12.3 JavaFX App Window Structure

A JavaFX app window consists of several parts (Fig. 12.1).

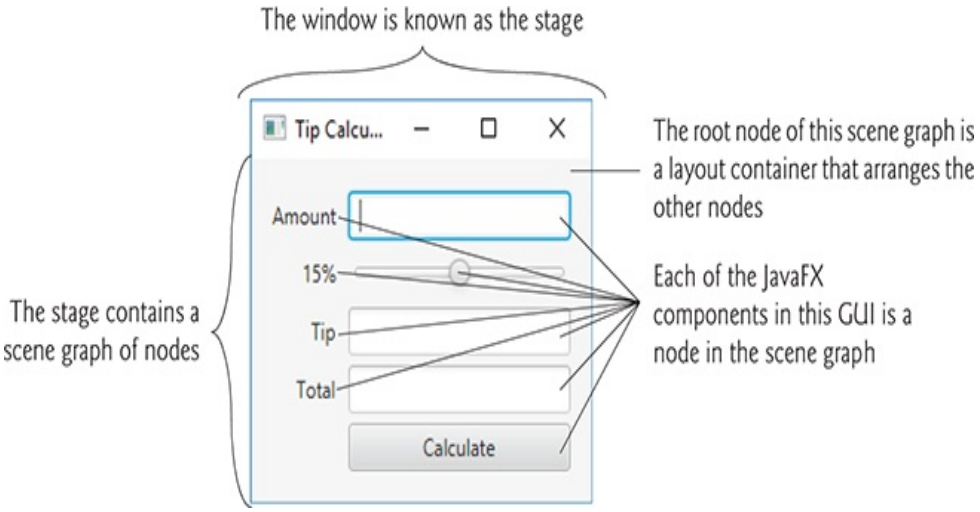

Fig. 12.1

JavaFX app window parts.

Description

Controls

Controls are GUI components, such as `Label`s that display

text, `TextField`s that enable a program to receive user input, `Button`s that users click to initiate actions, and more.

Stage

The window in which a JavaFX app's GUI is displayed is known as the **stage** and is an instance of class `Stage` (package `javafx.stage`).

Scene

The stage contains one active **scene** that defines the GUI as a **scene graph**—a tree data structure of an app's visual elements, such as GUI controls, shapes, images, video, text and more (trees are discussed in Section 21.7). The scene is an instance of class `Scene` (package `javafx.scene`).

Nodes

Each visual element in the scene graph is a **node**—an instance of a subclass of `Node` (package `javafx.scene`), which defines common attributes and behaviors for all nodes. With the exception of the first node in the scene graph—the **root node**—each node in the scene graph has one parent. Nodes can have transforms (e.g., moving, rotating and scaling), opacity (whether a node is transparent, partially transparent or opaque), effects (e.g., drop shadows, blurs, reflection and

lighting) and more that we'll introduce in Chapter 22.

Layout Containers

Nodes that have children are typically **layout containers** that arrange their child nodes in the scene. You'll use two layout containers (`VBox` and `GridPane`) in this chapter and learn several more in Chapters 13–22. The nodes arranged in a layout container are a combination of controls and, in more complex GUIs, possibly other layout containers.

Event Handler and Controller Class

When the user interacts with a control, such as clicking a `Button` or typing text into a `TextField`, the control generates an event. Programs can respond to these events—known as event handling—to specify what should happen when each user interaction occurs. An **event handler** is a method that responds to a user interaction. An FXML GUI's event handlers are defined in a so-called **controller class** (as you'll see in Section 12.5.5).