POLYTECHNIC UNIVERSITY OF THE PHILIPPINES

Conversion of Length System

A Case Study Presented to

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In Fulfillment of the requirements of the subject

Integrative Programming & Technologies 1

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Brief Background of Case Study/System Program

The term "length" derives from the Old English prefix "lengðu," which indicates "the quality of being long or extended in one direction," and the Middle English prefix "lengthe." Length is used as a gauge of how long an object is. It is used to quantify the size of an object or the distance between one point and another. An object's extended dimension or longest side is known as its length. Length can be measured by using any type of unit available to an individual, but with the differences of materials used in measuring length, uniformity was needed to standardize and conform people into using a widely adoptable system of measurement.

The International System of Units (SI) system of measurement is commonly used by most countries. Its basic units are liters, meters, and grams. These units are based on multiples of 10, meaning the basic units can be converted easily (e.g., 1 meter is equal to 100 centimeters). The system was created during the French Revolution. In 1971, the SI that we use until today was completed by adding mole as a new base unit ("Historical context of the SI," n.d.).

On the other hand, the British Imperial System uses different units for measurements. This system has been carried on since the Middle Ages which was from the 5th century CE to 15th century CE. Units such as pounds, feet, and inches are still used. The Weights and Measures Act of 1824 and the Act of 1878 officially established the British Imperial System to provide precise definitions for different units of measurement (The Editors of Encyclopaedia Britannica, n.d.). The system is used by some countries such as the United States of America. This is because the USA was a colony of Great Britain and after gaining independence, the succeeding government decided to keep this system (Wallace, 2012).

On March 30, 1791, the French Academy of Sciences defined meter as one ten-millionth of the distance from the Equator to the North Pole. As of 1983, The meter is defined as how far light in a vacuum would travel during a time interval of 1/299,792,458 of a second (National Geographic, n.d.).

The traditional definitions of length units in the British Imperial System are based on how long the objects that were used in the history of the United Kingdom. An inch is defined as the length of "three grains of barley, dry and round, placed end to end lengthwise" in the early 14th century. In 1958, the United States defined foot as equal to 30.48 centimeters (The Editors of Encyclopaedia Britannica, n.d.). Another unit of length, the miles, originated in the Roman era. They used a unit called the *mille passum* which meant "a thousand paces." In 1592, the Parliament decided that a mile is if 5,280 feet (Trex, 2017). Another unit of length named nautical mile is defined as 1,852 meters. Based on the circle of the globe, a nautical mile is a unit of length that is equivalent to one minute of latitude (Mambra, 2021).

The process of converting lengths from one unit to another is known as length conversion. For instance, you can change a kilometer into a meter, a mile into a yard, a yard into an inch, and so on. For what reason is length conversion important? As stated previously a multitude of measurement systems exists to suit the needs of the user, for this matter length conversion is required for measurements to match across several scales to be used in a practical setting.

This length converter system is a tool that enables fast conversion between length units. Using the converter provided by Google as the basis of the most used units of measurement in both imperial and metric.

Scope and Limitations

The system covers 3 parts. Registration, login, and conversion. By clicking the register, the system will ask the user to create an account by entering a username and password. After the registration, the user can now login with the details they input to the registration. The conversion window will not open unless a user has registered and logged in. Also, the system recognizes spaces in usernames and passwords. When a user registers and logs in. Proceeding to the conversion system window, the system has 11 length units that can do 121 combinations of length conversions. The user can input whole and decimal types of numbers for conversion. Another feature of the system is that it has a formula section where the procedure that is being applied is displayed. It also helps the user to understand what to do with the system by reading all the steps that are indicated to the screen. Lastly, when a user types of an incorrect password or username, does not select units to convert to and from, types a letter or special character into

the text field under FROM, and does not select a length unit when converting, a warning message appears.

The limitation of the system is it accepts all passwords and usernames without checking if somebody has acquired the same password and username. The system has no security feature that secures the username and password. Every user's username and password registered in registration form are stored in a txt file for each user separately. It is located where the program is stored. A user can register just by filling in the username field and not the password, but the user who does that won't be able to login with that username without the registered password. The system has multiple windows that are used in each function. It can't close the initial screen when a user is logged in to the system; it will only close when they logout. The conversion input field and result field only display 20-digit numbers but are not limited to 20-digit input and result. The design of the system is optimized on a single computer. Therefore, the developers will not guarantee the screen design. The dimensions and specs of the user's computer affect widget placement in window design.

Output Screenshots
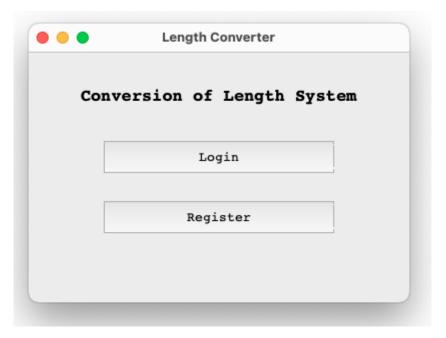
Figure 1. Login and Register window
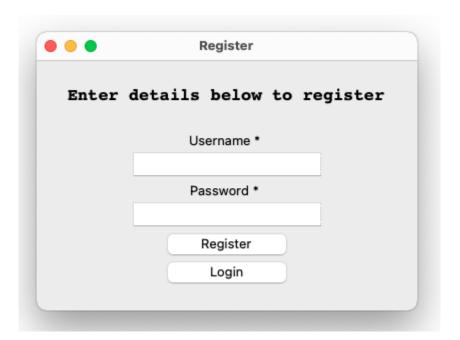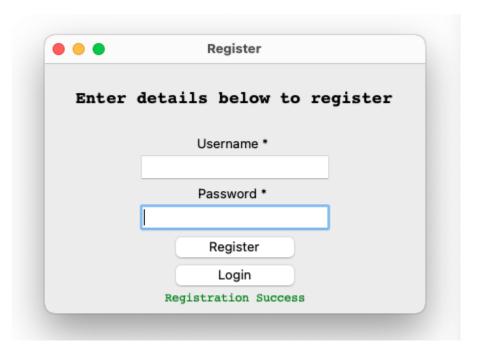
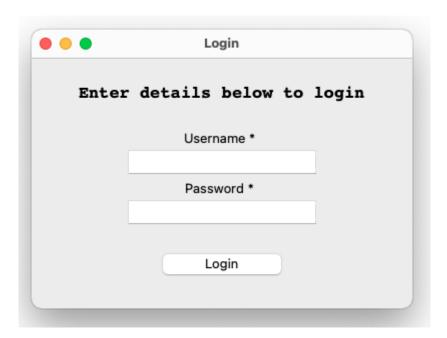**Figure 2. Register**
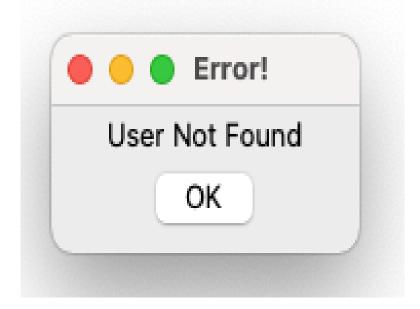
Figure 3. Registration Success

Figure 4. Login

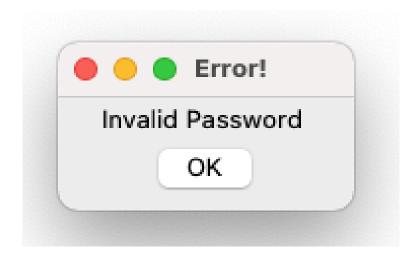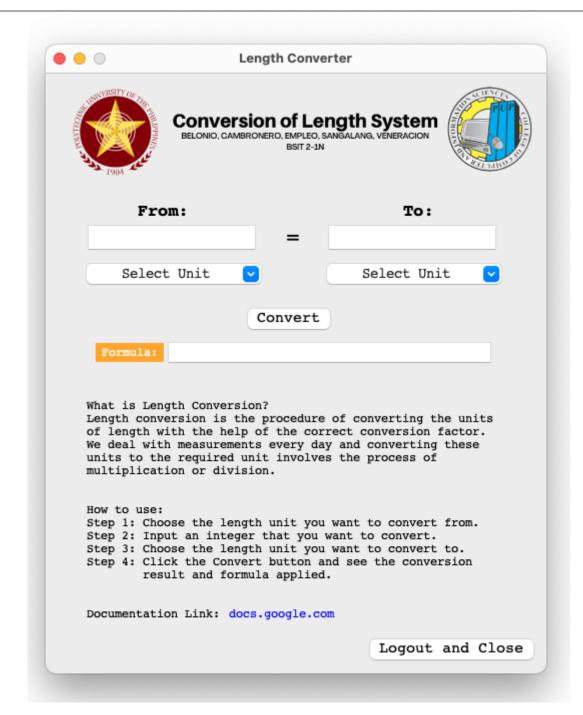**Figure 5. Invalid Username**

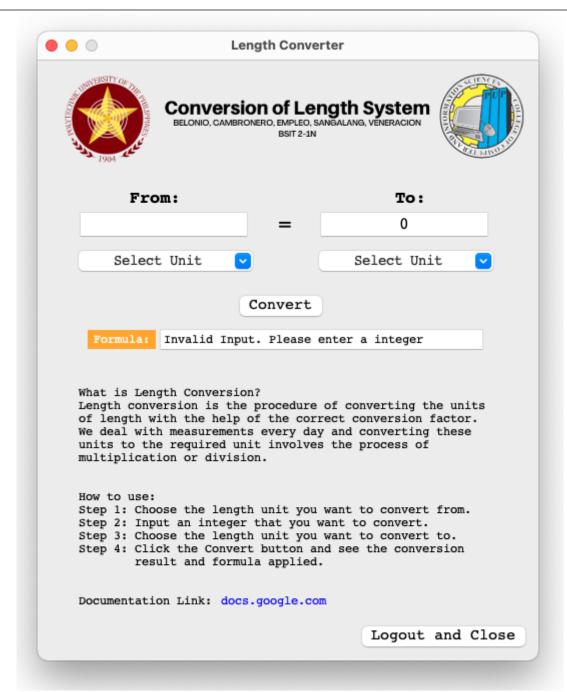**Figure 6. Invalid Password**

Figure 7. Length Conversion Main Screen

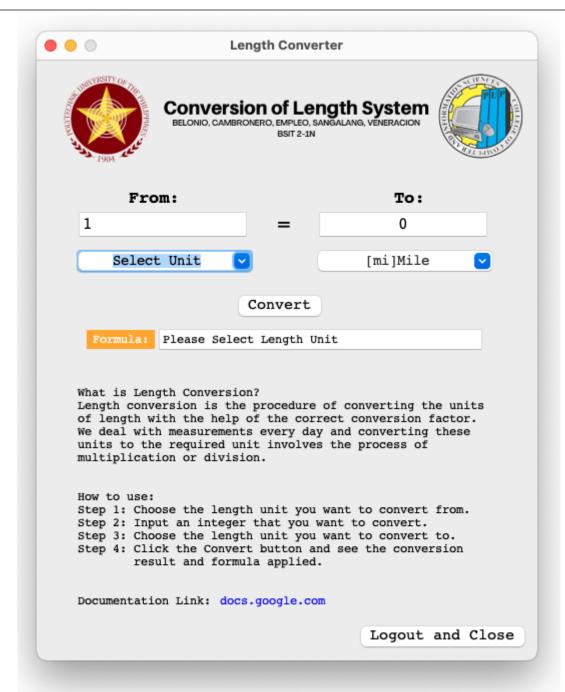**Figure 8. Length Conversion Main Screen**

(Invalid input)

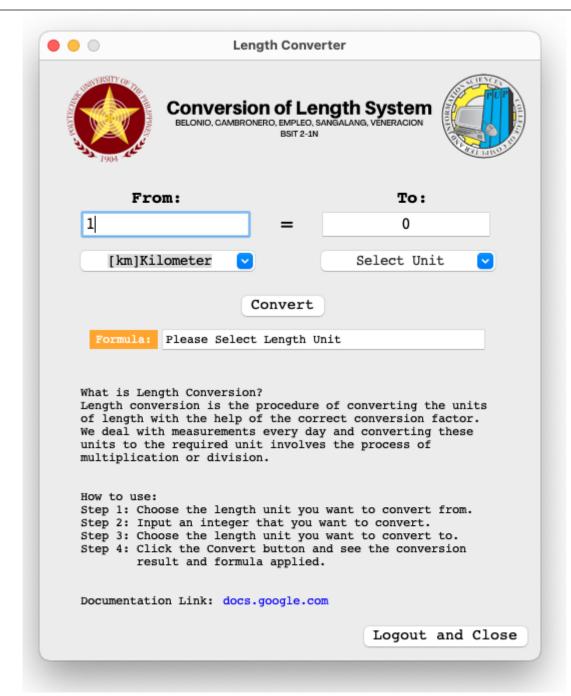**Figure 9. Length Conversion Main Screen**

(No selected 'from' unit)

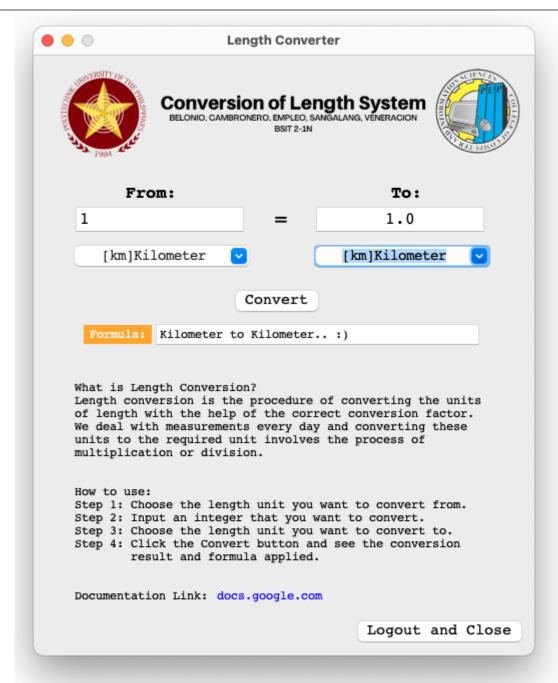**Figure 10. Length Conversion Main Screen**

(No selected 'to' unit)
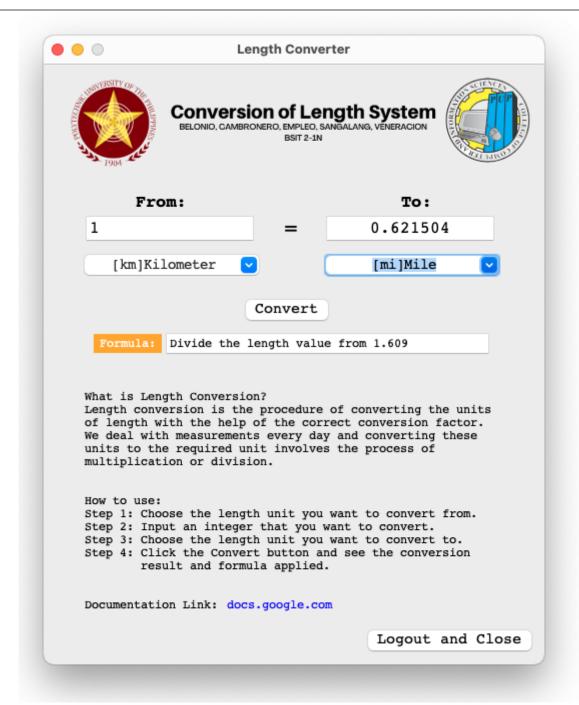
Figure 11. Length Conversion Main Screen

(Same unit selected)

Figure 12. Length Conversion Main Screen

(Successfully converted)

Source Code Link: https://github.com/jnrveneracion/Length-Converter-with-formula-display.git

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