



## Basic Communication Operations: Introduction

- Many interactions in practical parallel programs occur in well-defined patterns involving groups of processors.
- Efficient implementations of these operations can improve performance, reduce development effort and cost, and improve software quality.
- Efficient implementations must leverage the underlying architecture. For this reason, we refer to specific architectures in this lecture such as linear array, ring, mesh and hypercube.

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- Group communication operations are built using point-topoint messaging primitives.
- Recall from our discussion of architectures that communicating a message of size *m* over an uncongested network takes time t<sub>s</sub> +t<sub>m</sub>w (setup time + transmission time for all words.)
- We use this as the basis for our analyses. Where necessary, we take congestion into account explicitly by scaling the *t<sub>w</sub>* term.
- We assume that the network is bidirectional (2 ways) and that communication is single-ported (one communication at one time).



























































