



# COMPUTER SYSTEMS FUNDAMENTALS ( 4COSC004W )

Lecture: Week 10. Part 2 of 2



# Contact details

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# This week:

- Computer architecture Hardware to the von Neumann Machine
  - *Major hardware components*
    - Main memory
    - CPU
  - *Data and control*
  - *Von Neumann Machine*
  - *Instruction set*
  - *Direct addressing*

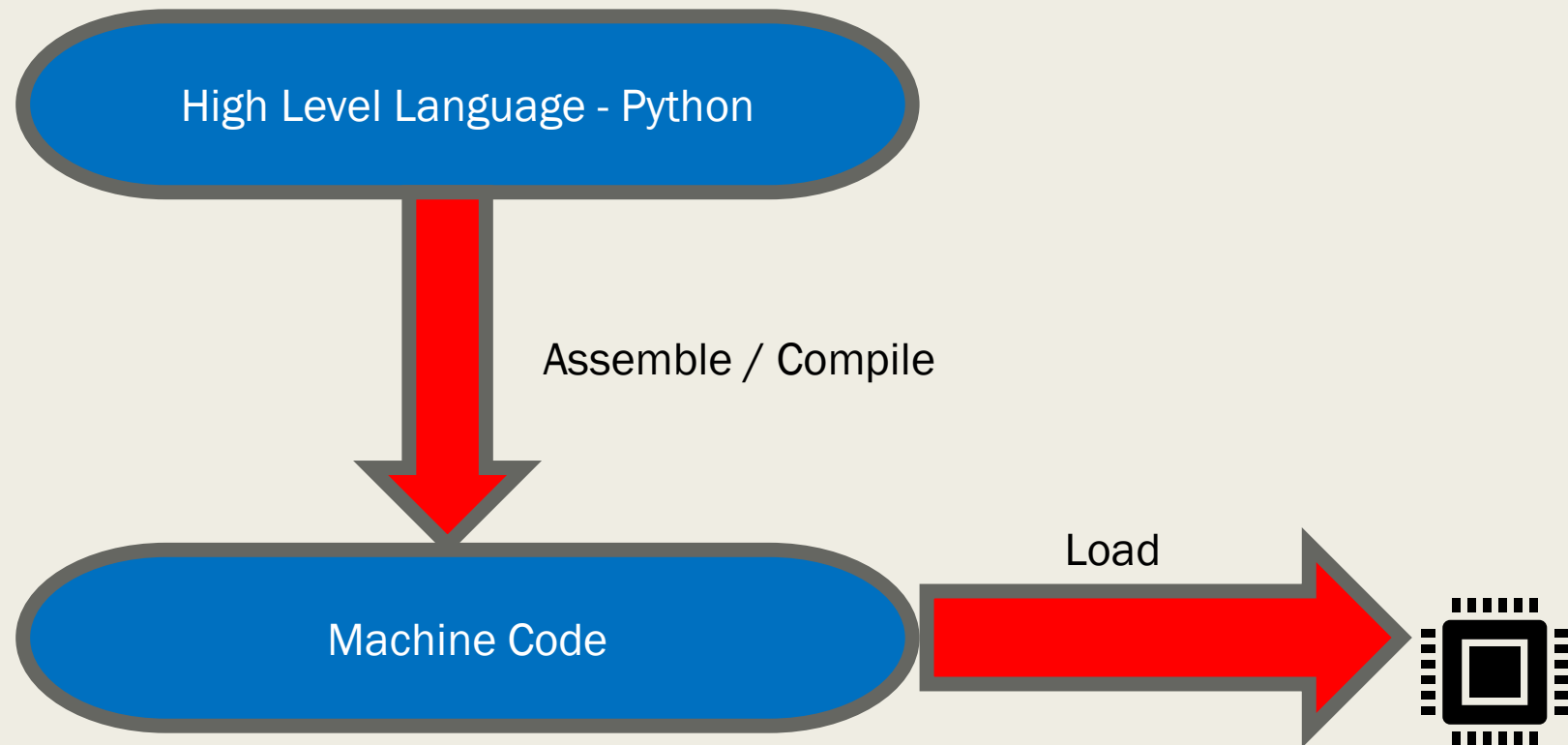
# ASSEMBLY LANGUAGE

One-step up from Machine Language

# By the end of this unit you will gain an understanding of:

- Instruction set
- Direct addressing
- PEP 9
- Example Assembly Language programs
- Simulation
- Predicting output

# High and Low Level languages:



# Instruction set

- RISC (**R**educed **I**nstruction **S**et **C**omputing)  
Asmb5 – 39 commands
- CISC (**C**omplex **I**nstruction **S**et **C**omputing)
  - *See the further reading, for the PEP 9 instruction set*

# Addressing modes

- Direct
- Immediate



# Operand addressing methods

## Direct

- $\text{Oprnd} = \text{Mem}[\text{OprndSpec}]$
- Asmb5 letter: d
- The operand specifier is the *address* in memory of the operand

## Immediate

- $\text{Oprnd} = \text{OprndSpec}$
- Asmb5 letter: i
- The operand specifier is the operand

# PEP9 DEMONSTRATION

# In this unit we have covered:

- Instruction set
- Direct addressing
- PEP 9
- Example Assembly Language programs
- Simulation
- Predicting output

# Further reading:

- Computer Systems, S. Warford
  - *4. Computer Architecture (pp. 184 – 230)*

# Further material for lecture:

- iTunesU course COSC303
  - Follow [\*this link\*](#) from your iPad
  - Install iTunesU if not already installed
  - Watch Lectures 6 through 11
    - About 5 hours of footage

# This week we covered:

- Computer architecture Hardware to the von Neumann Machine
  - *Major hardware components*
  - *Main memory*
  - *CPU*
  - *Data and control*
  - *Von Neumann Machine*
- Assembly Language
  - *Instruction set & Direct addressing*
  - *PEP 9*
  - *Example Assembly Language programs*
  - *Simulation*
  - *Predicting output*

# By this stage you:

- Have gain an appreciation of ;
  - *Major hardware components*
  - *CPU*
    - *Cycles*
  - *Von Neumann Model*
  - *Machine code*

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