Victory DoE

Victory Design of Experiments

Overview

Victory DoE is a UI driven software solution to automate TCAD simulation projects, run experiments and perform data analysis. It is designed to be compatible with Silvaco's DeckBuild environment, in which users have full control of simulation decks editing, debugging and visualization. Victory DoE also delivers cutting-edge DoE algorithms that boost simulation effectiveness.

Features

- Simulation deck(s) in Victory DoE are compatible with DeckBuild

- Users can take advantage of the flexibility of DeckBuild combined with the DOE capabilities of Victory DoE

- Simulation projects are UI driven

- Intuitive user interface enables easy navigation between projects

- Various sorting methods of simulation projects are provided such as sorting by flag, time, comment, file size, etc., helping to organize multiple projects

- Single Victory DoE tool manages multiple projects at the same time

- Simulation results are stored in Silvaco proprietary format as well as csv format

- Full integration with Victory Visual– Silvaco's TCAD results visualization tool

- Supports real time structure visualization function during the simulation

- Supports LSF (Load Sharing Facility)

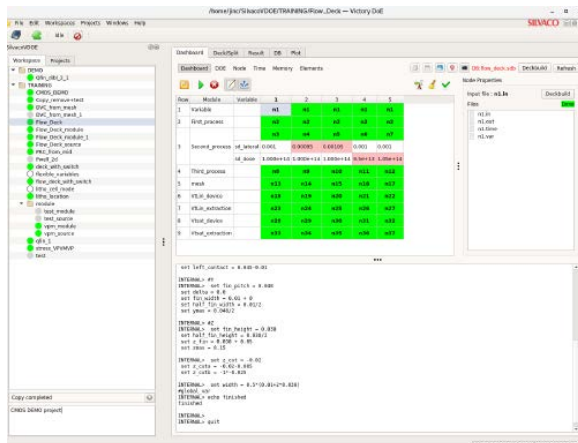Victory DoE Main View

Dashboard View

- Controls simulation progress, structure visualization, debug, and add / delete simulation conditions

- Monitors the simulation progress by reviewing output and structure files

- Displays simulation time for all nodes. Displays maximum memory usage and maximum number of nodes during simulation

- Enables addition and deletion of simulation conditions

- Modification of the "golden-deck" and re-run of the project
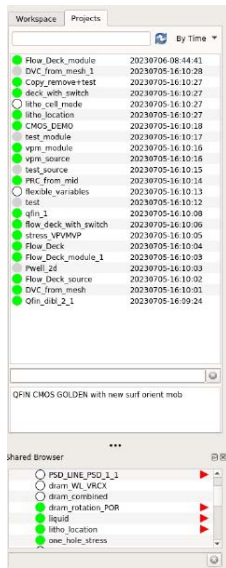
Simulation Project Workspace

- Manages simulation projects, which are organized like directory structures

- Supports multiple workspaces

- For each project, users can assign a flag and attach comments

- All essential file management tools are provided: copy (clean), paste, archive, clean project, lock, etc.

- Allows users to perform search and sort based on the file name, time, flag, file size, …etc.

- Shared workspace enables a collaborative workflow in which multiple users share projects

- Simulation examples are available through default example workspaces

Golden-deck and DOE Table

- Victory DoE uses the "Golden-deck" concept, where a main deck is chosen as the DOE target file

- Deck / Split View to construct a simulation project by assigning the Golden-deck with as supplemental file

- Define DOE input variables and create DOE tables

- Drop-zone for managing the deck and supplemental files

- Any set commands in the Golden-deck can be DOE inputs

- Simulation version and number of threads are automatically assigned as split variables

- Users have the option to lock the simulation version per project

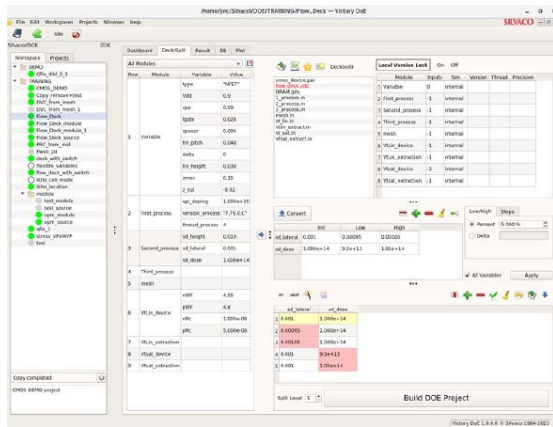- DOE tables can be created manually or automatically using the DOE builder

Project Workspace

Deck/Split View

Simulation Results View

Simulation Result View

- Victory DoE automatically generates the output value at every extract command from the golden-deck
- Input variables and simulation results available in a single table
- Download to .csv format is available

Simulation Structure Visualizationby Victory Visual
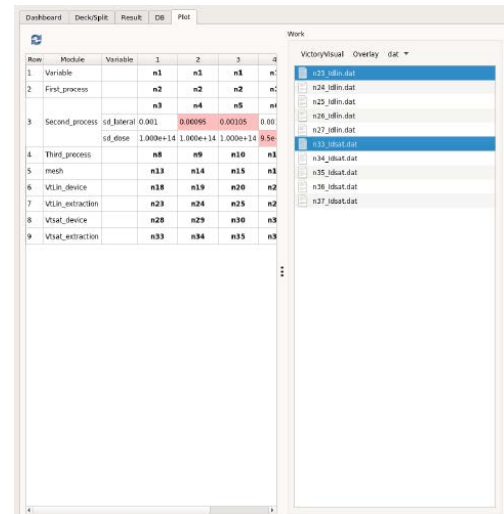
Simulation Plot View

- Integration of Victory Visual to view results
- All files in one location, allowing easy comparison of split lots
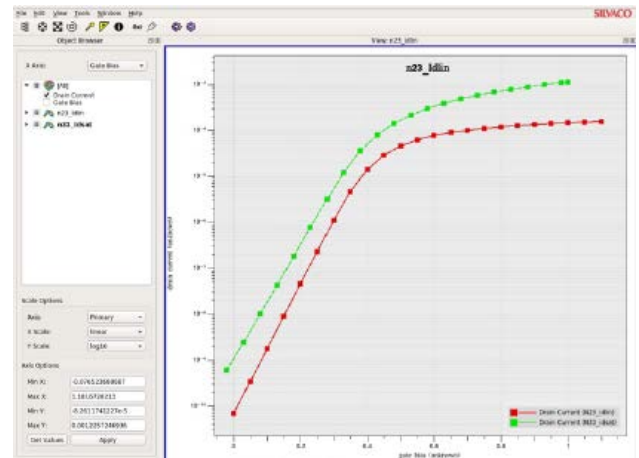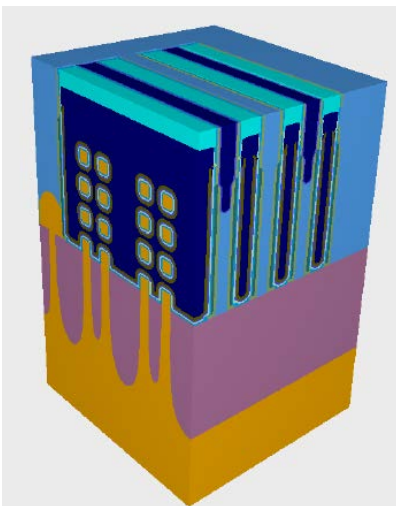- Plot overlay between various conditions allows for quick analysis of different splits

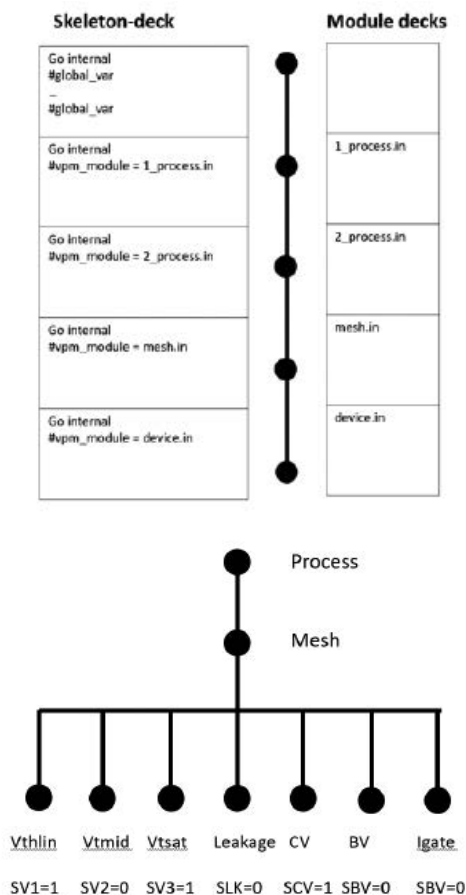Plot View

Victory Visual Overlap Plot

Special Project Flow

1. Skeleton with multiple modules

- Inspired by the conventional software development flow in which a project is comprised of multiple modules. Each module can run independently so that it can be plugged into other projects
- The goal of the skeleton-deck is to build a deck using modules
- Splits are performed on modules
- Modules can be processing recipes or device characterization (IVs, CVs)
- Ideal for collaborative work environment (no requirement of "deep" TCAD simulation knowledge)

2. Switch function with superset golden-deck

- This flow is coming from the requirement that engineers want to have a single superset golden-deck and use only a portion of the flow. Examples may include a conventional CMOS project having NFET, PFET, Vtlin, Vtsat, breakdown, leakage, CV curves, etc. This method is advantageous in keeping the golden-deck golden
- Victory DoE offers a switch function with which users run a portion of the golden-deck more efficiently

Simulation Version Control

- Victory DoE provides straightforward management of simulator versions
- All Silvaco simulation tool versions are displayed in a simple table format
- Ability to lock the simulation tool version for each project

	App	Version	Date
1	internal	1.0.0.R	Feb-17-2022
2	clever	3.11.30.A	Jun-13-2023
3	VP	8.19.0.A	Jun-06-2023
4	VD	1.23.0.A	Jun-16-2023
5	VM	1.10.0.R	May-11-2023
6	VRCX	1.3.0.R	Jun-01-2023
7	DB	5.2.21.R	Jun-12-2023
8	devedit	2.8.26.R	Jan-26-2016
9	VV	1.6.2.R	Jun-22-2023
10	Athena	5.26.2.R	Aug-09-2022
11	Atlas	5.35.1.C	Dec-15-2022
12	VA	1.7.1.A	Feb-09-2023
13	UT4	0.20.0.A	Jun-22-2023
14	UT	30.3.0.R	Mar-25-2014

Local Version Lock — On Off

	Module	Inputs	Sim	Version	Thread	Precision
1	SACOX	0	VP	8.9.0.A	4	
2	STI_FILL	-1	VP	8.19.0.A	4	
3	PWELL	-1	VP	8.19.0.A	4	
4	NWELL	-1	VP	8.19.0.A	4	
5	Well_anneal	-1	VP	8.19.0.A	4	
6	extract	-1	VP	8.19.0.A	4	

Simulation Tool Version Control (A) Global Version Control (B) Local Version Control

Schematics of Special Simulation Flow (A) Skeleton/module Flow
(B) Switch Feature on the Single Golden-deck Flow

DOE Builder

- Generate DOE table from various DOE algorithms

- Option to add Augmented and Constraints DOE features

- Provides state-of-the-art DOE algorithms such as computer-generated DOE from D-optimization algorithm

- Visualization of DOE table

- DOE builder supports Fraction of Design Space (FDS) plot

- Power analysis of DOE is conducted in the DOE builder
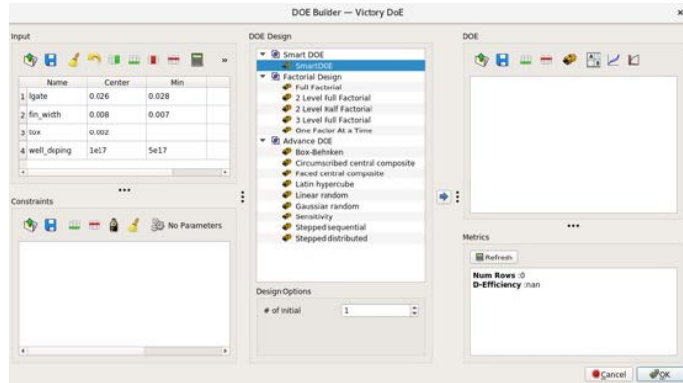
DOE Builder
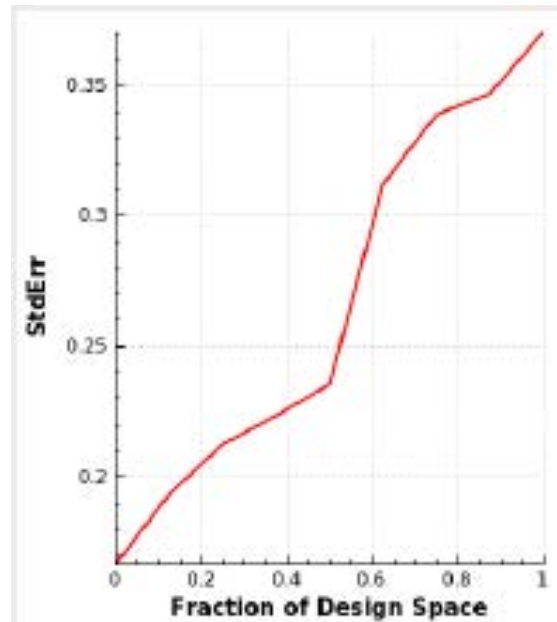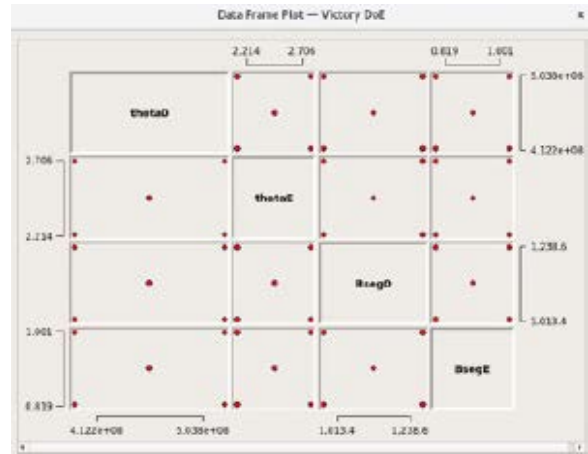
(A) DOE plot (B) Fraction of Design Space Plot