Full Stack Python or JAVA Programming
Harvard CS50AP
Spring Semester 2022 Revision 1, 4 Jan 22
Standards Mastery Framework Project Sequence

Track Outlines

Item	Language (Python/JAVA) Track	Data Management (SQLITE3/MySQL) Track	GUI (Tk/Swing/JavaFx) Track
0	Hello, World	SQLite3/MySQL Installation	Hello, World (Button)
1	Printing	SQL Table Builds/Drops	Hello World as a POCO
2	Calculations/Data Types	SQL Table Operations	Interactive
3	Procedures	SQL Query Basics - Selections	Menu
4	Functions	SQL Insertions	Decorations/Imagery
5	External Libraries	SQL Deletions	Navigation Queries
6	POCO/OOP	SQL Updates	Query Displays
7	Try/Except or Try/Catch	Basic Program SQL Queries	Add/Delete Records
8	Container Classes	Advanced Program SQL Queries	Edit Records
9	**30 points for completed CRUD Capable GUI Program**		

Requirements Overview

- Each student is expected to complete all three tracks
- Each item is worth 10 points
- Master Project is worth 100 points
- 400 points to Spring semester means that SMF tracks are 75% of the grade
- Master Project is 25% of your grade
- CREATE will commence 3rd week of January pending F2F return

Critical Calendar Dates

Date	Total Required Completions	Rules of Completion
January 31st	10	• Each Track MUST be completed in order.
February 28th	20	• **Requirements continue despite CREATE performance task.**
March 31st	30 (All Tracks Complete)	• Each Assignment is a stand-alone programming project.
April 11th	Master Project Proposal	• Each set (10 elements) may be aggregate of all tracks.
May 13th	Master Projects Due	• All three tracks should be completed in parallel.

Detail Specifications by Track

Language Track

Item	Language Track	Specifications
0	Hello, World	Submit a properly running Hello World Program in Python/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 SQLite 3 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
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

GUI Track

Item	GUI Track	Specifications
0	GUI Hello, World (Button)	Submit a properly running Hello World Program in a GUI for Python/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.

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.).

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[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.