Full Stack Python, C#, or JAVA Programming
Harvard CS50AP
Spring Semester 2023 Revision 1, 2 Jan 24
Standards Mastery Framework Project Sequence

Track Outlines

Item	Grade Level	Language (Python/C#/JAVA) Track	Data Management (SQLITE3/MySQL) Track	GUI (Tk/MAUI/Swing/JavaFx) Track
0	P	Hello, World	SQLite3/MySQL Installation	Hello, World (Button)
1	P	Printing	SQL Table Builds/Drops	Hello World as a POCO
2	Minor	Calculations/Data Types	SQL Table Operations	Interactive
3	Minor	Procedures	SQL Query Basics - Selections	Menu
4	**Major**	Functions	SQL Insertions	Decorations/Imagery
5	Minor	External Libraries	SQL Deletions	Navigation Queries
6	Minor	POCO/OOP	SQL Updates	Query Displays
7	Minor	Try/Except or Try/Catch	Basic Program SQL Queries	Add/Delete Records
8	**Major**	Container Classes	Advanced Program SQL Queries	Edit Records
9	**Major**	**Completed CRUD Capable GUI Program (Full Stack)**		

Requirements Overview

- Each student is expected to complete all three tracks
- Each item is graded as listed (Practice/Minor/Major)
- All assignments are worth 100 points with the listed weights
- Master Project receives a Major Grade for Overall Rigor, and a Major Grade for Code Quality

Critical Calendar Dates

Date	Total Required Completions	Rules of Completion
January 31st	--CREATE--	• Each Track MUST be completed in order. • Each Assignment is a stand-alone programming project. • Each set (10 elements) may be aggregate of all tracks. • All three tracks to be completed in parallel.
February 28th	15	
March 28th	30 (All Tracks Complete)	
April 11th	Master Project Proposal	
May 13th	Master Projects Due	

Detail Specifications by Track

Language Track

Item	Language Track	Specifications
0	Hello, World	Submit a properly running Hello World Program in Python/C#/Java
1	Printing	Submit a program printing in a properly running program using At least 4 different ***types*** of print commands. Example: • Printing literals • Formatted printing • Printing multiple variables (several ways) simultaneously in text
2	Calculations/ Data Types	Submit a program performing calculations using at LEAST the following data types: • Int • Float • Double • Decimal (or its equivalent) • Long • Byte (Can involve bitwise shifting)
3	Procedures	Submit a program that has multiple procedures existing outside but called from the main method
4	Functions	Submit a program that has multiple functions existing outside but called from the main method
5	External Libraries	Submit a program that links in 3 external libraries you use in your code
6	POCO/OOP	Write a POCO class and instantiate it at least three times in your main application
7	Try/Except	Write a program that uses try/except clauses to catch errors. Show one error being caught in your run sheet/run check
8	Container Classes	Write a POCO Class, then instantiate a container in your main program that holds multiple objects of your class. Demonstrate CRUD on the objects in memory
9	Full Stack Project	See specific project spec for item 9 below

Database Track

Item	Database Track	Specifications
0	SQLite3 Installation	Prove proper installation of MySQL and any tool to allow you to manually operate databases
1	SQL Table Builds/Drops	Submit your SQL queries that resulted in proper formation of your desired schema (table)
2	SQL Table Operations	Demonstrate SQL queries that add columns, remove columns, and edit data types of columns (In SQLite there is no edit columns)
3	SQL Query Basics - Selections	Demonstrate multiple selection queries varying records and what is returned to the result set
4	SQL Insertions	Demonstrate multiple SQL insertions
5	SQL Deletions	Demonstrate proper SQL deletions
6	SQL Updates	Demonstrate proper SQL updates to multiple records
7	Basic Python SQL Queries	Demonstrate connecting to your SQLite 3 from a python POCO class
8	Advanced Python SQL Queries	Demonstrate using the data from an SQLite3 query call in your python POCO in the main part of your program
9	Full Stack Project	See specific project spec for item 9 below

SQLite is only authorized for students w/school laptops without the ability to download full MySQL.

GUI Track

Item	GUI Track	Specifications
0	GUI Hello, World (Button)	Submit a properly running Hello World Program in a GUI for Python/C#/JAVA
1	GUI Hello World as a POCO	Submit your GUI Hello World as a POCO instantiated in main
2	GUI Interactive	Write a GUI program that allows user to interact with at least: • Buttons that change labels • Buttons that read and write to text edit fields
3	GUI Menu	Write a GUI Menu that performs basic application functionality including: File-> Exit Help->About (With an actual popup menu) 3 other functions you write
4	GUI Decorations/Imagery	Demonstrate GUI decoration by using images as backgrounds and set the application icon
5	GUI Navigation Queries	Navigate through a container object using GUI buttons
6	GUI Query Displays	Connect the data object to your database class and show records on a GUI screen using navigation buttons
7	GUI Add/Delete Records	Install SQLite3 methods to your database POCO and perform Add/Deletes from your GUI class
8	GUI Edit Records	Perform Edits on record with navigational focus
9	Full Stack Project	See specific project spec for item 9 below

Project 9 All Three Tracks

Your task for the final step is to pull together a full-stack program with core CRUD functionality. Submit a fully functional running application in Tk as follows:

1. Main has less than 3 lines of functional code.
2. GUI Class is container for database class.
3. Database class performs ALL query and connections methods.
4. GUI has full navigation and CRUD capabilities.
5. Application icon and imagery included in project.
6. Full documentation.
7. Proper naming conventions for all GUI objects.
8. No GUI code in main application class OR database class.
9. Assuming cooperative users, application does not crash.
10. NO MULTIPLE RECORD DISPLAYS ARE ALLOWED for your first Full-Stack Program. For your master project you may use them if you so choose.

Master Projects

Once you are completely signed off for all three tracks, you can proceed to your master project proposals. Your master projects require a unique topic of interest to you. Common ideas will not score as well. This must be uniquely your own.

What you will submit as your proposal is a 1-page detailed **word-processed** proposal using the template at the end of this packet. Hand-written proposals ***will not be accepted***.

April 11th	Master Project Proposals Due
May 13th	Master Projects Due

Specifications

This semester there will be substantial guidance by the teacher and my teacher assistants as to what is expected. Take notes.

Tl;dr;

You will write a better and more comprehensive full-stack python/JAVA GUI program that manages records of interest to you. For this one you will be graded on everything in Section 9 as well as the following items:

- User validation on fields via the GUI and at the database control layer (the database class)
- Error checking in general
- Polish on the GUI. No loud colors, etc. Professional design
- Topic selected – is it real-world enough? Meaning vs. silly or last-minute
- Depth of database table accomplished. Extra involves multiple tables or pivots (relational queries across multiple keys) This is a very big area so stay over your skis.
- Comprehensive correctness and code structure quality. (Shape, documentation, etc.).

CODE Major Grade Required minimums (Major Grade Number 1):

- Must be OOP Python with operable UI w/Menu (UI Class is NOT main module)
- Help About Dialog
- Must connect to a database on classroom Intranet (Rogue1/Skunkworks)
- Must be an EMBEDDED DEVICE PROJECT (i.e., Robot or other major challenge device)
- Must display data from the table

Meeting minimums achieves a grade of **75**.

Code Grade Enhancers: To achieve each tier, ALL of the lower tiers must be achieved.

To achieve an 80 or better, code must include the following minimums:

- Must include background imagery
- Must have a full working menu as shown in class (If not sure ASK)
- Must complete CRUD operations as directed by user in some manner

To achieve a 90 or better:

- Must have a class modeling the data used in transfer to/from the table (See example)
- Must have full CRUD operations (CREATE, READ, UPDATE, DELETE)
- Must accompany a proposal that scores above a 90

To achieve above a 95:

Your program must be comprehensively produced and show significant programmatic prowess. One of the biggest ways to guarantee this after meeting the 90% minimums, is to place your table on the lab cloud, and be able to connect remotely to it. This can be a copy of your table. Connection strings will be explained in class.

Presentation & Demonstration (Major Grade Number 2)

- Presentations will be done to the entire class
- This major grade will include all of the final elements:
- Professional Dress
- Comprehensive DEMO
- Demo functions properly
- Presentation clarity (Do you stay on point and relevant to the demo of your software)
- Demonstration of why this is meaningful to you beyond mere statement of such
- 2 words per slide rule adherence

Default Recovery
By definition: Submit in accordance with this document unless otherwise directed.

Code Point Deductions

- Multiple PDF submissions
- File format not PDF (other than PDF except for required imagery)
- Non scannable code results in a zero until resubmitted. If late, school board deductions in effect
- Incorrect Order of submission (Classes, Main, Schemas, Run/Images)
- Missing submissions
- Poorly documented code
- Non-meaningful code
- Non-Working Code
- Late code in accordance with school board policy at all deadlines

Harvard CS50AP/AP-CSP

[Replace this text with your full name]

Period: [1 or 3]

Master Project Proposal

Date Submitted: [DD Month-Spelled-Out YY]

What I am managing or tracking

[1-2pp]

Why this is meaningful to me

[1-2pp]

Attestation: By signing below I attest that I will write my own code. I will only allow others to help me understand my errors or generically perform a single specific task. All my code will be uniquely my own. My database queries and GUI construction will all be my own. I am aware that all code submissions will be digitally scanned for similarities and nay source codes I submit will be in a scannable colorized PDF to Microsoft Teams. I fully understand that this project is a major assessment, and that plagiarism will result in disciplinary action.

Date Signed

You may either add a digital signature or type your full name. By typing your full name, you are attesting the above acknowledgements.