Installation of RedHawk 6.5-r24.2 on the Jetson TX1 Development Board

Release Notes

September 19th, 2017

READ ME BEFORE INSTALLING THIS PRODUCT

concurrent
REAL-TIME

1. Introduction

This document describes the process of installing the ARM64 version of RedHawk 6.5-r24.2 on the Jetson TX1 development board. The directions in this document supercede all others – they are specific to installing the software on Concurrent Computer Corporation's RedHawk systems.

2. Requirements

- Jetson TX1 Development Board with Internet access
- An x86_64 host system running Ubuntu 14.04 with Internet access
- RedHawk Revision 6.5-r24.2 for the Jetson TX1 optical media disc

3. Installation

3.1.   Download JetPack on the host system

On an x86_64 host system running Ubuntu 14.04, download version 2.3 of the Jetson Development Package (JetPack) from the NVIDIA website via this URL:

> https://developer.nvidia.com/embedded/jetpack

Place the downloaded file named `JetPack-L4T-2.3-linux-x64.run` into a `jetpack-2.3` directory in the home directory of the current user. Note that logging in as the root user is *not* required to run the JetPack script.

3.2.   Perform a full JetPack installation of the Jetson

Change into the `jetpack-2.3` directory and run the `JetPack-L4T-2.3-linux-x64.run` tool as follows:

```
$ chmod +x JetPack-L4T-2.3-linux-x64.run
$ ./JetPack-L4T-2.3-linux-x64.run
```

At this point, you can generally follow the JetPack L4T instructions that are available on the NVIDIA website via this URL:

http://docs.nvidia.com/jetpack-l4t/2_3/index.html#developertools/mobile/jetpack/l4t/2.3/jetpack_l4t_install.htm

However, make sure to follow the directions listed below during the installation:

1. On the Select Development Environment screen, be sure to select the Jetson TX1 Development Kit (64-bit) development environment option, as shown in the following screenshot:

2. The on-line instructions illustrate performing a Standard installation; however for the subsequent RedHawk product installation you must choose a Full installation instead, as shown below:
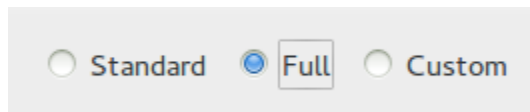
3. After selecting a Full installation, ensure that all of the items listed are displayed with an Action setting of install.

Note that if you are performing the JetPack installation process for the first time, JetPack will download a large amount of software in order to perform the full installation.

Also, throughout the installation process you will be prompted for interactive input in the terminal window that is spawned from the JetPack tool; make sure to pay attention to these prompts as the release will pause until the instructions in the prompts are performed.

Complete all remaining steps in the installation process and then proceed to the next section in this document to begin RedHawk product installation.

3.3. Copy the RedHawk packages to the Jetson

After JetPack has completed the Ubuntu installation on the Jetson, insert the *RedHawk 6.5 for Jetson TX1* optical media disc into the Ubuntu 14.04 host's optical drive and it should automatically mount under the `/media/$USER` directory (e.g. `/media/ubuntu/RedHawk 6.5 aarch64`).

Change to the mounted directory and copy the files to the Jetson over the network, as illustrated by the following example commands:

```
$ cd /media/ubuntu/RedHawk 6.5 aarch64/Packages
$ scp *.deb ubuntu@12.34.56.78:/tmp
```

Replace `12.34.56.78` with the actual IP address of the Jetson. The RedHawk packages should now be sitting in the `/tmp` directory on the Jetson.

3.4. Install the RedHawk packages on the Jetson

To install the RedHawk packages, log into the Jetson (either via `ssh` or via the graphical console) and issue the following commands:

```
$ cd /tmp
$ sudo dpkg -i ccur*.deb
```

Enter the password for the current user if the `sudo` command prompts for it.

NOTE

The following warning may be displayed during package installation:

cryptsetup: WARNING: could not determine root device from /etc/fstab

You can safely ignore this warning because embedded Installations generally do not use or require an fstab file.

At this point all of the RedHawk packages, including three RedHawk kernels, should have installed successfully on the Jetson. However, an additional step in the next section is required before you can boot into the RedHawk kernels.

3.5. Add RedHawk entries to the `extlinux.conf` file

Perform the following steps on the Jetson to create boot entries for the RedHawk kernels:

1. Create a backup of the `/boot/extlinux/extlinux.conf` file.

   ```
   $ cd /boot/extlinux
   $ sudo cp extlinux.conf extlinux.bak
   ```

2. Open the `extlinux.conf` file in your preferred editor. For example, if using `vi`:

   ```
   $ sudo vi extlinux.conf
   ```

3. Duplicate all of the `primary kernel` entry text lines (including the very long `APPEND` line) to create a second identical entry below the initial entry. For example:

```
TIMEOUT 30
DEFAULT primary

MENU TITLE p2371-2180 eMMC boot options

LABEL primary
   MENU LABEL primary kernel
   ...

LABEL primary
   MENU LABEL primary kernel
   ...
```

4. Customize the duplicated kernel entry to point to the desired RedHawk kernel. For example, to create an entry for the RedHawk trace kernel:

```
LABEL redhawk-trace
   MENU LABEL redhawk-trace kernel
   LINUX /boot/Image-3.10.96-r24.2-RedHawk-6.5-trace
   INITRD /boot/initrd.img-3.10.96-r24.2-RedHawk-6.5-trace
   FTD ...          ⇐ leave all contents identical and unchanged
   APPEND ...       ⇐ leave all contents identical and unchanged
```

5. Change the default kernel to the newly added RedHawk kernel by changing the DEFAULT entry at the top of the file:

```
TIMEOUT 30
DEFAULT redhawk-trace
```

Note that if your Jetson has been set up with a serial console, you may choose to skip this step and instead interactively decide which kernel you wish to boot each time the system restarts.

3.6.   Reboot to the RedHawk kernel

Finally, reboot the Jetson and it should now be running the selected RedHawk kernel. To verify this, issue the following command:

```
$ uname -r
```

You should see a line displayed similar to the following:

```
3.10.96-r24.2-RedHawk-6.5-trace
```

Please contact Concurrent technical support if you had any problems during this installation (support@ccur.com or 1-800-245-6453).

A. Serial Console Setup

Concurrent recommends setting up a serial console when using RedHawk on the Jetson development board. This appendix provides details and tips for connecting a serial console.

A.1.   Purchase a Raspberry Pi serial cable

First, you will need to purchase a special cable that attaches to specific pins on the Jetson motherboard to provide a USB serial connection suitable for a desktop PC. Concurrent recommends using the following Raspberry Pi cable, but other similar products may also work:

- Adafruit Industries 954 USB-to-TTL Serial Cable, Raspberry Pi
  http://www.amazon.com/ADAFRUIT-INDUSTRIES-954-SERIAL-RASPBERRY/dp/B00DJUHGHI

A.2.   Connect the serial cable to Jetson and PC

Once you have the correct serial cable, follow the instructions in the video on this page to attach the cable to the Jetson and then to a desktop PC:

- Serial Console – NVIDIA Jetson TX1
  http://jetsonhacks.com/2015/12/01/serial-console-nvidia-jetson-tx1/

Here is a brief summary of the important information of this video:

- The header pins are marked J21 with an arrow pointing to pin 1. Each pin is numbered as shown in the following image:
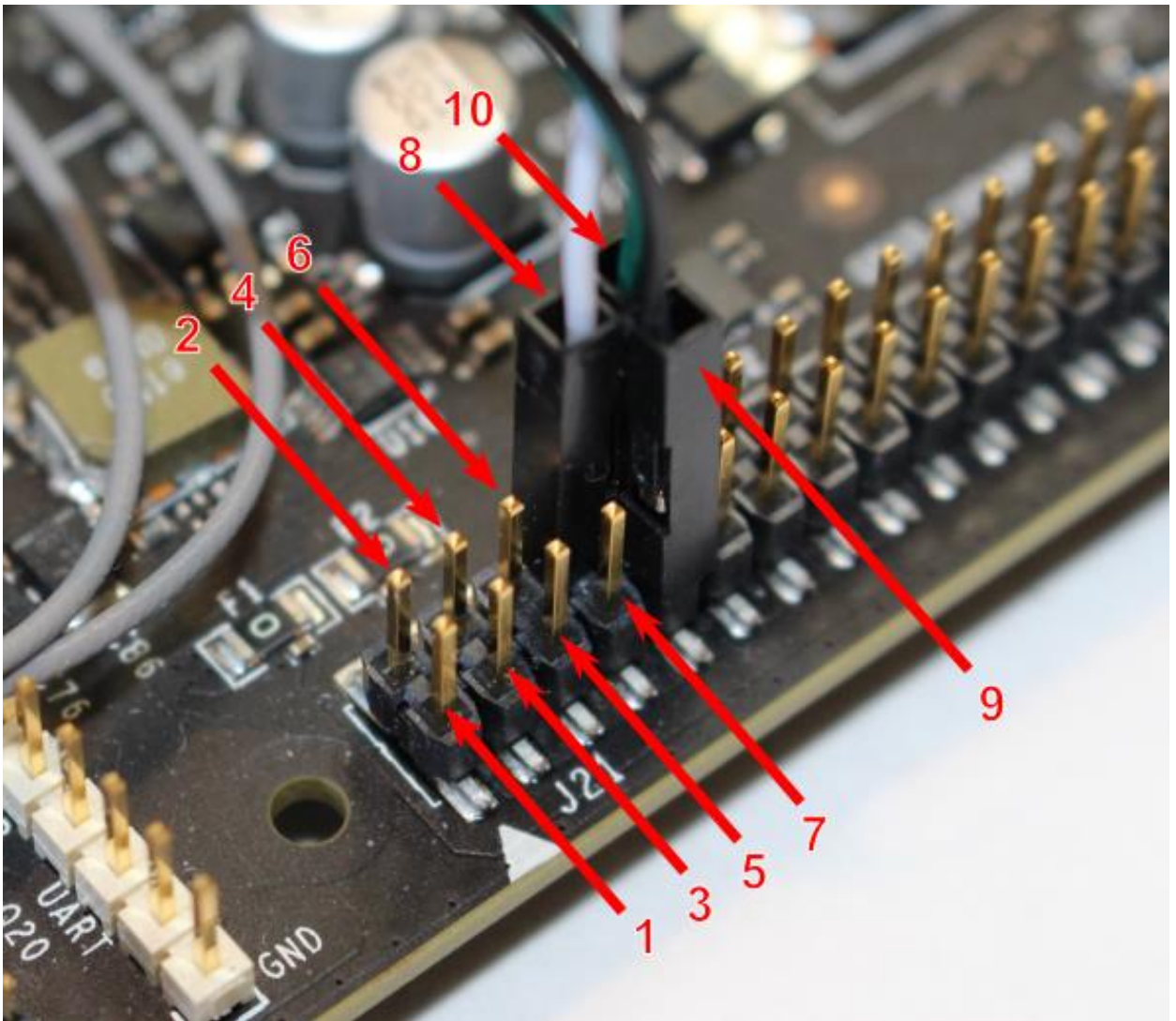
The serial cable's white wired connector goes to pin 8, green wired connector goes to pin 10 and black wired connector goes to pin 9. Note that the red wired connector is not used.

- The minicom settings should be configured as shown below: