652 homework7 Synopsys Cocentric

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## Data Flow Graph (DFG) Models

- This homework is a starting step towards understanding the functioning of Synopsys Cocentric.
- Data flow graph models are data models in which the instances they contain communicate by means of FIFO queues of data travelling on nets.

### Part A -- Creating a Model structure

- source the .cshrc file by typing source ~cad/.cshrc
- To invoke Synopsys tools, type synopsys\_tools
- To start System Studio, enter the following command: ccss &

## Part A -- Creating a Workspace

Select File --> New from the System Studio main menu bar. The Create Workspace dialog box displayed. Enter the name of the workspace that you wish to create. Click the Apply button. Don't click OK now.

-	Create Workspace
	Workspace         Name:       hw_652         Location:         /home/mdorai/652/
	OK Close Apply

## Part A -- Creating a Library

After you say Apply, the same window asks for the library name. Type a library name under the workspace that you have created. You can specify a different location for the library directory in the Location field if you want to. After you enter a library name (or accept the default name), click Apply. Again don't click OK.

	– Create Library					
<mark>₩ hw_652</mark> 	Library         Name:       hw_library         Location:         /home/mdorai/652/					
-	OK Close Apply					

## Part A -- Creating a Model

After you have clicked Apply, in the Create Library dialog box, select a library and click the Model tab. The dialog box changes to the Create Model dialog box, as shown in the Figure. If you do not select a library, the Model tab will not be visible. choose the DFG option.

image: hw_652 image: hw_652 image: hw_652	🐌 Library 🛄 Model 📠 File				
hw_library	Name: model_1				
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	⊖ <u>s</u> os ⊖ HDL wrapper				
	OK Close Apply				

## Part A -- Creating a Model

But when I first came to this page, there is no "DFG" option in the "model" frame. So I click the plus sign (+) on the left of "cocentric" to expand the "cocentric" library--> then clicked the plus sign (+) on the left of the "algorithm" library --> then clicked the plus sign (+) on the left of the "source" library-->then clicked on the "SinGenerator". The "DFG" option appeared in the "model" frame. When I click my own library , "hw\_library", there will be the "DFG" option in the "model" frame.

Define Model Implementation						
<ul> <li>work_1</li> <li>coccentric</li> <li>demos</li> <li>algorithm</li> <li>algorithm</li> <li>advancedmath</li> <li>basemath</li> <li>bitvector</li> <li>channel</li> <li>colversion</li> <li>filter</li> <li>fowcontrol</li> <li>logic</li> <li>matrixprim</li> <li>modulation</li> <li>sink</li> <li>Source</li> <li>Constant</li> <li>CosGenerator</li> <li>Dirac</li> <li>LFSR</li> <li>PatternGenerator</li> <li>Dirac</li> <li>RandomBit</li> <li>RandomBit</li> <li>SawTooth</li> <li>SinTableGenerator</li> </ul>	Implementation         Name:       SinGenerator         Domain:       Algorithmic Models         Type:       Nong         Implementation       Implementation         Implementation       Implementation         Name:       SinGenerator         Implementation       Implementation         Implementation       Imple					
		OK Close Apply				

## Part A -- Creating a Model

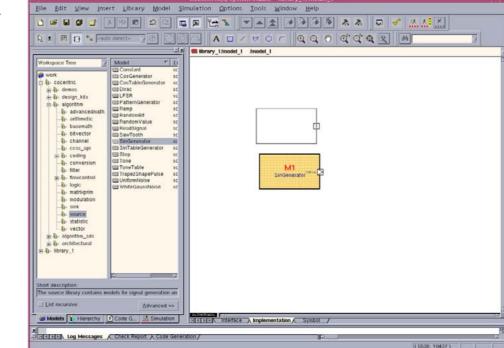
- Now, you click Apply and then OK.
- The DFG model that we are going to create is a simple model that consists of two blocks namely -
  - 1. A sine wave generator &
  - 2. A sink.

Both are existing models contained in the System Studio libraries. To create the model schematic, 1. If the "cocentric" library is collapsed, expand the library by clicking the plus sign (+) next to it in the Workspace window; expand the "algorithm" library and then select the "source" library.

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	SawTooth sourc				
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# Part A -- Adding the SinGenerator to the Implementation window

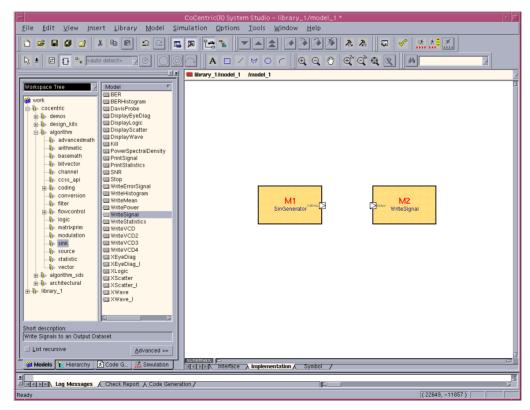
Click the "Implementation" frame. Otherwise, the insert Instance button does not work. Click "Insert" at the top of the window-->select "Instance". Select the SinGenerator model from the "source" library located in the algorithm library. Move the cursor into the design area. You will see the outline of the block displayed as you move the cursor around. Click the left mouse button when the outline of the block is positioned where you want to place the block. Click the middle button of the mouse to disable the



insert instance option.

## Part A -- Inserting the sink or the Write signal block

Select the WriteSignal block from the System Studio models "sink" library located in the algorithm library. Position the WriteSignal block to the right of the SinGenerator block, as shown in the figure and click the left mouse button. Click the middle mouse button to cancel the insert Instance function.



## Part A –

## Connecting the two blocks by a net

Click the Insert Net button in the Schematic toolbar. Position the cursor over the output port of the SinGenerator block. Press and hold the left mouse button, and create a net by dragging a line to the input port of the WriteSignal block. Release the mouse button. Click the middle mouse button to cancel the

Insert Net function.

Model         Vorkspace Tree       Model         Up or k       BEER         Image: State of the second sec	Ibrary_1/model_1 /model_1
Models K Hierarchy Code G Simulation	tion / (20661, -12141)

#### Part A – Set the parameters of the blocks

To finish the design, the blocks have to be parameterized. Position the mouse pointer over instance M1 (the SinGenerator model) and click the right mouse button. Choose Configure Object from the context-sensitive menu. The Configure Objects dialog box is displayed. Assign the expression atan(1.0) to the parameter "Increment", and click OK. The schematic design is now complete.

8	Cell: (source/SinGenerator)  Mame: M1 M1 M1 M1						
P	Parameters Ports Attributes						
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Ē	<del>(+)</del>	Name	Data Type	Value		Attributes	
i i	1	Т	type_param	float			
	2	Increment	double	atan(1.0)			
	3	Amplitude	Т	1.0			
	4	StartPhase	double	0.0			
					ок	Close	Apply

#### Part A – Simulating the models

You can create the executable simulation either automatically or manually. We will be using the **Cocentric data visualization tool (DAVIS)** to enable us to visually analyze and graphically display data.

**Starting DAVIS -** Select -->Tools-->DAVIS. This opens the DAVIS tool.

Go back to the Cocentric System Studio Window and select --> Simulation-->Simulate Model. All the steps will be performed automatically.

After a few seconds, you will get a message box as shown in the figure. Click OK and proceed to the DAVIS window.

-	Infobox: Message from 03/31/2003 06:42:20 PM	-	
	Simulation 'model_1_1'		
	started at 03/31/2003 06:42:13 PM		
	finished at 03/31/2003 06:42:20 PM		
	Simulation activation: activ_1 Simulation location: /home/mdorai/ccss/sim/model_1_1		
	ОК		

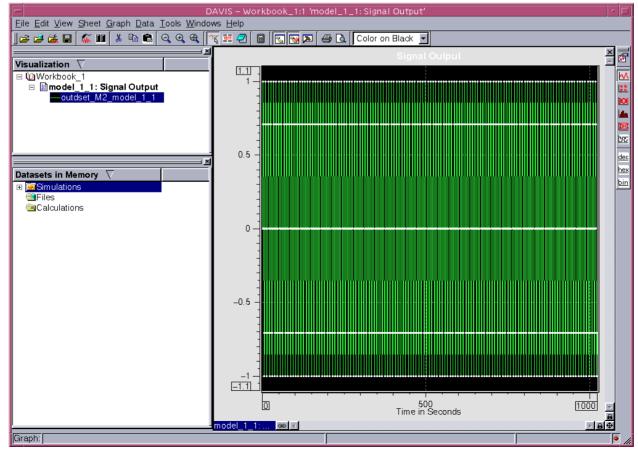
## Part A – Linking DAVIS and the earlier run Simulation

Now in the "DAVIS" work window, select -->File-->Open Simulation. Choose the model from the list of running or completed simulations. Make sure that you have selected the active simulation. Click Apply and OK.

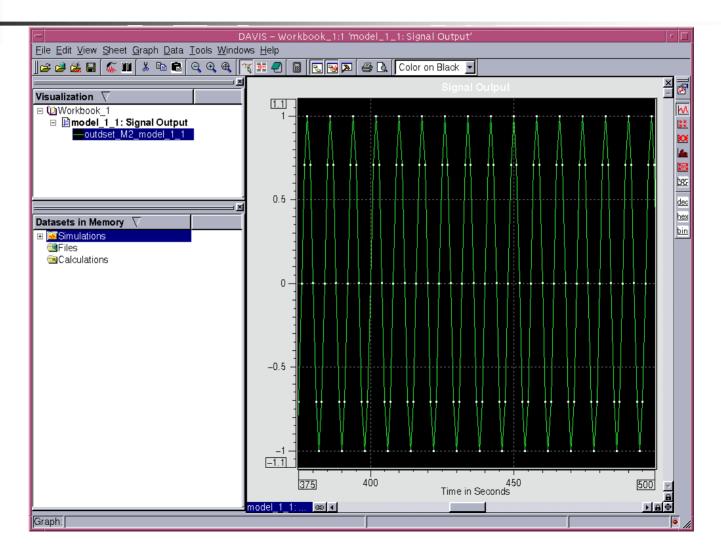
Directory: \${CCSS_SIM_DIR}			7 💻 🔁
Simulations — Test_light_1 :	Dataset ID Model ⊽ Mod outdset WriteSignal M3	idel Activ ID Iter ID activ_1 iter_1	Graph Name outdset_M3
☐ Show input datasets Plot format:	Sample vs. Time (line)		X
Down Sample   using all values ⊻isualization   Add these graphs to	) the selected sheet		
		<u>O</u> K Cance	el <u>Apply</u>

#### Part A – Viewing the Simulation Output

You may choose to view the waveform on a smaller scale by selecting --View-->Zoom Area--> and giving suitable values.



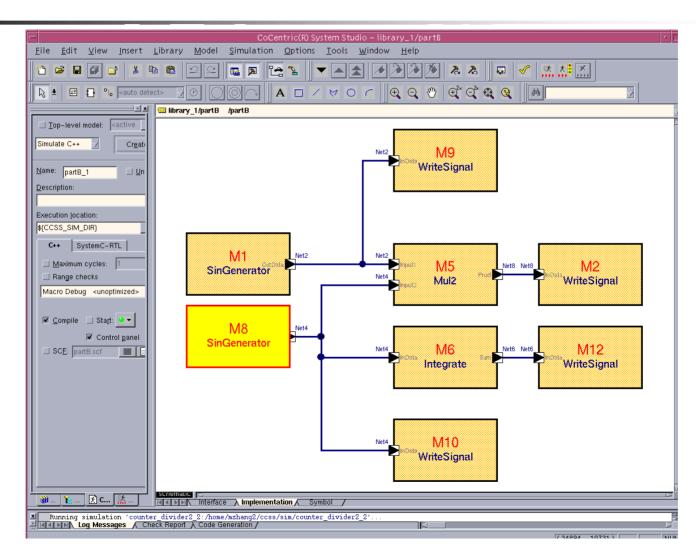
#### Part A – Viewing the Simulation Output



## Part A – Viewing the Simulation Output

- If you want to create a new workspace, you first have to close the exisitng workspace by choosing--> Select-->File-->close workspace.
- If you want to reopen your existing workspace, choose Select-->File-->Open workspace--> click the "\*.ssw", your workspace file.

## Part B-- The schematic of multiplying and integrating circuits.



#### Part B–

#### Configure of the Fast SinGenerator

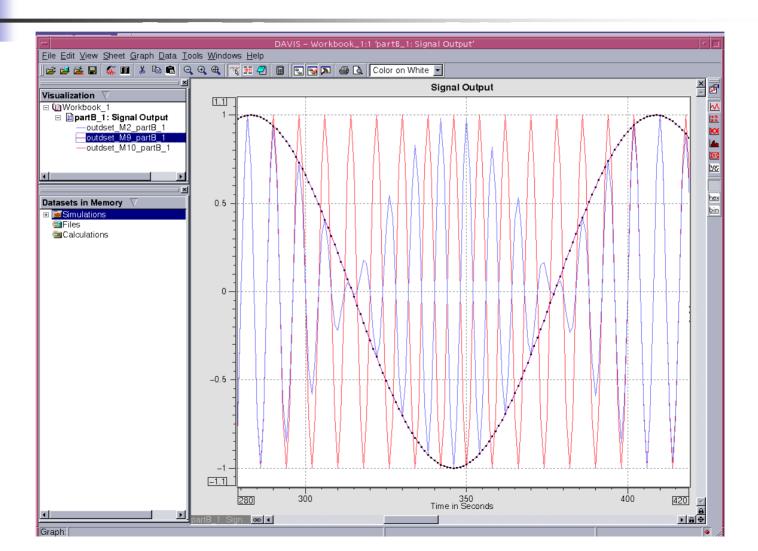
-	Configure Objects – library_1/partB								
Z	Cell: (source/SinGenerator) Name:								
H	M8 M8								
F	Paran	neters Po	rts   Instanc	e Attributes					
	¥		*						
	⇔	Name	Data Type	Value		Attributes			
	1	Т	type_param						
		Output sig	nal data ty	pe.					
	2	Increment		atan(1.0)					
				e sine signal.					
	3		Т	1.0					
		Amplitude	of the sine	signal.					
	4	StartPhase	double	0.0					
		Start phas	e of the si	ne signal.					
					01	<	Close	Apply	

#### Part B–

#### Configure of the Slow SinGenerator

			Configure Objects – libra	ary_1/pa	irtB	
		SinGenerator)	Nar			
■ M1						
Parameters Ports Instance Attributes						
¥		**				
⇔	Name	Data Type	Value		Attributes	
1	Т	type_param	float			
	Output sig	mal data ty	pe.			
2	Increment	double	atan(0.05)			
	Phase incr	ement of th	e sine signal.			
3	Amplitude	Т	1.0			
	Amplitude	of the sine	signal.			
4	StartPhase	double	0.0			
	Start phas	e of the si	ne signal.			
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#### Part B- Simulation of the Multiplier

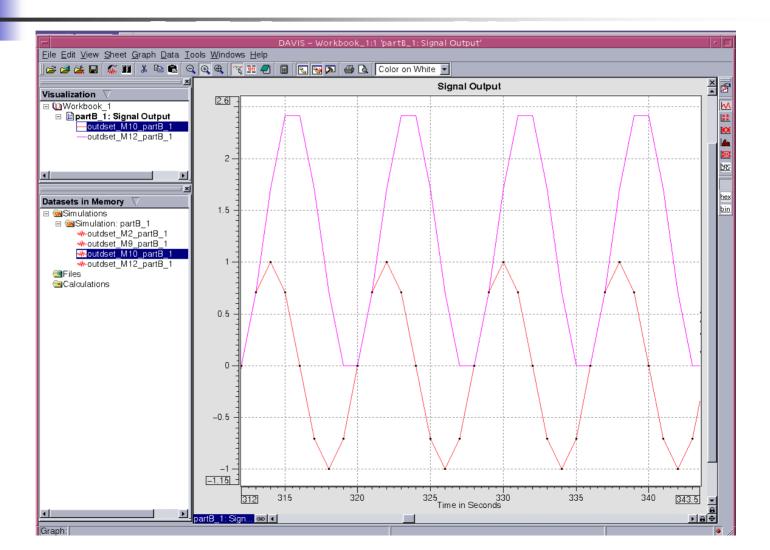


#### Part B– Simulation of the Integrator

$$-\sin(x) = \frac{d}{dx}\cos(x)$$

$$\int_{0}^{t} \sin(x) dx = -\cos(x) \Big|_{0}^{t} = -[\cos(t) - \cos(0)] = -\cos(t) + 1$$

#### Part B- Simulation of the Integrator





## Thank you! 🙂