

- Type `help <command_keyword>` in the Tcl window to see the syntax for the command.
2. To run a Tcl script, do the following:
 - Create a Tcl script. Refer to *Generating a Job Script*, on page 10-5 and *Creating a Tcl Synthesis Script*, on page 10-5.
 - Run the Tcl script by either typing `source Tcl_scriptfile` in the Tcl script window, or selecting File -> Run Tcl Script, selecting the Tcl file and clicking Open.

The software runs the selected script and executes the commands in it. For more information about Tcl scripts, refer to the following sections.

Generating a Job Script

You can record Tcl commands from the interface and use it to generate job scripts.

1. In the Tcl script window, type recording `-file logfile` to write out a Tcl log file.
2. Work through a synthesis session.

The software saves the commands from this session into a Tcl file that you can use as a job script, or as a starting point for creating other Tcl files.

Creating a Tcl Synthesis Script

Tcl scripts are text files with a *.tcl extension. You can use the graphic user interface to help you create a Tcl script. Interactive commands that you use actually execute Tcl commands, which are displayed in the Tcl window as they are run. You can copy this text in the Tcl window and paste it into a text file that you build to run as a Tcl script. For example:

```
add_file -verilog "prep2.v"
set_option -technology STRATIX
set_option -part EP1SGX40D
set_option -package FC1020

project -run
```

The following procedure covers general guidelines for creating a synthesis script from scratch.

1. Use a text file editor or select File->New, click the Tcl Script option and type a name for your Tcl script.
2. Start the script by specifying the project with the project -new command. For an existing project, use load *project.prj*.
3. Add files. This may not be needed for an existing project.
 - Add source files with add_file -vhdl or add_file -verilog. Make sure the top-level file is last:

```
add_file -vhdl "statemach.vhd"
add_file -vhdl "rotate.vhd"
add_file -vhdl "memory.vhd"
add_file -vhdl "top_level.vhd"
```
 - Add constraint files with constraints and vendor-specific attributes. See *Using a Text Editor for Constraint Files*, on page 3-62 for details about this file.

```
add_file -constraint "design.sdc"
```
4. Set the design synthesis controls and the output:
 - Set vendor-specific set_option controls as needed. See the appropriate vendor chapter in the *Reference Manual* for details.

```
set_option -technology VIRTEX2
set_option -part XC2V40
set_option -package CS144
set_option -speed_grade -6
```
 - Use the set_option command for implementation options.

```
set_option -symbolic_fsm_compiler true
set_option -frequency 30.0
```
 - Set the output file information with project -result_file and project -log_file.
5. Set the file and run options:
 - Save the project with project -save.
 - Run the project with project -run.
 - Open the RTL and Technology views:

```
open_file -rtl_view
open_file -technology_view
```

6. Check the syntax.
 - Check case, because Tcl is case-sensitive.
 - Start all comments with a hash mark (#).
 - Enclose all pathnames and filenames in double quotes.
 - Always use a forward slash (/) in directory and pathnames, even on the PC.

Using Tcl Variables to Try Different Clock Frequencies

To create a single script for multiple synthesis runs with different clock frequencies, you need to create a Tcl variable for the different settings you want to try. For example, you might want to try different target technologies.

1. To create a variable, use this syntax:

```
set variable_name {
  first_option_to_try
  second_option_to_try
  ...}
```

2. Create a foreach loop that runs through each option in the list, using the appropriate Tcl commands. The following example shows a variable set up to synthesize a design with different frequencies. It also creates a separate log file for each run.

```
Set of frequencies to try → set try_freq {
    85.0
    90.0
    92.0
    95.0
    97.0
    100.0
}
Foreach loop → foreach frequency $try_freq {
    set_option -frequency $frequency
    project -log_file $frequency.srr
    project -run}
Tcl commands that set the frequency, create separate log files for each run, and run synthesis ←
```