EDU4Chip Project Plan

2024 SyoSil ApS ©

Contents

1 Lectures (T1)

When the over all lecture plan has been approved then the documentation process can be started which describes which lectures are mapped to which days and also the contents of the lectores in an overview form.

The lectures which are available are found in Table 1

No.	Title	Available	Path	Comment
L00	General Introduction	Yes		
L01	Python Introduction	Yes		
L02	Verification Tools	Yes		
L03	Testbench Example	Yes		Slide set in SAT docs
L04	CRV Intro	Yes		
L05	cocoTB Introduction	Yes		
L06	UVM Intro	Yes		
L07	UVM TB Toplevel	Yes		
L08	UVM Test, Environment and Sequence	Yes		
L09	UVM UVCs	Yes		
L10	UVM Register Model	No		
L11	Functional Coverage	Yes		
L12	Checkers	Yes		
L13	CRV Best Practice	Yes		
L14	TLM	Yes		
L15	pyVSC constraints and randomization	TBD		
L16	Verification Plan	Yes		

Table 1: Overview of available lectures

2 Exercises (T2)

When the over all exercise plan has been approved then the documentation process can be started which describes which exercises are mapped to which days and also the contents of the lectores in an overview form.

The exercises which are available are found in Table 2

No.	Title	Available	Path	Comment
E00	Computer setup	Yes		
E01	SAT TB intro	Yes		
E02	pyUVM pre-study	Yes		
E03	cocoTB test	Yes		
E04	Random virtual sequence	Yes		
E05	Scoreboard implementation	Yes		
E06	Protocol checkers	Yes		
E07	Reactive test	Yes		
E08	cocoTB coverage	Yes		
E09	sSDT coverage	Yes		
E10	SAT coverage	No		
E11	Coverage analysis	Yes		

Table 2: Overview of available exercises

2.1 Exercise documentation

The detailed description of the exercises and the information needed to understand the SAT DUT and the backgraound elements of the testbench are found in the "exercise/" folder. Ducumentation includes a PDF file generated by multiple LaTex for the extensive description and a number of powerpoint slides with a summarized version of the topic and exercises included in the PDF.

2.1.1 E00: Computer setup

This exercise objective is to allow the students to correctly setup their computers (either Windows or Linux machine) and install all the necessary tools. For Windows students the Linux environment is installed with a WSL or Docker.

2.1.2 E01: SAT TB intro

This exercise objective is to provide an overview of the SAT testbench and the generic components of a UVM testbench, as well as familiarizing with the simulation flow, Makefile and the waveform viewer tool, GTKWave.

2.1.3 E02: pyUVM pre-study

This exercise objective is to get some preliminary understanding of the cocoTB and the pyUVM concepts by reading the suggested book. All these topic are going to be cover in more details in the following lectures.

2.1.4 E03: cocoTB test

This exercise objective is to familiarize with the cocoTB by implementing a test to generate some input stimuli to the SAT DUT and compare the output of the DUT against a golden reference generated by the reference model.

2.1.5 E04: Random virtual sequence

This exercise objective is to understand the randomization and the random constraints using pyVSC. A virtual sequence shall be implemented to randomize the number of samples to be sent to the DUT. Afterwards a test shall be implemented to override the virtusl sequence type and generate the desired stimuli.

2.1.6 E05: Scoreboard implementation

This exercise objective is to understand the checking mechanism of a Scoreboard and how this component is connected to the other elements of the testbench. The skeleton of the class is assumed to be available and the exercise shall focus on the comparison mechanism implementation and the connection with the reference model and uVCs.

2.1.7 E06: Protocol checkers

This exercise objective is to understand how coroutines work by developing protocol checkers to ensure the compliance of the sSDT uVC signals with the requirements of the protocol.

2.1.8 E07: Reactive test

This exercise objective is to understand the connections and simulation flow between the testbench and the uVC. This can be achieved by developing a new test case which reacts on the response item of the consumer to stop the simulation.

2.1.9 E08: cocoTB coverage

This exercise objective is to familiarize with the concept of the coverage using the pyVSC library. The coverage report shall be generated and briefly analized.

2.1.10 E09: sSDT coverage

This exercise objective is to apply the pyVSC coverage knowledge to the sSDT's uVC. The coverage class for the uVC shall be developed to collect coverage information about the sSDT and the connections between the monitor and the coverage shall be implemented. The coverage report shall be generated and briefly analized.

2.1.11 E10: SAT coverage

This exercise objective is to apply the pyVSC coverage knowledge to the SAT filter testbench. The monitor coroutine shall be implemented to trigger the sample mechanism of the coverage class. The coverage report shall be generated and briefly analized.

2.1.12 E11: Coverage analysis

This exercise objective is to analize and understand the coverage report. By tweaking the parametrization of the DUT and the random constraints it shall be possible to modify and improve the coverage results.

3 Lecture Plan

This section shows different lecture plans on how to perform the lectures. Each section describes a possible execution plan for the course.

The lectures ae taken from the Table 1 and the exercises from Table 2.

3.1 Three Week Plan

This lecture plan is based on 4 x 1h 15m slots every day for 3 weeks (15 days as weekends are not a part of the working days), starting at 09:00.

The lecture plan is trying to mix lectures with regular lectures with exercises to keep the attention from the students.

Day	Time Slot	Lecture/Exercise	Comment
	09:00-10:15	L00	
	10:15-10:30	Break	
	10:30-11:45	L01	
01	11:45-12:45	Break	
	12:45-14:00	L04	
	14:00-14:15	Break	
	14:15-16:30	L04, Computer Setup	
	09:00-10:15	L06	
	10:15-10:30	Break	
	10:30-11:45	L06, L02	
02	11:45-12:45	Break	
	12:45-14:00	L02, L03	
	14:00-14:15	Break	
	14:15-16:00	L03, T2 E01 - SAT TB Intro	
	09:00-10:15	L05	
	10:15-10:30	Break	
	10:30-11:45	T2 E02 - Read pyUVM book	
03	11:45-12:45	Break	
	12:45-14:00	T2 E03 - cocoTB test for SAT	
	14:00-14:15	Break	
	14:15-16:30	L15, T2 E04 - Random virtual sequence	
	09:00-10:15	L07	
	10:15-10:30	Break	
	10:30-11:45	L12	
04	11:45-12:45	Break	
	12:45-14:00	T2 E05 - Scoreboard	
	14:00-14:15	Break	
	14:15-16:00	T2 E06 - Protocol checkers	
	09:00-10:15	L08	
	10:15-10:30	Break	
	10:30-11:45	T2 E07 - Reactive test	
05	11:45-12:45	Break	
	12:45-14:00	L11	
	14:00-14:15	Break	
	14:15-16:00	T2 E08 - cocoTB test coverage	

Table 3: Lecture Plan for Week 1 of 3

Day	Time Slot	Lecture/Exercise	Comment
	09:00-10:15	L09	
	10:15-10:30	Break	
	10:30-11:45	L14	
06	11:45-12:45	Break	
	12:45-14:00	T2 E09 - sSDT pyVSC coverage	
	14:00-14:15	Break	
	14:15-16:00	T2 E10 - SAT pyVSC coverage	
	09:00-10:15	L13	
	10:15-10:30	Break	
	10:30-11:45	L16	
07	11:45-12:45	Break	
	12:45-14:00	T2 E11 - Coverage analysis	
	14:00-14:15	Break	
	14:15-16:00	T3 Ex - Intro	+Practical infor
	09:00-10:15	T3 Ex	
	10:15-10:30	Break	
	10:30-11:45	T3 Ex	
08	11:45-12:45	Break	
	12:45-14:00	T3 Ex	
	14:00-14:15	Break	
	14:15-16:00	T3 Ex	
	09:00-10:15	T3 Ex	
	10:15-10:30	Break	
	10:30-11:45	T3 Ex	
09	11:45-12:45	Break	
	12:45-14:00	T3 Ex	
	14:00-14:15	Break	
	14:15-16:00	Ex	
	09:00-10:15	T3 Ex	
	10:15-10:30	Break	
	10:30-11:45	T3 Ex	
10	11:45-12:45	Break	
	12:45-14:00	T3 Ex	
	14:00-14:15	Break	
	14:15-16:00	T3 Ex	

Table 4: Lecture Plan for Week 2 of 3

Day	Time Slot	Lecture/Exercise	Comment
	09:00-10:15	T3 Ex	
	10:15-10:30	Break	
	10:30-11:45	T3 Ex	
11	11:45-12:45	Break	
	12:45-14:00	T3 Ex	
	14:00-14:15	Break	
	14:15-16:00	T3 Ex	
	09:00-10:15	T3 Ex	
	10:15-10:30	Break	
	10:30-11:45	T3 Ex	
12	11:45-12:45	Break	
	12:45-14:00	T3 Ex	
	14:00-14:15	Break	
	14:15-16:00	T3 Ex	
	09:00-10:15	T3 Ex	
	10:15-10:30	Break	
	10:30-11:45	T3 Ex	
13	11:45-12:45	Break	
	12:45-14:00	T3 Ex	
	14:00-14:15	Break	
	14:15-16:00	T3 Ex	
	09:00-10:15	Ex	
	10:15-10:30	Break	
	10:30-11:45	Ex	
14	11:45-12:45	Break	
	12:45-14:00	Ex	
	14:00-14:15	Break	
	14:15-16:00	Ex	
15	09:00-16:00	Examination	Plan will be handed out later

Table 5: Lecture Plan for Week 3 of 3