SYNTHESIS OF DIGITAL ASYNCHRONOUS SEQUENTIAL SYSTEMS

TIMIS Mihai, VALACHI Alexandru, BOTEZATU Nicolae
"Gh.Asachi" Technical University of Iasi
mtimis@cs.tuiasi.ro, avalachi@cs.tuiasi.ro

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Abstract: The use of asynchronous sequential circuits has brought many advantages to system development, given the following examples:

- Signal interface protocols (for example SCSI)
- Asynchronous circuits are ideal for building modular systems. This modular structure enables a global system time checkup. The asynchronous circuits developed for high performance systems, for speeds up to 75 MHz, function correctly for lower speeds also. An asynchronous sequential system can be built from a number of modules, by interfacing them.
- CMOS asynchronous circuits dissipate less power than synchronous circuits for the same application. The power consumption rises only while switching. The parts of the circuit that are not used are in a wait state, thus the dissipated power being zero.
- For asynchronous systems, output signal are generated instantly, without waiting the clock signal for synchronization.
- The absence of the clock signal reduces the EMI(Electro Magnetic Interferences).

The design of asynchronous circuit is more difficult than the design of synchronous ones considering the propagation delay of signal trough elementary circuits.

To simplify the analysis and the design of asynchronous systems, their operation is considered to be in fundamental mode. Operating in fundamental mode means that the input signals can change their state only if the circuit is in a stable state, meaning that no state variable is modifying. In fundamental mode all inputs are considered to be levels. Sometimes there is considered the impulse mode, where the inputs can provide impulses (level variations).

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