IBM JavaPOS For Linux v1.9.4
Installation Instructions - 2.6 Kernel

Document Number (IBM JavaPOS for Linux Installation V1.7)
11/12/2007

Summary of Changes

Changes resulting in document revisions will be summarized in this table in reverse chronological sequence. Revision bars (|) will highlight the text changed in new document versions.

Version	Approval Date	Change Description
V 1.00	2/1/05	Initial version
V1.10	3/16/05	Added install/uninstall scripts Update JavaPOS 1.7.4
V1.20	11/18/05	Update latest scripts Update JavaPOS 1.9.0
V1.3	11/06/0	Updated 1.9.2
V1.4	1/25/07	Updated 1.9.2 Kernel module updates
V1.5	2/22/07	To avoid confusion, removed tarball from package. Updated instructions to request tarball separately.
V1.7	11/12/07	Updated for JavaPOS 1.9.4

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1.0 Overview

1.1 Introduction

This document provides installation instructions for IBM JavaPOS on Linux distributions. Currently the IBM JavaPOS is fully supported on SUSE Linux Retail Solutions (SLRS 8.0) as well as Novell Linux Point of Service (NLPOS 9). Therefore, the instructions in this document are based upon the SUSE Linux file structure. The IBM JavaPOS installation can be adapted to other Linux distribution as described in this document.

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The JavaPOS drivers provided here are on **as-is basis**. If support for other Linux distribution is desired, please contact IBM representative or visit IBM support site http://www.ibm.com/solutions/retail/store/suport/

1.2 Disclaimer and Known Issues

The IBM JavaPOS installation instructions have not been tested on other Linux Distributions and are not supported. The instructions in this documented are provided as-is.

LINUX DISTRIBUTION	KERNEL VERSION	STATUS
Fedora Core 3	2.6.9-1.667	Known Issues NPTL 2.3.3 not supported set environment variable "**LD_ASSUME_KERNEL=2.4.2**" in order to use JavaPOS **1.9.4**. This allows the use of linuxthreads. Without this variable CashDrawer may not function properly.
Fedora Core 5	2.6.15-1.2056_FC5	Not Tested due to Known Issues NPTL 2.4 causes problems; no support for linuxthreads.

1.3 Relevant Publications

- IBM UnifiedPOS Programming Reference, Keyboards, and Codepages at http://www.ibm.com/solutions/retails/store/support/

2.0 Installation Package Contents

The following main installation package can be downloaded from http://www.ibm.com/solutions/retail/store/support/:

ibm-javapos-1.9.4-19-for-linux.tgz

You must be root to extract the tgz file and perform many of the steps described in this document. Extract the tar file and a **/ibmjavapos** directory will be created into the current directory.

- Log in as root
- Create ibmpos directory, and copy the package into ibmpos directory and extract the installation package.
- % tar –zxvf ibm-javapos-1.9.4-19-for-linux.tgz

Upon extraction, you will have the following rpms in **/ibmjavapos** directory

- JavaPOS
  - ibm-javapos-1.9.4-19.i386.rpm
  - ibmposs-linux-3.4.0-23_2_6.i386.rpm
- IBM JVM
  - IBMJava2-142-ia32-JRE-1.4.2-9.0.i386.rpm
  - IBMJava2-JAVACOMM-1.4.2-9.0.i386.rpm
- JavaxUsb
  - javax-usb-1.0.1-1.i386.rpm
  - javax-usb-ri-1.0.1-1.i386.rpm
  - javax-usb-ri-linux-1.0.1-1.i386.rpm
- Kernel Mode Drivers
  - ibmposs-kernel-3.4.0-23.i386.tgz
- Kernel Patches
  - ibmposs-linux-2.6-kernel-patches.tgz
- IBM JavaPOS for Linux v194 Installation Instructions.htm or pdf (this document)

3.0 JavaPOS Installation

The JavaPOS can be installed two ways - rpm mechanism and tar file mechanism. Depending upon the device and the bus support desired, you can install specific components. The instructions in this document assume the following:

- User has root privileges
- % represents console command prompt
- The comments are indicated by #.

3.1 JavaPOS Installation

The JavaPOS driver installation includes several components as described below, and they must be installed separately.

3.2 JavaPOS Components

The JavaPOS rpms are required to support IBM JavaPOS and RS485 devices.

To Install:

```
% rpm -ivh ibmposs-linux-<version>-<build>.i386.rpm
% rpm  -ivh ibm-javapos-<version>-<build level>.i386.rpm
```

To uninstall:

% rpm -e `ibmposs-linux`

% rpm -e `ibm-javapos`

3.3 javax.usb Components

The javax.usb rpms are required to support IBM USB peripheral devices.

To Install:

```
% rpm -ivh javax-usb-1.0.1-1.i386.rpm
% rpm -ivh javax-usb-ri-1.0.1-1.i386.rpm
% rpm -ivh javax-usb-ri-linux1.0.1-1.i386.rpm
```

To uninstall:

% rpm -e javax-usb

% rpm -e javax-usb-ri

% rpm -e javax-usb-ri-linux

3.4 IBM JVM

This product is tested and supported on IBM JVM 1.4.2-SR9. The JVM component includes two rpms – one for JVM and the other for Java COMM support. Install both JVM rpms:

To Install:

% rpm -ivh IBMJava2-142-ia32-JRES-1.4.2-7.0.i386.rpm

% rpm -ivh IBMJava2-JAVACOMM-1.4.2-7.0.i386.rpm

To uninstall:

% rpm -e IBMJava2

% rpm -e IBMJava2-JAVACOMM

Setup path and symbolic links:

If Operating System provides a default JVM or you have previously installed another JVM, then symbolic links and the paths must be set manually to point to IBM JVM.

- Remove old java and javaw symbolic links and re-link them to IBM JVM.
  - usr/bin/rm java, and ln -s /opt/IBMJava2-142/jre/bin java
  - usr/bin/rm javaw, and ln -s /opt/IBMJava2-142/jre/bin javaw

- setup path. This can be added to your .profile
  - export PATH=/opt/IBMJava2-142/jre/bin:$PATH$

- check IBM JVM Version: java –version, it should read something like
  - Java™ 2 Runtime Environment, Standard Edition (build 1.4.2)
  - Classic VM (build 1.4.2, J2JRE 1.4.2 IBM build cxiaxxx …)

3.5 Install Kernel Mode Drivers

For 2.6 Linux Kernel, IBM provides the source files for the following drivers in the form a tar file. The source files must compiled for the specific kernel source. Then only you can install the drivers properly. The tar file provides necessary make file to compile and install the drivers.

Install Kernel Source (pre-requisite):

To compile IBM drivers successfully, you must first install kernel source code. The kernel source should be available on install CD or from the location you obtained the kernel. If the kernel source does not exist, the IBM drivers will not compile successfully.

Extract IBM driver source:

% tar -zxvf ibmposs-kernel-3.4.0-23.i386.tgz

This will extract the driver source files into two separate directories

- ibmposs-kernel-3.4.0-23/kernel-drivers/ibmposs-kernel-3.4.0-xx/usr/src/kernel-modules/ibm/dcs
- ibmposs-kernel-3.4.0-23/kernel-drivers/ibmposs-kernel-3.4.0-xx/usr/src/kernel-modules/ibm/kbd

Build and Install IBM drivers:

Note: Before proceeding with building IBM drivers, ensure that you have installed linux kernel sources.

Build and install drivers in dcs directory:

- % cd ibmposs-kernel-3.4.0-23/ibmposs/ kernel-drivers/ibmposs-kernel-3.3.0-xx/usr/src/kernel-modules/ibm/dcs
- % make # to compile drivers
- This will build aipdcs.ko, aipbcd.ko, aipmtn.ko, aipsocdkl.ko, aiptchmouse.ko drivers.
- % make install # to intall drivers
- % depmod –ae # **This must be done** to satisfy module dependency in modules.def file.

Build and install drivers in kbd directory:

- % cd ibmposs-kernel-3.4.0-23/ibmposs/ kernel-drivers/ibmposs-kernel-3.3.0-xx/usr/src/kernel-modules/ibm/kbd
- % make # to compile drivers
- This will build aipikbps.ko, aipsokbps.ko
- % make install # to install drivers.
- % depmod –ae # **This must be done** to satisfy module dependency in modules.def file.

IBM driver install location:

The drivers will be installed in the following locations:

/lib/module/<kernel-version>/kernel/drivers/char/dcs
/lib/module/<kernel-version>/kernel/drivers/char/kbd

The driver details:

`aipdcs.ko` # This is a **core** driver for RS485 devices
`aipbcd.ko` # Cash Drawer drivers for SP300
`aipmtn.ko` # Motion Sensor driver for Anyplace Kiosk
aipsocdkl.ko # CashDrawer driver for SureOne
aiptchmouse.c # mouse emulation driver for RS485 SurePoint
aipikbps.ko # ps/2 keyboard driver
aipskbps.ko # SureOne Keyboard driver

4.0 System Keyboard Support

A kernel patch is required for the IBM Point of Sale Keyboard as system attached (PS/2). However, it is not guaranteed that a given patch will work various versions of 2.6 kernels. If you are not using IBM Point of Sale Keyboard as a PS/2 attached system keyboard, then you must skip this section.

4.1 Keyboard Patch File

To extract the tar file:

% tar -zxvf ibmposs-linux-2.6-kernel-patches.tgz

This will extract the following patch file:

atkbd-patch-<level>

4.2 Obtaining Kernel Source

In order to patch the kernel source, you must first obtain and install a kernel source, compiler, and any other dependent tools. Please consult your Linux distribution manuals or distribution website to obtain the correct kernel source. Perform the following command to see what kernel source is currently installed on the system:

```
% uname -a
```

4.3 Patching the Kernel

These instructions assume that the patch files are located in `/ibmjavapos/kernel-patches` directory.

The example shown below is based on Fedore Core 3.

You must first test the patch before applying.

Go to the kernel source tree. (example based upon Fedora Core 3 source directory)

```
% cd /usr/src/redhat/BUILD/linux-2.6.5<level>
```

test if patch will succeed (not actually applied)

```
% patch -i /ibmjavapos/kernel-patches/atkbd-patch-<level>  -p1 -dry-run
```

if no error messages, then apply the patch

```
% patch -i /ibmjavapos/kernel-patches/atkbd-patch-<level> -p1
```

4.4 Configuring the Kernel

```
% cd /usr/src/redhat/BUILD/linux-2.6.5<level>
% make menuconfig
```

At minimum, the following options must be selected. To go into how configure all options is beyond the scope of this document.

- Enable Loadable Module support under Loadable Module Support
- Select correct processor type for the system under Processor & features

4.5 Compiling the Kernel

You can create a symbolic link to access the new source tree. Verify that Linux symbolic link "linux" is pointing to /usr/src/redhat/BUILD/kernel-2.6.5<level>

You can set the symbolic link as follows:

ln –s /usr/src/redhat/BUILD/kernel-2.6.5<level> linux

You are now ready to compile the kernel. This may take several hours depending upon the processor speed and configuration options selected. Enter the following to begin kernel compilation:

% make all modules modules_install

If no errors generated, you can proceed to the next step. To describe what actions to take in case of errors is beyond the scope of this document.

4.6 Installing the Kernel

Once the new kernel is build, the files associated with the new kernel must be copied into system infrastructure so that the new image can be used to boot the system.

- `% cp /usr/src/redhat/BUILD/linux-2.6.5-<level>-javapos/arch/i386/boot/bzImage/boot/vmlinuz-2.6.5-javapos`
- `% cp /usr/src/redhat/BUILD/linux-2.6.5-<level>-javapos/arch/i386/boo/System.map/boot/System.map-2.6.5-javapos`

4.7 Creating an initrd

To make an initrd, create it now by entering the following command:

```
% /sbin/mkinitrd     /boot/initrd-2.6.5<level>-javapos.img2.6.5<level>-javapos
```

4.8 Update boot loader

This section describes the necessary steps to add the newly compiled kernel to the boot loaders – grub or lilo.

Updating grub:

```
% cd /sbin
```

The following command should be entered on a single line. If you did not create an initrd, then you do not need to add the initrd section to this grubby command line.

```
%  grubby  --title=”IBM® JavaPOS 1.9 Drivers” –add-kernel=/boot/vmlinuz-2.6.5-<level>-javapos

--initrd=/boot/initrd-2.6.<level>-javapos.img            --make-default     --copy-default
```

You can check the new kernel configuration by issuing:

```
% cat    /boot/grub/grub.conf
```

Updating lilo:

If /etc/lilo.conf file does not exist, you need to create one. If the file exists, edit the file and add the following entries to it.

```
image = /boot/vmlinuz-2.6.<level>-javapos
root=<root partition>
label = IBM_JavaPOS
Read-only
initrd = /boot/initrd-2.4.21-javapos
default = IBM_JavaPOS
```

Run the lilo application, in order to make the changes effective:

```
% /sbin/lilo
```

After updating boot loader, you must restart the system. IBM JavaPOS should be selected as the default kernel.

4.9 PS/2 Keyboard Configuration

Verify that the following configuration file, which is used enumerate PS/2 attached IBM Alphanumeric Keyboard as system keyboard, is present and located in the correct path.

/etc/ps2kbd.conf

4.10 USB System Keyboard Configuration

Verify that the following configuration file, which is used enumerate IBM Alphanumeric USB Keyboard as a system keyboard, is present and located in the correct path.

/opt/ibm/javapos/etc/usbkbd.conf

If the configuration file for the USB System Keyboard is not present, the IBM Alphanumeric USB Keyboard will be enumerated in Point of Sale mode i.e. the scan codes will not be available to the normal system keyboard mechanism

5.0 IBM POS Systems Support

5.1 Anyplace Kiosk

The IBM 4836 AnyPlace Kiosk requires external drivers from Texas Instruments for Scanner and MSR. These drivers can be obtained and installed from the following web sites.

For Linux 2.6:

http://gate.brimson.com/downloads/ti_usb_2.6_release_notes-1.0.txt

http://gate.brimson.com/downloads/ti_usb_2.6-1.0-1.src.rpm

http://gate.brimson.com/downloads/ti_usb_2.6-1.0.tgz

6.0 Appendix A: Updating Linux Environment

The environmental variables and classpaths automatically set during JavaPOS installation. The information provided in this section can be used to debug JavaPOS driver issues.

6.1 Updating Classpath

The CLASSPATH environment variable is automatically set to include necessary jar files by the scripts located in

/etc/init.d/ibm-javapos.sh, javax-usb.sh or

/etc/profile.d/ibm-javapos.sh, javax-usb.sh

The following jar files are used by the IBM JavaPOS subsystem, and make sure the classpath is set to these jar files.

jar files to look for:

```
/opt/ibm/javapos/lib/jpos1911.jar
/opt/ibm/javapos/lib/jpos-common.jar        # this must be set before other jar files in the list below.
/opt/ibm/javapos/lib/jsio.jar
/opt/ibm/javapos/lib/jtux.jar
/opt/ibm/javapos/lib/jutil.jar
/opt/ibm/javapos/lib/posj.jar
/opt/ibm/javapos/lib/poskbd.jar
/opt/ibm/javapos/lib/ibmjpos.jar            # this should be after jtux.jar
/opt/ibm/javapos/lib/log4j-1.2.8.jar
/opt/ibm/javapos/lib/xercesImpl.jar
/opt/ibm/javapos/lib/xmlParserAPIs.jar
/opt/ibm/javapos/lib/ibmuposst.jar
/opt/ibm/javapos/lib/IBMTouchMon.jar
/opt/ibm/javapos/lib/IBMTouchUtil.jar
```

Directories to look for:

```
/opt/ibm/javapos          # javapos components are installed in this directory.
/opt/ibm/javapos/etc
/opt/ibm/javapos/bin
/opt/IBMJava2-142         # JVM directory
/opt/java-xusb            # javax.usb directory
```

6.2 Update PATH

The PATH environment variable should have been modified to include the various javapos libraries. Verify that the following directories are included in the PATH environment variable.

/opt/ibm/javapos/bin

/opt/ibm/javax-usb/bin

/opt/IBMJava2-142/jre/bin

Update to the PATH environment variable can be made in the /etc/profile.d/ibm-javapos.csh and /etc/profile.d/ibm-javapos.sh scripts.

6.3 Shared Libraries

Several shared libraries are installed by the IBM JavaPOS tar ball implementation. In order to make these libraries available to JavaPOS applications, the user must update the Linux shared library cache. The following command updates required cache.

% ldconfig OR

Update LD_LIBRARY_PATH to include /usr/lib

6.4 JavaPOS Services

The JavaPOS services are located in /etc/init.d directory. However, these scripts can be tailored to be compatible/executable by particular Linux distribution.

6.5 Disable-usbfs-security

The library used by IBM JavaPOS to access the USB subsystem requires specific permissions on the Linux USB file system in order to work properly for non-root users. These permissions can be set as a part of startup service.

The following command re-mounts a USB file system that was previously mounted with incompatible permissions

- % mount –o “remount, devnode=0666” /proc/bus/usb# remount the usb file system with proper permissions

Regardless of the method used to establish the proper permissions, the usb file system mount should have read and write permissions for all users.

6.6 Configuring Serial Ports

The IBM SurePOS 500 systems require configuring additional com ports. See IBM support website http://www.ibm.com/solutions/retail/store/support/ for details of setting up serial ports for various IBM POS systems.