Addressing Mode

- Displacement
  - Instructions have two address fields, \textit{at least one of which is explicit}. The other address field, or an implicit reference based on opcode, \textit{refers to a register whose contents are added to A to produce the actual address}
  - Adv: flexibility
  - Dis: complexity

![Diagram showing the addressing mode concept](image)

- Relative addressing
  - Address is immediate displacement + PC
- Indexed addressing
  - Address is immediate address + index register
- Register based-indexed addressing
  - Two address fields, both refer to the registers
  - Address is base register + index register
- Register base-scaled indexed addressing
  - Three address fields, two refer to the registers, one is the scale
  - Address is base register + index register x scale
Register Organization

- **User Visible**
  - programmer
  - minimize mm references

- **Registers**
  - cpu working space
  - top-level hierarchy
  - Num. & func. vary

- **General Purpose**
  - can be assigned variety of func.
  - may be true GP: operands for any opcode
  - may be restricted: floating-point & stack operation
  - can be used for data or addressing (register indirect, displacement)

- **Data**
  - may only hold data, cannot be used for operand address (Acc.)

- **Address**
  - may be used for an addr. mode
  - (Index Reg.)

- **Condition**
  - a set of bits set by the processor hardware
  - cannot (usually) be set by programs
  - can be read by programs

- **Control & Status**
  - control unit
  - control the operation of processor
  - not visible to users

- **PC, IR, MAR, MBR**

- **Program Status Word (PWS)**