Lecture 1/Introduction

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System Software

Definition

System software is the set of programs for a given computer that:

- Supports the operation of the computer
- Assists the programmer in developing application software for the computer
- Creates an environment for application software to run
- Controls the application software's environment for security and efficiency purposes

Abstract Examples

◦ The Operating System

◦ Libraries

◦ Debuggers

◦ Loaders

◦ Linkers

◦ Assemblers

◦ Compilers

◦ Editors

Let's divide that up a little more…

The Program Development Environment
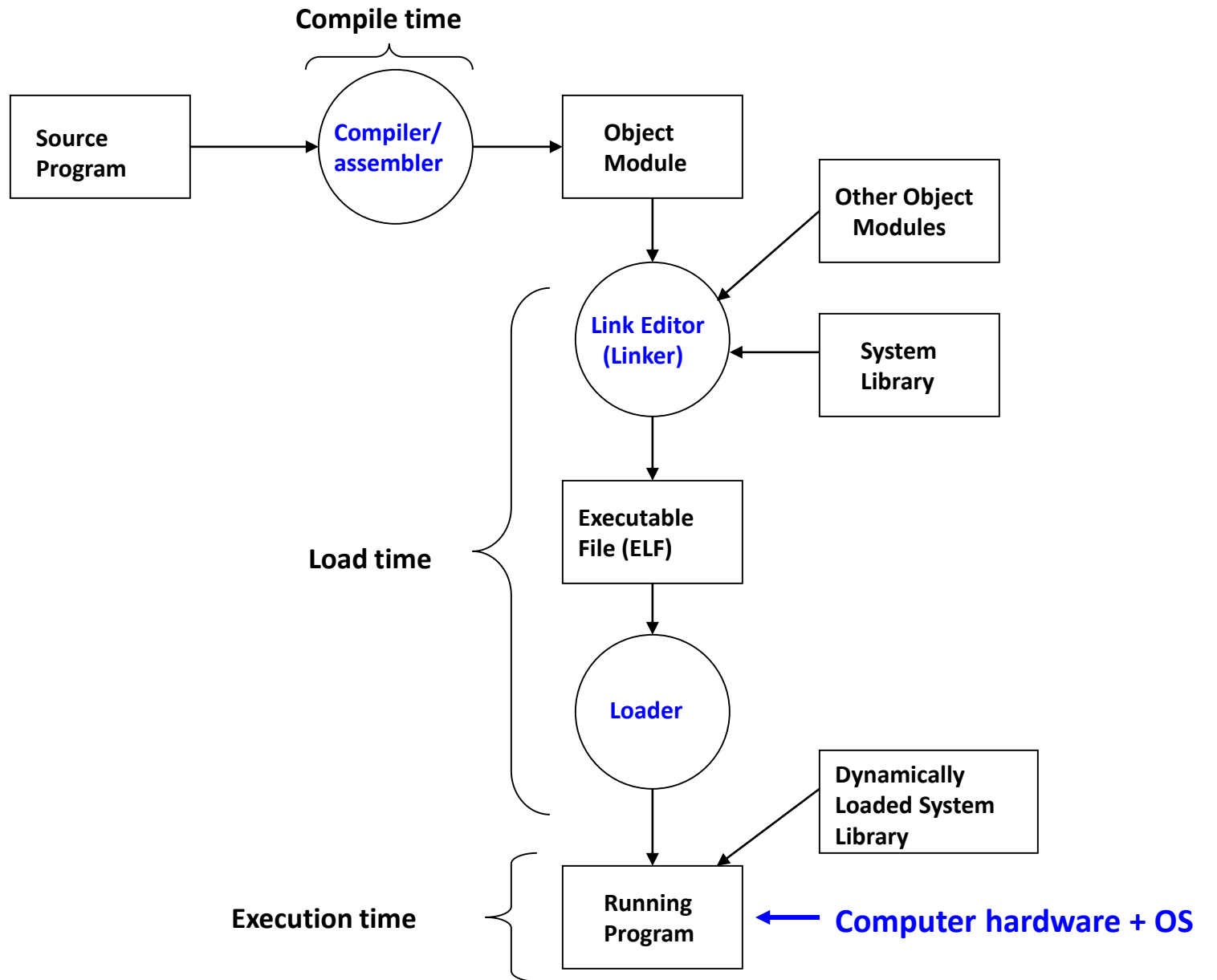
Software to **create** programs. In this context, we have:

- Editor: Assists the creation of application source code
- Compiler: Translates application source code into assembly language
- Assembler: Translates assembly language into binary object code
- Static Linker: Translates object code into executable code
- Debugger: Provides information about running processes in light of their object code and/or source code

The Run-Time Environment

Software to **execute** programs. In this context, we have:
- **Library:**   Pre-compiled set of code that consists of functions to be used by programs
- **Operating System:**   *The software that abstracts the computer itself.* Provides interfaces to the computer for both users and programmers, creates the run-time environment, and manages all resources. Broadly includes the…
- **Loader:**   Loads and runs executable programs
- **Dynamic Linker:**   Loads shared libraries at runtime and links programs to them

The Big Picture

Compile time

Source Program → Compiler/assembler → Object Module

Object Module → Link Editor (Linker) ← Other Object Modules

Link Editor (Linker) ← System Library

Load time

Link Editor (Linker) → Executable File (ELF)

Executable File (ELF) → Loader

Execution time

Loader → Running Program ← Dynamically Loaded System Library

Running Program ← **Computer hardware + OS**

So what do we (most) care about?

Course Focus

- The Operating System
- Libraries
- Debuggers
- Loaders
- Linkers
- Assemblers
- **Compilers**
- Editors

Next Time:
The Tiny Computer