Quick Guide

Building Sabrelite Linux SDK Development Environment and System Image

Exclusively from element14

Table of Contents

1 Overview

Sabrelite SDK is a software development environment for Freescale Sabrelite Development Board. This quick guide mainly contains three parts:

1) Downloading SDK from Internet

2) Compiling SDK on a local PC

3) Running system image on Sabrelite

The part includes two methodes by which different SDK packages can be obtained. The first is downloading the exsiting SDK package, the second is building a custom version of SDK online and then downloading it.

2 Downloading SDK Package

2.1 Downloading Exsiting Pakcage

Pleae following the steps listed blow to download a dedault Freescale SDK from http://www.timesys.com/.

1) Access thehomepage of http://www.timesys.com/ and click **User LinuxLink FREE Register now** (the button marked with a red arrow in the figure shown below) on the right;

Figure 2-1 Timesys Website Homepage

2) Enter the information required on registration page;

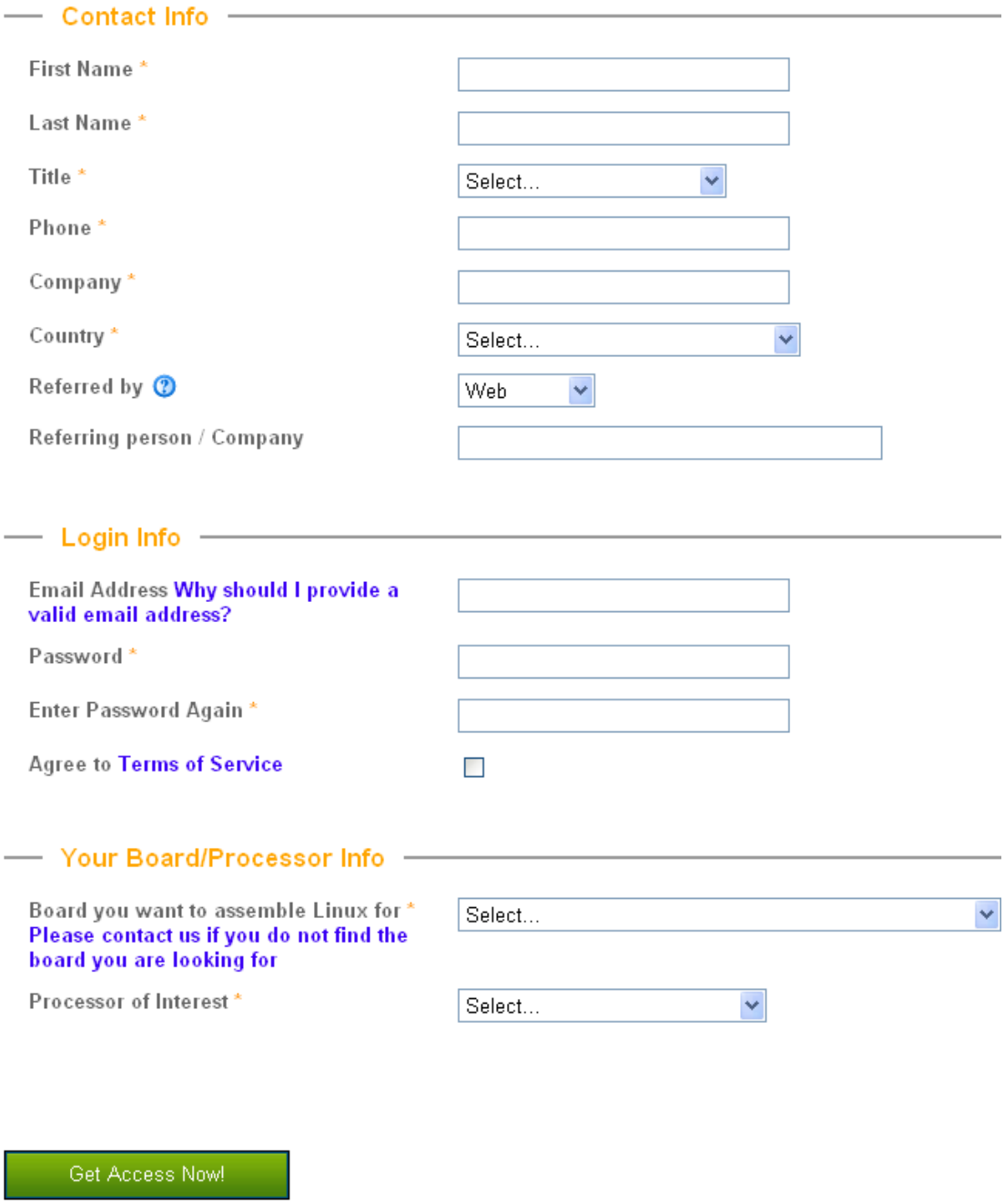

Figure 2-2 Timesys Registration Page

The items marked with "*" and the email address are required for registration. The table shown below contains brief decriptions of these items.

Table 2-1 Registration Information

Items	Descriptions
First Name	Enter your first name
Last Name	Enter your last name

Items	Descriptions
Title	Select a job title
Phone	Enter your phone number
Comany	Enter your company name
Country	Enter your county's name
Password	Enter a login password
Enter Password Again	Enter login password again
Agree to Terms of Service	Check it to agree the terms
Board you want to assemble Linux for	Select the name of your development board, which would be Freescale i.MX6Q SABRE-Lite here.
Processor of Interest	Select the name of the CPU, which would be Freescale i.MX6 here.

After all the required informtion are entered, click **Get Access Now** at the bottom of the page to finish registration, and then click **Login to LinuxLink** on the top-right of the page to login with your email address and password you previously entered.

3) Click **Download BSP/SDK** (marked with a red arrow as shown below) in the navigation bar of the page;

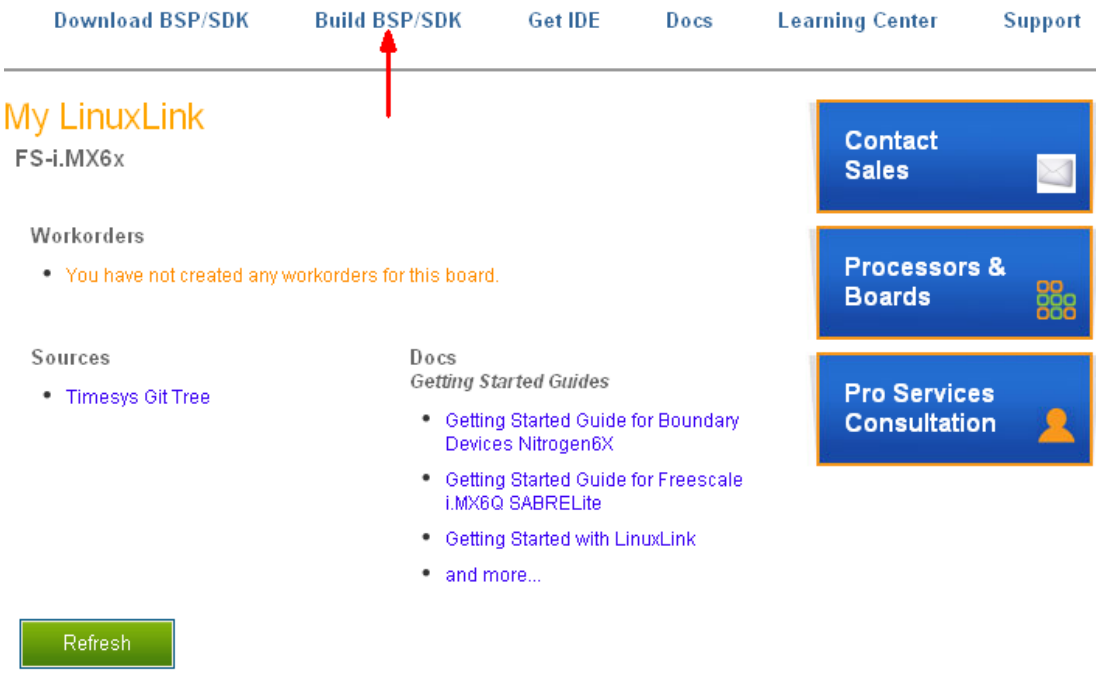

Figure 2-3 LoginTimesys

4) Click **i.MX6Q SABRE-Lite Small Footprint** (marked with a red arrow as shown below) in the following page;

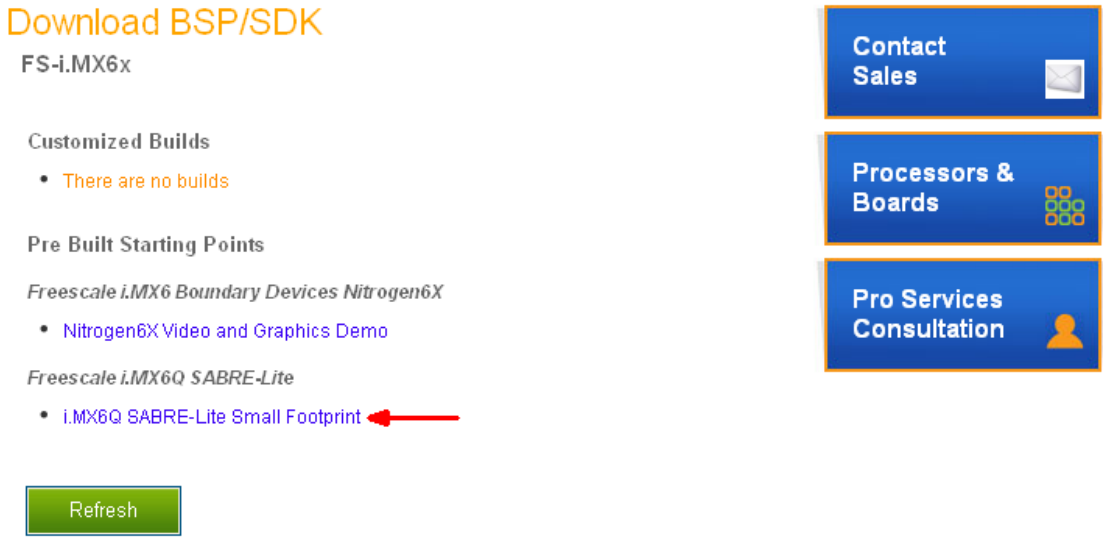

Figure 2-4 Download Page

5) Click the link (marked with a red arrow as shown below) next to **Download SDK installer** to download SDK pakcage;

Figure 2-5 Download SDK Package

Note: The SDK package downloaded above only includes file system image, but not the tools and u-boot source code. You can display their download links by clicking **View All Files** at the bottom of the page.

2.2 Making a Custom SDK Online

Please follow the steps listed in this section to make a custom SDK on http://www.timesys.com/;

1) Accesss and login http://www.timesys.com/, and then click **Build BSP/SDK** in the navigation bar to enter project creation page as shown below;

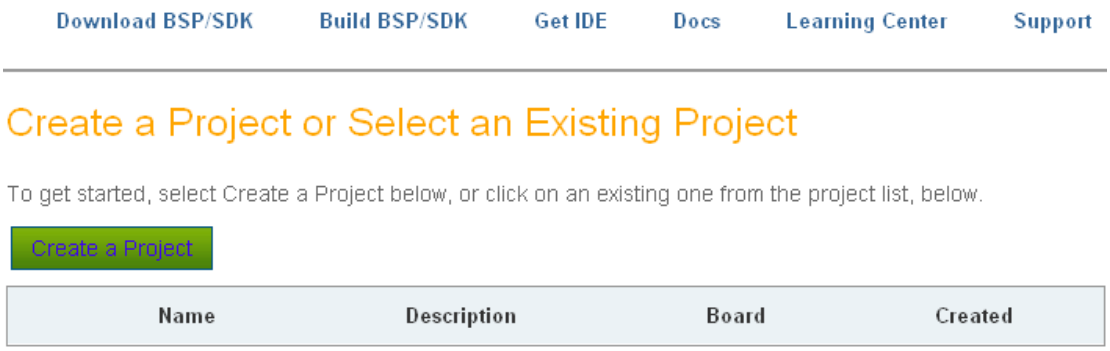

Figure 2-6 Create a Project

Click **Create a Project** in the above page;

2) Enter information such as **Name** and **Description** in the following page and select **Freescale i.MX6Q SABRE-Lite** in the **Board** drop-down menu;

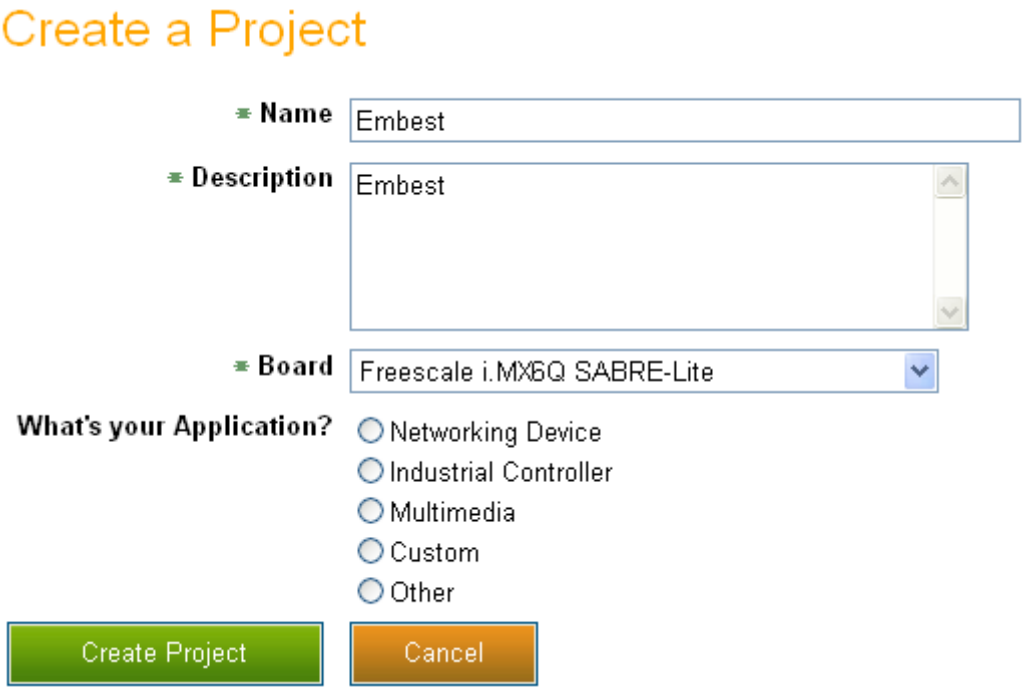

Figure 2-7 Enter Project information

Then click **Create Projec**t at the bottom of the page;

3) Click **Create a Workorder** in the following page;

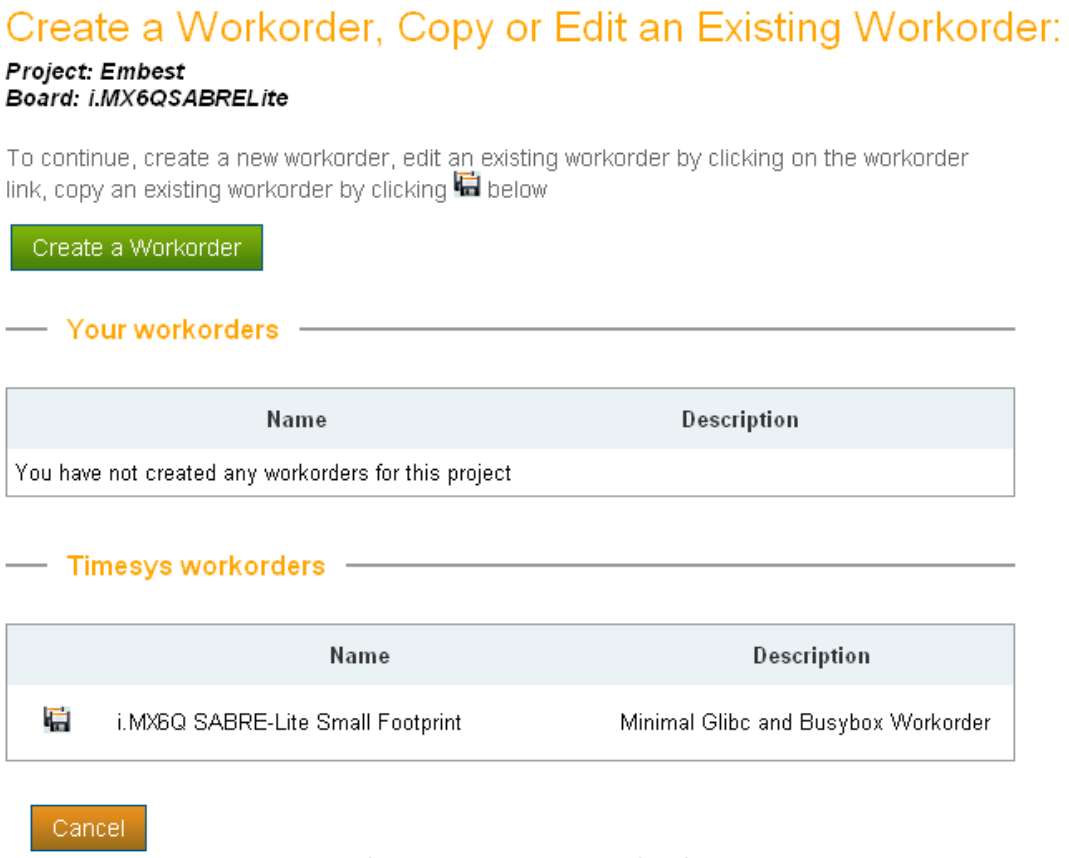

Figure 2-8 Create a Workorder

4) Enter the name of new workorder in the following page and click **Next**;

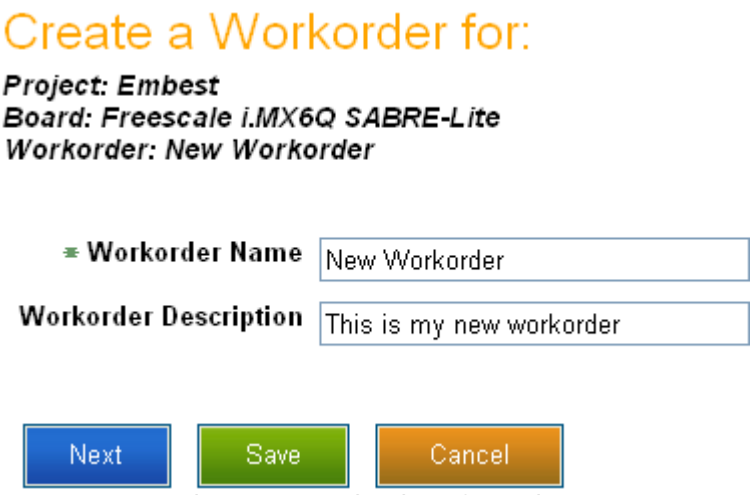

Figure 2-9 Workorder Information

5) Select kernel version in the following page and click **Next**;

Figure 2-10 Select Kernel Version

6) Select a toolchain you need in the following page. The option **glibc Recommended** is recommended. Click **Next**;

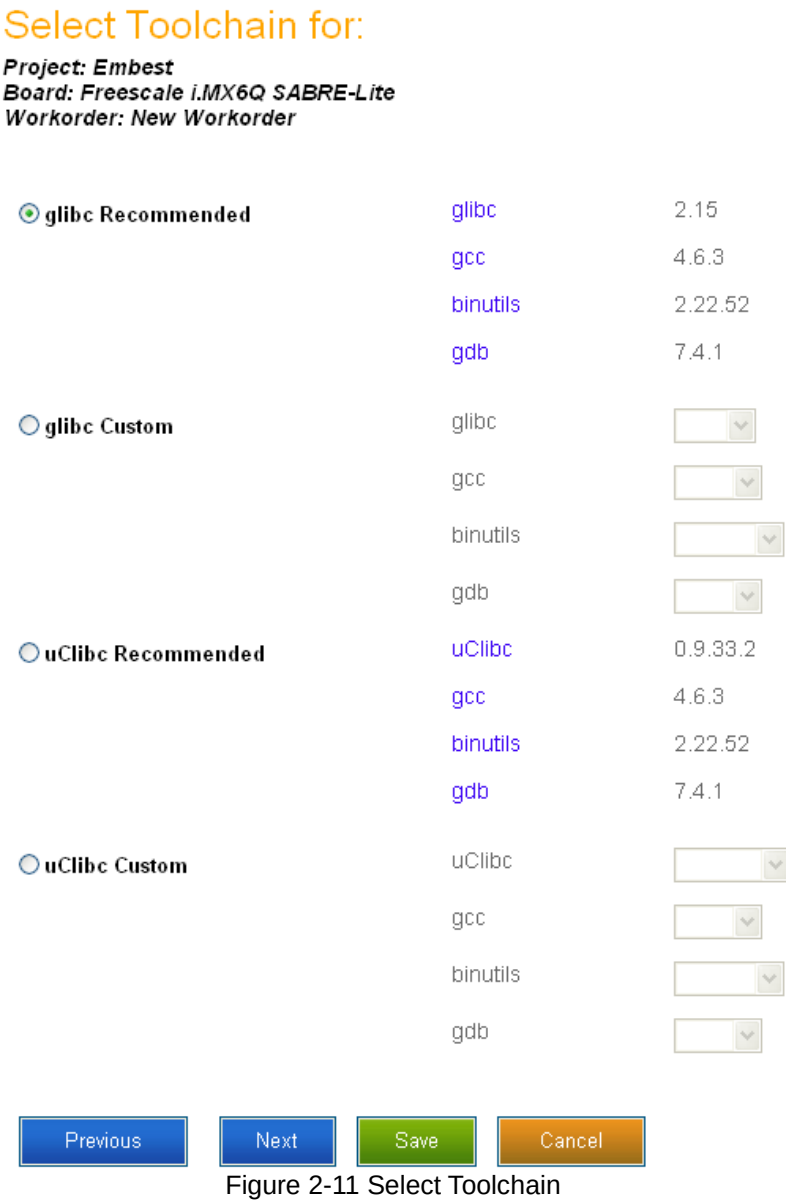

Figure 2-11 Select Toolchain

7) Select software package in the table of the following page;

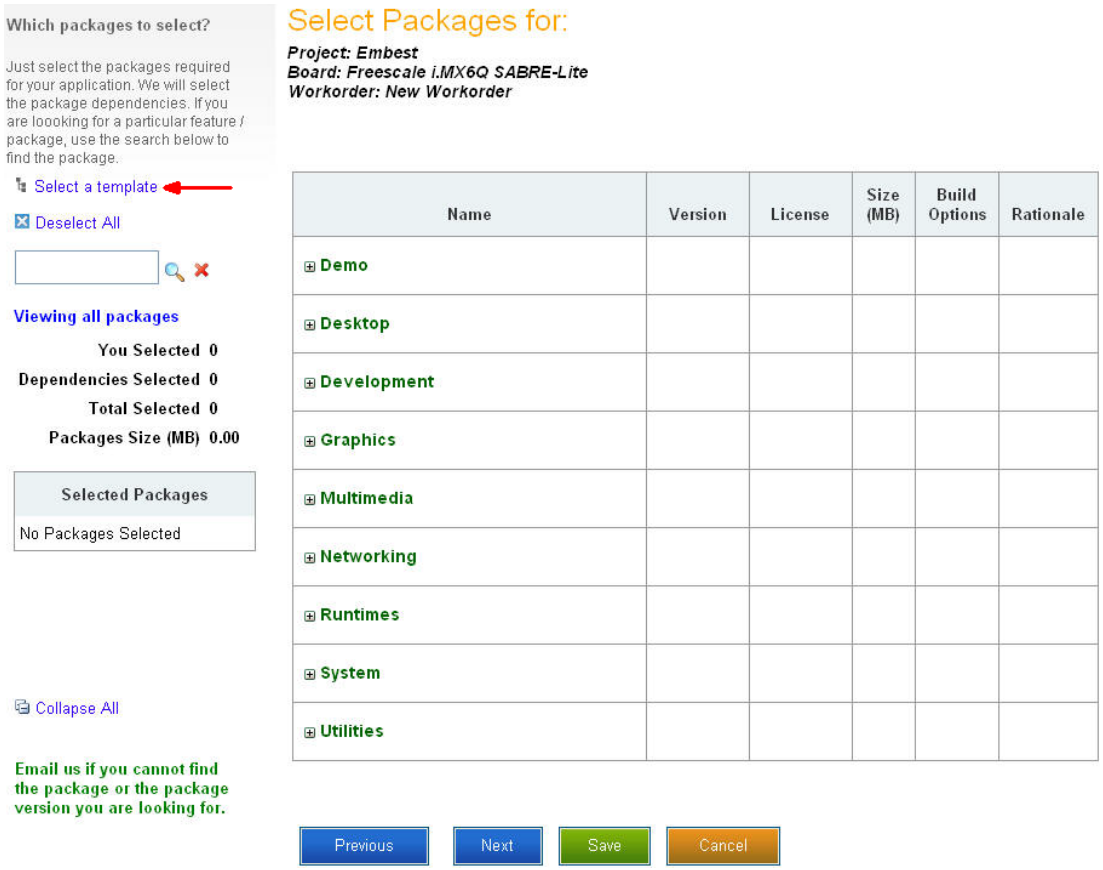

Figure 2-12 Select Package

Choosing a template in the **Select a template** drop-down menu in the left of the page can help you complete the selection of a bulk of functions with a single click, for example, you may select Busybox Init, Systemv Init and X Windows GUI for different packages;

Click **Next** at the bottom of the page;

Note: The default SDK requires **Busybox Init** to be selected. Additionally, the options fluidlauncher, qt-about-timesys, timesys-theatre-1080p and nitrogen6x-addons-tslib under **Demo** in the table and fsl-mm-aacpdec-codeclib, fsl-codec-full and libfslcodec under **Multimedia** are required as well.

8) Keep the default options unchanged in the following page and click **Next**;

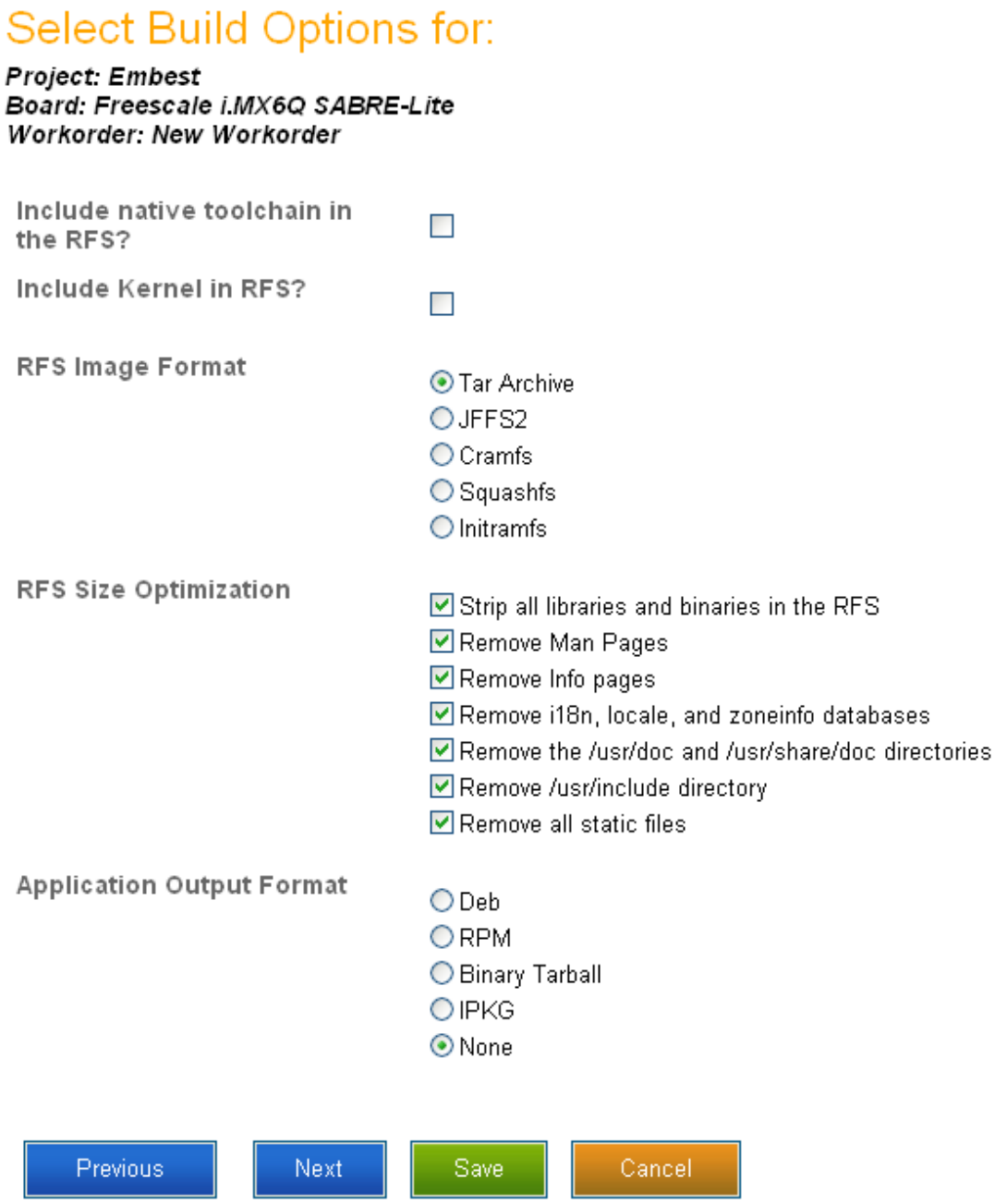

Figure 2-13 Select Build Options

9) Click **Next** in the following page;

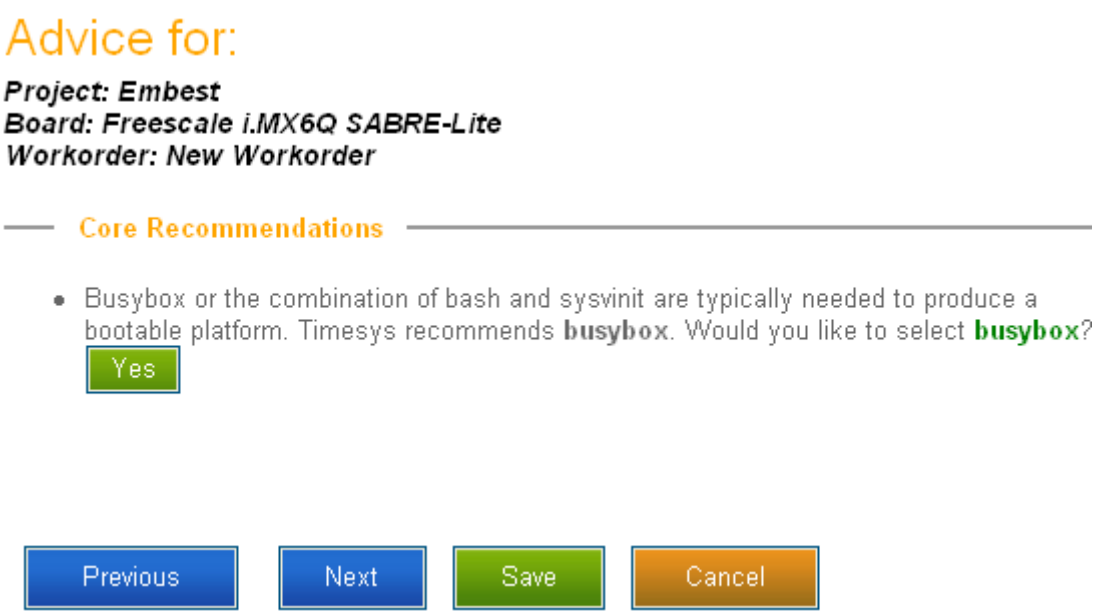

Figure 2-14 Click **Next**

10) In the Workorker Summary page as shown below, all the contents of SDK can be modified; You can click **Save** at the bottom of the page to save the project, or click **Build** to start building custom SDK pakcage; The building process may last for a while before it is finished and a notification email is sent to your email box by the website.

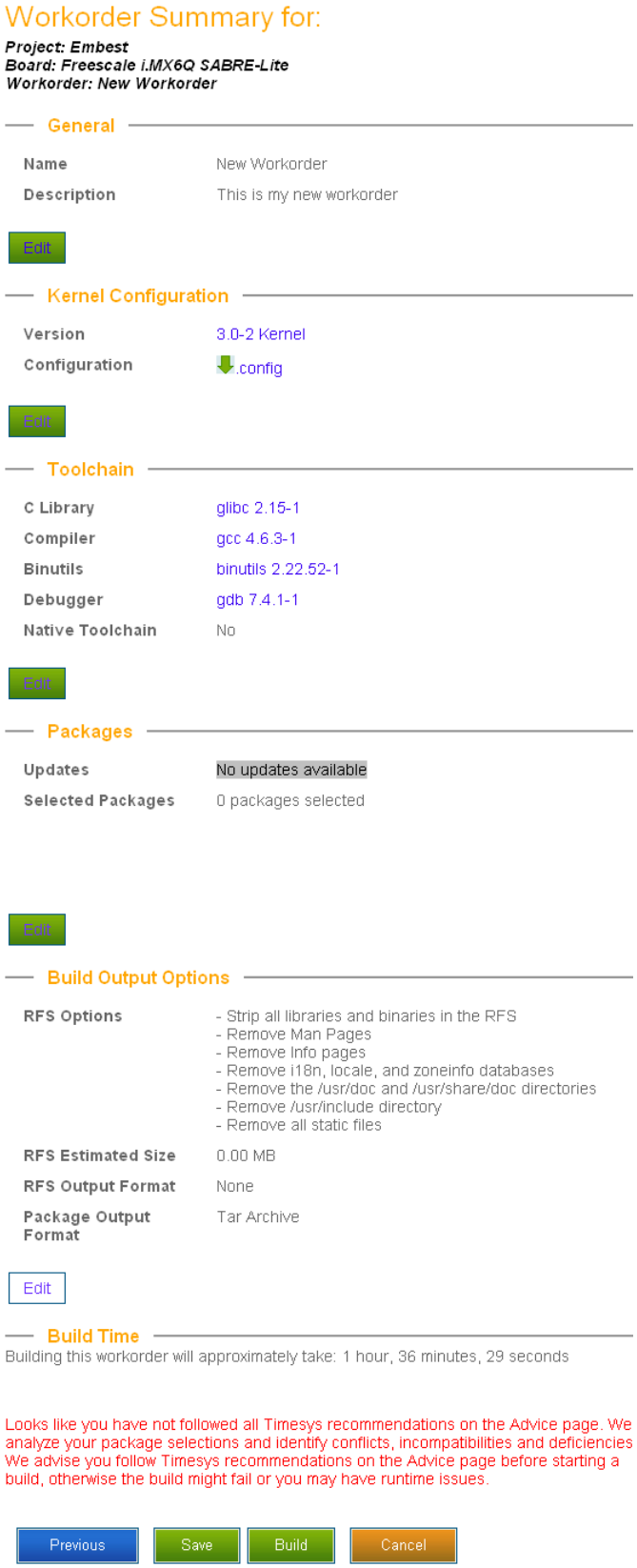

Figure 2-15 Saving and Building SDK

11) After you receive the notification, please login www.timesys.com and click **Download BSP/SDK** in the navigation bar to enter the page as shown below;

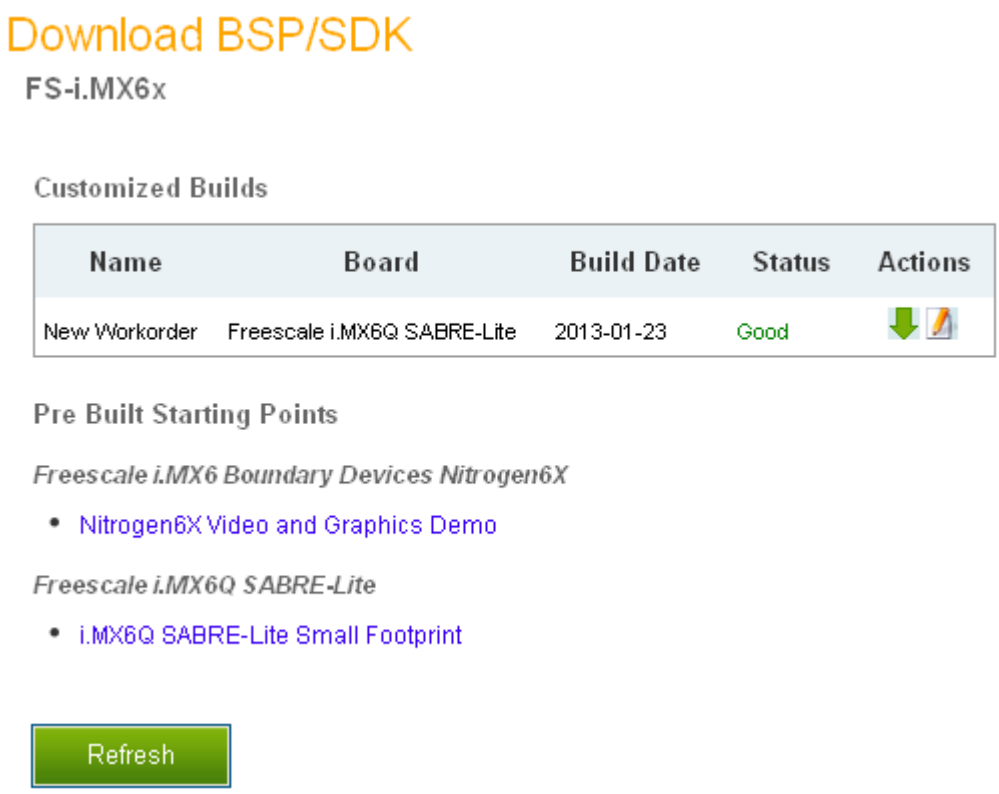

Figure 2-16 Completed SDK

Click ⬇ to enter the next page;

12) Click the link next to **Download SDK installer** to download the custom SDK package (marked with a red arrow);

Figure 2-17 Downloading Custom SDK

3 Compiling SDK on PC

3.1 Installing SDK

1) Put the downloaded SDK package **i.MX6QSABRELite-development-environment.sh** under **/work**of user directory, and then install the package under Bash Shell enviroment of Linux system;

```
yanglsh@TIOP:~/work$ chmod a+x i.MX6QSABRELite-development-environment.sh
yanglsh@TIOP:~/work$ ./i.MX6QSABRELite-development-environment.sh
```

Note: The words in bold are the instructions need to be entered.

During the installation process, you need to press SPACE key on your PC's keyboard for many times and then type **Y** in the last stage to confirm the installation. The default installation directory is **$HOME/timesys**;

2) The following instructions can be used to view the SDK files which have been installed in the systetm;

```
yanglsh@TIOP:~/work$ cd $HOME/timesys
yanglsh@TIOP:~/timesys$ ls -l i_MX6QSABRELite/
total 3684
drwxr-xr-x  2 yanglsh yanglsh    4096 2012-12-17 03:58 bootloader
drwxr-xr-x  3 yanglsh yanglsh    4096 2012-12-17 04:41 kernel-source
drwxr-xr-x  2 yanglsh yanglsh    4096 2013-01-10 15:34 rfs
drwxr-xr-x 12 yanglsh yanglsh    4096 2013-01-10 15:34 toolchain
-rw-r--r--  1 yanglsh yanglsh 3750792 2013-01-10 15:34 uImage-3.0-ts-armv7l
```

A precompiled u-boot can be found under **bootloader** directory; The recompiled Linux kernel is named uImage-3.0-ts-armv7l;

3) Now enter the follwing instruction to put the path of cross compiler into the path list.

```
yanglsh@TIOP:~/timesys$ export PATH=$PATH:$HOME/timesys/i_MX6QSABRELite/toolchain/ccache:$HOME/timesys/i_MX6QSABRELite/toolchain/bin
```

3.2 Compiling SDK

3.2.1 Compiling u-boot

Please following the steps listed below to accomplish the compilation of u-boot.

1) Click **View All Files** at the bottom of the page as shown in the above Figure 2-17, and then click **source/** (marked with a red arrow) in the new page as shown below;

Figure 2-18 Viewing All Files

2) Click **u/** (marked with a red arrwo) in the following page;

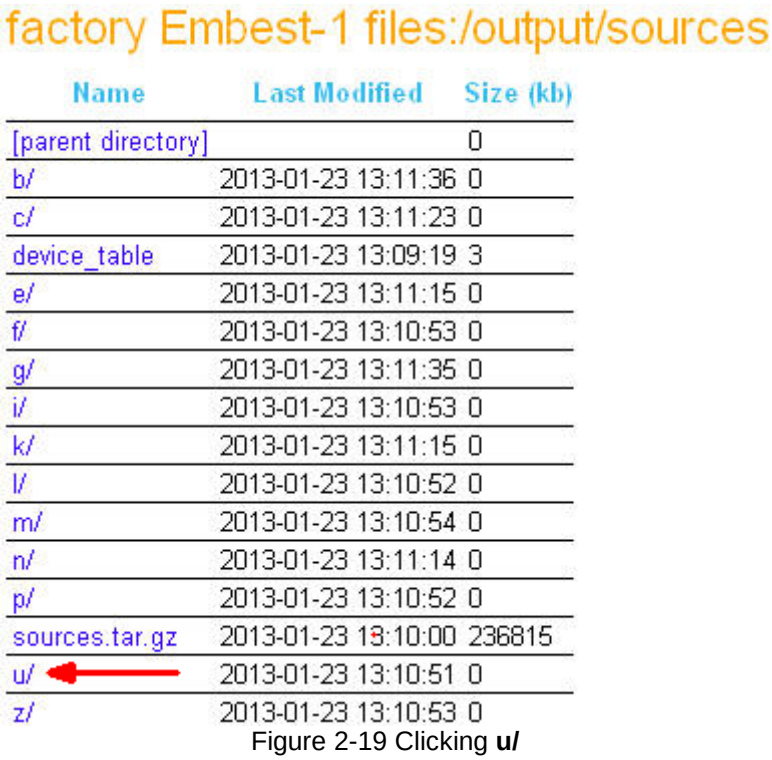

Figure 2-19 Clicking **u/**

3) Click **u-boot/** (marked with a red arrow) in the following page;

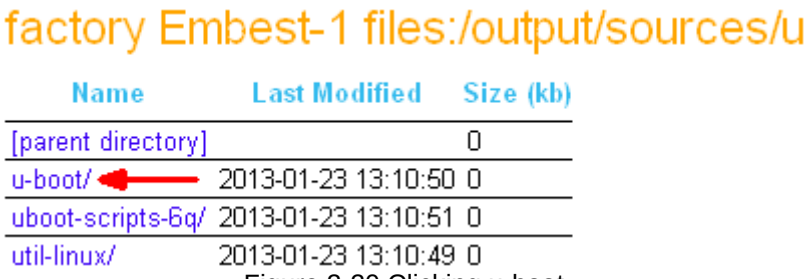

Figure 2-20 Clicking u-boot

4) Click **u-boot-2009.08/** (marked with a red arrow) in the following page;

Figure 2-21 Clicking u-boot-2009.08

5) Click **u-boot-2009.08.tar.bz2** and **u-boot-2009.08-imx6-12.09.01-201209111811.patch** in the following page to download them to **$HOME/timesys/i_MX6QSABRELite**;

Figure 2-22 Downloading u-boot

6) Execute the following instructions to uncompress u-boot and install patch;

```
yanglsh@TIOP:~/work$ cd $HOME/timesys/i_MX6QSABRELite

yanglsh@TIOP:~/timesys/i_MX6QSABRELite$ tar -xvf u-boot-2009.08.tar.bz2

yanglsh@TIOP:~/timesys/i_MX6QSABRELite$ cd u-boot-2009.08/

yanglsh@TIOP:~/timesys/i_MX6QSABRELite/u-boot-2009.08$ patch -p1 <../u-boot-2009.08-imx6-12.09.01-201209111811.patch
```

7) Execute the following instructions to start compilation;

```
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/u-boot-2009.08$ make CROSS_COMPILE=armv7l-timesys-linux-gnueabi- distclean

yanglsh@TIOP:~/timesys/i_MX6QSABRELite/u-boot-2009.08$ make CROSS_COMPILE=armv7l-timesys-linux-gnueabi- mx6q_sabrelite_config

Configuring for mx6q_sabrelite board...
```

```
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/u-boot-2009.08$ make CROSS_COMPILE=armv7l-timesys-linux-gnueabi-

Generating include/autoconf.mk

Generating include/autoconf.mk.dep
```

8) Execute the following instruction to copy the software tool **mkimage** to ../toolchain/bin/;

```
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/u-boot-2009.08$ cp tools/mkimage ../toolchain/bin/
```

3.2.2 Compiling Linux Kernel

Execute the following instructions to compile Linux kernel;

```
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/u-boot-2009.08$ cd $HOME/timesys/i_MX6QSABRELite/kernel-source/linux-3.0

yanglsh@TIOP:~/timesys/i_MX6QSABRELite/kernel-source/linux-3.0$ make ARCH=arm distclean

  CLEAN   .

  CLEAN   arch/arm/kernel

  CLEAN   drivers/tty/vt

  CLEAN   drivers/video/logo

  CLEAN   firmware

  CLEAN   kernel

  CLEAN   lib

  CLEAN   arch/arm/boot/compressed

  CLEAN   arch/arm/boot

  CLEAN   .tmp_versions

  CLEAN   vmlinux System.map .tmp_kallsyms1.o .tmp_kallsyms1.S .tmp_kallsyms2.o .tmp_kallsyms2.S .tmp_vmlinux1 .tmp_vmlinux2 .tmp_System.map

  CLEAN   scripts/basic

  CLEAN   scripts/genksyms

  CLEAN   scripts/kconfig

  CLEAN   scripts/mod

  CLEAN   scripts
```

```
  CLEAN   include/config include/generated arch/arm/include/generated
  CLEAN   .config .config.old .version include/linux/version.h Module.symvers
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/kernel-source/linux-3.0$ make ARCH=arm imx6_defconfig
  HOSTCC  scripts/basic/fixdep
  HOSTCC  scripts/kconfig/conf.o
  SHIPPED scripts/kconfig/zconf.tab.c
  SHIPPED scripts/kconfig/lex.zconf.c
  SHIPPED scripts/kconfig/zconf.hash.c
  HOSTCC  scripts/kconfig/zconf.tab.o
  HOSTLD  scripts/kconfig/conf
#
# configuration written to .config
#
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/kernel-source/linux-3.0$ make ARCH=arm CROSS_COMPILE=armv7l-timesys-linux-gnueabi- uImage
scripts/kconfig/conf --silentoldconfig Kconfig
  CHK     include/linux/version.h
  UPD     include/linux/version.h
```

A file named **uImage** can be found under $HOME/timesys/i_MX6QSABRELite/kernel-source/linux-3.0/arch/arm/boot/ after the compilation is done.

3.2.3 Making Filesystem Image

1) Execute the following instructions to uncompress the package;

```
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/kernel-source/linux-3.0$ cd $HOME/timesys/i_MX6QSABRELite/rfs
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/rfs$ mkdir rootfs
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/rfs$ cd rootfs/
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/rfs/rootfs$ sudo tar -xvf ../rootfs.tar.gz
```

2) Execute the following instructions to make a new compressed package;

```
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/rfs/rootfs$ sudo tar -jcvf ../rootfs.tar.bz2 *
yanglsh@TIOP:~/timesys/i_MX6QSABRELite/rfs/rootfs$ ls -l ../
total 43972
drwxr-xr-x 19 root    root        4096 2012-12-17 04:40 rootfs
-rw-r--r--  1 root    root    20820205 2013-01-11 17:37 rootfs.tar.bz2
-rw-r--r--  1 yanglsh yanglsh 24145795 2013-01-10 15:34 rootfs.tar.gz
```

4 Writing and Running Images

4.1 Writing Images

Please follow the steps shown in the following sections to accomplish the writing of images.

4.1.1 Preparing Tools and Images

Table 4-1 Preparing Tools and Images

Items	Descriptions
Writing tool “Mfgtool”	It is Running under Windows and saved under \linux\tools of the CD-ROM.
Virtual Terminal	For exampe, the HyperTerminal of Windows
Image file “uImage”	Please refer to 3.2.2 Compiling Linux Kernel
Image file “u-boot.bin”	Please refer to 3.2.1 Compiling u-boot
Compress Image file “rootfs.tar.bz2”	Please refer to 3.2.3 Making Filesystem Image
Sabrelite board	No description
USB OTG cable	No description
Male-to-male crossover serial cable	It is used to observe the writing process
Serial extension wire	It is used to observe the writing process
5V DC power adapter	No description
TF card	No description

4.1.2 Copying Files

Table 4-2 Copying Files

Steps	Operations
1	Copy the folder Mfgtools-Rel-12.04.01_ER_MX6Q_UPDATER from CD-ROM to C:\
2	Copy u-boot.bin to C:\Mfgtools-Rel-12.04.01_ER_MX6Q_UPDATER\Profiles\MX6Q Linux Update\OS Firmware\files\ (or replace the exsiting file)
3	Copy uImage to C:\Mfgtools-Rel-12.04.01_ER_MX6Q_UPDATER\Profiles\MX6Q Linux Update\OS Firmware\files\ (or replace the exsiting file)
4	Copy rootfs.tar.bz2 to C:\Mfgtools-Rel-12.04.01_ER_MX6Q_UPDATER\Profiles\MX6Q Linux Update\OS Firmware\files\ (or replace the exsiting file)

4.1.3 Connecting Hardware

Table 4-3 Connecting Hardware

Steps	Operations
1	Connect the serial extension wire to Sabrelite, and then connect PC's serial interface to the wire with a crossover serial cable.
2	Connect Sabrelite to PC with a USB OTG cable
3	Connect the power adpater to Sabrelite
4	Insert the TF card to Sabrelite

4.1.4 Configureing USB Boot Mode

Set the switch marked as SW1 on Sabrelite to the state of "01 USB OTG" according to the following table;

Table 4-4 Configuring SW1

Switch	D1	D2
SW1	ON	OFF

4.1.5 Running Mfgtool and Detecting Sabrelite

Run MfgTool.exe and press SW4 bottun on Sabrelite to reset the board. The MfgTool will find the board as shown below;

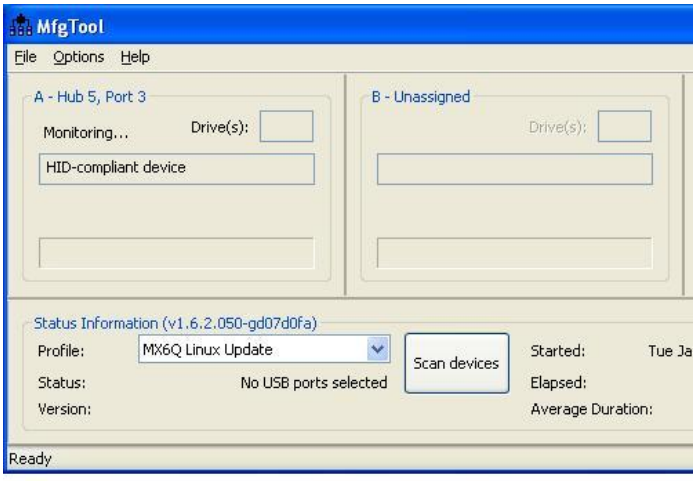

Figure 4-1 MfgTool Software Window

4.1.6 Starting Writing

Click the green botton in the MfgTool window as shown below to start the writing process;

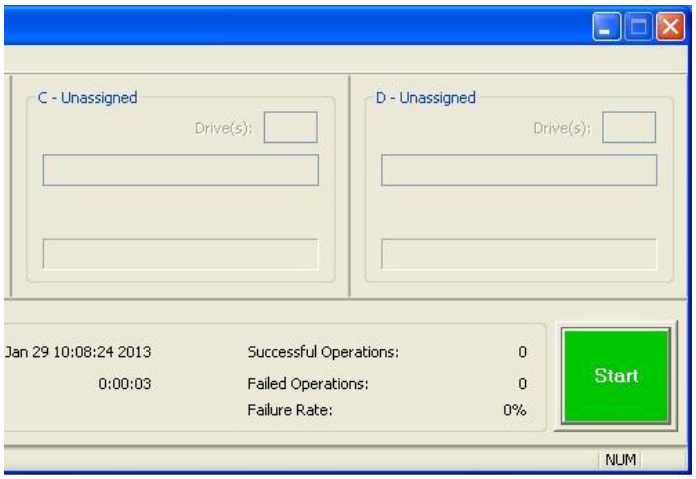

Figure 4-2 Click Green Button

Click the red button when the writing process is completed as shown below;

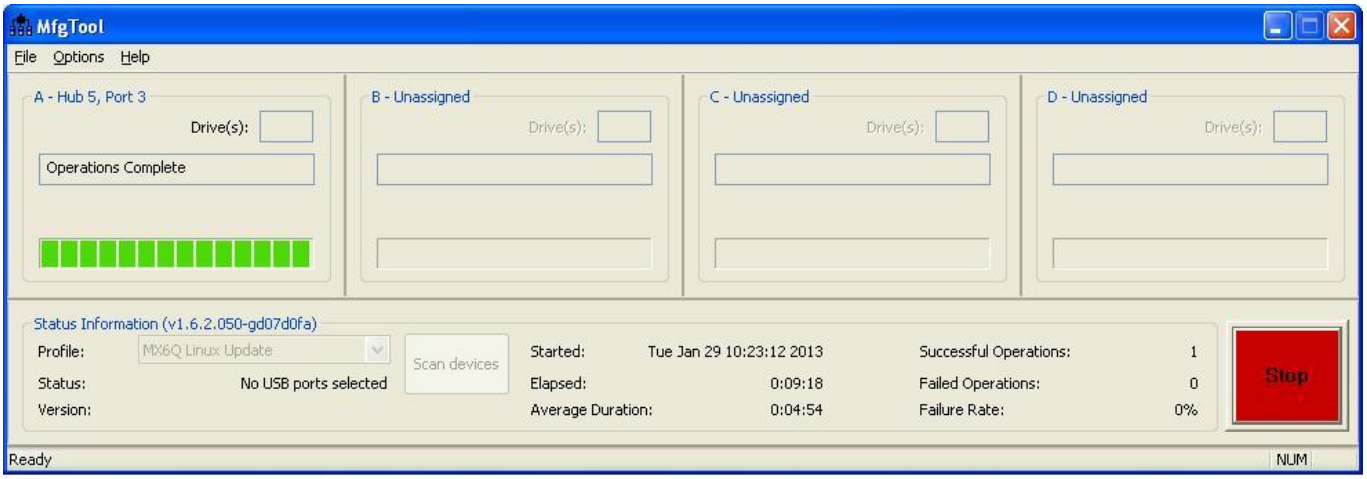

Figure 4-3 Click Red Button

4.2 Running Image Files

Please run image files according to the contents of the following sections.

4.2.1 Configuring SPI-NOR Boot Mode

Configure SW1 switch according to the table shown below;

Table 4-5 Configuring SW1

Switch	D1	D2
SW1	OFF	OFF

4.2.2 Open Terminal

Start HyperTerminal of Windows and configure it according the figure shown below;

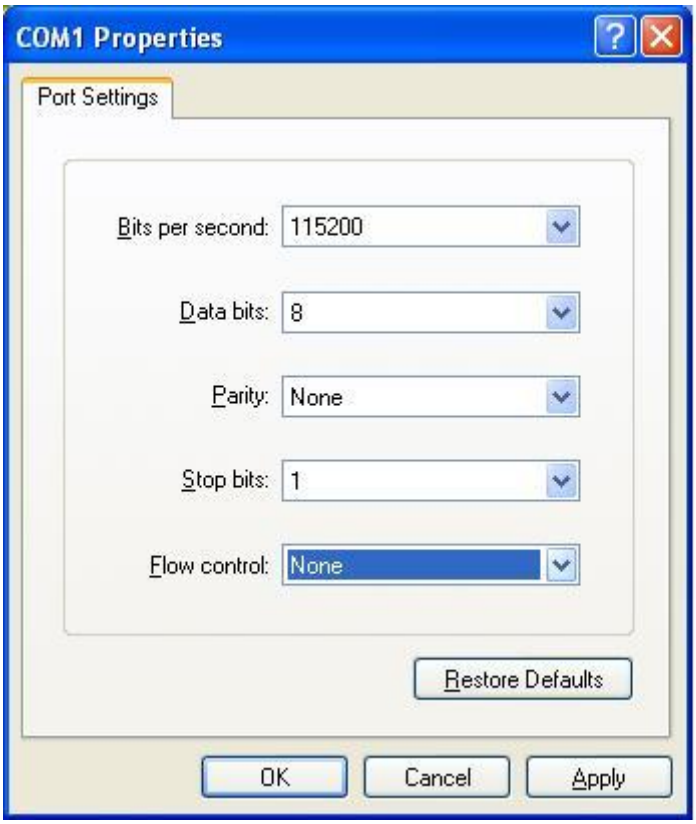

Figure 4-4 Configuring HyperTerminal

4.2.3 Running System Image

Press SW4 button on Sabrelite to reset the board and run the system image; HyperTerminal will show the booting information as shown below;

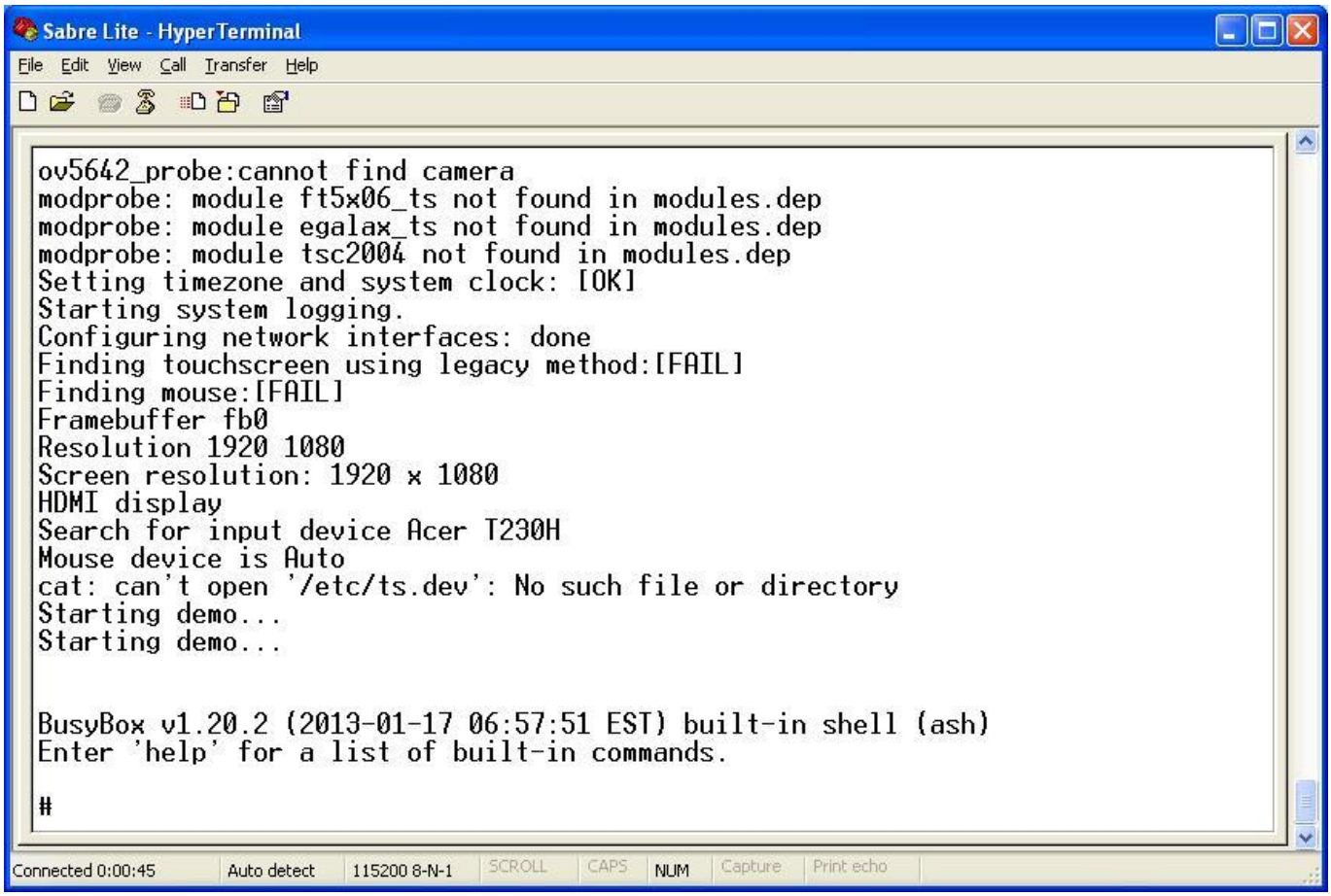

Figure 4-5 System Booting Information

The above information indicates that the system image is running properly.

5 Appendix

- For more information on Linux related materials, please visit http://www.timesys.com/embedded-linux/resources/dev-center/imx6.
- If you encounter software issues when using Linux, please send an email to support@timesys.com.
- If you encounter hardware issues when using our products, please send an email to support@timll.com, or simply call +86-0755-25503401.