

Arquitectura de Computadores

Instalación y uso de Mentor ModelSim/QuestaSim

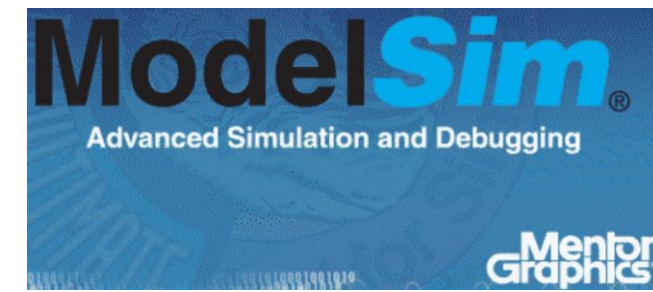
3º de grado en Ingeniería Informática y

4º de doble grado en Ing. Informática y Matemáticas

Generalidades



- Esta presentación describe el uso básico de QuestaSim/Modelsim
- Se tratan de entornos de simulación HDL (*Hardware Description Languages*) en varios lenguajes (VHDL, Verilog y SystemC) de Mentor Graphics (adquirida por el grupo Siemens).
- Questa/ModelSim se puede utilizar de forma independiente o junto con otras herramientas de diseño hardware como Intel Quartus, Xilinx ISE o Xilinx Vivado.
- La simulación se realiza mediante la interfaz gráfica (GUI- *Graphical User Inteface*) o automáticamente mediante scripts.



Generalidades

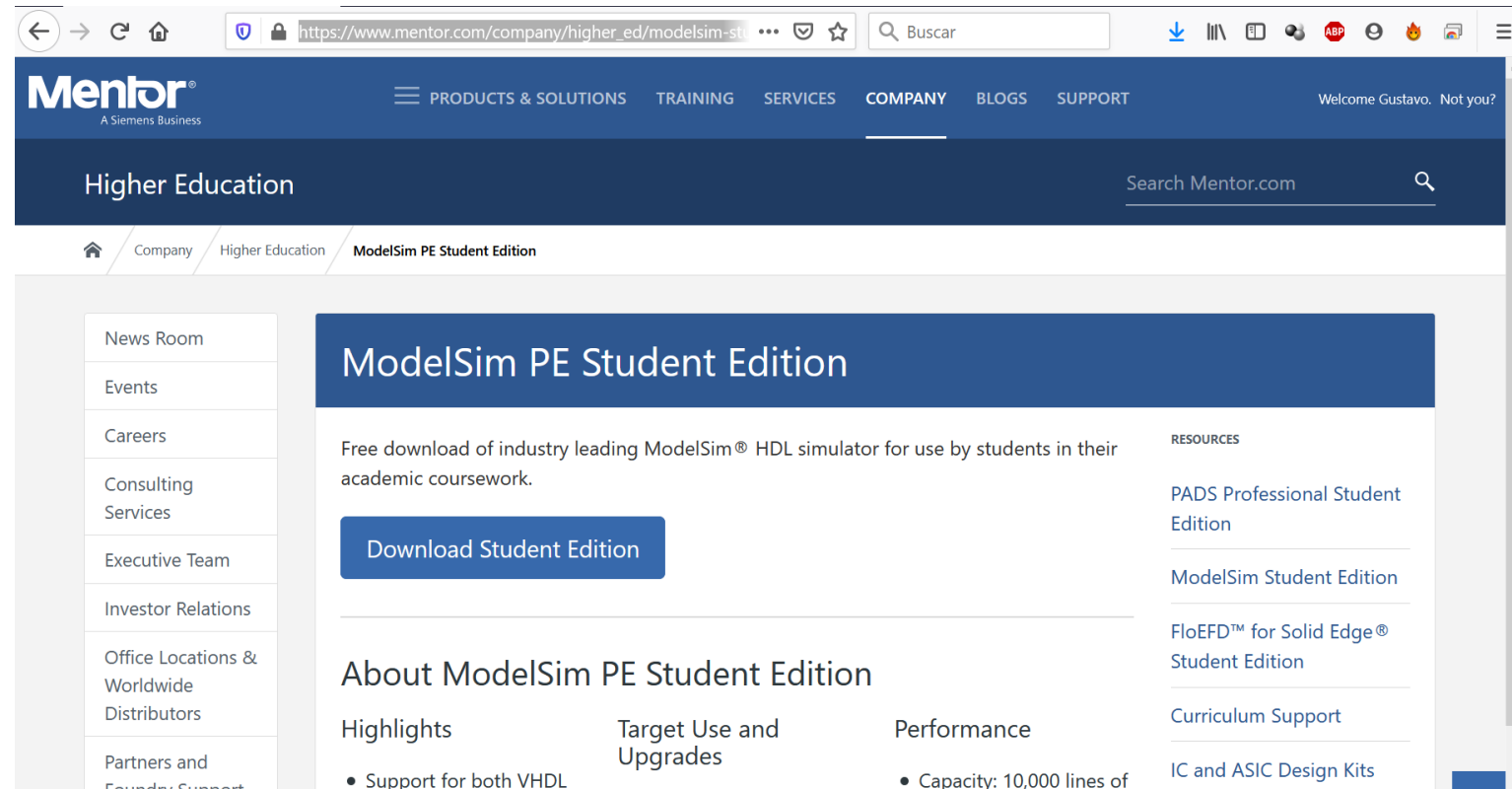
- En la EPS-UAM dependiendo el laboratorio existen instalaciones de Mentor QuestaSim o Mentor Modelsim
 - Se trata de versiones completas que utilizan licencias desde un servidor y no pueden usarse fuera del entorno de la universidad
 - En las imágenes Linux de los laboratorio de Hardware se puede encontrar QuestaSim.
 - En algunas imágenes Windows, existen instalaciones de ModelSim SE.
- En casa: Versión gratuita (ModelSim PE Student Edition) de Modelsim. A continuación como instalarlo.

Instalación de ModelSim Student Edition

1. Buscar en internet “modelsim student” o seguir el enlace https://www.mentor.com/company/higher_ed/modelsim-student-edition

Se trata de una versión solo Windows

Existe versiones Linux usando Intel (Altera) FPGAs



Instalación de ModelSim Student Edition

2. Crear un usuario
rellenando el formulario

3. Leer y aceptar el “end
user agreement”

4. Aparecerá un aviso de
que recibirás un correo
electrónico con las
instrucciones

The screenshot shows a registration form for ModelSim Student Edition. At the top left, there is a blue button labeled "Iniciar sesión con LinkedIn" and a link "Rellena automáticamente tu información". The form is divided into two columns. The left column contains fields for "First Name", "Email", "Company", "Address 1", and "Country/Region". The right column contains fields for "Last Name", "Phone", "Primary job function" (a dropdown menu), and "Address 2". A "Submit" button is located at the bottom left. On the right side of the form, there is a section titled "Already have an account?" with a "Sign In" button. Below this is a section titled "Want an account?" with a list of benefits and a "Create Account" button. The benefits listed are: "It's free, will only take a minute, and will improve your experience on mentor.com.", "Access our entire library of white papers and product demos instantly", "Register for online seminars, events, and training with ease", "Access your recent activity for easy retrieval of requested resources", "Manage your account information", and "Sign in to your account from any computer, browser, or location".

Iniciar sesión con LinkedIn
Rellena automáticamente tu información

First Name •
Last Name •
Email •
Phone •
Company •
Primary job function •
Address 1 •
Address 2
Country/Region •

A valid email address is required.

Please select a Job Function

Submit

Already have an account?
Sign In

Want an account?
It's free, will only take a minute, and will improve your experience on mentor.com.

- ✓ Access our entire library of white papers and product demos instantly
- ✓ Register for online seminars, events, and training with ease
- ✓ Access your recent activity for easy retrieval of requested resources
- ✓ Manage your account information
- ✓ Sign in to your account from any computer, browser, or location

Create Account

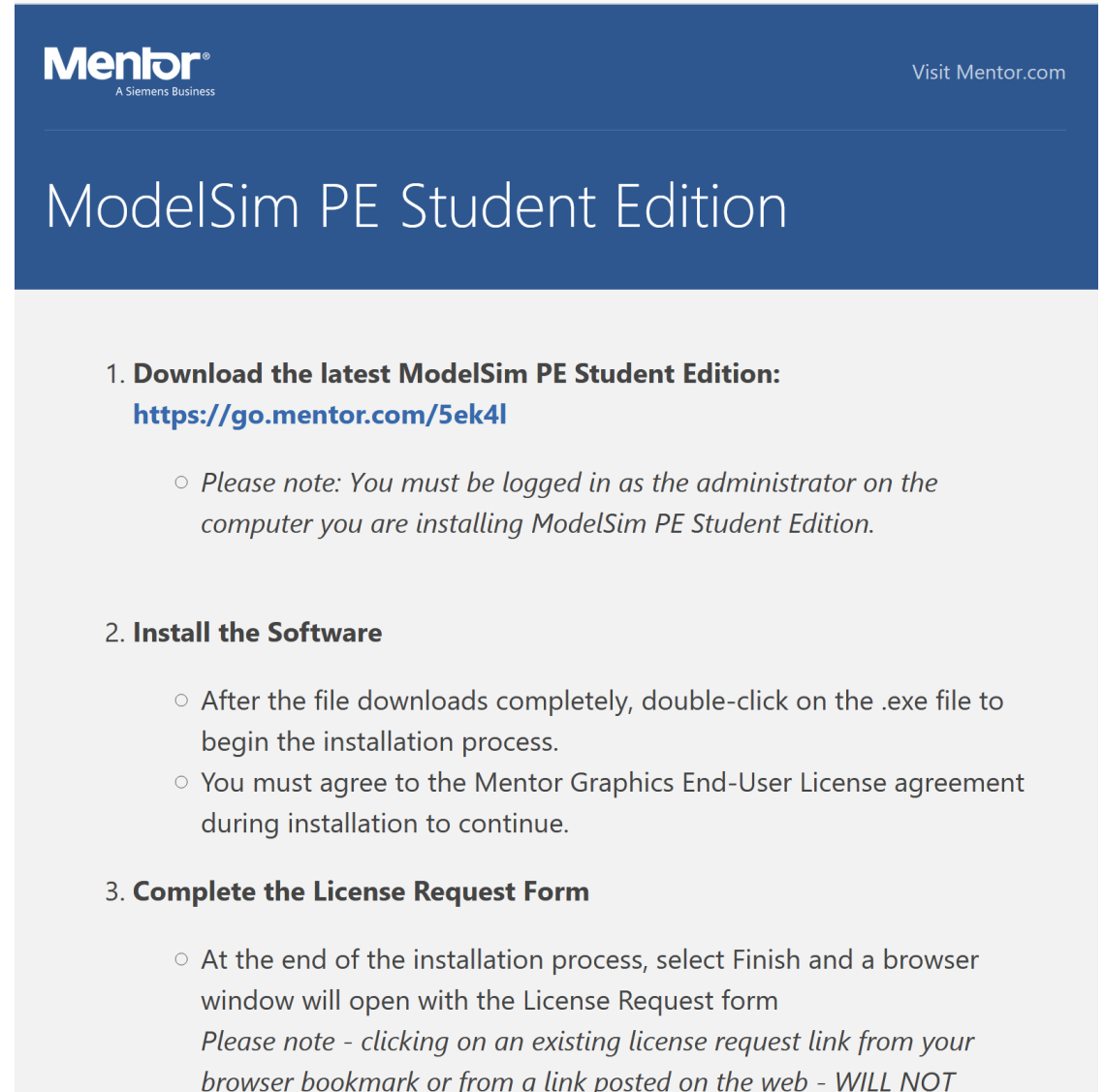
Instalación de ModelSim Student Edition

5. El email contiene los pasos para la instalación

– Son 3 simples pasos

6. Bajar el instalable siguiendo el enlace

7. Comenzar la instalación del ejecutable descargado



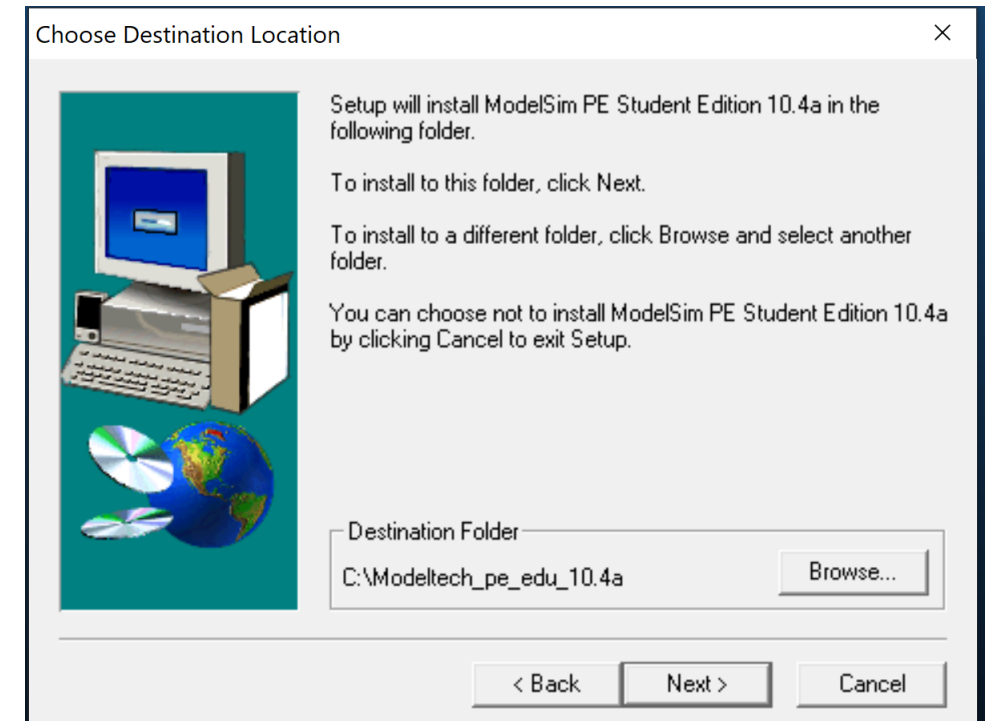
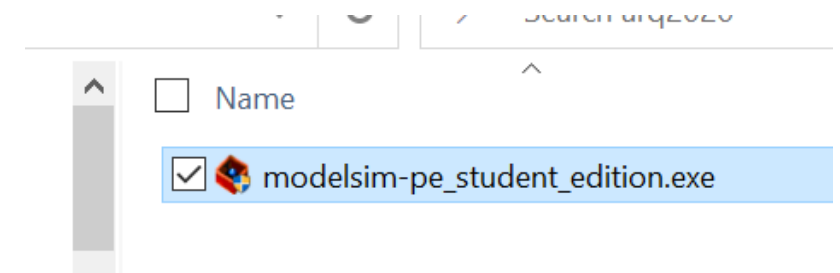
The screenshot shows the Mentor logo (A Siemens Business) and the text 'Visit Mentor.com' in the top right corner. Below this is a blue header with the text 'ModelSim PE Student Edition'. The main content area is light gray and contains three numbered steps:

- 1. Download the latest ModelSim PE Student Edition:**
<https://go.mentor.com/5ek4l>
 - Please note: You must be logged in as the administrator on the computer you are installing ModelSim PE Student Edition.
- 2. Install the Software**
 - After the file downloads completely, double-click on the .exe file to begin the installation process.
 - You must agree to the Mentor Graphics End-User License agreement during installation to continue.
- 3. Complete the License Request Form**
 - At the end of the installation process, select Finish and a browser window will open with the License Request form
Please note - clicking on an existing license request link from your browser bookmark or from a link posted on the web - WILL NOT

Instalación de ModelSim Student Edition

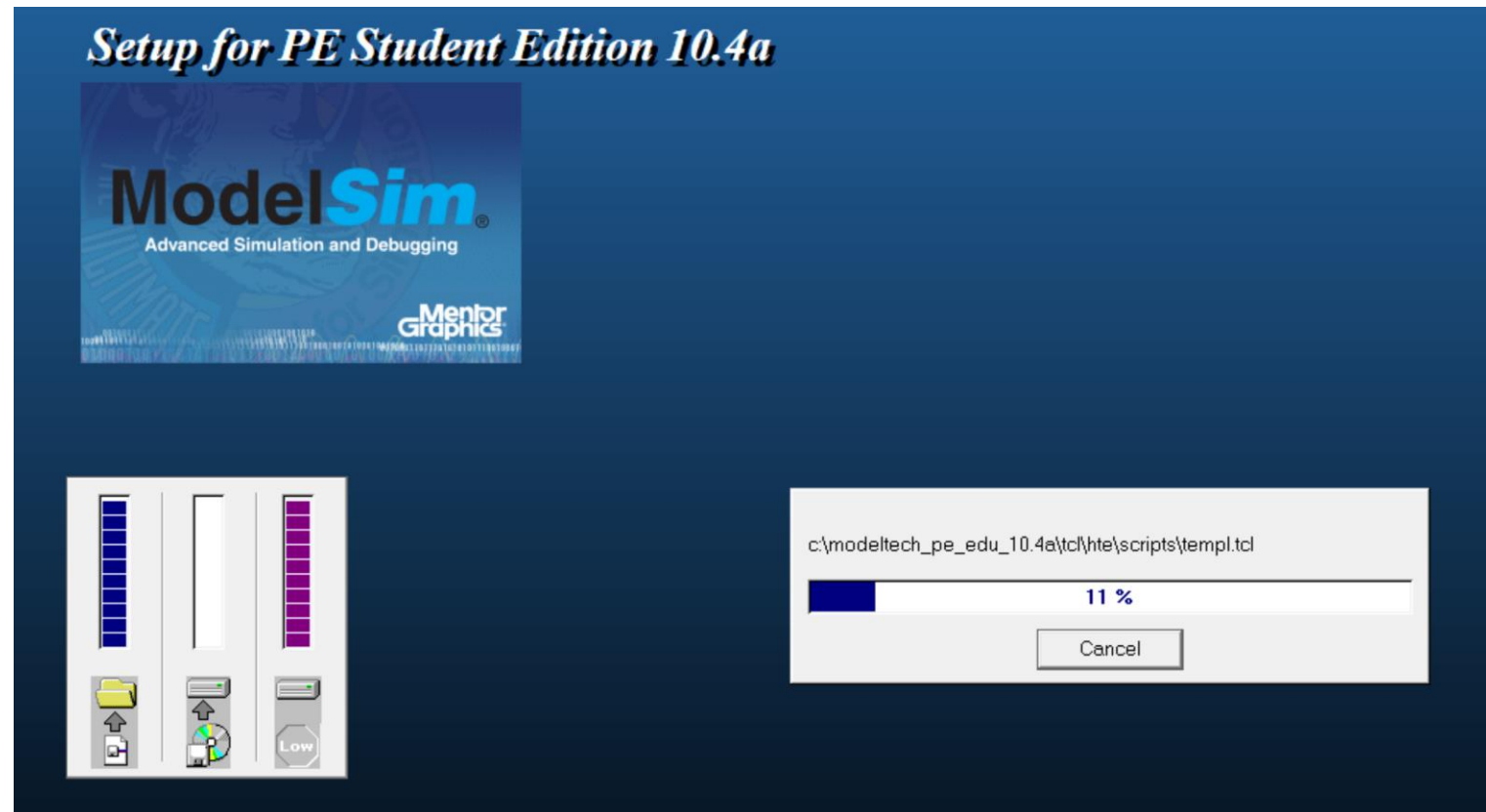
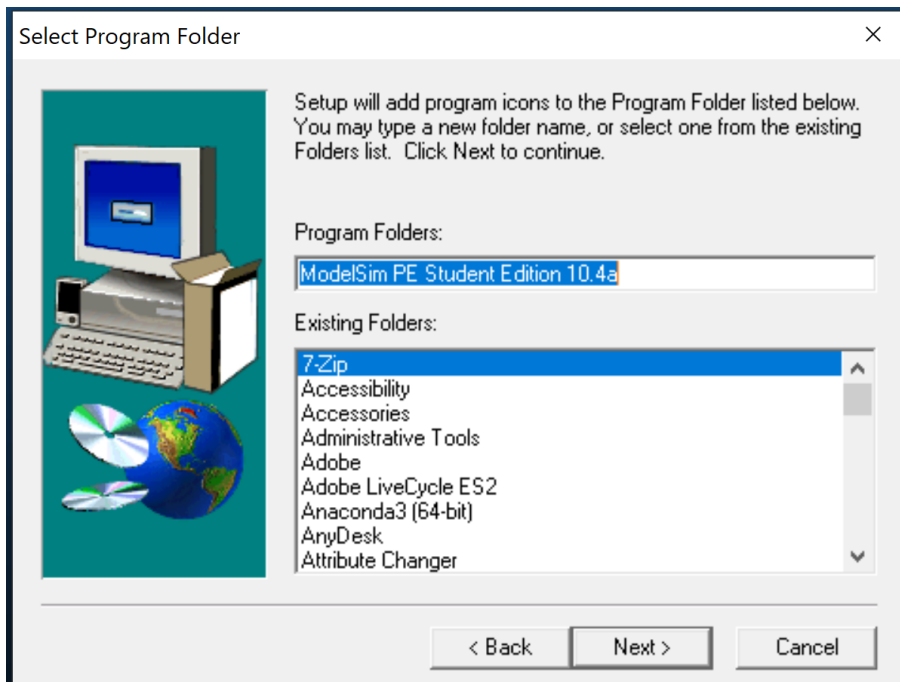
7. Comenzar la instalación del ejecutable descargado

- Seguir lo pasos necesarios



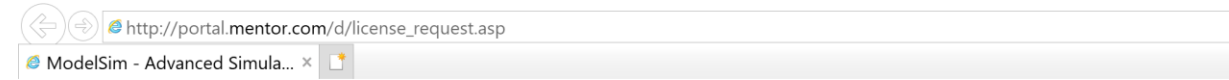
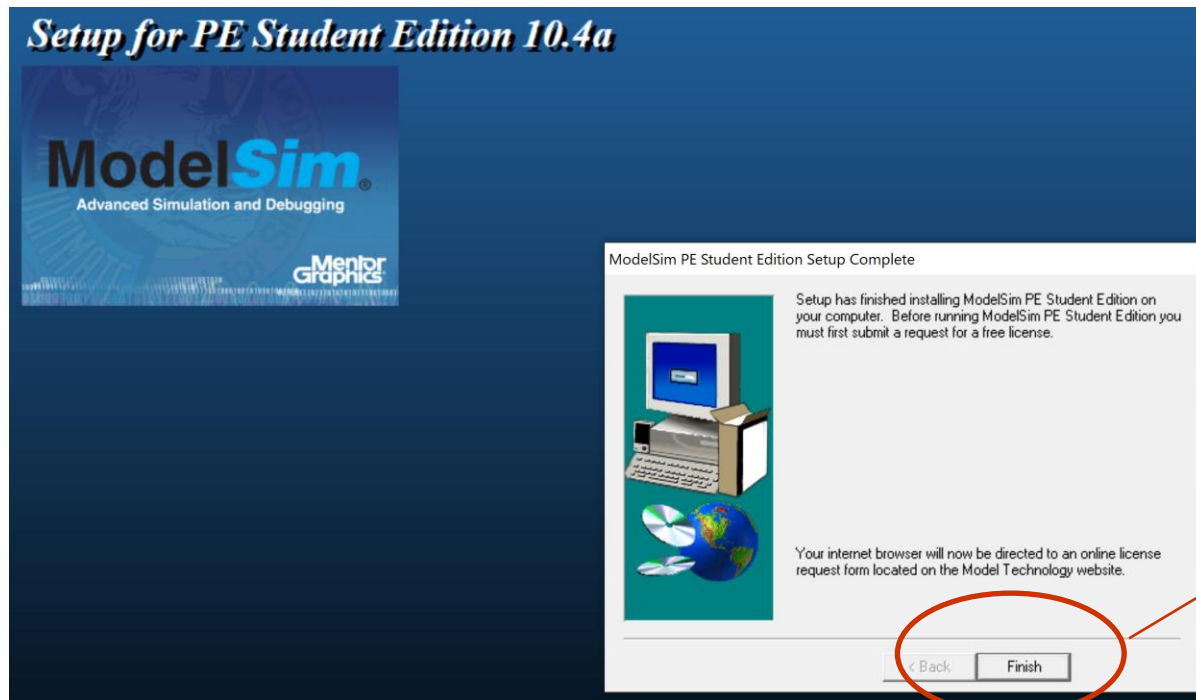
Instalación de ModelSim Student Edition

7. Comenzar la instalación del ejecutable (continuar...)



Instalación de ModelSim Student Edition

8. Al finalizar la instalación, se abrirá automáticamente una página web para obtener una licencia gratuita



ModelSim PE Student Edition – License Request

Please complete the form below to have a license file emailed to you.

First Name *	Last Name *
<input type="text"/>	<input type="text"/>
Email *	Phone * (No Dashes or Spaces)
<input type="text"/>	<input type="text"/>
Email (Please Re-enter your email) *	Please verify your email is correct, as the ModelSim Student Edition license file will be emailed to you.
<input type="text"/>	
Address *	Address 2
<input type="text"/>	<input type="text"/>
City *	State/Province (US or Canada Only)
<input type="text"/>	<input type="text"/>
Country *	Zip/PostCode *
<input type="text" value="UNITED STATES"/>	<input type="text"/>

Please tell us about yourself

Please specify your University, College, School, or Institute: *

Are you a Student or Instructor? *

☐ Student ☐ Professor / Instructor ☐ Other:

If you are a student:

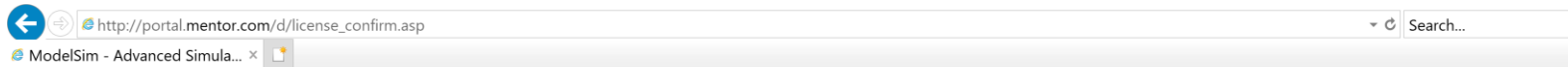
Please indicate your grade or position: *

☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Graduate Student ☐ Other:

Expected graduation year: *

Instalación de ModelSim Student Edition

9. Tras la solicitud de licencia la recibirás en tu email. Deberás copiar el fichero donde indica para que funcione correctamente



ModelSim PE Student Edition – License Request

**** READ THE FOLLOWING INFORMATION CAREFULLY ****

Thank you for requesting your free ModelSim PE Student Edition License. A detailed email with license installation instructions will be sent to the email address *gustavo.sutter@uam.es*.

Please verify that the email address listed above is correct. If not - you will not receive your license. You will then have to rerun the .exe and request another license.

**** CHECK YOUR SPAM FOLDER FOR THE *student_license.dat* File EMAIL ****

Need help?

ModelSim PE Student Edition Google Group

[Visit this group](#)

ModelSim

- [ModelSim Student Edition](#)
- [Verification Academy](#)
- [Horizons Blog](#)
- [Contact Us](#)
- [Website Terms of Use](#)
- [Privacy Policy](#)
- [Partners](#)

© Mentor, a Siemens Business, All rights reserved

De ModelSim PE Student Edition <info@model.com> ☆
Asunto: **ModelSim Student Edition License**
A Gustavo Sutter ★
9/8/2020, 7:54

Dear Gustavo,

Thank you for downloading and installing ModelSim PE Student Edition.

Enclosed is your license key. In order to complete the installation you will need to carry out the FINAL INSTALLATION INSTRUCTIONS detailed below.

NOTE - Please note that this license key will only work on the host computer on which you ran the product installation; it is not transferable to any other computer.

FINAL INSTALLATION INSTRUCTIONS
=====

1) Save the attached file with the name 'student_license.dat' to the top level installation directory for ModelSim PE Student Edition (e.g., c:/modeltech_pe_edu). This is the directory that contains that sub-directory 'win32pe_edu.'

2) Do not edit the file 'student_license.dat' in any way, or the license will not work.

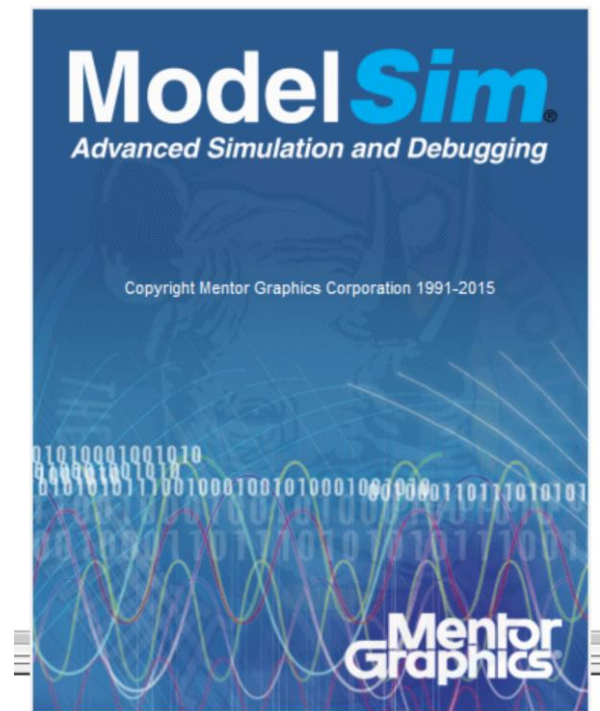
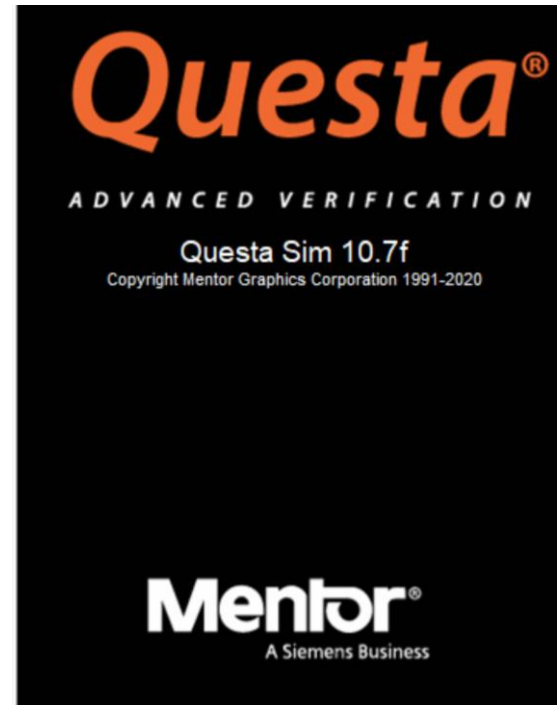
3) You should now be able to run ModelSim PE Student Edition.

> 1 adjunto: student_license.dat 34 bytes

Guarda

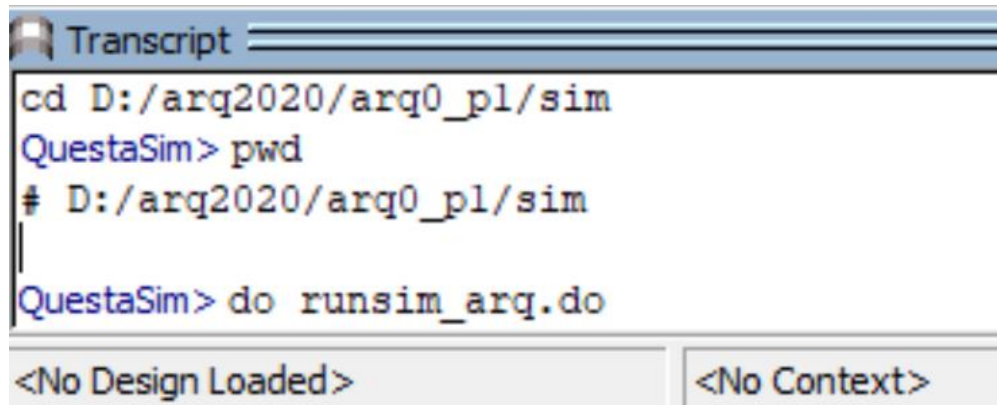
Recordatorio uso ModelSim o QuestaSim

- El flujo de trabajo es igual en ambos (al menos lo que se utilizará en arquitectura de ordenadores)
- Se puede crear un proyecto, o usar script (recomendado en arqo)
- Para iniciar Model/questa
 - Doble click (windows)
 - ***vsim*** en Linux shell



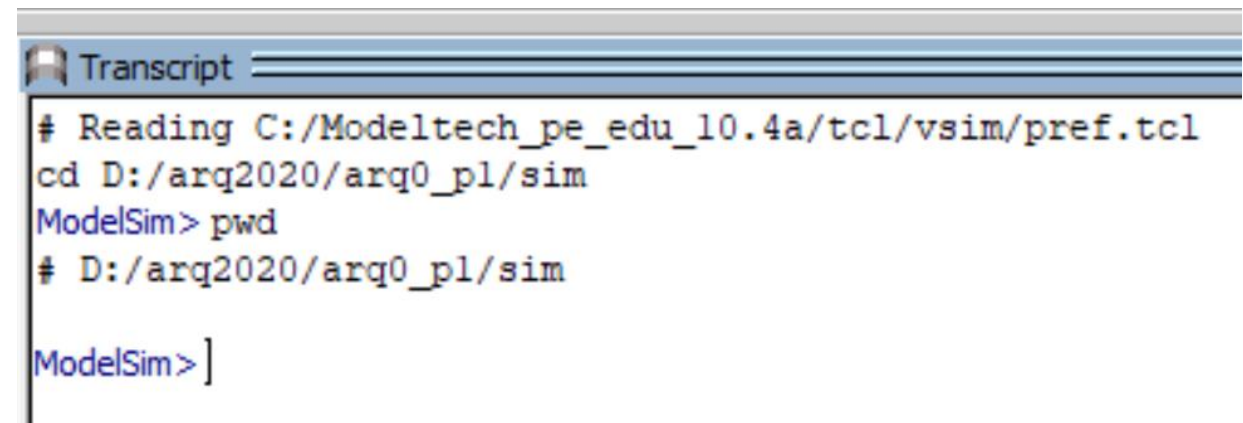
Ejecutar script

- Desde la consola de modelSim/Questa sim
- Ir a la carpeta donde está el script (extensión .do)
 - cd ruta_a_arq2020/arq_ejerc_xx/sim (o usar file-> change directory ...)
 - Asegurarse estar donde queremos (pwd)
- Ejecutar el script (comando “do”)
 - **do** run_sim_arq.do



```
Transcript
cd D:/arq2020/arq0_pl/sim
QuestaSim> pwd
# D:/arq2020/arq0_pl/sim
|
QuestaSim> do runsim_arq.do
```

<No Design Loaded> <No Context>



```
Transcript
# Reading C:/Modeltech_pe_edu_10.4a/tcl/vsim/pref.tcl
cd D:/arq2020/arq0_pl/sim
ModelSim> pwd
# D:/arq2020/arq0_pl/sim
ModelSim> ]
```

¿Que hace el script?

```
-----  
# Script ModelSim para la simulacion del procesador Arq2019-2020  
-----
```

```
# Crear library, borrando cualquier compilacion previa:
```

```
if [file exists work] {vdel -lib work -all }  
vlib work
```

```
# Compilar RTL:
```

```
vcom -work work -2002 -explicit -check_synthesis ../rtl/reg_bank.vhd  
vcom -work work -2002 -explicit -check_synthesis ../rtl/alu.vhd  
vcom -work work -2002 -explicit -check_synthesis ../rtl/alu_control.vhd  
vcom -work work -2002 -explicit -check_synthesis ../rtl/control_unit.vhd  
vcom -work work -2002 -explicit -check_synthesis ../rtl/processor.vhd
```

```
# Compilar testbench:
```

```
vcom -work work -2002 -explicit memory.vhd  
vcom -work work -2002 -explicit processor_tb.vhd
```

```
---
```

```
set StdArithNoWarnings 0
```

```
# Lanzar la simulacion, hast  
run -all  
-----
```

- Borra compilación Previa
- Crea biblioteca work
- Compila los fuentes del procesador (vcom)
- Compila los fuentes del simulación (vcom)
- Elabora el diseño (lanza simulación) usando processor_tb como top
 - -g para los generics del toplevel
- Abre las formas de onda del archivo wave_Arq.do
- Simula hasta el final (run -all)

¿Que hace el script?

```
-----  
# Script ModelSim para la simulacion del procesador Arq2019-2020  
-----
```

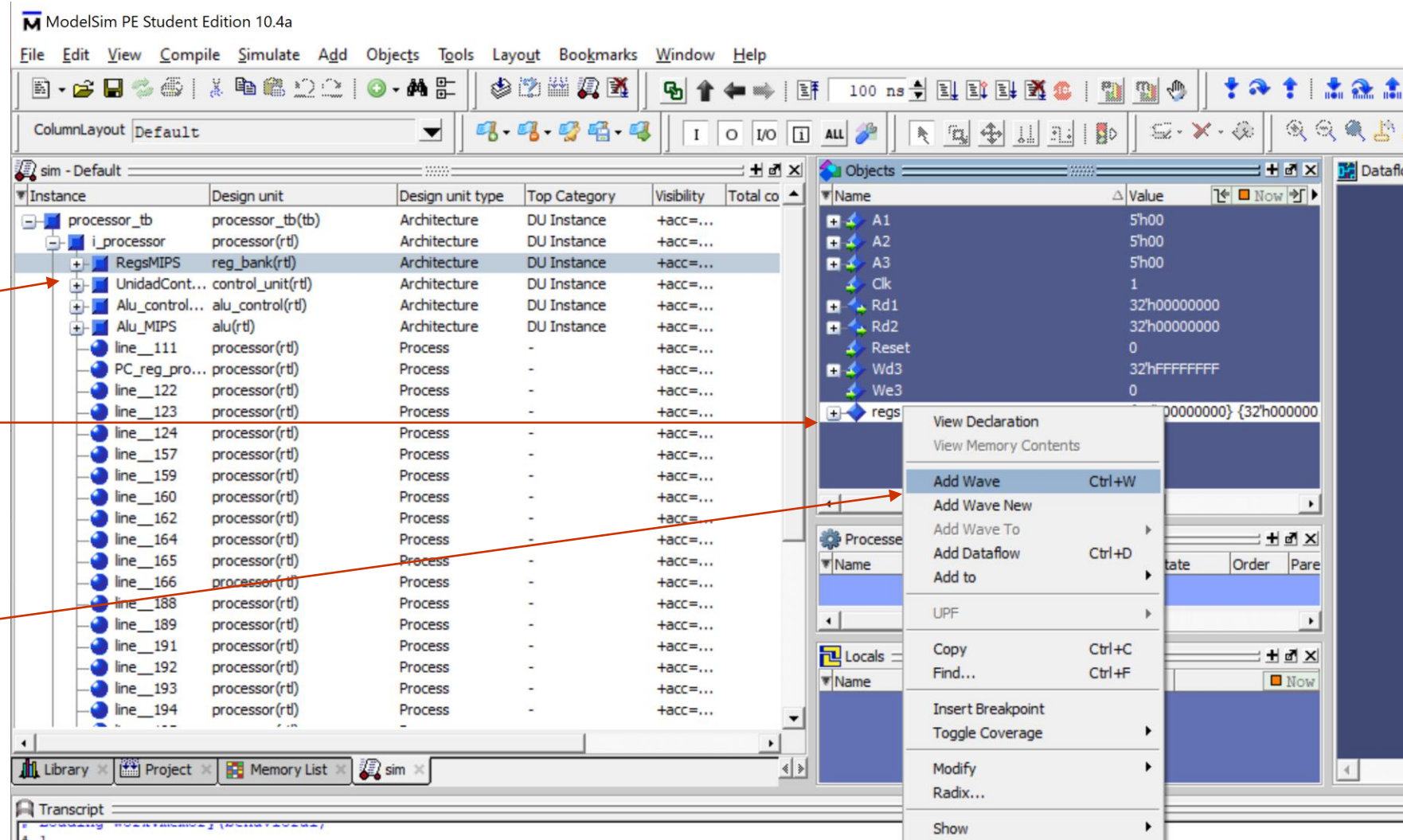
```
# Crear library, borrando cualquier compilacion previa:
```

- Borra compilación Previa
- Crea biblioteca work
- Compila los fuentes del procesador (vcom)
- Compila los fuentes de la simulación (vcom)
- Elabora el diseño (lanza simulación) usando processor_tb como top
 - -g para los generics del toplevel
- Abre las formas de onda del archivo wave_arq.do
- Simula hasta el final (run -all)

```
all }  
  
# Elaboracion:  
vsim -novopt -gINIT_FILENAME_INST="instrucciones"  
-gINIT_FILENAME_DATA="datos" -gN_CYCLES=100 processor_tb  
  
# Opcion para guardar todas las ondas:  
log -r /*  
  
# Mostrar las ondas:  
do wave_arq.do  
  
# Opcion del simulador para evitar warnings tipicos en tiempo 0 :  
set StdArithNoWarnings 1  
run 0 ns  
set StdArithNoWarnings 0  
  
# Lanzar la simulacion, hasta que pare sola:  
run -all  
-----
```

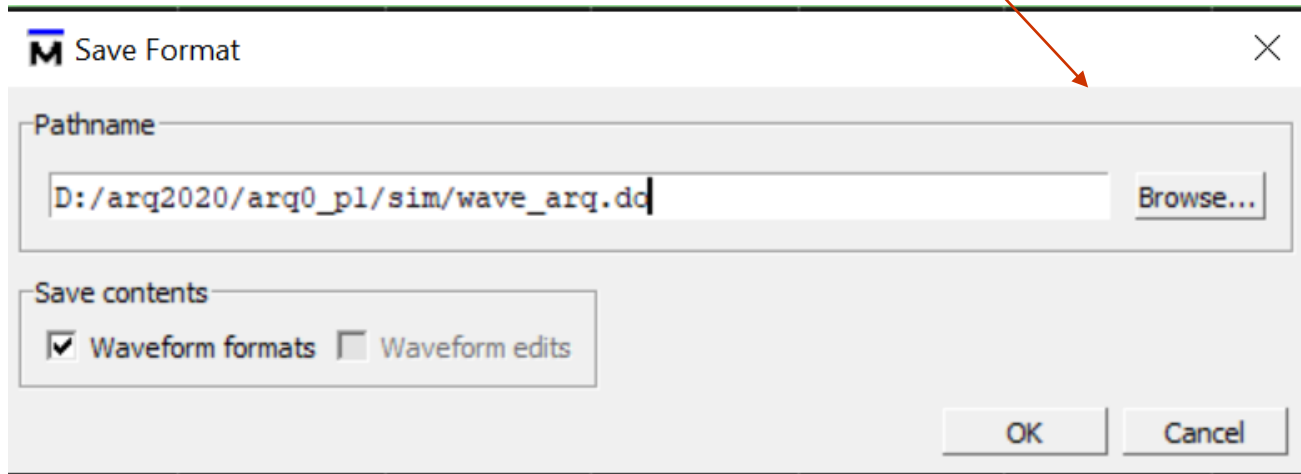

Visualizar más formas de ondas

- Seleccionar el elemento en la jerarquía de componentes, luego la(s) señal(es), botón derecho “add wave”



Configurar vista y guardar para futuras simulaciones

- Mover, cambiar base (radix), formato (color), agregar separadores, etc.
- Guardar la forma de ondas
 - File -> “save format...” (ctrl+s)



- La próxima vez que se simule, se visualizarán los cambios en el formato

