Programs that make decisions
COMP 102

Victoria University of Wellington

Programs that make decisions

- Everything we have done executes one line after the other.
- We have varied the action in a program by getting input from the user:

```
String name = UI.askString("name:");
        :
UI.println("Hello " + ", how are you?", name);
```

- But this just changes the values, not the action itself.
  - What if we wanted to do something else if the name variable was an empty string?
- Programs that perform the same action every time are boring!

Decisions in Java

Java has an **if … else …** statement:

- Can do an action only in some circumstances:

  ```java
  if ( countTimes > 10 ) {
      UI.clearGraphics();
      this.drawBoard(10, 10, 100);
  }
  ```

- Can choose between different actions:

  ```java
  if ( userChoice.equals("Yes" ) ){
      UI.drawImage("Nod.png", left, top);
  }
  else {
      UI.drawImage("Shake.png", left, top);
  }
  ```

Java: if *and* if … else LDC 4.2
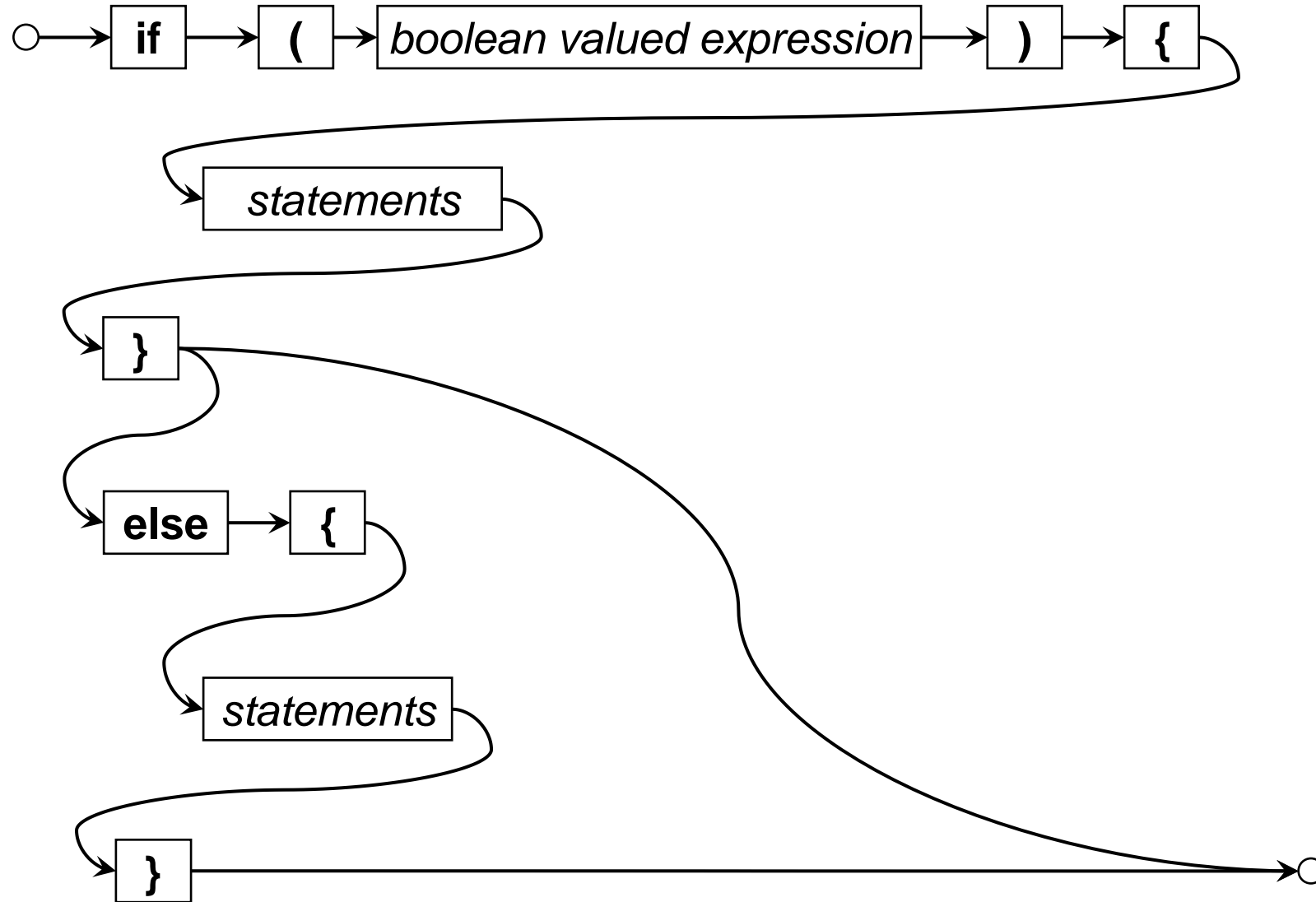
- Two forms of the **if** statement:

> **if** (⟨ *condition* ⟩) {
>   ⟨ *actions to perform if condition is true* ⟩
> **}**

⇒ just skip the actions when the condition is not true !

and ─────────────────────────────────

> **if** (⟨ *condition* ⟩) {
>   ⟨ *actions to perform if condition is true* ⟩
> **}**
> **else** {
>   ⟨ *actions to perform if condition is false* ⟩
> **}**

Note: the **{ … }** represent a "Block" – a sequence of actions that are wrapped up together into a single statement.

if … _vs_ if … else …

Method with a condition

```
/** Ask for amount and currency; print note if –ve,  print value.*/
public void  convertMoney( ) { ;
    double amount = UI.askDouble("Enter amount $NZ");

    if ( amount < 0 ) {
        UI.println("Note: you have entered a debt!");
    }

    String currency = UI.askString ("Enter currency (US or Aus)");

    if ( currency.equals("US")  ) {

        UI.printf("$NZ%.2f  = $US%.2f\n", amount,  (amount * 0.677));
    }
    else  {
        UI.printf("$NZ%.2f  = $AUS%.2f\n", amount,  (amount * 0.942));
    }
}
```

> Like println, but can control the format:
> %.2f $\Rightarrow$ floating point, 2dp
> %d $\Rightarrow$ integer
> %s $\Rightarrow$ string
> \n $\Rightarrow$ new line

> What is printf?

Multiway choice: if ... else if ... else if ...

- Can put another **if** statement in the **else** part:

```
if ( ⟨condition1⟩ ) {
    ⟨actions to perform if condition1 is true⟩
        :
}
else if ( ⟨condition2⟩ ) {
    ⟨actions to perform if condition 2 is true (but not condition 1)⟩
        :
}
else if ( ⟨condition3⟩ ) {
    ⟨actions to perform if condition 3 is true (but not conditions 1, 2)⟩
        :
}
else {
    ⟨actions to perform if other conditions are false⟩
        :
}
```

Example with multiway choice

```
public void convertMoney( ) {
    double amount = UI.askDouble("Enter amount");
    if (amount < 0 ) {
        UI.println("Note: you have entered a debt!");
    }
    String currency = UI.askString("Enter currency (US or Aus)");
    if (currency.equals("US")  ) {
        UI.printf("$NZ%.2f  = $US%.2f\n", amount , amount * 0.668);
    }
    else if ( currency.equals("Aus") ) {
        UI.printf("$NZ%.2f  = $AUS%.2f\n", amount , amount * 0.893);
    }
    else  {
        UI.printf("I cannot convert to %s currency\n", currency);
    }
}
```