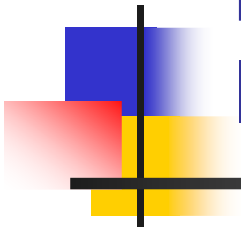
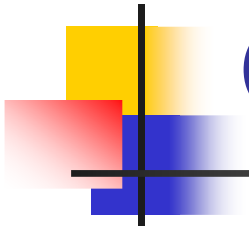


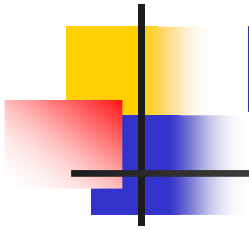
A Technology-Agnostic Simulation Environment (TASE) for Iterative Custom IC Design across Processes

S. Nalam, M. Bhargava, K. Ringgenberg, K. Mai, and B. H. Calhoun



Overview

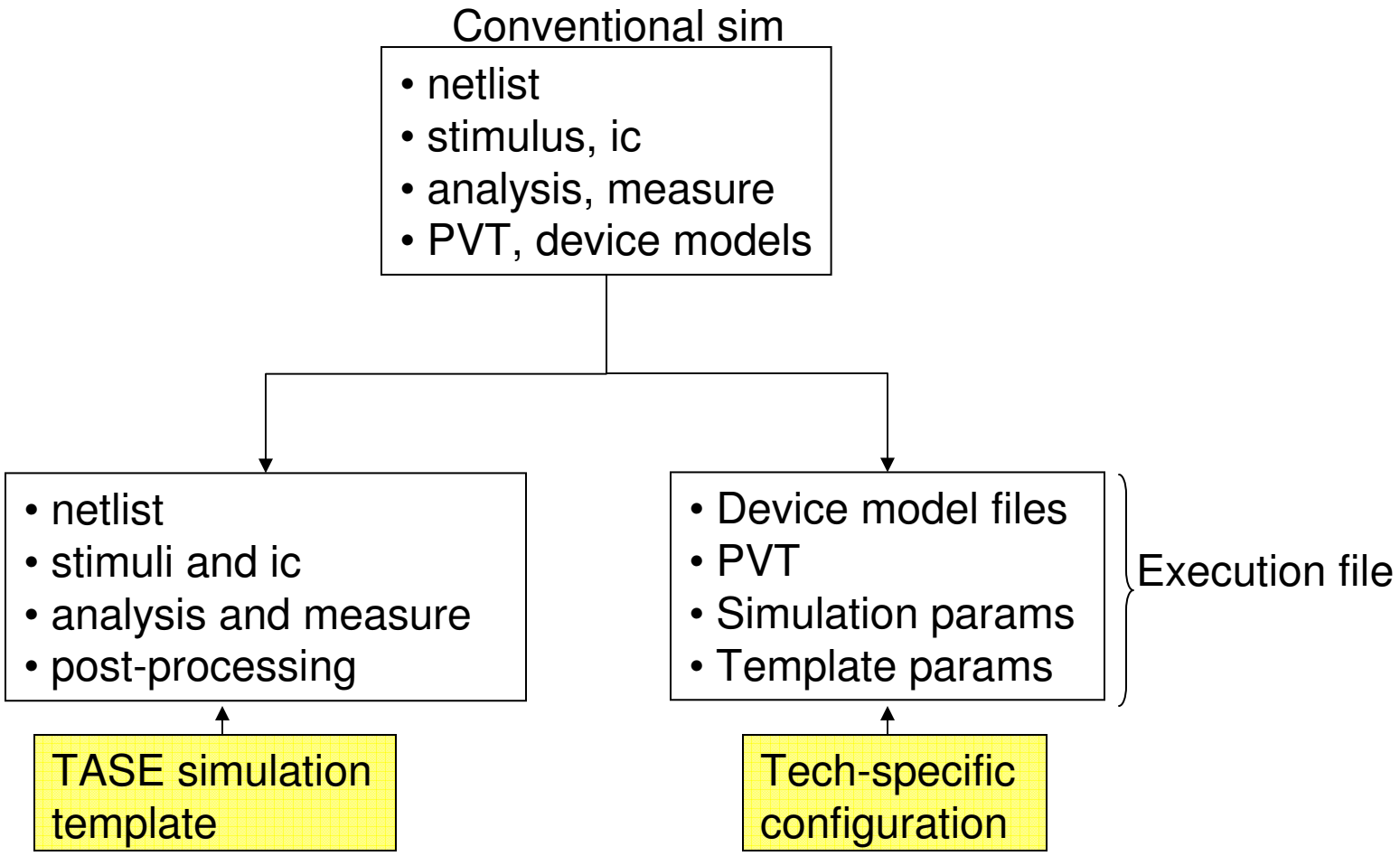
- Motivation
- TASE structure and flow
- Usage example
- TASE GUI
- Conclusion



Motivation

- Port design ***and*** underlying analyses
- Preserve designer knowledge/intent $\Rightarrow$ rapid redesign
- Productivity
- Share and increase knowledge of design trade-offs across technologies

TASE Structure



Example template (Spectre)

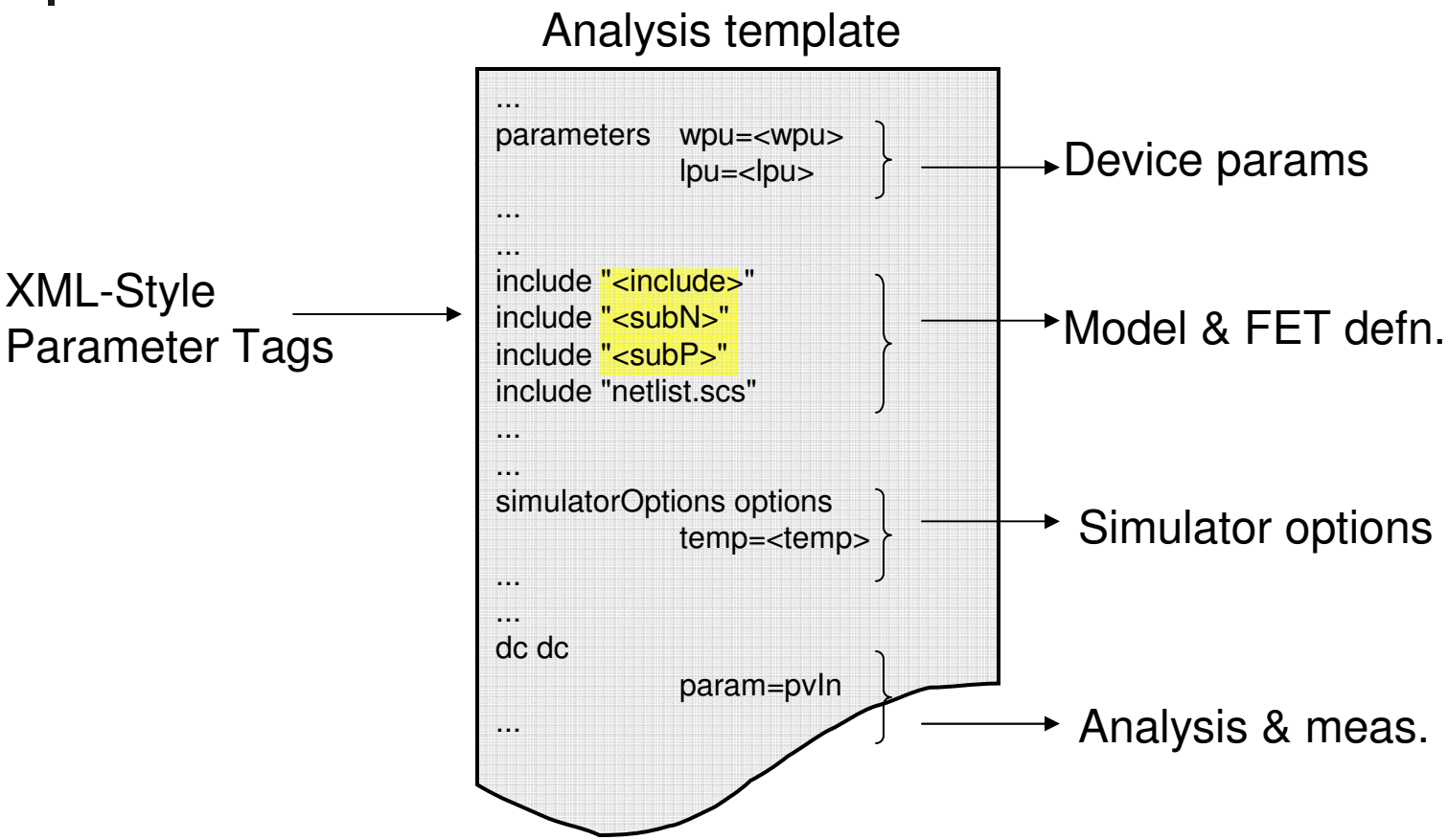
Netlist template

```
//===========================================
// Half cell for SNM test
//===========================================
subckt HALFCELL (IN OUT BL WL VDD VBP VSS VBN)
  MP (OUT IN VDD VBP) P_TRANSISTOR width=wpu length=lpu
  MN (OUT IN VSS VBN) N_TRANSISTOR width=wpd length=lpd
…
…
VU (U 0) vsource dc=pvIn
VWL (WL 0) vsource dc=pvdd
…
```

Stimuli, ic

Generic FET names

Example template (Spectre)



Example Execution file

Tech-specific definitions for parameter tags in exec file

Netlist parameters

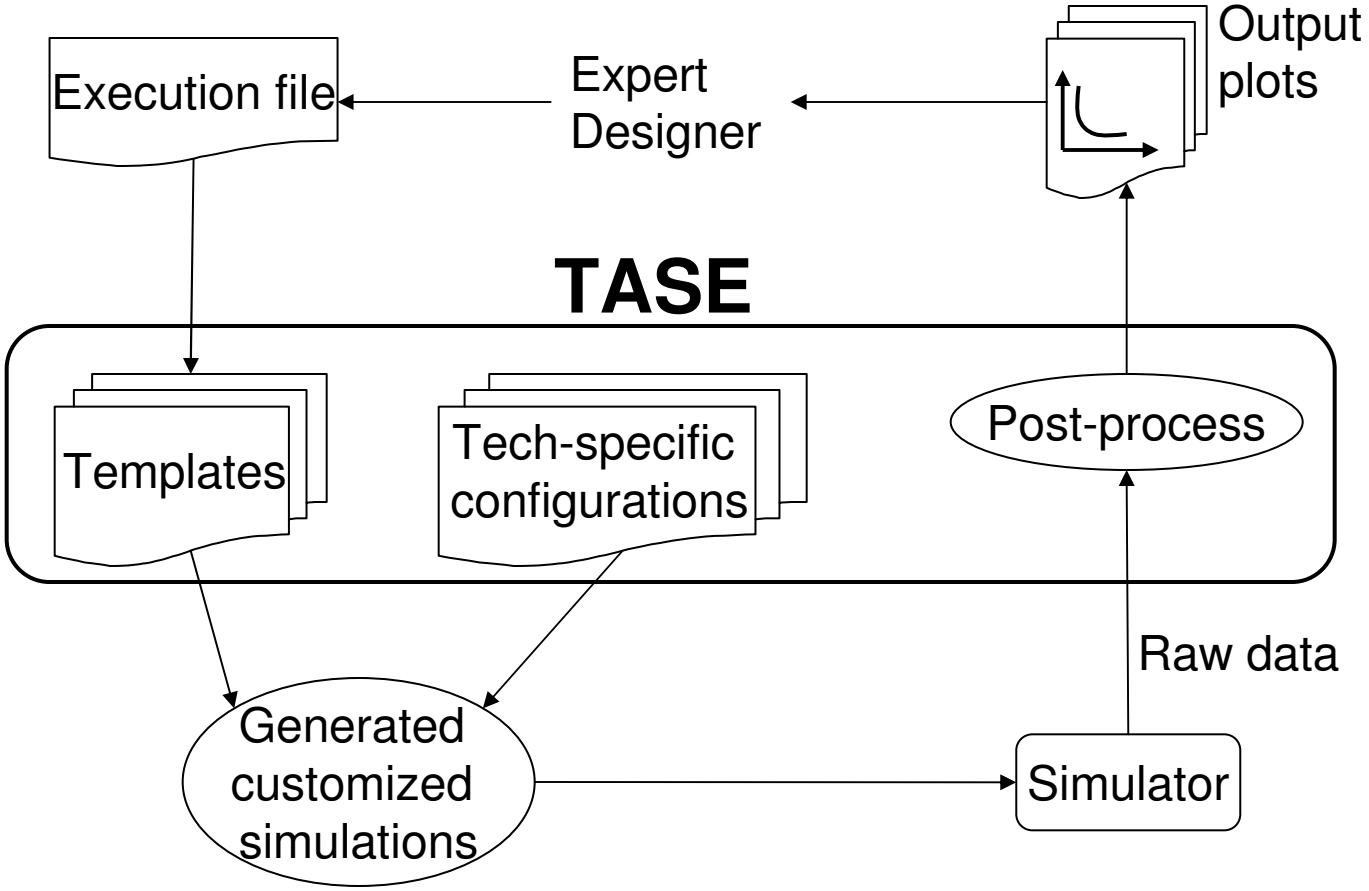
Model files

Simulation set

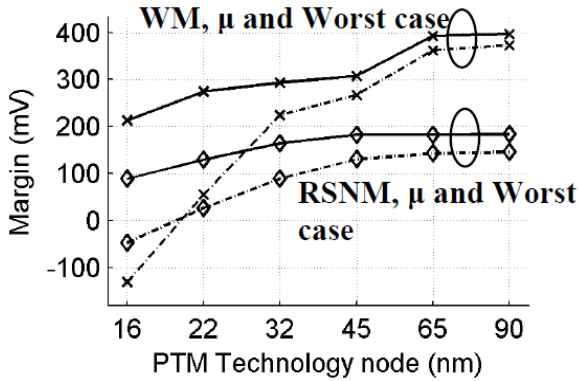
```
...
<lpu>       100n
<wpu>       200n
<pvdd>      1.0
<subN>      ../../../../template/ptm90/subN.scs
<subP>      ../../../../template/ptm90/subP.scs
<include>   ../../../../template/ptm90/include.scs
...
...
############################
# TEST EXECUTION SELECTION
############################
<scs>
IDVD_N
...
</scs>

<ocn>
...
</ocn>
```

Tool flow


Execution file
Expert Designer
Output plots
TASE
Templates
Tech-specific configurations
Post-process
Raw data
Generated customized simulations
Simulator

Usage Example



45nm Exec file

32nm Exec file

22nm Exec file

Re-usable exec files

No change to templates

TASE

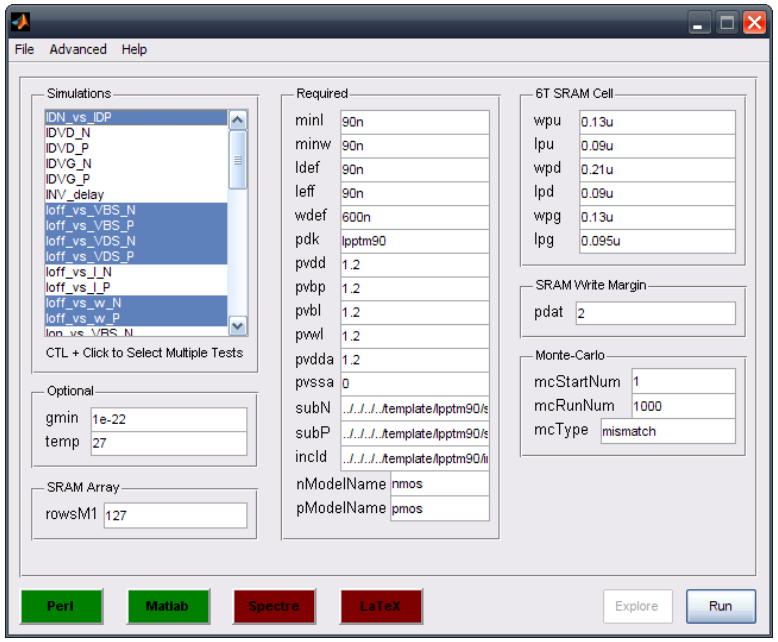
RSNM, WM templates

- Quick trend plotting
- Forecasting
- Model revisions

TASE GUI: Configuration mode

Define Tech-specific parameters

Pick simulations

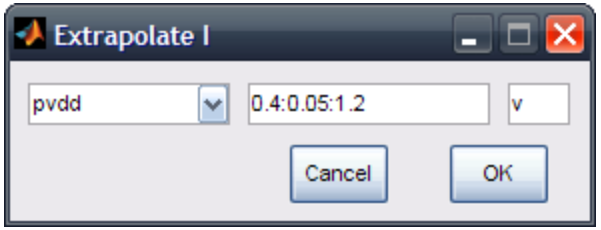


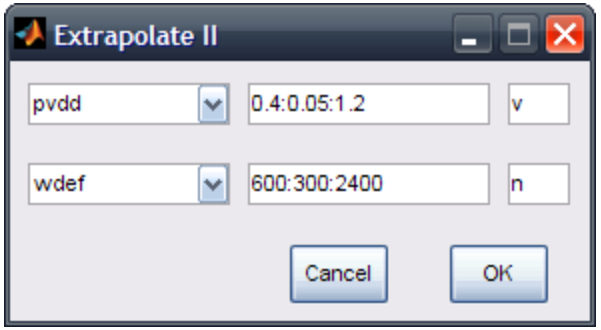
Auto-generate exec files

Check dependencies

TASE GUI: Configuration mode

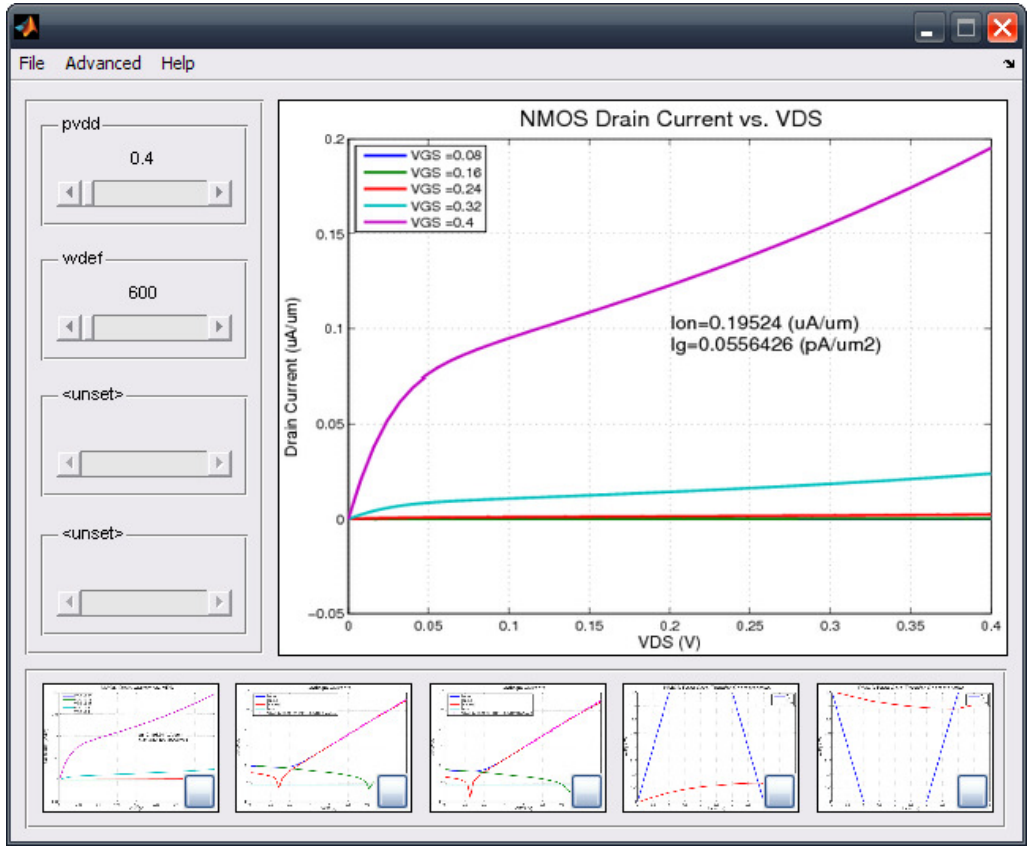
Extrapolate tools - auto-generate exec files for swept variables





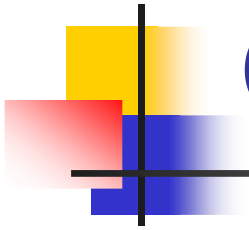
TASE GUI: Exploration mode

Visualize Variable interdependence



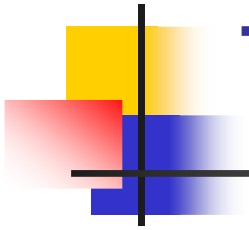
Variable sliders

Visualization area



Conclusion

- TASE tool
  - Simulation templates to enable technology agnostic simulation
  - Easier porting of designs *and* analyses related to design
  - GUI and Visualization tools to observe variable interdependence and manage large sets of simulations



Thank You

Questions?