

CS 131 Chapter 4 Assignment

Install and Exercise the LC-3 Software Toolchain

Objectives:

- Install the LC-3 Editor and Simulator (i.e., the LC-3 toolchain)
- Read Chapters 1 – 3 of the LC-3 Guide to learn how to write programs using the LC-3 Editor and then run programs using the LC-3 Simulator

1. Background

Included with the class text book (Introduction to Computing Systems by Patt and Patel) are two software programs that support the Little Computer 3 (LC-3). The two programs are:

- LC3edit: LC-3 editor and assembler. Used to create / edit LC-3 source files and convert them into LC-3 binary object files.
- Simulate: LC-3 simulator. Used to execute LC-3 object files. The LC-3 simulator includes a set of debug tools for examining the state of the LC-3 during execution of a program (i.e., includes an LC-3 debugger).

In this assignment, you will install the LC-3 software toolchain on your PC and then follow steps contained in the LC-3 Guide to become familiar with the LC-3 software.

2. Assignment

On the CS-131 Canvas Home page, click on the LC-3 Files button.



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Next, click on the first two links to download the Windows installer and the LC-3 Guide.



LC-3 Files


LC-3 Windows


 [LC-3 Windows Installer \(LC301.exe\) - contains LC3Edit and Simulate](#) 


 [LC-3 Windows LC3Edit and Simulate Users Guide](#)  


LC-3 Mac OS X

[How to run LC3Edit and Simulate on Mac OS X](#)  

[LC-3 Editor Executable \(LC3Edit.exe\)](#) 

[LC-3 Simulator Executable \(Simulate.exe\)](#) 

[Wine for Mac OS X](#) 

[XQuartz X Window for Mac OS X](#) 

2.1 Toolchain and Guide Installation

You may choose to either run the installer directly or save the LC301.exe file and install the software after the download. The installer does not install the files in the Program Files directory nor is a Start Menu entry created. Instead, the installer prompts you for a target directory and then a set of files are simply unzipped from the installer and installed in the target directory (the default directory is c:\lc-3). The two files of interest are LC3Edit.exe and Simulate.exe. To execute either file, execute Windows Explorer, navigate to the target directory, and double-click on either .exe file. To create a desktop icon, right click on the .exe file, select Send To -> Desktop (create shortcut). An icon for the executable should appear on your desktop.

Also download the LC-3 Guide, I recommend you install the guide in the same directory as the LC-3 toolchain.

Mac OS X Users: If you want to run the LC-3 toolchain on the Mac, follow the instructions in the “How to run LC3Edit and Simulate on Mac OS X” document. Although there is a Unix version of the LC-3 toolchain, the preferred approach is to install a Windows Emulator (WINE) and then run the Windows versions of LC3Edit and Simulate on the Mac. Using the Unix version of the LC-3 toolchain is not recommended due to differences between the Windows toolchain and the Unix toolchain.

2.1 Read and Execute Selected LC-3 Guide Sections

- Read and execute the steps in Chapter 1. Skip the section titled “Entering your program in the LC-3 assembly language” (we are starting out with machine language). Rather than manually entering the machine language binary code on page 2 into LC3Edit, you can simply copy the binary code from the guide and then paste the code into LC3Edit.
- Read Chapter 2 (an introduction to the basic operation of the LC-3 Simulator).
- Read and execute the steps in Chapter 3. On page 11, I recommend you copy the 10 data values from the guide and paste them into LC3Edit rather than manually entering the data.

3.0 Deliverables

Submit the following graphics file on Canvas:

1. A screen capture of the LC-3 Simulator after running the addnums program. Results should look similar to the image below (notice the correct total in R1).

Please upload the capture file on Canvas as follows:

- Select the Submit Assignment button on the Assignment page
- Select the Browse button, select the local file name, and select Open
- Select the Submit Assignment button

