

The Art of Engineering – Amplified A customer experience of IC61 and the path to get there

CDNLive! Israel – Nov. 4, 2007

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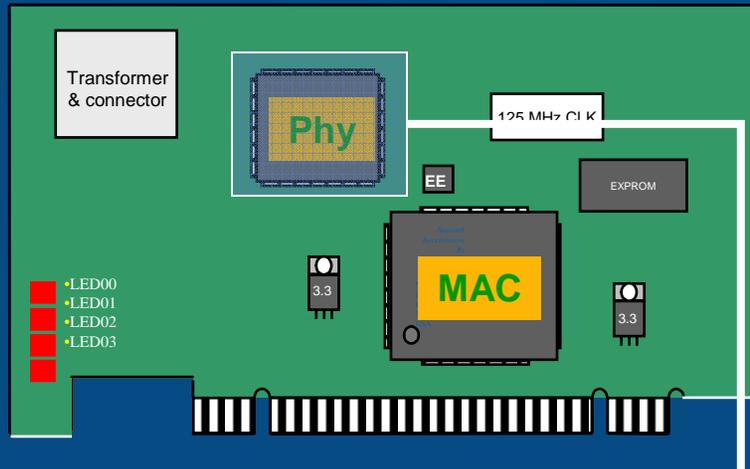
Design Automation team - LAD

LAD (LAN Access Division) overview

- ❖ Local Area Network (LAN) – Communication network which connects computers that are located in close proximity either by Fiber or Copper
- ❖ LAD develops components which connects computers to Wired Networks using Copper lines (CAT5, CAT6, etc)
 - ❖ 10 Mb, 10/100 Mb (Fast Ethernet), 1Gb products and now 10Gb Ethernet
 - ❖ MAC/PHY – cover the 1st 2 communication layers in the communications stack
- ❖ LAD is part of Digital Enterprise Group
 - ❖ Israel (Haifa, Jerusalem and Petach-Tikva)- Architecture; Analog, digital and DSP Design, Firmware, Silicon Integration, Manufacturing, QNR, HW Application Engineers, Design Automation
 - ❖ USA - SW, SW Validation, Marketing, Product Application Engineers, Strategic Planning)

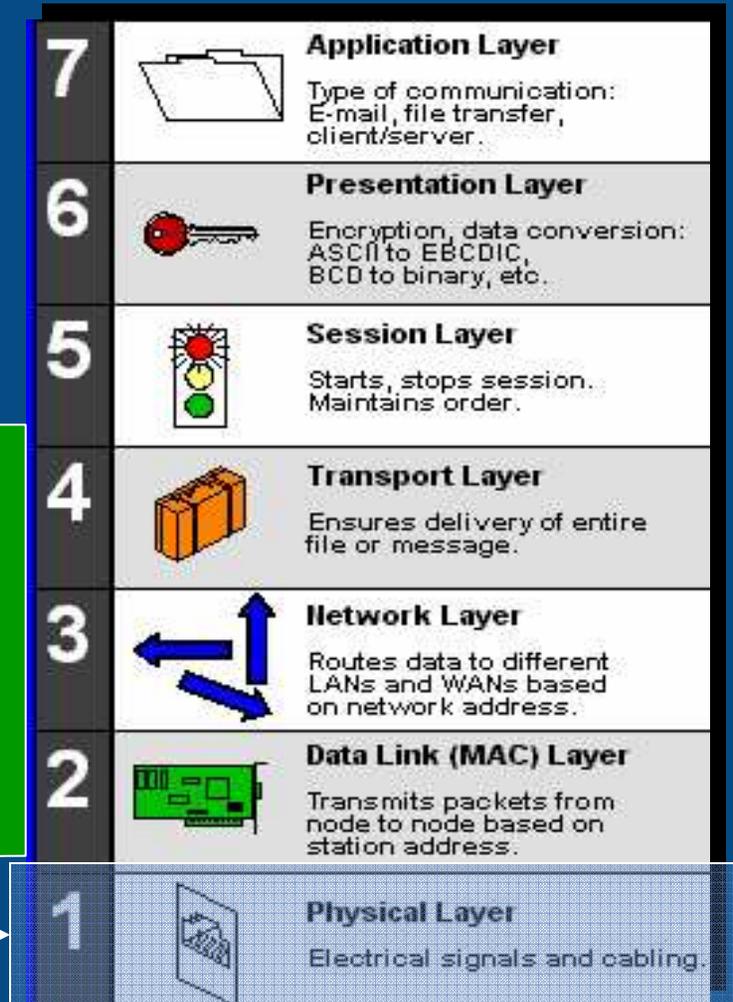


LAN Basics: PHY "Analog"



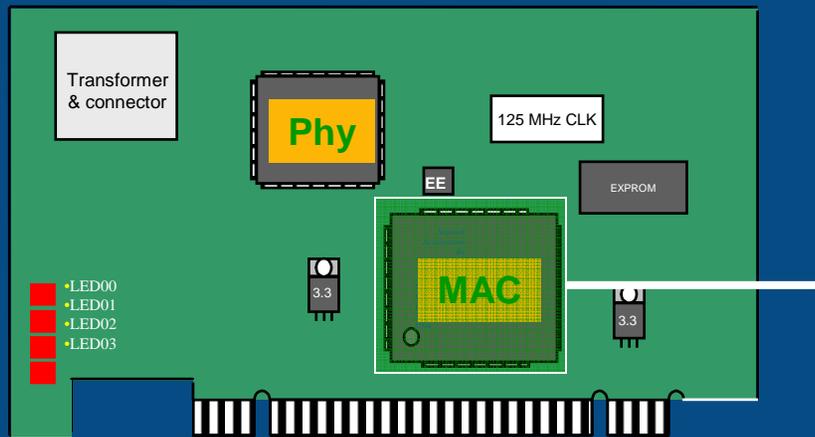
“The physical layer is the most basic network layer, providing only the means of transmitting raw bits. The shapes of the electrical connectors, which frequencies to broadcast on, and similar low-level things are specified here. An analogy of this layer in a physical mail network would be a specification for various kinds of paper and ink”

Source: Wikipedia



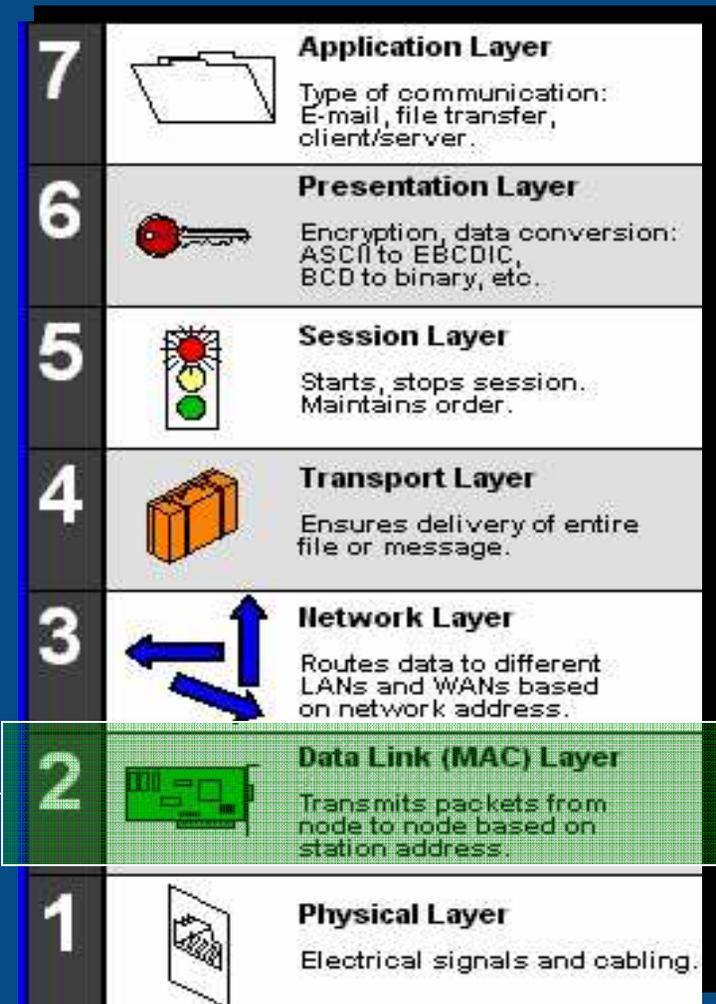
OSI Model

LAN Basics: MAC "Digital"



“The Media Access Control (MAC) sublayer determines who is allowed to access the physical media at any one time. The MAC sublayer is primarily concerned with the control of access to the physical transmission medium (i.e. which of the stations attached to the wire or frequency range has the right to transmit?).”

Source: Wikipedia



OSI Model

LAD Ethernet - Target Market Segments

Enterprise Networking

- Routers/Switches
- Security Appliance
- Blade Servers



Storage

- Network Attached Storage
- Storage Area Networks

Interactive Clients

- POS
- ATM
- Kiosk
- Gaming



Enterprise Server

- Pedestal
- Rack-mounted
- Modular

Enterprise Client

- Desktop
- Notebook
- Workstation

Print Imaging

- Printer Controllers
- Digital Printers
- Copiers



Telecom

- 2.5G/3G Buildout
- Media Gateways
- DSLAM
- Head-End



Industrial PCs

- Industrial control
- Factory automation
- Medical imaging



Home Media Devices

- Set Top Boxes
- Residential Gateways

IC61 migration status at Intel LAD

- ❖ Users have been trained
 - ❖ New Projects start to use IC6.1 these days, in 65nm process
 - ❖ Initial feedback from users is positive
- ❖ Tapeouts in 2008 will be the real test



IC61 – new features that make a difference in productivity

- General
 - ❖ One tech file – all tools
 - ❖ One exec (no more icms, icfb... etc')
 - ❖ Licenses – token model, enables flexible use
 - ❖ ITDB – incremental technology database



OA Database

- ❖ Becomes Industry-standard database
 - ❖ Lot of EDA vendors (especially Cadence competitors!) adopt OA
- ❖ Standard C++ API and Cadence-proprietary C API
 - ❖ Allows non-SKILL DB manipulation!



GUI improvements - CIW

```
Virtuoso@ 6.1.1 - Log: /home/sruby/CDS.log
File Tools Options Help
cadence

'Unable to open library avTech at path /export/home/cds/assura316/tools/assura/etc/avtech/avTech: I
*WARNING* LIB opamp090 from File /export/sruby/IC6.1_Whatsnew/design/cds.lib Line 6 redefines
LIB opamp090 from OA File /export/sruby/IC6.1_Whatsnew/design/lib.defs
OA libdef DEFINES take precedence, ignoring re-define
*WARNING* The directory: '/export/home/cds/assura316/tools/assura/etc/avtech/avTech' does not exist
but was defined in libFile '/export/sruby/IC6.1_Whatsnew/design/cds.lib' for Lib 'avTech'
.. ddUpdateLibList called to update the library list.
>
hiiSetCurrentForm('ddsRefreshForm)
t
hiFormDone(ddsRefreshForm)
.. refreshed CDF for library "analogLib".
t
t
myname()
*Error* eval: undefined function - myname
>

procedure( test( arg1 )
println( "arg1" )
)

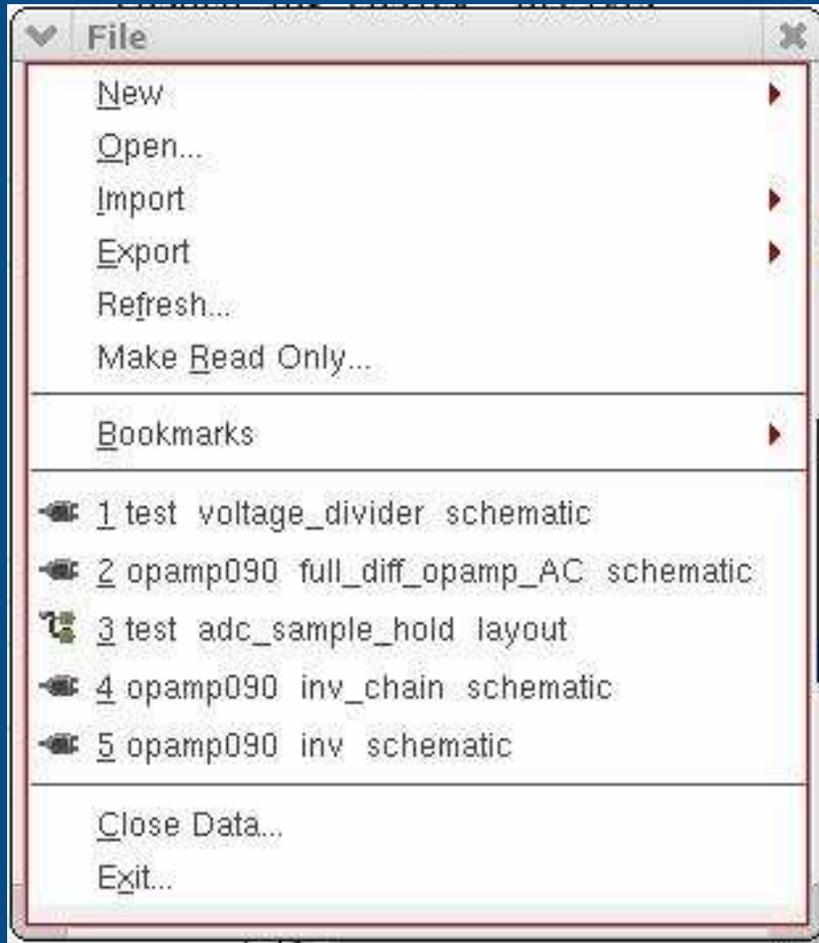
mouse L: schSingleSelectPt() M: schHiMousePopUp() R: ddsHiRefresh()
1 | procedure(test( arg1 ) ... )
```

- ❖ Warning & Errors messages color coded
- ❖ CIW auto raised on error/warning
- ❖ Expandable multi-line input area

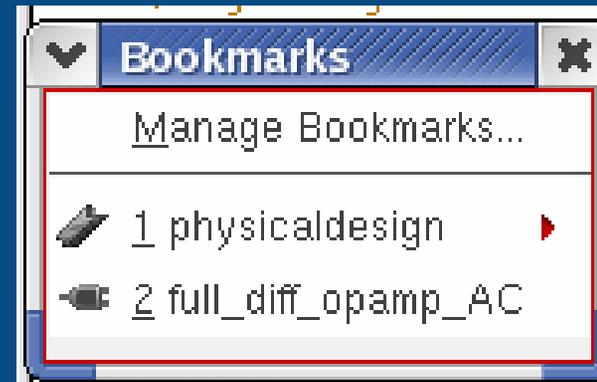
- ❖ Skill editor: highlighting Procedures and SKILL keywords, parenthesis awareness
- ❖ History (!command) and Arrow navigation



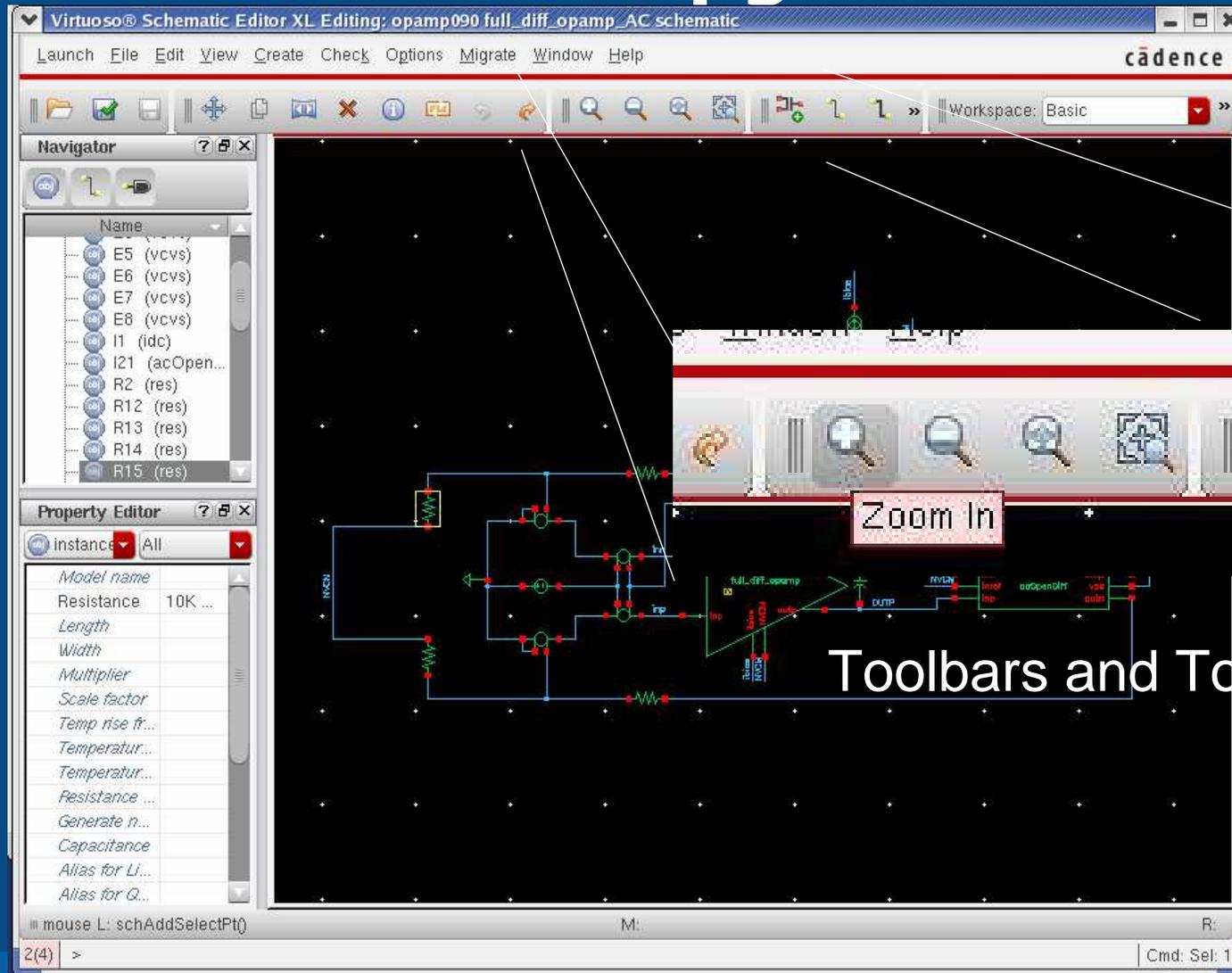
GUI improvements



- ❖ Recently opened designs
- ❖ Bookmarks
- ❖ Tear off menus

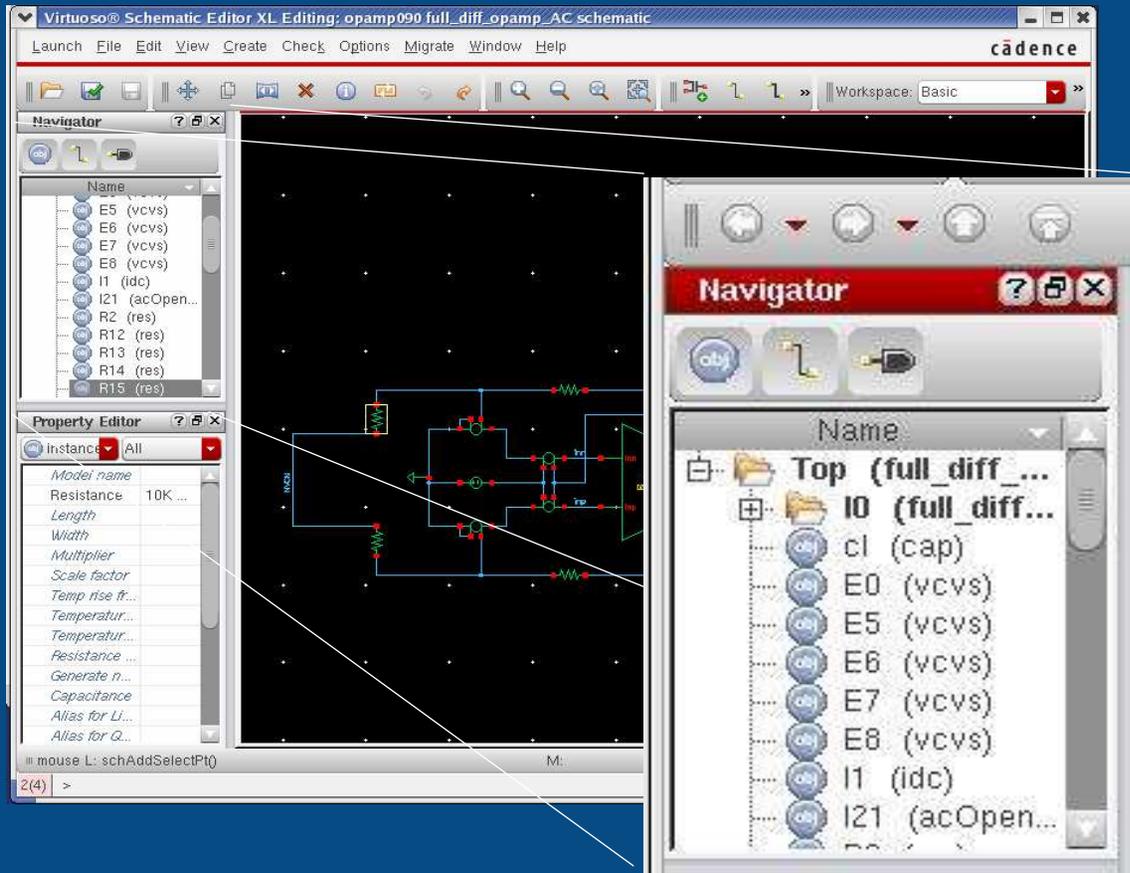


GUI Upgrade



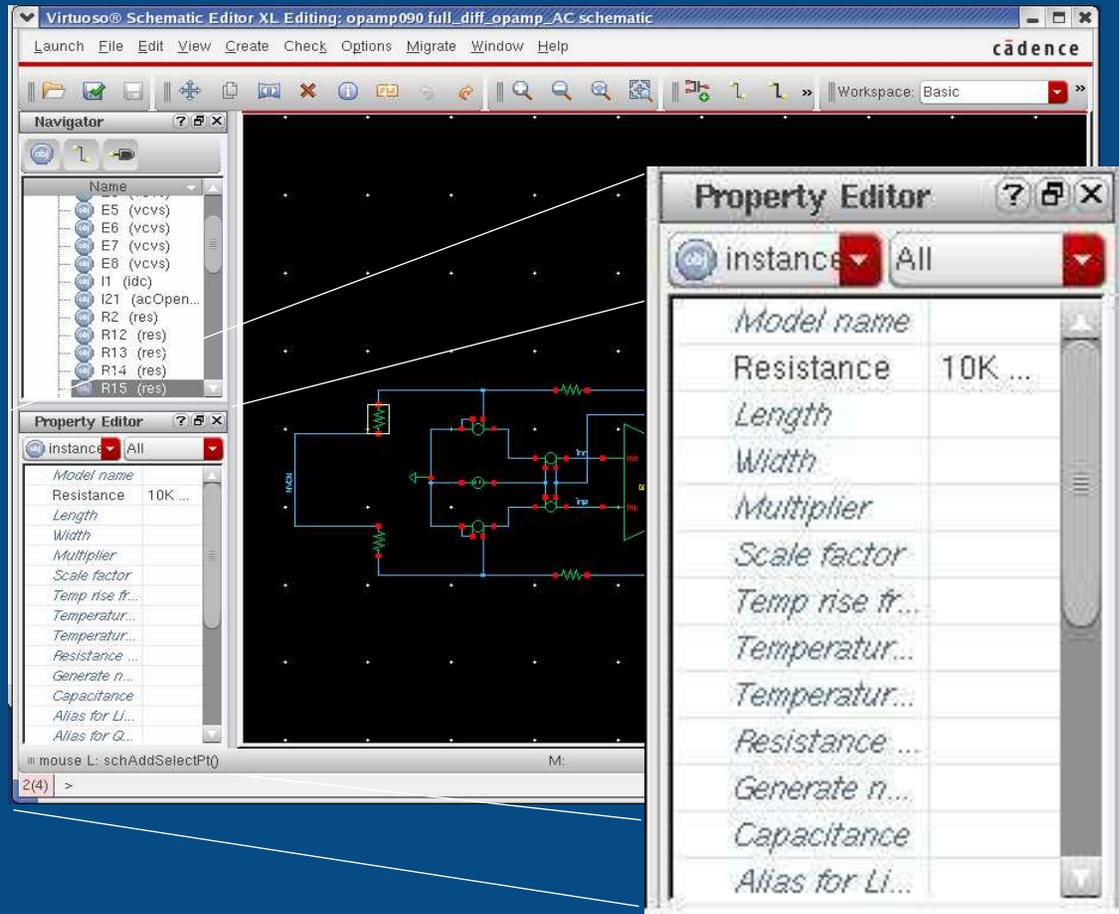
Toolbars and Tooltips

Go Toolbar and Navigator



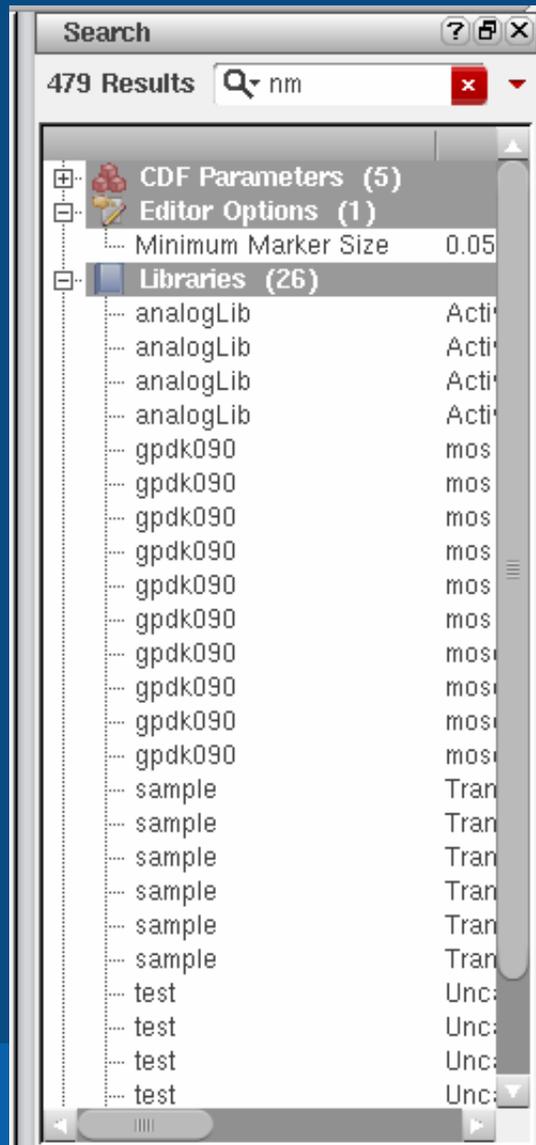
❖ Provides a clear view of the design hierarchy, and a quick way to move around in it.

Property Editor Assistant



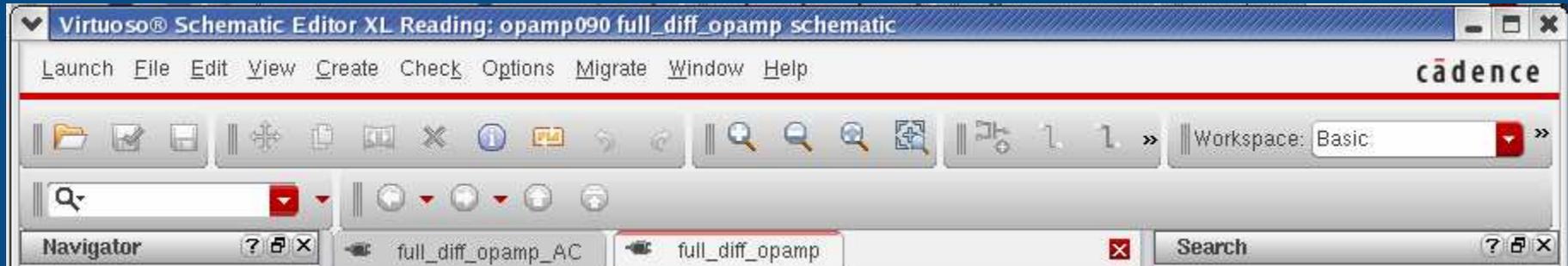
❖ Speeds up property changes of devices.

Search Assistant



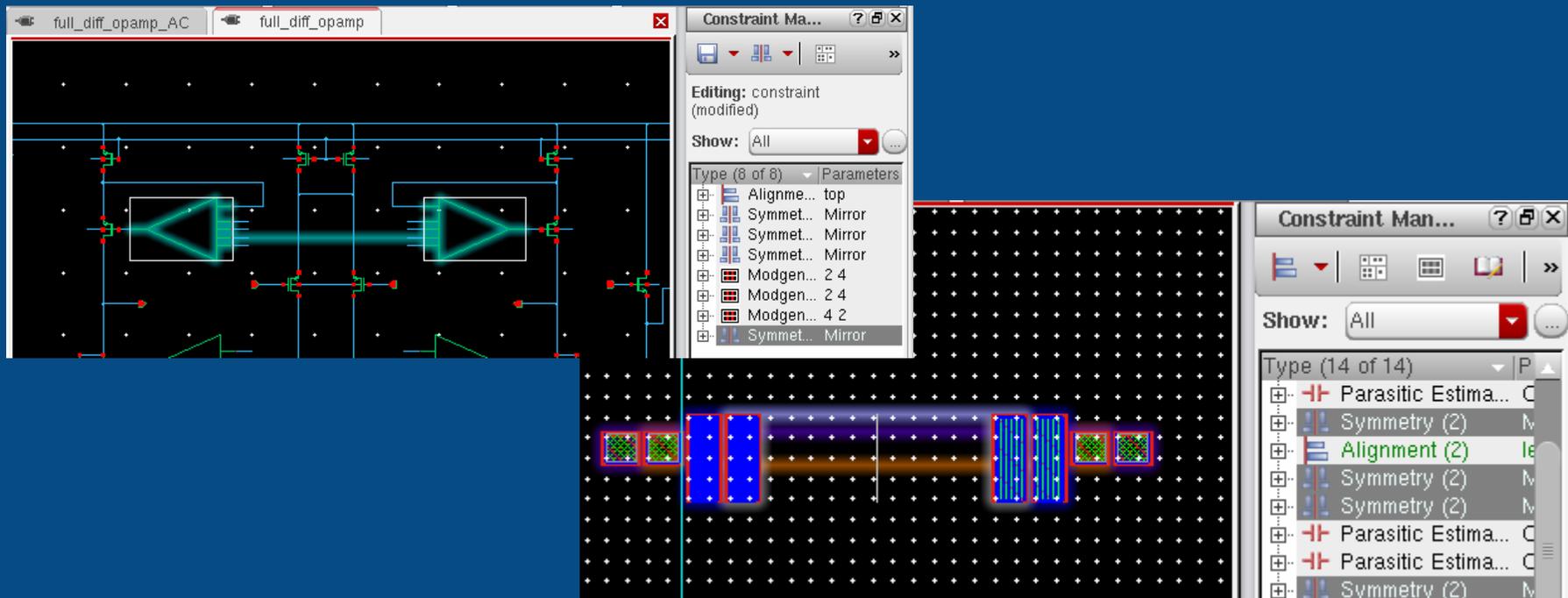
- ❖ Helps to quickly find
 - ❖ design elements
 - ❖ Tool options
 - ❖ CDF parameters
 - ❖ SKILL functions
 - ❖ ...more

IC61 – Workspaces and tabs



- ❖ Workspaces – organizes the flow, and provides better usage of the ‘canvas’ at various design stages
- ❖ Tabs – one window for everything

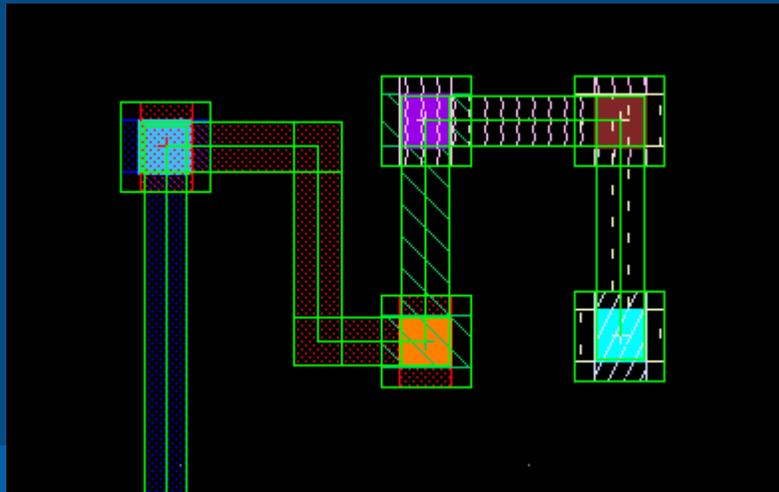
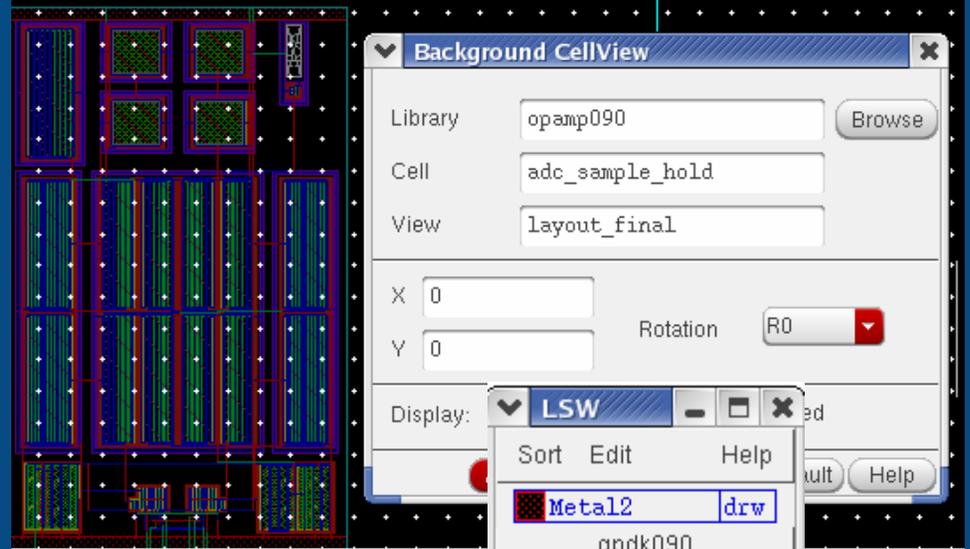
IC61 - Constraints



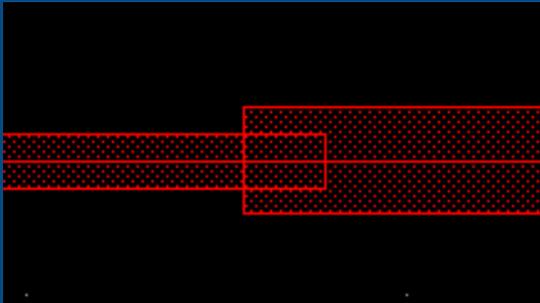
- ❖ Closes communication gaps between schematics and layout
- ❖ Allows to enforce layout rules at design entry and layout stages

Layout

- ❖ Background cellview
- ❖ Groups
- ❖ Selection set navigation
- ❖ New objects in LSW
- ❖ Wires (wire stitching/auto reshape/loops removal)
- ❖ Built-in Turbo Toolbox



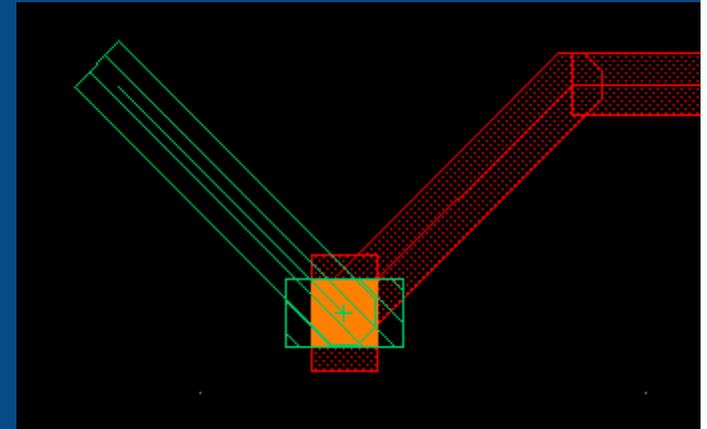
Layout



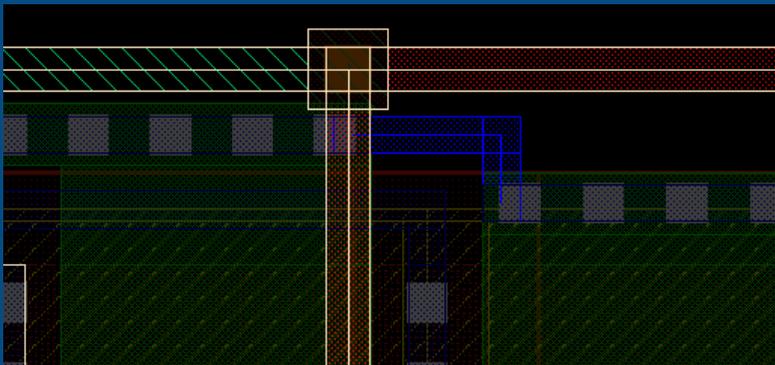
Segment width control



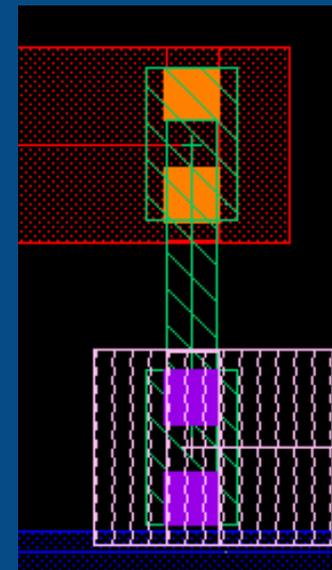
Dynamic object information



On grid 45 degree shapes



Shadowing



Smart Vias

ADE-XL

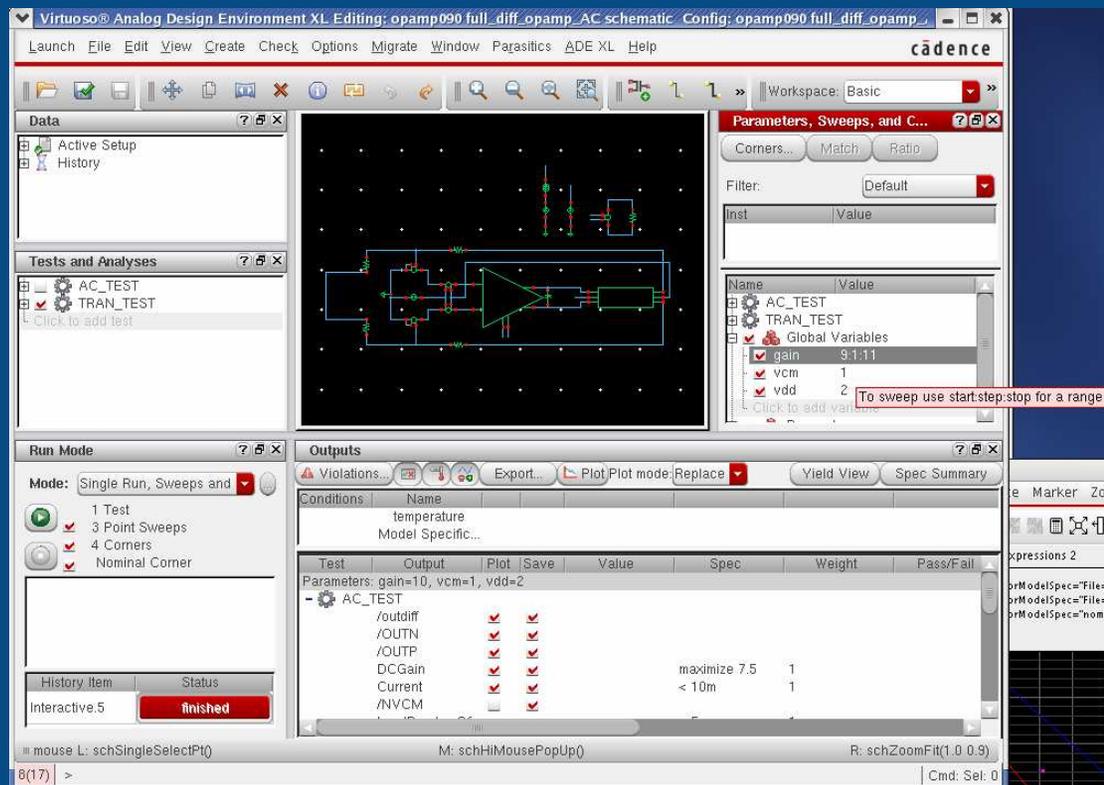
❖ Multi-testbench setup

❖ contributes to a more organized development environment

❖ Fast transition between testbenches

❖ Easy parameter sweep

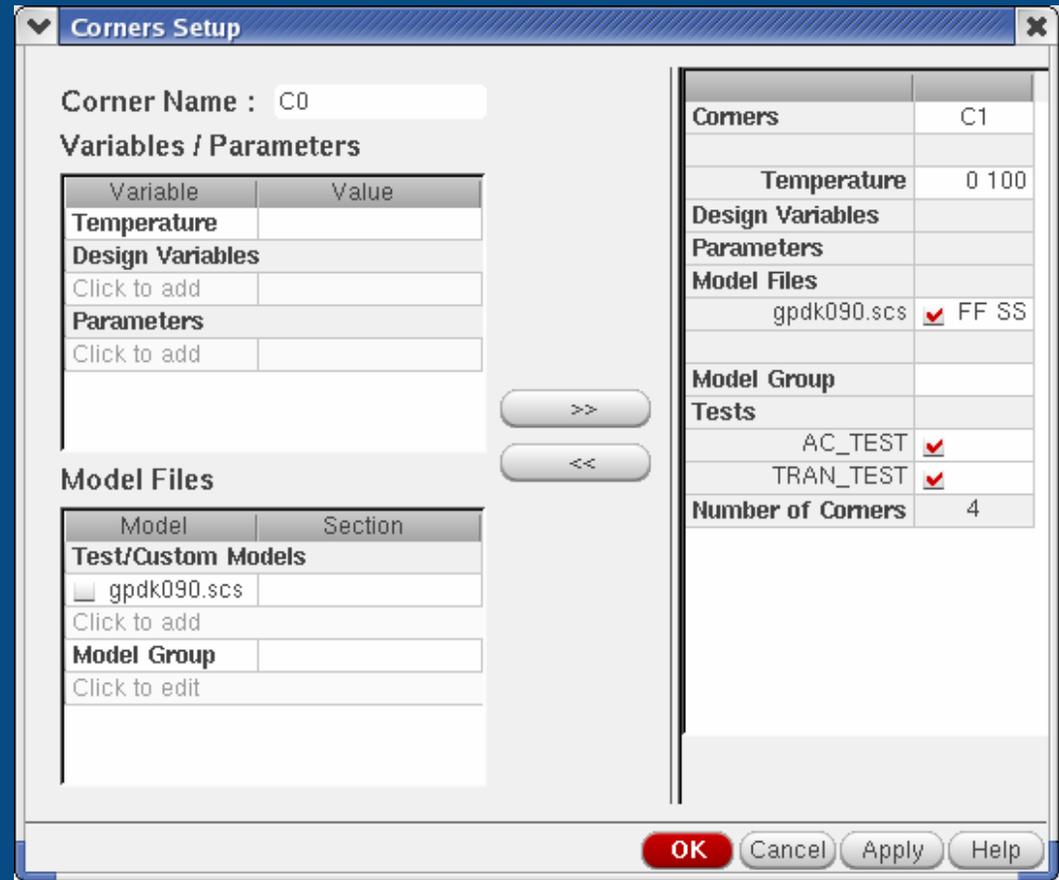
❖ nice feature that saves time and allows sweeping device parameters w/o having to change the schematics



ADE-XL

❖ Corner analysis

- ❖ The corner tool provides an intuitive, easy way to specify the corner parameters and manage the jobs
- ❖ The GUI is clear and simple
- ❖ Combined with the SPECS defined in the output assistant pane for each output and the OCEAN/MATLAB post processing integration – it creates a full regression environment, with reporting capabilities



IC61 – features we have not yet implemented in LAD flow but look promising

- ❖ Modgens
- ❖ Analog Floor-planner, Placer and Router
- ❖ ADE-GXL
 - ❖ Design optimization
 - ❖ Parasitics estimation and analysis



Migrating to IC61

- ❖ Migration of Skill code that manipulates Schematics was not too difficult
- ❖ The concept of device magnification was changed – forcing a change in existing schematics
- ❖ Much more work invested in Layout Skill code migration – new DB objects (Via, PathSeg, Boundary, etc), changes in Skill API
- ❖ Overall migrated tens of thousands lines of SKILL code
- ❖ Biggest roadblock was availability of a quality PDK from the foundry
- ❖ Creating a methodology around Via migration was the biggest issue
- ❖ We hit some bugs/issues in layout migration, but these were solved in a reasonable amount of time



Summary

- ❖ IC61 has some very significant improvements over the IC5141 platform
- ❖ Migration is not trivial, but not too difficult if a reliable PDK is available and you have the SKILLS
- ❖ Cadence team has been professional and supportive, committed to escort the migration and deploy the new environment in a smooth mode

