↑3.5 Detecting ranges using logical operators

Students:
Section 3.6 is a part of 2 assignments: CSC108 CH03.1-3.10 C3A
This assignment's due date has passed. Activity will still be recorded, but will not count towards this assignment (unless the due date is changed). See this article for more info.

Includes: CA
Due: 02/20/2025, 11:59 PM EST

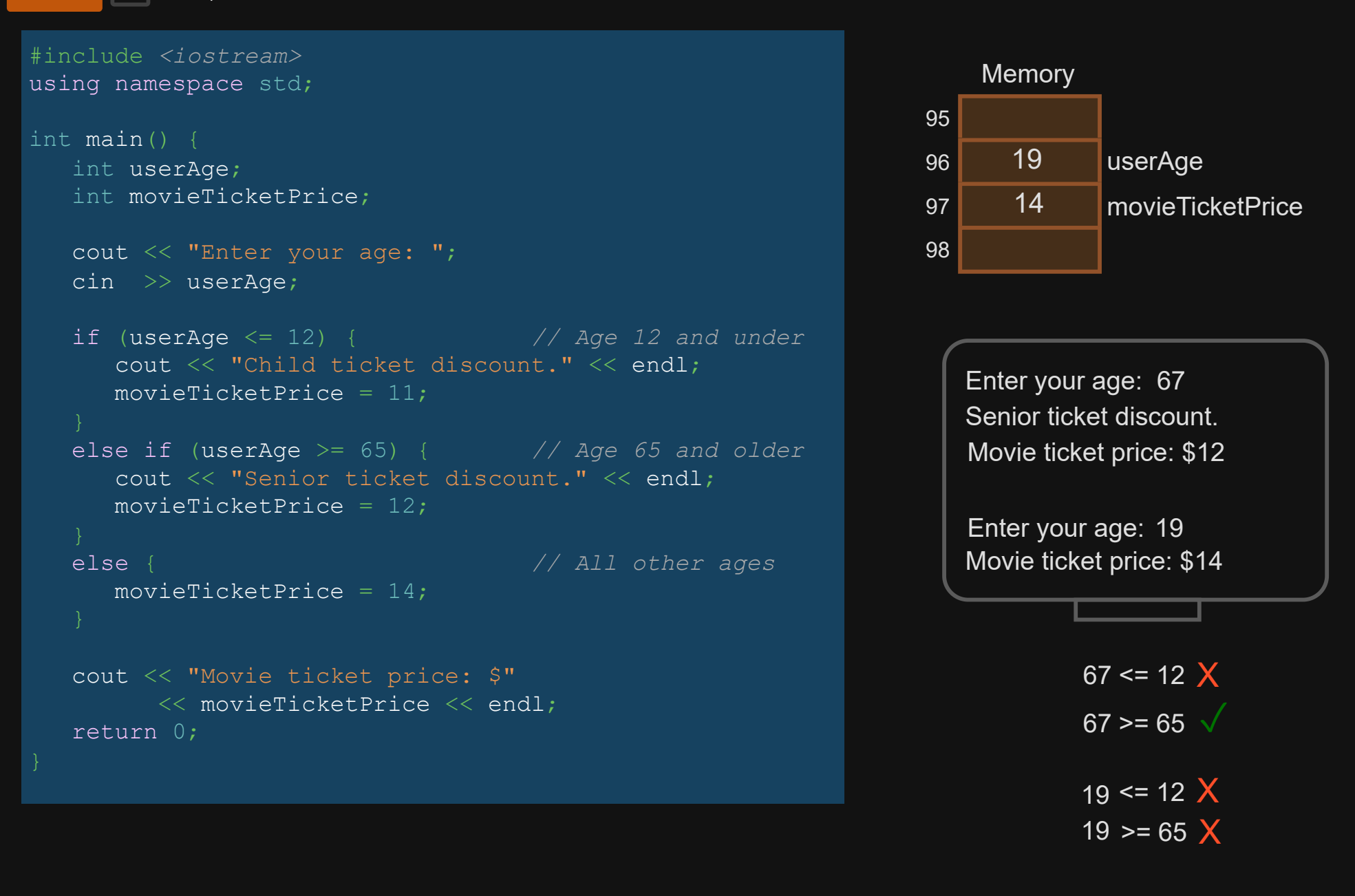
3.6 Detecting ranges with gaps

Basic ranges with gaps

Oftentimes, ranges contain gaps. Ex: Movie theaters often give ticket discounts to children (anyone 12 and under) and seniors (anyone 65 and older). The gap is the group of people aged 13 to 64. An if-else statement can be used to detect such ranges with gaps.

PARTICIPATION ACTIVITY 3.6.1: Using multi-branch if-else for detecting ranges with gaps: Movie ticket prices.

Start ☐ 2x speed



```
#include <iostream>
using namespace std;

int main() {
   int userAge;
   int movieTicketPrice;

   cout << "Enter your age: ";
   cin  >> userAge;

   if (userAge <= 12) {               // Age 12 and under
      cout << "Child ticket discount." << endl;
      movieTicketPrice = 11;
   }
   else if (userAge >= 65) {          // Age 65 and older
      cout << "Senior ticket discount." << endl;
      movieTicketPrice = 12;
   }
   else {                             // All other ages
      movieTicketPrice = 14;
   }

   cout << "Movie ticket price: $"
        << movieTicketPrice << endl;
   return 0;
}
```

```
Enter your age:  67
Senior ticket discount.
Movie ticket price: $12

Enter your age:  19
Movie ticket price: $14
```

Captions

1. After the user enters their age, the else-if branch's first branch checks if age is <= 12.
2. userAge is 67, which is greater than 12, so the program moves to the second branch that checks if userAge is >= 65.
3. 67 is >= 65, so the second branch's statements execute, applying the senior discount to the ticket price. The program concludes by outputting the ticket price.
4. If the user's age falls between the gap of 12 and 65 (13 to 64), the else branch executes and the ticket price is $14, the most expensive price.

Feedback?

PARTICIPATION ACTIVITY 3.6.2: Detecting ranges with gaps and multi-branch if-else.

Select the correct answers below.

1) In the animation above, what is the age range for a child ticket discount?
- ● 0 - 12
- ● less than 13
- ● less than 11

2) In the animation above, what is the age range for a senior ticket discount?
- ● 65 or more
- ● 66 or more
- ● 13 - 64

3) What is the range for the last branch below?

```
if (numItems <= 0) {
   ...
}
else if (numItems > 100) {
   ...
}
else {  // Range: ______
   ...
}
```

- ● 1 - 99
- ● 0 - 100
- ● 1 - 100

4) What is the range for the last branch below?

```
if (numItems < 50) {
   ...
}
else if (numItems > 50) {
   ...
}
else {  // Range: ______
   ...
}
```

- ● 49 - 51
- ● 0 - 50
- ● 50

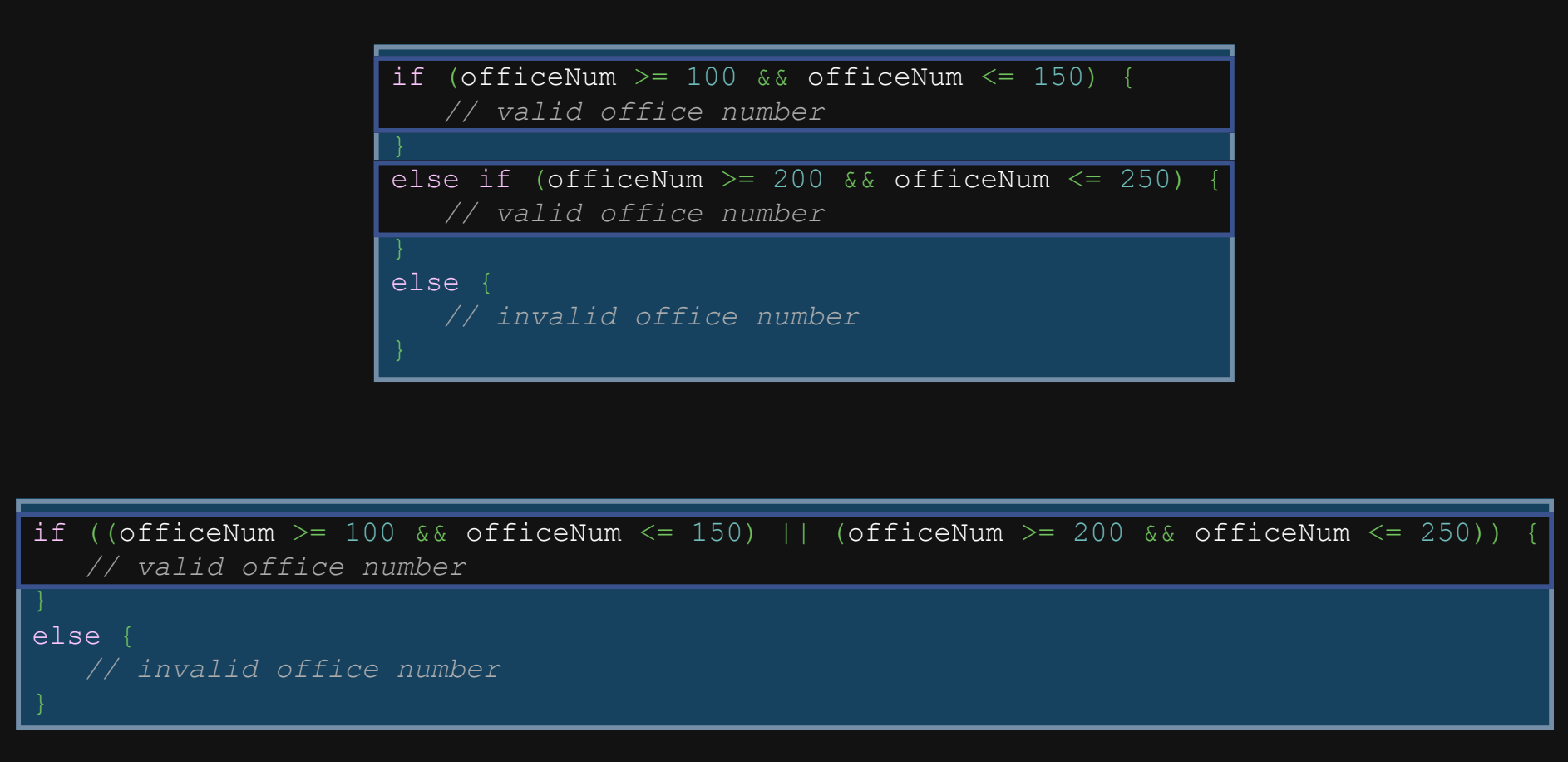
Feedback?

Ranges with gaps using logical operators

Programmers often use logical operators to explicitly detect ranges with an upper and lower bound, including ranges with gaps that may have intermediate bounds. Ex: If a valid office number is within the ranges of 100 to 150 or 200 to 250, the logical AND operator can be used to identify the lower and upper bounds of the two ranges. Further, the ranges can be combined into a single branch using the logical OR operator.

PARTICIPATION ACTIVITY 3.6.3: Explicit ranges with gaps detection using logical AND and OR.

Start ☐ 2x speed



```
if (officeNum >= 100 && officeNum <= 150) {
   // valid office number
}
else if (officeNum >= 200 && officeNum <= 250) {
   // valid office number
}
else {
   // invalid office number
}
```

```
if ((officeNum >= 100 && officeNum <= 150) || (officeNum >= 200 && officeNum <= 250)) {
   // valid office number
}
else {
   // invalid office number
}
```

Captions

1. The logical AND operator is used to identify the lower and upper bounds of the two valid ranges of office numbers (100 to 150 and 200 to 250). Any number outside of the ranges is in the gap.
2. Further, the two ranges can be combined into a single branch using the logical OR operator.

Feedback?

PARTICIPATION ACTIVITY 3.6.4: Jersey numbers.

In American football, certain player positions are assigned jersey numbers in specific ranges. Ex: A wide receiver on a team can can only wear jersey numbers from 10 to 19 or 80 to 89.
Select the if statement that explicitly detects the correct jersey number ranges.

1) Linebacker: 40 to 59 or 90 to 99
- ● `if ((jNum >= 40 && jNum <= 59) || (jNum >= 90 && jNum <= 99))`
- ● `if ((jNum > 40 && jNum <= 59) || (jNum > 90 && jNum <= 99))`
- ● `if (jNum >= 40 && jNum <= 99)`

2) Tight end: 40 to 49 or 80 to 89
- ● `if ((jNum >= 40 && jNum <= 49) && (jNum >= 80 && jNum <= 89))`
- ● `if ((jNum >= 40 || jNum <= 49) && (jNum >= 80 || jNum <= 89))`
- ● `if ((jNum >= 40 && jNum <= 49) || (jNum >= 80 && jNum <= 89))`

3) Defensive lineman: 50 to 79 or 90 to 99
- ● `if ((jNum > 50 && jNum < 79) || (jNum > 90 && jNum < 99))`
- ● `if ((jNum >= 49 && jNum <= 80) || (jNum >= 89 && jNum <= 100))`
- ● `if ((jNum > 49 && jNum < 80) || (jNum > 89 && jNum < 100))`

4) Quarterback: 1 to 19
- ● `if (jNum <= 19)`
- ● `if (jNum > 0 && jNum < 20)`
- ● `if (jNum > 0 || jNum < 20)`

Feedback?

CHALLENGE ACTIVITY 3.6.1: Enter the output of the branch expressions.

620890.5010016.qx3zqy7

Start

Type the program's output

```
#include <iostream>
using namespace std;

int main() {
   int x;

   x = 6;
   if ( (x < 8) && (x > 2) ) {
      cout << "a" << endl;
   }
   else {
      cout << "b" << endl;
   }

   return 0;
}
```

```
a
```

1 2 3 4 5

Check Next

Feedback?

CHALLENGE ACTIVITY 3.6.2: Ranges with gaps.

620890.5010016.qx3zqy7

Start

Integer onionsAvailable is read from input representing the number of onions. If the number of onions is fewer than or equal to 5, or more than 15, output "Unacceptable batch", followed by a newline.

Click here for example

```
#include <iostream>
using namespace std;

int main() {
   int onionsAvailable;

   cin >> onionsAvailable;

   /* Your code goes here */

   return 0;
}
```

1 2 3 4

Check Next level

Feedback?

How was this section? Provide section feedback

Activity summary for assignment: CSC108 CH03.1-3.10 C3A

48 / 48 points

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48 / 48 points submitted to BlackboardLearn

Completion details

↓3.7 Detecting multiple features with branches