The Computer Architect's View

- Architect is concerned with design & performance
- Designs the ISA for optimum programming utility and optimum performance of implementation
- Designs the hardware for best implementation of the instructions
- Uses performance measurement tools, such as benchmark programs, to see that goals are met
- Balances performance of building blocks such as CPU, memory, I/O devices, and interconnections
- Meets performance goals at lowest cost

Buses as Multiplexers

- Interconnections are very important to computer
- Most connections are shared
- A bus is a time-shared connection or multiplexer
- A bus provides a data path and control
- Buses may be serial, parallel, or a combination
  - Serial buses transmit one bit at a time
  - Parallel buses transmit many bits simultaneously on many wires

Fig 1.4 Simple One- and Two-Bus Architectures

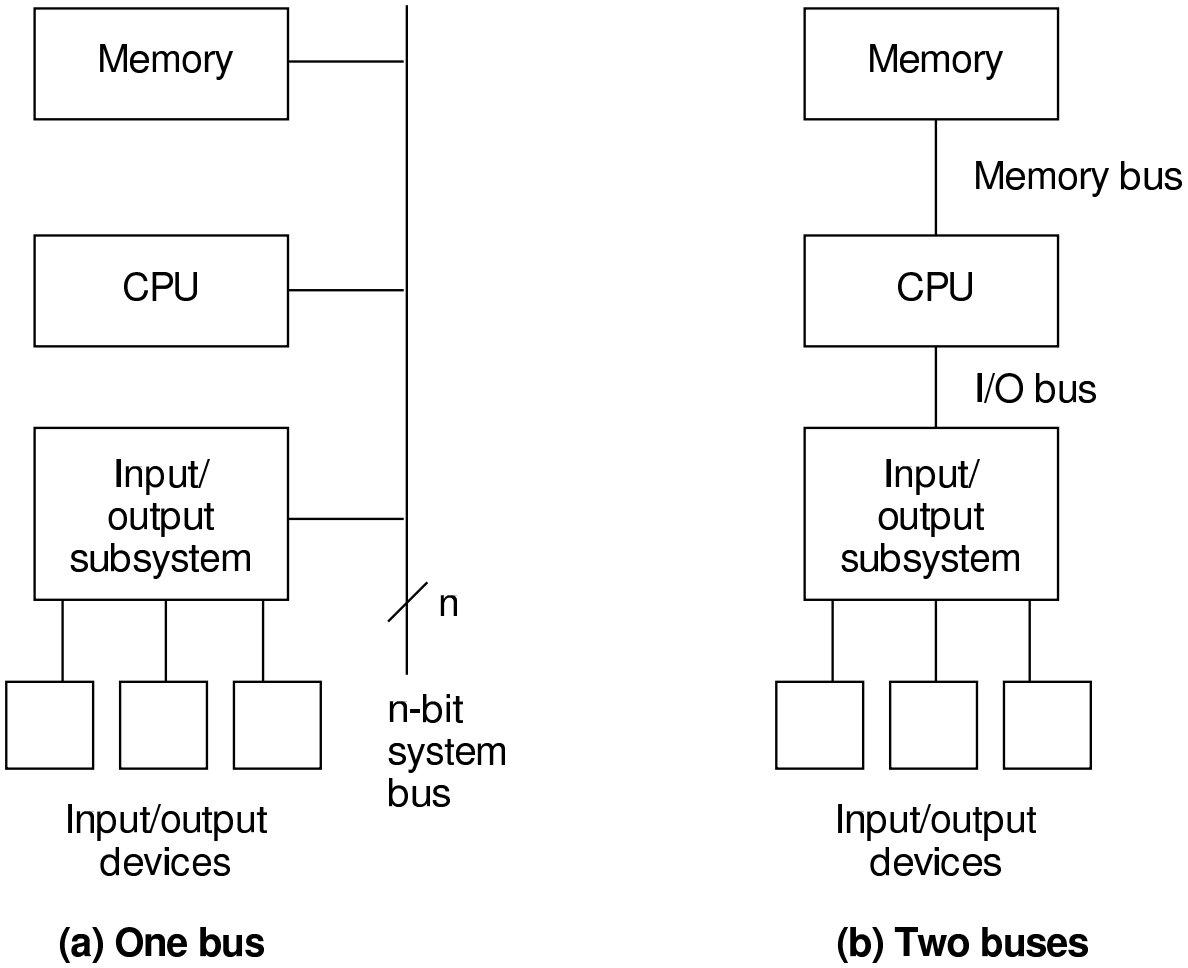


Fig 1.5 The Apple Quadra 950 Bus System (Simplified)

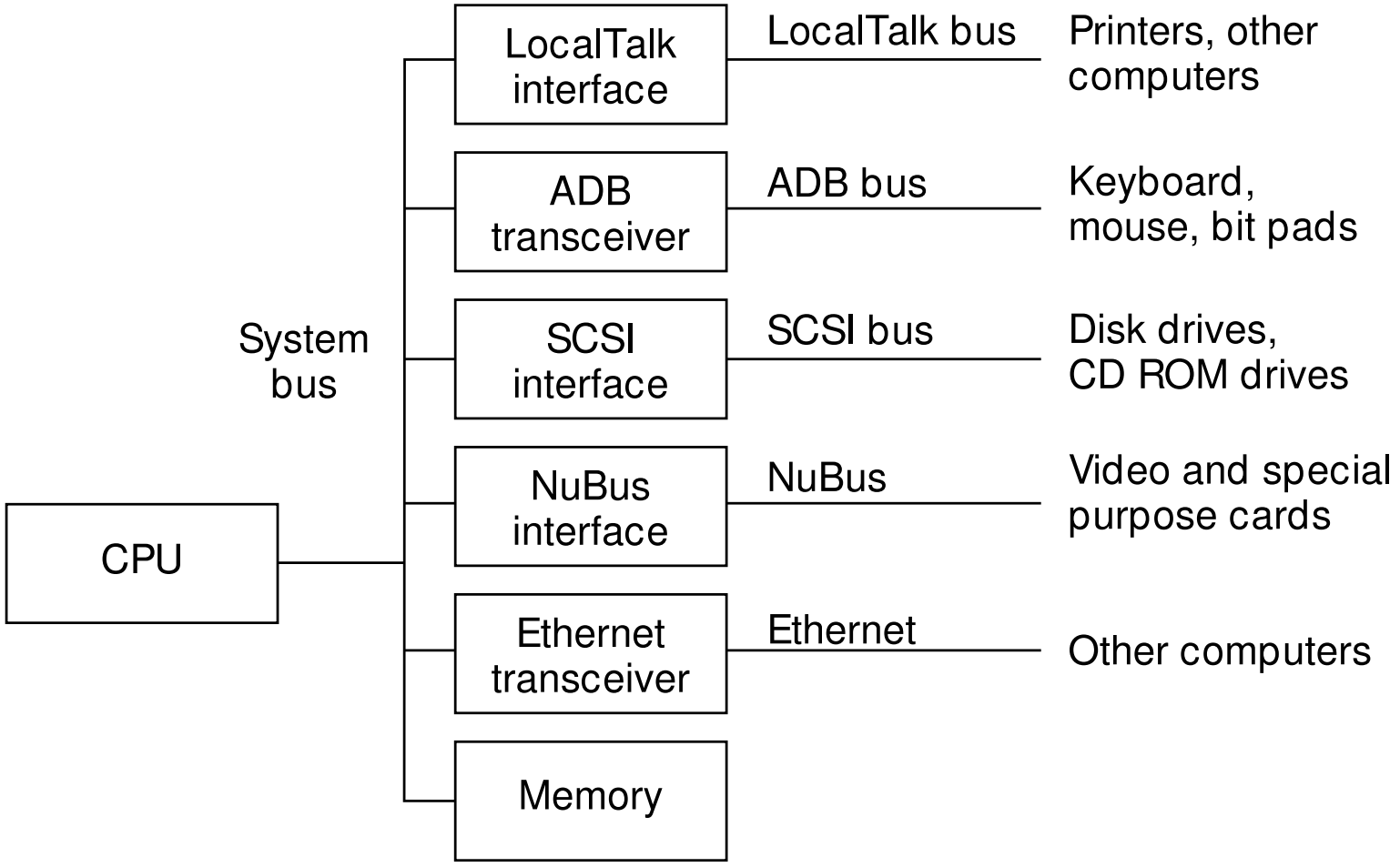
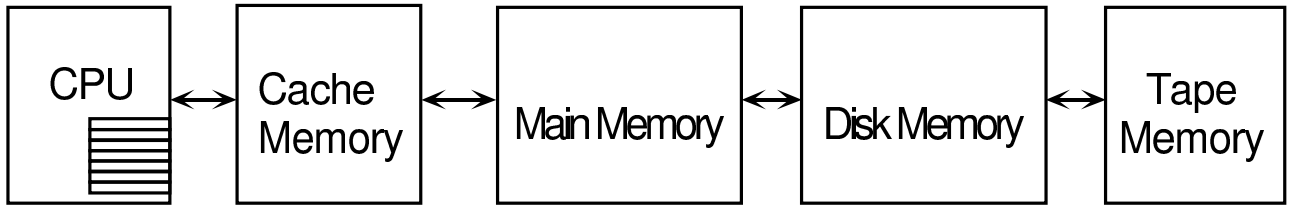


Fig 1.6 The Memory Hierarchy

- **Modern computers have a hierarchy of memories**
  - **Allows tradeoffs of speed/cost/volatility/size, etc.**
- **CPU sees common view of levels of the hierarchy.**



Tools of the Architect's Trade

- Software models, simulators and emulators
- Performance benchmark programs
- Specialized measurement programs
- Data flow and bottleneck analysis
- Subsystem balance analysis
- Parts, manufacturing, and testing cost analysis