ADS Start-up Assistance

Instructions based on ADS 2019 and NSCL 20190924

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Keysight ADS can be downloaded and installed to Linux or Windows systems, but require a license to run. You may also need additional programs to support some of the advanced program features.

This document guides the start-up of ADS and linking of a component library to your workspace.

Workspace Organisation

One of the main features in ADS is that projects are organised into workspaces, which can be linked to each other. This allows the user to break down big projects in building blocks that can be separately designed. The building blocks can then be put together in another workspace.

The workspace structure also fits well to modern circuit design traditions where a process design kit (PDK) is typically provided from the fab (semiconductor chip factory). The PDK can be linked to any number of workspaces and used for design of various circuits or systems.

Library

The workspace has a library with components that are referred to as cells. This is where device components are defined in terms of schematic, layout, symbol, etc. The library is also used to define circuit cells, that are built from any device cells created in the library, or from the built in component palettes (for example R, L, C and other basic components). Yet another cell type in the library is test benches, which define electrical simulations.

The distinction between device and circuit cells is not very strict. Typically, devices and circuits both have one or more pins (electrical access points) that are used to connect them to test benches. Use sort but descriptive names for these cells.

Test bench cells run simulations and are therefore a bit special. It is not impossible to build your circuit from scratch directly in the test bench, but it will quickly become a mess. It is recommended to name test benches "TB_description" to keep them clearly apart from your other cells.

Technology

The workspace has a technology setup that describes the design steps in the fab, not used here.

Setup on Linux

A complete installation on Linux requires the ADS 2019 package.

Create and step into/open a project folder

Applications > System Tools > Terminal

>> mkdir ~/Documents/_course_code_or_similar_ (~ denotes your user home folder)

>> cd ~/Documents/_course_code_or_similar_

Install ADS package to your project folder on your account at EIT (Lund University)

>> source /usr/local-eit/cad2/keysight/ads2019/setup.efd

(possibly try the above without the ".efd"-ending or just >> inittde ads2019)

Run

>> ads

Setup on Windows

A complete installation on Windows requires ADS 2019 and Visual Studio 2015-SP2. Note that a newer version of the latter cannot be used, but it is only required for compilation of user-defined models.

Install programs to your computer

Run the ADS installer and indicate a work folder with user write permissions

Run the Visual Studio installer

Run

Run ADS from the start menu.

Starting ADS for the first time

When starting for the first time, you will be prompted to select a license (ADS inclusive), then select that you are familiar with ADS, select the design flow (RF/Microwave), and add utilities (SnP).

Create a Project Workspace

Install and run ADS, see above, and make sure that you are working in your project folder.

Create a new project workspace

ADS > File > New > Workspace…

Make sure the path is right and note that the library should typically share the name of the workspace.

Workspace Views

The workspace can be viewed in various ways by clicking the corresponding tabs in the main window.

File view

File explorer that allows navigation between workspaces.

Folder view

Workspace files are shown and can be organised into folders, allowing for custom organisation.

Library view

Workspace contents are organised into various groups, based on file types, etc.

Library Cell Types

The library of the workspace contains cells that can carry schematic, layout, symbol, etc. views.

Device, circuit, or sub-circuit

Devices, circuits, and sub-circuits can be defined in various views but need a symbol for external use.

Names should be informative but preferably quite brief.

Test bench

Performs simulations on circuits, components, or devices. They include at least one simulation controller that generate data when run. A separate data display window is triggered when the simulation finishes, allowing for the data to be visualised.

Names preferably start with "TB_" continue with the simulation type "DC/AC/HB/TR/SP_" and finish with a description.

Link a Component Library to the Project Workspace

A generic workspace library is maintained for ADS labs and student projects within the Nanoelectronics Group at Lund University. This is referred to as the Nanoelectronics Student Component Library (NSCL) and can be used to explore nanowire transistor technologies and other emerging devices.

Note that an ADS component library is a half-way version of an ADS process design kit (PDK). Both allow import of pre-defined model components to another workspace. In contrast to a PDK, however, a component library has only basic functionality but allows the user to inspect and modify the models.

Unarchive component library

Download and place an archived version of the NSCL workspace (NSCL_wrk_20190924.7zads) in your main ADS folder. Download is available from your course page, or similar.

ADS > File > Unarchive (and just step through the dialogue)

This adds NSCL to your list of workspaces and by default opens it, but you will note that its internal library is set to read-only. You can investigate its contents, then close the NSCL workspace.

Link component library to your project workspace

Open your project workspace (not the component library), and instead link the NSCL to it.

ADS: File > Manage libraries > Add Library Definition File…

Browse to the NSCL and select "lib.defs" from its root directory.

This adds NSCL as a read-only library (unless you change its status) to your project workspace.
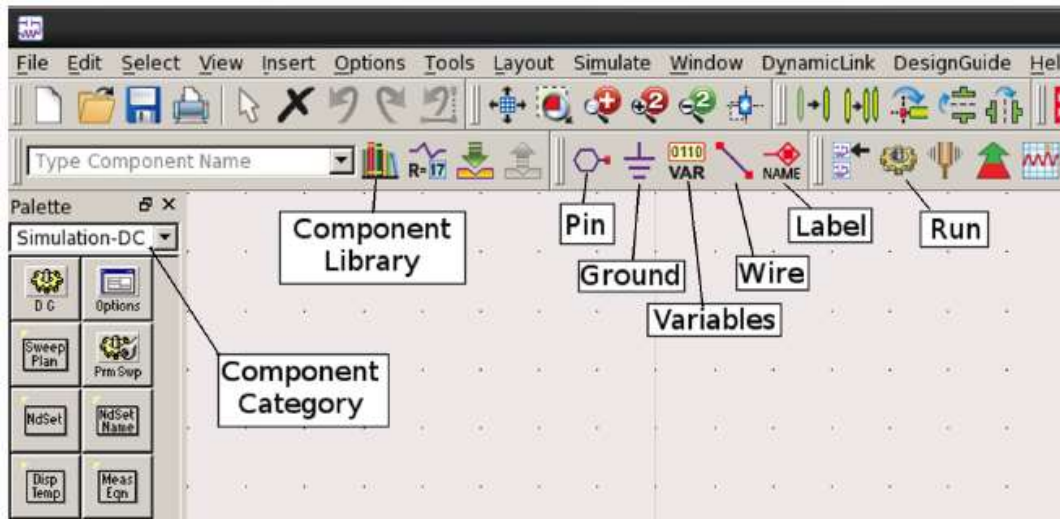
Use components from the component library

The components in the linked NSCL can now be placed into your project library schematics, etc.

Schematic > Insert > Component > Component Library… (hotkey "I")

ADS Windows and Hotkeys

Layout of the schematic window…

A list of useful schematic hotkeys…

1. Esc: cancel whatever cursor function activated
2. I: insert component
3. Ctrl+W: place wire
4. Ctrl+G: toggle grid (keep activated in schematic view)
5. Ctrl+E: toggle grid snapping (keep activated in schematic view)
6. F7: Run/Simulate

Layout of the data display window…