Introduction to SimpleSem

CS181: Programming Languages

Topics:

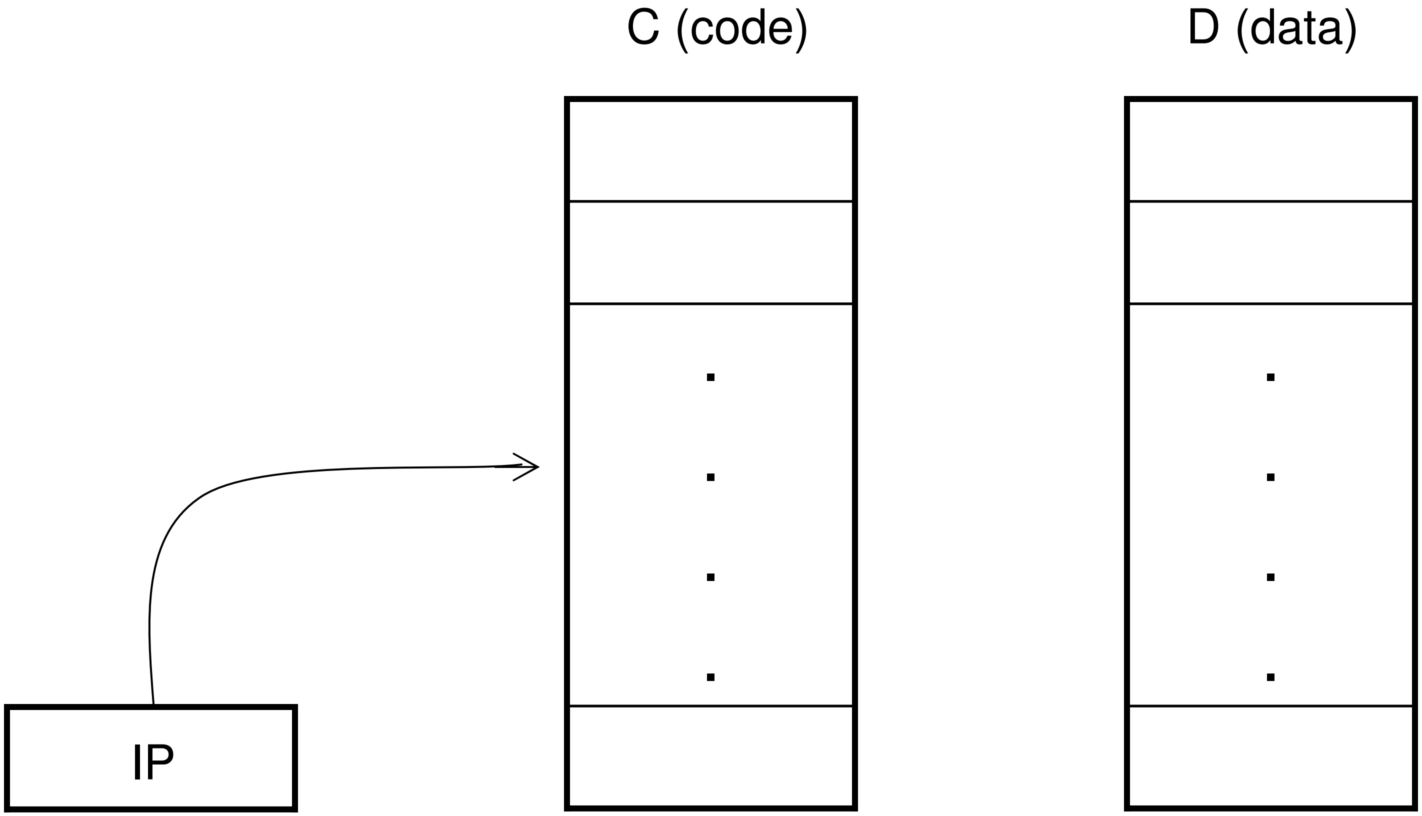
- What is SimpleSem?
- SimpleSem machine
- Basic instructions

What is SimpleSem?

- SimpleSem is a simple abstract processor
- Semantics of SimpleSem is intuitively understood (as you will see through examples)

- Semantics of programming languages can be described operationally – that is, by describing the language constructs by translating them into a sequence of equivalent SimpleSem instructions.

SimpleSem machine



Modus Operandi

- This machine operates in the following manner:

```
while not(halt)
    get the current instruction (C[IP])
    increment IP
    execute the current instruction
end
```

- (halt is a special instruction)

Set instruction

- General format: set target, source
- For example

  set 12, D[8]

  - means “store the content of D[8] into D[12]”
- This is not to be confused with:

  set D[12], D[8]

  - which means “store the content of D[8] into D[whatever is the content of D[12]]”
  - indirect addressing
- We can combine values into expressions:

  set 10, D[12] * D[8] + D[1978]

Reading and writing

- Reading and writing is done via the set instruction:

  set 12, read

  - Reads the input value from the keyboard

  set write, D[12]

  - Writes the output value onto the screen

Branching (jumps)

- Unconditional jumps

  jump 42

  - means “jump to instruction 42”

- Conditional jumps

  jumpt 42, D[12] > D[8]

  - means jump to instruction 42 if the condition is satisfied”

SimpleSem implemented

- Check out a Java implementation of the SimpleSem interpreter at:

  http://www.infosys.tuwien.ac.at/pl-book/simplesem/simplesem.html

Reference

- Ghezzi, C., and Jazayeri M. *Programming Language Concepts*. 3rd ed. New York: John Wiley and Sons. 1998.