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EXERCISE: CUSTOM MODULE

Exercise Goals

This exercise will enable you to create you own SoC system with custom made modules. Some of the diciplines are:

- Import of components into Qsys
- Use the components
- Try it on the DE1SOC board

Prerequisites

- Quartus II and ModelSim software must be installed and working.
- Introduction to the Qsys Tool (sections 1-6)
- My First NIOS Software tutorial
- Making QSys Components
- The IIS2ST module must tested and working with proper rtl code

Introduction

Based on the MM-Bus and ST-Bus components created in previous exercises, we will create an Qsys project with custom hardware

Exercise Steps

1 Import the custom MM modules into the SoC project

A) Create a SoC project (or use an existing project) and open Qsys.
B) Follow the Introduction to the Qsys Tool (sections 1-6) and see this tutorial to create SoC components from the seven-segment and counter modules
C) Rebuild the SoC project and download it to hardware
D) Create a small application, that writes to the Hex displays and reads from the counter
E) Download and test

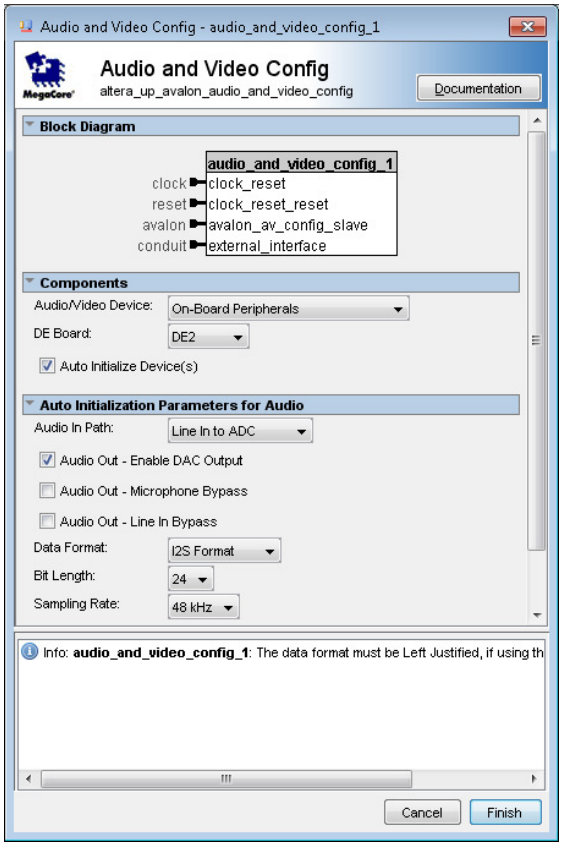
2 Import the custom ST modules into the SoC project

A) Open QSys

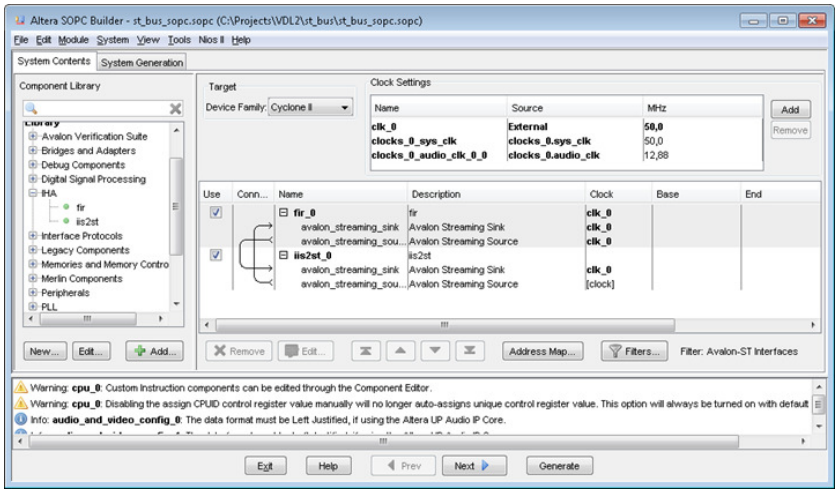
B) Follow this tutorial to create a SoC component from the IIS2ST module.
For missing details on customizing the II2ST module see this guide

C) Do the same for the fir filter (Mega Wizard or own)

D) Add the Audio & Video Configuration component from the University program section, select I2S format for the codec.



E) Connect the iis2st->filter->st2iis source/sink ports in Qsys



F) Remove the Clock generation unit and add 2 new clock sources (12Mhz and 48Khz) see L10_AudioDesign.pdf for connecting clocks.

G) Generate SoC and return to schematic

H) Add connections in the schematic as described in L10_AudioDesign.pdf

I) Compile, download and enjoy! You should be able to input audio and output the left channel filtered through your filter.

NOTE! If you use the Mega Wizard to create the filter and select non-constant coefficients, the fir component will have both an ST interface for audio and an MM Interface for updating the coefficeints.