REAL-TIME SYSTEM: PROCESS, EVENT, STATE
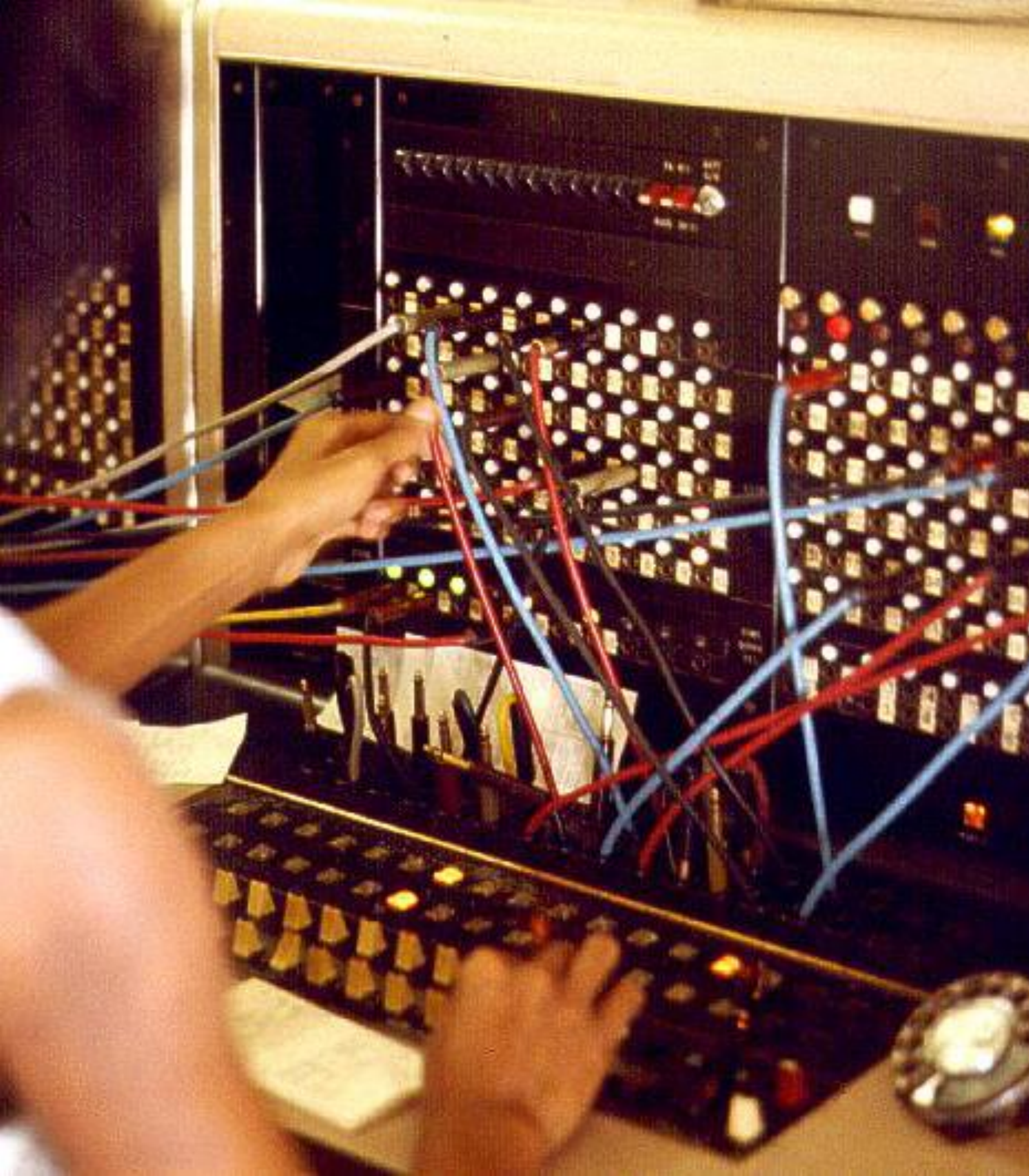
REAL-TIME SYSTEMS

➤ A real-time system means that the system is subjected to real-time, i.e., the response should be guaranteed within a specified timing constraint or the system should meet the specified deadline. For example flight control systems, real-time monitors, etc.

TYPES OF REAL-TIME SYSTEMS BASED ON TIMING CONSTRAINTS

HARD REAL-TIME SYSTEM

➤ **Hard real-time system:** This type of system can never miss its deadline. Missing the deadline may have disastrous consequences. The usefulness of results produced by a hard real-time system decreases abruptly and may become negative if tardiness increases. Tardiness means how late a real-time system completes its task with respect to its deadline. Example: Flight controller system.

SOFT REAL-TIME
SYSTEM

➤ **Soft real-time system:** This type of system can miss its deadline occasionally with some acceptably low probability. Missing the deadline have no disastrous consequences. The usefulness of results produced by a soft real-time system decreases gradually with an increase in tardiness. Example: Telephone switches.

EVENTS IN REAL-TIME SYSTEM

Events *in a* *real-time System* *are the actions or the result of the actions that are generated by the system or the environment. An event in a real-tie system is either a instantaneous or may have certain duration. The classification of events in a real-time system is based on different theories. Once the events in real-time system are classified thereafter timing constraints are categorized accordingly.*

CLASSIFICATION OF EVENTS

1. ON THE BASIS OF GENERATION :

➤ An event in a real-time system may be generated by either system of the environment. On this basis events are classified into two categories:

➤ 1. Stimulus Events

➤ 2. Response Events

STIMULUS EVENTS

➤ In a real-time system, stimulus events are generated by the environment. Stimulus events act on the computer system. Stimulus events are aperiodic and asynchronous. These events are not generated for a response. Stimulus events may be instantaneous or may have some duration.

➤ Example:

➤ 1. Typing on keyboard is a stimulus event that acts on the computer system.

➤ 2. Measuring of temperature in a plant.

RESPONSE EVENTS

➤ In a real-time system, response events are generated by the computer system. These events act on the environment. These events are generated in response of stimulus events. Response events may be periodic or aperiodic. These events are generated for a response. Response events are generally instantaneous events.

➤ Example:

➤ 1. Alarm ringing at 4 o'clock is a response event.

➤ 2. Switching off the induction at temperature exceeding 100 degree.

2. ON THE BASIS OF DURATION :

➤ An event in a real-time system may be instantaneous or may have some duration. On this basis events in a real-time system are classified into two categories:

➤ 1. Instantaneous Events

➤ 2. Durational Events

INSTANTANEOUS EVENTS

➤ In a real-time system, instantaneous events are the events having duration time zero. These events may be generated by the environment or the computer system but these are generated at instant time. Instantaneous events may be stimulus events or response events.

➤ Example:

➤ 1. Pressing a key at a instant.

➤ 2. Display of alert notice at any instant.

DURATIONAL EVENTS

➤ In a real-time system, duration events are the events having duration time greater than zero. These events may be generated by the environment or the computer system but these events have some duration time. Duration events may be stimulus events or response events.

➤ Example:

➤ 1. Measuring of temperature is a durational event.

➤ 2. All the computational events inside computer system are durational events.

THANKS FOR YOUR ATTENTION!