Ways to get Linux Ready for Real-Time

The PREEMPT_RT Patch
PREEMPT_RT is the most well-known kernel patch for making the Linux kernel preemptive. Preemption increases determinism and latency.

• Worst case interrupt latency: ~ 10-50 µs.

Configuration and maintenance
• Needs patching of the Linux kernel.
• PREEMPT_RT is maintained by the Linux Foundation.

Usability
• Decreases throughput significantly.

Suitable for
• Functions with moderate real-time requirements.

User Space Core Isolation
Pinning single threads to their own cores and isolating them from the Linux kernel allows them to run in a bare-metal like environment, providing very good real-time characteristics.

• Allows only one thread per core.
• System calls from pinned services breaks determinism.
• Provides good real-time characteristics for single-threaded functions pinned to an isolated core.

Suitable for
• Single-threaded real-time polled loop functions.

Hypervisor Acceleration
Partitioning on operating system level using a bare-metal hypervisor provides one real-time domain and one domain for an unmodified Linux kernel with IPC and shared file system.

• Functions with very high real-time requirements.