

Real-Time Systems Interview Questions and Answers

Q1: What do you mean by a real-time system?

Ans: A real-time system is one that must process information and produce a response within a specified time, else risk severe consequences, including failure. That is, in a system with a real-time constraint it is no good to have the correct action or the correct answer after a certain deadline: it is either by the deadline or it is useless.

We can also say that any information processing activity or system which has to respond to externally generated input stimuli within a finite and specified period.

Q2: Discuss issues in real-time system scenario.

Ans: Most important issues regarding real-time systems are:

- Recovering from Failures.
- Working with distributed Architectures.
- Asynchronous Communication
- Race Conditions and Timing.
- Real Time response.

Q3: What is an embedded system? Differentiate between embedded system and real-time system.

Ans: An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular function.



Embedded System Example

OR

It can be defined as "A specialized computer system that is part of a larger system or machine".

Embedded systems are the ones found in generally immutable machines, such as ATMs, internet kiosks, airport terminal displays, cellphones, or at the screen at McD that displays your order are all examples of embedded systems. Real-time systems are the ones that are designed to provide a result within a specific time-frame. If you are using a touch-screen to order a sandwich from a gas store chain, you don't want to have to wait 20 seconds for it to

display pictures of each of the ingredients. You want it "now" or at least within a second or two of pushing the button.

Q4: Explain real-time communications.

Ans: Real-time communications (RTC) is any mode of telecommunications in which all users can exchange information instantly or with negligible latency. In this context, the term "real-time" is synonymous with "live."

RTC can take place in half-duplex or full duplex modes. In half-duplex RTC, data can be transmitted in both directions on a single carrier or circuit but not at the same time. In full-duplex RTC, data can be transmitted in both directions simultaneously on a single carrier or circuit. RTC generally refers to peer-to-peer communications, not broadcast or multicast.

Real-time communications can include:

- Telephony in the conventional sense
- Mobile and cellular telephone.

- IM (instant messaging)
- VoIP (Voice over IP, also called Internet telephone).
- Live videoconference communications.

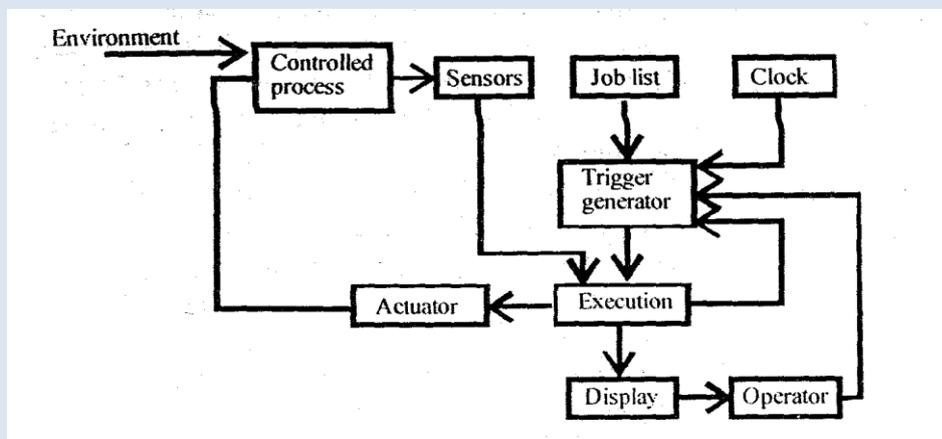
Q5: Define Hard and Soft real-time system.

Ans: A hard real-time system (also known as an immediate real-time system) is hardware or software that must operate within the confines of a stringent deadline. The application may be considered to be failed if it does not complete its function within the allotted time span. Examples of hard real-time systems include components of pacemakers, anti-lock brakes and aircraft control systems.

A soft real-time system is a system where a critical real-time task gets priority over other tasks and retains that priority until it completes. As in hard real time systems, kernel delays need to be bounded.

Q6: Draw structure or block diagram of Real time system OR the components of the RTS.

Ans: Schematic block diagram of a Real time system.



Real-Time Systems

Q7. Describe Trigger Generator?

Ans: The “Trigger generator” is a representation of the mechanism used to trigger the execution of individual jobs. It is not really a separate hardware unit, typically it is a part of an executive software. Many of the jobs are periodic i.e. they execute regularly. The schedule for these jobs can be obtained offline and loaded as a look up table to be used by the scheduler.

Q8. Define real time database and give its types.

Ans: A real-time database system is a database system in which a timely response to a user request is needed.

Types of Real-Time Database Systems:

- Hard real-time database systems, e.g., safety-critical system such as an early warning system, etc.
- Soft real-time database systems, e.g., banking system, *airline reservation system, digital library, stock market system, etc.*
- *Mixed real-time database systems, e.g., air traffic control system, etc.*

Q.9. Explain all types of task classes in real time system?

Ans: There are five types of task classes:

- (i) Periodic and aperiodic tasks
- (ii) Sporadic task
- (iii) Critical task
- (iv) Non-critical task

(1) Periodic task: There are many tasks in real — time systems that are done repetitively. For example one may wish to monitor the speed altitude and attitude of an aircraft every 100 ms. This sensor information will be used by periodic tasks that control surfaces of the aircraft in order to maintain stability and other desired characteristics. The periodicity of these tasks is known to the designer, and much tasks can be pre-scheduled.

(2) Aperiodic task: There are many other tasks that are aperiodic, that occur occasionally. For instance, when the pilot wishes to execute a turn a large number of subtasks. Associated with that action are self-off aperiodic tasks cannot be predicted and sufficient completing power must be held in a reserve to execute them in a timely fashion.

(3) Critical tasks: Critical tasks are those whose timely executions is critical; if deadlines are missed, catastrophes occur. Example include life - support systems and the stability control of air craft. If critical tasks are executed at a higher frequency then it is absolutely necessary.

(4) Non critical tasks: Non critical tasks are real times tasks. As the name implies, they are not critical to the application. However they do deal with time varying data and hence they are useless if not completed within a deadline. The goal in scheduling these tasks is to maximize the percentage of jobs successfully executed within their deadlines.

Q10: Define TargetOS.

Ans: TargetOS is a full-featured real-time operating system (RTOS) from Blunk Microsystems designed specifically for embedded applications. TargetOS is fast, small, and preemptive. To help reduce your time to market, TargetOS is integrated with development tools and off-the-shelf board support packages. Custom board support packages and drivers are also available.

Benefits:

- Royalty Free
- Source Code
- Integrated with TargetTools
- Integrated Event Trace Tool
- Board Support Packages and Device Drivers

