpfx = "C:/Storage"
90 end
91
92 return arghomedirpfx
93
94 method insrpi4osinfofb(arginsdbcon=Connection, argsqlinsrpi4osinfofb=string) static
95 do
96   stmtinsrpiosinfofb = arginsdbcon.createStatement()
97   stmtinsrpiosinfofb.executeUpdate(argsqlinsrpi4osinfofb)
98   -- Commit The Database Update
99   -- arginsdbcon.commit()
100 catch sqlexc=SQLException
101   say 'SQL Exception on Insert of rpiosinfo Table Row!'
102   say 'SQL: ' argsqlinsrpi4osinfofb
103   say sqlexc.getMessage
104   say 'Terminating Program!'
105   exit -99
106 end
107
108 method main(args = string[]) static
109   banner()
110   -- Mainline Code Follows --
```

112,34 (4749/6706) (netrex,none,Cp1252) | n m r o W G 9/48MB 11:52 AM

NetRexx Program - Load rpi4osinfo Table - III

- Program: Idh2rpi4osinfo.nrx (Screenshot #3)



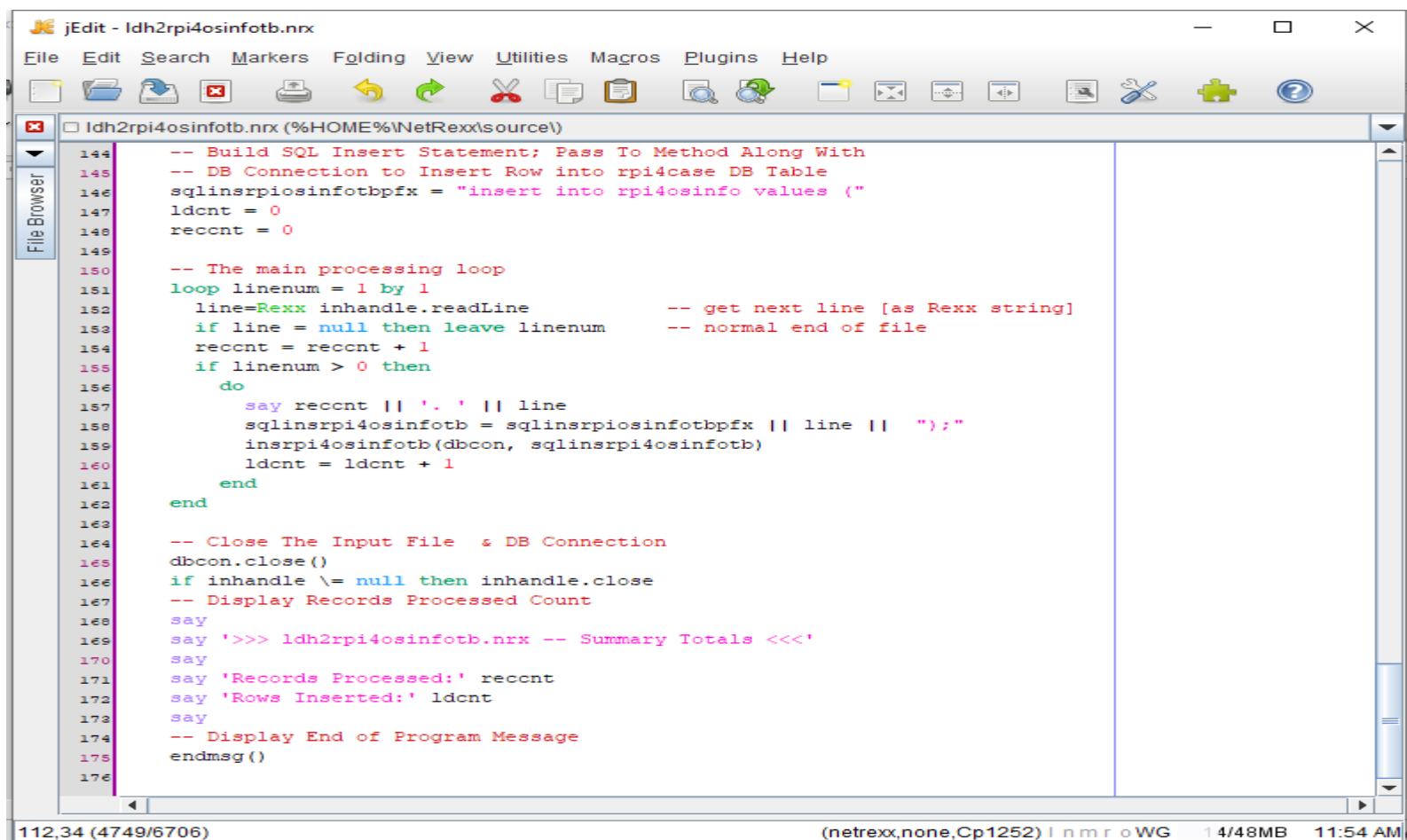
```
jEdit - Idh2rpi4osinfo.nrx
File Edit Search Markers Folding View Utilities Magros Plugins Help
Idh2rpi4osinfo.nrx (%HOME%\NetRexx\source\)
```

```
107
108 method main(args = string[]) static
109     banner()
110     -- Mainline Code Follows --
111     passwd = args[0]
112     arghomedir = getuserhomedir()
113     -- Get DB Connection -- Delete Previous rpi4case Table Rows
114     url = "jdbc:h2:~/rpi4osinvdb;IFEXISTS=TRUE"
115     say 'H2 URL: ' || url
116     uid = System.getProperty("user.name").toUpperCase()
117     say 'User Id: ' || uid
118
119     do
120         dbcon = DriverManager.getConnection(url, uid, passwd)
121     catch exc = Exception
122         say 'Error Connecting to H2 Database: ' || url
123         exc.printStackTrace()
124         say 'Terminating Program!'
125         return
126     end
127
128     delrpi4osinfofotb(dbcon)
129
130     ldflnm = arghomedir || '/txtfiles/rpi4osinfo.csv'
131     -- Open Input Text File; Process Records
132     do
133         infile=File(ldflnm)
134         instream=FileInputStream(infile)
135         inhandle=BufferedReader(InputStreamReader(instream))
136         say 'Processing' infile '...'
137     catch ioexc=IOException
138         say 'IOException Error Opening File!'
139         say ioexc.getMessage
140         say 'Terminating Program!'
141
```

112,34 (4749/6706) (netrex,none,Cp1252) | nmr oWG 12/48MB 11:53 AM

NetRexx Program - Load rpi4osinfo Table - IV

- Program: Idh2rpi4osinfo.nrx (Screenshot #4)



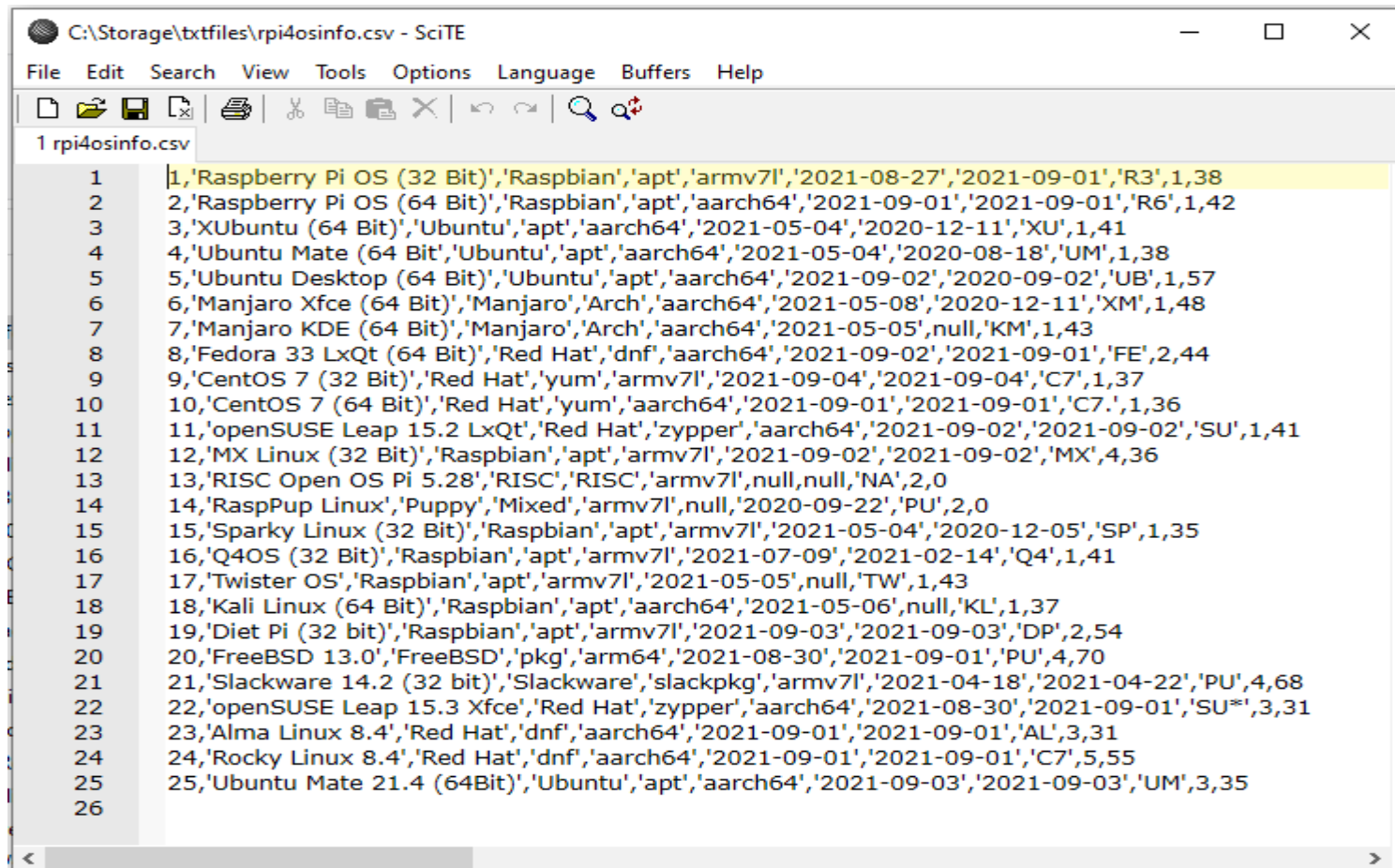
```
jEdit - Idh2rpi4osinfotb.nrx
File Edit Search Markers Folding View Utilities Macros Plugins Help
Idh2rpi4osinfotb.nrx (%HOME%\NetRexx\source\)
```

```
144  -- Build SQL Insert Statement; Pass To Method Along With
145  -- DB Connection to Insert Row into rpi4case DB Table
146  sqlinsrpiosinfotbpfx = "insert into rpi4osinfo values ("
147  ldcnt = 0
148  reccnt = 0
149
150  -- The main processing loop
151  loop linenum = 1 by 1
152  line=Rexx inhandle.readLine          -- get next line [as Rexx string]
153  if line = null then leave linenum    -- normal end of file
154  reccnt = reccnt + 1
155  if linenum > 0 then
156  do
157      say reccnt || '. ' || line
158      sqlinsrpi4osinfotb = sqlinsrpiosinfotbpfx || line || ");"
159      insrpi4osinfotb(dbcon, sqlinsrpi4osinfotb)
160      ldcnt = ldcnt + 1
161  end
162  end
163
164  -- Close The Input File & DB Connection
165  dbcon.close()
166  if inhandle \= null then inhandle.close
167  -- Display Records Processed Count
168  say
169  say '>>> Idh2rpi4osinfotb.nrx -- Summary Totals <<<'
170  say
171  say 'Records Processed:' reccnt
172  say 'Rows Inserted:' ldcnt
173  say
174  -- Display End of Program Message
175  endmsg()
176
```

112,34 (4749/6706) (netrex,none,Cp1252) | n m r o W G 14/48MB 11:54 AM

NetRexx Program - Load rpi4osinfo Table - V

- Input File: rpi4osinfo.csv



```
1 1,'Raspberry Pi OS (32 Bit)','Raspbian','apt','armv7l','2021-08-27','2021-09-01','R3',1,38
2 2,'Raspberry Pi OS (64 Bit)','Raspbian','apt','aarch64','2021-09-01','2021-09-01','R6',1,42
3 3,'XUbuntu (64 Bit)','Ubuntu','apt','aarch64','2021-05-04','2020-12-11','XU',1,41
4 4,'Ubuntu Mate (64 Bit)','Ubuntu','apt','aarch64','2021-05-04','2020-08-18','UM',1,38
5 5,'Ubuntu Desktop (64 Bit)','Ubuntu','apt','aarch64','2021-09-02','2020-09-02','UB',1,57
6 6,'Manjaro Xfce (64 Bit)','Manjaro','Arch','aarch64','2021-05-08','2020-12-11','XM',1,48
7 7,'Manjaro KDE (64 Bit)','Manjaro','Arch','aarch64','2021-05-05',null,'KM',1,43
8 8,'Fedora 33 LxQt (64 Bit)','Red Hat','dnf','aarch64','2021-09-02','2021-09-01','FE',2,44
9 9,'CentOS 7 (32 Bit)','Red Hat','yum','armv7l','2021-09-04','2021-09-04','C7',1,37
10 10,'CentOS 7 (64 Bit)','Red Hat','yum','aarch64','2021-09-01','2021-09-01','C7.',1,36
11 11,'openSUSE Leap 15.2 LxQt','Red Hat','zypper','aarch64','2021-09-02','2021-09-02','SU',1,41
12 12,'MX Linux (32 Bit)','Raspbian','apt','armv7l','2021-09-02','2021-09-02','MX',4,36
13 13,'RISC Open OS Pi 5.28','RISC','RISC','armv7l',null,null,'NA',2,0
14 14,'RaspPup Linux','Puppy','Mixed','armv7l',null,'2020-09-22','PU',2,0
15 15,'Sparky Linux (32 Bit)','Raspbian','apt','armv7l','2021-05-04','2020-12-05','SP',1,35
16 16,'Q4OS (32 Bit)','Raspbian','apt','armv7l','2021-07-09','2021-02-14','Q4',1,41
17 17,'Twister OS','Raspbian','apt','armv7l','2021-05-05',null,'TW',1,43
18 18,'Kali Linux (64 Bit)','Raspbian','apt','aarch64','2021-05-06',null,'KL',1,37
19 19,'Diet Pi (32 bit)','Raspbian','apt','armv7l','2021-09-03','2021-09-03','DP',2,54
20 20,'FreeBSD 13.0','FreeBSD','pkg','arm64','2021-08-30','2021-09-01','PU',4,70
21 21,'Slackware 14.2 (32 bit)','Slackware','slackpkg','armv7l','2021-04-18','2021-04-22','PU',4,68
22 22,'openSUSE Leap 15.3 Xfce','Red Hat','zypper','aarch64','2021-08-30','2021-09-01','SU*',3,31
23 23,'Alma Linux 8.4','Red Hat','dnf','aarch64','2021-09-01','2021-09-01','AL',3,31
24 24,'Rocky Linux 8.4','Red Hat','dnf','aarch64','2021-09-01','2021-09-01','C7',5,55
25 25,'Ubuntu Mate 21.4 (64Bit)','Ubuntu','apt','aarch64','2021-09-03','2021-09-03','UM',3,35
26
```

NetRexx Program - Load rpi4osinfo Table - VI

- Program run: java Idh2rpi4osinfo h2dbpassword

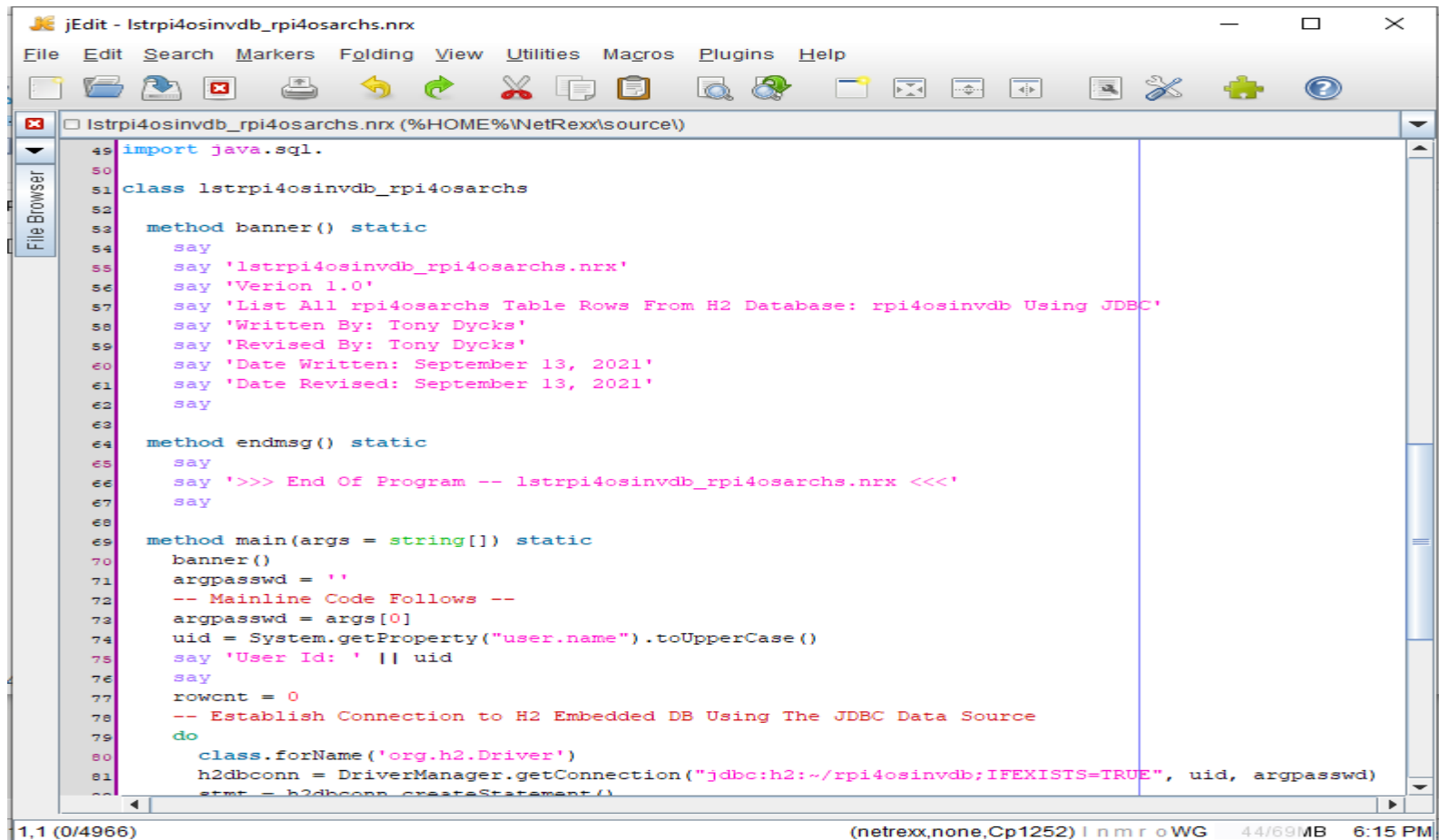
```
Select Command Prompt
ldh2rpi4osinfotb.nrx
Version 1.0
Load H2 DB rpi4osinvdb Table rpi4cases With CSV Text File Using JDBC
Written By: Tony Dycks
Revised By: Tony Dycks
Date Written: September 16, 2021
Date Revised: September 16, 2021

osplatform: Windows 10
H2 URL: jdbc:h2:~/rpi4osinvdb;IFEXISTS=TRUE
User Id: TONYD
SQL: delete from rpi4osinfo
Processing C:\Storage\txtfiles\rpi4osinfo.csv ...
1. 1,'Raspberry Pi OS (32 Bit)', 'Raspbian', 'apt', 'armv7l', '2021-08-27', '2021-09-01', 'R3', 1,38
2. 2,'Raspberry Pi OS (64 Bit)', 'Raspbian', 'apt', 'aarch64', '2021-09-01', '2021-09-01', 'R6', 1,42
3. 3,'XUbuntu (64 Bit)', 'Ubuntu', 'apt', 'aarch64', '2021-05-04', '2020-12-11', 'XU', 1,41
4. 4,'Ubuntu Mate (64 Bit)', 'Ubuntu', 'apt', 'aarch64', '2021-05-04', '2020-08-18', 'UM', 1,38
5. 5,'Ubuntu Desktop (64 Bit)', 'Ubuntu', 'apt', 'aarch64', '2021-09-02', '2020-09-02', 'UB', 1,57
6. 6,'Manjaro Xfce (64 Bit)', 'Manjaro', 'Arch', 'aarch64', '2021-05-08', '2020-12-11', 'XM', 1,48
7. 7,'Manjaro KDE (64 Bit)', 'Manjaro', 'Arch', 'aarch64', '2021-05-05', null, 'KM', 1,43
8. 8,'Fedora 33 LxQt (64 Bit)', 'Red Hat', 'dnf', 'aarch64', '2021-09-02', '2021-09-01', 'FE', 2,44
9. 9,'CentOS 7 (32 Bit)', 'Red Hat', 'yum', 'armv7l', '2021-09-04', '2021-09-04', 'C7', 1,37
10. 10,'CentOS 7 (64 Bit)', 'Red Hat', 'yum', 'aarch64', '2021-09-01', '2021-09-01', 'C7.', 1,36
11. 11,'openSUSE Leap 15.2 LxQt', 'Red Hat', 'zypper', 'aarch64', '2021-09-02', '2021-09-02', 'SU', 1,41
12. 12,'MX Linux (32 Bit)', 'Raspbian', 'apt', 'armv7l', '2021-09-02', '2021-09-02', 'MX', 4,36
13. 13,'RISC Open OS Pi 5.28', 'RISC', 'RISC', 'armv7l', null, null, 'NA', 2,0
14. 14,'RaspPup Linux', 'Puppy', 'Mixed', 'armv7l', null, '2020-09-22', 'PU', 2,0
15. 15,'Sparky Linux (32 Bit)', 'Raspbian', 'apt', 'armv7l', '2021-05-04', '2020-12-05', 'SP', 1,35
16. 16,'Q4OS (32 Bit)', 'Raspbian', 'apt', 'armv7l', '2021-07-09', '2021-02-14', 'Q4', 1,41
17. 17,'Twister OS', 'Raspbian', 'apt', 'armv7l', '2021-05-05', null, 'TW', 1,43
18. 18,'Kali Linux (64 Bit)', 'Raspbian', 'apt', 'aarch64', '2021-05-06', null, 'KL', 1,37
19. 19,'Diet Pi (32 bit)', 'Raspbian', 'apt', 'armv7l', '2021-09-03', '2021-09-03', 'DP', 2,54
20. 20,'FreeBSD 13.0', 'FreeBSD', 'pkg', 'arm64', '2021-08-30', '2021-09-01', 'PU', 4,70
21. 21,'Slackware 14.2 (32 bit)', 'Slackware', 'slackpkg', 'armv7l', '2021-04-18', '2021-04-22', 'PU', 4,68
22. 22,'openSUSE Leap 15.3 Xfce', 'Red Hat', 'zypper', 'aarch64', '2021-08-30', '2021-09-01', 'SU*', 3,31
23. 23,'Alma Linux 8.4', 'Red Hat', 'dnf', 'aarch64', '2021-09-01', '2021-09-01', 'AL', 3,31
24. 24,'Rocky Linux 8.4', 'Red Hat', 'dnf', 'aarch64', '2021-09-01', '2021-09-01', 'C7', 5,55
25. 25,'Ubuntu Mate 21.4 (64Bit)', 'Ubuntu', 'apt', 'aarch64', '2021-09-03', '2021-09-03', 'UM', 3,35

>>> ldh2rpi4osinfotb.nrx -- Summary Totals <<<
Records Processed: 25
Rows Inserted: 25
```


NetRexx Program - Select rpi4osarchs Table - I

- Program: Istrpi4osinvdb_rpi4osarchs.nrx

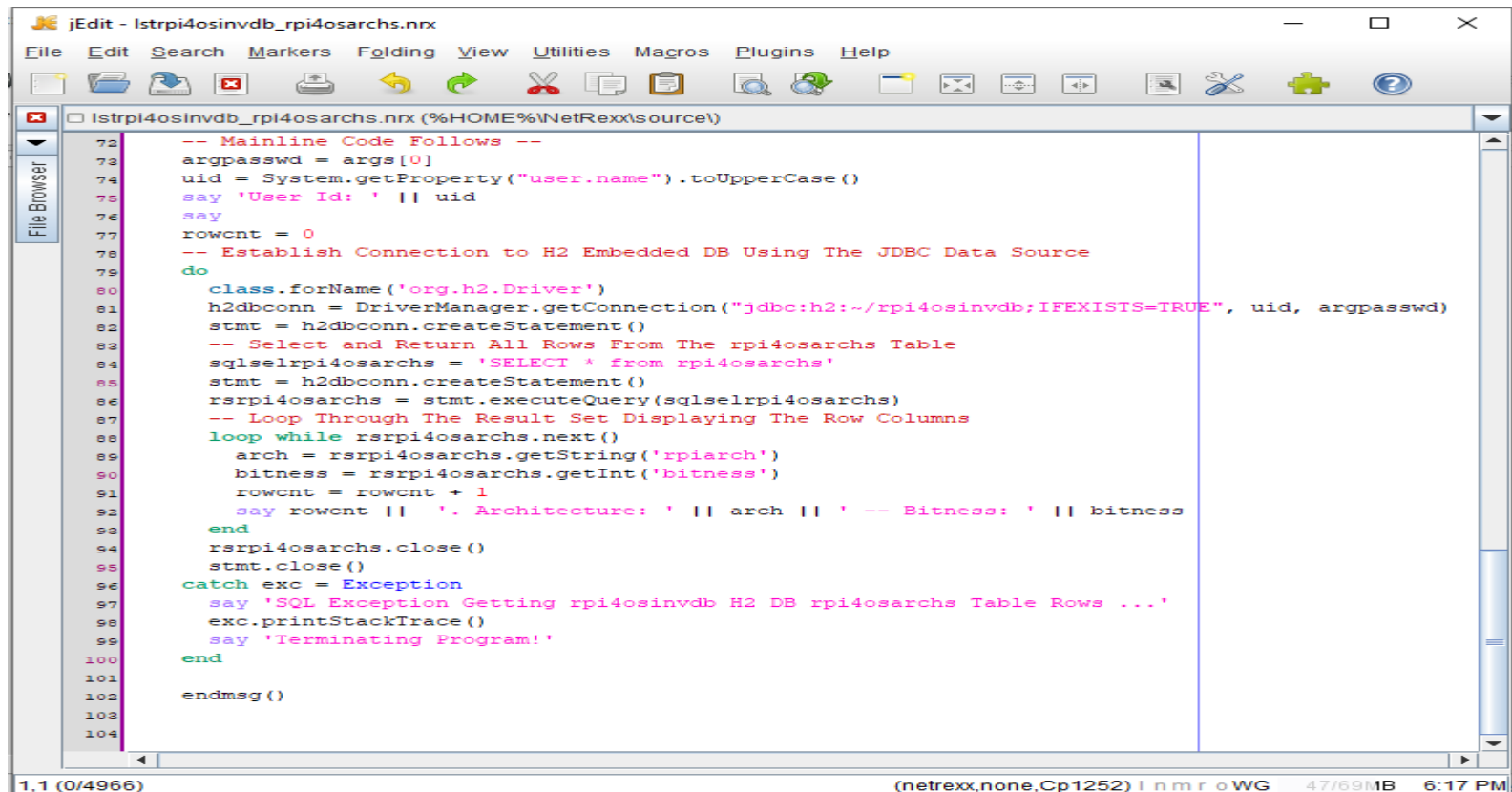


```
jEdit - Istrpi4osinvdb_rpi4osarchs.nrx
File Edit Search Markers Folding View Utilities Macros Plugins Help
Istrpi4osinvdb_rpi4osarchs.nrx (%HOME%\NetRexx\source\l)
49 import java.sql.
50
51 class Istrpi4osinvdb_rpi4osarchs
52
53     method banner() static
54         say
55         say 'Istrpi4osinvdb_rpi4osarchs.nrx'
56         say 'Verion 1.0'
57         say 'List All rpi4osarchs Table Rows From H2 Database: rpi4osinvdb Using JDBC'
58         say 'Written By: Tony Dycks'
59         say 'Revised By: Tony Dycks'
60         say 'Date Written: September 13, 2021'
61         say 'Date Revised: September 13, 2021'
62         say
63
64     method endmsg() static
65         say
66         say '>>> End Of Program -- Istrpi4osinvdb_rpi4osarchs.nrx <<<'
67         say
68
69     method main(args = string[]) static
70         banner()
71         argpasswd = ''
72         -- Mainline Code Follows --
73         argpasswd = args[0]
74         uid = System.getProperty("user.name").toUpperCase()
75         say 'User Id: ' || uid
76         say
77         rowcnt = 0
78         -- Establish Connection to H2 Embedded DB Using The JDBC Data Source
79         do
80             class.forName('org.h2.Driver')
81             h2dbconn = DriverManager.getConnection("jdbc:h2:~/rpi4osinvdb;IFEXISTS=TRUE", uid, argpasswd)
82             stmt = h2dbconn.createStatement()
```

1.1 (0/4966) (netrex,none,Cp1252) | n m r o W G 44/69MB 6:15 PM

NetRexx Program - Select rpi4osarchs Table - II

- Program: Istrpi4osinvdb_rpi4osarchs.nrx (continued)



```
jEdit - Istrpi4osinvdb_rpi4osarchs.nrx
File Edit Search Markers Folding View Utilities Macros Plugins Help
Istrpi4osinvdb_rpi4osarchs.nrx (%HOME%\NetRexx\source\l)
72 -- Mainline Code Follows --
73 argpasswd = args[0]
74 uid = System.getProperty("user.name").toUpperCase()
75 say 'User Id: ' || uid
76 say
77 rowcnt = 0
78 -- Establish Connection to H2 Embedded DB Using The JDBC Data Source
79 do
80 class.forName('org.h2.Driver')
81 h2dbconn = DriverManager.getConnection("jdbc:h2:~/rpi4osinvdb;IFEXISTS=TRUE", uid, argpasswd)
82 stmt = h2dbconn.createStatement()
83 -- Select and Return All Rows From The rpi4osarchs Table
84 sqlselrpi4osarchs = 'SELECT * from rpi4osarchs'
85 stmt = h2dbconn.createStatement()
86 rsrpi4osarchs = stmt.executeQuery(sqlselrpi4osarchs)
87 -- Loop Through The Result Set Displaying The Row Columns
88 loop while rsrpi4osarchs.next()
89 arch = rsrpi4osarchs.getString('rpiarch')
90 bitness = rsrpi4osarchs.getInt('bitness')
91 rowcnt = rowcnt + 1
92 say rowcnt || ' . Architecture: ' || arch || ' -- Bitness: ' || bitness
93 end
94 rsrpi4osarchs.close()
95 stmt.close()
96 catch exc = Exception
97 say 'SQL Exception Getting rpi4osinvdb H2 DB rpi4osarchs Table Rows ...'
98 exc.printStackTrace()
99 say 'Terminating Program!'
100 end
101
102 endmsg()
103
104
1,1 (0/4966) (netrex,none,Cp1252) | n m r o W G 47/69MB 6:17 PM
```

NetRexx Program - Select rpi4osarchs Table - III

- **Run: java lstrpi4osinvdb_rpi4osarchs <password>**

```
Ca. Command Prompt
C:\Storage\NetRexx\source>java lstrpi4osinvdb_rpi4osarchs [password]
lstrpi4osinvdb_rpi4osarchs.nrx
Verion 1.0
List All rpi4osarchs Table Rows From H2 Database: rpi4osinvdb Using JDBC
Written By: Tony Dycks
Revised By: Tony Dycks
Date Written: September 13, 2021
Date Revised: September 13, 2021

User Id: TONYD

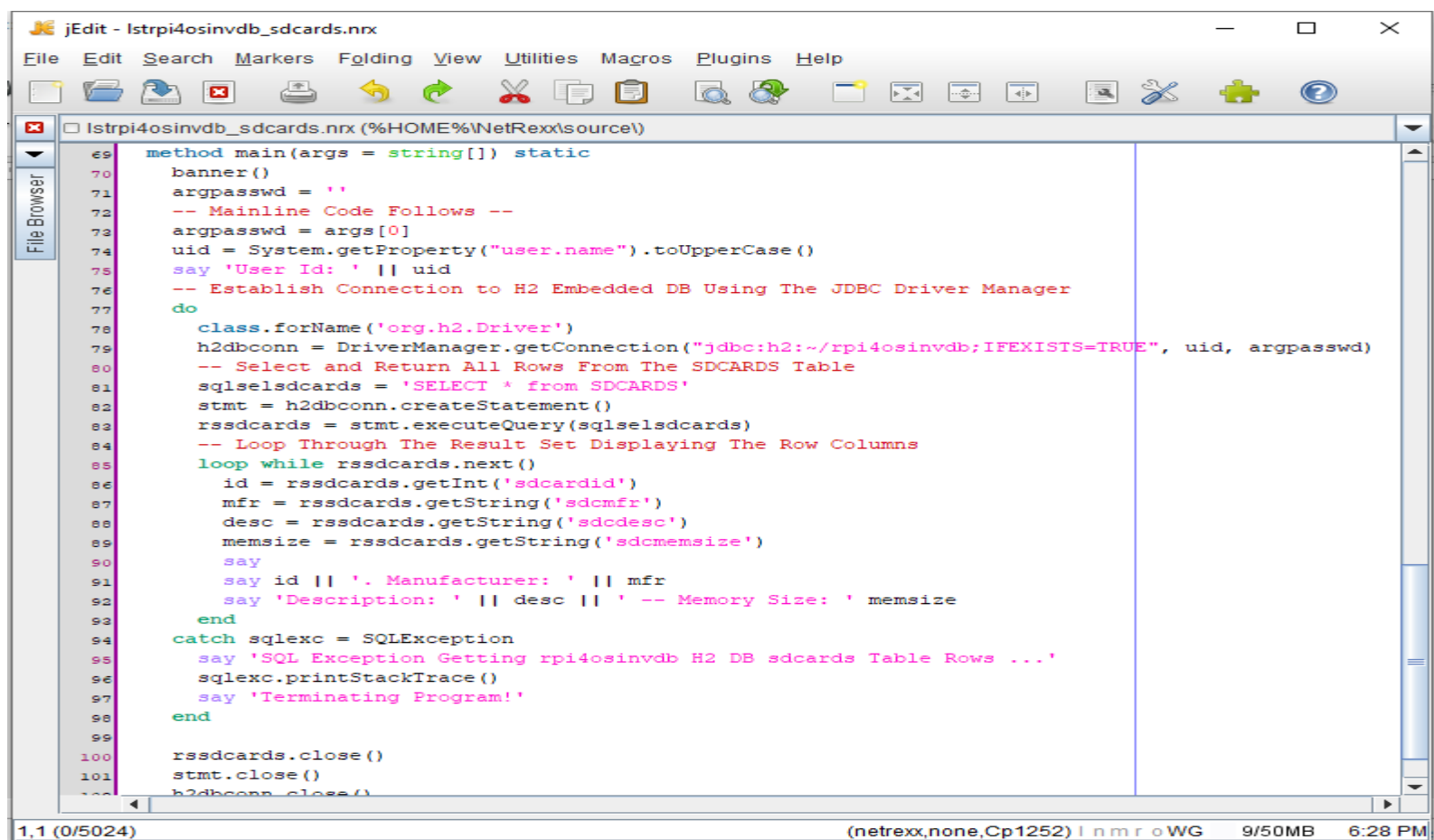
1. Architecture: aarch64 -- Bitness: 64
2. Architecture: armv7l -- Bitness: 32
3. Architecture: arm64 -- Bitness: 64

>>> End Of Program -- lstrpi4osinvdb_rpi4osarchs.nrx <<<

C:\Storage\NetRexx\source>
```

NetRexx Program - Select sdcards Table - I

- Program: Istrpi4osinvdb_sdcards.nrx



```
jEdit - Istrpi4osinvdb_sdcards.nrx
File Edit Search Markers Folding View Utilities Macros Plugins Help
Istrpi4osinvdb_sdcards.nrx (%HOME%\NetRexx\source\)
```

```
69 method main(args = string[]) static
70 banner()
71 argpasswd = ''
72 -- Mainline Code Follows --
73 argpasswd = args[0]
74 uid = System.getProperty("user.name").toUpperCase()
75 say 'User Id: ' || uid
76 -- Establish Connection to H2 Embedded DB Using The JDBC Driver Manager
77 do
78 class.forName('org.h2.Driver')
79 h2dbconn = DriverManager.getConnection("jdbc:h2:~/rpi4osinvdb;IFEXISTS=TRUE", uid, argpasswd)
80 -- Select and Return All Rows From The SDCARDS Table
81 sqlselsdcards = 'SELECT * from SDCARDS'
82 stmt = h2dbconn.createStatement()
83 rssdcards = stmt.executeQuery(sqlselsdcards)
84 -- Loop Through The Result Set Displaying The Row Columns
85 loop while rssdcards.next()
86 id = rssdcards.getInt('sdcardid')
87 mfr = rssdcards.getString('sdcmfr')
88 desc = rssdcards.getString('sdcdesc')
89 memsize = rssdcards.getString('sdcmemsize')
90 say
91 say id || '. Manufacturer: ' || mfr
92 say 'Description: ' || desc || ' -- Memory Size: ' memsize
93 end
94 catch sqlexc = SQLException
95 say 'SQL Exception Getting rpi4osinvdb H2 DB sdcards Table Rows ...'
96 sqlexc.printStackTrace()
97 say 'Terminating Program!'
98 end
99
100 rssdcards.close()
101 stmt.close()
102 h2dbconn.close()
```

1,1 (0/5024) (netrex,none,Cp1252) | n m r o W G 9/50MB 6:28 PM

NetRexx Program - Select sdcards Table - II

- **Run: java lstrpi4osinvdb_sdcards
<password>**

```
Command Prompt
C:\Storage\NetRexx\source>java lstrpi4osinvdb_sdcards 
lstrpi4osinvdb_sdcards.nrx
Version 1.0
List All sdcards Table Rows From H2 Database: rpi4osinvdb Using JDBC
Written By: Tony Dycks
Revised By: Tony Dycks
Date Written: September 13, 2021
Date Revised: September 13, 2021

User Id: TONYD

1. Manufacturer: Samsung
Description: EVO Plus microSDXC UHS-I Card with Adapter -- Memory Size: 64GB

2. Manufacturer: Samsung
Description: EVO Plus microSDXC UHS-I Card with Adapter -- Memory Size: 32GB

3. Manufacturer: Samsung
Description: EVO Select microSDXC UHS-I Card with Adapter -- Memory Size: 64GB

4. Manufacturer: Verbatim
Description: Carte Premium microSDHC Card with Adapter -- Memory Size: 32GB

5. Manufacturer: Samsung
Description: EVO Select microSDXC UHS-I Card with Adapter -- Memory Size: 32GB

6. Manufacturer: Samsung
Description: EVO Select microSDXC UHS-I Card with Adapter -- Memory Size: 128GB

>>> End Of Program -- lstrpi4osinvdb_sdcards.nrx <<<

C:\Storage\NetRexx\source>
```

Findings and Recommendations - I

- **Results were Consistent on both Windows and Linux OS Platforms**
- **Occasionally the H2 Console would not start automatically**
- **Navigating to <http://localhost:8082> would start the H2 Console OK**
- **H2 Embedded and H2 In Memory Database were Tested OK with consistent Results**
- **Was able to Implement JDBC Data Source API on BSF4ooRexx but unable to Implement on NetRexx**
- **Tested the Following Jar Version Files Successfully:**
 - h2-1.4.199.jar
 - h2-1.4.200.jar

Findings and Recommendations - II

- **H2 Embedded Database File Storage Location**
 - ~ : User's Home Directory
 - **Windows: %USERPROFILE%** Environment
 - C:\Users*<User-Id>*
 - **Linux: \$HOME** Environment
 - */home/<User-Id>*
- **H2 Embedded DB Filenames and Extensions**
 - *<db-name>.mv.db*
 - *<db-name>.trace.db*
- **DB Files Portability**
 - Files can be transferred to other Computers
 - Files can be transferred to other OS Platforms

Findings and Recommendations - III

- **Recommended Technology Stack**

- **Oracle Java SE JDK 8** or **Open JDK 8** (1.8 in Red Hat Family)
- H2 Version 1.4.199 (Debian Package **h2** in Debian Family)
- **NetRexx** 3.09 GA
- **ooRexx** 5.0 Beta (4.2 is OK too; Recommend 5.0 Beta)
- **BSF4ooRexx** v641 (Requires Java 6 or Later)
- **Firefox** Web Browser (Default for H2 Console)

List of References for H2 Database

Website	Description	URL
H2 Database Downloads	Downloads for Windows Installer or Zip Archive for H2 Database	https://www.h2database.com/html/download.html
H2 Database Quick Start	Quickstart Documentation for H2 Database	https://www.h2database.com/html/quickstart.html
H2 Website Tutorial	Website Tutorial for H2 DB Use	https://www.h2database.com/html/tutorial.html
Tutorials Point H2 Tutorial	Tutorials Point Website – H2 Database Tutorial	https://www.tutorialspoint.com/h2_database/index.htm
H2 Database Engine Doc	PDF of H2 Database Engine Documentation	https://h2database.com/h2.pdf

End of Presentation



- **Zip Archive of NetRexx and BSF400Rexx Programs will be available with these Slides**
- **Questions?**
- **Comments?**

A blue rectangular graphic with a white gradient on the left side. The text "H2" is written in a large, white, sans-serif font in the center-right of the rectangle.

H2