

# QAM2 – QAM2 TASK 1: JAVA APPLICATION DEVELOPMENT

SOFTWARE II - ADVANCED JAVA CONCEPTS – C195

PRFA – QAM2

TASK OVERVIEW

SUBMISSIONS

EVALUATION REPORT

## COMPETENCIES

### **4025.01.05 : Database and File Server Applications**

The graduate produces database and file server applications using advanced Java programming language constructs to meet business requirements.

### **4025.01.06 : Lambda**

The graduate incorporates lambda expressions in application development to meet business requirements more efficiently.

### **4025.01.07 : Collections**

The graduate incorporates streams and filters in application development to manipulate data more efficiently.

### **4025.01.08 : Localization API and Date/Time API**

The graduate applies the localization API and date/time API in application development to support end-users in various geographical regions.

### **4025.01.09 : Advanced Exception Control**

The graduate incorporates advanced exception control mechanisms in application development for improving user experience and application stability.

## INTRODUCTION

Throughout your career in software design and development, you will be asked to create applications with various features and criteria based on a variety of business requirements. For this assessment, you will create your own GUI-based Java application with requirements that mirror those you will likely encounter in a real-world job assignment.

The skills you will showcase in this assessment are also directly relevant to technical interview questions for future employment. This application may become a portfolio piece for you to show to future employers.

Several attachments and links have been included to help you complete this task. The attached “Database ERD” shows the entity relationship diagram (ERD) for this database, which you can reference as you create your application.

For this task, you will use the Performance Assessment Lab Area accessed by the Performance Assessment Lab Area in the web link to access the virtual lab environment to complete this task. The preferred integrated development environment (IDE) for this assignment is IntelliJ IDEA (Community Edition). If you choose to use another IDE, you must export your project into NetBeans 11.1 or later, or IntelliJ format, or your submission will be returned. This assessment also requires the following software: the latest long term support (LTS) version of JDK, JavaFX SDK, and Scene Builder which are also available the Performance Assessment Lab Area.

Your submission should include a zip file with all the necessary code files to compile, support, and run your application. Your submission should also include an index.html file with reflective Javadoc comments in the .java files. The zip file submission must keep the project file and folder structure intact for the IDE.

In NetBeans, zip your file by going to File>Export Project>To ZIP and click Export. In IntelliJ Idea, go to File>Export to Zip File and click OK. If you try to zip your project files with an external program, it will include the build files and make the zip files too large for submission.

*Note: You may receive an error message upon submitting your files because the automated plagiarism detectors at WGU will not be able to access a zipped file, but the evaluation team will run their checks manually when evaluating your submission.*

## SCENARIO

You are working for a software company that has been contracted to develop a GUI-based scheduling desktop application. The contract is with a global consulting organization that conducts business in multiple languages and has main offices in Phoenix, Arizona; White Plains, New York; Montreal, Canada; and London, England. The consulting organization has provided a MySQL database that the application must pull data from. The database is used for other systems, so its structure cannot be modified.

The organization outlined specific business requirements that must be met as part of the application. From these requirements, a system analyst at your company created solution statements for you to implement in developing the application. These statements are listed in the requirements section.

Your company acquires Country and First-Level-Division data from a third party that is updated once per year. These tables are prepopulated with read-only data. Please use the attachment “Locale Codes for Region and Language” to review division data. Your company also supplies a list of contacts, which are prepopulated in the Contacts table; however, administrative functions such as adding users are beyond the scope of the application and done by your company’s IT support staff. Your application should be organized logically using one or more design patterns and generously commented using Javadoc so your code can be read and maintained by other programmers.

## REQUIREMENTS

*Your submission must be your original work. No more than a combined total of 30% of the submission and no more than a 10% match to any one individual source can be directly quoted or closely paraphrased from sources, even if cited correctly. The originality report that is provided when you submit your task can*

*be used as a guide.*

*You must use the rubric to direct the creation of your submission because it provides detailed criteria that will be used to evaluate your work. Each requirement below may be evaluated by more than one rubric aspect. The rubric aspect titles may contain hyperlinks to relevant portions of the course.*

*Tasks may **not** be submitted as cloud links, such as links to Google Docs, Google Slides, OneDrive, etc., unless specified in the task requirements. All other submissions must be file types that are uploaded and submitted as attachments (e.g., .docx, .pdf, .ppt).*

A. Create a GUI-based application for the company in the scenario. Regarding your file submission—the use of non-Java API libraries are not allowed with the exception of JavaFX SDK and MySQL JDBC Driver. If you are using the NetBeans IDE, the custom library for your JavaFX .jar files in your IDE must be named JavaFX.

*Note: If you are using IntelliJ IDEA, the folder where the JavaFX SDK resides will be used as the library name as shown in the “JavaFX SDK with IntelliJ IDEA webinar.”*

1. Create a log-in form with the following capabilities:

- accepts username and password and provides an appropriate error message
- determines the user’s location (i.e., ZoneId) and displays it in a label on the log-in form
- displays the log-in form in English or French based on the user’s computer language setting to translate all the text, labels, buttons, and errors on the form
- automatically translates error control messages into English or French based on the user’s computer language setting

*Note: Some operating systems require a reboot when changing the language settings.*

2. Write code that provides the following customer record functionalities:

- Customer records and appointments can be added, updated, and deleted.
  - When deleting a customer record, all of the customer’s appointments must be deleted first, due to foreign key constraints.
- When adding and updating a customer, text fields are used to collect the following data: customer name, address, postal code, and phone number.
  - Customer IDs are auto-generated, and first-level division (i.e., states, provinces) and country data are collected using separate combo boxes.

*Note: The address text field should not include first-level division and country data.*

*Please use the following examples to format addresses:*

- *U.S. address: 123 ABC Street, White Plains*
- *Canadian address: 123 ABC Street, Newmarket*
- *UK address: 123 ABC Street, Greenwich, London*

- When updating a customer, the customer data autopopulates in the form.

- Country and first-level division data is prepopulated in separate combo boxes or lists in the user interface for the user to choose. The first-level list should be filtered by the user’s selection of a country (e.g., when choosing U.S., filter so it only shows states).

- All of the original customer information is displayed on the update form.
  - Customer\_ID must be disabled.
- All of the fields can be updated except for Customer\_ID.
- Customer data is displayed using a TableView, including first-level division data. A list of all the customers and their information may be viewed in a TableView, and updates of the data can be performed in text fields on the form.
- When a customer record is deleted, a custom message should display in the user interface.

3. Add scheduling functionalities to the GUI-based application by doing the following:

- Write code that enables the user to add, update, and delete appointments. The code should also include the following functionalities:
  - A contact name is assigned to an appointment using a drop-down menu or combo box.
  - A custom message is displayed in the user interface with the Appointment\_ID and type of appointment canceled.
  - The Appointment\_ID is auto-generated and disabled throughout the application.
  - When adding and updating an appointment, record the following data: Appointment\_ID, title, description, location, contact, type, start date and time, end date and time, Customer\_ID, and User\_ID.
  - All of the original appointment information is displayed on the update form in local time zone.
  - All of the appointment fields can be updated except Appointment\_ID, which must be disabled.
- Write code that enables the user to view appointment schedules by month and week using a TableView and allows the user to choose between these two options using tabs or radio buttons for filtering appointments. Please include each of the following requirements as columns:
  - Appointment\_ID
  - Title
  - Description
  - Location
  - Contact
  - Type
  - Start Date and Time
  - End Date and Time
  - Customer\_ID
  - User\_ID
- Write code that enables the user to adjust appointment times. While the appointment times should be stored in Coordinated Universal Time (UTC), they should be automatically and consistently updated according to the local time zone set on the user's computer wherever appointments are displayed in the application.

*Note: There are up to three time zones in effect. Coordinated Universal Time (UTC) is used for storing the time in the database, the user's local time is used for display purposes, and Eastern Standard Time (EST) is used for the company's office hours. Local time will be checked against EST business hours before they are stored in the database as UTC.*

- d. Write code to implement input validation and logical error checks to prevent each of the following changes when adding or updating information; display a custom message specific for each error check in the user interface:
- scheduling an appointment outside of business hours defined as 8:00 a.m. to 10:00 p.m. EST, including weekends
  - scheduling overlapping appointments for customers
  - entering an incorrect username and password
- e. Write code to provide an alert when there is an appointment within 15 minutes of the user's log-in. A custom message should be displayed in the user interface and include the appointment ID, date, and time. If the user does not have any appointments within 15 minutes of logging in, display a custom message in the user interface indicating there are no upcoming appointments.

*Note: Since evaluation may be testing your application outside of business hours, your alerts must be robust enough to trigger an appointment within 15 minutes of the **local time set on the user's computer**, which may or may not be EST.*

- f. Write code that generates accurate information in *each* of the following reports and will display the reports in the user interface:

*Note: You do not need to save and print the reports to a file or provide a screenshot.*

- the total number of customer appointments by type and month
- a schedule for each contact in your organization that includes appointment ID, title, type and description, start date and time, end date and time, and customer ID
- an additional report of your choice that is different from the two other required reports in this prompt and from the user log-in date and time stamp that will be tracked in part C

B. Write *at least two* different lambda expressions to improve your code.

C. Write code that provides the ability to track user activity by recording all user log-in attempts, dates, and time stamps and whether each attempt was successful in a file named login\_activity.txt. Append each new record to the existing file, and save to the root folder of the application.

D. Provide descriptive Javadoc comments for at least 70 percent of the classes and their members throughout the code, and create an index.html file of your comments to include with your submission based on Oracle's guidelines for the Javadoc tool best practices. Your comments should include a justification for each lambda expression in the method where it is used.

*Note: The comments on the lambda need to be located in the comments describing the method where it is located for it to export properly.*

E. Create a README.txt file that includes the following information:

- title and purpose of the application
- author, contact information, student application version, and date
- IDE including version number (e.g., IntelliJ Community 2020.01), full JDK of version used (e.g., Java SE 17.0.1), and JavaFX version compatible with JDK version (e.g. JavaFX-SDK-17.0.1)

- directions for how to run the program
- a description of the additional report of your choice you ran in part A3f
- the MySQL Connector driver version number, including the update number (e.g., mysql-connector-java-8.1.23)

F. Demonstrate professional communication in the content and presentation of your submission.

## File Restrictions

File name may contain only letters, numbers, spaces, and these symbols: ! - \_ . \* ' ( )

File size limit: 200 MB

File types allowed: doc, docx, rtf, xls, xlsx, ppt, pptx, odt, pdf, txt, qt, mov, mpg, avi, mp3, wav, mp4, wma, flv, asf, mpeg, wmv, m4v, svg, tif, tiff, jpeg, jpg, gif, png, zip, rar, tar, 7z

## RUBRIC

### A:GUI-BASED APPLICATION

#### NOT EVIDENT

No code is provided for an application.

#### APPROACHING COMPETENCE

The provided application is not GUI-based or does not include *all* the supporting files for the IDE. Or non-Java APIs or custom libraries are used, with the exception of JavaFX SDK and MySQL JDBC Driver.

#### COMPETENT

The provided GUI-based application includes *all* the supporting files for the IDE. Non-Java APIs or custom libraries are not used, with the exception of JavaFX SDK and MySQL JDBC Driver.

### A1:LOG-IN FORM

#### NOT EVIDENT

No code is provided for a log-in form.

#### APPROACHING COMPETENCE

The submitted log-in form does not include *each* of the required capabilities, or 1 or more of the capabilities are not fully functional.

#### COMPETENT

The submitted log-in form includes *each* of the required capabilities, and *all* are fully functional.

### A2:CUSTOMER RECORD FUNCTIONALITIES

#### NOT EVIDENT

No code is provided for customer record functionalities.

#### APPROACHING COMPETENCE

The submitted application does

#### COMPETENT

The submitted application includes *each* of the required cus-

not include *each* of the required customer record functionalities, or 1 or more of the provided functionalities do not work correctly.

tomer record functionalities, and *all* work correctly.

#### A3A:SCHEDULING FUNCTIONALITY: ADD, UPDATE, AND DELETE

##### NOT EVIDENT

No code is provided.

##### APPROACHING COMPETENCE

The submitted code does not enable the user to add, update, or delete appointments or does not include *each* of the required functionalities, or 1 or more of the provided functionalities do not work correctly.

##### COMPETENT

The submitted code enables the user to add, update, and delete appointments and includes *each* of the required functionalities and *all* work correctly.

#### A3B:SCHEDULING FUNCTIONALITY: VIEWS

##### NOT EVIDENT

No code is provided.

##### APPROACHING COMPETENCE

The submitted code does not enable the user to view appointment schedules by month and week using a TableView or does not allow the user to choose between the two options using tabs or radio buttons for filtering appointments. Or *each* of the given requirements are not represented as columns.

##### COMPETENT

The submitted code enables the user to view appointment schedules by month and week using a TableView and allows the user to choose between the two options using tabs or radio buttons for filtering appointments. *Each* of the given requirements are represented as columns.

#### A3C:TIME ZONES

##### NOT EVIDENT

No code is provided.

##### APPROACHING COMPETENCE

The submitted code does not enable the user to adjust appointment times based on the local time zone set on the

##### COMPETENT

The submitted code enables the user to adjust appointment times based on the local time zone set on the user's computer, and the appointment times are

user's computer or does not automatically or consistently display appointment times in the application.

automatically and consistently displayed in the application.

#### A3D:INPUT VALIDATION AND LOGICAL ERROR CHECKS

##### NOT EVIDENT

No code is provided.

##### APPROACHING COMPETENCE

The submitted code does not implement input validation and logical error checks to prevent *each* of the listed errors when adding or updating information or does not display a custom message specific for *each* error check in the user interface.

##### COMPETENT

The submitted code implements input validation and logical error checks to prevent *each* of the listed errors when adding or updating information and displays a custom message specific for *each* error check in the user interface.

#### A3E:ALERTS

##### NOT EVIDENT

No code is provided.

##### APPROACHING COMPETENCE

The submitted code does not provide an alert when there is an appointment within 15 minutes of the user's log-in or does not display a custom message in the user interface, or the message does not include the appointment ID, date, or time. Or a custom message is not displayed upon log-in in the user interface indicating there are no upcoming appointments if the user does not have any appointments in the next 15 minutes.

##### COMPETENT

The submitted code provides an alert when there is an appointment within 15 minutes of the user's log-in and displays a custom message in the user interface that is visible to the user that includes the appointment ID, date, and time. A custom message is displayed upon log-in in the user interface indicating there are no upcoming appointments if the user does not have any appointments in the next 15 minutes.

#### A3F:REPORTS

##### NOT EVIDENT

No code is provided.

##### APPROACHING COMPETENCE

##### COMPETENT

The submitted code generates



The submitted code does not generate accurate information for *each* of the three required reports or will not display them in the user interface. Or the additional, chosen report is the same as one of the two other required reports. Or the additional, chosen report is the same as the one required in part C.

accurate information for *each* of the three required reports and will display them in the user interface. The additional, chosen report is different from the two other required reports and from the one required in part C.

#### B:LAMBDA EXPRESSIONS

##### NOT EVIDENT

The submission does not include *at least* 2 lambda expressions.

##### APPROACHING COMPETENCE

The submission includes *at least* 2 lambda expressions, but they are not different or do not improve the code.

##### COMPETENT

The submission includes *at least* 2 different lambda expressions that improve the code.

#### C:TRACK USER ACTIVITY

##### NOT EVIDENT

No code is provided.

##### APPROACHING COMPETENCE

The submitted code does not provide the ability to track user activity or does not record all user log-in attempts, dates, or time stamps or does not record whether each log-in attempt was successful. Or this information is not recorded in a file named login\_activity.txt. Or each new record is not appended to the existing file or does not save the information to the root folder of the application.

##### COMPETENT

The submitted code provides the ability to track user activity by recording all user log-in attempts, dates, and time stamps and whether each log-in attempt was successful in a file named login\_activity.txt. Each new record is appended to the existing file and saves the information to the root folder of the application.

#### D:JAVADOC COMMENTS

##### NOT EVIDENT

##### APPROACHING

##### COMPETENT

The submission does not include an index.html file containing Javadoc comments.

### COMPETENCE

The submission includes an index.html file containing descriptive Javadoc comments, but the comments are not based on Oracle's guidelines for the Javadoc tool best practices. Or a comment is not provided for *at least* 70 percent of the classes and their members throughout the code, or the comments do not include a justification for *each* lambda expression in the method where it is used.

The submission includes an index.html file containing descriptive Javadoc comments based on Oracle's guidelines for the Javadoc tool best practices for *at least* 70 percent of the classes and their members throughout the code, including a justification for *each* lambda expression in the method where it is used.

#### E:README.TXT

### NOT EVIDENT

The submission does not include a README.txt file.

### APPROACHING COMPETENCE

The submission includes a README.txt file, but the file does not include *all* of the required information, or the provided information for 1 or more of the requirements is inaccurate.

### COMPETENT

The submission includes a README.txt file that includes *all* of the required information.

#### F:PROFESSIONAL COMMUNICATION

### NOT EVIDENT

Content is unstructured, is disjointed, or contains pervasive errors in mechanics, usage, or grammar. Vocabulary or tone is unprofessional or distracts from the topic.

### APPROACHING COMPETENCE

Content is poorly organized, is difficult to follow, or contains errors in mechanics, usage, or grammar that cause confusion. Terminology is misused or ineffective.

### COMPETENT

Content reflects attention to detail, is organized, and focuses on the main ideas as prescribed in the task or chosen by the candidate. Terminology is pertinent, is used correctly, and effectively conveys the intended meaning. Mechanics, usage, and grammar promote accurate interpretation and understanding.

## WEB LINKS

[IntelliJ IDEA \(Community Edition\) IDE](#)

[JavaFX SDK \(Windows SDK or Mac OS X SDK\)](#)

[NetBeans 11 or later](#)

[Scene Builder for Java 17](#)

[Performance Assessment Lab Area for JDK17 users](#)

The JDK17 lab is available to use now and is the preferred lab.

[JDK 17 \(LTS\) \(Windows x64 installer or macOS Installer\)](#)

[Skillable Labs Knowledge Base Article](#)

Please consult this WGU Knowledge Base article for general FAQs regarding your Skillable lab environment.

## SUPPORTING DOCUMENTS

[Database ERD.pdf](#)

[Locale Codes for Region.pdf](#)

[Locale Codes for Language.pdf](#)

