Feature	8086	80186	80286	80386	Pentium-1
Data Bus Width	16-bit	16-bit	16-bit	32-bit	32-bit
Address Bus Width	20-bit	20-bit	24-bit	32-bit	32-bit
Max Addressable Memory	1 MB	1 MB	16 MB	4 GB	4 GB
Operating Modes	Real mode only	Real mode only	Real + Protected mode	Real + Protected + Virtual 8086	Full protected mode
Internal Architecture	Single execution unit	8086 + better control logic	2-stage pipeline	5-stage pipeline	Dual superscalar pipelines
Integrated Peripherals	None	Timers, DMA, Interrupt Controller	Few integrated	Few peripherals	Advanced FPU, cache
Clock Speed Range	5–10 MHz	6–20 MHz	6–25 MHz	16–40 MHz	60–200 MHz
Memory Protection	None	None	Segmentation protection	Full protection	Advanced
Cache Support	No	No	No	Optional external	On-chip L1 cache
Instruction Set	Basic 16-bit	8086 ISA + more	Added protected-mode instructions	Full 32-bit ISA	Optimized 32-bit ISA
Multitasking Support	No	No	Limited	Strong multitasking	Superior
Application Usage	Simple embedded, educational	Industrial controllers, embedded	Early PCs	Real PCs, 32-bit OS	PCs, multimedia, gaming
Register Size	16-bit	16-bit	16-bit	32-bit	32-bit
Pipeline Capability	No pipeline	Minimal	Light pipeline	True pipeline	Superscalar
Virtual Memory Support	No	No	Limited (via OS)	Hardware paging	Advanced paging with TLB
Typical OS Support	DOS-like	Embedded RTOS	Early protected-mode OS	Windows 95, Linux	Windows 98/XP-era
Hardware Complexity	Simple	Low	Medium	High	Very high
Power Usage	Very low	Low	Low-medium	Medium	High
Use in Modern Embedded Systems	Teaching use	Industrial devices	Rare	Legacy only	Not used
Mathematical Performance	Slow; no FPU	Slightly better	Faster segmentation	32-bit arithmetic	Hardware FPU, very fast

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Processor	4–5 Real Applications
8086	1. Basic microcomputer training kits (lab use) 2. Simple embedded control systems 3. Industrial stepper/servo motor controllers 4. BIOS-level low-level programming education 5. Early robotics & automation boards
80186	1. Industrial automation systems (PLC-like controllers) 2. Embedded systems in telecom equipment 3. Laser printers and scanners 4. Network routers and modems 5. Embedded military/avionics systems
80286	1. Systems requiring memory protection (secure terminals) 2. Early multitasking control systems 3. Advanced industrial controllers 4. DOS-based office computers 5. Early GUI systems
80386	1. 32-bit operating systems (Windows, Linux) 2. High-level language compilers & OS development 3. Networking servers (early LAN servers) 4. Industrial & scientific computing devices 5. Virtualization using Virtual 8086 mode
Pentium-1	1. Multimedia PCs (audio/video processing) 2. Early 3D gaming PCs (Doom, Quake era) 3. Office workstations (MS Office, browsing) 4. Embedded vision / image processing boards 5. Early internet servers / home PCs

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