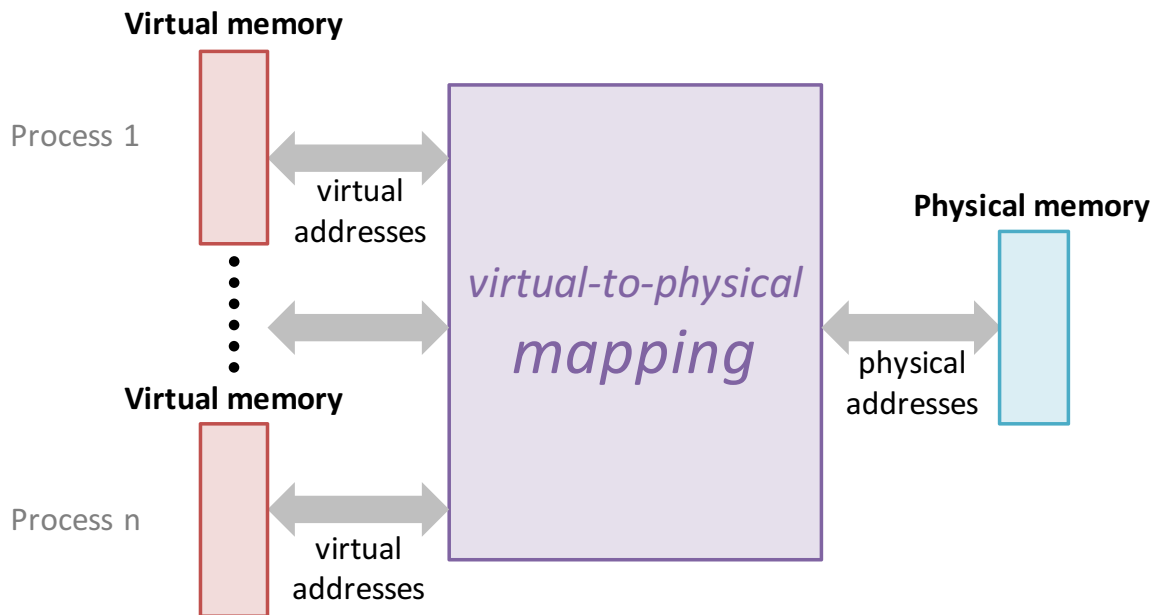
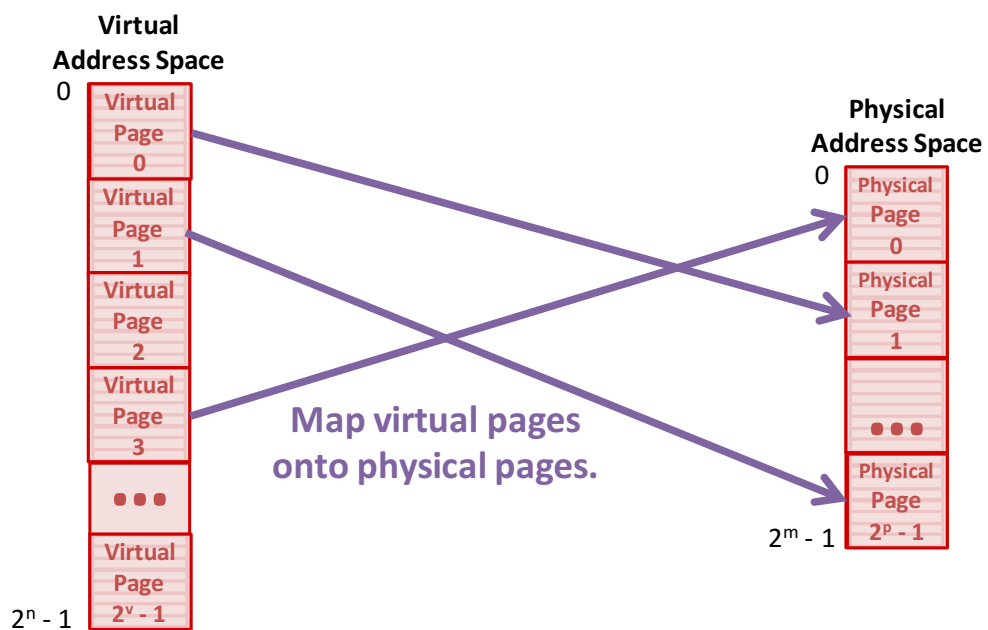


# Virtual Memory



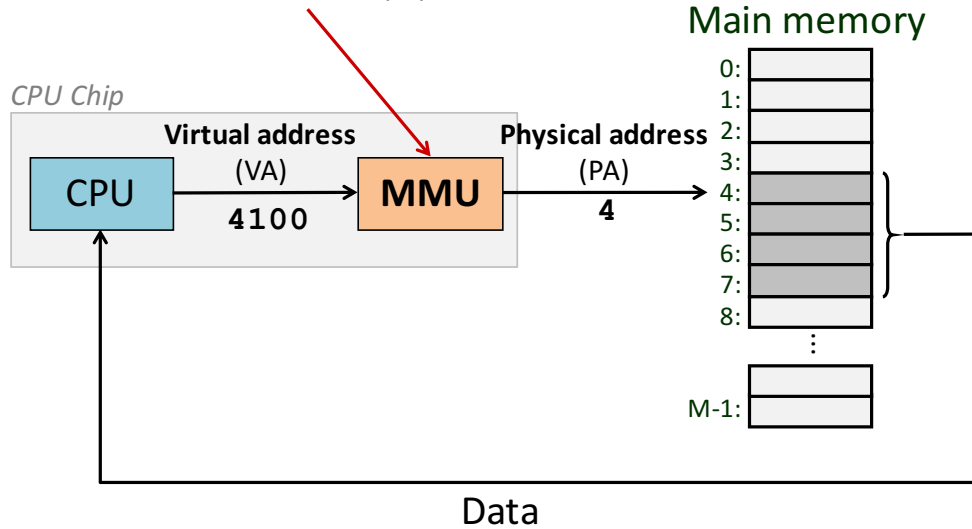
# Memory Pages



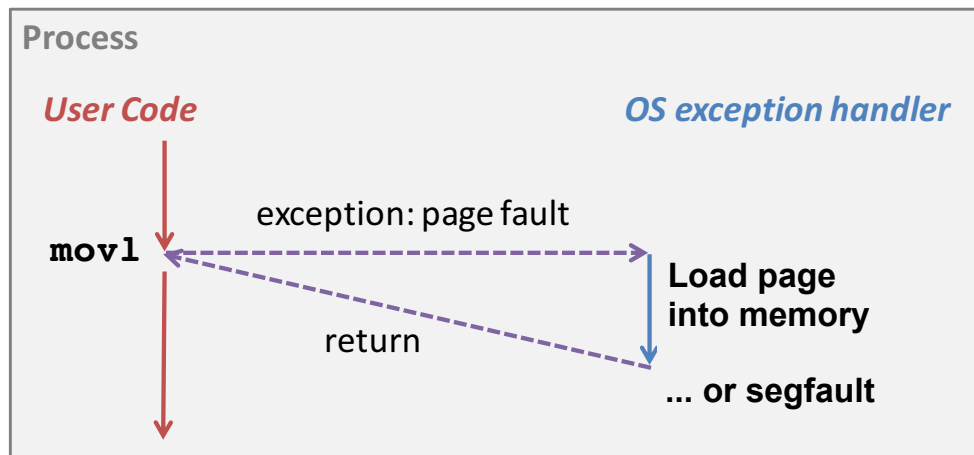
# Address Translation

## Memory Management Unit

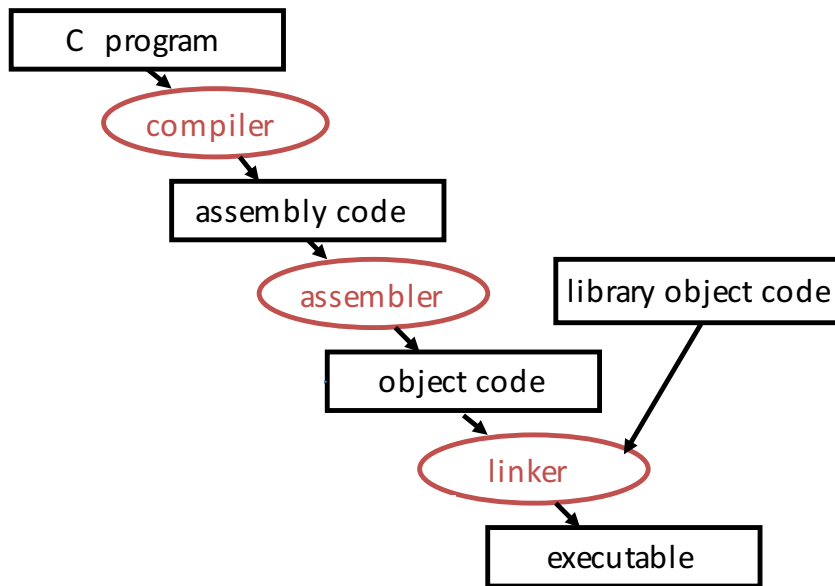
translates virtual address to physical address



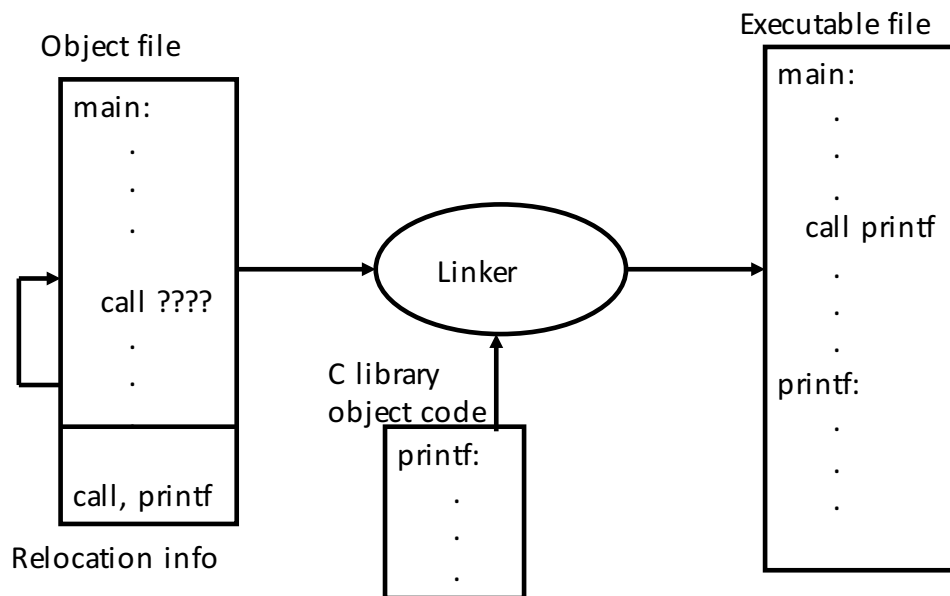
# Page Fault



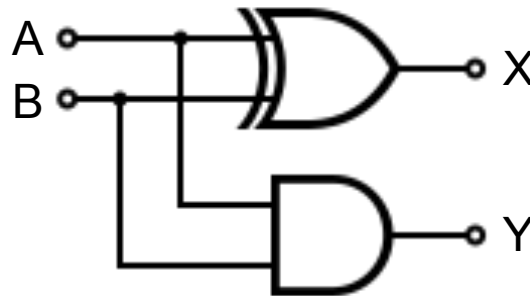
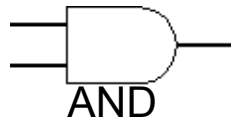
# Program Generation Workflow



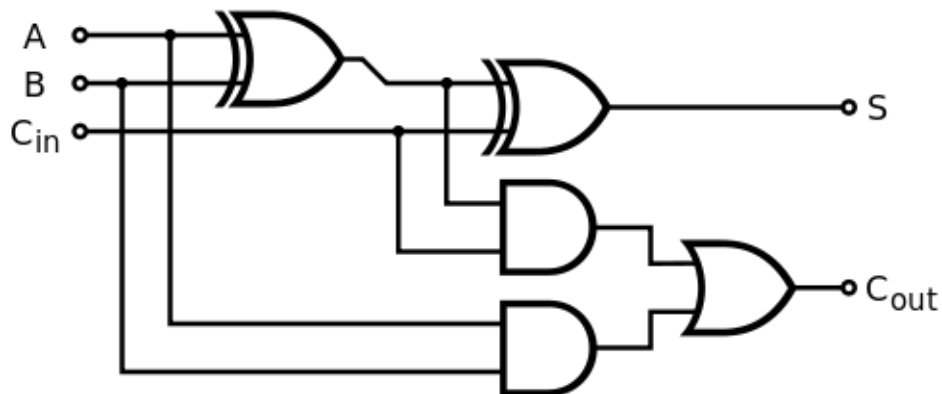
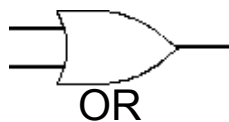
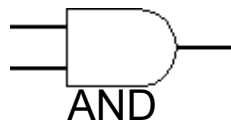
# Linking Schematic



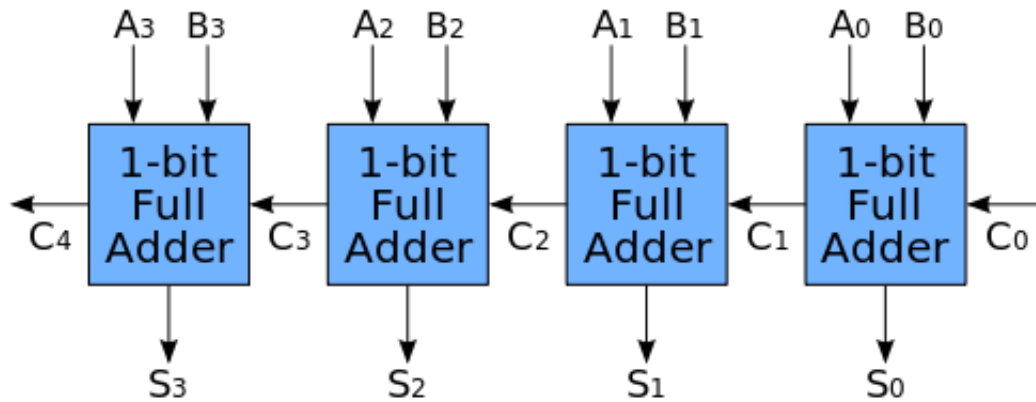
# Circuits and Logic Gates



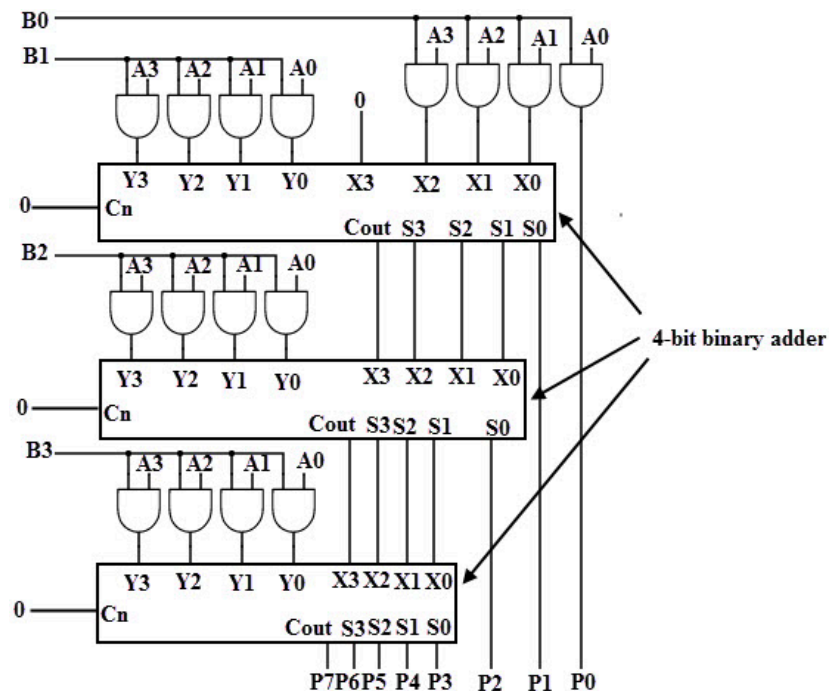
# Full Adder



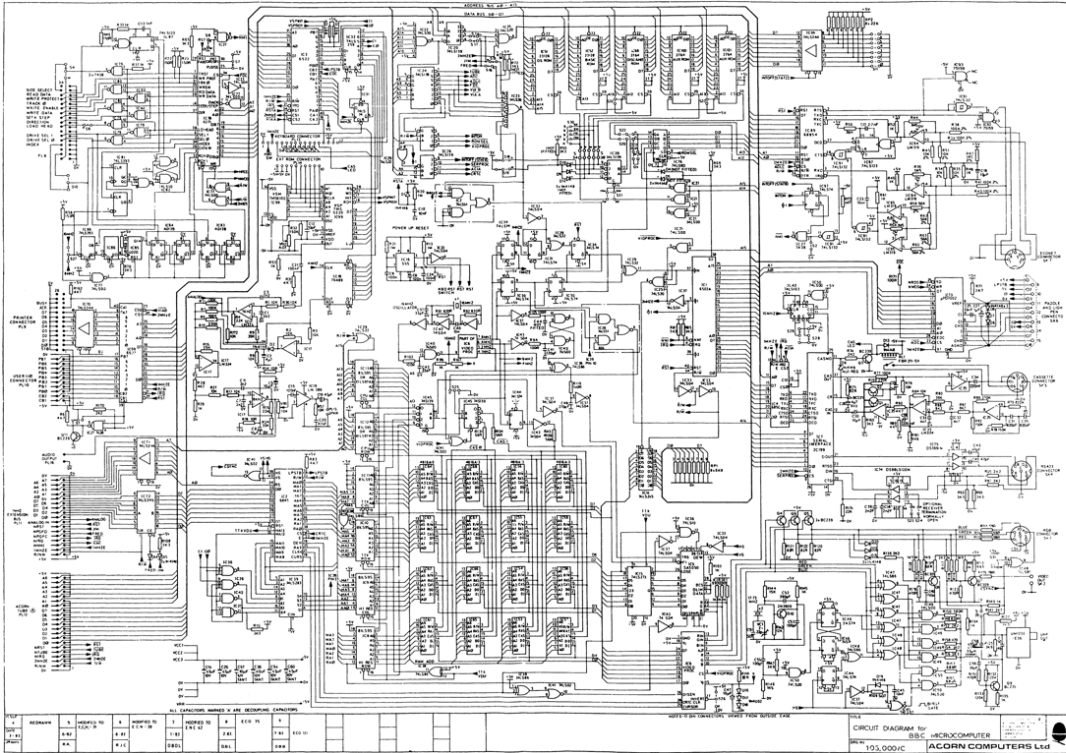
# 4-Bit Full Adder



# 4-Bit Binary Multiplier



# Microprocessor (1980's)



# Big Ideas in Systems

**Abstraction**

**Representation**

**Performance**

**Security + Reliability**

