

# Heterogeneous Reactive Models and Correct-by-Construction Deployment

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# Synchronous Model

$$P_i \equiv R_i^{\omega}$$
$$P_1 || P_2 \equiv (R_1 \wedge R_2)^{\omega}$$

- $P_i$ : synchronous process
- $R_i$ : set of all possible reactions of process  $P_i$
- $\omega$ : indicates non-terminating reactions

- A **synchronous process** evolves according to an **infinite sequence of successive reactions**
- The **parallel composition of two processes** is the **conjunction of their reactions**
  - product of automata, FSM connection

# Synchronous Model

- **Foundation of Synchronous Languages**
  - Esterel, Lustre, Signal
- **Pervasive in Mathematics and Engineering**
  - Discrete-Dynamic Control Systems
  - Digital Integrated Circuit Design
- **When composition is possible, we can reason formally on the properties of the composite system based on the properties of its components**
  - **Notice:** generally, functional systems are not closed under concurrent composition