

HIGH PERFORMANCE PHOTOMASK GENERATION

Customer Overview

Our customer in this case is a large IC Packaging and Assembly vendor based out of Japan with annual revenues of about a billion US dollars.

Objective

The customer has an in-house EDA tool development team that develops tools in the area of technology CAD. The team had developed a Photo-mask generation tool with the following features:

- Generation of data for Photomasks in MEBES format from the GDS2 format.
- Capacity to perform boolean operations such as OR, AND, XOR, NOT as well as geometric operations such as positive and negative resizing and subtraction.
- Distributed processing capability enabling higher throughput.

While the above feature set was suitable for the current generation of lithography, the technology trend towards

nano lithography required higher accuracy and higher speed. Also, the current version was not designed to exploit the inherent hierarchy and arrays in a GDS2 layout data.

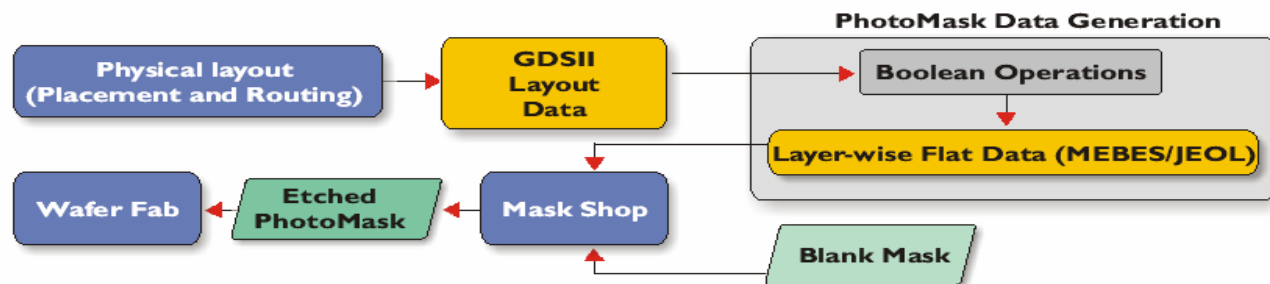
This new version of photomask generation tool was a crucial enabler for the company to handle the next generation of Integrated Circuits.

The key objectives from the new tool were the following:

- Ability to handle the inherent hierarchy and arrays in the layout. Improved resolution of the resulting data.
- 10X speedup requirement over the existing version.
- Ability to handle the largest of the real world layout data of CPUs and Memory chips within 500 MB of runtime memory.

The challenge for our delivery team was to develop the photomask generation tool with the highest throughput in the world and unmatched feature set.

PhotoMask Generation Process



Approach

The SoftJin team worked with the in-house customer team in all stages of the software development process.

- A mix of off-shore and on-site software development and delivery model was adopted to enable communication and seamless extension of the in-house development team. Two engineers were deputed throughout the duration of the project at customer site in Japan to coordinate and assist in the joint development efforts.
- The detailed functional specifications were jointly defined and a similar collaborative approach was taken for tool design. At this stage, the key modules to be created were clearly identified enabling a division of tasks between the teams.
- While each team was independently responsible for delivery and quality of development of its own modules, there was a joint integration and validation effort.
- The SoftJin team also collaborated with Indian Institute of Technology, Bombay (Mumbai), for carrying out research in the area of fast computational geometry algorithms and their implementations. This focused interaction with the academia enabled quick exploration of various approaches needed to achieve the stringent performance requirements.

Result

The new version of the tool met all the objectives in terms of features and performance:

- 10X speedup over the existing version was achieved.
- As per our knowledge, this is the only photomask generation tool which makes use of both the inherent hierarchy as well as the distributed processing for enhancing the throughput of the processing.
- Early results indicate that the new version has the maximum throughput capacity among the currently available tools for photomask generation. At present, the new version is being qualified for production quality release by SoftJin's engineers.

As a result of huge success of this project covering several person years of effort over 3 years, a strong long term relation has been built between the customer and SoftJin. The mix of on-site and off-shore software delivery model ensured optimal combination of close communication and cost control for the customer. The success of the new approaches used in the project has enabled the customer to re-use the same in different settings