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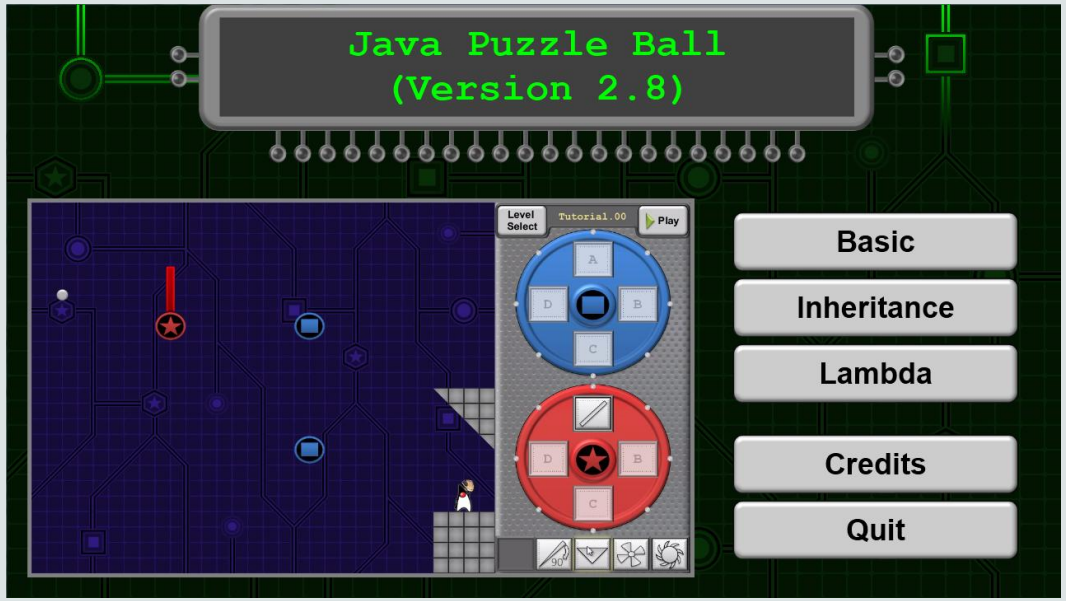
Java Puzzle Ball

Nick Ristuccia

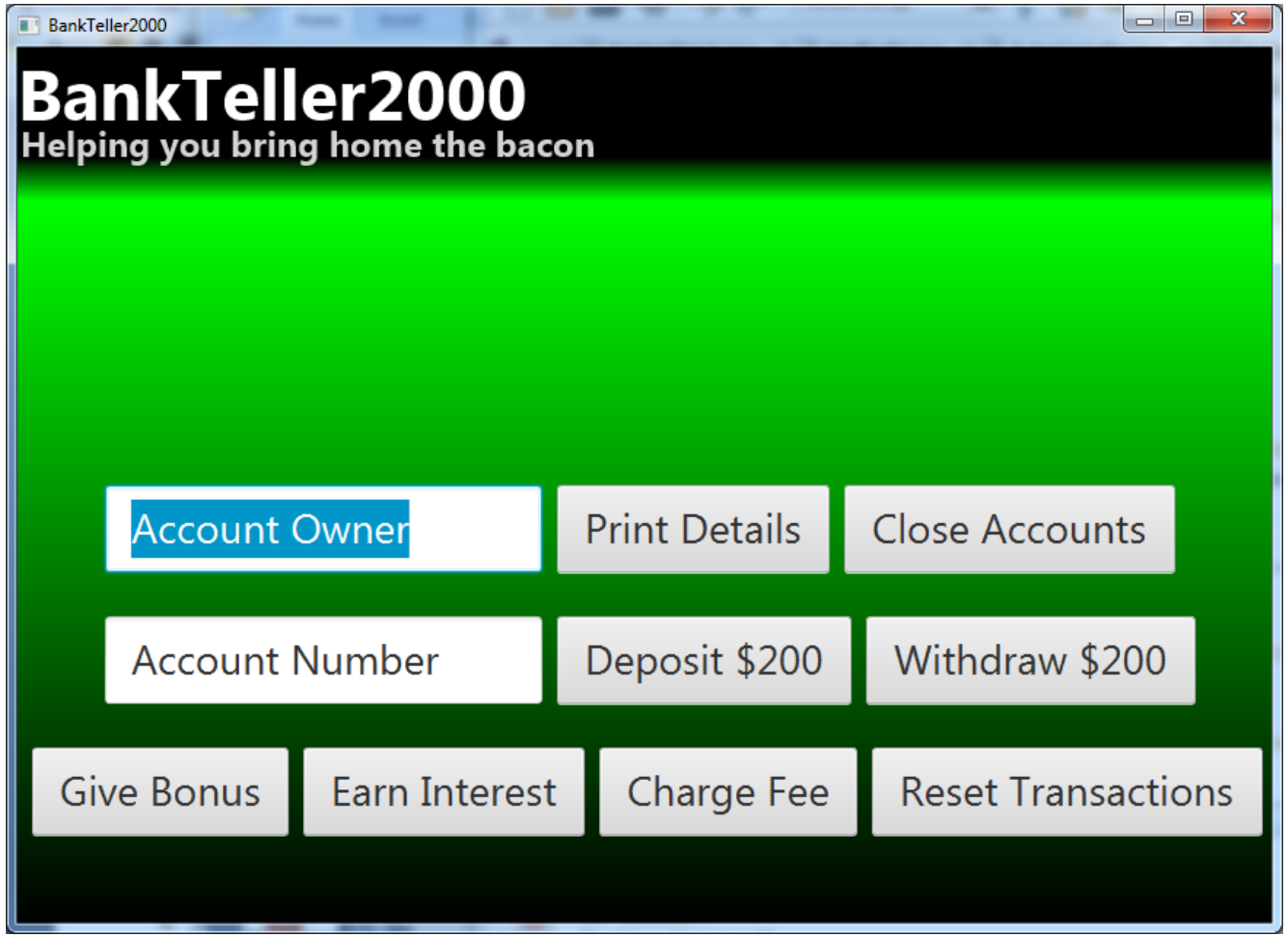
Lesson 4-3
Editing Java Code



Lab 4: Finish the Banking GUI Application

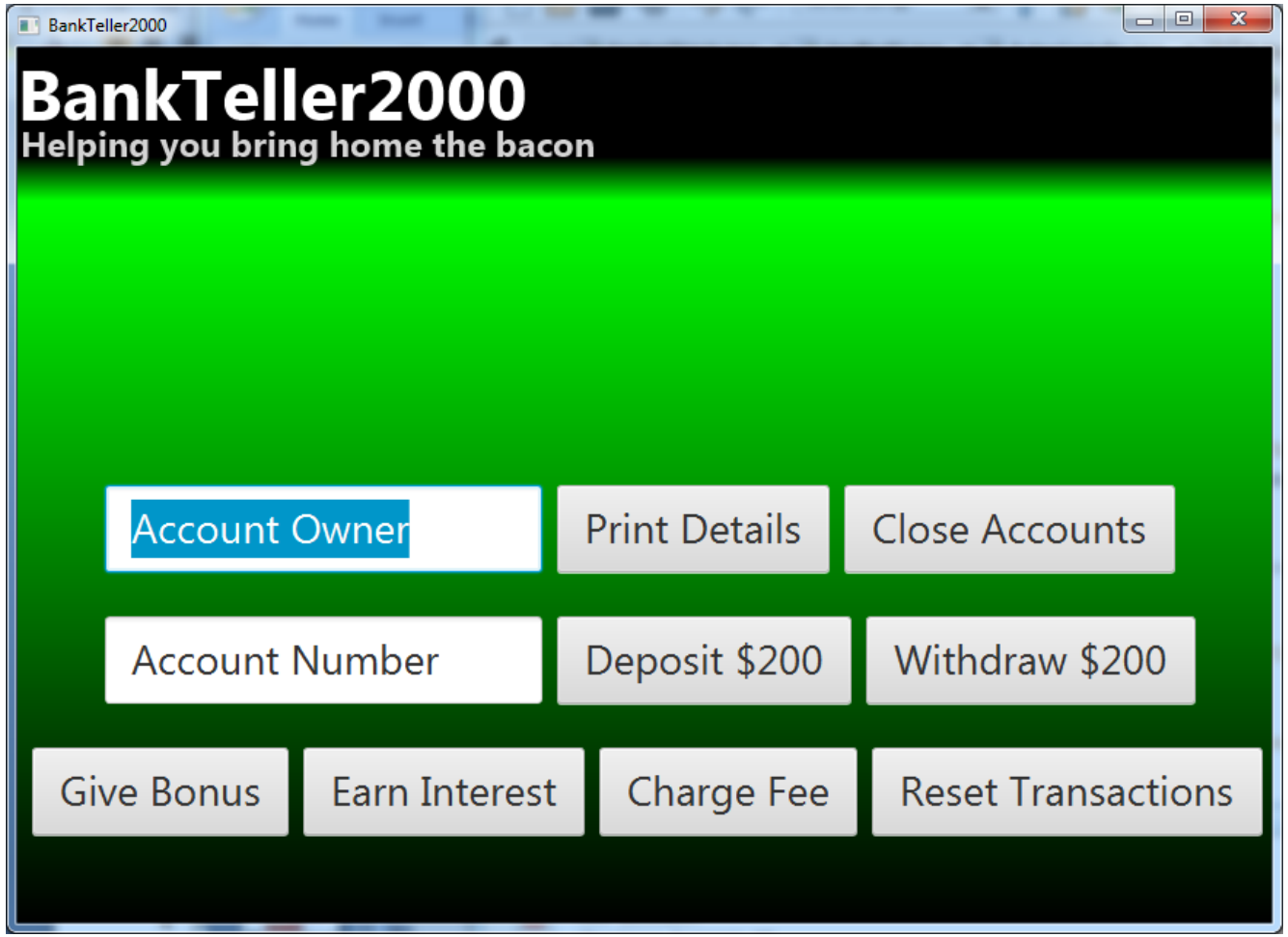
- The Lab Instructions are available on the Lesson 4 page of the MOOC.
- This is an enhanced version of the program you wrote in Lab 3.
  - The application works with many account instances.
  - The application is visual, and uses a GUI
- GUI means Graphical User Interface
  - The application is written in JavaFX, just like Java Puzzle Ball.
  - Lambda expressions detect button presses.
  - Lambda expressions implement the logic and functionality of working with accounts.
- The remaining part of this lesson will give you tips.

The Banking GUI Application



- The application contains 8 buttons.
  - Some of them work
  - Some of them don't
- Your goal is to implement the logic and functionality for the remaining buttons.
  - Do this in the `ButtonController` class.
- The Lab 4 instructions outline each button's functionality.

Demo



- Show the application in action
- Show how to use the application in conjunction with output window
- Show how to maximize the output window

The `NewFXMain` Class

- Replaces `TestClass` from Lab 3
- Still contains a main method, and has other special components necessary for launching a JavaFX GUI application
- It also creates many account instances
- The collection of these accounts is stored in an ArrayList
- An ArrayList is a special kind of class in Java
  - Because both Checking and Savings classes inherit from the abstract Account class, this Arraylist of Accounts may contain both Checking and Savings accounts

The `ButtonController` Class

- This is where you'll do all your editing for Lab 4.
- The field variable `accountList` stores the ArrayList of accounts.
- When you start implementing button functionality, `accountList` is what you'll need to create a stream of and filter.

```
public class ButtonController{
   ArrayList<Account> accountList = new ArrayList<>();
 …

   public void button3Pressed(){
     accountList.stream()
       .filter(a -> String.valueOf(a.getAccountNumber()).equals(numberSearchBar.getText()))
       .forEach(a -> a.deposit(200));
   }

 …
```

The Dot Operator (.)

- First, create an instance and name it with a reference variable.
  - In a stream, this is implicitly done for you. The ArrayList is defined to contain a specific object type.
  - In the stream, `a` is the name for any given Account instance.

```
SavingsAccount a = new SavingsAccount("Duke", 100);
```

- Then, use the dot operator (.) to attempt accessing that instance's fields or methods:
  - Access field

```
a.accountNumber
```

  - Access method

```
a.getAccountNumber()
```

Encapsulation

- For reasons beyond the scope of this course, it's dangerous to allow different classes to freely access and edit each other's fields.
- Encapsulation makes fields private, preventing other classes from accessing or modifying fields in an unsafe way.
- Instead, use specially written…
  - Getter methods to read the value of a field
  - Setter methods to change the value of a field
    - You can think of deposit() and withdraw() as setters
    - They prevent negative and other inappropriate values

The `Account` Class

- All the getter and setter methods you'll need are in this class.
- These methods are shared by checking and savings accounts.
- Take a look, because there's some new fields and methods here:
  - Transactions
  - resetTransactions (safer to call this than to grant access to the transaction field)
- Button6 does something special, called casting, to access the `earnInterest()` method. This method is exclusive to the `SavingsAccount` subclass.

```
    a -> ((SavingsAccount)a).earnInterest()
```

Comparing Strings

- When you filter, you'll need to compare values.
- For reasons beyond the scope of this course, using == on text (known as Strings) is not recommended. You might get the wrong result.
- This has to do with how Java stores Strings in memory.
- Instead, use the `.equals()` method.
  - Bad:

```
a.getAccountType() == "Savings Account"
```

  - Good:

```
a.getAccountType().equals("Savings Account")
```

Comparing Numbers

Logic Operator	Meaning
==	Equal to
!=	Not equal to
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to

- You can use () to organize logic.
- In the case of organizing logic or writing methods, be careful that parenthesis match the way you think they do. It's easy to mismatch, forget, or add an extra parenthesis somewhere.

Functional Programming

- When you see the same lambda expression logic repeated, this is an indication that it may be beneficial to store the repeated logic as a variable.
- You've seen **Consumer** lambda expressions
- Lab 4 uses a two **Predicate** lambda expressions
  - Identify where logic is repeated in the `ButtonController` class.
  - Replace the field variables' `null` value with lambda logic.

```
Predicate<Account> matchAccountOwner = null;
Predicate<Account> matchAccountNumber = null;
```

Goodbye Message

- Thanks for playing!
- Wouldn't it be cool if there were more games and courses like this?

Lots More to Learn…

- What are those many other types of Lambdas? (mentioned in 4-2)
- What are other methods from the Streams API?

- You won't need to know these concepts for this course.
  - But if you're curious, Oracle as other courses where you can learn more.
  - You could also go for Oracle's industry-recognized certification exams.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