A dynamic pipeline can be reconfigured to carry out variable functions at different times. The traditional linear pipelines are static pipelines because they are used to carry out fixed functions. A dynamic pipeline permit feed forward and feedback connections besides the streamline connections. For this reason, some authors call such a structures as non-linear pipeline.
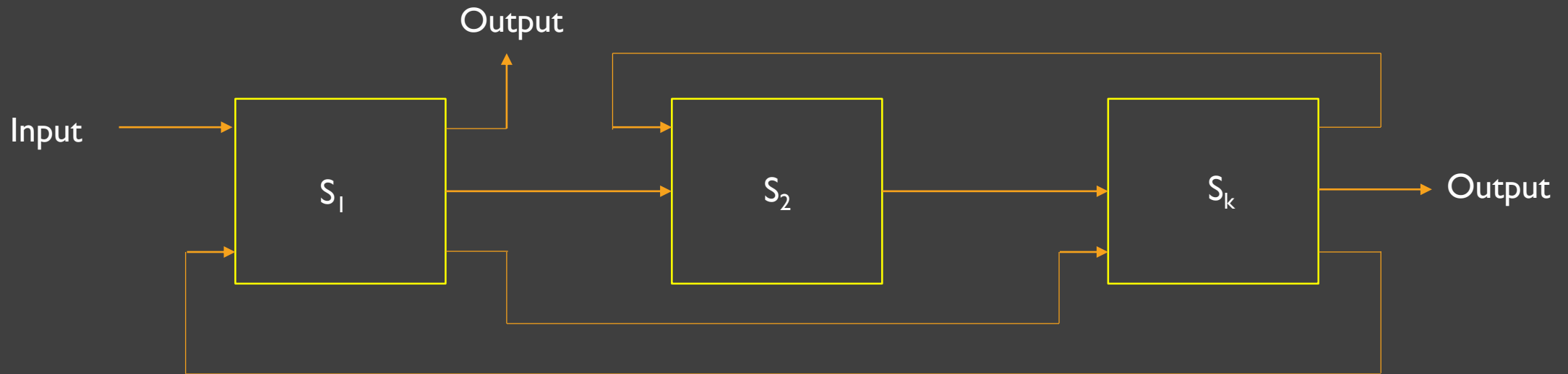
This pipeline has three stages. Besides the streamline connections from S1 to S2 and from S2 to S3, there is feed forward connection from S2 to S3 and two feedback associations from S3 to S2 and from S3 to S1.

These feed forward and feedback connections make the scheduling of consecutive event into the pipeline a non trivial task. With these connections, the output of the pipeline is not necessarily from the last stage. In fact, following different dataflow model, one can use the same pipeline to assess different functions.

Reservation table for a dynamic pipeline become more complex and interesting because a non-linear pattern is followed. For a given non-linear pipeline configuration, multiple reservation tables can be generated. Each reservation table will show evaluation of different function.

Each reservation table displays the time space flow of data through the pipeline for one function evaluation. Different function may pursue different paths on the reservation table.

	1	2	3	4	5	6	7	8
S_1	X					X		X
S_2		X		X				
S_3			X		X		X	

stages

Processing sequence

$$S_1 \rightarrow S_2 \rightarrow S_1 \rightarrow S_2 \rightarrow S_3 \rightarrow S_1 \rightarrow S_3 \rightarrow S_1$$

Reservation table for function 'X'

Multiprocessor System Interconnects

❑ A multiprocessor system consists of multiple processing units connected via some interconnection network plus the software needed to make the processing units work together.

❑ A number of communication styles exist for multiprocessing networks. These can be broadly classified according to the communication model as shared memory (single address space) versus message passing (multiple address spaces).

  o Communication in shared memory systems is performed by writing to and reading from the global memory

  o Communication in message passing systems is accomplished via send and receive commands.
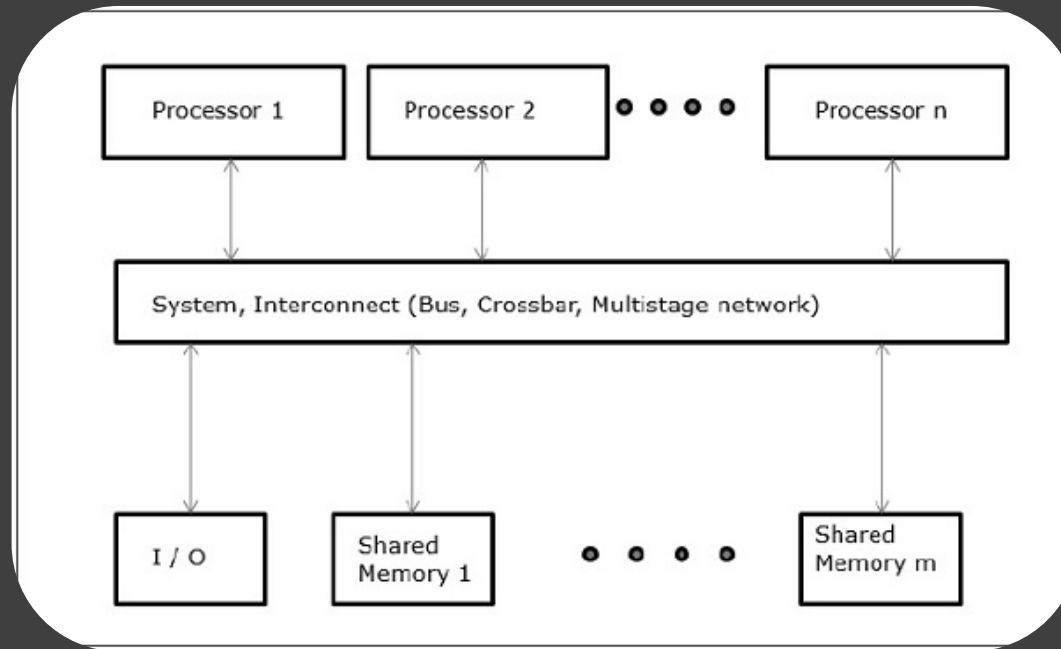
o In both cases, the interconnection network plays a major role in determining the communication speed. Two schemes are introduced, namely static and dynamic interconnection networks.

   ✓ Static networks form all connections when the system is designed rather than when the connection is needed. In a static network, messages must be routed along established links. (hypercube, mesh, and k-ary n-cube topologies)

   ✓ Dynamic interconnection networks establish connections between two or more nodes on the fly as messages are routed along the links. (bus, crossbar, and multistage interconnection)