Principles of Compiler Design

Amey Karkare
Department of Computer Science and Engineering, IIT Kanpur
karkare@iitk.ac.in
http://www.cse.iitk.ac.in/~karkare/cs335/

Acknowledgements

- Most of the text in the slide is based on classic text **Compilers: Principles, Techniques, and Tools** by **Aho, Sethi, Ullman** and **Lam**
- Slides are modified version of those created by Prof S K Aggarwal, IITK

Motivation

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- Software quality assurance and software testing

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- Why study compilers?
  - Compilers use the whole spectrum of language processing technology

Expectations?

- What will we learn in the course?

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- Confidence to use language processing technology for software development

Organization of the course

- Assignments 10%
- Mid semester exam 20%
- End semester exam 35%
- Course Project 35%
  - Group of 2/3/4 (to be decided)
- Tentative

Bit of History

- How are programming languages implemented? Two major strategies:
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  - Interpreter for development
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- Java
  - Java compiler: Java to interpretable bytecode
  - Java JIT: bytecode to executable image

Some early machines and implementations

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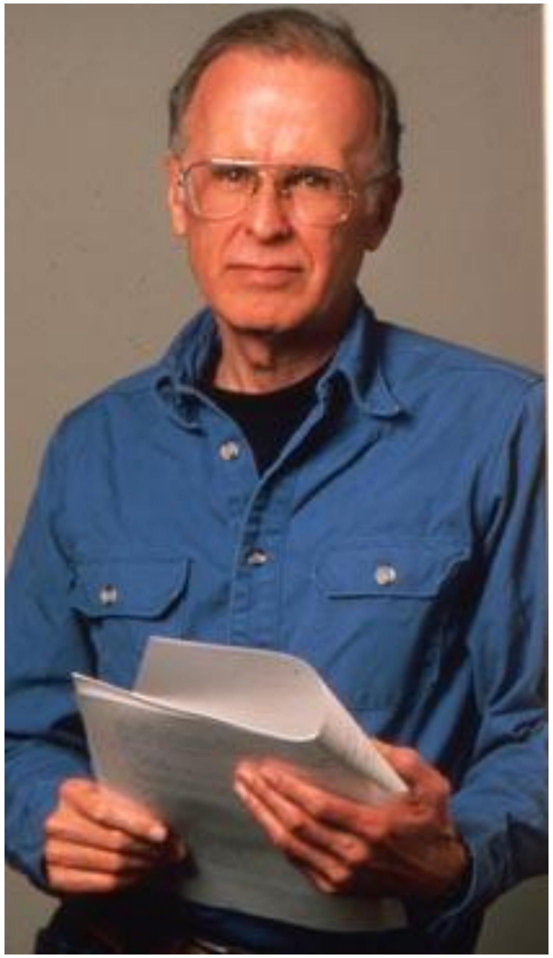
- Fortran I project (1954-1957): The first compiler was released



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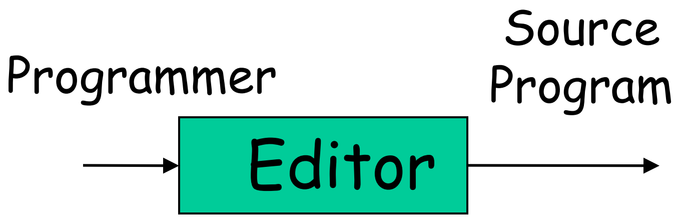
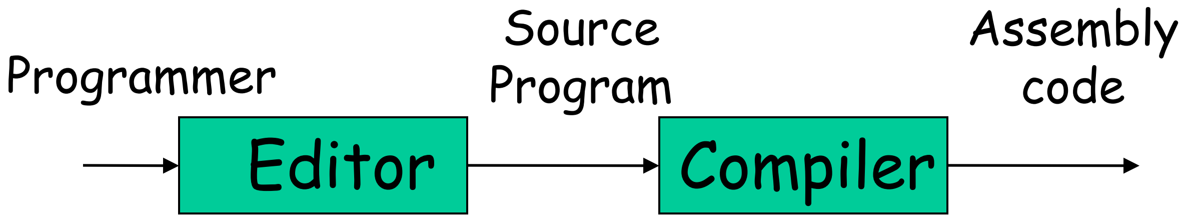
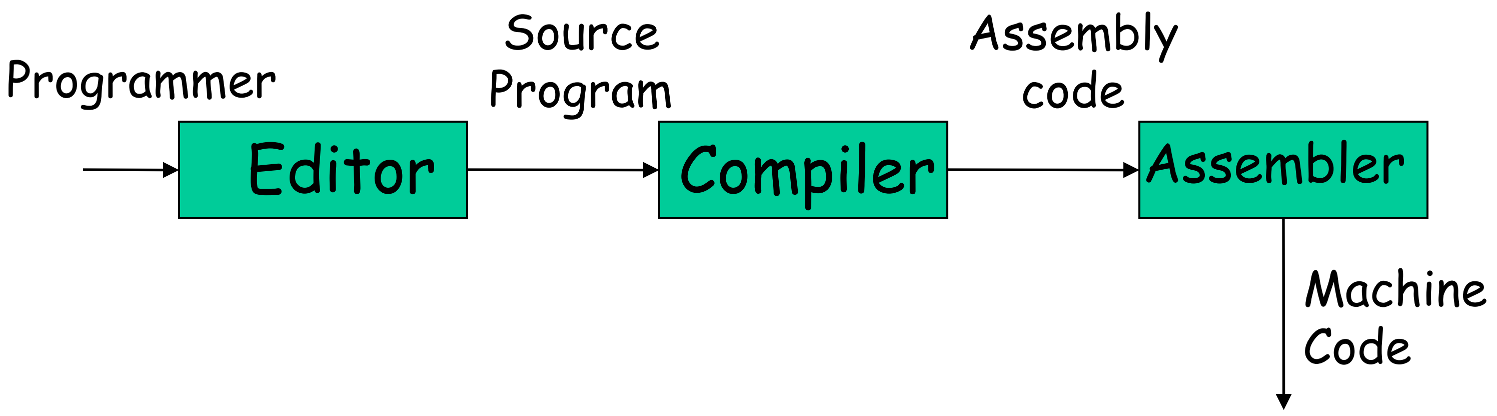
- Modern compilers preserve the basic structure of the Fortran I compiler !!!

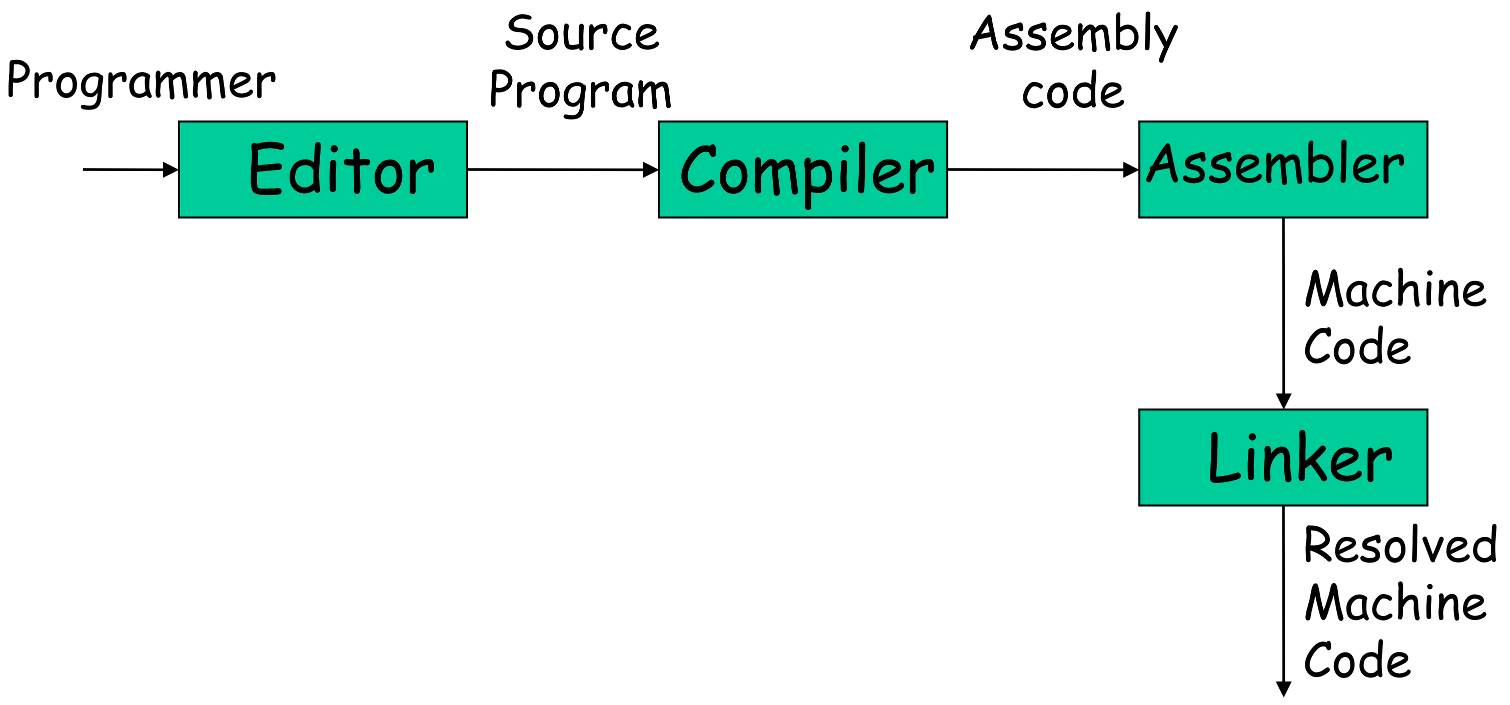
The big picture

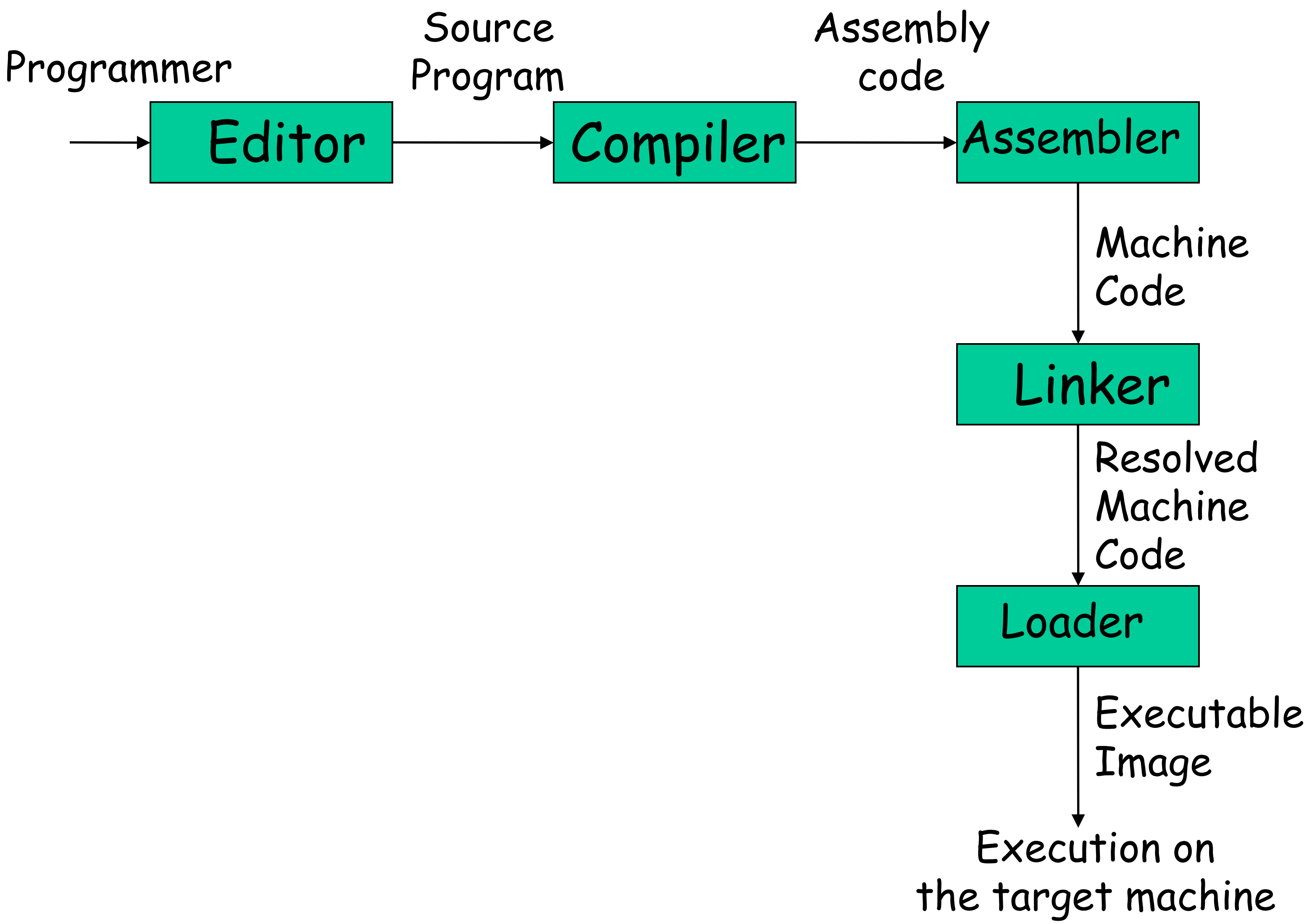
- Compiler is part of program development environment
- The other typical components of this environment are editor, assembler, linker, loader, debugger, profiler etc.
- The compiler (and all other tools) must support each other for easy program development

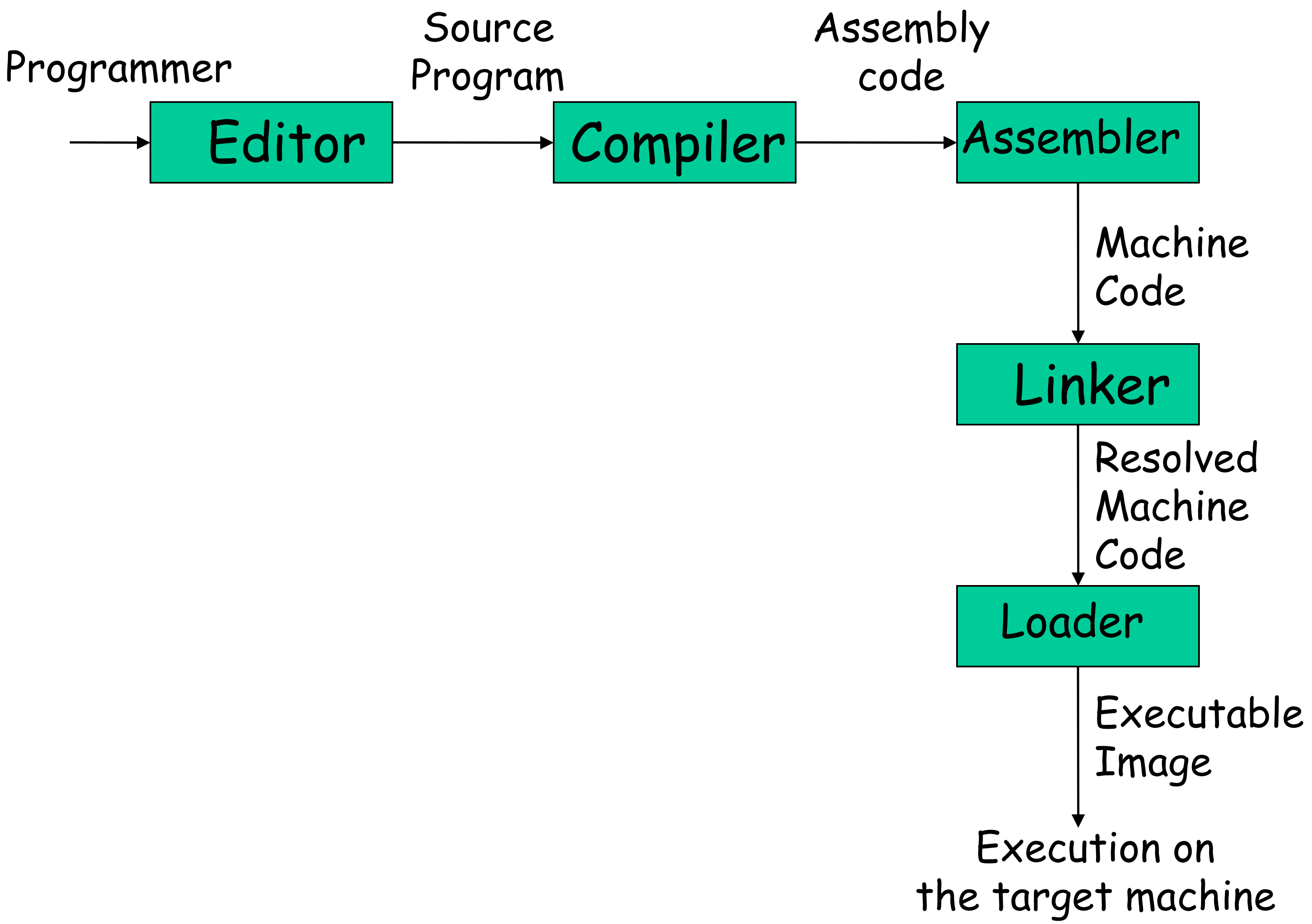

Programmer
Editor
Source Program


Programmer
Source Program
Assembly code
Editor
Compiler

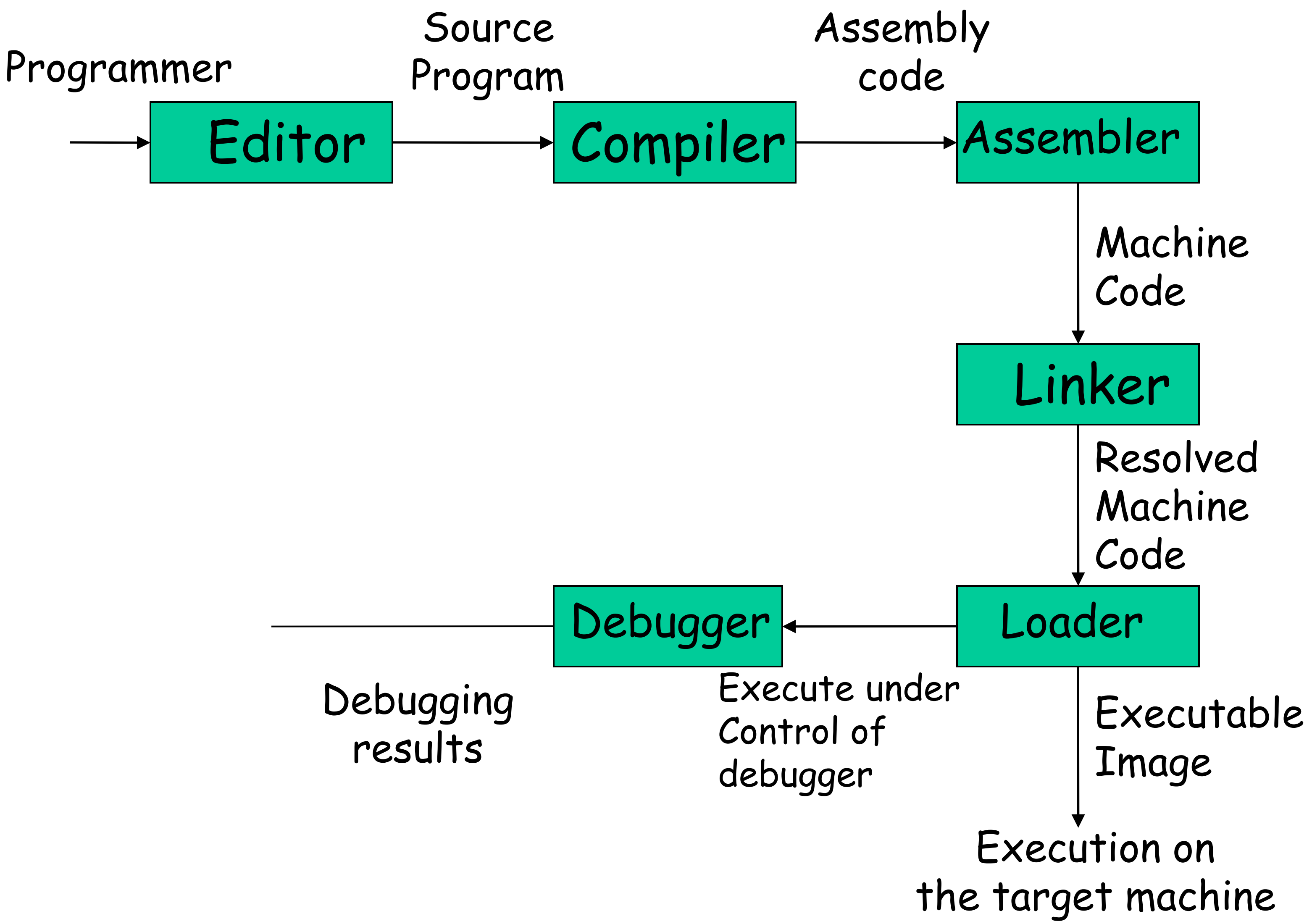

Programmer
Editor
Source Program
Compiler
Assembly code
Assembler
Machine Code


Programmer
Source Program
Assembly code
Editor
Compiler
Assembler
Machine Code
Linker
Resolved Machine Code


Programmer
Editor
Source Program
Compiler
Assembly code
Assembler
Machine Code
Linker
Resolved Machine Code
Loader
Executable Image
Execution on the target machine



Normally end up with error



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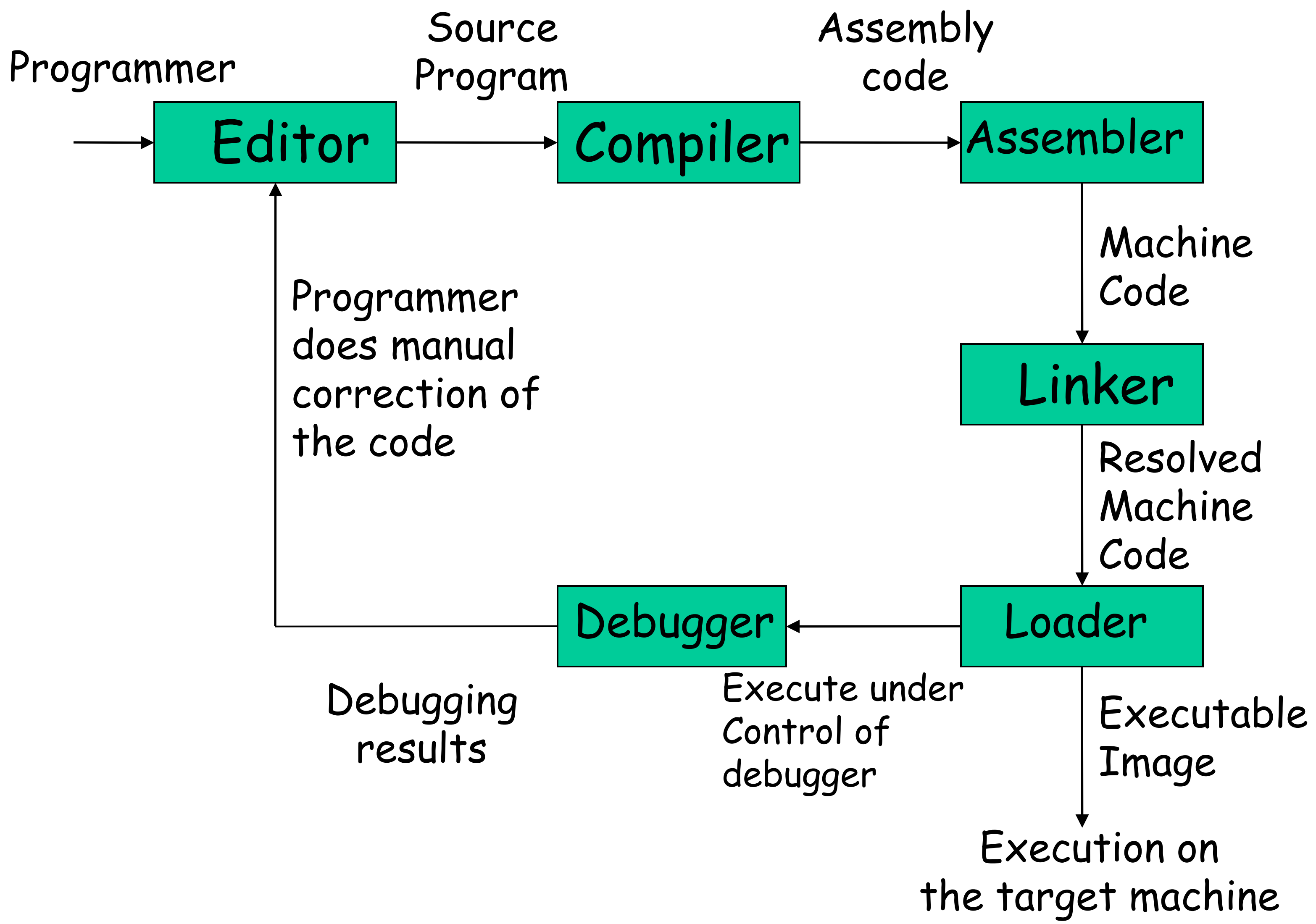

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