

This lab is an extension of Lab 15.1. If you have not completed Lab15.1, you should do it now.

## Due Date:

You must demonstrate the solution to this lab exercise to the instructor by **Monday, November 18**, in order to receive full credit for this work.

## Summary of Lab 15.1

In Lab 15.1, you were given code for the **Employee** class (**Employee.h** and **Employee.cpp**), and you wrote a class named **ProductionWorker** that is derived from the **Employee** class. That is, the **ProductionWorker** class is a subclass of the **Employee** class.

## Programming Assignment: Enhancements to Use Exceptions for Error Reporting

Starting with your solution to Lab 15.1, modify the **Employee** and **ProductionWorker** classes to define exception classes and use them in the program to report errors in the user input.

### Employee Class

Modify the **Employee** class:

- Add an exception class: **InvalidHireDate**
- Add code to the **Employee** class to check if hire date **string** object fits the **MM/DD/YYYY** numeric format. One easy way to accomplish this is to use the “square brackets” operator ( **[ ]** ) to access individual characters in the hire date string:
  1. The hire date string should have a length of **10**.
  2. The characters at index **2** and index **5** should be a forward-slash character ( **/** ).
  3. The characters at index **0, 1, 3, 4, 6, 7, 8, and 9** should be in the range of **0 . . 9**. (Refer to the **isdigit()** function in the **cctype** function library . You may need to add a

**#include <cctype>**

statement to your program. (Refer to Chapter 10 of the textbook, or the **cplusplus.com** web-site.)

### ProductionWorker Class

Modify the **ProductionWorker** class:

- Add two exception classes: **InvalidShift**, and **InvalidPayRate**.
- Add two new test functions:

**testShift(int shift) and**  
**testPayRate(double rate)**

These functions should test the validity of the parameter, and throw the appropriate exception if the parameter is incorrect.

- Add a static function for creating a new **ProductionWorker** object:

```
static ProductionWorker *createNewProductionWorker() ;
```

This function should prompt the user for input of the employee name, hire date, shift, and hourly pay rate, and then dynamically create a **ProductionWorker** object from inside a **try** block.

After the **try** block there should be **catch** blocks to handle the three types of exceptions:

**InvalidHireDate**, **InvalidShift**, and **InvalidPayRate**.

- Add a function to print out the details of a **ProductionWorker** object:

```
void printWorkerData() const;
```

## Main Program

Modify the “**c**” command to call the **createNewProductionWorker()** function, and save the address returned in a local variable.

Modify the “**p**” command to call the **printWorkerData** function.

Test the program with some valid input values and some invalid values.

## Sample Output

In the sample session shown below, the **bold** text is what the user entered. In actuality, all text (both input and output) will be displayed in the same font.

Sample Input / Output Session	
Enter command (or 'h' for help): <b>h</b>	
Supported commands:	
c	create a new ProductionWorker object.
h	print help text.
p	print ProductionWorker information.
q	quit (end the program).
Enter command (or 'h' for help): <b>c</b>	
Enter name of new employee: <b>George Washington</b>	
Enter hire date of new employee: <b>04/30/1789</b>	
Enter shift for new employee (1=day, 2=night): <b>1</b>	
Enter hourly pay rate for new employee: <b>35.43</b>	
Enter command (or 'h' for help): <b>p</b>	
Name: George Washington	
Employee number: 1	

**Sample Input / Output Session**

```
Hire date: 04/30/1789
Shift: Day
Shift number: 1
Pay rate: 35.43
Enter command (or 'h' for help): c
Enter name of new employee: John Adams
Enter hire date of new employee: 3/4/1797
Enter shift for new employee (1=day, 2=night): 1
Enter hourly pay rate for new employee: 50.33
Error: Invalid hire date [3/4/1797]: Hire date must be MM/DD/YYYY format.
Enter name of new employee: Thomas Jefferson
Enter hire date of new employee: 03/04/1801
Enter shift for new employee (1=day, 2=night): 1
Enter hourly pay rate for new employee: 64.53
Enter command (or 'h' for help): p
Name: Thomas Jefferson
Employee number: 3
Hire date: 03/04/1801
Shift: Day
Shift number: 1
Pay rate: 64.53
Enter command (or 'h' for help): c
Enter name of new employee: James Madison
Enter hire date of new employee: 03/04/1809
Enter shift for new employee (1=day, 2=night): 2
Enter hourly pay rate for new employee: -88.44
Error: Invalid pay rate: -88.44
Enter name of new employee: James Madison
Enter hire date of new employee: 03/04/1809
Enter shift for new employee (1=day, 2=night): 2
Enter hourly pay rate for new employee: 88.44
Enter command (or 'h' for help): p
Name: James Madison
Employee number: 5
Hire date: 03/04/1809
Shift: Night
Shift number: 2
Pay rate: 88.44
Enter command (or 'h' for help): c
Enter name of new employee: James Monroe
Enter hire date of new employee: 03/04/1817
Enter shift for new employee (1=day, 2=night): 3
Enter hourly pay rate for new employee: 3.44
```

**Sample Input / Output Session**

```
Error: Invalid shift number: 3
Enter name of new employee: James Monroe
Enter hire date of new employee: 03/04/1817
Enter shift for new employee (1=day, 2=night): 1
Enter hourly pay rate for new employee: 43.44
Enter command (or 'h' for help): p
Name: James Monroe
Employee number: 7
Hire date: 03/04/1817
Shift: Day
Shift number: 1
Pay rate: 43.44
Enter command (or 'h' for help): q
Press any key to continue . . .
```