Stream Manager, Easy CAD Tools Switching in Academic Context

Jean-Marc Gallière, Guy Cathebras
Polytech'Montpellier, University of Montpellier, France
Pôle CNFM of Montpellier
{Galliere, Cathebras}@polytech.univ-montp2.fr

Abstract

In electrical engineering graduate schools, integrated circuit design is usually taught through lectures, tutorials, projects and labs. During these courses, the reference to electronic design automation software is essential. However, it is during the projects that the students acquire the most of their know-how in this field: since these project topics are given by industrialists or researchers, students are able to develop their skills in computer-aided design software in the field of microelectronics. However, these future engineers are often unconscious of the configuration problems, which are generally the task of the system administrator. These softwares are often running under some UNIX flavor and the skill to configure them is not very common. Therefore, EDA vendors often provide configuration scripts. But, and this is even truer in the educational world, one must often switch between different EDA software from the same user account. Unfortunately, this can lead to some configuration conflicts, even when these softwares are coming from the same vendor. The objective of this paper is to suggest the use of Cadence Stream Manager to assist students in their configuration tasks and to help the CAD system administrator in solving some configuration problems.

1. Introduction

For many years, the microelectronic and automation department of the Polytech'Montpellier University Engineering Graduate School has offered a wide range of lectures, laboratory works and project surveys in both digital and analog integrated circuit design [1]. Projects take a significant place in a student's curriculum. To this end, future engineers get a 300-hour period to carry out an actual industrial study in their last year of scholarship. Each year, about forty subjects are usually proposed. Among these topics we meet a wide spectrum of know-how such as digital and analog ASIC designs, process characterization and IC testing. Basically, these projects need to implement several software CAD tools such as Cadence, Synopsys and Silvaco suites. More particularly, students make a mix of all these features to perform their work. So, the CAD system manager gets a dual challenge. On the one hand, it has to implement properly all this features free of all inherent software conflicts. On the other hand, it has to facilitate the students’ software configuration task. To help the CAD manager in its duty, Cadence Design Systems proposes a tool called Stream Manager. Obviously, this software permits to manage Cadence executable files but also third party tools like Synopsys or Silvaco. The main objectives of this paper are to present the Stream Manager facility in academic project and to show the choice we made in our project policy.

2. The Stream Manager Software

Cadence Design Systems, Inc. provides software products that facilitate the design of integrated circuits at different levels of physical design process. Each product consists of a number of executable files. Defining and setting up the environment for a small number of products is relatively straightforward. However, Cadence releases suites of products and associated data which are implemented as streams. Streams allow collections of Cadence products to be quickly and efficiently assembled and released. For example, the "Virtuoso Custom Design Platform" (named: IC5441) include many products devoted to analog IC design.

To manage the complexity of multiple product releases, and to allow project environments to be specified and implemented, Cadence has introduced the Stream Manager. To support specific design environments at the project level, the products required by a particular project are selected from streams. A project may also require third party products, which must also be included in streams before the project is able to select them.

The Cadence project object concept perfectly fits with the microelectronics teaching project in engineering school. Moreover, this concept permits students to dispose of configuration starting problems and above all gives a standardized project policy for everyone.
3. Our Project Organization

The microelectronic student project takes place in a classroom outfitted of sixteen Sun-Ray clients managed by an UltraSPARC-III server loaded by the Cadence, Synopsys and Silvaco suites. In addition, three design kits from two manufacturers are also available: the AMS 0.35µm, the STMicro 120nm and the 90nm processes.

At the beginning of September the project list is finalized and all software resources needed by students are known. Then, with this list, the CAD administrator can create the project objects. Table 1 gives a non-exhaustive list of these objects managed by the Stream Manager.

To highlight the software administrator's complexity task, we see on Table 1 that some design kits are able to run with the newest Cadence tool version and some others are unable. For example, the 0.35µm AMS design kit is implemented with the IC5141 Virtuoso stream, but the 90nm STmicro design kit needs the IC5033 Virtuoso stream. In this case, project objects make possible the selection of different streams and make this stream disparity between the two project objects imperceptible for students.

<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>STREAM OR THIRD PARTY TOOLS</th>
<th>DESIGN KIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS_A_350</td>
<td>IC5141</td>
<td>AMS 350NM</td>
</tr>
<tr>
<td>AMS_D_350</td>
<td>SOC41</td>
<td>AMS 350NM</td>
</tr>
<tr>
<td>ST_A_90</td>
<td>IC5033</td>
<td>STMICRO 90NM</td>
</tr>
<tr>
<td>TMAX</td>
<td>TETRAMAX</td>
<td>NONE</td>
</tr>
<tr>
<td>SILVACO</td>
<td>SILVACO</td>
<td>NONE</td>
</tr>
</tbody>
</table>

Table 1: Project objects list

In some cases, a mix is possible between manufacturer, process dimension and circuit level description. Thus, we adopt an intelligible three-part convention to enhance the students' visibility in this configuration methodology. The first field gives the IC manufactory name of the technology employed in the project object (ex. AMS), the second field provides the project typology, analog (A) or digital (D) and the last one gives the process dimension in nanometers (ex. 350). Otherwise, i.e. when the tools are clearly identified, the project objects take the name of the main executable file (ex. HSPICE [3]) or of the software supplier (ex. SILVACO [4]).

Students have to perform only two operations to configure their environment. At first, they have to "source" the Stream Manager script with an Unix tcsh command:

```bash
> source $SM_PATH/setupStreams.csh
```

Then, they select the project with the command:

```bash
> selectproject AMS_A_350
```

Afterward, all the environment variables are setting, the licensing path is managed and the executable files are ready to be executed. If a student wants to identify the project object list available in the environment, he can utilize the command:

```bash
> showproject
```

Then, a listing appears with a brief description of all project objects both available and registered by the CAD administrator. Whenever a student wants to swap his configuration environment, he has first to deselect his current project with the command:

```bash
> deselectproject AMS_A_350
```

4. The CAD Administrator Task

For the following explanation, we suppose that all products are set up and well configured. The next steps are performed with the Stream Manager Graphical User Interface [2] (GUI).

At first, every Cadence Streams, like SOC41, must be registered. This operation consists of a basically "File → New" and "File → Save" templates. After the Streams registration is achieved, projects are to be created. Here, it is necessary to choose products that can be included into the project. The project object has to incorporate some other configuration path or environment variable like, for example the license server location for the AMS design kit.

This previous task is quite more complex for third party tools as it consists in first registering the product in the stream manager registry, in creating a stream and only after in building the project.

5. Conclusion

This approach has been used for two years in our engineering school and it turns out to be of great help as regards the management of project configuration. Students are highly satisfied with this method. Likewise, it has been confirmed by professors in charge of microelectronics projects that the students' autonomy had also established during project classes.

6. References