

Introduction to 8086 Assembly

Lecture 1

Behrooz Nasihatkon



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Introduction to 8086 Assembly Language

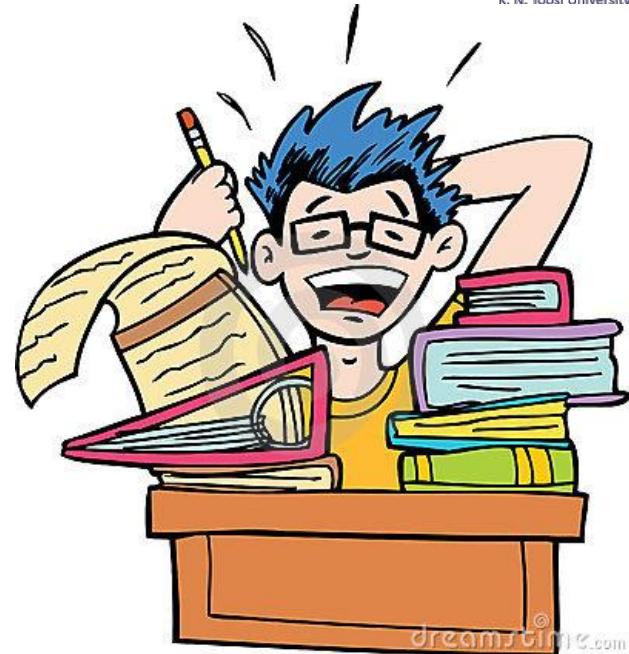
- 3 credits
- Saturday, Wednesday, 15:30-17:30 AM
- Instructor: Behrooz Nasihatkon
- Email: nasihatkon@kntu.ac.ir
- Room: EC building, level 3



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Grading

- Homeworks
- Quizzes
- Project(s)
- Midterm Exam
- Final Exam



dreamstime.com



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What is considered cheating?





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Roll call



Special needs



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Auditing the course





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Recording the lectures





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Eating in class





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How to get help?





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Asking questions!





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How to give feedback?

Anonymous form:

<https://goo.gl/zPxBAS>





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Join the Telegram Channel

<https://t.me/asmkntus97>





Resources

- Carter, Paul A. **PC Assembly Language**, 2007
 - http://cs.dartmouth.edu/~spl/Academic/Organization/docs/NASM/PC_Assembly.pdf
- **NASM tutorial**
 - <http://cs.lmu.edu/~ray/notes/nasmtutorial/>
- **TutorialsPoint**
 - https://www.tutorialspoint.com/assembly_programming
- **GOOGLE!**

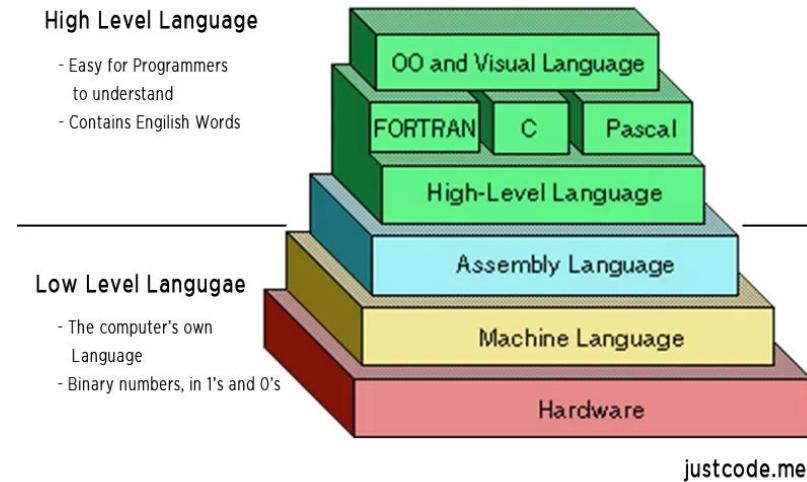
Further study:

- Hyde, Randall. **The art of assembly language**. No Starch Press, 2010.
 - **Linux:** <http://www.plantation-productions.com/Webster/www.artofasm.com/Linux>
 - **Windows:** <http://www.plantation-productions.com/Webster/www.artofasm.com/Windows/>
- Blum, Richard. **Professional assembly language**. John Wiley & Sons, 2007.



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What is Assembly language?



<http://justcode.me/assembly/introduction-assembly-language-examples/>



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How many assembly languages are there?



<https://knowyourhandheld.weebly.com/blog/what-are-the-necessary-features-in-latest-smartphones>



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Why assembly?

- Going low-level!
- **How programming languages are implemented (code, variables, arrays, functions, etc.)!**
- Writing efficient programs
- System programming
- Writing device drivers
- Interfacing with high-level languages like C
- Reverse engineering



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x86 & x86-64 Assembly





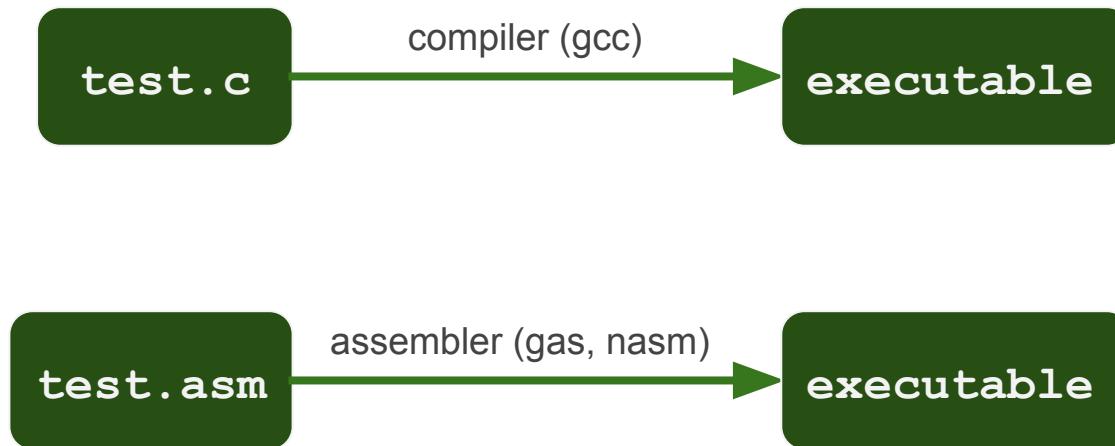
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AT&T vs Intel Syntax

https://en.wikipedia.org/wiki/X86_assembly_language#Syntax



What is an Assembler?





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Major Assemblers

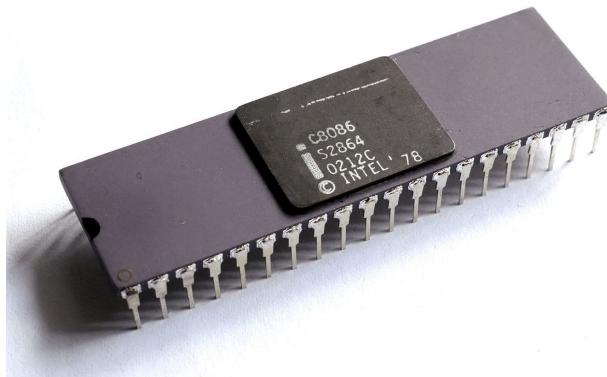
- Microsoft Assembler (MASM)
- GNU Assembler (GAS)
- Flat Assembler (FASM)
- Turbo Assembler (TASM)
- **Netwide Assembler (NASM)**



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Backward compatibility

- Look at
 - <https://en.wikipedia.org/wiki/X86>





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Our platform

- **Hardware:** 80x86 processor (**32**, 64 bit)
- **OS:** Linux
- **Assembler:** Netwide Assembler (NASM)
- **C Compiler:** GNU C Compiler (GCC)
- **Linker:** GNU Linker (LD)



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How does an assembly code look like?

Write a C program named **test.c**.

Compile it to x86 assembly language, the **AT&T syntax**

```
>>> gcc -S -o att.s test.c
```

Now compile to the **Intel syntax**:

```
>>> gcc -S -masm=intel -o intel.s test.c
```

Compare the two assembly syntaxes (output files att.s and intel.s)