CAO: Lecture 16
Instruction set formats

Topics Covered

- Central Processing Unit Instruction Formats
- Three address instruction
- Two address instruction
- One address instruction
- Zero address instruction

Central Processing Unit
Instruction Formats

- Example: the influence of the number of addresses on the way of evaluating this arithmetic statement using different:
  X= (A+B)*(C+D)
- 3-address instructions: see Page 258
- 2-address instructions: see Page 258
- 1-address instructions: see Page 259
- Zero-address instructions: see Page 259

Three address instruction

ADD R1,A,B R1← M[A]+M[B]

ADD R2,C,D R2← M[C]+M[D]

MUL X,R1,R2 M[X]← R1*R2

TWO ADDRESS INSTRUCTION

- MOV R1 ,A R1←M[A]
- ADD R1,B R1←R1+M[B]
- MOV R2,C R2←M[C]
- ADD R2,D R2←R2+M[D]
- MUL R1,R2 R1←R1*R2
- MOV X,R1 M[X]←R1

ONE ADDRESS INSTRUCTION

- LOAD A AC←M[A]
- ADD B AC←AC+M[B]
- STORE T M[T]←AC
- LOAD C AC←M[C]
- ADD D AC←AC+M[D]
- MUL T AC←AC*M[T]
- STORE X M[X]←AC

ZERO ADDRESS INSTRUCTION

```
PUSH  A    TOS <- A
PUSH  B    TOS<- B
ADD        TOS<-(A+B)
PUSH  C    TOS <- C
PUSH  D    TOS <- D
ADD        TOS<-(C+D)
MUL        TOS<-(C+D) * (A+B)
POP  X     M[X]<-TOS
```