

Real time Systems1

Desirable Features Of Real-Time Systems

Lecture 3



DESIRABLE FEATURES OF REAL-TIME SYSTEMS

- ▶ There are some very important basic properties that real-time systems must have to support critical applications. They include the following:
 - ▶ **1. Timeliness.** Results have to be correct not only in their value but also in the time domain.
 - ▶ As a consequence, the operating system must provide specific kernel mechanisms for time management and for handling tasks with explicit timing constraints and different criticality.

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- ▶ **2. Predictability.** To achieve a desired level of performance, the system must be analyzable to predict the consequences of any scheduling decision.
- ▶ In safety critical applications, all timing requirements should be guaranteed offline, before putting system in operation.
- ▶ If some task cannot be guaranteed within its time constraints, the system must notify this fact in advance, so that alternative actions can be planned to handle the exception.

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- ▶ **3. Efficiency.** Most of real-time systems are embedded into small devices with severe constraints in terms of space, weight, energy, memory, and computational power.
- ▶ In these systems, an efficient management of the available resources by the operating system is essential for achieving a desired performance

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- ▶ **4. Robustness.** Real-time systems must not collapse when they are subject to peak load conditions, so they must be designed to manage all anticipated load scenarios.
- ▶ Overload management and adaptation behavior are essential features to handle systems with variable resource needs and high load variations.

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- ▶ **5. Fault tolerance.** Single hardware and software failures should not cause the system to crash. Therefore, critical components of the real-time system have to be designed to be fault tolerant.

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- ▶ **6. Maintainability.** The architecture of a real-time system should be designed according to a modular structure to ensure that possible system modifications are easy to perform .