

## Technical Note – Improving ISaGRAF Scan Time for Large Applications in an IPm Controller modem

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### Abstract:

The standard IPm firmware allocates an equal amount of CPU time to each LINUX process which is normally quite sufficient. However, in very large applications, the logic scan time of the ISaGRAF program may be too long for the process being controlled. By allocating more CPU time to the ISaGRAF task the scan times of large applications can be substantially improved. In the example detailed below, it has been found to improve a large gas compressor application by approximately halving the scan time of the ISaGRAF program tested.

### Prerequisite

The following details an advanced procedure and requires that the IPm LINUX support features of the Sixnet I/O Toolkit are available and that the target IPm has been configured for Telnet access. It also assumes an ability to work with the LINUX command line. It is intended to speed up programs with a scan time >200mS.

### LINUX “renice” command

Usage: renice priority pid [pid...]

The “renice” command changes the priority of running processes. Allowed priorities range from 20 (the process runs only when nothing else is running) to 0 (default priority) to -20 (almost nothing else ever gets to run).

### Preparation

Open a command line window on the PC and use Telnet to connect to the IPm, i.e. Telnet <IP Address> where <IP\_Address> is the address of your IPm controller. Login to the prompt as “root” and the LINUX command prompt “#” will be displayed. Type in the “ps” command and a list of all the processes running in the IPm will be displayed. Looking at that list, determine the PID number of the process named “isagraf” and note it for reference later.

The following page contains an example of a login to an IPm at IP address 10.1.0.1 from a PC at IP address 10.1.0.130 after the “ps” command has been executed. You can see that the PID number shown for the “isagraf” process is 57. Note down the PID for your particular IPm as it may not be the same as the one shown.

```

C:\ Telnet 10.1.0.1

Linux 2.4.18 <10.1.0.130> <tttyp0>

@@
NewStal login: root

BusyBox v0.60.3 (2003.03.18-15:10+0000) Built-in shell (ash)
Enter 'help' for a list of built-in commands.

~ #
~ # ps
  PID  Uid      UmSize Stat Command
    1  root      1472 S    init
    2  root          S    [keventd]
    3  root          S    [ksoftirqd_CPU0]
    4  root          S    [kswapd]
    5  root          S    [bdflush]
    6  root          S    [kupdated]
    7  root          S    [mtdblockd]
   13  root          S    [jffs2_gcd_mtd2]
   19  root          S    [jffs2_gcd_mtd4]
   49  root      1560 S    /usr/sbin/inetd
   56  root      5916 S    ./sxmanager
   57  root      2504 S    ./isagraf
   58  root      1580 S    ./sxspecfeat
   59  root      1704 S    ./sxbeth_client
   60  root      3792 S    ./sxpeerlink
   61  root      3788 S    ./sxetherpeer
   63  root      5916 S    ./sxmanager
   66  root      5916 S    ./sxmanager
   68  root      1780 S    ./sxtagload
   74  root      1868 S    sxioserver
   76  root      3800 S    sxdatalog
   79  root      1800 S    /usr/local/bin/ringmon
   81  root      1432 S    sxportload
   86  root      3844 S    sxserial_client 15
   87  root      3844 S    sxserial_client 23
   88  root      3844 S    sxserial_client 31
   91  root      1860 S    sxether_client 39
   92  root      5916 S    ./sxmanager
   93  root      3844 S    sxserial_client 31
   94  root      3844 S    sxserial_client 23
   95  root      3844 S    sxserial_client 15
   96  root      3844 S    sxserial_client 15
   97  root      3788 S    ./sxetherpeer
   98  root      3788 S    ./sxetherpeer
   99  root      3844 S    sxserial_client 23
  100  root      3844 S    sxserial_client 31
  103  root      3792 S    ./sxpeerlink
  104  root      3792 S    ./sxpeerlink
  105  root      1864 S    /bin/sh /usr/local/bin/sx_telnetd
  111  root      2528 S    /usr/sbin/telnetd
  112  root      1980 S    -sh
  113  root      3800 S    sxdatalog
  114  root      3800 S    sxdatalog
  115  root      1968 R    ps
~ #

```

## Methodology

It will be noted from the description of the “renice” command that it changes the priority of running processes, therefore it must be executed after the IPm has booted up. The IPm’s directory structure contains a directory “/etc/user.d” and on start-up it will automatically run any executable saved in this directory. So we will create a shell script to run the “renice” command and set the priority of the “isagraf” process to a higher value.

## Procedure

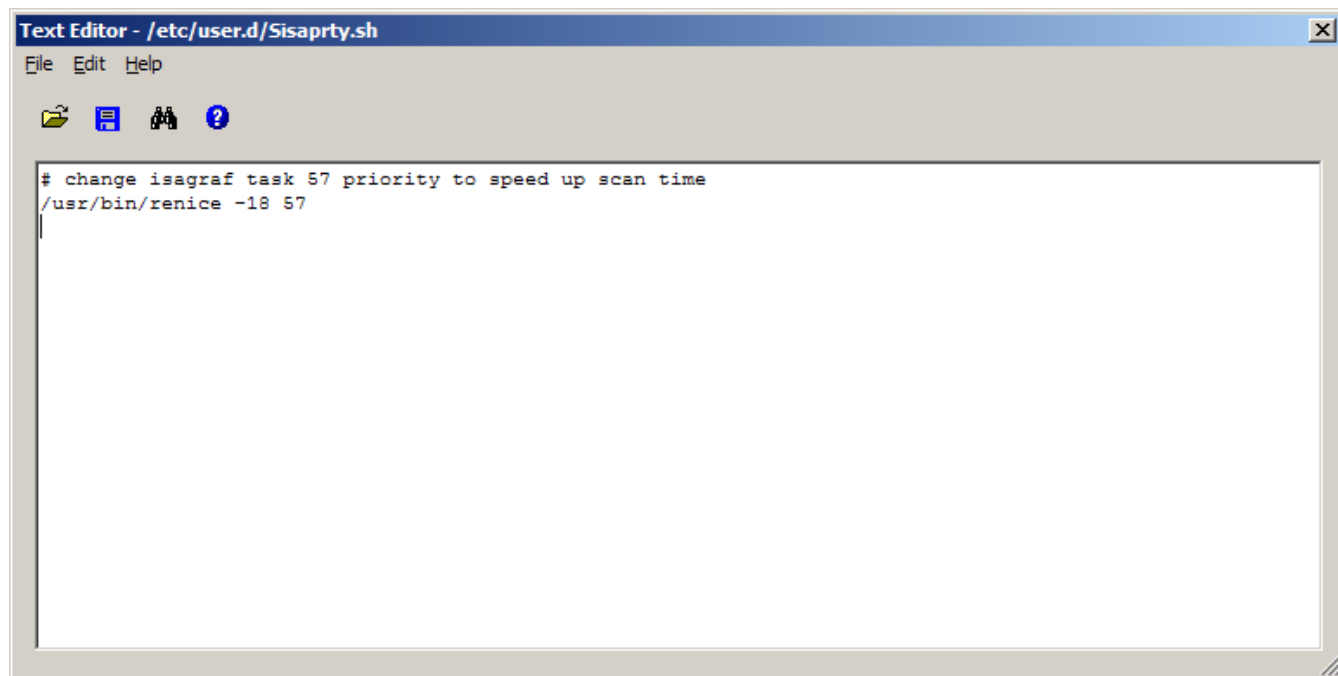
Firstly, you should run ISaGRAF and note the scan time of your program before modification so that you can refer to it later. Then, in the I/O Toolkit, select “Operations->File Operations...” from the menu. Navigate to the “/usr/etc.d” directory and with the cursor on the single dot file “.” (next to a file folder icon), click on the “Edit Text File” button. This will open up a blank editing window. In the editor, insert the following:

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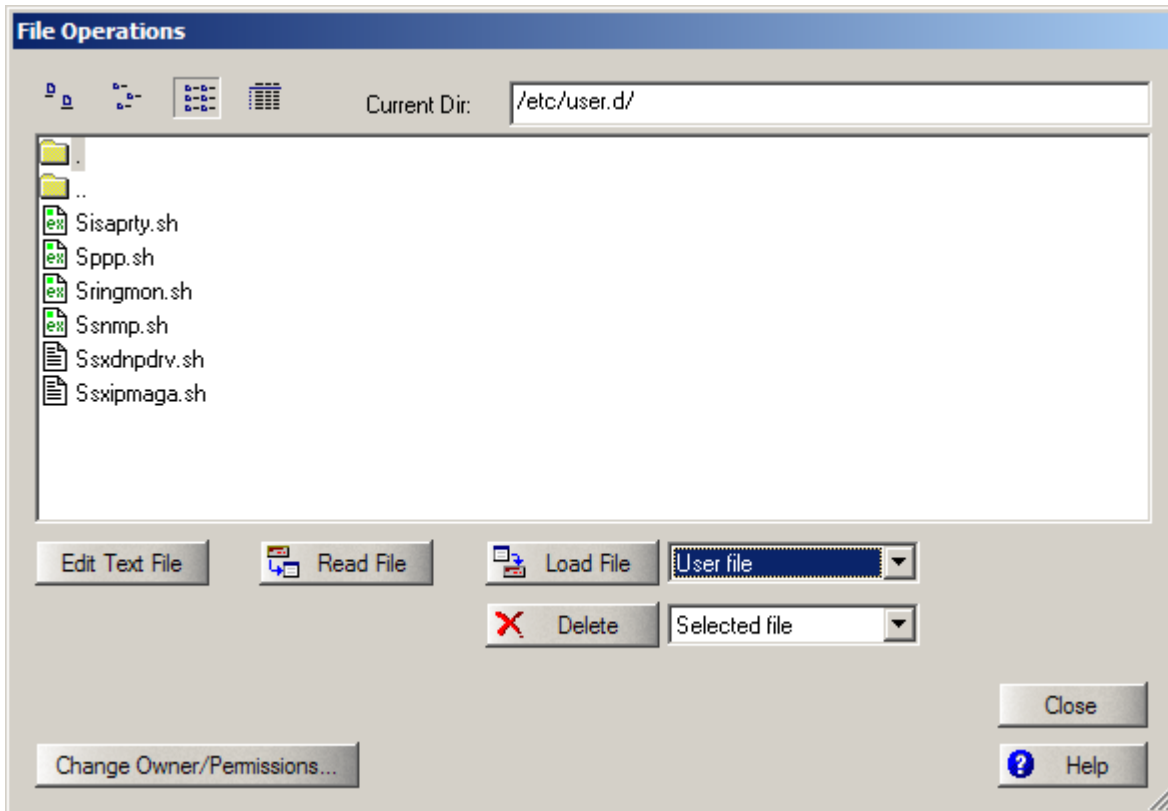
```
# change isagraf task <PID> priority to speed up scan time
/usr/bin/renice -18 <PID>
```

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Substitute the PID number you noted earlier from your particular IPm. Your file script should look like this:



Now save the file with the name “Sisaprtty.sh”. The file that you have just created is a shell script and must be saved with an extension of “sh” and the name can be no longer than 8 characters. For simplicity’s sake, the name “Sisaprtty.sh” is recommended. Your directory should now include your newly-created file and look something like this:



You can now close the window and restart the IPm by disconnecting the power for 5 seconds and then re-connecting it.

Now run ISaGRAF and check the scan time – it should be substantially improved. You can add your newly created file to the “Files to Load” tab in the I/O Toolkit so that it will be automatically loaded in future.

Finally, this procedure was developed on an IPm running firmware V4.2.1002. Note that in future versions, it’s possible that features could be added requiring additional processes and that the PID might change after an upgrade. It is therefore recommended that the PID of the “isagraf” process be checked after a firmware version upgrade to ensure it has not changed. If it has, the shell script needs to be modified accordingly.