



# Data acquisition systems

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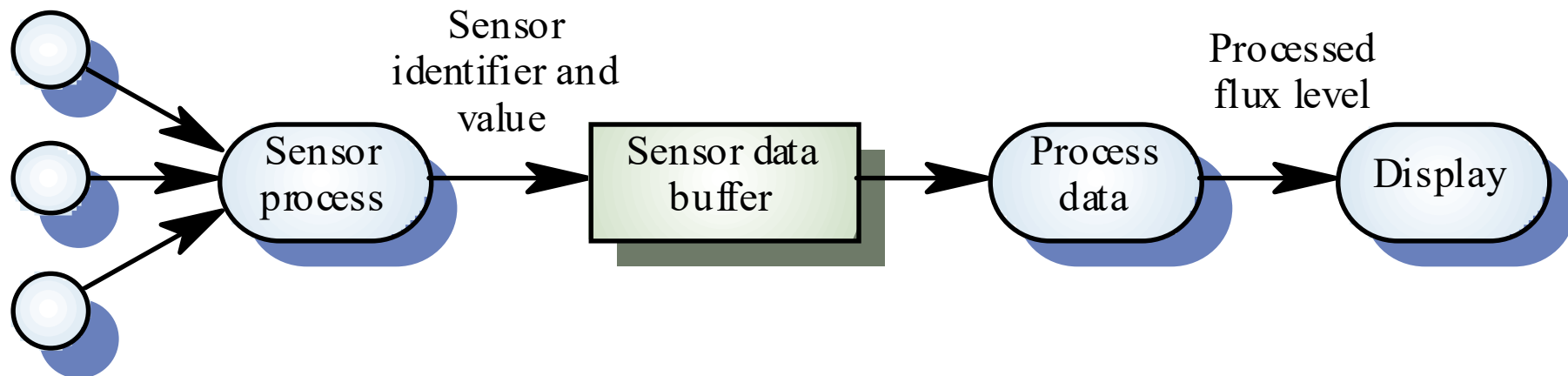
- Collect data from sensors for subsequent processing and analysis.
- Data collection processes and processing processes may have different periods and deadlines.
- Data collection may be faster than processing e.g. collecting information about an explosion.
- Circular or ring buffers are a mechanism for smoothing speed differences.

# Reactor data collection

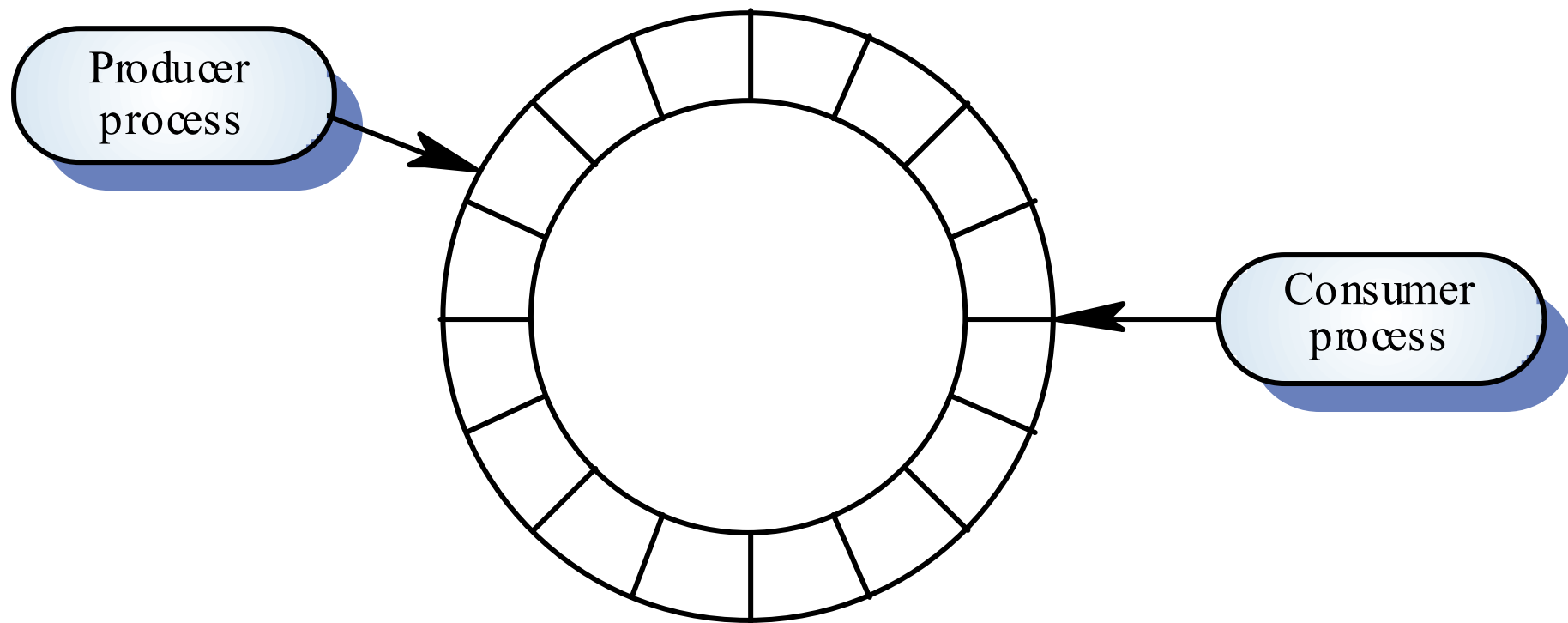
- A system collects data from a set of sensors monitoring the neutron flux from a nuclear reactor.
- Flux data is placed in a ring buffer for later processing.
- The ring buffer is itself implemented as a concurrent process so that the collection and processing processes may be synchronized.

# Reactor flux monitoring

Sensors (each data flow is a sensor value)



# A ring buffer



# Mutual exclusion

- Producer processes collect data and add it to the buffer. Consumer processes take data from the buffer and make elements available
- Producer and consumer processes must be mutually excluded from accessing the same element.
- The buffer must stop producer processes adding information to a full buffer and consumer processes trying to take information from an empty buffer.