CAD tools: Current status and trends

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What is CAD, and EDA?

CAD is short for computer-aided design. It is the use of computer systems to assist in the creation, modification, analysis, and optimization of a design.

EDA (Electronic Design Automation) is a category of CAD tool that is used to design computer chips.

Why EDA?

- Before EDA, integrated circuits were designed by hand, and manually laid out.

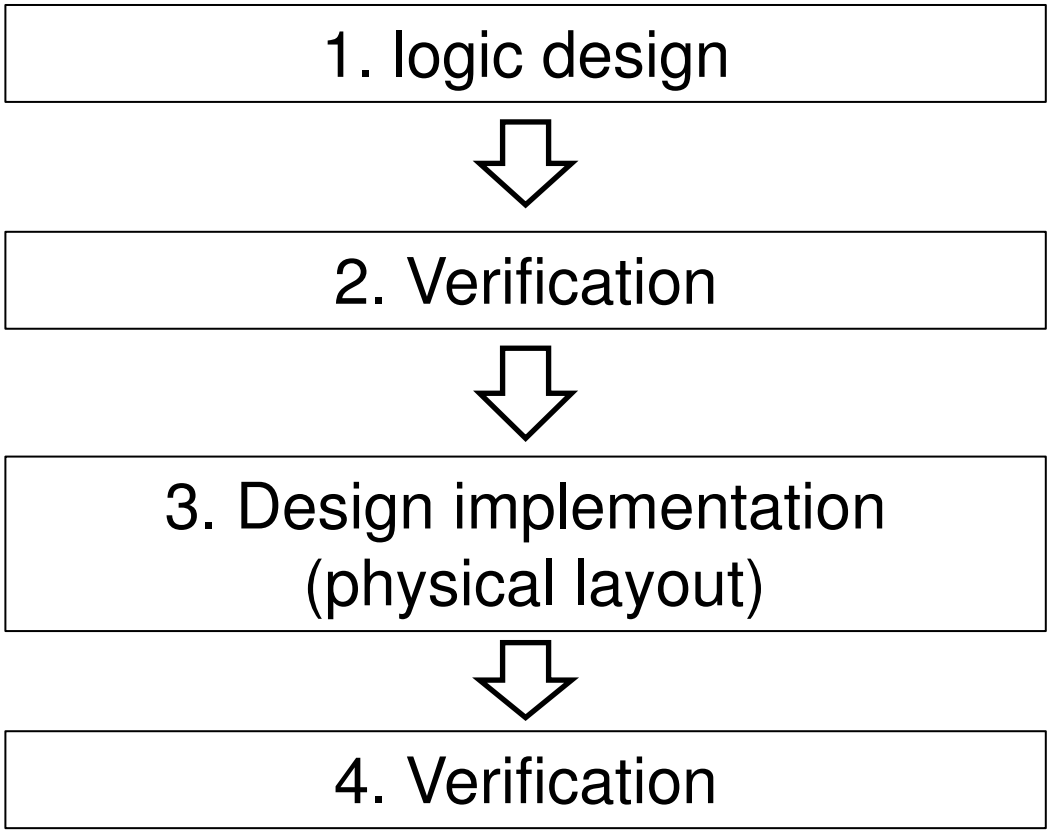
- But nowadays, design a IC cannot be achieved only with hard work.

Why EDA?

Imagine a Intel based micro processor having 1.5 million transistors. Would it be feasible to design such a complex system with help of truth table and K-maps?

Obviously Impossible.

How does EDA help in the design flow?



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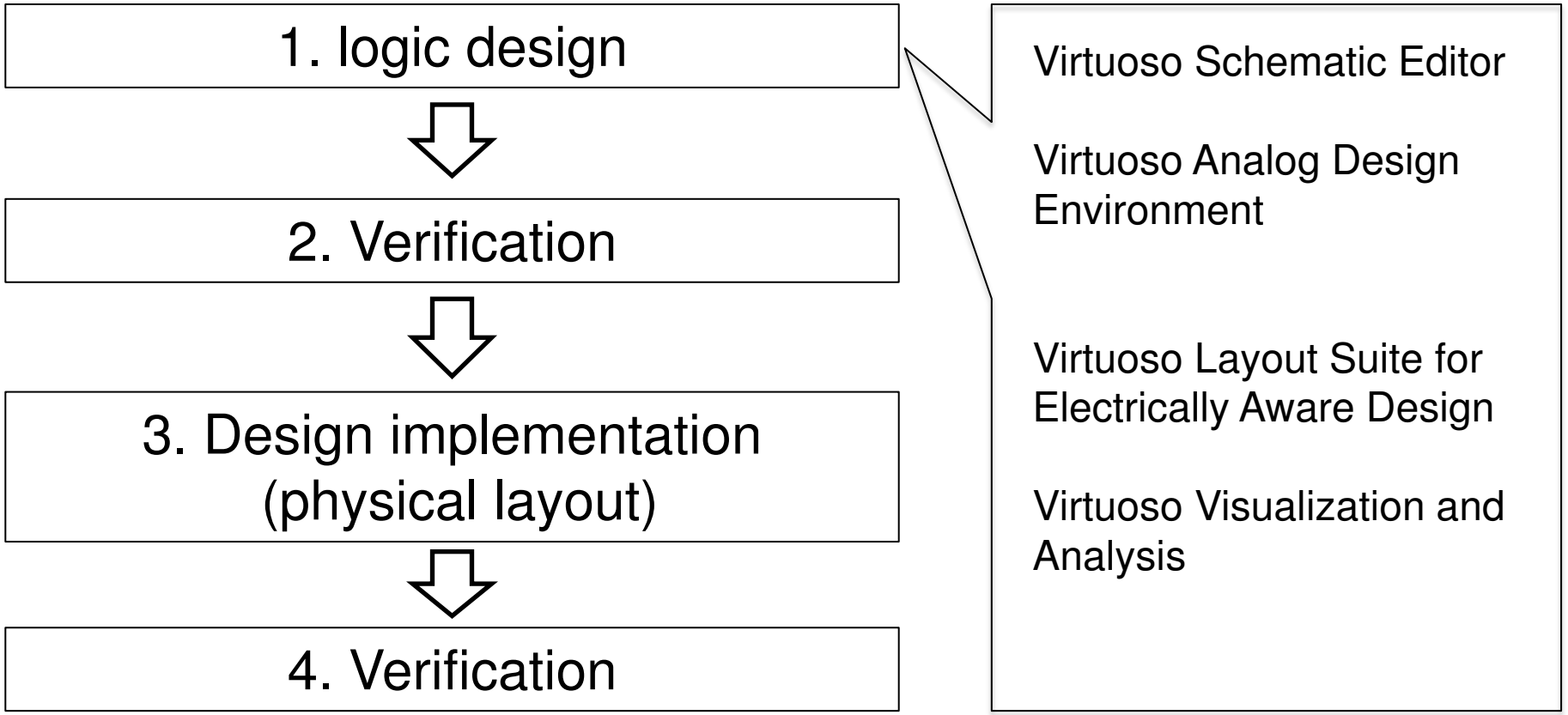

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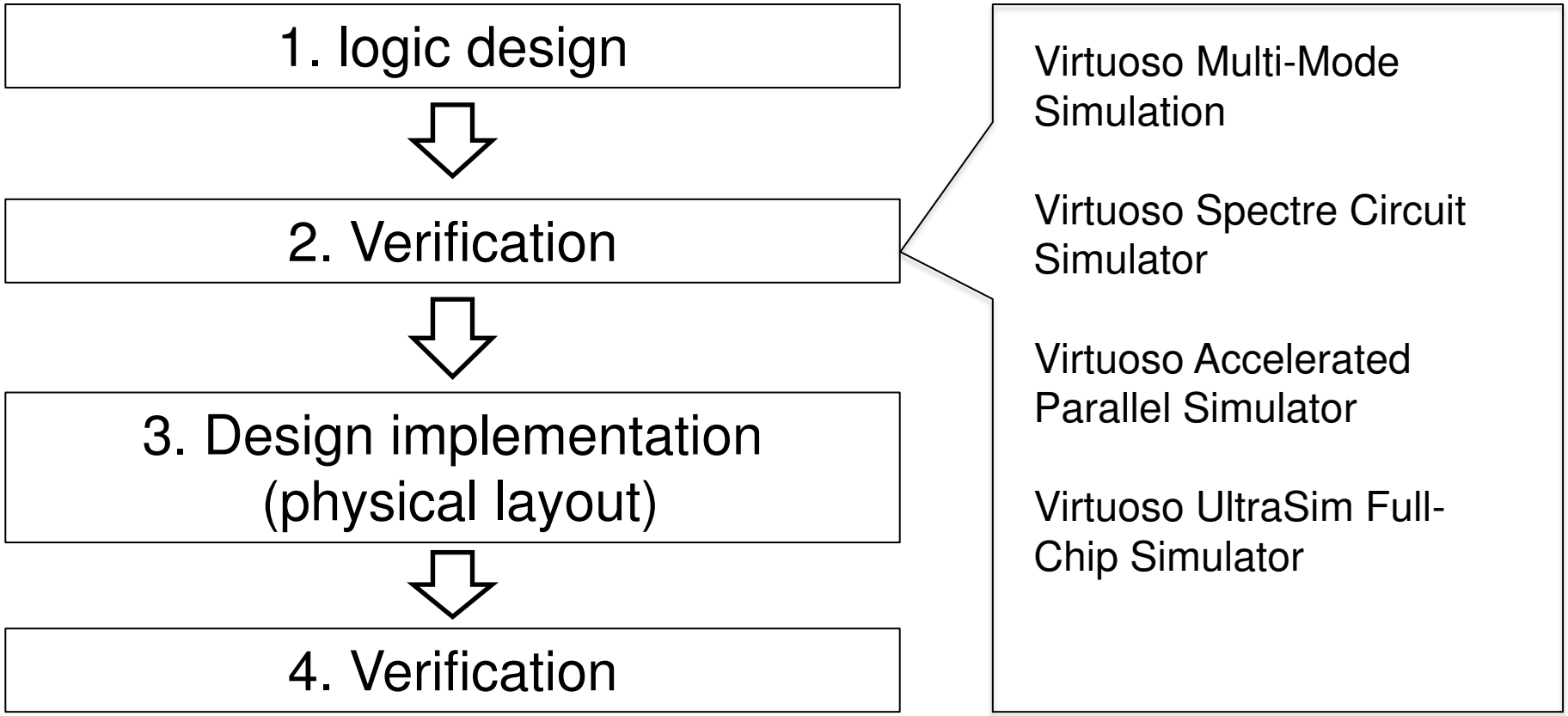

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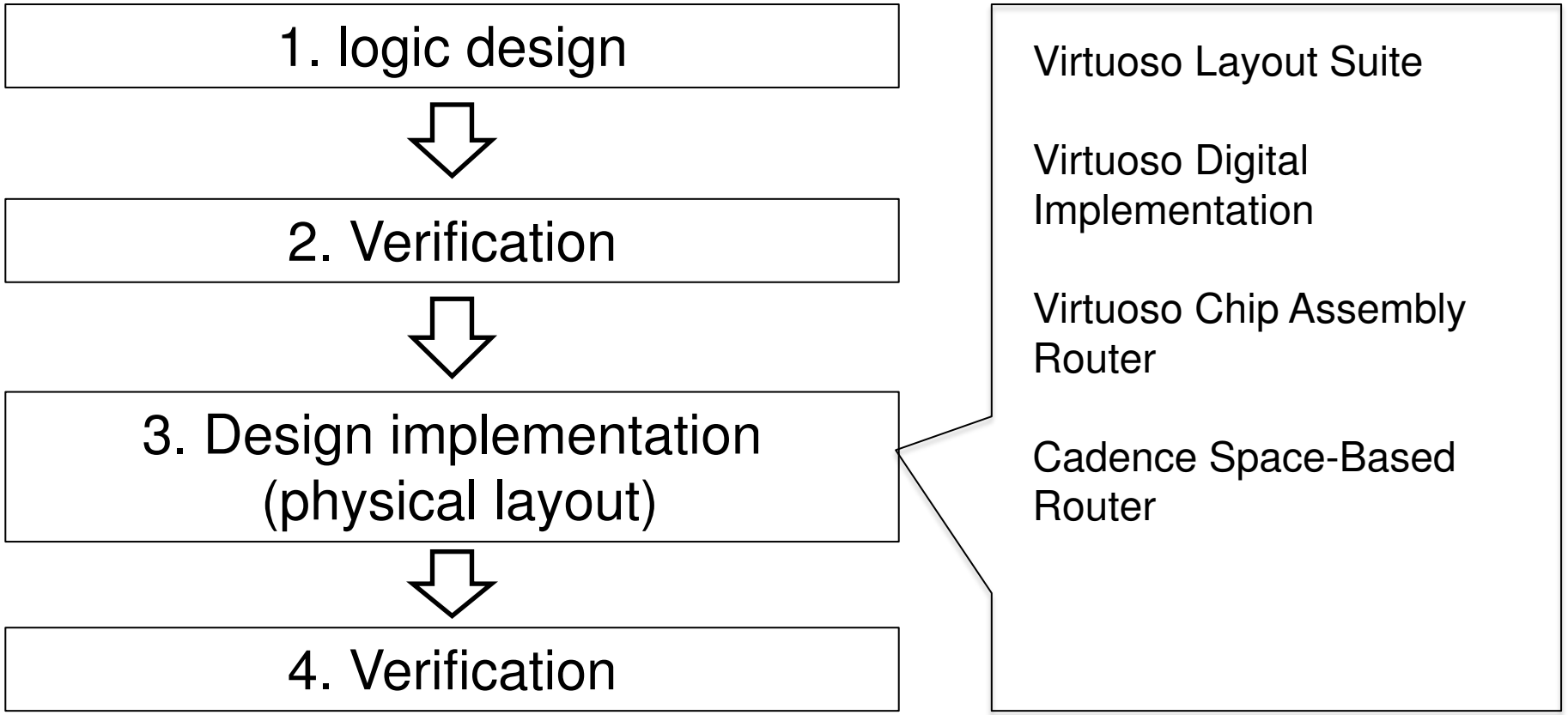

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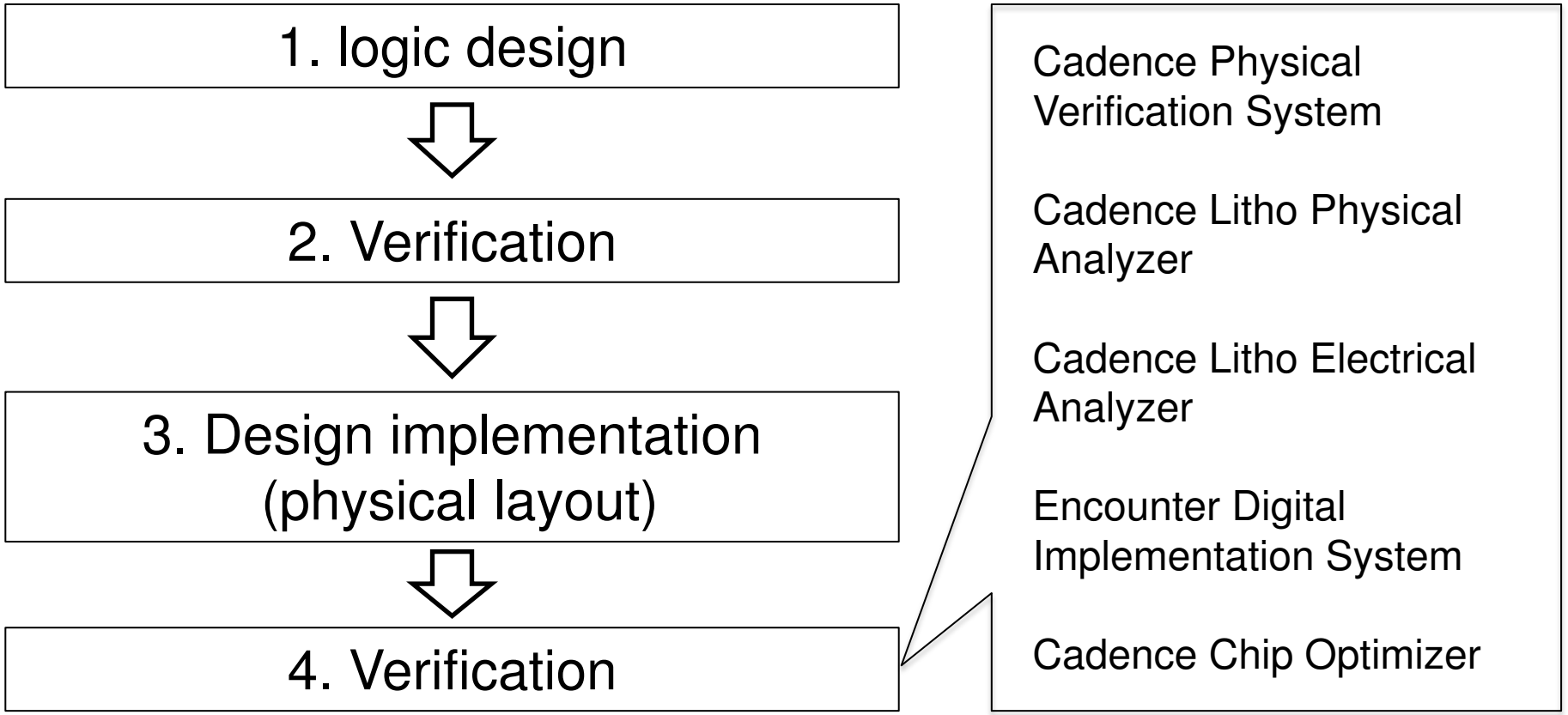
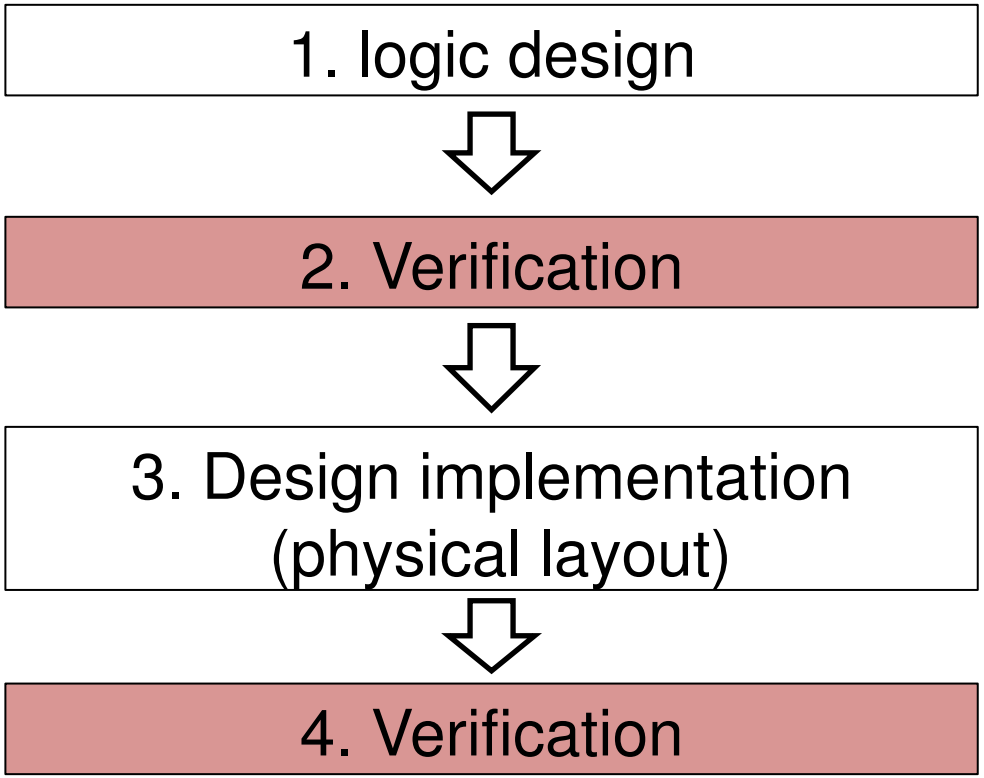


Verification is a crucial part of the design flow

Verification can be up to 70% of the overall time to create a chip design.



So people want to improve verification efficiency ..

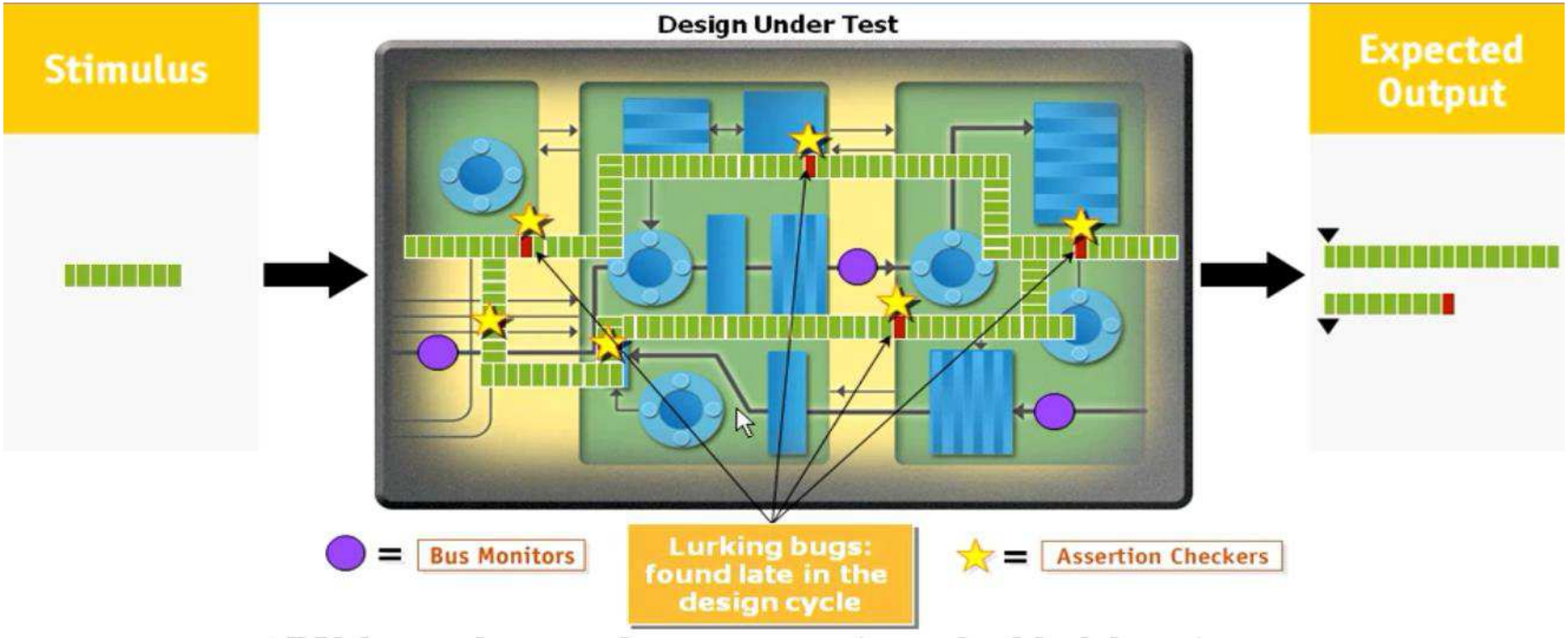
EDA engineers came up with an idea called Assertion-Based verification

What is an Assertion?

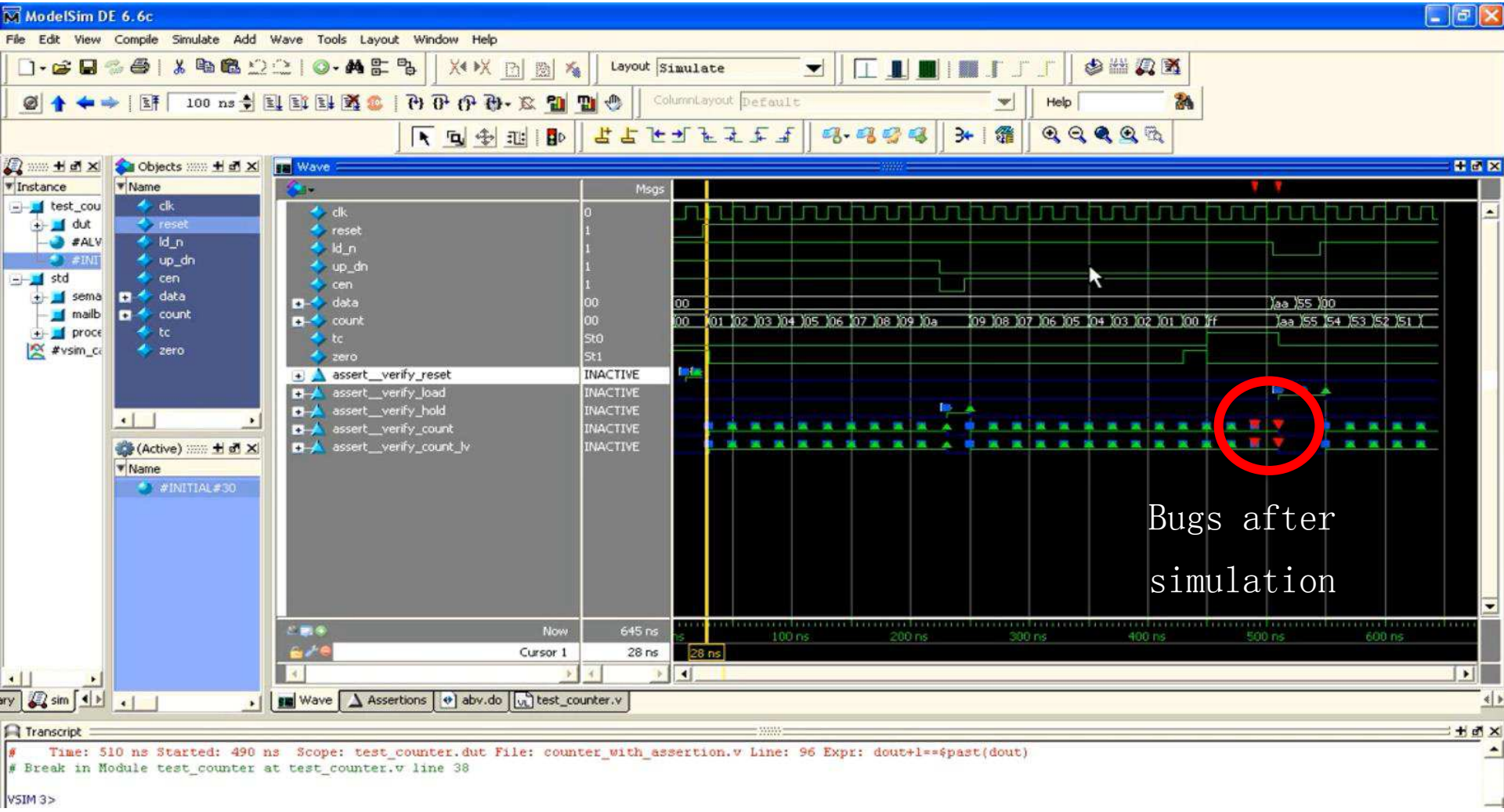
A concise description of [un]desired behavior

Assertions can be thought of as internal test points that wait for a particular problem to happen and then alert the designer when it does.

ABV improves designers' ability to observe bugs

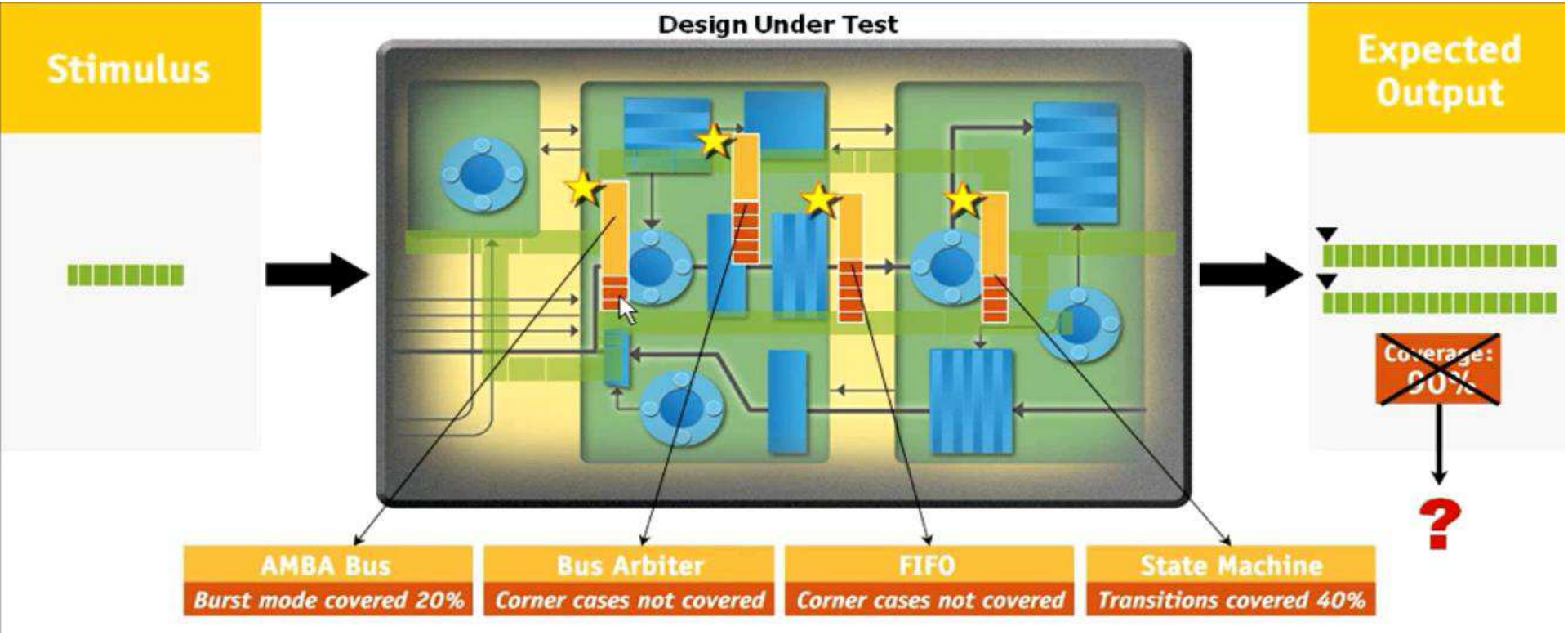


Put assertions at various locations in the design. When an assertion is triggered, you know exactly where it happens. By adding assertions, bad behavior inside the design could be checked and the bugs were observed instantly at their source. Black-box testing vs. White-box testing



From Mentor Graphics

ABV reveals internal structural coverage during testing



ABV also shows how complete a verification test is. After a test, you only see 20% triggered assertions in AMBA. That means the test did not cover much features in that part, and it helps to decide what sets of tests that need to be used next.

Current situation

- Venture capital for start-ups in EDA has decreased significantly.
- Faculty positions in EDA are tight
- Student interest in EDA as a career has decreased in recent years.
- Transition of academic research to industry is much harder than before

But it doesn’t mean there is no future for EDA

- EDA will not go away and cannot stagnate.

- As technology shrinks, the problems get harder, so not less but more EDA activity is required.

- EDA training in its various disciplines, including complex and large problem solving, will be valuable as new growth areas come into

- EDA has many hot areas
  - system-level design
  - embedded software
  - design for manufacturing including lithographic and scaling problems
  - issues of robustness and unreliable components
  - parallelism, design and application of many core processors
  - application of probabilistic methods to enhance scaling of algorithms
  - new methods for derivative and incremental design

Conclusion

Today’s semiconductors and electronic systems are so complex that designing them would be impossible without electronic design automation (EDA).

EDA provides a comprehensive overview of the electronic design process, then describes how design teams use CAD tools to create the best possible design in the least amount of the time.

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