



# ASCIA - A Multi-Vendor IC Design System

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## Siemens HL

- We are the **semiconductor** (“Halbleiter”) group of the German Siemens AG
- Our main location is in **Munich**, Bavaria
- HL has one **central IC CAD department** “HL CAD” in Munich which is responsible for CAD tools, libraries, technology data; customer support is shared with local CAD groups
- HL in figures:
  - **5 microelectronics development centers** worldwide
  - **7 fabs** worldwide
  - about **16,000 employees**
  - about **US\$ 3 Bill. sales** (in fy 94/95)
  - **#2 in Europe** in sales (behind Intel)

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## Objectives of this Presentation

- Present the **architecture** of Siemens HL’s “mainstream” IC design system “**ASCIA 4.1**”
- Describe the relationship between **HL and Cadence**
- Discuss the **role of Cadence’s DFII** in ASCIA
- Give a short overview of our **Opus 4.4 beta test results**
- **Underline our most important EDA needs**

Objectives of this Presentation

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## What is ASCIA?

- **ASCIA** = “Advanced Silicon Compilation”  
HL’s **proprietary IC design system**, developed by HL CAD
  - Based on HL-specific concepts, libraries and technology data plus commercial EDA tools
  - **All-in-one system**:  
analog, digital, mixed-signal **designs** (not for memory ICs)  
cell-based, full-custom **methodology**  
CMOS, bipolar, BiCMOS, smart power **technologies**
  - ASCIA 1.X (1990..today): **best-tool-in-market** approach,  
solely for **in-house use**, “3rd generation” CAD system  
**problems with system complexity and interfaces**
- > Develop a “4th generation” CAD system to solve these problems!

What is ASCIA?

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## ASCIA 4.X Objectives

- Remove **interface problems**
  - Minimize **effort for system integration and support**
  - Offer **state-of-the-art EDA tools with uniform GUI**
  - Reduce overall **tool cost**
  - **Avoid** need to develop **own EDA software**
  - Get uniform, **powerful design data management**
- > Cooperate with **one EDA company** to supply a **complete, framework-based** IC design system incorporating HL’s parts
- > Choose the **technology leader** with the **broadest tool set**

ASCIA 4.X Objectives

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## Cadence/Siemens Partnership

- In 1992: HL’s decision to **choose Cadence as main EDA supplier**
- **1. July 1993**: A **5-year** “Services and License Agreement”  
between Cadence and Siemens HL was signed
- Objectives:
  - Create a **full front-to-back production EDA environment**  
for HL based on the DFII and Cadence’s IC CAD tool suite
  - Establish a **CAD product partnership** (e.g. Vampire)
  - Grant **licenses of all IC CAD tools** (“seats”) to HL’s users
  - Provide **consulting, training and maintenance** to HL
- Today, we have several hundred Cadence seats in use at HL

Cadence/Siemens Partnership

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## The ASCIA 4.1 "Kernel"

- HW/OS platform: Sun workstations running SunOS 4.1.3
- GUI: OpenWindows 3.0
- Consists of **versioned "packages"** (tools, libs, tech, SKILL)
- All **ASCIA** software incl. libs stored on **central file servers**
- **Design data** stored on **user's workstations**
- Tools activated via **"modules"** software package
- **Hierarchical technology and library concept**
- 2 user roles: **"designer"**, **"project administrator"**
- **Access rights** based on UNIX groups

The ASCIA 4.1 "Kernel"

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## The DFII in ASCIA 4.1

- **"Smooth transition"** from ASCIA 1.4 to ASCIA 4.1:  
All "old" tools were still offered and **graphically encapsulated** into the DFII; our goal was to replace them with Cadence tools
- All views which do not have to be stored in **CDBs** are managed on **UNIX level**, e.g. VHDL, verilog
- About **100,000 lines of SKILL code** in more than 40 packages to configure CDS tools and implement missing functionality, e.g.
  - **hierarchical power supply concept**
  - **backannotation flow**
  - **design data management utilities**
- **Hierarchical DFII initialization:**
  1. ASCIA specific, 2. subproject version specific, 3. user specific

The DFII in ASCIA 4.1

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## ASCIA 4.1 Project Structure

- Separation between **personal** and **project accounts**
- Each project account owns one UNIX group;  
all project members become members of UNIX group
- All **tools are executed** and **design data is stored**  
in project accounts
- Project structure on **UNIX level:**  
~<project>/<subproject>/<version>/<tool>/<user>
- ASCIA specific **configuration files** per subproject version
- **Automatic tool configuration** through wrapper scripts

ASCIA 4.1 Project Structure

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## ASCIA 4.1 today

- Portion of **non-Cadence tools** in ASCIA 4.1 is steadily **increasing**
- **No longer an in-house system**: also used by external design contractors; over **20 installations**; about **1000 users worldwide**
- Problems with **CDB data corruption** reduce productivity
- **Stability/performance** enhancements of some CDS-tools needed, e.g. place & route, backannotation, analog simulation, static timing analysis, design data management
- High effort for **testing** tools and implementing workarounds
- Today, our **users demand a best-tool-in market** system: we are back to the ASCIA 1 approach and have to spend much effort for system integration

ASCIA 4.1 today

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## Our EDA Needs

- Component **Quality!!!**
- Interface **Standards!!**
- System **Modularity!**
- Leading-edge designs require **leading-edge tools (functionality, performance, stability)**
- Complete, up-to-date, easy-to-access **documentation**, realistic **training classes** in our environment
- Reliable, powerful **design management** functionality
- **Easy-to-use tools, intuitive GUI**, ability to run in **batch mode**
- **Affordable consulting** services

Our EDA Needs

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## Opus 4.4 Beta Test Results

- We expect **CDB/SKILL/technology data migration** to be the **main task** when broadly introducing Opus 4.4 in 1997
- Official 4.4 beta test site in 1./2.96, focused on TDM/SKILL
- **Basic CDB migration** (libcvt) went smoothly
- **TDM** very powerful, **complex**, user acceptance questionable
- Performance and stability **problems** with **"full TDM"**
- **No** solution for **management of globally distributed design teams**
- Insufficient **SKILL migration** aids (4.4 SKILL lint, docs)
- Little confidence in Cadence's commitment to supply DM solutions

Opus 4.4 Beta Test Results

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## Conclusion

- HL's globalization strategy:  
ASCI A 4.1 is no longer an in-house design system
- HL's innovation strategy:  
We need the best EDA tools in market for our best designs
- HL's productivity enhancement strategy:  
We can't afford tools which are unstable, difficult to use, or poorly documented
- ASCI A 4.1's "Integrated CAD System" approach:  
Meanwhile, many of our users dislike the term "framework"
- ASCI A 4.2 (based on Opus 4.4 and TDM):  
We have to invest much to regain what we currently have

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Conclusion

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