# Parallel System Architectures

**Overview of Parallel System Architectures**

# Parallel System Architectures

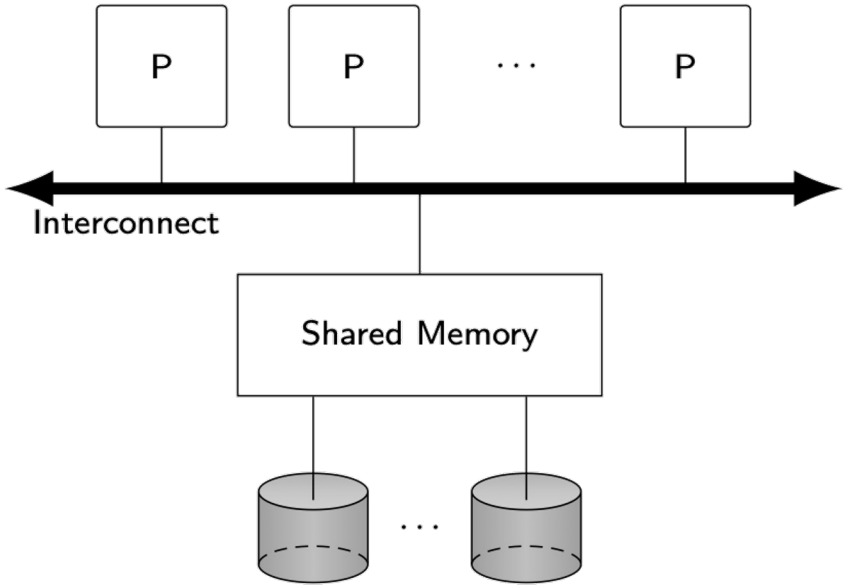
- Shared memory (SM)
  - Uniform Memory Architecture (UMA)
  - Non-Uniform Memory Architecture (NUMA)
- Shared disk (SD)
- Shared nothing (SN)

# UMA

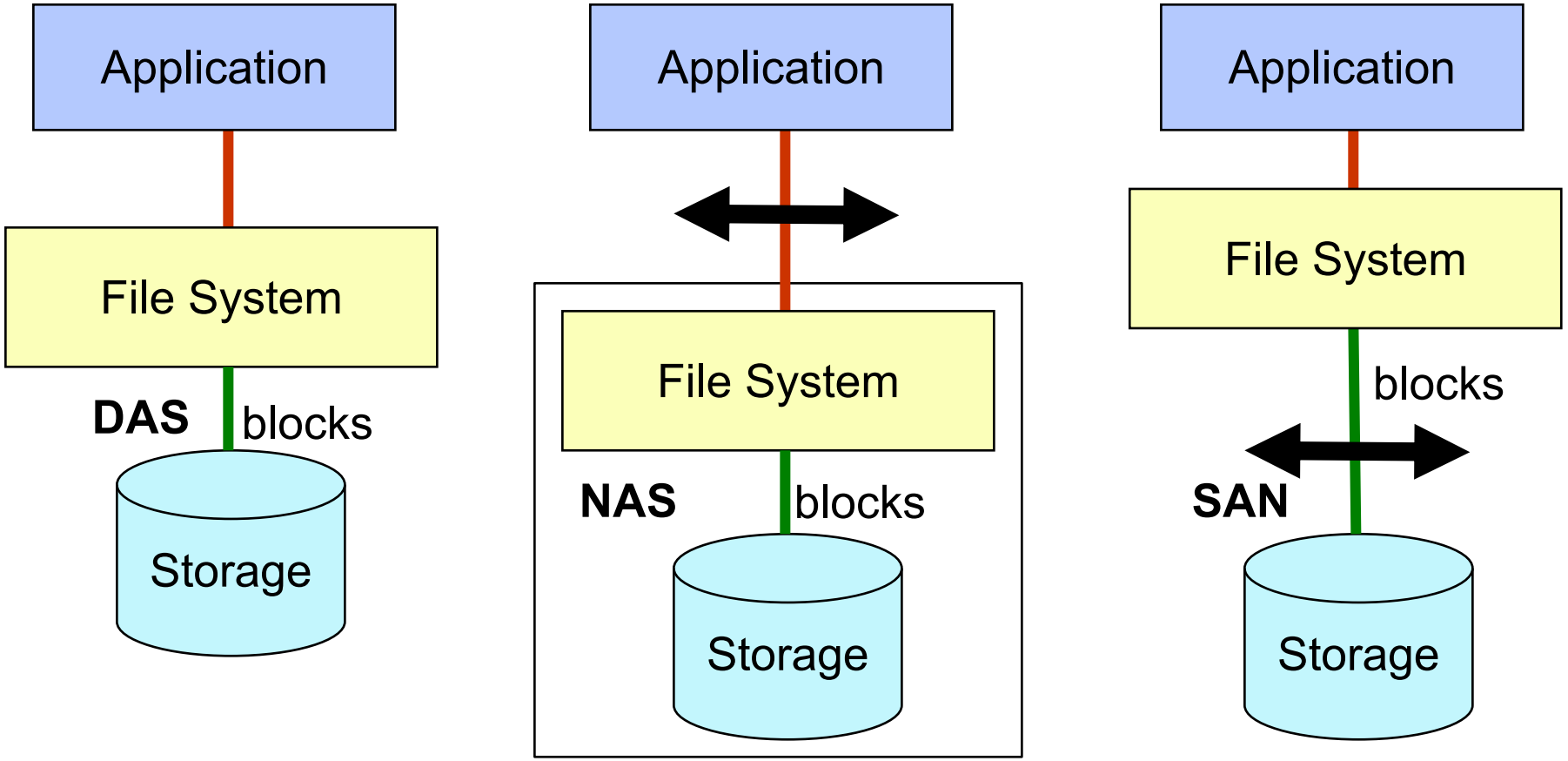
- Physical memory shared by all processors
  - Symmetric multiprocessor (SMP) or multicore processor
  - Constant access time
- Examples
  - XPRS, Volcano, DBS3
- Assessment

  + Simplicity, load balancing, fast communication

  - Network cost, low extensibility



# Storage: DAS vs NAS vs SAN



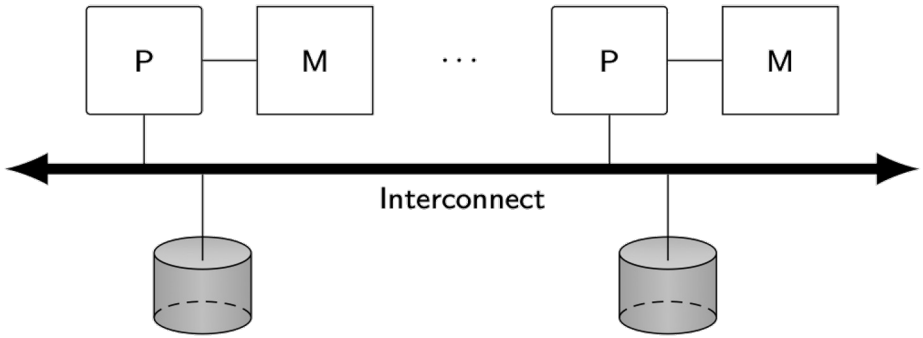

Direct Attached Storage

Network Attached Storage

Storage Area Network

# Shared-Disk

- Shared disk, private memory
  - SAN
  - Cache coherency
- Examples
  - Oracle RAC et Exadata
  - IBM PowerHA
- Assessment
  - \+ Simplicity for admin.
  - \- Network cost (SAN), scalability



# Shared-Nothing

- No sharing of either disk or memory
  - Data partitioning
- Examples
  - DB2 DPF, SQL Server Parallel DW, Teradata, MySQLcluster
  - NoSQL, NewSQL
- Assessment
  - \+ Scalability, cost/performance
  - \- Complex (distributed updates)