San José State University
Department of Computer Science

CS/SE 153
Concepts of Compiler Design

Section 1
Fall 2022

Course and Contact Information

Instructor:	Ron Mak
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Office hours:	Tu 3:15 – 4:15 PM online via Zoom
Class days/time:	TuTh: 4:30 – 5:45 PM
Classroom:	

Programming language translation in various forms:

Interpreter with an interactive symbolic debugger. Execute a program written in a procedural language and be able to set breakpoints, single-step, examine and set variable values, etc.

Language conversion. Convert a program written in one high-level language to an equivalent program written in another high-level language.

Compiler construction and language design. Design and build a working compiler for a programming language that you invented. Write sample programs in your language and compile them into assembly language code that you can then assemble and run.

Software engineering. Employ the best practices of object-oriented design and team-based software engineering. A compiler is a large, complex program! Managing the development of such a program requires learning *critical job skills that are highly desired by employers*.

Course Learning Outcomes (CLO)

Online Pascal Tutorials

We will use Pascal as the example source language.

Pascal Tutorial looks very good. It even has an online compiler.
Learn Pascal also looks good, although it doesn't appear to cover set types.

Some online websites to compile and run Pascal programs:

http://rextester.com/l/pascal_online_compiler
https://www.tutorialspoint.com/compile_pascal_online.php
https://www.jdoodle.com/execute-pascal-online

Other Useful Tutorials

Install the ANTLR 4 plug-in for Eclipse, etc.

Software to Install

You should install and use an interactive development environment (IDE) such as Eclipse or IntelliJ. To develop a compiler for your language, you will need to download and install the ANTLR 4 package and its Eclipse or IntelliJ plugin, and then modify them to generate the compiler components in Java. This is relatively straightforward on the Mac and Linux platforms. However, the Windows platform may have compatibility challenges. Therefore, if you're on Windows, you should download and install the Windows Subsystem for Linux and then download and run Ubuntu (a variant of Linux):

This is

A high-level description of the design of the compiler with UML diagrams of the major classes.
The grammar for your source language, either as syntax diagrams or in BNF.
Code templates that show the Jasmin assembly code your compiler generates for some key constructs of the source language.

Postmortem Report

At the end of the semester, each student must also turn in a short (1 or 2 pages) **individual postmortem report** that includes:

A brief description of what you learned in the course.
An assessment of your accomplishments for your project team on the assignments and the compiler project.
An assessment of each of your other project team members.

Only the instructor will see these reports.

Technology Requirements

Students are required to have an electronic device (laptop, desktop, or tablet) with a camera and microphone. SJSU has a free equipment loan program available for students: https://www.sjsu.edu/learnanywhere/equipment/index.php

Students are responsible for ensuring that they have access to reliable Wi-Fi during tests. If students are unable to have reliable Wi-Fi, they must inform the instructor, as soon as possible or at the latest one week before the test date to determine an alternative. See Learn Anywhere website for current Wi-Fi options on campus

Postmortem Report

At the end of the semester, each student must also turn in a short (under 1 page) individual postmortem report that includes:

- A brief description of what you learned in the course.
- An assessment of your accomplishments for your team assignments and design project.
- An assessment of each of your other project team members.

Only the instructor will see these reports. How your teammates evaluate you may affect your course grade.

Zoom Classroom Etiquette

Mute your microphone. To help keep background noise to a minimum, make sure you mute your microphone when you are not speaking>BDC q0.00000912 0 612 792 reW* nBT/F4 14 Tf1 0 (

Week	Dates	Topics
7	Oct 4 Oct 6	Runtime memory management The runtime stack and stack frames Programs, procedures, and functions Procedure and function calls A language converter: Pascal to C++
8	Oct 11 Oct 13	***Midterm exam Tuesday, October 11*** The Java Virtual Machine (JVM) architecture Jasmin assembly language Lab: Language converter
9	Oct 18 Oct 20	Code templates and code generation Code for expressions Code for assignment statements Code for control statements
10	Oct 25 Oct 27	Code for procedure and function calls Code to call **`printf()`** Code for arrays and records Lab: Code generation
11	Nov 1 Nov 3	Code to pass parameters by value and by reference Runtime libraries Code optimization Compiling object-oriented languages
12	Nov 8 Nov 10	Backend compiler architecture Static vs. dynamic scoping Runtime memory management Garbage collection algorithms
13	Nov 15 Nov 17	A simple source-level debugger An integrated development environment (IDE) Context-free vs. context-sensitive grammars Bottom-up parsing with yacc and lex
14	Nov 22	*(TBD)*
15	Nov 29 Dec 1	*Project presentations*
16	Dec 6	Project lab
	Thursday, Dec 8	***Final exam*** Time: 2:45 – 5:00 PM