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The prospect of building quantum circuits using advanced semiconductor manufacturing positions quantum dots as an attractive platform for quantum information processing. Extensive studies on various materials have led to demonstrations of two-qubit logic in gallium arsenide, silicon, and germanium. However, interconnecting larger numbers of qubits in semiconductor devices has remained an outstanding challenge. Here, I will present our recent demonstration of a two-dimensional four-qubit quantum processor based on hole spins in germanium quantum dots. Qubit logic is implemented all-electrically and the exchange interaction can be pulsed to freely program one-qubit, two-qubit, three-qubit, and four-qubit operations, resulting in a compact and high-connectivity circuit. A quantum logic circuit that generates a four-qubit Greenberger-Horne-Zeilinger state is executed and coherent evolution is obtained by incorporating dynamical decoupling. I will furthermore discuss opportunities and challenges for quantum dot qubits, such as operation at relatively high temperatures for scalable quantum technology and integrated quantum circuits.