Rexx LA Symposium 2021 – H2 Database JDBC API with NetRexx and BSF4ooRexx

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Overview – Table of Contents

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 commited)
  - 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

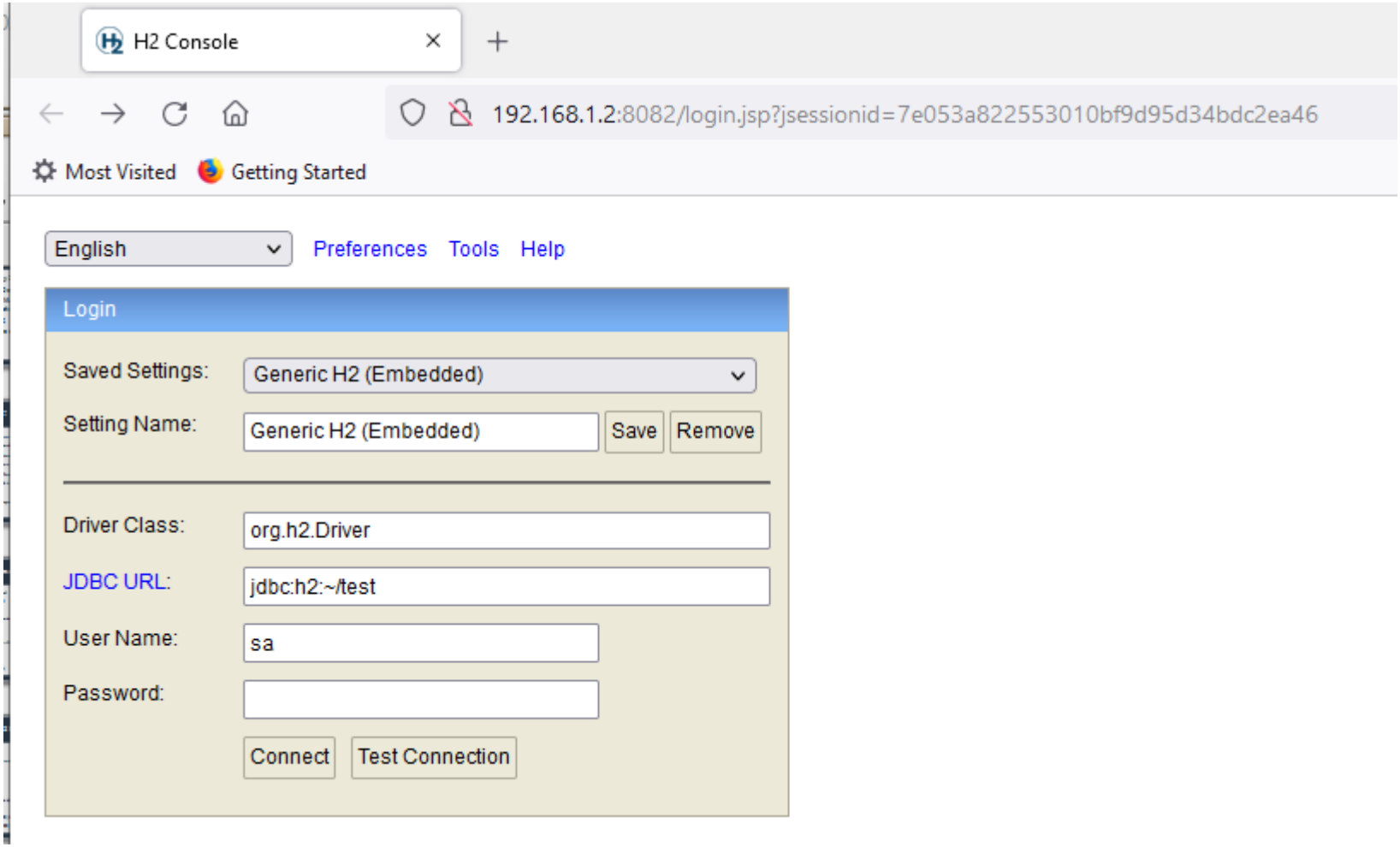
Java Based H2 Tutorials

- **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<Verson>.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}

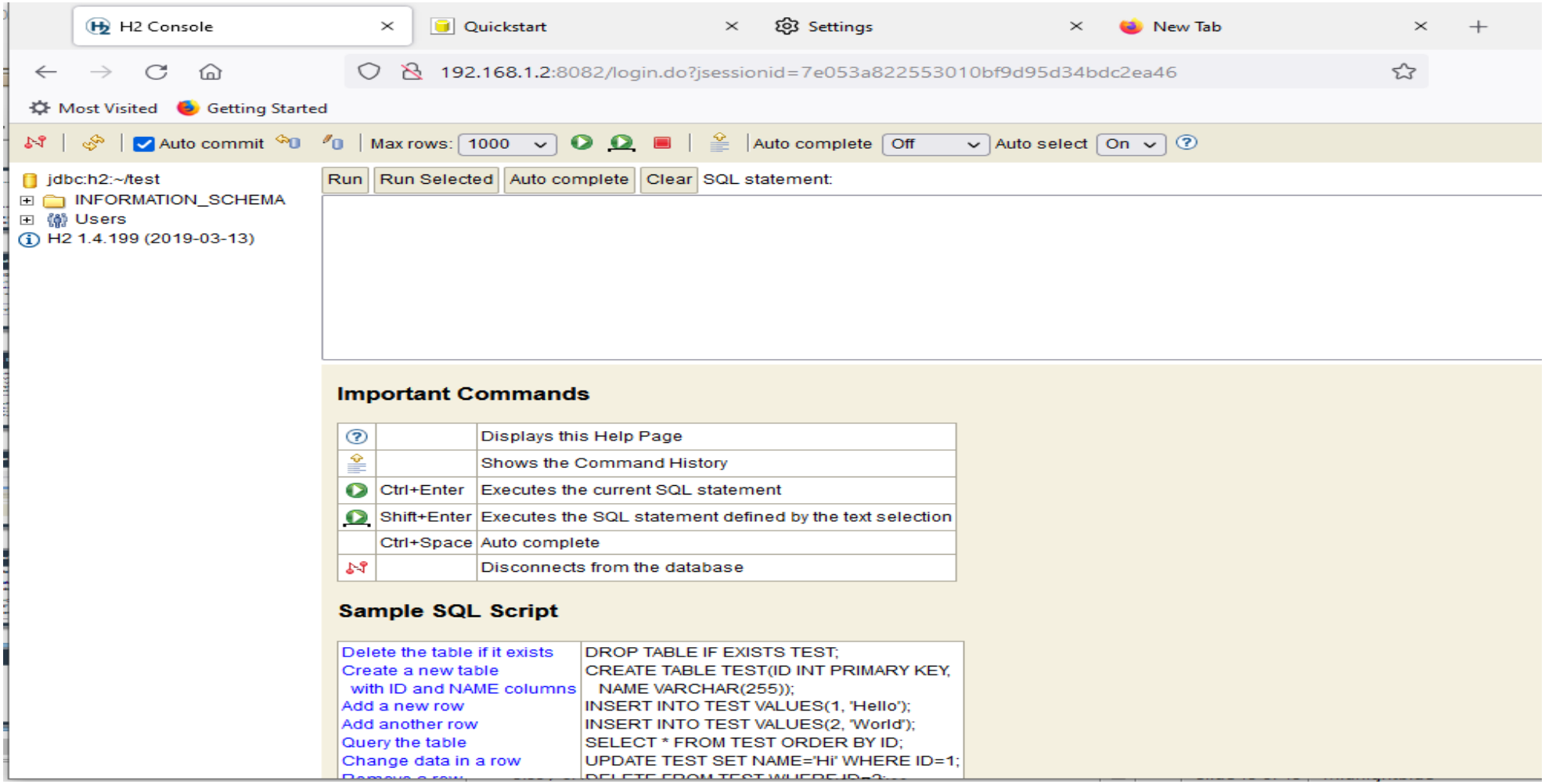
Windows – H2 Console Login Sample Firefox



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 ...

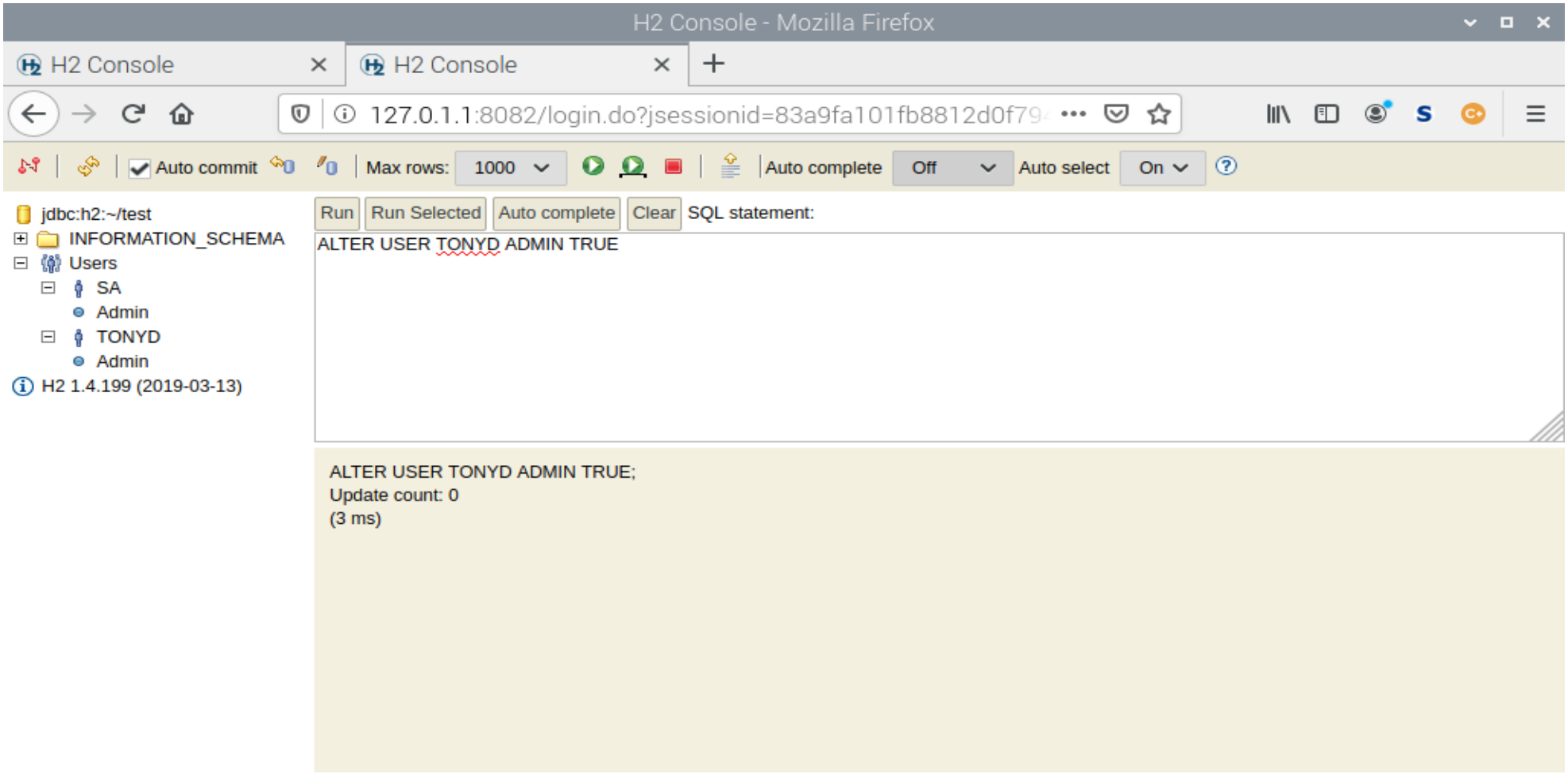
Windows 10 – H2 Web Console – Start Menu



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

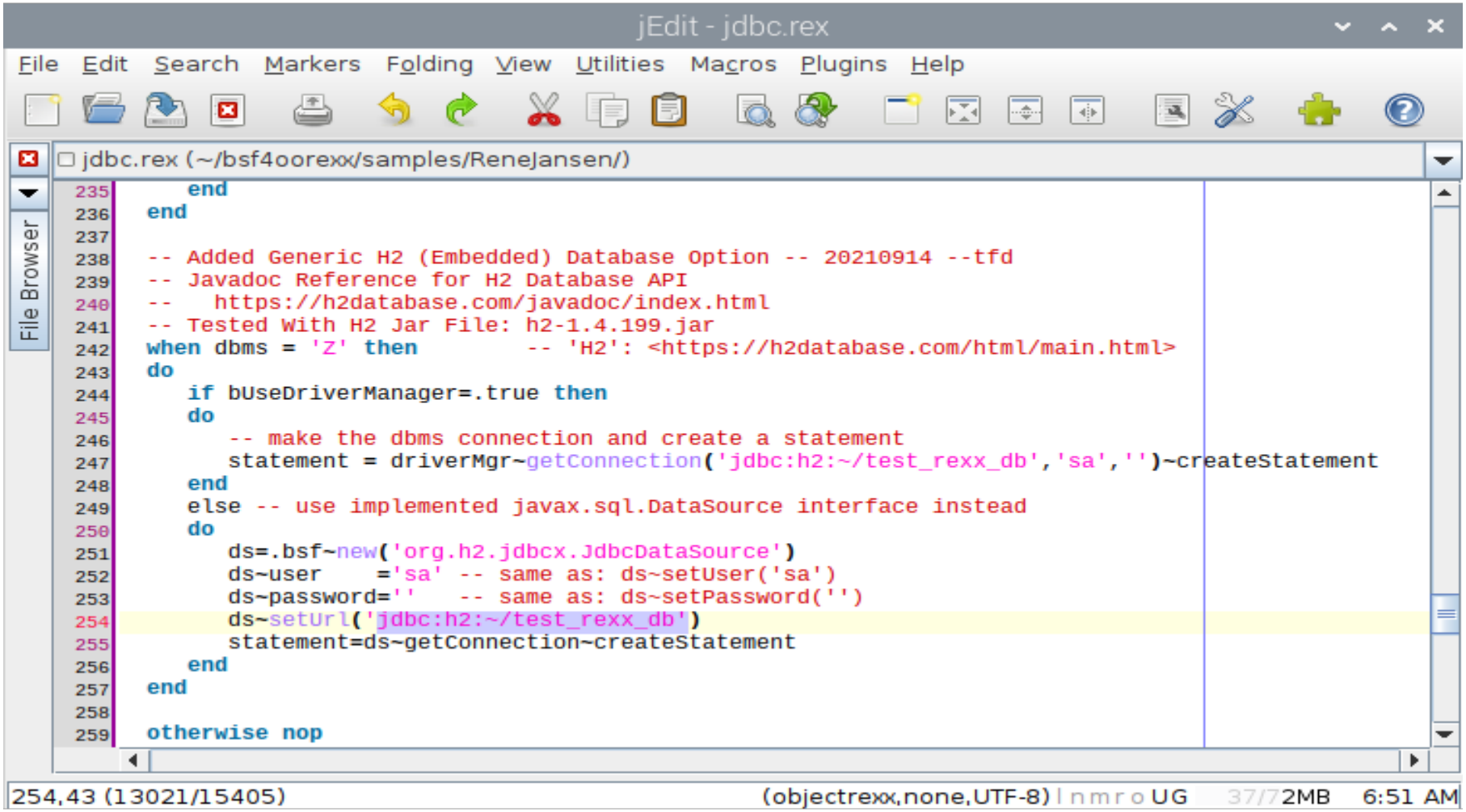
H2 Console – Users With Admin Example



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

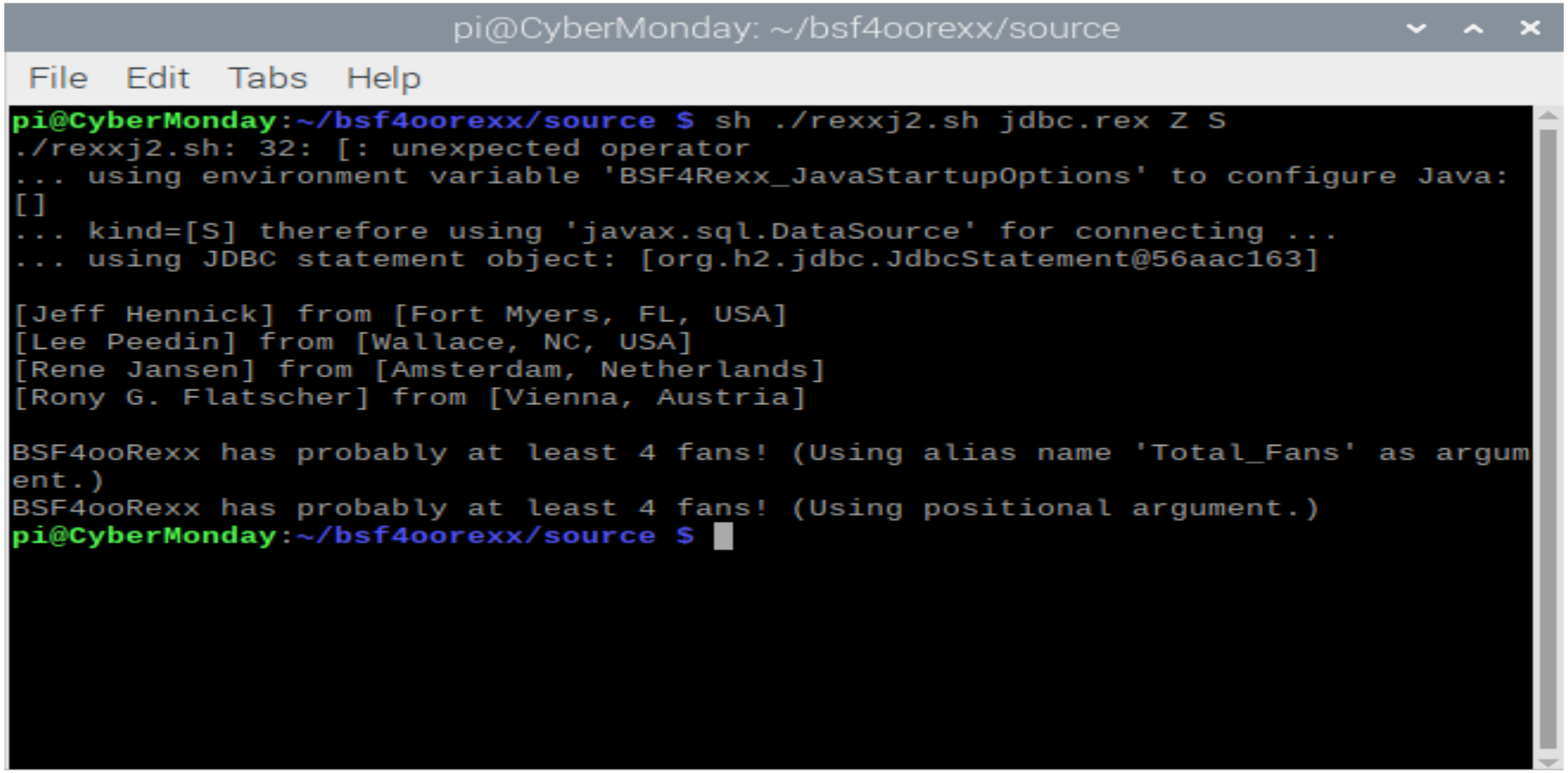


BSF4ooRexx Sample – jdbc.rex Run

- **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**



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

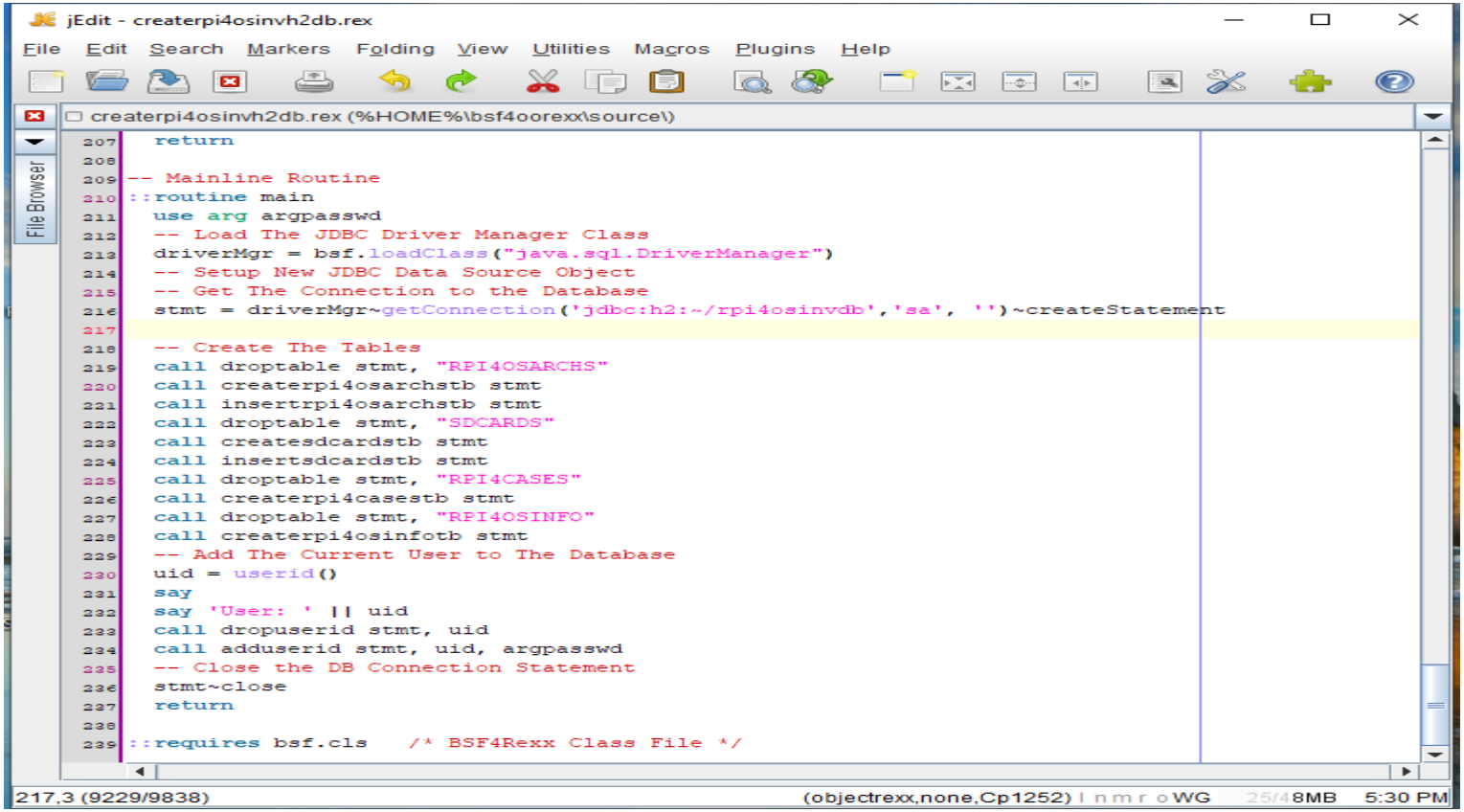
- **DB Create Program**
  - **Program Name**:
    - createrpi4osinvh2db.rex
  - **Language**: BSF4ooRexx
  - **Program Short Description**:
    - Create a H2 Embedded Database: **rpi4osinvdb**
    - Set a password for the the currently logged in user
    - Create 4 Database Tables:
      - **rpi4osarchs** – 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

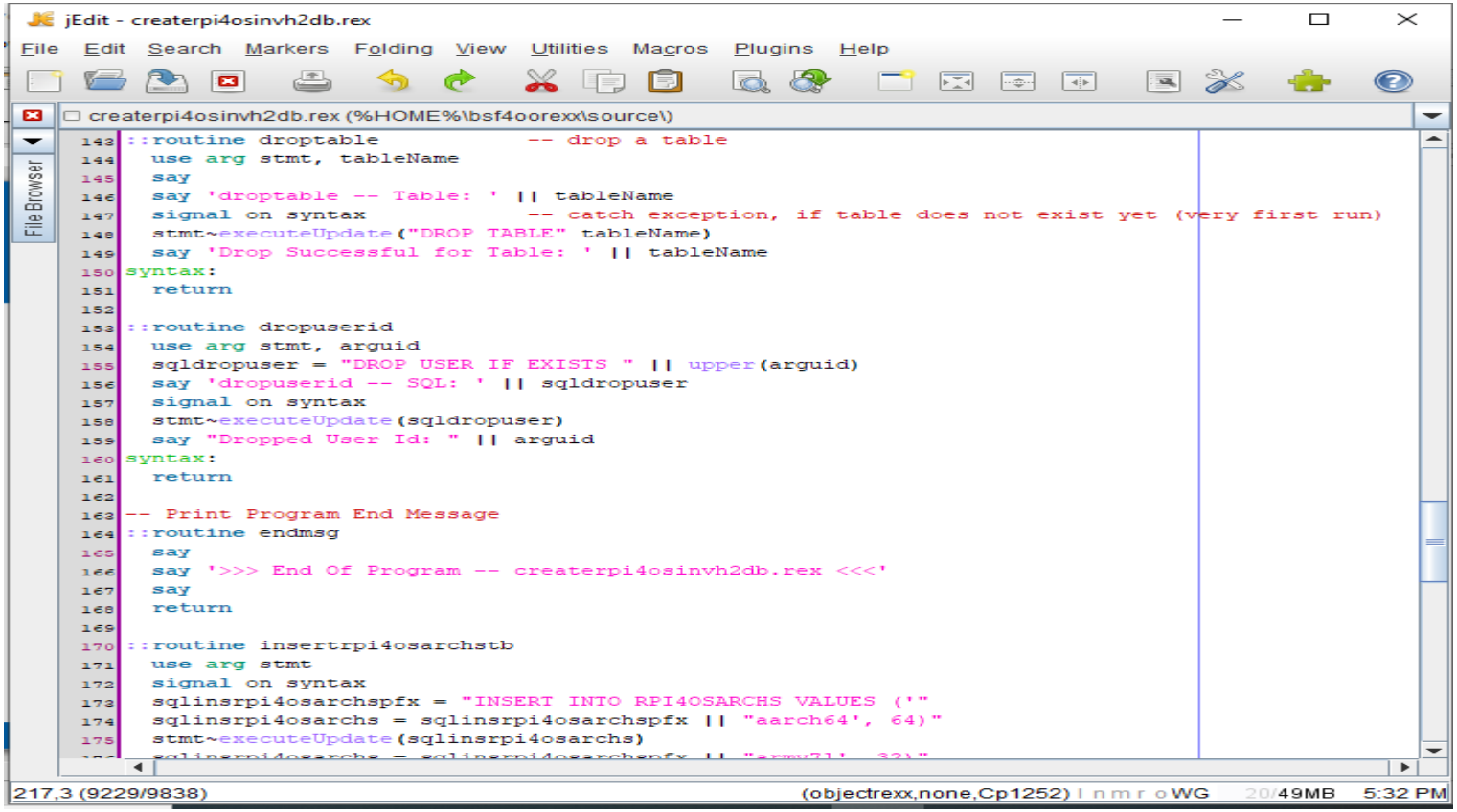
H2 Embedded DB – Creating a Sample Database - V

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



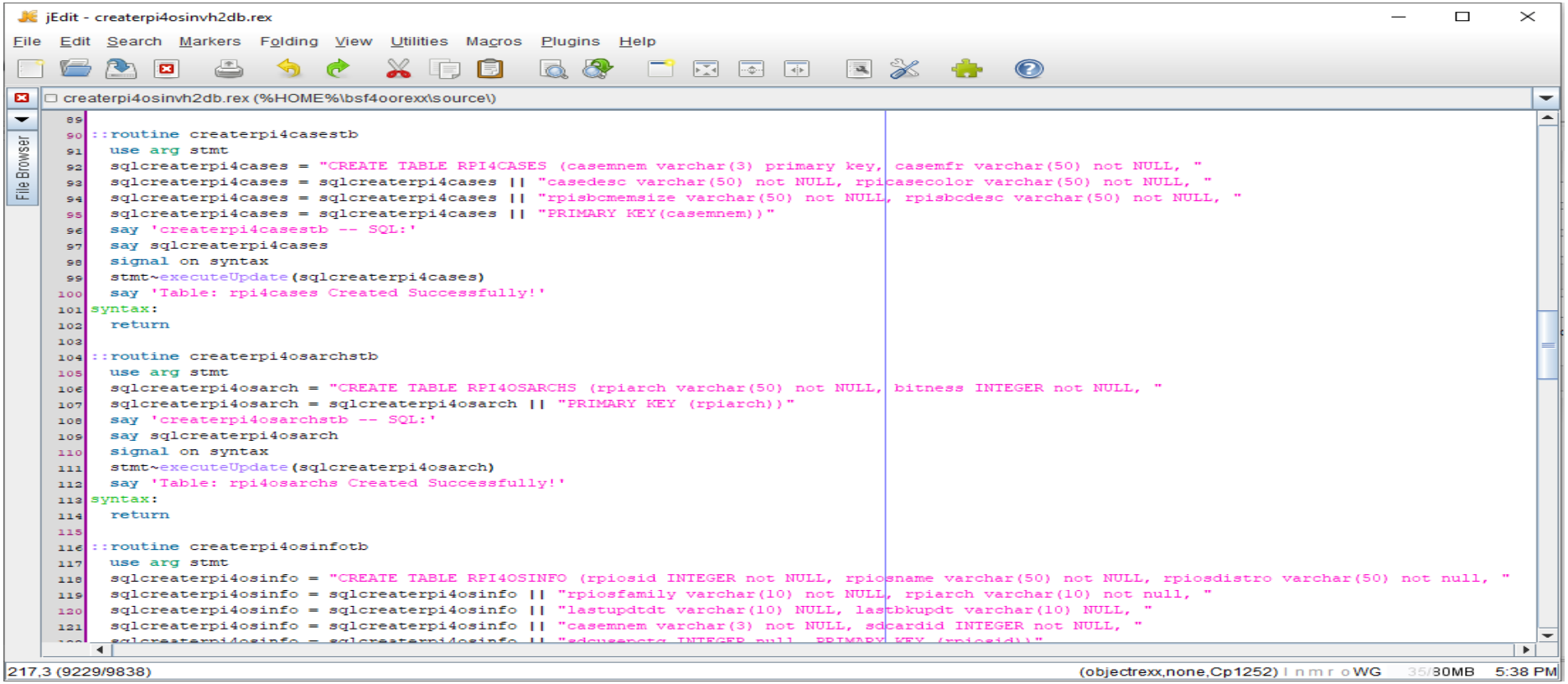
H2 Embedded DB – Creating a Sample Database - VI

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



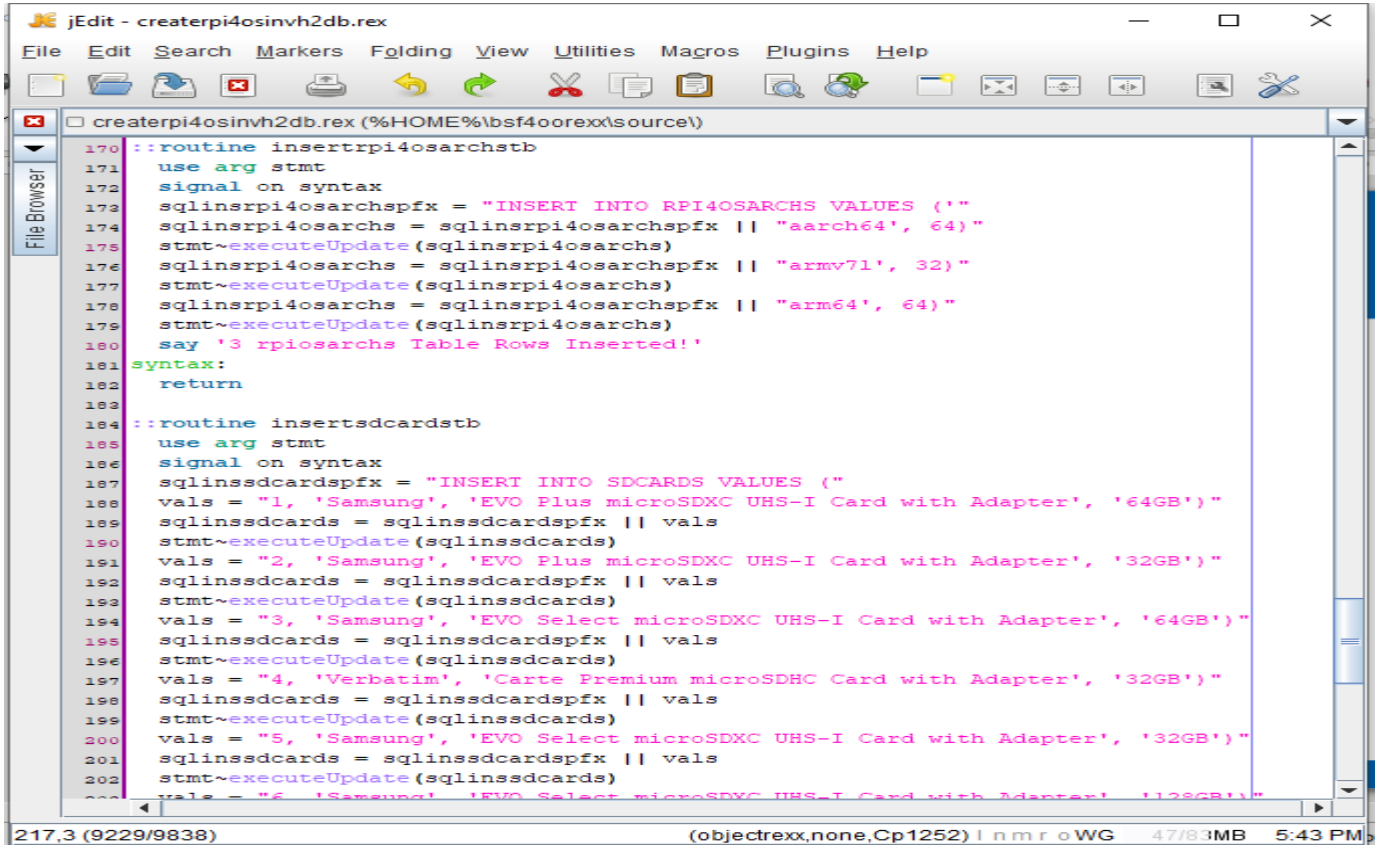
H2 Embedded DB – Creating a Sample Database - VII

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



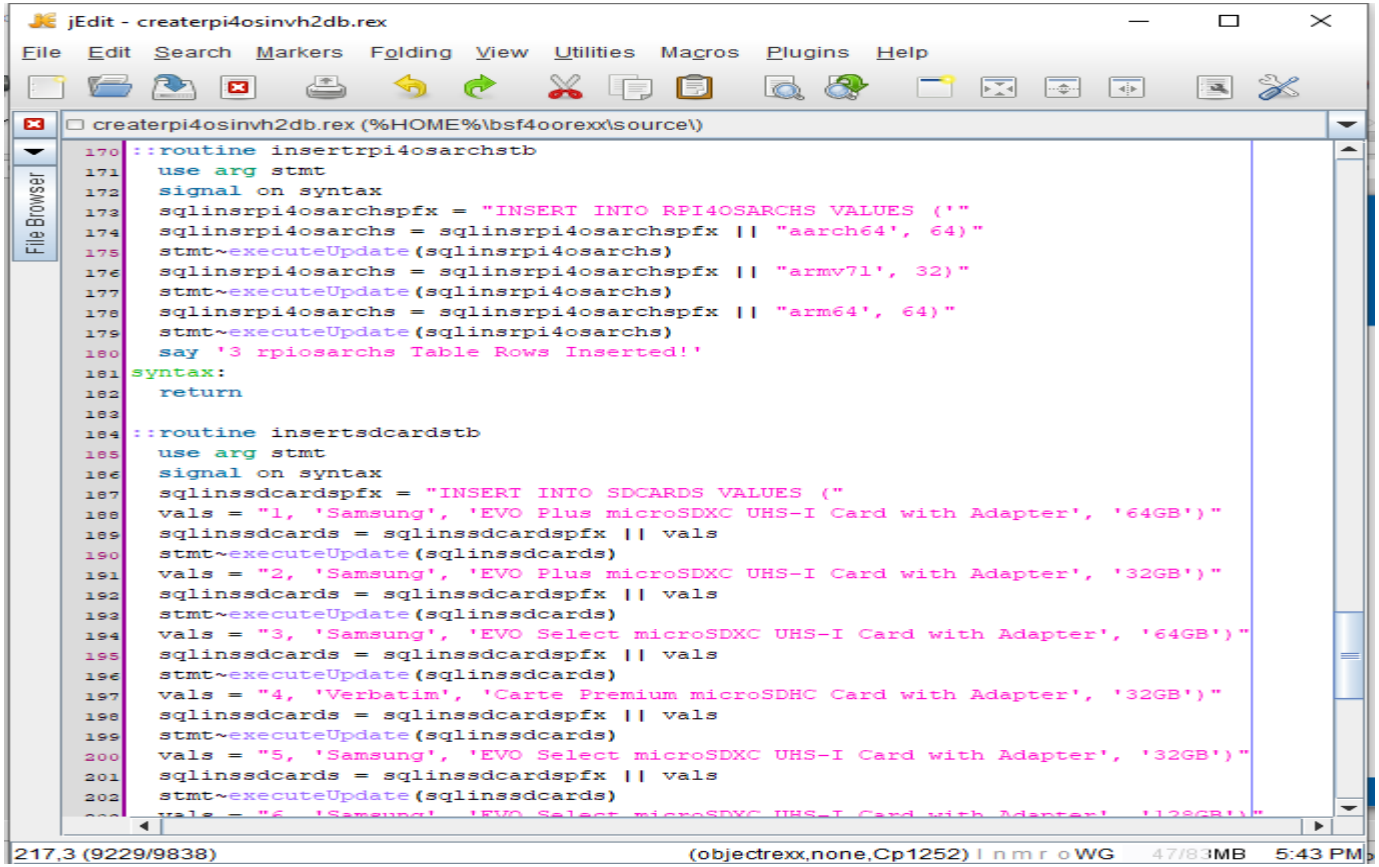
H2 Embedded DB – Creating a Sample Database - VIII

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



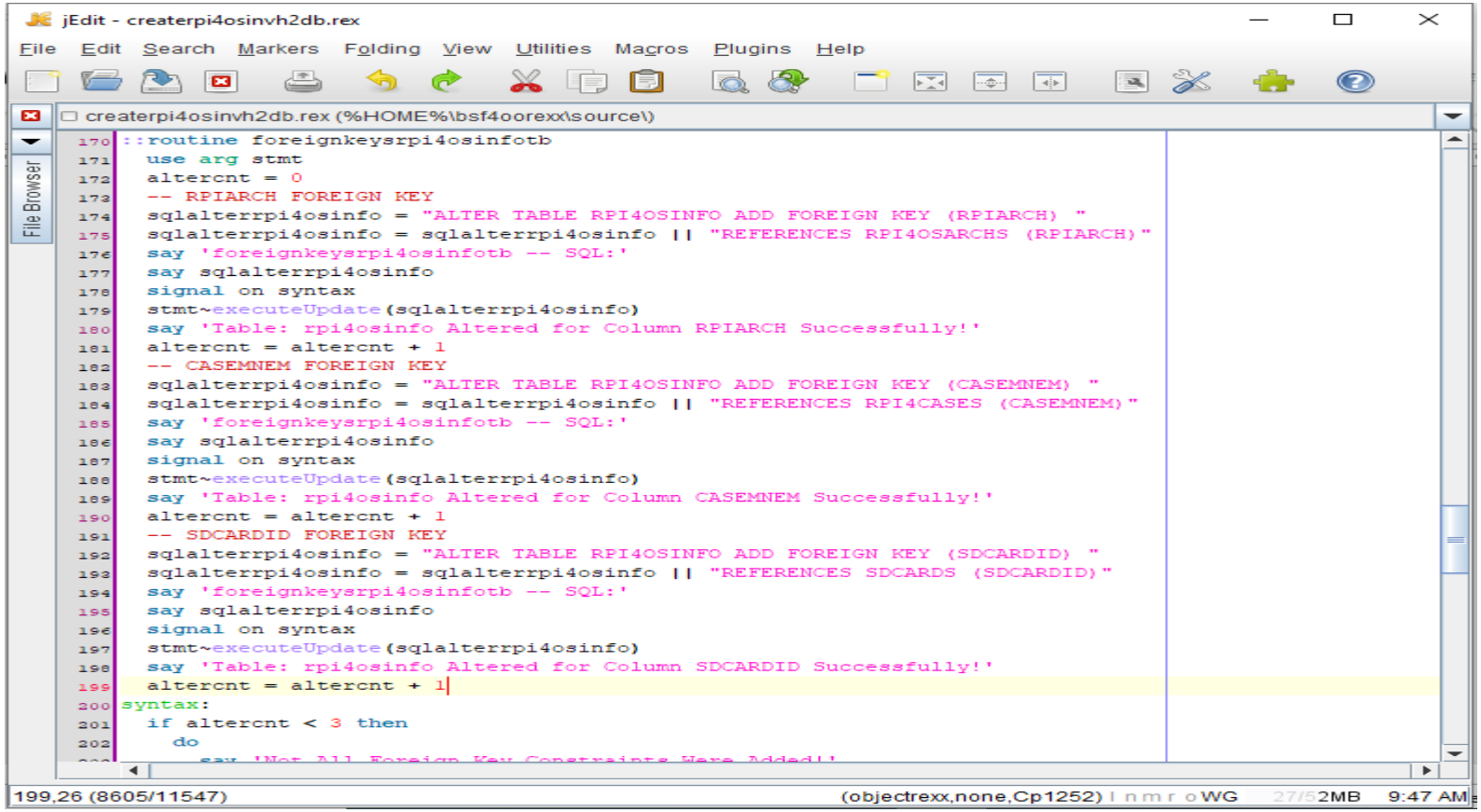
H2 Embedded DB – Creating a Sample Database - IX

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



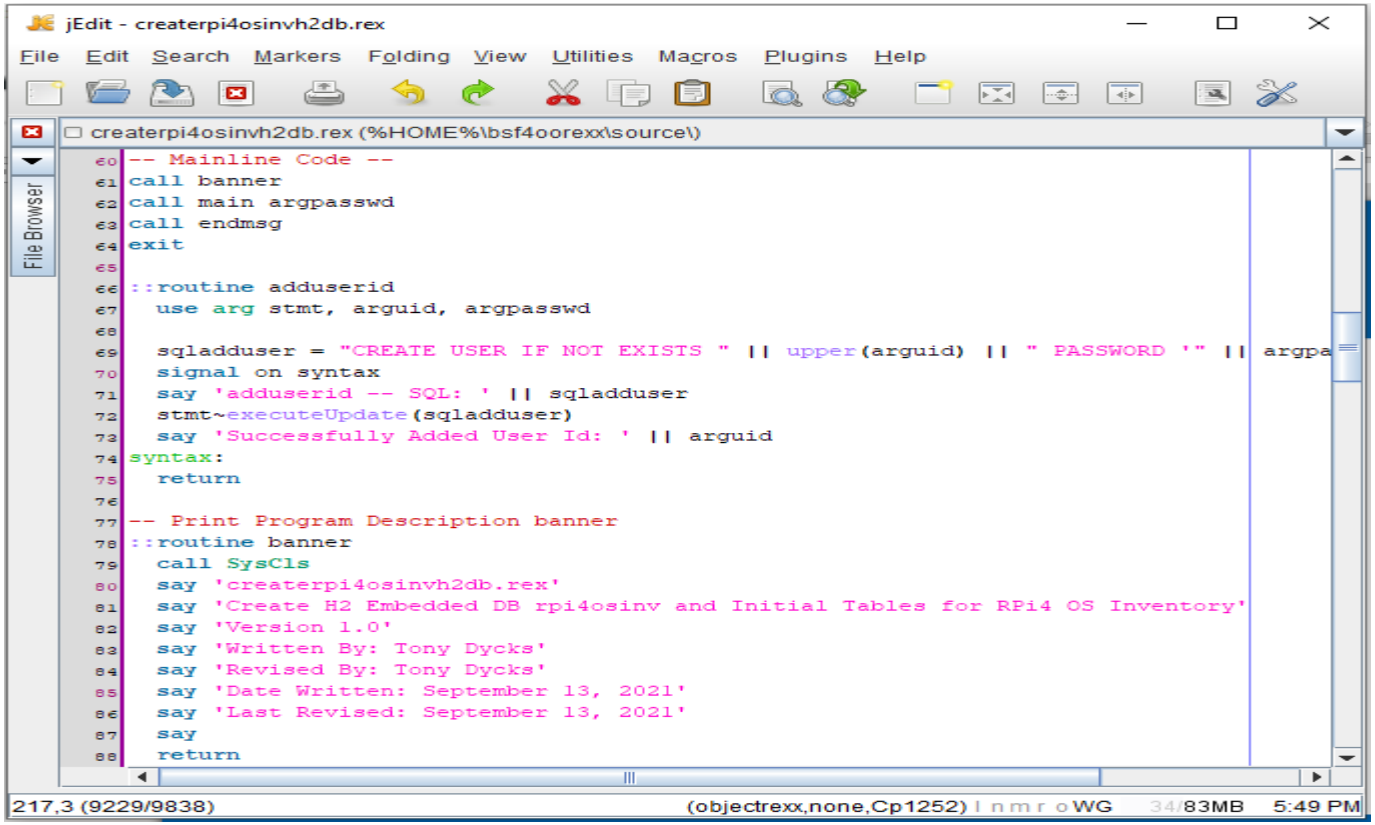
H2 Embedded DB – Creating a Sample Database - X

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



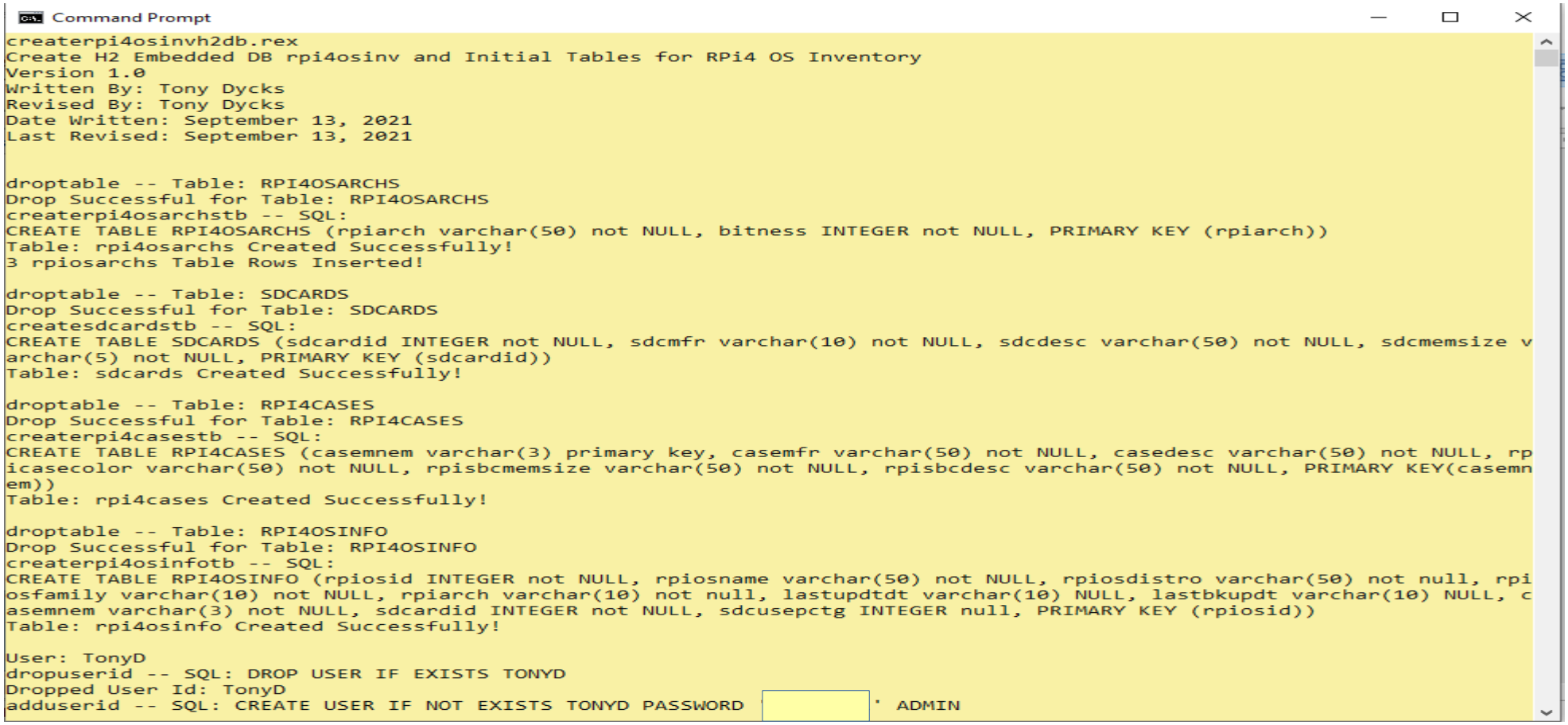
H2 Embedded DB – Creating a Sample Database - XI

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



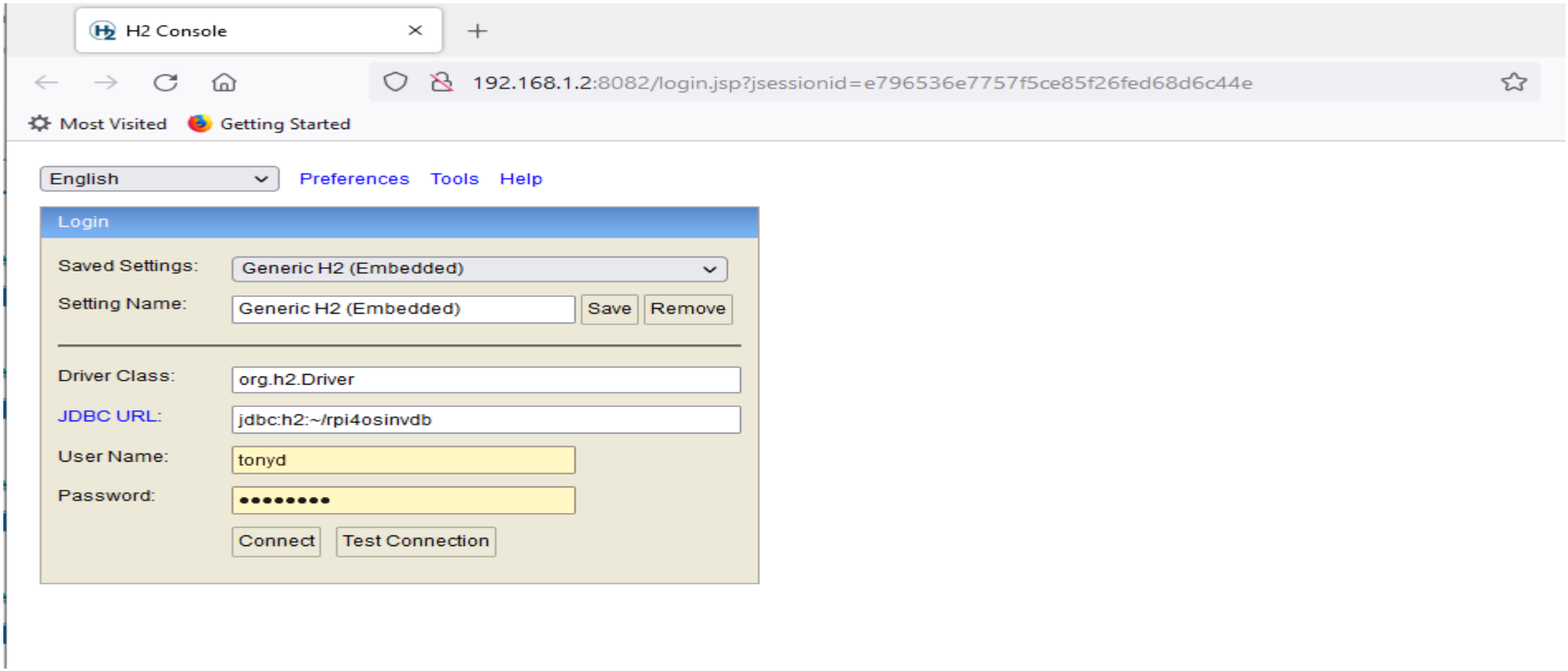
H2 Embedded DB – Creating a Sample Database – XII

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



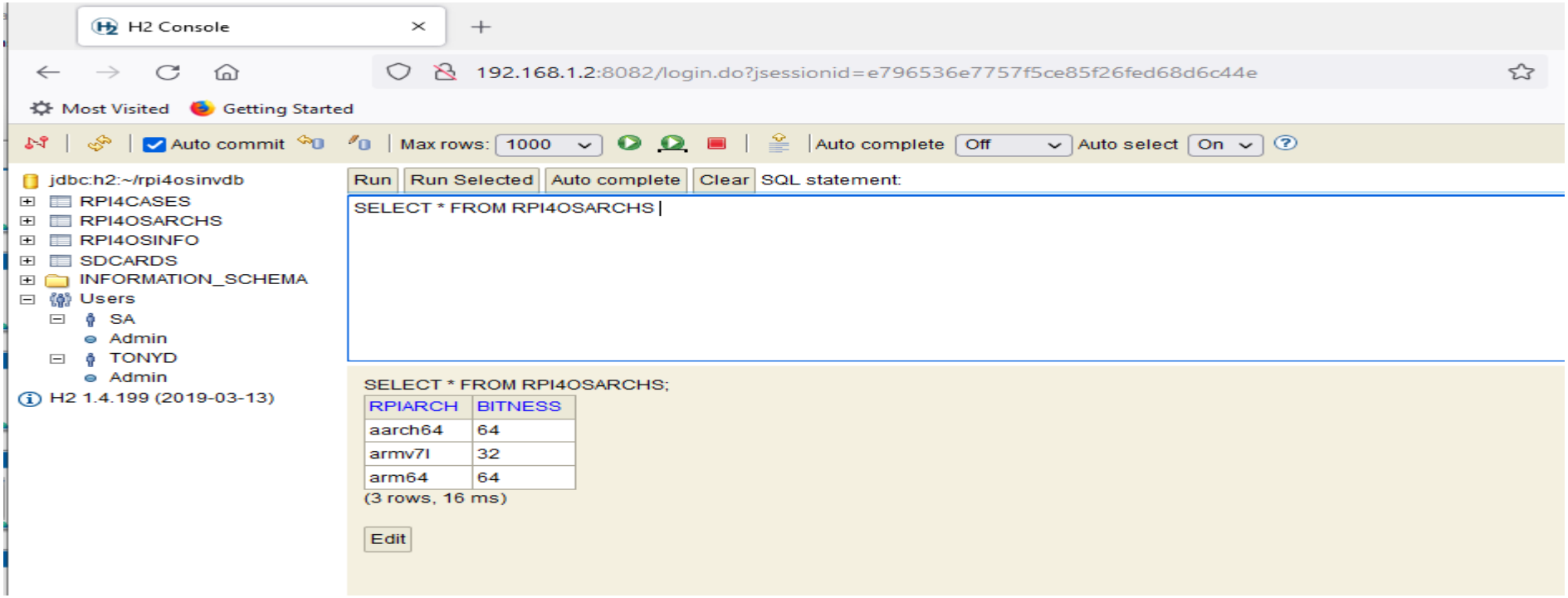
H2 Embedded DB – Creating a Sample Database – XIII

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



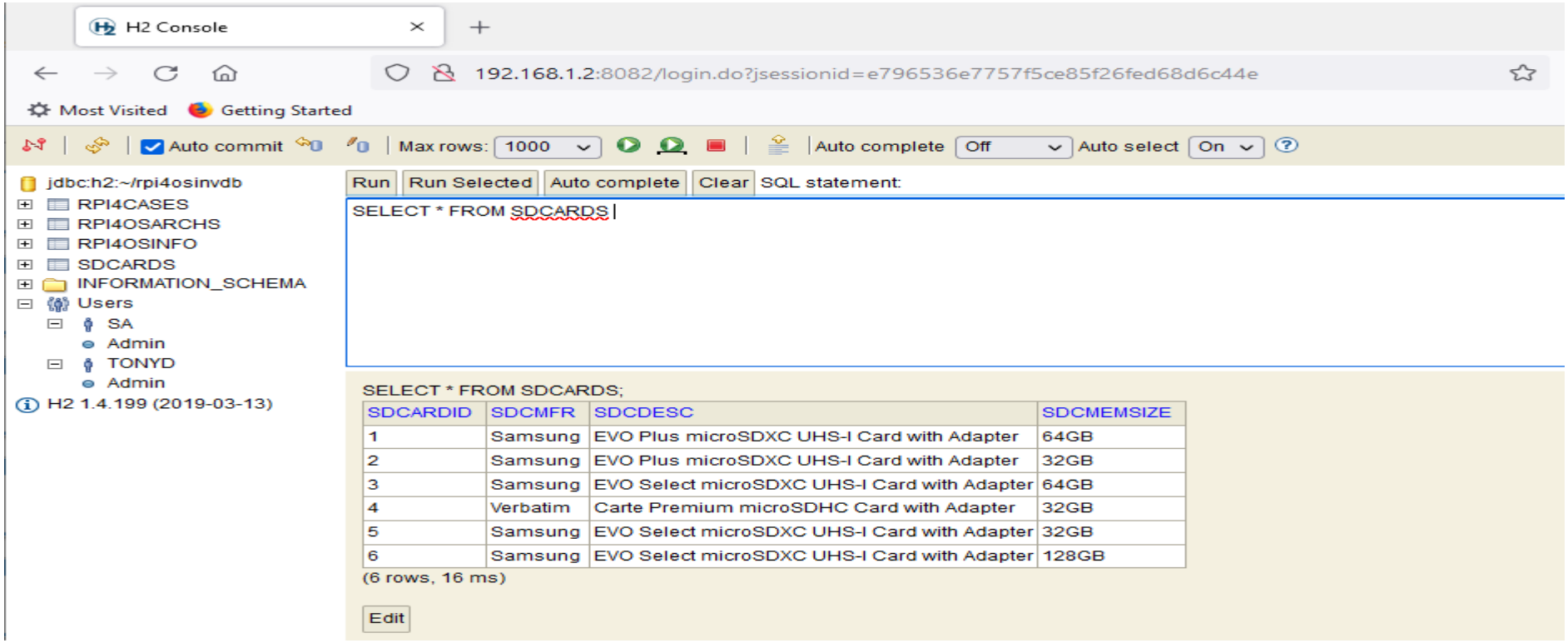
H2 Embedded DB – Creating a Sample Database – XIV

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



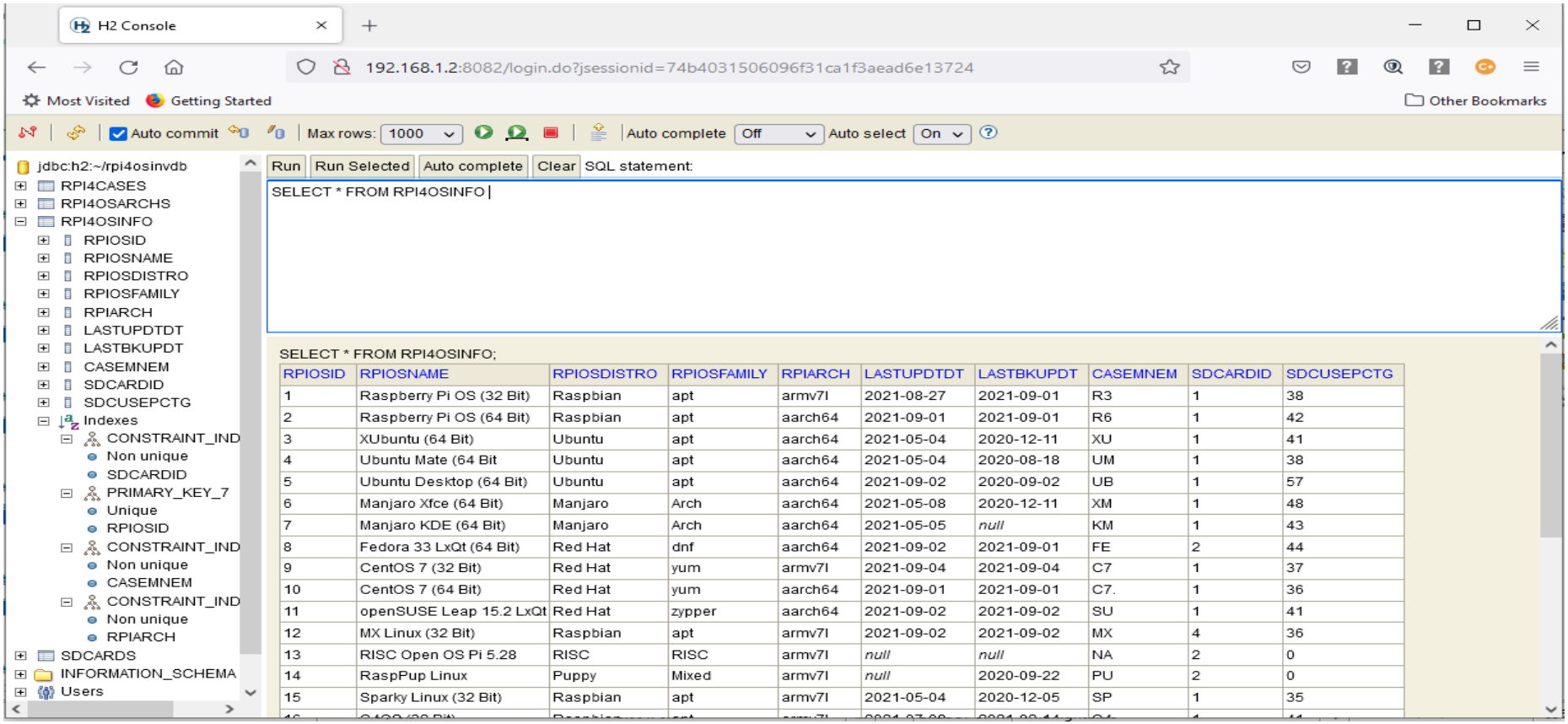
H2 Embedded DB – Creating a Sample Database – XV

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



H2 Embedded DB – Creating a Sample Database – XVI

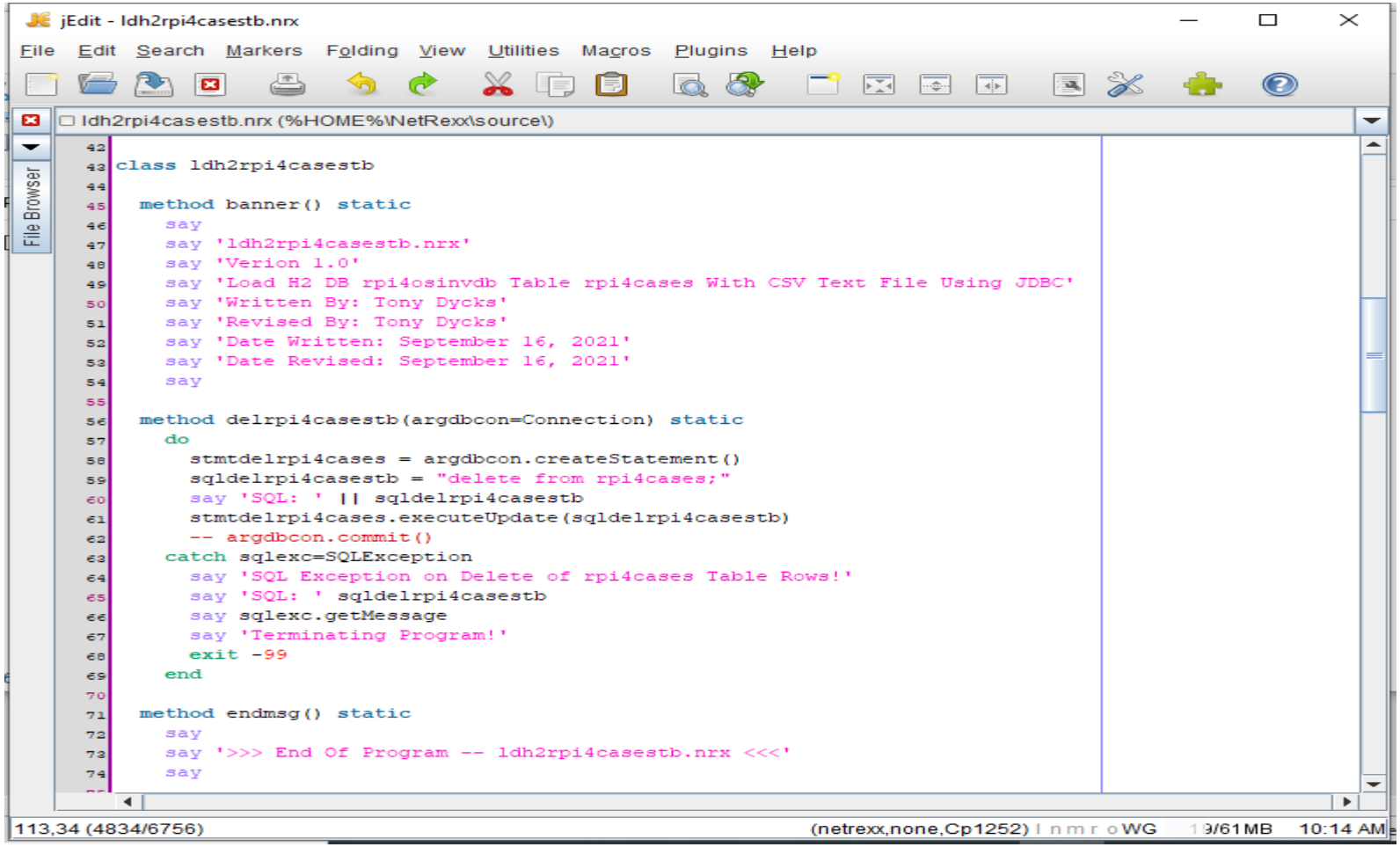
- **Verify Run Using H2 Console – rpi4osinfo Table Primary & Foreign Keys**



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

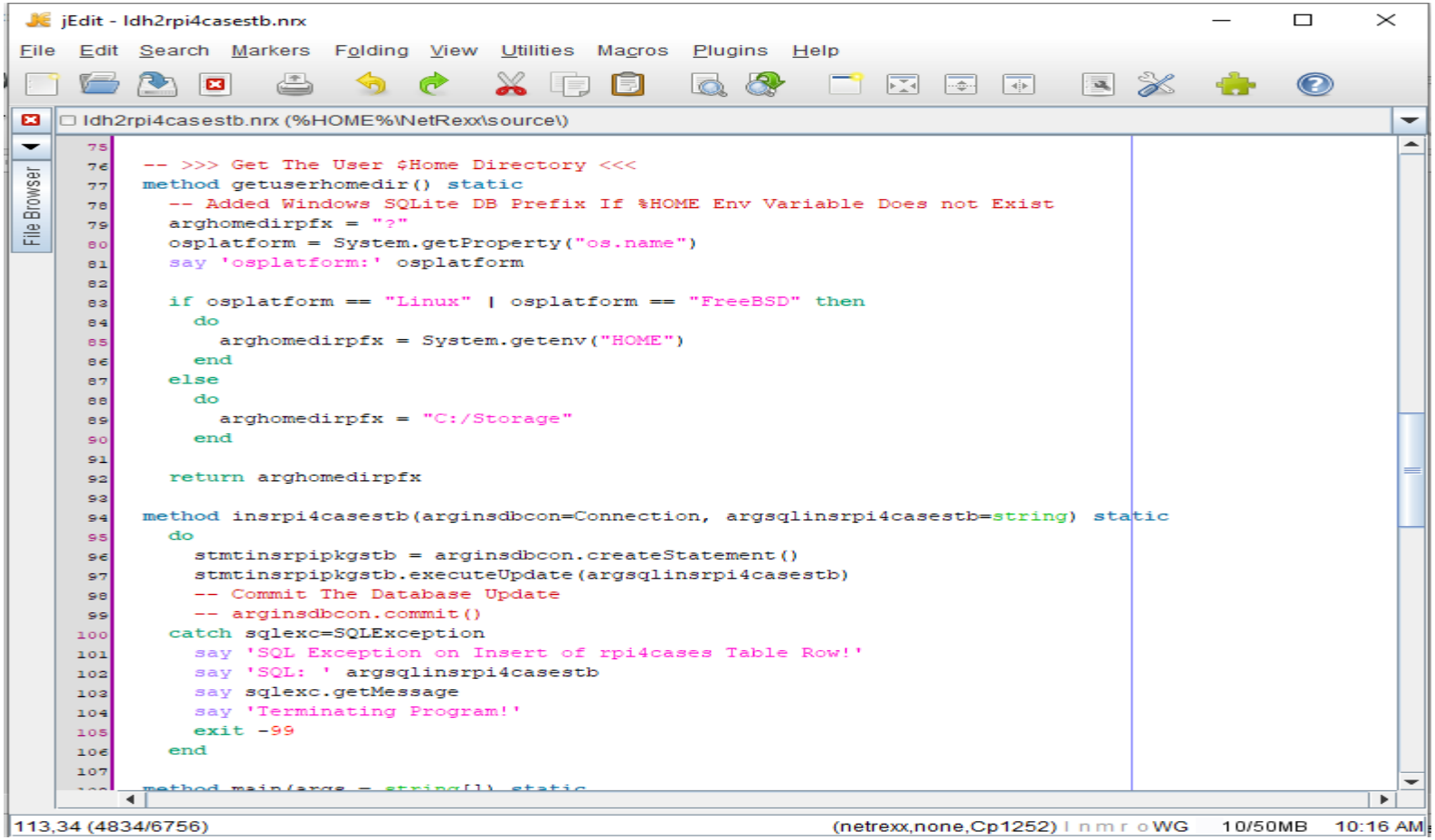
NetRexx Program – Load rpi4cases Table - I

- **Program: ldh2rpi4cases.nrx (Screenshot #1)**



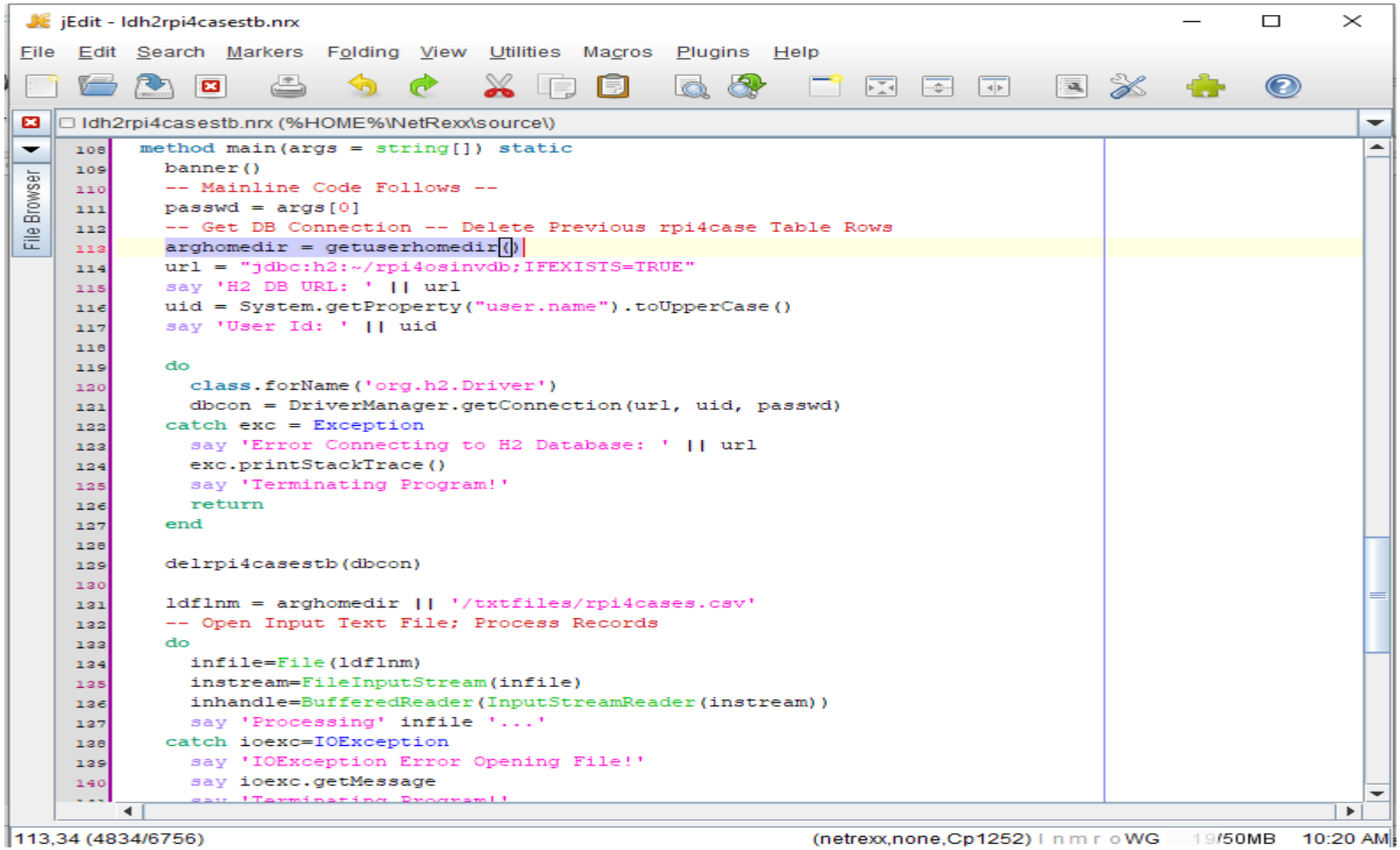
NetRexx Program – Load rpi4cases Table - II

- **Program: ldh2rpi4cases.nrx (Screenshot #2)**



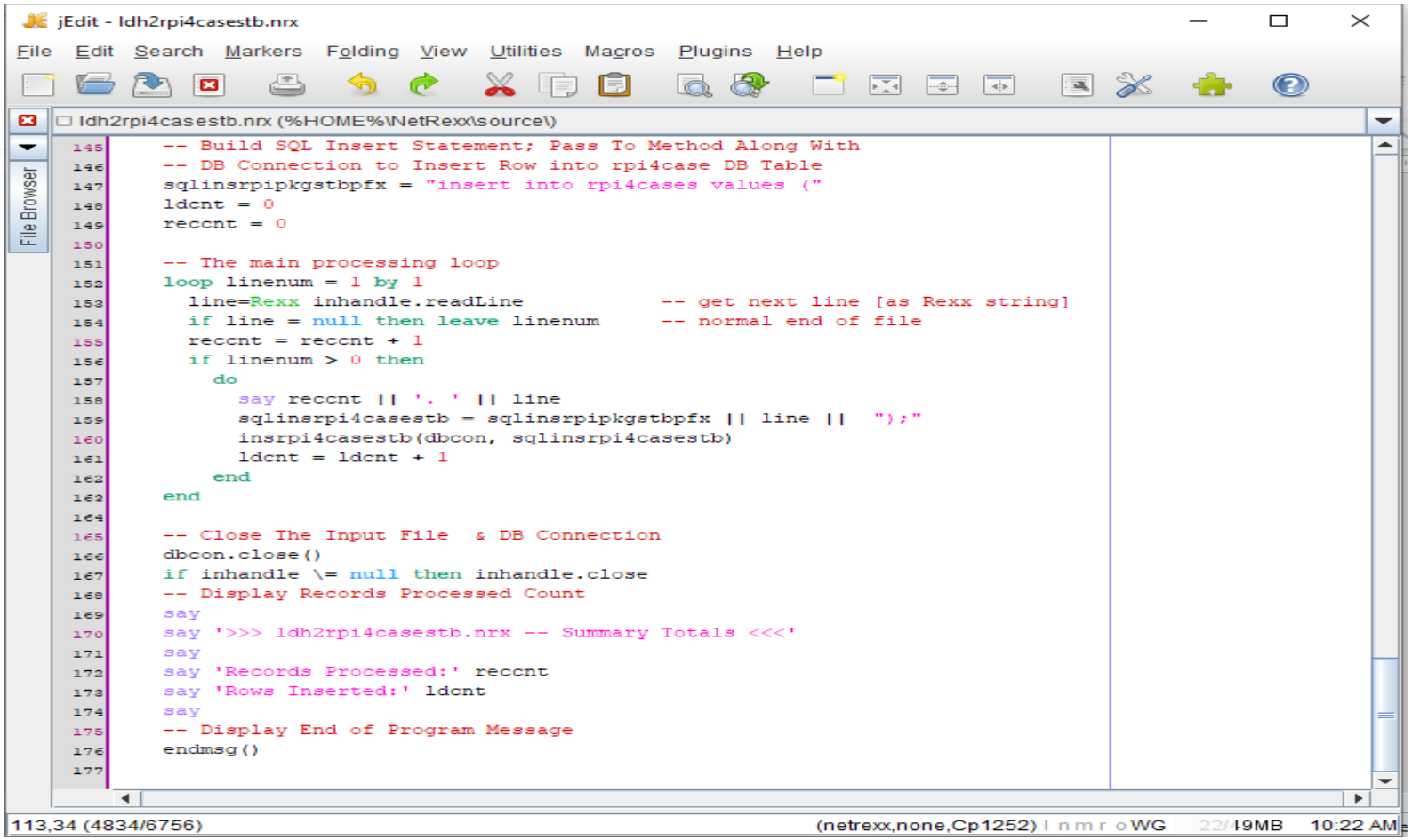
NetRexx Program – Load rpi4ocases Table - III

- **Program: ldh2rpi4cases.nrx (Screenshot #3)**



NetRexx Program – Load rpi4ocases Table - IV

- **Program: ldh2rpi4cases.nrx (Screenshot #4)**



NetRexx Program – Load rpi4ocases Table - V

- **Program: ldh2rpi4cases.nrx (CSV Input Data)**

C:\Storage\txtfiles\rpi4cases.csv - SciTE

File Edit Search View Tools Options Language Buffers Help

1 rpi4cases.csv

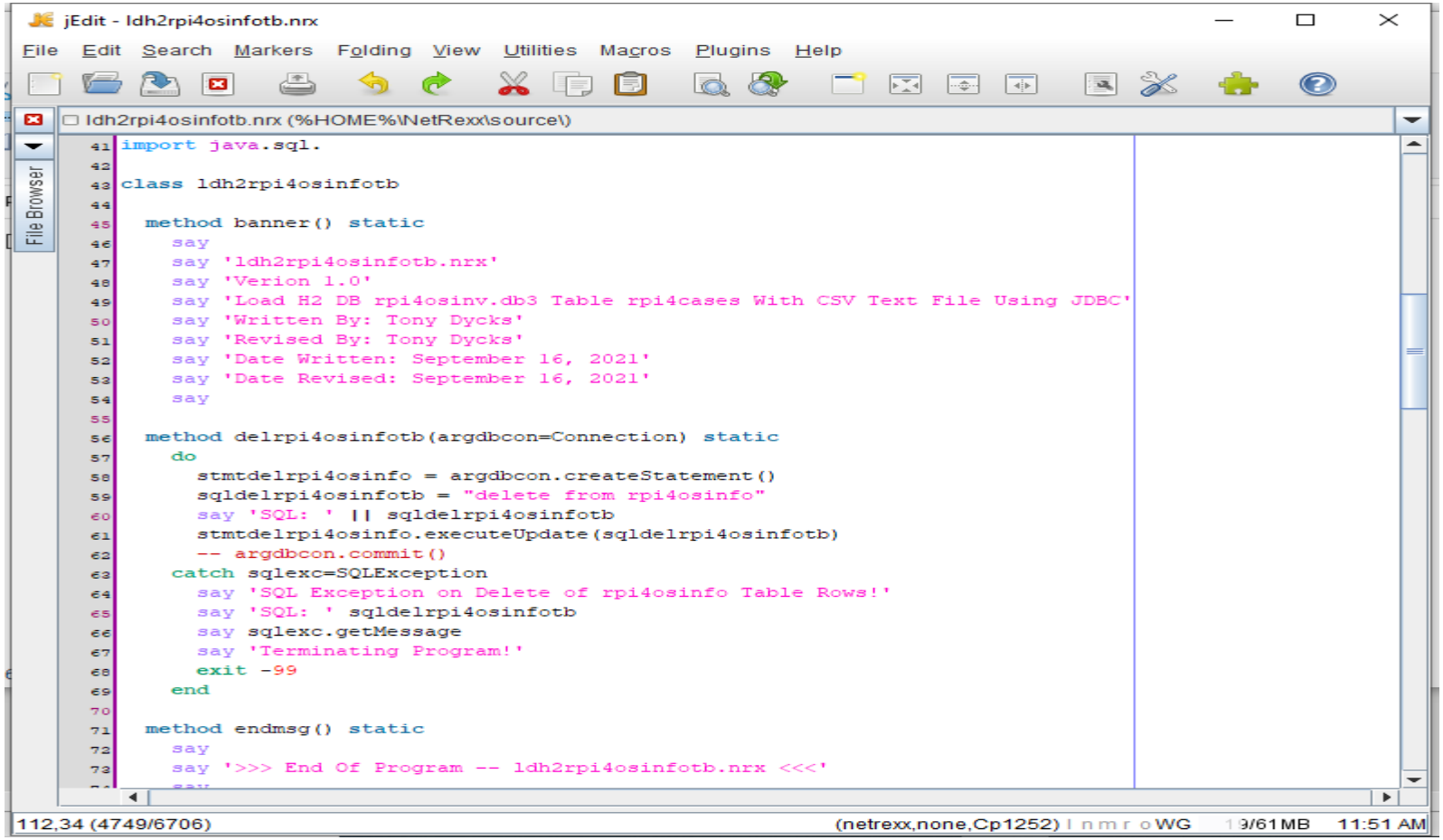
```
1  'R3','Canakit','Raspberry Pi 4 Case - Premium','Black','4GB','Raspberry Pi4 Model B'
2  'XU','Canakit','Raspberry Pi 4 Case - Premium','White','4GB','Raspberry Pi4 Model B'
3  'XM','Canakit','Raspberry Pi 4 Case - Premium','Clear','4GB','Raspberry Pi4 Model B'
4  'KL','Vilros','Raspberry Pi 4 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)

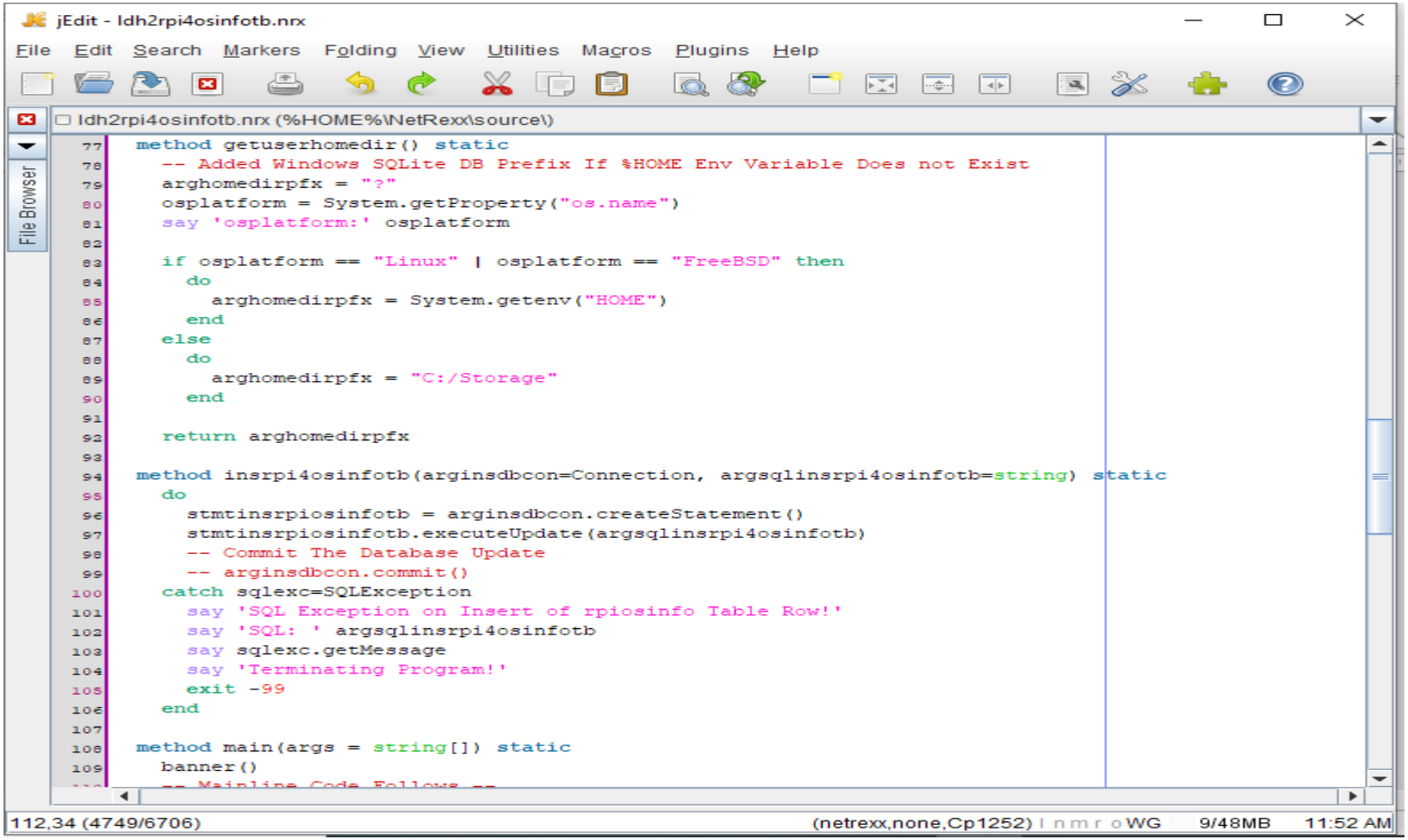
NetRexx Program – Load rpi4osinfo Table - I

- **Program: ldh2rpi4osinfo.nrx (Screenshot #1)**



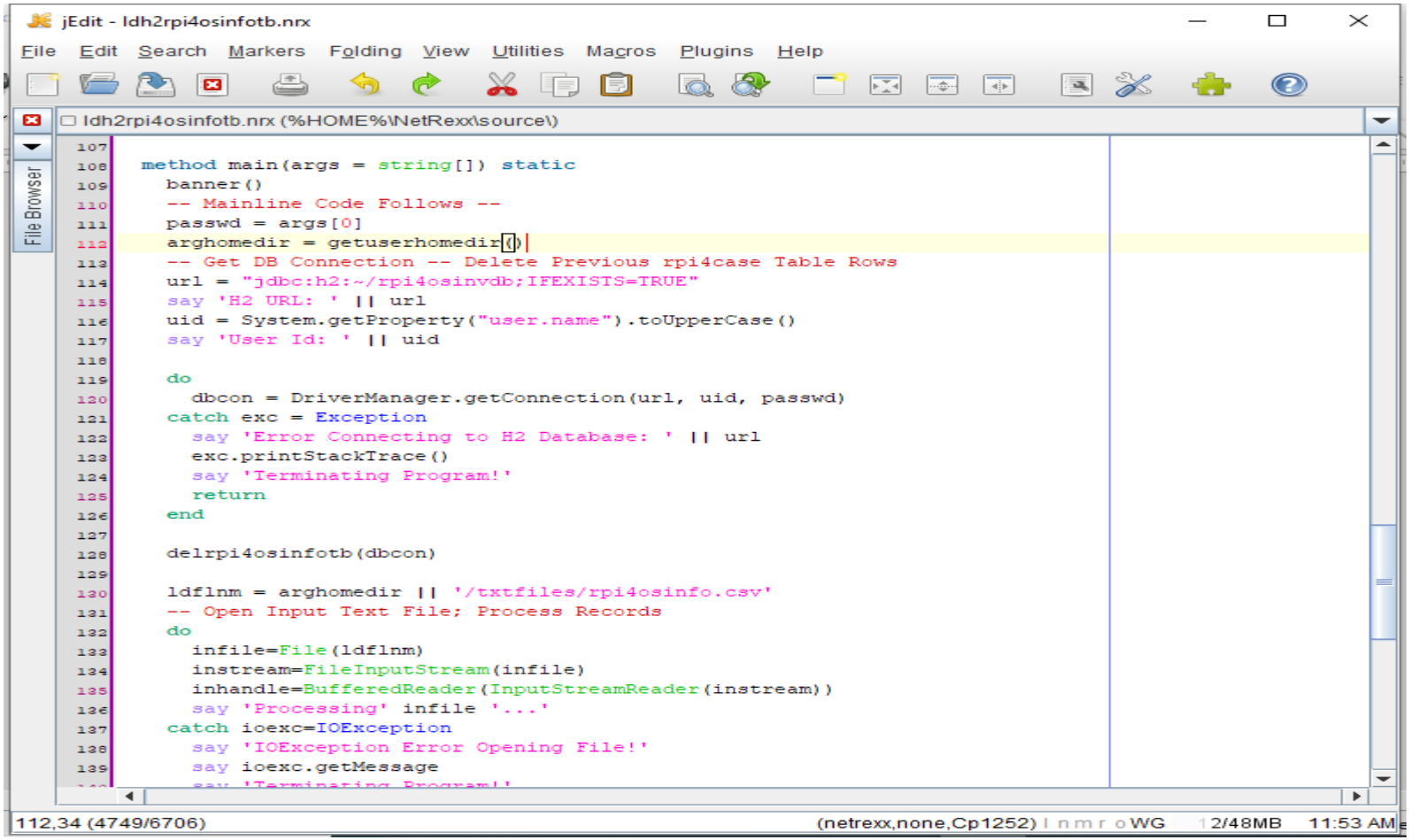
NetRexx Program – Load rpi4osinfo Table - II

- **Program: ldh2rpi4osinfo.nrx (Screenshot #2)**



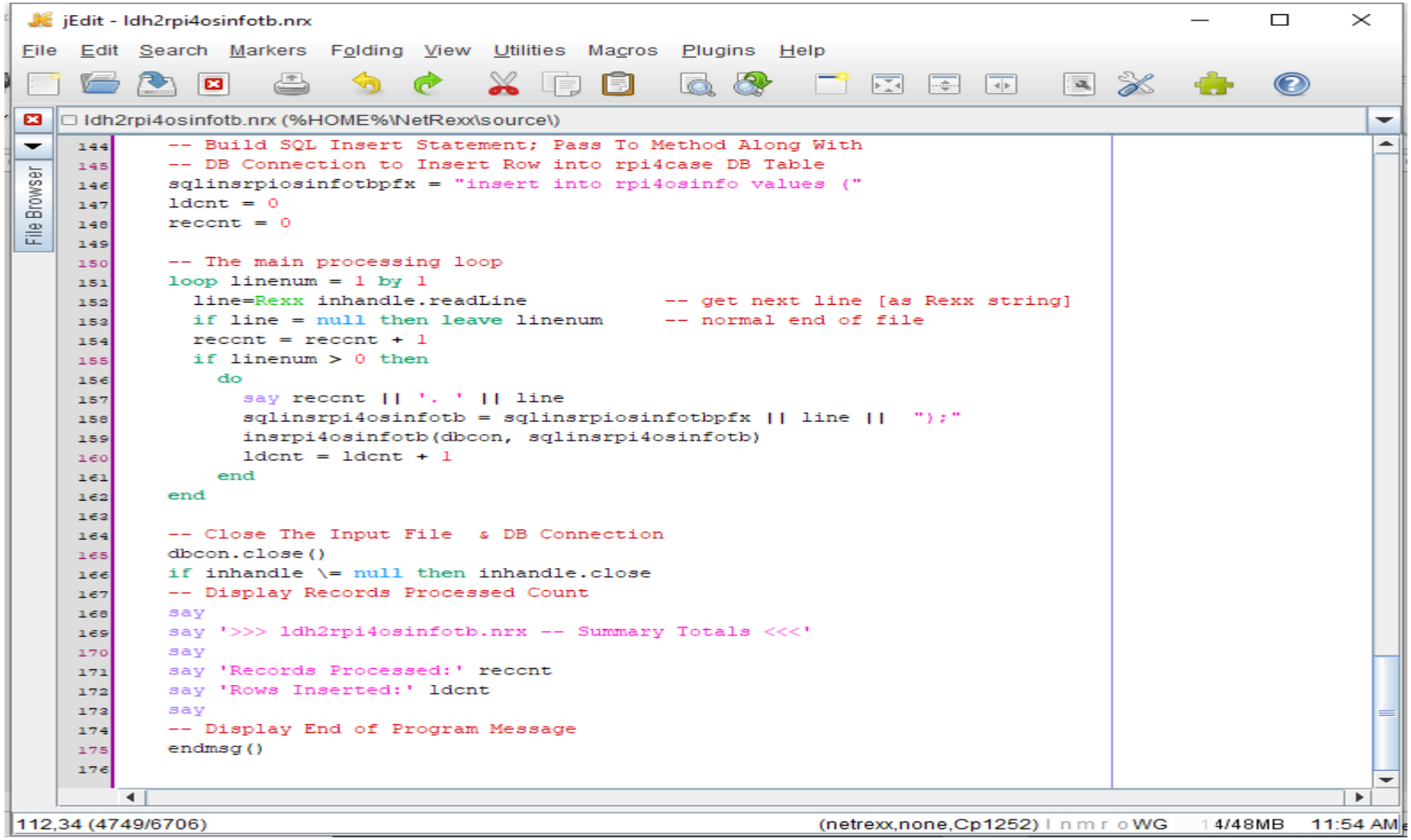
NetRexx Program – Load rpi4osinfo Table - III

- **Program: ldh2rpi4osinfo.nrx (Screenshot #3)**



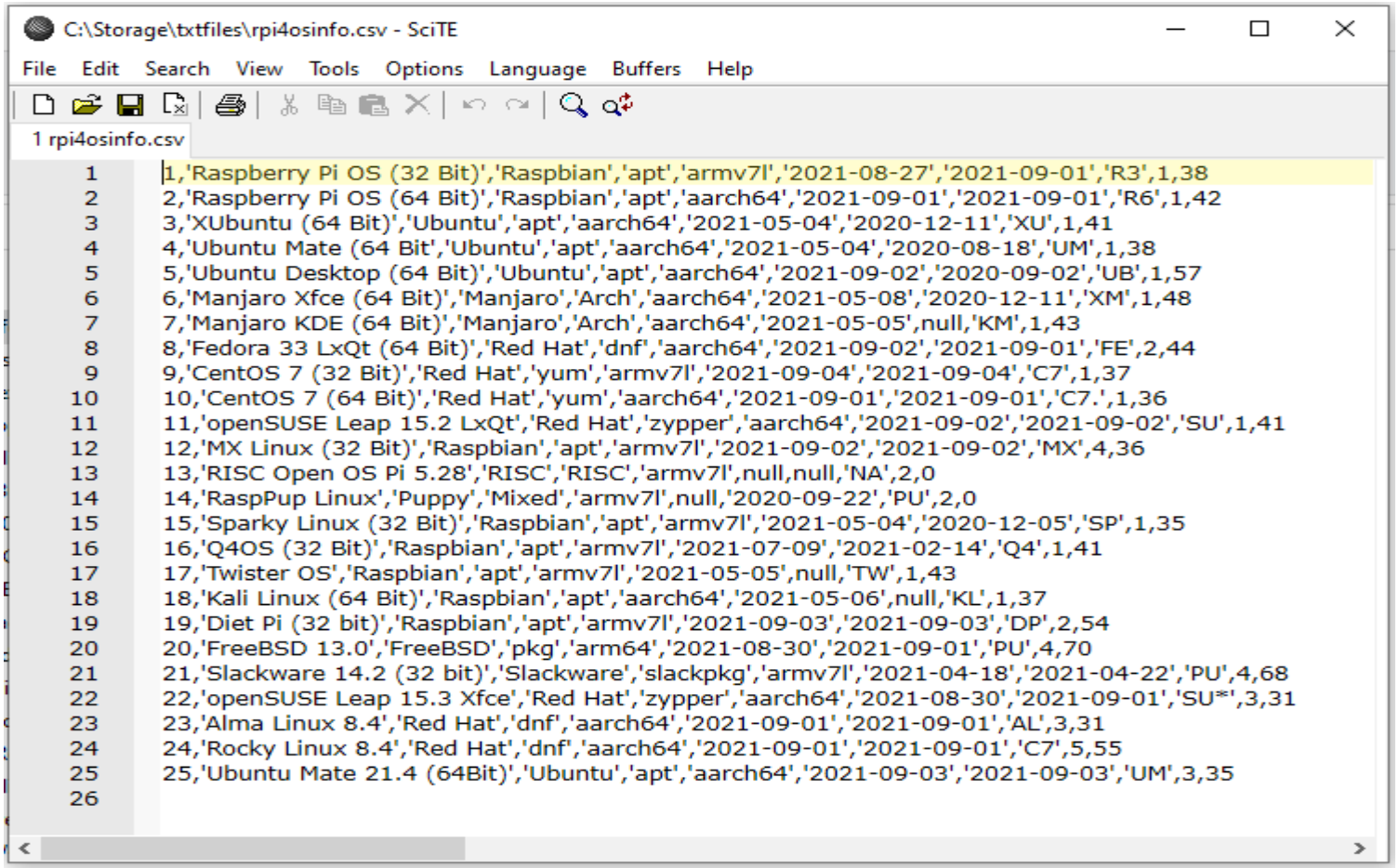
NetRexx Program – Load rpi4osinfo Table - IV

- **Program: ldh2rpi4osinfo.nrx (Screenshot #4)**



NetRexx Program – Load rpi4osinfo Table - V

- **Input File: rpi4osinfo.csv**



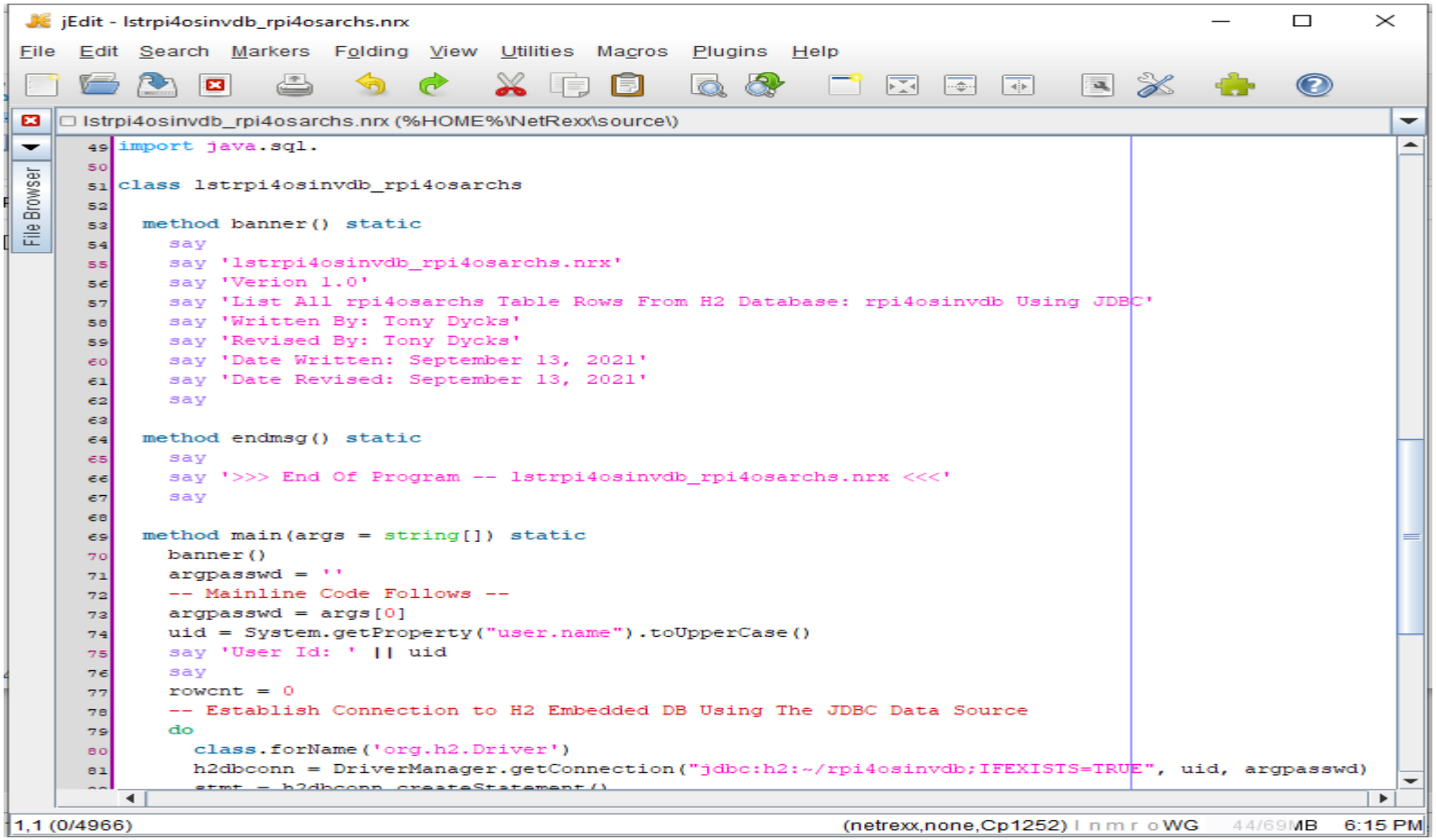
NetRexx Program – Load rpi4osinfo Table - VI

- **Program run: java ldh2rpi4osinfo h2dbpassword**

```
Select Command Prompt
ldh2rpi4osinfotb.nrx
Verion 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
```

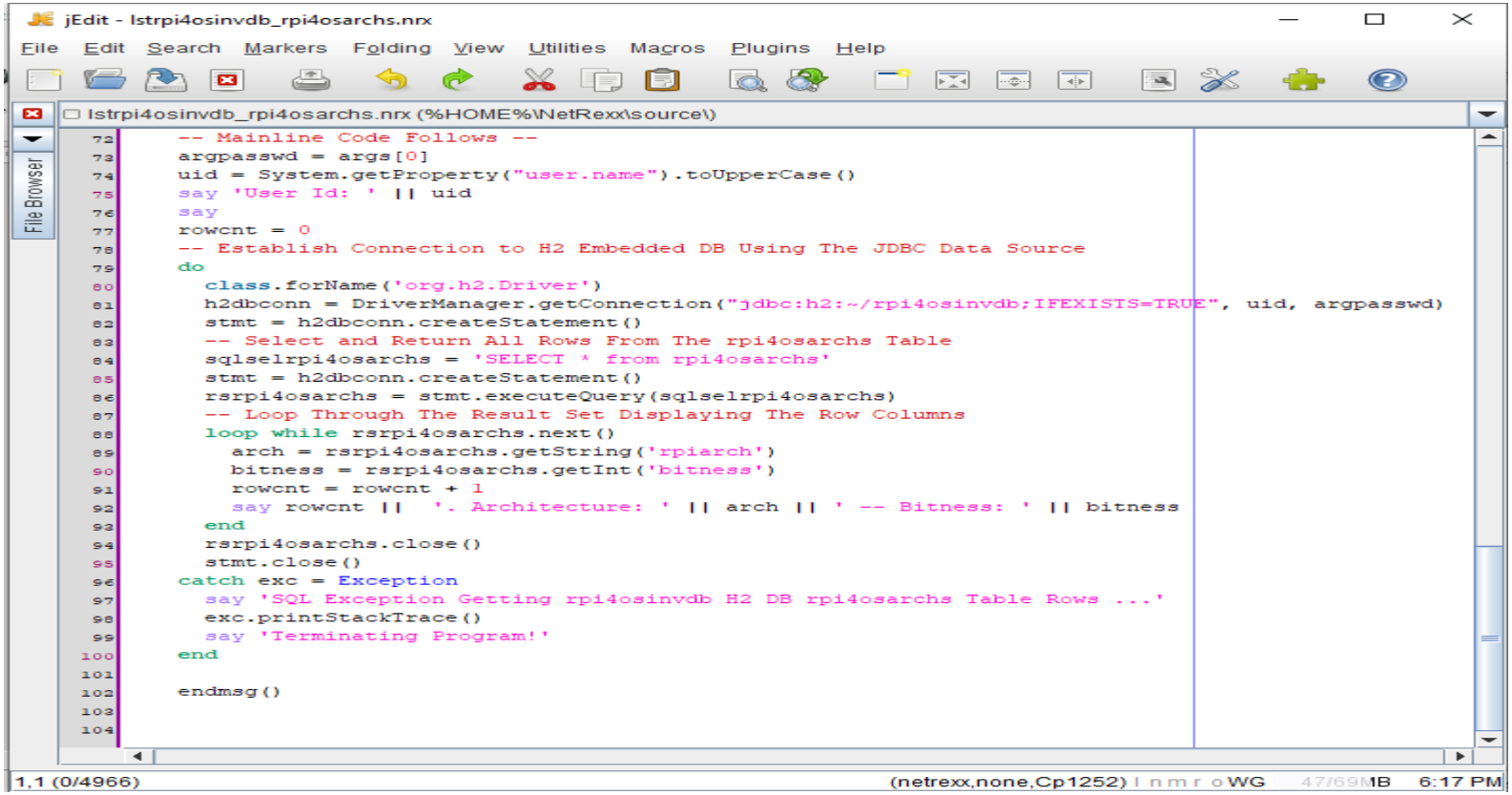
NetRexx Program – Select rpi4osarchs Table - I

- **Program: lstrpi4osinvdb_rpi4osarchs.nrx**



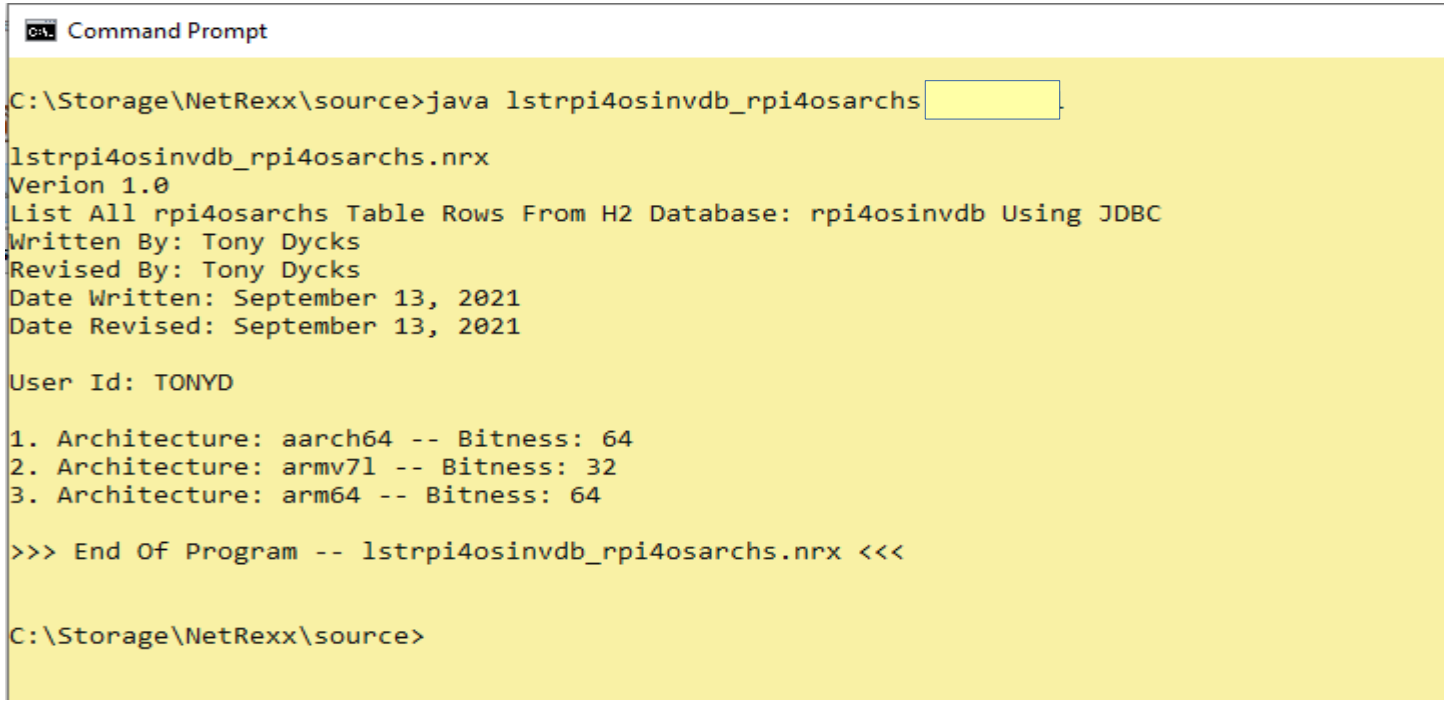
NetRexx Program – Select rpi4osarchs Table - II

- **Program: lstrpi4osinvdb_rpi4osarchs.nrx (continued)**



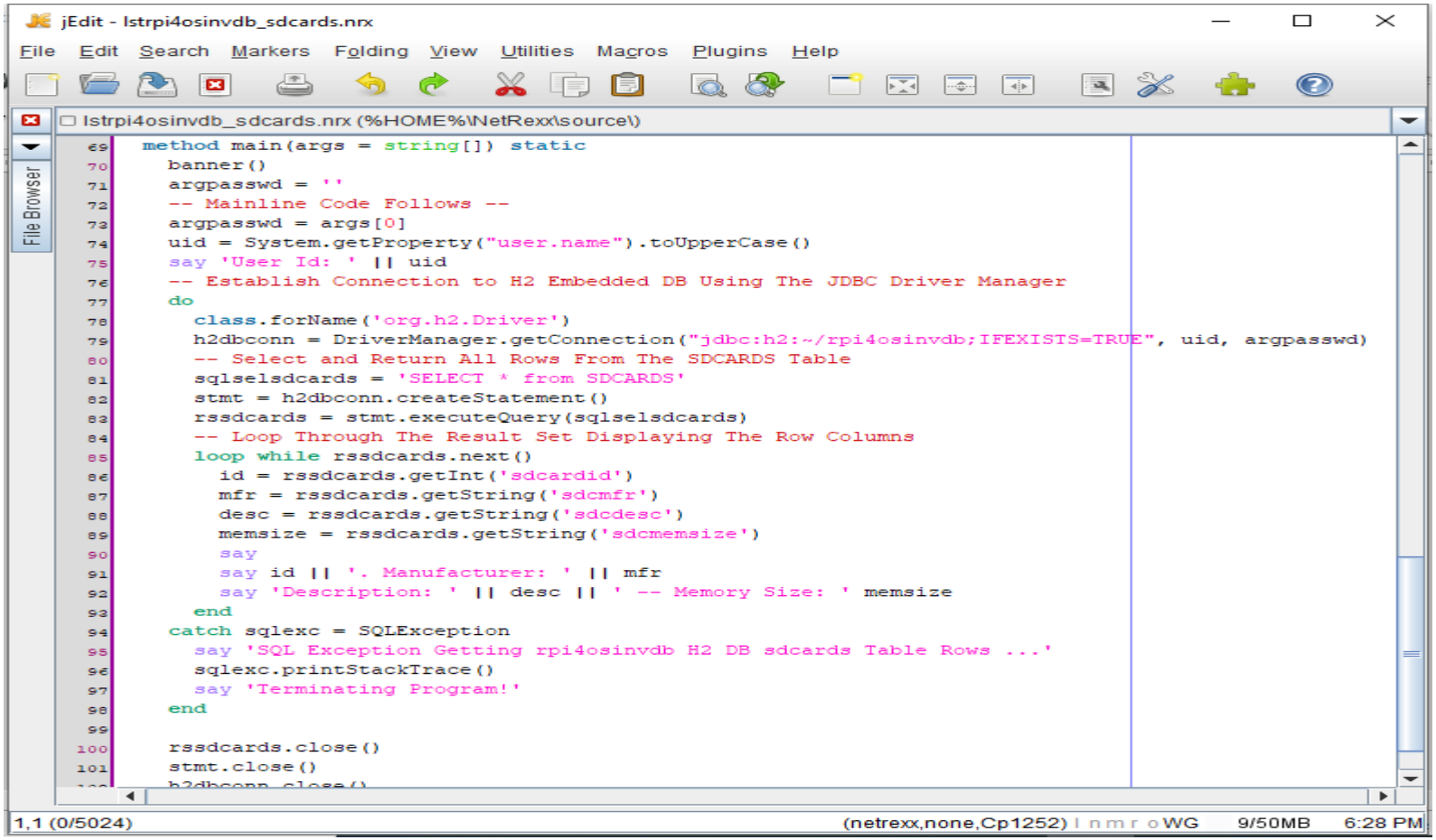
NetRexx Program – Select rpi4osarchs Table - III

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



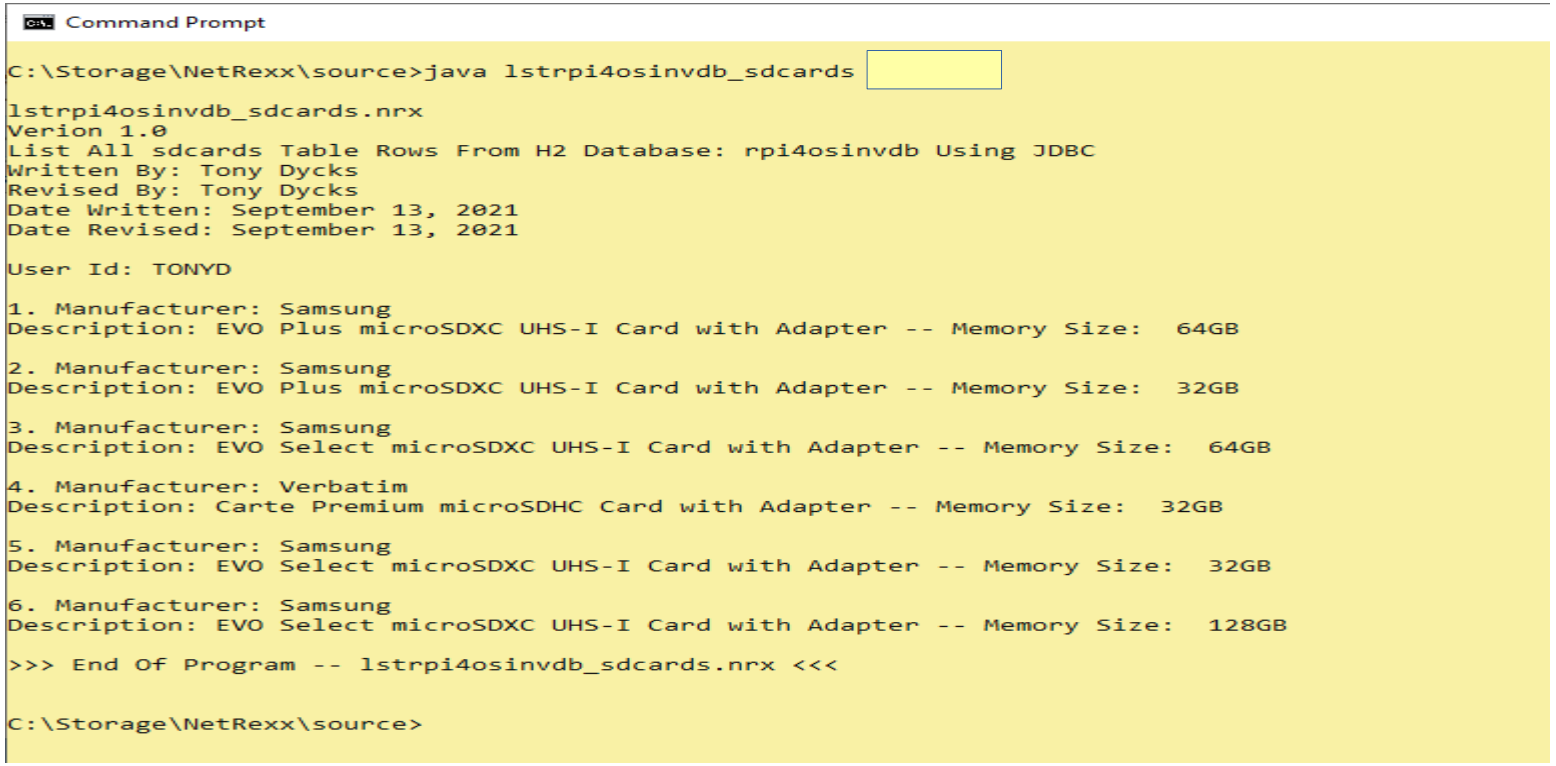
NetRexx Program – Select sdcards Table - I

- **Program: lstrpi4osinvdb_sdcards.nrx**



NetRexx Program – Select sdcards Table - II

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



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 BSF4ooRexx Programs will be available with these Slides**
- **Questions?**
- **Comments?**