AMS Programming User Manual

Accumulator Management System

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Overview

The purpose of this document is to show how to upload code to the AMS boards. A Virtual Machine is used so that a reproducible build can be performed each time the software is modified, built or uploaded.

STEP ONE

Navigate to <u>http://sites.lafayette.edu/ece492-sp15/ams/</u> with your web browser, and download the AMS Build Environment Virtual Machine Image.



Google will warn you that the file cannot be scanned for viruses. The file is clean, and this warning can be safely ignored.

STEP TWO

Navigate to <u>https://www.virtualbox.org/wiki/Downloads</u> and download the latest version of VirtualBox for your preferred Host Operating System.



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VirtualBox

Download VirtualBox

Here, you will find links to VirtualBox binaries and its source code.

VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

- VirtualBox platform packages. The binaries are released under the terms of the GPL version 2.
 VirtualBox 5.0.12 for Windows hosts ↔ x86/amd64
 - VirtualBox 5.0.12 for OS X hosts ⇔amd64
 - VirtualBox 5.0.12 for Linux hosts
 - VirtualBox 5.0.12 for Solaris hosts ⇒ amd64

STEP THREE

Contribute

Once VirtualBox has been installed, open the Virtual Machine Manager.



Select "File -> Import Appliance"

📴 Virtual Media Manager	Ctrl+D
🗿 Import Appliance	Ctrl+I
🚯 Export Appliance	Ctrl+E
<u> <u> P</u>references </u>	Ctrl+G
⊽ E <u>x</u> it	Ctrl+Q

Navigate to the file you just downloaded, "LFEV_Build_2015-12.ova"



Complete the import procedure by clicking "Import", all default settings should be acceptable.



Appliance settings

These are the virtual machines contained in the appliance and the suggested settings of the imported VirtualBox machines. You can change many of the properties shown by doubleclicking on the items and disable others using the check boxes below.

Description	Configuration	
Virtual System 1		
- 😽 Name	LFEV_BUILD_ENV	
📃 Guest OS Type	📝 Ubuntu (32-bit)	
- CPU	1	
	1024 MB	
	×	_
	×	

STEP FOUR Plug the PICKit3 into the Host Machine, and then click the "Settings" button.

File Machine Help Ę 0 🙆 Details Snapshots New Settings Start -64 Windows 7 Pro... 📃 General Preview 77= 😸 Saved Name: LFEV_BUILD_ENV Operating System: Ubuntu (32-bit) LFEV BUILD ENV () Powered Off I System Base Memory: 1024 MB LFEV BUILD ENV Boot Order: Floppy, CD/DVD, Hard Disk VT-x/AMD-V, Nested Paging, Acceleration: PAE/NX Display Video Memory: 12 MB Remote Desktop Server: Disabled Video Capture: Disabled Storage Controller: IDE IDE Secondary Master: [CD/DVD] Empty Controller: SATA SATA Port 0: Linux Lite 2.6 (32bit).vdi (Normal, 50.00 GB) Þ Audio • Host Driver: ALSA Audio Driver Controller: ICH AC97

Add a USB filter rule for the PICKit3.

3 •	LFEV_BUILD_ENV - Settings	$\odot \odot \odot $
 General System Display Storage Audio Network Serial Ports USB Shared Folders 	USB Enable USB Controller Enable USB 2.0 (EHCI) Controller USB Device Filters X Microchip Technology Inc. PICkit 3 (0002)	
Melp	● 0K	Cancel

Ensure that a USB filter rule is applied permanently for your PICKit3 programmer. It is essential that the rule be created through this dialog, as the PICkit3 reprograms itself every time a new binary image is uploaded. The process of reprogramming the PICkit causes it to disconnect itself.

NOTE: A Shared Folder is optional. This step is only necessary if you want to be able to edit/save the files in a Host Machine Folder.

All files can be downloaded directly to the Virtual Machine instead.

Add a shared folder to the Virtual Machine.

ی 😳	LFEV_BUILD_ENV - Settings	$\odot \odot \odot \otimes$
General System Display	Shared Folders Eolders List	
 Display Storage Audio Network Serial Ports USB Shared Folders 	Name Path Auto-mou Machine Folders Transient Folders	Int Access I
Help		DK 🖉 Cancel

This folder should point to where the ams repository is located on the host machine.

NOTE: You can download the latest version of the software by navigating to the following link, and selecting "Download Repository": <u>https://bitbucket.org/lafayetteEV/ams/downloads</u>.

Seatures Pricing					
IafayetteEV AMS	Downloads				
ACTIONS	Downloads Tags Branches				
🛃 Clone	Name				
Compare	Download repository				
- Fork					
	AMS_Gerber_2015.zip				
NAVIGATION	AMS_2015_DxD_Project.zip				

Or you can use Mercurial, and run the command: hg clone <u>https://bitbucket.org/lafayetteEV/ams</u>

This will also download the latest working copy of the software repository.

Navigate to the location of the AMS Software Repository (see above note), and add it as a shared folder.

0	LFEV_BUILD_ENV - Settings	0000
General	Shared Folders	
🔝 System	Folders List	
Display	Add Share ? S & standard	
🔊 Storage		Access
🗭 Audio	Folder Path: Folder Path:	La
P Network	Folder Name: ams	
🔊 Serial Ports	□ <u>R</u> ead-only	
🖉 USB	Auto-mount	
💼 Shared Folders	<u>M</u> ake Permanent	
	Ø Cancel	
Help	₩ 0K	Cancel

Virtual Box Shared Folders allow you to edit/save/modify files stored on the Host Machine from inside of your Guest Virtual Machine

NOTE: You will have to mount this shared folder at the command prompt later.

The command is:

sudo mount -t vboxsf -o uid=\$UID,gid=\$(id -g) {Shared Folder Name} ams

STEP FIVE Start the "LFEB_BUILD_ENV" by clicking the "Start" button.

File Machine Help



You should be greeted with the following screen.



The username and password for the machine are as follows:

Username: "osboxes" Password: "password"

Root Password: "password"

NOTE: The password is not necessary for regular operation, you will be logged in automatically.

STEP SIX

Power must be applied to the AMS during programming.

It is recommended that you set the power supply limits to 3.5V and 3.00A.



PICKit3 programmer must be oriented as shown below.



The square hole and arrow marker should line up.

NOTE: It is recommended to place 0.1" x 6 pin 90 degree header into the PICkit3 instead of soldering pins to the programming port. If this technique is used, it may be necessary to apply some pressure to the PICkit while undergoing programming.

STEP SEVEN

NOTE: You can bypass this step if you downloaded the source code directly to the virtual machine.

Open a terminal session and mount the Shared Folder you created previously.

sudo mount -t vboxsf -o uid=\$UID,gid=\$(id -g) {Shared Folder Name} ams



STEP EIGHT (UPLOAD BINARY IMAGE)

This step shows how to upload a binary image using MPLAB. Skip to the next step if you want to build the binary image from source code.

Navigate to <u>http://sites.lafayette.edu/ece492-sp15/ams/</u> with your virtual machine's web browser, and download the AMS Production Hex Image.



Extract the ZIP folder, and open MPLAB. A shortcut link is provided on the Desktop.



Create a New Project...

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The project type should be "Prebuilt (Hex Loadable Image) Project"

Open the "firmware.production.hex" file you just extracted.

Steps Create Probuilt Project	-
1. Choose Project 2. Create Prebuilt Project 3. Select Project Name and Folder Prebuilt Filename: //home/osboxes/Desktop/firmware.production.hex Browse Browse	
Family: All Families	
Device: PIC16LF1827	
Supported Debug Header:	
Supported Plugin Board:	
Hardware Tool: Hardware Tools Hardware Tools Hardware Tools Hardware Tools Hardware Tools Hardware Tools Hardware Tools Nicrochip Starter Kits Hardware Tools Hardware Tools	_
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Device: PIC16F1827 Hardware Tool: PICkit3

The last dialog will prompt you for a project location. Select a folder, and click "Finish"

		New Project	<u>بر</u> بر
Steps	Select Project Name and F	older	^
 Choose Project Create Prebuilt Project Select Project Name and Folder 			
	Project Name:	firmware.prebuilt	
	Project Location:	/home/osboxes/Desktop Br	owse
111XX/	Project Folder:	/home/osboxes/Desktop/firmware.prebuilt.X	
	Overwrite existing	i project.	=
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STEP NINE (BUILD AND UPLOAD BINARY IMAGE)

Once the machine has started, open MPLAB IDE.



You need the AMS Software Repository downloaded. The file can be in either the Shared Folder, or locally to the guest virtual machine.

The repository can be downloaded in two ways:

- 1. Run "hg clone https://bitbucket.org/lafayetteEV/ams" in a command prompt.
- 2. Download a zip folder from the Downloads Page of the AMS Software Repisitory.

Once you have downloaded the software repository to the virtual machine, open a new project.



Navigate to the project, and open it.

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	Team Tools Window Help	— F ~
1 1 2 2 5 6	✓ ▼ ▼ PC: 0x0 z dc c : W:0x0 : bank	0 How do I? Keyword(s)
P 1 x Files Services	Start Page 🗴	
Open Project	Project Name: LFEV_AMS_Firmware Open as Main Project Open Required Projects: PLAE PLAE pLAE	PLAB IDE
File Name: //home/osboxes/ams/firmware Files of Type: Project Folder	Qpen Project inuts	videos
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The project can now be modified, built, and uploaded to one or more AMS Boards.

After modifying the source code, you can program the AMS Board by clicking the "Make and Program Device" toolbar icon.

