Altair EDA 2022.1.0

Tool Integration Guide

Contents

EDA Tool Integration Guide

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This document is a collection of techniques that have proven to be useful when applying FlowTracer in Electronic Design Automation.

This chapter covers the following:

lmstat

Version 10.* of lmstat by MacroVision may generate incorrect information when dealing with multiple daemons. Here is an example command that could generate wrong information:

```
% lmstat -a -c 1234@host1:1235@host2
```

This is obviously a bug. As a workaround, you can use the script `vovsafelmstat` which is used as a wrapper for the `lmstat` command as in:

```
% vovsafelmstat lmstat -a -c 1234@host1:1235@host2
```

Advanced uses of vovflexlmd

`vovflexlmd` is the main interface to FlexNet Publisher.

When dealing with version 10 of `lmstat`, remember to either use `vovsafelmstat` or use the option -safe in add_LM_LICENSE_FILE.

```
# Two equivalent methods
add_LM_LICENSE_FILE 1234@host1:1235@host2  -lmstat "vovsafelmstat /full/path/to/
lmstat"  -tag    "TAG1"

add_LM_LICENSE_FILE 1234@host3:1235@host4  -safe  -lmstat "/full/path/to/lmstat"  -
tag    "TAG2"
```

When polling license daemons on remote machines reachable through a slow link, it is much faster to run `lmstat` on a remote machine.

For example, to sample a server in Japan from a US site, assuming we can rsh or ssh into a host in Japan, we want to use the following command:

```
% rsh host1.company.jp  env TZ=$TZ  vovsafelmstat /full/path/to/lmstat -a  -c
 27000@host2.company.jp:27001@host3.company.jp
```

Note that the host we use to rsh or ssh into need not be the same as the host of the FlexNet Publisher daemons.

In the `config.tcl` file for `vovflexlmd`, please use the following form for the -lmstat option:

```
add_LM_LICENSE_FILE 27000@host2.company.jp:27001@host3.company.jp  -tag LICJP  -
lmstat "rsh host1.company.jp  env TZ=$env(TZ) vovsafelmstat /full/path/to/lmstat "
```

Excluding file .flexlmrc from the flow

The file `~/.flexlmrc` is a most annoying file that is written by many tools in the home directory of the users.

We strongly recommend excluding it from the trace with a statement like the following added to the `exclude.tcl` file.

```
# Fragment of exclude.tcl
vtk_exclude_rule -regexp {/.flexlmrc}
```

LSF 4.2

This section is relevant to those who use indirect LSF taskers to submit jobs to LSF.

Release 4.2 is by now an old release of LSF and it may cause problems on certain 64-bit platforms like Opterons because of unproper setting of the process limits.

Workaround

You have to modify the `$VOVDIR/scripts/vovfire` script and add the following statement:

```
# Set the soft limit for the stack space to
# a reasonable value.
ulimit -S -s 10240
```

NeoCircuit

Cadence NeoCircuit

NeoCircuit is a circuit optimizer that can size transistors and adjust values in a circuit to center it for optimum yield in a given process.

It has its own parallelization setup, using rsh/ssh, or integrated with compute farms run by LSF, SGE, and Altair Accelerator.

Altair Accelerator Integration

The baseline integration was written by Altair, and consists of two files:

- `etc/pmconfig/FTNC.tcl`, the interface procedures
- `etc/pmconfig/examples/PMConfigFTNC`, the example variables setup file

Configuration File PMConfig Variables

The following table describes the configuration file variables used by the NeoCircuit-Altair Accelerator integration.

Table 1: Altair Accelerator PMConfig Variables

Variable	Meaning	Default	Range
pmtype	Parallel Machine integration type	tcl	tcl
tcl_file_name	Name of integration procedures file	FTNC.tcl	FTNC.tcl
portnumber	TCP/IP port used by evalNode job on a host	4000	1024-65535
queuename	Name of Altair Accelerator queue to receive evalNode jobs	vnc	Any string starting with vnc
maximum_number_of_evalnode	Maximum number of evalNode jobs to start	unlimited	1 .. 2X number of farm hosts
resourcerequirements	Resources required to run an evalNode job	RAM/32 (linux)	Only installed Altair Accelerator platforms should be configured
runenv	Name of environment in which to run evalNode jobs	none	Named environment capable of running NeoCircuit

Environment

A snapshot environment is used by default, but you can specify a named environment in the PMConfig file using the variable runenv.

Integration Procedures

This describes the Tcl procedures that implement the integration between NeoCircuit and Altair Accelerator. The baseline was derived from the `Lsf.tcl` file.

Table 2: NeoCircuit--Altair Accelerator Tcl Integration Procedures

Procedure	Function	Parameters	Return
start_evalNode	Start an evalNode job on a farm host	none	jobID of evalNode job
get_pending_pids	Return a list of jobids for jobs that have been submitted, but are not yet running.	{unused1 username}	list of pending jobids for username
check_suspended	Determine whether a given jobID is suspended	{jobID}	1 if suspended, 0 if not
sendSignal	Stop a given evalNode job	{jobid signum unused2 }	0

RedHawk by Apache/Ansys

To run RedHawk in distributed parallel mode, you need to use the scripts in `$VOVDIR/eda/Ansys/redhawk`.

- If you are running a version of Altair Accelerator before 2014.03, you need to apply the "redhawk_scripts" patch. Request the patch from https://www.pbsworks.com/ContactSupport.aspx
- You need to create an environment called REDHAWK. Use as template the file in `$VOVDIR/eda/Ansys/redhawk/REDHAWK.start.sh`

```
% cp $VOVDIR/eda/Ansys/redhawk/REDHAWK* $VOVDIR/local/environments/.
% vi $VOVDIR/local/environments/REDHAWK.start.sh
```

- Test the environment with this sequence:

```
% ves BASE+REDHAWK
% which redhawk               ## Do you have redhawk in the path?
% which nc_redhawk            ## Do you have nc_redhawk?
% lmstat -f redhawk           ## Is LM_LICENSE_FILE correct?
```

- You may need to identify the taskers in your farm that can run RedHawk. If all taskers are ok, you may skip this step. To identify the taskers, use the `taskerClass.table` file and add the resource "hasRedhawk" to selected taskers.

```
lnx0021:  hasRedhawk
lnx0022:  hasRedhawk
lnx0023:
lnx0024:  hasRedhawk
```

- You need an `nc.cfg` configuration file for the -dmp option of redhawk.

```
GRID_TYPE RTDA
## This number must match the number in option -dp in nc run.
NUMBER_OF_JOBS 4

## This assumes you have a jobclass called "redhawk"
QUEUE_NAME redhawk
```

Running Without License Management

To get started and understand how distributed processing works, let's run without worrying about licenses.

We want to run a redhawk job using the script `run.tcl`. We want to run the job on 4 machines, in addition to the master process, i.e. we need 5 parallel components. For now, let's assume that all components are similar in terms of resource requirements.

```
% ves BASE+REDHAWK
% setenv DISPLAY "good_name_for_DISPLAY:XX"
% nc run -e SNAPSHOT+D,DISPLAY=$DISPLAY -profile -preemptable 0 \
    -dp 4 -dpres hasRedhawk -dpwait 3m \
        nc_redhawk \
       -lmwait  -dmp nc.cfg -f run.tcl
```

Explanation of options

-e SNAPSHOT+D,DISPLAY=$DISPLAY	Take the current environment, including the DISPLAY variable. This may not be necessary if running in batch mode (option -b of redhawk).
-profile	Track RAM and CPU usage of each component of the job. In the case of redhawk, you need to have 2014.03 or more to see the usage, because of the way the processes of redhawk detach themselves from their parents.
-preemptable 0	In general, you do not want to preempt jobs that are as complex as these.
-dp 4	We want 4 processes, one of which becomes the "master" and the other 3 will be the work-horses. The master runs in the first component of the Distributed Parallel job.
-dpres	Run each component on machines that have the "hasRedhawk" resource.
-dpwait 3m	Wait up to 3 minutes for all components to be started. If 3m pass from the start of the first component and not all components are started, the dispatch is aborted and soon after restarted with a longer wait time.
nc_redhawk	This is the script that is started on the master component and that activates all other components. Techincal note: In Altair Accelerator, all components are up and running when this script runs and the script convinces OpenMPI to use a special ssh script to launch the appropriate command on each of the remote components.
-lmwait -dmp nc.cfg -f run.tcl	The actual redhawk command you want to run

VHDL

Integrating VHDL tools

In most cases, the best approach to integrate VHDL tools is to use "OS-level interception" to capture the dependencies (through the wrapper vrt) and then use the exclude.tcl file to exclude files that are not interesting (like the `*.mra` file, or local caches).

To encapsulate VHDL tools, you may want to look at the VHDL preprocessor utility `vhdlpp` which parses a VHDL file and determines which design units are described in the file and which design units are referenced by the file.

Wrapper vwrap

Note: This wrapper is no longer needed, since this functionality has been implemented directly into vw. See VOV_LM_VARNAMES for more information. The wrapper `vwrap` is still available for backward compatibility.

If you have multiple daemons serving the same feature, you may choose to use the FlexNet Publisher capability of specifying multiple daemons in the LM_LICENSE_FILE variable, as in this example:

```
% setenv LM_LICENSE_FILE 1234@host1:1234@host2
```

When the tool is run, FlexNet Publisher checks first host1 for a license. If not available, then it checks host2.

When working with FlowTracer, you can setup the daemons to be monitored independently. In the `config.tcl` file for `vovflexlmd`, you could have the following entries:

```
add_LM_LICENSE_FILE 1234@host1   -tag V1
add_LM_LICENSE_FILE 1234@host2   -tag V2
```

In the `resources.tcl` file, you would have:

```
vtk_flexlm_monitor V1/hspice   License:hspice1
vtk_flexlm_monitor V2/hspice   License:hspice2

vtk_resourcemap_set License:hspice UNLIMITED "License:hspice1 | License:hspice2"
```

This means that you let the FlowTracer server decide whether it is best to use one license daemon or the other. This information is stored at dispatch time in the field "GRABBED_RESOURCES" of the job. The wrapper `vwrap` looks at the GRABBER_RESOURCES and sets LM_LICENSE_FILE to point exactly to the list of servers associated with the grabbed resources. This leads to a more accurate and efficient management of licenses.

FEKO

We assume you have installed FEKO, and for the following examples the installation directory will be `FEKO_HOME=/opt/Altair/2017/altair/feko/`

In addition you need to install the scripts `vovrunfeko` and `runfeko_trojan` in `$VOVDIR/eda/Altair`.

Create Environment FEKO

The installation comes with a BASH script in `$FEKO_HOME/bin/initfeko`. This script works only with Bash shells. With Accelerator, it always makes sense to have a named environment, called for example "FEKO", which can be used with any shell.

```
# This is file $VOVDIR/local/environments/FEKO.start.bash
. /opt/Altair/2017/altair/feko/bin/initfeko
export PATH=`vovenv PREPEND -colon $VOVDIR/eda/Altair $PATH`
```

With such FEKO environment in place, you can switch to that environment regardless of the shell you are using, for example with the command:

```
% ves FEKO
% ves BASE+FEKO
```

Submission from the Command Line

From the command line, you can submit runfeko directly if you only need to run on a single machine:

```
% nc run -e FEKO -r RAM/2000 CORES/4 -- runfeko myexample -np 4
```

If you want to run on multiple machines, that is in DP mode (DP=Distributed Parallel), then you can submit the script `vovrunfeko`, which takes all options passed to `runfeko`. Do not bother with the machinesfile or the -np option; the script `vovrunfeko` takes care of those options. Example:

```
% nc run -dp 16 -profile vovrunfeko myexample
```

You can also use `vovrunfeko` for jobs that use a single machine, as in this example:

```
% nc run -e FEKO -r RAM/2000 CORES/4 -- runfeko myexample
```

Submit from the CADFEKO User Interface wit a "Trojan Horse"

Currently, it is not natively possible to submit FEKO jobs to a scheduler directly from the CADFEKO interface. However, this can be accomplished with Accelerator provided that `runfeko` is replaced by a trojan horse that we provide:

```
  % ves FEKO
  % cd $FEKO_HOME/bin
  % mv runfeko runfeko.bin                    ##### Make a copy of the original
binary.
  % cp ...../runfeko_trojanhorse ./runfeko    ##### Place our trojan horse in place of
runfeko.
  % chmod a+x ./runfeko
```

Now you can run the UI cadfeko and when you press the "FEKO solver #" button, you will actually submit the run to Accelerator, with the requested level of parallelism.

Note: unfortunately, the "Stop" button does not work properly, and you may have to stop the job using `nc stop JOBID` from the command line.

Cadence

Cadence ADE 5.1 or ADE L

The Cadence Analog Design Environments (ADE 5.1) supports distributed processing (DP), using either LBS (Load Balancing System), which is a proprietary Cadence system based on `rsh`, or LSF (previously by Platform Computing, Ltd., now IBM). To use Altair Accelerator with ADE 5.1:

1. Make ADE believe that it is using LBS
2. Use the "Job Submit Form" to specify the command line to dispatch the jobs to Altair Accelerator

Set Up a Minimal LBS Queue Using Accelerator

The following steps describe how to set up a minimal LBS queue and to tell ADE to use Altair Accelerator instead.

1. Pick a machine to use as the LBS master (such as 'host1'). You should be able to RSH to this machine without entering a password.
2. Add the following line to the environment used to run the Cadence tools.

   ```
   # Add this to the environment definition file
   # $VOVDIR/local/environments/CADENCE.start.tcl
   # (An example is available in
   # $VOVDIR/eda/Cadence/environments/CADENCE.start.tcl)
   setenv LBS_CLUSTER_MASTER host1
   ```

   In the above example, the `CADENCE.start.tcl` file is the one that defines the VOV environment named 'CADENCE'. By defining LBS_CLUSTER_MASTER in the environment script, it will be set for jobs running in that environment.

   ```
   % ves CADENCE,5.1
   % printenv | grep LBS
   % which icfb
   ```

3. Create a minimal configuration file for LBS. Call this file `lbsconfig`.

   This file says that we have one queue called 'samplequeue' that has 1 host and that such host is called 'host1' and has capacity 1.

   Remember that we are just trying to persuade ICFB that we are using LBS, when in fact we are going to use Altair Accelerator.

   Example of minimal config file for LBS (e.g. called lbsconfig:

   ```
   samplequeue 1
   cheetah 1
   ```

   In the above example, the file configures a queue named 'samplequeue' having one execution host named 'cheetah' that has one job slot. This queue is not actually used, but is necessary to permit using the distributed option in ADE.

4. Launch Cadence LBS on the $LBS_CLUSTER_MASTER machine with:

```
% cdsqmgr $cwd/lbsconfig >& lbs.log &
```

5. Optional: You can also check the setup with:

```
% cdsDPSetupChk -shell csh -mode n
```

> **Note:** If you are using `ssh` instead of `rsh`, you may need to modify the script `cdsDPrsh`. Otherwise, you can skip this step altogether.

6. Update your `~/.cdsinit` file. The simplest change is to add the following lines:

```
;;; Append these lines to ~/.cdsinit
  ;;; Sourcing RTDA cdsinit
  vovdir = getShellEnvVar( "VOVDIR" )
  ilfile = strcat( vovdir "/eda/Cadence/ADE-NC/cdsinit" );
  printf( "Loading RTDA NC Interface %s\n" ilfile )
  load( ilfile )
```

7. Launch ICFB in an environment that contains both icfb and spectre:

```
% ves CADENCE,5.1+MMSIM
% which icfb
% which spectre
% icfb &
```

8. In the Simulation window, select **Setup** > **Simulation/Directory/Host** and change Host Mode to **distributed**.

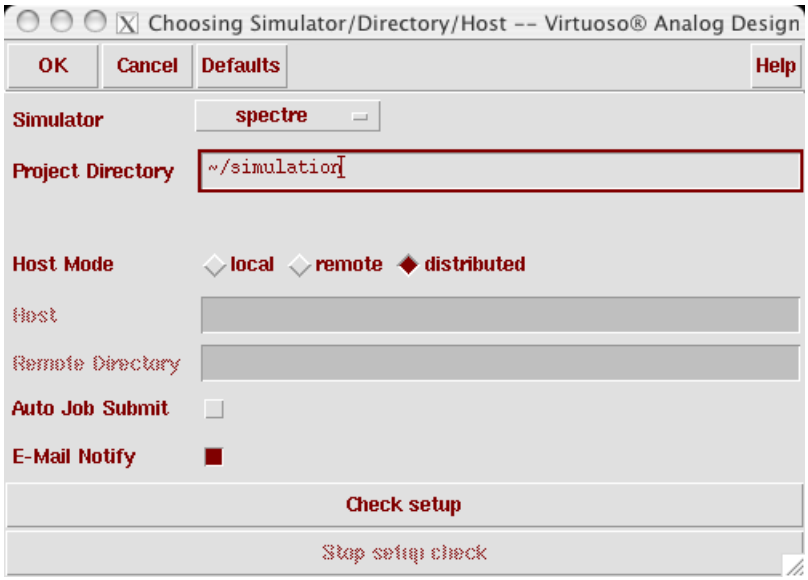


Figure 1:

9. Click on **Check setup** to make sure ADE agrees that all is ok.
10. Click **Simulation** > **Netlist** and then click **Run**, or click **Simulation** > **Run** to display the **Job Submit** form shown here:

Figure 2:

11. Select the field labeled **command** and enter the Altair Accelerator submission command.
This will be prefixed to all the simulation commands, and will submit the jobs to the Altair Accelerator farm. You will typically use something like:

```
nc run -D
       -C cadence_ade -J ADE_@JOB@
```

where `cadence_ade` is the name of a job class that defines the submission parameters for Spectre jobs.

12. In the command field, use symbolic values @JOB@ and @USER@.

Make sure spectre is run in a preemptable mode

13. For spectre to be preemptable, you need to run it with the +lsusp option, which means that we can send SIGTSTP to the spectre process to release the licenses. You can define this option in the environment options form.

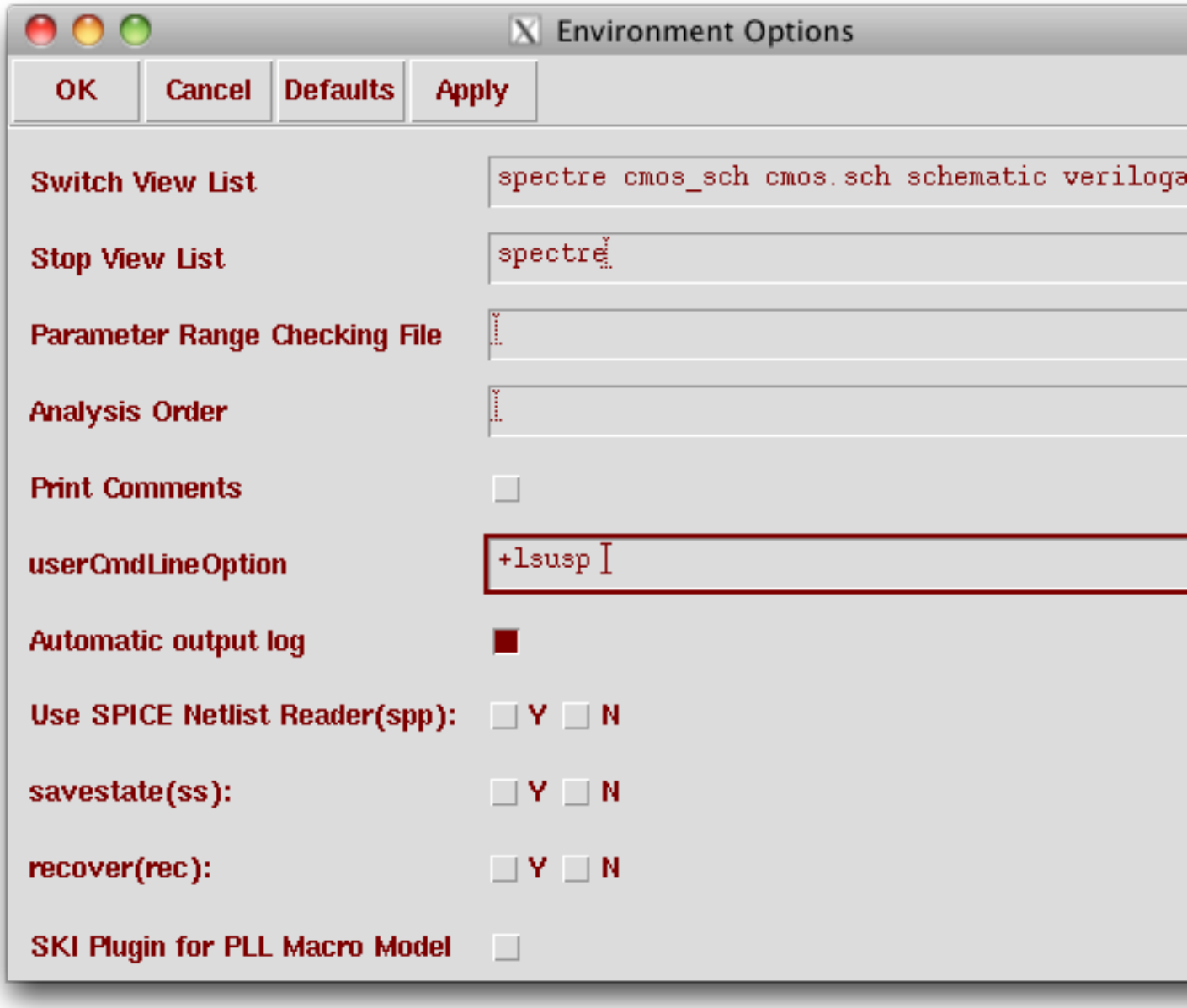


Figure 3:

14. You can fix this by configuring Altair Accelerator's `equiv.tcl` file, or work around it by using the -D option in the prefix you enter in the Job Submit form, for example:

```
vnc run -D -C spectre
```

The -D switch asserts that the run directory is the same and reachable from any vovtasker host. For documentation, see Submitting Jobs.

For information on VOV Logical Filesystem Names, configured in the `equiv.tcl` file, please refer to Equivalence File. Usually the Altair Accelerator administrator will need to be involved to modify this configuration file.

15. To stop the simulation, use the Accelerator GUI or the `nc stop` command.

Cadence ADE XL 6.1

The following releases of Cadence Virtuoso are supported:

- Virtuoso Advanced-Node and Methodology Platform Release "ICADVM 18.1"
- Virtuoso Advanced Node Release "ICADV 12.3"
- Virtuoso Analog Design Environment (ADE) Release "ICADV 12.2"
- Virtuoso Analog Design Environment (ADE) Release "IC 6.1.8"

Install Cadence

1. Check that the VOVDIR environment variable is set correctly. You should be able to locate the following file: `$VOVDIR/eda/Cadence/ADE-NC/cdsinit`
2. Update your `~/.cdsinit` file. The simplest change is to add the following lines:

```
;;; Append these lines to ~/.cdsinit
  ;;; Sourcing RTDA cdsinit
  vovdir = getShellEnvVar( "VOVDIR" )
  ilfile = strcat( vovdir "/eda/Cadence/ADE-NC/cdsinit" );
  printf( "Loading RTDA NetworkComputer Interface %s\n" ilfile )
  load( ilfile )
```

Environment

The environment variable LBS_CLUSTER_MASTER is **not needed in ADE-6.1**, although it is useful in ADE-5.1. If the environment variables LBS_BASE_SYSTEM or LBS_CLUSTER_MASTER are set, please check that they have valid values or the Job Policy form may take 30 seconds or more to be displayed (this has nothing to do with Altair Accelerator). During the initial setup, it might be a good idea to unset these environment variables.

If you need to create environments to run ADE-6, we recommend you look in the directory `$VOVDIR/eda/Cadence/environments` where you can find two environments, one called CADENCE and one called MMSIM. You may want to copy those environments into `$VOVDIR/local/environments` and customize them as necessary.

In the following we assume you have an environment called CADENCE to enable virtuoso and an environment called MMSIM to enable spectre, aps, ultrasim, etc.

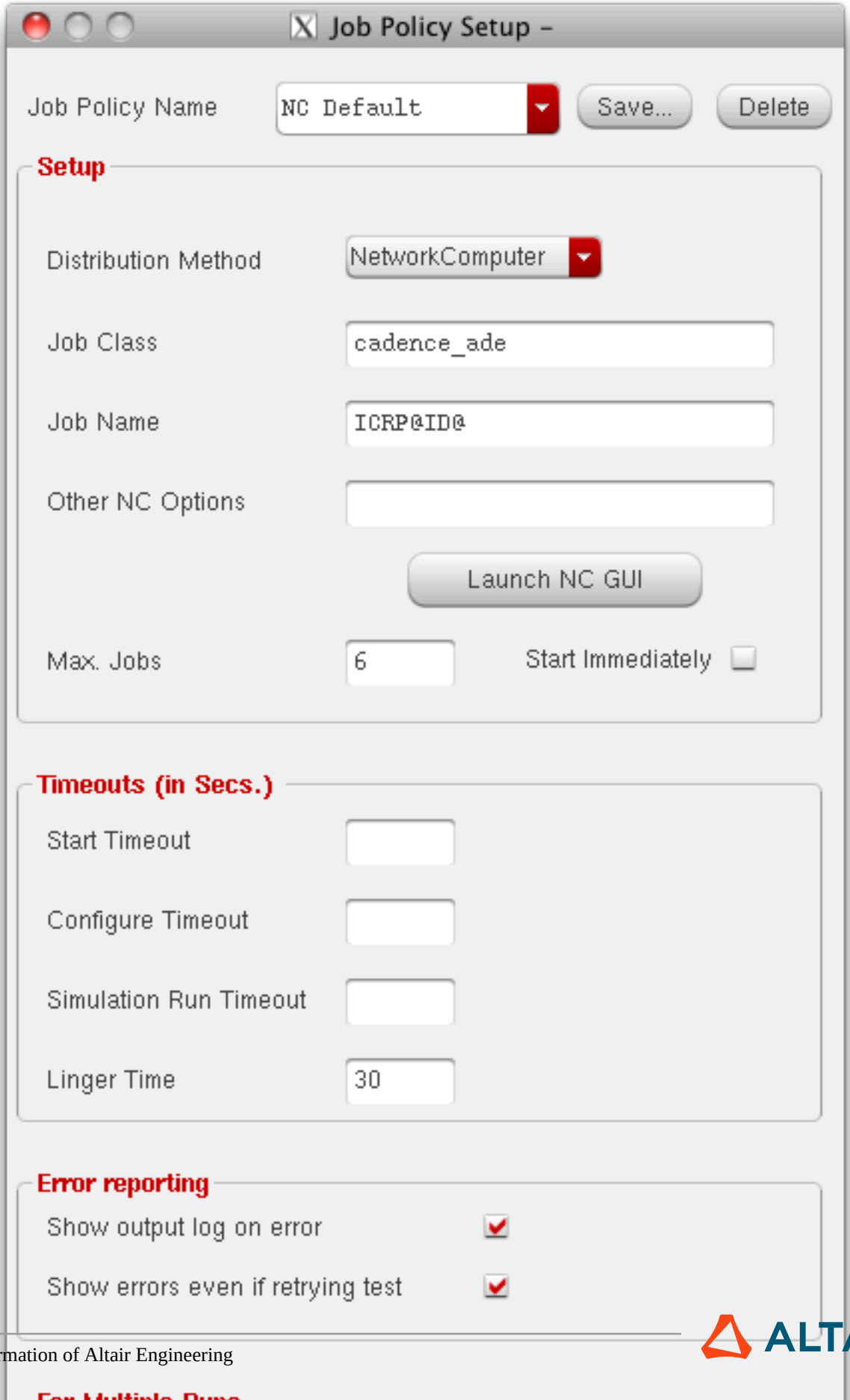
```
% ves CADENCE+MMSIM
```

```
% which virtuoso
% which spectre
```

Initial Setup

It is *strongly* recommended that you begin with a working simulation environment (correct paths, model files, etc.).

1. Start virtuoso and bring up the simulation environment.
2. Choose **Options** > **Job Setup** and bring up the Job Policy Setup form.
3. Setup the policy as follows:
   a) Select the **NC Default** job policy.
   b) Set **Job Class** to a suitable Accelerator jobclass. The default is 'cadence_ade'.
   c) Optional: Change **Job Name**. In this field you can use the symbolic values @ID@ and @USER@ (but not the @JOB@ value, as in ADE-5)
   d) Choose **Max. Jobs** appropriately. The default is 2. This number determines how many parallel jobs you want to run.
   e) If desired, change the job policy name and save the job policy to disk. To do this, enter a Job Policy Name to anything you like. (The name will be remembered when you run tests.)
   f) Click **Save** and save in one of the locations shown (typically `.cadence/jobpolicy`, this is dictated by the value of `setup.loc` in your installation).


Job Policy Setup –
Job Policy Name
NC Default
Save...
Delete
Setup
Distribution Method
NetworkComputer
Job Class
cadence_ade
Job Name
ICRP@ID@
Other NC Options
Launch NC GUI
Max. Jobs
6
Start Immediately
Timeouts (in Secs.)
Start Timeout
Configure Timeout
Simulation Run Timeout
Linger Time
30
Error reporting
Show output log on error
Show errors even if retrying test

4. Click **OK**.
5. In the Run Options dialog, select the **Parallel** option.

Figure 5:

6. Try running a single simulation to test the setup.

Enable Vendor Queueing

Since with Altair Accelerator you will be often running near the edge of saturation of the licenses, you need to enable vendor queueing to add the necessary reliability to overcome occasional situations where licenses are not available due to some out-of-queue activity. For Spectre, the option to use appears to be +lqtimeout VALUE or +lqmmtokens. This is in addition to +lsusp explained below.

Enable Preemption

The spectre jobs must be run with the +lsusp option in order to become easily preemptable. You can set this option in the "Environment Options" dialog:

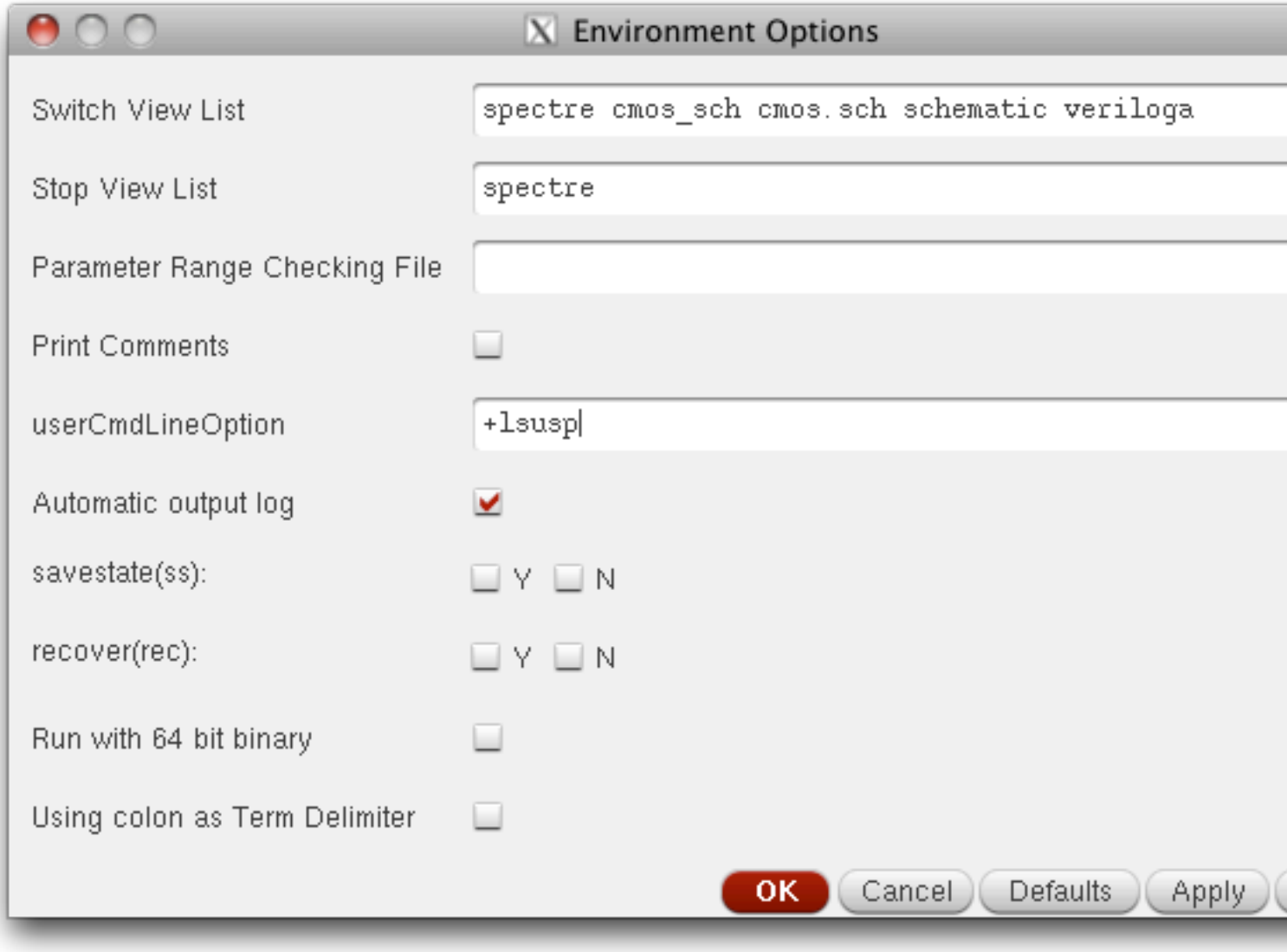


Figure 6:

Debugging Setup Issues

If you encounter an error of the form:

```
ERROR (ADEXL-5011): While simulating text deleted
Simulation Error:
 ------------------------------
  Failed to launch the simulation.

  For details open log: text deleted
```

then check the relevant log file. If the simulator executable is not found, create or select an appropriate Altair Accelerator jobclass and update the 'Job Class' field on the 'Job Setup' form.

If virtuoso repeatedly tries to start a new job, then there is a problem with the setup. Stop the simulation and debug the issue by looking through the CIW output (usually in the file ~/CDS.log).

If you encounter an error of the form:

```
*Error* NCJobIntfc.runNC: non-zero status
    command= text deleted
    result= text deleted
Errset caught: text deleted
```

then it is possible that the Altair Accelerator `nc` executable is not in your search path. If the message has the text `nc: invalid option` then the `netcat` executable is being used instead. If the message has the text `nc: command not found`, then the executable `nc` is not on the search path. In either case, the simplest fix is to exit virtuoso, update your search path and try again.

You may encounter the following error when you bring up the 'Job Setup' form:

```
ERROR (ADEXL-1932): Could not initialize LBS text deleted
lbpsGetComponentHandle: Could not create handle to server
LBS will not be available for job distribution
```

This indicates a problem with your LBS configuration. The error is benign, but it you wish to avoid it in future, unset the environment variables LBS_BASE_SYSTEM, LBS_CLUSTER_MASTER.

Post Initial Setup

You can turn off the debug messages after initial setup. You can do this by removing or commenting out the call to `NCSetDebug()` in your `.cdsinit` file. Alternatively, you can type:

```
NCSetDebug( nil )
```

in the CIW.

You can increase the 'Max. Jobs' number in the 'Job Setup' form.

Further information on setting up job policy and options (other than those specific to Altair Accelerator) may be found in the *Cadence Analog Distributed Processing Option User Guide* and the *Virtuoso Analog Design Environment XL User Guide*.

If you wish to restrict the 'Job Class' to a prescribed list, use the `NCSetJobClassList()` function in the `.cdsinit` file (see the included `.cdsinit` file for an example. This function must be called *before* the 'Job Setup' form is displayed.). For example, to restrict the choices to the jobclasses "normal", "priority", "overnight", add the following to the appropriate place in your .cdsinit:

```
NCSetJobClassList( '("normal" "priority" "overnight") )
```

The 'Linger Time' field in the job policy governs the delay before the ICRP process is terminated after last simulation job. The nature of the simulation jobs will dictate an appropriate value of this field. A smaller value allows Altair Accelerator to distribute the simulation jobs among computing nodes effectively, while a larger value reduces the simulation setup overhead, which is effective for shorter simulations of similar circuits.

The `.cdsenv` file can be used to set a default job policy. For example, adding the following to your `.cdsenv` file will make "my_policy" be the default.

```
adexl.icrpStartup defaultJobPolicy string "my_policy"
```

To specify a default job policy use the `NCSpecifyDefaultJobPolicy()` function. This only has effect if there is no existing policy of the same name. For example, the following will register a policy named "Example Policy", if no such policy already exists.

```
        policy = '(
                ("jobclass"                     "cadence_ade")
                ("jobname"                      "ICRP@ID@")
                ("maxjobs"                      "2")
                ("lingertimeout"                "30")
                ("preemptivestart"              "0")
            )
        NCSpecifyDefaultJobPolicy( "Example Policy" policy)
```

If specified, the "jobclass" field must be an element of any list specified using `NCSetJobClassList()`. Any number of default job policies may be specified.

As a convenience, any substring of the form "@ID@" is replaced by the ICRP job id. Similarly, any string of the form "@USER@" is replaced by the value of the environment variable USER.

Advanced Jobclass for ADE Jobs

In the directory $VOVDIR/etc/jobclass/examples you can find an advanced jobclass for ADE jobs called spectre_ade.tcl. To deploy this jobclass you can do this:

```
% cd `nc cmd vovserverdir -p jobclass`
% cp $VOVDIR/etc/jobclass/examples/spectre_ade.tcl.
% vi spectre_ade.tcl
```

File: spectre_ade.tcl

```
# Original Documentation about MMSIM.
set MMSIMDOC {

Simulator solver        RF      turbo   parasitics level         tokens
--------- -----------   ------- ------  ---------  -------      ---------
Spectre   Spectre       N       N       N       spectre L       1
          Spectre       N       Y       N       spectre XL      2
          Spectre       N       N       Y       spectre GXL     4
          Spectre       N       Y       Y       spectre GXL     4
SpectreRF Spectre       Y       N       N       spectre XL      2
          Spectre       Y       N       Y       spectre GXL     4
          Spectre       Y       Y       N       spectre GXL     4
          Spectre       Y       Y       Y       spectre GXL     4
Ultrasim  Ultrasim      N/A     N/A     N       Ultrasim L      4
          Ultrasim      N/A     N/A     Y       Ultrasim XL     6
AMS       Spectre       N/A     N       N       AMS+Spectre L   3
          Spectre       N/A     Y       N       AMS+Spectre XL  4
```

```
          Spectre      N/A     N       Y       AMS+Spectre GXL 6
          Spectre      N/A     Y       Y       AMS+Spectre GXL 6
          Ultrasim     N/A     N/A     N       AMS+Ultrasim L  6
          Ultrasim     N/A     N/A     Y       AMS+Ultrasim XL 8

AMS-APS:  4 tokens + number of tokens in chart below.

Basically the AMS mmsim token # equals 2 + mmsim (spectre L/XL/GXL, or usim L/XL)
 tokens

In MMSIM 7.2 APS licensing using 90003 is:

1-4 Cores takes 4 tokens.
5-16 Cores take 6 tokens.
APS-RF takes 6 tokens.

APS was released in MMSIM7.1 (and not available in MMSIM7.0).
If you are using MMSIM 7.1, the licensing for APS using 90002 tokens is this:

APS   #Elements  #Threads     #Tokens
    <=75K        1-4        4 tokens (see Note 1)
    <=75K        5-8        8 tokens (see Note 2)
     >75K        1-4        8 tokens (see Note 3)
     >75K        5-8        12 tokens (see Note 4)

Note 1: APS L license OR APS XL license OR 4 tokens
Note 2: 2 APS L licenses OR APS XL license OR 8 tokens
Note 3: APS XL license OR 8 tokens(2 APS L licenses not allowed)
Note 4: APS XL+L license OR 2 APS XL licenses OR 12 tokens (2 APS L licenses not
 allowed)

The APS license process is (MMSIM 7.1):

1. The APS L license or 4 tokens are checked out since circuit size is unknown
2. Once the circuit size is detected, APS L license or 4 tokens are checked in, and
 the
   appropriate license/number of tokens is checked out.

}

proc checkRunCommand {{file "runCommand"}} {
    # This procedure examines the runCommand file created by ADE
    # and tries to compute the number of license tokens needed.

    # It is important to be correct so that we do not
    #  - reduce throughput by queueing jobs when licenses are available
    #  - cause license errors by launching jobs when no licenses available

    # Examples of what we may expect in the runCommand file.
    # The \ indicates that the content is all on one line

    # spectre input.ics +iscchars +log ../psf/spectre.out  -format sst2 -raw \
                                                #   ../psf +turbo +lqtimeout 0 -maxw
 5 -maxn 5 +lsuspend +lqt 0 +lqs 30

    # spectre input.scs +escchars +log ../psf/spectre.out  -format sst2 -raw \
                                                #   ../psf +aps +lqtimeout 0 -maxw 5
 -maxn 5 +lsuspend

    global VOV_JOB_DESC
    # Use a variable for the (long) license name
    # IMPORTANT: change this if you use a non-default name for MMSIM license
    set lictok "License:Virtuoso_Multi_mode_Simulation"
```

```
    # Initialize flags
    set hasRF    0
    set hasTurbo 0
    set hasAPS   0
    set tool    ""
    set threadNum 1
    set hasRunCommand 0

    if { [file exists $file] } {
        if { [catch {set ifp [open $file "r"] } opnmsg] } {
            # complain, but do not return, fall into default case below
            VovError "opening run-cmd file '$file'  -- $opnmsg"
        } else {
            set cmd [read $ifp]
            catch {close $ifp}
            set hasRunCommand 1
            set tool [shift cmd] ; # usually 'spectre'
            # examine the arguments
            while { $cmd != {} } {
                set a [shift cmd]
                switch -glob -- $a {
                    "++aps" -
                    "+aps"   { set hasAPS   1 }
                    "-aps"   { set hasAPS   0 }
                    "+turbo" { set hasTurbo 1 }
                    "-turbo" { set hasTurbo 0 }
                    "+multithread=*" { set threadNum [string range $a 13 end] }
                    "+mt=*"          { set threadNum [string range $a  4 end] }
                    "-multithread" - "-mt" { set threadNum 1 }
                }
            }
        }
    } else {
        VovMessage "run-cmd file does not exist -- '$file'" 3
    }

    # For now, we only cover the spectre case (below, handy line for cut/paste)
    ##### License:Virtuoso_APS_MMSIM_Lk#6
    ##### License:Virtuoso_Multi_mode_Simulation#6

    # Do not print this - confuses the interface code
    # puts "$hasRF-$hasTurbo-$hasAPS"

    # compute base number of tokens
    switch -glob "$hasRF-$hasTurbo-$hasAPS" {
        "*-*-1" -
        "1-1-0" {
            set tok_base 2
        }
        "1-0-0" -
        "0-1-0" {
            set tok_base 1
        }
        "0-0-0" -
        default {
            set tok_base 1
        }
    }

    if { $threadNum > 16 } {
        # We do not have doc about this case.  Should check with Cadence
        set tok_core 6
```

```
    } elseif { $threadNum >= 5 } {
        set tok_core 6
    } elseif { $threadNum >= 2 } {
        set tok_core 2
    } else {
        if { $hasAPS } {
            set tok_core 4
        } else {
            set tok_core 1
        }
    }
    set tok_tot [expr $tok_base + $tok_core]
    # license resource
    set    VOV_JOB_DESC(fstokens)  $tok_tot
    append VOV_JOB_DESC(resources) " ${lictok}\#$tok_tot "
    # CORES resource
    append VOV_JOB_DESC(resources) " CORES/$threadNum "

    append  VOV_JOB_DESC(resources) " Limit:spectre3_ade#$tok_tot"          ;# Limit
 for the whole job class.
    append  VOV_JOB_DESC(resources) " Limit:spectre3_ade_@USER@#$tok_tot"   ;# Limit
 for each user in this job class.
    return $hasRunCommand
}
###
### A jobclass for the jobs generated by Cadence ADE
###

set classDescription "Cadence ADE jobs"

# Use snapshot env for now, but we recommend using composite named environment.
set VOV_JOB_DESC(env)       "SNAPSHOT"
set VOV_JOB_DESC(group)     "/class/spectre_ade"
set VOV_JOB_DESC(legalExit) "0-137"
set VOV_JOB_DESC(priority,sched)  8
# set VOV_JOB_DESC(env)    "BASE+CADENCE"

# following is equivalent to -D on the command line
append  VOV_JOB_DESC(check,directory) 0

# check old and new command file names
set cmdfiles {"runSimulation" "runCommand"}
foreach cfn $cmdfiles {
    if { [file readable $cfn] } {
        break
    }
}

set hasRunCommand [checkRunCommand $cfn]

if { $hasRunCommand } {
    # nothing
} else {
    # This slave resource is to limit a host to one virtuoso
    #01jul2016 abb; comment out for now
    #append  VOV_JOB_DESC(resources) " virtuoso/1 "
}

##append  VOV_JOB_DESC(resources) " x86_64 RAM/200";   ## Other hardware
 requirements.
# parray VOV_JOB_DESC

proc initJobClass {} {
```

```
    vtk_resourcemap_set       Limit:spectre3_ade            24
    vtk_resourcemap_set_limit Limit:spectre3_ade_@USER@     16
}
```

Warning: This is our best attempt to capture the number of tokens used by the various ADE tools, based on the command line in the ICRP scripts. Since Cadence may change their policies on tokens at any time, you may want to adapt the jobclass to your needs.ed by Altair Accelerator as a networkable directory. This may happen if it is on a non-exported filesystem, for example `/tmp`. To use Altair Accelerator well, the simulation run directories should be on networkable filesystems.

Ocean

To submit a job from an Ocean script to Altair Accelerator, use the option `?drmsCmd` in the `run()` procedure, and use the regular `nc run` submission command. We recommend using a jobclass to define the licenses and environments required for a successful job execution. We also recommend using a unique name for each job, in order to enable waiting for each specific job.

Below you can find a fragment of an Ocean script. First we compute a unique name for each job we want to submit, then we use

```
nc run -C spectre_ade -J JOBNAME ...
```

as the submission command. It is assumed that the jobclass "spectre_ade" is ready and working.

A few lines below, we wait for a specific job using the unique job name, specifically using:

```
nc wait -select "jobname==JOBNAME"
```

The following fragment of Ocean script is part of a much bigger script and is meant to show a possible interaction beteen Ocean and Altair Accelerator.

```
 foreach(curr_corner listOfCorners

   ;;;
   ;;;  --- Do whatever is needed
   ;;;

    ;; Compute a unique name for the jobs used in this session.
    ;; Here we use the PID of the current Ocean process as uniquifier.
    ;; The name of each job contains the corner name.
    ;; Options used in nc run:
    ;;   -C JobClass
    ;;   -J JobName
    ;;
    sprintf( ncNameRoot "ocn_%d_" ipcGetPid() )
    ncName            = strcat( ncNameRoot curr_corner )
    submissionCommand = strcat( "nc run  -C spectre_ade -J " ncName )
    myresults =  run( ?jobName "rtda" ?drmsCmd submissionCommand )
         joblist = append( joblist list(list(myresults curr_corner ncName)) )
 )

 foreach(job joblist
   curr_job   =nth(0 job)
   curr_corner=nth(1 job)
```

```
    ncName     =nth(2 job)

    println( strcat("WAITING FOR COMPLETION OF JOB " ncName ) )
    csh( strcat("nc wait -select jobname==" ncName ) )

   ;;;
   ;;;  --- DO whatever is needed
   ;;;

 )
```

Cadence Encounter

GUI from farm hosts to submit host

Cadence Encounter uses X-windows, so you need to be sure the X server on the submit host can accept client connections from the farm machines.

In olden days, this was as simple as:

```
% xhost +
```

You still have to do this, but there is more too. See below.

Alas, due to heightened security concerns, most recent (2009) Linux distributions start the X-server with the `-nolisten tcp` option, so it does not even listen for clients, except on the loopback interface, in the expectation that clients from remote hosts will be tunneled through an SSH connection.

You can verify that this is the case running the following and looking for `-nolisten tcp` in the output.

```
% ps auxww | grep X
```

You can use the gdmsetup GUI to edit the config to enable listening on TCP ports (Usually 6000 for display :0), or edit the config files directly. It is better to use the config UI because the file location varies.

If you get messages from Encounter like `_IceTransSocketUNIXConnect: Cannot connect to non-local host` you can probably work around it by submitting the job in an xterm, after setting env-var DISPLAY to the host:displaynumber for your workstation.

```
% setenv DISPLAY your-host:your-displaynum
% nc run -Ix xterm -e encounter
```

Or..

```
% nc run -e 'D(DISPLAY=host:N)'  xterm -e encounter
```

Specman

Preemption

It appears that for preemption to work with the method SIGTSTP it is necessary to add

```
SPECMAN_LICENSE_RELEASE=yes
```

in the file `system.specman` or `.specman`.

In the `vovpreemptd/config.tcl` file you will have a line that looks like the following:

```
VovPreemptPolicy License:specman -method SIGTSTP
```

Emanager/Vmanager

Altair distributes the source code for the plugin for Altair Accelerator. The code is in `$VOVDIR/eda/Cadence/EnterpriseManager/user_drm`.

To install the plugin, you first need to compile it. Make sure the VMANAGER_HOME is defined first.

```
% cd $VOVDIR/eda/Cadence/EnterpriseManager/user_drm
% ves EMGR       ## Switch to the environment that enables emanager
### OR directly set VMANAGER_HOME
% setenv VMANAGER_HOME /tools/cadence/em/8.22.3.3/components/vm
```

Then compile the `libUserDrm_d.so` library with:

```
### Here we assume you are running on a Linux machine
% make -f Makefile.linux release
```

This will create a dynamic library called `$VMANAGER_HOME/linux/vm/libUserDrm.so`. At this point, when you start eManager, you must configure the User DRM interface to use this new library.

Old Approach with LSF Emulation

Our customers also report good success with the LSF emulation package.

```
% ves EMGR+LSFEMUL
% emanager &
```

It has also been reported that session stopping is inefficient, in the sense that it takes a long time to stop the jobs.

Synopsys

Synopsys Design-Compiler

dc_shell

Although DesignCompiler by Synopsys is totally controllable, most user scripts for synthesis tend to ignore the problem of returning a meaningful exis status, so that most runs of DesignCompiler finish with the "Thank you" message and exit with status 0. To detect errors in the compilation, most customers follow the execution of `dc_shell` with a grep for errors on the log file.

You can use the script `$VOVDIR/eda/Synopsys/vdc_shell` as a template to combine `dc_shell` and grep into a single tool that returns a meaningful exit status.

Environment variables

Activate vendor queueing for the license

```
setenv SNPSLMD_QUEUE      1
setenv SNPS_MAX_QUEUETIME 7200
```

Exclusions for dc_shell

It is common to exclude the `command.log` file from the dependencies and also all files in the synopsys_cache directory.

```
# In file exclude.tcl

# This is to allow multiple executions of dc_shell
# in the same directory.
vtk_exclude_rule -regexp {/command.log$}

# This is to exclude the Synopsys cache from the trace
# when using vrt as a wrapper.
vtk_exclude_rule -regexp {/synopsys_cache/}
```

Hspice

Environment

Set the environment variable META_QUEUE to 1 to activate vendor queueing. Set the environment variable META_QUEUE_TIME to limit how long to retry to acquire a license.

The variable LM_LICENSE_FILE also needs to be set in the environments, although its value will be overridden if you use Altair Accelerator with the wrapper `vw vwrap`.

For example, if the environment used to run hspice is called HSPICE, add the following lines:

```
# Add this line to the HSPICE.start.tcl file
setenv META_QUEUE 1
```

```
setenv LM_LICENSE_FILE 1234@name_of_license_host
```

Submission to Altair Accelerator

If you have multiple license daemons, use VOV_LM_VARNAMES in the HSPICE environment to automatically set the value of LM_LICENSE_FILE. In practice, find the environment definition you want to use for hspice (e.g. `$VOVDIR/local/environments/HSPICE.start.csh`) and add a statement like

```
# Fragment of ..../environments/HSPICE.start.csh
setenv VOV_LM_VARNAMES LM_LICENSE_FILE
```

Then you can test your setup.

```
% ves HSPICE
% echo $VOV_LM_VARNAMES
LM_LICENSE_FILE
% nc run hspice file.spi
```

Hsim

Environment for hsim

Activate vendor queueing with the environment variable HSIM_WAIT_LICENSE.

```
# Add this to $VOVDIR/local/environments/HSIM.start.csh
setenv HSIM_WAIT_LICENSE 1
```

Sentaurus WorkBench

As of 2015, Sentaurus WorkBench (henceforth abbreviated to "SWB") directly supports Altair Accelerator. The configuration requires a modification of `gqueues.dat` and an improvement to the jobclass `nc_swb.tcl` file.

```
#########################################################################
# Global SWB queue configuration file
#########################################################################
isequeues: defaulto configuration, Jul 12 2011

#---- queues -----
#---- queue <scheduler>:<qname> "<scheduler dependent options>"

queue rtda:vnc "vnc run -C nc_swb -profile -nolog "
queue local:default "19"
queue local:priority "0"

#----- tools -----
#----- tool <dbtool> "<scheduler dependent options>" <queue>
tool launcher "" local:default
tool tecplot  "" local:default
tool inspect  "" local:default
tool svisual  "" local:default
```

```
tool default  "" rtda:vnc
```

Older Integration with LSF Emulation

Sentaurus WorkBench works well with the LSF emulation layer of Altair Accelerator. Our strategy is to invoke swb with `$VOVDIR/scripts/lsfemulation` in the path and to make SWB believe that it is using LSF.

Configuring SWB

To configure SWB to use LSF, consult the *Sentaurus Workbench User Guide*. Here is a highlight of what you should do.

First you have to change the file `gqueues.dat`, which is typically located in `$STROOT/tcad/$STRELEASE/lib/glib` or `$STROOT/tcad/$STRELEASE/lib/glib`. You need to add a line like the following:

```
# Fragment of file gqueues.dat
queue lsf:nc_swb "bsub"
```

In this example, we assume that we tell SWB to use an LSF queue called "nc_swb". You can of course change the name of the queue as long as you define the appropriate jobclass in Altair Accelerator (see below).

As explained in the user guide, you can also set tool specific resource requirements. The resources have to be specified as LSF resources and then are automatically mapped into Altair Accelerator resources during submission with the bsub emulator.

```
# THESE VARIABLE ARE SET IN THE Sentaurus Tool Database.
set WB_tool(sprocess,LSF,resource) {rusage[sprocess_all=1:sprocess3d_all=1]}
set WB_tool(sprocess,LSF,resource) {rusage[sprocess_all=1||SK_sprocess_all=1]}
set WB_tool(sdevice,LSF,resource)  {mem>5000 rusage[sdevice_all=1]}
```

The resource strings specified in the example above, are mapped respectively to the following Altair Accelerator resource strings:

```
"License:sprocess_all License:sprocess3d_all"
"License:sprocess_all OR License:SK_sprocess_all"
"RAM/5000 License:sdevice_all"
```

If you have properly connected Accelerator and Monitor, and if Monitor is monitoring the Synopsys licenses, then the resources like License:sprocess_all are already known to Accelerator. If not, please see the Altair Accelerator documentation.

Configuring an Environment for SWB

It is convenient to have a VOV Named Environment to run SWB. As a starting point for such environment, look at the examples in `$VOVDIR/etc/environments/SWB.*`.

File: SWB.start.tcl:

```
# Enter the environment for Synopsys TCAD Sentaurus Workbench

set vendorBase /tools/synopsys;  # CHANGE THIS.
set version    2008.09;   # CHANGE THIS.
setenv SNPSLMD_LICENSE_FILE 1720@pluto; # CHANGE THIS.

set appBase    $vendorBase/swb
set licBase    $vendorBase/license

# Optional argument is a different version.
if { [llength $argv] > 0 } {
```

```
    set version [shift]
}

if {! [file isdirectory $appBase/$version] } {
    VovUserError "SWB version not found: '$version'"
}

set versionBase $appBase/$version

# Add license binaries
switch -- $env(VOVARCH) {
  sun5 - sun7 {
    set arch sparcOS5
  }
  linux22 - linux - linux64 {
    set arch linux
  }
  default {
    VovWarning "No binary mapping for FT arch -- $env(VOVARCH)"
  }
}

if { [info exists arch] } {
    vovenv PATH : PREPEND $licBase/$arch/bin
}

setenv STROOT $versionBase
vovenv PATH : PREPEND $versionBase/bin
```

- You need to copy the SWB.* files from `$VOVDIR/etc/environments to $VOVDIR/local/environments`
- You need to customize the environments to fit your installation

The all important environment variable STDB, which points to the top of your SWB work area, has to be set on a case-by-case basis before starting SWB.

Configuring a queue in Altair Accelerator

In Altair Accelerator, the concept that corresponds to an "LSF queue" is the "jobclass". Following the example above, where the LSF queue is called "nc_swb", you need to create a jobclass with the same name, defined by the file `vnc.swd/jobclass/nc_swb.tcl`. An example is available in `$VOVDIR/etc/jobclass/nc_swb.tcl`.

File: nc_swb.tcl

```
###
### A jobclass for the jobs generated by SWB=Sentaurus WorkBench
###
################################ PROCEDURES

proc NC_SWB_extractLogFile {} {
    global saveBsubArgv; # Which exists if the jobs is called with bsub -q nc_swb
    set logFile     ""

    if { [info exists saveBsubArgv] } {
 set fullCommand $saveBsubArgv
 while { $fullCommand != {} } {
     set a [shift fullCommand]
     switch -- $a {
  "-o" {
      set logFile [shift fullCommand];
      break;
```

```
  }
  default {}
     }
 }
    } else {
 global argv
 global VOV_JOB_DESC

 if { [info exists VOV_JOB_DESC(logfile)] } {
     set logFile  $VOV_JOB_DESC(logfile)
 }
 set scanArgs $argv
 while { $scanArgs != {} } {
     set a  [shift scanArgs]
     switch -- $a {
  "-l" {
      set logFile [shift scanArgs]
      break;
  }
     }
 }
    }

    return $logFile
}

################################# MAIN CODE
set classDescription "Sentaurus WorkBench Jobs"

# Use the snapshot for now, but we recommend to use
# a composite named environment.
set VOV_JOB_DESC(env) "SNAPSHOT"
# set VOV_JOB_DESC(env) "BASE+LSFEMUL+SWB"

#
# Guess the license resources based on the name of the log file.
#
set presumedLogFile [NC_SWB_extractLogFile]

### puts "XXXX '$presumedLogFile'"

switch -glob -- $presumedLogFile {
    "*_des.job" { set VOV_JOB_DESC(resources) "License:sdevice_all"    }
    "*_dvs.job" { set VOV_JOB_DESC(resources) "License:sde_all"        }
    "*_fps.job" { set VOV_JOB_DESC(resources) "License:SK_sprocess2d_all" }
    "*_ins.job" { set VOV_JOB_DESC(resources) "License:Inspect_all"    }
    "*_moc.job" { set VOV_JOB_DESC(resources) "License:sdevice-montecarlo_all" }
    "*_msh.job" { set VOV_JOB_DESC(resources) "License:Mesh2D_all"     }
    "*_pof.job" { set VOV_JOB_DESC(resources) "License:Noffset-2D_all" }
    "*_tec.job" { set VOV_JOB_DESC(resources) "License:Tecplot_all"    }
    default     { set VOV_JOB_DESC(resources) "License:sde_all"        }
}

append  VOV_JOB_DESC(resources) " Limit:swb"         ;# Limit for the whole job
 class.
append  VOV_JOB_DESC(resources) " Limit:swb_@USER@"  ;# Limit for the user in this
 job class.

##append  VOV_JOB_DESC(resources) "  x86_64 RAM/200";   ## Other hardware
 requirements.
#parray VOV_JOB_DESC

proc initJobClass {} {
```

```
    vtk_resourcemap_set       Limit:swb        100
    vtk_resourcemap_set_limit Limit:swb_@USER@  50
}
```

Customizing Altair Accelerator GUI

By default, the log file of the SWB jobs has a `.job` suffix. It is convenient to add a tab to the NC GUI to view those log files. To do that, you have to edit the file `vnc.swd/gui.tcl` and add a new statement calling ::VovGUI::addOutputTab as shown in the following example:

```
# Fragment of vnc.swd/gui.tcl
::VovGUI::addOutputTab "vnc_log" {/vnc_logs/[0-9]+/[0-9]+\.[0-9]+$}  "+"
::VovGUI::addOutputTab "swb_job" {\.job$}  "+"; ### ADD THIS LINE
```

This will add the right-most tab called "O:swb_job" to the "Node Viewer" window as shown in this picture.

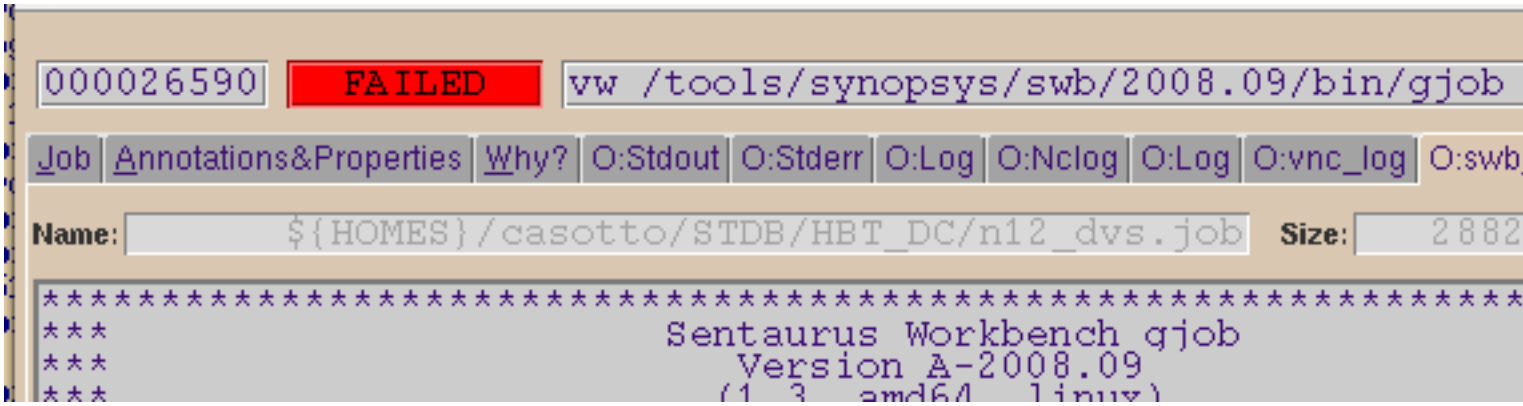


Figure 7:

Running SWB

Before running SWB, make sure you have entered the correct environment. Example:

```
% ves BASE+SWB+LSFEMUL
% setenv STDB `pwd`
% swb &
```

Troubleshooting

For advanced debugging, use

```
% setenv GSUB_ADVANCED_MODE 1
% setenv GSUB_ADVANCED_LOG_LSF 1
...
% cat glog.txt
```

VCS

The tool vcs by Synopsys is used to compile Verilog files into an executable typically called simv. It internally uses a makefile to efficiently update the output. It is therefore possible for the output to remain unchanged.

License management

Use the +vcs+lic+wait option to enable vendor queueing.

Preemption

The simv binary use VCSRuntime_Net. This resource can be preempted with the LMREMOVE method.

```
## Add this to your vovpreemptd/config.tcl  file
VovPreemptMethod License:VCSRuntime_Net      LMREMOVE
VovPreemptMethod License:VT_TestbenchRuntime LMREMOVE
```

The advertised method of using TSTP does not seem to work all the time, as reported on Jan 15, 2013. There is a simple way to test this.

1. Launch a SIMV job
2. Go to the machine on which the job is running
3. Identify the PID of the simv process
4. kill -TSTP PID_OF_SIMV
5. If the simv process stops and the license has been released (check with lmstat), then your SIMV can be preempted with SIGTSTP, which would be more effective than LMREMOVE. Otherwise, stay with LMREMOVE.

Encapsulation

Although the vrt wrapper is reported to work well with vcs we recommend you also have a simple capsule to take care of the complex rules that affect the existence and timestamp of the output simv.

```
# This is an example capsule for vcs
# Put this in file $VOVDIR/local/capsules/vov_vcs.tcl

while { $argv != {} } {
   set arg [shift]
   switch -- $arg {
     "-f" { VovInput                    [shift] }
     "-o" { VovOutput -ignore_timestamp [shift] }
     "-l" { VovOutput                   [shift] }
     default {}
   }
}
```

Mentor

VLOG

Flow Consideration

If you use -fast=optimized then it is best to compile all verilog at once.

```
set vList {
   a.v
   b.v
   c.v
}

set useOptimized 1
if $useOptimized {
   T "vrt vlog -fast=optimized $vList"
} else {
   # It is ok to run multiple jobs to maximize parallelism.
   foreach v $vList {
     T "vrt vlog $v"
   }
}
```

vsim 6.*

vsim may use several alternative licenses, or even more than one, which creates challenges in accurate management and preemption.

vsim, vlog and vlib exchange a lot of information in files that are called `_info`, `_lock`, `_deps`. Many files are opened for read/write by vsim. Also the file `~/.modelsim` is often modified by vsim and other tools. Sometimes the files called `_primary.vhd` is read and written by vsim. This may happen if the vlog job was run on a 32bit machine and vsim runs on a 64bit machine. You should run the tools on the same type of machine. This use of read/write files makes the flow with ModelSim quite challenging.

Environment

We strongly recommend using a named environment called, for example, MODELSIM. Use the environment to set the path and also the JOBSPY_DAEMON.

Preemption OLD

Preemption: use JOBSPY method, because it is much speedier than LMREMOVE and also more reliable. You do need to have the JobSpy daemon running.

Example:

```
# Example: assuming the license used by vsim is License:msimhdlsim.
```

```
VovPreemptPolicy License:msimhdlsim  -method JOBSPY -maxage 120 -delay 20
```

Preemption NEW

Customers report good success with method MODELSIM. Also required is the environment variable MTI_RELEASE_ON_SUSPEND set to 1 second instead of the default 10 seconds.

```
% setenv MTI_RELEASE_ON_SUSPEND 1
```

In case of mixed simulation add vsim command line option `-lic_mixed_only`, in order to instruct modelsim to always use a combination of Sim + Mix licenses and not Sim + Sim license to prevent a mismatch in licenses after resume.

Dealing with the _lock file

If a vlog job aborts, it may leave a ".../_lock" file in the work library directory, which prevents a subsequent vlog from completing, since it is waiting for the _lock file to be removed.

Disable vopt

For vcom, use -novopt.

vsim 6.0a

vsim may use several alternative licenses, or even more than one, which creates challenges in accurate management and preemption.

Environment

We strongly recommend using a named environment called, for example, MODELSIM. Use of the JOBSPY_DAEMON variable is optional.

Preemption

Requirements: either release 8.1.4 or later of Altair FlowTracer or release 8.1.2/8.1.3 of Altair FlowTracer with patch "msimpreempt200608". This preemption method is not available for jobs running on Windows

We cannot use JobSpy with this version of ModelSim because of the limitation that requires rsh capabilities to suspend and resume jobs, Instead we need to be able to signal TSTP to all processes except mgls_asynch. This can be done with the preemption method "MODELSIM".

Preemption: use JOBSPY method, because it is much speedier than LMREMOVE and also more reliable. You do need to have the JobSpy daemon running.

The SIGTSTP method seems to work, but actually does not because it signals all child processes of vsim, including mgls_asynch which does not seem to take it nicely.

Example configuration for vnc.swd/vovpreemtpd/config.tcl

```
# Example: assuming the license used by vsim is License:msimhdlsim.
VovPreemptPolicy License:msimhdlsim  -method MODELSIM -maxage 120 -delay 20
```

JobSpy and Indirect Slaves

When you run a vsim job via an indirect slave (i.e. the job is dispatched from FlowTracer to Accelerator). The JobXXXXXXX directory is the one of the RUNNING (yellow) job in FlowTracer. In particular, it is not the ID of the job running in Accelerator.

vsim 6.1

See also vsim 6.2.

Preemption

The method SIGTSTP has been reported to work well with this release. For the other releases, we recommend using method MODELSIM.

Example:

```
# Example: assuming the license used by vsim is License:msimhdlsim.

VovPreemptPolicy License:msimhdlsim  -method SIGTSTP -maxage 120 -delay 20
```

vsim 6.2

vsim may use several alternative licenses, or even more than one, which creates challenges in accurate management and preemption.

Environment

We strongly recommend using a named environment called, for example, MODELSIM. Use the environment to set the path and also the JOBSPY_DAEMON in the form port@host.

Preemption

With release 6.2 of ModelSim, you can use two preemption methods: MODELSIM (see information for vsim6.0 or JOBSPY, which is explained here.

To use the JOBSPY method, you do need to have the JobSpy daemon running and set the JOBSPY_DAEMON environment variable.

The SIGTSTP method seems to work, but actually does not because the resumed job restarts in a confused state. The LMREMOVE method is not recommended, because it is much slower than JOBSPY and also less reliable.

Example:

```
# Example: assuming the license used by vsim is License:msimhdlsim.
VovPreemptPolicy License:msimhdlsim  -method JOBSPY -maxage 120 -delay 20
```

Note: because of a short delay between the delivery of SIGTSTP to the simulator and the actual release of the license, it is normal to notice that the newly started simulation finds all licenses taken and is therefore put in the "vendor queue" (i.e. lmstat reports the handle as 'queued'). This situation is quickly and automatically resolved.

Using vsim in Flows

Exclude from the trace the files `~/.modelsim` and `~/.modelsim_new`. Also exclude all `.asm` and `.asm64` files that are created in the library directories.

```
vtk_exclude_rule -regexp {/.modelsim$}
vtk_exclude_rule -regexp {_fast.asm$}
# vtk_exclude_rule -regexp {\.asm$}
# vtk_exclude_rule -regexp {\.asm64$}

if [info exists env(MTI_HOME)] {
  vtk_exclude_rule -prefix $env(MTI_HOME)
}
```

The file `work/_info` is created by vlib and modified by vlog. Do not make 'vlib' part of the flow. Instead consider it at the same level as a 'mkdir' command and execute it as part of vovbuild. In your flow description file, call

```
catch {exec vlib work}
```

JobSpy

JobSpy by ModelTech

These annotations apply to release 6.2a of ModelSim, which appears to be less stable than previous versions.

It is not necessary to use JobSpy with FlowTracer. FlowTracer/Accelerator is capable of suspending and resuming simulation jobs even without JobSpy.

Set the environment variable JOBSPY_DAEMON (port@host) and start the daemon.

Note:

- JobSpy with an illegal jobid still returns exit status 0, so we need to parse the output string to determine if the operation was successful.
- JobSpy JOBID suspend is asynchronous, meaning that it returns before the job is actually suspended and the license has been released.

Calibre Turbo

vovcalibremt

`vovcalibremt` is a script to support the parallel distributed version of calibre with MTflex. This script is designed to be invoked in N identical instances on all machines used for the run, with the instance 1 becoming the calibre master while all other instances become the calibre slaves.

The remotefile tells the master calibre how to launch the jobs. Here is an example of a "remote file" which is used to specify to the "calibre master" the configuration to be used to the parallel run. Note the 'MANUAL' keyword which means that 'calibre' leaves to Accelerator the task of starting the remote slaves.

```
LAUNCH MANUAL WAIT 600 COUNT 16 PORT 10102
LOCAL HOST 4
LOCAL HOST DIR /some/directory
```

In order to get N identical invocations of the same vovcalibremt command, we can use vovparallel clone. The full invocation of the command therefore is:

```
% nc run -dp 16 -dpres mt_master,mt_slave -dpwait 4m  vovparallel clone vovcalibremt
 [CALIBRE_OPTIONS]
```

which could be simplified by the use of a job class like the following :

```
# This is an example job class file 'calmt.tcl'
set classDescription        "Calibre MTflex jobs"
set VOV_JOB_DESC(resources) "License:calibre"
set VOV_JOB_DESC(env)       "BASE+RTSIM"
set VOV_JOB_DESC(mpi,resources)    "mt_master,mt_slave"; # Deprecated
set VOV_JOB_DESC(mpi,wait)   240 ;                       # Deprecated
set VOV_JOB_DESC(dp,resources)    "mt_master,mt_slave";
set VOV_JOB_DESC(dp,wait)   240
set VOV_JOB_DESC(wrapper)  "vw vovparallel clone"
set VOV_JOB_DESC(priority,sched)  9

proc initJobClass {} {
  # define resource requiremets for the master (big machine AND a license)
  vtk_resourcemap_set mt_master  -map "linux RAM/1000 CPUS/1 License:calibre#1"  -max
 unlimited

  # define resource requiremets for the slave.
  vtk_resourcemap_set mt_slave  -map "unix RAM/100 CPUS/1"                    -max
 unlimited
}
```

The resulting submission line would look like this:

```
% nc run -C calmt -dp 16  vovcalibremt [CALIBRE_OPTIONS]
```

Using Different Resources and Jobclasses

When specifying DP jobs, you can stack jobclasses so that the primary and component jobs have different resources and job classes.

This is done by setting VOV_JOB_DESC(dp,resources) and VOV_JOB_DESC(dp,jobclasses) to specify the resources and jobclass labels for the master and subcomponent DP jobs.

For example, two jobclass definitions `mycalibre_a.tcl` and `mycalibre_b.tcl` are defined as follows:

```
::::::::::::::
mycalibre_a.tcl
```

```
::::::::::::::
# Copyright (c) 1995-2021, Altair Engineering
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# $Id: //vov/trunk/src/scripts/jobclass/short.tcl#3 $


set classDescription "My Calibre job resources"

puts "This is mycalibre jobclass"
if { [ info exists VOV_JOB_DESC(dp,resources) ] } {
  set VOV_JOB_DESC(dp,resources) [ string cat $VOV_JOB_DESC(dp,resources) ",RAM/200
 CORES/2" ]
  set VOV_JOB_DESC(dp,jobclasses) [ string cat $VOV_JOB_DESC(dp,jobclasses)
 ",mycalibre_a" ]
} else {
  set VOV_JOB_DESC(dp,resources) "RAM/200 CORES/2"
  set VOV_JOB_DESC(dp,jobclasses) "mycalibre_a"
}

proc initJobClass {} {
}
::::::::::::::
mycalibre_b.tcl
::::::::::::::
# Copyright (c) 1995-2021, Altair Engineering
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# $Id: //vov/trunk/src/scripts/jobclass/short.tcl#3 $

set classDescription "My Calibre job resources"

puts "This is mycalibre2.tcl"
if { [info exists VOV_JOB_DESC(dp,res,*)] }  {
  puts "VOV_JOB_DESC(dp,res,*) already exists.  This is good!"
} else {
  puts "VOV_JOB_DESC(dp,res,*) does not appear to exist.  This is bad."
}

if { [ info exists VOV_JOB_DESC(dp,resources) ] } {
  set VOV_JOB_DESC(dp,resources) [ string cat $VOV_JOB_DESC(dp,resources) ",RAM/400
 CORES/4" ]
  set VOV_JOB_DESC(dp,jobclasses) [ string cat $VOV_JOB_DESC(dp,jobclasses)
 ",mycalibre_b" ]

} else {
  set VOV_JOB_DESC(dp,resources) "RAM/400 CORES/4"
  set VOV_JOB_DESC(dp,jobclasses) "mycalibre_b"
}

proc initJobClass {} {
}
```

You then call `nc run` as:

```
nc run -v 5 -C mycalibre -C mycalibre2 -e BASE -J jeffjob -dp 4 vovparallel clone
 sleep 1
```

This results in the primary job having the jobclass "`mycalibre_a`" and the resources "RAM/200 CORES/2" while the secondary jobs have a jobclass of "`mycalibre_b`" and the resources "RAM/400 CORES/4".

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argparse

ArgumentParser

A slimline C++ class for parsing command-line arguments

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Bootstrap

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client-oauth2

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history

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jwt-decode

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react

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react-bootstrap

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react-bootstrap-table-next

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react-cookies

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react-data-grid

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react-dom

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react-grid-layout

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react-items-carousel

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react-page-visibility

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react-resize-detector

Version: 5.2.0

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react-scripts

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react-sparklines

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react-time-ago

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reactstrap

Version: 8.0.1

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treemap-squarify

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yup

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