Tomasulo v/s Scoreboard Techniques

1. Any write or modification to a register is broadcasted by the FU to all other units in Tomasulo. But in Scoreboard, all the units have to keep checking for the dependencies in the central unit waiting for the FU to write into it.
2. Tomasulo gives control to distributed systems (reservation station) while Scoreboard gives control to a central unit (centralized register file).
3. Tomasulo allows register renaming which prevents WAW and WAR hazards. Scoreboard does not provide register renaming, and units have to stall in case of WAW and WAR hazards.
4. Tomasulo doesn't need any hazard detection unit while Scoreboard has it to detect WAW and WAR hazards.
5. Both Tomasulo and Scoreboard prevent structural hazard by preventing such issues.

Register Renaming - how does it prevent WAW and WAR hazards?

- What happens in register renaming?

In Tomasulo, all the destination registers are renamed including those with pending read/write(s). The reservation station fetches and buffers an operand as soon as it is available. Also the pending instructions designate the reservation stations which will provide their inputs. In these pending instructions, registers are renamed to the ones as specified by the reservation station. Also, when there are successive writes to register overlap (i.e. many of the alternate names of the same register have been written into in separate instructions), only the last one is actually used to write in register.

- How does it prevent WAW and WAR?

Since all the destination registers are renamed (including those with pending read/write(s)), so out-of order execution does not affect any instruction that depends on an earlier value of an operand. Also, as only the last write is actually written onto the register, so WAR and WAW are prevented (as both of them will work on different registers (different name) from the eariler instruction on whom they are depending).