A guide to use chronos

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Chronos (`http://www.comp.nus.edu.sg/~rpembed/chronos`) performs timing analysis of embedded software (written in C) through static analysis. In particular, Chronos estimates Worst Case Execution Time (WCET), which is the upper bound on the execution time of a program over all possible data inputs on a specific hardware platform.

To use the pre-installed Chronos on "tembusu"/"Angsana" cluster for the purpose of this assignment, you can follow the steps below:

1. Launch ssh secure client (installed in every machine of SOC). Go to "Edit menu" and go to "settings". Goto "Profile settings->Connection->Tunneling". Check the box "Tunnel X11 connections". Goto "File menu" and click "Save settings".

2. Log in `sunfire.comp.nus.edu.sg` with a SSH Secure Shell Client using your SOC account and password.

3. Log in `tembusu.comp.nus.edu.sg/angsana.comp.nus.edu.sg` from sunfire using the command "ssh -X tembusu"/"ssh -X angsana". To copy file from sunfire to tembusu(angsana), use the "scp" command. Type "man scp" to see its usage guide.

4. Check for a ".bashrc" (note the ".") file in your home directory. If available, edit the file by putting the following two lines at the end of the file:

   ```
   export PATH=$PATH:/home/s/sudiptac/TA-4271/CHRONOS_HOME/bin
   alias chronos="cd /home/s/sudiptac/TA-4271/CHRONOS_HOME/gui; ./gui.sh"
   ```

   If the file is not in your home directory, then create one with that name (i.e. ".bashrc") by putting the above two lines in ".bashrc" file. Save and close the file ".bashrc".

5. Type the command "bash".

6. Open an X11 connection to support the Chronos GUI by using X-Win32 / Xming. "Xming" is already installed in Embedded Systems Teaching Labs. If you want to connect from outside NUS, you can download the free version of Xming at `http://sourceforge.net/projects/xming`. After downloading, you can install and launch the "xming" application with the *default* settings.

7. Type the following command in your SSH to launch Chronos GUI: "chronos". Note that all the necessary settings for this copy of Chronos have already been done. Please do not change them. Please also make a note that you have to use *only this installation of Chronos* to do Homework 2.

8. To analyze/simulate a particular benchmark, you should do the following:

   (a) Open a benchmark by choosing to open the folder containing the benchmark. One folder should contain exactly one benchmark (one main method).

   (b) After the source code, CFG, and assembly code are displayed on Chronos GUI, you can set the loop bounds using Option / Loop bound constraints. If no loop bound constraints are required, it means all the loop bounds have already been automatically set by the Chronos data flow analysis.

(c) Before analyzing/simulating the benchmark, you need to set the processor architecture on which the program runs in Run / Processor configuration.

(d) After all these have been done, you can estimate the programs WCET or simulate it by clicking Run / Estimate or Run / Simulate respectively. The result will be shown in the bottom panel. *The unit of the displayed result is in terms of CPU cycles.*

9. In your next login to tembusu/angsana, you only need to type "bash" command before launching "chronos" (by typing the command of same name).

10. For sample testing, go to the directory "/home/s/sudiptac/TA-4271/CHRONOS_HOME/benchmarks". Inside this directory, you will find some sample benchmarks. Open any directory in chronos GUI.

11. *NOTE:* Point 1 and point 6 are only relevant if you are using Windows operating systems. Linux users can safely ignore them.