Manufacture of a microprocessor case study

Design

The use of computer design tools such as computer-aided design has been extensively utilized in the design of electronic devices because of its ability to create, modify, analyze and optimize the design and manufacturing process. Electronic design automation tools, for instance, utilizes vector based graphics and taster graphics to display the overall look of designed objects such as microprocessor chips. These tools are found on all major platforms such as Windows, UNIX, Linux, and Mac OS and are used to design and estimate the dimension of devices. In addition, they perform graphic and computational intensive tasks that could not be accomplished by using pen and paper. For instance in the design and manufacture of a microprocessor, they are used to determine the shape, dimensions and the degree of compacting.

A microprocessor consists of North Bridge and the south bridge. The choice of components on each bridge is dependent on the user and the architecture used. The most common architectures include the Von Neumann and Harvard.

According to the design of a static-memory chip, for instance, takes place under four transistor bit of static memory. First, the memory cells are logically designed utilizing schematics. Thereafter, an equivalent CMOS layout is presented using alternate bits of memory. Two bits of cells are the foundation of the chip. The bits can then be compacted by using one-dimensional compacter and further rearrangement will lead to further compaction.

The aim of the design is to create a 128 × 32-bit memory and, therefore, six levels of the hierarchy are utilized. These include 4 × 2 array, a 4 × 4 array, a 16 × 8 array, a 64 × 8 array, a 64 × 32 array, and a 128 × 32 array. Each

level of the hierarchy connects the sub-cells with little stitches in order to attain overall connectivity. In each level of the hierarchy, all un-stitched ports must be exported to the next hierarchy through an automatic array-based layout commands. The stitches are automatically created by the router.

Once the basic memory array has been created, driving circuits are attached to the edges, and a 32-bit driver word is developed to pitch match the memory. The block of the 128 drivers is mounted at the bottom of the memory array, and similar drivers and decoders mounted on the sidesFig. 1 designing and manufacture of a microprocessor chip

In the design process, the use of computer simulation techniques serves to probe the functionality of the microprocessor. Earlier before simulation techniques were utilized, processors were built using electronic systems that consisted of components including transistors, resistors, and capacitors. The components were wired together to result in a processor. However, the process was labor –intensive and introduced faults when the components were mishandled. The touching of components introduced a lot of errors and the chip had to be discarded. This increased the overall cost of manufacturing whereas accuracy was not guaranteed. ICs are smaller and require less power to operate. In addition, they are extremely difficult in terms of repair and in case of a fault, the whole IC need to be replaced. Their widespread has, however, replaced the traditional method of designing processors because of their size, weight and ease of handling with computer simulation techniques.

Microprocessors are manufactured in a two way mechanism using silicon. The process is done in special containers known as ingot. Silicon is placed in

the ingots and cut into small pieces of one millimeter thick known as wafers. The wafer is treated with chemicals and a mask that contains the circuits is placed in it. In the next stage, a Polysilicon is added to the base of the wafer and treated with chemicals to wash away the photo-resistant layer. Layers are created, and pathways are added to connect them. The wafer is finally covered with external cover and is ready for use.

References

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