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Department of Electrical & Computer Engi	ineering Revision 0	Matthew Hershfield, PI
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QuestaSim is Intel's successor to ModelSim, and it is the default simulator for Quartus 21.1 and newer. While ModelSim is 32-bit software and has dependencies from the early 2010's (just look at the Linux installation), QuestaSim is modern, 64-bit software. Since QuestaSim shares most of its CLI with ModelSim, you can nearly use Questa as a drop-in replacement for ModelSim. You just have to get a license first.

## Part 1: Installing QuestaSim

- 1. Go to the Intel Download Center's page for Quartus Prime Lite 21.1.1
- 2. Select the "Individual Files" Tab and download QuestaSetup-21.1.1.850-windows.exe. See the below screenshot. Accept the license agreement to download the installer.

Downloads	
Multiple Download Individual Files Additional Software	Copyleft Licensed Source
Intel® Quartus® Software	
Intel® Quartus® Prime (includes Nios II EDS)	~
Download QuartusLiteSetup-21.1.1.850-windows.exe	Size: 1.6 GB SHA1: a78ac4ce88d3635f811f541e9811468f91befa90
** Nios® II EDS on Windows requires Ubuntu 18.04 LTS on Windows ** Nios® II EDS requires you to install an Eclipse IDE manually.	s Subsystem for Linux (WSL), which requires a manual installation.
Questa*-Intel® FPGA Edition	
Download QuestaSetup-21.1.1.850-windows.exe	Size: 784.1 MB SHA1: d985442ac1d4f1fbd8cac7a509a2a3d5978e4ab0

3. Run the QuestaSetup executable you just downloaded. When the option comes up, select that you want to install Questa Starter Edition (see below screenshot). Leave every other option as the default.

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🕥 Installing Questa - Intel FPGA Edition or Starter Edition 2021.2 (Quartus Prime	e 21.1.1.850)	—	
Select Questa edition you like to install			(intel)
Questa - Intel FPGA Starter Edition     Questa - Intel FPGA Edition			
This software requires a license. Please sign up for free Early Access license at			
https://www.intel.com/content/www/us/en/software/programmable/guartus-prime/	whats-new.html		
VMware InstallBuilder	< Back	Next >	Cancel
	- DOCK	INCAC /	Cancel

### Part 2: Licensing QuestaSim

1. Using Google Chrome, navigate to the Intel Self-Service Licensing Center. I had issues while using Firefox. Create an Intel account if you don't have one already. Once you have logged in, choose "Sign up for Evaluation or Free Licenses" from the top menu bar.

intel.	PRODUCTS	SUPPORT	SOLUTIONS	DEVELOPERS	PARTNERS		2	USA (ENGLISH)	Q Search Intel.c	com
	Intel® FPGA Self-Service Licensing Center									
	Home Licens	es 🗸 Comp	outers and License	e Files 🗸 🛛 Admin:	s 🗸 Sign	up for Evaluation or Fre	e Licenses	Reports Help	~	
F	li! W	elco	ome	to		Intel. PRODUCTS SUPPORT		VELOPERS PARTNERS	Center	Q Search Intel.com

2. Click the radio button next to "Questa\*-Intel FPGA Starter Edition". Click the pencil icon next to "Questa\*-Intel FPGA Starter Edition" in the "# of Seats" column and type in 1. Use the pencil icon and backspace out the 1 seat that was automatically selected for "Intel Quartus II Software". You must do these steps in exactly this order or the page will automatically refresh. See the below screenshot. Check the license agreement checkboxes below the table and click "Get License".

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e)

1	0	Product	Į.	Maintenance expiration	License expiration
2	۲	Questa*-Intel® FPGA Starter Edition SW-QUESTA 1	1	2023-07-06	
	0	Intel® FPGA MAXPLUS2WEB	1	2023-07-06	
Ļ		Intel® FPGA IP PLS-WEB	d'	2023-07-06	
		Intel® FPGA EVALUATION-LIC	J.	2022-10-06	2022-10-04
6		Intel® FPGA IP IP-NIOSVM		2023-07-06	

3. Click "+New Computer" under "Create a New Computer"

🖹 Generate License	
Create a New Computer	
Assign an Existing Computer Enter Computer Name/Primary Computer ID Search Host Information	0
Search Host mormaton	Cancel Generate

4. Give the computer a memorable name. Under "License Type", select "Fixed". This creates a singleuser license tied to your individual computer. Under "Computer Type", select "NIC ID". This will tell Intel that your computer will be identified by its network card. The form should look like the below screenshot.

* Computer Name	* Computer Type
Matthew's Laptop	NIC ID 💌
	How to determine Computer Type?
* License Type 🕕	* Primary Computer ID 🕕
FIXED	•
Companion Computer ID 1 🕕	Companion Computer ID 2 🚯
* Primary Admin	
🖪 Matthew Hershfield	×

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5. To find your computer's NIC ID, open up Command Prompt from the Start menu and type "ipconfig /all" without the quotation marks. This will list all of the network adapters connected to your computer. Look for your laptop's WiFi card in this list, and locate its Physical Address. The NIC ID that you will put into the Intel website is your network adapter's Physical Address with the dashes removed. Type your NIC ID into the Intel website under "Primary Computer ID". If you would like, you can optionally add NIC IDs for other network adapters under Companion Computer ID 1 and ID 2. Finally, click "Generate License".

Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix . : attlocal.net Description . . . . . . . . . . : Killer(R) Wi-Fi 6 AX1650s 160MHz Wireless Network Adapter Physical Address. . . . . . . . : C4-23-60-9F-3C-29 DHCP Enabled. . . . . . . . . . : Yes Autoconfiguration Enabled . . . . : Yes

- 6. Look for an email from authorization@intel.com sent to the address you used to create your Intel account. A file named LR-XXXXX\_License.dat should be attached to the email. Download that file and move it to a place where it will not be accidentally deleted. I created the folder C:\intelFPGA\21.1\licenses and copied my license file there.
- 7. In the Start menu, search for "Edit the system environment variables". Click the "Environment Variables" button in the bottom right corner of the window that appears. Under the "System Variables" section (bottom half of the window), click "New". In the window that appears, type in "LM\_LICENSE\_FILE" (without the quotation marks) for the variable name. To set the variable's value, click the "Browse File" button in the bottom left corner of the window and navigate to where you stored your license data file. Click OK to confirm the new environment variable.

		Value
ChocolateyLastPat	hUpdate	132767183418796932
GOPATH		C:\Users\selma\go
IntelliJ IDEA		C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.2\bin;
OneDrive		C:\Users\selma\OneDrive - University of Florida
OneDriveCommercial		C:\Users\selma\OneDrive - University of Florida
OneDriveConsume	er	C:\Users\selma\OneDrive
Path		C:\Users\selma\.cargo\bin;C:\Users\selma\AppData\Local\Micros
ariable name:	LM_LICEN C:\intelFF	NSE_FILE PGA\21.1\licenses\LR-087091_License.dat
ariable name: ariable value:	C:\intelFF	- PGA\21.1\licenses\LR-087091_License.dat
ariable name:	C:\intelFF	
ariable name: ariable value: Browse Directory	C:\intelFF	PGA\21.1\licenses\LR-087091_License.dat Browse File OK C.\VIIIGUWS\SystemD2_LOTVETS\ENTYPEData
ariable name: ariable value: Browse Directory Unversionada LM_LICENSE_FILE	C:\intelFF	PGA\21.1\licenses\LR-087091_License.dat Browse File OK C.\VIIIGUW3\5ystem52\UTVE15\UTVE15UTVE15404 C\\intelFPGA\21.1\licenses\LR-087091_License.dat
ariable name: ariable value: Browse Directory UNVELOBAG LM_LICENSE_FILE NUMBER_OF_PROO	C:\intelFF	PGA\21.1\licenses\LR-087091_License.dat Browse File OK C.\mtndows\gystemse_\onversigned_baca C.\intelFPGA\21.1\licenses\LR-087091_License.dat 8
ariable name: ariable value: Browse Directory UNVELOALA LM_LICENSE_FILE	C:\intelFF	PGA\21.1\licenses\LR-087091_License.dat Browse File OK C.\VIIIGUW3\5ystem52\UTVE15\UTVE15UTVE15404 C\\intelFPGA\21.1\licenses\LR-087091_License.dat
ariable name: ariable value: Browse Directory UNVEIDATA LIM_LICENSE_FILE NUMBER_OF_PROP OS	C:\intelFF	PGA\21.1\licenses\LR-087091_License.dat Browse File OK C.\mtelFPGA\21.1\licenses\LR-087091_License.dat 8 Windows_NT
UNVEIDATA LM_LICENSE_FILE NUMBER_OF_PROD OS Path	C:\intelFF	PGA\21.1\licenses\LR-087091_License.dat Browse File OK C.\mtelFPGA\21.1\licenses\LR-087091_License.dat C.\intelFPGA\21.1\licenses\LR-087091_License.dat 8 Windows_NT C.\Program Files (x86)\Common Files\Oracle\Java\javapath;C.\WI

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#### 8. Restart your computer for your changes to take effect.

9. Once your computer reboots, open a command prompt and run "**lmutil lmdiag**" (without the quotation marks) and confirm that your license is found correctly. If your license cannot be verified, double check that your LM\_LICENSE\_FILE environment variable is set correctly.

### Part 3: Updating Quartus to use QuestaSim

For this tutorial, we are assuming that you have installed Quartus Prime 19.1 using the Quartus installation instructions. The University Program VWF program is hardcoded to use ModelSim-Altera (even when you change your project to use QuestaSim by default), so we will have to trick Quartus into using QuestaSim instead of ModelSim for this program.

- 1. Open Quartus. Navigate to Tools -> Options. In the left menu bar, click "EDA Tool Options".
- 2. In the EDA Tool Options menu, click on the "…" button next to the ModelSim-Altera. In the file picker, navigate to "C:\intelFPGA\21.1\questa\_fse\win64" (assuming default QuestaSim installation) and choose "Select Folder". Click OK to save your changes.

EDA Tool	Directory Containing Tool Eventtable	
	Directory Containing Tool Executable	
Precision Synth		
Synplify		
Synplify Pro		
Active-HDL		
Riviera-PRO		
ModelSim		
QuestaSim		
ModelSim-Altera	C:\intelFPGA\21.1\questa_fse\win64	

3. You should now be set up to use QuestaSim instead of ModelSim with your University Program VWF simulations. Set up your Quartus projects as you did while using ModelSim: choose ModelSim for the simulation program and set the HDL to VHDL. Before you run a simulation, you have to go to the simulation's settings (Simulation->Simulation Settings) and change the first argument of the vsim command from -novopt to -voptargs="+acc". This makes it so that the simulation viewer can see every signal in your simulation. If you do not set this argument, the simulation will either fail to run or will display every output signal as unknown values.

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Simulation Options X	Simulation Options X
Caution: Improperly modifying these settings can cause the simulation to fail HDL Language: • Verilog · VHDL (The language used for the testbench and netlist)	Caution: Improperly modifying these settings can cause the simulation to fail HDL Language: • Verilog · VHDL (The language used for the testbench and netlist)
Functional Simulation Settings Timing Simulation Settings	Functional Simulation Settings Timing Simulation Settings
Testbench Generation Command (Functional Simulation):	Testbench Generation Command (Functional Simulation):
quartus_edagen_testbenchtool=modelsim_oemformat=verilogwrite_settings_files=off test_prog -c t	quartus_edagen_testbenchtool=modelsim_oemformat=verilogwrite_settings_files=off test_prog -c te
Netlist Generation Command (Functional Simulation):	Netlist Generation Command (Functional Simulation):
quartus_edawrite_settings_files=offsimulationfunctional=onflatten_buses=offtool=modelsim_oen	quartus_edawrite_settings_files=offsimulationfunctional=onflatten_buses=offtool=modelsim_oem
ModelSim Script (Functional Simulation):	ModelSim Script (Functional Simulation):
onerror {exit -code 1} vlib work vlog -work work test_prog.vo vlog -work work Waveform.wf.vt vsd file -direction test_prog.msim.xcd vcd add -internal test_prog.vlg_vec_tst/* vcd add -internal test_prog.vlg_vec_tst/1/* proc sim Timestamp 0 { echo "Simulation time: S::now ps" if {[String equal running [runStatus]]} { after 2500 sim Timestamp } after 2500 sim Timestamp run -all quit -f	<pre>onerror {exit -code 1} vlib work vlog -work work test_prog.vo vlog -work work Waveform.vwf.vt vsg -work work Waveform.vwf.vt vsg -work work Waveform.vwf.vt vsg -work work Waveform.vwf.vt vcd add -internal test_prog.msim.vcd vcd add -internal test_prog.vlg_vcc_tst/* vcd add -internal test_prog.vlg_vcc_tst/* vcd add -internal test_prog.vlg_vcc_tst/11/* proc simTimestamp 0 {     echo -Simulation time \$::now ps*     if {[string equal running [runStatus]]}{         after 2500 simTimestamp         }     }     after 2500 simTimestamp     run -all     quit -f</pre>
Restore Defaults Save Cancel	Restore Defaults Save Cancel

# Sources

https://www.intel.com/content/www/us/en/docs/programmable/691278/21-3/prerequisites.html

https://www.intel.com/content/www/us/en/support/programmable/licensing/quartus-licenses.html

https://community.intel.com/t5/Intel-Quartus-Prime-Software/When-I-try-to-make-and-run-University-Program-VWF-it-gives-this/m-p/678829

https://community.intel.com/t5/Intel-Quartus-Prime-Software/Questa-option-voptargs-quot-acc-quot/m-p/1362284