Installation Document

SensorWeb 2.0

Thee NOSA Project

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Contents

1. Introduction

1.1. Purpose

This document describes all the installation process for the SensorWeb 2.0 Software starting from scratch. This document covers all aspect of its installation including all various softwares needed, and how to deploy the web services in your machine.

1.2. How to Use This Document

When installing the SensorWeb 2.0 Software from scratch, readers are encouraged to follow the order specified below:

- Section 2 (Not all software are compulsory and readers are encouraged to check Section 3 when encounter some problems to see if they have already been documented).

- Section 4 (This section could be skipped but most service and routine in NOSA will not work without this).

- Section 5 (Compulsory)

1.3. References

- Various NOSA installation notes written by Tom Kobialka
- http://www.postgresql.org/docs/7.4/interactive/index.html
- http://www.postgresql.org/docs/faqs.FAQ_CYGWIN.html
- http://archives.postgresql.org/pgsql-cygwin/2004-07/msg00150.php
- http://archives.postgresql.org/pgsql-cygwin/2004-07/msg00136.php
- http://www.geocities.com/cfflorendo/postgresql-cygwin.html

1.4. Document Overview

The remainder of this document consists of the following sections:

- Section 2: Software Installation - All the various software that needs to be installed before the NOSA service can be installed and deployed.

- Section 3: Common Installation Problems - Describe some of the common problems encountered while following section 2 of this document.

- Section 4: Postgres Installation - Setting up the Postgres database to ensure it is ready to be used by the service.

- Section 5: Getting the Services Running - All the configuration needed to install and deploy the service in your machine.

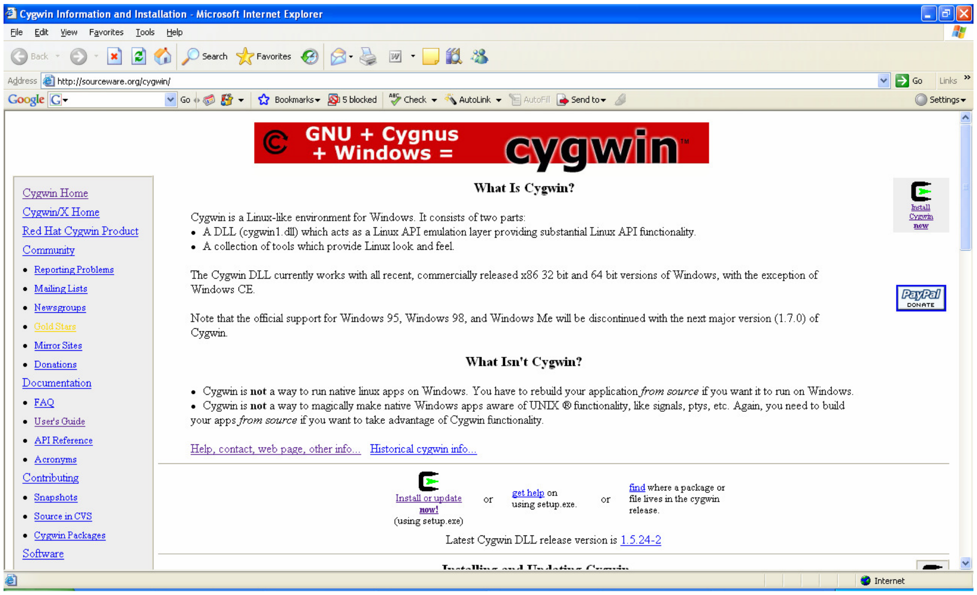
2. Software Installation

2.1. Installing Intel Mote 2 Development Environment for TinyOS 1.1 (Rev 5.0)

The Intel Mote 2 development environment requires Cygwin, Wasabi tool suite, xflash programming tool and TinyOS/Nesc. The Intel Mote 2 platform code is available
on sourceforge and can be downloaded from there. Please follow the detailed instructions below to install and configure the development environment.

Step 1 – Installing Cygwin

1. Obtain the latest cygwin version from http://sourceware.org/cygwin/.


Cygwin Information and Installation - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://sourceware.org/cygwin/
Go Links
Google Go Bookmarks 5 blocked Check AutoLink AutoFill Send to Settings
GNU + Cygnus + Windows = cygwin™
Install Cygwin now
PayPal DONATE
Internet

Cygwin Home
Cygwin/X Home
Red Hat Cygwin Product
Community
- Reporting Problems
- Mailing Lists
- Newsgroups
- Gold Stars
- Mirror Sites
- Donations

Documentation
- FAQ
- User's Guide
- API Reference
- Acronyms

Contributing
- Snapshots
- Source in CVS
- Cygwin Packages

Software

What Is Cygwin?

Cygwin is a Linux-like environment for Windows. It consists of two parts:
- A DLL (cygwin1.dll) which acts as a Linux API emulation layer providing substantial Linux API functionality.
- A collection of tools which provide Linux look and feel.

The Cygwin DLL currently works with all recent, commercially released x86 32 bit and 64 bit versions of Windows, with the exception of Windows CE.

Note that the official support for Windows 95, Windows 98, and Windows Me will be discontinued with the next major version (1.7.0) of Cygwin.

What Isn't Cygwin?

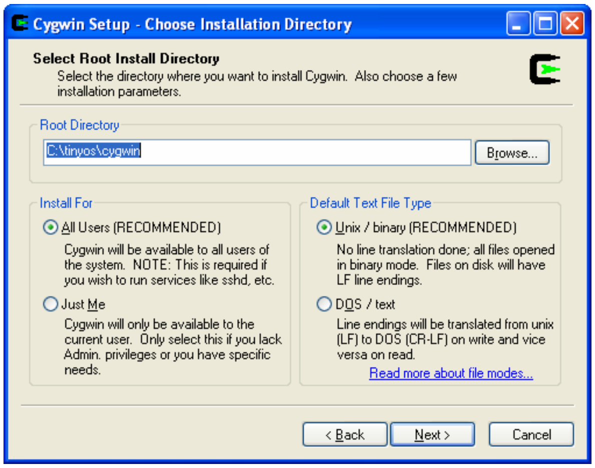
- Cygwin is **not** a way to run native linux apps on Windows. You have to rebuild your application *from source* if you want it to run on Windows.
- Cygwin is **not** a way to magically make native Windows apps aware of UNIX ® functionality, like signals, ptys, etc. Again, you need to build your apps *from source* if you want to take advantage of Cygwin functionality.

Help, contact, web page, other info... Historical cygwin info...

Install or update **now!** (using setup.exe) or get help on using setup.exe. or find where a package or file lives in the cygwin release.

Latest Cygwin DLL release version is 1.5.24-2

2. Install cygwin at C:\tinyos\cygwin
3. Select options for "install for all users" and "use unix file types".



Select Root Install Directory

Select the directory where you want to install Cygwin. Also choose a few installation parameters.

Root Directory: C:\tinyos\cygwin

Install For

● All Users (RECOMMENDED)

Cygwin will be available to all users of the system. NOTE: This is required if you wish to run services like sshd, etc.

○ Just Me

Cygwin will only be available to the current user. Only select this if you lack Admin. privileges or you have specific needs.

Default Text File Type

● Unix / binary (RECOMMENDED)

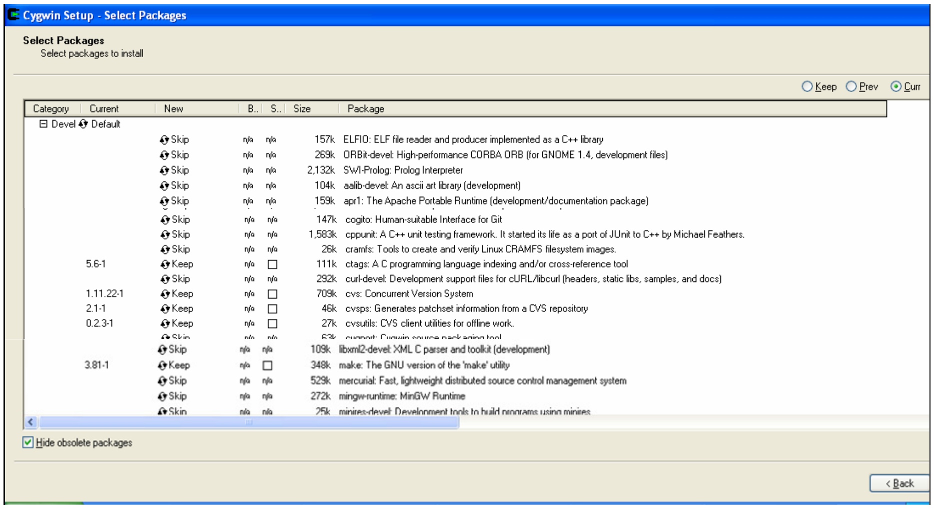
No line translation done; all files opened in binary mode. Files on disk will have LF line endings.

○ DOS / text

Line endings will be translated from unix (LF) to DOS (CR-LF) on write and vice versa on read.

Read more about file modes...

4. By default, the Devel option doesn't include the CVS options. Make sure you go to the Devel list, and change the *cvs*, *cvsps* and *cvsutil* sublists from skip to install. Also, select *make* sublist because it will be needed in step 6, Test the Setup.



Cygwin Setup - Select Packages

Select Packages
Select packages to install

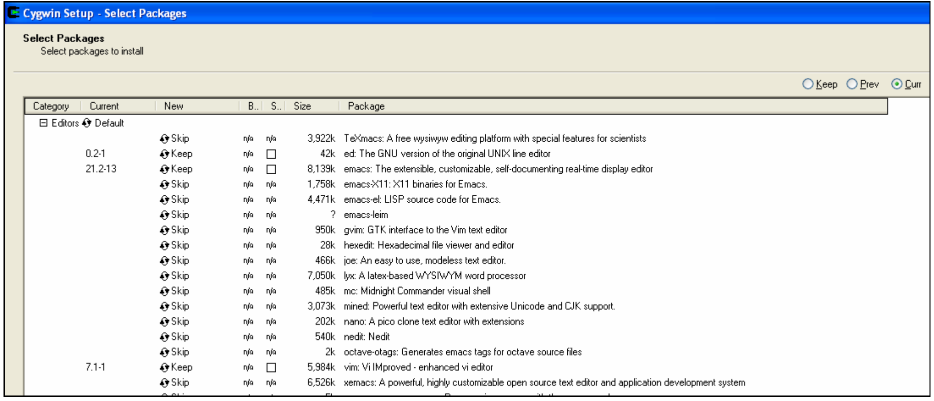
○ Keep ○ Prev ● Curr

Category	Current	New	B..	S..	Size	Package
⊟ Devel Default						
		Skip	n/a	n/a	157k	ELFIO: ELF file reader and producer implemented as a C++ library
		Skip	n/a	n/a	269k	ORBit-devel: High-performance CORBA ORB (for GNOME 1.4, development files)
		Skip	n/a	n/a	2,132k	SWI-Prolog: Prolog Interpreter
		Skip	n/a	n/a	104k	aalib-devel: An ascii art library (development)
		Skip	n/a	n/a	159k	apr1: The Apache Portable Runtime (development/documentation package)
		Skip	n/a	n/a	147k	cogito: Human-suitable Interface for Git
		Skip	n/a	n/a	1,583k	cppunit: A C++ unit testing framework. It started its life as a port of JUnit to C++ by Michael Feathers.
		Skip	n/a	n/a	26k	cramfs: Tools to create and verify Linux CRAMFS filesystem images.
	5.6-1	Keep	n/a	□	111k	ctags: A C programming language indexing and/or cross-reference tool
		Skip	n/a	n/a	292k	curl-devel: Development support files for cURL/libcurl (headers, static libs, samples, and docs)
	1.11.22-1	Keep	n/a	□	709k	cvs: Concurrent Version System
	2.1-1	Keep	n/a	□	46k	cvsps: Generates patchset information from a CVS repository
	0.2.3-1	Keep	n/a	□	27k	cvsutils: CVS client utilities for offline work.
		Skip	n/a	n/a	63k	cygport: Cygwin source packaging tool
		Skip	n/a	n/a	109k	libxml2-devel: XML C parser and toolkit (development)
	3.81-1	Keep	n/a	□	348k	make: The GNU version of the 'make' utility
		Skip	n/a	n/a	529k	mercurial: Fast, lightweight distributed source control management system
		Skip	n/a	n/a	272k	mingw-runtime: MinGW Runtime
		Skip	n/a	n/a	25k	minires-devel: Development tools to build programs using minires

☑ Hide obsolete packages

< Back

5. You need to install an editor for editing files. I chose three different editors to try out.



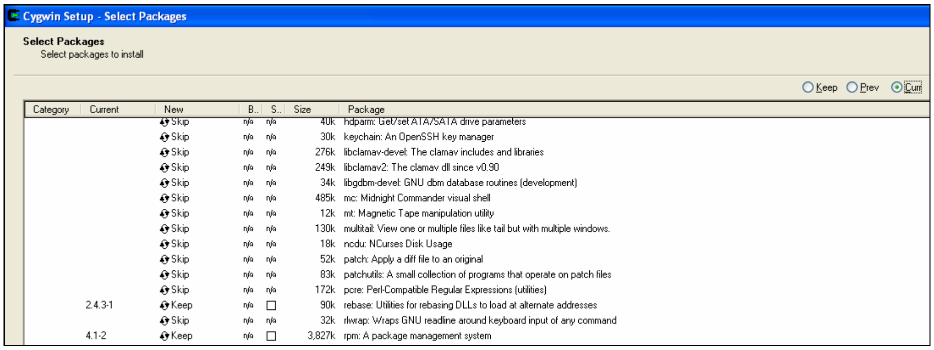
Cygwin Setup - Select Packages

Select Packages
Select packages to install

○ Keep ○ Prev ● Curr

Category	Current	New	B..	S..	Size	Package
⊟ Editors Default						
		Skip	n/a	n/a	3,922k	TeXmacs: A free wysiwyw editing platform with special features for scientists
	0.2-1	Keep	n/a	□	42k	ed: The GNU version of the original UNIX line editor
	21.2-13	Keep	n/a	□	8,139k	emacs: The extensible, customizable, self-documenting real-time display editor
		Skip	n/a	n/a	1,758k	emacs-X11: X11 binaries for Emacs.
		Skip	n/a	n/a	4,471k	emacs-el: LISP source code for Emacs.
		Skip	n/a	n/a	?	emacs-leim
		Skip	n/a	n/a	950k	gvim: GTK interface to the Vim text editor
		Skip	n/a	n/a	28k	hexedit: Hexadecimal file viewer and editor
		Skip	n/a	n/a	466k	joe: An easy to use, modeless text editor.
		Skip	n/a	n/a	7,050k	lyx: A latex-based WYSIWYM word processor
		Skip	n/a	n/a	485k	mc: Midnight Commander visual shell
		Skip	n/a	n/a	3,073k	mined: Powerful text editor with extensive Unicode and CJK support.
		Skip	n/a	n/a	202k	nano: A pico clone text editor with extensions
		Skip	n/a	n/a	540k	nedit: Nedit
		Skip	n/a	n/a	2k	octave-otags: Generates emacs tags for octave source files
	7.1-1	Keep	n/a	□	5,984k	vim: Vi IMproved - enhanced vi editor
		Skip	n/a	n/a	6,526k	xemacs: A powerful, highly customizable open source text editor and application development system

6. You will need to install an utility for executing rpm command that is used for installing NesC program in step 4 below.



Cygwin Setup - Select Packages

Select Packages
Select packages to install

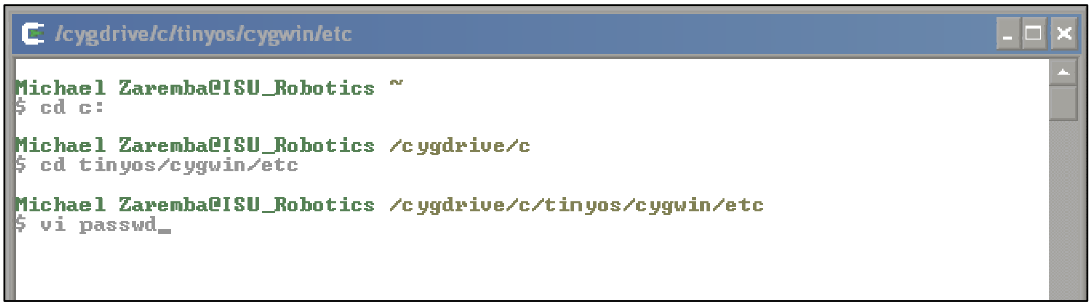
○ Keep ○ Prev ● Curr

Category	Current	New	B..	S..	Size	Package
		Skip	n/a	n/a	40k	hdparm: Get/set ATA/SATA drive parameters
		Skip	n/a	n/a	30k	keychain: An OpenSSH key manager
		Skip	n/a	n/a	276k	libclamav-devel: The clamav includes and libraries
		Skip	n/a	n/a	249k	libclamav2: The clamav dll since v0.90
		Skip	n/a	n/a	34k	libgdbm-devel: GNU dbm database routines (development)
		Skip	n/a	n/a	485k	mc: Midnight Commander visual shell
		Skip	n/a	n/a	12k	mt: Magnetic Tape manipulation utility
		Skip	n/a	n/a	130k	multitail: View one or multiple files like tail but with multiple windows.
		Skip	n/a	n/a	18k	ncdu: NCurses Disk Usage
		Skip	n/a	n/a	52k	patch: Apply a diff file to an original
		Skip	n/a	n/a	83k	patchutils: A small collection of programs that operate on patch files
		Skip	n/a	n/a	172k	pcre: Perl-Compatible Regular Expressions (utilities)
	2.4.3-1	Keep	n/a	□	90k	rebase: Utilities for rebasing DLLs to load at alternate addresses
		Skip	n/a	n/a	32k	rlwrap: Wraps GNU readline around keyboard input of any command
	4.1-2	Keep	n/a	□	3,827k	rpm: A package management system

7. Cygwin will point your home directory to "C:\Documents and Settings\your_loginname". This is liable to create problems with other apps,

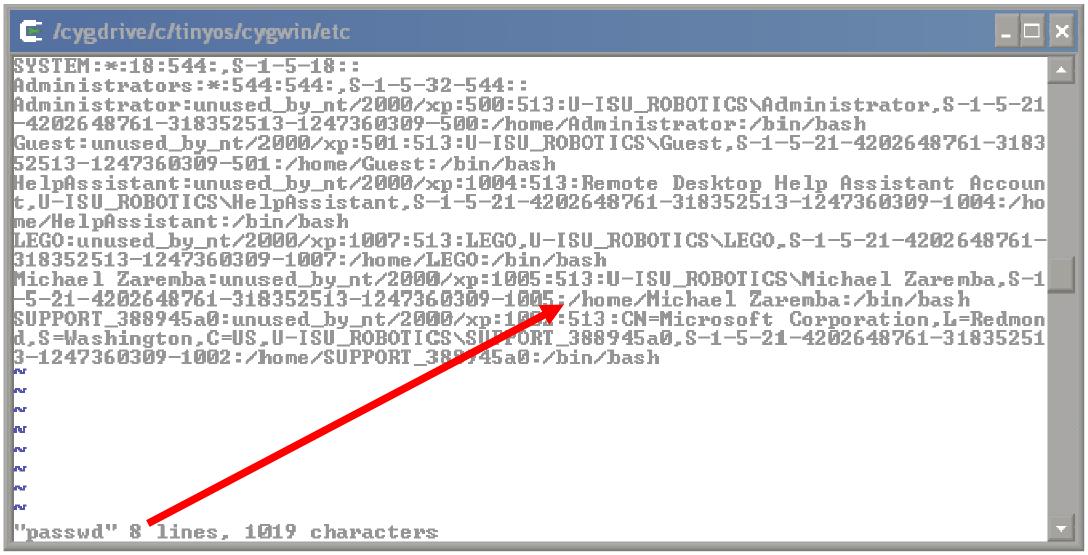
so change it to something like “/home/your_loginname”. This can be done by editing the /etc/passwd file, scrolling down to the line that starts with “your_loginname” and replacing the string “/cygdrive/c/Documents and Settings/your_loginname” by “/home/your_loginname”. Restart cygwin and check your home directory.

Here are the commands for editing passwd file with vi editor.



```
Michael Zaremba@ISU_Robotics ~
$ cd c:

Michael Zaremba@ISU_Robotics /cygdrive/c
$ cd tinyos/cygwin/etc

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos/cygwin/etc
$ vi passwd_
```

Note the directory below is already correct. I believe the above step for changing passwd file is no longer necessary. Somebody must have installed a patch to automatically perform this home directory correction. To exit vi editor without saving changes, type “:q!” and depress enter key. To save changes and exit vi editor, type “:wq” and depress enter key.



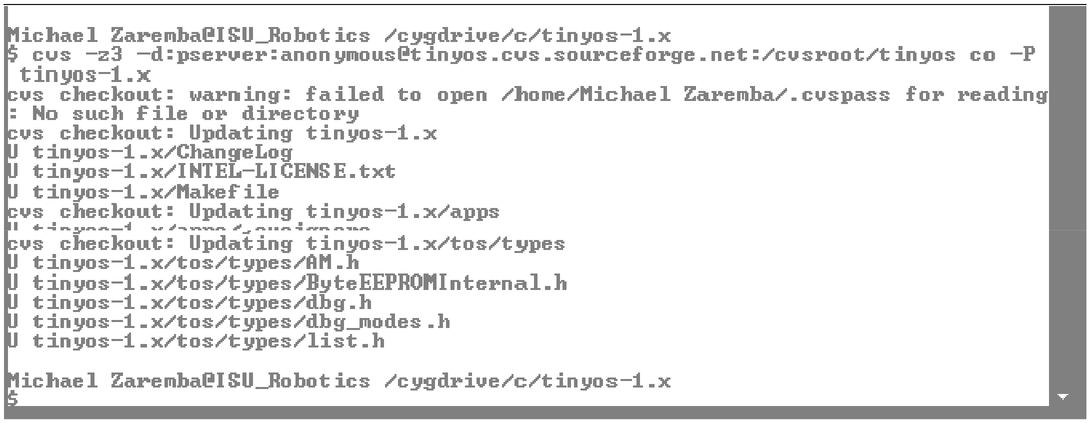
```
SYSTEM:*:18:544:,S-1-5-18::
Administrators:*:544:544:,S-1-5-32-544::
Administrator:unused_by_nt/2000/xp:500:513:U-ISU_ROBOTICS\Administrator,S-1-5-21
-4202648761-318352513-1247360309-500:/home/Administrator:/bin/bash
Guest:unused_by_nt/2000/xp:501:513:U-ISU_ROBOTICS\Guest,S-1-5-21-4202648761-3183
52513-1247360309-501:/home/Guest:/bin/bash
HelpAssistant:unused_by_nt/2000/xp:1004:513:Remote Desktop Help Assistant Accoun
t,U-ISU_ROBOTICS\HelpAssistant,S-1-5-21-4202648761-318352513-1247360309-1004:/ho
me/HelpAssistant:/bin/bash
LEGO:unused_by_nt/2000/xp:1007:513:LEGO,U-ISU_ROBOTICS\LEGO,S-1-5-21-4202648761-
318352513-1247360309-1007:/home/LEGO:/bin/bash
Michael Zaremba:unused_by_nt/2000/xp:1005:513:U-ISU_ROBOTICS\Michael Zaremba,S-1
-5-21-4202648761-318352513-1247360309-1005:/home/Michael Zaremba:/bin/bash
SUPPORT_388945a0:unused_by_nt/2000/xp:1002:513:CN=Microsoft Corporation,L=Redmon
d,S=Washington,C=US,U-ISU_ROBOTICS\SUPPORT_388945a0,S-1-5-21-4202648761-31835251
3-1247360309-1002:/home/SUPPORT_388945a0:/bin/bash
~
~
~
~
~
~
~
~
"passwd" 8 lines, 1019 characters
```

Step 2 – Downloading the TinyOS1.1 tree

1. If you already have an installation of the TinyOS1.1 tree from sourceforge, just update the tree and proceed to step 3. Note: The next screen shot shows directory of tinyos-1.x previously installed. I updated by running same code in next step.
2. To install the TinyOS1.1 tree from scratch, go to c:/ and type the following: cvs –z3 –d:pserver:anonymous@tinyos.cvs.sourceforge.net:/cvsroot/tinyos co –P tinyos-1.x

If you have an account on sourceforge, replace anonymous with your login name and “pserver” with “ext”. When prompted for password enter your password (or no password for the anonymous account, just press Enter key)

Note this will take a few minutes to download.

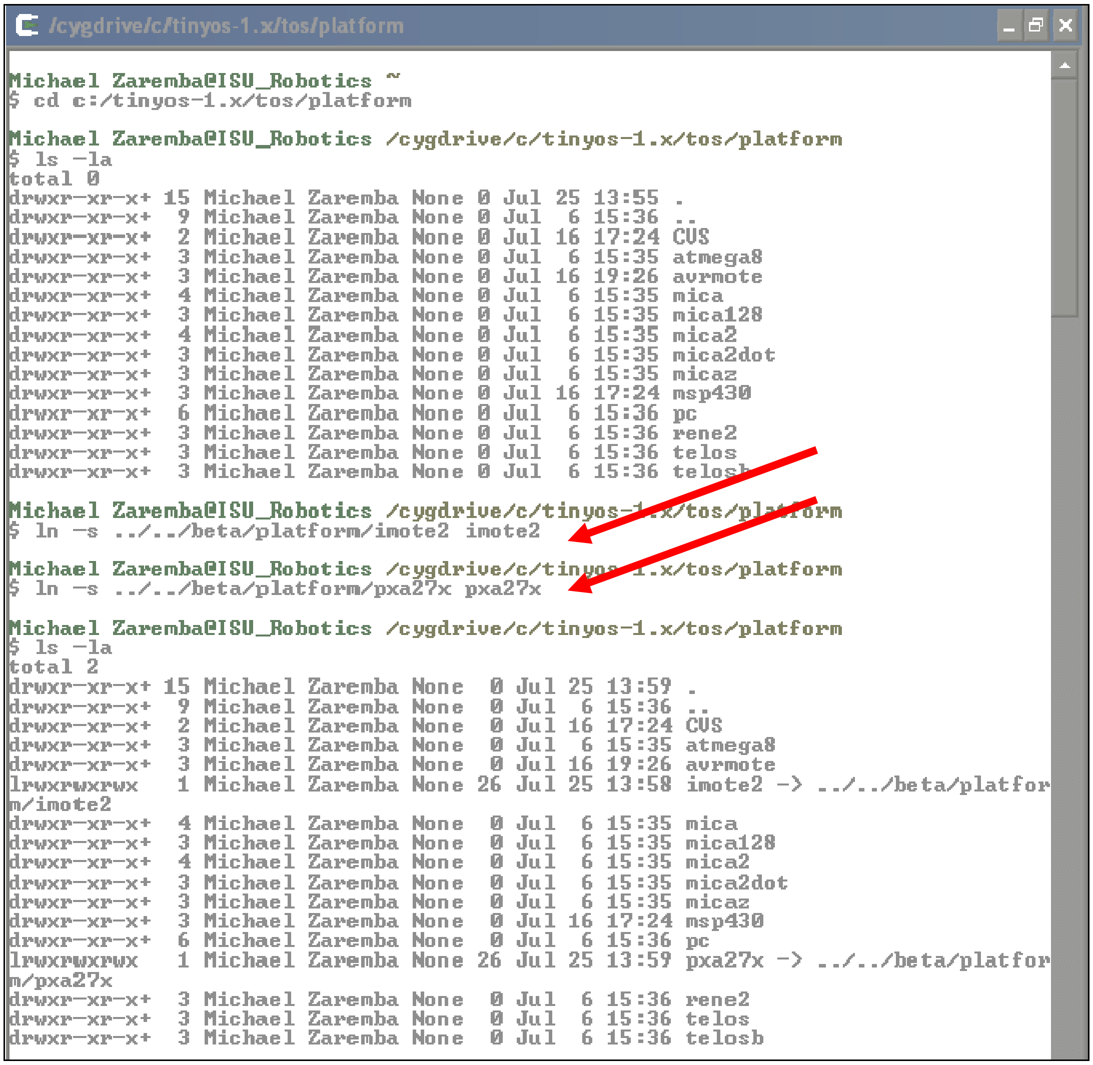


```
Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos-1.x
$ cvs -z3 -d:pserver:anonymous@tinyos.cvs.sourceforge.net:/cvsroot/tinyos co -P
 tinyos-1.x
cvs checkout: warning: failed to open /home/Michael Zaremba/.cvspass for reading
: No such file or directory
cvs checkout: Updating tinyos-1.x
U tinyos-1.x/ChangeLog
U tinyos-1.x/INTEL-LICENSE.txt
U tinyos-1.x/Makefile
cvs checkout: Updating tinyos-1.x/apps
U tinyos-1.x/apps/.cvsignore
cvs checkout: Updating tinyos-1.x/tos/types
U tinyos-1.x/tos/types/AM.h
U tinyos-1.x/tos/types/ByteEEPROMInternal.h
U tinyos-1.x/tos/types/dbg.h
U tinyos-1.x/tos/types/dbg_modes.h
U tinyos-1.x/tos/types/list.h

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos-1.x
$
```

Step 3 – Configure TinyOS1.1 tree

1. The Intel Mote 2 platform files are split into a pxa27x and imote2 subdirectories and can be found in tinyos1.x/beta/platform/. Create a link to each of these directories under tinyos1.x/tos/platform
   a) Go to tinyos-1.x/tos/platform
   b) Note space between “s ..”. Type: ln –s ../../beta/platform/imote2 imote2
   c) Type: ln –s ../../beta/platform/pxa27x pxa27x

Screen shot shows platform’s directories before and after linking.



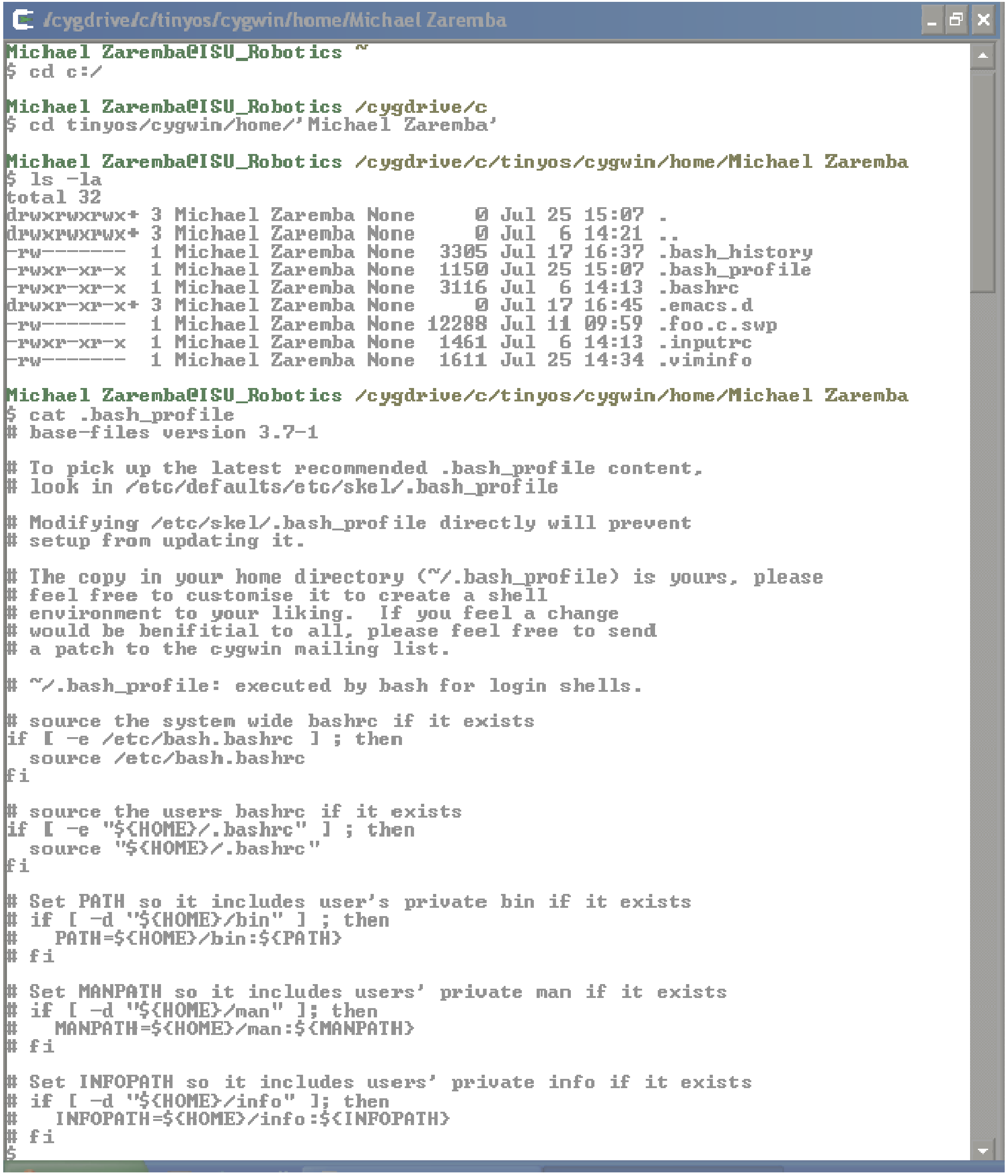
```
Michael Zaremba@ISU_Robotics ~
$ cd c:/tinyos-1.x/tos/platform

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos-1.x/tos/platform
$ ls -la
total 0
drwxr-xr-x+ 15 Michael Zaremba None 0 Jul 25 13:55 .
drwxr-xr-x+  9 Michael Zaremba None 0 Jul  6 15:36 ..
drwxr-xr-x+  2 Michael Zaremba None 0 Jul 16 17:24 CVS
drwxr-xr-x+  3 Michael Zaremba None 0 Jul  6 15:35 atmega8
drwxr-xr-x+  3 Michael Zaremba None 0 Jul 16 19:26 avrmote
drwxr-xr-x+  4 Michael Zaremba None 0 Jul  6 15:35 mica
drwxr-xr-x+  3 Michael Zaremba None 0 Jul  6 15:35 mica128
drwxr-xr-x+  4 Michael Zaremba None 0 Jul  6 15:35 mica2
drwxr-xr-x+  3 Michael Zaremba None 0 Jul  6 15:35 mica2dot
drwxr-xr-x+  3 Michael Zaremba None 0 Jul  6 15:35 micaz
drwxr-xr-x+  3 Michael Zaremba None 0 Jul 16 17:24 msp430
drwxr-xr-x+  6 Michael Zaremba None 0 Jul  6 15:36 pc
drwxr-xr-x+  3 Michael Zaremba None 0 Jul  6 15:36 rene2
drwxr-xr-x+  3 Michael Zaremba None 0 Jul  6 15:36 telos
drwxr-xr-x+  3 Michael Zaremba None 0 Jul  6 15:36 telosb

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos-1.x/tos/platform
$ ln -s ../../beta/platform/imote2 imote2

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos-1.x/tos/platform
$ ln -s ../../beta/platform/pxa27x pxa27x

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos-1.x/tos/platform
$ ls -la
total 2
drwxr-xr-x+ 15 Michael Zaremba None  0 Jul 25 13:59 .
drwxr-xr-x+  9 Michael Zaremba None  0 Jul  6 15:36 ..
drwxr-xr-x+  2 Michael Zaremba None  0 Jul 16 17:24 CVS
drwxr-xr-x+  3 Michael Zaremba None  0 Jul  6 15:35 atmega8
drwxr-xr-x+  3 Michael Zaremba None  0 Jul 16 19:26 avrmote
lrwxrwxrwx   1 Michael Zaremba None 26 Jul 25 13:58 imote2 -> ../../beta/platfor
m/imote2
drwxr-xr-x+  4 Michael Zaremba None  0 Jul  6 15:35 mica
drwxr-xr-x+  3 Michael Zaremba None  0 Jul  6 15:35 mica128
drwxr-xr-x+  4 Michael Zaremba None  0 Jul  6 15:35 mica2
drwxr-xr-x+  3 Michael Zaremba None  0 Jul  6 15:35 mica2dot
drwxr-xr-x+  3 Michael Zaremba None  0 Jul  6 15:35 micaz
drwxr-xr-x+  3 Michael Zaremba None  0 Jul 16 17:24 msp430
drwxr-xr-x+  6 Michael Zaremba None  0 Jul  6 15:36 pc
lrwxrwxrwx   1 Michael Zaremba None 26 Jul 25 13:59 pxa27x -> ../../beta/platfor
m/pxa27x
drwxr-xr-x+  3 Michael Zaremba None  0 Jul  6 15:36 rene2
drwxr-xr-x+  3 Michael Zaremba None  0 Jul  6 15:36 telos
drwxr-xr-x+  3 Michael Zaremba None  0 Jul  6 15:36 telosb
```

2. Setup the TOSDIR and TOSROOT variables in your .profile.
    a) If you installed the tinyos tree in /cygdrive/c/tinyos-1.x, add the following lines to your .profile file:
       export TOSROOT=/cygdrive/c/tinyos-1.x
       export TOSDIR=$TOSROOT/tos

       Note: If you have installed the tinyos tree in a different location, replace /cygdrive/c/tinyos-1.x with the path of your installed tree.

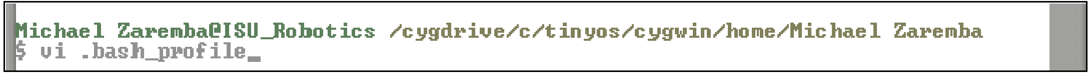
    b) Set the new make utility to be your makefile by adding the following line to your .profile:
       export MAKERULES=$TOSROOT/tools/make/Makerules

Screen shot of .bash_profile before editing.



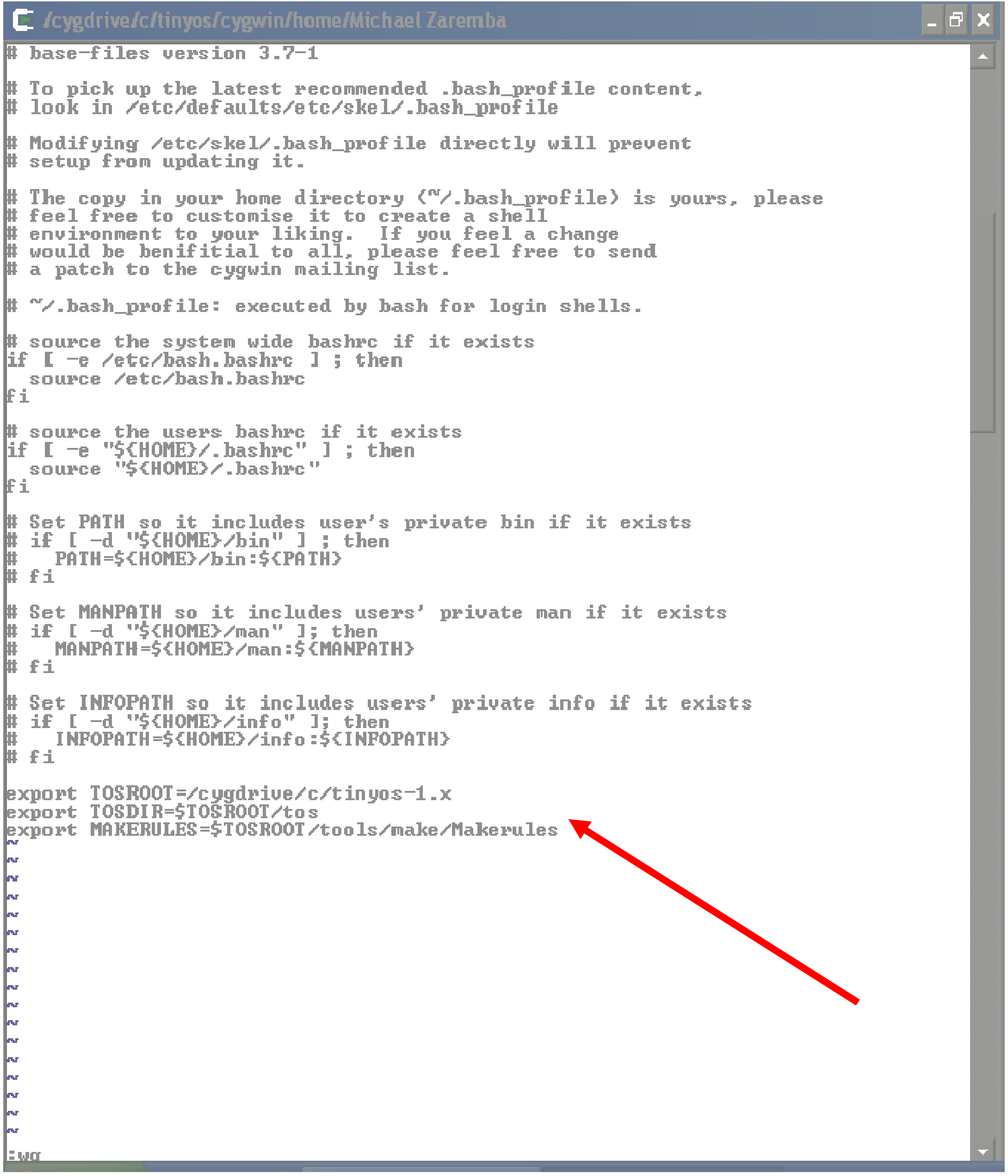
```
Michael Zaremba@ISU_Robotics ~
$ cd c:/

Michael Zaremba@ISU_Robotics /cygdrive/c
$ cd tinyos/cygwin/home/'Michael Zaremba'

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos/cygwin/home/Michael Zaremba
$ ls -la
total 32
drwxrwxrwx+ 3 Michael Zaremba None     0 Jul 25 15:07 .
drwxrwxrwx+ 3 Michael Zaremba None     0 Jul  6 14:21 ..
-rw-------  1 Michael Zaremba None  3305 Jul 17 16:37 .bash_history
-rwxr-xr-x  1 Michael Zaremba None  1150 Jul 25 15:07 .bash_profile
-rwxr-xr-x  1 Michael Zaremba None  3116 Jul  6 14:13 .bashrc
drwxr-xr-x+ 3 Michael Zaremba None     0 Jul 17 16:45 .emacs.d
-rw-------  1 Michael Zaremba None 12288 Jul 11 09:59 .foo.c.swp
-rwxr-xr-x  1 Michael Zaremba None  1461 Jul  6 14:13 .inputrc
-rw-------  1 Michael Zaremba None  1611 Jul 25 14:34 .viminfo

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos/cygwin/home/Michael Zaremba
$ cat .bash_profile
# base-files version 3.7-1

# To pick up the latest recommended .bash_profile content,
# look in /etc/defaults/etc/skel/.bash_profile

# Modifying /etc/skel/.bash_profile directly will prevent
# setup from updating it.

# The copy in your home directory (~/.bash_profile) is yours, please
# feel free to customise it to create a shell
# environment to your liking.  If you feel a change
# would be benifitial to all, please feel free to send
# a patch to the cygwin mailing list.

# ~/.bash_profile: executed by bash for login shells.

# source the system wide bashrc if it exists
if [ -e /etc/bash.bashrc ] ; then
  source /etc/bash.bashrc
fi

# source the users bashrc if it exists
if [ -e "${HOME}/.bashrc" ] ; then
  source "${HOME}/.bashrc"
fi

# Set PATH so it includes user's private bin if it exists
# if [ -d "${HOME}/bin" ] ; then
#   PATH=${HOME}/bin:${PATH}
# fi

# Set MANPATH so it includes users' private man if it exists
# if [ -d "${HOME}/man" ]; then
#   MANPATH=${HOME}/man:${MANPATH}
# fi

# Set INFOPATH so it includes users' private info if it exists
# if [ -d "${HOME}/info" ]; then
#   INFOPATH=${HOME}/info:${INFOPATH}
# fi
$
```

To edit .bash_profile with vi editor, use the below code:



```
Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos/cygwin/home/Michael Zaremba
$ vi .bash_profile_
```

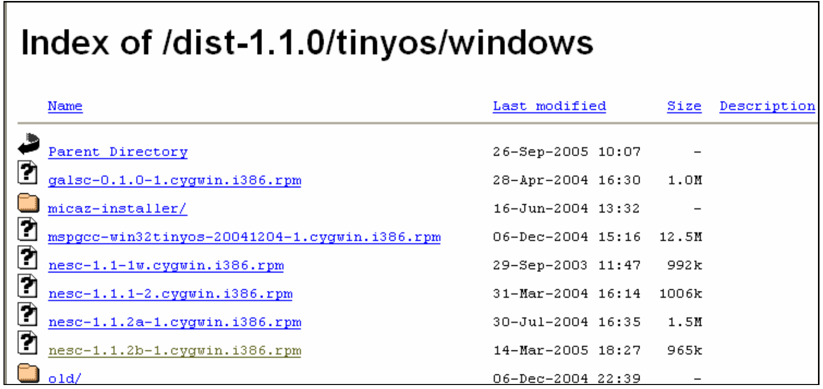
Screen shot showing vi editor with three added lines of code. Note: To exit and save changes while using vi editor, type ":wq" and depress enter key. After exiting vi editor, you must restart cygwin for changes in .bash_profile to take effect.



```
# base-files version 3.7-1

# To pick up the latest recommended .bash_profile content,
# look in /etc/defaults/etc/skel/.bash_profile

# Modifying /etc/skel/.bash_profile directly will prevent
# setup from updating it.

# The copy in your home directory (~/.bash_profile) is yours, please
# feel free to customise it to create a shell
# environment to your liking.  If you feel a change
# would be benifitial to all, please feel free to send
# a patch to the cygwin mailing list.

# ~/.bash_profile: executed by bash for login shells.

# source the system wide bashrc if it exists
if [ -e /etc/bash.bashrc ] ; then
  source /etc/bash.bashrc
fi

# source the users bashrc if it exists
if [ -e "${HOME}/.bashrc" ] ; then
  source "${HOME}/.bashrc"
fi

# Set PATH so it includes user's private bin if it exists
# if [ -d "${HOME}/bin" ] ; then
#   PATH=${HOME}/bin:${PATH}
# fi

# Set MANPATH so it includes users' private man if it exists
# if [ -d "${HOME}/man" ]; then
#   MANPATH=${HOME}/man:${MANPATH}
# fi

# Set INFOPATH so it includes users' private info if it exists
# if [ -d "${HOME}/info" ]; then
#   INFOPATH=${HOME}/info:${INFOPATH}
# fi

export TOSROOT=/cygdrive/c/tinyos-1.x
export TOSDIR=$TOSROOT/tos
export MAKERULES=$TOSROOT/tools/make/Makerules
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
:wq
```

Step 4 – Install NesC

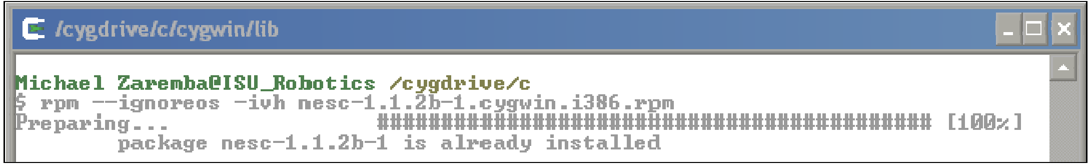
1. Download NesC from the TinyOS website: http://www.tinyos.net/dist-1.1.0/tinyos/windows . Get the latest version nesc-1.xxxx.cygwin.i386.rpm and load to a directory of your choice.



Index of /dist-1.1.0/tinyos/windows

Name	Last modified	Size	Description
Parent Directory	26-Sep-2005 10:07	-	
galsc-0.1.0-1.cygwin.i386.rpm	28-Apr-2004 16:30	1.0M	
micaz-installer/	16-Jun-2004 13:32	-	
mspgcc-win32tinyos-20041204-1.cygwin.i386.rpm	06-Dec-2004 15:16	12.5M	
nesc-1.1-1w.cygwin.i386.rpm	29-Sep-2003 11:47	992k	
nesc-1.1.1-2.cygwin.i386.rpm	31-Mar-2004 16:14	1006k	
nesc-1.1.2a-1.cygwin.i386.rpm	30-Jul-2004 16:35	1.5M	
nesc-1.1.2b-1.cygwin.i386.rpm	14-Mar-2005 18:27	965k	
old/	06-Dec-2004 22:39	-	

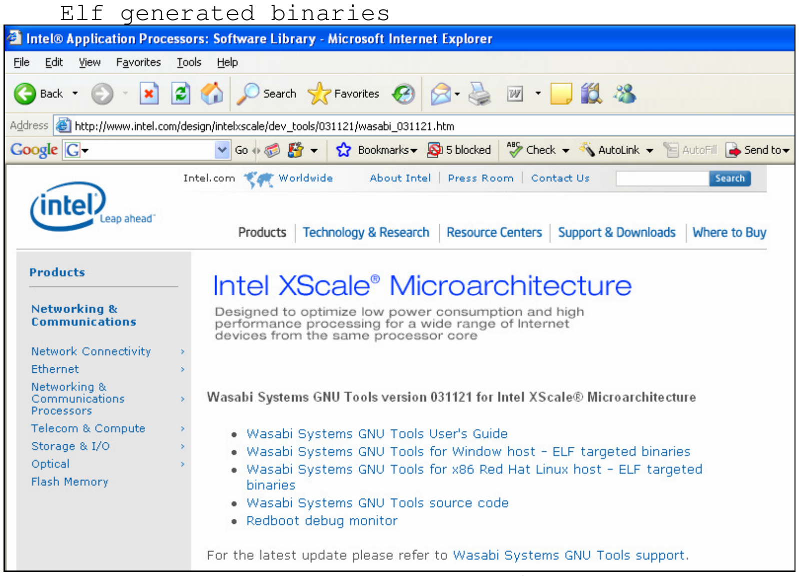
2. Using cygwin, navigate to your chosen directory and install using "rpm --ignoreos –ivh nesc-1.xxxx.cygwin.i386.rpm".



```
Michael Zaremba@ISU_Robotics /cygdrive/c
$ rpm --ignoreos -ivh nesc-1.1.2b-1.cygwin.i386.rpm
Preparing...                ########################################### [100%]
        package nesc-1.1.2b-1 is already installed
```

Step 5 – Install the Wasabi tool suite

1. The Wasabi toolsuite can be downloaded from http://www.intel.com/design/intelxscale/dev_tools/031121/
   a) Accept the license terms
   b) Choose the Wasabi Systems Gnu Tools for Windows Host – Elf generated binaries



Intel® Application Processors: Software Library - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.intel.com/design/intelxscale/dev_tools/031121/wasabi_031121.htm
Google Go Bookmarks 5 blocked Check AutoLink AutoFill Send to
Intel.com Worldwide About Intel Press Room Contact Us Search
intel Leap ahead
Products | Technology & Research | Resource Centers | Support & Downloads | Where to Buy
Products
Networking & Communications
Network Connectivity
Ethernet
Networking & Communications Processors
Telecom & Compute
Storage & I/O
Optical
Flash Memory

Intel XScale® Microarchitecture

Designed to optimize low power consumption and high performance processing for a wide range of Internet devices from the same processor core

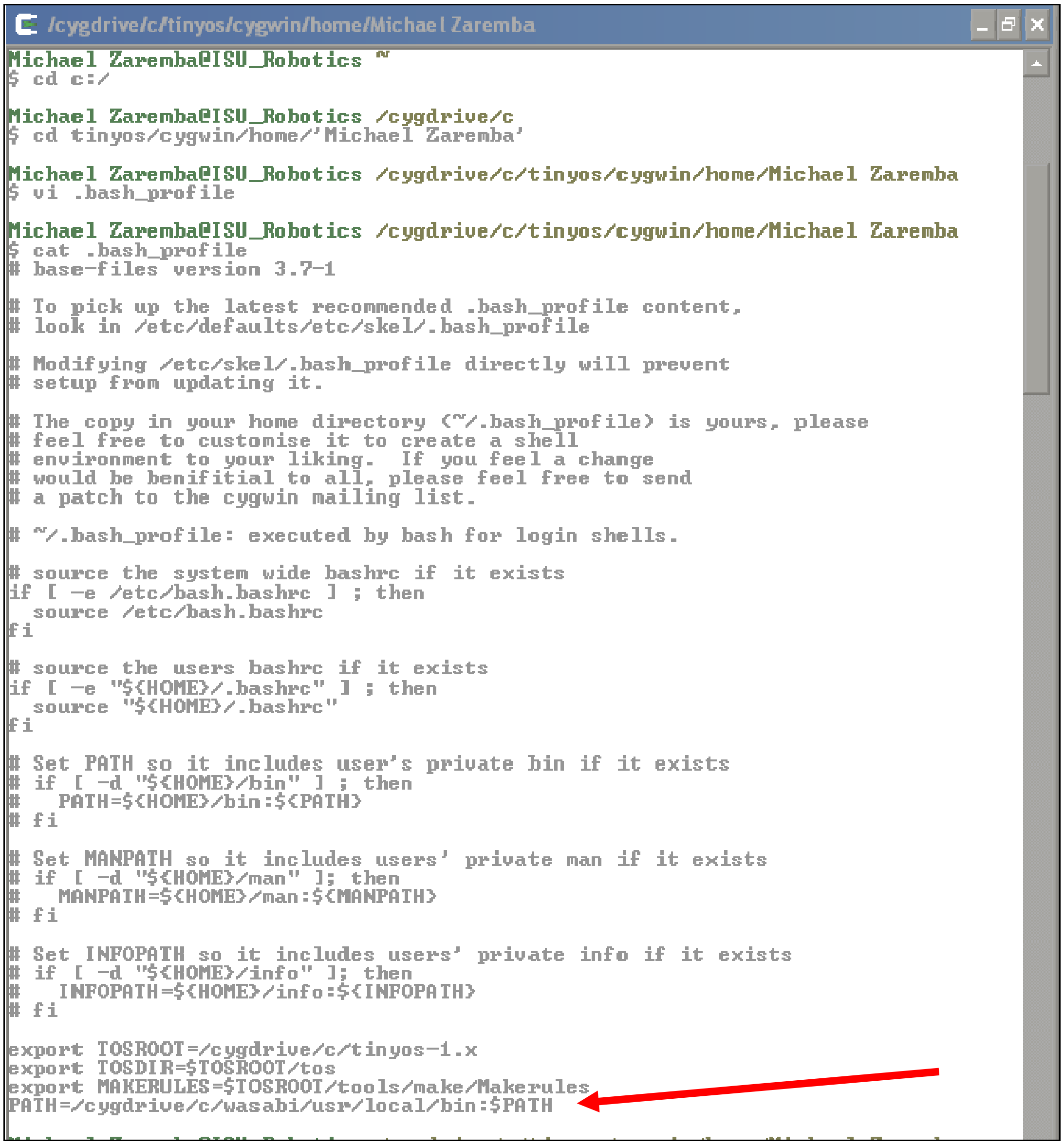
Wasabi Systems GNU Tools version 031121 for Intel XScale® Microarchitecture

- Wasabi Systems GNU Tools User's Guide
- Wasabi Systems GNU Tools for Window host - ELF targeted binaries
- Wasabi Systems GNU Tools for x86 Red Hat Linux host - ELF targeted binaries
- Wasabi Systems GNU Tools source code
- Redboot debug monitor

For the latest update please refer to Wasabi Systems GNU Tools support.

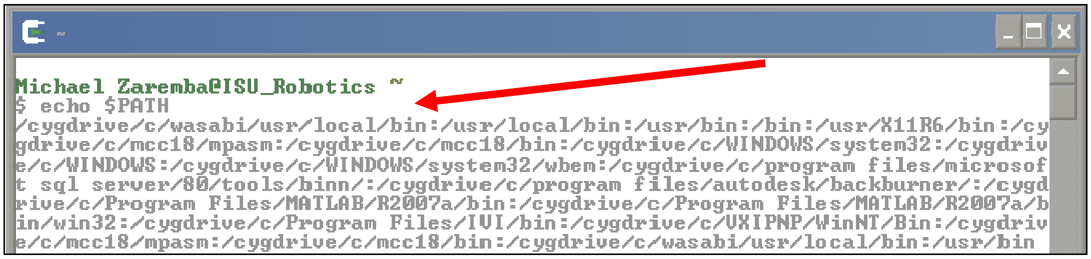
   c) Install the Wasabi tools to c:/wasabi
   d) Add /cygdrive/c/wasabi/usr/local/bin to the beginning of your path by adding the following to your .profile file:

```
PATH=/cygdrive/c/wasabi/usr/local/bin:$PATH
```



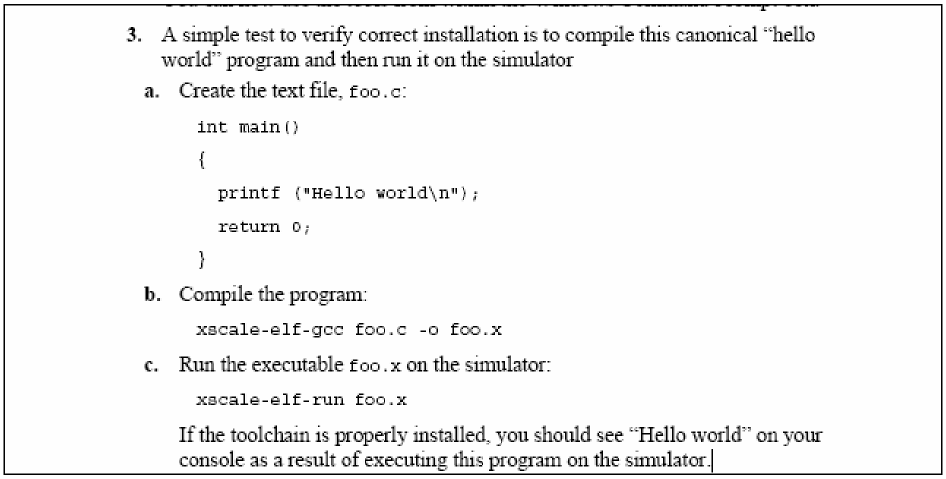
```
Michael Zaremba@ISU_Robotics ~
$ cd c:/

Michael Zaremba@ISU_Robotics /cygdrive/c
$ cd tinyos/cygwin/home/'Michael Zaremba'

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos/cygwin/home/Michael Zaremba
$ vi .bash_profile

Michael Zaremba@ISU_Robotics /cygdrive/c/tinyos/cygwin/home/Michael Zaremba
$ cat .bash_profile
# base-files version 3.7-1

# To pick up the latest recommended .bash_profile content,
# look in /etc/defaults/etc/skel/.bash_profile

# Modifying /etc/skel/.bash_profile directly will prevent
# setup from updating it.

# The copy in your home directory (~/.bash_profile) is yours, please
# feel free to customise it to create a shell
# environment to your liking.  If you feel a change
# would be benifitial to all, please feel free to send
# a patch to the cygwin mailing list.

# ~/.bash_profile: executed by bash for login shells.

# source the system wide bashrc if it exists
if [ -e /etc/bash.bashrc ] ; then
  source /etc/bash.bashrc
fi

# source the users bashrc if it exists
if [ -e "${HOME}/.bashrc" ] ; then
  source "${HOME}/.bashrc"
fi

# Set PATH so it includes user's private bin if it exists
# if [ -d "${HOME}/bin" ] ; then
#   PATH=${HOME}/bin:${PATH}
# fi

# Set MANPATH so it includes users' private man if it exists
# if [ -d "${HOME}/man" ]; then
#   MANPATH=${HOME}/man:${MANPATH}
# fi

# Set INFOPATH so it includes users' private info if it exists
# if [ -d "${HOME}/info" ]; then
#   INFOPATH=${HOME}/info:${INFOPATH}
# fi

export TOSROOT=/cygdrive/c/tinyos-1.x
export TOSDIR=$TOSROOT/tos
export MAKERULES=$TOSROOT/tools/make/Makerules
PATH=/cygdrive/c/wasabi/usr/local/bin:$PATH
```

e) Don't set GCC_EXEC_PREFIX like the user guide says. Restart cygwin to make sure the path change has taken effect.



```
Michael Zaremba@ISU_Robotics ~
$ echo $PATH
/cygdrive/c/wasabi/usr/local/bin:/usr/local/bin:/usr/bin:/bin:/usr/X11R6/bin:/cy
gdrive/c/mcc18/mpasm:/cygdrive/c/mcc18/bin:/cygdrive/c/WINDOWS/system32:/cygdriv
e/c/WINDOWS:/cygdrive/c/WINDOWS/system32/wbem:/cygdrive/c/program files/microsof
t sql server/80/tools/binn/:/cygdrive/c/program files/autodesk/backburner/:/cygd
rive/c/Program Files/MATLAB/R2007a/bin:/cygdrive/c/Program Files/MATLAB/R2007a/b
in/win32:/cygdrive/c/Program Files/IVI/bin:/cygdrive/c/VXIPNP/WinNT/Bin:/cygdriv
e/c/mcc18/mpasm:/cygdrive/c/mcc18/bin:/cygdrive/c/wasabi/usr/local/bin:/usr/bin
```

f) Make sure that you can execute xscale-elf-gcc. To do this refer to Wasabi_Xscale_Users_Guide1.pdf file and follow step 3 of XP Installation section. Step shown below. You can use a C-editor or text editor like notepad. Save your file to the C drive. Note: Insert a CD into CD drive or you will get an error about not being able to read your CD drive. This is a known bug.



3. A simple test to verify correct installation is to compile this canonical "hello world" program and then run it on the simulator
   - a. Create the text file, foo.c:

     ```
     int main()
     {
       printf ("Hello world\n");
       return 0;
     }
     ```

   - b. Compile the program:

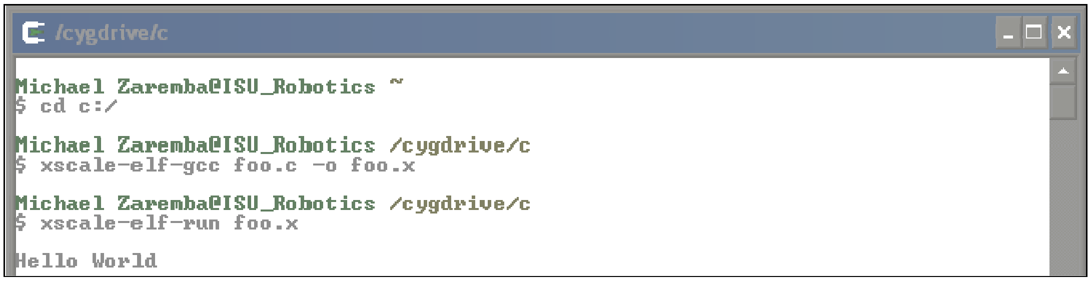
     ```
     xscale-elf-gcc foo.c -o foo.x
     ```

   - c. Run the executable foo.x on the simulator:

     ```
     xscale-elf-run foo.x
     ```

     If the toolchain is properly installed, you should see "Hello world" on your console as a result of executing this program on the simulator.

Results shown below:



```
Michael Zaremba@ISU_Robotics ~
$ cd c:/

Michael Zaremba@ISU_Robotics /cygdrive/c
$ xscale-elf-gcc foo.c -o foo.x

Michael Zaremba@ISU_Robotics /cygdrive/c
$ xscale-elf-run foo.x

Hello World
```

Step 6 – Test the setup

1. Go to $TOSROOT/apps/blink
2. Type : make imote2 debug. It should complete but complain about dwarf2bd. If it doesn't complete and gives you an error message about an e drive : "cc1: /cygdrive/e/wasabi_drops/…../include: No medium found", insert a CD in your e drive and try again. This is a known issue that we are trying to debug currently. If it doesn't complete but you don't get the error about the e drive, check your environment variables.

Text outputted to cygwin terminal while executing 'make imote2 debug':

```
mkdir -p build/imote2
xscale-elf-as -mcpu=iwmmxt -mfpu=softfpa -defsym BOOTLOADER=1
/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/../imote2/flash.s /cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/../imote2/binarymover.s /cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/barecrt.s /cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/mmu_table.s /cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/util.s  -o build/imote2/asms.o
cd /cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib; make;
make[1]: Entering directory `/cygdrive/c/tinyos-1.x/beta/platform/pxa27x/lib'
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o bufferManagement.o bufferManagement.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o downsample.o downsample.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o frequency.o frequency.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o paramtask.o paramtask.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o profile.o profile.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o queue.o queue.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o systemUtil.o systemUtil.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o utils.o utils.c
xscale-elf-gcc -g -O2 -Wall -I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x -
I/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/DSP -I/cygdrive/c/tinyos-
1.x/tos/platform/pxa27x/lib/   -c -o wmmx.o wmmx.c
xscale-elf-ar  -rvs libimote2.a bufferManagement.o downsample.o frequency.o
paramtask.o profile.o queue.o systemUtil.o utils.o wmmx.o
r - bufferManagement.o
r - downsample.o
```

```
r - frequency.o
r - paramtask.o
r - profile.o
r - queue.o
r - systemUtil.o
r - utils.o
r - wmmx.o
make[1]: Leaving directory `/cygdrive/c/tinyos-1.x/beta/platform/pxa27x/lib'
    compiling Blink to a imote2 binary
ncc -o build/imote2/main.exe -g -fnesc-no-inline -I/cygdrive/c/tinyos-
1.x/tos/lib/CC2420Radio -I/cygdrive/c/tinyos-1.x/tos/lib/Flash -
DAUTO_BATTERY_MONITORING=1 -Wall -Wshadow -
DDEF_TOS_AM_GROUP=0x7d -Wnesc-all -target=imote2 -fnesc-
cfile=build/imote2/app.c -board= -DBOOTLOADER -
DIDENT_PROGRAM_NAME=\"Blink\" -
DIDENT_USER_ID=\"MichaelZaremba\" -
DIDENT_HOSTNAME=\"ISU_Robotics\" -
DIDENT_USER_HASH=0xe8f84054L -DIDENT_UNIX_TIME=0x46af6ce8L -
DIDENT_UID_HASH=0x5d90bbfdL Blink.nc -lm  build/imote2/asms.o
/cygdrive/c/tinyos-1.x/tos/platform/pxa27x/lib/libimote2.a
    compiled Blink to build/imote2/main.exe
               0 bytes in ROM
               0 bytes in RAM
               0 bytes in STACK
          262144 bytes available in HEAP
xscale-elf-objcopy --output-target=binary build/imote2/main.exe
build/imote2/main.bin.out
dwarf2bd -nc build/imote2/main.exe
make: dwarf2bd: Command not found
make: *** [bin] Error 127
```

Note: Skip step 7, 8, 9 and 10 if using USB for programming. These steps are for xflash programming with JTAG cable.

Skip step 7.

Step 7 – Test the setup again

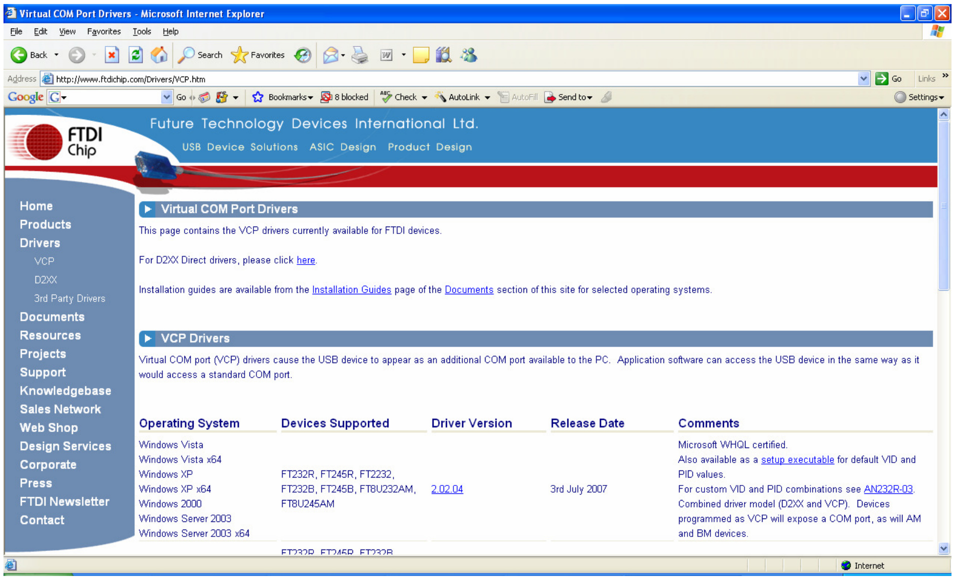
- Go to $TOSROOT/apps/blink
- Type : make imote2 debug
- It should complete.

o If you get a dwarf2bd error, you probably didn't restart your machine after installing the SDT tools. Try restarting your machine and repeat the step above. Note: dwarf2bd.exe is installed in c:\nordheim\xdbbin

o You can check if the path is setup correctly by typing which dwarf2bd at the cygwin prompt, you should get /cygdrive/c/nordheim/xdbbin/dwarf2bd

Step 8 – Setup Intel Mote 2 debug board drivers

- The Intel Mote 2 debug/programming board contains a dual port FTDI chip to map two of the mote UART ports to USB on your pc.
- Before connecting Intel Mote 2 debug board to your pc, download the drivers from http://www.ftdichip.com/Drivers/VCP.htm (for Windows XP). Current version is 2.02.04.


Virtual COM Port Drivers - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.ftdichip.com/Drivers/VCP.htm Go Links
Google Go Bookmarks 8 blocked Check AutoLink AutoFill Send to Settings
FTDI Chip
Future Technology Devices International Ltd.
USB Device Solutions ASIC Design Product Design
Home
Products
Drivers
VCP
D2XX
3rd Party Drivers
Documents
Resources
Projects
Support
Knowledgebase
Sales Network
Web Shop
Design Services
Corporate
Press
FTDI Newsletter
Contact
Internet

Virtual COM Port Drivers

This page contains the VCP drivers currently available for FTDI devices.

For D2XX Direct drivers, please click here.

Installation guides are available from the Installation Guides page of the Documents section of this site for selected operating systems.

VCP Drivers

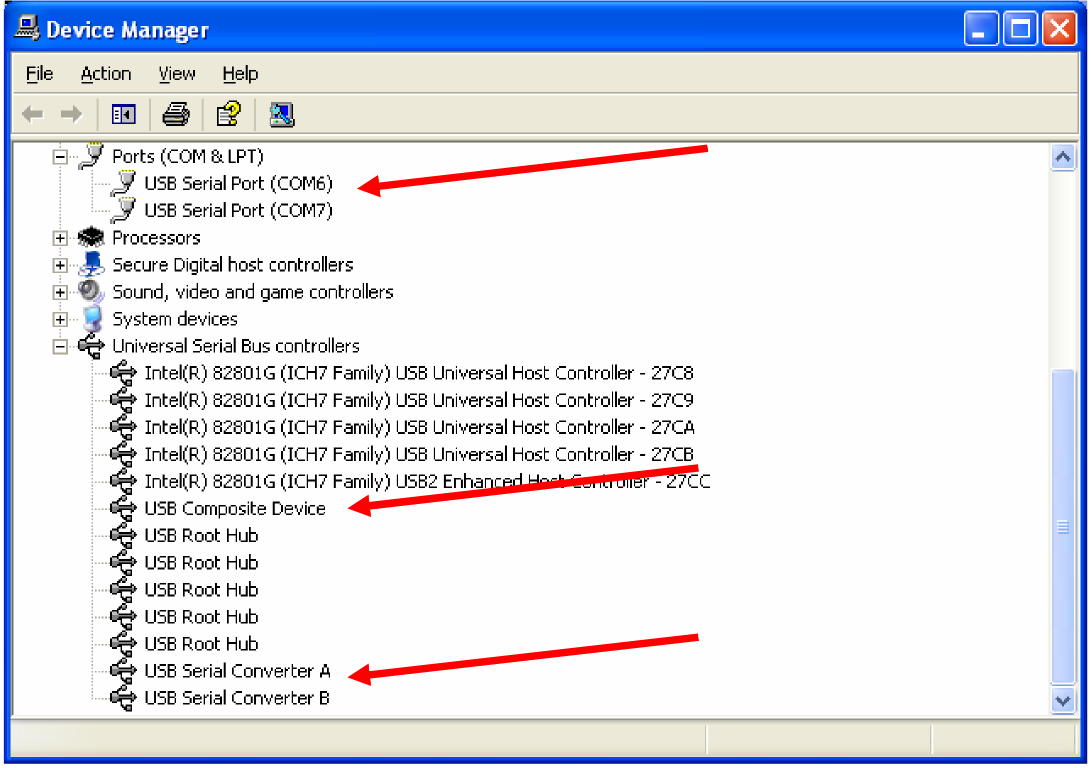
Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port.

Operating System	Devices Supported	Driver Version	Release Date	Comments
Windows Vista Windows Vista x64 Windows XP Windows XP x64 Windows 2000 Windows Server 2003 Windows Server 2003 x64	FT232R, FT245R, FT2232, FT232B, FT245B, FT8U232AM, FT8U245AM	2.02.04	3rd July 2007	Microsoft WHQL certified. Also available as a setup executable for default VID and PID values. For custom VID and PID combinations see AN232R-03. Combined driver model (D2XX and VCP). Devices programmed as VCP will expose a COM port, as will AM and BM devices.
	FT232R, FT245R, FT232B			

• Unzip the file to a folder.

• Connect the debug board to your computer via a USB cable. When prompted for a driver, follow the installation instructions, specify the folder that you just unzipped to look for a driver.

Device Manager results of loading drivers:



```
Ports (COM & LPT)
    USB Serial Port (COM6)
    USB Serial Port (COM7)
Processors
Secure Digital host controllers
Sound, video and game controllers
System devices
Universal Serial Bus controllers
    Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
    Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
    Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
    Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
    Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC
    USB Composite Device
    USB Root Hub
    USB Root Hub
    USB Root Hub
    USB Root Hub
    USB Root Hub
    USB Serial Converter A
    USB Serial Converter B
```

Skip step 9

Step 9 – Copy required files and setup the environment

• Copy imote2.fcf and imote2.xsf from $TOSROOT/contrib/imote2/installation to c:\imote2

- Copy imote2.xdb from $TOSROOT/contrib/imote2/installation to C:\nordheim\xflash\imote2.xdb (replace c:\norheim with your toolsuite location if different)
- Copy boards.ini from $TOSROOT/contrib/imote2/installation to c:\nordheim\xflash\boards.ini (overwrite existing file).
- If you have the Intel JTAG dongle, add the following line to your .profile file :
  - export PXA27X_JTAG_DEV="\"INTEL(R) JTAG CABLE\""

Note, the INTEL JTAG cable might complain unless your PC has been hard power cycled with its parallel port in ECP mode at base 0x378

- if you have a Macraigor Raven JTAG dongle, you don’t need to do anything.

Step 10 – Test the setup

- Restart Cygwin
- Plug in an Intel Mote 2 into the advanced connector of the debug board (J1 & J3).
- Push the power button on Intel Mote 2 (little button above the processor that should be on the top side of the board when the mote is attached to the advanced connectors.
- Go to tinyos-1.x/apps/Blink and type: make install imote2 debug.
- This will build, link and download the blink application to the Intel Mote 2.
- After the download is done, the mote should be blinking red at 2Hz (50% duty cycle).

Step 11 – Load file to Intel Mote 2 using USBLoaderHost

1. Connect USB cable to Intel Mote 2.
2. Go to $TOSROOT/contrib/imote2/tools/bin directory.
3. Type:
   './USBLoaderHost.exe –p $TOSROOT/apps/Blink/build/imote2/main.bin.out'.

   After program loads the led should flash red color.

Step 12 – Test the Intel Mote 2 debug shell

The Intel Mote 2 has a command shell that gets linked in by default to all applications. This enables sending debug messages to a console, or invoking commands in the mote from the console. The debug shell can be connected to either the USB port on the mote (directly connecting the Intel Mote 2 to USB not to the debug board), or through the UART (connecting the mote to the PC through the debug board, hence going through the USB->UART translation). The two approaches are mentioned below:

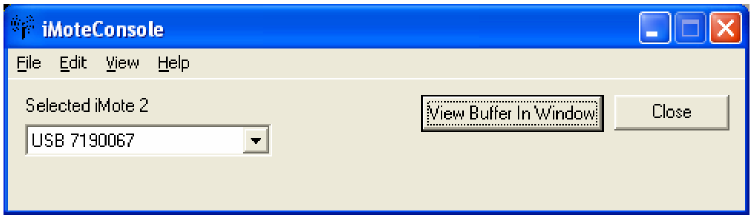
1. Debug through USB:
   a. Connect the USB cable to the Intel Mote 2 board directly (J2) on one side and to the PC on the other side.

   b. Push the power button of the Intel Mote 2. The mote will be recognized as a USB human interface device.

   c. Use the ImoteConsole program to communicate with the mote, this can be found in $TOSROOT/contrib/imote2/tools/bin directory.
      i. You may have to do this first:
         chmod a+x $TOSROOT/contrib/imote2/tools/bin/
         iMoteConsole.exe

   d. Start iMoteConsole by entering ./iMoteConsole.exe.

e. Select the Imote2 from the drop down menu, the name of the device will be “USB ID”, where ID is the least significant 4 digits of the serial number shown on the back of the Intel Mote 2 board.

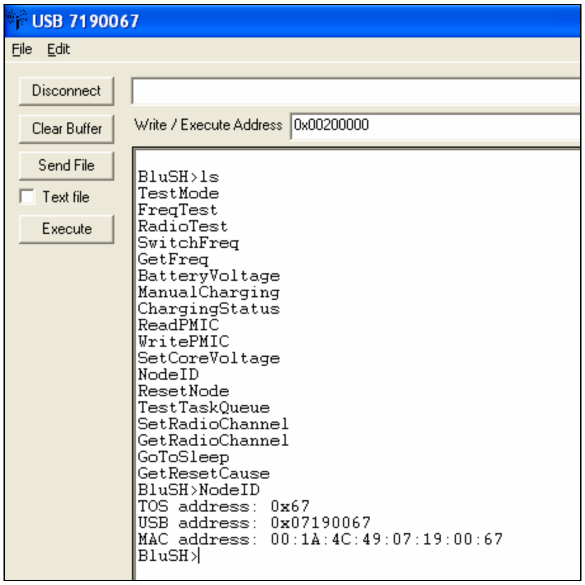


Selected iMote 2

USB 7190067

f. Click on “View Buffer In Window” option. This will start a new window, push the Connect button. Go to the large box (click anywhere inside the box), and push the enter button, you will see a “BluSH>” prompt.

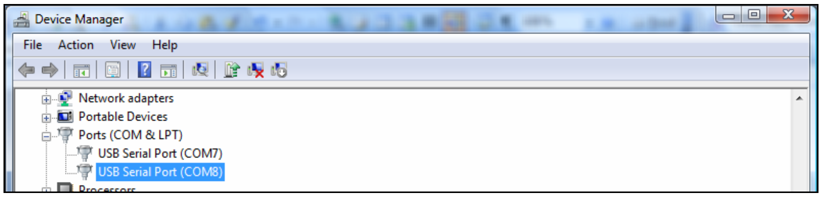
g. Type “ls” to see available commands. Type NodeID, the mote will print out the serial number of the mote.



Write / Execute Address 0x00200000

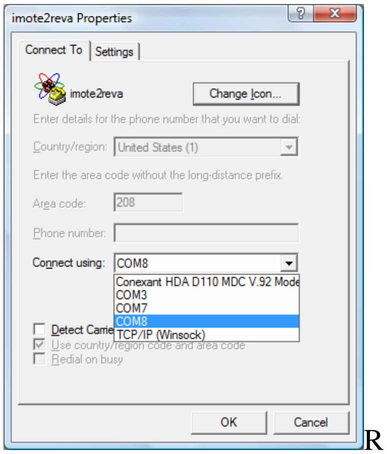
```
BluSH>ls
TestMode
FreqTest
RadioTest
SwitchFreq
GetFreq
BatteryVoltage
ManualCharging
ChargingStatus
ReadPMIC
WritePMIC
SetCoreVoltage
NodeID
ResetNode
TestTaskQueue
SetRadioChannel
GetRadioChannel
GoToSleep
GetResetCause
BluSH>NodeID
TOS address: 0x67
USB address: 0x07190067
MAC address: 00:1A:4C:49:07:19:00:67
BluSH>
```

2. Debug through UART:
   a. Connect the Intel Mote 2 to the programming board. If you installed the programming board successfully in step 9 above, it will create two "USB serial port" instances, you can find which COM ports were mapped by going to control panel, system, hardware, device manager. The ports will be listed under "Ports (COM & LPT)". If you don't see these listed, please go back and check Step 9 above.



Network adapters
Portable Devices
Ports (COM & LPT)
USB Serial Port (COM7)
USB Serial Port (COM8)
Processors

   b. The second USB serial port listed is the one dedicated to the console.



imote2reva

Enter details for the phone number that you want to dial:

Country/region: United States (1)

Enter the area code without the long-distance prefix.

Area code: 208

Phone number:

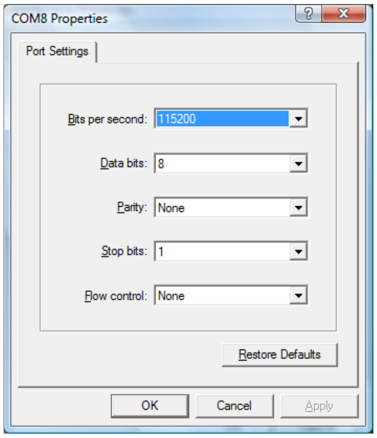
Connect using: COM8

Conexant HDA D110 MDC V.92 Mode
COM3
COM7
COM8
TCP/IP (Winsock)

☐ Detect Carrie
☑ Use country/region code and area code
☐ Redial on busy

R

   c. Start hyperterm, choose the second com port listed and configure it to 115200, 8, none, 1, none.



Bits per second: 115200

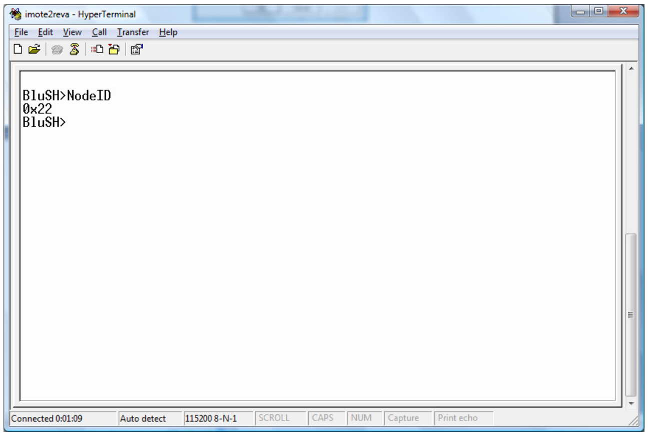
Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

   d. Push the connect button. Push the enter button, you will see a "BluSH>" prompt. Type NodeID, the mote will print out the serial number of the mote.



```
BluSH>NodeID
0x22
BluSH>
```

2.2. Install JNI Library for getenv

To install JNI Library, execute:

```
> cd $TOSROOT/tools/java/jni
> make install
```

2.3. Building TinyViz

NOTE: For the rest of this document, all the commands are to be entered into the Cygwin provided in the TinyOS installation setup

* We are going to create a PC simulation of TinyOS applications in TOSSIM. (The next few steps are the shortlist of all the command line needs to be entered to simulate it. Some explanations will be given but for more complete detailed explanations, please refer to the document provided from TinyOS installation in: $TOSROOT/doc/tutorial/lesson5.html).

```
> cd $TOSROOT/apps/TinyDBApp
> make pc

* Make TinyViz
>  cd $TOSROOT/tools/java/net/tinyos/sim
> make

* Add TinyViz to your PATH
> export PATH=/opt/tinyos-1.x/tools/java/net/tinyos/sim:$PATH

* To test TinyViz go to:
> cd $TOSROOT/apps/TestTinyViz
> make pc
> export DBG=usr1
> tinyviz -run build/pc/main.exe 5
```

```
* Execute TinyViz over the PC simulation
> cd $TOSROOT/apps/TinyDBApp
> export DBG=usr1
> tinyviz -run build/pc/main.exe 5
```

2.4. Running TinyDB in the TOSSIM Simulator

Now, we are going to run TinyDB in the TOSSIM Simulator. This section of the document follows closely section 9 of TinyDB documentation "Running TinyDB in the TOSSIM Simulator". Readers are encouraged to check that document as that document contains much more detailed explanation than the one offered here.
The documentation is available from $TOSROOT/doc/tinydb.pdf.

Inorder to run the TinyDB in the TOSSIM Simulator, we have to include the following files in our classpath

```
    C:\tinyos-1.x\tools\java\;
    C:\comm.jar; (This file should be downloaded from the following link)
    C:\tinyos-1.x\tools\java\jars\; (This must be done in order for java to compile)
    C:\tinyos-1.x\tools\java\jars\cup.jar;
    C:\tinyos-1.x\tools\java\jars\JLex.jar;
    C:\tinyos-1.x\tools\java\jars\plot.jar;
    C:\tinyos-1.x\tools\java\jars\junit.jar;
    C:\tinyos-1.x\tools\java\jars\xercesImpl.jar;
```

```
* Recompile the java code under TinyDB
> cd $TOSROOT/tools/java/net/tinyos/tinydb
> make clean
> make -f MakePC

* Compile the PC Binary from the TinyDBApp application
> cd $TOSROOT/apps/TinyDBApp
> make -f MakePC pc

> export DBG=usr1


* Start the PC binary with n simulation nodes by typing
> ./build/pc/main.exe n
in the $TOSROOT/apps/TinyDBApp directory


* In a different shell window, we need to start the Java GUI in simulator
mode.
* However, before we run it, it is important for us to compile the
TinyDBMain Java class beforehand.
> cd $TOSROOT/tools/java/net/tinyos/tinydb
> make
```

* NOTE: The above steps is not included in the TinyDB documentation but it needs to be done before starting the Java GUI simulator
* Then, to run the Java GUI simulator simply type in the command provided below

```
> cd $TOSROOT/tools/java
> java net.tinyos.tinydb.TinyDBMain -sim
```

Assuming you set the DBG string as above, you should be able to click the "Reset Motes" button and see a message in the window where you started the pc binary (the first shell window) stating that reset is not supported in the simulator.

2.5. Installing Ant

Download Ant from http://ant.apache.org/

To install Ant, simply follow the instructions provided at http://ant.apache.org/manual/index.html

Make sure ANT_HOME is set prior to building and don't forget to add $ANT_HOME/bin to your $PATH

2.6. Installing Tomcat

- Download and install Tomcat (Windows Executable version) from http://tomcat.apache.org/
  at the time of writing this document, the version of the Tomcat I'm using is 5.5.20
- Do not use Tomcat Version 6.0 as it is missing the values for ‘server.loader’ and ‘shared.loader’ in catalina.properties file.

- Additional installation instructions are available at http://tomcat.apache.org/tomcat-5.5-doc/setup.html

- Set JAVA_HOME environment variable to point to the pathname of the directory where the JRE is located. In my machine, the JAVA_HOME is set to C:\Program Files\ Java\jdk1.5.0_02. Your JAVA_HOME may be different depending on where you installed your JDK
  Note that the installer will try to determine this package by default using the registry but ensure manually that the location is correct for your machine

  For the purposes of the remainder of this document, the symbolic name "$CATALINA_HOME" is used to refer to the full pathname of the release directory. As an example, in my computer, the symbol $CATALINA_HOME in my computer represents C:\Program Files\Apache Software Foundation\apache-tomcat-5.5.20

NOTE: *CATALINA_HOME* represents the root of your tomcat installation.

- Add to /etc/bash.bashrc:

```
> export CATALINA_HOME="/cygdrive/c/Program\ Files/Apache\
Software\ Foundation/Tomcat\ 5.5/
```

- To start up Tomcat in Windows simply execute the file $CATALINA_HOME/bin/startup.bat
- To shut it down, simply execute the file $CATALINA_HOME/bin/shutdown.bat
- Visit http://localhost:8080/ in you web browser to ensure tomcat is working

2.7. Running the TOSSIM Simulation

- Before running make sure that all the REAL sensor proxy references in; /cygdrive/c/Program Files/Apache Software Foundation/Tomcat 5.5/webapps/SensorWeb/WEB-INF/classes/application.properties are commented out and all references to db connector are uncommented.

  This application.properties file will determine the execution path of the sensor web services.

- Start tomcat:
  /cygdrive/c/Program Files/Apache Software Foundation/Tomcat 5.5/bin/tomcat5.exe

  should be able to see something http://localhost:8080/SensorWeb/

- Start TinyViz

```
> cd $TOSROOT/apps/TinyDBApp
> export DBG=usr1
> tinyviz -run build/pc/main.exe 5
```

- >> On First Execution run..
  Edit Sensor-Source/build.properties
  change classname to be:

```
classname=org.sensorweb.demo.DemoFrame
```

- Now, to run DemoFrame execute, in Sensor-Source (/cygdrive/c/workspace/Sensor-Source) directory:

```
> ant run
```

2.8. Running with the MOTES connected

- Edit application.properties under tomcat/webapps/SensorWeb/classes/WEB-INF
  uncomment all the lines that start with "REAL"

- Go to c:/Surge-View/

  execute SerialForwarder.exe

  set: serail@COM1:57600

- Ensure the motes and bass station are connected to the serial port

- Restart the server

- Open cmd.exe and go to Surge-View directory

- Execute:

```
> Surge 125 > surgeout.out
```

- Go to Sensor-Source directory and Execute

```
> ant run
```

- Select the second tab and press "Get Observation"

2.8.1. “Write Failed” Error while running Application with SerialForwarder:

- Incase of “write failed” error, you will see a constant red light on your board as well as motes. First make sure that the error is not in your code by going through the tomcat trace logs. If the error is not in the code then you either have to reset your board.

2.9. Java Build Errors

BUILD FAILED
build.xml:41: Unable to find a javac compiler;
com.sun.tools.javac.Main is not on the classpath.
Perhaps JAVA_HOME does not point to the JDK

Eclipse -> preferences ->Ant-> classpath

ensure that tools.jar from the JDK you are using is located
in the classpath. If not go to "Add External Classpath"
and add it from c:/program files/java/jdk_1.5.0_2

2.10. JAR files

To extract files, including manifst file from jar archive, execute:

```
> jar xfv jaxrpc.jar
```

To view contents of jar file, execute:

```
> jar tf filename.jar
```

2.11. Globus

To setup Eclipse environment follow the guide “Using Eclipse to Develop Grid Services” available at:
http://grid.lamost.org/files/Eclipse_grid.pdf

To learn about grid services check out the “Borja’s Grid Services Tutorial” available at:
http://gdp.globus.org/gt4-tutorial/

2.12. TcpTunnelGui

Follow these steps to use TcpTunnel for monitoring purpose:

1. Download soap.jar from http://ws.apache.org/wsif/
2. Extract the file into directory of your choice (for me, it was C:\workspace\)
3. Run it

```
> cd /cygdrive/c/workspace/soap-2_3_1/lib
> java -cp soap.jar org.apache.soap.util.net.TcpTunnelGui 8081 localhost
8080
```

2.13. SVN

Start a new repository:
cd /home/projects/nosa/ (create this directory first!)
svnadmin create --fs-type fsfs svnrepository_1.0

svn import -m "Post- Techfest, with reworked SensorML repository code"
/home/staff/tkob/workspace_baseline_3_July_06/
file:///home/projects/nosa/svnrepository_1.0/

svnlook svn+ssh://mundula.melbuni.edu.au/home/project
s/nosa/svnrepository_1.0

2.14. Tomcat with eclipse edit

To ensure tinyOS jars are copied into the wsrf/WEB-INF/lib directory

add:

```
       <copy toDir="${webapp.webinf.lib.dir}">
          <fileset dir="${tinyos.lib.loc}">
               <include name="*.jar"/>
           </fileset>
        </copy>
 under <target name="_baseTomcatDeploy"> (approx line 116)
```

under $GLOBUS_LOCATION/share/globus_wsrf_common/tomcat/tomcat.xml

2.15. Logging

Change in /cygdrive/c/Program Files/Java/jdk1.5.0_02/jre/lib/logging.properties
cosole.logging.level from FINE to Finest

2.16. Documentation

Documentation on Web Services
http://ws.apache.org/axis/java/index.html

When adding new webservices add to:
C:\Program Files\Apache Software Foundation\Tomcat 5.5\webapps\SensorWeb\WEB-INF\server-config.wsdd

3. Common Installation Problems

This section contains the common problem encountered while trying to install and compile various software specified in Section 2.

3.1. Errors when compiling TinyOS

Problem:

When I tried to compile TinyOS, I get an error and the following scree of output is displayed:

```
Global.h: In member function â~@~Xvoid TPt<TRec>::MkRef()â~@~Y:
Global.h:45: error: â~@~XNULLâ~@~Y was not declared in this scope
Global.h: In member function â~@~Xvoid TPt<TRec>::UnRef()â~@~Y:
Global.h:46: error: â~@~XNULLâ~@~Y was not declared in this scope
Global.h: In constructor â~@~XTPt<TRec>::TPt()â~@~Y:
Global.h:48: error: â~@~XNULLâ~@~Y was not declared in this scope
Global.h: In member function â~@~XTRec* TPt<TRec>::operator->()
constâ~@~Y: Global.h:59: error: â~@~XNULLâ~@~Y was not declared
in this scope
Global.h: In member function â~@~XTRec& TPt<TRec>::operator*()
constâ~@~Y: Global.h:60: error: â~@~XNULLâ~@~Y was not declared
in this scope
Global.h: In member function â~@~XTRec& TPt<TRec>::operator[](int)
constâ~@~Y: Global.h:61: error: â~@~XNULLâ~@~Y was not declared
in this scope

make[4]: *** [AvrDummy.o] Error 1
make[4]: Leaving directory `/home/tkob/tinyos-1.1.0/tools/src/uisp/src'
make[3]: *** [all-recursive] Error 1
make[3]: Leaving directory `/home/tkob/tinyos-1.1.0/tools/src/uisp'
make[2]: *** [all] Error 2
make[2]: Leaving directory `/home/tkob/tinyos-1.1.0/tools/src'
make[1]: *** [all-recursive] Error 2
make[1]: Leaving directory `/home/tkob/tinyos-1.1.0/tools'
make: *** [all] Error 2
```

Solution:

find the Globals.h file and edit it, replacing all instances of NULL with 0.

3.2. Erros when executing TinyViz over the PC simulation

Problem:

When i tried to execute TinyViz over the PC simulation I get an error and the following screen of output is displayed

```
[root@rubyoureyes TestTinyViz]# tinyviz -run build/pc/main.exe 5
```

```
java -Dpython.cachedir=/tmp/jython.cache -DDBG=usr1 -DSIMDBG= -
jar
/usr/local/share/tinyos-1.x/tools/java/net/tinyos/sim/simdriver.jar -gui -run
build/pc/main.exe 5
Starting SimDriver...
Simulation random seed 449570990
Initializing simulator objects...
Could not find a platform specific version of TOSMsg
java.lang.ClassNotFoundException: net.tinyos.message.avrmote.TOSMsg
java.lang.ClassNotFoundException: net.tinyos.message.avrmote.TOSMsg
      at java.net.URLClassLoader.findClass(URLClassLoader.java:376)
      at java.lang.ClassLoader.loadClass(ClassLoader.java:570)
      at sun.misc.Launcher$AppClassLoader.loadClass(Launcher.java:442)
      at java.lang.ClassLoader.loadClass(ClassLoader.java:502)
      at java.lang.Class.forName1(Native Method)
      at java.lang.Class.forName(Class.java:180)
      at
net.tinyos.message.MessageFactory.instantiateTOSMsg(MessageFactory.j
ava:122)
      at
net.tinyos.message.MessageFactory.createTOSMsg(MessageFactory.java:
44)
      at net.tinyos.sim.SimCommands.<init>(SimCommands.java:64)
      at net.tinyos.sim.SimDriver.<init>(SimDriver.java:244)
      at net.tinyos.sim.SimDriver.main(SimDriver.java:539)
Loading simulator plugins...
Creating TinyViz GUI...


Welcome to Tython. Type 'quit' to exit.
ESC on a line by itself will pause/resume the simulator.


>>> AUTORUN: Initializing simulation.
AUTORUN: Running simulation: build/pc/main.exe -gui -r=lossy -
seed=449570990
-nodbgout 5
AUTORUN: Connecting...
SimComm: TossimInitEvent received (5 motes)... initializing system.
SimComm: Pausing system for TossimInitEvent
AUTORUN: Simulation running.
Could not find a platform specific version of TOSMsg
java.lang.ClassNotFoundException: net.tinyos.message.avrmote.TOSMsg
java.lang.ClassNotFoundException: net.tinyos.message.avrmote.TOSMsg
      at java.net.URLClassLoader.findClass(URLClassLoader.java:376)
      at java.lang.ClassLoader.loadClass(ClassLoader.java:570)
      at sun.misc.Launcher$AppClassLoader.loadClass(Launcher.java:442)
      at java.lang.ClassLoader.loadClass(ClassLoader.java:502)
      at java.lang.Class.forName1(Native Method)
      at java.lang.Class.forName(Class.java:180)
```

```
    at
net.tinyos.message.MessageFactory.instantiateTOSMsg(MessageFactory.j
ava:122)
    at
net.tinyos.message.MessageFactory.createTOSMsg(MessageFactory.java:
36)
    at
net.tinyos.packet.BrokenPacketizer.<init>(BrokenPacketizer.java:58)
    at net.tinyos.sim.packet.TossimSource.<init>(TossimSource.java:44)
    at
net.tinyos.sim.packet.TossimSerialSource.<init>(TossimSerialSource.java
:32)
    at sun.reflect.NativeConstructorAccessorImpl.newInstance0(Native
Method)
    at
sun.reflect.NativeConstructorAccessorImpl.newInstance(NativeConstruct
orAccessorImpl.java:80)
    at
sun.reflect.DelegatingConstructorAccessorImpl.newInstance(DelegatingC
onstructorAccessorImpl.java:44)
    at java.lang.reflect.Constructor.newInstance(Constructor.java:315)
    at
net.tinyos.packet.BuildSource.makeTossimSource(BuildSource.java:517)
    at
net.tinyos.packet.BuildSource.makeTossimSerial(BuildSource.java:486)
    at
net.tinyos.packet.BuildSource.makeArgsTossimSerial(BuildSource.java:4
77)
    at
net.tinyos.packet.BuildSource.makePacketSource(BuildSource.java:151)
    at net.tinyos.packet.BuildSource.makePhoenix(BuildSource.java:87)
    at net.tinyos.sf.SFListen.run(SFListen.java:84)
Built a Packet source for avrmote
Could not find a platform specific version of TOSMsg
java.lang.ClassNotFoundException: net.tinyos.message.avrmote.TOSMsg
java.lang.ClassNotFoundException: net.tinyos.message.avrmote.TOSMsg
    at java.net.URLClassLoader.findClass(URLClassLoader.java:376)
    at java.lang.ClassLoader.loadClass(ClassLoader.java:570)
    at sun.misc.Launcher$AppClassLoader.loadClass(Launcher.java:442)
    at java.lang.ClassLoader.loadClass(ClassLoader.java:502)
   at java.lang.Class.forName1(Native Method)
    at java.lang.Class.forName(Class.java:180)
    at
net.tinyos.message.MessageFactory.instantiateTOSMsg(MessageFactory.j
ava:118)
    at
net.tinyos.message.MessageFactory.createTOSMsg(MessageFactory.java:
44)
    at net.tinyos.packet.AbstractSource.open(AbstractSource.java:81)
    at net.tinyos.packet.PhoenixSource.run(PhoenixSource.java:167)
```

```
java.lang.NullPointerException
   &nbsp;  at
net.tinyos.packet.AbstractSource.open(AbstractSource.java:82)
     at net.tinyos.packet.PhoenixSource.run(PhoenixSource.java:167)
AUTORUN: Process exited.
AUTORUN: Done with run.
```

Solution:

Edit the file: $TOSROOT/tools/java/net/tinyos/sim/Makefile

Add:

```
$ diff -u Makefile.orig Makefile
--- Makefile.orig       2004-03-02 22:18:27.000000000 -0500
+++ Makefile    2004-10-18 10:58:54.000000000 -0400
@@ -53,6 +53,7 @@
             net/tinyos/util/*.class                \
             net/tinyos/packet/*.class              \
             net/tinyos/message/*.class             \
+            net/tinyos/message/avrmote/*.class     \
             org/apache/oro/text/regex/*.class      \
             org/python/compiler/*.class            \
             org/python/core/*.class                \
```

Note: If you don't understand what the above means, simply add the following line to your makefile in the place shown above
net/tinyos/message/avrmote/*.class
Then, In the same directory execute:

```
> make
```

3.3. *TinyViz flash and dissapear*

Problem:
When executing TinyViz, it flash and disappears with the following screen output.

```
Starting SimDriver...
SimComm: TossimInitEvent received (5 motes)... initializing system.
SimComm: Pausing system for TossimInitEvent
DRIVER: Can't use AutoRun when SimComm already connected
(check for stale main.exe processes)
```

Solution:
Simply open task manager and end main.exe task. Then just try it again. This is most likely happen because you end the previous TinyViz application prematurely.

3.4. Connection refused while running TinyDBMain java class

Problem:

I have followed the TinyDB documentation provided in $TOSROOT/doc/tinydb.pdf and when I execute the command below, it gives me a weird error telling me that connection is refused. Whats wrong with it ? I have read every single documentation available but there is nothing that mention this kind of problem.

```
> java net.tinyos.tinydb.TinyDBMain
```

The output is displayed below:

```
Opening tossim-serial source
Connecting to Tossim event port at localhost:10585
java.net.ConnectException: Connection refused: connect
   at java.net.PlainSocketImpl.socketConnect(Native Method)
   at java.net.PlainSocketImpl.doConnect(PlainSocketImpl.java:305)
   at
java.net.PlainSocketImpl.connectToAddress(PlainSocketImpl.java:171)
   at java.net.PlainSocketImpl.connect(PlainSocketImpl.java:158)
   at java.net.Socket.connect(Socket.java:426)
   at java.net.Socket.connect(Socket.java:376)
   at java.net.Socket.<init>(Socket.java:291)
   at java.net.Socket.<init>(Socket.java:119)
   at
net.tinyos.sim.packet.TossimSource.openSource(TossimSource.java:52)
   at net.tinyos.packet.AbstractSource.open(AbstractSource.java:77)
   at net.tinyos.packet.PhoenixSource.run(PhoenixSource.java:167)
tossim-serial@localhost died - restarting
java.net.ConnectException: Connection refused: connect
   at java.net.PlainSocketImpl.socketConnect(Native Method)
   at java.net.PlainSocketImpl.doConnect(PlainSocketImpl.java:305)
   at
java.net.PlainSocketImpl.connectToAddress(PlainSocketImpl.java:171)
   at java.net.PlainSocketImpl.connect(PlainSocketImpl.java:158)
   at java.net.Socket.connect(Socket.java:426)
   at java.net.Socket.connect(Socket.java:376)
   at java.net.Socket.<init>(Socket.java:291)
   at java.net.Socket.<init>(Socket.java:119)
   at
net.tinyos.sim.packet.TossimSource.openSource(TossimSource.java:52)
   at net.tinyos.packet.AbstractSource.open(AbstractSource.java:77)
   at net.tinyos.packet.PhoenixSource.run(PhoenixSource.java:167)
```

Solution:

If you read the TinyDB documentation carefully, you may notice that when they run the TinyDBMain class, they had already install TinyDB on a mote. That mote is the one that we are trying to connect. Obviously now you may realize that we get this problem simply because we have nothing that we try to connect to. So how do we go around this? What we need to do is to simulate the mote. Please ensure that you have run the PC binary simulation before you run the TinyDBMain class. That PC binary will simulate the motes that we need.

3.5. Exception when trying to start up Tomcat

Problem:

When I tried to start up Tomcat using the startup.bat in the $CATALINA_HOME folder, it gives me the following error

```
SEVERE: Error initializing endpoint
java.net.BindException: Address already in use: JVM_Bind:8080
   at
org.apache.tomcat.util.net.PoolTcpEndpoint.initEndpoint(PoolTcpEndpoi
nt.java:297)
   at
org.apache.coyote.http11.Http11BaseProtocol.init(Http11BaseProtocol.ja
va:138)
   at
org.apache.catalina.connector.Connector.initialize(Connector.java:1016)
   at
org.apache.catalina.core.StandardService.initialize(StandardService.java:5
80)
   at
org.apache.catalina.core.StandardServer.initialize(StandardServer.java:79
1)
   at org.apache.catalina.startup.Catalina.load(Catalina.java:503)
   at org.apache.catalina.startup.Catalina.load(Catalina.java:523)
   at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
   at
sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorIm
pl.java:39)
   at
sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAc
cessorImpl.java:25)
   at java.lang.reflect.Method.invoke(Method.java:324)
   at org.apache.catalina.startup.Bootstrap.load(Bootstrap.java:266)
   at org.apache.catalina.startup.Bootstrap.main(Bootstrap.java:431)
Dec 19, 2006 1:07:57 PM org.apache.catalina.startup.Catalina load
SEVERE: Catalina.start
LifecycleException:  Protocol handler initialization failed:
java.net.BindException: Address already in use: JVM_Bind:8080
   at
org.apache.catalina.connector.Connector.initialize(Connector.java:1018)
   at
org.apache.catalina.core.StandardService.initialize(StandardService.java:5
80)
   at
org.apache.catalina.core.StandardServer.initialize(StandardServer.java:79
1)
   at org.apache.catalina.startup.Catalina.load(Catalina.java:503)
   at org.apache.catalina.startup.Catalina.load(Catalina.java:523)
   at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
   at
sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorIm
pl.java:39)
   at
sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAc
cessorImpl.java:25)
   at java.lang.reflect.Method.invoke(Method.java:324)
   at org.apache.catalina.startup.Bootstrap.load(Bootstrap.java:266)
   at org.apache.catalina.startup.Bootstrap.main(Bootstrap.java:431)
```

Solution:

This is one of the most common problems found in using Tomcat. This happens simply because there is another web server (or any other process) that has already claimed port 8080. This can also occur when you have already started a Tomcat previously and didn't shut it down properly. To shut it down properly, use the script shutdown.bat available at $CATALINA_HOME/bin

To find out more solution for this issue, please refer to $CATALINA_HOME/running.txt

3.6. Failed to Initialize SensorCollectionService

Problem:

```
Failed to initialize 'globus/SensorCollectionService' service. Caused by
java.lang.InstantiationException:
localhost.globus.SensorWeb.services.SensorCollectionService.service.Sen
sorCollectionService
      at java.lang.Class.newInstance0(Class.java:335)
      at java.lang.Class.newInstance(Class.java:303)
      at
org.globus.axis.providers.RPCProvider.getNewServiceInstance(RPCProvi
der.java:115)
      at
org.globus.axis.description.ServiceDescUtil.initializeProviders(ServiceDe
scUtil.java:190)
      at
org.globus.axis.description.ServiceDescUtil.initializeService(ServiceDesc
Util.java:135)
      at
org.globus.wsrf.container.ServiceManager$InitPrivilegedAction.initialize(
ServiceManager.java:252)
      at
org.globus.wsrf.container.ServiceManager.initializeService(ServiceMana
ger.java:215)
    at
org.globus.wsrf.container.ServiceManager.start(ServiceManager.java:148
)
    at
org.globus.wsrf.container.ServiceDispatcher.init(ServiceDispatcher.java:1
31)
    at
org.globus.wsrf.container.ServiceContainer.start(ServiceContainer.java:2
37)
    at
org.globus.wsrf.container.ServiceContainer.<init>(ServiceContainer.java:
195)
    at
org.globus.wsrf.container.GSIServiceContainer.<init>(GSIServiceContai
ner.java:45)
    at sun.reflect.NativeConstructorAccessorImpl.newInstance0(Native
Method)
    at
sun.reflect.NativeConstructorAccessorImpl.newInstance(NativeConstruct
orAccessorImpl.java:39)
    at
sun.reflect.DelegatingConstructorAccessorImpl.newInstance(DelegatingC
onstructorAccessorImpl.java:27)
    at java.lang.reflect.Constructor.newInstance(Constructor.java:494)
    at
org.globus.wsrf.container.ServiceContainer.createContainer(ServiceConta
iner.java:136)
    at
org.globus.wsrf.container.ServiceContainer.startSecurityContainer(Servic
eContainer.java:449)
    at
org.globus.wsrf.container.ServiceContainer.main(ServiceContainer.java:4
03)
    at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
    at
sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorIm
pl.java:39)
    at
sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAc
cessorImpl.java:25)
    at java.lang.reflect.Method.invoke(Method.java:585)
    at org.globus.bootstrap.BootstrapBase.launch(BootstrapBase.java:95)
    at org.globus.bootstrap.Bootstrap.main(Bootstrap.java:37)
```

Solution:
All my classes weere mixed up. My org_sensorweb_sensor_collectionsevice.jar file had no content! I fixed this by following Borja's tutorial more closely and

modifying my class paths in my wsdl file to more closely align with his. Special care was taken to separate my actual implementation (.impl) from the generated stubs. Which is what I got mixed up.

3.7. Axis Jar Problem

Problem:

```
 Exception in thread "main" java.lang.NoSuchMethodError:
org.apache.axis.description.TypeDesc.<init>(Ljava/lang/Class;Z)V
  at
org.apache.axis.message.addressing.EndpointReferenceType.<clinit>(End
pointReferenceType.java:333)
  at
org.sensorweb.service.globus.client.SensorWebClient.main(SensorWebCl
ient.java:42)
```

Solution:

Different axis.jar files where being used to compile my code, compared to those used to execute my code. I followed the Eclipse grid services document to create a new project where I had complete control over my jar files.

4. Postgres Installation

This section contains guide on set up and initialisation of PostgreSQL 7.4.5 under Cygwin / Windows XP

Note that the postgres package that we need to use is PostgreSQL is the version 7.4.5 and it is already included in the TinyOS default install.

4.1. Set up

4.1.1. Step 0 - Setting Up Cygserver

Type in the following command in your Cygwin

```
> export CYGWIN=server
> cygserver-config
```

Note that a client application which wants to use the services provided by cygserver *must* have the environment variable CYGWIN set so that it contains the word "server". So if you don't need any other special CYGWIN setting, just set it to "server".

It is advisable to add this setting to the Windows system environment.

4.1.2. Step 1. Start Cygserver for Shared Memory Support

To do this, enter the command:

```
> /usr/sbin/cygserver.exe &
```

This program needs to be running anytime you start the PostgreSQL server (postmaster) or initialize a database (initdb).

4.1.3. Step 2. Create a New Database Cluster

Use the initdb command to create a new database cluster.
Enter the following command in your cygwin which will create a new database cluster in the /var/postgresql/data directory

```
> /usr/sbin/initdb -D /var/postgresql/data -W
```

NOTE: As a reference, a database cluster is a database storage area on disk. This is a collection of databases accessible by a single instance of a running database server

4.1.4. Step 3. Start up the postmaster

We can now start the database server using one of the following command

```
> /usr/sbin/postmaster -D /var/postgresql/data
```

or

```
> /usr/sbin/postmaster -D /var/postgresql/data >logfile 2>&1 &
```

The first command will leave the server running into the foreground while the second command will start the postmaster in the background. Note also that the second command will redirect the entire log message to the file called logfile.

This will start the postmaster, and if successful you will see some initial log entries, and an entry "LOG: database system is ready".
Before anyone can access the database, you must start the database server (i.e. postmaster).

NOTE: For some of the common problems associated with postmaster start up failure, please refer to http://www.postgresql.org/docs/7.4/static/postmaster-start.html

```
* Create Users:
 Note: This is not totally necessary, by default the user that
 executed createdb will already be in the database, however you
 may want to set a password (see below).


 > CREATE USER tkob;

   Use:
     > DROP USER name;
    to remove a user.

  Command line equivalents also exist:
    createuser name
    dropuser name

   To list users in database:
    "select * from pg_user;" OR \du

* Set password:
   ALTER USER tkob PASSWORD '********';
```

Step 4. Create a Database

```
> createdb sensorml_repository ----DONE
```

To remove a database:

```
dropdb sensorml_repository
```

Once you have created a database, you can access it by running the PostgreSQL interactive terminal program, called psql, which allows you to interactively enter, edit, and execute SQL commands

```
> psql sensorml_repository
```

NOTE: this is for terminal access only, for in-program access you will need to use the java connector (http://www.postgresql.org/docs/7.4/interactive/client-interfaces.html)

For help:

```
> mydb=> \h
```

To get out of psql, type

```
> mydb=> \q
```

To read in SQL commands from a specific file:

```
> mydb=> \i sensorml_db_populate.sql
```

Commands:

```
\l - list all databases on server

Use a Specific Database: \c databaseName;

List All Objects in the Database: \d

List Tables: \dt
      (or \d[ivsS] to list indexes, views, sequences, Schema objects)

Count All Rows in a Table: select count(*) from tableName;

List All Rows in a Table: select * from tableName;
```

4.2. Command Notes

To remove a table:

```
> DROP TABLE tablename;
```

The INSERT statement is used to populate a table with rows

UP TO: http://www.postgresql.org/docs/7.4/interactive/tutorial-join.html

4.3. Installing JDBC Driver

This will allow your Java code to talk to Postgres:

```
> cd /cygdrive/c/workspace/Sensor -Source/lib
> cp /usr/share/postgresql/java/postgresql.jar .
```

!!!IMPORTANT:!!!
Because Java only uses TCP/IP connections, the PostgreSQL server must be configured to accept TCP/IP connections. This can be done by setting tcpip_socket = true in the postgresql.conf file or by supplying the -i option flag when starting postmaster.

Also: uncomment Port 5432 in configuration file.

4.4. Running Postgres

```
> export CYGWIN=server
> /usr/sbin/cygserver &
> /usr/sbin/postmaster -i -D /var/postgresql/data &
```

-i allows clients to connect over TCP/IP as opposed to just those from the local machine.

4.5. Shutting Down Postgres

```
> pg_ctl stop -w -D /var/postgresql/data -s -m smart
> kill $(ps -f | grep cygserver | awk '{print $2}')
```

```
--Place the text below in sensorml_db_populate.sql under cygwin directory

-- Tom Kobialka tkob@cs.mu.oz.au
-- NICTA SensorWeb Project
-- 10th April 2006

-- Skeleton SQL TABLEs for SensorML Repository

-- Postgres Startup
-- ================
-- export CYGWIN=server
-- /usr/sbin/cygserver &
-- postmaster -i -D /var/postgresql/data &

-- Postgres Shutdown
-- =================
-- pg_ctl stop -w -D /var/postgresql/data -s -m smart
-- kill $(ps -f | grep cygserver | awk '{print $2}')

CREATE TABLE Sensor(
      SensorId varchar(80) PRIMARY KEY              -- Sensor ID
);

CREATE TABLE StationaryPlatform(
      PlatformId varchar(80) PRIMARY KEY            -- Platform ID
);

CREATE TABLE PlatformDescription(
      PlatformId varchar(80) REFERENCES StationaryPlatform (PlatformId), --
Forigen Key
      descriptionContent varchar(250)
);

CREATE TABLE namespace(
      SensorId varchar(80) REFERENCES Sensor (SensorId),
      nsPrefix varchar(80),
      nsUri varchar(250)
);

CREATE TABLE SensorDescription(
       SensorId varchar(80) REFERENCES Sensor (SensorId), -- Forgien Key
       descriptionContent varchar(250)
);

CREATE TABLE identification(
      SensorId varchar(80) REFERENCES Sensor (SensorId), -- Forgien Key
      identifierName varchar(80),
      idTermQualifier varchar(80),
      idTermContent varchar(80)
);

CREATE TABLE classification(
      SensorId varchar(80) REFERENCES Sensor (SensorId), -- Forgien Key
```

```
        classifierName varchar(80),
        clTermQualifier varchar(80),
        clTermContent varchar(80)
);

CREATE TABLE inputs(
        SensorId varchar(80) REFERENCES Sensor (SensorId), -- Forigen Key
        inputId varchar(80) PRIMARY KEY
);

CREATE TABLE inputList(
        inputId varchar(80) REFERENCES inputs (inputId),
        inputName varchar(80),
        inputType varchar(80),
        inputDefinition varchar(80),
        inputUom varchar(80),
        min int,
        max int
);

CREATE TABLE outputs(
        SensorId varchar(80) REFERENCES Sensor (SensorId), -- Forigen Key
        outputId varchar(80) PRIMARY KEY
);

CREATE TABLE outputList(
        outputId varchar(80) REFERENCES outputs (outputId),
        outputName varchar(80),
        outputType varchar(80),
        outputDefinition varchar(80),
        outputUom varchar(80),
        min int,
        max int
);

CREATE TABLE method(
        methodId varchar(80) REFERENCES Sensor (SensorId), -- Forigen Key
        methodName varchar(150)
);

-- Tom Kobialka tkob@cs.mu.oz.au
-- NICTA SensorWeb Project
-- 23 June 2006

-- Sample Data
-- Manual Insertion into Postgres database.. Should be done dynamically

-- Postgres Startup
-- ===============
-- export CYGWIN=server
-- /usr/sbin/cygserver &
-- postmaster -i -D /var/postgresql/data &

-- Postgres Shutdown
-- =================
-- pg_ctl stop -w -D /var/postgresql/data -s -m smart
-- kill $(ps -f | grep cygserver | awk '{print $2}')


-- WorkStation
INSERT INTO Sensor VALUES('Sensor_126');
INSERT INTO namespace
VALUES('Sensor_126','sml','http://www.opengis.net/sensorML');
INSERT INTO namespace
VALUES('Sensor_126','gml','http://www.opengis.net/gml');
INSERT INTO namespace
VALUES('Sensor_126','swe','http://www.opengis.net/swe');

INSERT INTO StationaryPlatform VALUES('Platform_126');
INSERT INTO PlatformDescription VALUES('Platform_126','Dell
Workstation, PC 686, Melbourne University 2006');

INSERT INTO SensorDescription VALUES('Sensor_126','No Sensors are
installed on the workstation');
INSERT INTO identification
VALUES('Sensor_126','longName','urn:ogc:def:identifier:longName','Workstati
on');
INSERT INTO classification
VALUES('Sensor_126','longName','urn:ogc:def:classifier:observationClassifica
tion','in-situ');

INSERT INTO inputs VALUES('Sensor_126','Sensor_126');
INSERT INTO inputList
VALUES('Sensor_126',NULL,NULL,NULL,NULL,NULL,NULL);

INSERT INTO outputs VALUES('Sensor_126','Sensor_126');
INSERT INTO outputList
VALUES('Sensor_126',NULL,NULL,NULL,NULL,NULL,NULL);

INSERT INTO method
VALUES('Sensor_126','urn:ogc:def:process:1.0:sensor');

-- Base Station
INSERT INTO Sensor VALUES('Sensor_0');
INSERT INTO namespace
VALUES('Sensor_0','sml','http://www.opengis.net/sensorML');
INSERT INTO namespace
VALUES('Sensor_0','gml','http://www.opengis.net/gml');
INSERT INTO namespace
VALUES('Sensor_0','swe','http://www.opengis.net/swe');
```

```
INSERT INTO namespace
VALUES('Sensor_0','xLink','http://www.w3.org/2001/XMLSchema-instance');

-- Platform
INSERT INTO StationaryPlatform VALUES('Platform_0');
INSERT INTO PlatformDescription VALUES('Platform_0','Crossbow
MIB510CA Base Station for Mica2 Motes with MPR400CB receiver, copyright
2003');

-- Sensors
INSERT INTO SensorDescription VALUES('Sensor_0','Crossbow Sensor 0
node, Mica Sensor board MTS300CA');
INSERT INTO identification
VALUES('Sensor_0','longName','urn:ogc:def:identifier:longName','Base
Station');
INSERT INTO classification
VALUES('Sensor_0','longName','urn:ogc:def:classifier:observationClassificatio
n','in-situ');

INSERT INTO inputs VALUES('Sensor_0','Sensor_0');
INSERT INTO inputList
VALUES('Sensor_0','nodeid','Count','urn:ogc:def:data:index',NULL,'0','1000');
INSERT INTO inputList
VALUES('Sensor_0','temperature','Quantity','urn:ogc:def:phenomenon:temperat
ure','urn:ogc:def:unit:celcius',NULL,NULL);
INSERT INTO inputList
VALUES('Sensor_0','light','Quantity','urn:ogc:def:illumination','urn:ogc:def:unit
:lux',NULL,NULL);

INSERT INTO outputs VALUES('Sensor_0','Sensor_0');
INSERT INTO outputList
VALUES('Sensor_0','measuredNodeid','Count','urn:ogc:def:data:index',NULL,'
0','1000');
INSERT INTO outputList
VALUES('Sensor_0','measuredTemperature','Quantity','urn:ogc:def:phenomeno
n:temperature','urn:ogc:def:unit:celcius',NULL,NULL);
INSERT INTO outputList
VALUES('Sensor_0','measuredLight','Quantity','urn:ogc:def:illumination','urn:o
gc:def:unit:lux',NULL,NULL);

INSERT INTO method VALUES('Sensor_0','urn:ogc:def:process:1.0:sensor');

-- Sensor 1
INSERT INTO Sensor VALUES('Sensor_1');
INSERT INTO namespace
VALUES('Sensor_1','sml','http://www.opengis.net/sensorML');
INSERT INTO namespace
VALUES('Sensor_1','gml','http://www.opengis.net/gml');
INSERT INTO namespace
VALUES('Sensor_1','swe','http://www.opengis.net/swe');
```

```
INSERT INTO namespace
VALUES('Sensor_1','xLink','http://www.w3.org/2001/XMLSchema-instance');

-- platform
INSERT INTO StationaryPlatform VALUES('Platform_1');
INSERT INTO PlatformDescription VALUES('Platform_1','MPR400CB 2003
Crossbow receiver');

-- sensors
INSERT INTO SensorDescription VALUES('Sensor_1','Crossbow Sensor 1
node, Mica Sensor board MTS300CA');
INSERT INTO identification
VALUES('Sensor_1','longName','urn:ogc:def:identifier:longName','Sensor 1');
INSERT INTO classification
VALUES('Sensor_1','longName','urn:ogc:def:classifier:observationClassificatio
n','in-situ');

INSERT INTO inputs VALUES('Sensor_1','Sensor_1');
-- INSERT INTO inputList
VALUES('Sensor_1','nodeid','Count','urn:ogc:def:data:index',NULL,'0','1000');
INSERT INTO inputList
VALUES('Sensor_1','sound','Quantity','urn:ogc:def:sound','urn:ogc:def:unit:dB',
NULL,NULL);
INSERT INTO inputList
VALUES('Sensor_1','light','Quantity','urn:ogc:def:illumination','urn:ogc:def:unit
:lux',NULL,NULL);

INSERT INTO outputs VALUES('Sensor_1','Sensor_1');
--INSERT INTO outputList
VALUES('Sensor_1','measuredNodeid','Count','urn:ogc:def:data:index',NULL,'
0','1000');
--INSERT INTO outputList
VALUES('Sensor_1','measuredTemperature','Quantity','urn:ogc:def:phenomeno
n:temperature','urn:ogc:def:unit:celcius',NULL,NULL);
INSERT INTO outputList
VALUES('Sensor_1','measuredLight','Quantity','urn:ogc:def:illumination','urn:o
gc:def:unit:lux',NULL,NULL);
INSERT INTO outputList
VALUES('Sensor_1','measuredSound','Quantity','urn:ogc:def:sound','urn:ogc:de
f:unit:dB',NULL,NULL);

INSERT INTO method VALUES('Sensor_1','urn:ogc:def:process:1.0:sensor');

-- Sensor 2
INSERT INTO Sensor VALUES('Sensor_2');
INSERT INTO namespace
VALUES('Sensor_2','sml','http://www.opengis.net/sensorML');
INSERT INTO namespace
VALUES('Sensor_2','gml','http://www.opengis.net/gml');
INSERT INTO namespace
```

```
VALUES('Sensor_2','swe','http://www.opengis.net/swe');
INSERT INTO namespace
VALUES('Sensor_2','xLink','http://www.w3.org/2001/XMLSchema-instance');
-- platform
INSERT INTO StationaryPlatform VALUES('Platform_2');
INSERT INTO PlatformDescription VALUES('Platform_2','MPR400CB 2003
Crossbow receiver');

-- sensors
INSERT INTO SensorDescription VALUES('Sensor_2','Crossbow Sensor 2
node, Mica Sensor board MTS300CA');
INSERT INTO identification
VALUES('Sensor_2','longName','urn:ogc:def:identifier:longName','Sensor 2');
INSERT INTO classification
VALUES('Sensor_2','longName','urn:ogc:def:classifier:observationClassificatio
n','in-situ');

INSERT INTO inputs VALUES('Sensor_2','Sensor_2');
-- INSERT INTO inputList
VALUES('Sensor_2','nodeid','Count','urn:ogc:def:data:index',NULL,'0','1000');
INSERT INTO inputList
VALUES('Sensor_2','sound','Quantity','urn:ogc:def:sound','urn:ogc:def:unit:dB',
NULL,NULL);
INSERT INTO inputList
VALUES('Sensor_2','temperature','Quantity','urn:ogc:def:phenomenon:temperat
ure','urn:ogc:def:unit:celcius',NULL,NULL);

INSERT INTO outputs VALUES('Sensor_2','Sensor_2');
--INSERT INTO outputList
VALUES('Sensor_2','measuredNodeid','Count','urn:ogc:def:data:index',NULL,'
0','1000');
INSERT INTO outputList
VALUES('Sensor_2','measuredTemperature','Quantity','urn:ogc:def:phenomeno
n:temperature','urn:ogc:def:unit:celcius',NULL,NULL);
INSERT INTO outputList
VALUES('Sensor_2','measuredSound','Quantity','urn:ogc:def:sound','urn:ogc:de
f:unit:dB',NULL,NULL);

INSERT INTO method VALUES('Sensor_1','urn:ogc:def:process:1.0:sensor');

=========================================================
Drop scripts should be placed in some other file.
=========================================================

DROP TABLE method CASCADE;
DROP TABLE outputs CASCADE;
DROP TABLE outputList CASCADE;
DROP TABLE inputs CASCADE;
DROP TABLE inputList CASCADE;
DROP TABLE SensorDescription CASCADE;
DROP TABLE PlatformDescription CASCADE;
DROP TABLE namespace CASCADE;
DROP TABLE classification;
DROP TABLE identification;
DROP TABLE StationaryPlatform;
DROP TABLE sensor;
DROP TABLE historic_observation;
DROP TABLE user_table;
DROP TABLE id_table;
=============================================================
Scripts should be placed in separate file.
=============================================================
-- Tom Kobialka tkob@cs.mu.oz.au
-- NICTA SensorWeb Project
-- 12th December 2006

-- Skeleton SQL TABLEs for Sensor Repository Service user repository

CREATE TABLE historic_observation(
	nodeid varchar(20),
	light varchar(20),
	temperature varchar(20)
);

-- Tom Kobialka tkob@cs.mu.oz.au
-- NICTA SensorWeb Project
-- 31st October 2006

-- Skeleton SQL TABLEs for Web Notification Service user repository

CREATE TABLE user_table(
	id varchar(20),
	name varchar(80),
	contact varchar(80)
);

CREATE TABLE id_table(
	id varchar(20)
);
```

5. Getting the Services Running

5.1. Before we start

The NOSA codes require JDK 1.5.0_02. They won't work under JDK 1.4 You need to make sure to set this as your default Java. To set it as your default JAVA, point the environment variable JAVA_HOME and PATH appropriately. Make sure also that Ant and Tomcat refers to JDK 1.5.0_02 in case you have more than one Java installed on your machine.

5.2. Configuring Eclipse

Firstly, install Eclipse and Globus following documentation. It is also helpful to configure Eclipse to be able to develop grid services. Follow the documentation provided in http://grid.lamost.org/files/Eclipse_grid.pdf for guide on how to configure Eclipse to develop grid services.

Then you need to make sure also to get tomcat running with eclipse. The guide to do that can be found in the same guide provided above.

Importing the NOSA codes

All the codes are located in NOSA directory.

To start with, you should have been given the NOSA directory containing all the codes. If you are using Eclipse and you are just starting out, start by importing the Project into your workspace. Choose File->Import. In the dialog, choose General->Existing Projects into Workspace. Follow the prompt as appropriately.

Rearrange the directory.

tinyos-lib contains the library file that you will need. Just place it into the same directory as NOSA as depicted above

It should also be in the same directory as ws-core-4.0.2

This is the way I arrange my workspace:

Workspace
- ws-core-4.0.3
- NOSA
- tinyos-lib
- Surge-View

3 Errors encountered after importing SensorWeb 2.0 Software into my workspace

Severity and Description	Path	Resource / Folder Name	Location	Creation Time	Id

The project cannot be built until build path errors are resolved		NOSA	Unknown	1167767733390	26
Unbound classpath container: 'GT4' in project NOSA		NOSA	Build path	1167767756859	77
Unbound classpath container: 'Tiny-OS' in project NOSA		NOSA	Build path	1167767756859	78

The first error is caused by the next two errors so we will need to fix those errors.

Unbound classpath container is caused by the fact that Eclipse could not find these libraries (this could be defined as user libraries previously).
To check this, open.classpath file from NOSA directory and see if there are two user libraries with the name of GT4 and Tiny-OS defined there.

What we need to do is to update the Java Build Path libraries to include those GT4 and Tiny-OS libraries. By doing so will enable the Eclipse editor to find those classes that NOSA sources will import.

Go to Project->Properties page. Select the Java Build Path page and click the Libraries tab. You would notice that all those libraries will be listed and there are two unbound libraries which are GT4 and Tiny-OS itself.

Fix each one of them by clicking Edit. In the dialog that comes up, choose the user library for each of them. If it is empty, you will need to create a new user library for each of them. For the GT4 library, create a new user library with the name GT4 Library, then click the button Add JARs and select and add all of the JARs in $GLOBUS_LOCATION\lib to the library. Selecting OK and Finish leaves us with the properly configured Libraries tab. The GT4 library should not be unbounded anymore. Note that $GLOBUS_LOCATION refer to the location where your GT4 is installed.

Do the similar thing with Tiny-OS library. The only difference is that, add the JARs from the tinyos-lib provided together with NOSA.

5.3. Machine Specific Configuration

Some machine specific configuration will needs to be done since some variable is hardcoded and some folder location could be different in two different machine

First, open some of the files listed below and change some of the variable to suit your machine. The comments in each file will help you determine which path to be changed.

- buildservice.properties:
    - globus.bs.loc
    - root.NOSA
    - tomcat.dir
- buildservice.xml:
    - tinyos.lib.loc (Note that there are more than 1 occurrences of this variable to be changed. In fact, there are 4 occurrences of them)
- application.properties:
    - tinydb.catalog

Note also that you might need to edit build_***.xml if hard coded path elements exist (if we miss anything)

Note that buildservice.xml uses buildservice.properties for configuration. You will need to set your paths in this file.

You also need to add application.properties to your Java build path in Eclipse. Go to Window->Preferences then choose Java->Build Path->Classpath Variables. Add new variable entries for GLOBUS_LOCATION and APPLICATION_PROPERTIES. For GLOBUS_LOCATION, point it to the location of the GT4 folder (it is C:/workspace/ws-core-4.0.3/ in my machine). For APPLICATION_PROPERTIES, point it to the location of $NOSA/application.properties where NOSA represents the location of NOSA source code. You may need to type the location directly instead of using the file selector.

5.4. Building the SensorWeb 2.0 Software

Run Ant on buildservice.xml. Start the building target starting from the bottom target.

In buildservice.xml, we have the following build targets:

```
<!--<target name="all" depends="SensorPlanningService" />-->
<!--<target name="all" depends="SensorCollectionService" />-->
<!--<target name="all" depends="SensorRepositoryService" />-->
<!--<target name="all" depends="WebNotificationService" />  -->
```

Initially, uncomment the bottom target (remove the <!-- and -->) and execute Ant build on it.

After that is built, comment the bottom line and uncomment the next above that. Keep on doing that until you reach the top.

In other words, this is the sequence order on which the build should be executed:

1. WebNotificationService
2. SensorRepositoryService

3. SensorCollectionService
4. SensorPlanningService

To execute Ant build on the targets, follow the instructions given in the tutorial for building grid services using Eclipse. (this is the link in case you forget it already http://grid.lamost.org/files/Eclipse_grid.pdf)

5.5. Error Encountered When Building the SensorWeb 2.0 Software

Error:
The eclipse editor shows red compilation errors on the package org.jdom and all the other class that is imported from that package.

Solution:
The problem comes from the fact that Eclipse couldn't see the package org.jdom. When you install TinyOS, jdom.jar file is included in $TOSROOT/tools/java/jars. Add this jar as a new user library to silence all those Editor View's red compile errors. Ensure that you use the jdom.jar provided by TinyOS

Error:
When I tried built the target, it gives me many compilation errors. From closer looks, it seems that most of the problem is because Eclipse couldn't find the package org.jdom.

Solution:
This is because Eclipse could see the package but Ant could not see the package. One solution to this would be to add all the jars to Ant CLASSPATH. One way of doing it is to go to Window->Preferences. In the dialog that comes up, choose Ant->Runtime. Choose Ant Home Entries (Default) and then choose Add External Jars to add jdom.jar from $TOSROOT/tools/java/jars. Ensure that you use the jdom.jar provided by TinyOS.

Error:
I get the following error, when I try to access http://localhost:8080/wsrf/services/globus/SCSFactoryService?wsdl.

```
java.lang.NoClassDefFoundError: Could not initialize class
org.sensorweb.service.globus.scs.impl.SensorCollectionService
```

Solution:
The problem comes from the fact that Tomcat is not able to locate the application.properties file located in the "C:\Program Files\Apache Software Foundation\Tomcat 6.0\common\classes". Open the dialog in Windows>Preferences>Tomcat>JVM and add the above mentioned path in Classpath textbox.

Error:

When I tried to execute the target, it complains that the any of these packages localhost.globus.WebNotificationService*.* does not exist or localhost.globus.SensorCollectionService*.* does not exist or localhost.globus.SensorRepositoryService*.* does not exist

Solution:
This is because the Eclipse expecting a stubs but could not find that stubs anywhere. This is most likely because you executed the build target in the wrong order cause there is some dependencies between them. The correct order is

1. WebNotificationService
2. SensorRepositoryService
3. SensorCollectionService
4. SensorPlanningService

5.6. Building the SensorWeb 2.0 Software - 2

Not only Eclipse and Ant, Tomcat also needs to have access to Jdom.jars. Make sure you copy this file (the one given by default from TinyOS installation) to $TOMCAT/webapps/wsrf/WEB-INF/lib where $TOMCAT represents the root installation of Tomcat. In my machine, it is c:Program Files/Apache Software Foundation/Tomcat 5.5

Tomcat must also have access to all the jars file inside tinyos-lib. To do this, you can simply copy all the jar files from tinyos-lib to $TOMCAT/webapps/wsrf/WEB-INF/lib.

After all the 4 build target is executed successfully, we could check if the services work by going to their URL. The URL for these services are defined in application.properties file. Note: change port numbers from 8081 to 8080. Then, visit these URLs to check that these services work.

Note that you need to start Tomcat to be able to access them.

For example: The URL for the web notification service is
http://localhost:8080/wsrf/services/globus/WebNotificationService

To check on their WSDL:
http://localhost:8080/wsrf/services/globus/WebNotificationService?wsdl

In the case where accessing those services shows you an error, it is helpful to debug Tomcat by making it show more detail log message. To change that, simply open the file $JAVA_HOME/jre/lib/logging.properties and change the global logging level. The variable is .level and it is INFO by default. Change it to FINE or FINEST.

May want to create a small script which will do everything (or as much as possible) automatically.

Error:
While running DemoFrame.java, the GUI loaded up fine but I get the following error when I tried to use the functionality

```
AxisFault
 faultCode:
{http://schemas.xmlsoap.org/soap/envelope/}Server.userException
 faultSubcode:
 faultString: java.lang.reflect.InvocationTargetException
 faultActor:
 faultNode:
 faultDetail:

 {http://xml.apache.org/axis/}stackTrace:java.lang.reflect.InvocationTarge
tException
       at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
       at
sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorIm
pl.java:39)
       at
sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAc
cessorImpl.java:25)
       at java.lang.reflect.Method.invoke(Method.java:585)
       at
org.apache.axis.providers.java.RPCProvider.invokeMethod(RPCProvider.
java:384)
       at
org.globus.axis.providers.RPCProvider.invokeMethodSub(RPCProvider.j
ava:107)
       at
org.globus.axis.providers.RPCProvider.invokeMethod(RPCProvider.java:
90)
       at
org.apache.axis.providers.java.RPCProvider.processMessage(RPCProvide
r.java:281)
       at
org.apache.axis.providers.java.JavaProvider.invoke(JavaProvider.java:319
)
       at
org.apache.axis.strategies.InvocationStrategy.visit(InvocationStrategy.jav
a:32)
       at org.apache.axis.SimpleChain.doVisiting(SimpleChain.java:118)
       at org.apache.axis.SimpleChain.invoke(SimpleChain.java:83)
       at
org.apache.axis.handlers.soap.SOAPService.invoke(SOAPService.java:45
0)
       at org.apache.axis.server.AxisServer.invoke(AxisServer.java:285)
       at
org.apache.axis.transport.http.AxisServlet.doPost(AxisServlet.java:697)
       at javax.servlet.http.HttpServlet.service(HttpServlet.java:709)
       at
org.apache.axis.transport.http.AxisServletBase.service(AxisServletBase.ja
va:327)
```

```
	at javax.servlet.http.HttpServlet.service(HttpServlet.java:802)
	at
org.apache.catalina.core.ApplicationFilterChain.internalDoFilter(Applicat
ionFilterChain.java:252)
	at
org.apache.catalina.core.ApplicationFilterChain.doFilter(ApplicationFilter
Chain.java:173)
	at
org.apache.catalina.core.StandardWrapperValve.invoke(StandardWrapper
Valve.java:213)
	at
org.apache.catalina.core.StandardContextValve.invoke(StandardContextV
alve.java:178)
	at
org.apache.catalina.core.StandardHostValve.invoke(StandardHostValve.j
ava:126)
	at
org.apache.catalina.valves.ErrorReportValve.invoke(ErrorReportValve.ja
va:105)
	at
org.apache.catalina.core.StandardEngineValve.invoke(StandardEngineVal
ve.java:107)
	at
org.apache.catalina.connector.CoyoteAdapter.service(CoyoteAdapter.java
:148)
	at
org.apache.coyote.http11.Http11Processor.process(Http11Processor.java:
869)
	at
org.apache.coyote.http11.Http11BaseProtocol$Http11ConnectionHandler.
processConnection(Http11BaseProtocol.java:664)
	at
org.apache.tomcat.util.net.PoolTcpEndpoint.processSocket(PoolTcpEndp
oint.java:527)
	at
org.apache.tomcat.util.net.LeaderFollowerWorkerThread.runIt(LeaderFoll
owerWorkerThread.java:80)
	at
org.apache.tomcat.util.threads.ThreadPool$ControlRunnable.run(ThreadP
ool.java:684)
	at java.lang.Thread.run(Thread.java:595)
Caused by: java.lang.NoClassDefFoundError: org/jdom/Element
	at
org.sensorweb.service.globus.scs.impl.SensorCollectionServiceResource.i
nitialise(SensorCollectionServiceResource.java:42)
	at
org.sensorweb.service.globus.scs.impl.SensorCollectionServiceResource
Home.create(SensorCollectionServiceResourceHome.java:31)
	at
org.sensorweb.service.globus.scs.impl.SensorCollectionServiceFactory.cr
```

```
eateResource(SensorCollectionServiceFactory.java:31)
        ... 32 more

        {http://xml.apache.org/axis/}hostname:alpha

java.lang.reflect.InvocationTargetException
        at
org.apache.axis.message.SOAPFaultBuilder.createFault(SOAPFaultBuild
er.java:221)
        at
org.apache.axis.message.SOAPFaultBuilder.endElement(SOAPFaultBuil
der.java:128)
        at
org.apache.axis.encoding.DeserializationContext.endElement(Deserializat
ionContext.java:1087)
        at
org.apache.xerces.parsers.AbstractSAXParser.endElement(Unknown
Source)
        at
org.apache.xerces.impl.XMLNSDocumentScannerImpl.scanEndElement(
Unknown
Source)
        at
org.apache.xerces.impl.XMLDocumentFragmentScannerImpl$FragmentC
ontentDispatcher.dispatch(Unknown
Source)
        at
org.apache.xerces.impl.XMLDocumentFragmentScannerImpl.scanDocum
ent(Unknown
Source)
        at org.apache.xerces.parsers.XML11Configuration.parse(Unknown
Source)
        at org.apache.xerces.parsers.XML11Configuration.parse(Unknown
Source)
        at org.apache.xerces.parsers.XMLParser.parse(Unknown Source)
        at org.apache.xerces.parsers.AbstractSAXParser.parse(Unknown
Source)
        at javax.xml.parsers.SAXParser.parse(SAXParser.java:375)
        at
org.apache.axis.encoding.DeserializationContext.parse(DeserializationCo
ntext.java:227)
        at
org.apache.axis.SOAPPart.getAsSOAPEnvelope(SOAPPart.java:645)
        at org.apache.axis.Message.getSOAPEnvelope(Message.java:424)
        at
org.apache.axis.handlers.soap.MustUnderstandChecker.invoke(MustUnde
rstandChecker.java:62)
        at org.apache.axis.client.AxisClient.invoke(AxisClient.java:206)
        at org.apache.axis.client.Call.invokeEngine(Call.java:2727)
        at org.apache.axis.client.Call.invoke(Call.java:2710)
```

```
	at org.apache.axis.client.Call.invoke(Call.java:2386)
	at org.apache.axis.client.Call.invoke(Call.java:2309)
	at org.apache.axis.client.Call.invoke(Call.java:1766)
	at
localhost.globus.SCSFactoryService.bindings.SCSFactoryPortTypeSOAP
BindingStub.createResource(SCSFactoryPortTypeSOAPBindingStub.java
:224)
	at org.sensorweb.demo.DemoWorker.invoke(DemoFrame.java:587)
	at org.sensorweb.demo.DemoWorker.run(DemoFrame.java:510)
	at java.lang.Thread.run(Thread.java:595)
```

Solution:

The problem lies in this line

```
Caused by: java.lang.NoClassDefFoundError: org/jdom/Element
	at
org.sensorweb.service.globus.scs.impl.SensorCollectionServiceResource.initialise(Se
nsorCollectionServiceResource.java:42)
```

You need to ensure that the jdom.jar file is copied across your $TOMCAT/wsrf/lib directory.

5.7. Adding Method to Existing WebServices

In order to add a new method to the existing webservices available under SensorWeb 2.0 Softwares (for example SensorPlanningService) you have to follow the steps mentioned below:

1. Add method signature in *SensorPlanningService* interface under *“org.sensorweb.service.sps”* package.
   e.g,
   ```
    public Element getSCSLocations() throws ServiceException;
   ```

2. Add method implementation in *SensorPlanningService* class under *“org.sensorweb.service.globus.sps.impl”*
   e.g,
   ```
   public Element getSCSLocations() throws ServiceException {
   		System.out.println("getSCSLocations() --START");
   		Element element = null;
   		…
    }
   ```

3. Next we have to add the method reference in “*SensorPlanningService.wsdl”* located in *NOSA* folder. Since our method is not taking an input parameters we will have to declare the xsd:type as
   ```
   <xsd:element name="getSCSLocations" nillable="true">
   	<xsd:complexType/>
   </xsd:element>
   ```

4. Now we have to add request and response messages
   e.g.

   ```
   <message name="getSCSLocationsRequest">
       <part name="parameters" element="tns:getSCSLocations" />
   </message>
   <message name="getSCSLocationsResponse">
       <part name="parameters" type="tns1:Element" />
   </message>
   ```

5. Lastly we have to add the operation item.

   ```
   <operation name="getSCSLocations">
      <input message="tns:getSCSLocationsRequest" />
      <output message="tns:getSCSLocationsResponse" />
   </operation>
   ```

6. Replicate these changes in “*SensorPlanningService.wsdl*” located in *NOSA\schema\SensorPlanningService\SensorPlanningService_instance\*

7. Build the SensorWeb 2.0 Software and your changes can be seen in the stubs generated as a result of build.